

POWER TRANSISTOR ARRAYS & MOS FET ARRAYS

SK JAPAN 4516
SMA5106

SK JAPAN
SLA5011
4926

SK 4513
STA501A

SK 4514
SK 4522

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Ordering

Specify the number of standard minimum packaged units when placing an order.

Standard minimum packaged unit

Package Type Series	Cardboard Box	Stick	Reel
SLA	50	108	
SMA	120	108	
STA300	100		
STA400	80		
STA500		110	
SDK			1200

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Product index by Part Number

Part Number	Classification	Number of chips	VCE0 • VDSS (V)	Ic • Id (A)	hFE (min)	RDS (ON) max (Ω)	Package	Page
SDA01	Source driver	4	-60	-1.5	2000		SMD 16-pin	191
SDA05	3-phase motor driver	3	-60	-4	2000		SMD 16-pin	192
SDC01	Sink driver	4	50	2	1000		SMD 16-pin	193
SDC03	Sink driver	4	60±10	1.5	2000		SMD 16-pin	194
SDC04	Sink driver	4	100±15	1.5	2000		SMD 16-pin	195
SDC06	Sink driver	4	30 to 45	2	400		SMD 16-pin	196
SDC07	3-phase motor driver	3	60	4	2000		SMD 16-pin	197
SDH02	Sink driver	4	100	1.5	2000		SMD 16-pin	198
SDH03	H-bridge driver	4	+100/-60	±1.5	2000		SMD 16-pin	200
SDK02	Sink driver	4	60	2		0.24	SMD 16-pin	202
SDK04	Sink driver	4	100	2		0.8	SMD 16-pin	203
SLA4010	Sink driver	4	60±10	4	2000		SIP 12-pin with fin	18
SLA4030	Sink driver	4	100	4	2000		SIP 12-pin with fin	19
SLA4031	Sink driver	4	120	4	2000		SIP 12-pin with fin	20
SLA4041	Sink driver	4	200	3	1000		SIP 12-pin with fin	21
SLA4060	Sink driver	4	120	5	2000		SIP 12-pin with fin	22
SLA4061	Sink driver	4	120	5	2000		SIP 12-pin with fin	23
SLA4070	Source driver	4	-100	-5	1000		SIP 12-pin with fin	24
SLA4071	Source driver	4	-100	-5	2000		SIP 12-pin with fin	25
SLA4310	H-bridge driver	4	±60	±4	80		SIP 12-pin with fin	26
SLA4340	H-bridge driver	4	±60	±4	2000		SIP 12-pin with fin	28
SLA4390	H-bridge driver	4	±100	±5	2000		SIP 12-pin with fin	30
SLA4391	H-bridge driver	4	±100	±5	1000		SIP 12-pin with fin	32
SLA5001	Sink driver	4	100	5		0.3	SIP 12-pin with fin	34
SLA5002	Sink driver	4	100	5		0.3	SIP 12-pin with fin	35
SLA5003	Sink driver	4	200	5		0.9	SIP 12-pin with fin	36
SLA5004	Source driver	4	-60	-5		0.3	SIP 12-pin with fin	37
SLA5005	Source driver	4	-100	-5		0.7	SIP 12-pin with fin	38
SLA5006	Source driver	4	-100	-5		0.7	SIP 12-pin with fin	39
SLA5007	H-bridge driver	4	±60	+5/-4		0.22/0.55	SIP 12-pin with fin	40
SLA5008	H-bridge driver	4	±100	+4/-3		0.6/1.3	SIP 12-pin with fin	42
SLA5009	3-phase motor driver	6	±60	+5/-4		0.22/0.55	SIP 12-pin with fin	44
SLA5010	3-phase motor driver	6	±100	+4/-3		0.6/1.3	SIP 12-pin with fin	46
SLA5011	Sink driver	5	60	5		0.22	SIP 12-pin with fin	48
SLA5012	Source driver	5	-60	-5		0.3	SIP 12-pin with fin	49
SLA5013	H-bridge driver	4	±100	±5		0.3/0.7	SIP 12-pin with fin	50
SLA5015	Source driver	5	-60	-4		0.55	SIP 12-pin with fin	52
SLA5017	3-phase motor driver	6	±60	+5/-4		0.22/0.55	SIP 12-pin with fin	54
SLA5018	H-bridge driver	4	±60	+5/-4		0.22/0.55	SIP 12-pin with fin	56
SLA5021	Sink driver	5	100	5		0.19	SIP 12-pin with fin	58
SLA5022	3-phase motor driver	6	±60	±6	2000	0.22	SIP 12-pin with fin	60
SLA5023	3-phase motor driver	6	±100	±6	2000	0.55	SIP 12-pin with fin	62
SLA5024	Source driver	4	-60	-4		0.55	SIP 12-pin with fin	64
SLA5029	Sink driver	5	60	4		0.45	SIP 12-pin with fin	65
SLA5031	Sink driver	4	60	5		0.3	SIP 12-pin with fin	66
SLA5037	Sink driver	4	100	10		0.08	SIP 12-pin with fin	67
SLA5040	Sink driver	4	100	4		0.6	SIP 12-pin with fin	68
SLA5041	Sink driver	4	200	10		0.175	SIP 12-pin with fin	69
SLA5042	Sink driver	5	100	5		0.185	SIP 12-pin with fin	70
SLA5044	Sink driver	4	250	10		0.25	SIP 12-pin with fin	71
SLA5046	Sink driver	5	200	7		0.35	SIP 12-pin with fin	72
SLA5047	Sink driver	4	150	10		0.085	SIP 12-pin with fin	73
SLA5049	Sink driver	5	250	7		0.5	SIP 12-pin with fin	74
SLA5052	Sink driver	4	150	10		0.115	SIP 12-pin with fin	75
SLA5054	Sink driver	6	150	±7/±5/±7		0.105/0.44/0.2	SIP 15-pin with fin	76
SLA5055	Sink driver	5	150	±5/±7		0.44/0.2	SIP 12-pin with fin	78
SLA5057	Sink driver	6	200	±7/±7		0.175/0.35	SIP 15-pin with fin	80
SLA5058	Sink driver	5	150	±7		0.2	SIP 12-pin with fin	81
SLA5059	3-phase motor driver	6	60	±4		0.55	SIP 12-pin with fin	82
SLA5060	3-phase motor driver	6	60	±6		0.22	SIP 12-pin with fin	84
SLA5061	3-phase motor driver	6	60	±10		0.14	SIP 12-pin with fin	86
SLA5064	3-phase motor driver	6	60	±10		0.14	SIP 12-pin with fin	88
SLA5065	5-phase motor driver	4	60	7		0.1	SIP 15-pin with fin	90
SLA5068	5-phase motor driver	6	60	7		0.1	SIP 15-pin with fin	91
SLA5070	Sink driver	6	150	±7/±7		0.105/0.2	SIP 15-pin with fin	92
SLA5072	3-phase motor driver	6	250	7		0.5	SIP 15-pin with fin	94
SLA5073	5-phase motor driver	6	60	5		0.3	SIP 15-pin with fin	95
SLA5074	5-phase motor driver	4	60	5		0.3	SIP 15-pin with fin	96
SLA5075	3-phase motor driver	6	500	±5		1.4	SIP 15-pin with fin	97
SLA5077	Sink driver	4	150	±10		0.2	SIP 12-pin with fin	98
SLA5079	3-phase motor driver	3	-60	-10		0.14	SIP 12-pin with fin	99

Part Number	Classification	Number of chips	VCE0 • VDSS (V)	Ic • Id (A)	hFE (min)	RDS (ON) max (Ω)	Package	Page
SLA5080	3-phase motor driver	3	60	10		0.14	SIP 12-pin with fin	100
SLA5081	Sink driver	5	150	±7/±7		0.105/0.2	SIP 15-pin with fin	102
SLA5085	Sink driver	5	60	5		0.22	SIP 12-pin with fin	104
SLA5086	Source driver	5	-60	-5		0.22	SIP 12-pin with fin	105
SLA5088	Sink driver	5	150	±5/±7		0.44/0.2	SIP 15-pin with fin	106
SLA6012	3-phase motor driver	6	±60	±4	2000		SIP 12-pin with fin	108
SLA6020	3-phase motor driver	6	±100	±5	2000		SIP 12-pin with fin	110
SLA6022	3-phase motor driver	6	±80	±5	2000		SIP 12-pin with fin	112
SLA6023	3-phase motor driver	6	±60	±6	2000		SIP 12-pin with fin	114
SLA6024	3-phase motor driver	6	±60	±8	2000		SIP 12-pin with fin	116
SLA6026	3-phase motor driver	6	±60	±10	2000		SIP 12-pin with fin	118
SLA8001	H-bridge	4	±60	±12	50		SIP 12-pin with fin	120
SMA4020	Source driver	4	-60	-4	2000		SIP 12-pin	122
SMA4021	Source driver	4	-60	-3	2000		SIP 12-pin	123
SMA4030	Sink driver	4	100	3	2000		SIP 12-pin	124
SMA4032	Sink driver	4	100	3	2000		SIP 12-pin	125
SMA4033	Sink driver	4	100	2	2000		SIP 12-pin	126
SMA5101	Sink driver	4	100	4		0.6	SIP 12-pin	127
SMA5102	Sink driver	4	100	4		0.6	SIP 12-pin	128
SMA5103	H-bridge driver	4	±60	+5/-4		0.22/0.55	SIP 12-pin	130
SMA5104	3-phase motor driver	6	±60	+5/-4		0.22/0.55	SIP 12-pin	132
SMA5105	Sink driver	4	100	5		0.3	SIP 12-pin	134
SMA5106	Sink driver	4	100	4		0.55	SIP 12-pin	135
SMA5112	3-phase motor driver	6	250	7		0.5	SIP 12-pin	136
SMA5114	Sink driver	4	60	3		0.25	SIP 12-pin	137
SMA5117	3-phase motor driver	6	250	7		0.25	SIP 12-pin	138
SMA5118	3-phase motor driver	6	500	±5		1.4	SIP 12-pin	139
SMA5125	3-phase motor driver	6	±60	±10		0.14	SIP 12-pin	140
SMA5127	3-phase motor driver	6	±60	±4		0.55	SIP 12-pin	142
SMA6010	3-phase motor driver	6	±60	±4	2000		SIP 12-pin	144
SMA6014	3-phase motor driver	6	±60	±2	1500/2000		SIP 12-pin	146
SMA6511	Stepper motor driver with Dual Supply Voltage Switch	5	100±15/-60	1.5/-3	2000		SIP 12-pin	148
SMA6512	Stepper motor driver with Dual Supply Voltage Switch	5	60±10/-60	1.5/-3	2000		SIP 12-pin	150
STA301A	Sink driver	3	60±10	4	1000		SIP 8-pin	152
STA302A	Source driver	3	-50	-4	1000		SIP 8-pin	153
STA302A	3-phase motor driver	3	-50	-4	1000		SIP 8-pin	153
STA303A	Sink driver	3	100	4	1000		SIP 8-pin	154
STA303A	3-phase motor driver	3	100	4	1000		SIP 8-pin	154
STA304A	3-phase motor driver	3	550	1	200		SIP 8-pin	155
STA305A	3-phase motor driver	3	-550	-1	200		SIP 8-pin	156
STA308A	Source driver	3	-120	-4	2000		SIP 8-pin	157
STA312A	Sink driver	3	60	3	300		SIP 8-pin	158
STA322A	Source driver	3	-50	-3	100		SIP 8-pin	159
STA371A	Sink driver	3	60±10	2	2000		SIP 8-pin	160
STA401A	Sink driver	4	60±10	4	1000		SIP 10-pin	161
STA402A	Source driver	4	-50	-4	1000		SIP 10-pin	162
STA403A	Sink driver	4	100	4	1000		SIP 10-pin	163
STA404A	Sink driver	4	200	3	1000		SIP 10-pin	164
STA406A	Sink driver	4	60±10	6	2000		SIP 10-pin	165
STA408A	Source driver	4	-120	-4	2000		SIP 10-pin	166
STA412A	Sink driver	4	60	3	300		SIP 10-pin	167
STA413A	Sink driver	4	35±5	3	500		SIP 10-pin	168
STA421A	Source driver	4	-60	-3	40		SIP 10-pin	169
STA431A	H-bridge driver	4	±60	±3	40		SIP 10-pin	170
STA434A	H-bridge driver	4	±60	±4	1000		SIP 10-pin	172
STA435A	Sink driver	4	65±15	4	1000		SIP 10-pin	174
STA457C	H-bridge driver	4	±60	±4	2000		SIP 10-pin	176
STA458C	H-bridge driver	4	±30	±5	40		SIP 10-pin	178
STA460C	Sink driver	2	60±10	6	700		SIP 10-pin	180
STA471A	Sink driver	4	60±10	2	2000		SIP 10-pin	181
STA472A	Source driver	4	-60	-2	2000		SIP 10-pin	182
STA473A	Sink driver	4	100	2	2000		SIP 10-pin	183
STA475A	Sink driver	4	100±15	2	2000		SIP 10-pin	184
STA481A	Sink driver	4	60±10	1	2000		SIP 10-pin	185
STA485A	Sink driver	4	100±15	1	2000		SIP 10-pin	186
STA501A	Sink driver	4	60	5		0.2	SIP 10-pin	187
STA504A	Sink driver	4	60	4		0.45	SIP 10-pin	188
STA505A	Sink driver	4	100	3		0.6	SIP 10-pin	189
STA506A	Sink driver	4	100	2		0.8	SIP 10-pin	190

Product index by function Sink driver

●With built-in avalanche diode between collector and base

Part Number	Number of chips	V _{CEO} (V)	I _c (A)	h _{FE} (min)	R _{DS (ON)} max (Ω)	Equivalent circuit	Package	Page
STA460C	2	60±10	6	700		1	SIP 10-pin	180
STA371A	3	60±10	2	2000		2	SIP 8-pin	160
STA301A	3	60±10	4	1000		2	SIP 8-pin	152
SDC06	4	30 to 45	2	400		3	SMD 16-pin	196
STA413A	4	35±5	3	500		4	SIP 10-pin	168
STA481A	4	60±10	1	2000		5	SIP 10-pin	185
SDC03	4	60±10	1.5	2000		6	SMD 16-pin	194
STA471A	4	60±10	2	2000		5	SIP 10-pin	181
STA401A	4	60±10	4	1000		5	SIP 10-pin	161
SLA4010	4	60±10	4	2000		6	SIP 12-pin with fin	18
STA406A	4	60±10	6	2000		5	SIP 10-pin	165
STA435A	4	65±15	4	1000		7	SIP 10-pin	174
STA485A	4	100±15	1	2000		5	SIP 10-pin	186
SDC04	4	100±15	1.5	2000		6	SMD 16-pin	195
STA475A	4	100±15	2	2000		5	SIP 10-pin	184

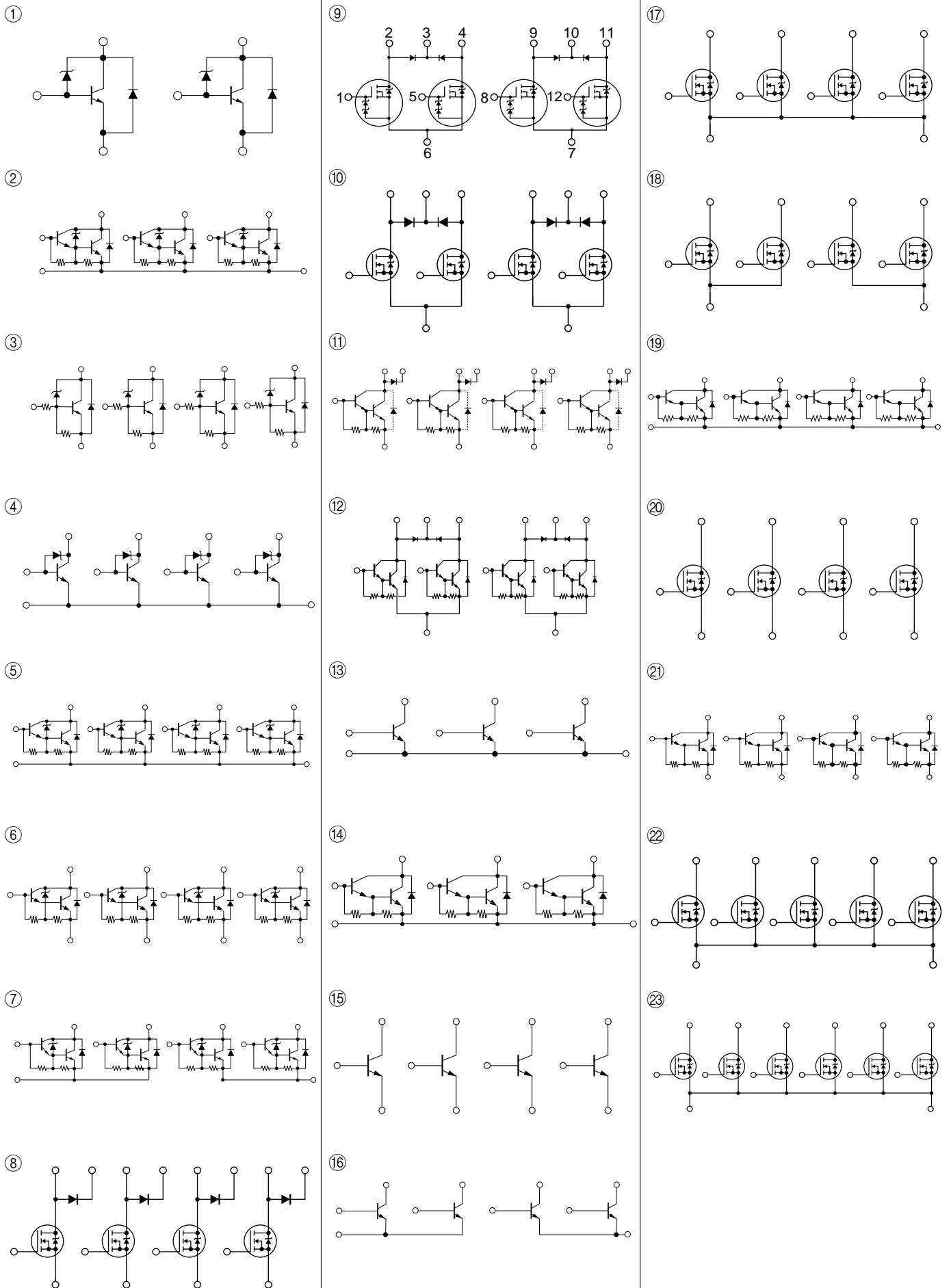
●With built-in flywheel diode

Part Number	Number of chips	V _{CEO} • V _{DSS} (V)	I _c • I _D (A)	h _{FE} (min)	R _{DS (ON)} max (Ω)	Equivalent circuit	Package	Page
SDK02	4	60	2		0.24	8	SMD 16-pin	202
SMA5114	4	60	3		0.25	9	SIP 12-pin	137
SLA5031	4	60	5		0.3	10	SIP 12-pin with fin	66
SDH02	4	100	1.5	2000		11	SMD 16-pin	198
SMA4033	4	100	2	2000		12	SIP 12-pin	126
SMA4032	4	100	3	2000		12	SIP 12-pin	125
SLA5040	4	100	4		0.6	10	SIP 12-pin with fin	68
SMA5102	4	100	4		0.6	10	SIP 12-pin	128
SMA5106	4	100	4		0.55	10	SIP 12-pin	135
SLA5002	4	100	5		0.3	10	SIP 12-pin with fin	35
SMA5105	4	100	5		0.3	10	SIP 12-pin	134
SLA4031	4	120	4	2000		12	SIP 12-pin with fin	20
SLA4061	4	120	5	2000		12	SIP 12-pin with fin	23
SLA4041	4	200	3	1000		12	SIP 12-pin with fin	21
SLA5003	4	200	5		0.9	10	SIP 12-pin with fin	36

●General purpose

Part Number	Number of chips	V _{CEO} • V _{DSS} (V)	I _c • I _D (A)	h _{FE} (min)	R _{DS (ON)} max (Ω)	Equivalent circuit	Package	Page
STA312A	3	60	3	300		13	SIP 8-pin	158
STA303A	3	100	4	100		14	SIP 8-pin	154
SDC01	4	50	2	1000		15	SMD 16-pin	193
STA412A	4	60	3	300		16	SIP 10-pin	167
STA504A	4	60	4		0.45	17	SIP 10-pin	188
STA501A	4	60	5		0.2	18	SIP 10-pin	187
STA473A	4	100	2	2000		19	SIP 10-pin	183
STA506A	4	100	2		0.8	18	SIP 10-pin	190
SDK04	4	100	2		0.8	20	SMD 16-pin	203
SMA4030	4	100	3	2000		21	SIP 12-pin	124
STA505A	4	100	3		0.6	18	SIP 10-pin	189
STA403A	4	100	4	1000		19	SIP 10-pin	163
SLA4030	4	100	4	2000		21	SIP 12-pin with fin	19
SMA5101	4	100	4		0.6	20	SIP 12-pin	127
SLA5001	4	100	5		0.3	20	SIP 12-pin with fin	34
SLA5037	4	100	10		0.08	20	SIP 12-pin with fin	67
SLA4060	4	120	5	2000		21	SIP 12-pin with fin	22
SLA5047	4	150	10		0.085	20	SIP 12-pin with fin	73
SLA5052	4	150	10		0.115	20	SIP 12-pin with fin	75
STA404A	4	200	3	1000		19	SIP 10-pin	164
SLA5041	4	200	10		0.175	20	SIP 12-pin with fin	69
SLA5044	4	250	10		0.25	20	SIP 12-pin with fin	71
SLA5029	5	60	4		0.45	22	SIP 12-pin with fin	65
SLA5011	5	60	5		0.22	22	SIP 12-pin with fin	48
SLA5085	5	60	5		0.22	22	SIP 12-pin with fin	104
SLA5021	5	100	5		0.19	22	SIP 12-pin with fin	58
SLA5042	5	100	5		0.185	22	SIP 12-pin with fin	70
SLA5055	5	150	±5/±7		0.44/0.2	22	SIP 12-pin with fin	78
SLA5088	5	150	±5/±7		0.44/0.2	22	SIP 15-pin with fin	106
SLA5058	5	150	±7		0.2	22	SIP 12-pin with fin	81
SLA5081	5	150	±7/±7		0.105/0.2	22	SIP 15-pin with fin	102
SLA5046	5	200	7		0.35	22	SIP 12-pin with fin	72
SLA5049	5	250	7		0.5	22	SIP 12-pin with fin	74
SLA5054	6	150	±7/±5/±7		0.105/0.44/0.2	23	SIP 15-pin with fin	76
SLA5070	6	150	±7/±7		0.105/0.2	23	SIP 15-pin with fin	92
SLA5057	6	200	±7/±7		0.175/0.35	23	SIP 15-pin with fin	80

●Equivalent circuit (Sink driver)



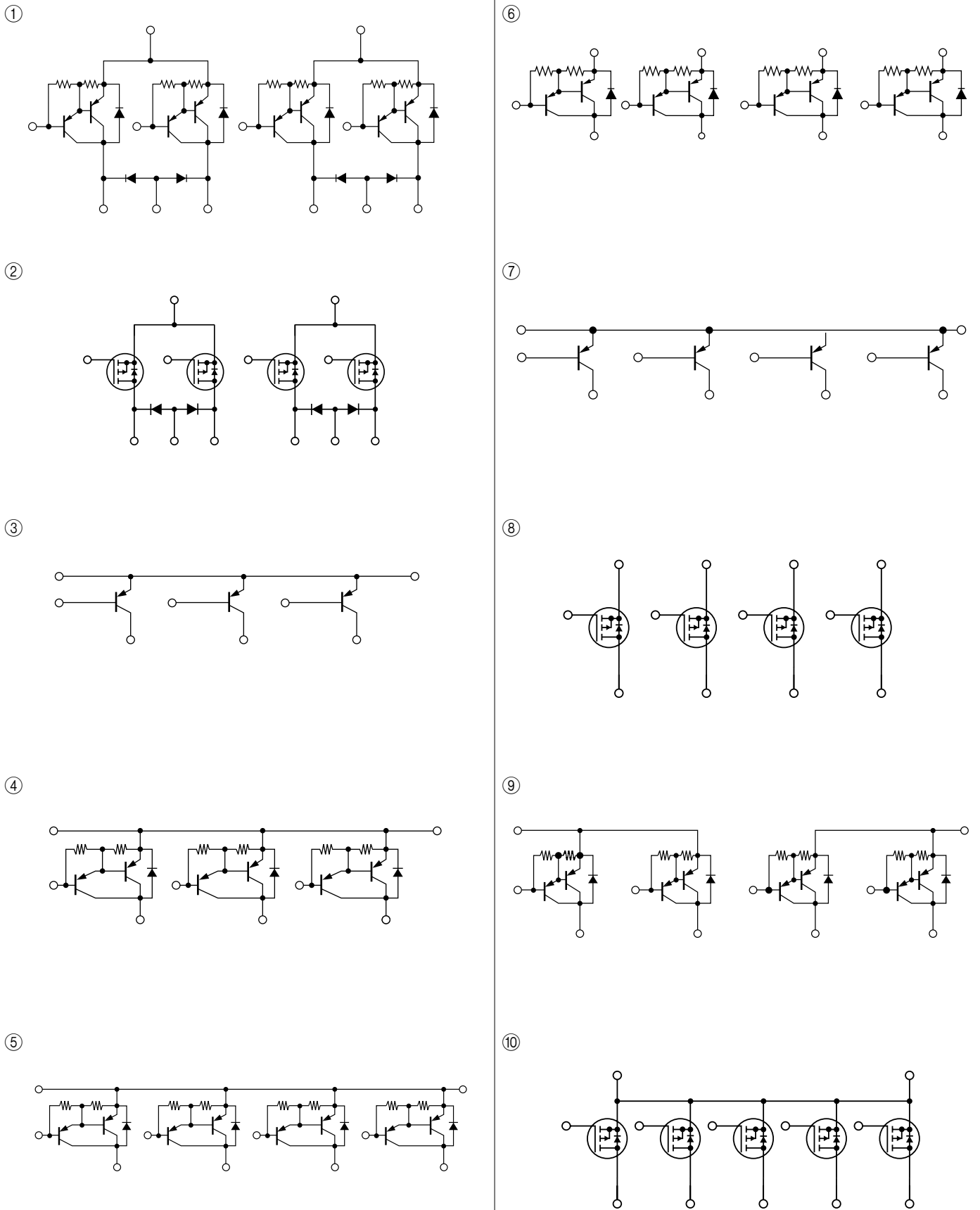
●With built-in flywheel diode

Part Number	Number of chips	V _{CEO} • V _{DSS} (V)	I _c • I _D (A)	h _{FE} (min)	R _{DS (ON)} max (Ω)	Equivalent circuit	Package	Page
SMA4021	4	-60	-3	2000		1	SIP 12-pin	123
SLA4071	4	-100	-5	2000		1	SIP 12-pin with fin	25
SLA5006	4	-100	-5		0.7	2	SIP 12-pin with fin	39

●General purpose

Part Number	Number of chips	V _{CEO} • V _{DSS} (V)	I _c • I _D (A)	h _{FE} (min)	R _{DS (ON)} max (Ω)	Equivalent circuit	Package	Page
STA322A	3	-50	-3	100		3	SIP 8-pin	159
STA302A	3	-50	-4	1000		4	SIP 8-pin	153
STA308A	3	-120	-4	2000		4	SIP 8-pin	157
STA402A	4	-50	-4	1000		5	SIP 10-pin	162
SDA01	4	-60	-1.5	2000		6	SMD 16-pin	191
STA472A	4	-60	-2	2000		5	SIP 10-pin	182
STA421A	4	-60	-3	40		7	SIP 10-pin	169
SMA4020	4	-60	-4	2000		6	SIP 12-pin	122
SLA5024	4	-60	-4		0.55	8	SIP 12-pin with fin	64
SLA5004	4	-60	-5		0.3	8	SIP 12-pin with fin	37
SLA4070	4	-100	-5	1000		6	SIP 12-pin with fin	24
SLA5005	4	-100	-5		0.7	8	SIP 12-pin with fin	38
STA408A	4	-120	-4	2000		9	SIP 10-Pin	166
SLA5015	5	-60	-4		0.55	10	SIP 12-pin with fin	52
SLA5012	5	-60	-5		0.3	10	SIP 12-pin with fin	49
SLA5086	5	-60	-5		0.22	10	SIP 12-pin with fin	105

●Equivalent circuit (Source driver)



Product index by function **Motor driver**

●H-bridge driver

Part Number	Number of chips	V _{CE0} • V _{DSS} (V)	I _C • I _D (A)	h _{FE} (min)	R _{DS (ON)} max (Ω)	Equivalent circuit	Package	Page
STA458C	4	±30	±5	40		1	SIP 10-pin	178
STA431A	4	±60	±3	40		2	SIP 10-pin	170
STA434A	4	±60	±4	1000		3	SIP 10Pin	172
STA457C	4	±60	±4	2000		4	SIP 10-pin	176
SLA4310	4	±60	±4	80		5	SIP 12-pin with fin	26
SLA4340	4	±60	±4	2000		3	SIP 12-pin with fin	28
SLA5007	4	±60	+5/-4		0.22/0.55	6	SIP 12-pin with fin	40
SLA5018	4	±60	+5/-4		0.22/0.55	6	SIP 12-pin with fin	56
SMA5103	4	±60	+5/-4		0.22/0.55	6	SIP 12-pin	130
SLA8001	4	±60	±12	50		1	SIP 12-pin with fin	120
SDH03	4	±100/-60	±1.5	2000		7	SMD 16-pin	200
SLA5008	4	±100	+4/-3		0.6/1.3	6	SIP 12-pin with fin	42
SLA4390	4	±100	±5	2000		3	SIP 12-pin with fin	30
SLA4391	4	±100	±5	1000		8	SIP 12-pin with fin	32
SLA5013	4	±100	±5		0.3/0.7	6	SIP 12-pin with fin	50

●3-phase motor driver

Part Number	Number of chips	V _{CE0} • V _{DSS} (V)	I _C • I _D (A)	h _{FE} (min)	R _{DS (ON)} max (Ω)	Equivalent circuit	Package	Page
SDC07	3	60	4	2000		9	SMD 16-pin	197
SLA5080	3	60	10		0.14	10	SIP 12-pin with fin	100
STA303A	3	100	4	1000		11	SIP 8-pin	154
STA304A	3	550	1	200		12	SIP 8-pin	155
STA302A	3	-50	-4	1000		13	SIP 8-pin	153
SDA05	3	-60	-4	2000		14	SMD 16-pin	192
SLA5079	3	-60	-10		0.14	15	SIP 12-pin with fin	99
STA305A	3	-550	-1	200		16	SIP 8-pin	156
SLA5059	6	60	±4		0.55	17	SIP 12-pin with fin	82
SLA5060	6	60	±6		0.22	17	SIP 12-pin with fin	84
SLA5061	6	60	±10		0.14	17	SIP 12-pin with fin	86
SLA5064	6	60	±10		0.14	18	SIP 12-pin with fin	88
SMA6014	6	±60	±2	1500/2000		19	SIP 12-pin	146
SMA6010	6	±60	±4	2000		20	SIP 12-pin	144
SLA6012	6	±60	±4	2000		19	SIP 12-pin with fin	108
SMA5127	6	±60	±4		0.55	21	SIP 12-pin	142
SLA5009	6	±60	+5/-4		0.22/0.55	21	SIP 12-pin with fin	44
SLA5017	6	±60	+5/-4		0.22/0.55	21	SIP 12-pin with fin	54
SMA5104	6	±60	+5/-4		0.22/0.55	21	SIP 12-pin	132
SLA5022	6	±60	±6	2000	0.22	22	SIP 12-pin with fin	60
SLA6023	6	±60	±6	2000		19	SIP 12-pin with fin	114
SLA6024	6	±60	±8	2000		19	SIP 12-pin with fin	116
SLA6026	6	±60	±10	2000		19	SIP 12-pin with fin	118
SMA5125	6	±60	±10		0.14	18	SIP 12-pin	140
SLA6022	6	±80	±5	2000		19	SIP 12-pin with fin	112
SLA5010	6	±100	+4/-3		0.6/1.3	21	SIP 12-pin with fin	46
SLA6020	6	±100	±5	2000		20	SIP 12-pin with fin	110
SLA5023	6	±100	±6	2000	0.55	22	SIP 12-pin with fin	62
SLA5072	6	250	7		0.5	23	SIP 15-pin with fin	94
SMA5112	6	250	7		0.5	24	SIP 12-pin	136
SMA5117	6	250	7		0.25	24	SIP 12-pin	138
SLA5075	6	500	±5		1.4	23	SIP 15-pin with fin	97
SMA5118	6	500	±5		1.4	24	SIP 12-pin	139

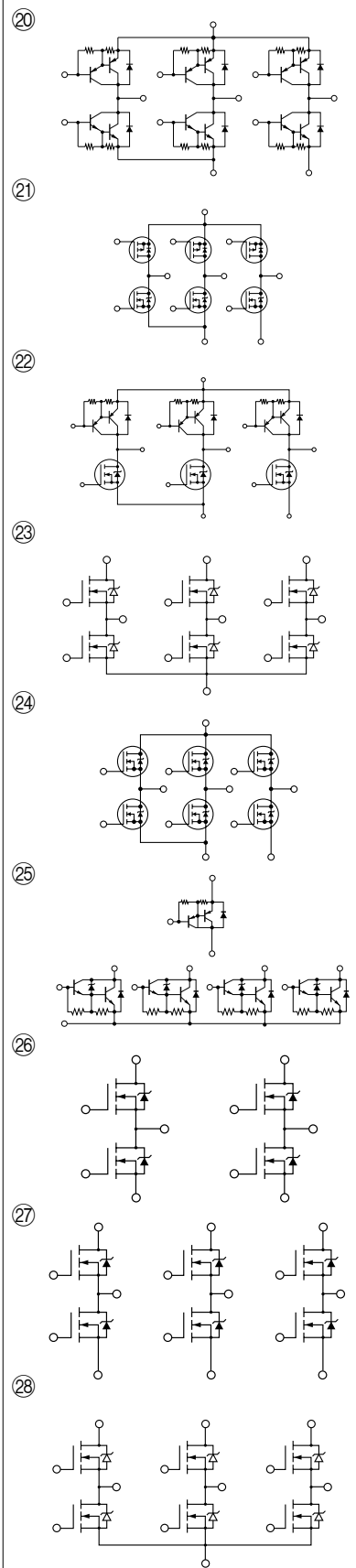
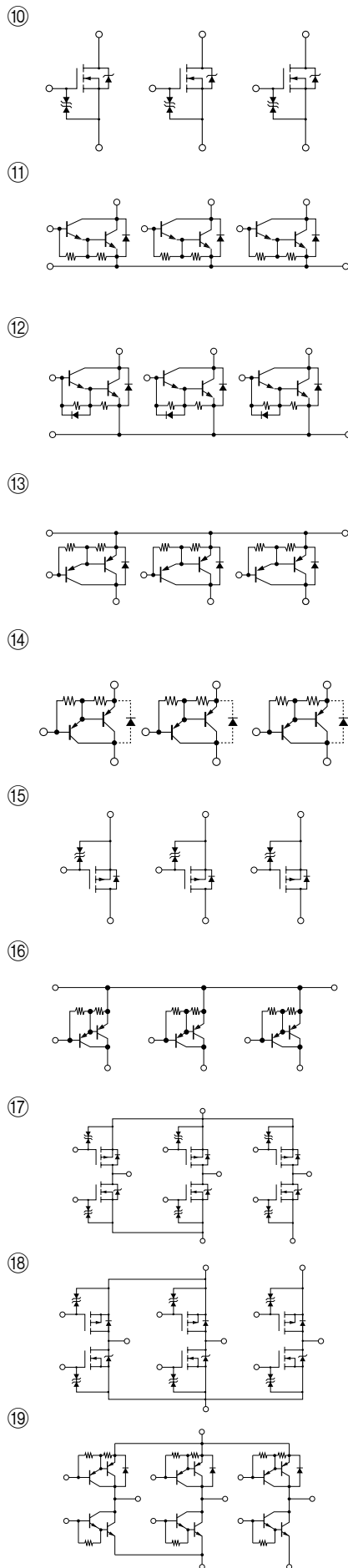
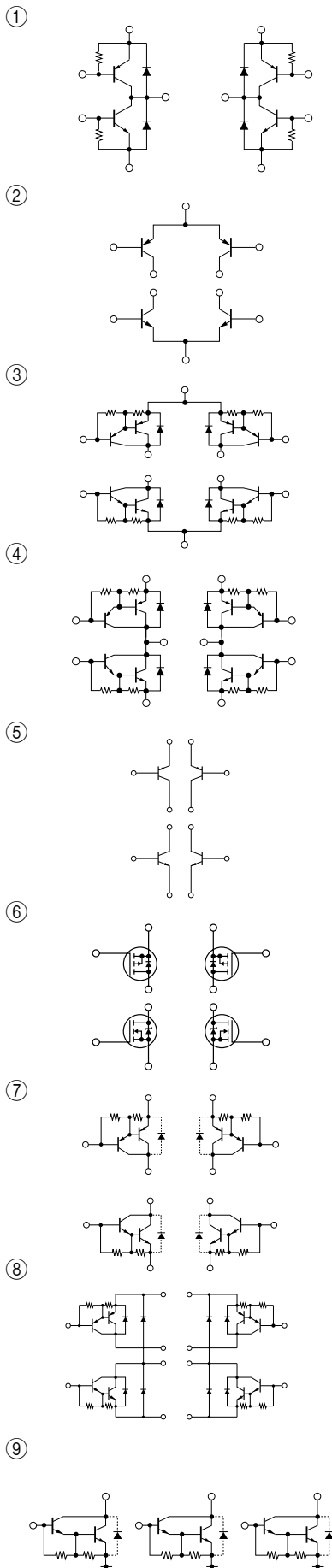
●Stepper motor driver with dual supply voltage switch

Part Number	Number of chips	V _{CE0} • V _{DSS} (V)	I _C • I _D (A)	h _{FE} (min)	R _{DS (ON)} max (Ω)	Equivalent circuit	Package	Page
SMA6511	5	100±15/-60	1.5/-3	2000		25	SIP 12-pin	148
SMA6512	5	60±10/-60	1.5/-3	2000		25	SIP 12-pin	150

●5-phase motor driver

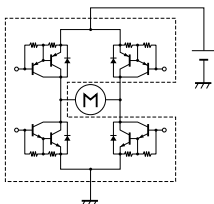
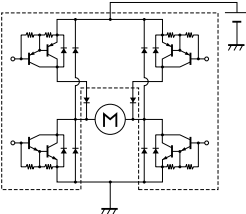
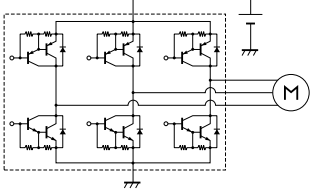
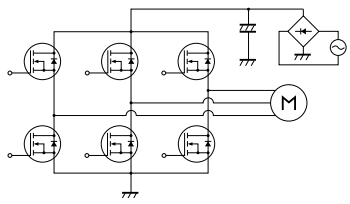
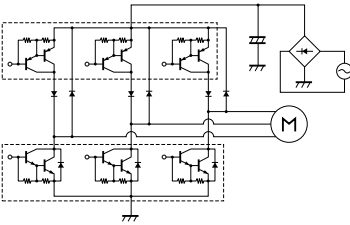
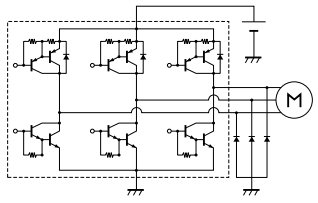
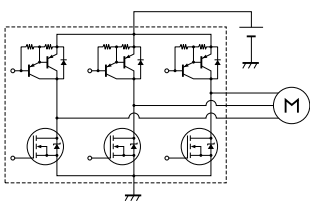
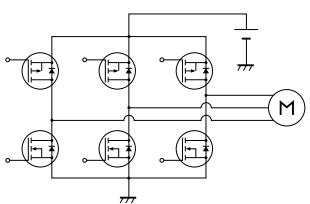
Part Number	Number of chips	V _{CE0} • V _{DSS} (V)	I _C • I _D (A)	h _{FE} (min)	R _{DS (ON)} max (Ω)	Equivalent circuit	Package	Page
SLA5074	4	60	5		0.3	26	SIP 15-pin with fin	96
SLA5065	4	60	7		0.1	26	SIP 15-pin with fin	90
SLA5073	6	60	5		0.3	27	SIP 15-pin with fin	95
SLA5068	6	60	7		0.1	28	SIP 15-pin with fin	91

●Equivalent circuit (Motor driver)

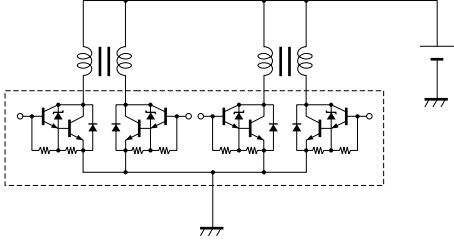
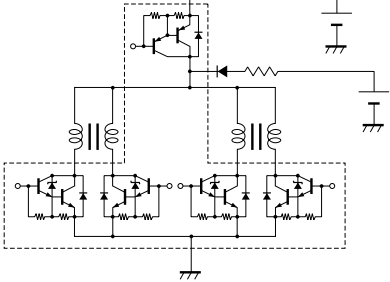
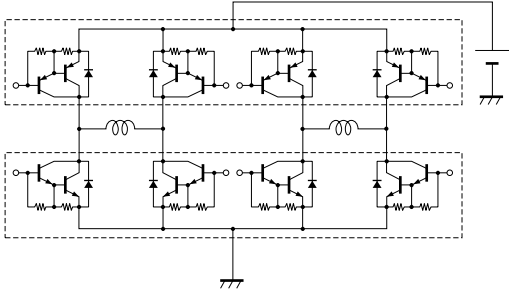


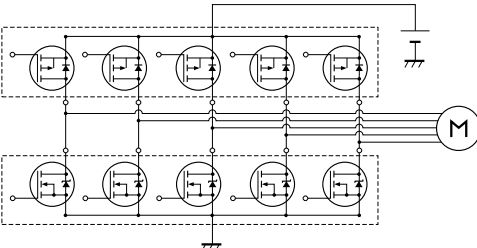
Product index by applications

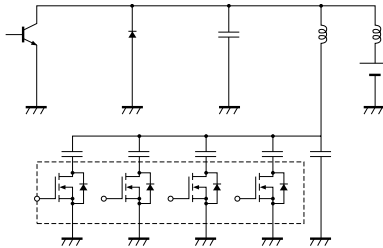
Application	Typical circuit example	Product type		
		Transistor		MOSFET
		Darlington	Single	
<ul style="list-style-type: none"> ● Solenoid ● Relay 		STA301A STA371A STA401A STA406A STA435A STA471A STA475A STA481A STA485A STA4010 SDC04 SDC03	STA460C STA413A SDC06	
		SLA4031 SLA4041 SLA4060 SMA4032 SMA4033 SDH02		SLA5002 SLA5003 SLA5031 SLA5040 SMA5102 SMA5105 SMA5106 SMA5114 SDK02
		SLA4071 SMA4021		SLA5006
		STA302A STA308A STA402A STA408A STA472A SLA4070 SMA4020 SDA01	STA322A STA421A	SLA5004 SLA5005 SLA5024

Application		Typical circuit example	Product type			
			Transistor		MOSFET	
			Darlington	Single		
●DC motor	Forward-reverse control		STA434A STA457C SLA4340 STA4390 SDH03	STA431A STA458C SLA4310 SLA8001		
	PWM control		SLA4391		SLA5007 SLA5008 SLA5013 SLA5018 SMA5103	
●3-phase DC brushless motor			STA302A+STA303A SMA6010 SLA6020 SDA05+SDC07			
	100V AC direct drive 200V AC direct drive				SLA5072 SLA5075 SMA5112 SMA5117 SMA5118	
	200V AC direct drive		STA304A+STA305A			
	PWM control			SLA6012 SLA6022 SLA6023 SLA6024 SLA6026 SMA6014		
				SLA5022 SLA5023		
					SLA5009 SLA5010 SLA5017 SLA5059 SLA5060 SLA5061 SLA5064 SLA5079+SLA5080 SMA5104 SMA5125 SMA5127	

Product index by applications

Application		Typical circuit example	Product type		
			Transistor		MOSFET
			Darlington	Single	
●Stepper motor	Constant voltage drive		STA401A STA406A STA435A STA471A STA475A STA481A STA485A SLA4010 SDC04 SDC03	STA460C STA413A SDC06	
	Dual supply voltage drive		SMA6511 SMA6512		
	Bipolar drive		STA473A STA472A STA408A STA404A STA403A STA402A SMA4030 SMA4020 SLA4070 SLA4060 SLA4030 SDA01	STA421A STA412A SDC01	STA506A STA505A STA504A STA501A SMA5101 SLA5024 SLA5005 SLA5004 SLA5001

Application	Typical circuit example	Product type	
		N-CH	P-CH
●5-phase motor		SLA5011 SLA5029 SLA5065+SLA5068 SLA5073+SLA5074 SLA5085	SLA5012 SLA5015 SLA5086

Application	Typical circuit example	Product type			
		100V	150V	200V	250V
●"S" shape correction switch		SLA5021 SLA5037 SLA5042	SLA5047 SLA5052 SLA5054 SLA5055 SLA5058 SLA5070 SLA5077 SLA5081 SLA5088	SLA5041 SLA5046 SLA5057	SLA5044 SLA5049

Storage, characteristic inspection, and handling precautions

Inappropriate storage, characteristic inspection, or handling may impair the reliability of the device. To ensure high reliability, observe the following precautions:

1. Storage precautions

- It is recommended to store the device at room temperature (between 5 and 35°C) and relative humidity of 40 to 75%. Avoid storing the device in a place where the temperature or humidity is high or changes greatly.
- Store the device in a clean place that is not exposed to direct sunlight, and is free from corrosive or harmful gases.
- If the device is stored for a long time, check the solderability and lead condition before using the device.

2. Precautions on characteristic inspections

When carrying out characteristic inspections on receiving products or other occasions, take care to avoid applying a surge voltage from the measuring equipment and check the terminals of the measuring equipment for a short circuit or wiring errors. Measure the device within the range of its rated values.

3. Silicone Grease

When attaching a heatsink, apply a small amount of silicone evenly to the back of the device and both sides of the insulator to reduce the thermal resistance between the device and heatsink.

Recommended silicone grease

- G746 SHINETSU SILICONE CO., LTD.
- YG6260 GE TOSHIBA SILICONE CO., LTD.
- SC102 DOW CORNING TORAY SILICONE CO., LTD.

Please select a silicone grease carefully since the oil in some grease can penetrate the product, which will result in an extremely short product life.

4. Screw tightening torque

If screws are not tightened with sufficient torque, this can increase the thermal resistance and reduce the radiation effect. Tightening screws with too great a torque damage the screw thread, deform the heatsink, or twist the device frame until it is damaged. Therefore, tighten screws with a torque between 0.588 and 0.784 N • m (6 to 8 kgf • cm).

5. Soldering temperature

If soldering is necessary, take care to keep the application of heat as brief as possible, and within the following limits:

- 260±5°C for 10 s max
- 350°C for 3 s max (soldering iron)

6. Heatsink

A large contact area between the device and the heatsink for effective heat radiation is required. To ensure a large contact area, minimize mounting holes and select a heatsink with a sufficiently smooth surface and that is free from burring or metal debris.

7. Handling precautions to protect power MOSFET arrays from static damage

- When handling the device, physical grounding is necessary. Wear a wrist strap with a 1 MΩ resistor close to the body in the wrist strap to prevent electric shock.
- Use a conductive tablemat or floor mat at the device handling workbench and to ensure grounding.
- When using a curve tracer or other measuring equipment, ground the equipment as well.
- When soldering, ground the bit of the soldering iron and the dip tank to prevent a leakage voltage from damaging the device.
- Store the device in the shipping container or a conductive container or use aluminum foil to protect the device from static electricity.

1. What is avalanche energy capability ?

When a MOSFET is used for high-speed switching, the inductive load and wiring inductance may cause a counter electromotive voltage at cutoff that the device cannot withstand.

Avalanche energy capability is the non-clamped ability to withstand damage expressed as energy. As long as the energy applied to the device at cutoff is within the guaranteed avalanche energy capability, the device will not be damaged even if the drain-source voltage exceeds the capability.

For example, a drain-source voltage that is within the guaranteed capability when electrically stationary may exceed the limit at startup or cutoff. Usually, a snubber circuit or similar surge absorbing circuit is used to keep the drain-source voltage within the guaranteed capability. Sanken MOSFETs, however, do not require this kind of protective circuit because the avalanche energy capability is guaranteed. Sanken MOSFETs enable the number of parts to be reduced, saving board area.

* Consult the engineering department of Sanken when planning to use MOSFETs in avalanche mode.

2. EAS calculation method

If the current in an inductive load L is I_{LP} at the moment when the MOSFET is cut off, E_{AS} can be expressed as follows:

$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{LP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}} \dots\dots\dots ①$$

* V_{DD} : Supply voltage

If the value of L is not known in an actual circuit, E_{AS} can also be calculated from the actual voltage and current waveforms as follows:

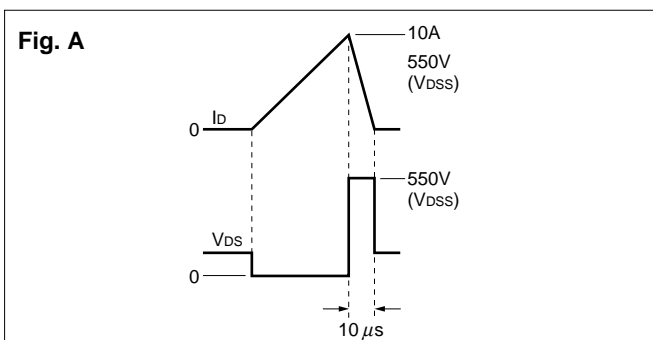
$$E_{AS} = P_s \cdot t \dots\dots\dots ②$$

* P_s : Surge power * t : Surge time

The following calculation is used to determine E_{AS} where the voltage and current shown in Fig. A are applied to the MOSFET in a circuit

Integrate the overlapping section of I_D and V_{DS} to calculate $\int I_D \cdot V_{DS} \cdot dt$. When the I_D waveform is triangular, E_{AS} will be as follows:

$$E_{AS} = \frac{1}{2} \cdot 10(A) \cdot 550(V) \cdot 10(\mu s) = 27.5(mJ)$$

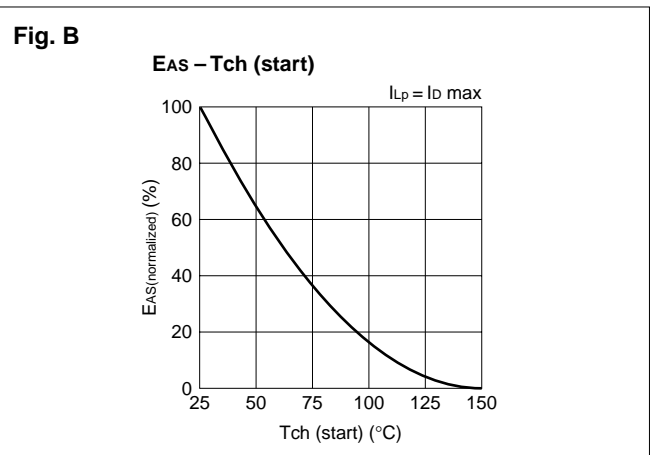


3. Temperature derating for EAS

The E_{AS} value in the specifications is guaranteed when the channel temperature T_{ch} is 25°C. Since the E_{AS} value drops as the channel temperature rises, derating depending on the temperature is necessary.

Fig. B shows the derating curve for single avalanche energy capability. This is the derating curve of E_{AS} and the channel temperature (T_{ch} (start)) immediately before the avalanche occurs in the product, with the E_{AS} value (maximum rating) at 25°C as 100%.

For example, if the product temperature is 50°C, the E_{AS} value is derated to 64% of the value at 25°C.



4. Continuous avalanche energy capability

This section explains the derating method for continuous avalanche.

Considering continuous avalanche as the repetition of a single avalanche, the safe operating area (SOA) is determined using the derating curve shown in Fig. B.

Calculate the energy and T_{ch} (start) of avalanche in the worst condition and determine SOA using the calculated data and the derating curve shown in Fig. B. The temperature rise due to avalanche should not cause the channel temperature to exceed the maximum rating.

The following is an example of determining SOA judgment by calculation when a MOSFET enters a transient avalanche state at power-on then changes to a stationary state

Supposing that the waveform is as shown in Fig. C until the MOSFET changes to the stationary state, calculate the start loss and switching (turn-on/off) loss. To simplify the calculation, the average loss P_a and the last two waveforms are used for approximation. (Fig. D)

First, calculate the channel temperature T_{ch} (τ) at time (τ) where the temperature condition is severest.

If the T_{ch} (τ) value is within the maximum rating, there is no problem as far as the temperature is concerned.

$$T_{ch}(t) = T_a + P_a \cdot r_{ch-c}(T_n + T + t_1 + t_2 + t_3) + (P_1 - P_a) \cdot r_{ch-c}(T + t_1 + t_2 + t_3) - (P_1 - P_2) \cdot r_{ch-c}(T + t_2 + t_3) + (P_3 - P_2) \cdot r_{ch-c}(T + t_3) - P_3 \cdot r_{ch-c}(T) + P_4 \cdot r_{ch-c}(t_4 + t_5 + t_6) - (P_4 - P_5) \cdot r_{ch-c}(t_5 + t_6) + (P_6 - P_5) \cdot r_{ch-c}(t_6) \dots \textcircled{3}$$

* T_a : Ambient temperature
 * $r_{ch-c}(t)$: Transient thermal resistance at pulse width t

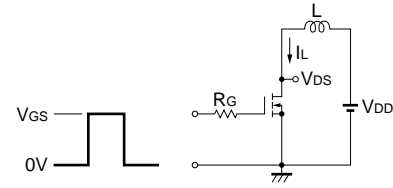
Then calculate the channel temperature $T_{ch}(\tau)$ immediately before avalanche.

$$T_{ch}(\tau) = T_a + P_a \cdot r_{ch-c}(T_n + T' + t_1 + t_2 + t_3) + (P_1 - P_a) \cdot r_{ch-c}(T' + t_1 + t_2 + t_3) - (P_1 - P_2) \cdot r_{ch-c}(T' + t_2 + t_3) + (P_3 - P_2) \cdot r_{ch-c}(T' + t_3) - P_3 \cdot r_{ch-c}(T') + P_4 \cdot r_{ch-c}(t_4 + t_5 + t_6) - (P_4 - P_5) \cdot r_{ch-c}(t_5 + t_6) + (P_6 - P_5) \cdot r_{ch-c}(t_6) \dots \textcircled{4}$$

This $T_{ch}(\tau)$ value becomes $T_{ch}(start)$. If the avalanche energy ($E_{AS} = P_6 \cdot t_6$) is within the value derated from the guaranteed E_{AS} value at the temperature, there is no problem as far as the avalanche energy is concerned.

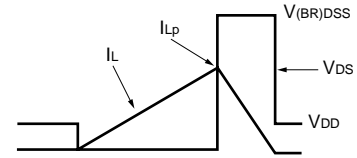
5. Avalanche energy capability measuring method

Fig. E



(a) Measuring circuit

$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{Lp}^2 \cdot \frac{V_{(BR)DSS}}{V_{(BR)DSS} - V_{DD}}$$



(b) Output waveform

Fig. C

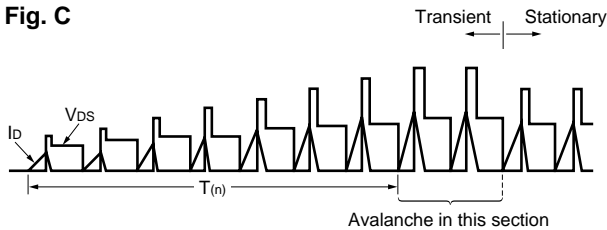
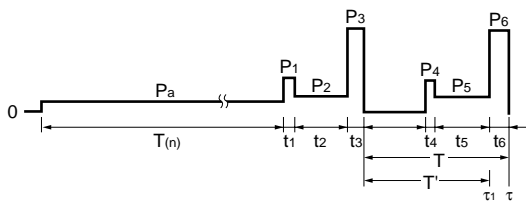
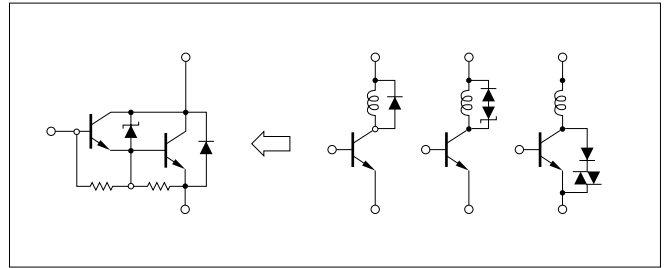


Fig. D



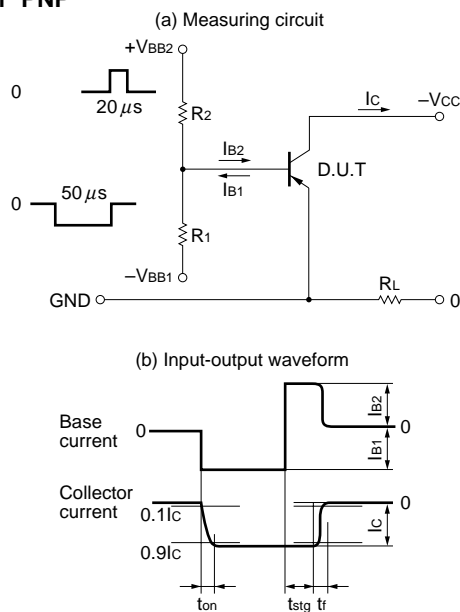
The Darlington transistor chip with a built-in avalanche diode is a planar type monolithic Darlington transistor chip having the equivalent circuit shown in the figure on the right. Surge Voltage can be absorbed by the avalanche diode provided between the collector and the base. This eliminated the need for extra components for absorbing surge caused by counter electromotive force produced by inductive load switch circuits. These Darlington transistor arrays are ideal for relay drive, solenoid drive, and printer wire drive applications.



Switching time measurement

1. Transistor array

Fig. 1 PNP



2. MOS FET array

Fig. 3 Nch

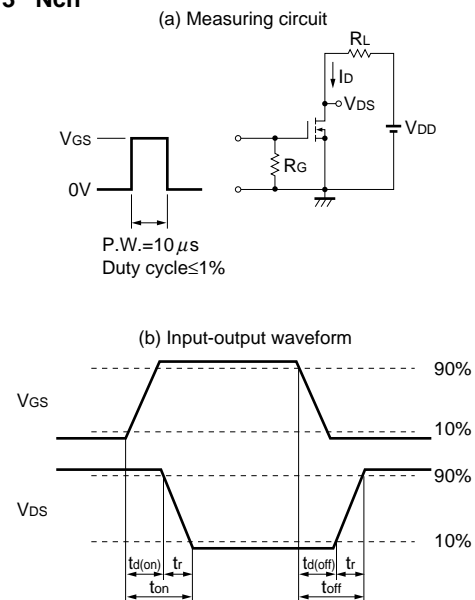


Fig. 2 NPN

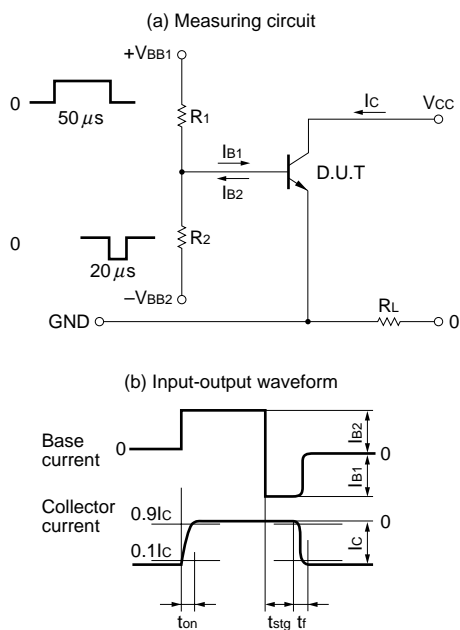
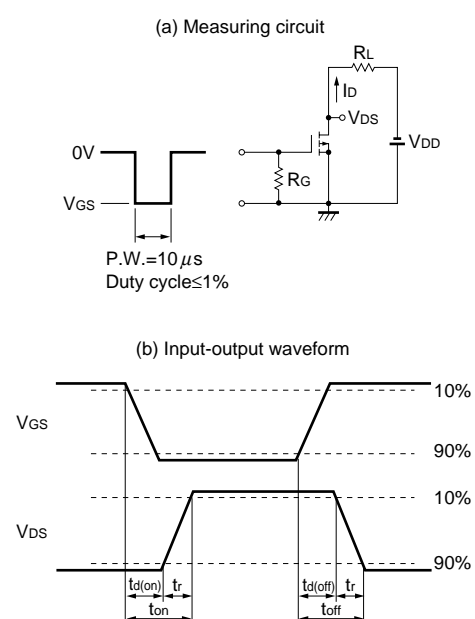


Fig. 4 Pch



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

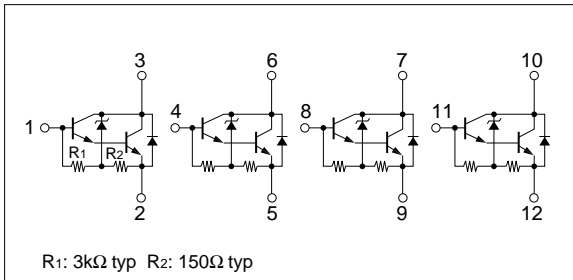
Symbol	Ratings	Unit
V_{CB0}	60 ± 10	V
V_{CE0}	60 ± 10	V
V_{EBO}	6	V
I_C	4	A
I_{CP}	6 (PW $\leq 10\text{ms}$, $D_u\leq 50\%$)	A
I_B	0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)	W
	40 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

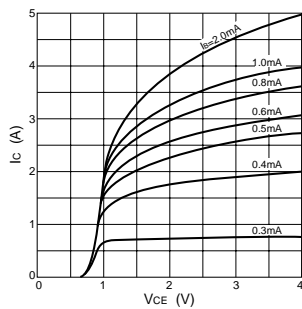
Symbol	Specification			unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=50\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$
V_{CE0}	50	60	70	V	$I_C=10\text{mA}$
h_{FE}	2000				$V_{CE}=4\text{V}$, $I_C=3\text{A}$
$V_{CE(sat)}$			1.5	V	$I_C=3\text{A}$, $I_B=10\text{mA}$

Equivalent circuit diagram

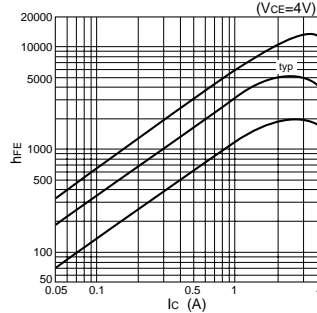


Characteristic curves

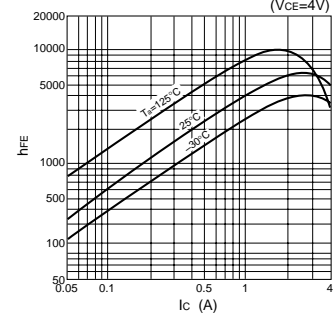
I_C - V_{CE} Characteristics (Typical)



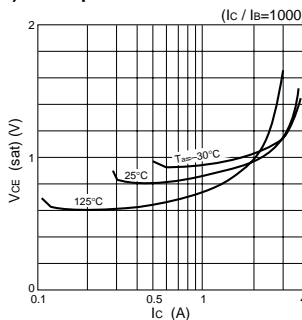
h_{FE} - I_C Characteristics (Typical)



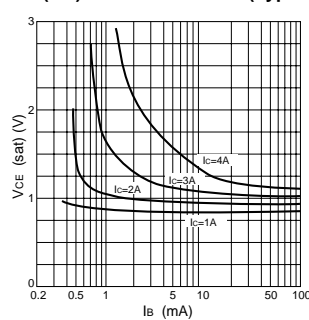
h_{FE} - I_C Temperature Characteristics (Typical)



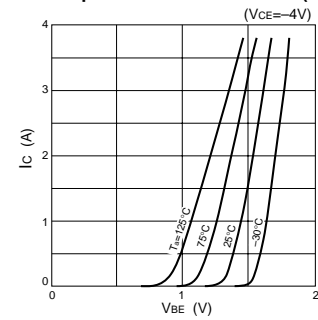
$V_{CE(sat)}$ - I_C Temperature Characteristics (Typical)



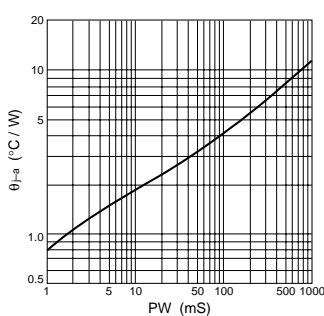
$V_{CE(sat)}$ - I_B Characteristics (Typical)



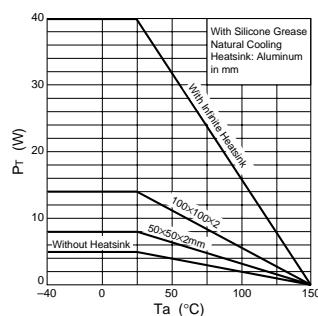
I_C - V_{BE} Temperature Characteristics (Typical)



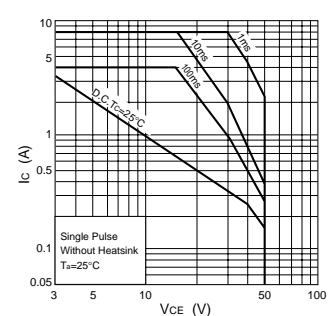
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

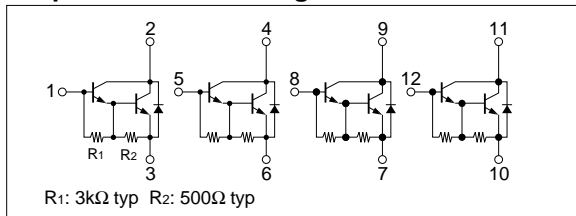
Symbol	Ratings	Unit
V_{CB0}	120	V
V_{CE0}	100	V
V_{EB0}	6	V
I_c	4	A
I_{CP}	6 (PW \leq 1ms, Du \leq 50%)	A
I_B	0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)	W
	25 ($T_c=25^\circ\text{C}$)	
V_{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$
θ_{j-c}	5	$^\circ\text{C}/\text{W}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

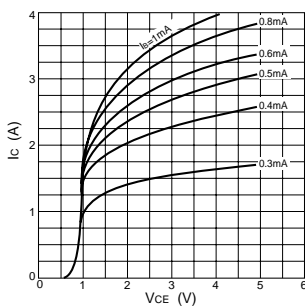
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=120\text{V}$
I_{EB0}			10	mA	$V_{EB}=6\text{V}$
V_{CE0}	100			V	$I_c=10\text{mA}$
hFE	2000				$V_{CE}=4\text{V}$, $I_c=2\text{A}$
$V_{CE(sat)}$			1.5	V	$I_c=2\text{A}$, $I_B=10\text{mA}$

Equivalent circuit diagram

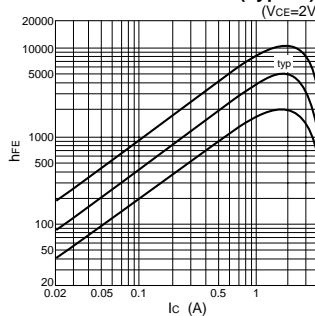


Characteristic curves

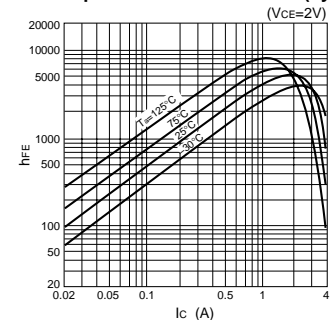
I_c - V_{CE} Characteristics (Typical)



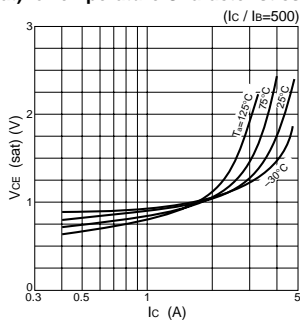
hFE- I_c Characteristics (Typical)



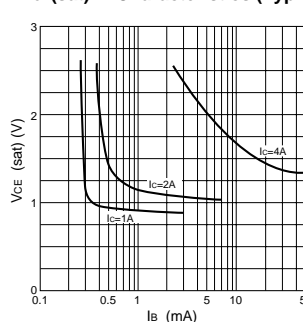
hFE- I_c Temperature Characteristics (Typical)



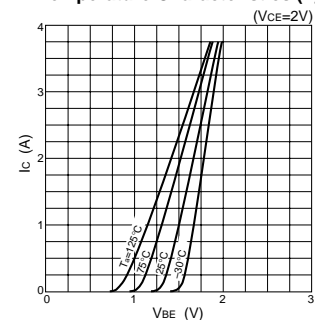
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



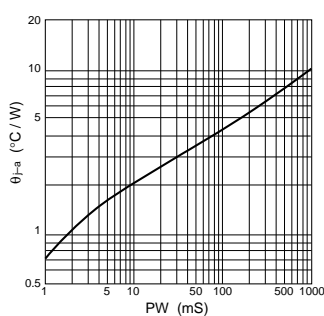
$V_{CE(sat)}$ - I_B Characteristics (Typical)



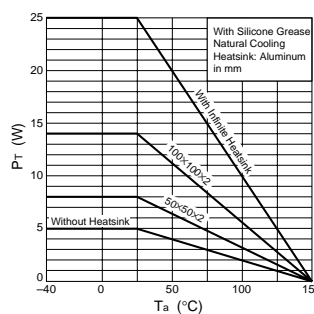
I_c - V_{BE} Temperature Characteristics (Typical)



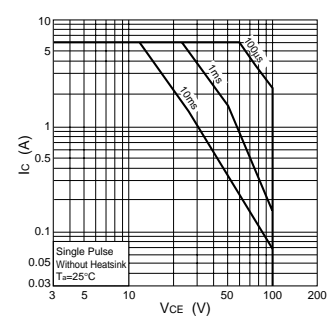
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{CB0}	120	V
V_{CE0}	120	V
V_{EB0}	6	V
I_c	4	A
I_{CP}	6 (PW \leq 1ms, Du \leq 50%)	A
I_B	0.5	A
I_F	4 (PW \leq 0.5ms, Du \leq 25%)	A
I_{FSM}	6 (PW \leq 10ms, Single)	A
V_R	120	V
P_T	5 ($T_a=25^\circ\text{C}$)	W
	25 ($T_c=25^\circ\text{C}$)	
V_{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$
θ_{j-c}	5	$^\circ\text{C}/\text{W}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

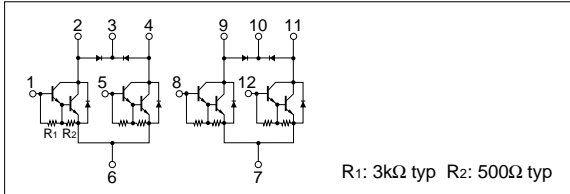
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=120\text{V}$
I_{EB0}			10	mA	$V_{EB}=6\text{V}$
V_{CE0}	120			V	$I_c=25\text{mA}$
h_{FE}	2000	5000	15000		$V_{CE}=2\text{V}, I_c=2\text{A}$
$V_{CE}(\text{sat})$		1.0	1.5	V	$I_c=2\text{A}, I_B=2\text{mA}$
$V_{BE}(\text{sat})$		1.6	2.0	V	
t_{on}		0.6		μs	$V_{CC}=40\text{V},$ $I_c=2\text{A},$ $I_{B1}=-I_{B2}=10\text{mA}$
t_{stg}		5.0		μs	
t_f		2.0		μs	

Diode for flyback voltage absorption

($T_a=25^\circ\text{C}$)

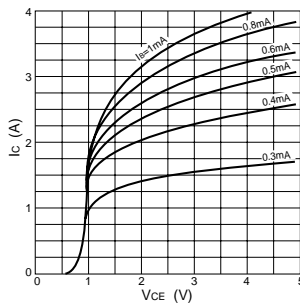
Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	120			V	$I_R=10\mu\text{A}$
V_F			1.2	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=120\text{V}$
t_{rr}		100		ns	$I_F=\pm 100\text{mA}$

Equivalent circuit diagram

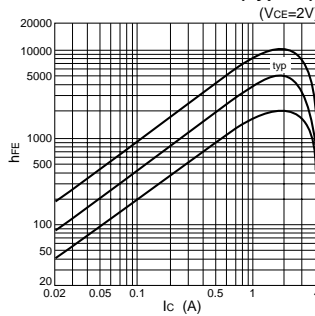


Characteristic curves

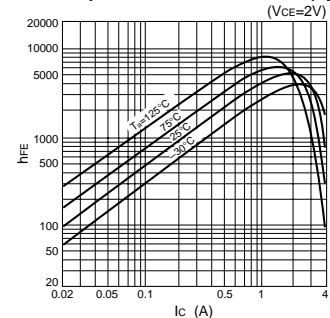
I_c - V_{CE} Characteristics (Typical)



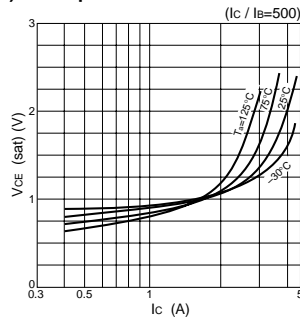
h_{FE} - I_c Characteristics (Typical)



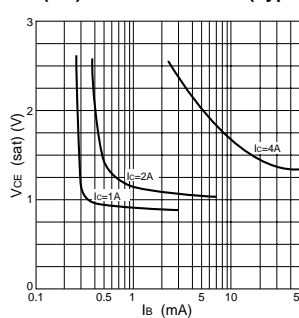
h_{FE} - I_c Temperature Characteristics (Typical)



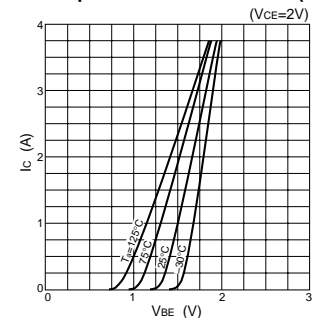
$V_{CE}(\text{sat})$ - I_c Temperature Characteristics (Typical)



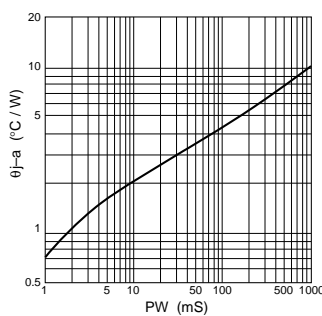
$V_{CE}(\text{sat})$ - I_B Characteristics (Typical)



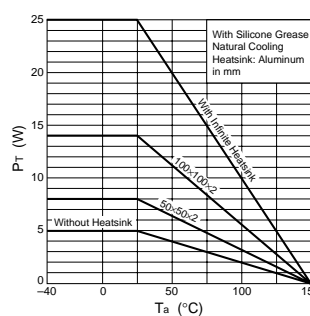
I_c - V_{BE} Temperature Characteristics (Typical)



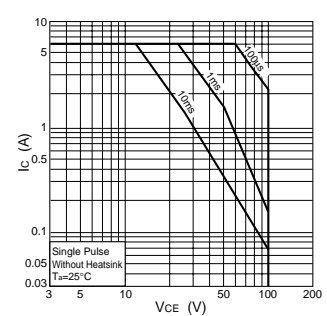
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{CB0}	200	V
V_{CEO}	200	V
V_{EBO}	6	V
I_c	3	A
I_{CP}	6 ($PW \leq 10\text{ms}$, $D_u \leq 50\%$)	A
I_B	0.2	A
I_F	3 ($PW \leq 0.5\text{ms}$, $D_u \leq 25\%$)	A
I_{FSM}	6 ($PW \leq 10\text{ms}$, single)	A
V_R	200	V
P_T	5 ($T_a=25^\circ\text{C}$) 25 ($T_c=25^\circ\text{C}$)	W
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

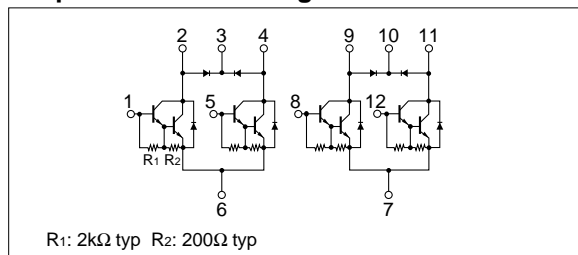
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=200\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$
V_{CEO}	200			V	$I_c=10\text{mA}$
h_{FE}	1000	6000	15000		$V_{CE}=4\text{V}$, $I_c=1.5\text{A}$
$V_{CE(sat)}$		1.1	1.5	V	$I_c=1.5\text{A}$, $I_b=3\text{mA}$
$V_{BE(sat)}$		1.7	2.0	V	
V_{FEC}			1.5	V	$I_{FEC}=2.0\text{A}$

Diode for flyback voltage absorption

($T_a=25^\circ\text{C}$)

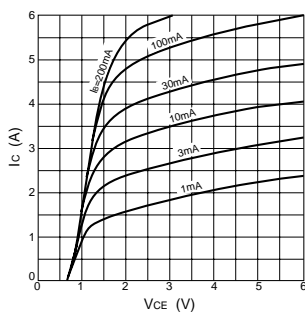
Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	200			V	$I_R=10\mu\text{A}$
V_F			1.6	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=200\text{V}$
t_{rr}		100		ns	$I_F=\pm 100\text{mA}$

Equivalent circuit diagram

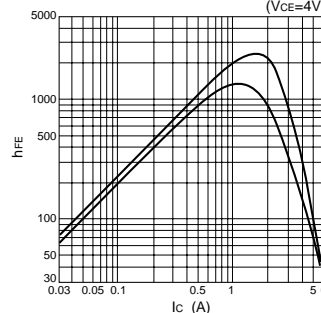


Characteristic curves

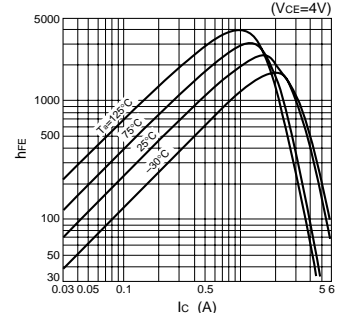
I_c - V_{CE} Characteristics (Typical)



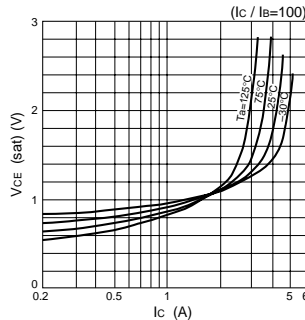
h_{FE} - I_c Characteristics (Typical)



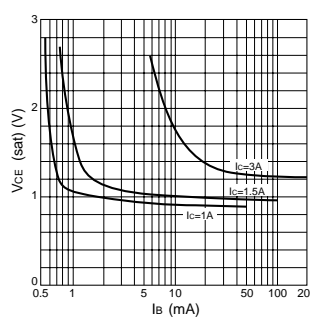
h_{FE} - I_c Temperature Characteristics (Typical)



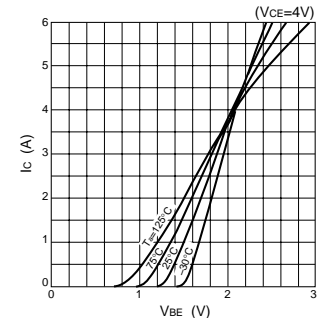
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



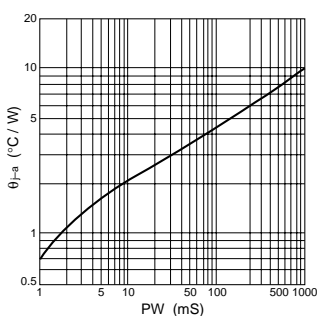
$V_{CE(sat)}$ - I_b Characteristics (Typical)



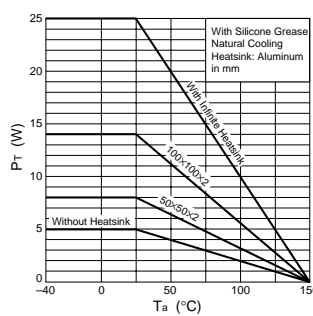
I_c - V_{BE} Temperature Characteristics (Typical)



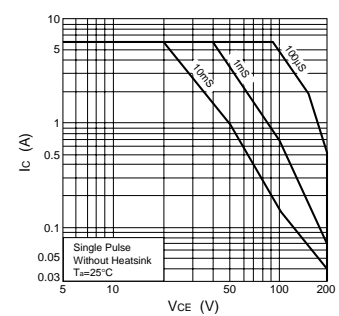
θ_{j-a} - PW Characteristics



P_r - T_a Characteristics



Safe Operating Area (SOA)



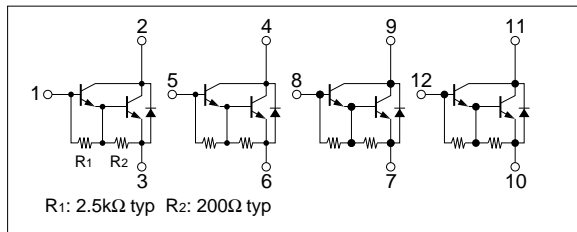
Absolute maximum ratings (Ta=25°C)

Symbol	Ratings	Unit
V _{CB0}	120	V
V _{CEO}	120	V
V _{EB0}	6	V
I _c	5	A
I _{cP}	8 (PW≤1ms, Du≤50%)	A
I _B	0.5	A
P _T	5 (Ta=25°C)	W
	25 (Tc=25°C)	
V _{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T _j	150	°C
T _{stg}	-40 to +150	°C
θ _{j-c}	5	°C/W

Electrical characteristics (Ta=25°C)

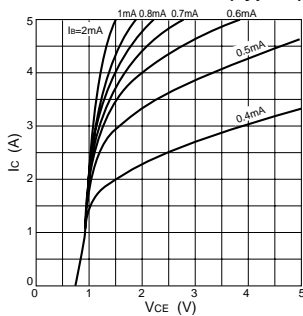
Symbol	Specification			Unit	Conditions
	min	typ	max		
I _{CB0}			10	μA	V _{CB} =120V
I _{EB0}			10	mA	V _{EB} =6V
V _{CEO}	120			V	I _c =25mA
h _{FE}	2000	5000	15000		V _{CE} =2V, I _c =3A
V _{CE(sat)}		1.0	1.5	V	I _c =3A, I _B =3mA
V _{BE(sat)}		1.6	2.0	V	
t _{on}		0.5		μs	V _{CC} ≐30V,
t _{stg}		5.5		μs	I _c =3A,
t _f		1.5		μs	I _{B1} =-I _{B2} =3mA

Equivalent circuit diagram

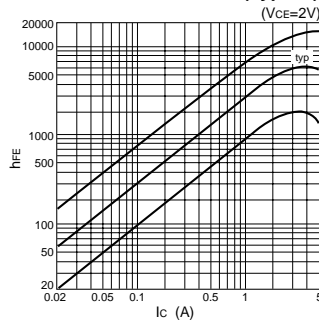


Characteristic curves

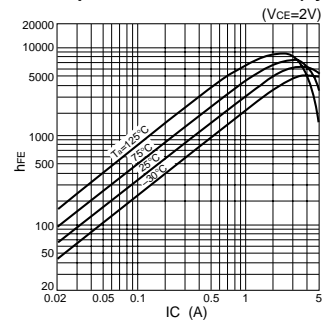
I_c-V_{CE} Characteristics (Typical)



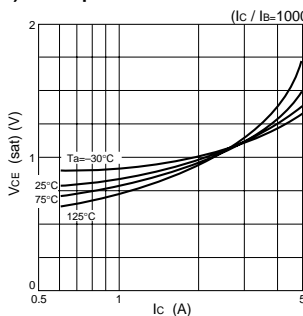
h_{FE}-I_c Characteristics (Typical) (V_{CE}=2V)



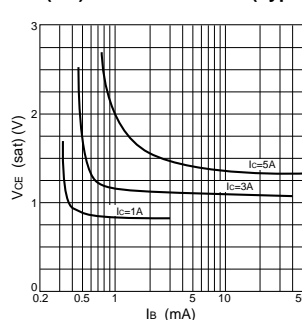
h_{FE}-I_c Temperature Characteristics (Typical) (V_{CE}=2V)



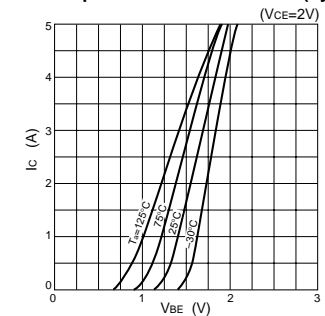
V_{CE(sat)}-I_c Temperature Characteristics (Typical) (I_c / I_B=1000)



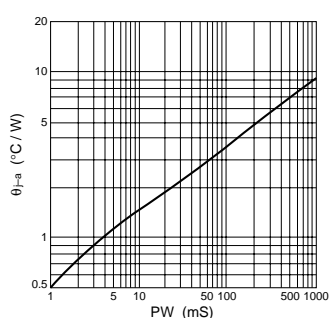
V_{CE(sat)}-I_B Characteristics (Typical)



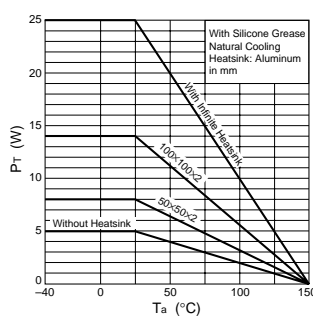
I_c-V_{BE} Temperature Characteristics (Typical) (V_{CE}=2V)



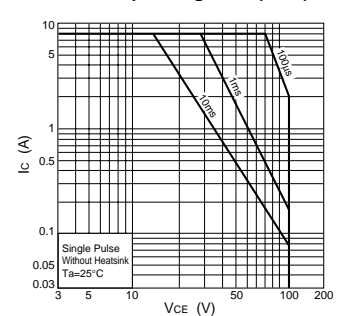
θ_{j-a}-PW Characteristics



P_T-T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{CBO}	120	V
V_{CEO}	120	V
V_{EBO}	6	V
I_c	5	A
I_{CP}	8 (PW \leq 1ms, Du \leq 50%)	A
I_B	0.5	A
I_F	5 (PW \leq 0.5ms, Du \leq 25%)	A
I_{FSM}	8 (PW \leq 10ms, single)	A
V_R	120	V
P_T	5 ($T_a=25^\circ\text{C}$)	W
	25 ($T_c=25^\circ\text{C}$)	
V_{ISO}	1000 (Between fin and lead pin, AC)	V_{rms}
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$
θ_{j-c}	5	$^\circ\text{C}/\text{W}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

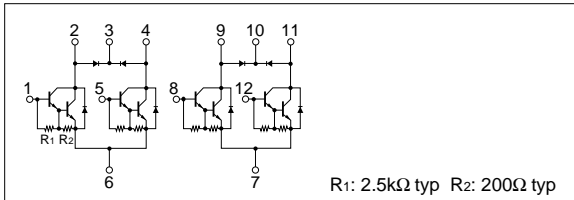
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			10	μA	$V_{CB}=120\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$
V_{CEO}	120			V	$I_c=25\text{mA}$
h_{FE}	2000	5000	15000		$V_{CE}=2\text{V}, I_c=3\text{A}$
$V_{CE(sat)}$		1.0	1.5	V	$I_c=3\text{A}, I_B=3\text{mA}$
$V_{BE(sat)}$		1.6	2.0	V	
t_{on}		0.5		μs	$V_{CC}=30\text{V}, I_c=3\text{A}, I_{B1}=-I_{B2}=3\text{mA}$
t_{stg}		5.5		μs	
t_f		1.5		μs	

Diode for flyback voltage absorption

($T_a=25^\circ\text{C}$)

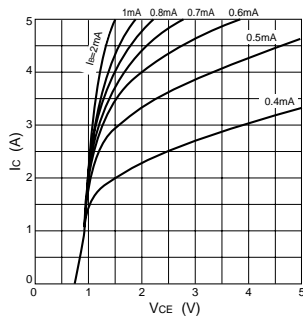
Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	120			V	$I_R=10\mu\text{A}$
V_F			1.2	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=120\text{V}$
t_{rr}		100		ns	$I_F=\pm 100\text{mA}$

Equivalent circuit diagram

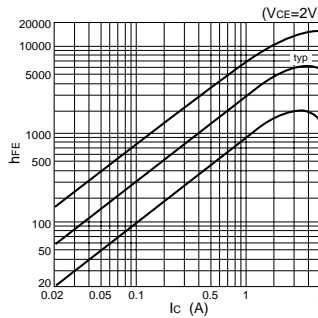


Characteristic curves

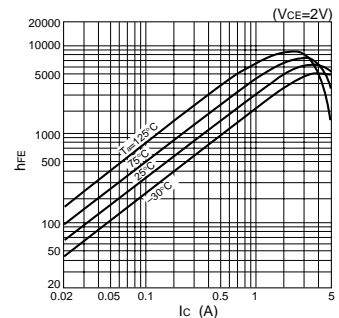
I_c - V_{CE} Characteristics (Typical)



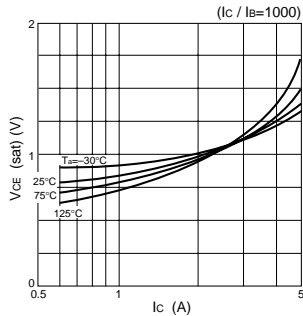
h_{FE} - I_c Characteristics (Typical)



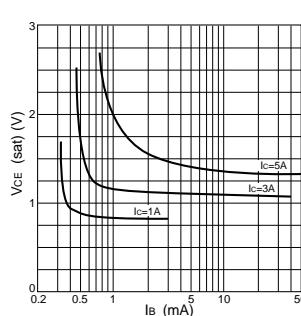
h_{FE} - I_c Temperature Characteristics (Typical)



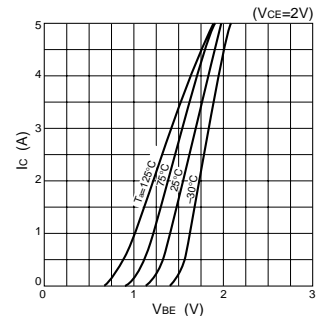
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



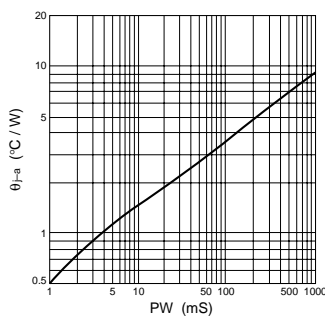
$V_{CE(sat)}$ - I_B Characteristics (Typical)



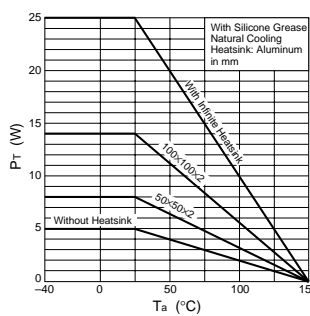
I_c - V_{BE} Temperature Characteristics (Typical)



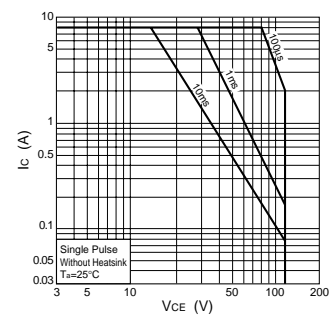
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

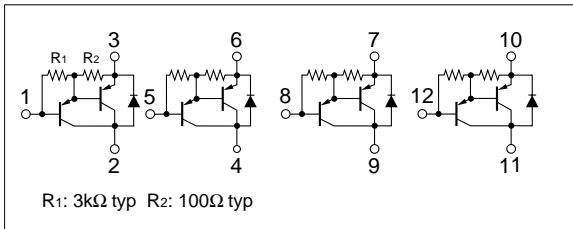
Symbol	Ratings	Unit
V_{CBO}	-100	V
V_{CEO}	-100	V
V_{EBO}	-6	V
I_c	-5	A
I_{cP}	-8 (PW \leq 1ms, $D_u\leq$ 50%)	A
I_B	-0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)	W
	25 ($T_c=25^\circ\text{C}$)	
V_{ISO}	1000 (Between fin and lead pin, AC)	V_{rms}
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$
θ_{j-c}	5	$^\circ\text{C}/\text{W}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

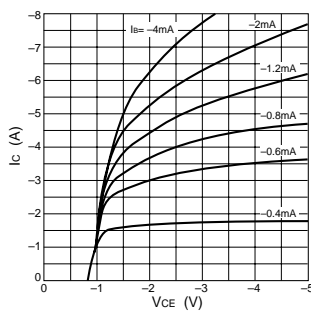
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			-10	μA	$V_{CB}=-100\text{V}$
I_{EBO}			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	-100			V	$I_c=-10\text{mA}$
h_{FE}	1000	5000	15000		$V_{CE}=-2\text{V}$, $I_c=-3\text{A}$
$V_{CE(sat)}$		-1.0	-1.5	V	$I_c=-3\text{A}$, $I_B=-6\text{mA}$
$V_{BE(sat)}$		-1.6	-2.0	V	

Equivalent circuit diagram

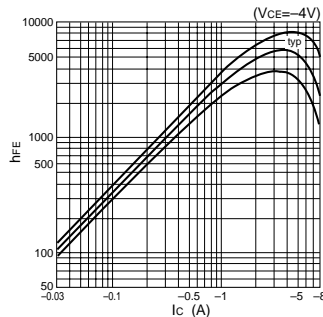


Characteristic curves

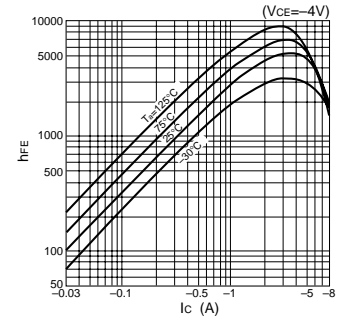
I_c - V_{CE} Characteristics (Typical)



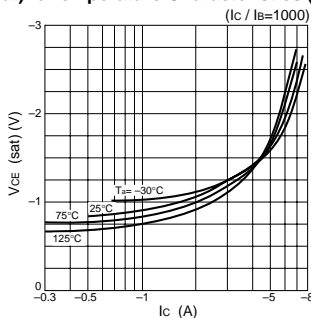
h_{FE} - I_c Characteristics (Typical)



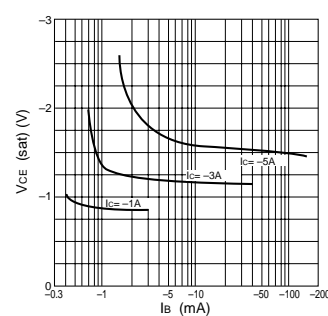
h_{FE} - I_c Temperature Characteristics (Typical)



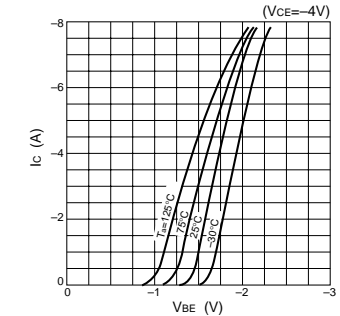
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



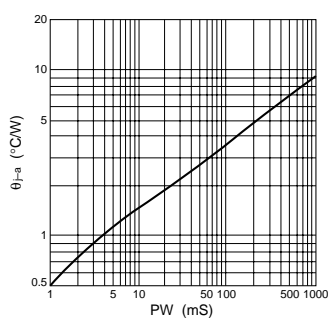
$V_{CE(sat)}$ - I_B Characteristics (Typical)



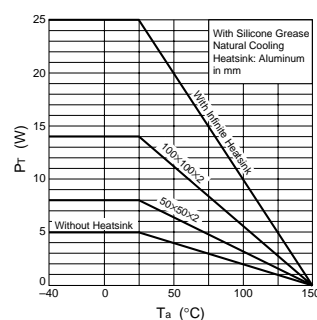
I_c - V_{BE} Temperature Characteristics (Typical)



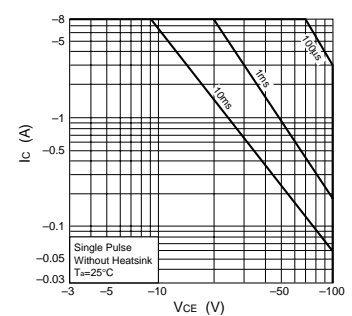
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{CB0}	-100	V
V_{CEO}	-100	V
V_{EBO}	-6	V
I_c	-5	A
I_{CP}	-8 (PW \leq 1ms, $D_u\leq$ 50%)	A
I_B	-0.5	A
I_F	-5 (PW \leq 0.5ms, $D_u\leq$ 25%)	A
I_{FSM}	-8 (PW \leq 10ms, single)	A
V_R	120	V
P_T	5 ($T_a=25^\circ\text{C}$)	W
	25 ($T_c=25^\circ$)	
V_{ISO}	1000 (Between fin and lead pin, AC)	V_{rms}
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$
θ_{j-c}	5	$^\circ\text{C/W}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

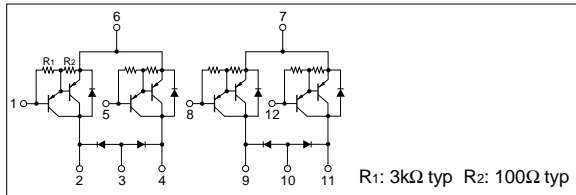
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			-10	μA	$V_{CB}=-100\text{V}$
I_{EBO}			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	-100			V	$I_c=-10\text{mA}$
h_{FE}	2000	5000	15000		$V_{CE}=-2\text{V}$, $I_c=-3\text{A}$
$V_{CE(sat)}$		-1.0	-1.5	V	$I_c=-3\text{A}$, $I_B=-6\text{mA}$
$V_{BE(sat)}$		-1.6	-2.0	V	

Diode for flyback voltage absorption

($T_a=25^\circ\text{C}$)

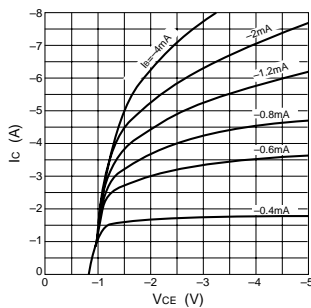
Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	120			V	$I_R=10\mu\text{A}$
V_F			1.2	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=120\text{V}$
t_{rr}		100		ns	$I_F=\pm 100\text{mA}$

Equivalent circuit diagram

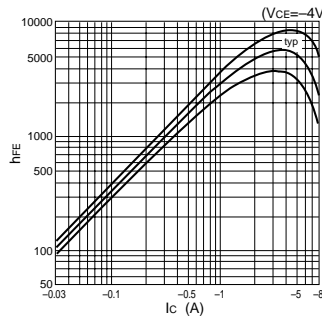


Characteristic curves

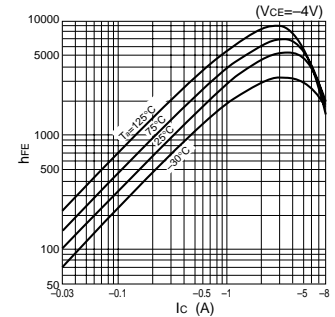
I_c - V_{CE} Characteristics (Typical)



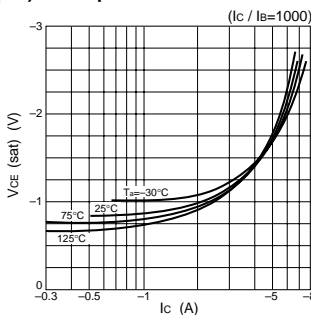
h_{FE} - I_c Characteristics (Typical)



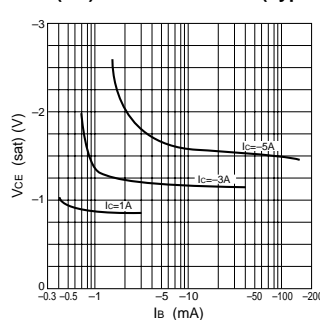
h_{FE} - I_c Temperature Characteristics (Typical)



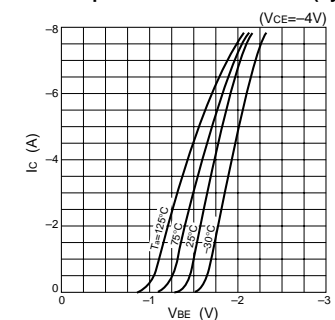
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



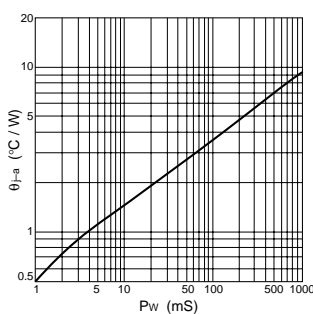
$V_{CE(sat)}$ - I_B Characteristics (Typical)



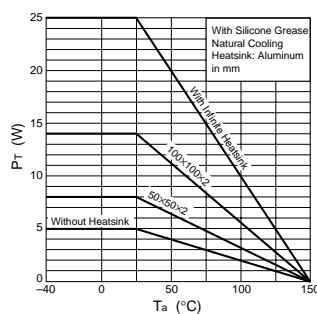
I_c - V_{BE} Temperature Characteristics (Typical)



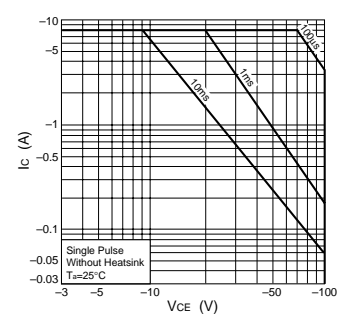
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)

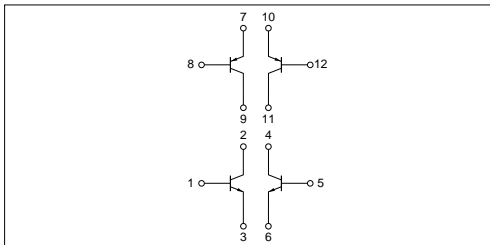


Absolute maximum ratings

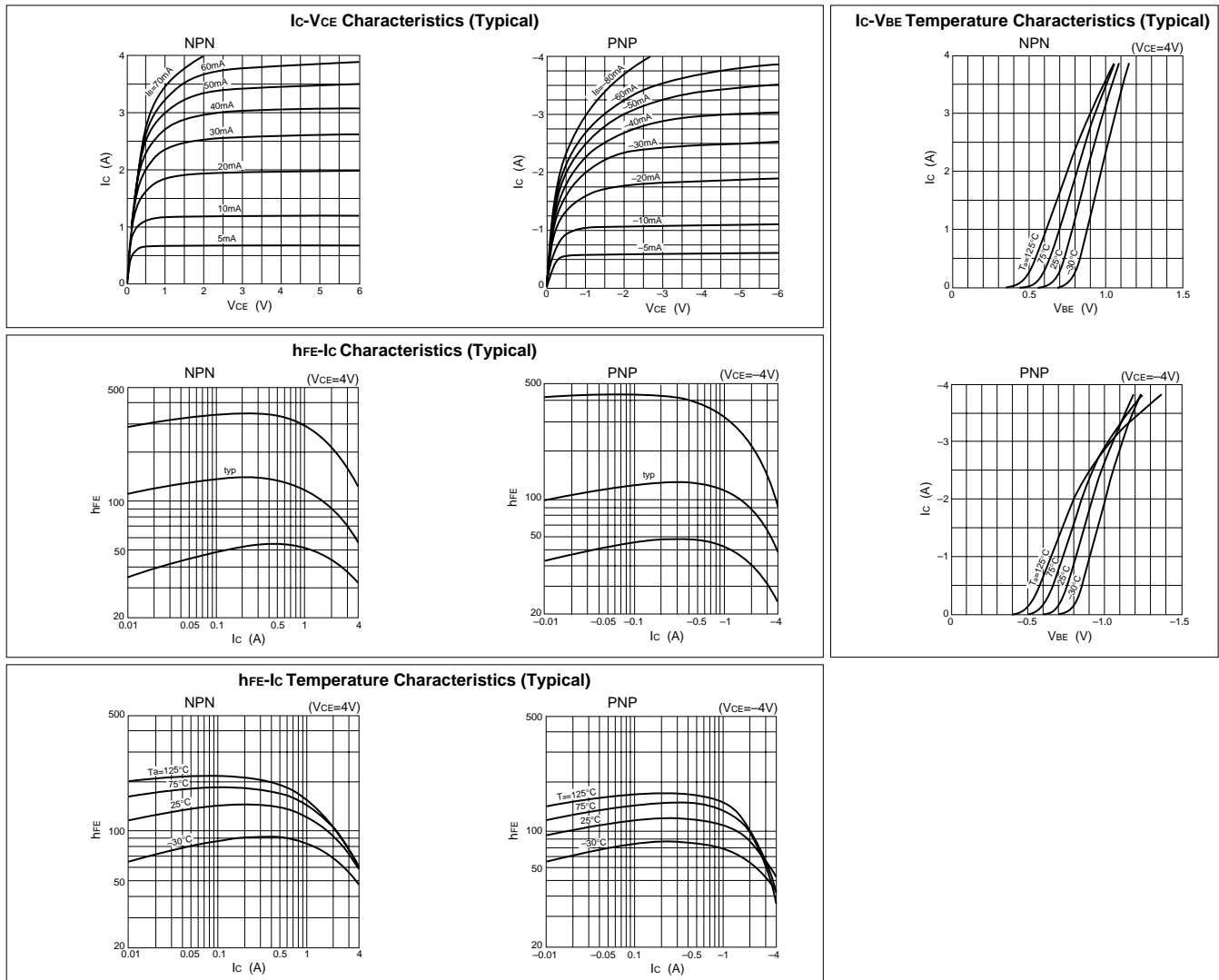
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	60	-60	V
V_{CEO}	60	-60	V
V_{EBO}	6	-6	V
I_c	4	-4	A
I_{cP}	6 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	-6 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	A
I_B	1	-1	A
P_T	5 ($T_a=25^\circ\text{C}$)		W
	25 ($T_c=25^\circ\text{C}$)		
V_{ISO}	1000 (Between fin and lead pin, AC)		V_{rms}
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	5		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

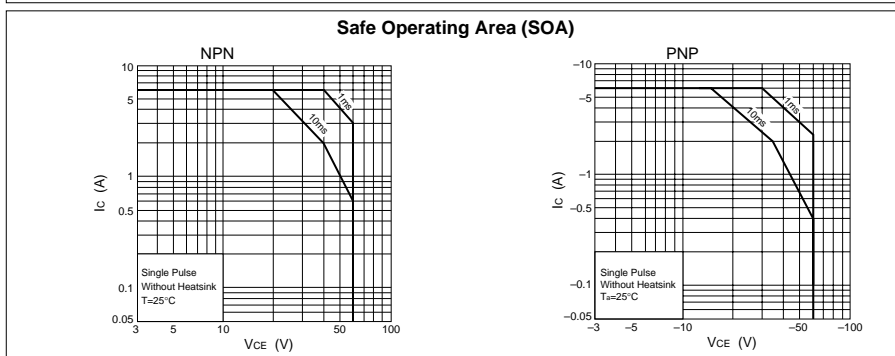
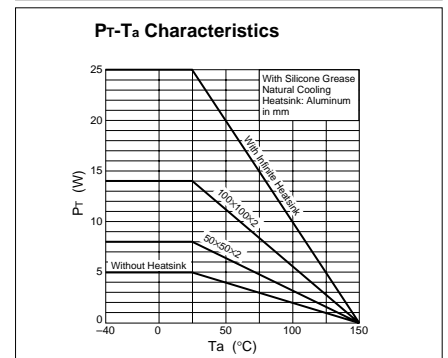
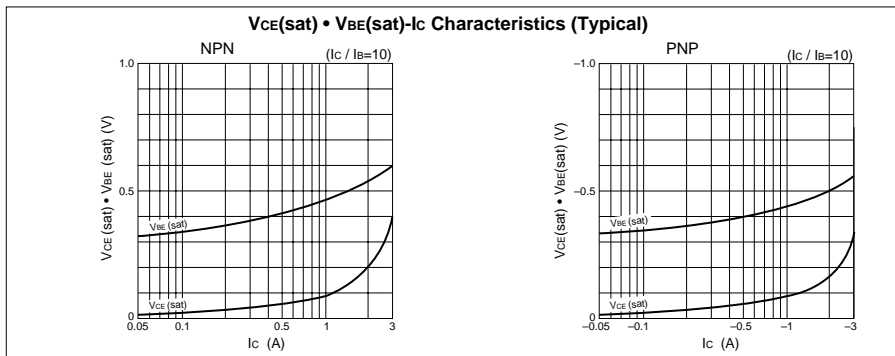
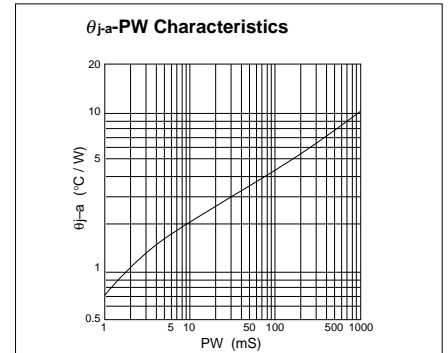
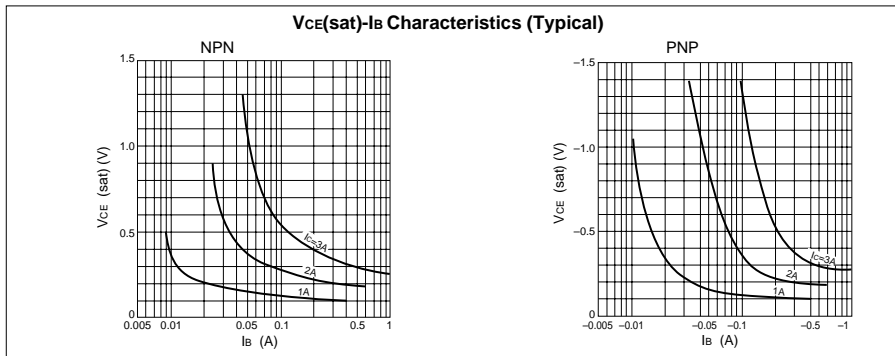


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=60\text{V}$			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			10	μA	$V_{EB}=6\text{V}$			-10	μA	$V_{EB}=-6\text{V}$
V_{CEO}	60			V	$I_C=25\text{mA}$	-60			V	$I_C=-25\text{mA}$
hFE	80				$V_{CE}=4\text{V}, I_C=1\text{A}$	80				$V_{CE}=-4\text{V}, I_C=-1\text{A}$
$V_{CE}(\text{sat})$			0.6	V	$I_C=2\text{A}, I_B=0.2\text{A}$			-0.6	V	$I_C=-2\text{A}, I_B=-0.2\text{A}$

Characteristic curves

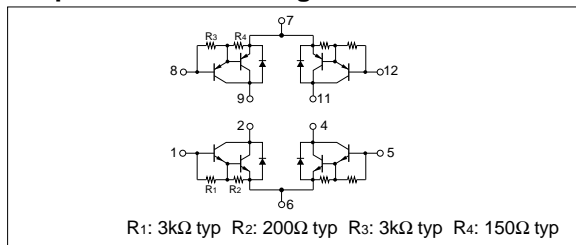


Absolute maximum ratings

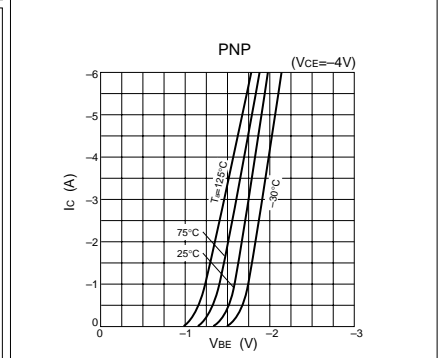
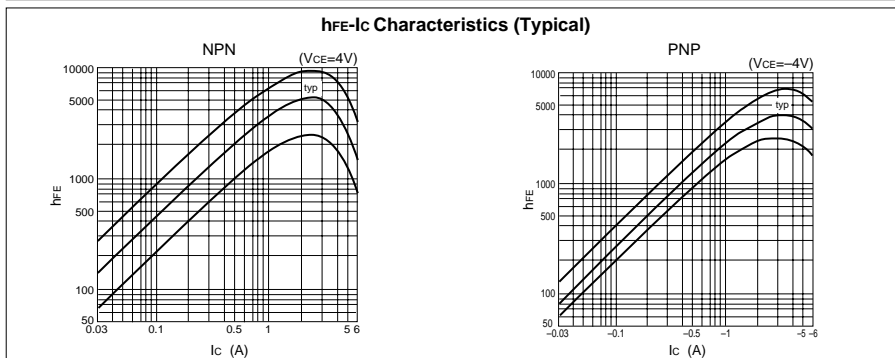
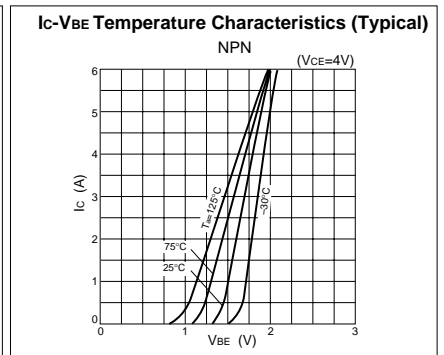
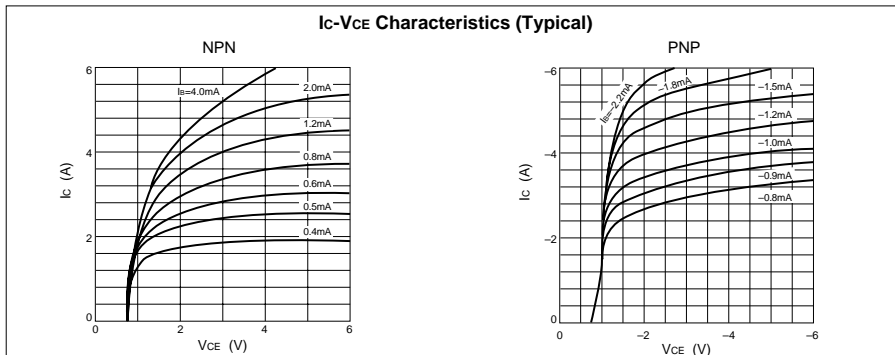
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	60	-60	V
V_{CEO}	60	-60	V
V_{EBO}	6	-6	V
I_C	4	-4	A
I_{CP}	6 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	-6 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	A
I_B	0.5	-0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)		W
	25 ($T_c=25^\circ\text{C}$)		
V_{ISO}	1000 (Between fin and lead pin, AC)		V_{rms}
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	5		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

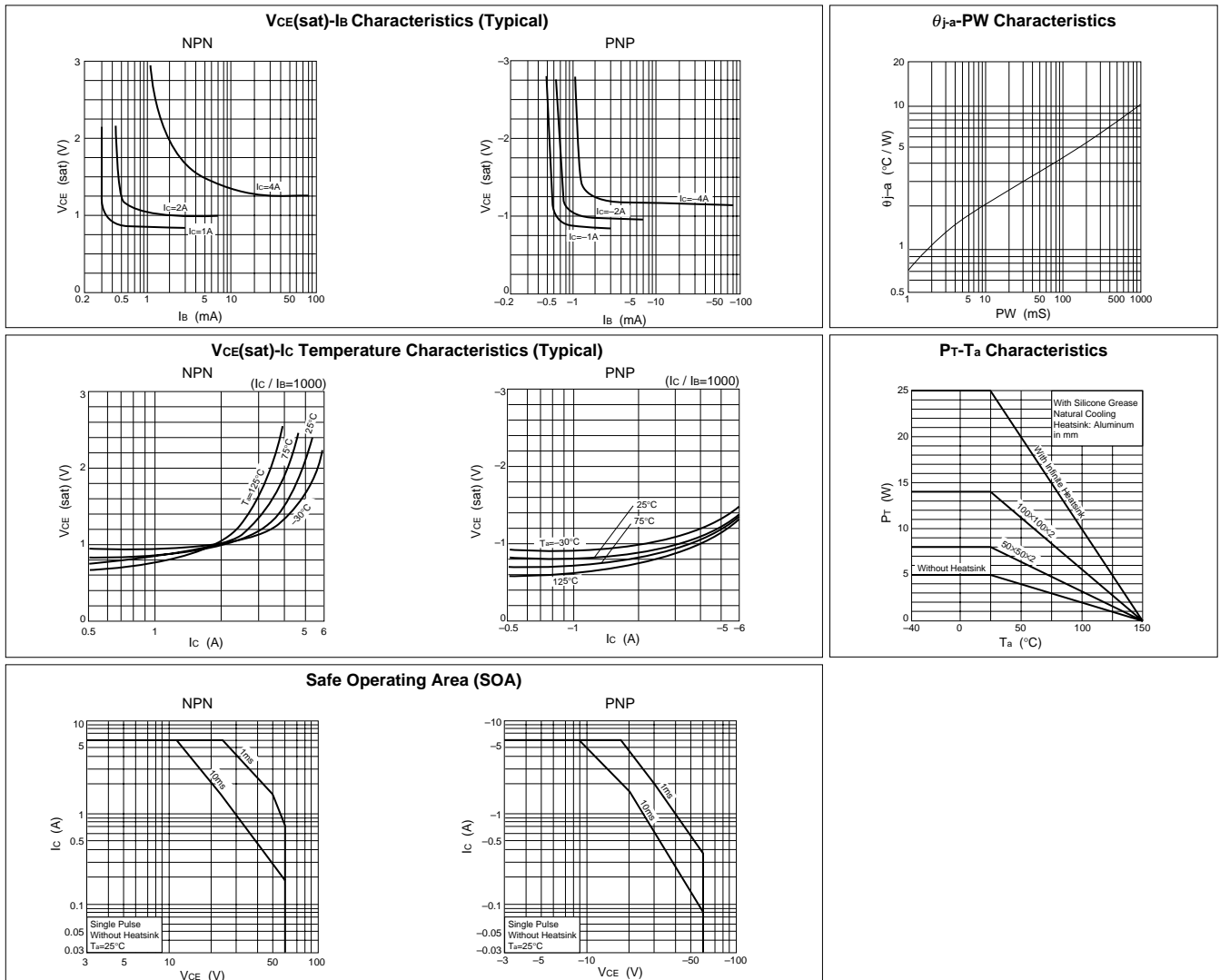


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=60\text{V}$			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	60			V	$I_C=10\text{mA}$	-60			V	$I_C=-10\text{mA}$
h_{FE}	2000				$V_{CE}=4\text{V}, I_C=3\text{A}$	2000				$V_{CE}=-4\text{V}, I_C=-3\text{A}$
$V_{CE}(\text{sat})$			1.5	V	$I_C=3\text{A}, I_B=6\text{mA}$			-1.5	V	$I_C=-3\text{A}, I_B=-6\text{mA}$

Characteristic curves

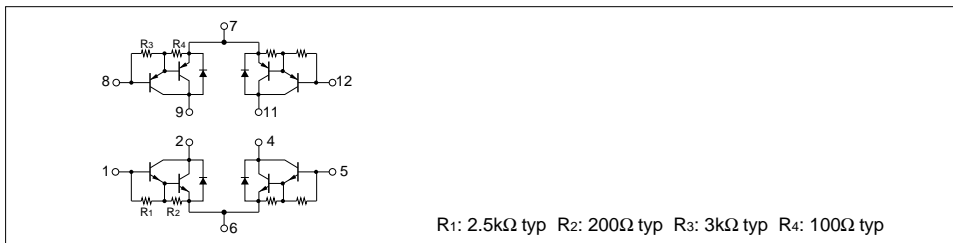


Absolute maximum ratings

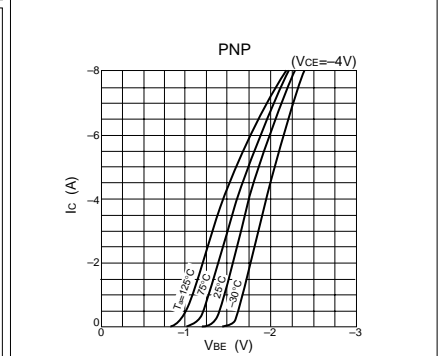
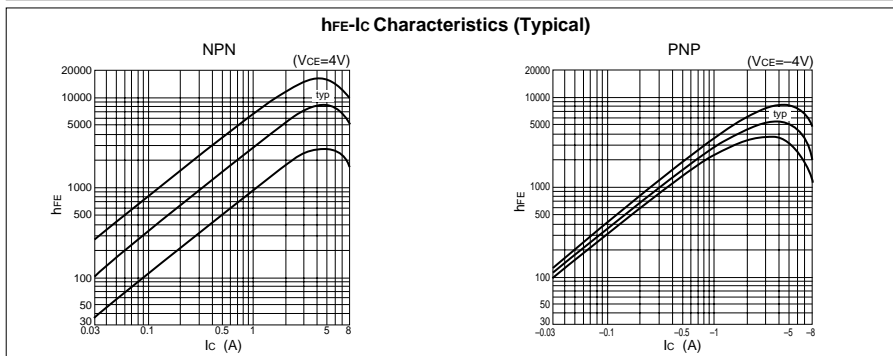
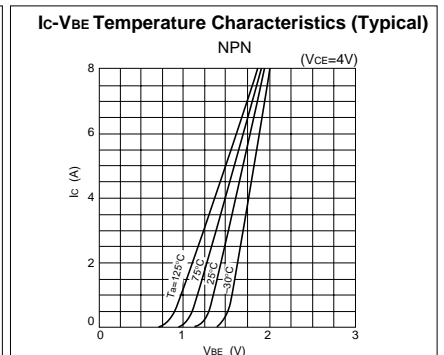
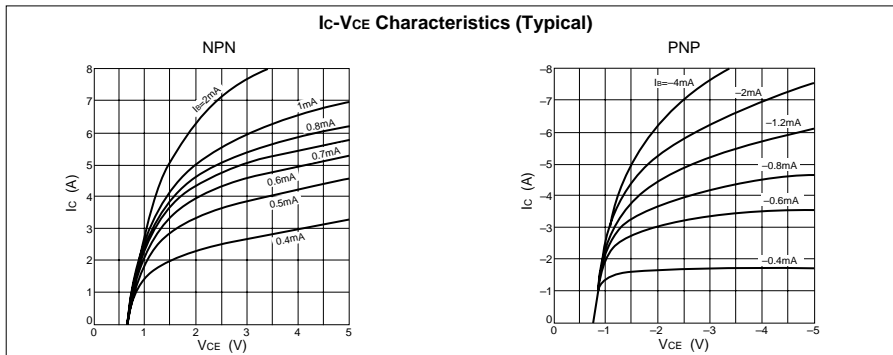
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	100	-100	V
V_{CEO}	100	-100	V
V_{EBO}	6	-6	V
I_C	5	-5	A
I_{CP}	8 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	-8 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	A
I_B	0.5	-0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)		W
	25 ($T_c=25^\circ\text{C}$)		
V_{ISO}	1000 (Between fin and lead pin, AC)		V_{rms}
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	5		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

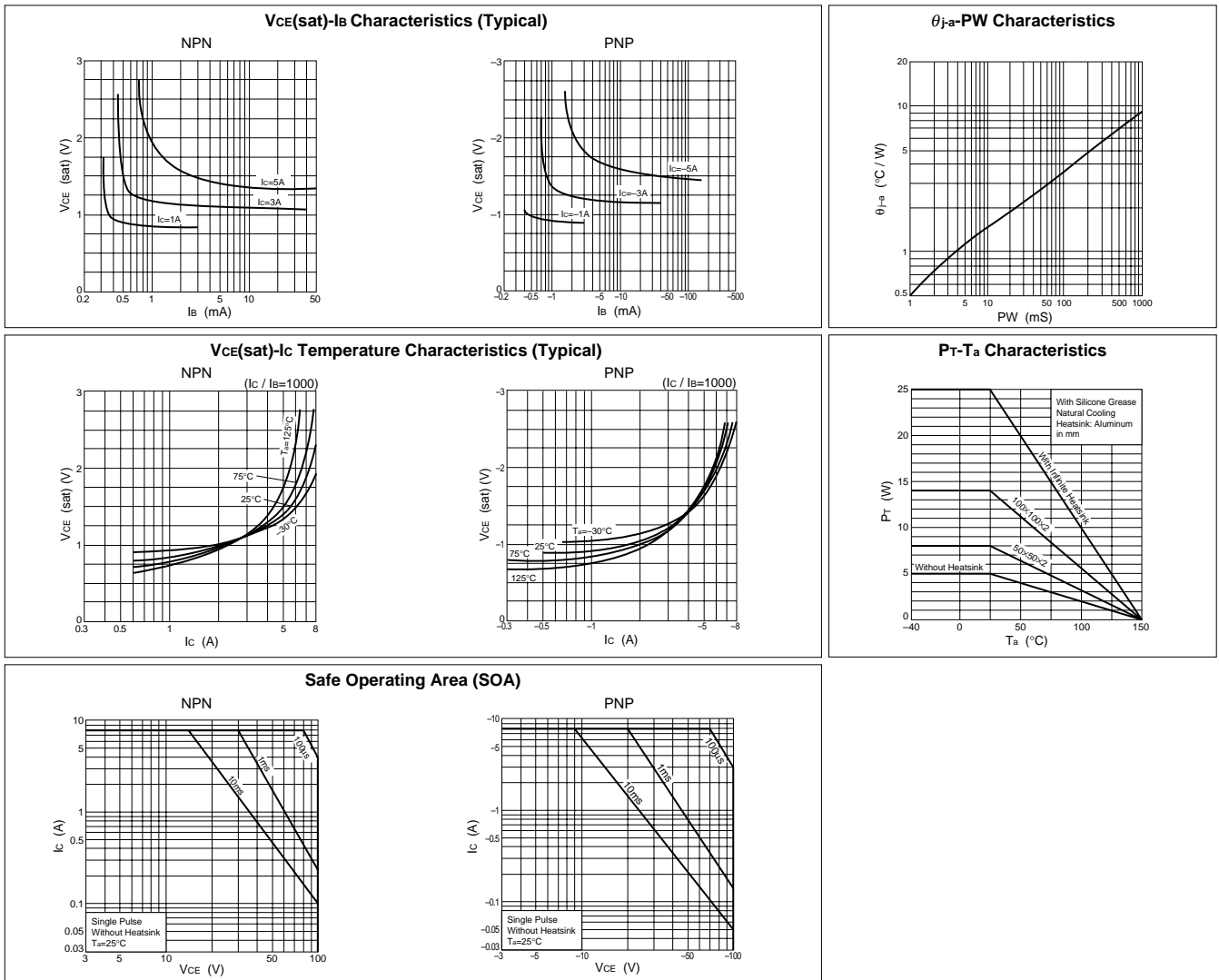


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=100\text{V}$			-10	μA	$V_{CB}=-100\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	100			V	$I_C=10\text{mA}$	-100			V	$I_C=-10\text{mA}$
h_{FE}	2000				$V_{CE}=4\text{V}, I_C=3\text{A}$	2000				$V_{CE}=-4\text{V}, I_C=-3\text{A}$
$V_{CE}(\text{sat})$			1.5	V	$I_C=3\text{A}, I_B=6\text{mA}$			-1.5	V	$I_C=-3\text{A}, I_B=-6\text{mA}$

Characteristic curves

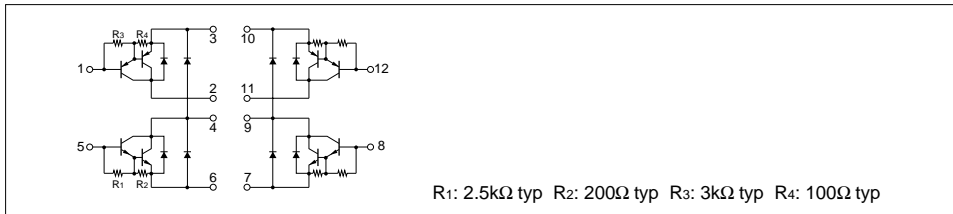


Absolute maximum ratings

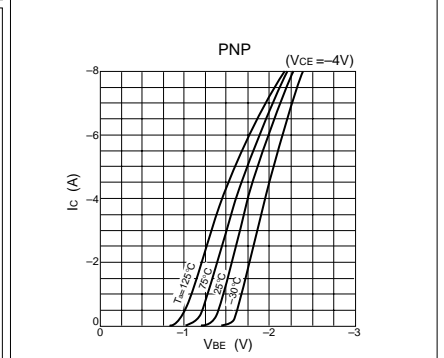
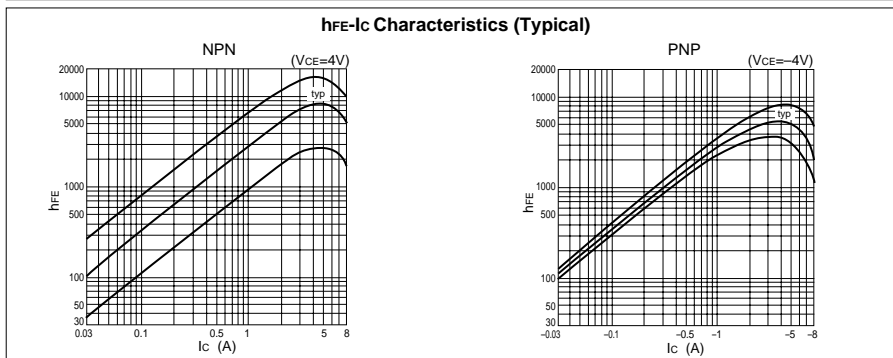
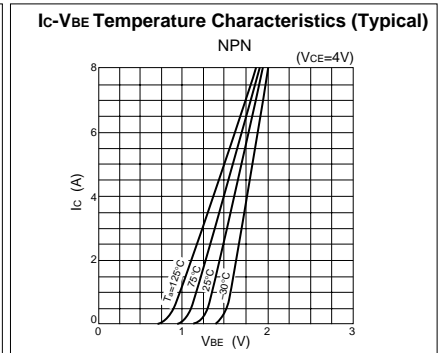
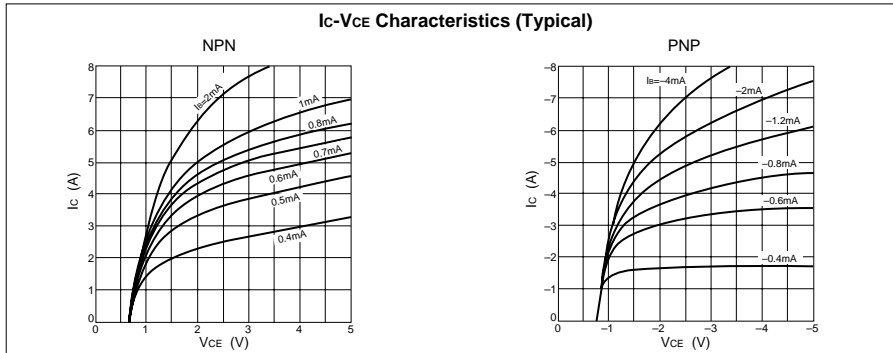
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	100	-100	V
V_{CEO}	100	-100	V
V_{EBO}	6	-6	V
I_c	5	-5	A
I_{CP}	8 ($PW \leq 1\text{ms}, D_u \leq 50\%$)	-8 ($PW \leq 1\text{ms}, D_u \leq 50\%$)	A
I_B	0.5	-0.5	A
I_F	5 ($PW \leq 0.5\text{ms}, D_u \leq 25\%$)		A
I_{FSM}	8 ($PW \leq 10\text{ms}, \text{single}$)		A
V_R	120		V
P_T	5 ($T_a=25^\circ\text{C}$)		W
	25 ($T_c=25^\circ\text{C}$)		
V_{ISO}	1000 (Between fin and lead pin, AC)		V_{rms}
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	5		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves



Electrical characteristics

($T_a=25^\circ\text{C}$)

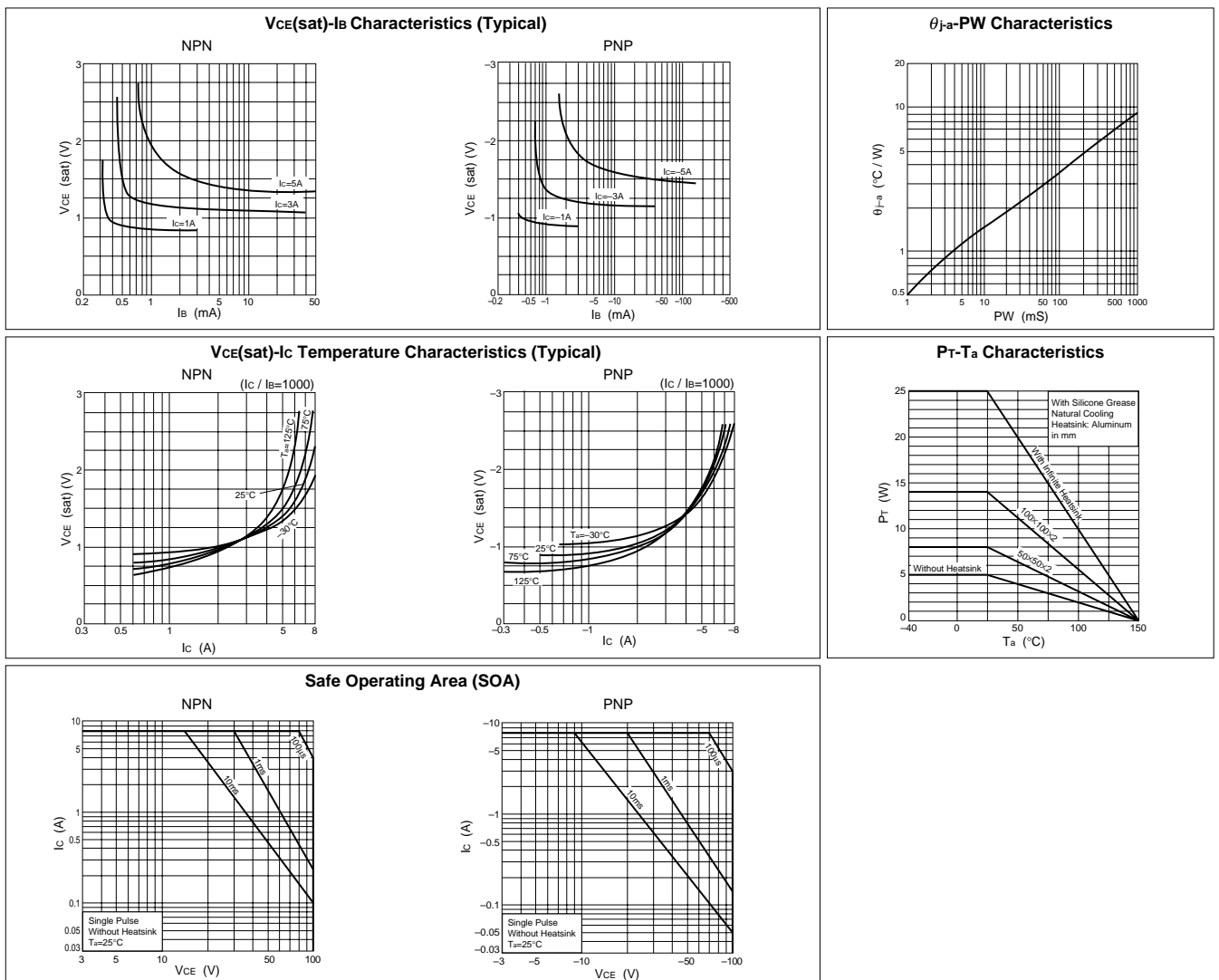
Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=100\text{V}$			-10	μA	$V_{CB}=-100\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	100			V	$I_C=10\text{mA}$	-100			V	$I_C=-10\text{mA}$
h_{FE}	1000				$V_{CE}=4\text{V}, I_C=3\text{A}$	1000				$V_{CE}=-4\text{V}, I_C=-3\text{A}$
$V_{CE(sat)}$			1.5	V	$I_C=3\text{A}, I_B=6\text{mA}$			-1.5	V	$I_C=-3\text{A}, I_B=-6\text{mA}$

Diode for flyback voltage absorption

($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	120			V	$I_R=10\mu\text{A}$
V_F			1.2	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=100\text{V}$

Characteristic curves



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	100	V
V_{GSS}	± 20	V
I_D	± 5	A
$I_D(\text{pulse})$	$\pm 10(PW \leq 1\text{ms})$	A
E_{AS}^*	30	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

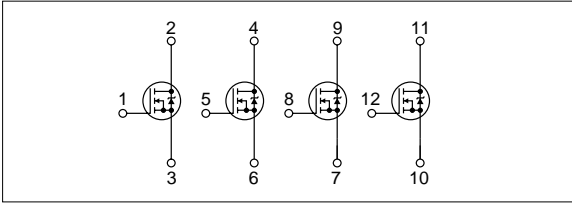
Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			250	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	2.4	3.7		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$
$R_{DS(ON)}$		0.27	0.30	Ω	$V_{GS}=10\text{V}$, $I_D=5\text{A}$
C_{iss}		350		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		130		pF	
t_{on}		60		ns	$I_D=5\text{A}$, $V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.
t_{off}		40		ns	
V_{SD}		1.1	1.8	V	$I_{SD}=5\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		330		ns	$I_{SD}=\pm 100\text{mA}$

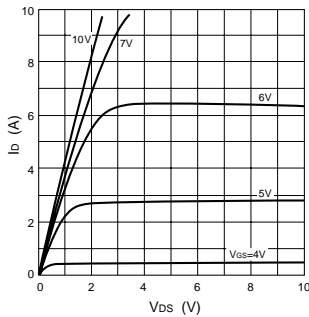
* : $V_{DD}=20\text{V}$, $L=10\text{mH}$, $I_D=2.5\text{A}$, unclamped, see Fig. E on page 15.

Equivalent circuit diagram

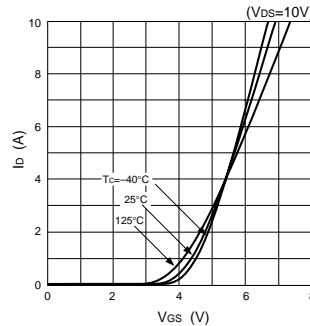


Characteristic curves

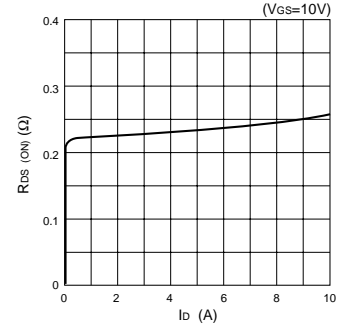
I_D - V_{DS} Characteristics (Typical)



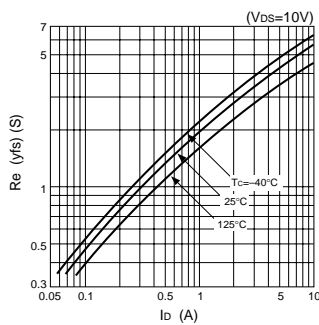
I_D - V_{GS} Characteristics (Typical)



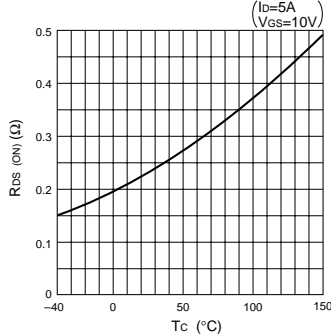
$R_{DS(ON)}$ - I_D Characteristics (Typical)



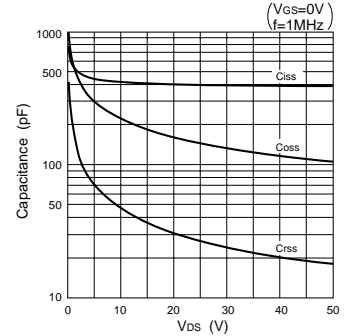
$R_{e(yfs)}$ - I_D Characteristics (Typical)



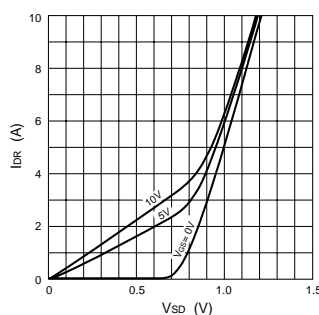
$R_{DS(ON)}$ - T_c Characteristics (Typical)



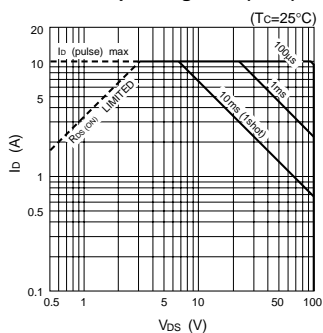
Capacitance- V_{DS} Characteristics (Typical)



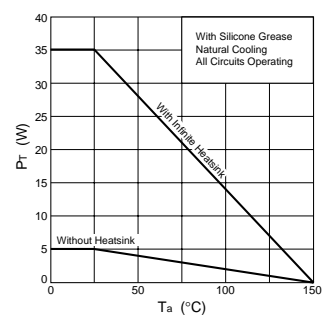
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



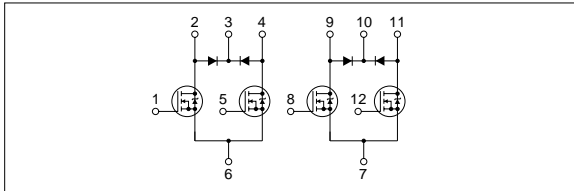
Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	100	V
V_{GSS}	± 20	V
I_D	± 5	A
$I_{D(pulse)}$	± 10 ($PW \leq 1ms$)	A
E_{AS}^*	30	mJ
I_F	5 ($PW \leq 0.5ms, Du \leq 25\%$)	A
I_{FSM}	10 ($PW \leq 10ms, \text{Single Pulse}$)	A
V_R	120	V
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

*: $V_{DD}=20V, L=10mH, I_D=2.5A$, unclamped, see Fig. E on page 15

Equivalent circuit diagram



Electrical characteristics

($T_a=25^\circ\text{C}$)

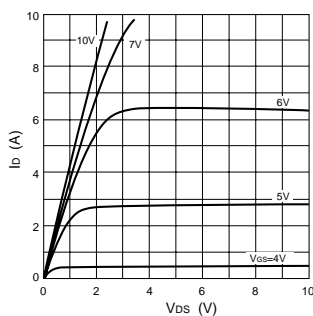
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=250\mu A, V_{GS}=0V$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20V$
I_{DSS}			250	μA	$V_{DS}=100V, V_{GS}=0V$
V_{TH}	2.0		4.0	V	$V_{DS}=10V, I_D=250\mu A$
$R_{e(yfs)}$	2.4	3.7		S	$V_{DS}=10V, I_D=5A$
$R_{DS(ON)}$		0.27	0.30	Ω	$V_{GS}=10V, I_D=5A$
C_{iss}		350		pF	$V_{DS}=25V, f=1.0MHz, V_{GS}=0V$
C_{oss}		130		pF	
t_{on}		60		ns	$I_D=5A, V_{DD}=50V, V_{GS}=10V$, see Fig. 3 on page 16.
t_{off}		40		ns	
V_{SD}		1.1	1.8	V	$I_{SD}=5A, V_{GS}=0V$
t_{rr}		330		ns	$I_{SD}=\pm 100mA$

Diode for flyback voltage absorption

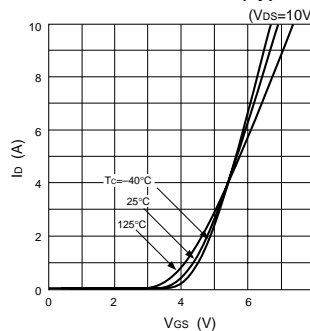
Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	120			V	$I_R=10\mu A$
V_F		1.0	1.2	V	$I_F=1A$
I_R			10	μA	$V_R=120V$
t_{rr}		100		ns	$I_F=\pm 100mA$

Characteristic curves

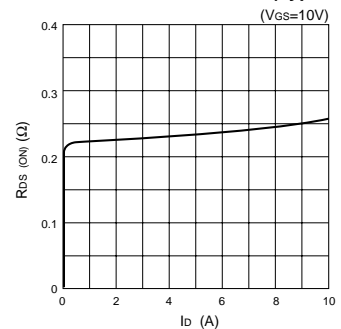
I_D - V_{DS} Characteristics (Typical)



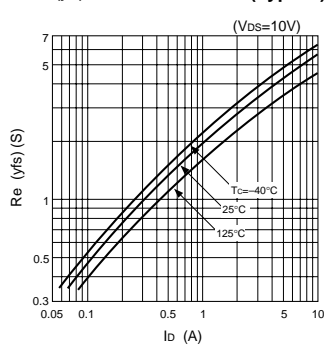
I_D - V_{GS} Characteristics (Typical)



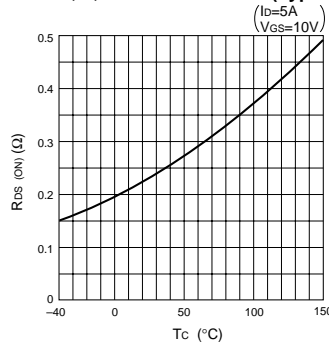
$R_{DS(ON)}$ - I_D Characteristics (Typical)



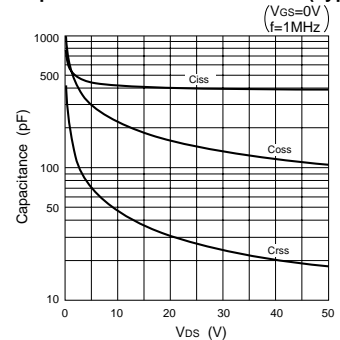
$R_{e(yfs)}$ - I_D Characteristics (Typical)



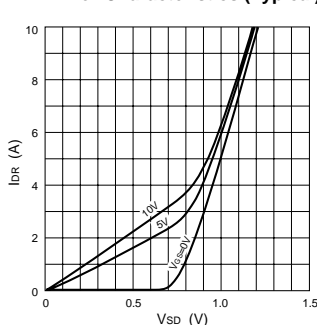
$R_{DS(ON)}$ - T_c Characteristics (Typical)



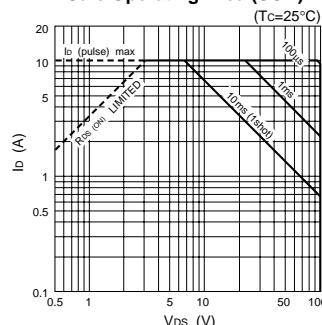
Capacitance- V_{DS} Characteristics (Typical)



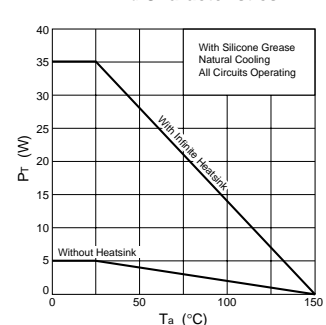
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



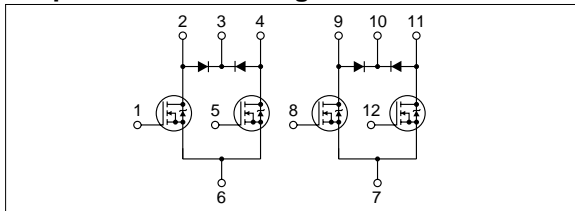
Absolute maximum ratings

(Ta=25°C)

Symbol	Ratings	Unit
V _{DSS}	200	V
V _{GSS}	±20	V
I _D	±5	A
I _{D(pulse)}	±10 (PW≤1ms)	A
E _{AS*}	60	mJ
I _F	5 (PW≤0.5ms, Du≤25%)	A
I _{FSM}	10 (PW≤10ms, Single pulse)	A
V _R	200	V
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)	W
	35 (Tc=25°C, with all circuits operating, with infinite heatsink)	W
θ _{J-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)	°C/W
θ _{J-c}	3.57 (Junction-Case, Tc=25°C, with all circuits operating)	°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T _{ch}	150	°C
T _{stg}	-40 to +150	°C

* : V_{DD}=20V, L=10mH, I_D=3.5A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Electrical characteristics

(Ta=25°C)

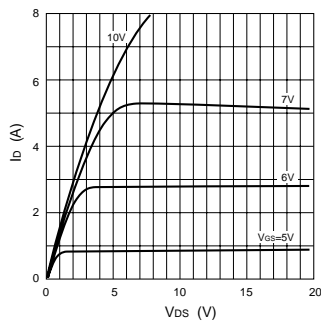
Symbol	Specification			Unit	Conditions
	min	typ	max		
V(BR)DSS	200			V	I _D =250μA, V _{GS} =0V
I _{GSS}			±500	nA	V _{GS} =±20V
I _{DSS}			250	μA	V _{DS} =200V, V _{GS} =0V
V _{TH}	2.0		4.0	V	V _{DS} =10V, I _D =250μA
Re(yfs)	1.3	2.5		S	V _{DS} =10V, I _D =5A
R _{DS(ON)}		0.67	0.9	Ω	V _{GS} =10V, I _D =5A
C _{iss}		260		pF	V _{DS} =25V, f=1.0MHz, V _{GS} =0V
C _{oss}		100		pF	
ton		50		ns	I _D =5A, V _{DD} =100V, V _{GS} =10V, see Fig. 3 on page 16.
toff		60		ns	
V _{SD}		1.1	1.5	V	I _{SD} =5A, V _{GS} =0V
t _{rr}		700		ns	I _{SD} =±100mA

Diode for flyback voltage absorption (1 circuit)

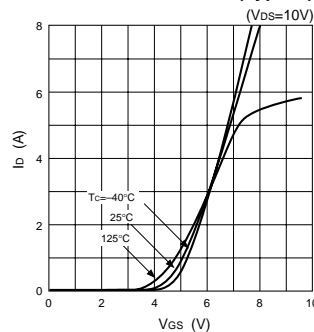
Symbol	Specification			Unit	Conditions
	min	typ	max		
V _R	200			V	I _R =10μA
V _F		1.0	1.2	V	I _F =1A
		1.5	2.0	V	I _F =5A
I _R			10	μA	V _R =200V
t _{rr}		100		ns	I _F =±100mA

Characteristic curves

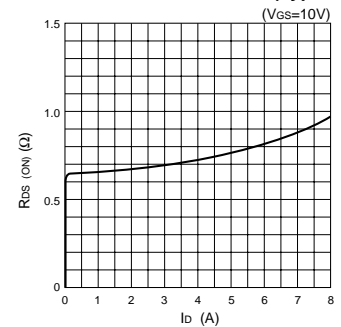
I_D-V_{DS} Characteristics (Typical)



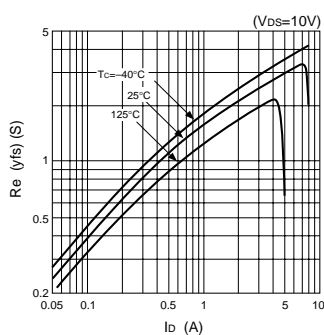
I_D-V_{GS} Characteristics (Typical)



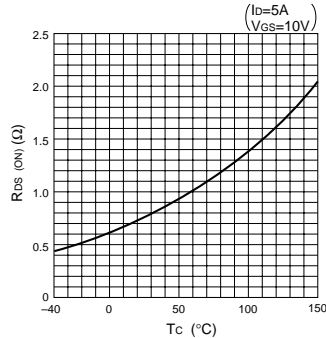
R_{DS(ON)}-I_D Characteristics (Typical)



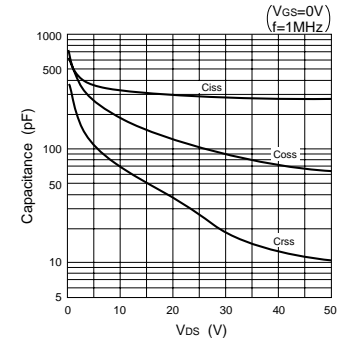
Re(y_{fs})-I_D Characteristics (Typical)



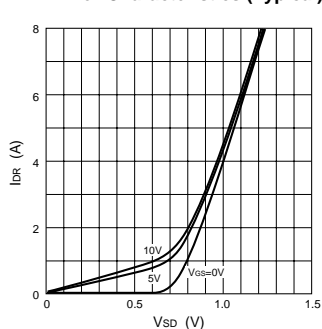
R_{DS(ON)}-T_C Characteristics (Typical)



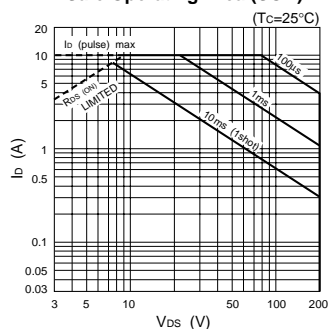
Capacitance-V_{DS} Characteristics (Typical)



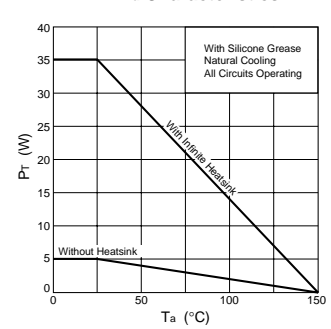
I_{DR}-V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T-T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

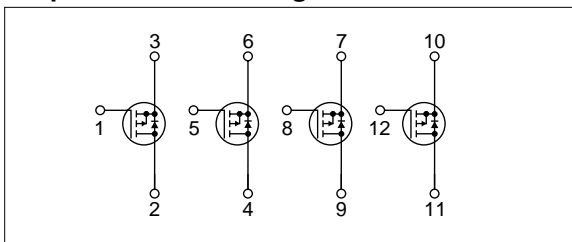
Symbol	Ratings	Unit
V_{DSS}	-60	V
V_{GSS}	∓ 20	V
I_D	∓ 5	A
$I_D(\text{pulse})$	∓ 10 ($PW \leq 1\text{ms}$)	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

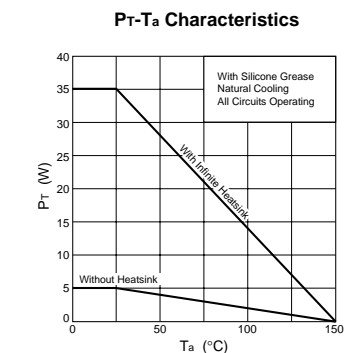
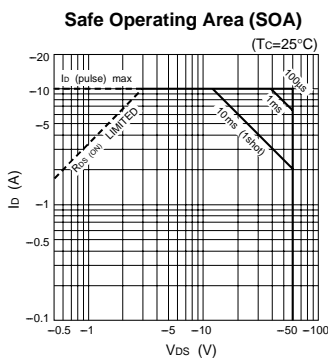
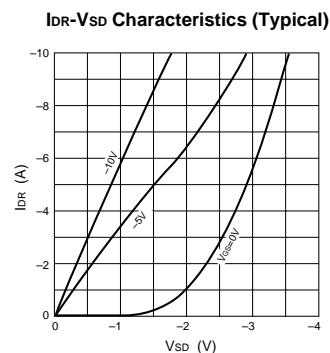
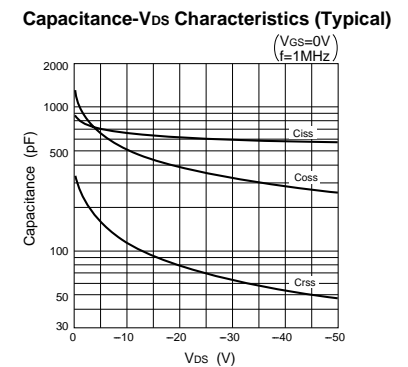
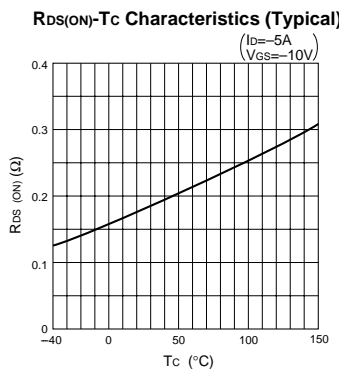
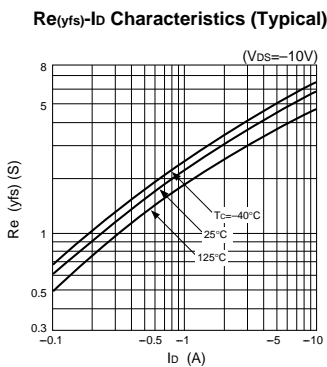
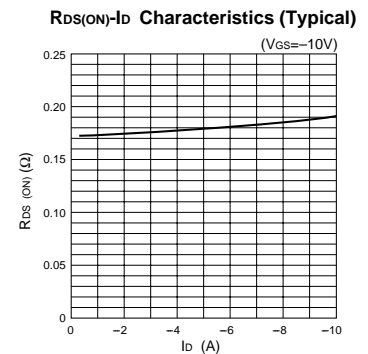
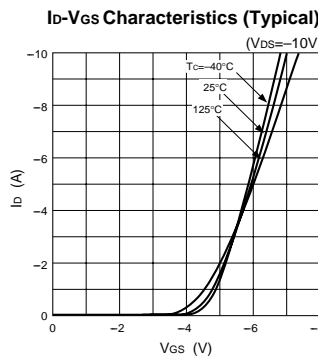
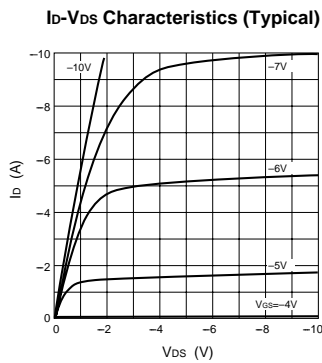
($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	-60			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			∓ 500	nA	$V_{DS}=\mp 20\text{V}$
I_{DSS}			-250	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$Re(yfs)$	2.3	3.5		S	$V_{DS}=-10\text{V}$, $I_D=-5\text{A}$
$R_{DS(ON)}$		0.22	0.30	Ω	$V_{GS}=-10\text{V}$, $I_D=-5\text{A}$
C_{iss}		570		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		360		pF	
t_{on}		100		ns	$I_D=-5\text{A}$, $V_{DD}=-30\text{V}$, $V_{GS}=-10\text{V}$
t_{off}		60		ns	see Fig. 4 on page 16.
V_{SD}		-4.5	-5.5	V	$I_{SD}=-5\text{A}$
t_{rr}		150		ns	$I_{SD}=\mp 100\text{mA}$

Equivalent circuit diagram



Characteristic curves



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

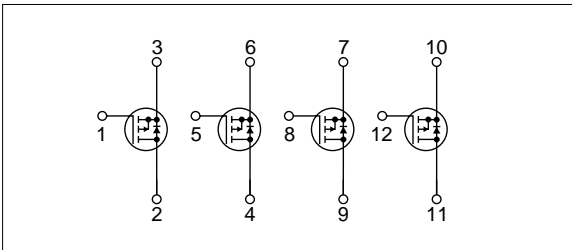
Symbol	Ratings	Unit
V_{DSS}	-100	V
V_{GSS}	± 20	V
I_D	± 5	A
$I_{D(pulse)}$	± 10 ($PW \leq 1\text{ms}$)	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

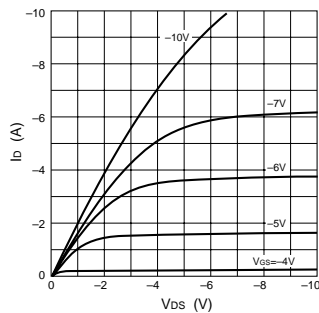
Symbol	Specifications			Unit	Condition
	min	typ	max		
$V_{(BR)DSS}$	-100			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			-250	μA	$V_{DS}=-100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$R_{e(yfs)}$	0.9	2.0		S	$V_{DS}=-10\text{V}$, $I_D=-5\text{A}$
$R_{DS(ON)}$		0.55	0.7	Ω	$V_{GS}=-10\text{V}$, $I_D=-5\text{A}$
C_{iss}		300		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		200		pF	
t_{on}		150		ns	$I_D=-5\text{A}$, $V_{DD}=-50\text{V}$, $V_{GS}=-10\text{V}$, see Fig. 4 on page 16.
t_{off}		200		ns	
V_{SD}		-4.5	-5.5	V	$I_{SD}=-5\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		220		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

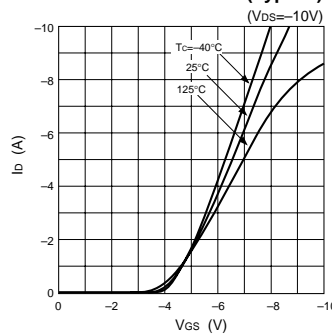


Characteristic curves

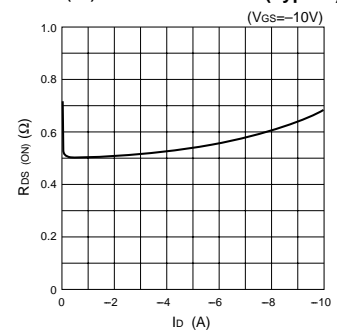
I_D - V_{DS} Characteristics (Typical)



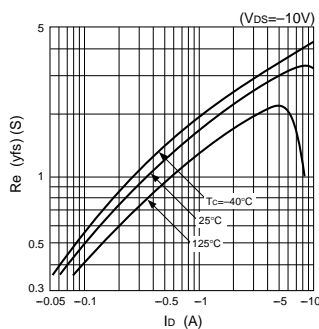
I_D - V_{GS} Characteristics (Typical)



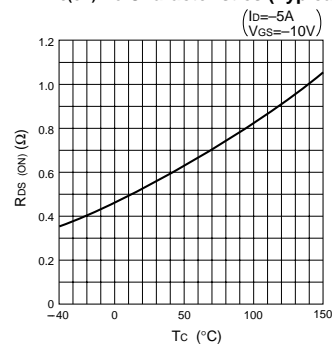
$R_{DS(ON)}$ - I_D Characteristics (Typical)



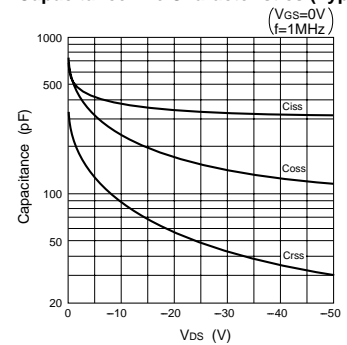
$R_{e(yfs)}$ - I_D Characteristics (Typical)



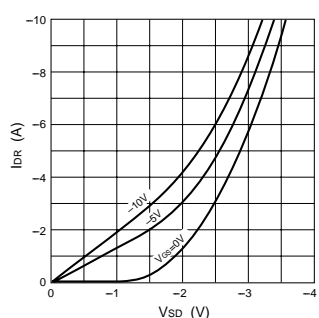
$R_{DS(ON)}$ - T_c Characteristics (Typical)



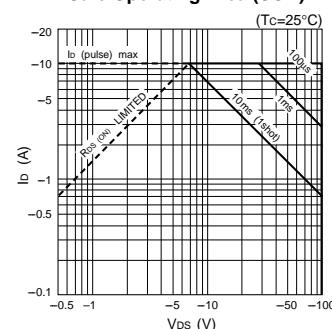
Capacitance- V_{DS} Characteristics (Typical)



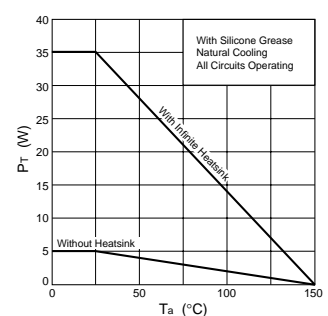
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	-100	V
V_{GSS}	∓ 20	V
I_D	∓ 5	A
$I_{D(\text{pulse})}$	∓ 10 (PW $\leq 1\text{ms}$)	A
I_F	5 (PW $\leq 0.5\text{ms}$, Du $\leq 25\%$)	A
I_{FSM}	10 (PW $\leq 10\text{ms}$, Single pulse)	A
V_R	120	V
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

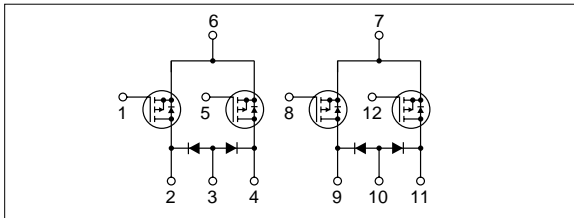
($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Condition
	min	typ	max		
$V_{(BR)DSS}$	-100			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			∓ 500	nA	$V_{GS}=\mp 20\text{V}$
I_{DSS}			-250	μA	$V_{DS}=-100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$R_{e(yfs)}$	0.9	2.0		S	$V_{DS}=-10\text{V}$, $I_D=-5\text{A}$
$R_{DS(ON)}$		0.55	0.7	Ω	$V_{GS}=-10\text{V}$, $I_D=-5\text{A}$
C_{iss}		300		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		200		pF	
t_{on}		150		ns	$I_D=-5\text{A}$, $V_{DD}=-50\text{V}$, $V_{GS}=-10\text{V}$,
t_{off}		200		ns	see Fig. 4 on page 16.
V_{SD}	-4.5		-5.5	V	$I_{SD}=-5\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		220		ns	$I_{SD}=\mp 100\text{mA}$

Diode for flyback voltage absorption

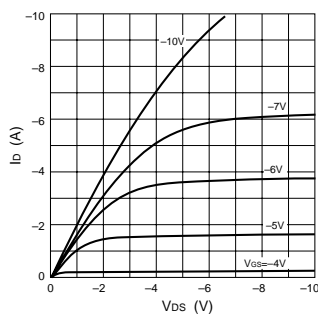
Symbol	Specification			Unit	Condition
	min	typ	max		
V_R	120			V	$I_R=10\mu\text{A}$
V_F		1.0	1.2	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=120\text{V}$
t_{rr}		100		ns	$I_F=\mp 100\text{mA}$

Equivalent circuit diagram

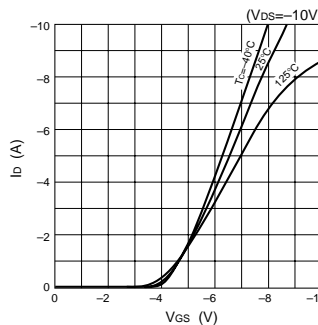


Characteristic curves

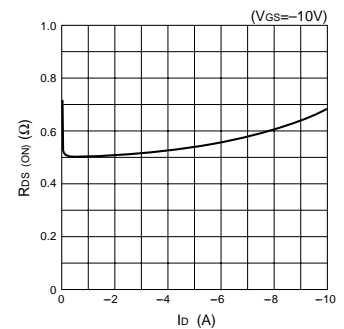
I_D - V_{DS} Characteristics (Typical)



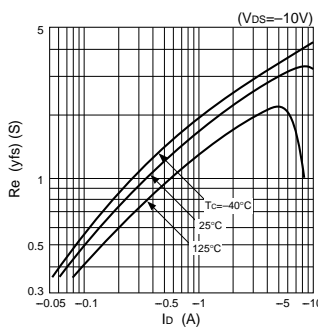
I_D - V_{GS} Characteristics (Typical)



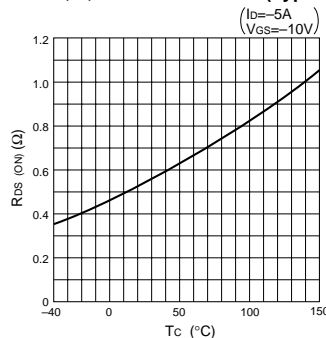
$R_{DS(ON)}$ - I_D Characteristics (Typical)



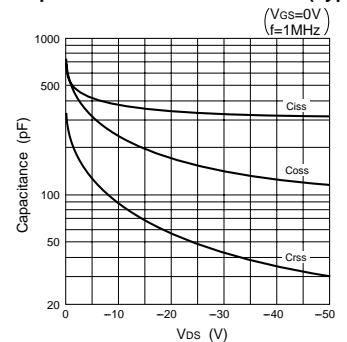
$R_{e(yfs)}$ - I_D Characteristics (Typical)



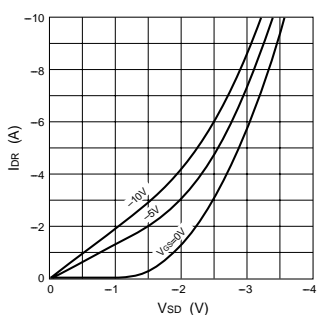
$R_{DS(ON)}$ - T_c Characteristics (Typical)



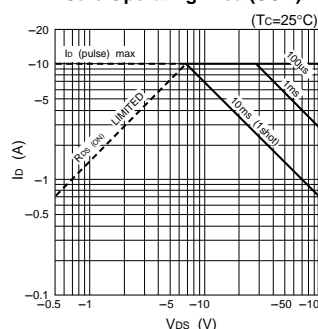
Capacitance- V_{DS} Characteristics (Typical)



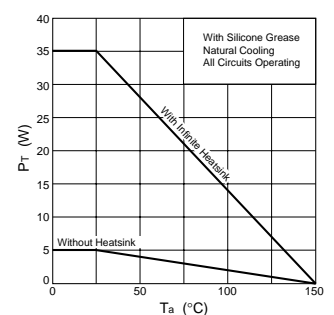
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



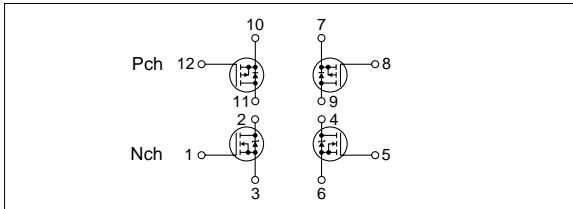
Absolute maximum ratings

(Ta=25°C)

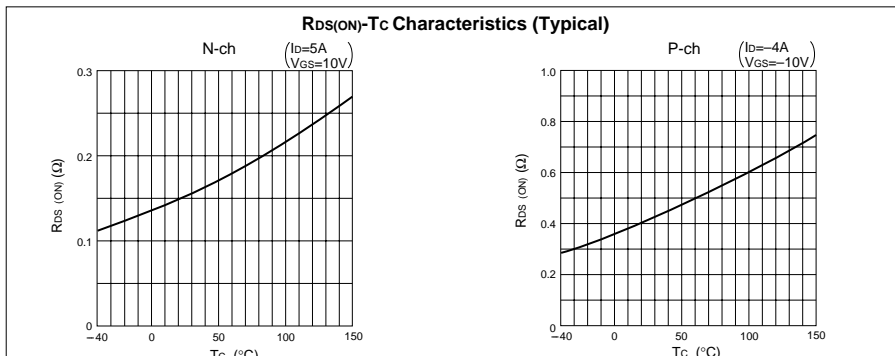
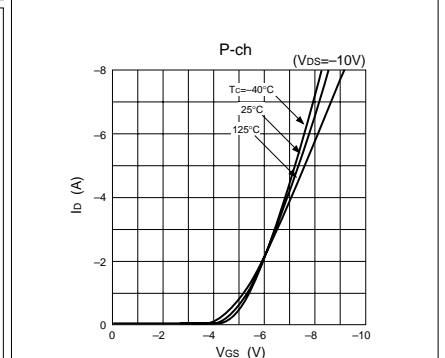
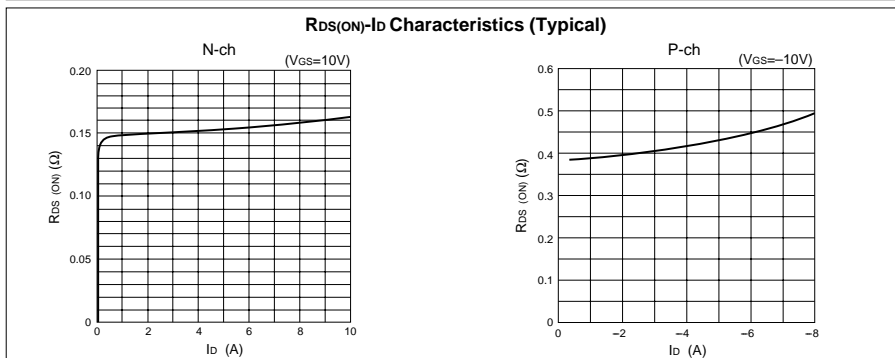
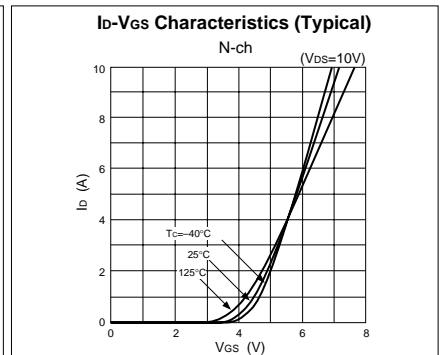
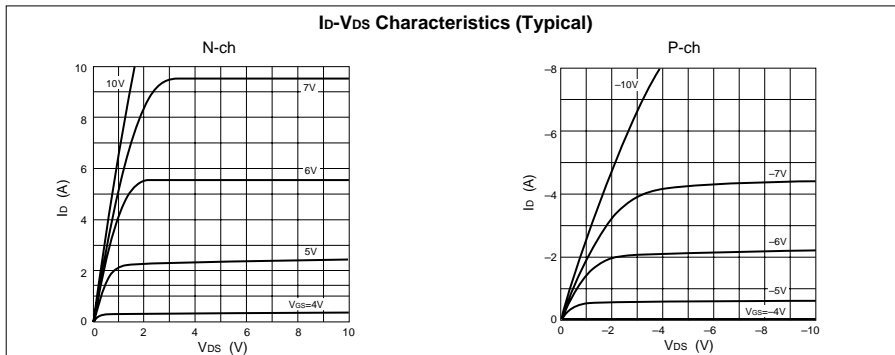
Symbol	Ratings		Unit
	N channel	P channel	
V _{DSS}	60	-60	V
V _{GSS}	±20	∓20	V
I _D	±5	∓4	A
I _{D(pulse)}	±10 (PW≤1ms)	∓8 (PW≤1ms)	A
E _{AS} *	2	—	mJ
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)		W
	35 (Tc=25°C, with all circuits operating, with infinite heatsink)		W
θ _{j-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)		°C/W
θ _{j-c}	3.57 (Junction-Case, Tc=25°C, with all circuits operating)		°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)		V _{rms}
T _{ch}	150		°C
T _{stg}	-40 to +150		°C

* : V_{DD}=20V, L=1mH, I_D=2A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

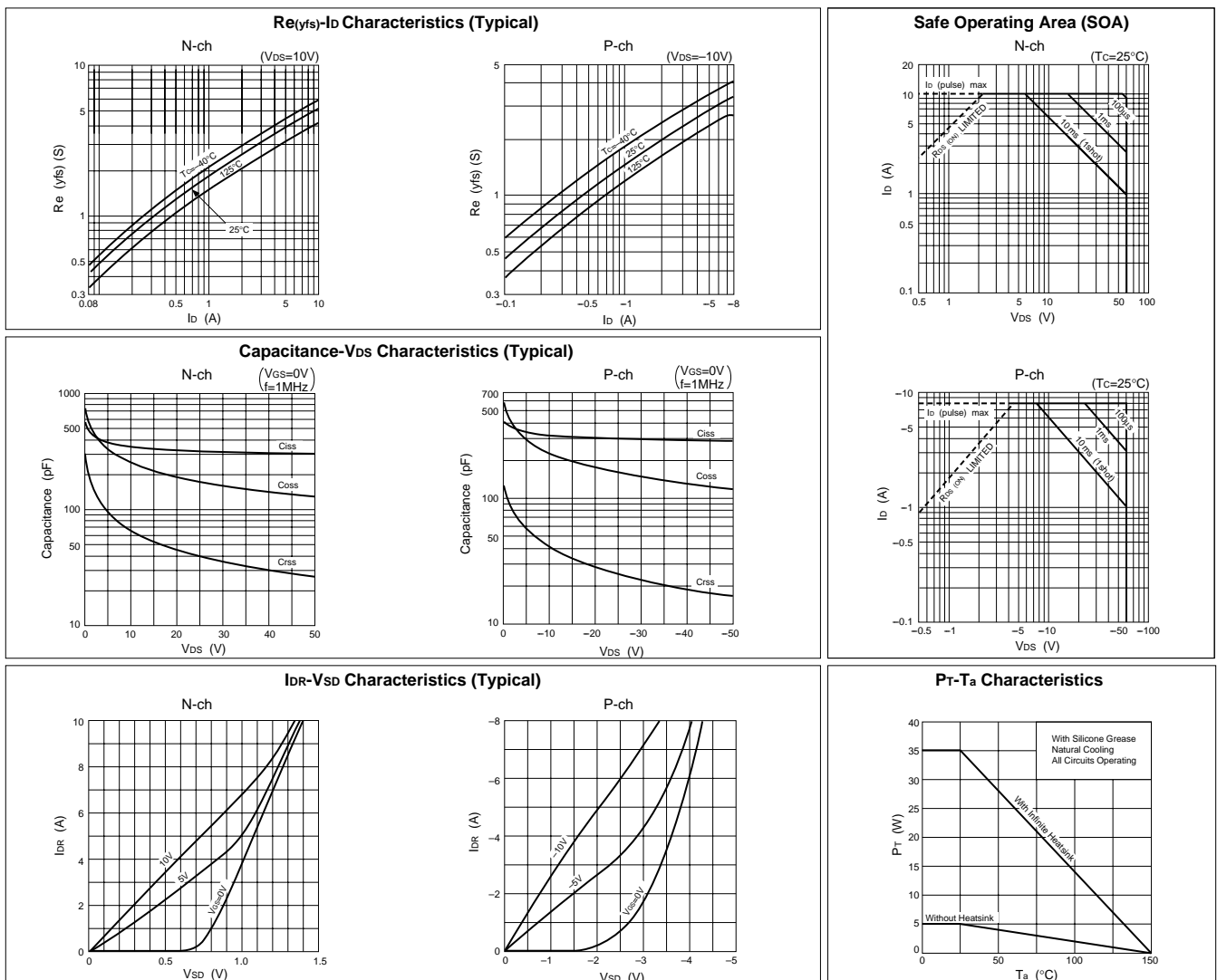


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	-60			V	$I_D=-250\mu\text{A}, V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20\text{V}$			∓ 500	nA	$V_{GS}=\mp 20\text{V}$
I_{DSS}			250	μA	$V_{DS}=60\text{V}, V_{GS}=0\text{V}$			-250	μA	$V_{DS}=-60\text{V}, V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}, I_D=250\mu\text{A}$	-2.0		-4.0	V	$V_{DS}=-10\text{V}, I_D=-250\mu\text{A}$
$Re_{(yfs)}$	2.2	3.3		S	$V_{DS}=10\text{V}, I_D=5\text{A}$	1.6	2.2		S	$V_{DS}=-10\text{V}, I_D=-4\text{A}$
$R_{DS(ON)}$		0.17	0.22	Ω	$V_{GS}=10\text{V}, I_D=5\text{A}$		0.38	0.55	Ω	$V_{GS}=-10\text{V}, I_D=-4\text{A}$
C_{iss}		300		pF	$V_{DS}=25\text{V}, f=1.0\text{MHz},$ $V_{GS}=0\text{V}$		270		pF	$V_{DS}=-25\text{V}, f=1.0\text{MHz},$ $V_{GS}=0\text{V}$
C_{oss}		160		pF			170		pF	
t_{on}		35		ns	$I_D=5\text{A}, V_{DD}\div 30\text{V}, V_{GS}=10\text{V}$		60		ns	$I_D=-4\text{A}, V_{DD}\div -30\text{V}, V_{GS}=10\text{V}$
t_{off}		35		ns	see Fig. 3 on page 16.		60		ns	see Fig. 4 on page 16.
V_{SD}		1.1	1.5	V	$I_{SD}=5\text{A}, V_{GS}=0\text{V}$		-4.4	-5.5	V	$I_{SD}=-4\text{A}, V_{GS}=0\text{V}$
t_{rr}		140		ns	$I_{SD}=\pm 100\text{mA}$		150		ns	$I_{SD}=\mp 100\text{mA}$

Characteristic curves



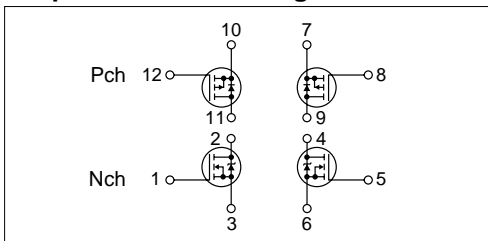
Absolute maximum ratings

(Ta=25°C)

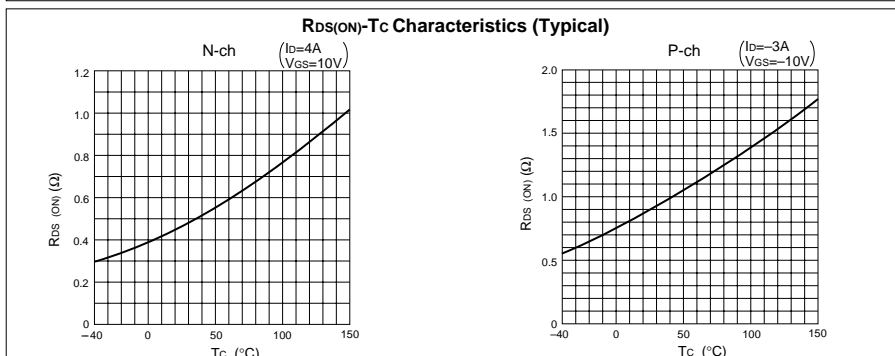
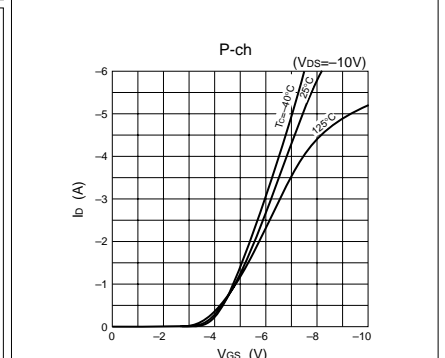
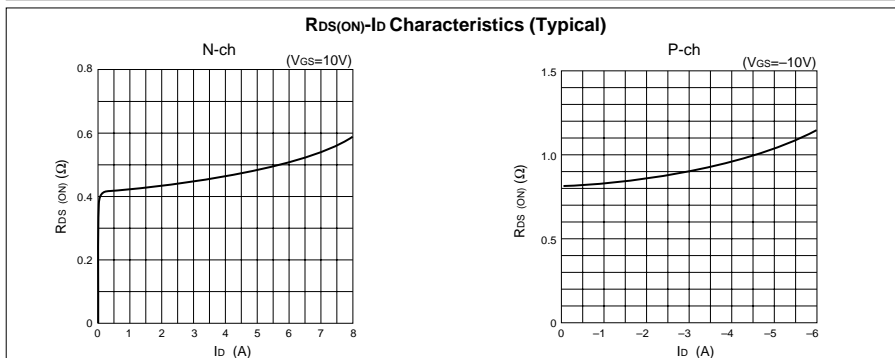
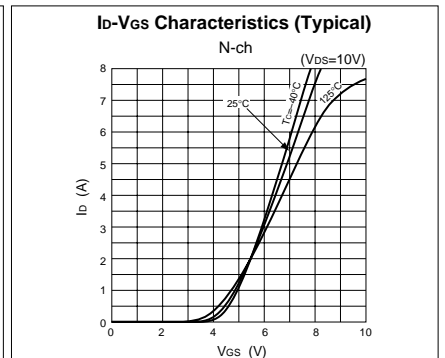
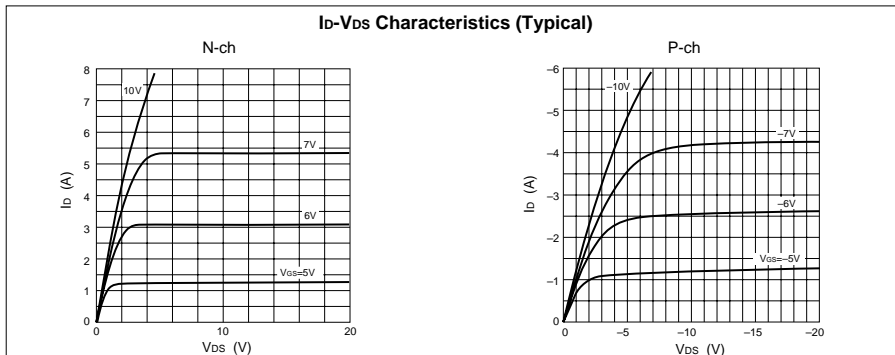
Symbol	Ratings		Unit
	N channel	P channel	
V _{DSS}	100	-100	V
V _{GSS}	±20	∓20	V
I _D	±4	∓3	A
I _{D(pulse)}	±8 (PW≤1ms)	∓6 (PW≤1ms)	A
E _{AS} *	15	—	mJ
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)		W
	35 (Tc=25°C, with all circuits operating, with infinite heatsink)		W
θ _{j-c}	3.57		°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)		V _{rms}
T _{ch}	150		°C
T _{stg}	-40 to +150		°C

*: V_{DD}=20V, L=1mH, I_D=5A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

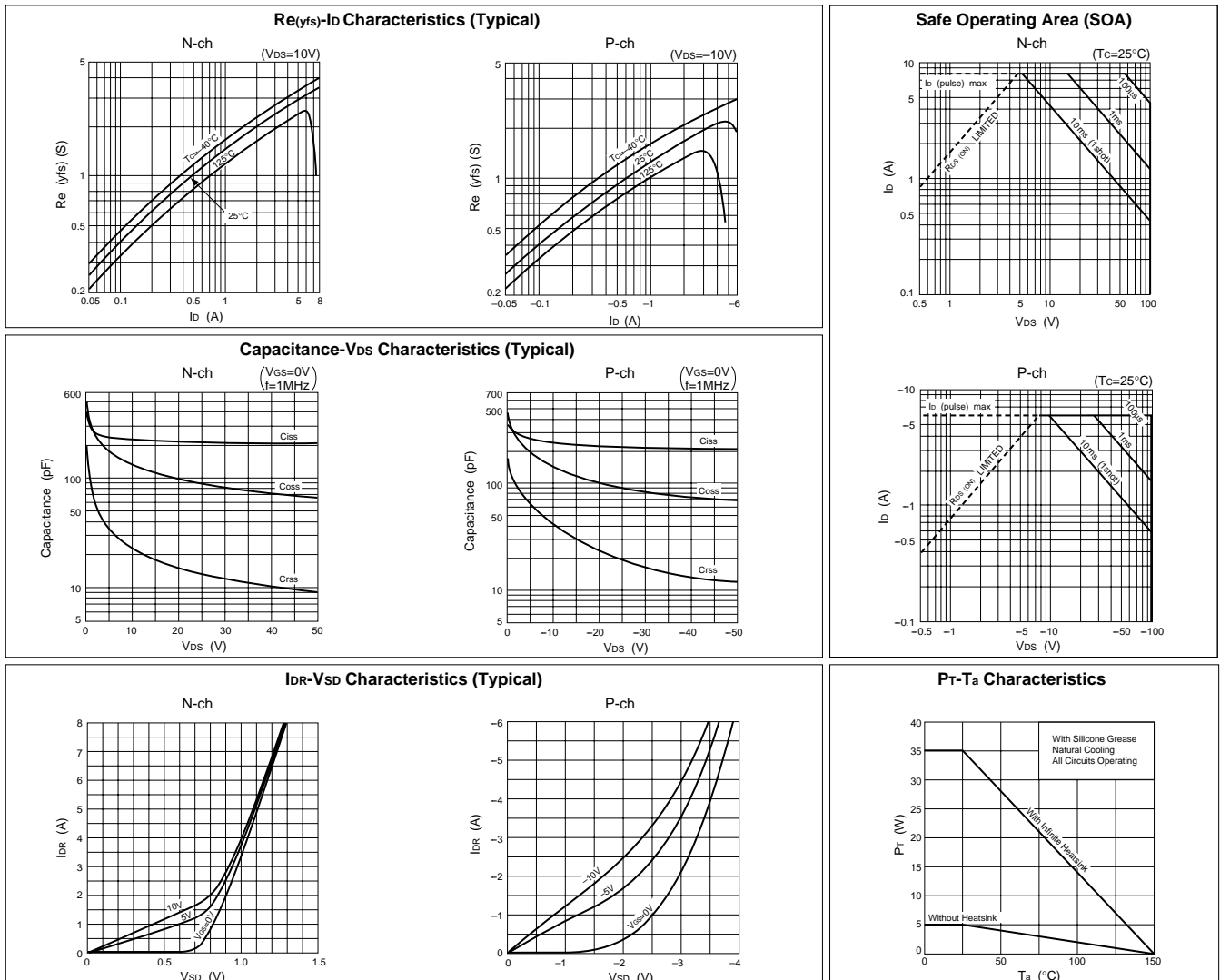


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specifications			Unit	Conditions	Specifications			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	-100			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20\text{V}$			∓ 500	nA	$V_{GS}=\mp 20\text{V}$
I_{DSS}			250	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$			-250	μA	$V_{DS}=-100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$R_{e(yfs)}$	1.1	1.7		S	$V_{DS}=10\text{V}$, $I_D=4\text{A}$	0.7	1.1		S	$V_{DS}=-10\text{V}$, $I_D=-3\text{A}$
$R_{DS(ON)}$		0.50	0.60	Ω	$V_{GS}=10\text{V}$, $I_D=4\text{A}$		1.1	1.3	Ω	$V_{GS}=-10\text{V}$, $I_D=-3\text{A}$
C_{iss}		180		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$		180		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		82		pF			85		pF	
t_{on}		40		ns	$I_D=4\text{A}$, $V_{DD}=\pm 50\text{V}$, $V_{GS}=-10\text{V}$,		90		ns	$I_D=-3\text{A}$, $V_{DD}=\pm 50\text{V}$, $V_{GS}=-10\text{V}$,
t_{off}		40		ns	see Fig. 3 on page 16.		80		ns	see Fig. 4 on page 16.
V_{SD}		1.2	2.0	V	$I_{SD}=4\text{A}$		-4.0	-5.5	V	$I_{SD}=-3\text{A}$
t_{rr}		250		ns	$I_{SD}=\pm 100\text{mA}$		250		ns	$I_{SD}=\mp 100\text{mA}$

Characteristic curves



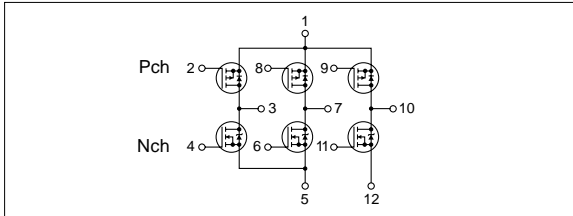
Absolute maximum ratings

(Ta=25°C)

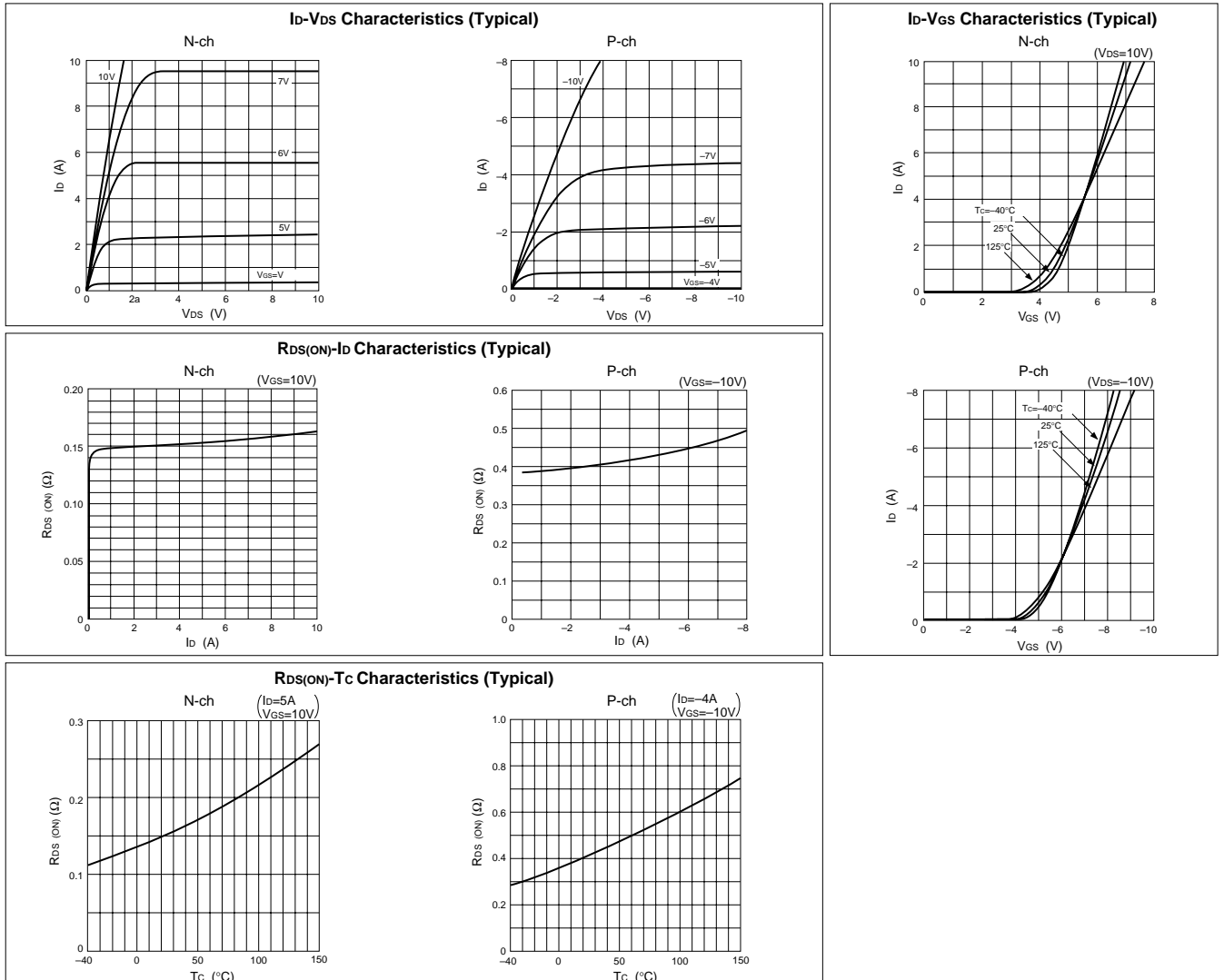
Symbol	Ratings		Unit
	N channel	P channel	
V _{DSS}	60	-60	V
V _{GSS}	±20	∓20	V
I _D	±5	∓4	A
I _{D(pulse)}	±10 (PW≤1ms)	∓8 (PW≤1ms)	A
E _{AS} *	2	—	mJ
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)		W
	35 (Tc=25°C, with all circuits operating, with infinite heatsink)		W
θ _{j-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)		°C/W
θ _{j-c}	3.57 (Junction-Case, Tc=25°C, with all circuits operating)		°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)		V _{rms}
T _{ch}	150		°C
T _{stg}	-40 to +150		°C

* : V_{DD}=20V, L=1mH, I_D=2A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

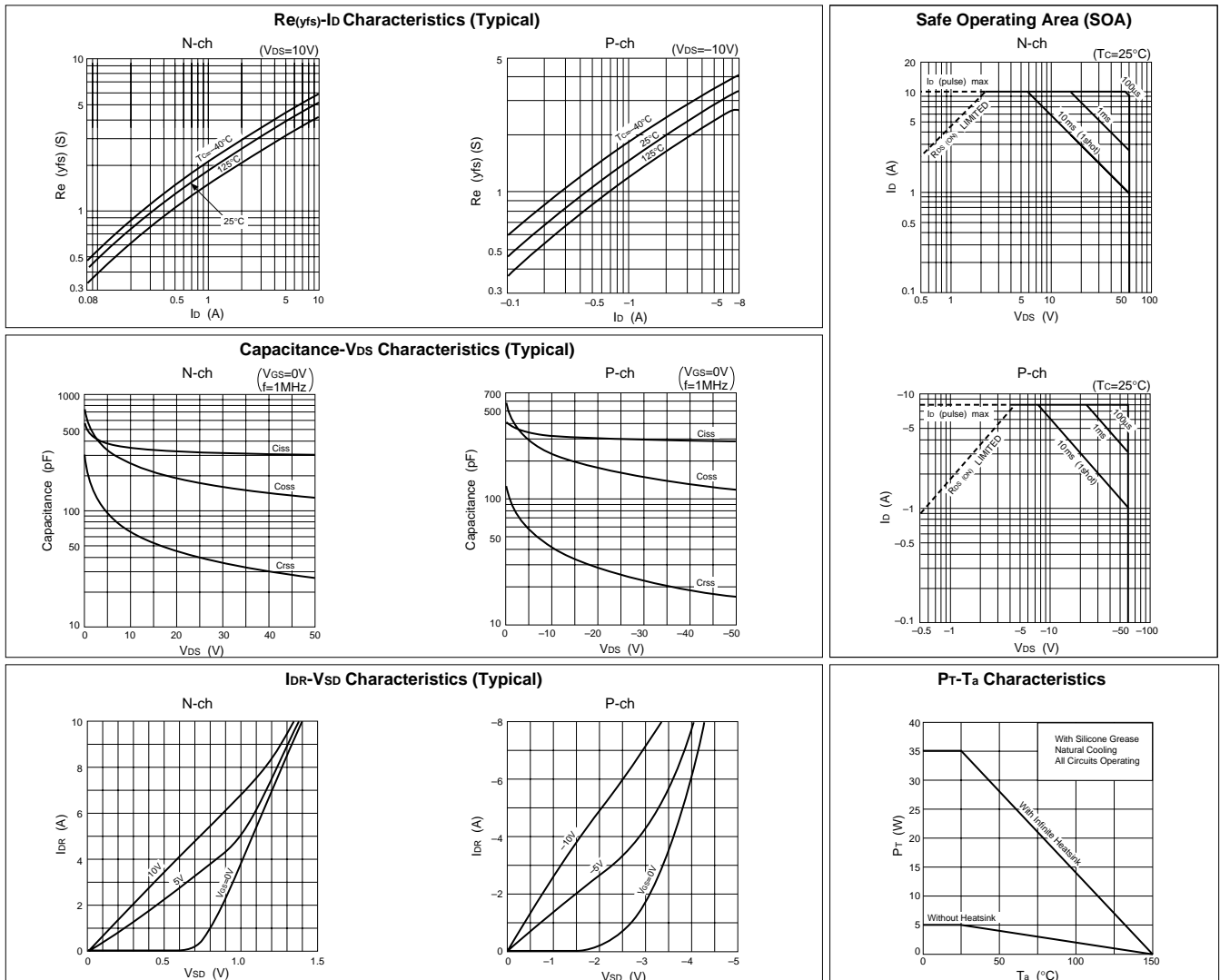


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	-60			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20\text{V}$			∓ 500	nA	$V_{GS}=\mp 20\text{V}$
I_{DSS}			250	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$			-250	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$R_{e(yfs)}$	2.2	3.3		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$	1.6	2.2		S	$V_{DS}=-10\text{V}$, $I_D=-4\text{A}$
$R_{DS(ON)}$		0.17	0.22	Ω	$V_{GS}=10\text{V}$, $I_D=5\text{A}$		0.38	0.55	Ω	$V_{GS}=-10\text{V}$, $I_D=-4\text{A}$
C_{iss}		300		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$		270		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		160		pF			170		pF	
t_{on}		35		ns	$I_D=5\text{A}$, $V_{DD}=30\text{V}$, $V_{GS}=-10\text{V}$,		60		ns	$I_D=-4\text{A}$, $V_{DD}=-30\text{V}$, $V_{GS}=-10\text{V}$,
t_{off}		35		ns	see Fig. 3 on page 16.		60		ns	see Fig. 4 on page 16.
V_{SD}		1.1	1.5	V	$I_{SD}=5\text{A}$, $V_{GS}=0\text{V}$		-4.4	-5.5	V	$I_{SD}=-4\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		140		ns	$I_{SD}=\pm 100\text{mA}$		150		ns	$I_{SD}=\mp 100\text{mA}$

Characteristic curves



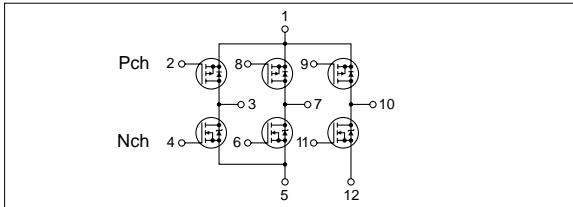
Absolute maximum ratings

(Ta=25°C)

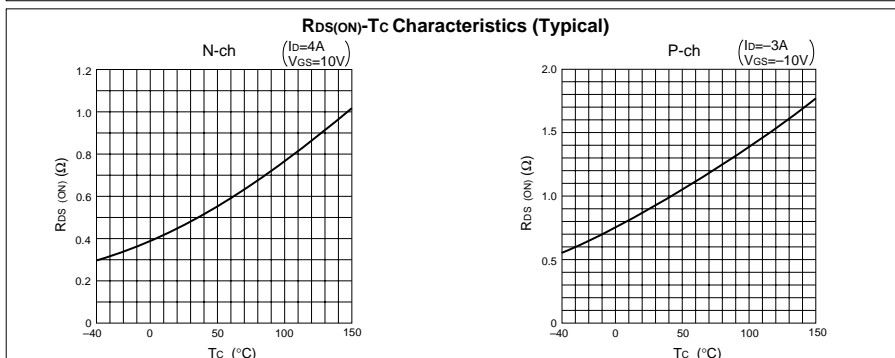
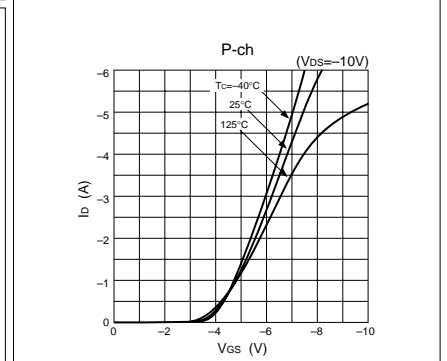
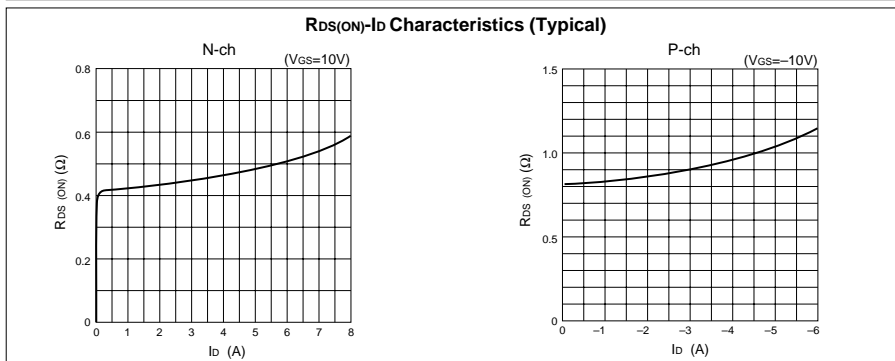
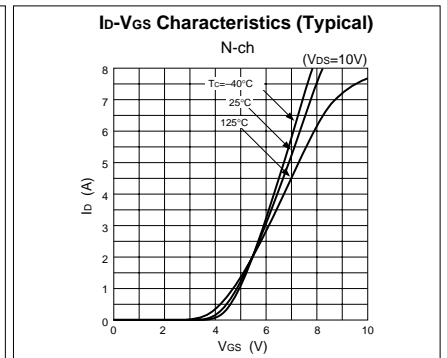
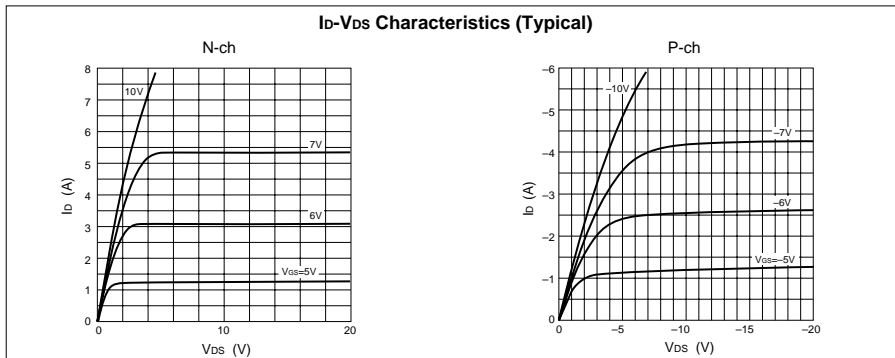
Symbol	Ratings		Unit
	N channel	P channel	
V _{DSS}	100	-100	V
V _{GSS}	±20	∓20	V
I _D	±4	∓3	A
I _{D(pulse)}	±8 (PW≤1ms)	∓6 (PW≤1ms)	A
E _{AS} *	16	—	mJ
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)		W
	35 (Tc=25°C, with all circuits operating, with infinite heatsink)		W
θ _{j-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)		°C/W
θ _{j-c}	3.57 (Junction-Case, Tc=25°C, with all circuits operating)		°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)		V _{rms}
T _{ch}	150		°C
T _{stg}	-40 to +150		°C

* : V_{DD}=20V, L=1mH, I_D=5A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

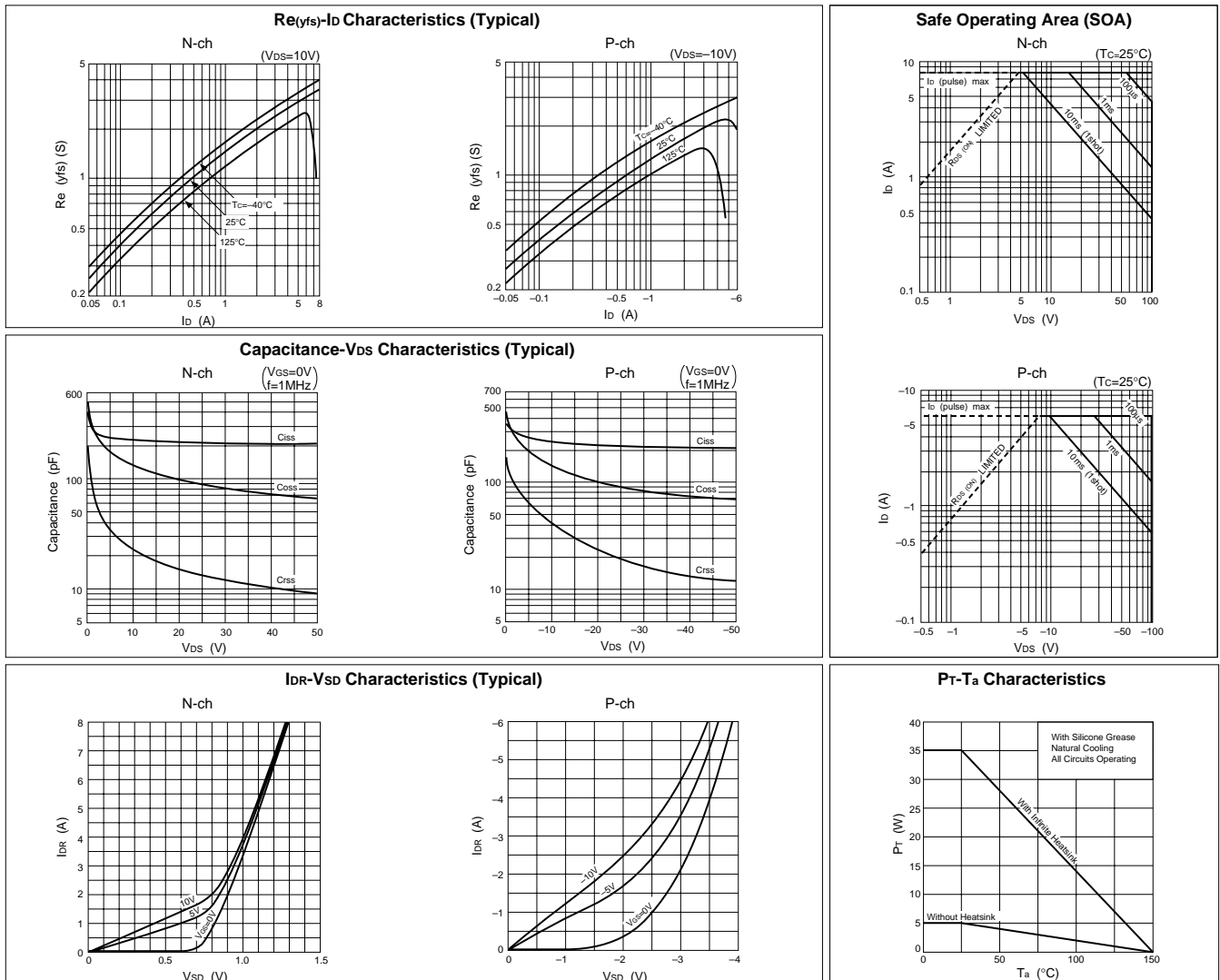


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	-100			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20\text{V}$			∓ 500	nA	$V_{GS}=\mp 20\text{V}$
I_{DSS}			250	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$			-250	μA	$V_{DS}=-100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$R_{e(yfs)}$	1.1	1.7		S	$V_{DS}=10\text{V}$, $I_D=4\text{A}$	0.7	1.1		S	$V_{DS}=-10\text{V}$, $I_D=-3\text{A}$
$R_{DS(ON)}$		0.50	0.60	Ω	$V_{GS}=10\text{V}$, $I_D=4\text{A}$		1.1	1.3	Ω	$V_{GS}=-10\text{V}$, $I_D=-3\text{A}$
C_{iss}		180		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$		180		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		82		pF			85		pF	
t_{on}		40		ns	$I_D=4\text{A}$, $V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$,		90		ns	$I_D=-3\text{A}$, $V_{DD}=-50\text{V}$, $V_{GS}=-10\text{V}$,
t_{off}		40		ns	see Fig. 3 on page 16.		80		ns	see Fig. 4 on page 16.
V_{SD}		1.2	2.0	V	$I_{SD}=4\text{A}$, $V_{GS}=0\text{V}$		-4.0	-5.5	V	$I_{SD}=-3\text{A}$
t_{rr}		250		ns	$I_{SD}=\pm 100\text{mA}$		250		ns	$I_{SD}=\mp 100\text{mA}$

Characteristic curves



Absolute maximum ratings

(Ta=25°C)

Symbol	Ratings	Unit
V _{DSS}	60	V
V _{GSS}	±20	V
I _D	±5	A
I _{D(pulse)}	±10(PW≤1ms)	A
E _{AS} *	2	mJ
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)	W
	35 (Tc=25°C, with all circuits operating, with infinite heatsink)	W
θ _{j-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)	°C/W
θ _{j-c}	3.57 (Junction-Case, Tc=25°C, with all circuits operating)	°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T _{ch}	150	°C
T _{stg}	-40 to +150	°C

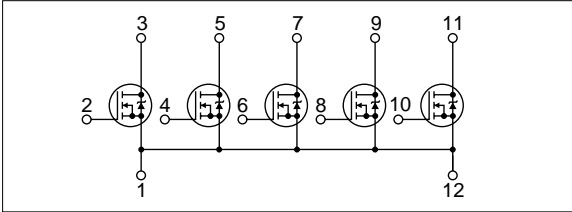
Electrical characteristics

(Ta=25°C)

Symbol	Specification			Unit	Conditions
	min	typ	max		
V _{(BR)DSS}	60			V	I _D =250μA, V _{GS} =0V
I _{GSS}			±500	nA	V _{GS} =±20V
I _{DSS}			250	μA	V _{DS} =60V, V _{GS} =0V
V _{TH}	2.0		4.0	V	V _{DS} =10V, I _D =250μA
Re(yfs)	2.2	3.3		S	V _{DS} =10V, I _D =5A
R _{DS(ON)}		0.17	0.22	Ω	V _{GS} =10V, I _D =5A
C _{ISS}		300		pF	V _{DS} =25V, f=1.0MHz, V _{GS} =0V
C _{OSS}		160		pF	
ton		35		ns	I _D =5A, V _{DD} =30V, V _{GS} =10V, see Fig. 3 on page 16.
toff		35		ns	
V _{SD}		1.1	1.5	V	I _{SD} =5A
trr		150		ns	I _{SD} =±100mA

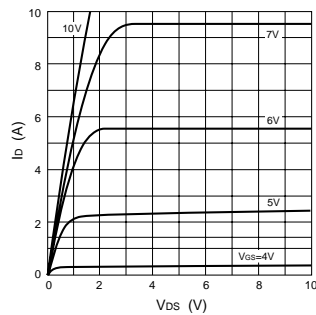
* : V_{DD}=20V, L=1mH, I_b=1.5A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram

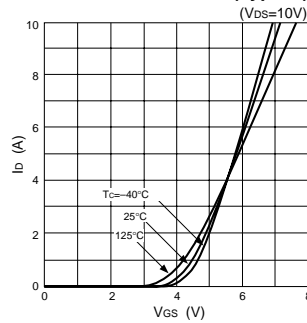


Characteristic curves

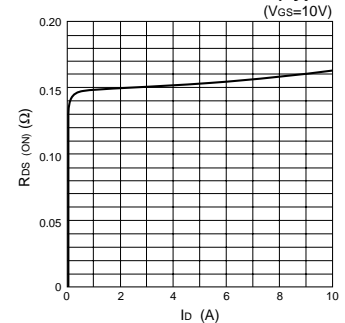
I_D-V_{DS} Characteristics (Typical)



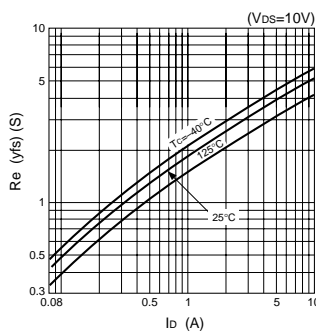
I_D-V_{GS} Characteristics (Typical)



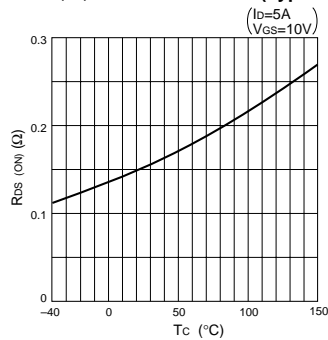
R_{DS(ON)}-I_D Characteristics (Typical)



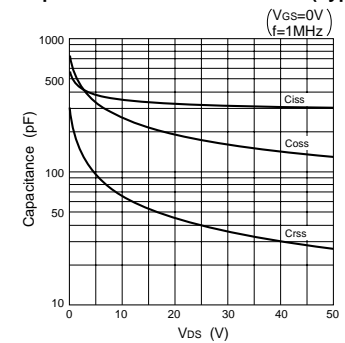
Re(y_{fs})-I_D Characteristics (Typical)



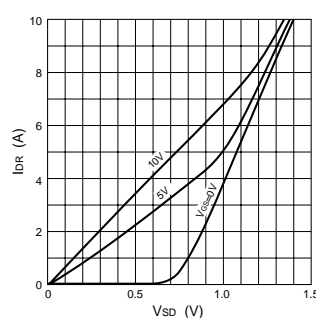
R_{DS(ON)}-T_C Characteristics (Typical)



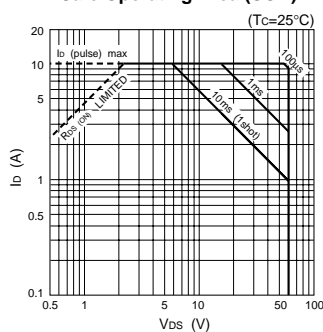
Capacitance-V_{DS} Characteristics (Typical)



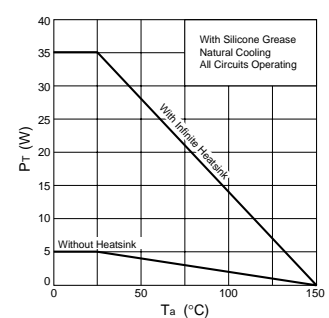
I_{DR}-V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T-T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

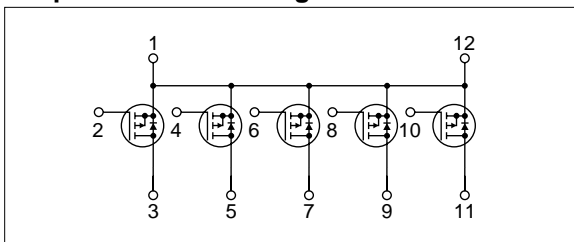
Symbol	Ratings	Unit
V_{DSS}	-60	V
V_{GSS}	± 20	V
I_D	± 5	A
$I_D(\text{pulse})$	± 10 ($PW \leq 1\text{ms}$)	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

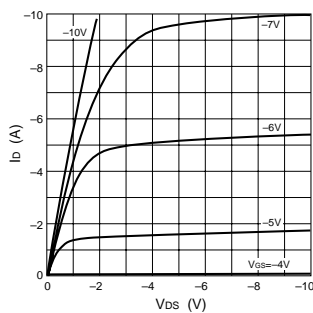
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	-60			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{DS}=\pm 20\text{V}$
I_{DSS}			-250	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$R_{e(yfs)}$	2.3	3.5		S	$V_{DS}=-10\text{V}$, $I_D=-5\text{A}$
$R_{DS(ON)}$		0.22	0.30	Ω	$V_{GS}=-10\text{V}$, $I_D=-5\text{A}$
C_{iss}		570		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		360		pF	$V_{GS}=0\text{V}$
t_{on}		100		ns	$I_D=-5\text{A}$, $V_{DD}=-30\text{V}$, $V_{GS}=-10\text{V}$, see Fig. 3 on page 16.
t_{off}		60		ns	
V_{SD}		-4.5	-5.5	V	$I_{SD}=-5\text{A}$
t_{rr}		150		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

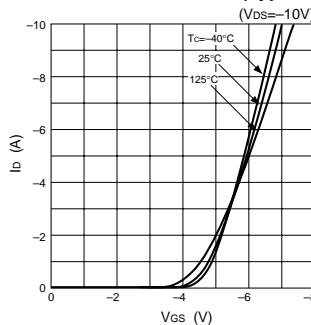


Characteristic curves

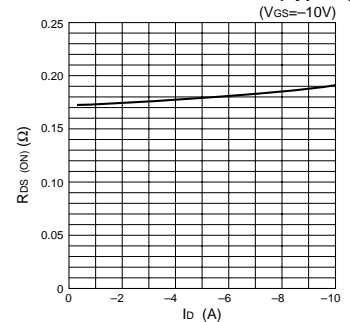
I_D - V_{DS} Characteristics (Typical)



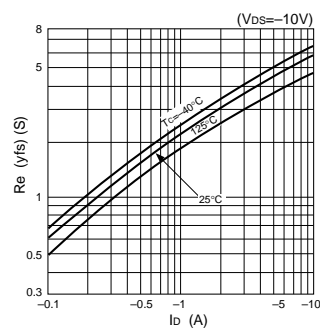
I_D - V_{GS} Characteristics (Typical)



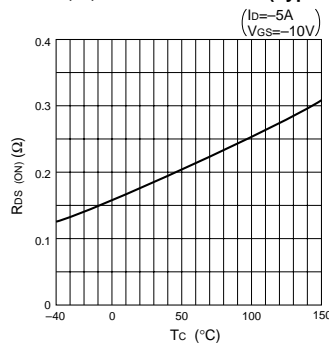
$R_{DS(ON)}$ - I_D Characteristics (Typical)



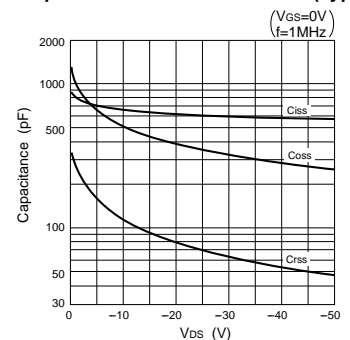
$R_{e(yfs)}$ - I_D Characteristics (Typical)



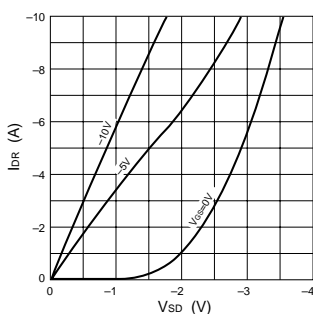
$R_{DS(ON)}$ - T_c Characteristics (Typical)



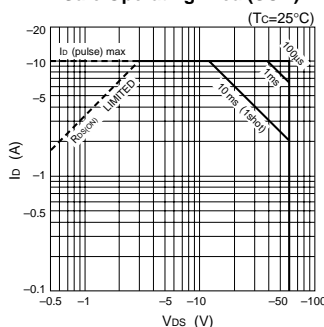
Capacitance- V_{DS} Characteristics (Typical)



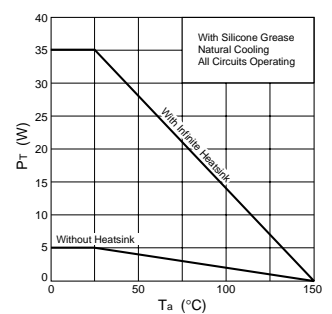
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



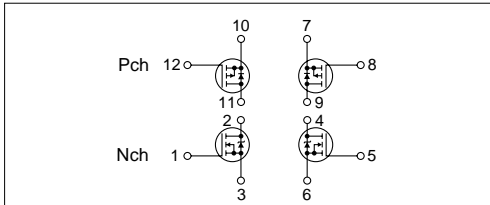
Absolute maximum ratings

(Ta=25°C)

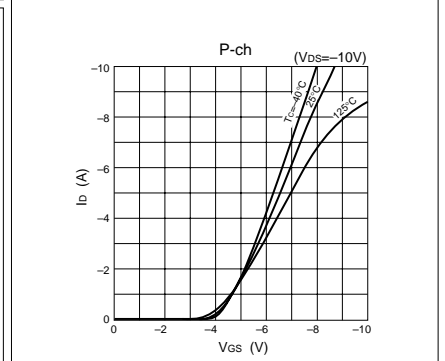
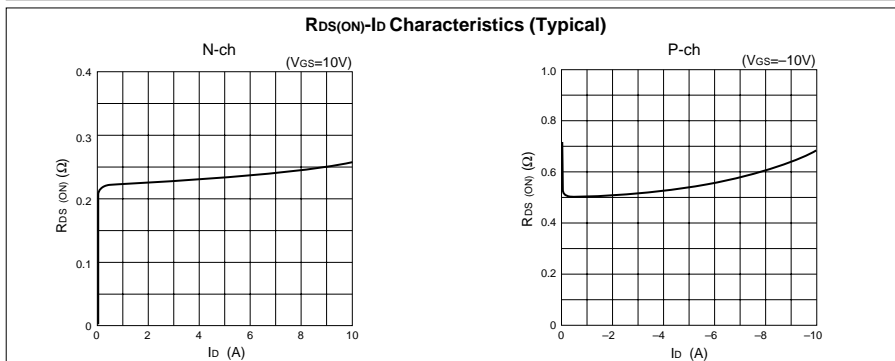
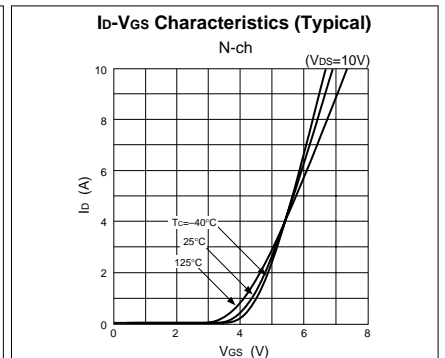
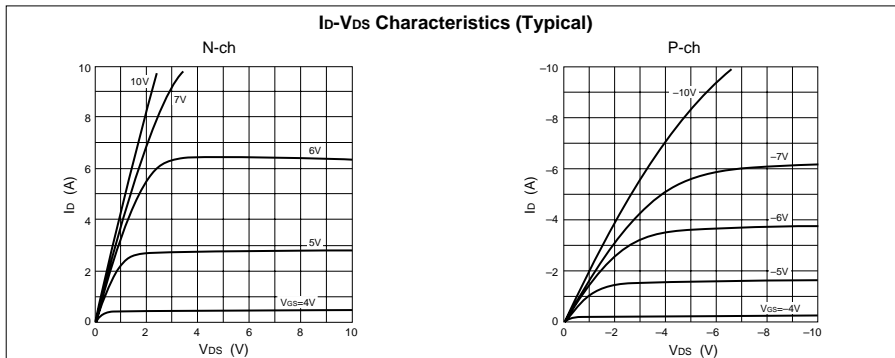
Symbol	Ratings		Unit
	N channel	P channel	
V _{DSS}	100	-100	V
V _{GSS}	±20	∓20	V
I _D	±5	∓5	A
I _{D(pulse)}	±10 (PW≤1ms)	∓10 (PW≤1ms)	A
E _{AS} *	30	—	mJ
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)		W
	35 (Tc=25°C, with all circuits operating, with infinite heatsink)		W
θ _{j-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)		°C/W
θ _{j-c}	3.57 (Junction-Case, Tc=25°C, with all circuits operating)		°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)		V _{rms}
T _{ch}	150		°C
T _{stg}	-40 to +150		°C

* : V_{DD}=20V, L=10mH, I_D=2.5A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

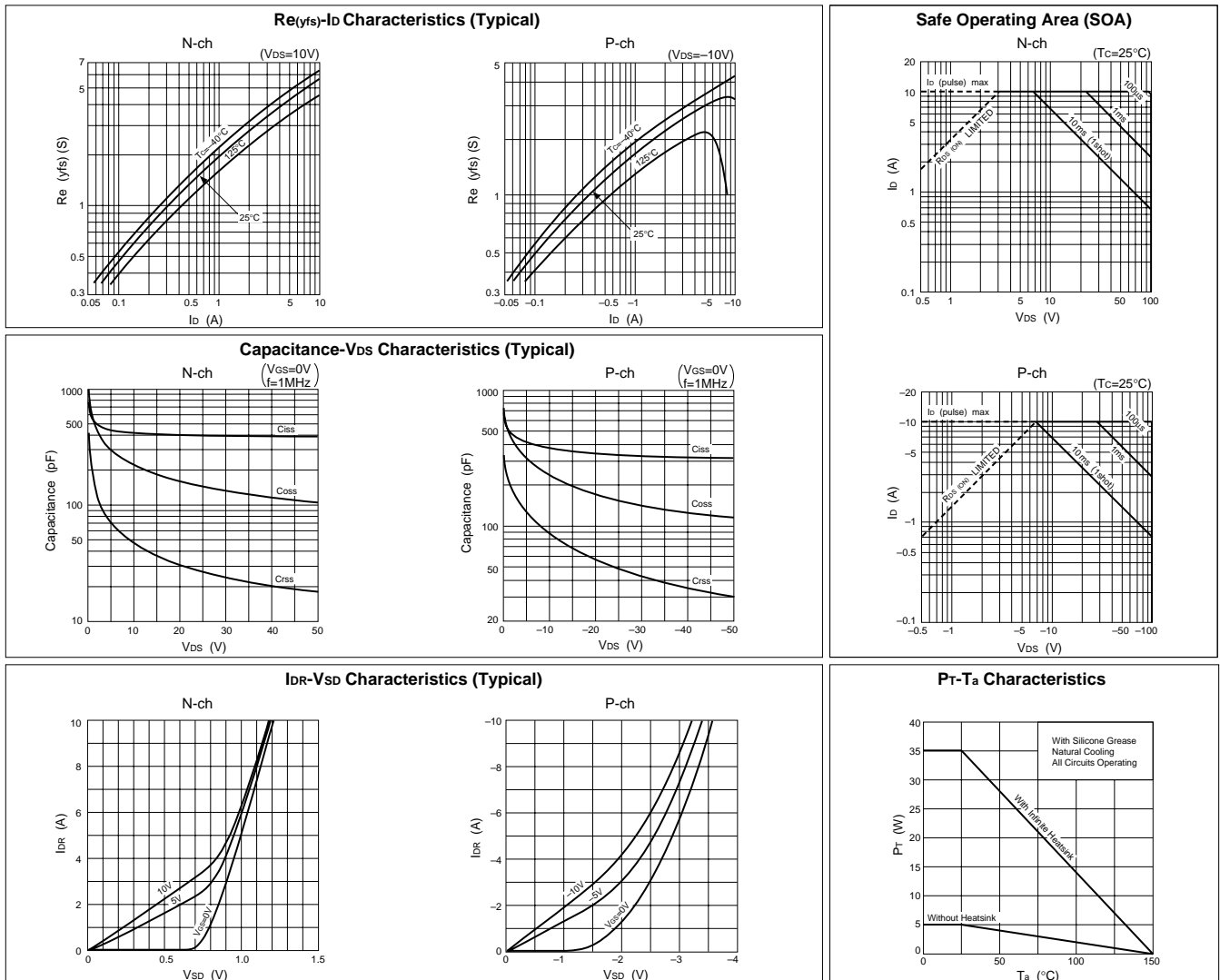


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	-100			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20\text{V}$			∓ 500	nA	$V_{GS}=\mp 20\text{V}$
I_{DSS}			250	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$			-250	μA	$V_{DS}=-100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$Re_{(yfs)}$	2.4	3.7		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$	0.9	2.0		S	$V_{DS}=-10\text{V}$, $I_D=-5\text{A}$
$R_{DS(ON)}$		0.27	0.30	Ω	$V_{GS}=10\text{V}$, $I_D=5\text{A}$		0.55	0.7	Ω	$V_{GS}=-10\text{V}$, $I_D=-5\text{A}$
C_{iss}		350		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$		300		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		130		pF			200		pF	
t_{on}		60		ns	$I_D=5\text{A}$, $V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$,		150		ns	$I_D=-5\text{A}$, $V_{DD}=-50\text{V}$, $V_{GS}=-10\text{V}$,
t_{off}		40		ns	see Fig. 3 on page 16.		200		ns	see Fig. 4 on page 16.
V_{SD}		1.1	1.8	V	$I_{SD}=5\text{A}$, $V_{GS}=0\text{V}$	-4.5	-5.5		V	$I_{SD}=-5\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		330		ns	$I_{SD}=\pm 100\text{mA}$		220		ns	$I_{SD}=\mp 100\text{mA}$

Characteristic curves



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

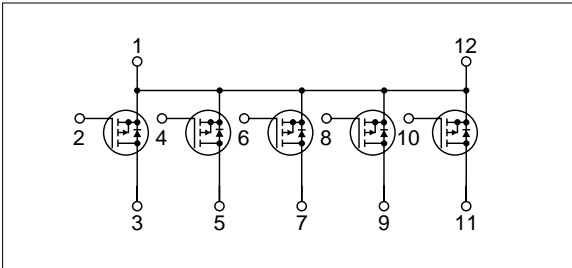
Symbol	Ratings	Unit
V_{DSS}	-60	V
V_{GSS}	± 20	V
I_D	± 4	A
$I_D(\text{pulse})$	± 8 ($PW \leq 1\text{ms}$)	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

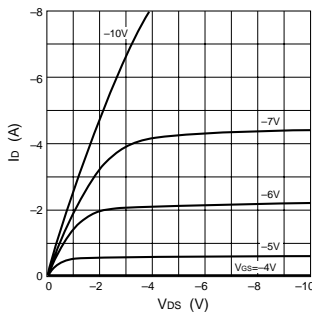
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	-60			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			-250	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$R_{e(yfs)}$	1.6	2.2		S	$V_{DS}=-10\text{V}$, $I_D=-4\text{A}$
$R_{DS(ON)}$		0.38	0.55	Ω	$V_{GS}=-10\text{V}$, $I_D=-4\text{A}$
C_{iss}		270		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		170		pF	
t_{on}		60		ns	$I_D=-4\text{A}$, $V_{DD}=-30\text{V}$, $V_{GS}=-10\text{V}$, see Fig. 4 on page 16.
t_{off}		60		ns	
V_{SD}		-4.5	-5.5	V	$I_{SD}=-4\text{A}$
t_{rr}		150		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

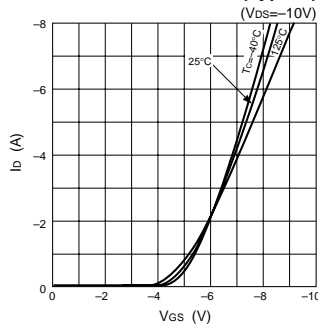


Characteristic curves

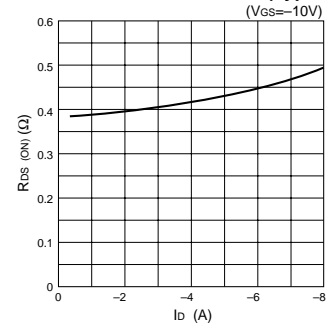
I_D - V_{DS} Characteristics (Typical)



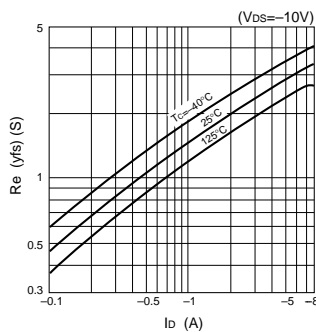
I_D - V_{GS} Characteristics (Typical)



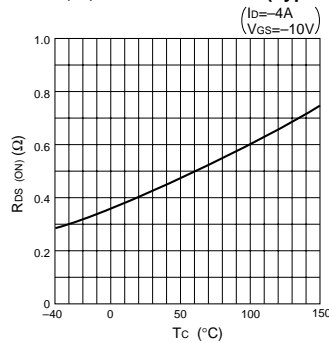
$R_{DS(ON)}$ - I_D Characteristics (Typical)



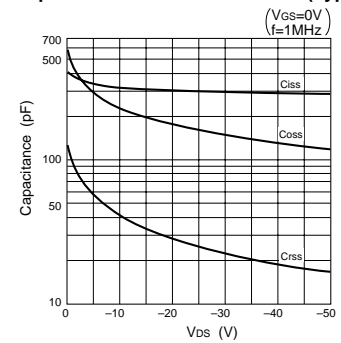
$R_{e(yfs)}$ - I_D Characteristics (Typical)



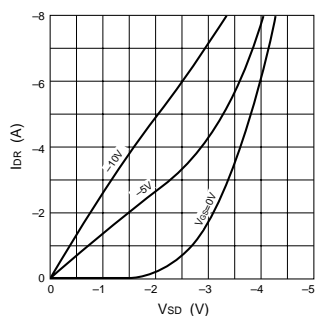
$R_{DS(ON)}$ - T_c Characteristics (Typical)



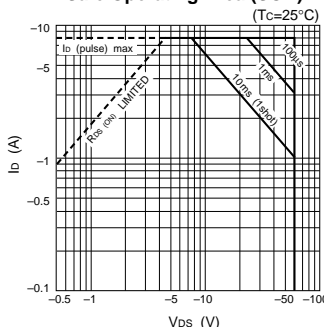
Capacitance- V_{DS} Characteristics (Typical)



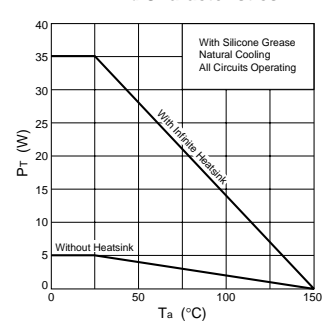
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



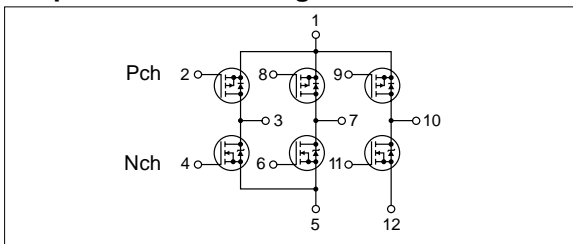
Absolute maximum ratings

($T_a=25^\circ\text{C}$)

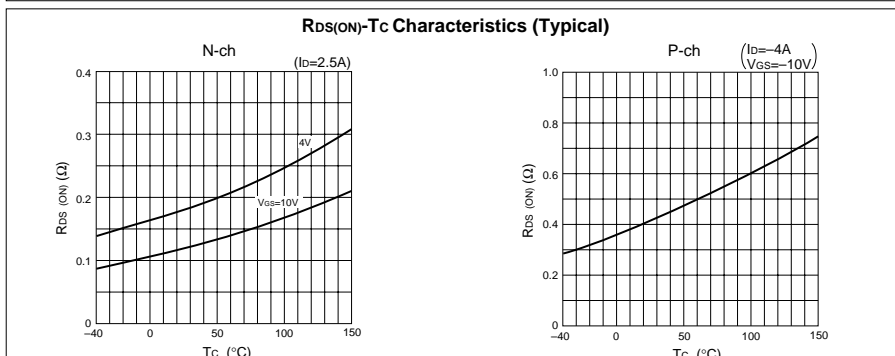
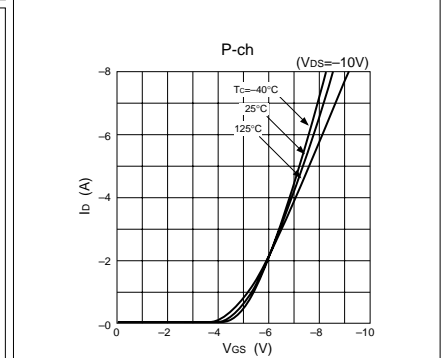
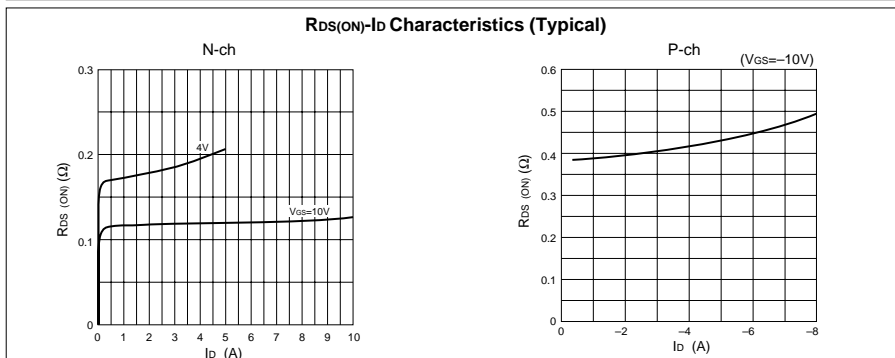
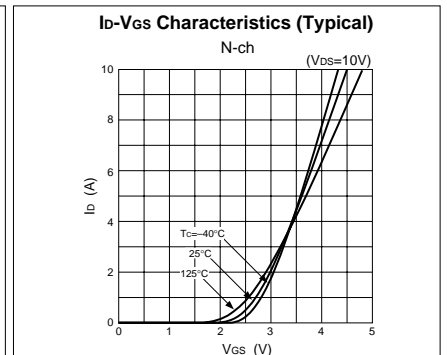
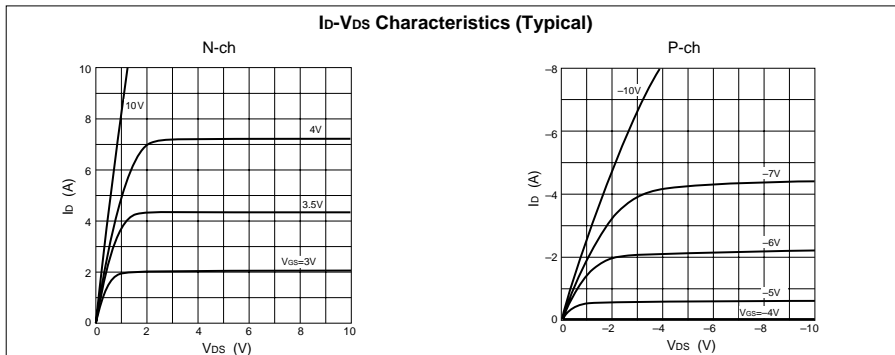
Symbol	Ratings		Unit
	N channel	P channel	
V_{BSS}	60	-60	V
V_{GSS}	± 10	∓ 20	V
I_D	± 5	∓ 4	A
$I_{D(\text{pulse})}$	± 10 ($PW \leq 1\text{ms}$)	∓ 8 ($PW \leq 1\text{ms}$)	A
E_{AS}^*	2	—	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)		W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)		W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)		V _{rms}
T_{ch}	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$

* : $V_{DD}=20\text{V}$, $L=1\text{mH}$, $I_D=2\text{A}$, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

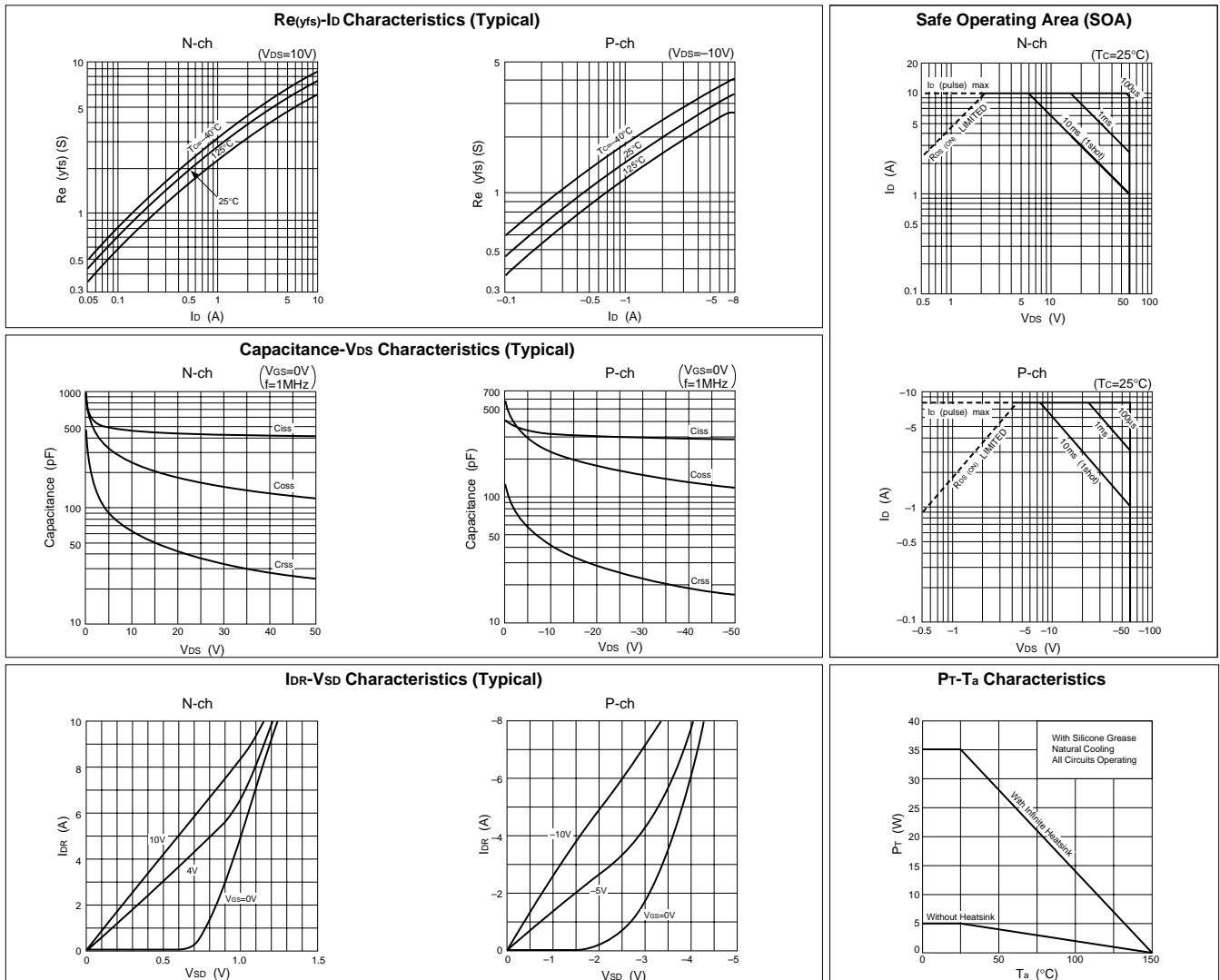


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	-60			V	$I_D=-250\mu\text{A}, V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 10\text{V}$			∓ 500	nA	$V_{GS}=\mp 20\text{V}$
I_{DSS}			250	μA	$V_{DS}=60\text{V}, V_{GS}=0\text{V}$			-250	μA	$V_{DS}=-60\text{V}, V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}, I_D=250\mu\text{A}$	-2.0		-4.0	V	$V_{DS}=-10\text{V}, I_D=-250\mu\text{A}$
$R_{e(yfs)}$	3.1	4.6		S	$V_{DS}=10\text{V}, I_D=5\text{A}$	1.6	2.2		S	$V_{DS}=-10\text{V}, I_D=-4\text{A}$
$R_{DS(ON)}$		0.17	0.22	Ω	$V_{GS}=10\text{V}, I_D=5\text{A}$		0.38	0.55	Ω	$V_{GS}=-10\text{V}, I_D=-4\text{A}$
		0.25	0.30	Ω	$V_{GS}=4\text{V}, I_D=5\text{A}$				Ω	$V_{GS}=-10\text{V}, I_D=-4\text{A}$
C_{iss}		400		pF	$V_{DS}=25\text{V}, f=1.0\text{MHz}$		270		pF	$V_{DS}=-25\text{V}, f=1.0\text{MHz}$
C_{oss}		160		pF	$V_{GS}=0\text{V}$		170		pF	$V_{GS}=0\text{V}$
t_{on}		80		ns	$I_D=5\text{A}, V_{DD}\div 30\text{V}, V_{GS}=5\text{V}$		60		ns	$I_D=-4\text{A}, V_{DD}\div -30\text{V}, V_{GS}=-10\text{V}$
t_{off}		50		ns	see Fig. 3 on page 16.		60		ns	see Fig. 4 on page 16.
V_{SD}		1.1	1.5	V	$I_{SD}=5\text{A}, V_{GS}=0\text{V}$		-4.4	-5.5	V	$I_{SD}=-4\text{A}, V_{GS}=0\text{V}$
t_{rr}		150		ns	$I_{SD}=\pm 100\text{mA}$		150		ns	$I_{SD}=\mp 100\text{mA}$

Characteristic curves



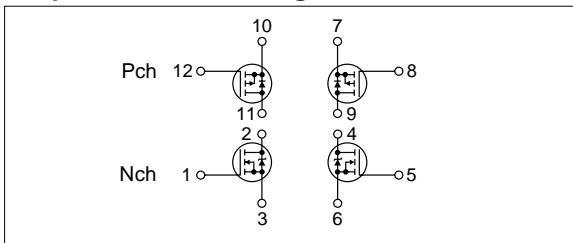
Absolute maximum ratings

(Ta=25°C)

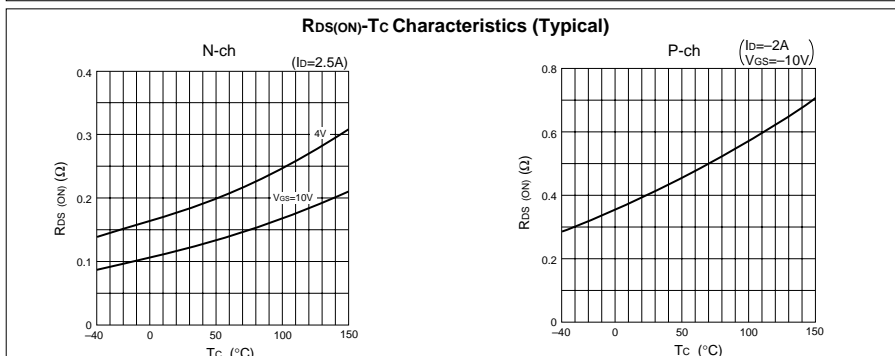
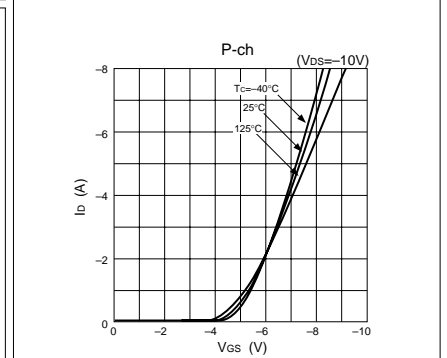
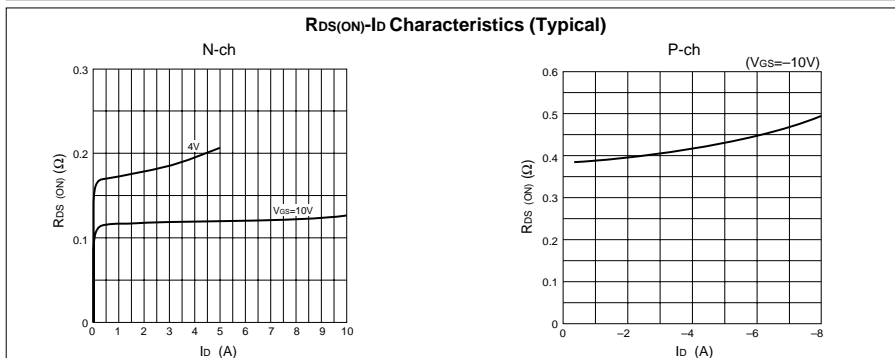
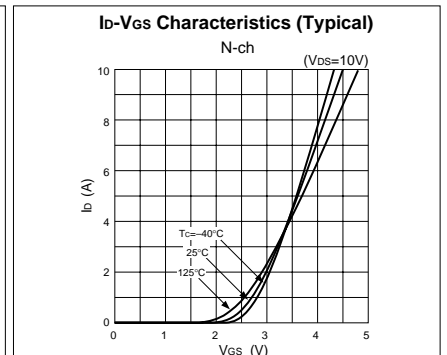
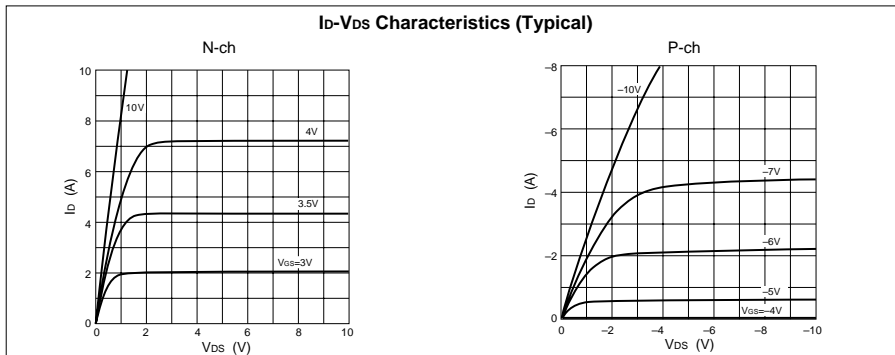
Symbol	Ratings		Unit
	N channel	P channel	
V _{DSS}	60	-60	V
V _{GSS}	±10	∓20	V
I _D	±5	∓4	A
I _{D(pulse)}	±10 (PW≤1ms)	∓8 (PW≤1ms)	A
E _{AS} *	2	—	mJ
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)		W
	35 (Tc=25°C, with all circuits operating, with infinite heatsink)		W
θ _{j-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)		°C/W
θ _{j-c}	3.57 (Junction-Case, Tc=25°C, with all circuits operating)		°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)		V _{rms}
T _{ch}	150		°C
T _{stg}	-40 to +150		°C

* : V_{DD}=20V, L=1mH, I_D=2A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

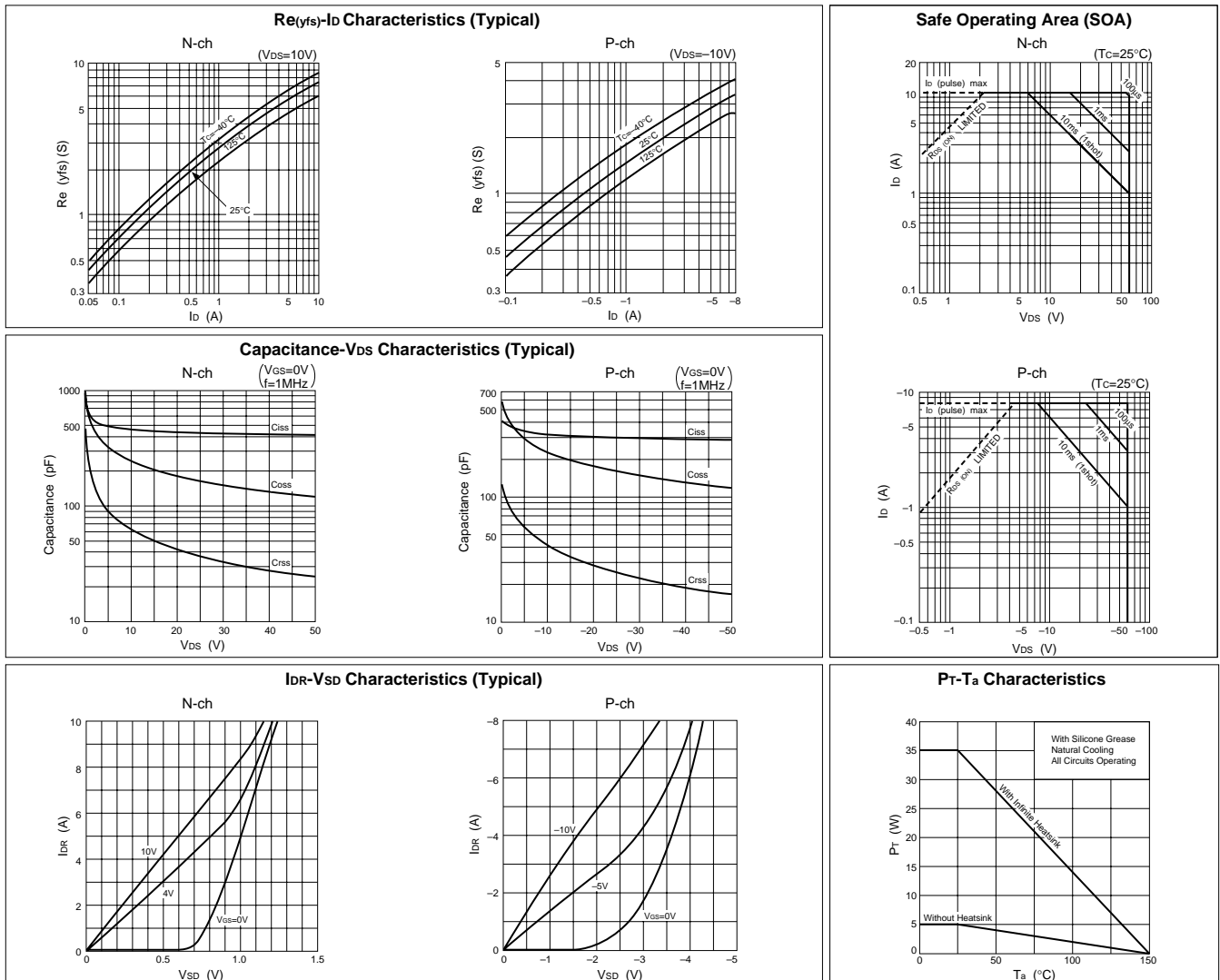


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	-60			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 10\text{V}$			∓ 500	nA	$V_{GS}=\mp 20\text{V}$
I_{DSS}			250	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$			-250	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$Re_{(yfs)}$	3.1	4.6		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$	1.6	2.2		S	$V_{DS}=-10\text{V}$, $I_D=-4\text{A}$
$R_{DS(ON)}$		0.17	0.22	Ω	$V_{GS}=10\text{V}$, $I_D=2.5\text{A}$		0.38	0.55	Ω	$V_{GS}=-10\text{V}$, $I_D=-2\text{A}$
		0.25	0.30	Ω	$V_{GS}=4\text{V}$, $I_D=2.5\text{A}$				Ω	$V_{GS}=-10\text{V}$, $I_D=-2\text{A}$
C_{iss}		400		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$,		270		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$,
C_{oss}		160		pF	$V_{GS}=0\text{V}$		170		pF	$V_{GS}=0\text{V}$
t_{on}		80		ns	$I_D=5\text{A}$, $V_{DD}\div 30\text{V}$, $V_{GS}=5\text{V}$,		60		ns	$I_D=-4\text{A}$, $V_{DD}\div -30\text{V}$, $V_{GS}=-10\text{V}$,
t_{off}		50		ns	see Fig. 3 on page 16.		60		ns	see Fig. 4 on page 16.
V_{SD}		1.1	1.5	V	$I_{SD}=5\text{A}$, $V_{GS}=0\text{V}$	-4.4	-5.5		V	$I_{SD}=-4\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		150		ns	$I_{SD}=\pm 100\text{mA}$		150		ns	$I_{SD}=\mp 100\text{mA}$

Characteristic curves



Absolute maximum ratings

(Ta=25°C)

Symbol	Ratings	Unit
V _{DSS}	100	V
V _{GSS}	±10	V
I _D	±5	A
I _{D(pulse)}	±10 (PW≤1ms)	A
E _{AS} *	60	mJ
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)	W
	35 (Tc=25°C, with all circuits operating, with infinite heatsink)	W
θ _{J-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)	°C/W
θ _{J-c}	3.57 (Junction-Case, Tc=25°C, with all circuits operating)	°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T _{ch}	150	°C
T _{stg}	-40 to +150	°C

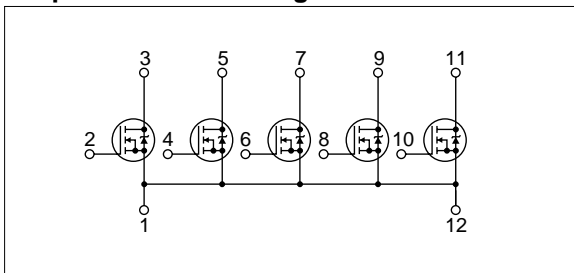
* : V_{DD}=20V, L=10mH, I_D=3A, unclamped, see Fig. E on page 15.

Electrical characteristics

(Ta=25°C)

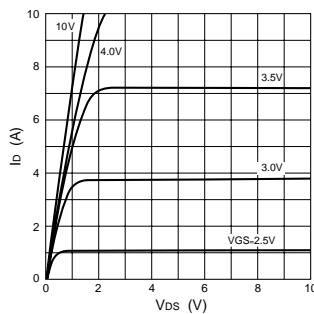
Symbol	Specification			Unit	Conditions
	min	typ	max		
V _{(BR)DSS}	100			V	I _D =250μA, V _{GS} =0V
I _{GSS}			±500	nA	V _{GS} =±10V
I _{DSS}			250	μA	V _{DS} =100V, V _{GS} =0V
V _{TH}	1.0		2.0	V	V _{DS} =10V, I _D =250μA
Re(yfs)	4	6		S	V _{DS} =10V, I _D =5A
R _{DS(ON)}		0.18	0.19	Ω	V _{GS} =10V, I _D =2.5A
		0.19	0.25	Ω	V _{GS} =4V, I _D =2.5A
C _{iss}		880		pF	V _{DS} =25V, f=1.0MHz, V _{GS} =0V
C _{oss}		240		pF	
ton		90		ns	I _D =5A, V _{DD} =50V, V _{GS} =5V, see Fig. 3 on page 16.
toff		75		ns	
V _{SD}		1.1	1.5	V	I _{SD} =5A, V _{GS} =0V
trr		500		ns	I _{SD} =±100mA

Equivalent circuit diagram

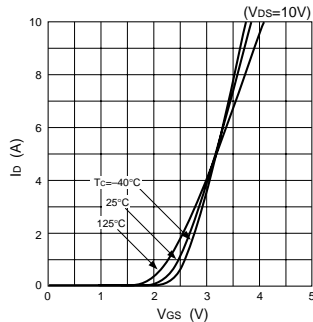


Characteristic curves

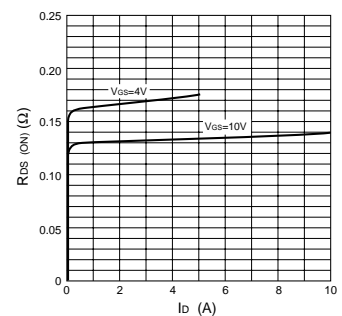
I_D-V_{DS} Characteristics (Typical)



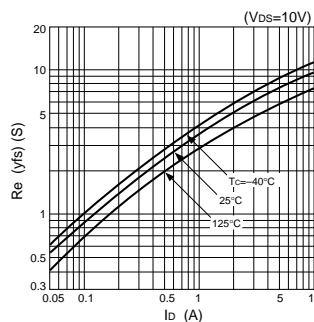
I_D-V_{GS} Characteristics (Typical)



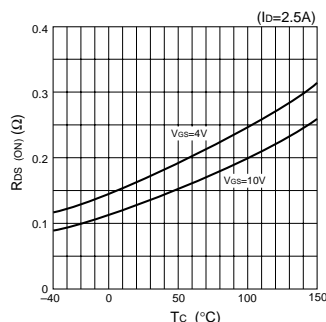
R_{DS(ON)}-I_D Characteristics (Typical)



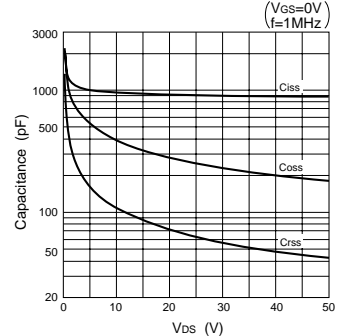
Re(y_{fs})-I_D Characteristics (Typical)



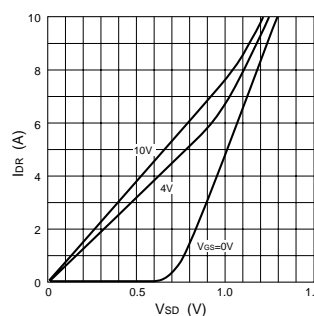
R_{DS(ON)}-T_C Characteristics (Typical)



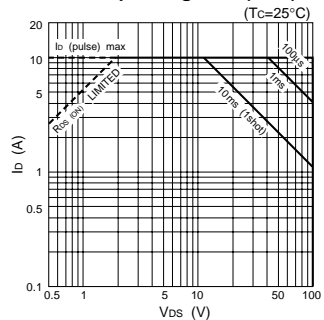
Capacitance-V_{DS} Characteristics (Typical)



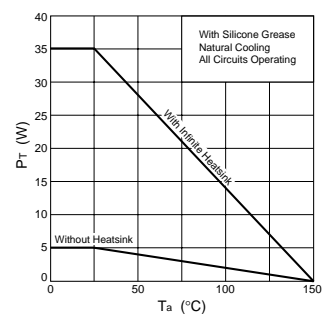
I_{DR}-V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T-T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

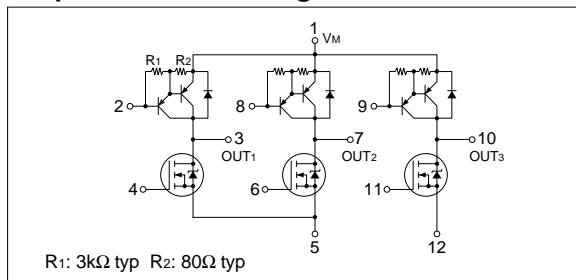
Symbol	Ratings	Unit
V_M	60	V
I_o	± 6 ($PW \leq 100\text{ms}$)	A
I_{OP}	± 10 ($PW \leq 1\text{ms}$)	A
V_{GS}	± 10	V
I_B	-0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)	W
	35 ($T_c=25^\circ\text{C}$)	
θ_{j-a}	25	$^\circ\text{C/W}$
θ_{j-c}	3.57	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V_{rms}
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics (Sink : N channel MOSFET)

($T_a=25^\circ\text{C}$)

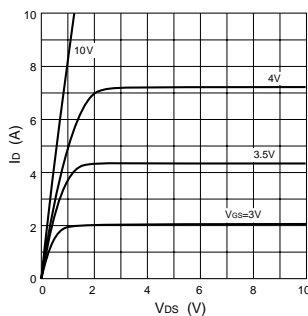
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 10\text{V}$
I_{DSS}			250	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$Re(yfs)$	3.1	4.6		S	$V_{DS}=10\text{V}$, $I_D=4\text{A}$
$R_{DS(ON)}$		0.17	0.22	Ω	$V_{GS}=10\text{V}$, $I_D=4\text{A}$
		0.25	0.30		$V_{GS}=4\text{V}$, $I_D=4\text{A}$
C_{iss}		400		pF	$V_{BS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		160		pF	$V_{GS}=0\text{V}$
t_{on}		80		ns	$I_D=4\text{A}$, $V_{DD}=30\text{V}$, $V_{GS}=5\text{V}$
t_{off}		50		ns	$V_{GS}=5\text{V}$
V_{SD}		1.1	1.5	V	$I_{SD}=4\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		150		ns	$I_F=\pm 100\text{mA}$

Equivalent circuit diagram

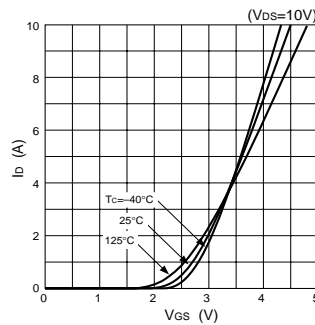


Characteristic curves (N-channel)

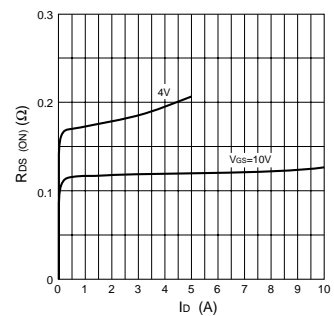
$V_{DS}-I_D$ Characteristics (Typical)



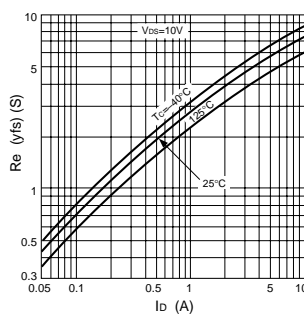
$V_{GS}-I_D$ Temperature Characteristics (Typical)



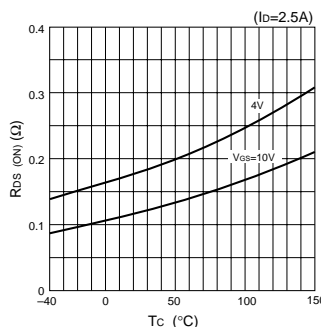
$I_{DS}-R_{DS(ON)}$ Characteristics (Typical)



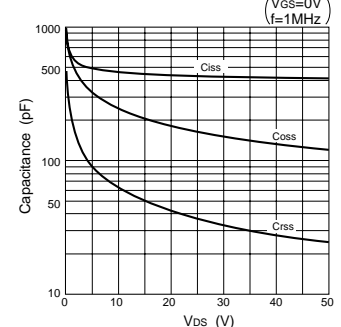
$I_D-Re(yfs)$ Temperature Characteristics (Typical)



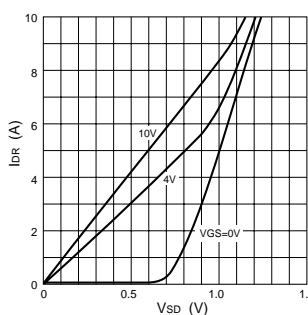
$T_c-R_{DS(ON)}$ Characteristics (Typical)



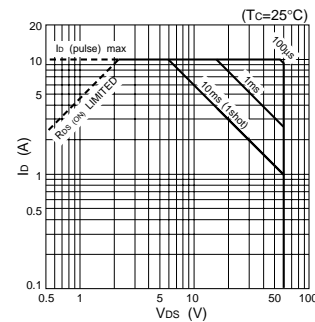
$V_{DS}-C$ Capacitance Characteristics (Typical)



$V_{SD}-I_{DR}$ Characteristics (Typical)



Safe Operating Area (SOA)

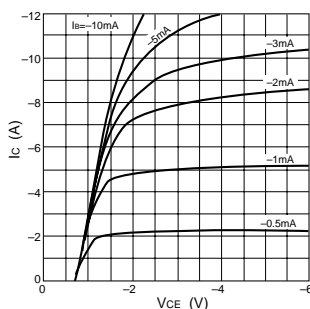


Electrical characteristics (Source: PNP transistor) (T_a=25°C)

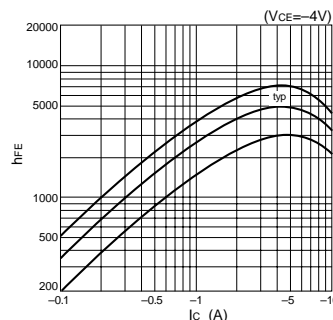
Symbol	Specification			Unit	Conditions
	min	typ	max		
I _{CBO}			-10	μA	V _{CB} = -60V
I _{EBO}	-1		-5	mA	V _{EB} = -6V
V _{CEO}	-60			V	I _C = -25mA
h _{FE}	2000	5000	12000		V _{CE} = -4V, I _C = -4A
V _{CE(sat)}			-1.5	V	I _C = -4A, I _B = -10mA
V _{BE(sat)}			-2.0	V	
V _{FEC}			2.0	V	I _{FEC} = 4A
t _{rr}		1.0		μs	I _F = ±0.5A
t _{on}		1.0		μs	V _{CC} = -25V, I _C = -4A, I _{B1} = -I _{B2} = -10mA
t _{stg}		1.4		μs	
t _f		0.6		μs	
f _T		120		MHz	V _{CE} = -12V, I _E = 1A
C _{ob}		150		pF	V _{CB} = -10V, f = 1MHz

Characteristic curves (PNP)

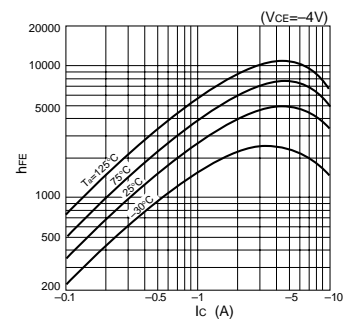
I_C-V_{CE} Characteristics (Typical)



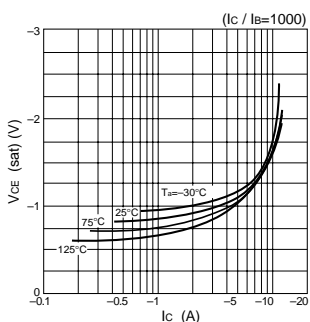
h_{FE}-I_C Characteristics (Typical)



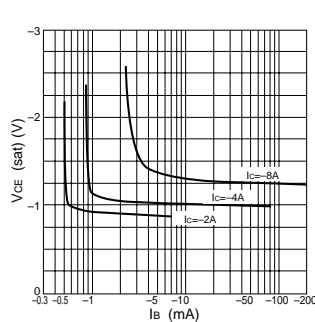
h_{FE}-I_C Temperature Characteristics (Typical)



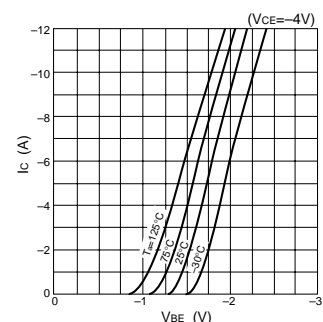
V_{CE(sat)}-I_C Temperature Characteristics (Typical)



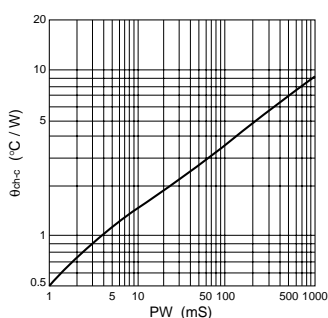
V_{CE(sat)}-I_B Characteristics (Typical)



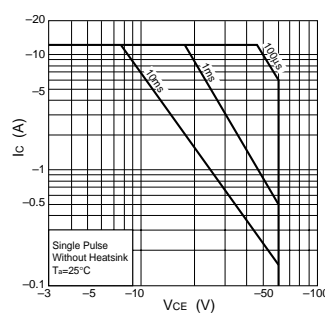
I_C-V_{BE} Temperature Characteristics (Typical)



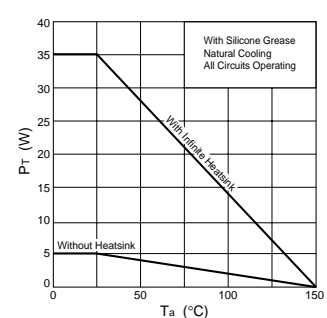
θ_{j-a}-PW Characteristics



Safe Operating Area (SOA)



P_T-T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

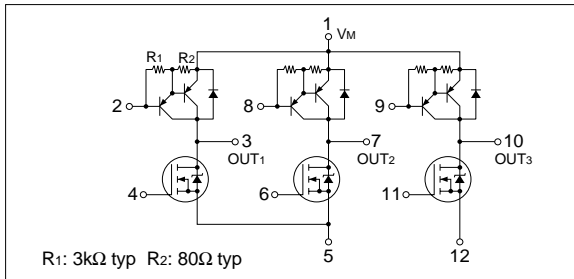
Symbol	Ratings	Unit
V_M	100	V
I_o	± 6 ($PW \leq 100\text{ms}$)	A
I_{OP}	± 8 ($PW \leq 1\text{ms}$)	A
V_{GSS}	± 10	V
I_B	-0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)	W
	35 ($T_c=25^\circ\text{C}$)	
θ_{j-a}	25	$^\circ\text{C/W}$
θ_{j-c}	3.57	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V_{rms}
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics (Sink: N-channel MOSFET)

($T_a=25^\circ\text{C}$)

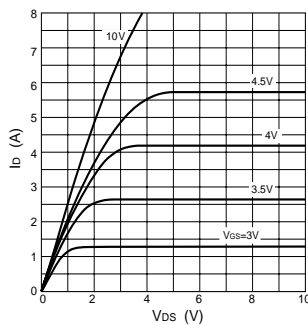
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 10\text{V}$
I_{DSS}			250	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	1.1	1.7		S	$V_{DS}=10\text{V}$, $I_D=4\text{A}$
$R_{DS(ON)}$		0.47	0.55	Ω	$V_{GS}=10\text{V}$, $I_D=2\text{A}$
		0.60	0.78		$V_{GS}=4\text{V}$, $I_D=2\text{A}$
C_{iss}		230		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		60		pF	$V_{GS}=0\text{V}$
t_{on}		60		ns	$I_D=4\text{A}$, $V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$
t_{off}		50		ns	$V_{GS}=10\text{V}$
V_{SD}		1.2	2.0	V	$I_{SD}=4\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		250		ns	$I_F=\pm 100\text{mA}$

Equivalent circuit diagram

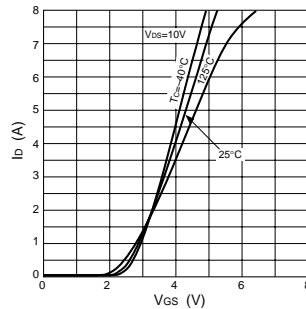


Characteristic curves (N-channel)

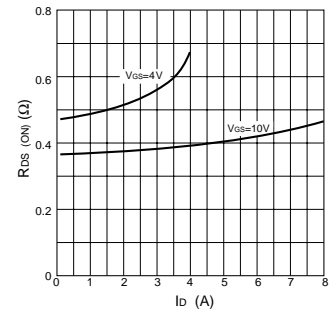
$V_{DS}-I_D$ Characteristics (Typical)



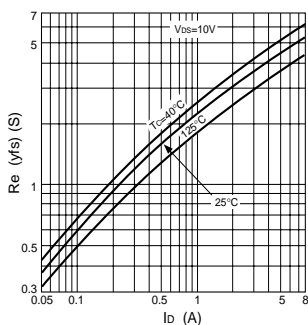
$V_{GS}-I_D$ Temperature Characteristics (Typical)



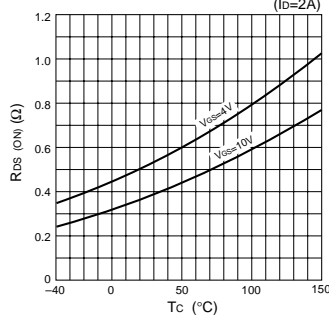
$I_{DS}-R_{DS(ON)}$ Characteristics (Typical)



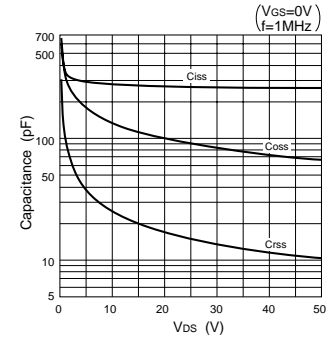
$I_D-R_{e(yfs)}$ Temperature Characteristics (Typical)



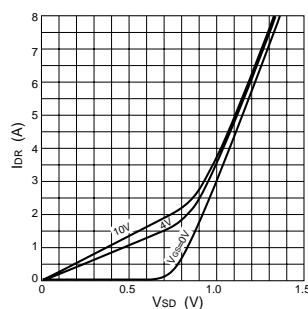
$T_c-R_{DS(ON)}$ Characteristics (Typical)



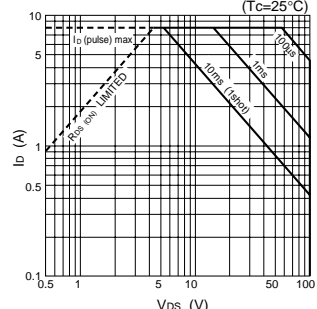
$V_{DS}-C_{pacitance}$ Characteristics (Typical)



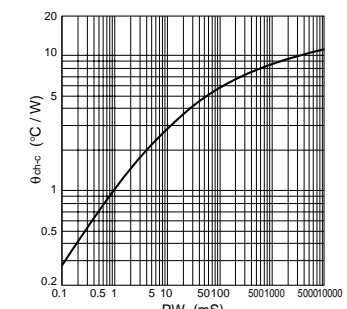
$V_{SD}-I_{DR}$ Characteristics (Typical)



Safe Operating Area (SOA)



$\theta_{ch-c}-PW$ Characteristics

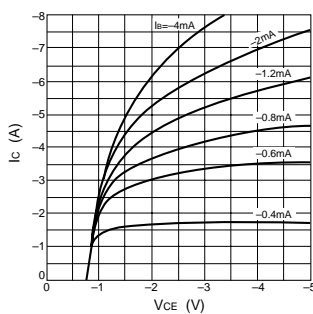


Electrical characteristics (Source: PNP transistor) (T_a=25°C)

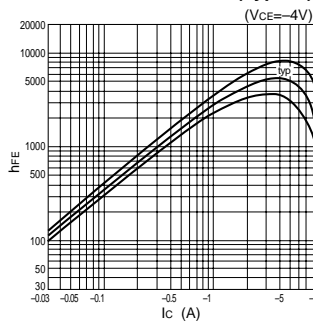
Symbol	Specification			Unit	Conditions
	min	typ	max		
I _{CBO}			-10	μA	V _{CB} =-100V
I _{EBO}			-10	mA	V _{EB} =-6V
V _{CEO}	-100			V	I _C =-10mA
h _{FE}	2000	5000	12000		V _{CE} =-4V, I _C =-3A
V _{CE(sat)}			-1.5	V	I _C =-3A, I _B =-6mA
V _{BE(sat)}			-2.2	V	
V _{FEC}			1.3	V	I _{FEC} =-1A
t _{rr}		2.0		μs	I _F =±100mA
t _{on}		0.6		μs	V _{CC} =-30V
t _{stg}		1.6		μs	I _C =-3A
t _f		0.5		μs	I _{B1} =-I _{B2} =-6mA
f _T		90		MHz	V _{CE} =-12V, I _E =1A
C _{ob}		100		pF	V _{CB} =-10V, f=1MHz

Characteristic curves (PNP)

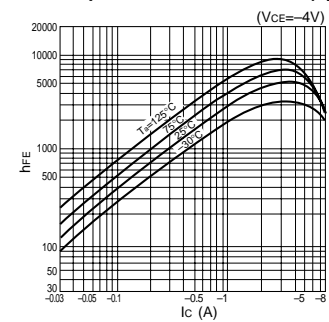
I_C-V_{CE} Characteristics (Typical)



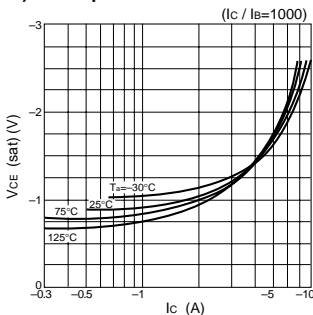
h_{FE}-I_C Characteristics (Typical)



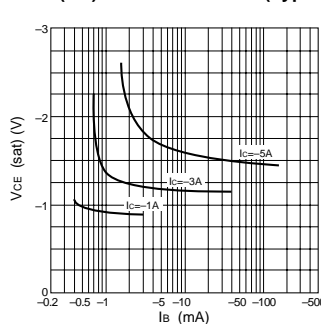
h_{FE}-I_C Temperature Characteristics (Typical)



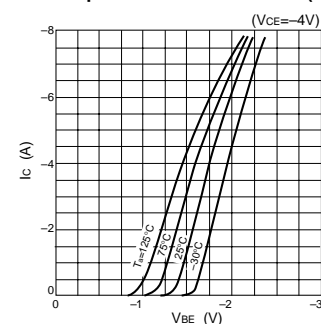
V_{CE(sat)}-I_C Temperature Characteristics (Typical)



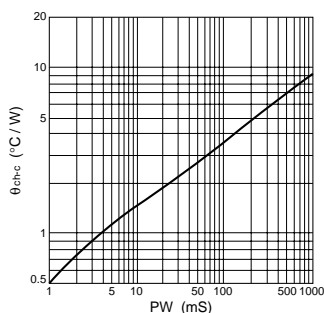
V_{CE(sat)}-I_B Characteristics (Typical)



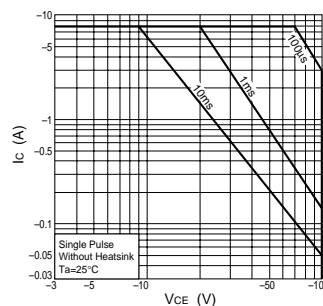
I_C-V_{BE} Temperature Characteristics (Typical)



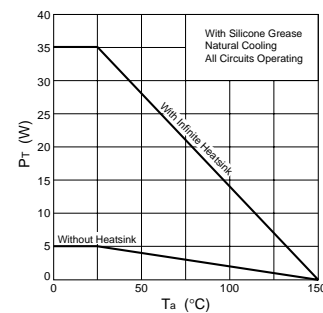
θ_{J-a}-PW Characteristics



Safe Operating Area (SOA)



P_T-T_a Characteristics



Absolute maximum ratings

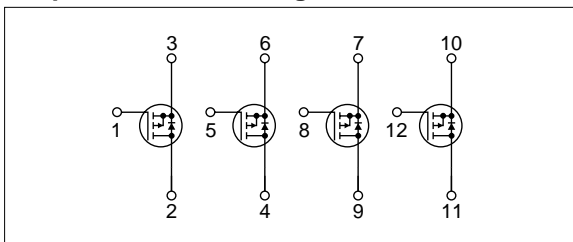
($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	-60	V
V_{GSS}	± 20	V
I_D	± 4	A
$I_D(\text{pulse})$	± 8 ($PW \leq 1\text{ms}$)	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

($T_a=25^\circ\text{C}$)

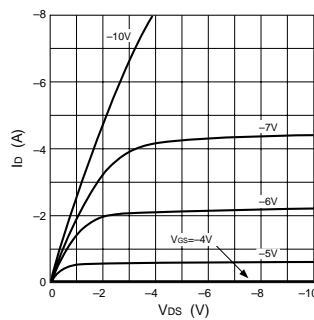
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	-60			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			-250	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$R_{e(yfs)}$	1.6	2.2		S	$V_{DS}=-10\text{V}$, $I_D=-4\text{A}$
$R_{DS(ON)}$		0.38	0.55	Ω	$V_{GS}=-10\text{V}$, $I_D=-4\text{A}$
C_{iss}		270		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		170		pF	
t_{on}		60		ns	$I_D=-4\text{A}$, $V_{DD}=-30\text{V}$, $V_{GS}=-10\text{V}$, see Fig. 4 on page 16.
t_{off}		60		ns	
V_{SD}		-4.4	-5.5	V	$I_{SD}=-4\text{A}$
t_{rr}		150		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

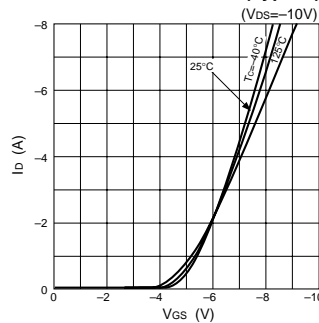


Characteristic curves

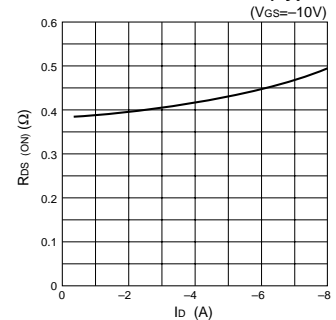
I_D - V_{DS} Characteristics (Typical)



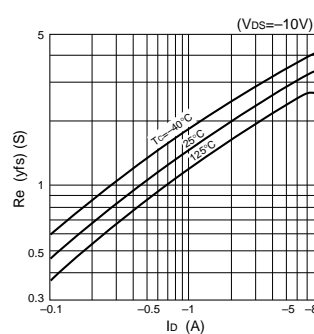
I_D - V_{GS} Characteristics (Typical)



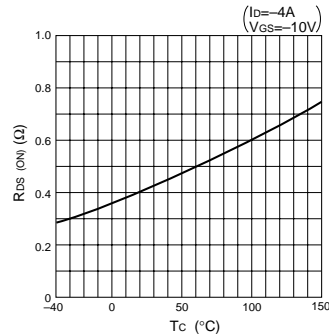
$R_{DS(ON)}$ - I_D Characteristics (Typical)



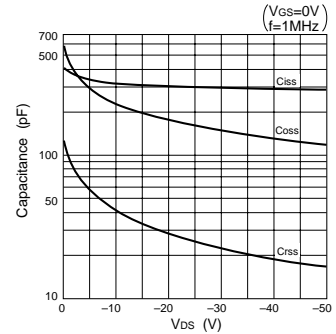
$R_{e(yfs)}$ - I_D Characteristics (Typical)



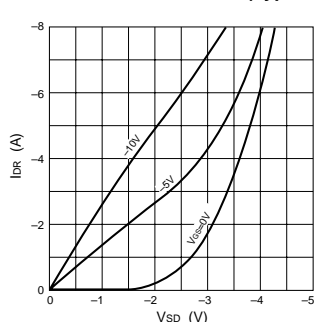
$R_{DS(ON)}$ - T_c Characteristics (Typical)



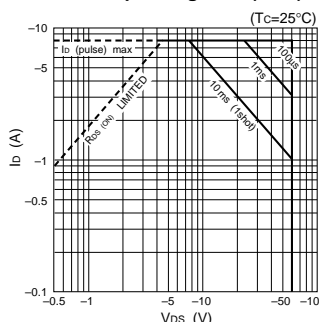
Capacitance- V_{DS} Characteristics (Typical)



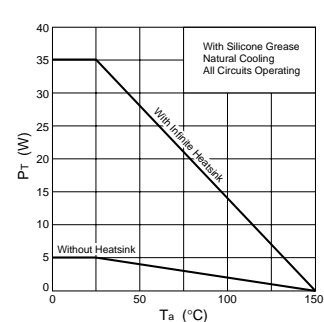
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

(Ta=25°C)

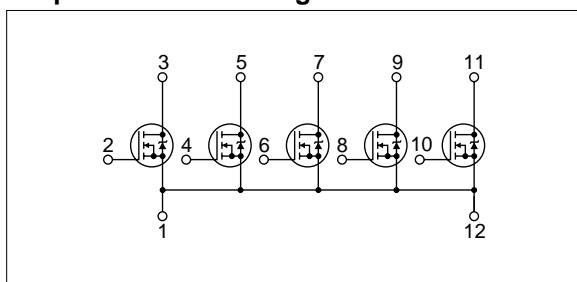
Symbol	Ratings	Unit
V _{DSS}	60	V
V _{GSS}	±20	V
I _D	±4	A
I _D (pulse)	±8 (PW≤1ms)	A
E _{AS} *	1	mJ
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)	W
	35 (Tc=25°C, with all circuits operating, with infinite heatsink)	W
θ _{j-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)	°C/W
θ _{j-c}	3.57 (Junction-Case, Tc=25°C, with all circuits operating)	°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T _{ch}	150	°C
T _{stg}	-40 to +150	°C

(Ta=25°C)

Symbol	Specification			Unit	Conditions
	min	typ	max		
V _{(BR)DSS}	60			V	I _D =100μA, V _{GS} =0V
I _{GSS}			±100	nA	V _{GS} =±20V
I _{DSS}			100	μA	V _{DS} =60V, V _{GS} =0V
V _{TH}	2.0		4.0	V	V _{DS} =10V, I _D =250μA
Re _(yfs)	1.5	2.4		S	V _{DS} =10V, I _D =4A
R _{DS(ON)}		0.33	0.45	Ω	V _{GS} =10V, I _D =4A
C _{iss}		120		pF	V _{DS} =25V, f=1.0MHz, V _{GS} =0V
C _{oss}		60		pF	
ton		115		ns	I _D =4A, V _{DD} =30V, V _{GS} =10V, see Fig. 3 on page 16.
toff		35		ns	
V _{SD}		1.1	1.5	V	I _{SD} =4A
trr		100		ns	I _{SD} =±100mA

* : V_{DD}=20V, L=1mH, I_D=1.2A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

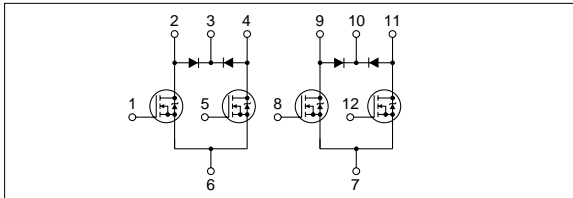
Absolute maximum ratings

(Ta=25°C)

Symbol	Ratings	Unit
V _{DSS}	60	V
V _{GSS}	±10	V
I _D	±5	A
I _{D(pulse)}	±10 (PW≤1ms)	A
E _{AS*}	2	mJ
I _F	5 (PW≤0.5ms, Du≤25%)	A
I _{FSM}	10 (PW≤10ms, Single pulse)	A
V _R	120	V
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)	W
	35 (Tc=25°C, with all circuits operating, with infinite heatsink)	W
θ _{j-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)	°C/W
θ _{j-c}	3.57 (Junction-Case, Tc=25°C, with all circuits operating)	°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T _{ch}	150	°C
T _{stg}	-40 to +150	°C

* : V_{DD}=20V, L=1mH, I_D=1.7A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Electrical characteristics

(Ta=25°C)

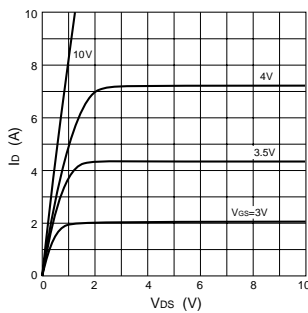
Symbol	Specification			Unit	Conditions
	min	typ	max		
V _{(BR)DSS}	60			V	I _D =250μA, V _{GS} =0V
I _{GSS}			±500	nA	V _{GS} =±10V
I _{DSS}			250	μA	V _{DS} =60V, V _{GS} =0V
V _{TH}	1.0		2.0	V	V _{DS} =10V, I _D =250μA
R _{e(yfs)}	3.1	4.6		S	V _{DS} =10V, I _D =5A
R _{DS(ON)}		0.17	0.22	Ω	V _{GS} =10V, I _D =2.5A
		0.25	0.30	Ω	V _{GS} =4V, I _D =2.5A
C _{iss}		400		pF	V _{DS} =25V, f=1.0MHz, V _{GS} =0V
C _{oss}		160		pF	
ton		80		ns	I _D =5A, V _{DD} =30V, V _{GS} =5V, see Fig. 3 on page 16.
toff		50		ns	
V _{SD}		1.1	1.5	V	I _{SD} =5A, V _{GS} =0V
trr		150		ns	I _{SD} =±100mA

Diode for flyback voltage absorption

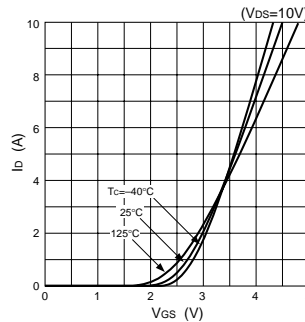
Symbol	Specification			Unit	Conditions
	min	typ	max		
V _R	120			V	I _R =10μA
V _F		1.0	1.2	V	I _F =1A
I _R			10	μA	V _R =120V
trr		100		ns	I _F =±100mA

Characteristic curves

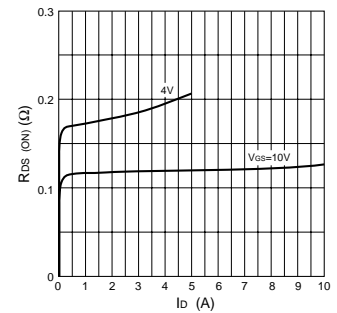
I_D-V_{DS} Characteristics (Typical)



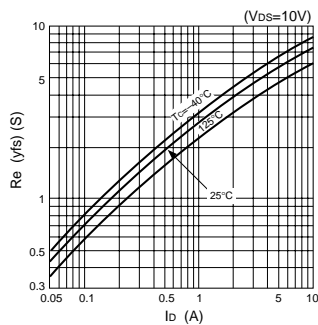
I_D-V_{GS} Characteristics (Typical)



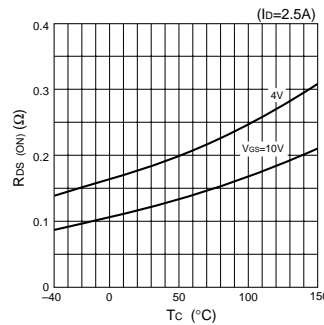
R_{DS(ON)}-I_D Characteristics (Typical)



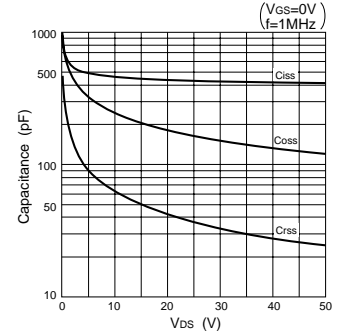
R_{e(yfs)}-I_D Characteristics (Typical)



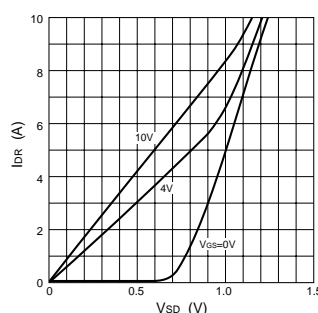
R_{DS(ON)}-T_C Characteristics (Typical)



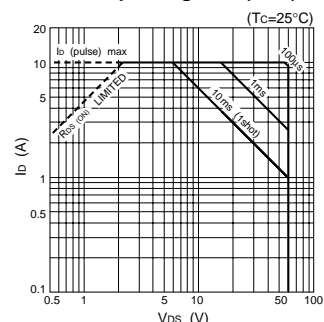
Capacitance-V_{DS} Characteristics (Typical)



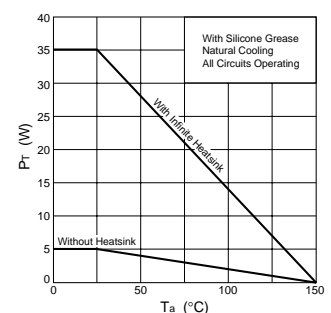
I_{DR}-V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T-T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	100	V
V_{GSS}	± 20	V
I_D	± 10	A
$I_{D(pulse)}$	± 40 ($PW \leq 1\text{ms}$)	A
E_{AS}^*	200	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	40 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
θ_{j-c}	3.13 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

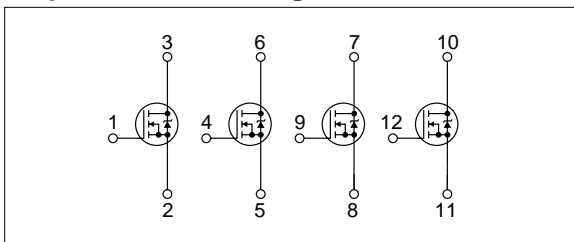
* : $V_{DD}=25\text{V}$, $L=3\text{mH}$, $I_D=10\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

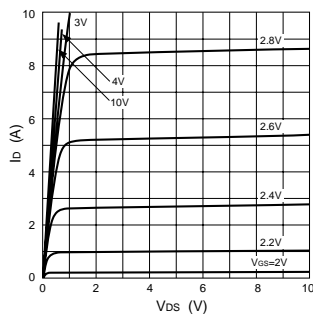
Symbol	Specifications			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	8	13		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$
$R_{DS(ON)}$		60	80	$\text{m}\Omega$	$V_{GS}=10\text{V}$, $I_D=5\text{A}$
		75	95	$\text{m}\Omega$	$V_{GS}=4\text{V}$, $I_D=5\text{A}$
C_{iss}		1630		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		480		pF	$V_{GS}=0\text{V}$
$t_{d(on)}$		30		ns	$I_D=5\text{A}$, $V_{DD} \approx 50\text{V}$, $R_L=10\Omega$, $V_{GS}=5\text{V}$, see Fig. 3 on page 16.
t_r		45		ns	
$t_{d(off)}$		100		ns	
t_f		40		ns	
V_{SD}	1.1	1.5		V	$I_{SD}=10\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		300		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

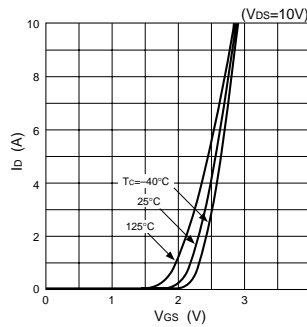


Characteristic curves

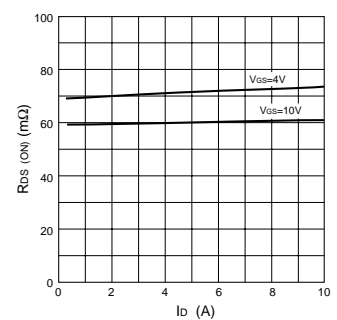
I_D - V_{DS} Characteristics (Typical)



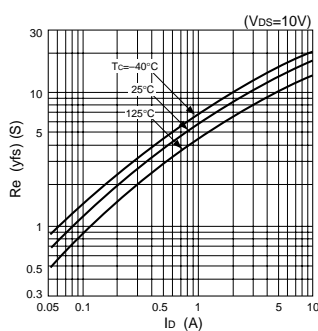
I_D - V_{GS} Characteristics (Typical)



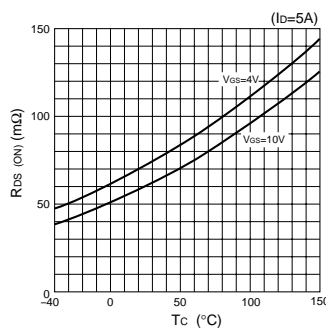
$R_{DS(ON)}$ - I_D Characteristics (Typical)



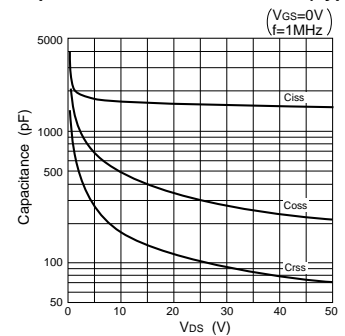
$R_{e(yfs)}$ - I_D Characteristics (Typical)



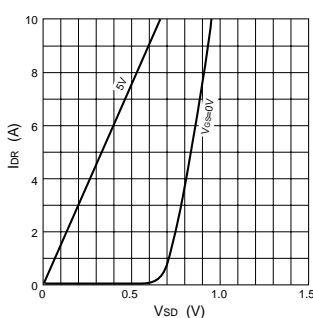
$R_{DS(ON)}$ - T_c Characteristics (Typical)



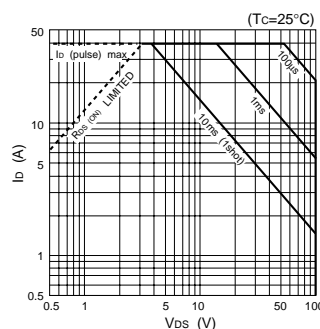
Capacitance- V_{DS} Characteristics (Typical)



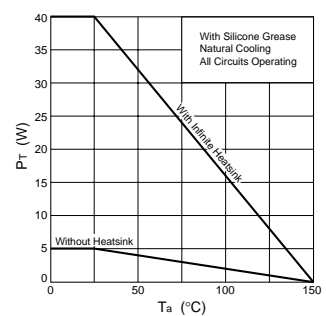
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



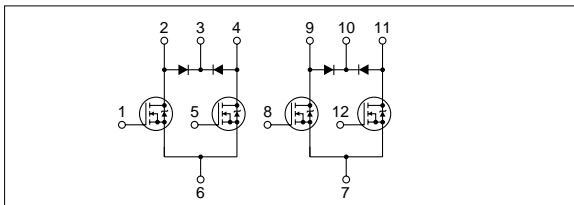
Absolute maximum ratings

(Ta=25°C)

Symbol	Ratings	Unit
V _{DSS}	100	V
V _{GSS}	±20	V
I _D	±4	A
I _{D(pulse)}	±8 (PW≤1ms)	A
E _{AS*}	16	mJ
I _F	4 (PW≤0.5ms, D≤25%)	A
I _{FSM}	8 (PW≤10ms, Single pulse)	A
V _R	120	V
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)	W
	35 (Tc=25°C, with all circuits operating, with infinite heatsink)	W
θ _{j-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)	°C/W
θ _{j-c}	3.57 (Junction-Case, Tc=25°C, with all circuits operating)	°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T _{ch}	150	°C
T _{stg}	-40 to +150	°C

* : V_{DD}=20V, L=1mH, I_D=5A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

Electrical characteristics

(Ta=25°C)

Symbol	Specification			Unit	Conditions
	min	typ	max		
V _{(BR)DSS}	100			V	I _D =250μA, V _{GS} =0V
I _{GSS}			±500	nA	V _{GS} =±20V
I _{DSS}			250	μA	V _{DS} =100V, V _{GS} =0V
V _{TH}	2.0		4.0	V	V _{DS} =10V, I _D =250μA
R _{e(yfs)}	1.1	1.7		S	V _{DS} =10V, I _D =4A
R _{DS(ON)}		0.50	0.60	Ω	V _{GS} =10V, I _D =4A
C _{iss}		180		pF	V _{DS} =25V, f=1.0MHz, V _{GS} =0V
C _{oss}		82		pF	
ton		40		ns	I _D =4A, V _{DD} =50V, V _{GS} =10V, see Fig. 3 on page 16.
toff		40		ns	
V _{SD}		1.2	2.0	V	I _{SD} =4A, V _{GS} =0V
trr		250		ns	I _{SD} =±100mA

Diode for flyback voltage absorption

Symbol	Specification			Unit	Conditions
	min	typ	max		
V _R	120			V	I _R =10μA
V _F		1.0	1.2	V	I _F =1A
I _R			10	μA	V _R =120V
trr		100		ns	I _F =±100mA

Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	200	V
V_{GSS}	± 20	V
I_D	± 10	A
$I_D(\text{pulse})$	± 40 ($PW \leq 1\text{ms}$, $D_u \leq 1\%$)	A
E_{AS}^*	120	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	40 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.13 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

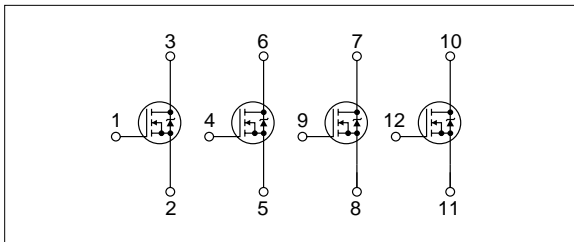
* : $V_{DD}=25\text{V}$, $L=2.1\text{mH}$, $I_D=10\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

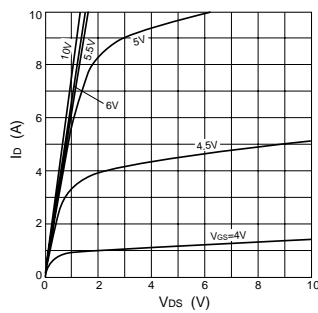
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	200			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=200\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=1\text{mA}$
$R_{e(yfs)}$	5.0	8.5		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$
$R_{DS(ON)}$		130	175	$\text{m}\Omega$	$V_{GS}=10\text{V}$, $I_D=5\text{A}$
C_{iss}		850		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		550		pF	$I_D=5\text{A}$, $V_{DD} \div 100\text{V}$, $R_L=20\Omega$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.
$t_{d(on)}$		20		ns	
t_r		25		ns	
$t_{d(off)}$		70		ns	
t_f		70		ns	
V_{SD}		1.0	1.5	V	$I_{SD}=10\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		500		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

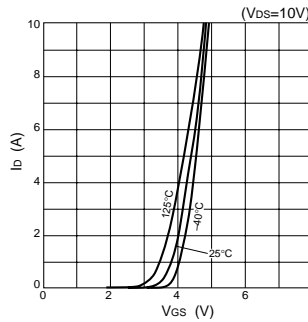


Characteristic curves

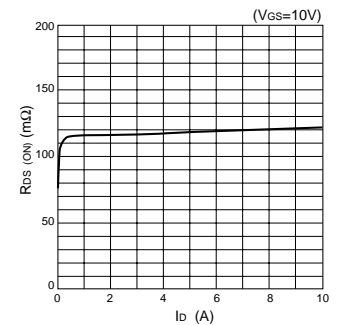
I_D - V_{DS} Characteristics (Typical)



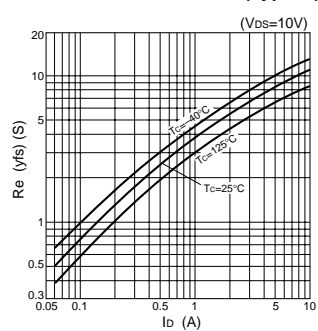
I_D - V_{GS} Characteristics (Typical)



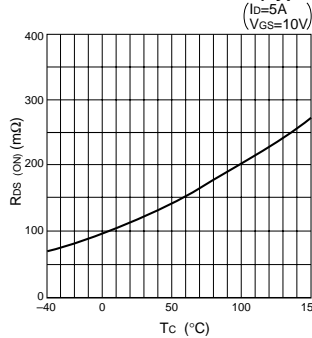
$R_{DS(ON)}$ - I_D Characteristics (Typical)



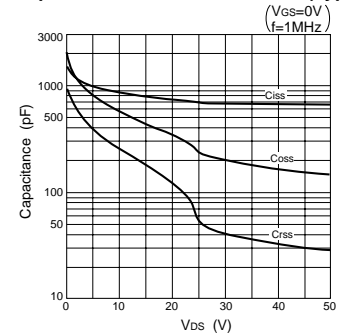
$R_{e(yfs)}$ - I_D Characteristics (Typical)



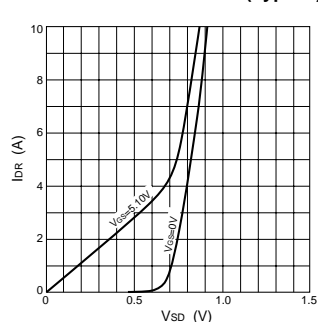
$R_{DS(ON)}$ - T_c Characteristics (Typical)



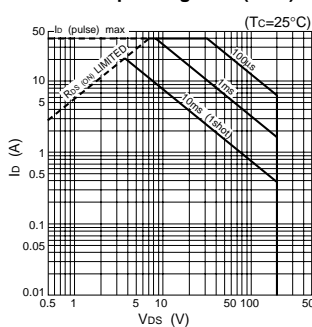
Capacitance- V_{DS} Characteristics (Typical)



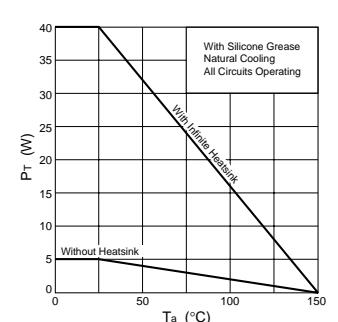
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	100	V
V_{GSS}	± 20	V
I_D	± 5	A
$I_D(\text{pulse})$	± 10 ($PW \leq 1\text{ms}$, $D_u \leq 1\%$)	A
E_{AS}^*	70	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

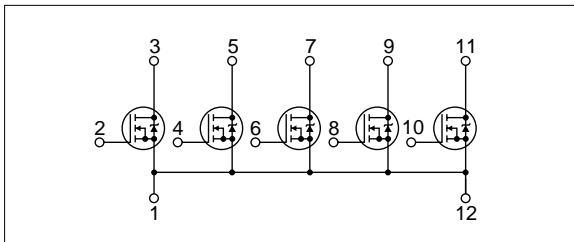
* : $V_{DD}=25\text{V}$, $L=4.2\text{mH}$, $I_D=5\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

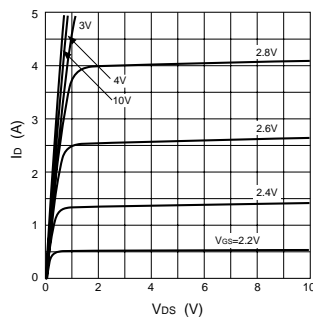
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	4	6		S	$V_{DS}=10\text{V}$, $I_D=2.5\text{A}$
$R_{DS(ON)}$		130	185	$\text{m}\Omega$	$V_{GS}=10\text{V}$, $I_D=2.5\text{A}$
		155	230	$\text{m}\Omega$	$V_{GS}=4\text{V}$, $I_D=2.5\text{A}$
C_{iss}		740		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		240		pF	$V_{GS}=0\text{V}$
$t_{d(on)}$		20		ns	$I_D=2.5\text{A}$, $V_{DD}=50\text{V}$, $R_L=20\Omega$, $V_{GS}=5\text{V}$, see Fig. 3 on page 16.
t_r		30		ns	
$t_{d(off)}$		60		ns	
t_f		20		ns	
V_{SD}		1.0	1.4	V	
t_{rr}		180		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

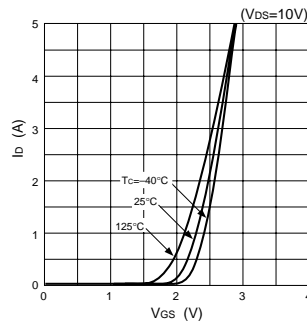


Characteristic curves

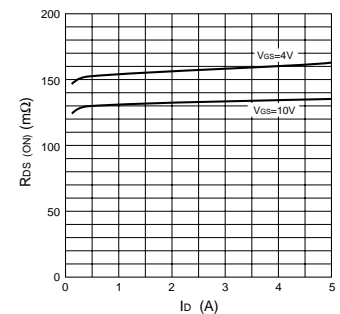
I_D - V_{DS} Characteristics (Typical)



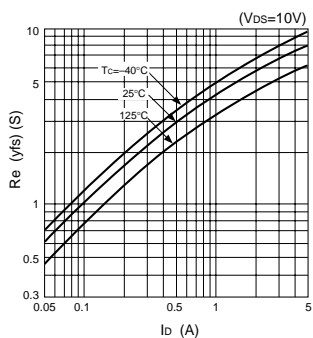
I_D - V_{GS} Characteristics (Typical)



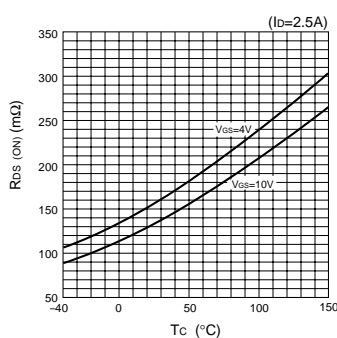
$R_{DS(ON)}$ - I_D Characteristics (Typical)



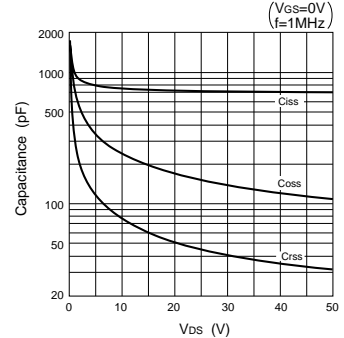
$R_{e(yfs)}$ - I_D Characteristics (Typical)



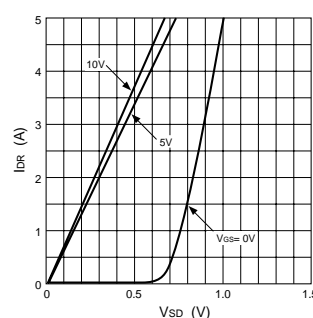
$R_{DS(ON)}$ - T_c Characteristics (Typical)



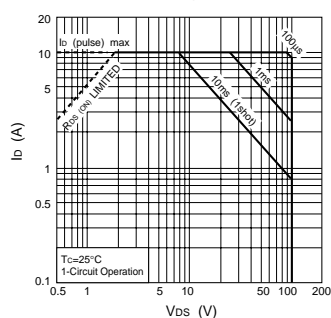
Capacitance- V_{DS} Characteristics (Typical)



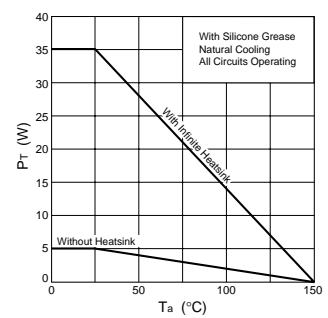
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	250	V
V_{GSS}	± 20	V
I_D	± 10	A
$I_D(\text{pulse})$	± 40 ($PW \leq 1\text{ms}$, $D_u \leq 1\%$)	A
E_{AS}^*	120	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	40 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
θ_{j-c}	3.13 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

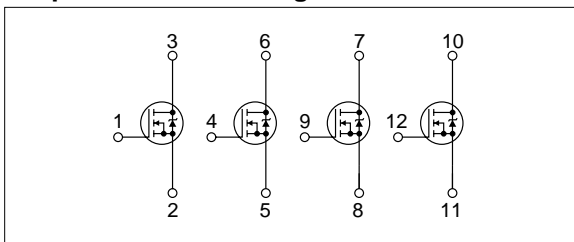
* : $V_{DD}=25\text{V}$, $L=2.2\text{mH}$, $I_D=10\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

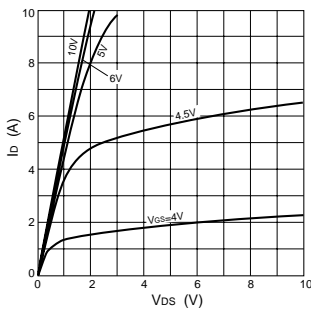
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	250			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=250\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=1\text{mA}$
$R_{e(yfs)}$	5.0	8.5		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$
$R_{DS(ON)}$		200	250	$\text{m}\Omega$	$V_{GS}=10\text{V}$, $I_D=5\text{A}$
C_{iss}		850		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		550		pF	
$t_{d(on)}$		20		ns	$I_D=5\text{A}$, $V_{DD}=100\text{V}$, $R_L=20\Omega$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.
t_r		25		ns	
$t_{d(off)}$		70		ns	
t_f		70		ns	
V_{SD}	1.0		1.5	V	
t_{rr}		700		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

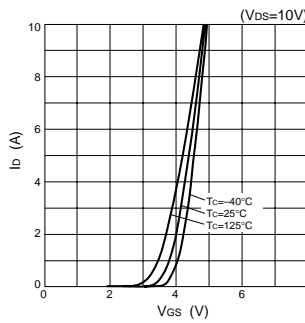


Characteristic curves

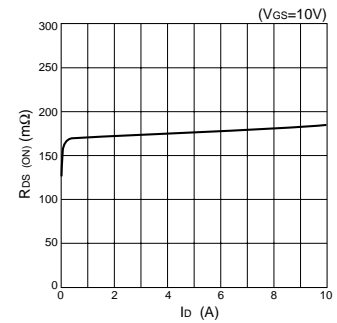
I_D - V_{DS} Characteristics (Typical)



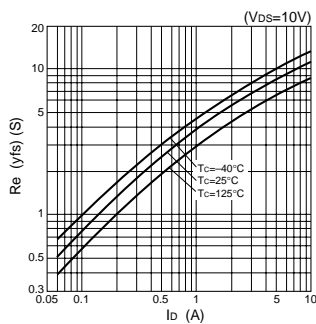
I_D - V_{GS} Characteristics (Typical)



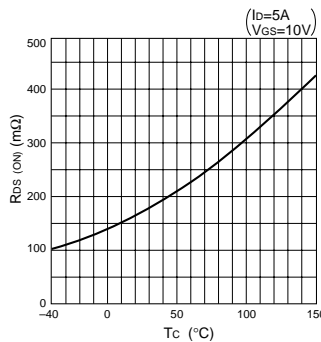
$R_{DS(ON)}$ - I_D Characteristics (Typical)



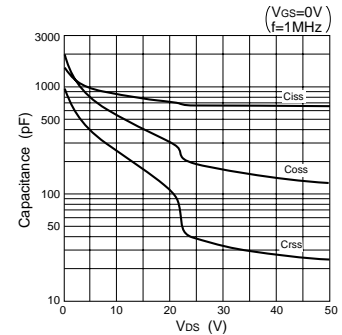
$R_{e(yfs)}$ - I_D Characteristics (Typical)



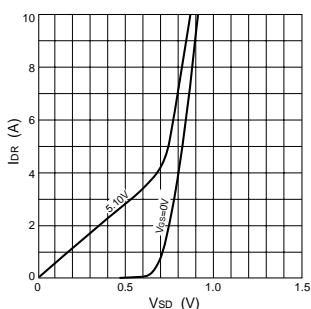
$R_{DS(ON)}$ - T_c Characteristics (Typical)



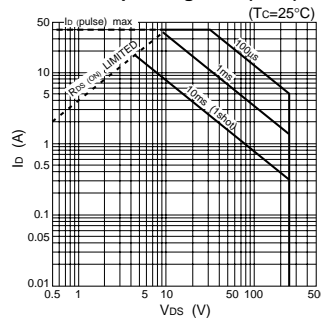
Capacitance- V_{DS} Characteristics (Typical)



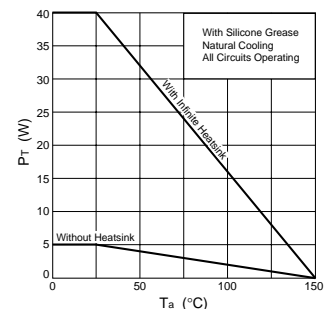
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	200	V
V_{GSS}	± 20	V
I_D	± 7	A
$I_D(\text{pulse})$	± 15 ($PW \leq 1\text{ms}$, $D_u \leq 1\%$)	A
E_{AS}^*	55	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

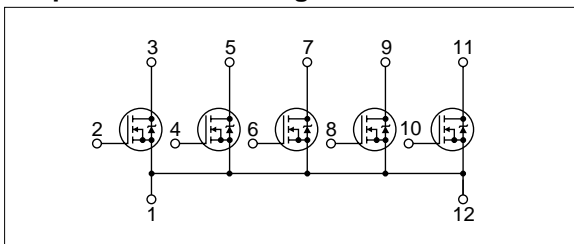
* : $V_{DD}=25\text{V}$, $L=2.0\text{mH}$, $I_D=7\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

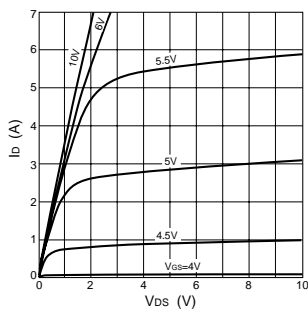
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	200			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=200\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=1\text{mA}$
$R_{e(yfs)}$	2.5	5.0		S	$V_{DS}=10\text{V}$, $I_D=3.5\text{A}$
$R_{DS(ON)}$		270	350	m Ω	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$
C_{iss}		450		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		280		pF	
C_{rss}		120		pF	
$t_{d(on)}$		20		ns	$I_D=3.5\text{A}$, $V_{DD} \div 100\text{V}$, $R_L=28.6\Omega$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.
t_r		30		ns	
$t_{d(off)}$		55		ns	
t_f		75		ns	
t_{rr}		450		ns	
V_{SD}		1.0	1.5	V	$I_{SD}=7\text{A}$, $V_{GS}=0\text{V}$
				ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

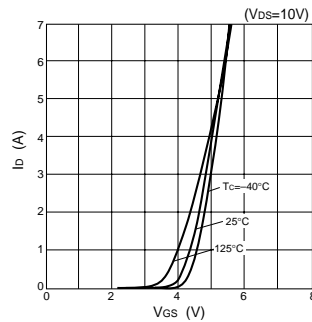


Characteristic curves

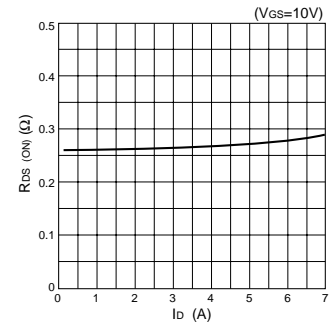
I_D - V_{DS} Characteristics (Typical)



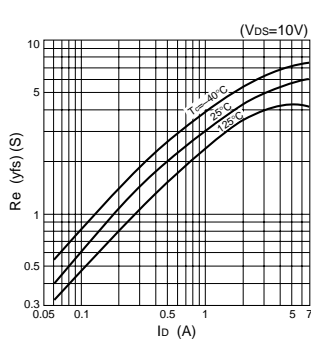
I_D - V_{GS} Characteristics (Typical)



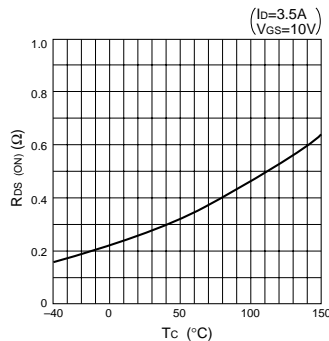
$R_{DS(ON)}$ - I_D Characteristics (Typical)



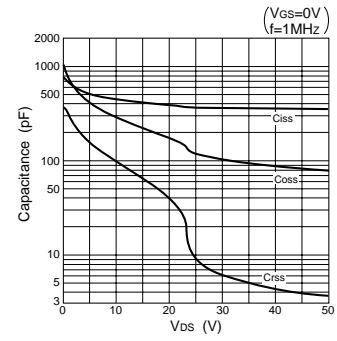
$R_{e(yfs)}$ - I_D Characteristics (Typical)



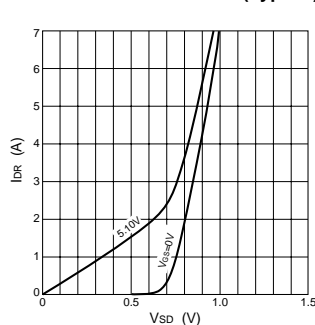
$R_{DS(ON)}$ - T_c Characteristics (Typical)



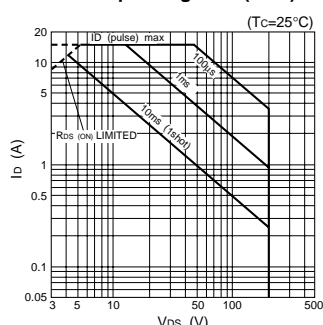
Capacitance- V_{DS} Characteristics (Typical)



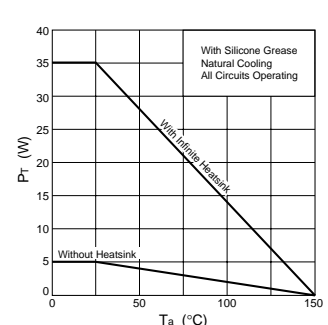
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	150	V
V_{GSS}	± 20	V
I_D	± 10	A
$I_D(\text{pulse})$	± 40 ($PW \leq 1\text{ms}$, $D \leq 1\%$)	A
E_{AS}^*	280	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	40 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.13 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

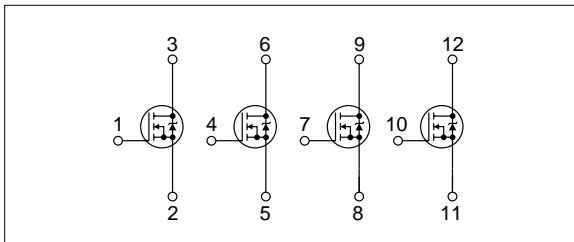
* : $V_{DD}=25\text{V}$, $L=4.7\text{mH}$, $I_D=10\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

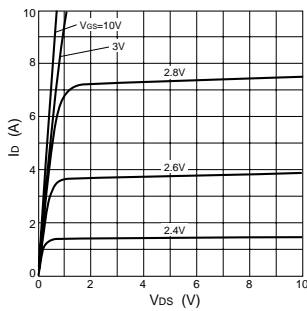
Symbol	Specification			Unit	Specification
	min	typ	max		
$V_{(BR)DSS}$	150			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=150\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	10	15		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$
$R_{DS(ON)}$		70	85	$\text{m}\Omega$	$V_{GS}=10\text{V}$, $I_D=5\text{A}$
		80	100	$\text{m}\Omega$	$V_{GS}=4\text{V}$, $I_D=5\text{A}$
C_{iss}		2000		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		470		pF	$V_{GS}=0\text{V}$
$t_{d(on)}$		35		ns	$I_D=5\text{A}$, $V_{DD} \approx 70\text{V}$, $R_L=14\Omega$, $V_{GS}=5\text{V}$, see Fig. 3 on page 16.
t_r		40		ns	
$t_{d(off)}$		150		ns	
t_f		50		ns	
V_{SD}		0.9	1.5	V	
t_{rr}		500		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

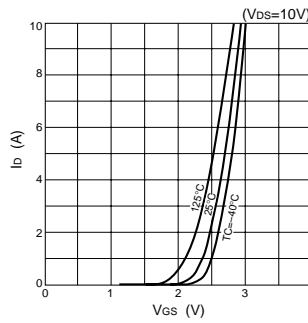


Characteristic curves

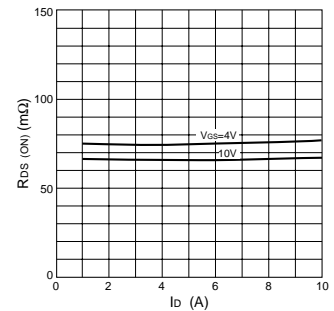
I_D - V_{DS} Characteristics (Typical)



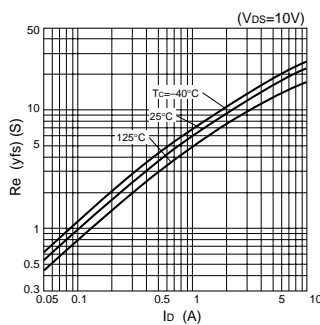
I_D - V_{GS} Characteristics (Typical)



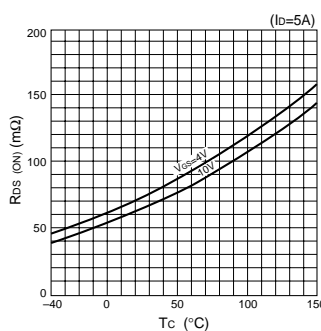
$R_{DS(ON)}$ - I_D Characteristics (Typical)



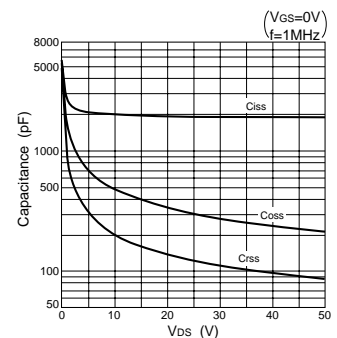
$R_{e(yfs)}$ - I_D Characteristics (Typical)



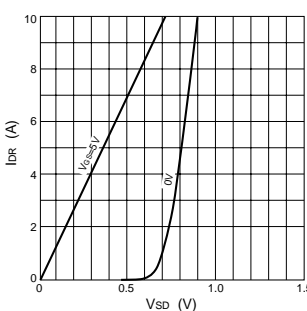
$R_{DS(ON)}$ - T_c Characteristics (Typical)



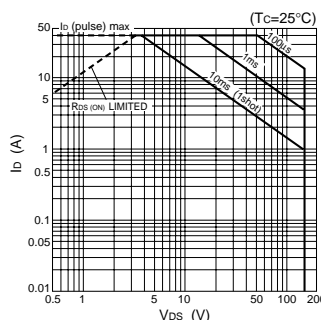
Capacitance- V_{DS} Characteristics (Typical)



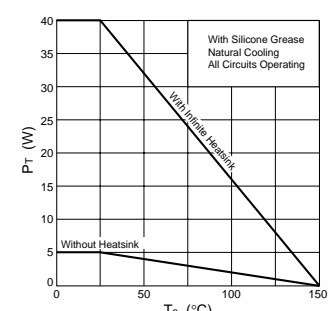
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	250	V
V_{GSS}	± 20	V
I_D	± 7	A
$I_D(\text{pulse})$	± 15 ($PW \leq 1\text{ms}$, $D_u \leq 1\%$)	A
E_{AS}^*	55	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

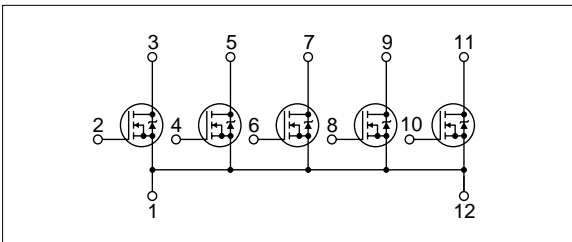
* : $V_{DD}=25\text{V}$, $L=2.0\text{mH}$, $I_D=7\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

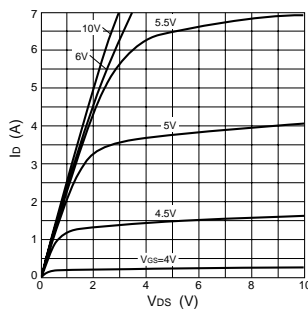
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	250			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=250\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=1\text{mA}$
$R_{e(yfs)}$	2.5	5.0		S	$V_{DS}=10\text{V}$, $I_D=3.5\text{A}$
$R_{DS(ON)}$		400	500	m Ω	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$
C_{iss}		450		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		280		pF	
$t_{d(on)}$		20		ns	$I_D=3.5\text{A}$, $V_{DD} \doteq 100\text{V}$, $R_L=28.6\Omega$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.
t_r		30		ns	
$t_{d(off)}$		55		ns	
t_f		75		ns	
V_{SD}		1.0	1.5	V	
t_{rr}		600		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

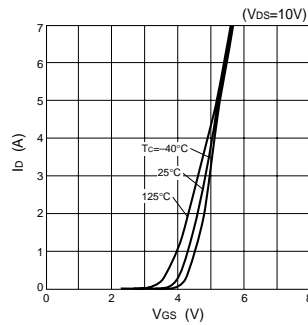


Characteristic curves

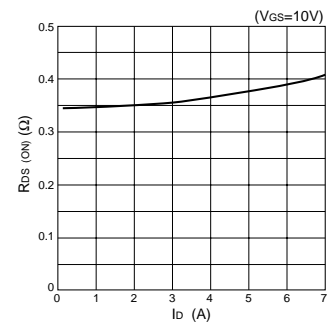
I_D - V_{DS} Characteristics (Typical)



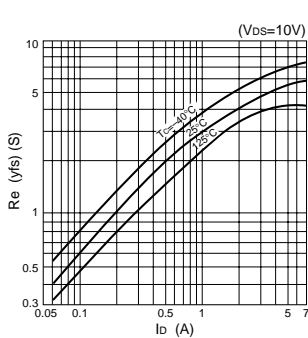
I_D - V_{GS} Characteristics (Typical)



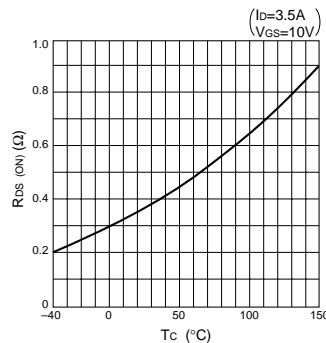
$R_{DS(ON)}$ - I_D Characteristics (Typical)



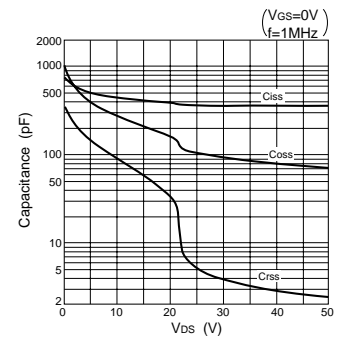
$R_{e(yfs)}$ - I_D Characteristics (Typical)



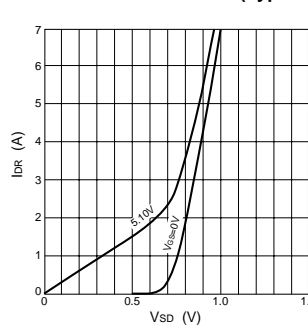
$R_{DS(ON)}$ - T_C Characteristics (Typical)



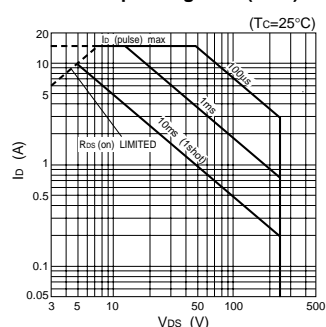
Capacitance- V_{DS} Characteristics (Typical)



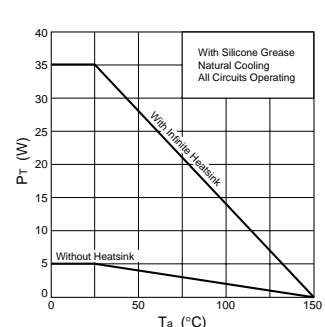
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	150	V
V_{GSS}	± 20	V
I_D	± 10	A
$I_D(\text{pulse})$	± 40 ($PW \leq 1\text{ms}$, $D_u \leq 1\%$)	A
E_{AS}^*	160	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	40 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.13 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

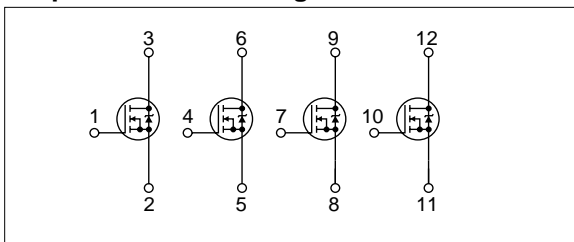
* : $V_{DD}=25\text{V}$, $L=2.7\text{mH}$, $I_D=10\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

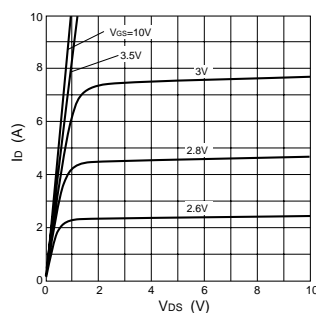
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	150			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=150\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	8	13.5		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$
$R_{DS(ON)}$		90	115	$\text{m}\Omega$	$V_{GS}=10\text{V}$, $I_D=5\text{A}$
		105	130	$\text{m}\Omega$	$V_{GS}=4\text{V}$, $I_D=5\text{A}$
C_{iss}		1500		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		360		pF	$V_{GS}=0\text{V}$
$t_{d(on)}$		30		ns	$I_D=5\text{A}$, $V_{BD} \approx 70\text{V}$, $R_L=14\Omega$, $V_{GS}=5\text{V}$, see Fig. 3 on page 16.
t_r		35		ns	
$t_{d(off)}$		100		ns	
t_f		40		ns	
V_{SD}	1.0	1.5		V	
t_{rr}		420		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

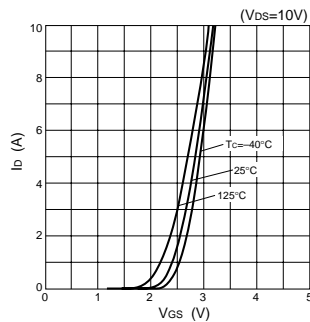


Characteristic curves

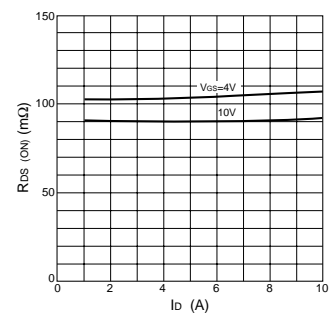
I_D - V_{DS} Characteristics (Typical)



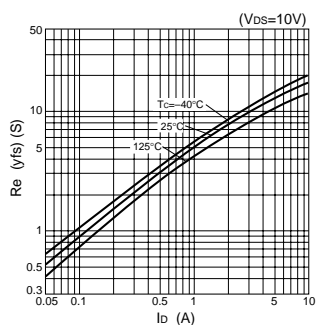
I_D - V_{GS} Characteristics (Typical)



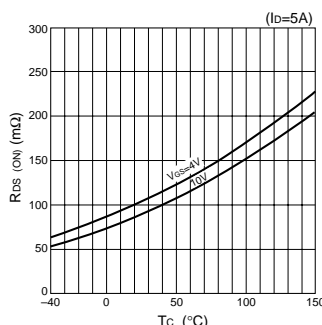
$R_{DS(ON)}$ - I_D Characteristics (Typical)



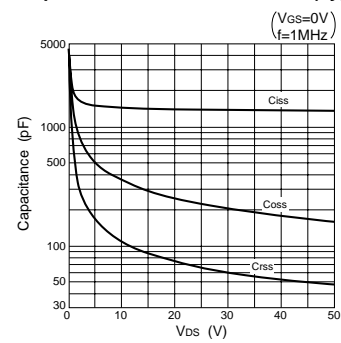
$R_{e(yfs)}$ - I_D Characteristics (Typical)



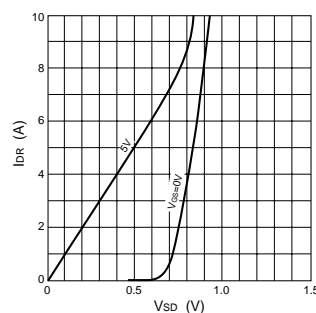
$R_{DS(ON)}$ - T_c Characteristics (Typical)



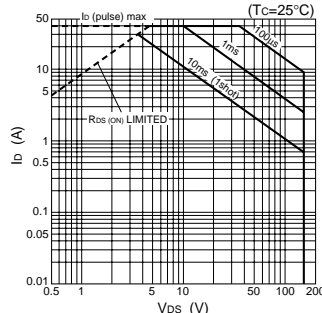
Capacitance- V_{DS} Characteristics (Typical)



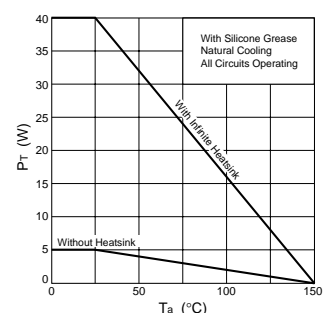
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

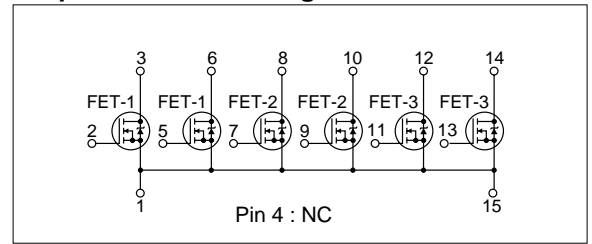
($T_a=25^\circ\text{C}$)

Symbol	Ratings			Unit
	FET1	FET2	FET3	
V_{DSS}		150		V
V_{GS}		+20, -10		V
I_D	± 7	± 5	± 7	A
$I_D(\text{pulse})^{*1}$	± 15	± 10	± 15	A
E_{AS}^{*2}		15		mJ
I_{AS}		5		A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)			W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)			W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)			$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)			$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)			Vrms
T_{ch}	150			$^\circ\text{C}$
T_{stg}	-40 to +150			$^\circ\text{C}$

*1 : $PW \leq 100\mu\text{s}$, $duty \leq 50\%$

*2 : $V_{DD}=25\text{V}$, $L=1.0\text{mH}$, $I_L=5\text{A}$ unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Equivalent circuit diagram



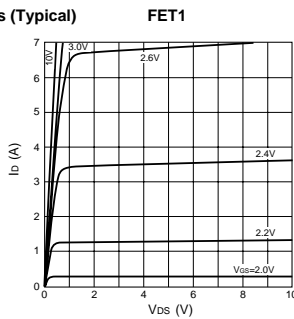
Electrical characteristics

($T_a=25^\circ\text{C}$)

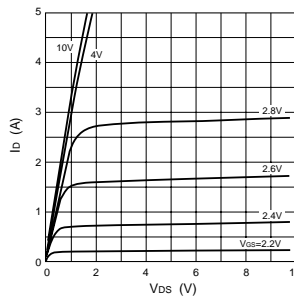
Symbol	FET1				FET2				FET3							
	Specification			Unit	Conditions	Specification			Unit	Conditions	Specification			Unit	Conditions	
	min	typ	max			min	typ	max			min	typ	max			
$V_{(BR)DSS}$	150			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$	150			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$	150			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$	
I_{GSS}			100	nA	$V_{GS}=20\text{V}$			100	nA	$V_{GS}=20\text{V}$			100	nA	$V_{GS}=20\text{V}$	
I_{DSS}			100	μA	$V_{DS}=150\text{V}$, $V_{GS}=0\text{V}$			100	μA	$V_{DS}=150\text{V}$, $V_{GS}=0\text{V}$			100	μA	$V_{DS}=150\text{V}$, $V_{GS}=0\text{V}$	
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	
$R_{e(f)}(s)$	7		12	S	$V_{DS}=10\text{V}$, $I_D=3.5\text{A}$	3		5.5	S	$V_{DS}=10\text{V}$, $I_D=2.5\text{A}$	4		9	S	$V_{DS}=10\text{V}$, $I_D=3.5\text{A}$	
$R_{DS(ON)}$		80	105	m Ω	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$	330	440	m Ω	$V_{GS}=10\text{V}$, $I_D=2.5\text{A}$	150	200	m Ω	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$			
		85	115	m Ω	$V_{GS}=4\text{V}$, $I_D=3.5\text{A}$	370	480	m Ω	$V_{GS}=4\text{V}$, $I_D=2.5\text{A}$	170	230	m Ω	$V_{GS}=4\text{V}$, $I_D=3.5\text{A}$			
C_{ISS}	1900			pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$	380			pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$	870			pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$	
C_{OSS}	630			pF		95			pF		320			pF		
C_{RSS}	420			pF		25			pF		210			pF		
$t_{d(ON)}$	35			ns	$I_D=3.5\text{A}$, $V_{DD} \approx 70\text{V}$, $R_L=20\Omega$, $V_{GS}=5\text{V}$, see Fig.3 on page 16.	25			ns	$I_D=2.5\text{A}$, $V_{DD} \approx 70\text{V}$, $R_L=28\Omega$, $V_{GS}=5\text{V}$, see Fig.3 on page 16.	25			ns	$I_D=3.5\text{A}$, $V_{DD} \approx 70\text{V}$, $R_L=20\Omega$, $V_{GS}=5\text{V}$, see Fig.3 on page 16.	
t_r	70			ns		50			ns		55			ns		
$t_{d(OFF)}$	140			ns		55			ns		80			ns		
t_f	90			ns		40			ns		50			ns		
V_{SD}	1.0	1.5		V	$I_{SD}=7\text{A}$, $V_{GS}=0\text{V}$	1.1	1.5		V	$I_{SD}=5\text{A}$, $V_{GS}=0\text{V}$	1.0	1.5		V	$I_{SD}=7\text{A}$, $V_{GS}=0\text{V}$	
t_{rr}	620			ns	$I_F=\pm 100\text{mA}$	180			ns	$I_F=\pm 100\text{mA}$	500			ns	$I_F=\pm 100\text{mA}$	

Characteristic curves

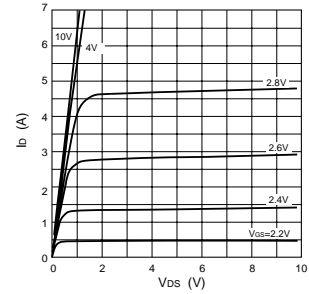
I_D - V_{DS} Characteristics (Typical)



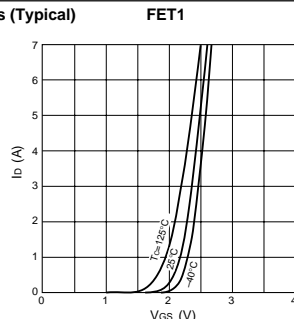
FET2



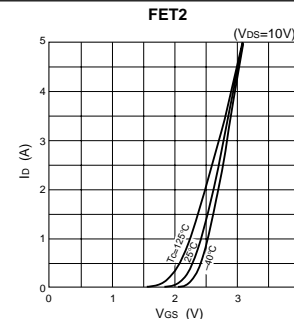
FET3



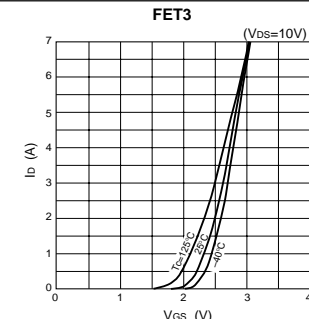
I_D - V_{GS} Characteristics (Typical)



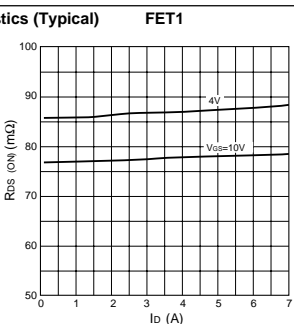
FET2



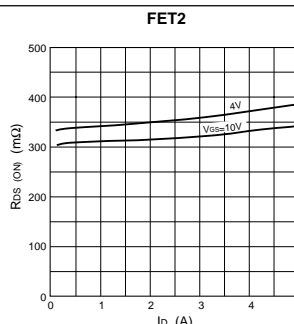
FET3



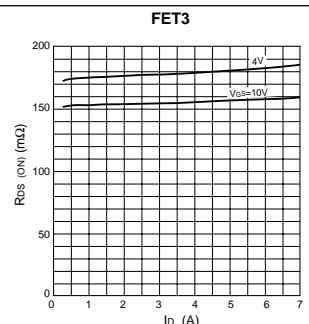
$R_{DS(ON)}$ - I_D Characteristics (Typical)



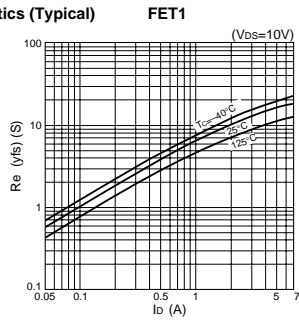
FET2



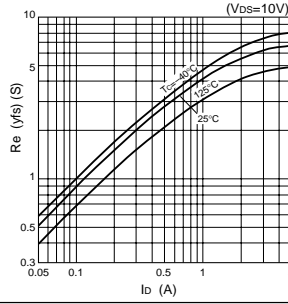
FET3



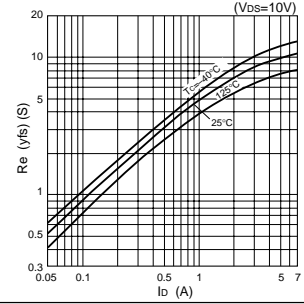
Re(yfs)-Id Characteristics (Typical)



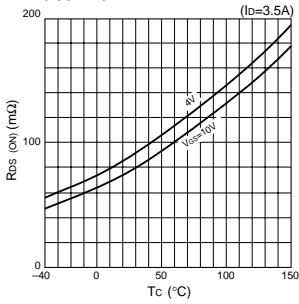
FET2



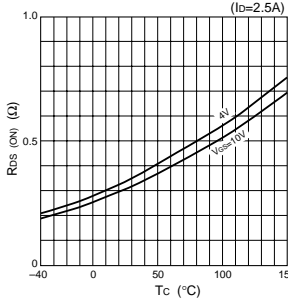
FET3



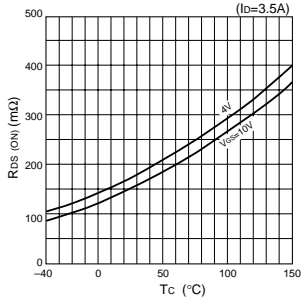
Rds(on)-Tc Characteristics (Typical)



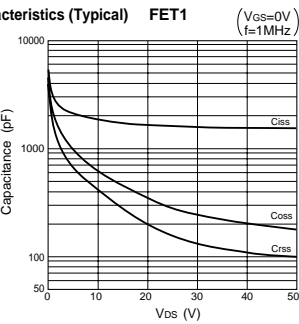
FET2



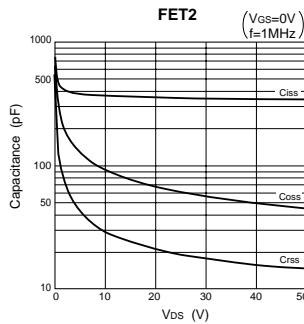
FET3



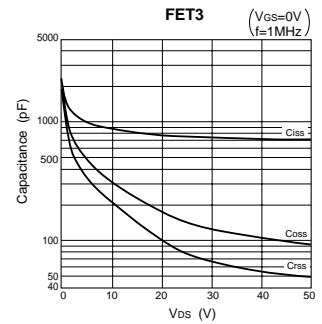
Capacitance-Vds Characteristics (Typical)



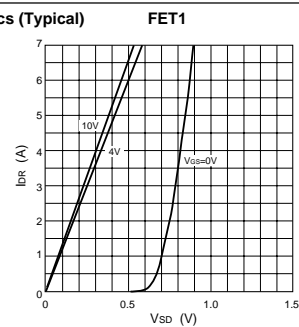
FET2



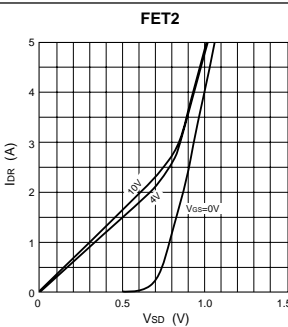
FET3



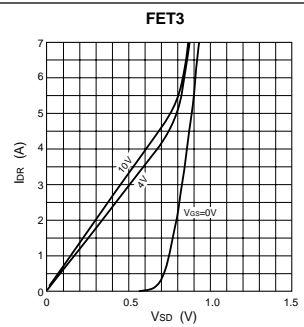
Idr-Vsd Characteristics (Typical)



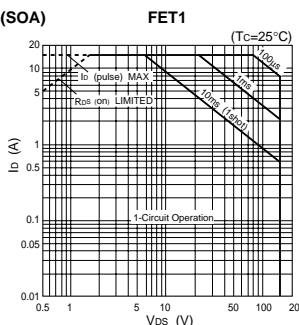
FET2



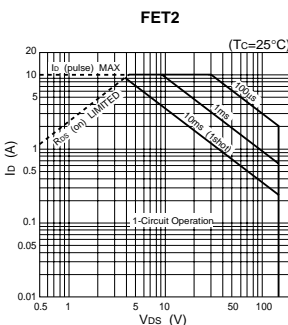
FET3



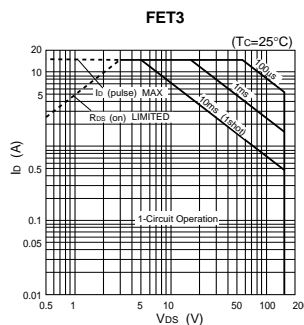
Safe Operating Area (SOA)



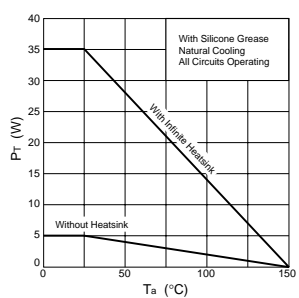
FET2



FET3



Pr-Ta Characteristics



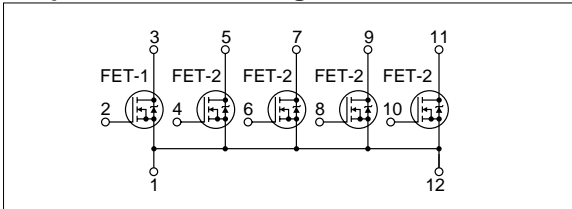
Absolute maximum ratings

($T_a=25^\circ\text{C}$)

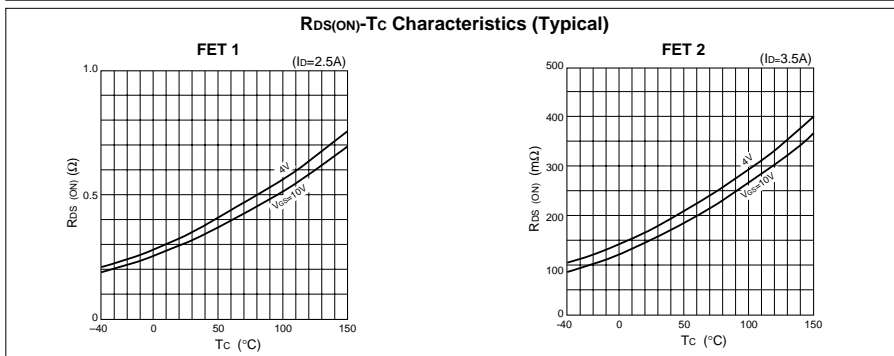
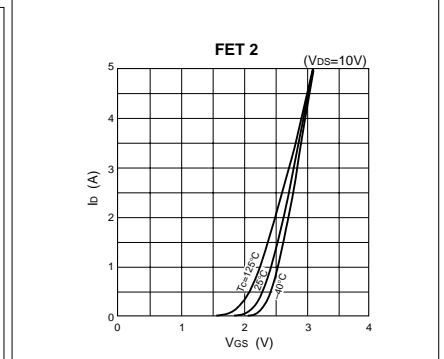
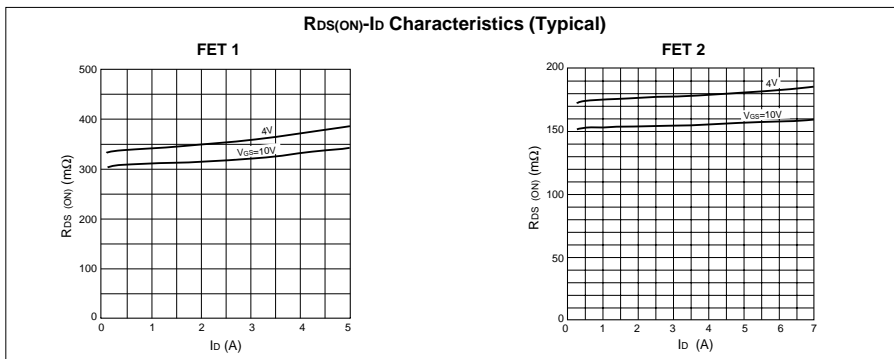
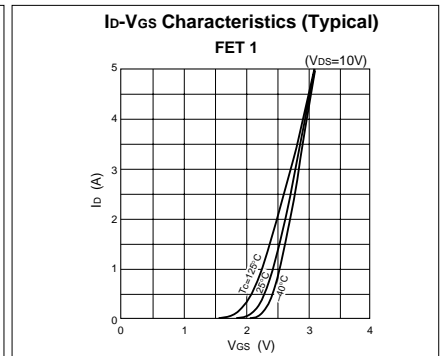
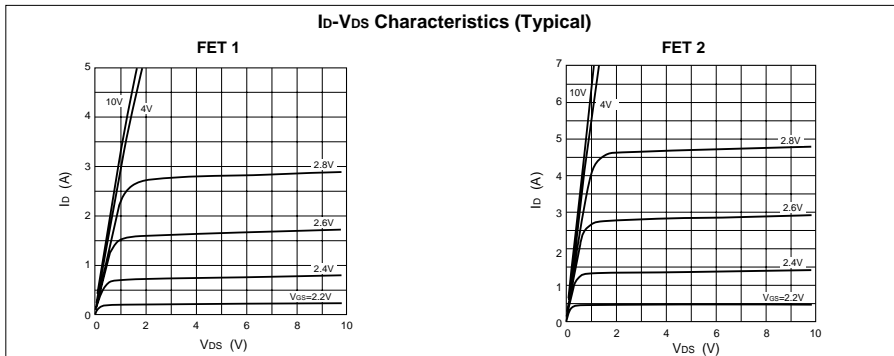
Symbol	Ratings		Unit
	FET 1	FET 2	
V_{DSS}	150		V
V_{GSS}	+20, -10		V
I_D	± 5	± 7	A
I_D (pulse)*	± 10	± 15	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)		W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)		W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)		Vrms
T_{ch}	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$

* : $PW \leq 100\mu\text{s}$, duty $\leq 50\%$

Equivalent circuit diagram



Characteristic curves

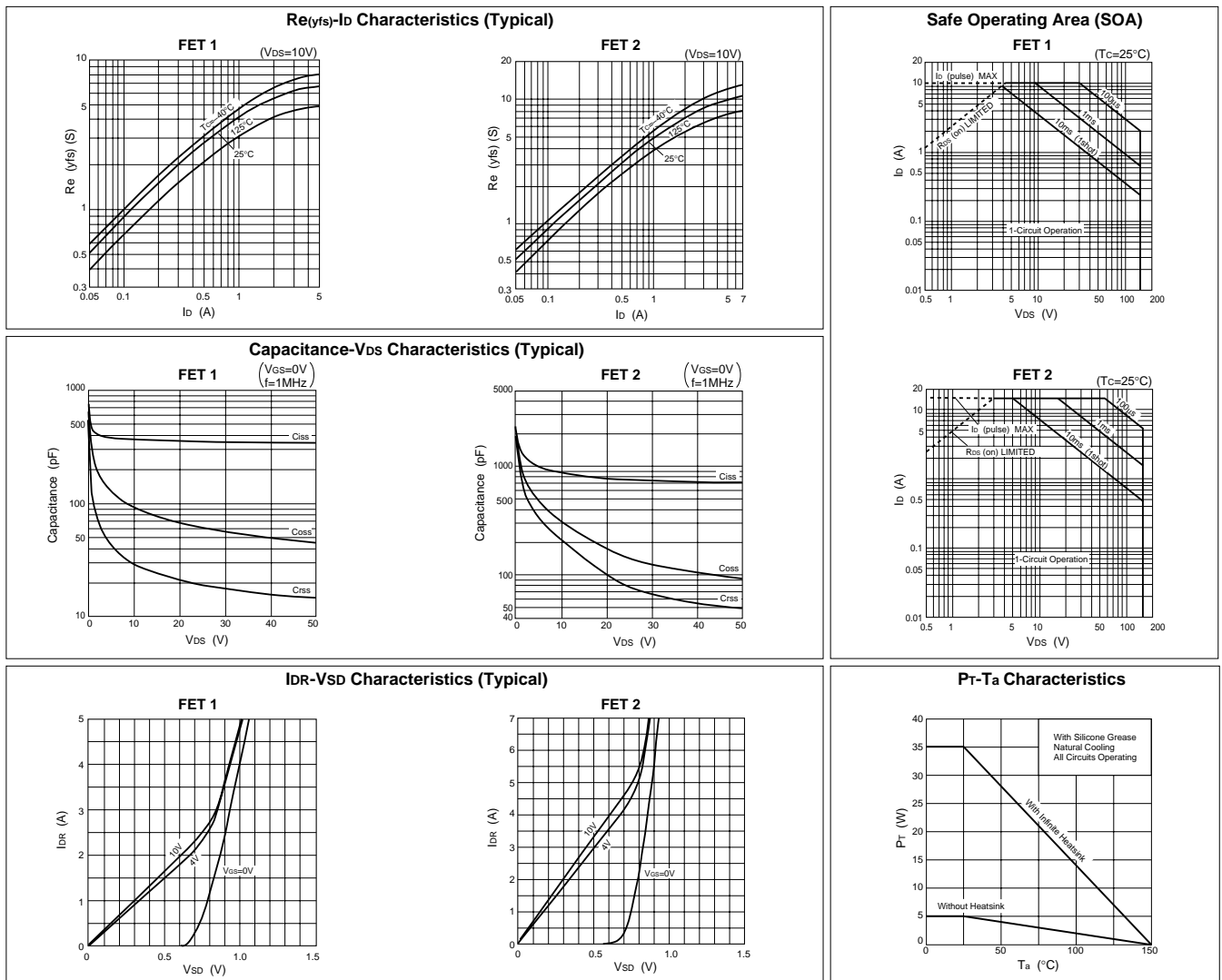


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	FET 1					FET 2				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	150			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$	150			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			100	nA	$V_{GS}=20\text{V}$			100	nA	$V_{GS}=20\text{V}$
I_{DSS}			100	μA	$V_{DS}=150\text{V}$, $V_{GS}=0\text{V}$			100	μA	$V_{DS}=150\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	3	5.5		S	$V_{DS}=10\text{V}$, $I_D=2.5\text{A}$	4	9		S	$V_{DS}=10\text{V}$, $I_D=3.5\text{A}$
$R_{DS(ON)}$		330	440	$\text{m}\Omega$	$V_{GS}=10\text{V}$, $I_D=2.5\text{A}$		150	200	$\text{m}\Omega$	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$
			370	$\text{m}\Omega$	$V_{GS}=4\text{V}$, $I_D=2.5\text{A}$		170	230	$\text{m}\Omega$	$V_{GS}=4\text{V}$, $I_D=3.5\text{A}$
C_{iss}		380		pF	$V_{DS}=10\text{V}$,		870		pF	$V_{DS}=10\text{V}$,
C_{oss}		95		pF	$f=1.0\text{MHz}$,		320		pF	$f=1.0\text{MHz}$,
C_{rss}		25		pF	$V_{GS}=0\text{V}$		210		pF	$V_{GS}=0\text{V}$
$t_{d(on)}$		25		ns	$I_D=2.5\text{A}$,		25		ns	$I_D=3.5\text{A}$,
t_r		50		ns	$V_{DD}\div 70\text{V}$,		55		ns	$V_{DD}\div 70\text{V}$,
$t_{d(off)}$		55		ns	$R_L=28\Omega$,		80		ns	$R_L=20\Omega$, $V_{GS}=5\text{V}$,
t_f		40		ns	$V_{GS}=5\text{V}$, see Fig.3 on page 16.		50		ns	see Fig.3 on page 16.
V_{SD}		1.1	1.5	V	$I_{SD}=5\text{A}$, $V_{GS}=0\text{V}$		1.0	1.5	V	$I_{SD}=7\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		180		ns	$I_F=\pm 100\text{mA}$		500		ns	$I_F=\pm 100\text{mA}$

Characteristic curves



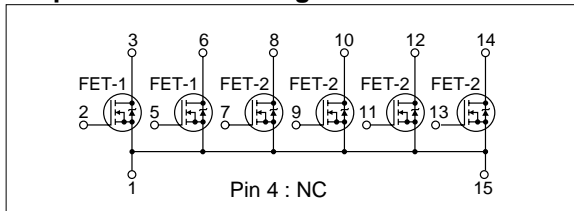
Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	FET 1	FET 2	
V_{DSS}	200		V
V_{GSS}	± 20		V
I_D	± 7		A
$I_D(\text{pulse})^*$	± 15		A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)		W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)		W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
V_{iso}	1000 (Between fin and lead pin, AC)		Vrms
T_{ch}	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$

* : $PW \leq 100\mu\text{s}$, $duty \leq 50\%$

Equivalent circuit diagram



Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	FET 1					FET 2				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	200			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$	200			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=200\text{V}$, $V_{GS}=0\text{V}$			100	μA	$V_{DS}=200\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=1\text{mA}$	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=1\text{mA}$
$R_{e(yfs)}$	4.5	6.5		S	$V_{DS}=10\text{V}$, $I_D=3.5\text{A}$	2.5	5.0		S	$V_{DS}=10\text{V}$, $I_D=3.5\text{A}$
$R_{DS(ON)}$		130	175	m Ω	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$		270	350	m Ω	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$
C_{iss}		850		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$		450		pF	$V_{DS}=10\text{V}$,
C_{oss}		550		pF			280		pF	$f=1.0\text{MHz}$,
C_{rss}		250		pF			120		pF	$V_{GS}=0\text{V}$
$t_{d(on)}$		20		ns	$I_D=3.5\text{A}$, $V_{DD} \approx 100\text{V}$, $R_L=28.6\Omega$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.		20		ns	$I_D=3.5\text{A}$,
t_r		25		ns			30		ns	$V_{DD} \approx 100\text{V}$,
$t_{d(off)}$		90		ns			55		ns	$R_L=28.6\Omega$,
t_f		70		ns			75		ns	$V_{GS}=10\text{V}$, see Fig. 3 on page 16.
V_{SD}		1.0	1.5	V	$I_{SD}=7\text{A}$, $V_{GS}=0\text{V}$		1.0	1.5	V	$I_{SD}=7\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		500		ns	$I_F=\pm 100\text{mA}$		450		ns	$I_F=\pm 100\text{mA}$

Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	150	V
V_{GSS}	+20, -10	V
I_D	$\pm 7A$	A
I_D (pulse)	± 15 ($PW \leq 1ms, Du \leq 1\%$)	A
E_{AS}^*	100	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V_{rms}
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

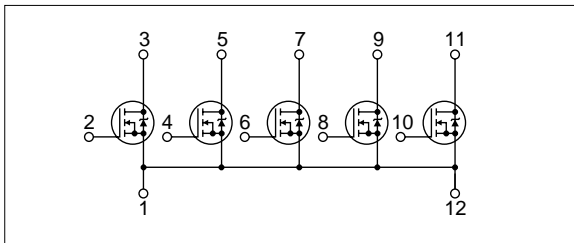
* : $V_{DD}=25V, L=3.4mH, I_D=7A$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

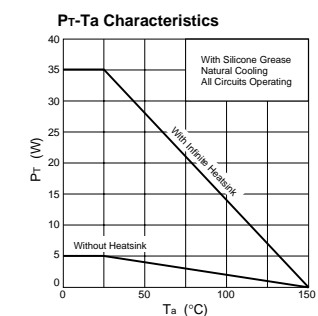
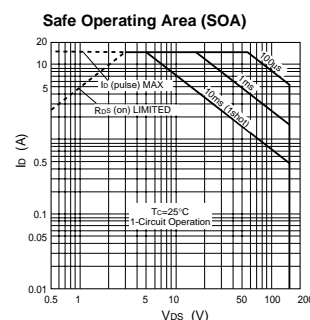
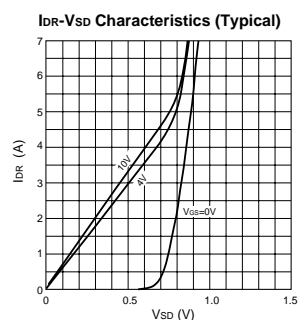
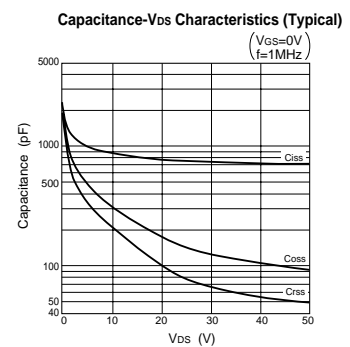
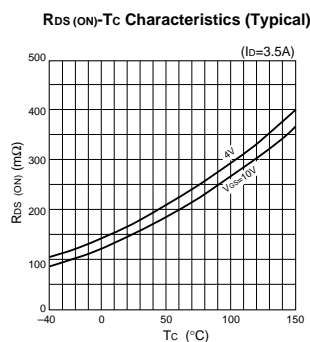
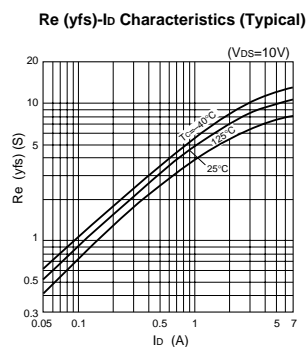
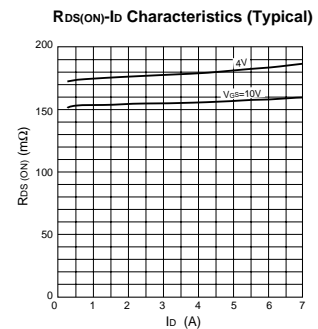
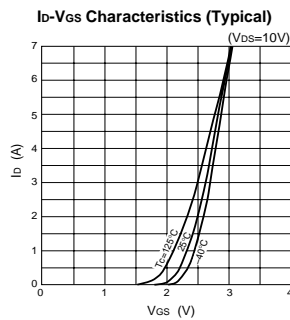
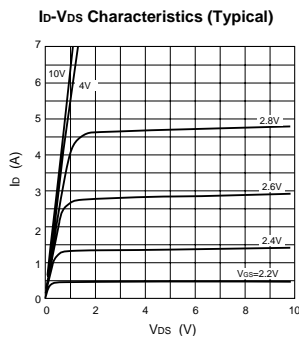
($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	150			V	$I_D=100\mu A, V_{GS}=0V$
I_{GSS}			100	nA	$V_{GS}=20V$
I_{DSS}			100	μA	$V_{DS}=150V, V_{GS}=0V$
V_{TH}	1.0		2.0	V	$V_{DS}=10V, I_D=250\mu A$
$Re(yfs)$	4	9		S	$V_{DS}=10V, I_D=3.5A$
$R_{DS(ON)}$		150	200	$m\Omega$	$V_{GS}=10V, I_D=3.5A$
		170	230	$m\Omega$	$V_{GS}=4V, I_D=3.5A$
C_{iss}		870		pF	$V_{DS}=10V,$ $f=1.0MHz,$ $V_{GS}=0V$
C_{oss}		320		pF	
C_{rss}		210		pF	
$td(on)$		25		ns	$I_D=3.5A,$ $V_{DD} \approx 70V,$ $R_L=20\Omega,$ $V_{GS}=5V$, see Fig. 3 in page 16.
tr		55		ns	
$td(off)$		80		ns	
tf		50		ns	
V_{SD}		1.0	1.5	V	$I_{SD}=7A, V_{GS}=0V$
t_{rr}		500		ns	$I_{SD}=\pm 100mA$

Equivalent circuit diagram



Characteristic curves

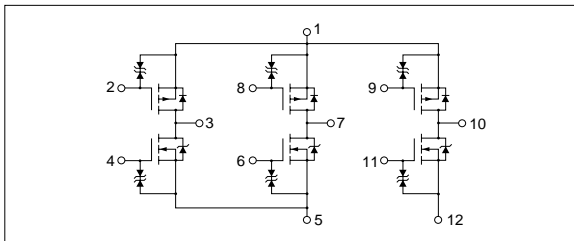


Absolute maximum ratings

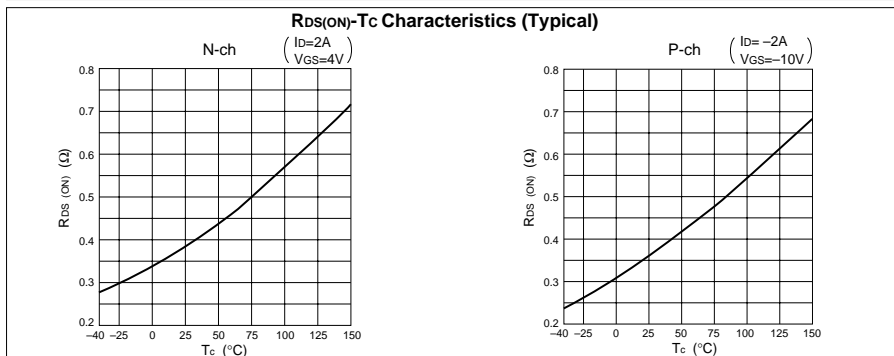
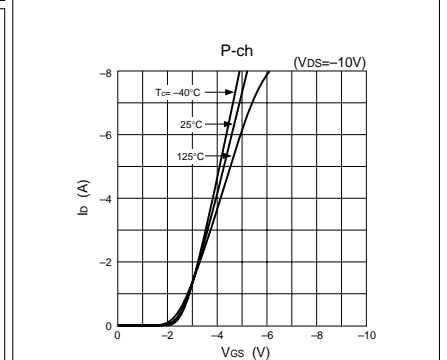
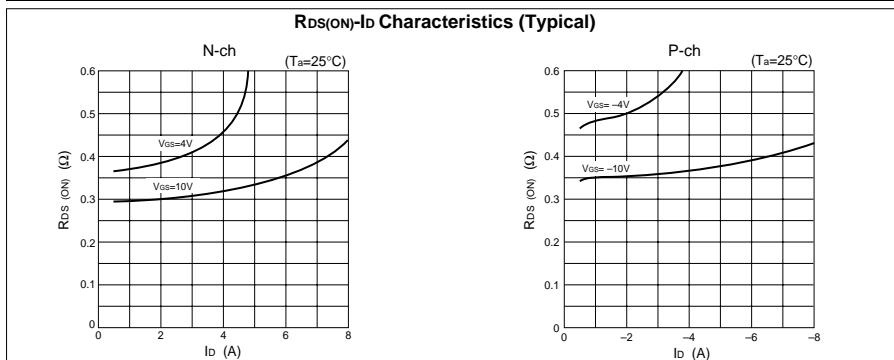
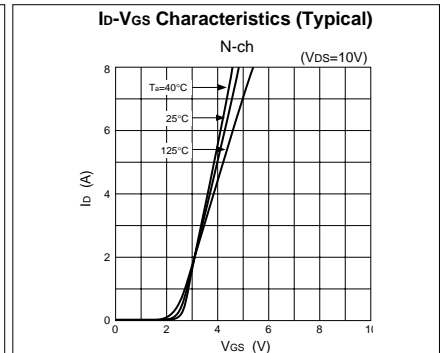
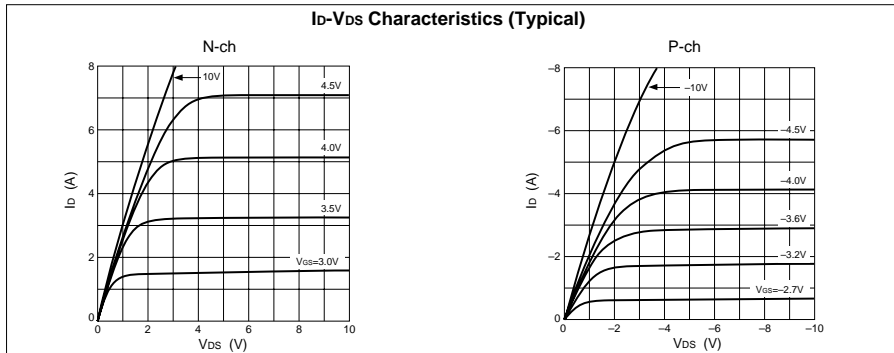
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	N channel	P channel	
V_{DSS}	60	-60	V
V_{GSS}	± 20	∓ 20	V
I_D	4	-4	A
$I_D(\text{pulse})$	8 ($PW \leq 1\text{ms}$, $Duty \leq 25\%$)	-8 ($PW \leq 1\text{ms}$, $Duty \leq 25\%$)	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)		W
	30 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)		W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
θ_{j-c}	4.17 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
Tch	150		$^\circ\text{C}$
Tstg	-40 to +150		$^\circ\text{C}$

Equivalent circuit diagram



Characteristic curves

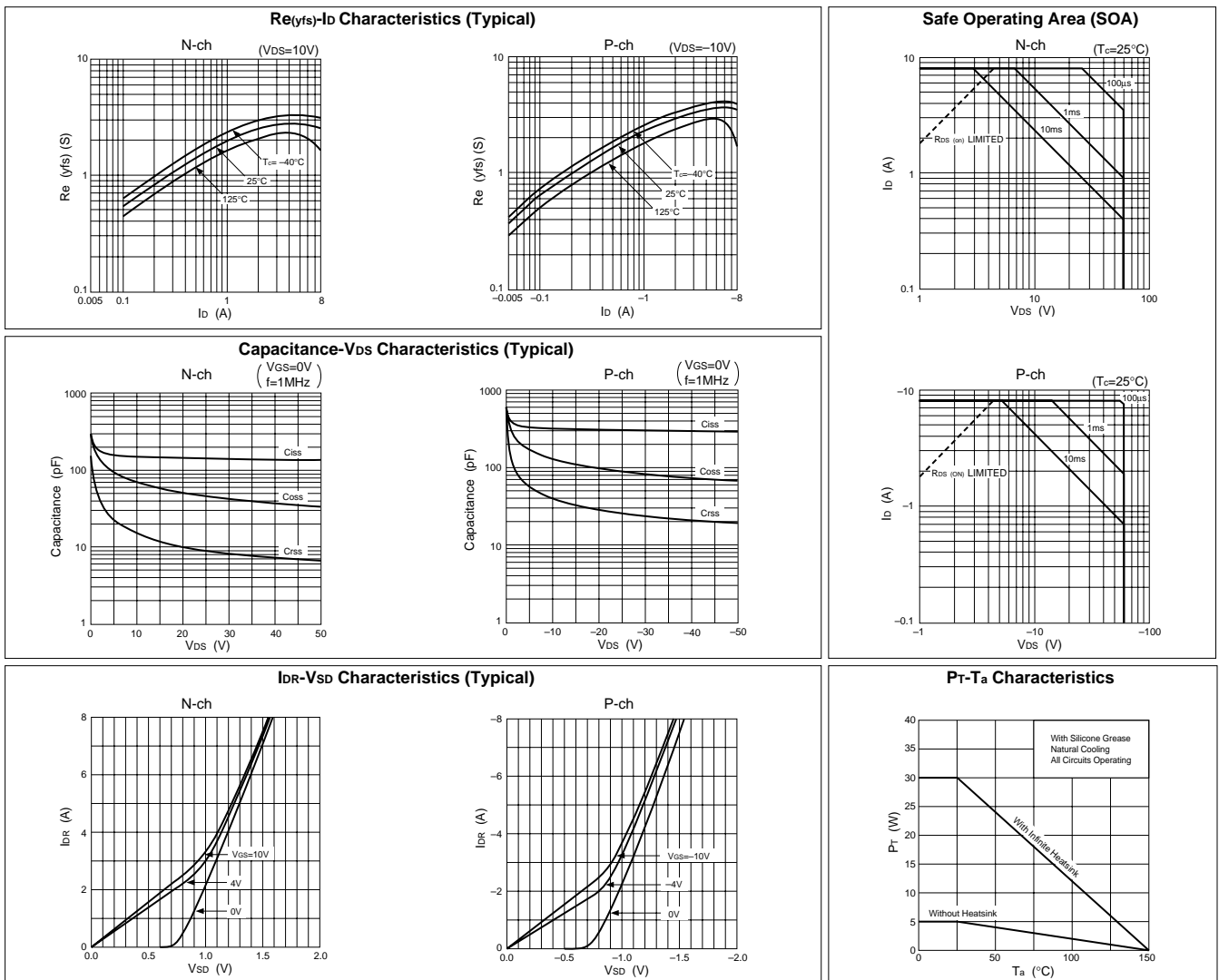


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$	-60			V	$I_D=-100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 10	μA	$V_{GS}=\pm 20\text{V}$			∓ 10	μA	$V_{GS}=\mp 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$			-100	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	-1.0		-2.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$R_{e(yfs)}$		2.5		S	$V_{DS}=10\text{V}$, $I_D=2\text{A}$		3		S	$V_{DS}=-10\text{V}$, $I_D=-2\text{A}$
$R_{DS(ON)}$			0.55	Ω	$V_{GS}=4\text{V}$, $I_D=2\text{A}$			0.55	Ω	$V_{GS}=-10\text{V}$, $I_D=-2\text{A}$
C_{iss}		150		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$		320		pF	$V_{DS}=-10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		70		pF			130		pF	
C_{rss}		15		pF			40		pF	
$t_{d(on)}$		12		ns	$I_D=2\text{A}$, $V_{DD}\div 20\text{V}$, $R_L=10\Omega$, $V_{GS}=5\text{V}$, see Fig. 3 on page 16.		20		ns	$I_D=-2\text{A}$, $V_{DD}\div -20\text{V}$, $R_L=10\Omega$, $V_{GS}=-5\text{V}$, see Fig. 4 on page 16.
t_r		40		ns			95		ns	
$t_{d(off)}$		40		ns			70		ns	
t_f		25		ns			60		ns	
V_{SD}		1.2		V		$I_{SD}=4\text{A}$, $V_{GS}=0\text{V}$		-1.1		
t_{rr}		75		ns	$I_{SD}=2\text{A}$, $V_{GS}=0\text{V}$, $di/dt=100\text{A}/\mu\text{s}$		75		ns	$I_{SD}=-2\text{A}$, $V_{GS}=0\text{V}$, $di/dt=100\text{A}/\mu\text{s}$

Characteristic curves

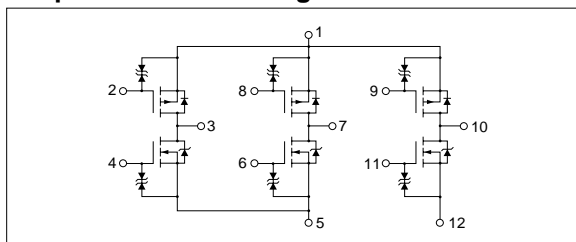


Absolute maximum ratings

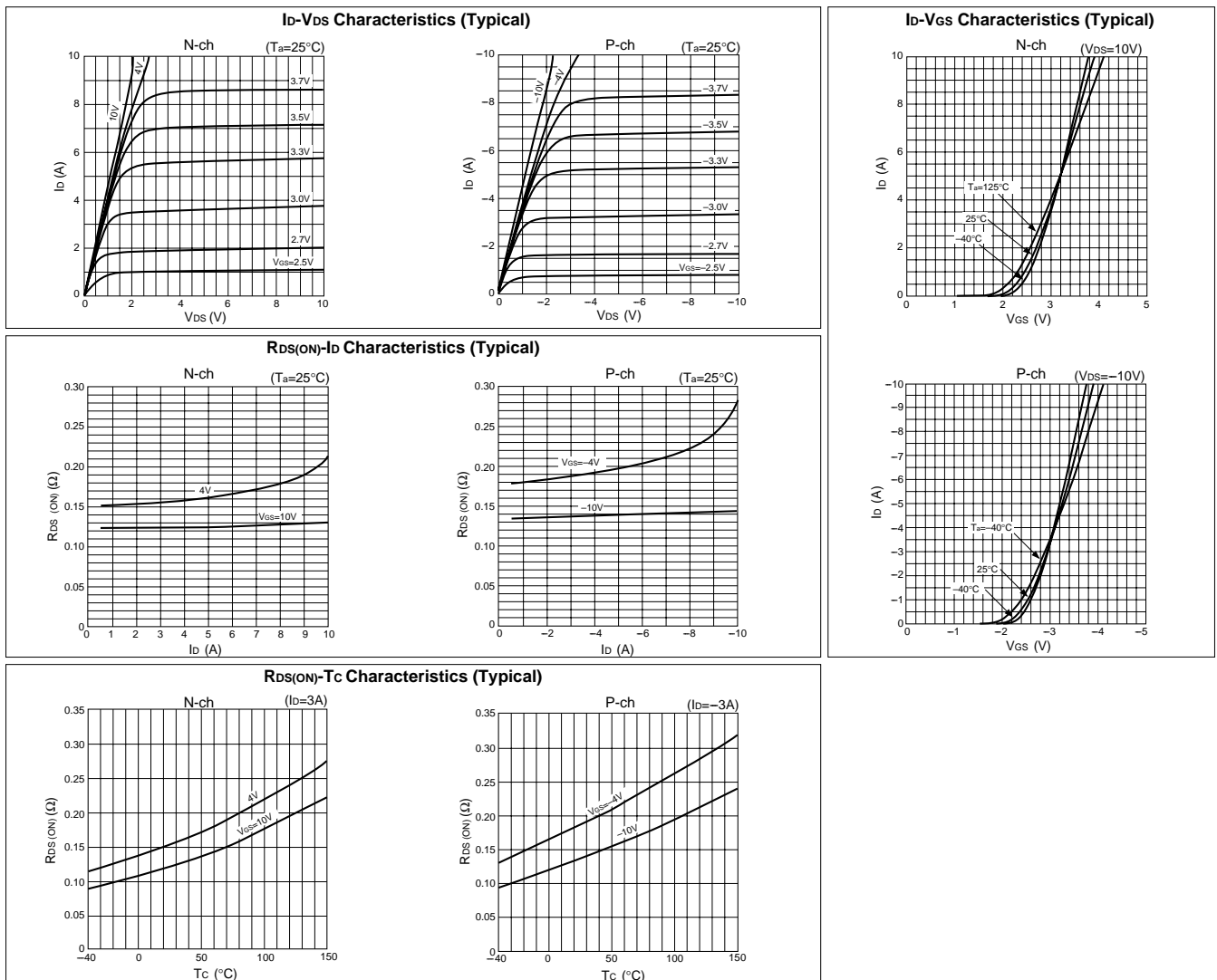
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	N channel	P channel	
V_{DSS}	60	-60	V
V_{GSS}	± 20	± 20	V
I_D	6	-6	A
$I_{D(\text{pulse})}$	10 ($PW \leq 1\text{ms}$, $\text{duty} \leq 25\%$)	-10 ($PW \leq 1\text{ms}$, $\text{duty} \leq 25\%$)	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)		W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)		W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)		Vrms
Tch	150		$^\circ\text{C}$
Tstg	-40 to +150		$^\circ\text{C}$

Equivalent circuit diagram



Characteristic curves

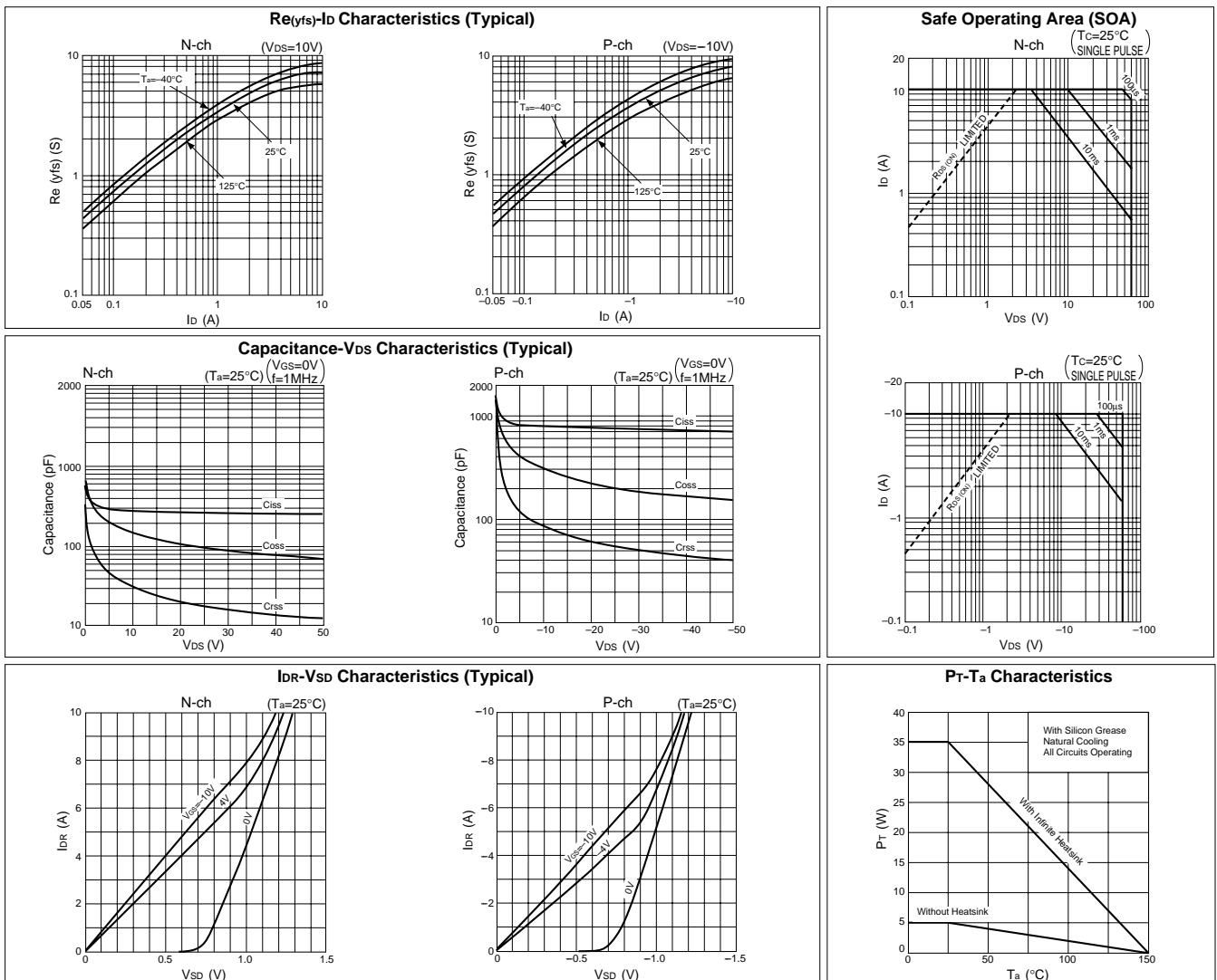


Electrical characteristics

(Ta=25°C)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
V _{(BR)DSS}	60			V	I _D =100μA, V _{GS} =0V	-60			V	I _D =-100μA, V _{GS} =0V
I _{GSS}			±10	μA	V _{GS} =±20V			±10	μA	V _{GS} =±20V
I _{DSS}			100	μA	V _{DS} =60V, V _{GS} =0V			-100	μA	V _{DS} =-60V, V _{GS} =0V
V _{TH}	1.0		2.0	V	V _{DS} =10V, I _D =250μA	-1.0		-2.0	V	V _{DS} =-10V, I _D =-250μA
Re _(yfs)		5.5		S	V _{DS} =10V, I _D =3A		6		S	V _{DS} =-10V, I _D =-3A
R _{DS(ON)}			0.22	Ω	V _{GS} =4V, I _D =3A			0.22	Ω	V _{GS} =-10V, I _D =-3A
C _{iss}		320		pF	V _{DS} =10V, f=1.0MHz, V _{GS} =0V		790		pF	V _{DS} =-10V, f=1.0MHz, V _{GS} =0V
C _{oss}		160		pF			310		pF	
C _{rss}		35		pF			90		pF	
td _(on)		16		ns	I _D =3A, V _{DD} =20V, R _L =6.67Ω, V _{GS} =5V, see Fig. 3 on page 16.		40		ns	I _D =-3A, V _{DD} =20V, R _L =6.67Ω, V _{GS} =-5V, see Fig. 4 on page 16.
t _r		65		ns			110		ns	
td _(off)		70		ns			160		ns	
t _f		45		ns			80		ns	
V _{SD}		1.2		V		I _{SD} =6A, V _{GS} =0V		-1.1		
t _{rr}		65		ns	I _{SD} =3A, V _{GS} =0V, di/dt=100A/μs		85		ns	I _{SD} =-3A, V _{GS} =0V, di/dt=100A/μs

Characteristic curves

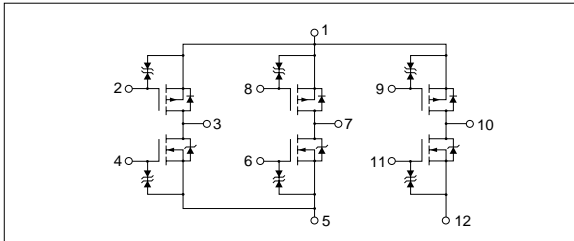


Absolute maximum ratings

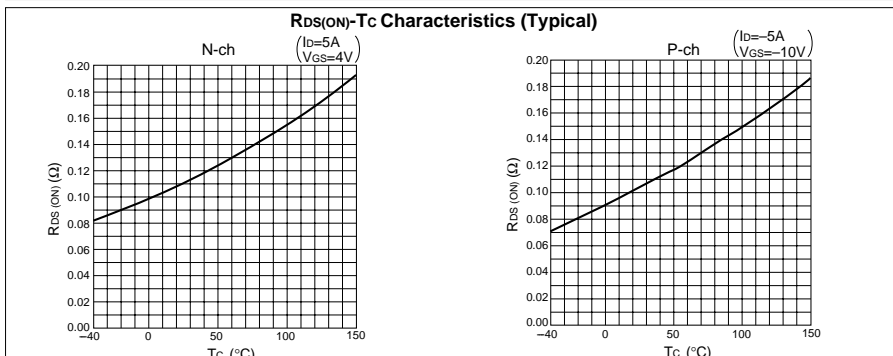
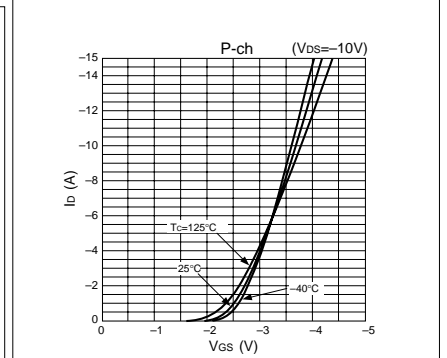
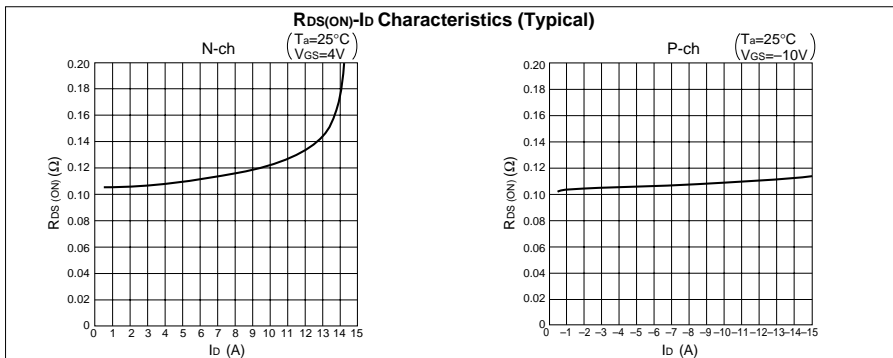
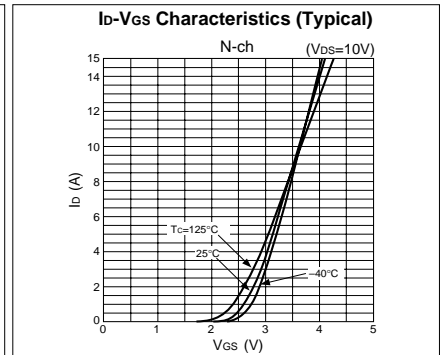
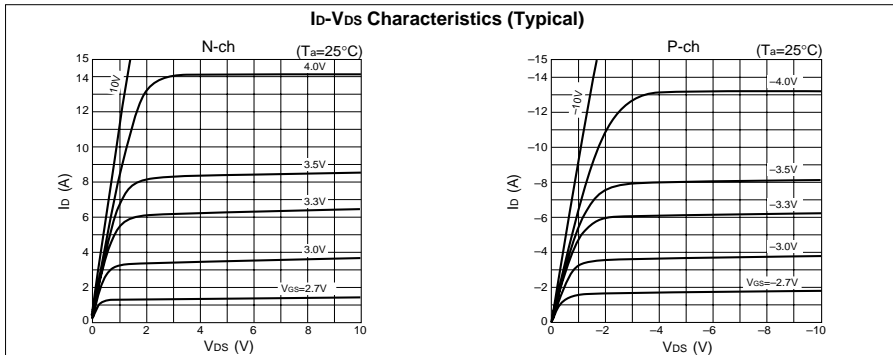
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	N channel	P channel	
V_{DSS}	60	-60	V
V_{GSS}	± 20	± 20	V
I_D	10	-6	A
$I_{D(pulse)}$	15 (PW \leq 1ms, duty \leq 25%)	-15 (PW \leq 1ms, duty \leq 25%)	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)		W
	40 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)		W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C}/\text{W}$
θ_{j-c}	3.125 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C}/\text{W}$
V_{ISO}	1000 (Between fin and lead pin, AC)		Vrms
T_{ch}	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$

Equivalent circuit diagram



Characteristic curves

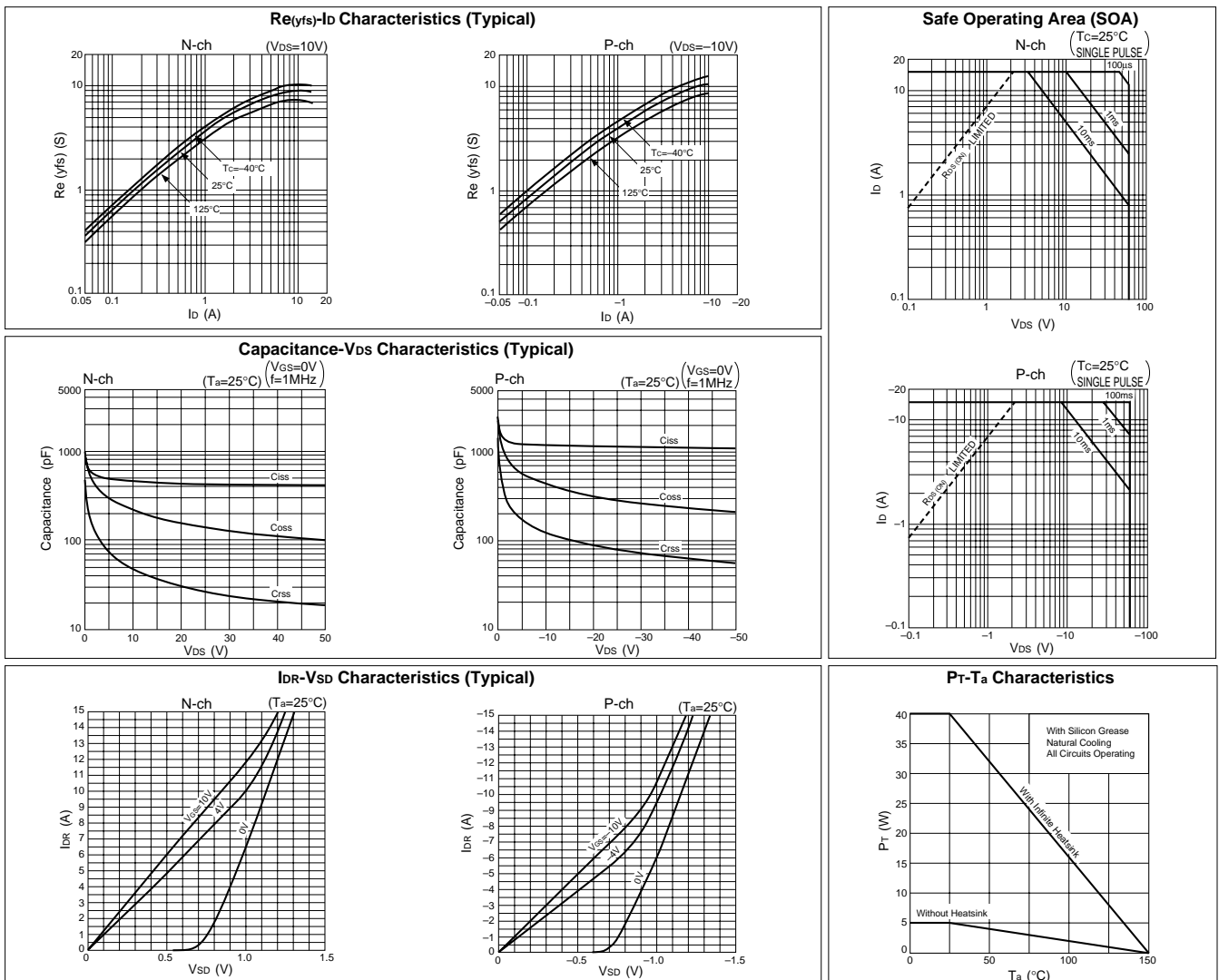


Electrical characteristics

(Ta=25°C)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
V _{(BR)DSS}	60			V	I _D =100μA, V _{GS} =0V	-60			V	I _D =-100μA, V _{GS} =0V
I _{GSS}			±10	μA	V _{GS} =±20V			±10	μA	V _{GS} =±20V
I _{DSS}			100	μA	V _{DS} =60V, V _{GS} =0V			-100	μA	V _{DS} =-60V, V _{GS} =0V
V _{TH}	1.0		2.0	V	V _{DS} =10V, I _D =250μA	-1.0		-2.0	V	V _{DS} =-10V, I _D =-250μA
Re _(yfs)		8		S	V _{DS} =10V, I _D =5A		8.7		S	V _{DS} =-10V, I _D =-5A
R _{DS(ON)}			0.14	Ω	V _{GS} =4V, I _D =5A			0.14	Ω	V _{GS} =-10V, I _D =-5A
C _{iss}		460		pF	V _{DS} =10V, f=1.0MHz, V _{GS} =0V		1200		pF	V _{DS} =-10V, f=1.0MHz, V _{GS} =0V
C _{oss}		225		pF			440		pF	
C _{rss}		50		pF			120		pF	
td _(on)		25		ns	I _D =5A, V _{DD} =20V, R _L =4Ω, V _{GS} =5V, see Fig. 3 on page 16.		50		ns	I _D =-5A, V _{DD} =20V, R _L =4Ω, V _{GS} =-5V see Fig. 4 on page 16.
tr		110		ns			170		ns	
td _(off)		90		ns			180		ns	
tf		55		ns			100		ns	
V _{SD}		1.15		V	I _{SD} =10A, V _{GS} =0V		-1.25		V	I _{SD} =-10A, V _{GS} =0V
t _{rr}		75		ns	I _{SD} =5A, V _{GS} =0V di/dt=100A/μs		100		ns	I _{SD} =-5A, V _{GS} =0V di/dt=100A/μs

Characteristic curves

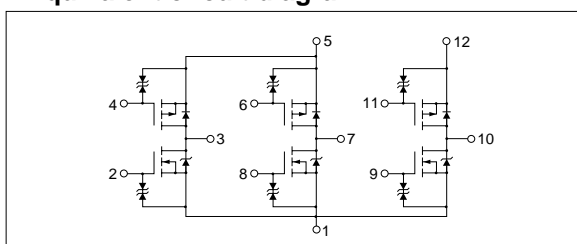


Absolute maximum ratings

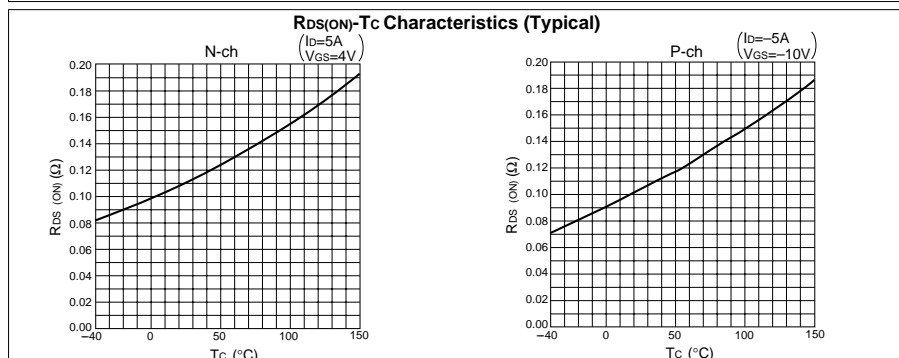
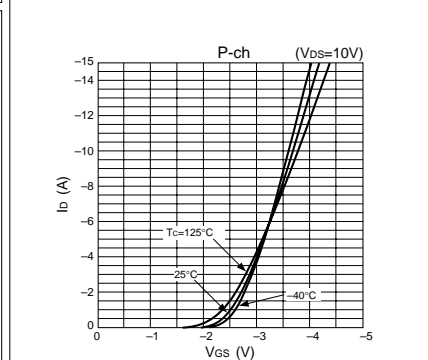
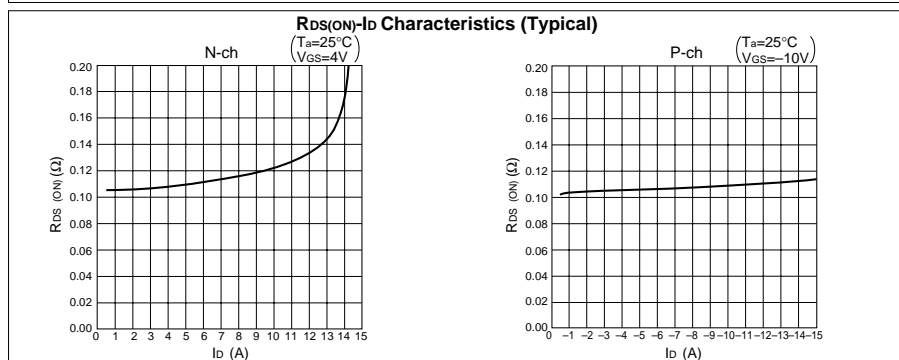
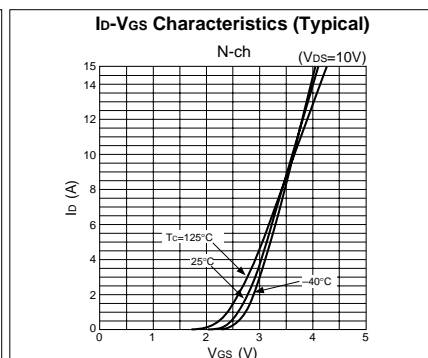
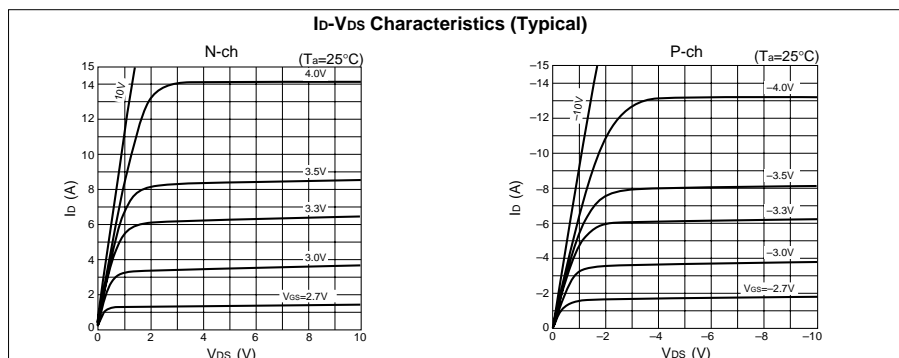
(Ta=25°C)

Symbol	Ratings		Unit
	N channel	P channel	
V _{DSS}	60	-60	V
V _{GSS}	±20	±20	V
I _D	10	-10	A
I _{D(pulse)}	15 (PW≤1ms, duty≤25%)	-15 (PW≤1ms, duty≤25%)	A
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)		W
	40 (Tc=25°C, with all circuits operating, with infinite heatsink)		W
θ _{j-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)		°C/W
θ _{j-c}	3.125 (Junction-Case, Tc=25°C, with all circuits operating)		°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)		V _{rms}
T _{ch}	150		°C
T _{stg}	-40 to +150		°C

Equivalent circuit diagram



Characteristic curves

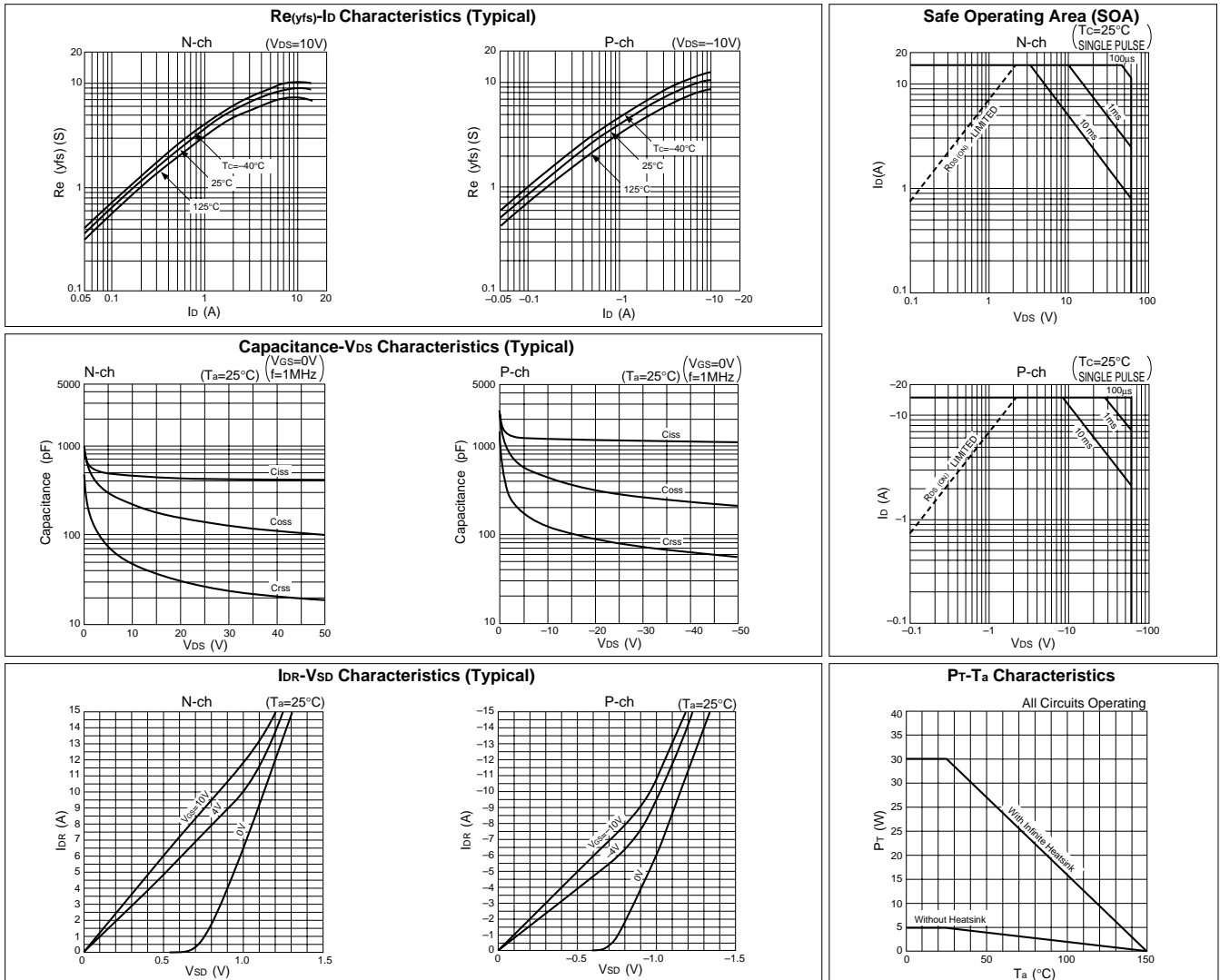


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$	-60			V	$I_D=-100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 10	μA	$V_{GS}=\pm 20\text{V}$			∓ 10	μA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$			-100	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	-1.0		-2.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$Re_{(yfs)}$		8		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$		8.7		S	$V_{DS}=-10\text{V}$, $I_D=-5\text{A}$
$R_{DS(ON)}$			0.14	Ω	$V_{GS}=4\text{V}$, $I_D=5\text{A}$			0.14	Ω	$V_{GS}=-10\text{V}$, $I_D=-5\text{A}$
C_{iss}		460		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$		1200		pF	$V_{DS}=-10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		225		pF			440		pF	
C_{rss}		50		pF			120		pF	
$t_{d(on)}$		25		ns	$I_D=5\text{A}$, $V_{DD}\approx 20\text{V}$, $R_L=4\Omega$, $V_{GS}=5\text{V}$, see Fig. 3 on page 16.		50		ns	$I_D=-5\text{A}$, $V_{DD}\approx 20\text{V}$, $R_L=4\Omega$, $V_{GS}=-5\text{V}$, see Fig. 4 on page 16.
t_r		110		ns			170		ns	
$t_{d(off)}$		90		ns			180		ns	
t_f		55		ns			100		ns	
V_{SD}		1.15		V	$I_{SD}=10\text{A}$, $V_{GS}=0\text{V}$		-1.25		V	$I_{SD}=-10\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		75		ns	$I_{SD}=5\text{A}$, $V_{GS}=0\text{V}$, $di/dt=100\text{A}/\mu\text{s}$		100		ns	$I_{SD}=-5\text{A}$, $V_{GS}=0\text{V}$, $di/dt=100\text{A}/\mu\text{s}$

Characteristic curves



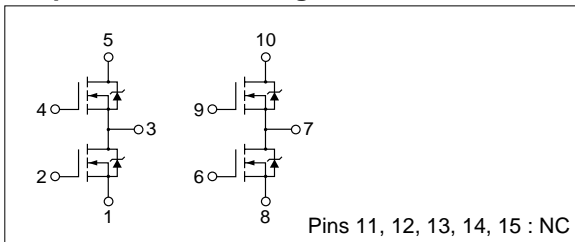
Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	60	V
V_{GSS}	± 20	V
I_D	7	A
$I_{D(\text{pulse})}$	15 ($PW \leq 100\mu\text{s}$, $D_u \leq 1\%$)	A
E_{AS}^*	60	mJ
I_{AS}	7	A
P_T	4.8 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	
θ_{j-a}	26 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

* : $V_{DD}=20\text{V}$, $L=20\text{mH}$, $I_D=2\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Equivalent circuit diagram



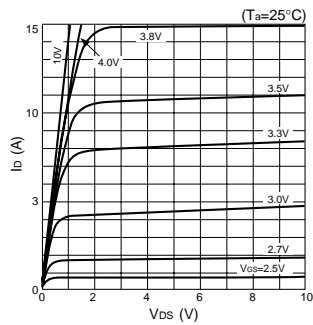
Electrical characteristics

($T_a=25^\circ\text{C}$)

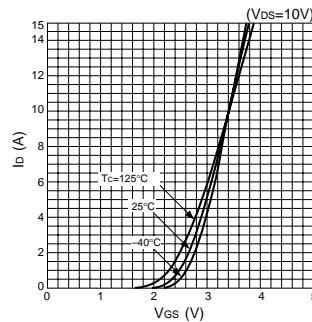
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	6			S	$V_{DS}=10\text{V}$, $I_D=3.5\text{A}$
$R_{DS(ON)}$			0.1	Ω	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$
C_{iss}		660		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		310		pF	
C_{rss}		75		pF	
$t_{d(on)}$		30		ns	$I_D=3.5\text{A}$, $V_{DD} \approx 20\text{V}$, $R_L=5.7\Omega$, $V_{GS}=5\text{V}$, see Fig. 3 on page 16.
t_r		90		ns	
$t_{d(off)}$		140		ns	
t_f		65		ns	
V_{SD}		1.1		V	
t_{rr}		80		ns	$I_{SD}=3.5\text{A}$, $di/dt=100\text{A}/\mu\text{s}$

Characteristic curves

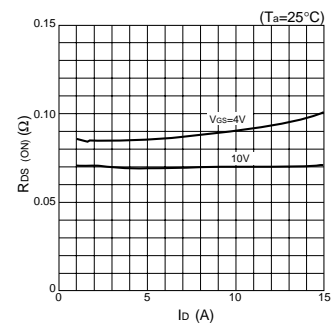
I_D - V_{DS} Characteristics (Typical)



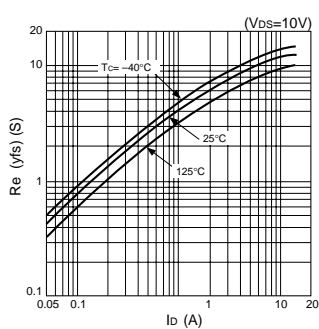
I_D - V_{GS} Characteristics (Typical)



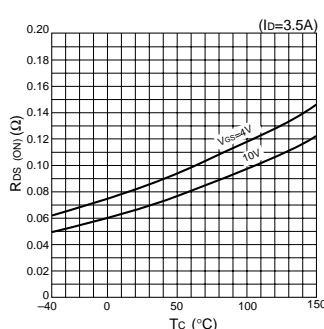
$R_{DS(ON)}$ - I_D Characteristics (Typical)



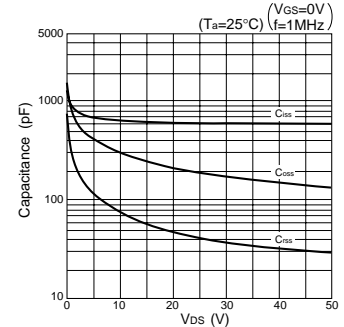
$R_{e(yfs)}$ - I_D Characteristics (Typical)



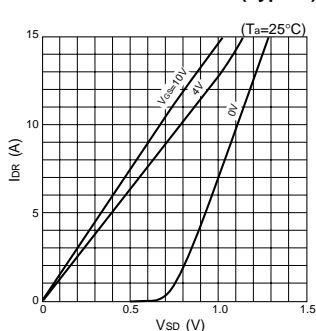
$R_{DS(ON)}$ - T_C Characteristics (Typical)



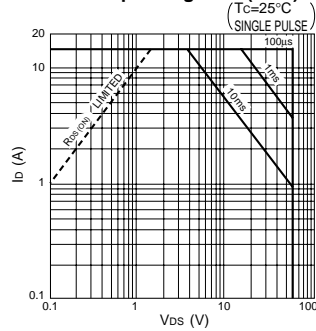
Capacitance- V_{DS} Characteristics (Typical)



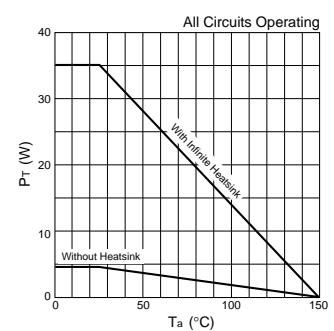
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



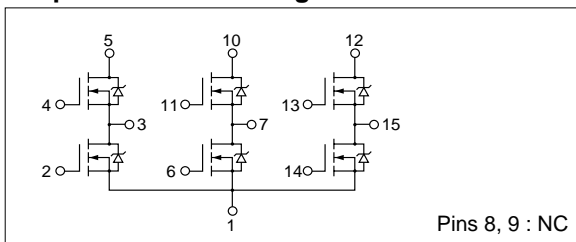
Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	60	V
V_{GSS}	± 20	V
I_D	7	A
$I_D(\text{pulse})$	15 ($PW \leq 100\mu\text{s}$, $D_u \leq 1\%$)	A
E_{AS}^*	60	mJ
I_{AS}	7	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	50 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
θ_{j-c}	2.5 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

* : $V_{DD}=20\text{V}$, $L=20\text{mH}$, $I_D=2\text{A}$, unclamped, $R_C=50\Omega$, see Fig. E on page 15.

Equivalent circuit diagram

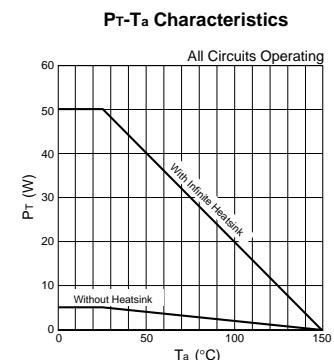
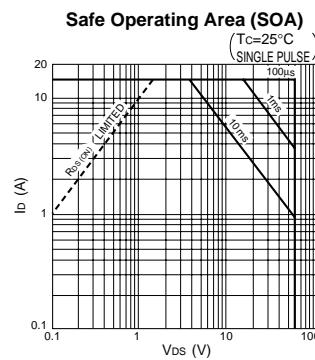
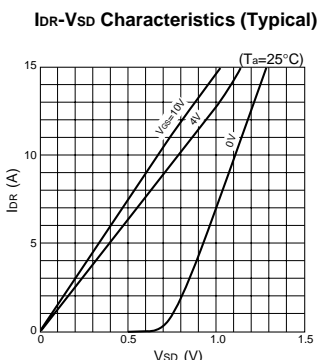
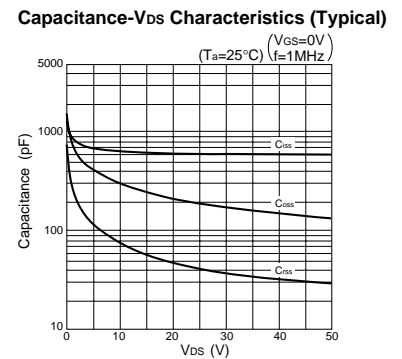
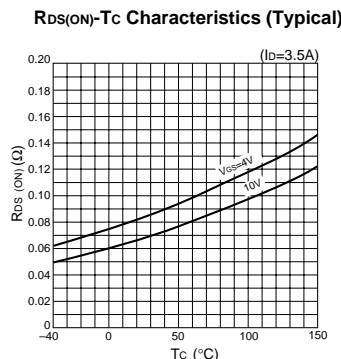
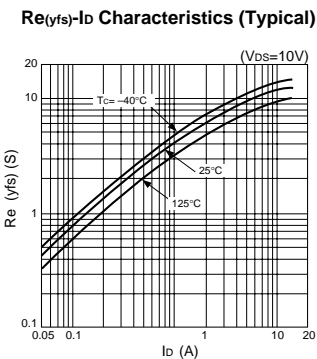
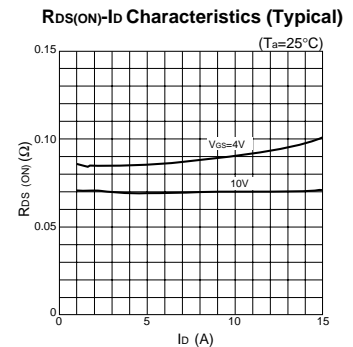
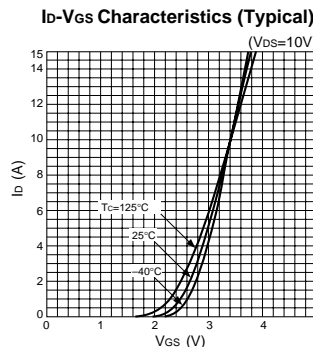
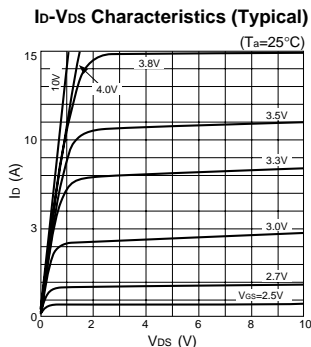


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}				nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	6			S	$V_{DS}=10\text{V}$, $I_D=3.5\text{A}$
$R_{DS(ON)}$			0.1	Ω	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$
C_{iss}		660		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		310		pF	
C_{rss}		75		pF	
$t_{d(on)}$		30		ns	$I_D=3.5\text{A}$, $V_{DD}=20\text{V}$, $R_L=5.7\Omega$, $V_{GS}=5\text{V}$, see Fig. 3 on page 16.
t_r		90		ns	
$t_{d(off)}$		140		ns	
t_f		65		ns	
V_{SD}		1.1		V	
t_{rr}		80		ns	$I_{SD}=3.5\text{A}$, $di/dt=100\text{A}/\mu\text{s}$

Characteristic curves



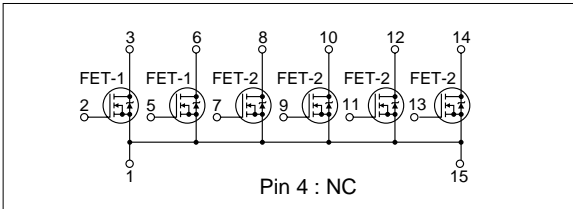
Absolute maximum ratings

($T_a=25^\circ\text{C}$)

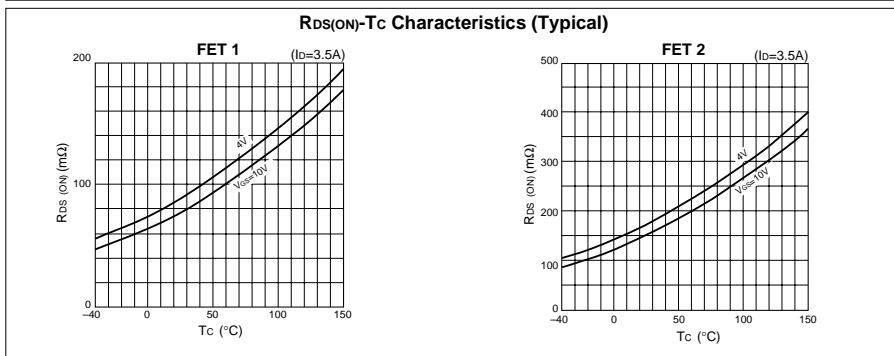
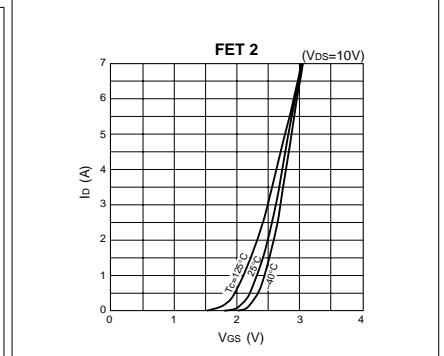
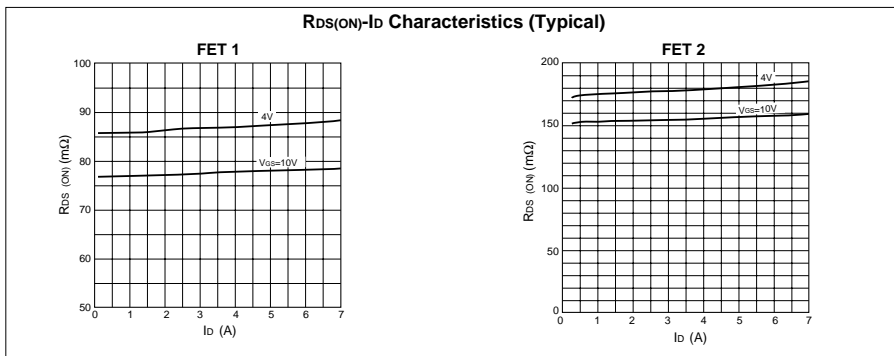
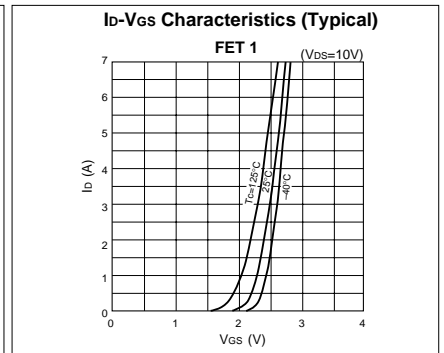
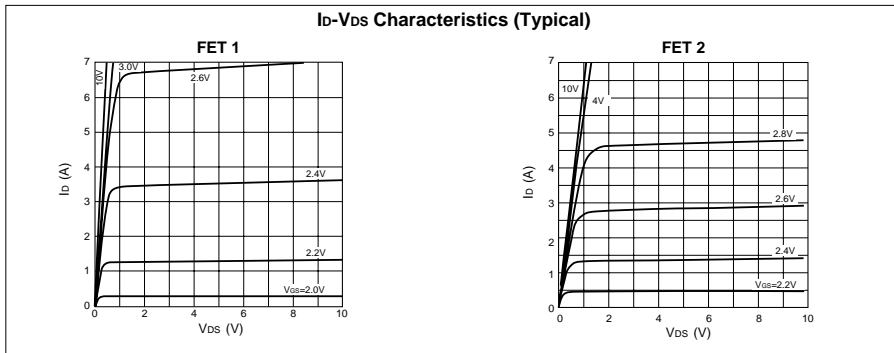
Symbol	Ratings		Unit
	FET 1	FET 2	
V_{DSS}	150		V
V_{GSS}	+20, -10		V
I_D	± 7		A
$I_{D(pulse)}$	± 15 ($PW \leq 100\mu s$, $duty \leq 1\%$)		A
E_{AS}	100		mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)		W
	60 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)		W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
θ_{j-c}	2.08 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)		V _{rms}
T_{ch}	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$

* : $V_{DD}=25\text{V}$, $L=3.4\text{mH}$, $I_D=7\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

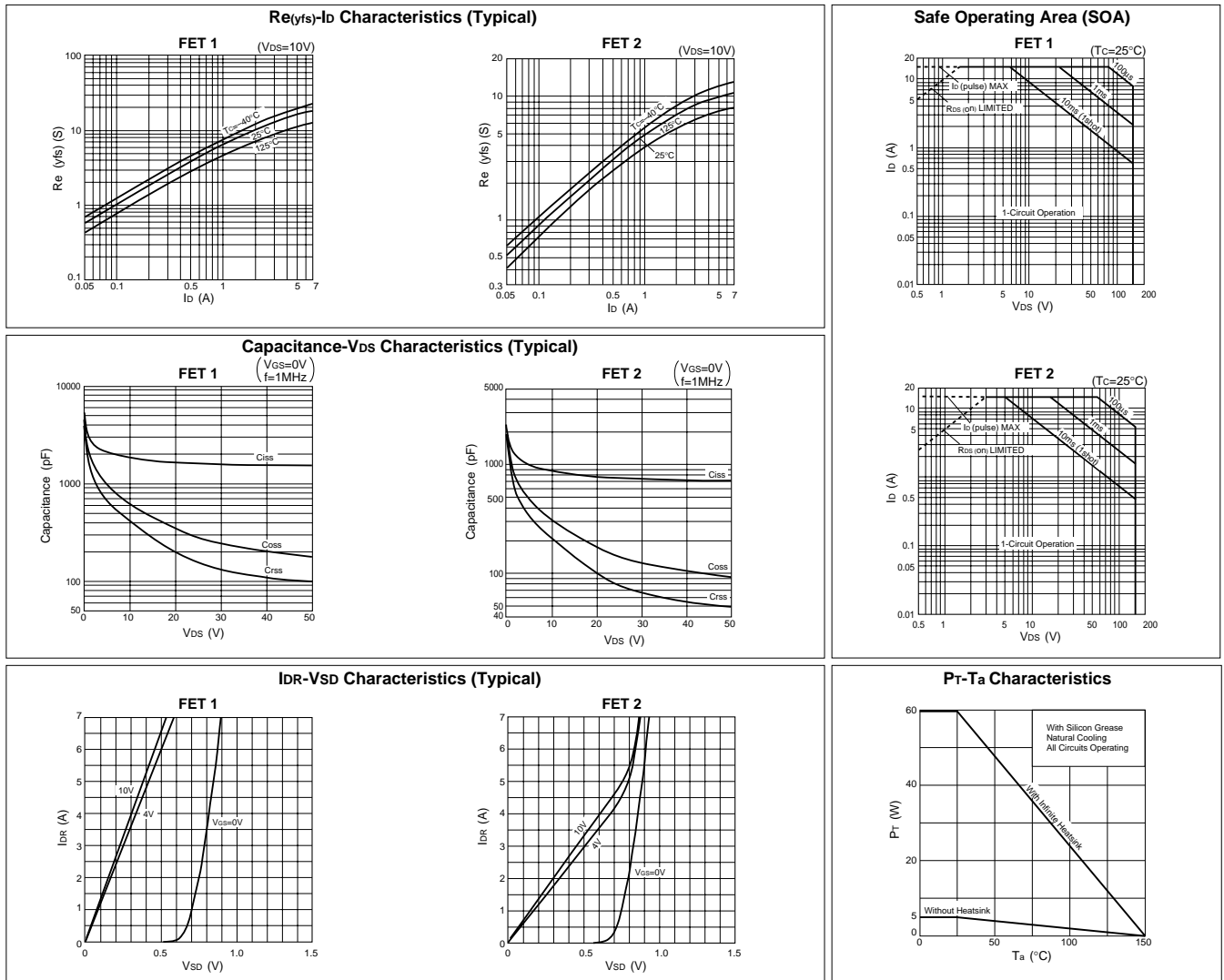


Electrical characteristics

(Ta=25°C)

Symbol	FET 1					FET 2				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
V(BR)DSS	150			V	I _D =100μA, V _{GS} =0V	150			V	I _D =100μA, V _{GS} =0V
I _{GSS}			±100	nA	V _{GS} =20V, -10V			±100	nA	V _{GS} =20V, -10V
I _{DSS}			100	μA	V _{DS} =150V, V _{GS} =0V			100	μA	V _{DS} =150V, V _{GS} =0V
V _{TH}	1.0		2.0	V	V _{DS} =10V, I _D =250μA	1.0		2.0	V	V _{DS} =10V, I _D =250μA
Re(yfs)	7	12		S	V _{DS} =10V, I _D =3.5A	4	9		S	V _{DS} =10V, I _D =3.5A
R _{DS(ON)}		80	105	mΩ	V _{GS} =10V, I _D =3.5A		150	200	mΩ	V _{GS} =10V, I _D =3.5A
			85	115	mΩ	V _{GS} =4V, I _D =3.5A		170	230	mΩ
C _{iss}		1900		pF	V _{DS} =10V, f=1.0MHz, V _{GS} =0V		870		pF	V _{DS} =10V, f=1.0MHz, V _{GS} =0V
C _{oss}		630		pF			320		pF	
C _{rss}		420		pF			210		pF	
t _{d(on)}		35		ns	I _D =3.5A		25		ns	I _D =3.5A,
t _r		70		ns	V _{DD} ≐70V,		55		ns	V _{DD} ≐70V,
t _{d(off)}		140		ns	R _L =20Ω		80		ns	R _L =20Ω,
t _f		90		ns	V _{GS} =5V, see Fig.3 on page 16.		50		ns	V _{GS} =5V, see Fig.3 on page 16.
V _{SD}		1.0	1.5	V	I _{SD} =7A, V _{GS} =0V		1.0	1.5	V	I _{SD} =7A, V _{GS} =0V
t _{rr}		620		ns	I _F =±100mA		500		ns	I _F =±100mA

Characteristic curves



Absolute maximum ratings

(Ta=25°C)

Symbol	Ratings	Unit
V _{DSS}	250	V
V _{GSS}	±20	V
I _D	7	A
I _{D(pulse)}	15 (PW≤1ms, Du≤1%)	A
E _{AS*}	55	mJ
I _{AS}	7	A
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)	W
	40 (Tc=25°C, with all circuits operating, with infinite heatsink)	
θ _{J-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)	°C/W
θ _{J-c}	3.125 (Junction-Case, Tc=25°C, with all circuits operating)	°C/W
T _{ch}	150	°C
T _{stg}	-40 to +150	°C

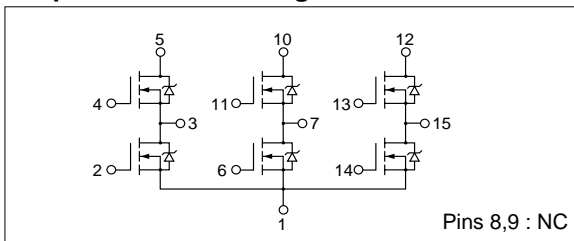
* : V_{DD}=25V, L=2mH, I_D=7A, unclamped, R_G=50Ω, see Fig. E on page 15.

Electrical characteristics

(Ta=25°C)

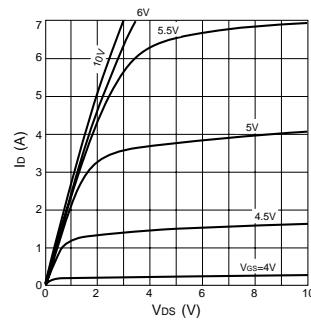
Symbol	Specification			Unit	Conditions
	min	typ	max		
V _{(BR)DSS}	250			V	I _D =100μA, V _{GS} =0V
I _{GSS}			±100	nA	V _{GS} =±20V
I _{DSS}			100	μA	V _{DS} =250V, V _{GS} =0V
V _{TH}	2.0		4.0	V	V _{DS} =10V, I _D =1mA
R _{e(yfs)}	2.5	5.0		S	V _{DS} =10V, I _D =3.5A
R _{DS(ON)}		400	500	mΩ	V _{GS} =10V, I _D =3.5A
C _{iss}		450		pF	V _{DS} =10V, f=1.0MHz, V _{GS} =0V
C _{oss}		280		pF	
td(on)		20		ns	I _D =3.5A, V _{DD} =100V, R _L =28.6Ω, V _{GS} =10V, see Fig. 3 on page 16.
tr		30		ns	
td(off)		55		ns	
tf		75		ns	
V _{SD}		1.0	1.5	V	
t _{rr}		75		ns	I _{SD} =7A, V _{GS} =0V
					I _{SD} =3.5A, V _{GS} =0V, di/dt=100A/μs

Equivalent circuit diagram

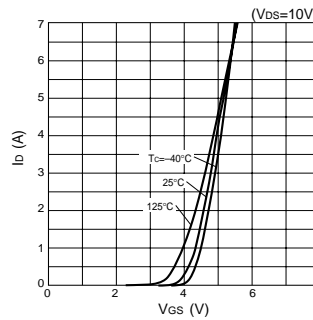


Characteristic curves

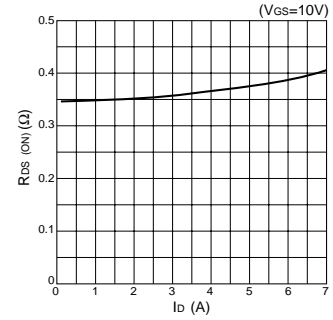
I_D-V_{DS} Characteristics (Typical)



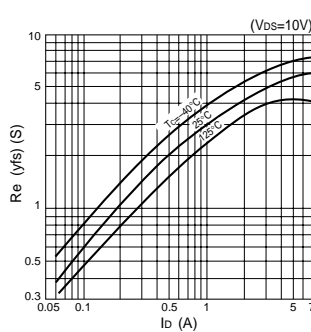
I_D-V_{GS} Characteristics (Typical)



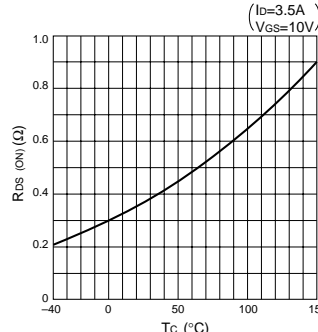
R_{DS(ON)}-I_D Characteristics (Typical)



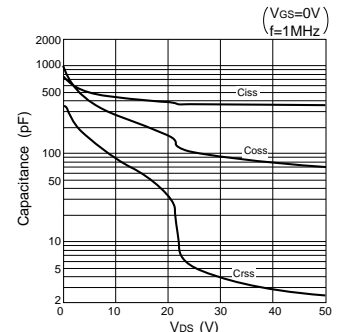
R_{e(yfs)}-I_D Characteristics (Typical)



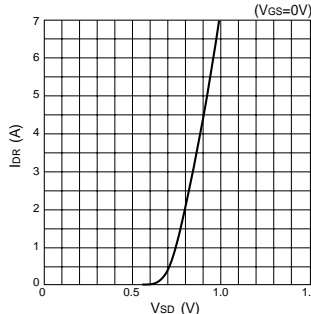
R_{DS(ON)}-T_C Characteristics (Typical)



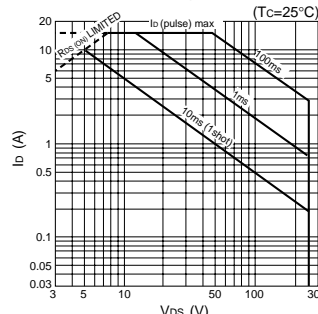
Capacitance-V_{DS} Characteristics (Typical)



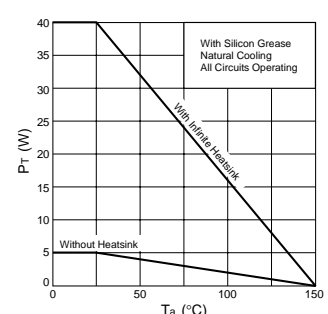
I_D-V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T-T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

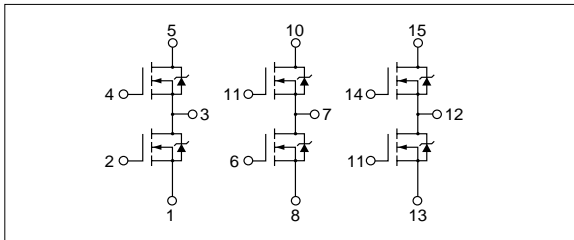
Symbol	Ratings	Unit
V_{DSS}	60	V
V_{GSS}	± 20	V
I_D	5	A
$I_D(\text{pulse})$	8 ($PW \leq 1\text{ms}, D \leq 25\%$)	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	30 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	4.17 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

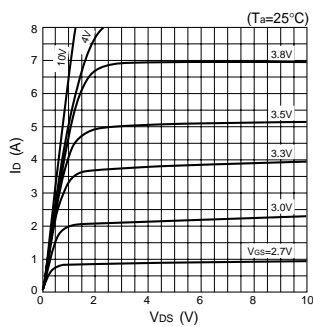
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=100\mu\text{A}, V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=60\text{V}, V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}, I_D=250\mu\text{A}$
$R_{e(yfs)}$		5.5		S	$V_{DS}=10\text{V}, I_D=3\text{A}$
$R_{DS(ON)}$			0.3	Ω	$V_{GS}=4\text{V}, I_D=3\text{A}$
C_{iss}		320		pF	$V_{DS}=10\text{V},$ $f=1.0\text{MHz},$ $V_{GS}=0\text{V}$
C_{oss}		160		pF	
C_{rss}		35		pF	
$t_{d(on)}$		16		ns	$I_D=3\text{A},$ $V_{DD} \approx 20\text{V},$ $R_L=6.67\Omega, V_{GS}=5\text{V},$ see Fig. 3 on page 16.
t_r		65		ns	
$t_{d(off)}$		70		ns	
t_f		45		ns	
V_{SD}		1.2		V	
t_{rr}		65		ns	$I_{SD}=4\text{A}, V_{GS}=0\text{V}$
					$I_{SD}=3\text{A}, V_{GS}=0\text{V}, di/dt=100\text{A}/\mu\text{s}$

Equivalent circuit diagram

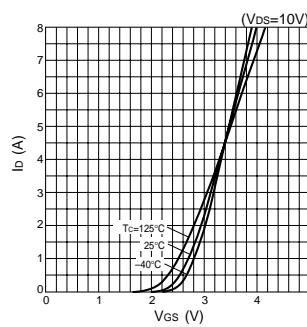


Characteristic curves

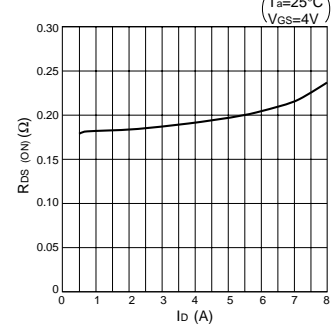
I_D - V_{DS} Characteristics (Typical)



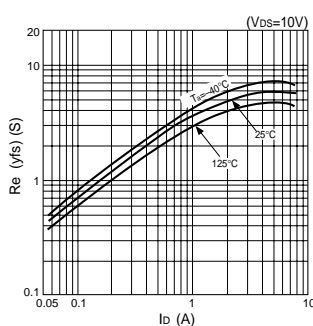
I_D - V_{GS} Characteristics (Typical)



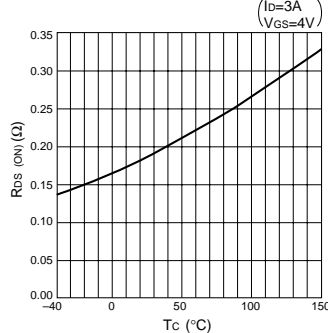
$R_{DS(ON)}$ - I_D Characteristics (Typical)



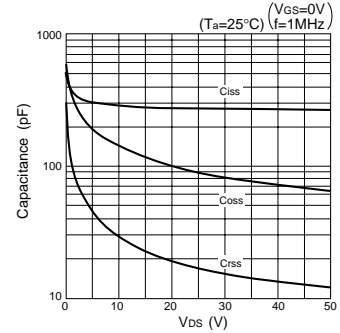
$R_{e(yfs)}$ - I_D Characteristics (Typical)



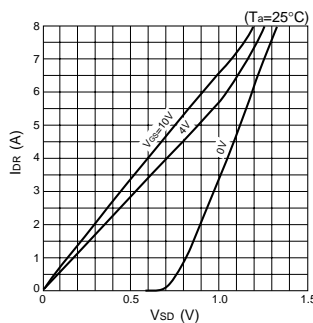
$R_{DS(ON)}$ - T_c Characteristics (Typical)



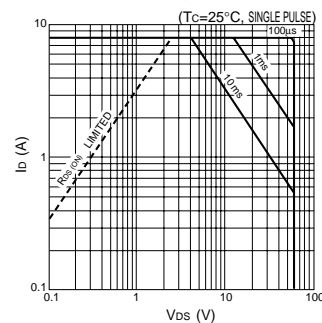
Capacitance- V_{DS} Characteristics (Typical)



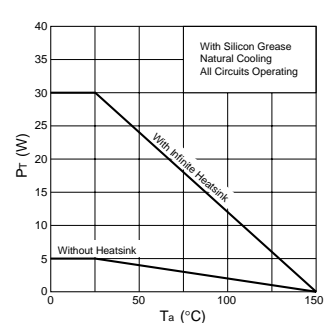
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



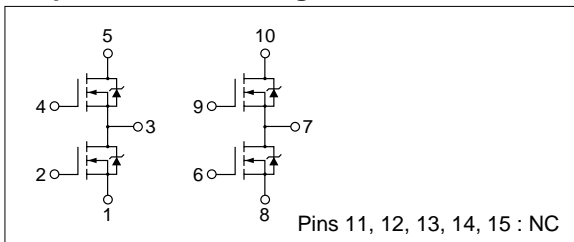
Absolute maximum ratings (T_a=25°C)

Symbol	Ratings	Unit
V _{DSS}	60	V
V _{GSS}	±20	V
I _D	5	A
I _D (pulse)	8 (PW≤1ms, Du≤25%)	A
P _T	4.8 (T _a =25°C, with all circuits operating, without heatsink)	W
	25 (T _c =25°C, with all circuits operating, with infinite heatsink)	
θ _{J-a}	26 (Junction-Air, T _a =25°C, with all circuits operating)	°C/W
θ _{J-c}	5 (Junction-Case, T _c =25°C, with all circuits operating)	°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T _{ch}	150	°C
T _{stg}	-40 to +150	°C

Electrical characteristics (T_a=25°C)

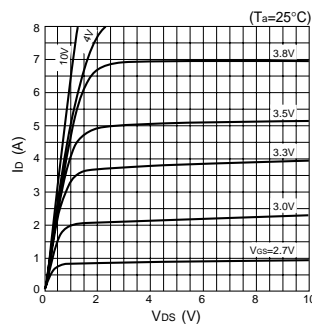
Symbol	Specification			Unit	Conditions
	min	typ	max		
V _{(BR)DSS}	60			V	I _D =100μA, V _{GS} =0V
I _{GSS}			±100	nA	V _{GS} =±20V
I _{DSS}			100	μA	V _{DS} =60V, V _{GS} =0V
V _{TH}	1.0		2.0	V	V _{DS} =10V, I _D =250μA
Re(yfs)		5.5		S	V _{DS} =10V, I _D =3A
R _{DS(ON)}			0.3	Ω	V _{GS} =4V, I _D =3A
C _{iss}		320		pF	V _{DS} =10V, f=1.0MHz, V _{GS} =0V
C _{oss}		160		pF	
C _{rss}		35		pF	
td(on)		16		ns	I _D =3A, V _{DD} ≐20V, R _L =6.67Ω, V _{GS} =5V, see Fig. 3 on page 16.
tr		65		ns	
td(off)		70		ns	
tf		45		ns	
V _{SD}		1.2		V	
t _{rr}		65		ns	I _{SD} =4A, V _{GS} =0V
					I _{SD} =3A, V _{GS} =0V, di/dt=100A/μs

Equivalent circuit diagram

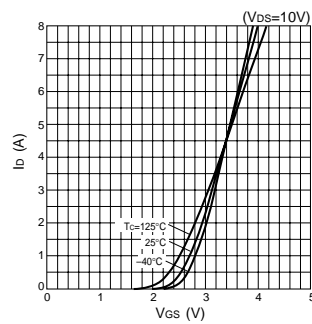


Characteristic curves

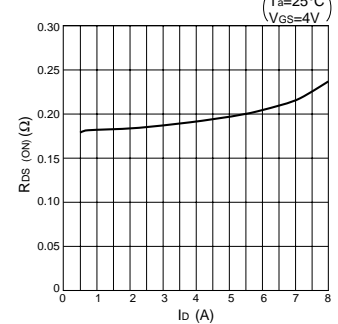
I_D-V_{DS} Characteristics (Typical)



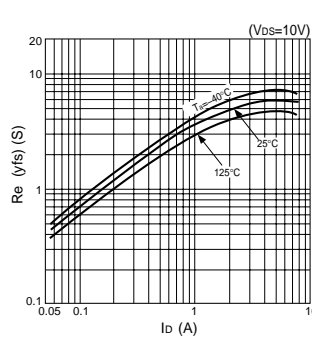
I_D-V_{GS} Characteristics (Typical)



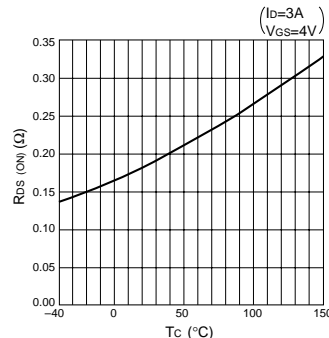
R_{DS(ON)}-I_D Characteristics (Typical)



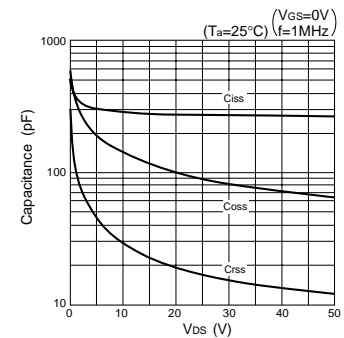
Re(yfs)-I_D Characteristics (Typical)



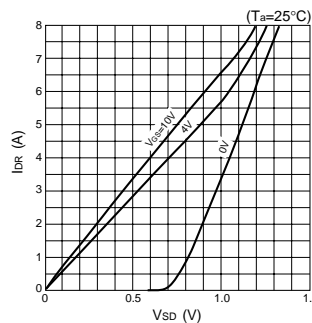
R_{DS(ON)}-T_C Characteristics (Typical)



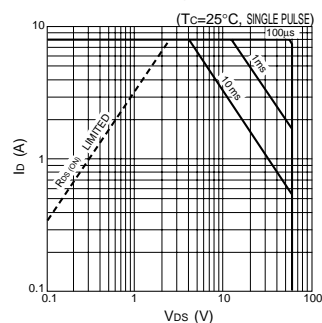
Capacitance-V_{DS} Characteristics (Typical)



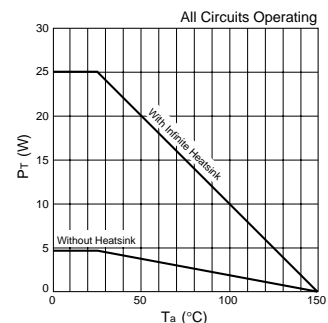
I_{DR}-V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T-T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	500	V
V_{GSS}	± 30	V
I_D	± 5	A
$I_D(\text{pulse})$	± 10 ($PW \leq 1\text{ms}$, $D \leq 1\%$)	A
E_{AS}^*	45	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	60 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	2.08 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

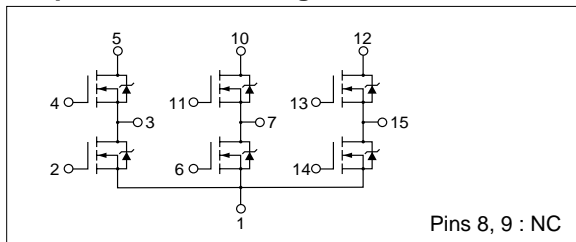
* : $V_{DD}=30\text{V}$, $L=3.4\text{mH}$, $I_D=5\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

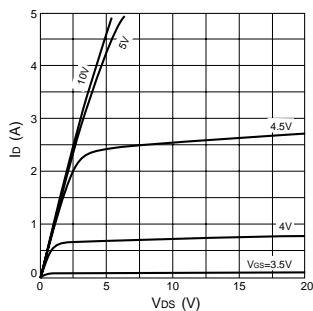
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	500			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 30\text{V}$
I_{DSS}			100	μA	$V_{DS}=500\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=1\text{mA}$
$R_{e(yfs)}$	2.4	4.0		S	$V_{DS}=10\text{V}$, $I_D=2.5\text{A}$
$R_{DS(ON)}$		1.05	1.4	Ω	$V_{GS}=10\text{V}$, $I_D=2.5\text{A}$
C_{iss}		770		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		290		pF	
$t_{d(on)}$		20		ns	$I_D=2.5\text{A}$, $V_{DD}=200\text{V}$, $R_L=80\Omega$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.
t_r		25		ns	
$t_{d(off)}$		70		ns	
t_f		65		ns	
V_{SD}		1.1	1.5	V	
t_{rr}		75		ns	

Equivalent circuit diagram

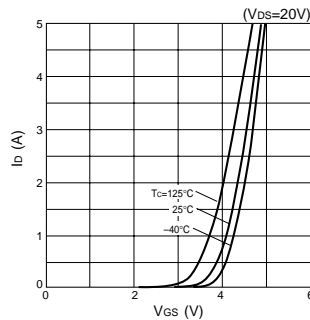


Characteristic curves

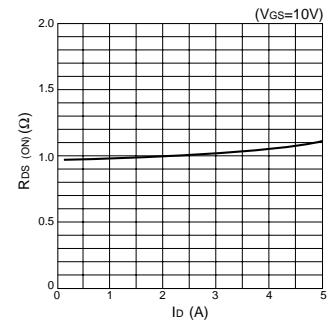
I_D - V_{DS} Characteristics (Typical)



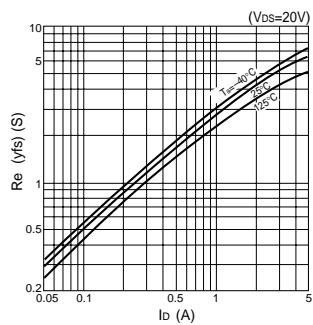
I_D - V_{GS} Characteristics (Typical)



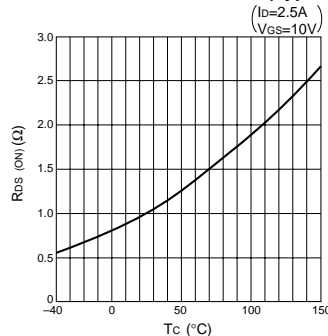
$R_{DS(ON)}$ - I_D Characteristics (Typical)



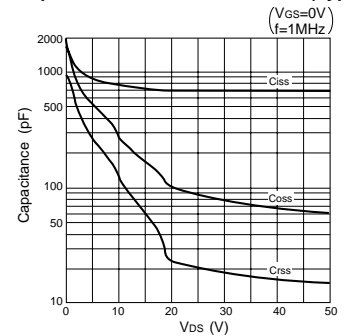
$R_{e(yfs)}$ - I_D Characteristics (Typical)



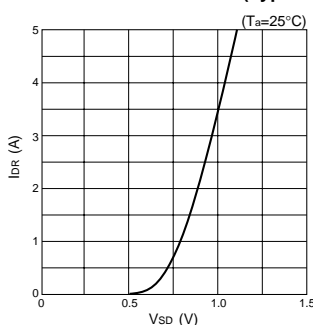
$R_{DS(ON)}$ - T_c Characteristics (Typical)



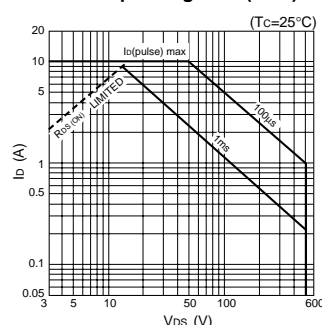
Capacitance- V_{DS} Characteristics (Typical)



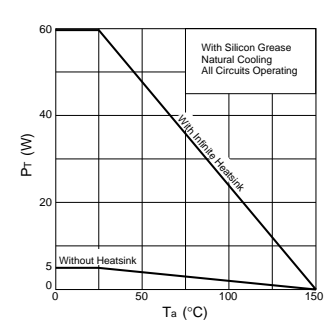
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

(Ta=25°C)

Symbol	Ratings	Unit
V _{DSS}	150	V
V _{GSS}	+20, -10	V
I _D	±10	A
I _{D(pulse)}	±40 (PW≤100μs, duty≤1%)	A
E _{AS*}	100	mJ
I _{AS}	10	A
P _T	5 (Ta=25°C, with all circuits operating, without heatsink)	W
	50 (Tc=25°C, with all circuits operating, with infinite heatsink)	
θ _{J-a}	25 (Junction-Air, Ta=25°C, with all circuits operating)	°C/W
θ _{J-c}	2.5 (Junction-Case, Tc=25°C, with all circuits operating)	°C/W
V _{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T _{ch}	150	°C
T _{stg}	-40 to +150	°C

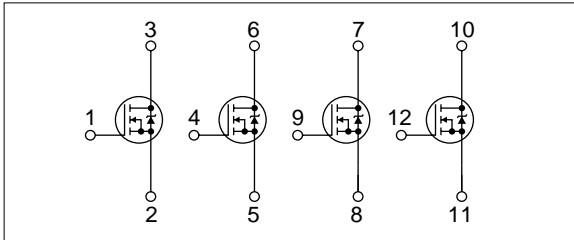
* : V_{DD}=25V, L=1.7mH, I_D=10A, unclamped, R_G=50Ω, see Fig. E on page 15.

Electrical characteristics

(Ta=25°C)

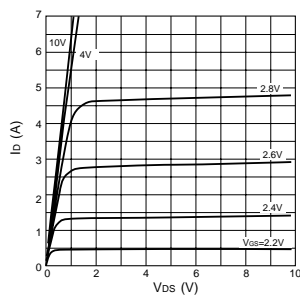
Symbol	Specification			Unit	Conditions
	min	typ	max		
V _{(BR)DSS}	150			V	I _D =100μA, V _{GS} =0V
I _{GSS}			±100	nA	V _{GS} =20V, -10V
I _{DSS}			100	μA	V _{DS} =150V, V _{GS} =0V
V _{TH}	1.0		2.0	V	V _{DS} =10V, I _D =250μA
Re(yfs)	5	10		S	V _{DS} =10V, I _D =5A
R _{DS(ON)}		150	200	mΩ	V _{GS} =10V, I _D =5A
			170	230	mΩ
C _{iss}		870		pF	V _{DS} =10V, f=1.0MHz, V _{GS} =0V
C _{oss}		320		pF	
C _{rss}		210		pF	
td(on)		25		ns	I _D =5A, V _{DD} ≐70V, R _L =14Ω, V _{GS} =5V, see Fig. 3 on page 16.
tr		50		ns	
td(off)		75		ns	
tf		40		ns	
V _{SD}		1.0	1.5	V	
t _{rr}		500		ns	
					I _F =±100mA

Equivalent circuit diagram

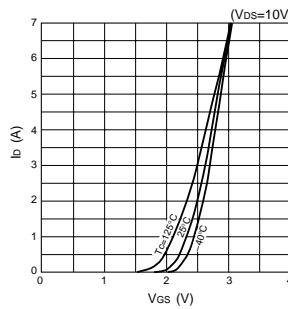


Characteristic curves

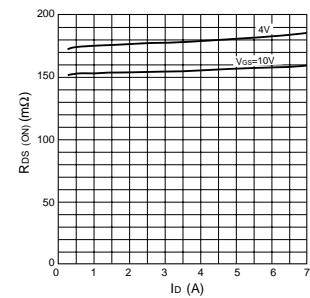
I_D-V_{DS} Characteristics (Typical)



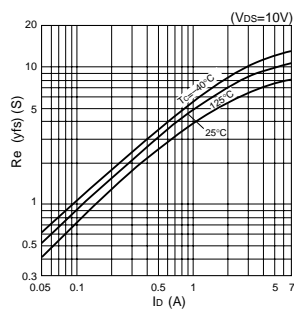
I_D-V_{GS} Characteristics (Typical)



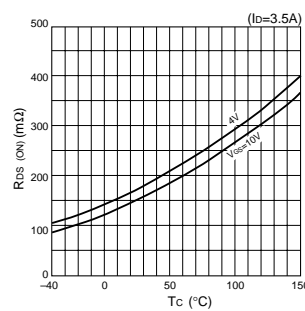
R_{DS(ON)}-I_D Characteristics (Typical)



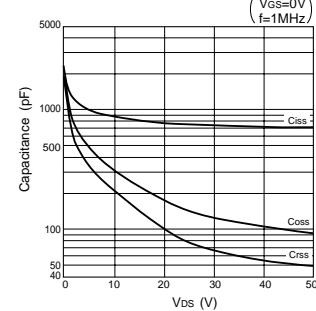
Re(y_{fs})-I_D Characteristics (Typical)



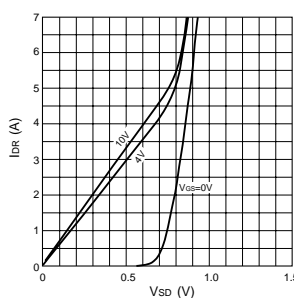
R_{DS(ON)}-T_c Characteristics (Typical)



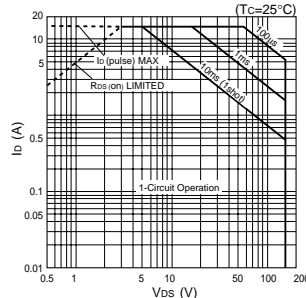
Capacitance-V_{DS} Characteristics (Typical)



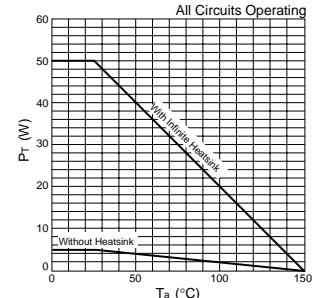
I_{DR}-V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T-T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

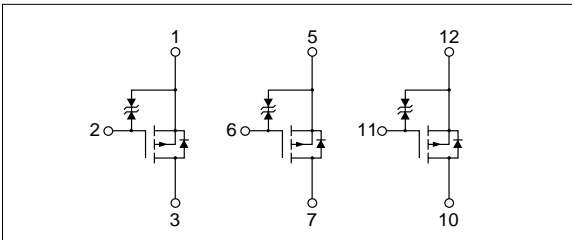
Symbol	Ratings	Unit
V_{DSS}	-60	V
V_{GSS}	± 20	V
I_D	-10	A
$I_D(\text{pulse})$	-15 ($PW \leq 1\text{ms}$, $\text{duty} \leq 25\%$)	A
P_T	4.5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	30 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	
θ_{j-a}	27.8 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	4.17 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

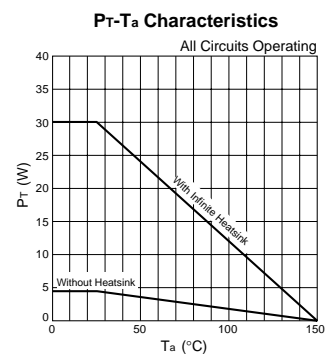
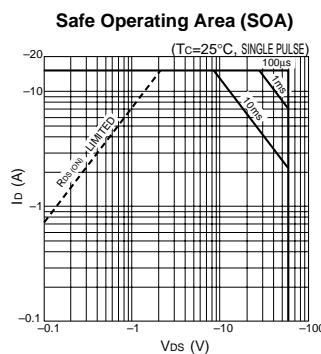
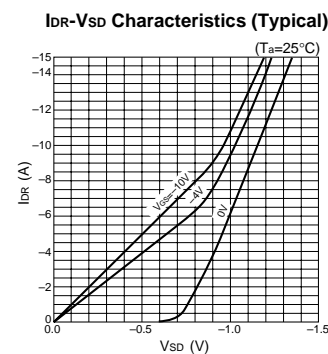
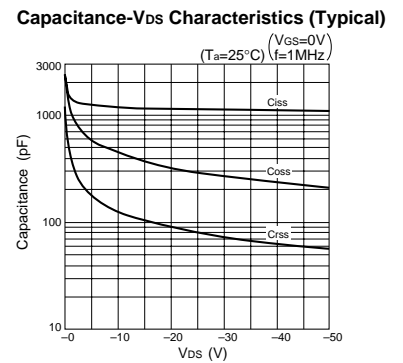
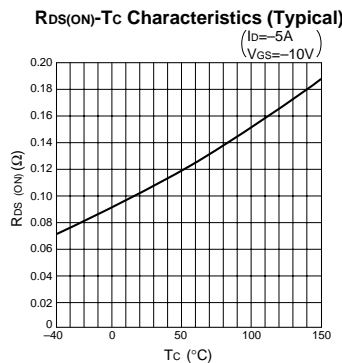
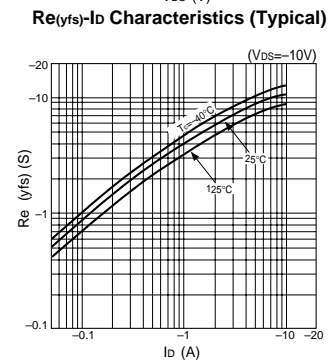
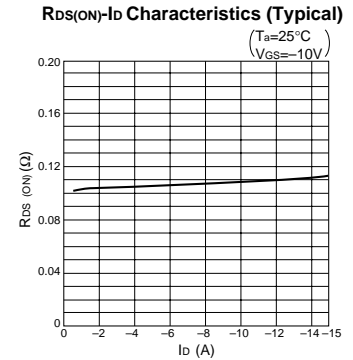
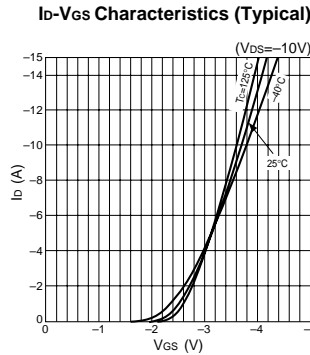
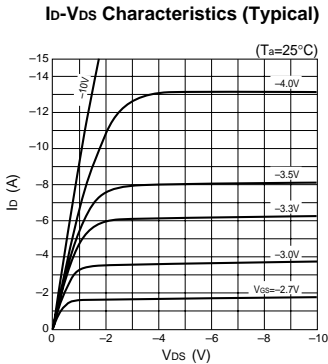
($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	-60			V	$I_D=-100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 10	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			-100	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	-1.0		-2.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$R_{e(yfs)}$		8.7		S	$V_{DS}=-10\text{V}$, $I_D=-5\text{A}$
$R_{DS(ON)}$			0.14	Ω	$V_{GS}=-10\text{V}$, $I_D=-5\text{A}$
C_{iss}		1200		pF	$V_{DS}=-10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		440		pF	
C_{rss}		120		pF	
$t_{d(on)}$		50		ns	$I_D=-5\text{A}$, $V_{DD}=-20\text{V}$, $R_L=4\Omega$, $V_{GS}=-5\text{V}$, $R_G=50\Omega$, see Fig. 4 on page 16.
t_r		170		ns	
$t_{d(off)}$		180		ns	
t_f		100		ns	
V_{SD}	-1.25			V	
t_{rr}		100		ns	$I_{SD}=-5\text{A}$, $di/dt=100\text{A}/\mu\text{s}$

Equivalent circuit diagram



Characteristic curves



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

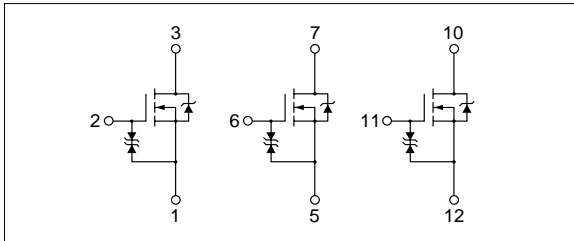
Symbol	Ratings	Unit
V_{DSS}	60	V
V_{GSS}	± 20	V
I_D	10	A
$I_D(\text{pulse})$	15 ($PW \leq 1\text{ms}, D \leq 25\%$)	A
P_T	4.5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	30 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	
θ_{j-a}	27.8 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	4.17 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

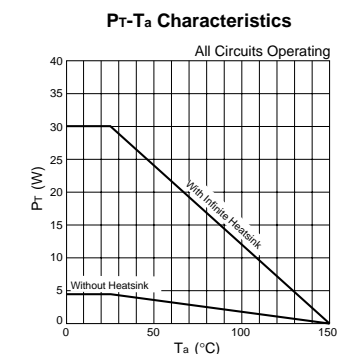
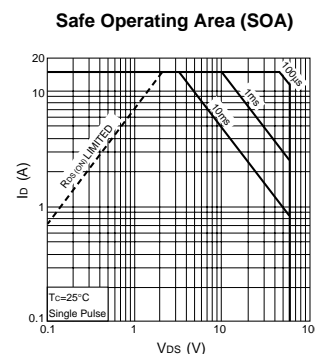
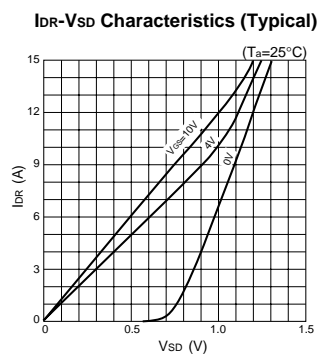
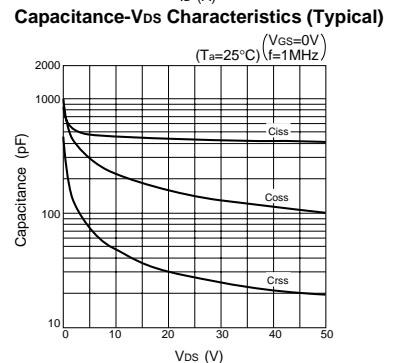
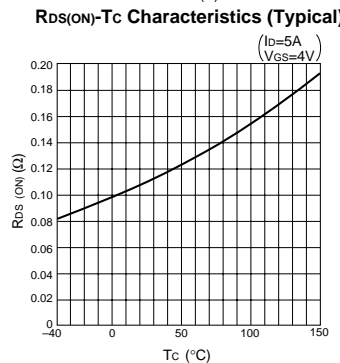
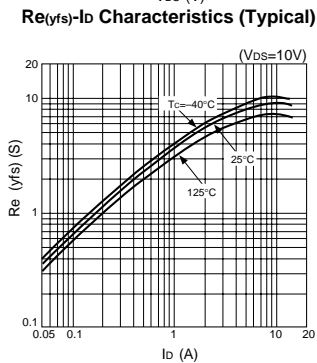
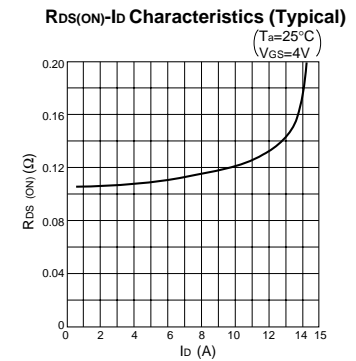
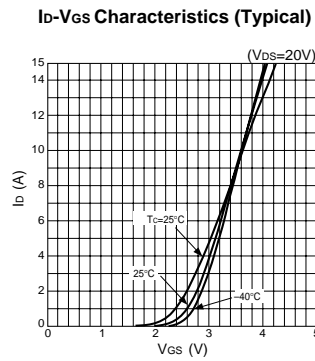
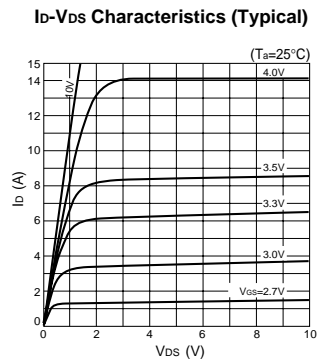
($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=100\mu\text{A}, V_{GS}=0\text{V}$
I_{GSS}			± 10	μA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=60\text{V}, V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}, I_D=250\mu\text{A}$
$R_{e(yfs)}$		8.0		S	$V_{DS}=10\text{V}, I_D=5\text{A}$
$R_{DS(ON)}$			0.14	Ω	$V_{GS}=4\text{V}, I_D=5\text{A}$
C_{iss}		460		pF	$V_{DS}=10\text{V},$ $f=1.0\text{MHz},$ $V_{GS}=0\text{V}$
C_{oss}		225		pF	
C_{rss}		50		pF	
$td(\text{on})$		25		ns	$I_D=5\text{A}, V_{DD} \Rightarrow 20\text{V},$ $R_L=4\Omega,$ $V_{GS}=5\text{V},$ see Fig. 4 on page 16.
tr		110		ns	
$td(\text{off})$		90		ns	
tf		55		ns	
V_{SD}		1.15		V	
t_{rr}		75		ns	$I_{SD}=5\text{A}, di/dt=100\text{A}/\mu\text{s}$

Equivalent circuit diagram



Characteristic curves



Absolute maximum ratings

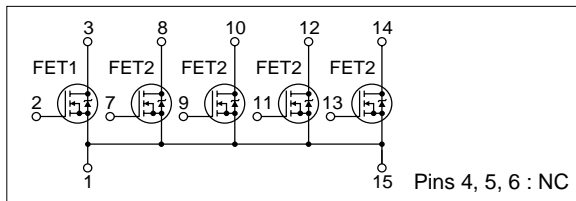
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	FET 1	FET 2	
V_{DSS}	150		V
V_{GSS}	+20, -10		V
I_D	± 7		A
I_D (pulse) ^{*1}	± 15		A
E_{AS} ^{*2}	100		mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)		W
	47 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)		W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C}/\text{W}$
θ_{j-c}	2.66 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C}/\text{W}$
V_{iso}	1000 (Between fin and lead pin, AC)		Vrms
T_{ch}	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$

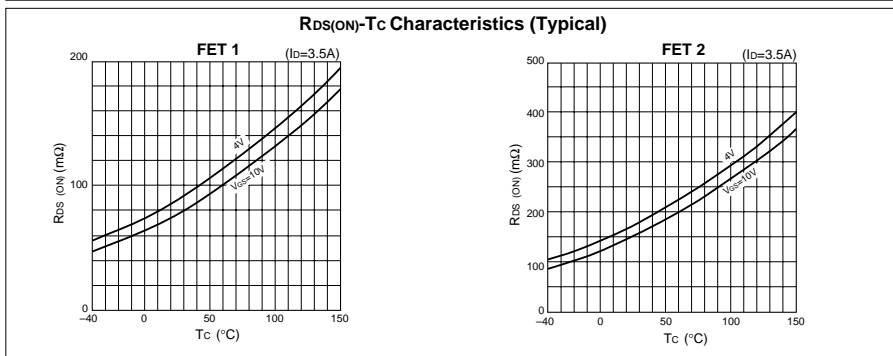
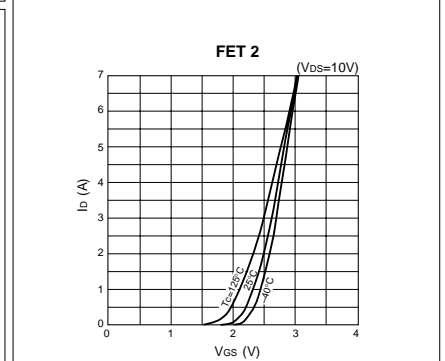
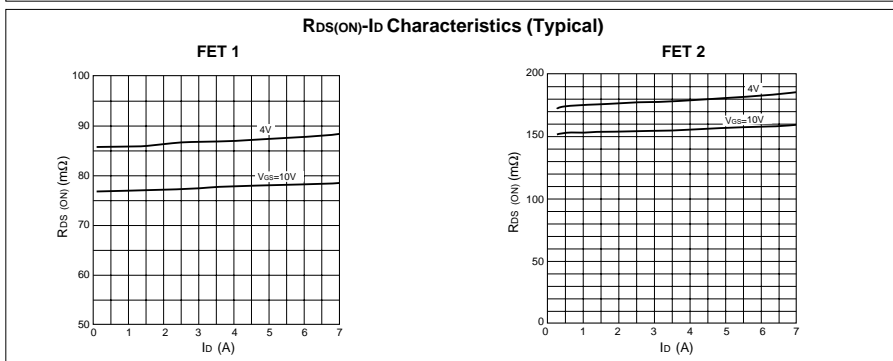
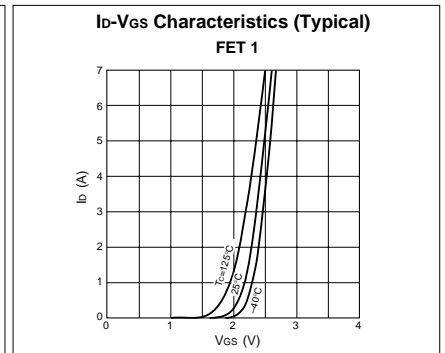
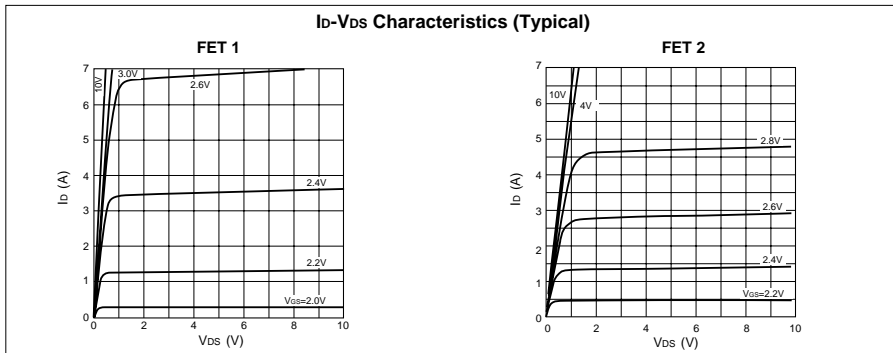
*1 : $PW \leq 100\mu\text{s}$, $duty \leq 1\%$

*2 : $V_{DD}=25\text{V}$, $L=3.4\text{mH}$, $I_D=7\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

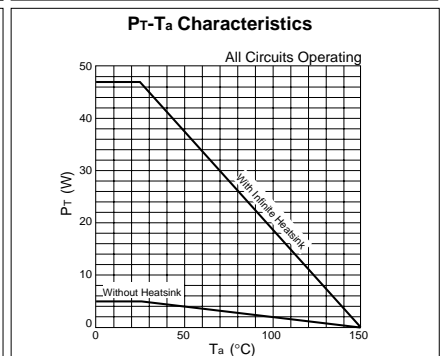
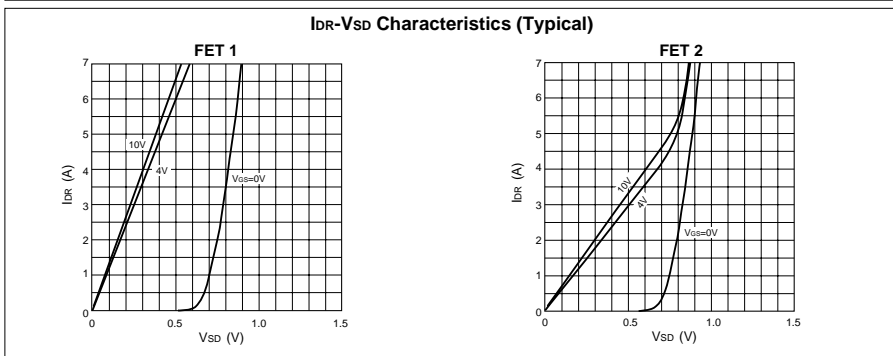
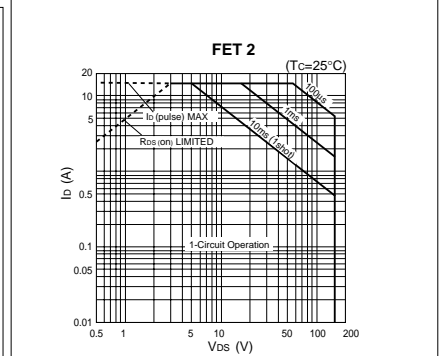
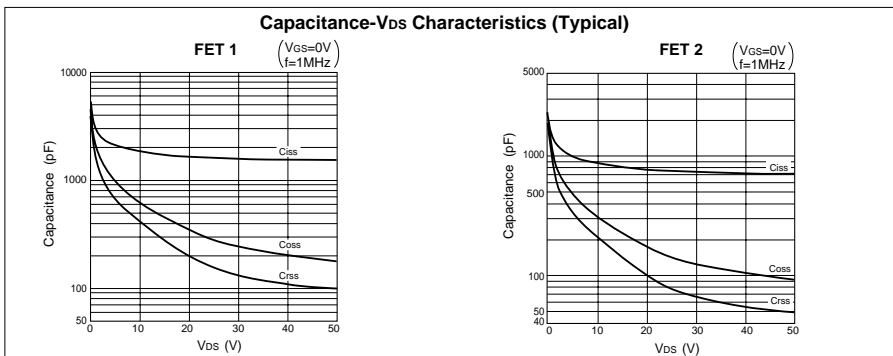
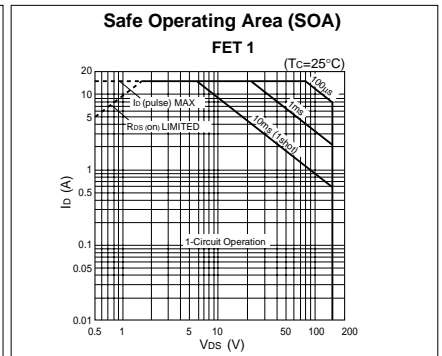
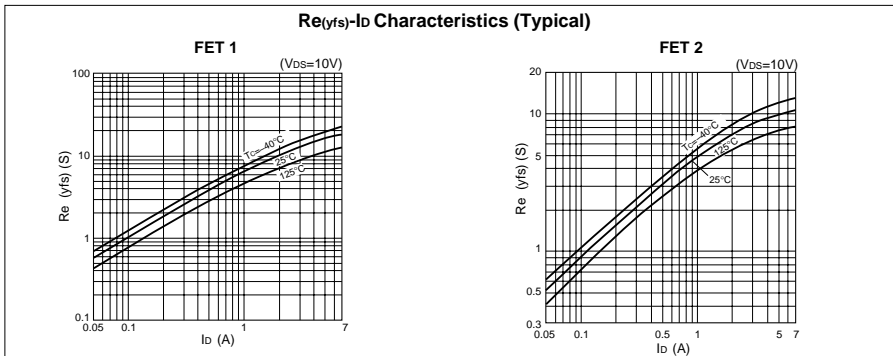


Electrical characteristics

(Ta=25°C)

Symbol	FET 1					FET 2				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
V(BR)DSS	150			V	Id=100μA, VGS=0V	150			V	Id=100μA, VGS=0V
IGSS			±100	nA	VGS=20V, -10V			±100	nA	VGS=20V, -10V
IDSS			100	μA	VDS=150V, VGS=0V			100	μA	VDS=150V, VGS=0V
VTH	1.0		2.0	V	VDS=10V, Id=250μA	1.0		2.0	V	Vbs=10V, Id=250μA
Re(yfs)	7	12		S	Vbs=10V, Id=3.5A	4	9		S	VDS=10V, Id=3.5A
RDS(ON)		80	105	mΩ	VGS=10V, Id=3.5A		150	200	mΩ	VGS=10V, Id=3.5A
		85	115	mΩ	VGS=4V, Id=3.5A		170	230	mΩ	VGS=4V, Id=3.5A
Ciss		1600		pF	VDS=10V, f=1.0MHz,		870		pF	VDS=10V, f=1.0MHz
Coss		380		pF	VGS=0V		320		pF	VGS=0V
Crss		90		pF	VGS=0V		210		pF	VGS=0V
td(on)		35		ns	Id=3.5A, VDD≐70V, RL=20Ω,		25		ns	Id=3.5A, VDD≐70V, RL=20Ω
tr		70		ns	VGS=5V, see Fig.3 on page 16.		55		ns	VGS=5V, see Fig.3 on page 16.
td(off)		125		ns			80		ns	
tf		90		ns			50		ns	
VSD		1.0	1.5	V	ISD=7A, VGS=0V		1.0	1.5	V	ISD=7A, VGS=0V
ttr		320		ns	IF=±100mA		500		ns	IF=±100mA

Characteristic curves



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	60	V
V_{GS}	± 20	V
I_D	10	A
$I_{D(pulse)}$	10 ($PW \leq 1\text{ms}$, $duty \leq 25\%$)	A
E_{AS}	30	mJ
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	30 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	4.17 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	Vrms
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

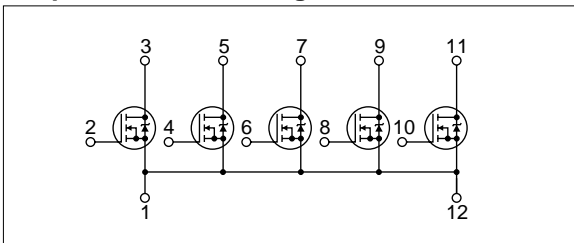
* : $V_{DD}=40\text{V}$, $L=20\text{mH}$, $I_D=1\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

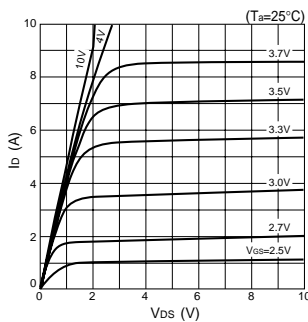
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0	2.0		V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	3.7	5.5		S	$V_{DS}=10\text{V}$, $I_D=3\text{A}$
$R_{DS(ON)}$		0.16	0.22	Ω	$V_{GS}=4\text{V}$, $I_D=3\text{A}$
C_{iss}		320		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		160		pF	
C_{rss}		35		pF	
$t_{d(ON)}$		16		ns	$I_D=3\text{A}$, $V_{DD}=20\text{V}$, $R_L=6.67\Omega$, $V_{GS}=5\text{V}$, see Fig. 3 on page 16.
t_r		65		ns	
$t_{d(OFF)}$		70		ns	
t_f		45		ns	
t_{rr}		65		ns	
V_{SD}		1.05	1.5	V	$I_{SD}=5\text{A}$, $V_{GS}=0\text{V}$
			65	ns	$I_{SD}=3\text{A}$, $V_{GS}=0\text{V}$, $di/dt=100\text{A}/\mu\text{s}$

Equivalent circuit diagram

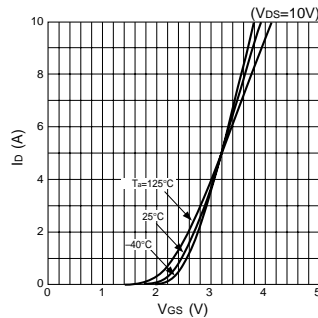


Characteristic curves

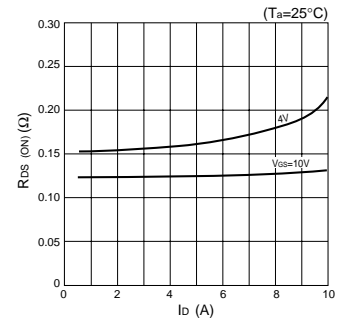
I_D - V_{DS} Characteristics (Typical)



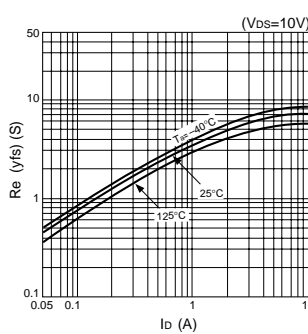
I_D - V_{GS} Characteristics (Typical)



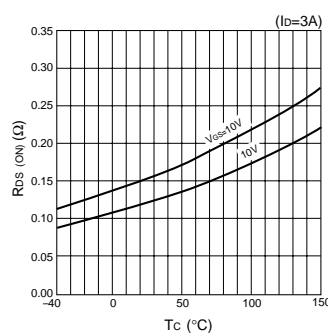
$R_{DS(ON)}$ - I_D Characteristics (Typical)



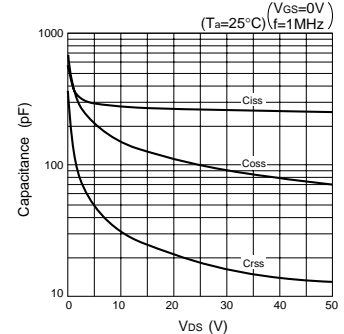
$R_{e(yfs)}$ - I_D Characteristics (Typical)



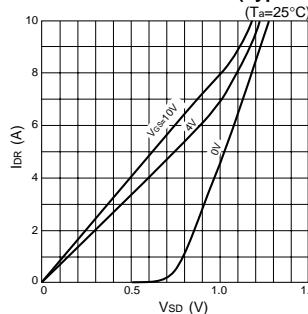
$R_{DS(ON)}$ - T_C Characteristics (Typical)



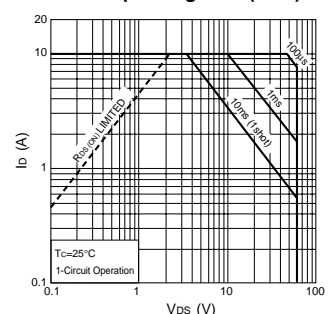
Capacitance- V_{DS} Characteristics (Typical)



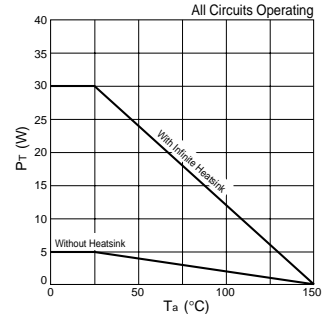
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

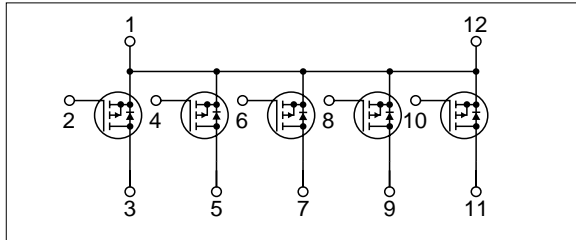
Symbol	Ratings	Unit
V_{DSS}	-60	V
V_{GSS}	± 20	V
I_D	-5	A
$I_D(\text{pulse})$	-10 (PW $\leq 1\text{ms}$, duty $\leq 25\%$)	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	30 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	4.17 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
V_{ISO}	1000 (Between fin and lead pin, AC)	V _{rms}
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

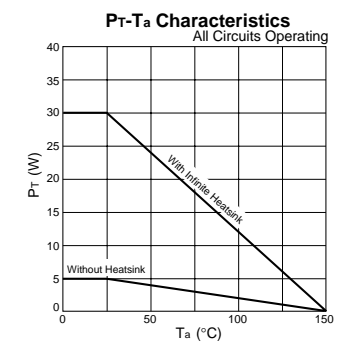
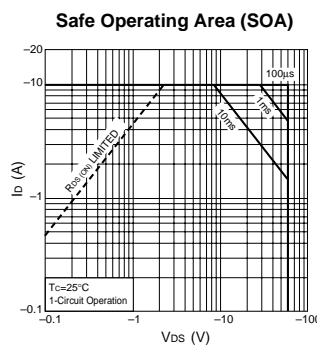
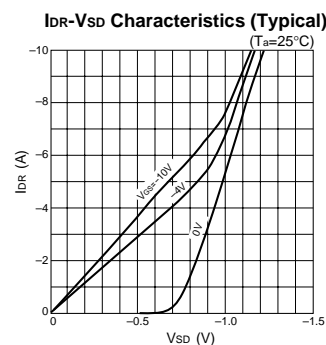
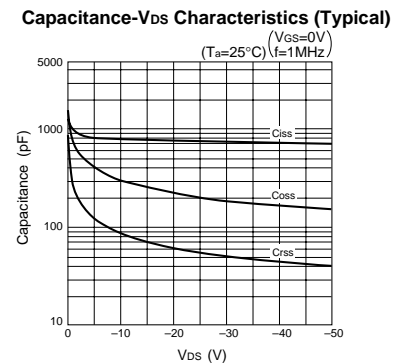
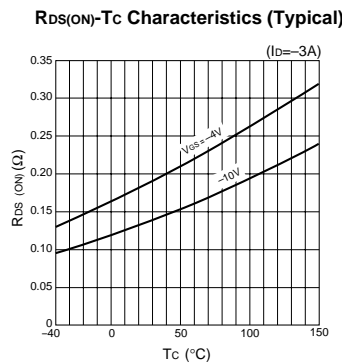
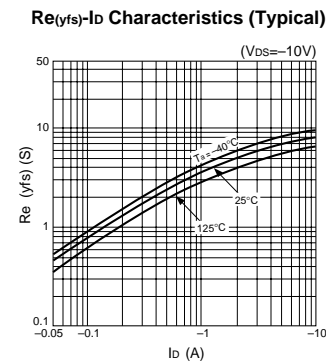
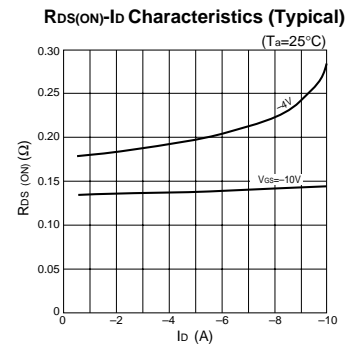
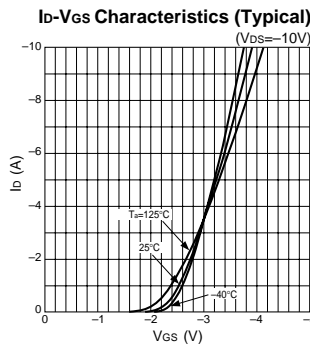
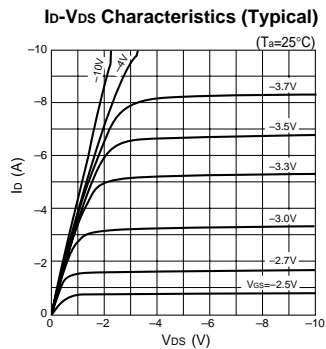
($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	-60			V	$I_D=-100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			-100	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	-1.0		-2.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$R_{e(yfs)}$	4	6		S	$V_{DS}=-10\text{V}$, $I_D=-3\text{A}$
$R_{DS(ON)}$		0.14	0.22	Ω	$V_{GS}=-10\text{V}$, $I_D=-3\text{A}$
C_{iss}		790		pF	$V_{DS}=-10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		310		pF	
C_{rss}		90		pF	
$t_{d(on)}$		40		ns	$I_D=-3\text{A}$, $V_{DD}=-20\text{V}$, $R_L=6.67\Omega$, $V_{GS}=-5\text{V}$, see Fig. 4 on page 16.
t_r		110		ns	
$t_{d(off)}$		160		ns	
t_f		80		ns	
V_{SD}	-1.0	-1.5		V	
t_{rr}		85		ns	$I_{SD}=3\text{A}$, $V_{GS}=0\text{V}$, $di/dt=100\text{A}/\mu\text{s}$

Equivalent circuit diagram



Characteristic curves



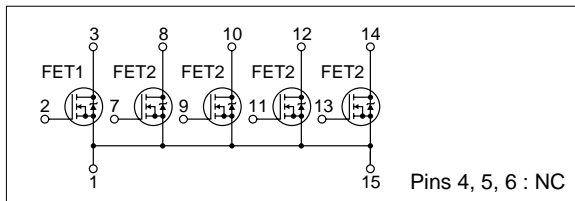
Absolute maximum ratings

($T_a=25^\circ\text{C}$)

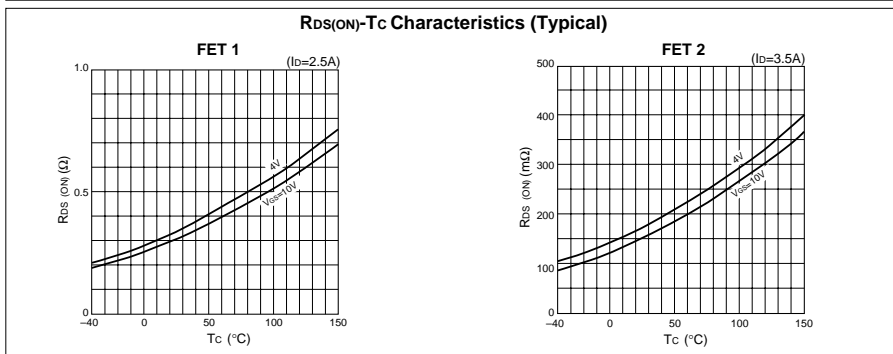
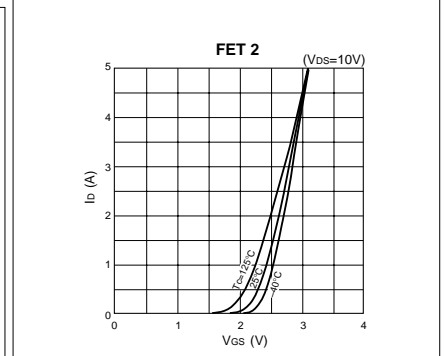
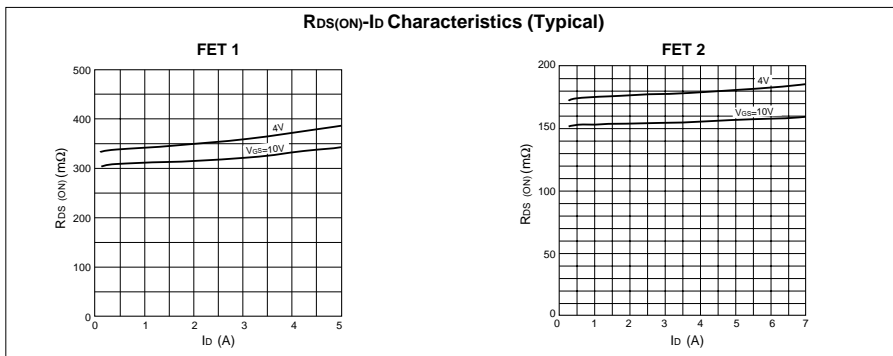
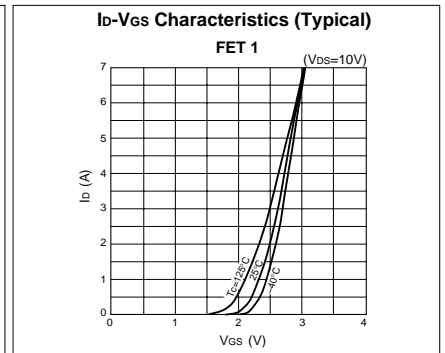
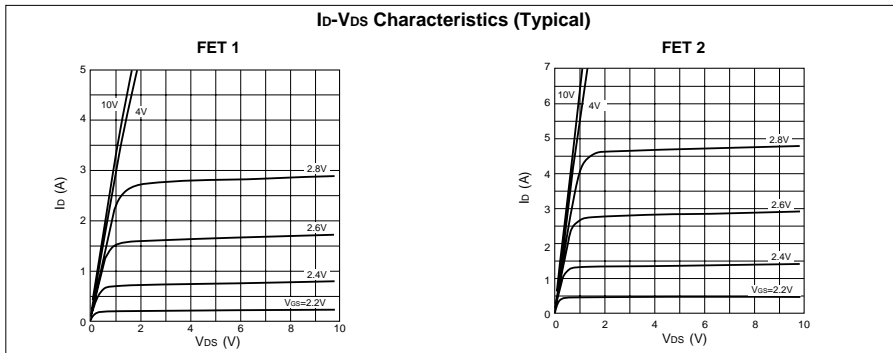
Symbol	Ratings		Unit
	FET 1	FET 2	
V_{bss}	150		V
V_{gss}	+20, -10		V
I_D	± 5	± 7	A
I_D (pulse)*1	± 10	± 15	A
P_T	5 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)		W
	43 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)		W
θ_{j-a}	25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C}/\text{W}$
θ_{j-c}	2.91 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C}/\text{W}$
V_{iso}	1000 (Between fin and lead pin, AC)		Vrms
T_{ch}	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$

*: $PW \leq 100\mu\text{s}$, $duty \leq 50\%$

Equivalent circuit diagram



Characteristic curves

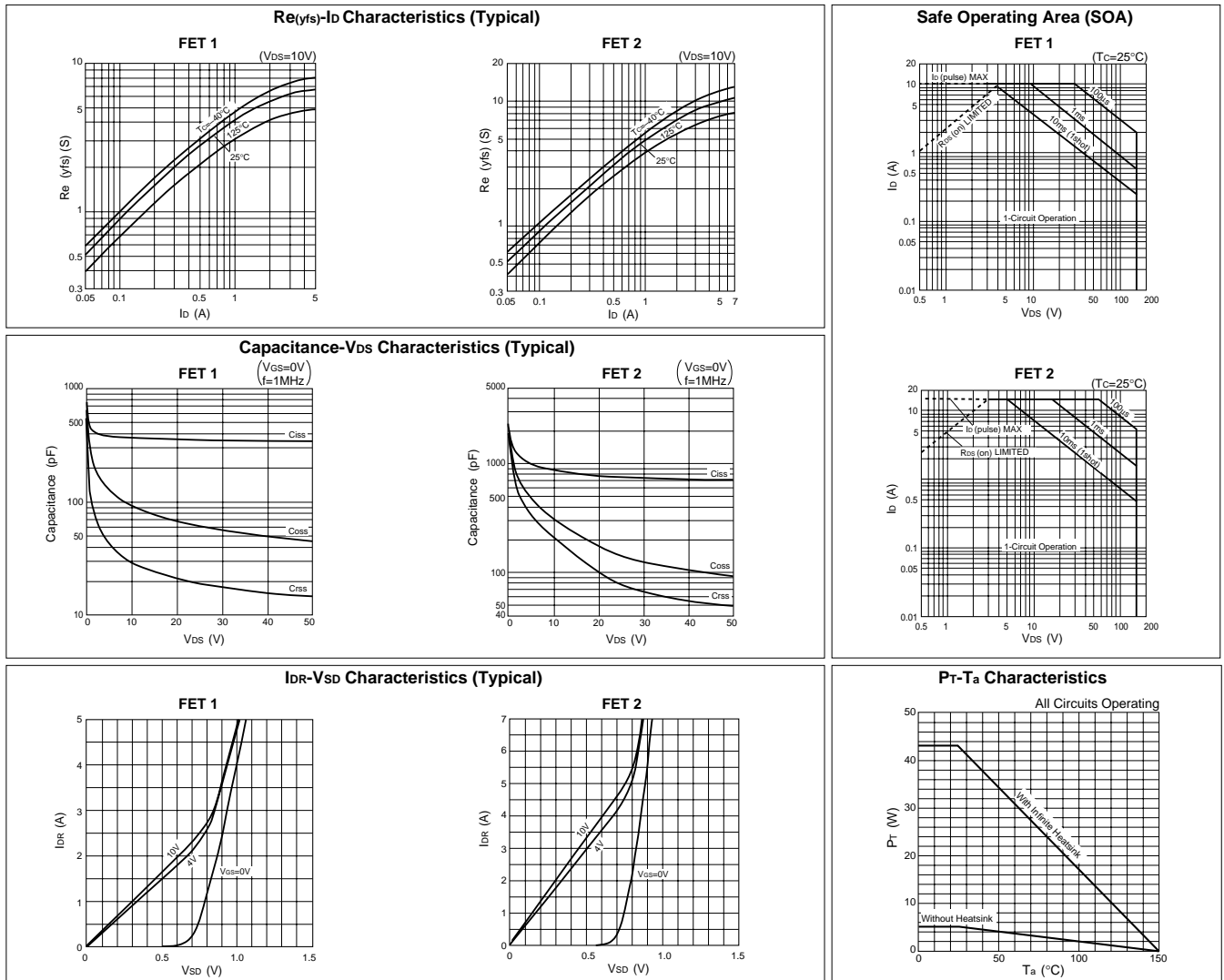


Electrical characteristics

(Ta=25°C)

Symbol	FET 1					FET 2				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
V(BR)DSS	150			V	Id=100μA, VGS=0V	150			V	Id=100μA, VGS=0V
IGSS			100	nA	VGS=20V			100	nA	VGS=20V
IDSS			100	μA	VDS=150V, VGS=0V			100	μA	VDS=150V, VGS=0V
VTH	1.0		2.0	V	VDS=10V, Id=250μA	1.0		2.0	V	VDS=10V, Id=250μA
Re(yfs)	3	5.5		S	VDS=10V, Id=2.5A	4	9		S	VDS=10V, Id=3.5A
RDS(ON)		330	440	mΩ	VGS=10V, Id=2.5A	150	200	mΩ		VGS=10V, Id=3.5A
		370	480	mΩ	VGS=4V, Id=2.5A	170	230	mΩ		VGS=4V, Id=3.5A
Ciss		380		pF	VDS=10V, f=1.0MHz,		870		pF	VDS=10V, f=1.0MHz,
Coss		95		pF	VGS=0V		320		pF	VGS=0V
Crss		25		pF	VGS=0V		210		pF	VGS=0V
td(on)		25		ns	Id=2.5A, VDD≐70V, RL=28Ω,		25		ns	Id=3.5A, VDD≐70V, RL=20Ω,
tr		50		ns	VGS=5V, see Fig.3 on page 16.		55		ns	VGS=5V, see Fig.3 on page 16.
td(off)		55		ns			80		ns	
tf		40		ns			50		ns	
VSD		1.1	1.5	V	ISD=5A, VGS=0V	1.0	1.5	V		ISD=7A, VGS=0V
trr		180		ns	IF=±100mA	500			ns	IF=±100mA

Characteristic curves

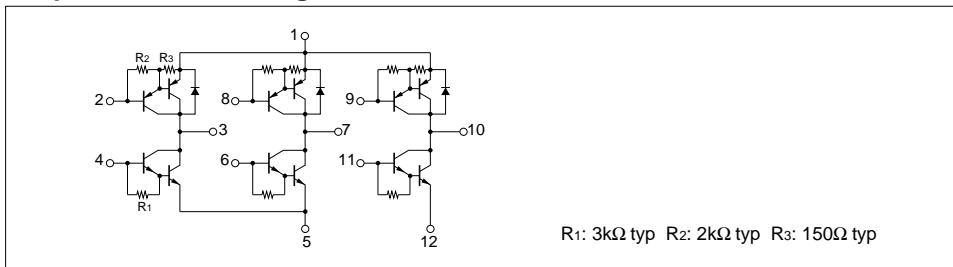


Absolute maximum ratings

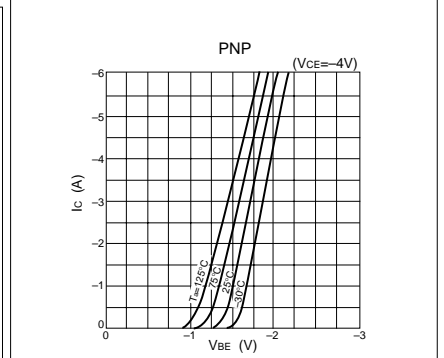
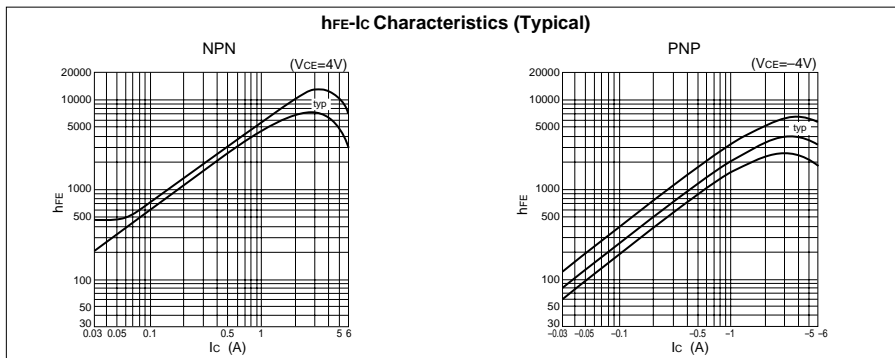
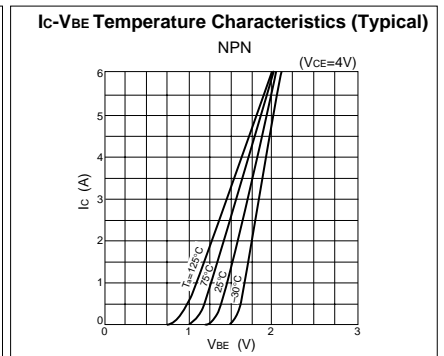
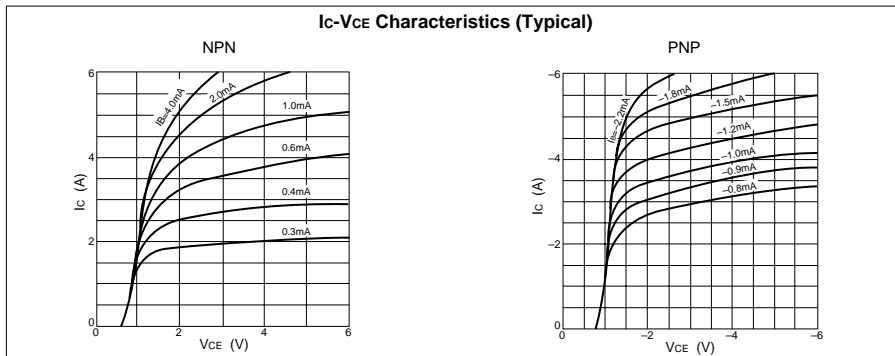
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	60	-60	V
V_{CEO}	60	-60	V
V_{EBO}	6	-6	V
I_C	4	-4	A
I_B	0.5	-0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)		W
	25 ($T_c=25^\circ\text{C}$)		
V_{ISO}	1000 (Between fin and lead pin, AC)		V_{rms}
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	5		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

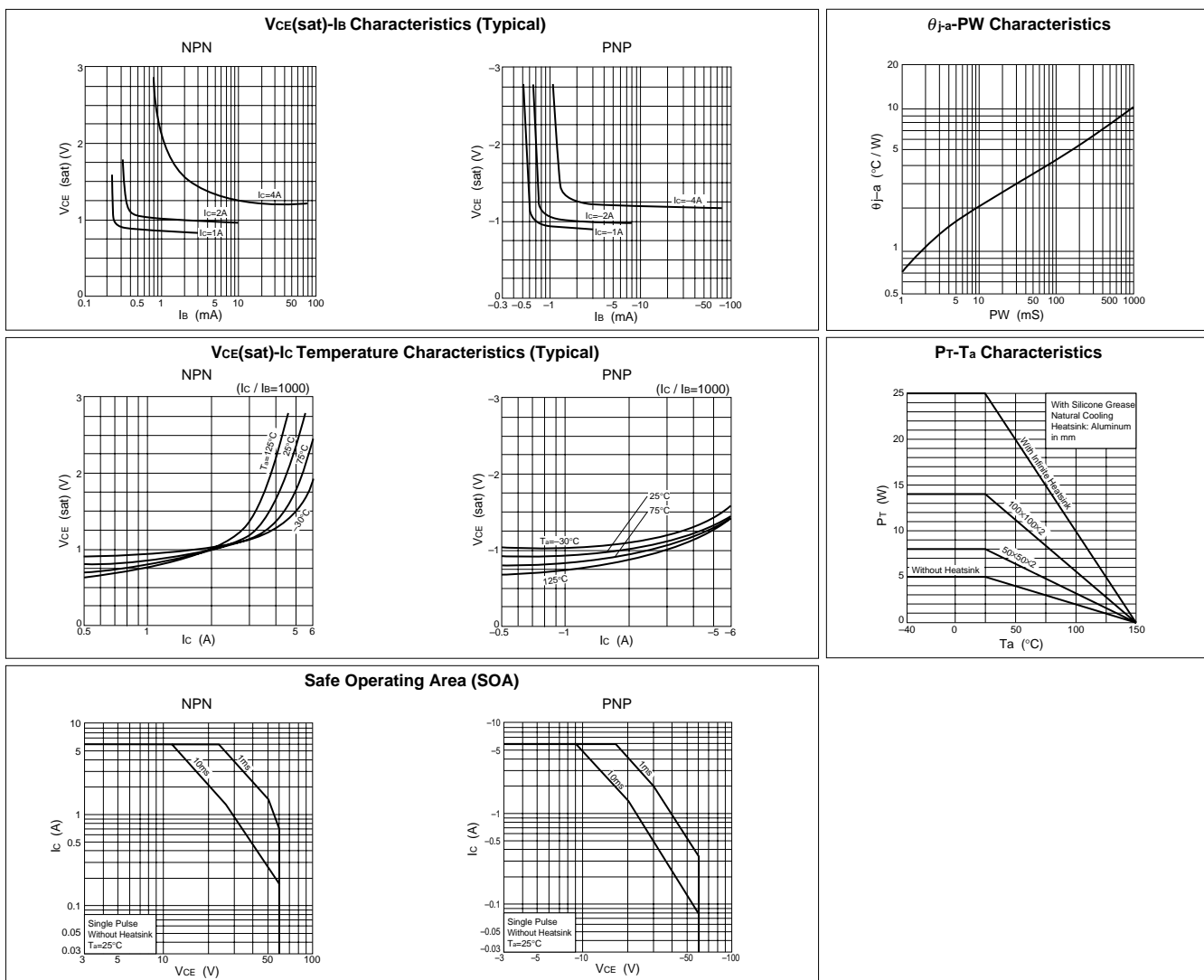


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=60\text{V}$			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			10	μA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	60			V	$I_C=10\text{mA}$	-60			V	$I_C=-10\text{mA}$
hFE	2000				$V_{CE}=4\text{V}, I_C=3\text{A}$	2000				$V_{CE}=-4\text{V}, I_C=-3\text{A}$
$V_{CE}(\text{sat})$			1.5	V	$I_C=3\text{A}, I_B=6\text{mA}$			-1.5	V	$I_C=-3\text{A}, I_B=-6\text{mA}$

Characteristic curves

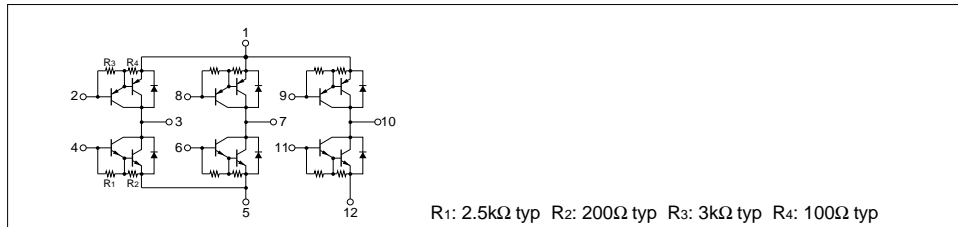


Absolute maximum ratings

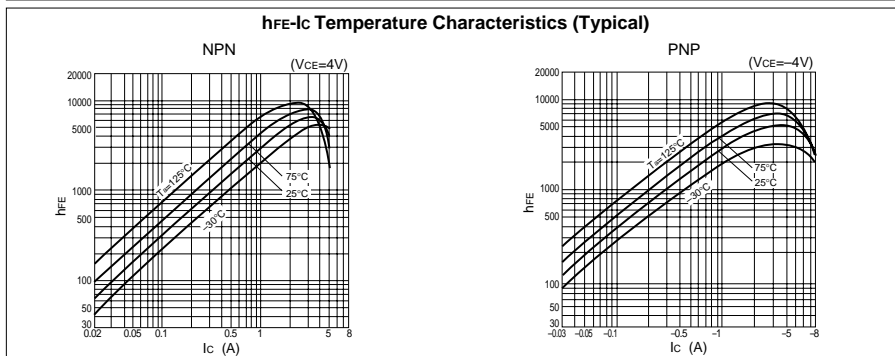
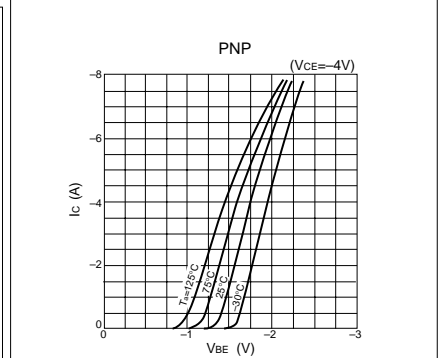
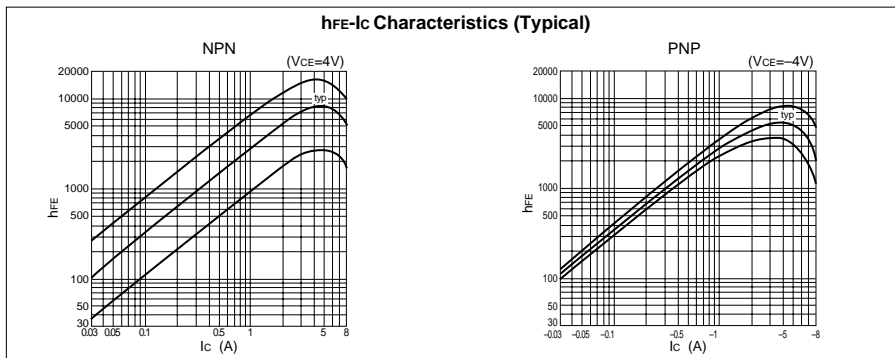
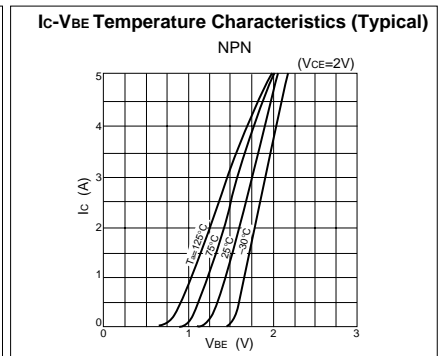
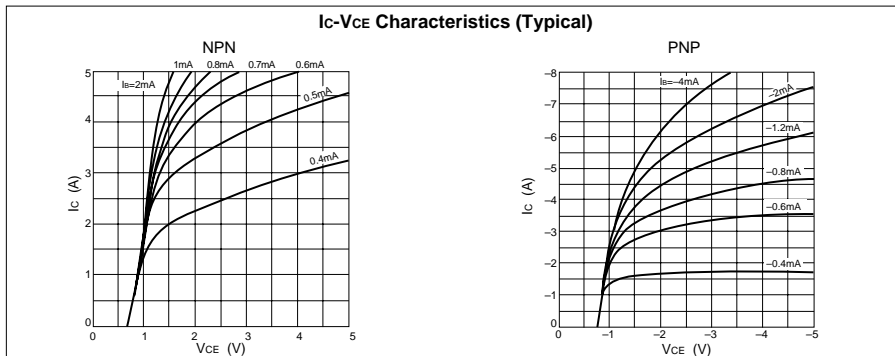
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	100	-100	V
V_{CEO}	100	-100	V
V_{EBO}	6	-6	V
I_c	5	-5	A
I_{CP}	8 (PW \leq 1ms, Du \leq 50%)	-8 (PW \leq 1ms, Du \leq 50%)	A
I_B	0.5	-0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)		W
	25 ($T_c=25^\circ\text{C}$)		
V_{ISO}	1000 (Between fin and lead pin, AC)		V_{rms}
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	5		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

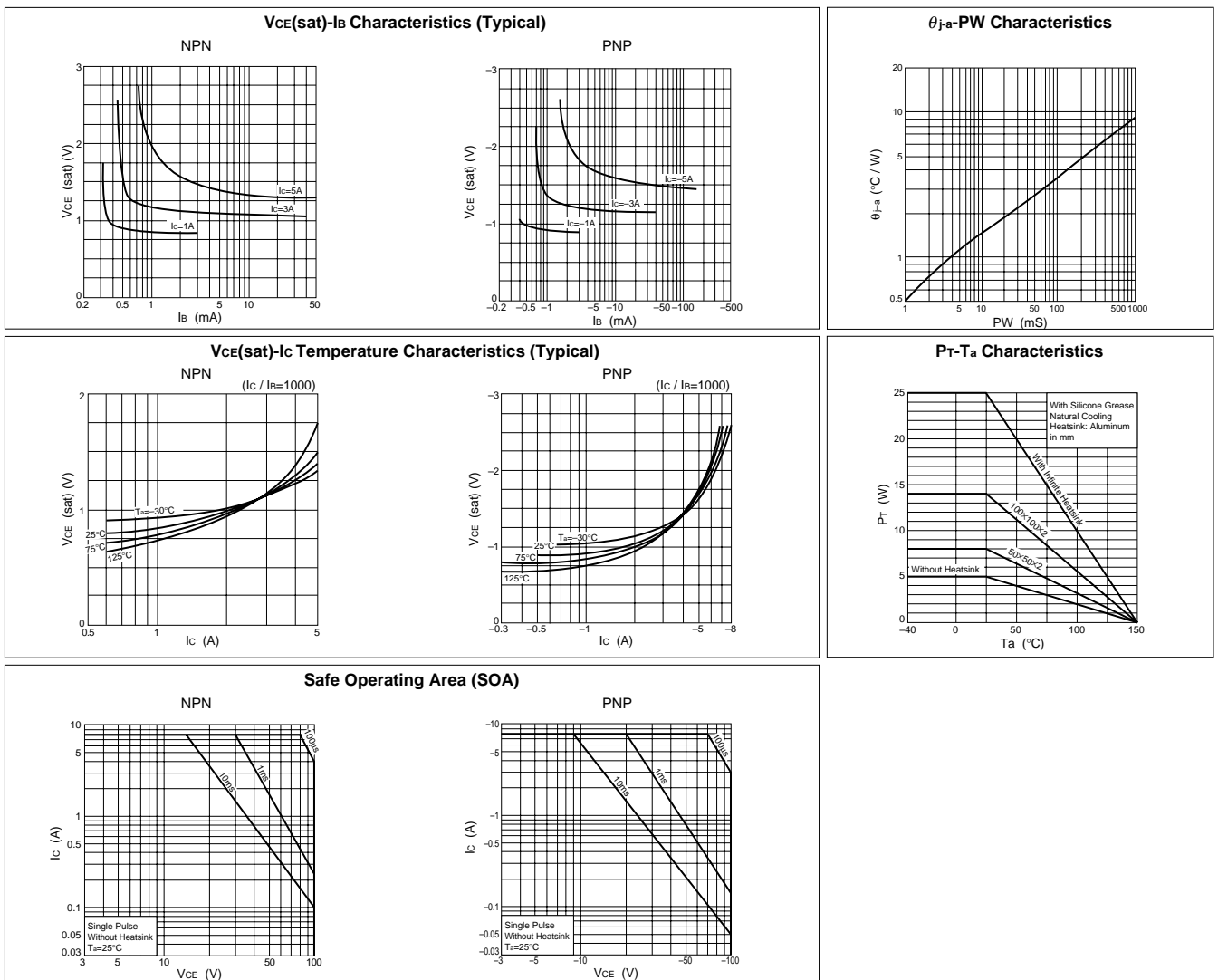


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=100\text{V}$			-10	μA	$V_{CB}=-100\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	100			V	$I_C=10\text{mA}$	-100			V	$I_C=-10\text{mA}$
h_{FE}	2000				$V_{CE}=4\text{V}, I_C=3\text{A}$	2000				$V_{CE}=-4\text{V}, I_C=-3\text{A}$
$V_{CE}(\text{sat})$			1.5	V	$I_C=3\text{A}, I_B=6\text{mA}$			-1.5	V	$I_C=-3\text{A}, I_B=-6\text{mA}$

Characteristic curves

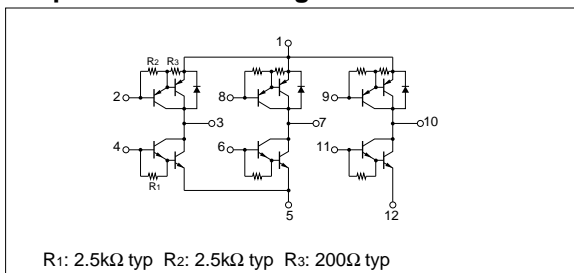


Absolute maximum ratings

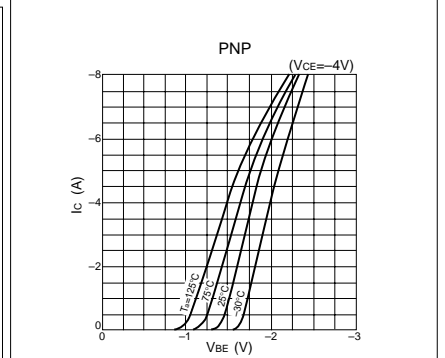
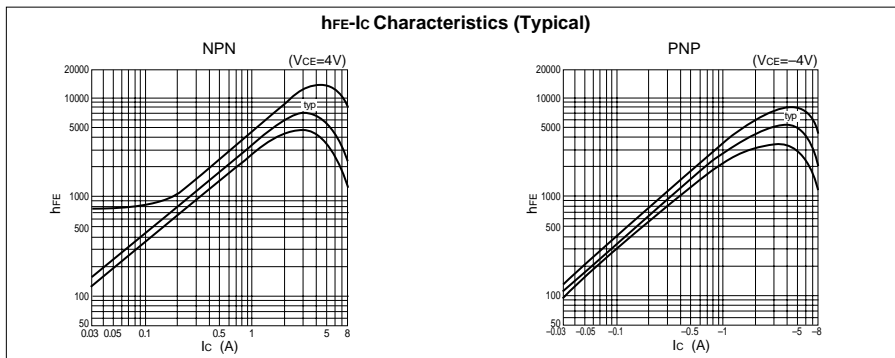
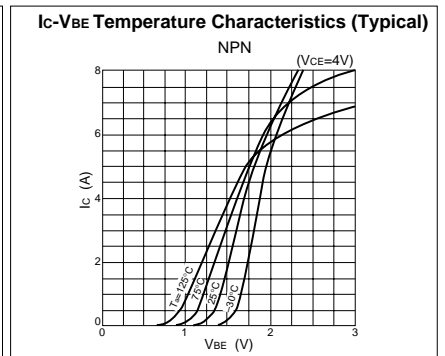
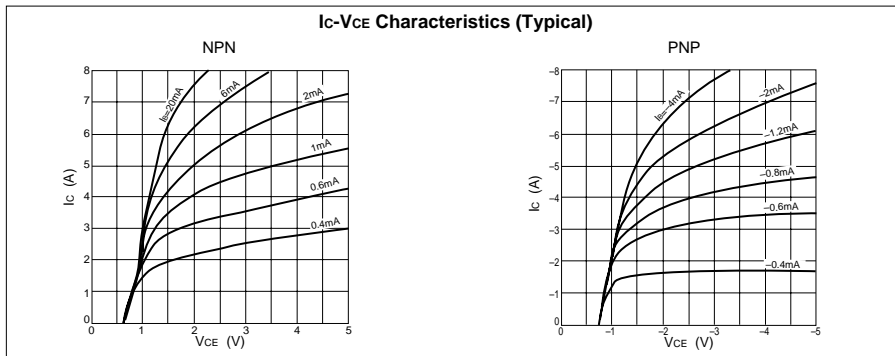
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	100	-100	V
V_{CEO}	80	-100	V
V_{EBO}	6	-6	V
I_C	5	-5	A
I_B	0.5	-0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)		W
	25 ($T_c=25^\circ\text{C}$)		
V_{ISO}	1000 (Between fin and lead pin, AC)		V_{rms}
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	5		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

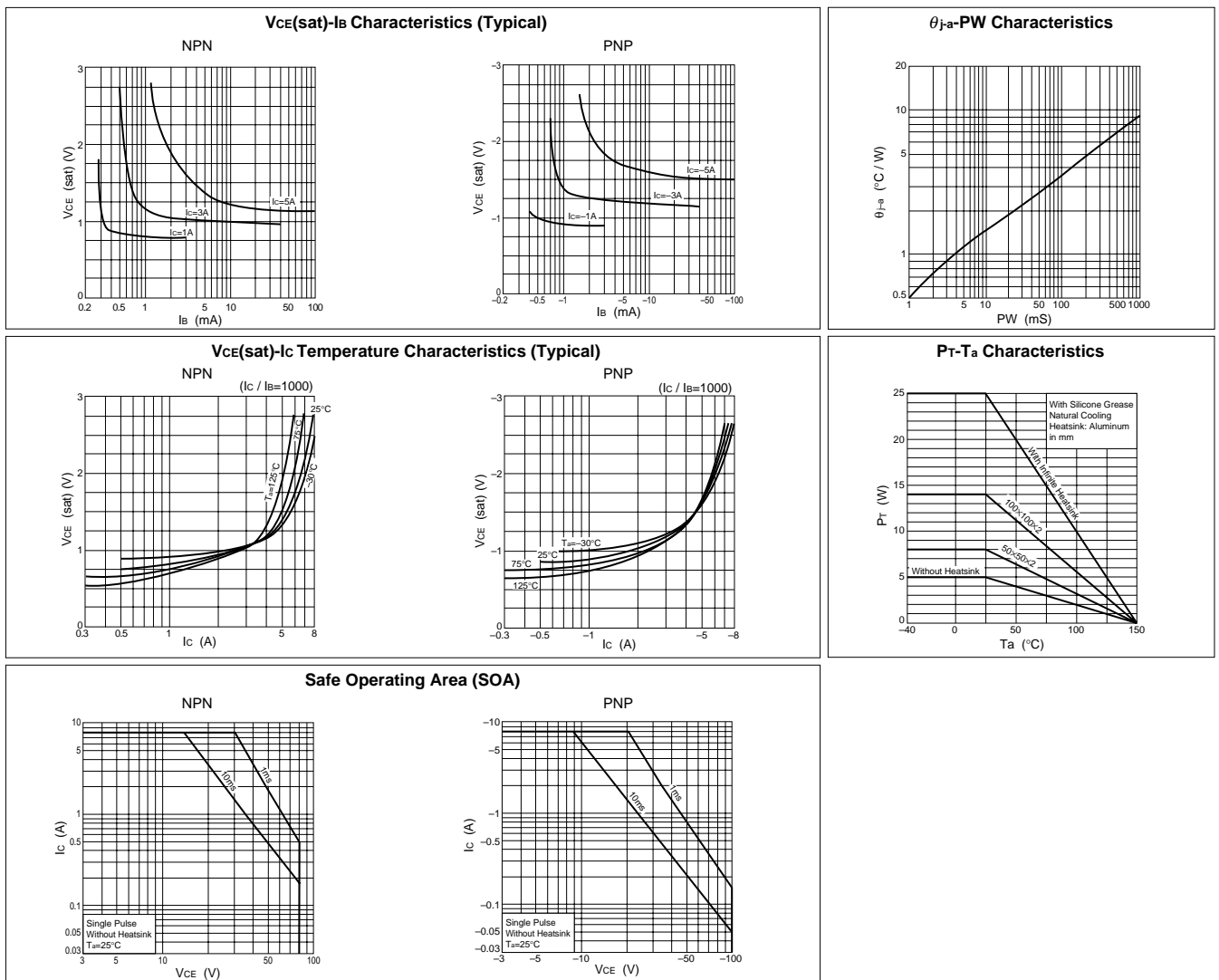


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=100\text{V}$			-10	μA	$V_{CB}=-100\text{V}$
I_{EBO}			10	μA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	80			V	$I_C=10\text{mA}$	-100			V	$I_C=-10\text{mA}$
h_{FE}	2000				$V_{CE}=4\text{V}, I_C=3\text{A}$	2000				$V_{CE}=-4\text{V}, I_C=-3\text{A}$
$V_{CE(sat)}$			1.5	V	$I_C=3\text{A}, I_B=6\text{mA}$			-1.5	V	$I_C=-3\text{A}, I_B=-6\text{mA}$
V_{FEC}				V				1.3	V	$I_{FEC}=1\text{A}$
t_{rr}				μs			2.0		μs	$I_{FEC}=\pm 100\text{mA}$

Characteristic curves

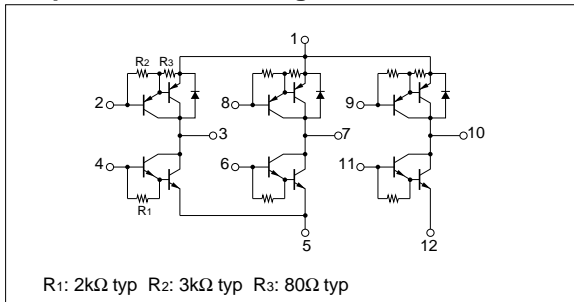


Absolute maximum ratings

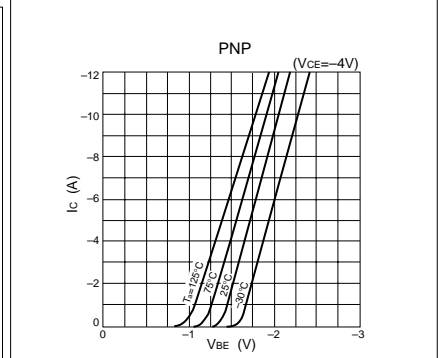
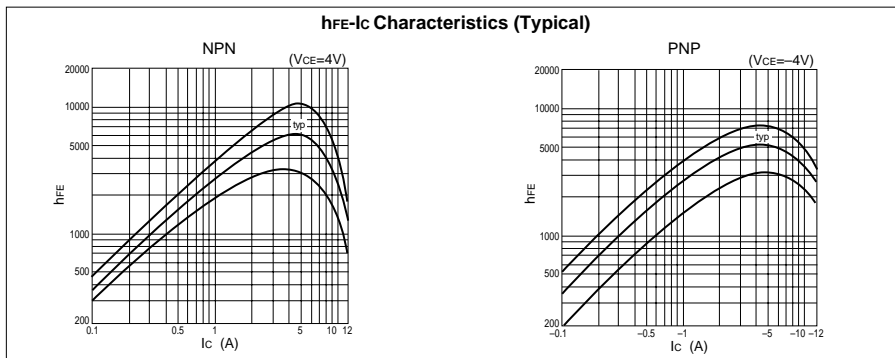
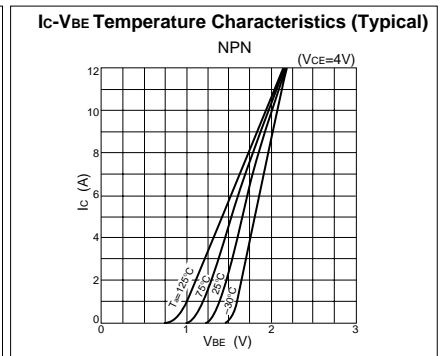
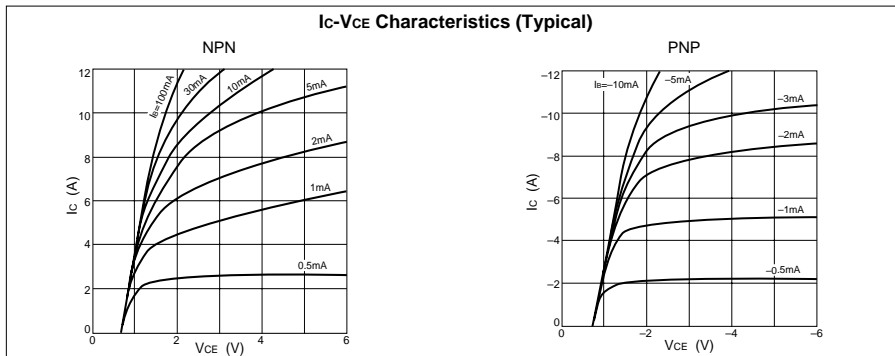
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	60	-60	V
V_{CEO}	60	-60	V
V_{EBO}	6	-6	V
I_c	6	-6	A
I_{CP}	12 ($PW \leq 1\text{ms}, D_u \leq 50\%$)	-12 ($PW \leq 1\text{ms}, D_u \leq 50\%$)	A
I_B	0.5	-0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)		W
	25 ($T_c=25^\circ\text{C}$)		
V_{ISO}	1000 (Between fin and lead pin, AC)		V_{rms}
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	5		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

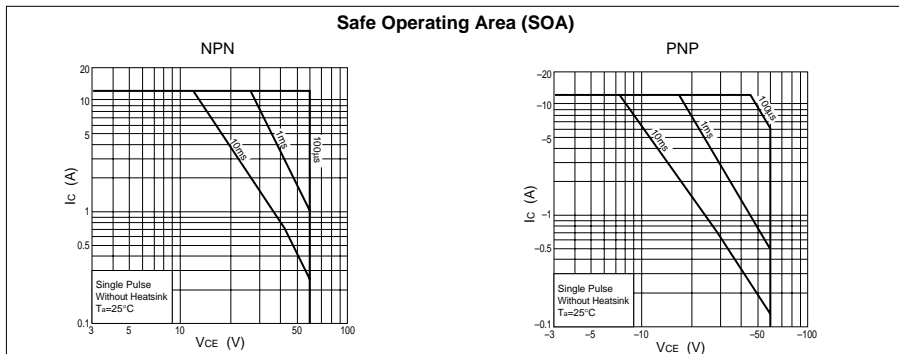
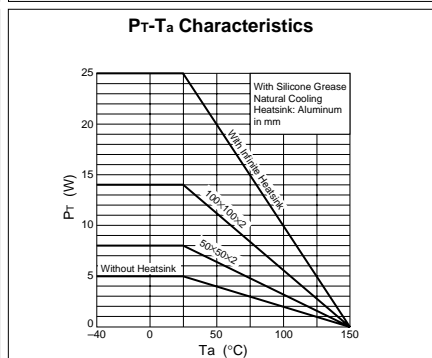
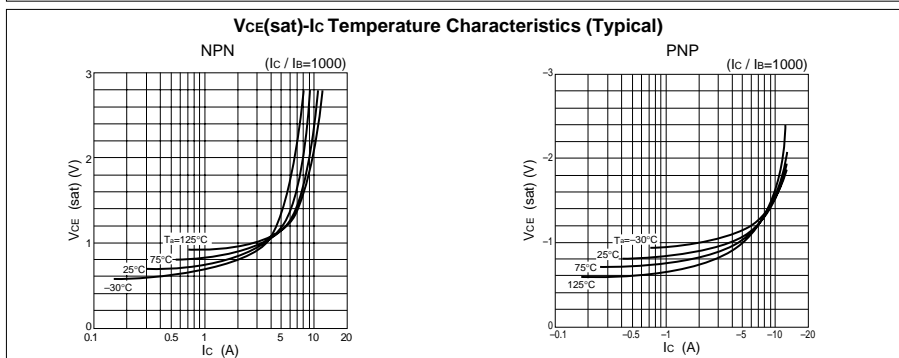
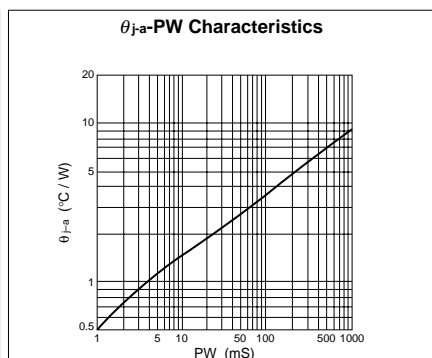
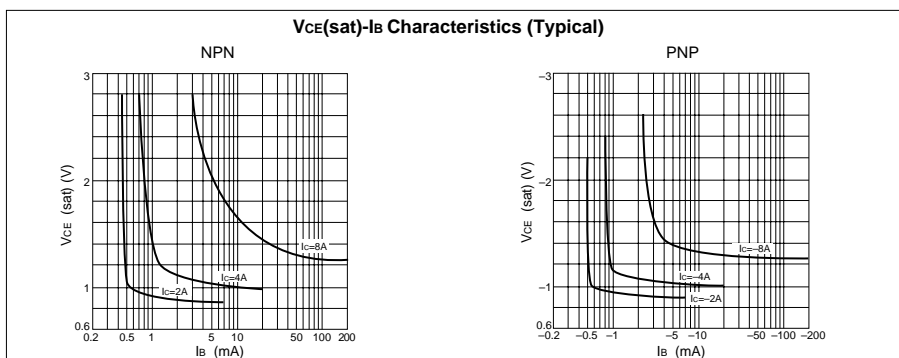


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=60\text{V}$			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			10	μA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	60			V	$I_C=25\text{mA}$	-60			V	$I_C=-25\text{mA}$
h_{FE}	2000	5000	12000		$V_{CE}=4\text{V}, I_C=5\text{A}$	2000	5000	12000		$V_{CE}=-4\text{V}, I_C=-5\text{A}$
$V_{CE(sat)}$			1.5	V	$I_C=5\text{A}, I_B=10\text{mA}$			-1.5	V	$I_C=-5\text{A}, I_B=-10\text{mA}$
$V_{BE(sat)}$			2.0	V				-2.0	V	
V_{FEC}				V				2.0	V	
t_{rr}				μs			1.0		μs	$I_{FEC}=\pm 0.5\text{A}$
t_{on}		0.8		μs	$V_{CC}=\pm 25\text{V}, I_C=5\text{A}, I_{B1}=-I_{B2}=10\text{mA}$		1.0		μs	$V_{CC}=\pm 25\text{V}, I_C=-5\text{A}, I_{B1}=-I_{B2}=-10\text{mA}$
t_{stg}		6.0		μs			1.4		μs	
t_f		2.0		μs			0.6		μs	
f_T		80		MHz			120		MHz	
C_{ob}		100		pF	$V_{CB}=10\text{V}, f=1\text{MHz}$		150		pF	$V_{CB}=-10\text{V}, f=1\text{MHz}$

Characteristic curves

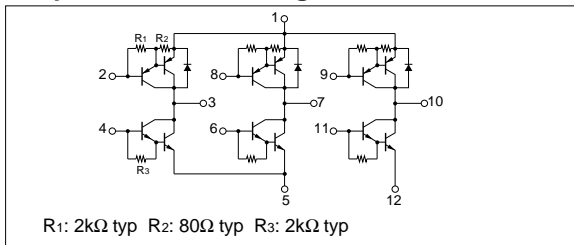


Absolute maximum ratings

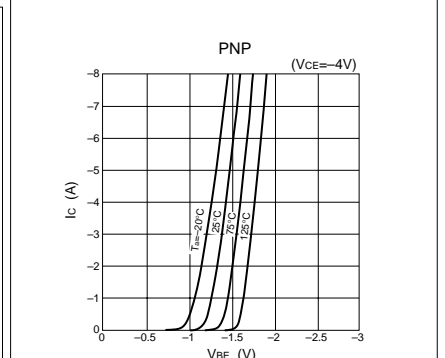
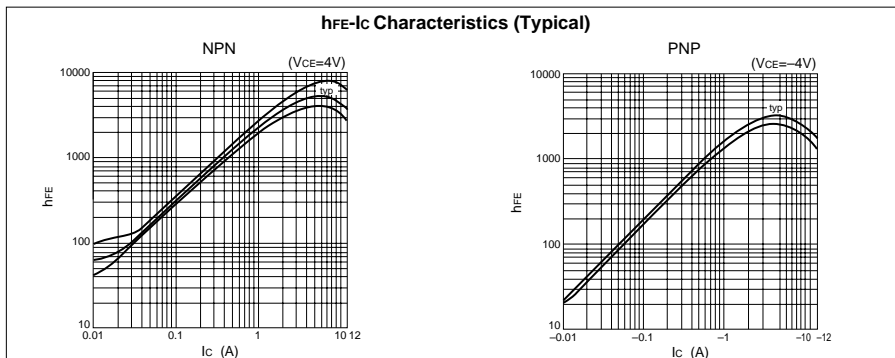
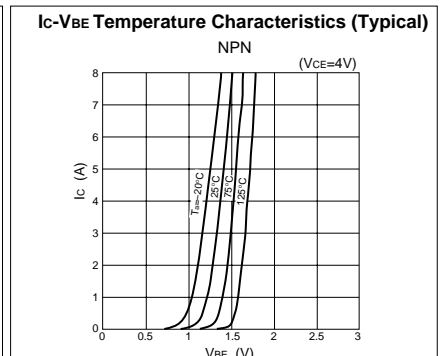
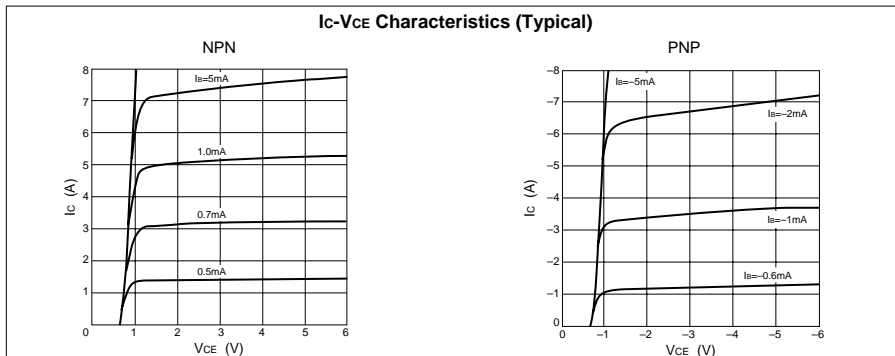
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	60	-60	V
V_{CEO}	60	-60	V
V_{EBO}	6	-6	V
I_c	8	-8	A
I_{CP}	12 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	-12 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	A
I_{FEC}	—	-8	A
$I_{FEC P}$	—	-12	A
I_B	0.5	-0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)		W
	25 ($T_c=25^\circ\text{C}$)		
V_{ISO}	1000 (Between fin and lead pin, AC)		V_{rms}
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	5		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

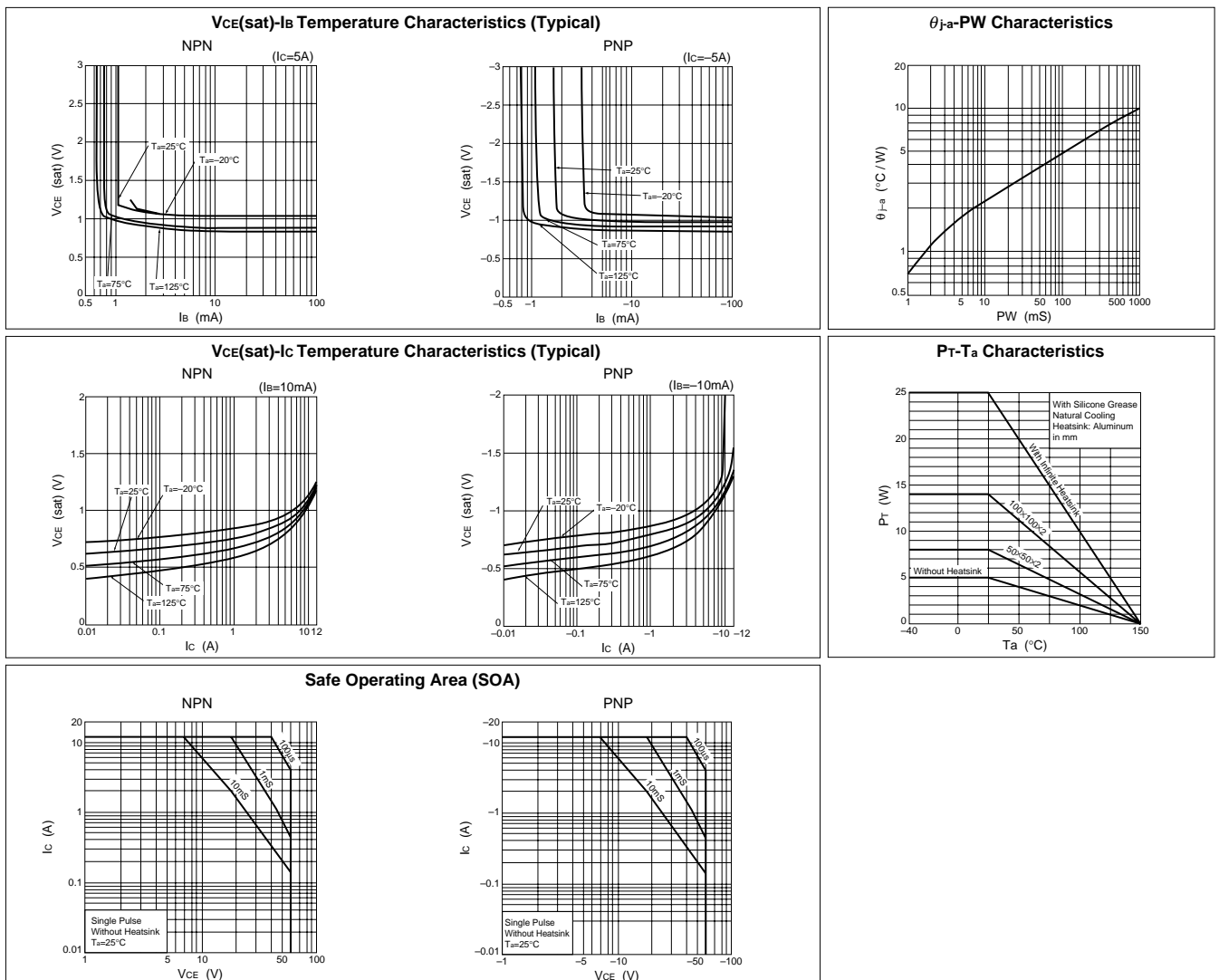


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=60\text{V}$			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			10	μA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	60			V	$I_C=10\text{mA}$	-60			V	$I_C=-10\text{mA}$
h_{FE}	2000	5000	12000		$V_{CE}=4\text{V}, I_C=5\text{A}$	2000	5000	12000		$V_{CE}=-4\text{V}, I_C=-5\text{A}$
$V_{CE(sat)}$			1.5	V	$I_C=5\text{A}, I_B=10\text{mA}$			-1.5	V	$I_C=-5\text{A}, I_B=-10\text{mA}$
$V_{BE(sat)}$			2.0	V				-2.0	V	
V_{FEC}		—		V				2.0	V	$I_{FEC}=5\text{A}$
t_{rr}		—		μs			1.0		μs	$I_{FEC}=\pm 0.5\text{A}$
t_{on}		0.5		μs	$V_{CC}=\pm 25\text{V},$ $I_C=5\text{A},$ $I_{B1}=-I_{B2}=10\text{mA}$			0.5	μs	$V_{CC}=\pm 25\text{V},$ $I_C=-5\text{A},$ $I_{B1}=-I_{B2}=-10\text{mA}$
t_{stg}		2.0		μs				1.4	μs	
t_f		1.2		μs				0.6	μs	
f_T		50		MHz				100	MHz	
C_{ob}		100		pF	$V_{CB}=10\text{V}, f=1\text{MHz}$			130	pF	$V_{CB}=-10\text{V}, f=1\text{MHz}$

Characteristic curves

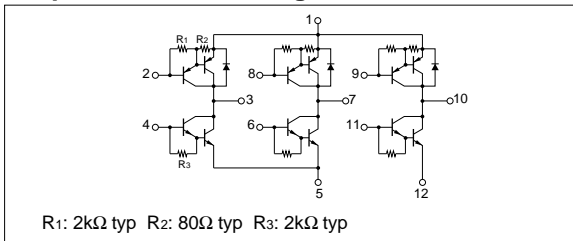


Absolute maximum ratings

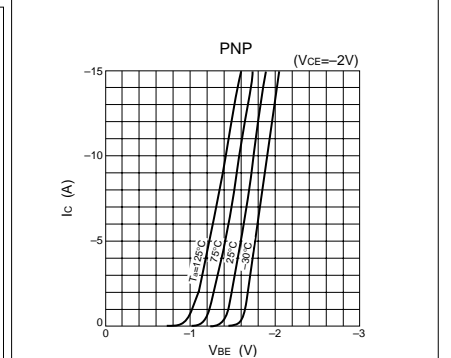
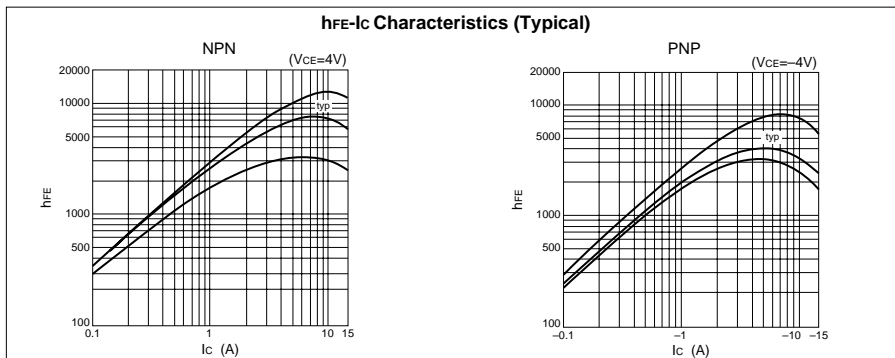
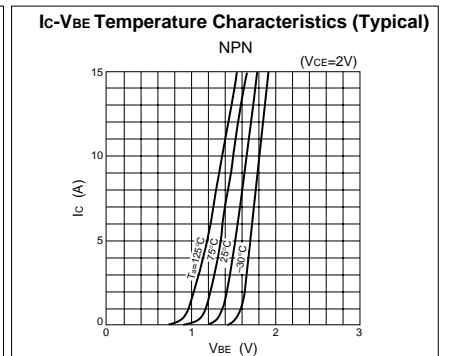
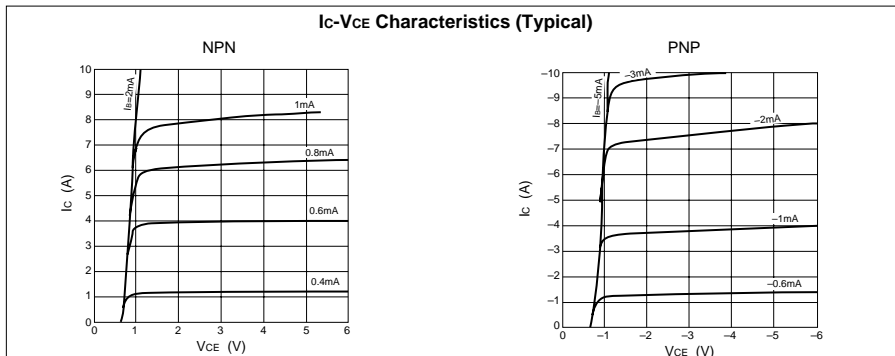
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	60	-60	V
V_{CEO}	60	-60	V
V_{EBO}	6	-6	V
I_c	10	-10	A
I_{CP}	15 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	-15 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	A
I_{FEC}	—	-10	A
$I_{FEC P}$	—	-15	A
I_B	0.5	-0.5	A
P_T	5 ($T_a=25^\circ\text{C}$)		W
	35 ($T_c=25^\circ\text{C}$)		
V_{ISO}	1000 (Between fin and lead pin, AC)		V_{rms}
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	3.57		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

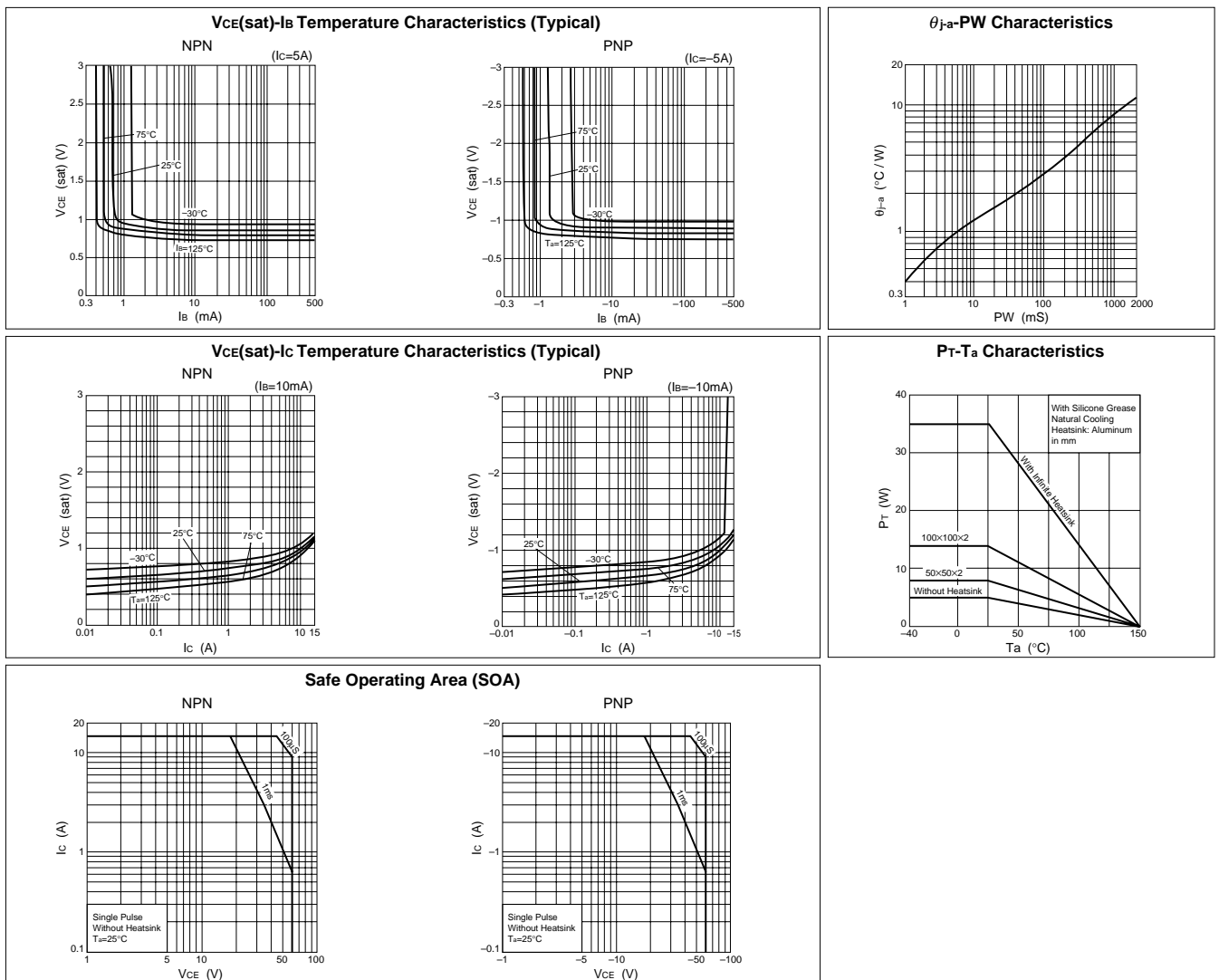


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=60\text{V}$			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			10	μA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	60			V	$I_C=10\text{mA}$	-60			V	$I_C=-10\text{mA}$
h_{FE}	2000	5000	12000		$V_{CE}=4\text{V}, I_C=6\text{A}$	2000	5000	12000		$V_{CE}=-4\text{V}, I_C=-6\text{A}$
$V_{CE(sat)}$			1.5	V	$I_C=6\text{A}, I_B=12\text{mA}$			-1.5	V	$I_C=-6\text{A}, I_B=-12\text{mA}$
$V_{BE(sat)}$			2.0	V				-2.0	V	
V_{FEC}		-		V				2.0	V	$I_{FEC}=-6\text{A}$
t_{rr}		-		μs			4.0		μs	$I_{FEC}=\pm 0.5\text{A}$
t_{on}		0.6		μs	$V_{CC}=\pm 24\text{V}, I_C=6\text{A}, I_{B1}=-I_{B2}=12\text{mA}$			0.7	μs	$V_{CC}=\pm 24\text{V}, I_C=-6\text{A}, I_{B1}=-I_{B2}=-12\text{mA}$
t_{stg}		2.0		μs				1.2	μs	
t_f		1.5		μs				0.7	μs	
f_T		50		MHz	$V_{CE}=12\text{V}, I_E=-1\text{A}$			50	MHz	$V_{CE}=-12\text{V}, I_E=1\text{A}$
C_{ob}		100		pF	$V_{CB}=10\text{V}, f=1\text{MHz}$			180	pF	$V_{CB}=-10\text{V}, f=1\text{MHz}$

Characteristic curves

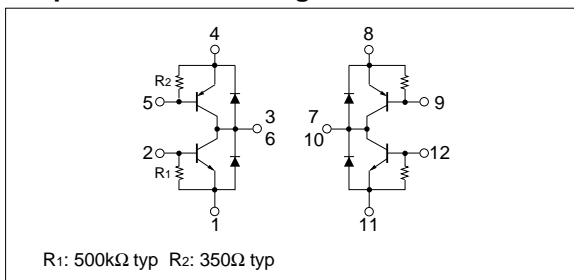


Absolute maximum ratings

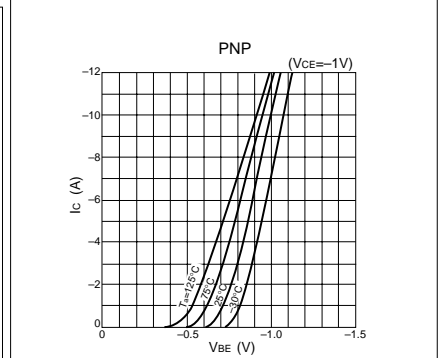
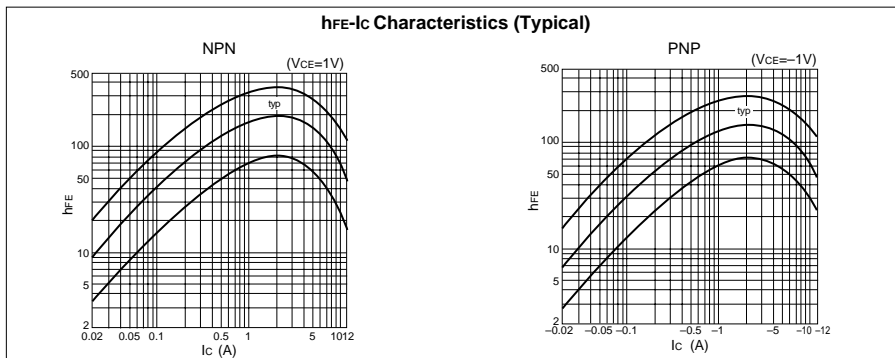
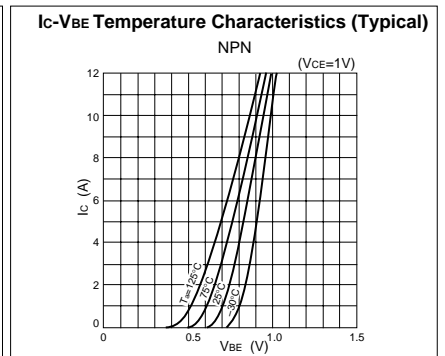
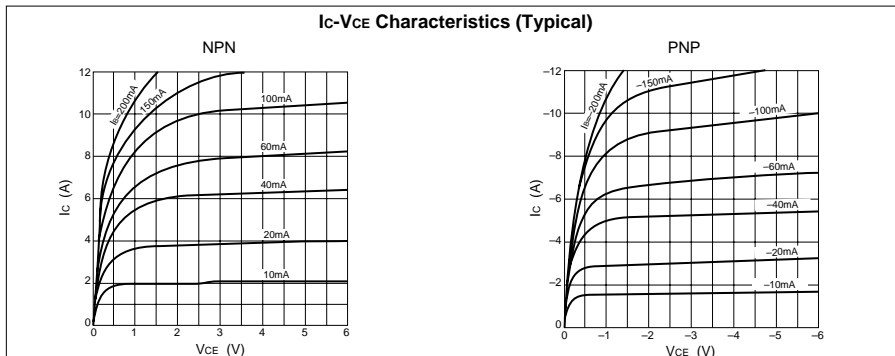
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	60	-60	V
V_{CEO}	60	-60	V
V_{EBO}	6	-6	V
I_C	12	-12	A
I_B	3	-3	A
P_T	5 ($T_a=25^\circ\text{C}$)		W
	40 ($T_c=25^\circ\text{C}$)		
V_{ISO}	1000 (Between fin and lead pin, AC)		V_{rms}
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	3.12		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

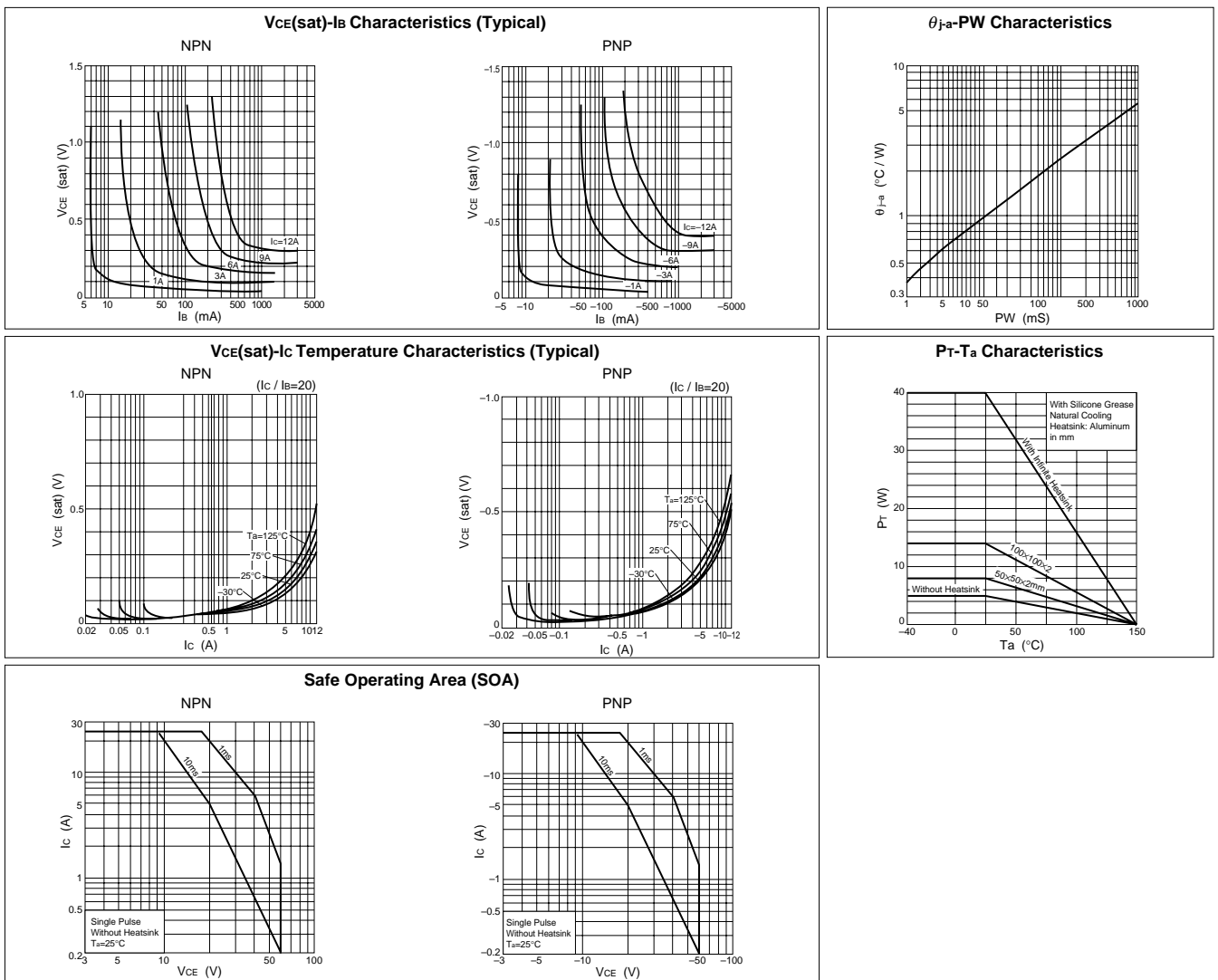


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			100	μA	$V_{CB}=60\text{V}$			-100	μA	$V_{CB}=-60\text{V}$
I_{EBO}			60	mA	$V_{EB}=6\text{V}$			-60	mA	$V_{EB}=-6\text{V}$
V_{CEO}	60			V	$I_C=25\text{mA}$	-60			V	$I_C=-25\text{mA}$
h_{FE}	50				$V_{CE}=1\text{V}, I_C=6\text{A}$	50				$V_{CE}=-1\text{V}, I_C=-6\text{A}$
$V_{CE(sat)}$			0.35	V	$I_C=6\text{A}, I_B=0.3\text{A}$			-0.35	V	$I_C=-6\text{A}, I_B=-0.3\text{A}$
V_{FEC}			2.5	V	$I_{FEC}=10\text{A}$			2.5	V	$I_{FEC}=10\text{A}$

Characteristic curves



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

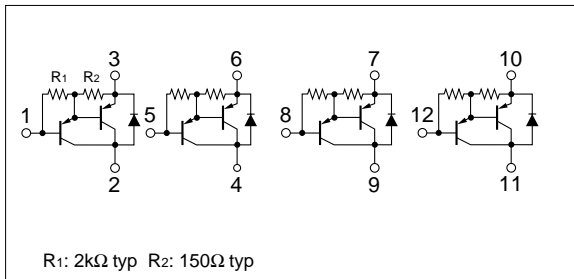
Symbol	Ratings	Unit
V_{CBO}	-60	V
V_{CEO}	-60	V
V_{EBO}	-6	V
I_C	-4	A
I_B	-1	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

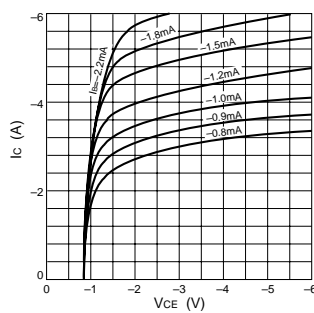
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	-60			V	$I_C=-10\text{mA}$
h_{FE}	2000				$V_{CE}=-4\text{V}$, $I_C=-3\text{A}$
$V_{CE(sat)}$			-1.5	V	$I_C=-3\text{A}$, $I_B=-6\text{mA}$

Equivalent circuit diagram

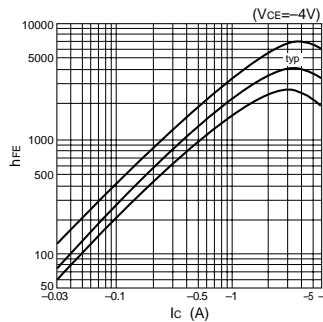


Characteristic curves

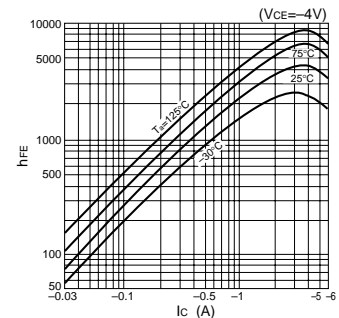
I_C - V_{CE} Characteristics (Typical)



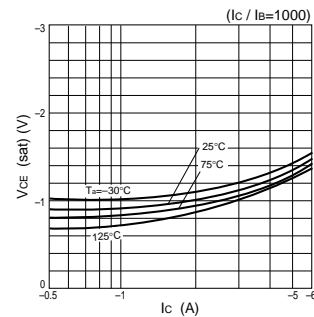
h_{FE} - I_C Characteristics (Typical)



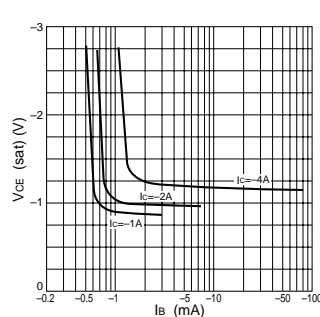
h_{FE} - I_C Temperature Characteristics (Typical)



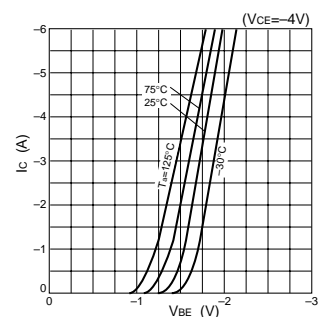
$V_{CE(sat)}$ - I_C Temperature Characteristics (Typical)



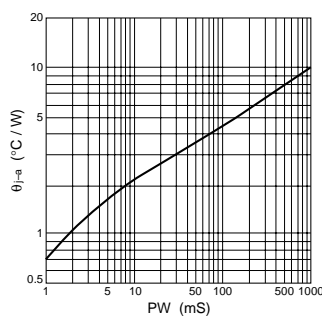
$V_{CE(sat)}$ - I_B Characteristics (Typical)



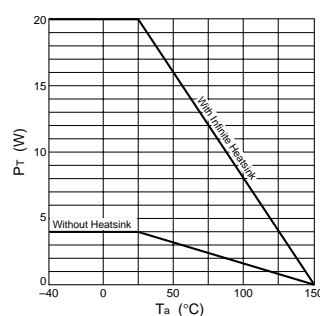
I_C - V_{BE} Temperature Characteristics (Typical)



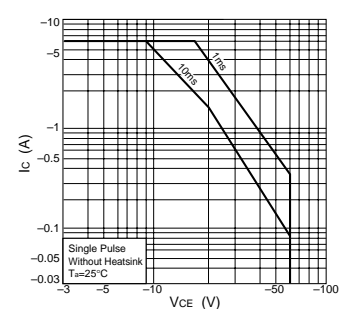
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{CB0}	-60	V
V_{CEO}	-60	V
V_{EBO}	-6	V
I_c	-3	A
I_{CP}	-6 (PW \leq 1ms, Du \leq 50%)	A
I_B	-0.5	A
I_F	-6 (PW \leq 0.5ms, Du \leq 25%)	A
I_{FSM}	-8 (PW \leq 10ms, Single pulse)	A
V_R	100	V
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

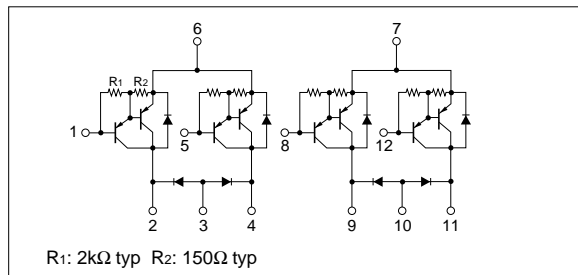
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	-60			V	$I_c=-10\text{mA}$
h_{FE}	2000	5000	12000		$V_{CE}=-4\text{V}$, $I_c=-2\text{A}$
$V_{CE(sat)}$			-1.5	V	$I_c=-2\text{A}$, $I_B=-4\text{mA}$
$V_{BE(sat)}$			-2.0	V	

Diode for flyback voltage absorption

($T_a=25^\circ\text{C}$)

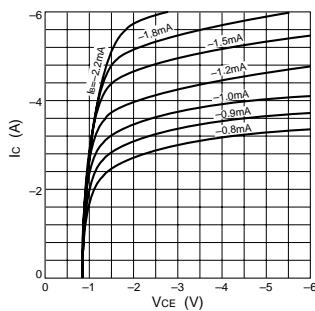
Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	100			V	$I_R=10\mu\text{A}$
V_F			1.2	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=100\text{V}$
t_{rr}		100		ns	$I_F=\pm 100\text{mA}$

Equivalent circuit diagram

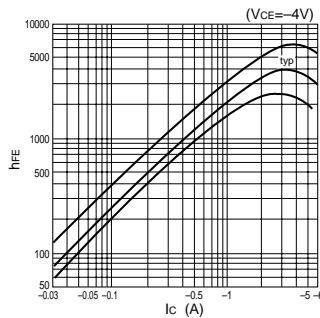


Characteristic curves

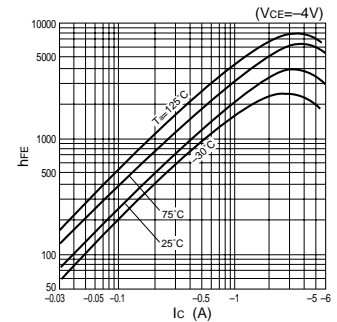
I_c - V_{CE} Characteristics (Typical)



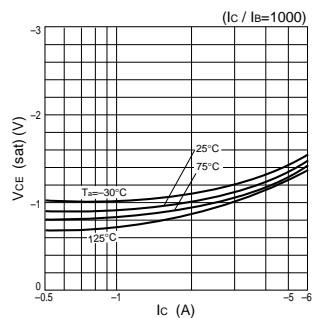
h_{FE} - I_c Characteristics (Typical)



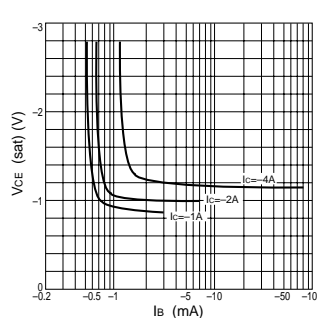
h_{FE} - I_c Temperature Characteristics (Typical)



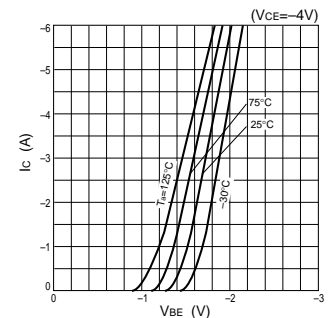
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



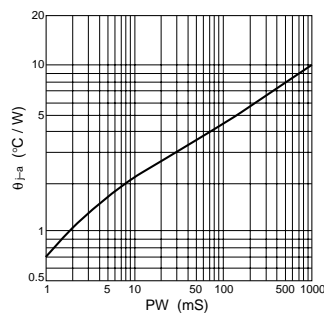
$V_{CE(sat)}$ - I_B Characteristics (Typical)



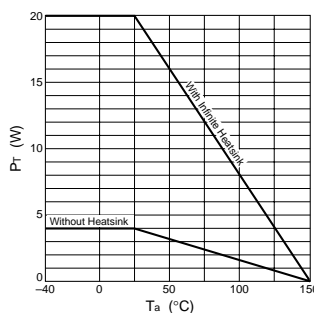
I_c - V_{BE} Temperature Characteristics (Typical)



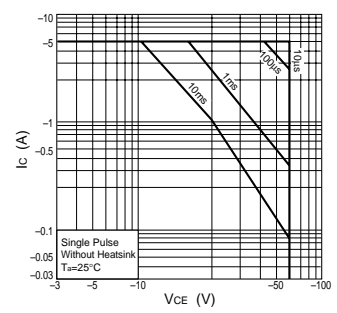
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

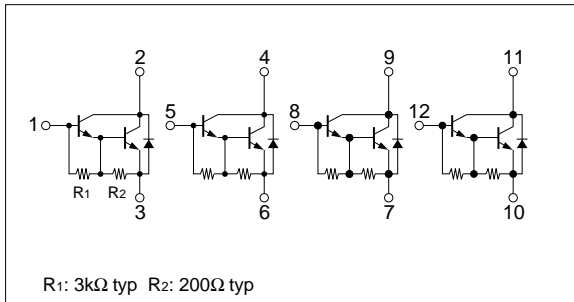
Symbol	Ratings	Unit
V_{CB0}	120	V
V_{CEO}	100	V
V_{EBO}	6	V
I_c	3	A
I_{cP}	5 (PW \leq 1ms, Du \leq 50%)	A
I_B	0.2	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

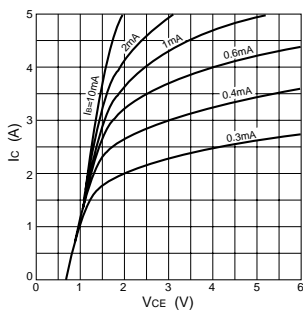
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{cB0}			10	μA	$V_{CB}=120\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$
V_{CEO}	100			V	$I_c=25\text{mA}$
h_{FE}	2000	6000	15000		$V_{CE}=4\text{V}$, $I_c=1.5\text{A}$
$V_{CE(sat)}$		1.1	1.5	V	$I_c=1.5\text{A}$, $I_B=3\text{mA}$
$V_{BE(sat)}$		1.7	2.0	V	
t_{on}		0.5		μs	$V_{CC}\approx 30\text{V}$
t_{stg}		2.2		μs	$I_c=1.5\text{A}$
t_f		0.9		μs	$I_{B1}=-I_{B2}=3\text{mA}$
f_T		40		MHz	$V_{CE}=12\text{V}$, $I_E=-0.5\text{A}$
C_{ob}		30		pF	$V_{CB}=10\text{V}$, $f=1\text{MHz}$

Equivalent circuit diagram

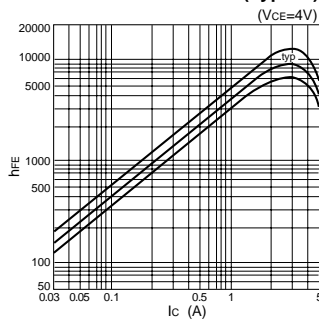


Characteristic curves

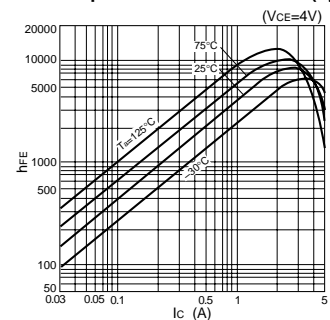
I_c - V_{CE} Characteristics (Typical)



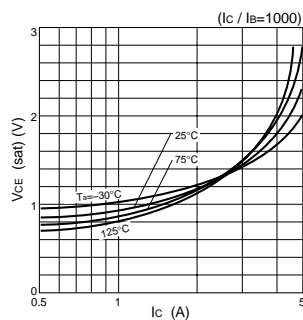
h_{FE} - I_c Characteristics (Typical)



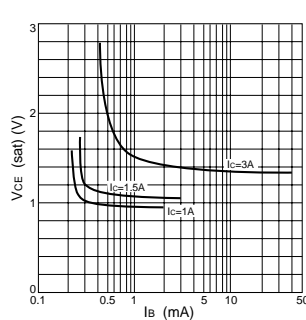
h_{FE} - I_c Temperature Characteristics (Typical)



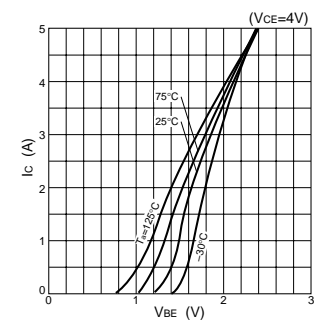
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



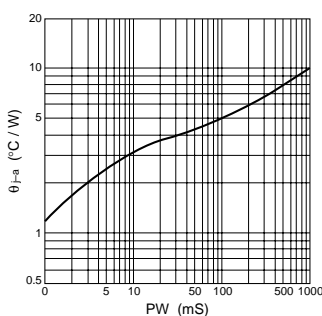
$V_{CE(sat)}$ - I_B Characteristics (Typical)



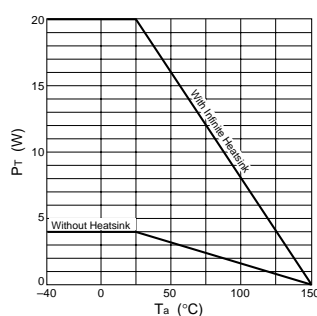
I_c - V_{BE} Temperature Characteristics (Typical)



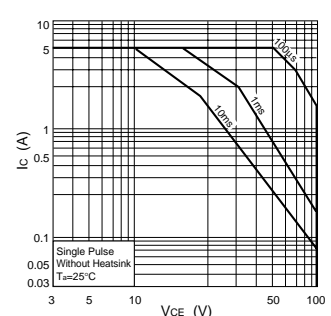
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{CB0}	120	V
V_{CEO}	100	V
V_{EBO}	6	V
I_c	3	A
I_{CP}	5 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	A
I_B	0.2	A
I_F	3 ($PW \leq 0.5\text{ms}$, $D_u \leq 25\%$)	A
I_{FSM}	5 ($PW \leq 10\text{ms}$, Single pulse)	A
V_R	120	V
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

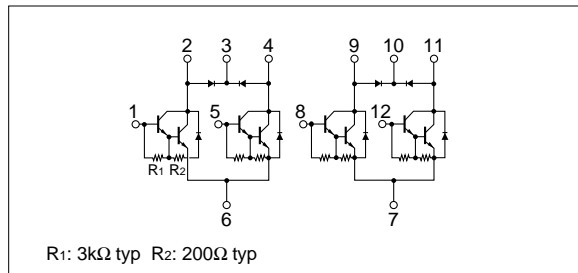
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			10	μA	$V_{CB}=120\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$
V_{CEO}	100			V	$I_c=25\text{mA}$
h_{FE}	2000	6000	15000		$V_{CE}=4\text{V}$, $I_c=1.5\text{A}$
$V_{CE(sat)}$		1.1	1.5	V	$I_c=1.5\text{A}$, $I_B=3\text{mA}$
$V_{BE(sat)}$		1.7	2.0	V	
t_{on}		0.5		μs	$V_{CC} \approx 30\text{V}$, $I_c=1.5\text{A}$, $I_{B1}=-I_{B2}=3\text{mA}$
t_{stg}		2.2		μs	
t_f		0.9		μs	
f_T		40		MHz	$V_{CE}=12\text{V}$, $I_E=-0.5\text{A}$
C_{ob}		30		pF	$V_{CB}=10\text{V}$, $f=1\text{MHz}$

Diode for flyback voltage absorption

($T_a=25^\circ\text{C}$)

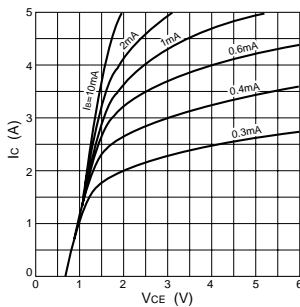
Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	120			V	$I_R=10\mu\text{A}$
V_F			1.6	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=120\text{V}$
t_{rr}		100		ns	$I_F=\pm 100\text{mA}$

Equivalent circuit diagram

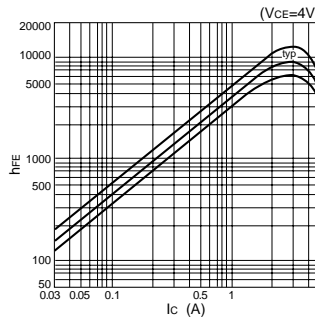


Characteristic curves

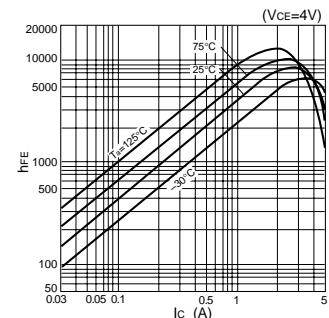
I_c - V_{CE} Characteristics (Typical)



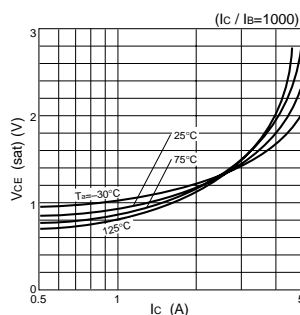
h_{FE} - I_c Characteristics (Typical)



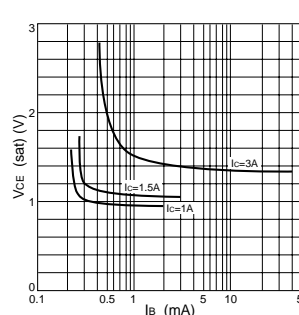
h_{FE} - I_c Temperature Characteristics (Typical)



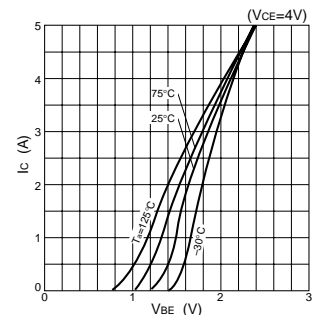
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



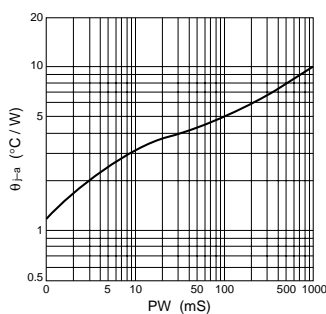
$V_{CE(sat)}$ - I_B Characteristics (Typical)



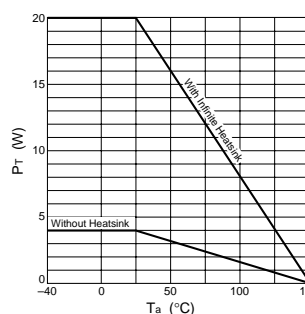
I_c - V_{BE} Temperature Characteristics (Typical)



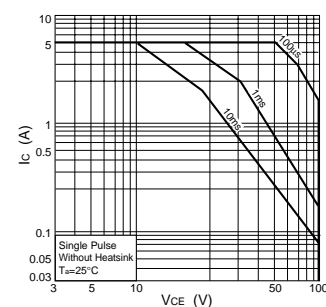
θ_{j-a} - PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{CB0}	120	V
V_{CEO}	100	V
V_{EBO}	6	V
I_C	2	A
I_{CP}	4 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	A
I_B	0.2	A
I_F	2 ($PW \leq 0.5\text{ms}$, $D_u \leq 25\%$)	A
I_{FSM}	4 ($PW \leq 10\text{ms}$, Single pulse)	A
V_R	120	V
P_T	4 ($T_a=25^\circ\text{C}$) 20 ($T_c=25^\circ\text{C}$)	W
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

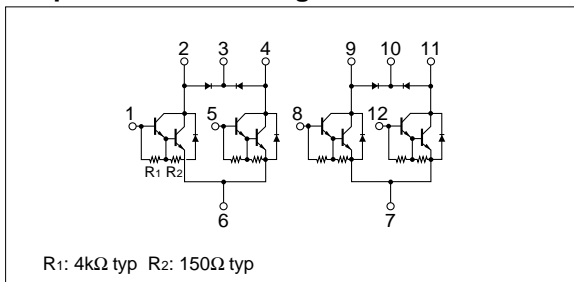
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			10	μA	$V_{CB}=120\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$
V_{CEO}	100			V	$I_C=25\text{mA}$
h_{FE}	2000	6000	15000		$V_{CE}=4\text{V}$, $I_C=1\text{A}$
$V_{CE(sat)}$		1.1	1.5	V	$I_C=1\text{A}$, $I_B=2\text{mA}$
$V_{BE(sat)}$		1.7	2.0	V	

Diode for flyback voltage absorption

($T_a=25^\circ\text{C}$)

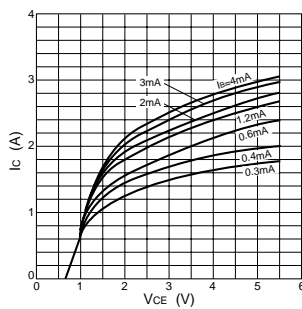
Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	120			V	$I_R=10\mu\text{A}$
V_F			1.8	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=120\text{V}$
t_{rr}		100		ns	$I_F=\pm 100\text{mA}$

Equivalent circuit diagram

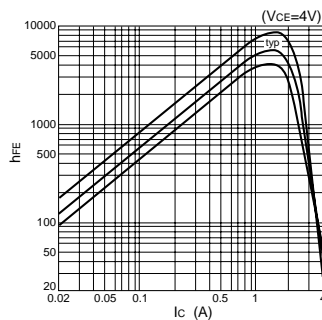


Characteristic curves

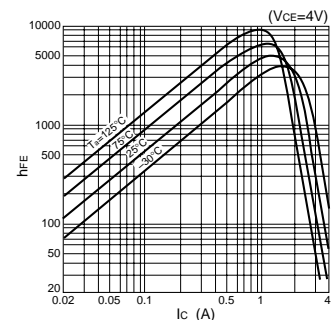
I_C - V_{CE} Characteristics (Typical)



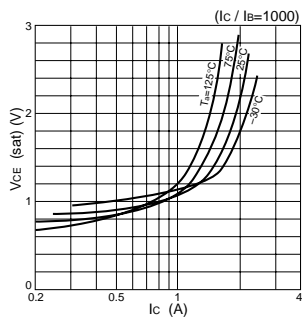
h_{FE} - I_C Characteristics (Typical)



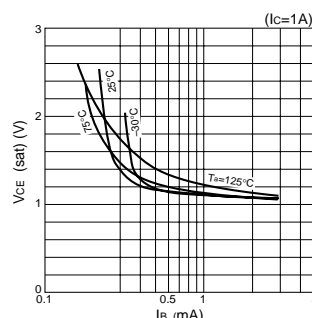
h_{FE} - I_C Temperature Characteristics (Typical)



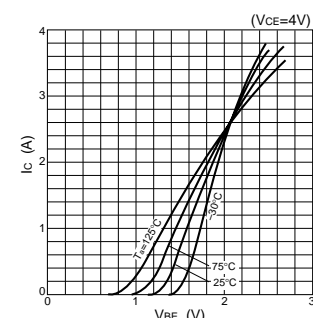
$V_{CE(sat)}$ - I_C Temperature Characteristics (Typical)



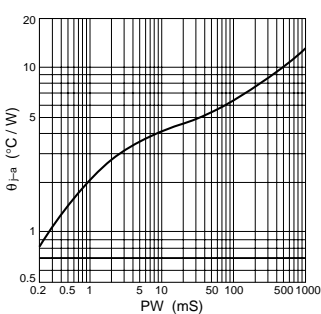
$V_{CE(sat)}$ - I_B Characteristics (Typical)



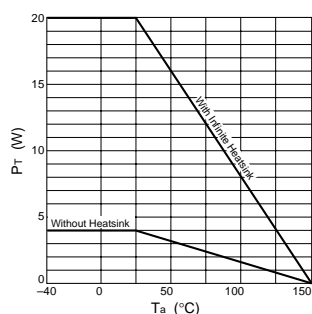
I_C - V_{BE} Temperature Characteristics (Typical)



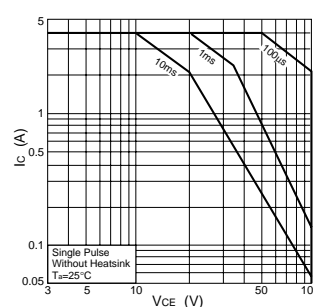
θ_{j-a} - PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

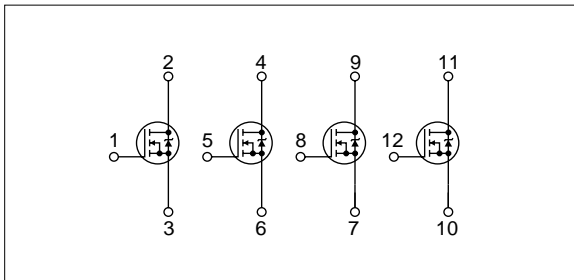
Symbol	Ratings	Unit
V_{DSS}	100	V
V_{GSS}	± 20	V
I_D	± 4	A
$I_D(\text{pulse})$	± 8 ($PW \leq 1\text{ms}$)	A
E_{AS}^*	16	mJ
P_T	4 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	28 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	31.2 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	4.46 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

* : $V_{DD}=20\text{V}$, $L=1\text{mH}$, $I_D=5\text{A}$, unclamped, see Fig. E on page 15.

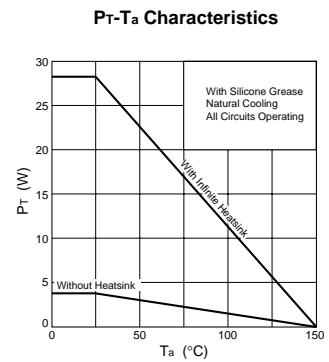
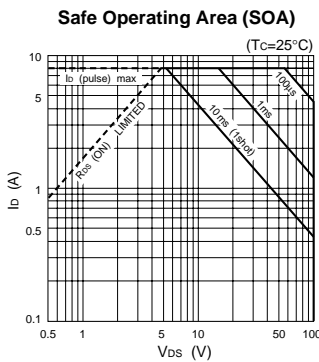
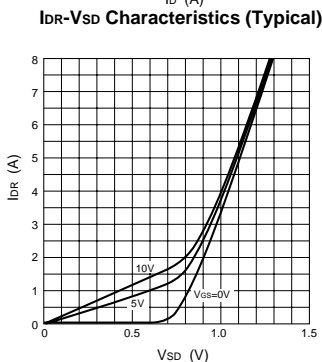
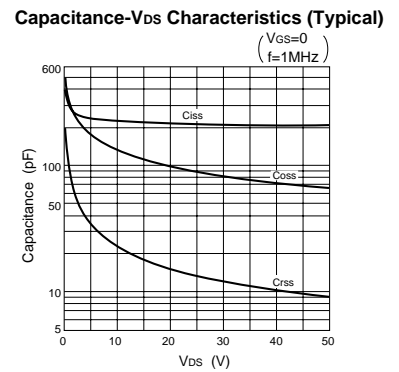
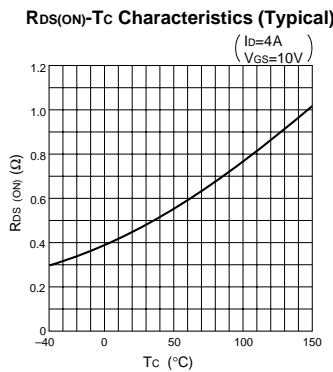
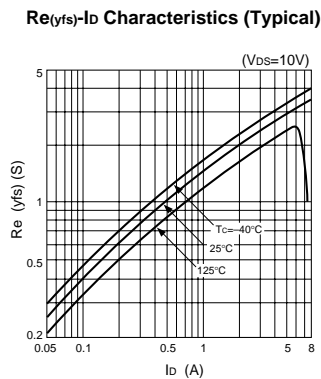
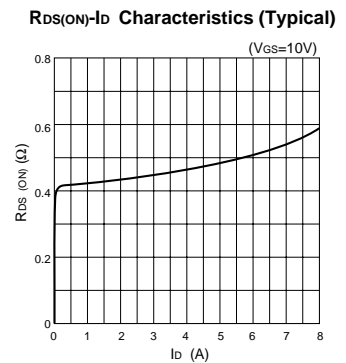
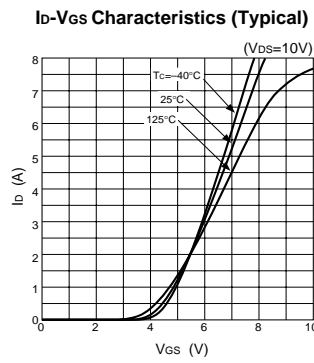
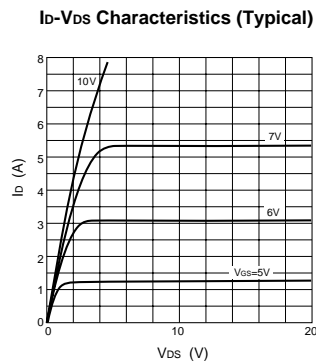
($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			250	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	1.1	1.7		S	$V_{DS}=10\text{V}$, $I_D=4\text{A}$
$R_{DS(ON)}$		0.50	0.60	Ω	$V_{GS}=10\text{V}$, $I_D=4\text{A}$
C_{iss}		180		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		82		pF	
t_{on}		40		ns	$I_D=4\text{A}$, $V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.
t_{off}		40		ns	
V_{SD}		1.2	2.0	V	$I_{SD}=4\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		250		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram



Characteristic curves



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Uni
V_{DSS}	100	V
V_{GSS}	± 20	V
I_D	± 4	A
$I_{D(\text{pulse})}$	± 8 (PW $\leq 1\text{ms}$)	A
E_{AS}^*	16	mJ
I_F	4 (PW $\leq 0.5\text{ms}$, Du $\leq 25\%$)	A
I_{FSM}	8 (PW $\leq 10\text{ms}$, Single pulse)	A
V_R	120	V
P_T	4 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	28 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	31.2 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	4.46 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

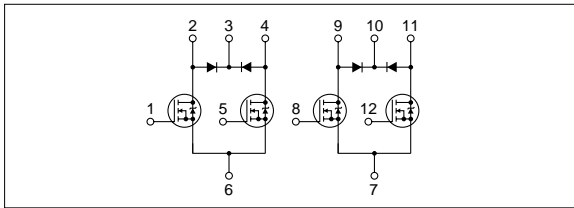
($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{DS}=\pm 20\text{V}$
I_{DSS}			250	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	1.1	1.7		S	$V_{DS}=10\text{V}$, $I_D=4\text{A}$
$R_{DS(ON)}$		0.50	0.60	Ω	$V_{GS}=10\text{V}$, $I_D=4\text{A}$
C_{iss}		180		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		82		pF	
t_{on}		40		ns	$I_D=4\text{A}$, $V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.
t_{off}		40		ns	
V_{SD}		1.2	2.0	V	$I_{SD}=4\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		250		ns	$I_{SD}=\pm 100\text{mA}$

● Diode for flyback voltage absorption

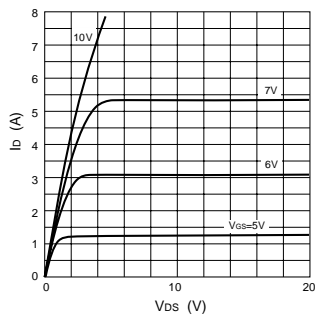
Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	120			V	$I_R=10\mu\text{A}$
V_F		1.0	1.2	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=120\text{V}$
t_{rr}		100		ns	$I_F=\pm 100\text{mA}$

* : $V_{DD}=20\text{V}$, $L=1\text{mH}$, $I_D=5\text{A}$, unclamped, see Fig. E on page 15.

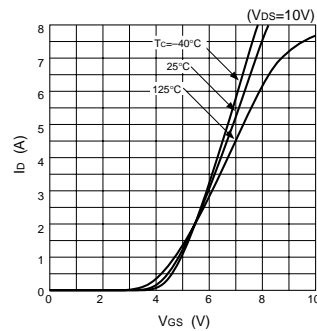


Characteristic curves

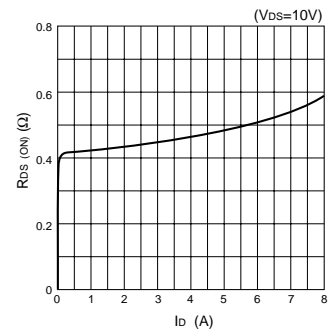
I_D - V_{DS} Characteristics (Typical)



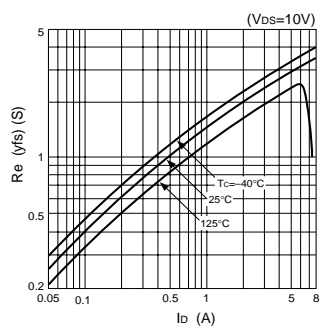
I_D - V_{GS} Characteristics (Typical)



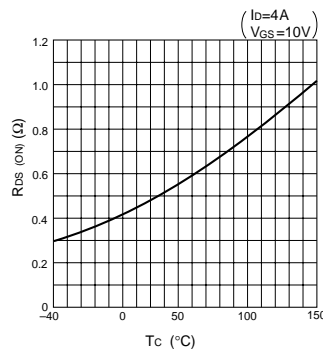
$R_{DS(ON)}$ - I_D Characteristics (Typical)



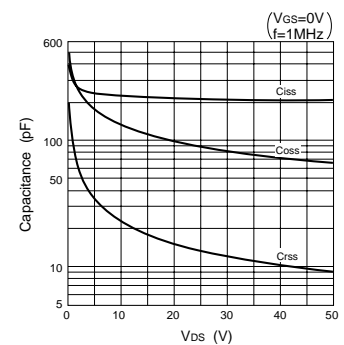
$R_{e(yfs)}$ - I_D Characteristics (Typical)



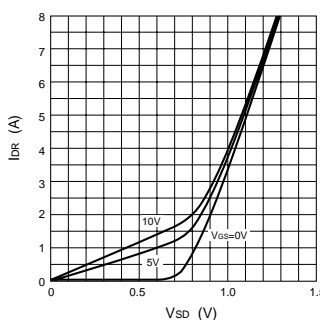
$R_{DS(ON)}$ - T_C Characteristics (Typical)



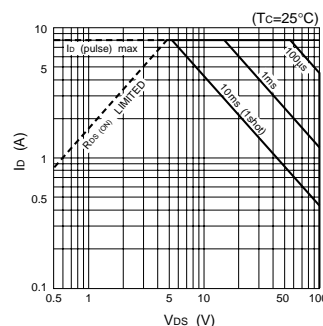
Capacitance- V_{DS} Characteristics (Typical)



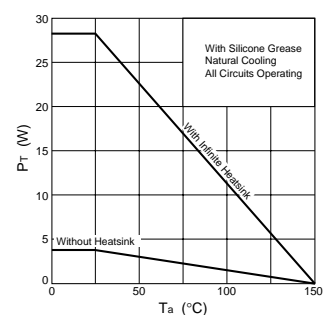
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



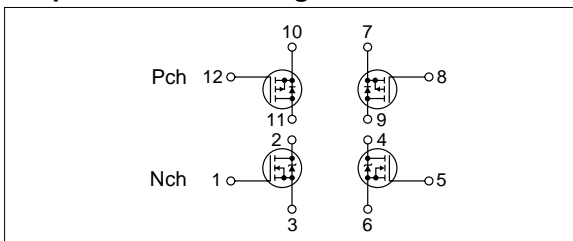
Absolute maximum ratings

(Ta=25°C)

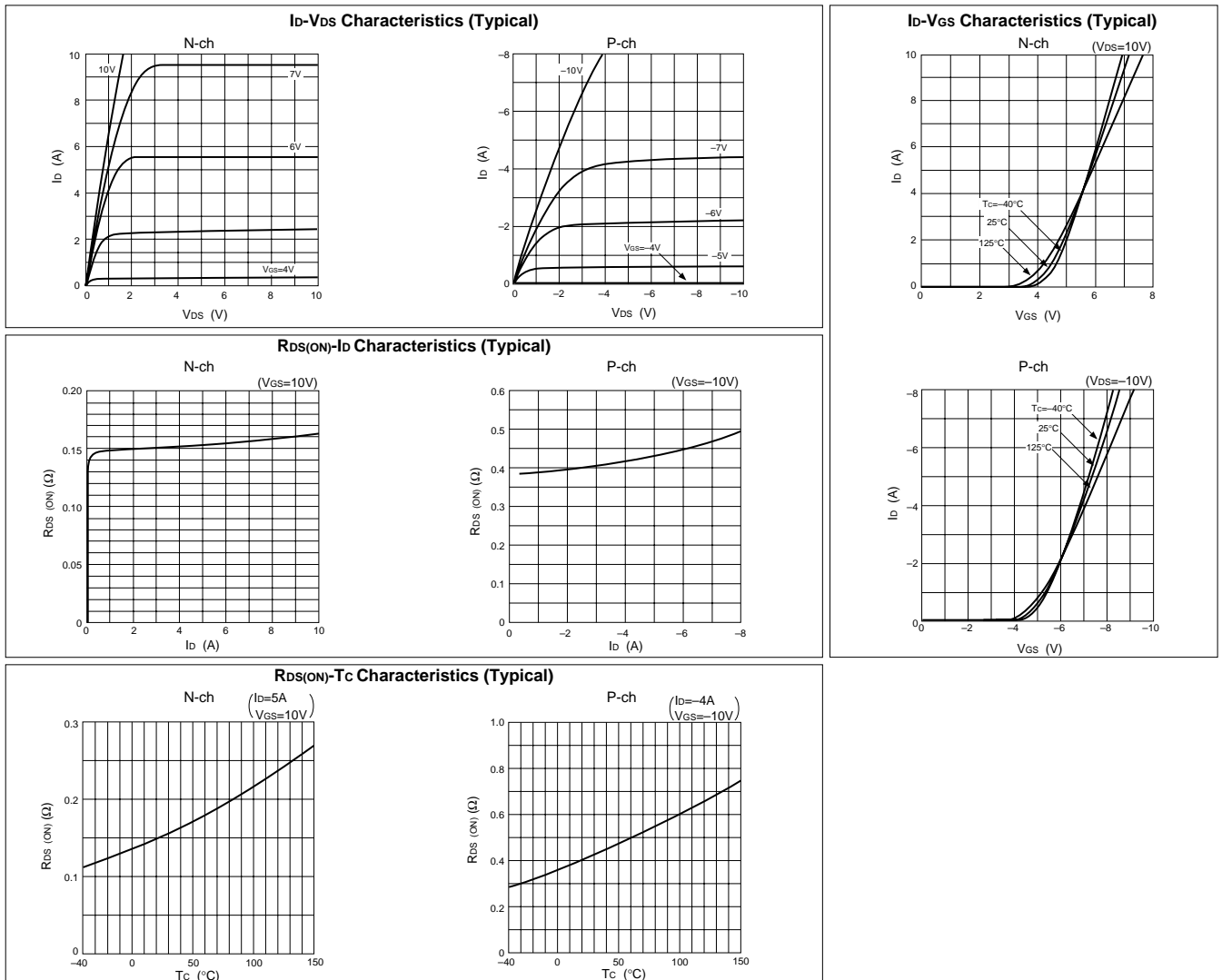
Symbol	Ratings		Unit
	N channel	P channel	
V _{DSS}	60	-60	V
V _{GSS}	±20	∓20	V
I _D	±5	∓4	A
I _{D(pulse)}	±10 (PW≤1ms)	∓8 (PW≤1ms)	A
E _{AS} *	2	—	mJ
P _T	4 (Ta=25°C, with all circuits operating, without heatsink)		W
	28 (Tc=25°C, with all circuits operating, with infinite heatsink)		W
θ _{j-a}	31.2 (Junction-Air, Ta=25°C, with all circuits operating)		°C/W
θ _{j-c}	4.46 (Junction-Case, Tc=25°C, with all circuits operating)		°C/W
T _{ch}	150		°C
T _{stg}	-40 to +150		°C

* : V_{DD}=20V, L=1mH, I_D=2A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

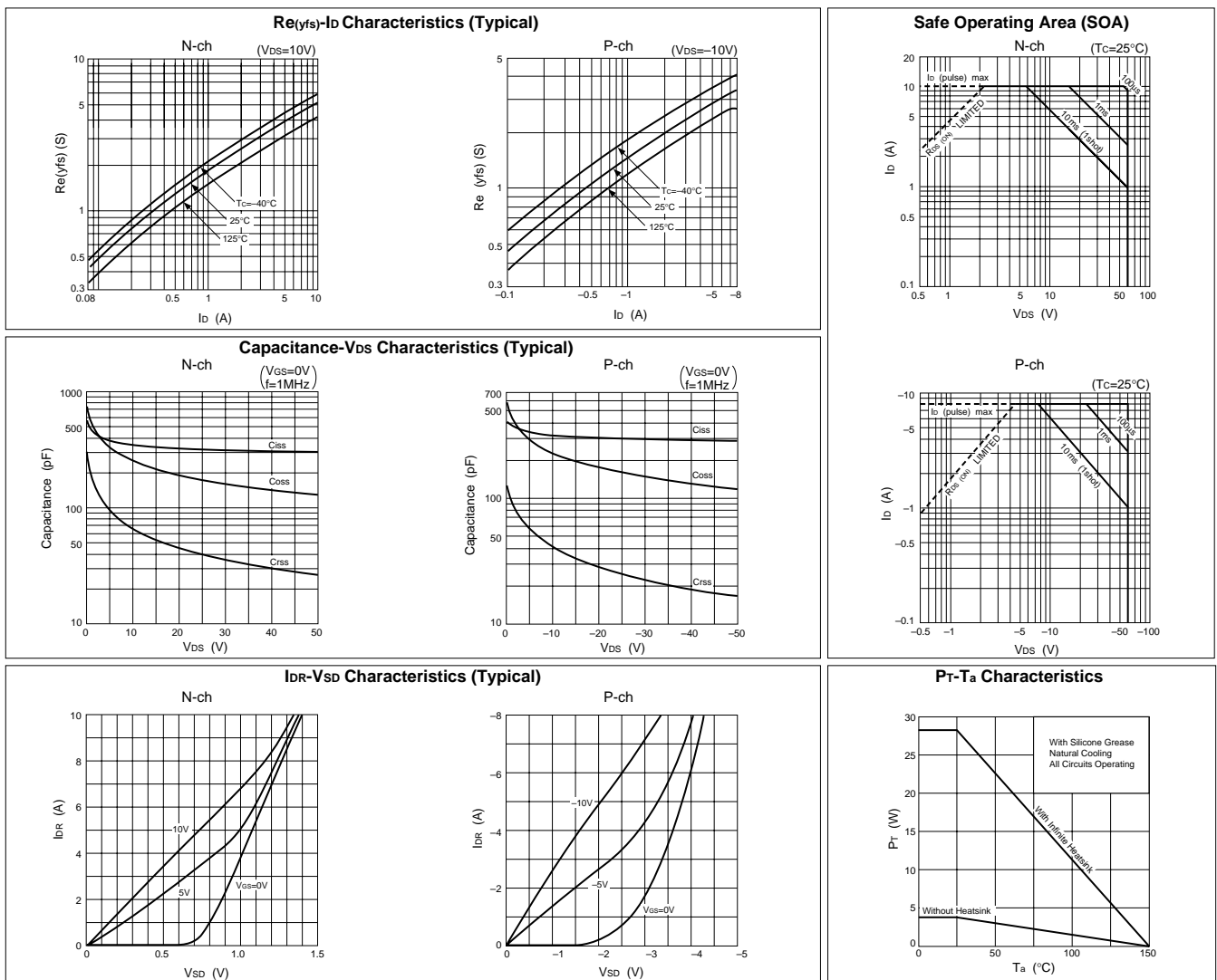


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	-60			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20\text{V}$			∓ 500	nA	$V_{GS}=\mp 20\text{V}$
I_{DSS}			250	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$			-250	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$Re_{(yfs)}$	2.2	3.3		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$	1.6	2.2		S	$V_{DS}=-10\text{V}$, $I_D=-4\text{A}$
$R_{DS(ON)}$		0.17	0.22	Ω	$V_{GS}=10\text{V}$, $I_D=5\text{A}$		0.38	0.55	Ω	$V_{GS}=-10\text{V}$, $I_D=-4\text{A}$
C_{iss}		300		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$		270		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		160		pF			170		pF	
t_{on}		35		ns	$I_D=5\text{A}$, $V_{DD}=30\text{V}$, $V_{GS}=10\text{V}$,		60		ns	$I_D=-4\text{A}$, $V_{DD}=-30\text{V}$, $V_{GS}=-10\text{V}$,
t_{off}		35		ns	see Fig. 3 on page 16.		60		ns	see Fig. 4 on page 16.
V_{SD}		1.1	1.5	V	$I_{SD}=5\text{A}$, $V_{GS}=0\text{V}$		-4.4	-5.5	V	$I_{SD}=-4\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		140		ns	$I_{SD}=\pm 100\text{mA}$		150		ns	$I_{SD}=\mp 100\text{mA}$

Characteristic curves



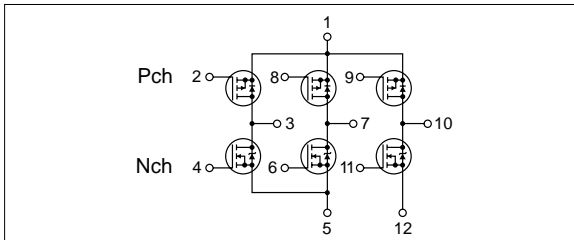
Absolute maximum ratings

(Ta=25°C)

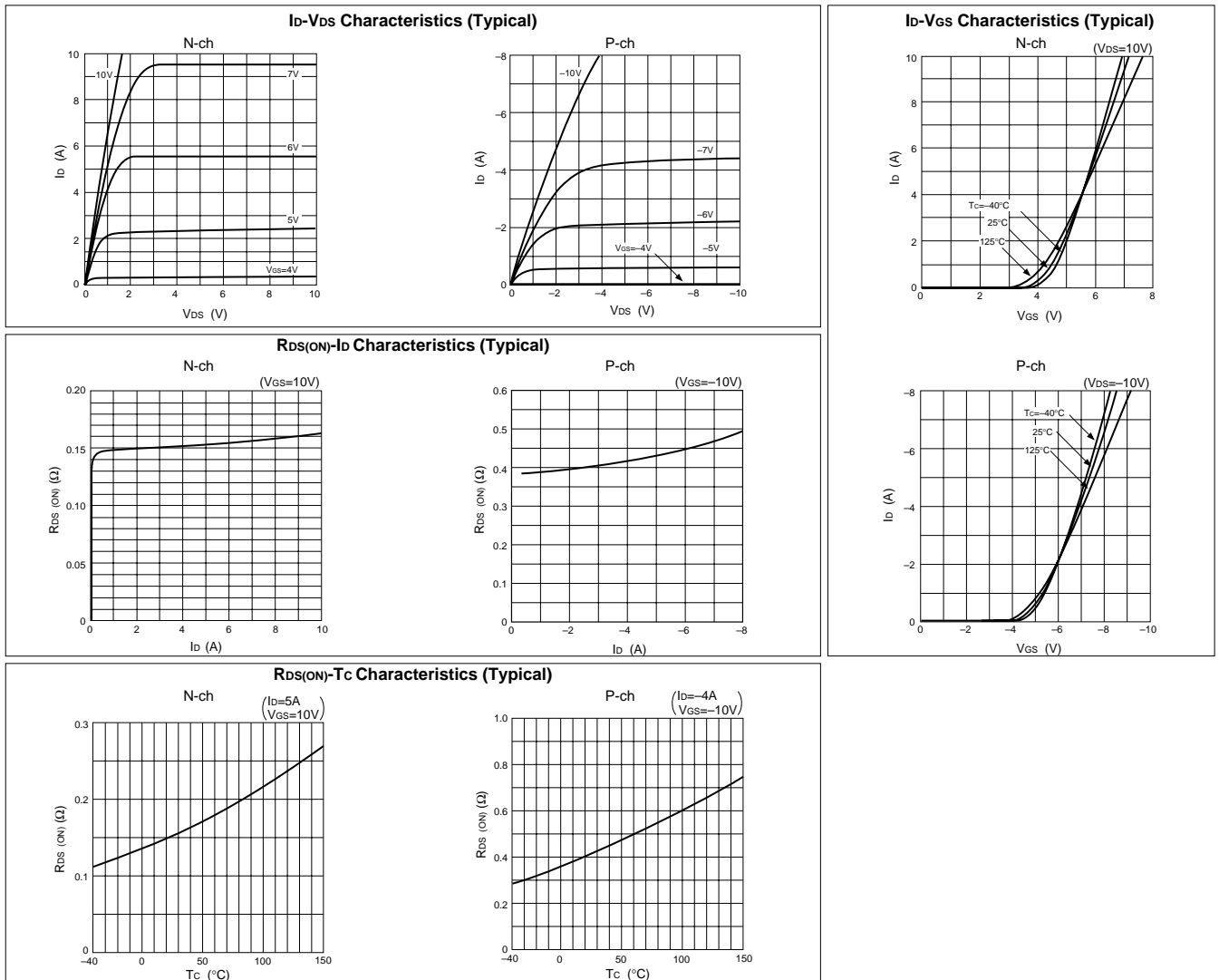
Symbol	Ratings		Unit
	N channel	P channel	
V _{DSS}	60	-60	V
V _{GSS}	±20	∓20	V
I _D	±5	∓4	A
I _{D(pulse)}	±10 (PW≤1ms)	∓8 (PW≤1ms)	A
E _{AS} *	2	—	mJ
P _T	4 (Ta=25°C, with all circuits operating, without heatsink)		W
	28 (Tc=25°C, with all circuits operating, with infinite heatsink)		W
θ _{j-a}	31.2 (Junction-Air, Ta=25°C, with all circuits operating)		°C/W
θ _{j-c}	4.46 (Junction-Case, Tc=25°C, with all circuits operating)		°C/W
T _{ch}	150		°C
T _{stg}	-40 to +150		°C

* : V_{DD}=20V, L=1mH, I_b=2A, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Characteristic curves

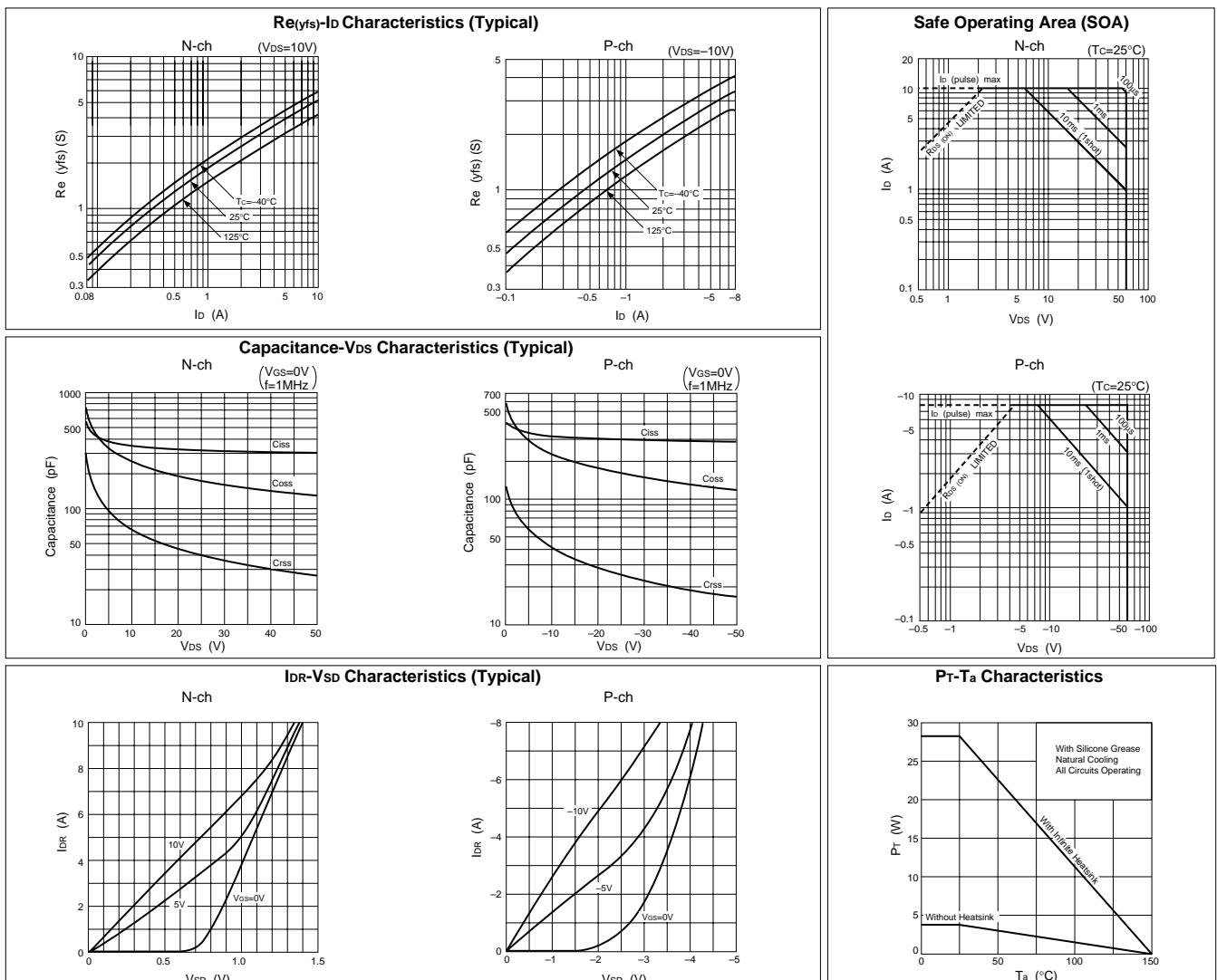


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	-60			V	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 20\text{V}$			∓ 500	nA	$V_{GS}=\mp 20\text{V}$
I_{DSS}			250	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$			-250	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	-2.0		-4.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$Re_{(yfs)}$	2.2	3.3		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$	1.6	2.2		S	$V_{DS}=-10\text{V}$, $I_D=-4\text{A}$
$R_{DS(ON)}$		0.17	0.22	Ω	$V_{GS}=10\text{V}$, $I_D=5\text{A}$		0.38	0.55	Ω	$V_{GS}=-10\text{V}$, $I_D=-4\text{A}$
C_{iss}		300		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$		270		pF	$V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		160		pF			170		pF	
t_{on}		35		ns	$I_D=5\text{A}$, $V_{DD}\div 30\text{V}$, $V_{GS}=10\text{V}$,		60		ns	$I_D=-4\text{A}$, $V_{DD}\div -30\text{V}$, $V_{GS}=-10\text{V}$,
t_{off}		35		ns	see Fig. 3 on page 16.		60		ns	see Fig. 4 on page 16.
V_{SD}		1.1	1.5	V	$I_{SD}=5\text{A}$, $V_{GS}=0\text{V}$		-4.4	-5.5	V	$I_{SD}=-4\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		140		ns	$I_{SD}=\pm 100\text{mA}$		150		ns	$I_{SD}=\mp 100\text{mA}$

Characteristic curves



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	100	V
V_{GSS}	± 10	V
I_D	± 5	A
$I_{D(pulse)}$	± 10 ($PW \leq 1\text{ms}$)	A
E_{AS}^*	32	mJ
I_F	5 ($PW \leq 0.5\text{ms}$, $D_{us} \leq 25\%$)	A
I_{FSM}	10 ($PW \leq 10\text{ms}$, Single pulse)	A
V_R	120	V
P_T	4 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	28 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	31.2 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	4.46 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

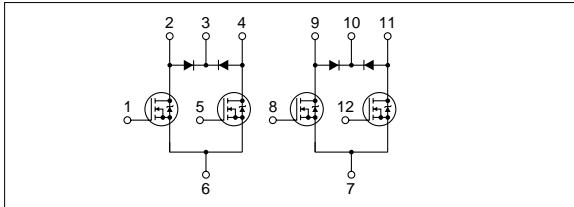
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 10\text{V}$
I_{DSS}			250	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	3.1	4.5		S	$V_{DS}=10\text{V}$, $I_D=5\text{A}$
$R_{DS(ON)}$		0.27	0.30	Ω	$V_{GS}=10\text{V}$, $I_D=2.5\text{A}$
		0.38	0.41	Ω	$V_{GS}=4\text{V}$, $I_D=2.5\text{A}$
C_{iss}		470		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		130		pF	
t_{on}		70		ns	$I_D=5\text{A}$, $V_{DD}=50\text{V}$, $V_{GS}=5\text{V}$, see Fig. 3 on page 16.
t_{off}		50		ns	
V_{SD}		1.2	2.0	V	$I_{SD}=5\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		330		ns	$I_{SD}=\pm 100\text{mA}$

Diode for flyback voltage absorption (1 circuit)

Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	120			V	$I_R=10\mu\text{A}$
V_F		1.0	1.2	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=120\text{V}$
t_{rr}		100		ns	$I_F=\pm 100\text{mA}$

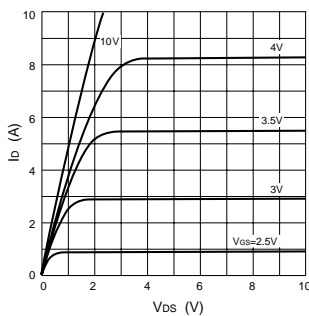
*: $V_{DD}=20\text{V}$, $L=2\text{mH}$, $I_D=5\text{A}$, unclamped, see Fig. E on page 15.

Equivalent circuit diagram

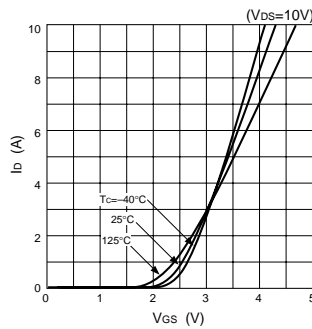


Characteristic curves

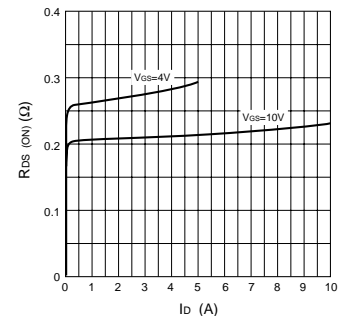
I_D - V_{DS} Characteristics (Typical)



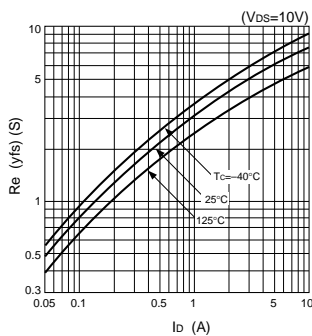
I_D - V_{GS} Characteristics (Typical)



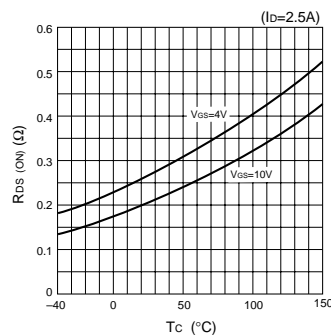
$R_{DS(ON)}$ - I_D Characteristics (Typical)



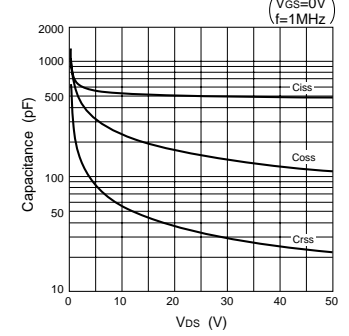
$R_{e(yfs)}$ - I_D Characteristics (Typical)



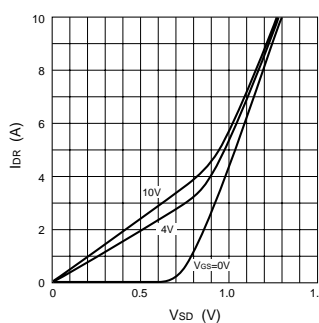
$R_{DS(ON)}$ - T_C Characteristics (Typical)



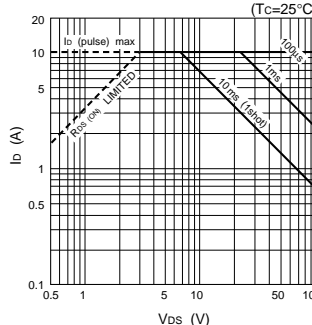
Capacitance- V_{DS} Characteristics (Typical)



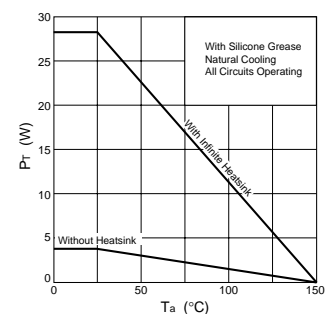
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



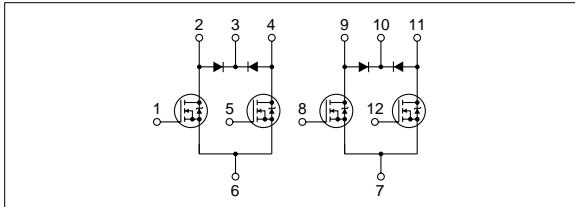
Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	100	V
V_{GSS}	± 10	V
I_D	± 4	A
$I_D(\text{pulse})$	± 8 ($PW \leq 1\text{ms}$)	A
E_{AS}^*	16	mJ
I_F	4 ($PW \leq 0.5\text{ms}$, $D \leq 25\%$)	A
I_{FSM}	8 ($PW \leq 10\text{ms}$, Single pulse)	A
V_R	120	V
P_T	4 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	28 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	31.2 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
θ_{j-c}	4.46 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

* : $V_{DD}=20\text{V}$, $L=1\text{mH}$, $I_b=5\text{A}$, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Electrical characteristics

($T_a=25^\circ\text{C}$)

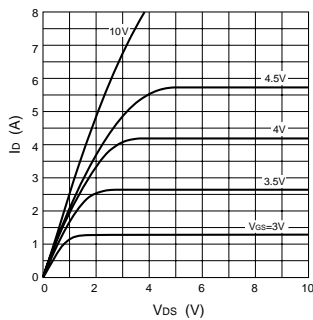
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 10\text{V}$
I_{DSS}			250	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	1.1	1.7		S	$V_{DS}=10\text{V}$, $I_D=4\text{A}$
$R_{DS(ON)}$		0.47	0.55	Ω	$V_{GS}=10\text{V}$, $I_D=2\text{A}$
		0.60	0.78	Ω	$V_{GS}=4\text{V}$, $I_D=2\text{A}$
C_{iss}		230		pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		60		pF	$V_{GS}=0\text{V}$
t_{on}		60		ns	$I_D=4\text{A}$, $V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.
t_{off}		50		ns	
V_{SD}		1.2	2.0	V	$I_{SD}=4\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		250		ns	$I_{SD}=\pm 100\text{mA}$

Diode for flyback voltage absorption

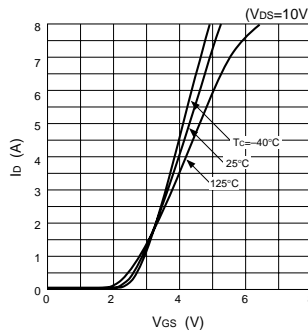
Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	120			V	$I_R=10\mu\text{A}$
V_F		1.0	1.2	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=120\text{V}$
t_{rr}		100		ns	$I_F=\pm 100\text{mA}$

Characteristic curves

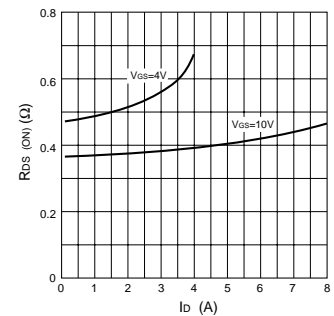
I_D - V_{DS} Characteristics (Typical)



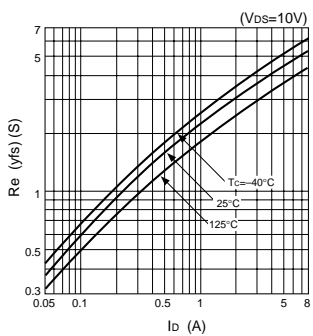
I_D - V_{GS} Characteristics (Typical)



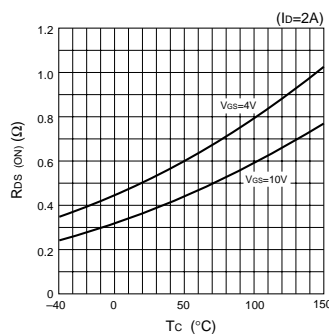
$R_{DS(ON)}$ - I_D Characteristics (Typical)



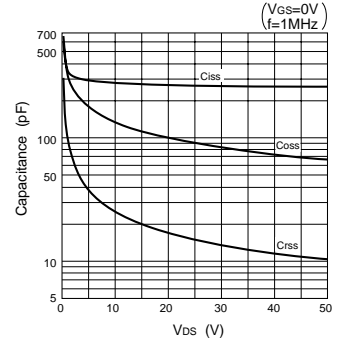
$R_{e(yfs)}$ - I_D Characteristics (Typical)



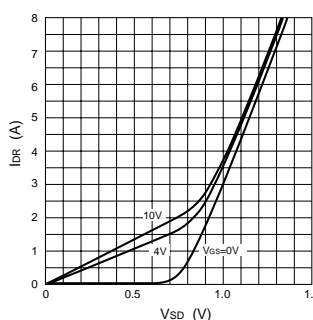
$R_{DS(ON)}$ - T_C Characteristics (Typical)



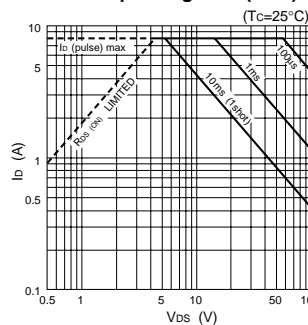
Capacitance- V_{DS} Characteristics (Typical)



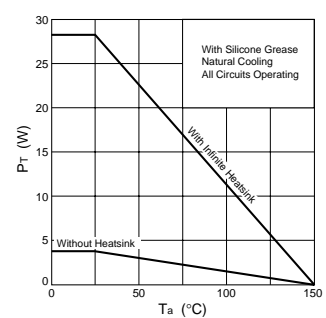
I_{BR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	250	V
V_{GSS}	± 20	V
I_D	± 7	A
$I_D(\text{pulse})$	± 15 ($PW \leq 1\text{ms}$, $D_u \leq 1\%$)	A
E_{AS}^*	55	mJ
P_T	4 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	31.2 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

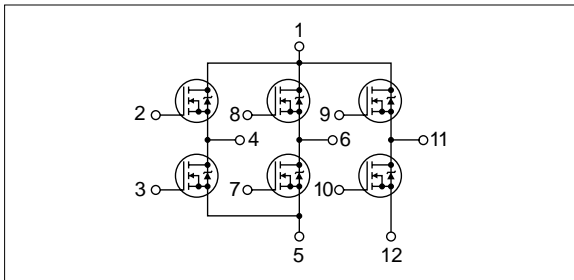
* : $V_{DD}=25\text{V}$, $L=2.0\text{mH}$, $I_D=7\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

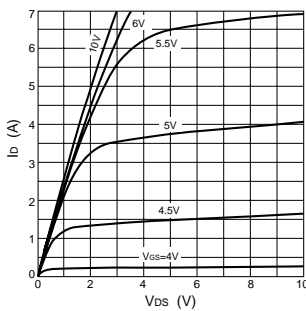
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	250			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=250\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=1\text{mA}$
$R_{e(yfs)}$	2.5	5.0		S	$V_{DS}=10\text{V}$, $I_D=3.5\text{A}$
$R_{DS(ON)}$		0.4	0.5	Ω	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$
C_{iss}		450		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		280		pF	$I_D=3.5\text{A}$, $V_{DD} \div 100\text{V}$, $R_L=28.6\Omega$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.
$t_{d(on)}$		20		ns	
t_r		30		ns	
$t_{d(off)}$		55		ns	
t_f		75		ns	
V_{SD}		1.0	1.5	V	$I_{SD}=7\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		600		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

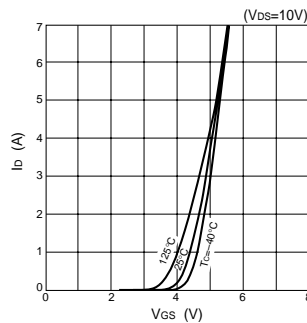


Characteristic curves

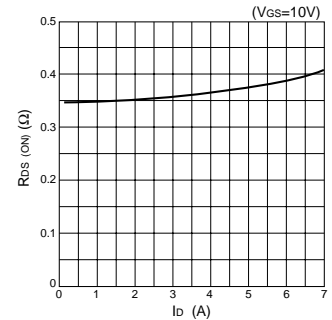
I_D - V_{DS} Characteristics (Typical)



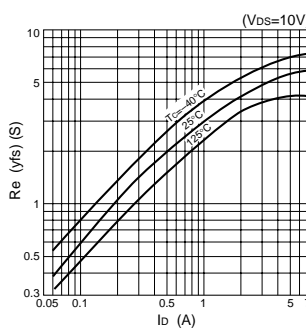
I_D - V_{GS} Characteristics (Typical)



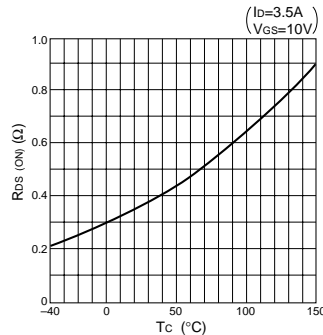
$R_{DS(ON)}$ - I_D Characteristics (Typical)



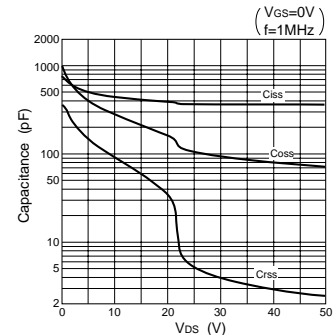
$R_{e(yfs)}$ - I_D Characteristics (Typical)



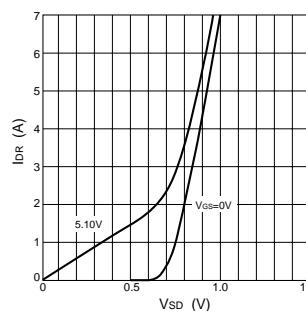
$R_{DS(ON)}$ - T_C Characteristics (Typical)



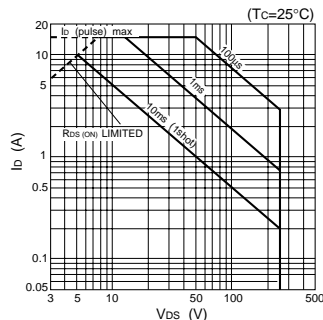
Capacitance- V_{DS} Characteristics (Typical)



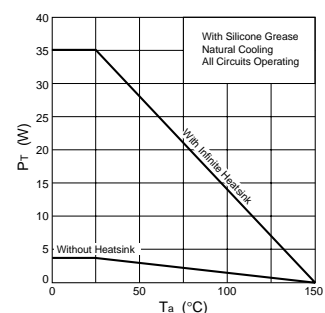
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



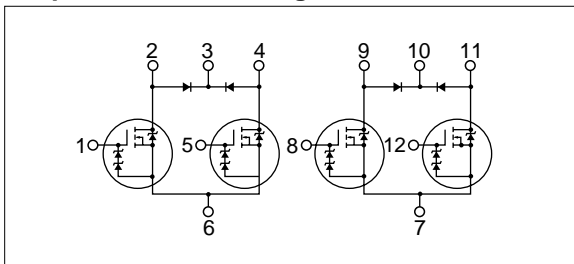
Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	60	V
V_{GSS}	± 20	V
I_D	± 3	A
$I_D(\text{pulse})$	± 6 ($PW \leq 1\text{ms}$, $D_u \leq 1\%$)	A
E_{AS}^*	6.8	mJ
I_{AS}	3	A
P_T	4 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	28 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	31.2 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
θ_{j-c}	4.46 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C/W}$
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

* : $V_{DD}=20\text{V}$, $L=1\text{mH}$, $I_L=3\text{A}$, unclamped, see Fig. E on page 15.

Equivalent circuit diagram



Electrical characteristics

($T_a=25^\circ\text{C}$)

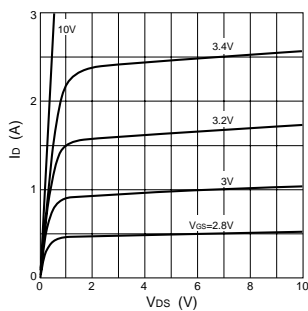
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 10	μA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.5	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	1.0	2.3		S	$V_{DS}=10\text{V}$, $I_D=1.0\text{A}$
$R_{DS(ON)}$		0.20	0.25	Ω	$V_{GS}=10\text{V}$, $I_D=1.0\text{A}$
		0.25	0.30	Ω	$V_{GS}=4\text{V}$, $I_D=1.0\text{A}$
C_{iss}		170		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$,
C_{oss}		130		pF	$V_{GS}=0\text{V}$
C_{rss}		20		pF	$I_D=1\text{A}$, $V_{DD}=30\text{V}$,
$t_{d(on)}$		80		ns	$R_L=30\Omega$, $V_{GS}=5\text{V}$,
t_r		170		ns	see Fig. 3 on page 16.
$t_{d(off)}$		330		ns	
t_f		150		ns	
V_{SD}		1.0	1.5	V	$I_{SD}=3\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		80		ns	$I_{SD}=\pm 100\text{mA}$

Diode for flyback voltage absorption

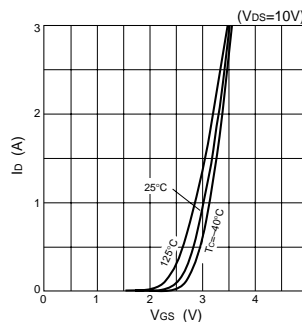
Symbol	Specification			Unit	Conditions
	min	typ	max		
V_R	120			V	$I_R=10\mu\text{A}$
V_F		1.0	1.2	V	$I_F=1\text{A}$
I_R			10	μA	$V_R=120\text{V}$
t_{rr}		100		ns	$I_F=\pm 100\text{mA}$

Characteristic curves

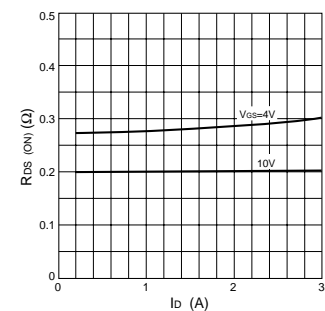
I_D - V_{DS} Characteristics (Typical)



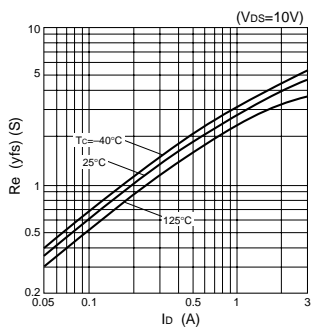
I_D - V_{GS} Characteristics (Typical)



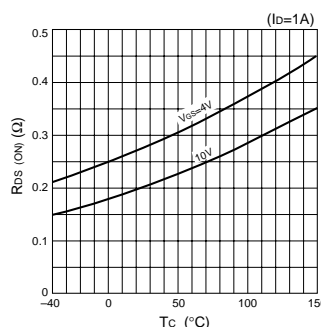
$R_{DS(ON)}$ - I_D Characteristics (Typical)



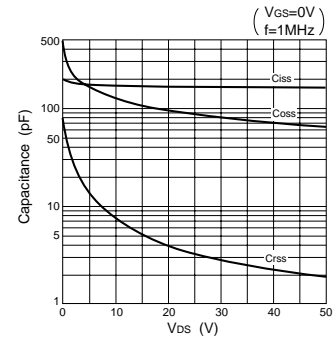
$R_{e(yfs)}$ - I_D Characteristics (Typical)



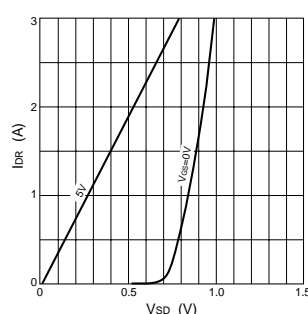
$R_{DS(ON)}$ - T_c Characteristics (Typical)



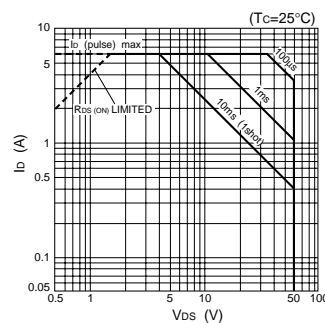
Capacitance- V_{DS} Characteristics (Typical)



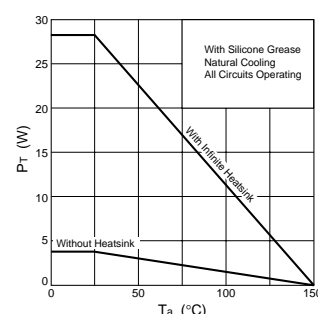
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	250	V
V_{GSS}	± 20	V
I_D	± 7	A
$I_D(\text{pulse})$	± 15 ($PW \leq 1\text{ms}$, $D_u \leq 1\%$)	A
E_{AS}^*	120	mJ
P_T	4 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	31.2 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

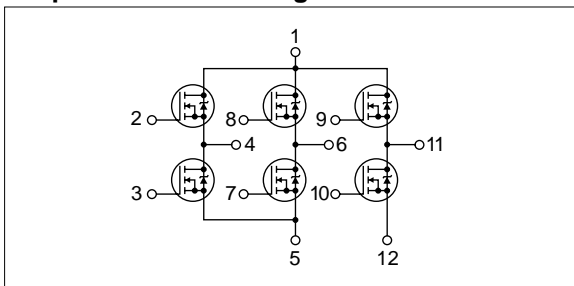
* : $V_{DD}=25\text{V}$, $L=4.4\text{mH}$, $I_D=7\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

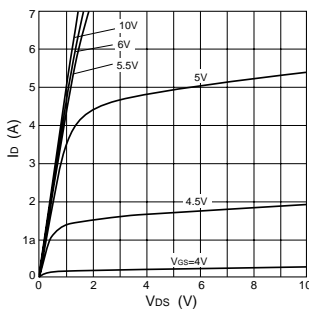
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	250			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=250\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=1\text{mA}$
$R_{e(yfs)}$	4.5	6.5		S	$V_{DS}=10\text{V}$, $I_D=3.5\text{A}$
$R_{DS(ON)}$		0.2	0.25	Ω	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$
C_{iss}		850		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		550		pF	
C_{rss}		250		pF	
$td(\text{on})$		20		ns	$I_D=3.5\text{A}$, $V_{DD} \div 100\text{V}$, $R_L=28.6\Omega$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.
tr		25		ns	
$td(\text{off})$		90		ns	
tf		70		ns	
V_{SD}	1.1	1.5		V	
t_{rr}		85		ns	$I_{SD}=3.5\text{A}$, $V_{GS}=0\text{V}$, $di/dt=100\text{A}/\mu\text{s}$

Equivalent circuit diagram

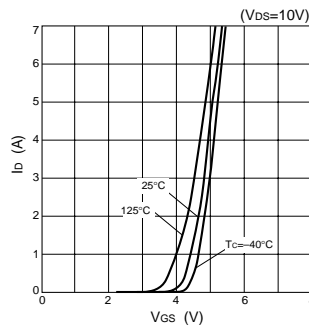


Characteristic curves

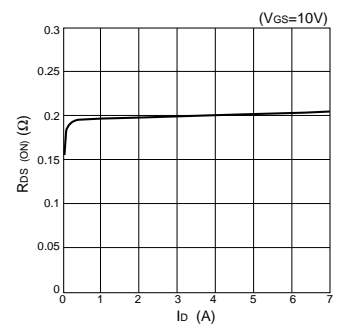
I_D - V_{DS} Characteristics (Typical)



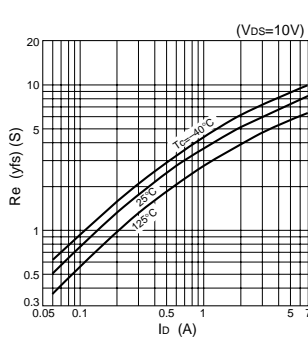
I_D - V_{GS} Characteristics (Typical)



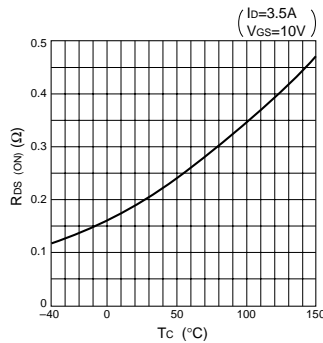
$R_{DS(ON)}$ - I_D Characteristics (Typical)



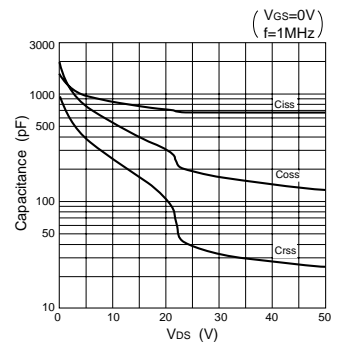
$R_{e(yfs)}$ - I_D Characteristics (Typical)



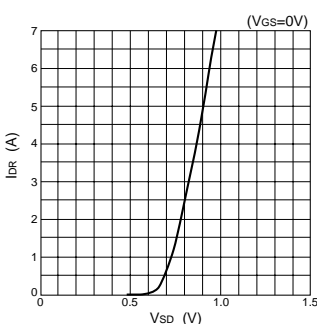
$R_{DS(ON)}$ - T_C Characteristics (Typical)



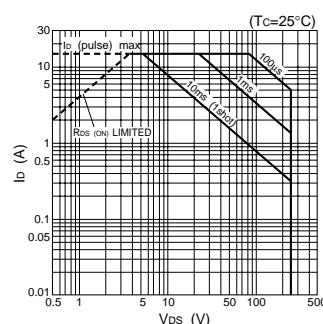
Capacitance- V_{DS} Characteristics (Typical)



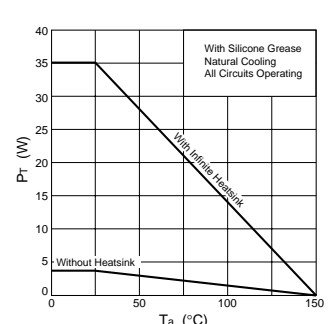
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	500	V
V_{GSS}	± 30	V
I_D	± 5	A
$I_D(\text{pulse})$	± 10 ($PW \leq 1\text{ms}$, $D_u \leq 1\%$)	A
E_{AS}^*	45	mJ
P_T	4 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)	W
	35 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)	W
θ_{j-a}	31.2 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
θ_{j-c}	3.57 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)	$^\circ\text{C}/\text{W}$
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

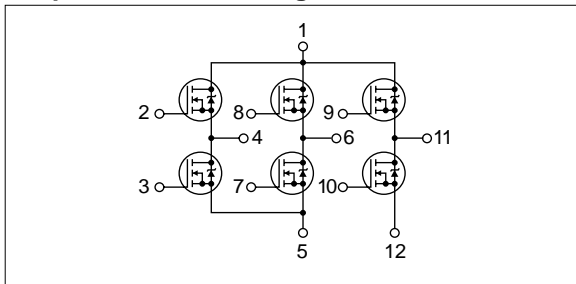
* : $V_{DD}=30\text{V}$, $L=3.4\text{mH}$, $I_D=5\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

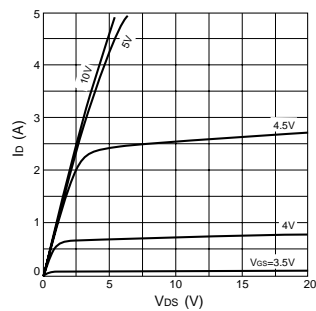
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	500			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 30\text{V}$
I_{DSS}			100	μA	$V_{DS}=500\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	2.0		4.0	V	$V_{DS}=10\text{V}$, $I_D=1\text{mA}$
$R_{e(yfs)}$	2.4	4.0		S	$V_{DS}=10\text{V}$, $I_D=2.5\text{A}$
$R_{DS(ON)}$		1.05	1.4	Ω	$V_{GS}=10\text{V}$, $I_D=2.5\text{A}$
C_{iss}		770		pF	$V_{DS}=10\text{V}$, $f=1.0\text{MHz}$, $V_{GS}=0\text{V}$
C_{oss}		290		pF	
$t_{d(on)}$		20		ns	$I_D=2.5\text{A}$, $V_{DD} \approx 200\text{V}$, $R_L=80\Omega$, $V_{GS}=10\text{V}$, see Fig. 3 on page 16.
t_r		25		ns	
$t_{d(off)}$		70		ns	
t_f		65		ns	
V_{SD}		1.1	1.5	V	
t_{rr}		75		ns	$I_{SD}=2.5\text{A}$, $di/dt=100\text{A}/\mu\text{s}$

Equivalent circuit diagram

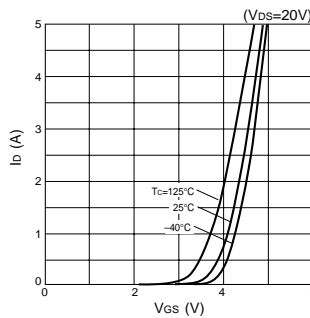


Characteristic curves

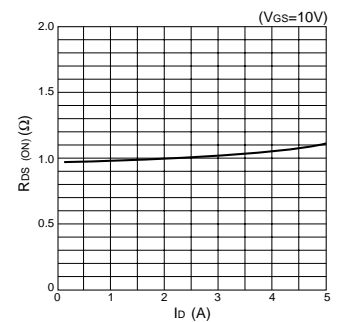
I_D - V_{DS} Characteristics (Typical)



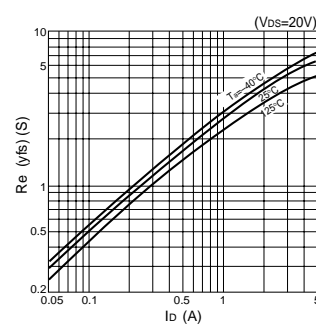
I_D - V_{GS} Characteristics (Typical)



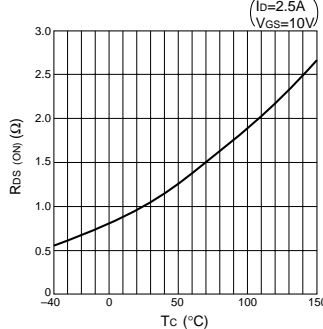
$R_{DS(ON)}$ - I_D Characteristics (Typical)



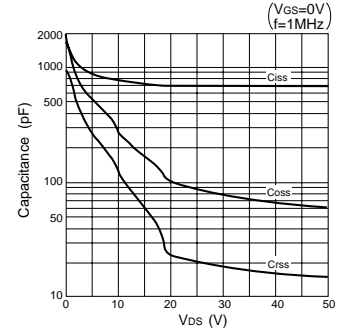
$R_{e(yfs)}$ - I_D Characteristics (Typical)



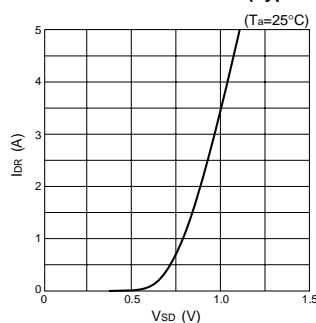
$R_{DS(ON)}$ - T_C Characteristics (Typical)



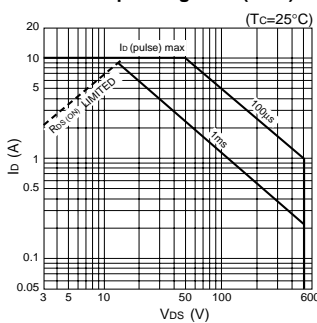
Capacitance- V_{DS} Characteristics (Typical)



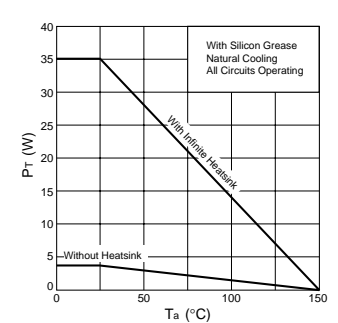
I_{DR} - V_{SD} Characteristics (Typical)



Safe Operating Area (SOA)



P_T - T_a Characteristics

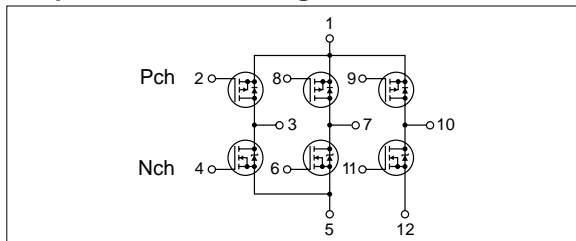


Absolute maximum ratings

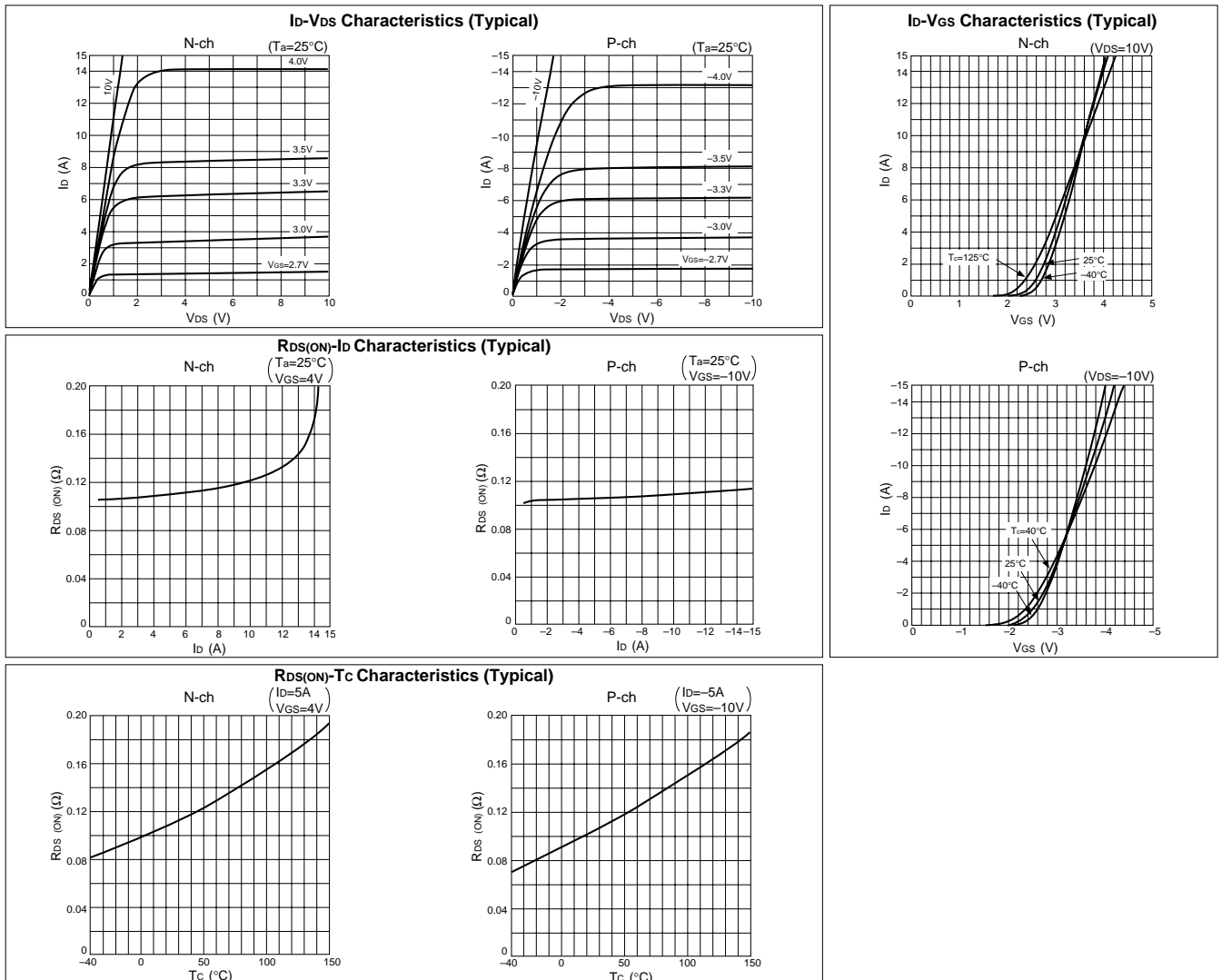
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	N channel	P channel	
V_{DSS}	60	-60	V
V_{GSS}	± 20	± 20	V
I_D	10	-10	A
$I_{D(pulse)}$	15 (PW \leq 1ms, duty \leq 25%)	-15 (PW \leq 1ms, duty \leq 25%)	A
P_T	4 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)		W
	30 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)		W
θ_{j-a}	31.25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
θ_{j-c}	4.166 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
Tch	150		$^\circ\text{C}$
Tstg	-40 to +150		$^\circ\text{C}$

Equivalent circuit diagram



Characteristic curves

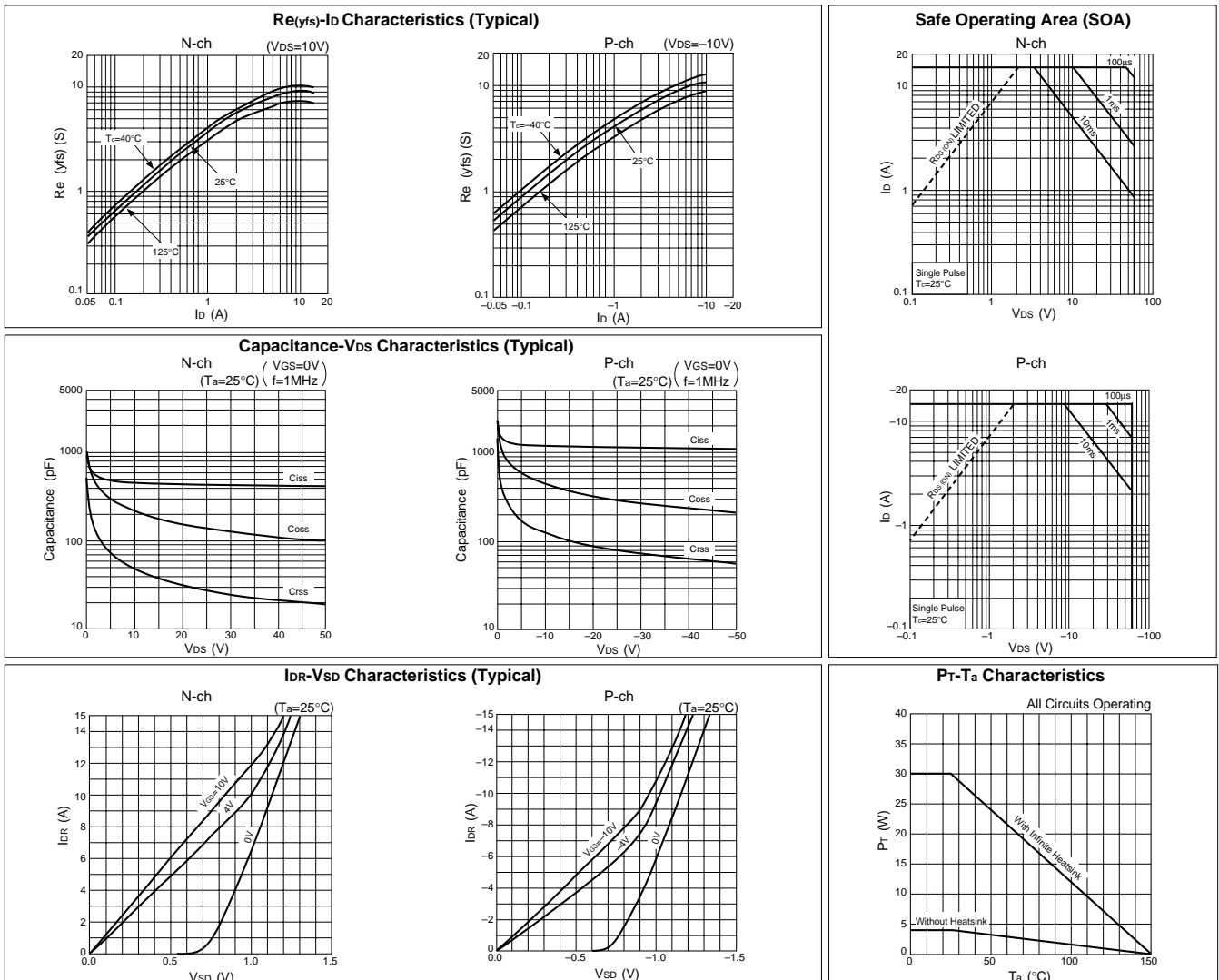


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=100\mu\text{A}, V_{GS}=0\text{V}$	-60			V	$I_D=-100\mu\text{A}, V_{GS}=0\text{V}$
I_{GSS}			± 10	μA	$V_{GS}=\pm 20\text{V}$			± 10	μA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=60\text{V}, V_{GS}=0\text{V}$			-100	μA	$V_{DS}=-60\text{V}, V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}, I_D=250\mu\text{A}$	-1.0		-2.0	V	$V_{DS}=-10\text{V}, I_D=-250\mu\text{A}$
$R_{e(yfs)}$		8.0		S	$V_{DS}=10\text{V}, I_D=5\text{A}$		8.7		S	$V_{DS}=-10\text{V}, I_D=-5\text{A}$
$R_{DS(ON)}$			0.14	Ω	$V_{GS}=4\text{V}, I_D=5\text{A}$			0.14	Ω	$V_{GS}=-10\text{V}, I_D=-5\text{A}$
C_{iss}		460		pF	$V_{DS}=10\text{V},$ $f=1.0\text{MHz},$ $V_{GS}=0\text{V}$		1200		pF	$V_{DS}=-10\text{V},$ $f=1.0\text{MHz},$ $V_{GS}=0\text{V}$
C_{oss}		225		pF			440		pF	
C_{rss}		50		pF			120		pF	
$t_d(\text{on})$		25		ns	$I_D=5\text{A}, V_{DD}\approx 20\text{V},$ $R_L=4\Omega, V_{GS}=5\text{V},$ $R_G=50\Omega,$		50		ns	$I_D=-5\text{A}, V_{DD}\approx -20\text{V},$ $R_L=4\Omega, V_{GS}=-5\text{V},$ $R_G=50\Omega,$
t_r		110		ns			170		ns	
$t_d(\text{off})$		90		ns			180		ns	
t_f		55		ns	see Fig.3 on page 16.		100		ns	see Fig.4 on page 16.
V_{SD}		1.15		ns	$I_{SD}=10\text{A}, V_{GS}=0\text{V}$		-1.25		V	$I_{SD}=-10\text{A}, V_{GS}=0\text{V}$
t_{rr}		75		V	$I_{SD}=5\text{A}, di/dt=100\text{A}/\mu\text{s}$		100		ns	$I_{SD}=-5\text{A}, di/dt=100\text{A}/\mu\text{s}$

Characteristic curves

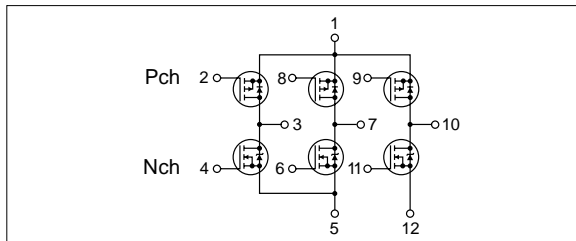


Absolute maximum ratings

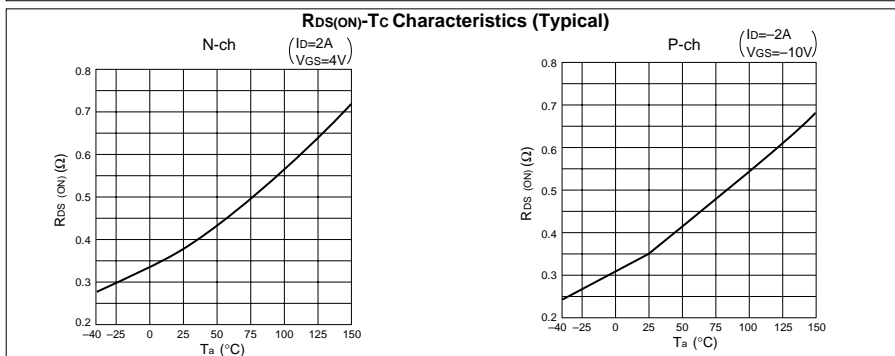
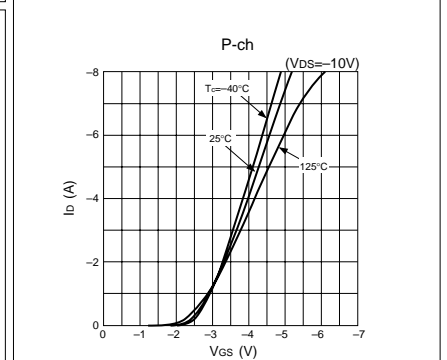
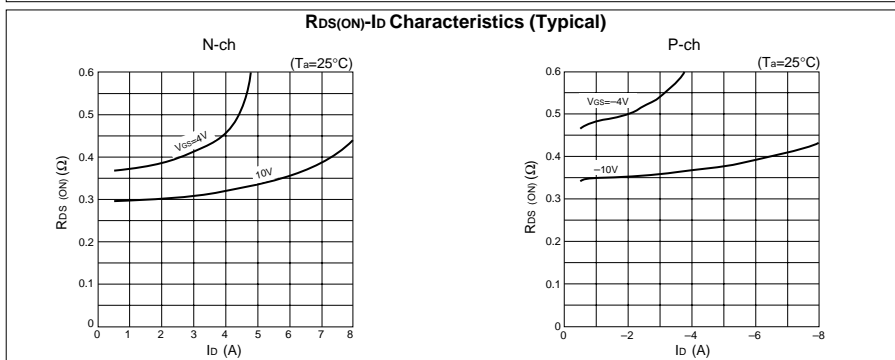
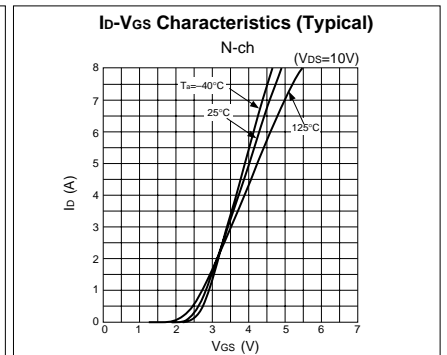
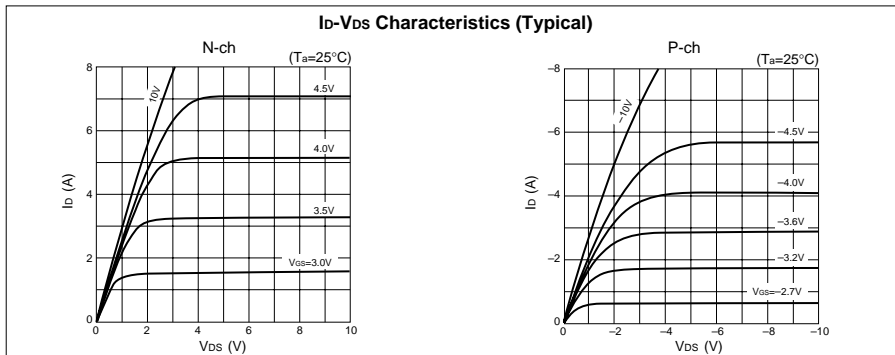
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	N channel	P channel	
V_{BSS}	60	-60	V
V_{GSS}	± 20	∓ 20	V
I_D	4	-4	A
$I_{D(pulse)}$	8 ($PW \leq 1\text{ms}$, $Duty \leq 1\%$)	-8 ($PW \leq 1\text{ms}$, $Duty \leq 1\%$)	A
P_T	4 ($T_a=25^\circ\text{C}$, with all circuits operating, without heatsink)		W
	28 ($T_c=25^\circ\text{C}$, with all circuits operating, with infinite heatsink)		W
θ_{j-a}	31.25 (Junction-Air, $T_a=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
θ_{j-c}	4.46 (Junction-Case, $T_c=25^\circ\text{C}$, with all circuits operating)		$^\circ\text{C/W}$
Tch	150		$^\circ\text{C}$
Tstg	-40 to +150		$^\circ\text{C}$

Equivalent circuit diagram



Characteristic curves

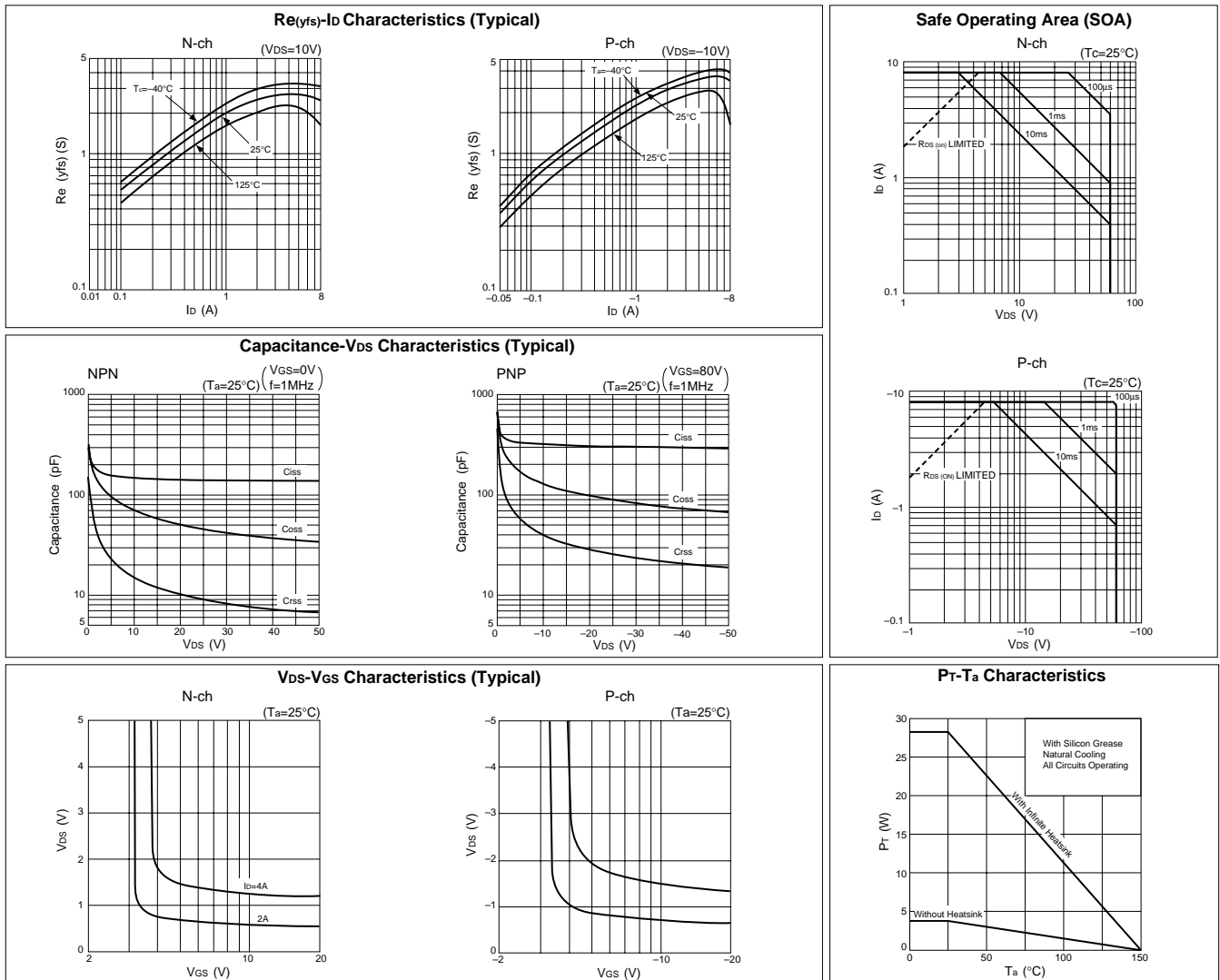


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	N channel					P channel				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$	-60			V	$I_D=-100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 10	μA	$V_{GS}=\pm 20\text{V}$			∓ 10	μA	$V_{GS}=\mp 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$			-100	μA	$V_{DS}=-60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$	-1.0		-2.0	V	$V_{DS}=-10\text{V}$, $I_D=-250\mu\text{A}$
$Re_{(yfs)}$		2.5		S	$V_{DS}=10\text{V}$, $I_D=2\text{A}$		3		S	$V_{DS}=-10\text{V}$, $I_D=-2\text{A}$
$R_{DS(ON)}$			0.55	Ω	$V_{GS}=4\text{V}$, $I_D=2\text{A}$		0.55		Ω	$V_{GS}=-10\text{V}$, $I_D=-2\text{A}$
C_{iss}		150		pF	$V_{DS}=10\text{V}$		320		pF	$V_{DS}=-10\text{V}$,
C_{oss}		70		pF	$f=1.0\text{MHz}$		130		pF	$f=1.0\text{MHz}$,
C_{rss}		15		pF	$V_{GS}=0\text{V}$		40		pF	$V_{GS}=0\text{V}$
$t_{d(on)}$		12		ns	$I_D=2\text{A}$, $V_{DD}=\pm 20\text{V}$, $R_L=10\Omega$, $V_{GS}=5\text{V}$, see Fig.3 on page 16.		20		ns	$I_D=-2\text{A}$, $V_{DD}=\pm 20\text{V}$, $R_L=10\Omega$, $V_{GS}=-5\text{V}$, see Fig.4 on page 16.
t_r		40		ns			95		ns	
$t_{d(off)}$		40		ns			70		ns	
t_f		25		ns			60		ns	
V_{SD}		1.2		V		$I_{SD}=4\text{A}$, $V_{GS}=0\text{V}$	-1.1		V	
t_{rr}		75		ns	$I_{SD}=2\text{A}$, $V_{GS}=0\text{V}$, $di/dt=100\text{A}/\mu\text{s}$		75		ns	$I_{SD}=-2\text{A}$, $V_{GS}=0\text{V}$, $di/dt=100\text{A}/\mu\text{s}$

Characteristic curves

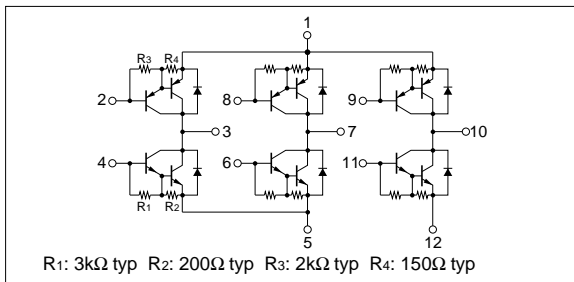


Absolute maximum ratings

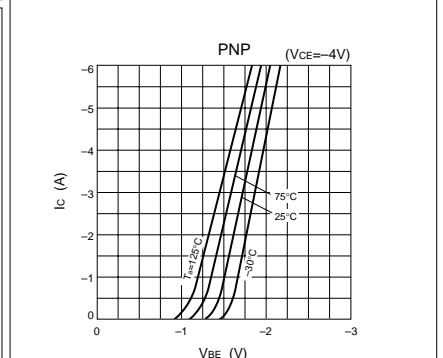
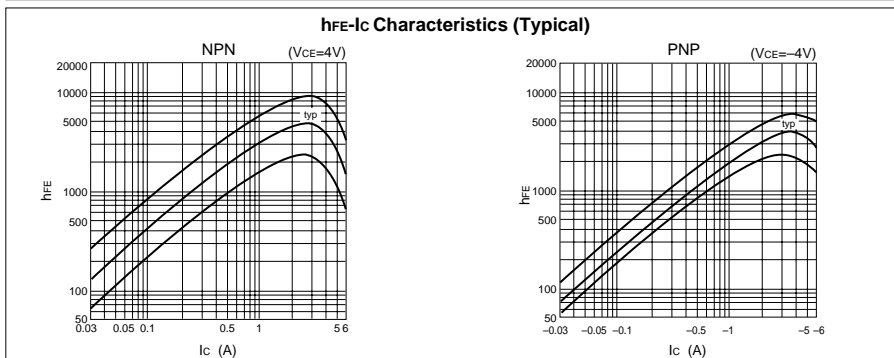
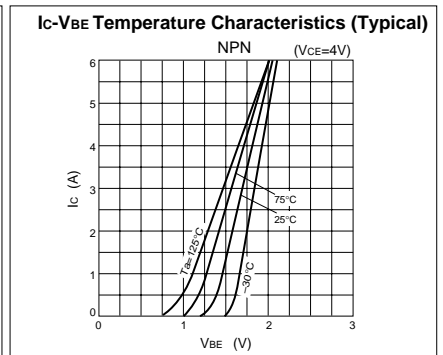
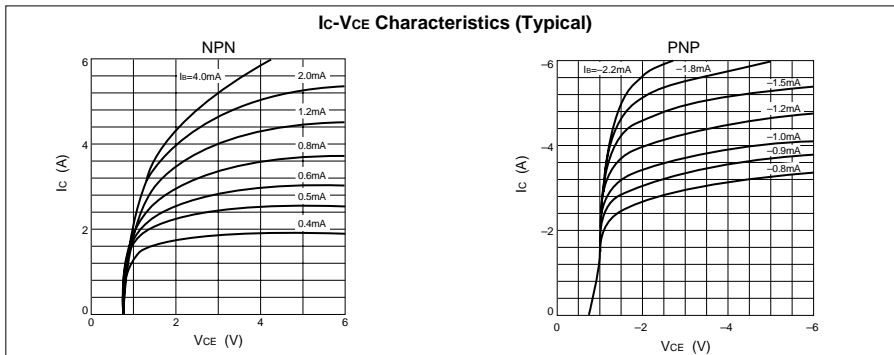
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	60	-60	V
V_{CEO}	60	-60	V
V_{EBO}	6	-6	V
I_c	4	-4	A
I_{cP}	6 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	-6 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	A
I_B	0.5	-0.5	A
P_T	4 ($T_a=25^\circ\text{C}$)		W
	20 ($T_c=25^\circ\text{C}$)		
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	6.25		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

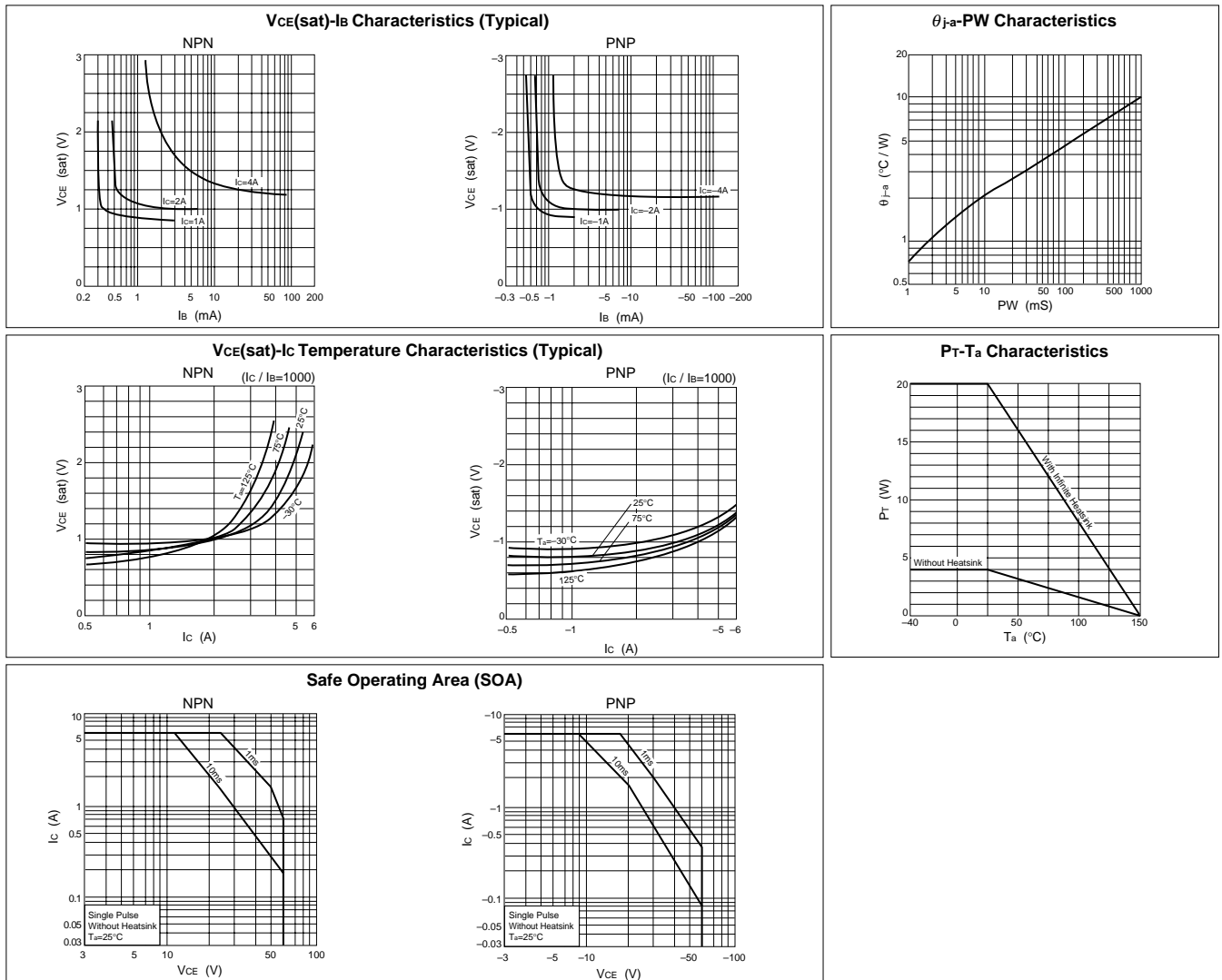


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=60\text{V}$			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	60			V	$I_C=10\text{mA}$	-60			V	$I_C=-20\text{mA}$
h_{FE}	2000	5000	12000		$V_{CE}=4\text{V}, I_C=3\text{A}$	2000	5000	12000		$V_{CE}=-4\text{V}, I_C=-3\text{A}$
$V_{CE(sat)}$			1.5	V	$I_C=3\text{A}, I_B=6\text{mA}$			-1.5	V	$I_C=-3\text{A}, I_B=-6\text{mA}$
$V_{BE(sat)}$			2.0	V				-2.0	V	
V_{FEC}			1.8	V	$I_{FEC}=1\text{A}$			-1.8	V	$I_{FEC}=-1\text{A}$
t_{on}		1.0		μs	$V_{CC} \approx 30\text{V},$ $I_C=3\text{A},$ $I_{B1}=-I_{B2}=10\text{mA}$		0.4		μs	$V_{CC} \approx -30\text{V},$ $I_C=-3\text{A},$ $I_{B1}=-I_{B2}=-10\text{mA}$
t_{stg}		4.0		μs			0.8		μs	
t_f		1.5		μs			0.6		μs	
f_T		75		MHz	$V_{CE}=12\text{V}, I_E=-0.1\text{A}$	200			MHz	$V_{CE}=-12\text{V}, I_E=0.2\text{A}$
C_{ob}		50		pF	$V_{CB}=10\text{V}, f=1\text{MHz}$	75			pF	$V_{CB}=-10\text{V}, f=1\text{MHz}$

Characteristic curves

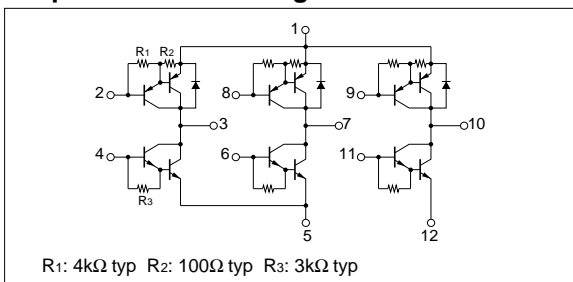


Absolute maximum ratings

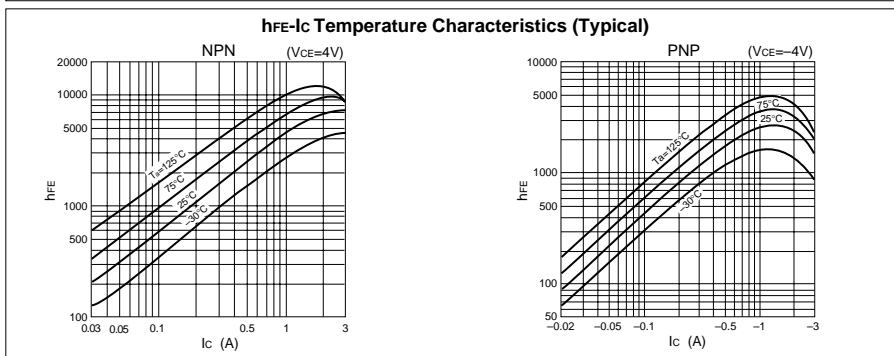
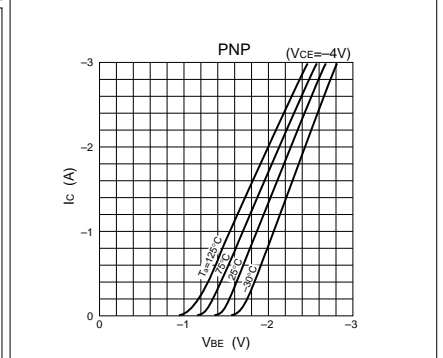
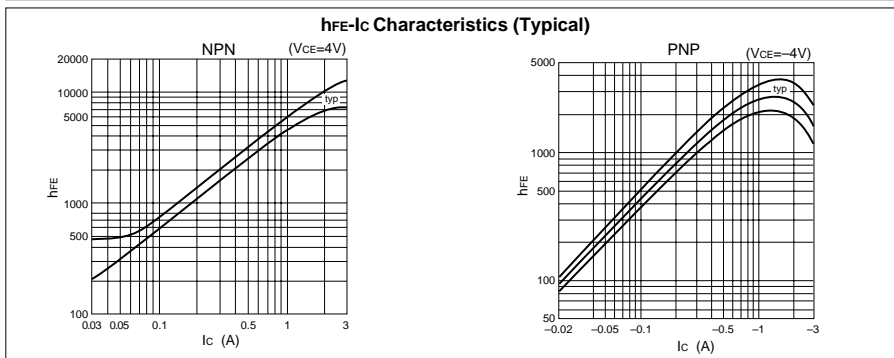
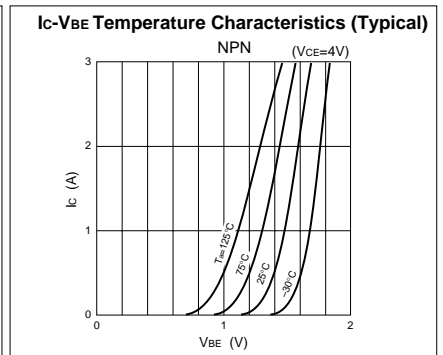
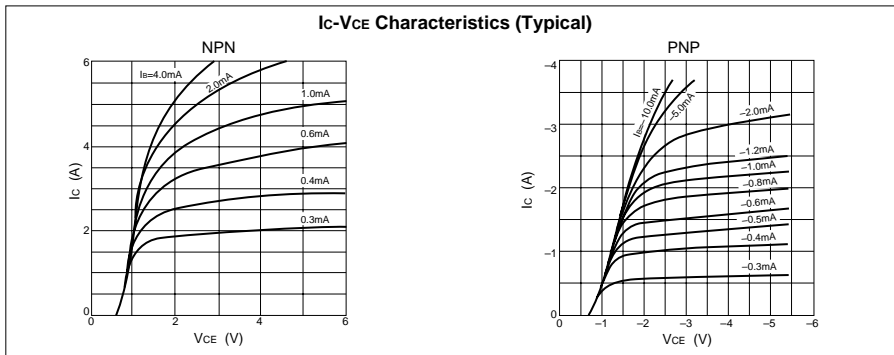
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	60	-60	V
V_{CEO}	60	-60	V
V_{EBO}	6	-6	V
I_c	2	-2	A
I_{cP}	3 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	-3 ($PW \leq 1\text{ms}$, $D_u \leq 50\%$)	A
I_B	0.5	-0.5	A
P_T	4 ($T_a=25^\circ\text{C}$)		W
	20 ($T_c=25^\circ\text{C}$)		
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-c}	6.25		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

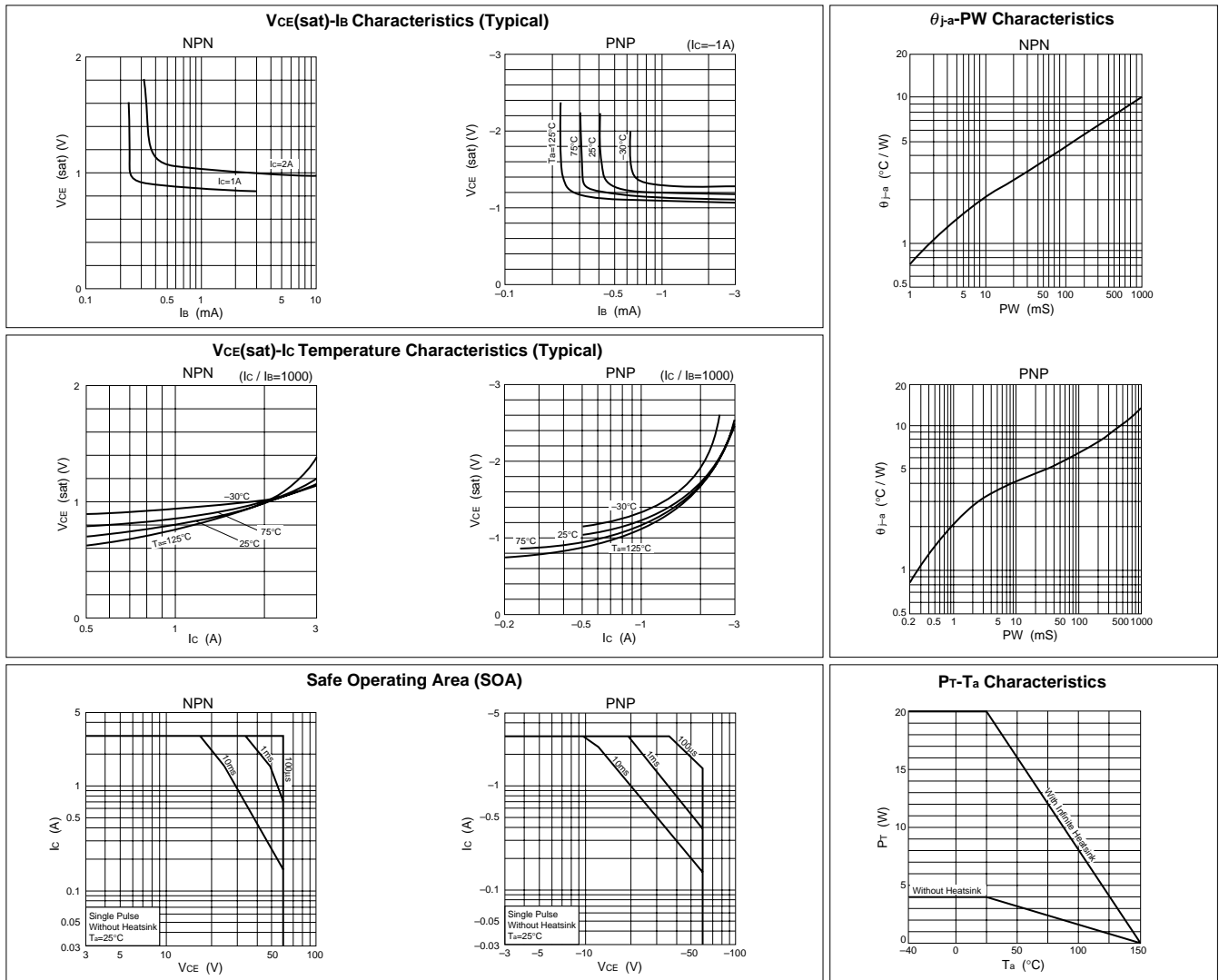


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=60\text{V}$			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			10	μA	$V_{EB}=6\text{V}$			-5	mA	$V_{EB}=-6\text{V}$
V_{CEO}	60			V	$I_C=10\text{mA}$	-60			V	$I_C=-10\text{mA}$
h_{FE}	1500	4000	10000		$V_{CE}=4\text{V}, I_C=1\text{A}$	2000	4000	10000		$V_{CE}=-4\text{V}, I_C=-1\text{A}$
$V_{CE(sat)}$			1.5	V	$I_C=1\text{A}, I_B=2\text{mA}$			-1.5	V	$I_C=-1\text{A}, I_B=-2\text{mA}$
$V_{BE(sat)}$			2.2	V				-2.2	V	
V_{FEC}		—		V				-1.8	V	$I_{FEC}=-1\text{A}$
t_{rr}		—		μs			3.0	μs		$I_{FEC}=\pm 100\text{mA}$
t_{on}		0.7		μs	$V_{CC} \doteq 30\text{V},$ $I_C=1\text{A},$ $I_{B1}=-I_{B2}=2\text{mA}$			0.4	μs	$V_{CC} \doteq -30\text{V},$ $I_C=-1\text{A},$ $I_{B1}=-I_{B2}=-2\text{mA}$
t_{stg}		5.0		μs				1.0	μs	
t_f		3.0		μs				0.4	μs	
f_T		20		MHz				100	MHz	
C_{ob}		45		pF	$V_{CB}=10\text{V}, f=1\text{MHz}$			30	pF	$V_{CB}=-10\text{V}, f=1\text{MHz}$

Characteristic curves

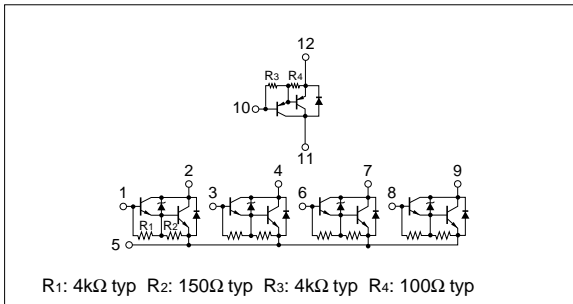


Absolute maximum ratings

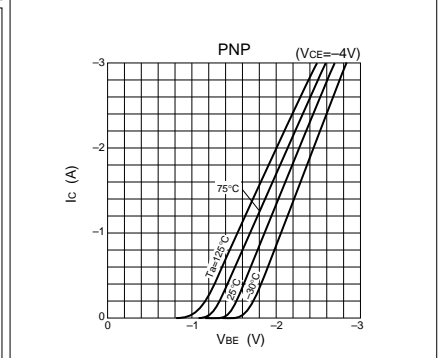
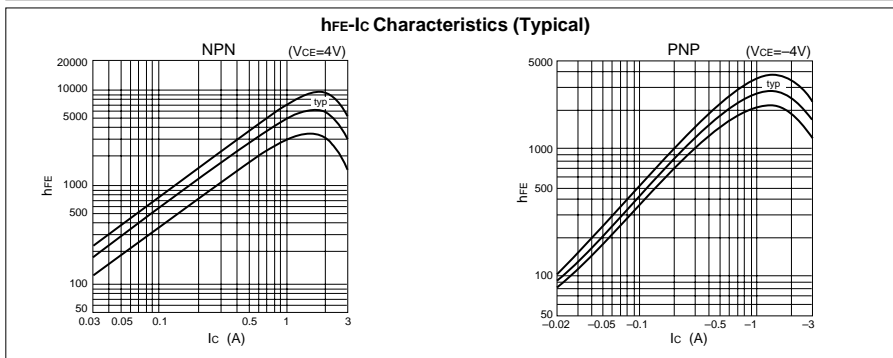
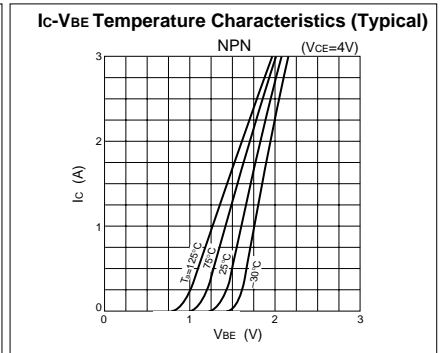
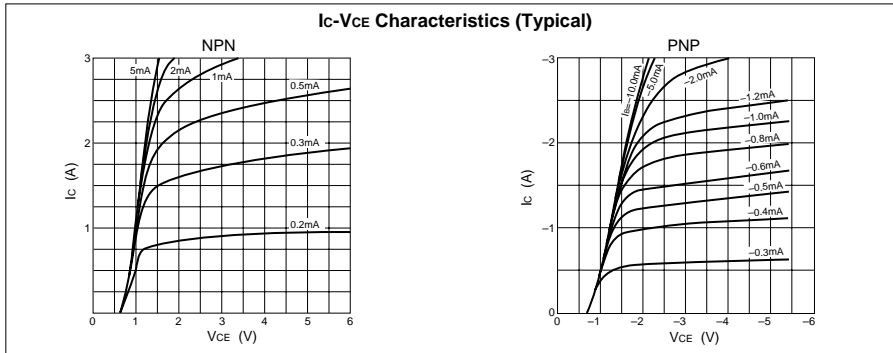
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	100±15	-60	V
V_{CEO}	100±15	-60	V
V_{EBO}	6	-6	V
I_{CP}	1.5	-3	A
I_B	0.5	-0.5	A
P_T	4 ($T_a=25^\circ\text{C}$)		W
	20 ($T_c=25^\circ\text{C}$)		
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$

Equivalent circuit diagram



Characteristic curves

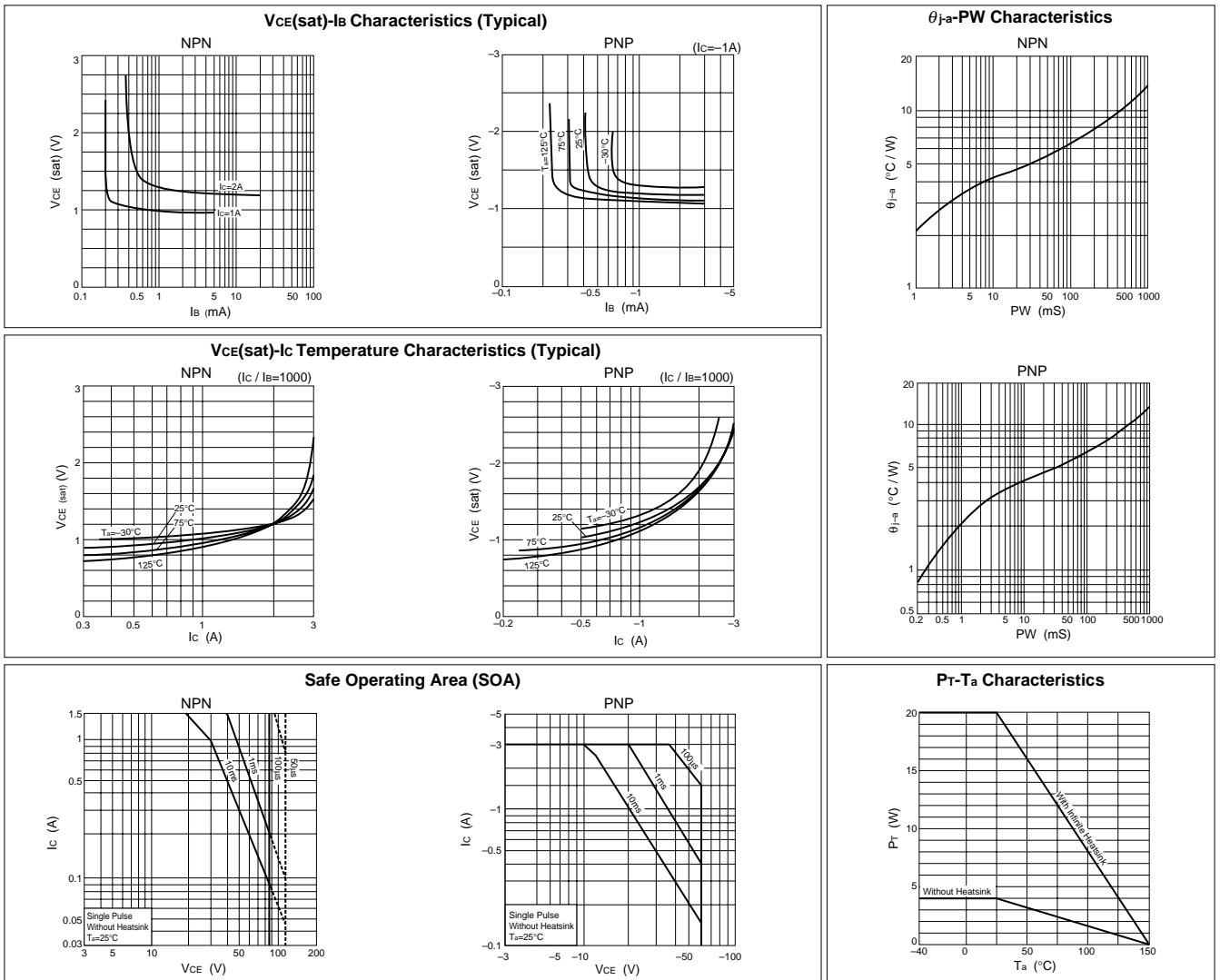


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=85\text{V}$			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			5	mA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	85	100	115	V	$I_C=10\text{mA}$	-60			V	$I_C=-10\text{mA}$
hFE	2000				$V_{CE}=4\text{V}, I_C=1\text{A}$	2000				$V_{CE}=-4\text{V}, I_C=-1\text{A}$
$V_{CE}(\text{sat})$			1.5	V	$I_C=1\text{A}, I_B=2\text{mA}$			-1.5	V	$I_C=-1\text{A}, I_B=-2\text{mA}$

Characteristic curves

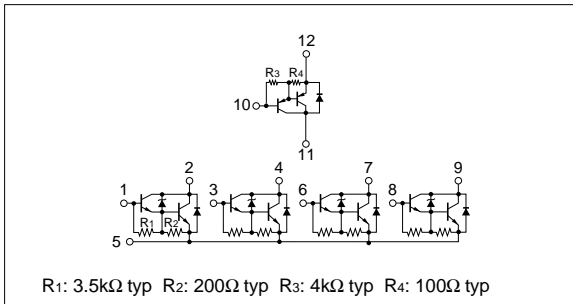


Absolute maximum ratings

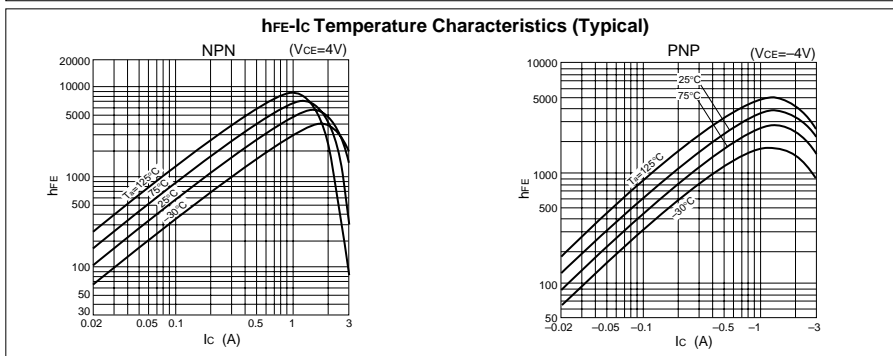
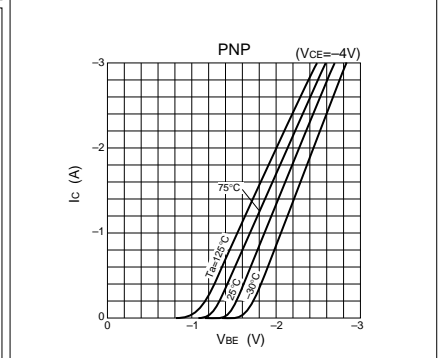
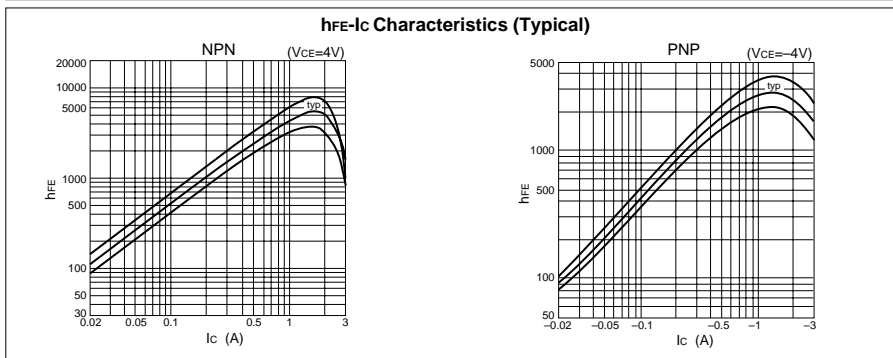
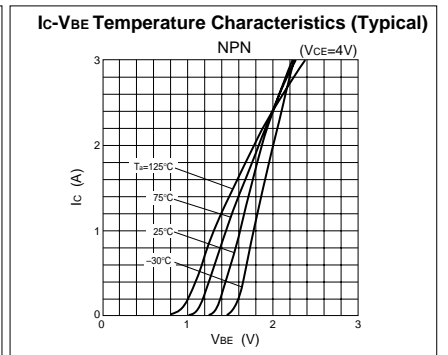
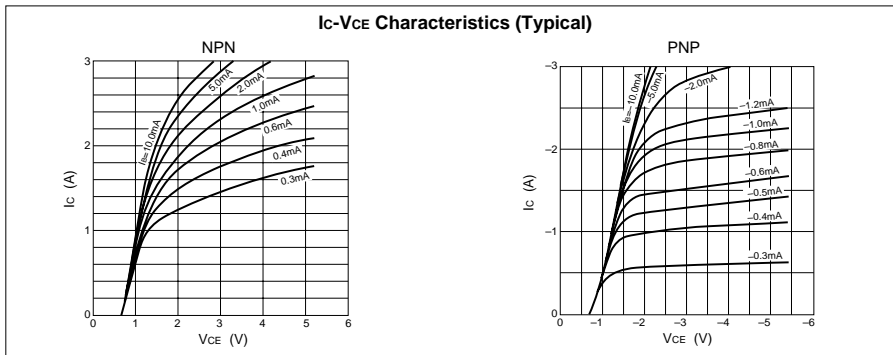
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	60 ± 10	-60	V
V_{CEO}	60 ± 10	-60	V
V_{EBO}	6	-6	V
I_{CP}	1.5	-3	A
I_B	0.5	-0.5	A
P_T	4 ($T_a=25^\circ\text{C}$)		W
	20 ($T_c=25^\circ\text{C}$)		
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$

Equivalent circuit diagram



Characteristic curves

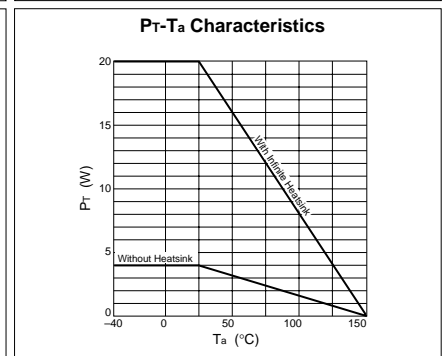
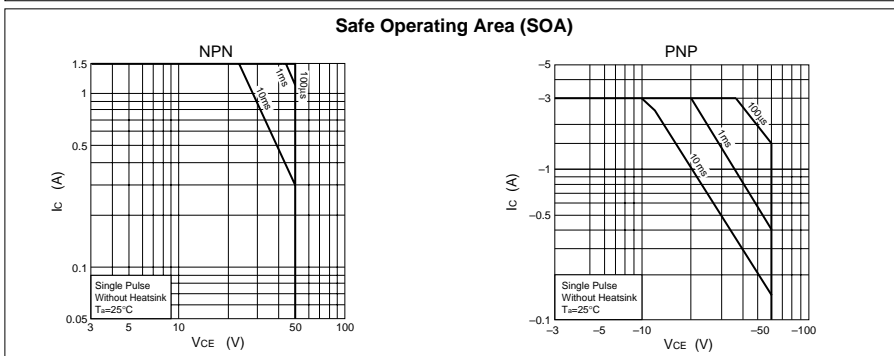
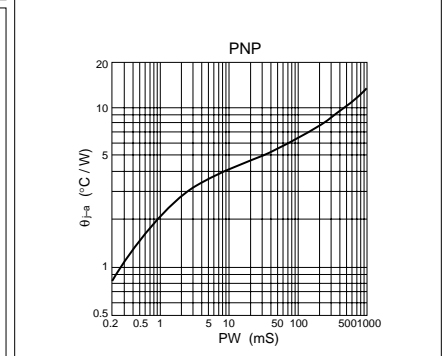
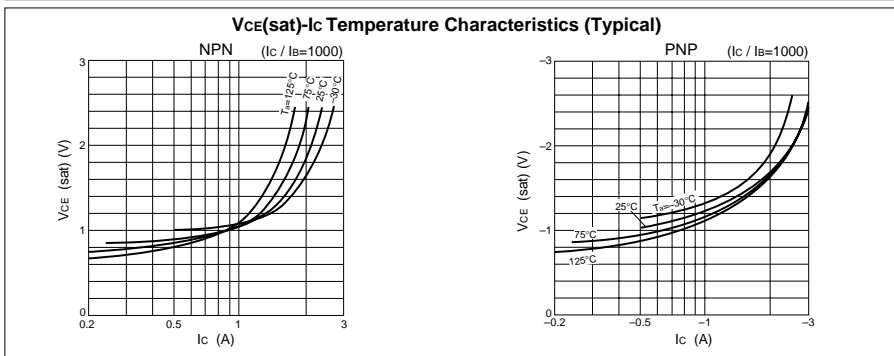
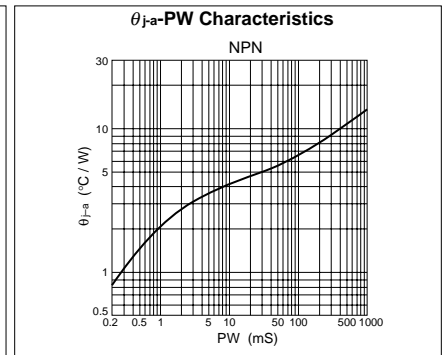
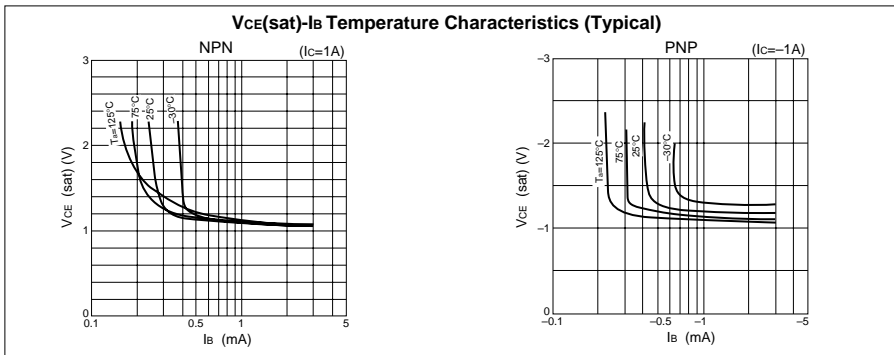


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=50\text{V}$			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			5	mA	$V_{EB}=6\text{V}$			-5	mA	$V_{EB}=-6\text{V}$
V_{CEO}	50	60	70	V	$I_C=10\text{mA}$	-60			V	$I_C=-10\text{mA}$
hFE	2000				$V_{CE}=4\text{V}, I_C=1\text{A}$	2000				$V_{CE}=-4\text{V}, I_C=-1\text{A}$
$V_{CE}(\text{sat})$			1.5	V	$I_C=1\text{A}, I_B=2\text{mA}$			-1.5	V	$I_C=-1\text{A}, I_B=-2\text{mA}$

Characteristic curves



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

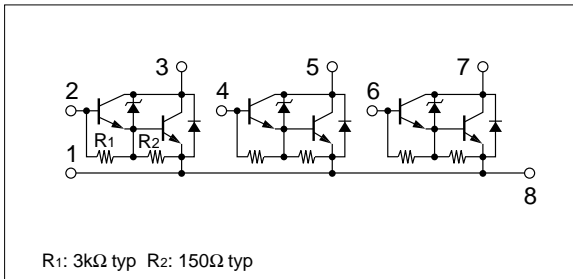
Symbol	Ratings	Unit
V_{CB0}	60±10	V
V_{CE0}	60±10	V
V_{EB0}	6	V
I_C	4	A
I_{CP}	8 (PW≤10ms, $D_u\leq 50\%$)	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
	15 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

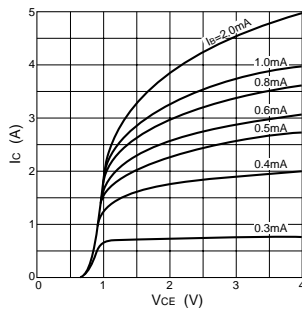
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			100	μA	$V_{CB}=50\text{V}$
I_{EB0}			10	mA	$V_{EB}=6\text{V}$
V_{CE0}	50	60	70	V	$I_C=10\text{mA}$
h_{FE}	1000				$V_{CE}=4\text{V}$, $I_C=3\text{A}$
$V_{CE(sat)}$			2.0	V	$I_C=3\text{A}$, $I_B=10\text{mA}$
t_{on}		1.0		μs	$V_{CC}\doteq 30\text{V}$, $I_C=3\text{A}$, $I_{B1}=-I_{B2}=10\text{mA}$
t_{stg}		4.0		μs	
t_f		1.5		μs	

Equivalent circuit diagram

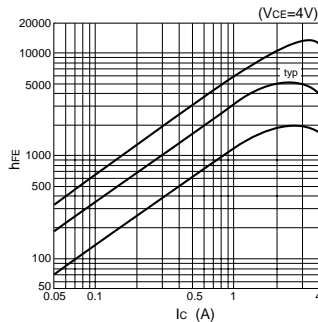


Characteristic curves

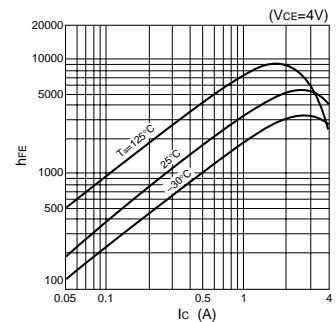
I_C - V_{CE} Characteristics (Typical)



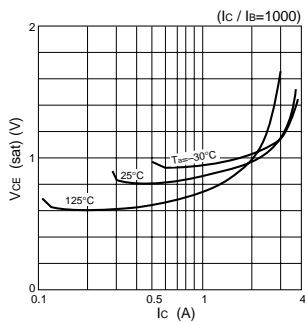
h_{FE} - I_C Characteristics (Typical)



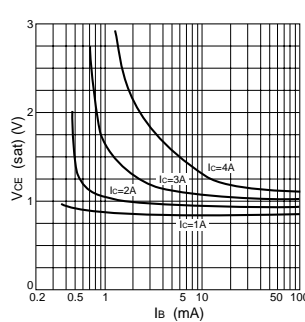
h_{FE} - I_C Temperature Characteristics (Typical)



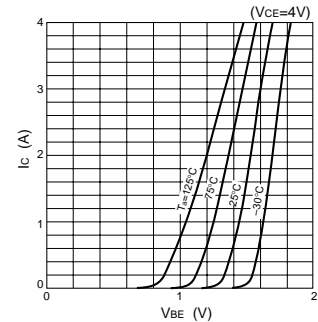
$V_{CE(sat)}$ - I_C Temperature Characteristics (Typical)



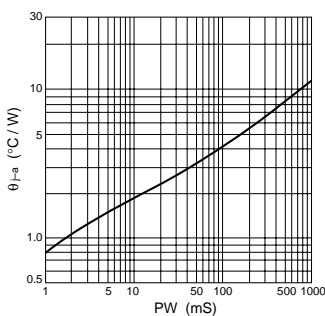
$V_{CE(sat)}$ - I_B Characteristics (Typical)



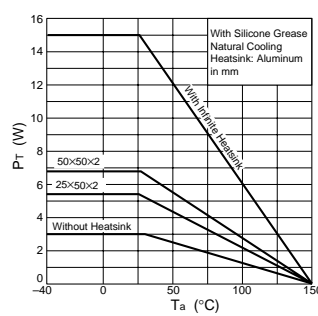
I_C - V_{BE} Temperature Characteristics (Typical)



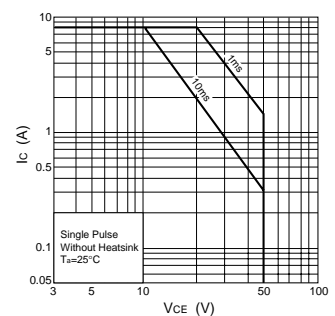
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

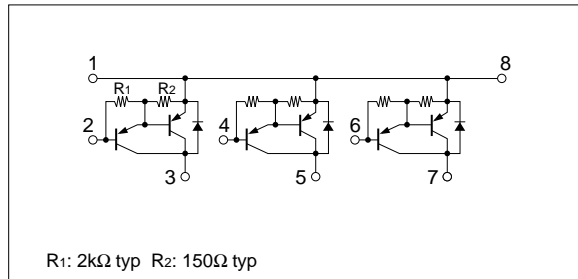
Symbol	Ratings	Unit
V_{CBO}	-50	V
V_{CEO}	-50	V
V_{EBO}	-6	V
I_C	-4	A
I_{CP}	-8 (PW \leq 10ms, Du \leq 50%)	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
	15 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

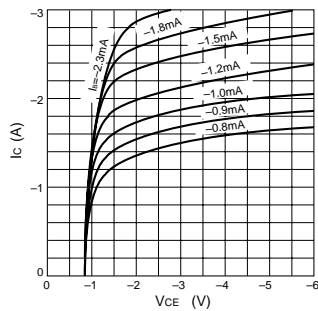
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			-100	μA	$V_{CB}=-50\text{V}$
I_{EBO}			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	-50			V	$I_C=-10\text{mA}$
h_{FE}	1000				$V_{CE}=-4\text{V}$, $I_C=-3\text{A}$
$V_{CE(sat)}$			-2.0	V	$I_C=-3\text{A}$, $I_B=-10\text{mA}$
t_{on}		0.4		μs	$V_{CC}=-30\text{V}$, $I_C=-3\text{A}$, $I_{B1}=-I_{B2}=-10\text{mA}$
t_{stg}		0.8		μs	
t_f		0.6		μs	

Equivalent circuit diagram

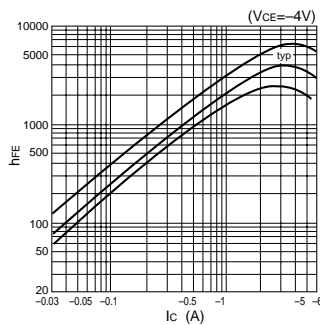


Characteristic curves

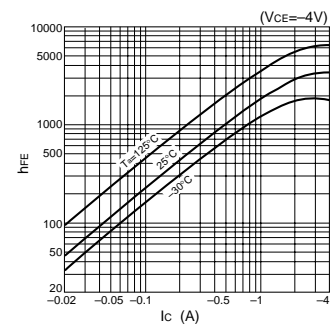
I_C - V_{CE} Characteristics (Typical)



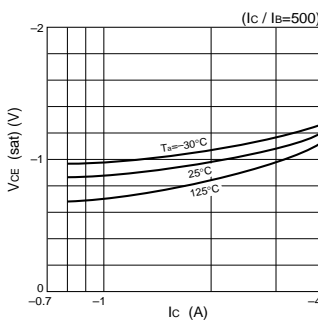
h_{FE} - I_C Characteristics (Typical)



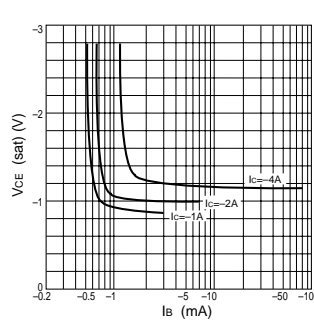
h_{FE} - I_C Temperature Characteristics (Typical)



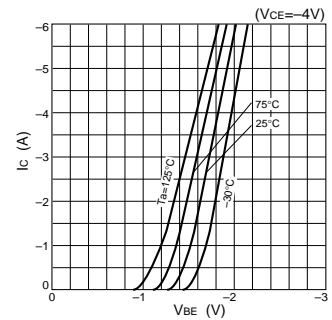
$V_{CE(sat)}$ - I_C Temperature Characteristics (Typical)



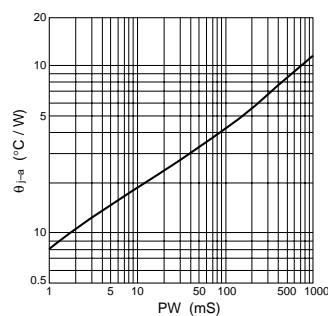
$V_{CE(sat)}$ - I_B Characteristics (Typical)



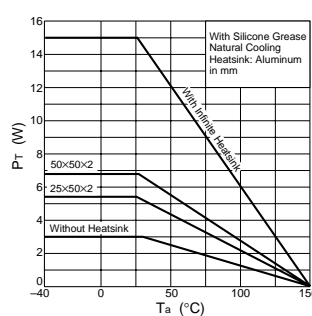
I_C - V_{BE} Temperature Characteristics (Typical)



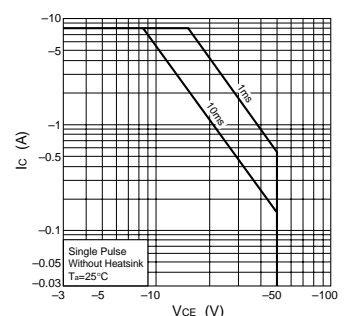
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

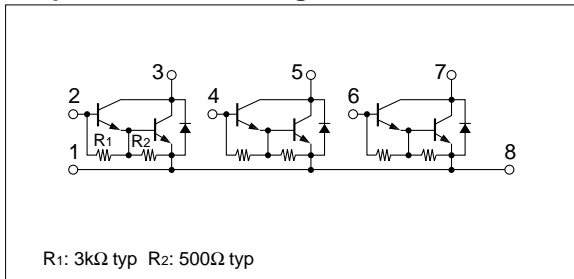
Symbol	Ratings	Unit
V_{CB0}	120	V
V_{CEO}	100	V
V_{EBO}	6	V
I_c	4	A
I_{CP}	8 (PW \leq 10ms, $D_u\leq$ 50%)	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
	15 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

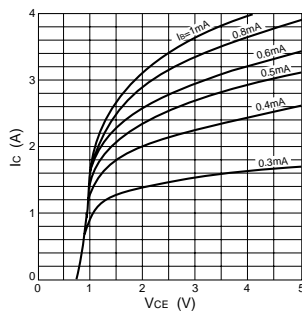
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			100	μA	$V_{CB}=120\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$
V_{CEO}	100			V	$I_c=10\text{mA}$
h_{FE}	1000				$V_{CE}=4\text{V}$, $I_c=2\text{A}$
$V_{CE(sat)}$			2.0	V	$I_c=2\text{A}$, $I_B=10\text{mA}$
t_{on}		0.8		μs	$V_{CC}\doteq 40\text{V}$, $I_c=2\text{A}$, $I_{B1}=-I_{B2}=10\text{mA}$
t_{stg}		5.0		μs	
t_f		2.0		μs	

Equivalent circuit diagram

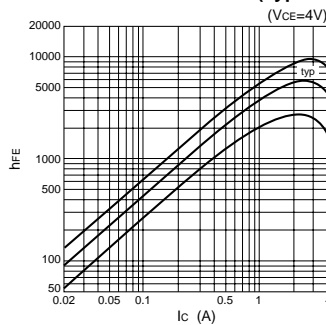


Characteristic curves

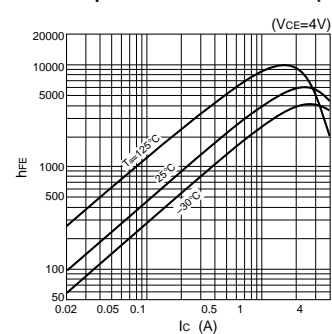
I_c - V_{CE} Characteristics (Typical)



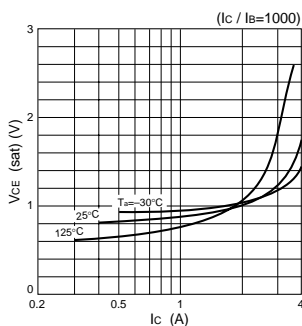
h_{FE} - I_c Characteristics (Typical)



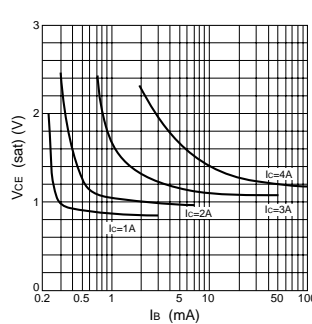
h_{FE} - I_c Temperature Characteristics (Typical)



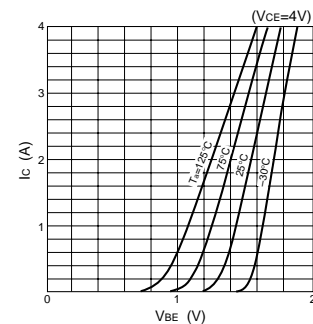
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



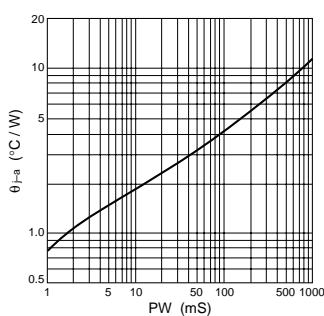
$V_{CE(sat)}$ - I_B Characteristics (Typical)



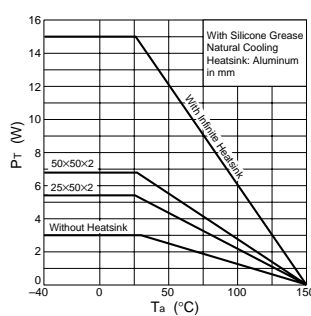
I_c - V_{BE} Temperature Characteristics (Typical)



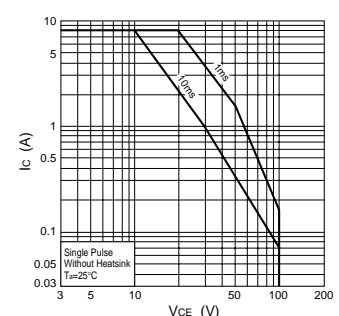
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

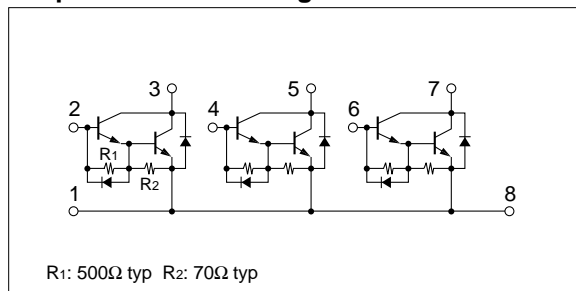
Symbol	Ratings	Unit
V_{CB0}	550	V
V_{CEO}	550	V
V_{EBO}	6	V
I_c	1	A
I_{CP}	2 (PW \leq 1ms, Du \leq 25%)	A
I_B	0.5	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
	15 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

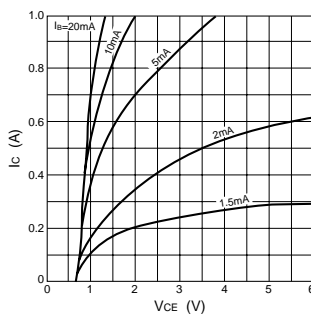
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			100	μA	$V_{CB}=550\text{V}$
I_{EBO}		75	150	mA	$V_{EB}=6\text{V}$
V_{CEO}	550			V	$I_c=100\mu\text{A}$
h_{FE}	200	400	1000		$V_{CE}=4\text{V}$, $I_c=500\text{mA}$
$V_{CE(sat)}$		1.0	1.5	V	$I_c=500\text{mA}$, $I_B=10\text{mA}$
$V_{BE(sat)}$		1.5	2.2	V	
V_{FEC}		1.1	1.5	V	$I_{FEC}=1\text{A}$
t_{on}		0.5		μs	$V_{CC}\div 200\text{V}$, $I_c=500\text{mA}$,
t_{stg}		3.5		μs	
t_f		0.7		μs	$I_{B1}=-I_{B2}=10\text{mA}$
f_T		15		MHz	$V_{CE}=12\text{V}$, $I_E=-0.2\text{A}$
C_{ob}		35		pF	$V_{CB}=10\text{V}$, $f=1\text{MHz}$

Equivalent circuit diagram

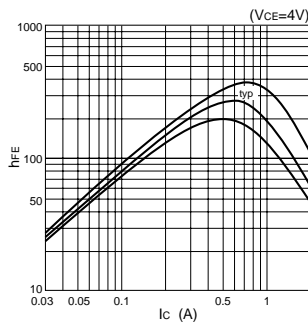


Characteristic curves

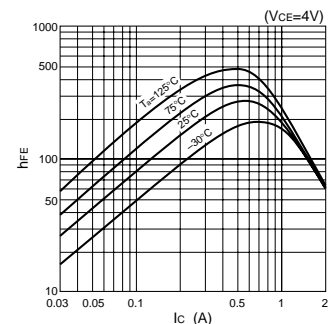
I_c - V_{CE} Characteristics (Typical)



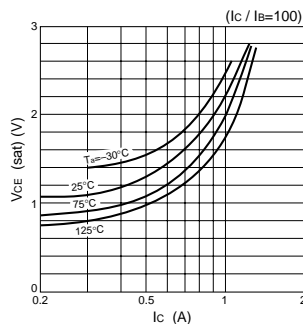
h_{FE} - I_c Characteristics (Typical)



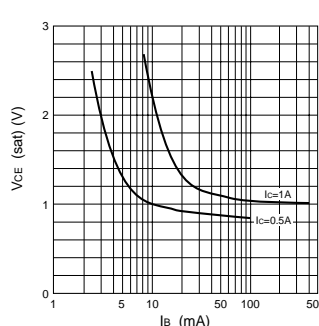
h_{FE} - I_c Temperature Characteristics (Typical)



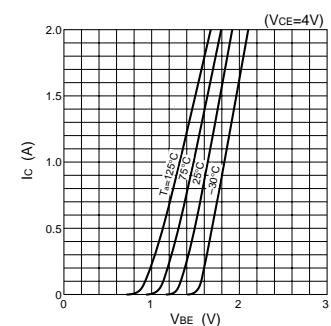
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



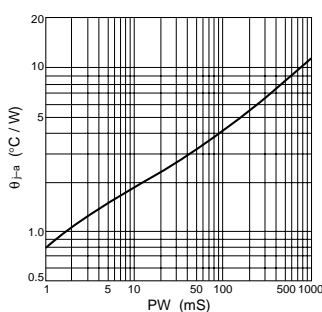
$V_{CE(sat)}$ - I_B Characteristics (Typical)



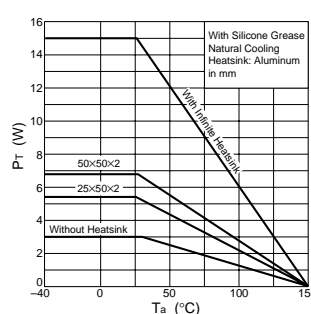
I_c - V_{BE} Temperature Characteristics (Typical)



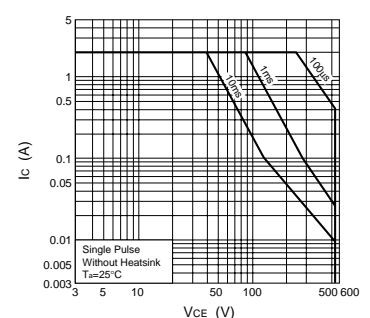
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

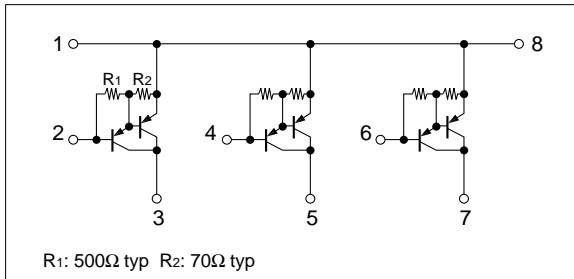
Symbol	Ratings	Unit
V_{CBO}	-550	V
V_{CEO}	-550	V
V_{EBO}	-6	V
I_c	-1	A
I_{cP}	-2 (PW \leq 1ms, $D_u\leq$ 25%)	A
I_B	-0.5	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
	15 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			-100	μA	$V_{CB}=-550\text{V}$
I_{EBO}		-10	-20	mA	$V_{EB}=-6\text{V}$
V_{CEO}	-550			V	$I_c=-100\mu\text{A}$
h_{FE}	200	400	1000		$V_{CE}=-4\text{V}$, $I_c=-500\text{mA}$
$V_{CE(sat)}$		-1.0	-1.5	V	$I_c=-500\text{mA}$, $I_B=-10\text{mA}$
$V_{BE(sat)}$		-1.6	-2.2	V	
t_{on}		0.7		μs	$V_{CC}=-200\text{V}$, $I_c=-500\text{mA}$, $I_{B1}=-I_{B2}=-10\text{mA}$
t_{stg}		13.0		μs	
t_f		2.5		μs	
f_T		15		MHz	$V_{CE}=-12\text{V}$, $I_E=0.2\text{A}$
C_{ob}		48		pF	$V_{CB}=-10\text{V}$, $f=1\text{MHz}$

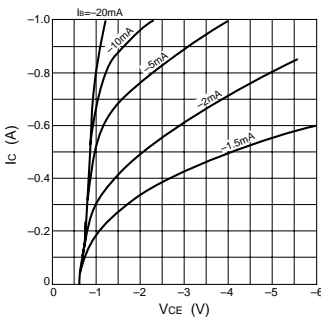
Equivalent circuit diagram



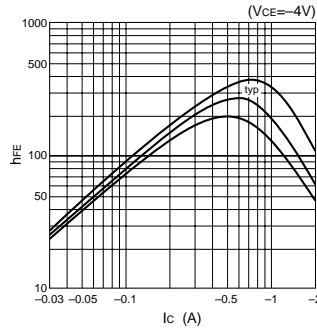
R1: 500 Ω typ R2: 70 Ω typ

Characteristic curves

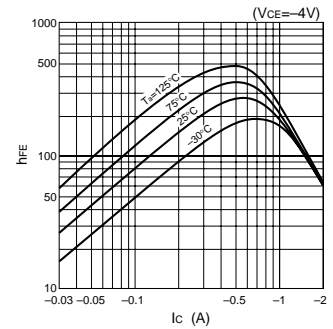
I_c - V_{CE} Characteristics (Typical)



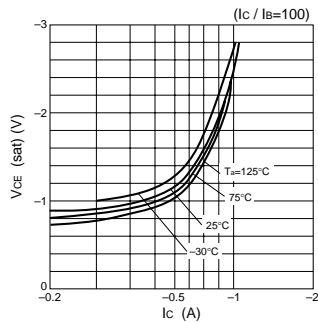
h_{FE} - I_c Characteristics (Typical)



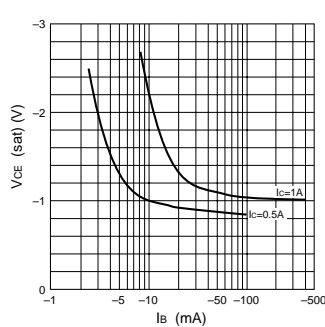
h_{FE} - I_c Temperature Characteristics (Typical)



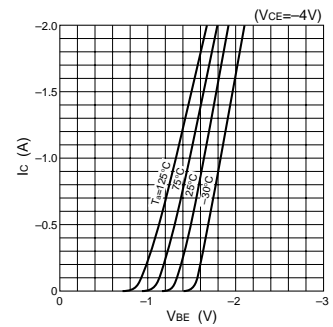
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



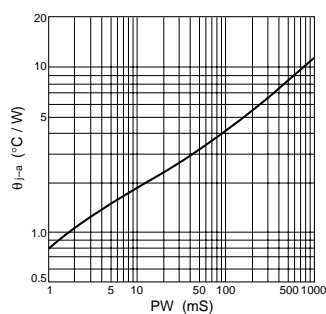
$V_{CE(sat)}$ - I_B Characteristics (Typical)



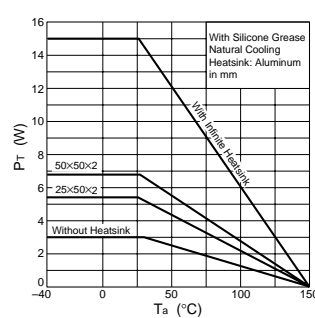
I_c - V_{BE} Temperature Characteristics (Typical)



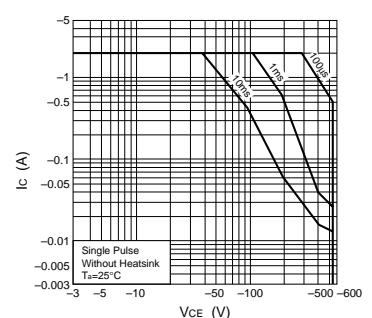
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

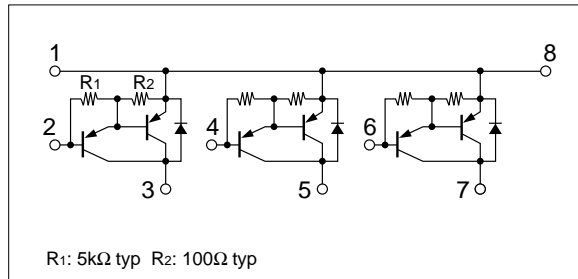
Symbol	Ratings	Unit
V_{CB0}	-120	V
V_{CE0}	-120	V
V_{EB0}	-6	V
I_c	-4	A
I_B	-1	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
	15 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

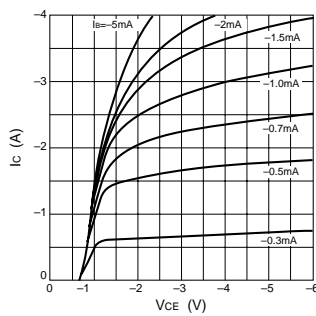
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			-10	μA	$V_{CB}=-120\text{V}$
I_{EB0}			-10	mA	$V_{EB}=-6\text{V}$
V_{CE0}	-120			V	$I_c=-10\text{mA}$
h_{FE}	2000				$V_{CE}=-4\text{V}$, $I_c=-2\text{A}$
$V_{CE(sat)}$			-1.5	V	$I_c=-2\text{A}$, $I_B=-4\text{mA}$
$V_{BE(sat)}$			-2.5	V	

Equivalent circuit diagram

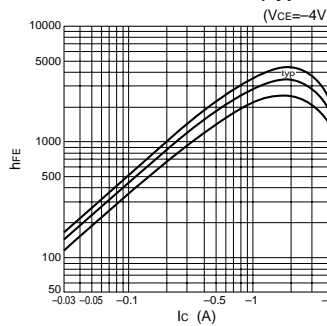


Characteristic curves

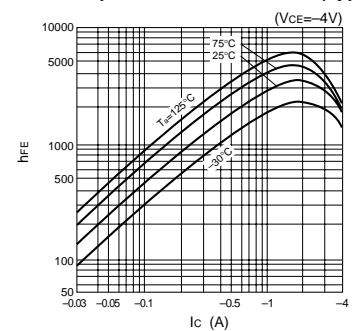
I_c - V_{CE} Characteristics (Typical)



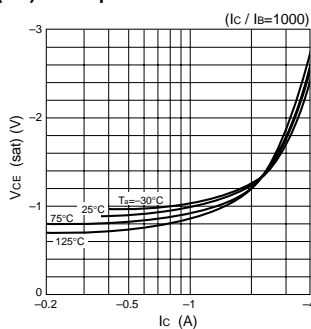
h_{FE} - I_c Characteristics (Typical)



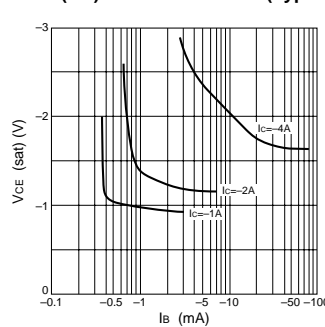
h_{FE} - I_c Temperature Characteristics (Typical)



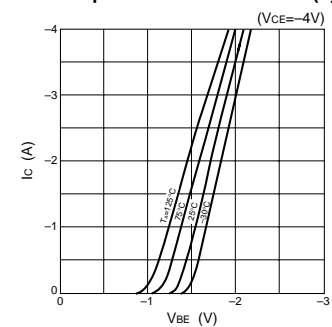
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



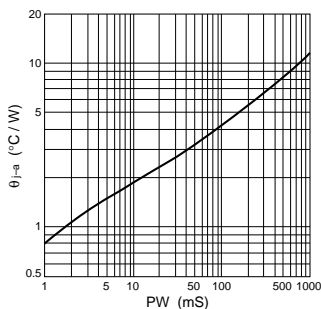
$V_{CE(sat)}$ - I_B Characteristics (Typical)



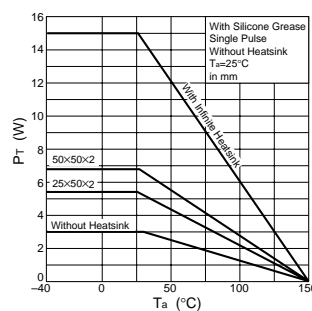
I_c - V_{BE} Temperature Characteristics (Typical)



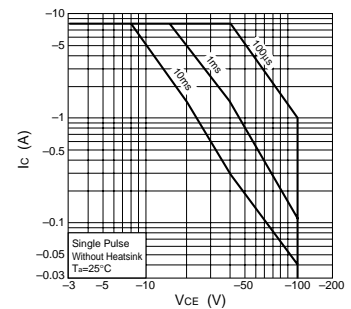
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

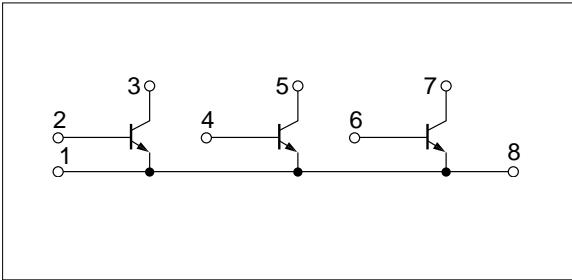
Symbol	Ratings	Unit
V_{CB0}	60	V
V_{CE0}	60	V
V_{EB0}	6	V
I_c	3	A
I_{CP}	6 (PW \leq 10ms, $D_u\leq$ 50%)	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
	15 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

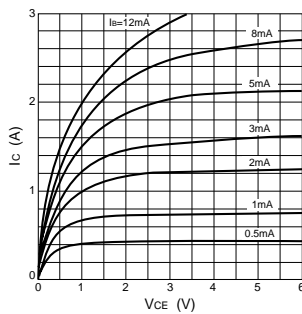
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			100	μA	$V_{CB}=60\text{V}$
I_{EB0}			100	μA	$V_{EB}=6\text{V}$
V_{CE0}	60			V	$I_c=25\text{mA}$
h_{FE}	300				$V_{CE}=4\text{V}$, $I_c=0.5\text{A}$
$V_{CE(sat)}$			1.0	V	$I_c=1\text{A}$, $I_b=10\text{mA}$
t_{on}		0.8		μs	$V_{CC}\doteq 20\text{V}$, $I_c=1\text{A}$, $I_{B1}=15\text{mA}$, $I_{B2}=-30\text{mA}$
t_{stg}		3.0		μs	
t_f		1.2		μs	

Equivalent circuit diagram

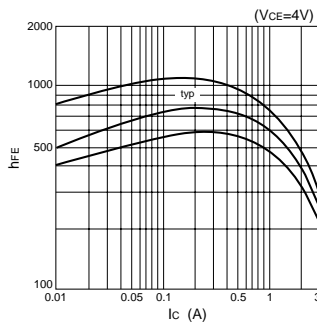


Characteristic curves

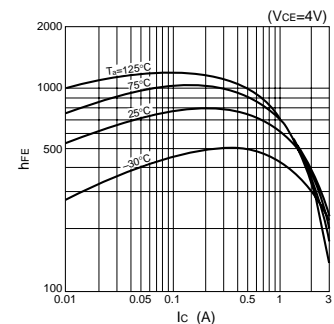
I_c - V_{CE} Characteristics (Typical)



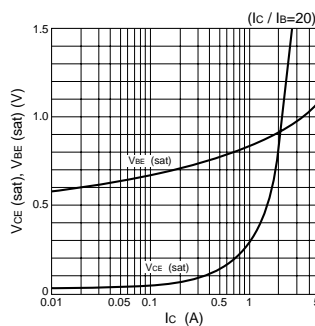
h_{FE} - I_c Characteristics (Typical)



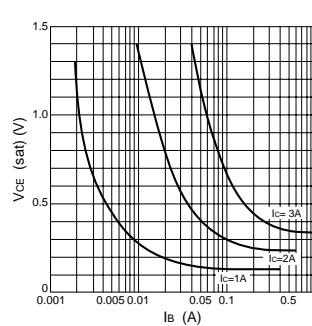
h_{FE} - I_c Temperature Characteristics (Typical)



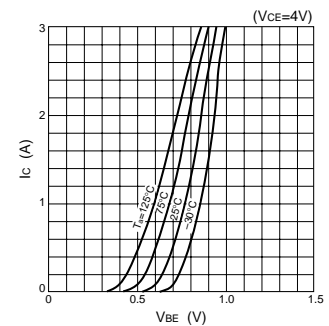
$V_{CE(sat)}$, $V_{BE(sat)}$ - I_c Characteristics (Typical)



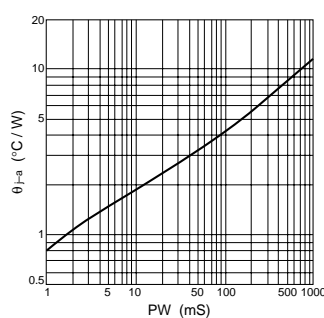
$V_{CE(sat)}$ - I_b Characteristics (Typical)



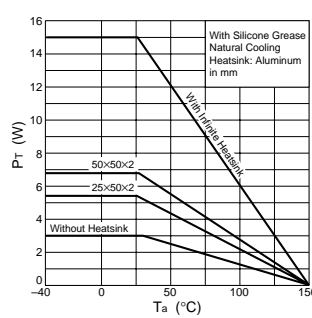
I_c - V_{BE} Temperature Characteristics (Typical)



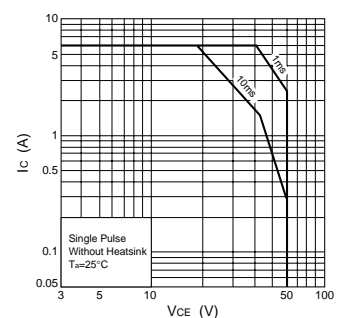
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

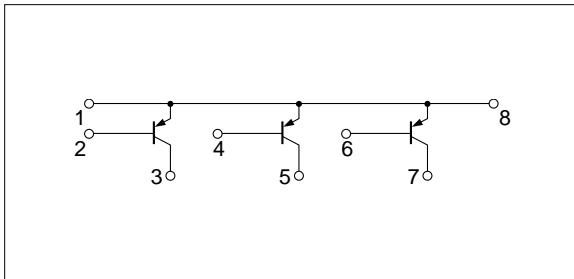
Symbol	Ratings	Unit
V_{CB0}	-50	V
V_{CE0}	-50	V
V_{EB0}	-5	V
I_c	-3	A
I_{cP}	-5 (PW \leq 1ms, Du \leq 50%)	A
I_B	-1	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
	15 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

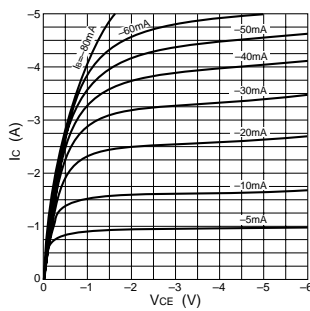
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			-10	μA	$V_{CB}=-50\text{V}$
I_{EB0}			-10	μA	$V_{EB}=-8\text{V}$
V_{CE0}	-50			V	$I_c=-25\text{mA}$
h_{FE}	100		350		$V_{CE}=-4\text{V}$, $I_c=-1\text{A}$
$V_{CE(sat)}$			-1.0	V	$I_c=-2\text{A}$, $I_B=-40\text{mA}$
$V_{BE(sat)}$			-1.5	V	

Equivalent circuit diagram

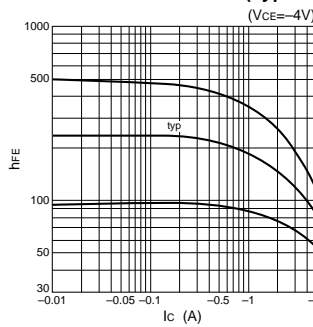


Characteristic curves

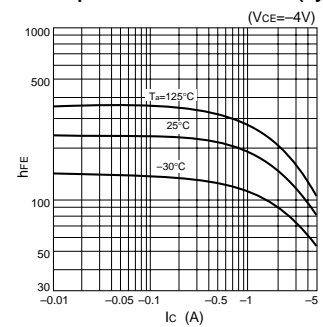
I_c - V_{CE} Characteristics (Typical)



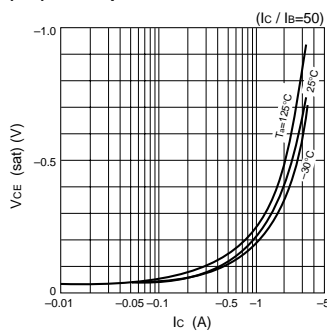
h_{FE} - I_c Characteristics (Typical)



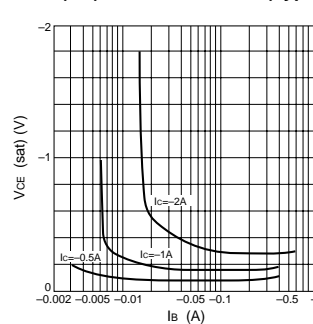
h_{FE} - I_c Temperature Characteristics (Typical)



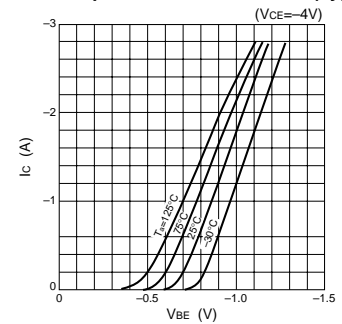
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



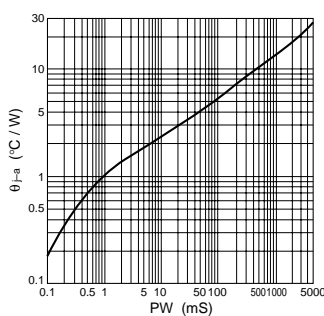
$V_{CE(sat)}$ - I_B Characteristics (Typical)



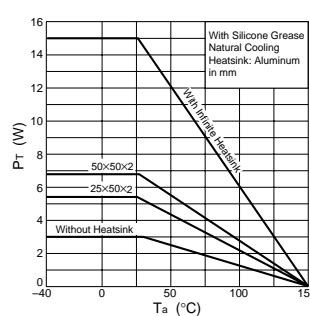
I_c - V_{BE} Temperature Characteristics (Typical)



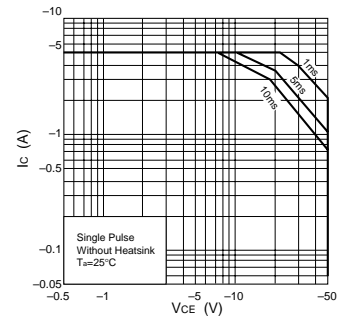
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

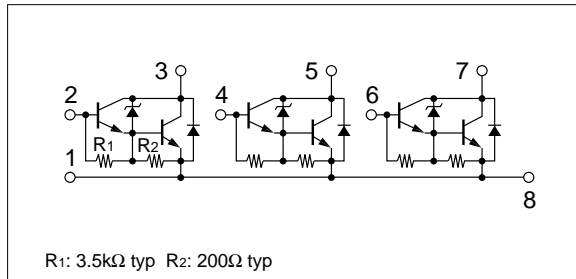
Symbol	Ratings	Unit
V_{CB0}	60±10	V
V_{CEO}	60±10	V
V_{EBO}	6	V
I_c	2	A
I_{cP}	4 (PW≤1ms, $D_u\leq 25\%$)	A
I_B	0.5	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
	15 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

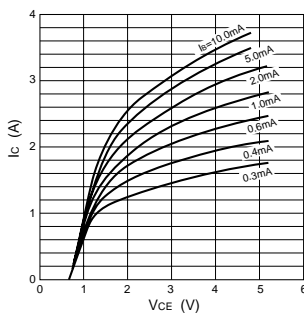
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=50\text{V}$
I_{EBO}			5	mA	$V_{EB}=6\text{V}$
V_{CEO}	50	60	70	V	$I_c=10\text{mA}$
h_{FE}	2000	5000	12000		$V_{CE}=4\text{V}, I_c=1\text{A}$
$V_{CE(sat)}$		1.1	1.5	V	$I_c=1\text{A}, I_B=2\text{mA}$
$V_{BE(sat)}$		1.8	2.2	V	
V_{FEC}		1.3	1.8	V	$I_{FEC}=1\text{A}$
t_{on}		0.5		μs	$V_{CC}\doteq 30\text{V},$ $I_c=1\text{A},$ $I_{B1}=-I_{B2}=2\text{mA}$
t_{stg}		4.0		μs	
t_f		1.0		μs	
f_T		50		MHz	$V_{CE}=12\text{V}, I_E=-0.1\text{A}$
C_{ob}		25		pF	$V_{CB}=10\text{V}, f=1\text{MHz}$

Equivalent circuit diagram

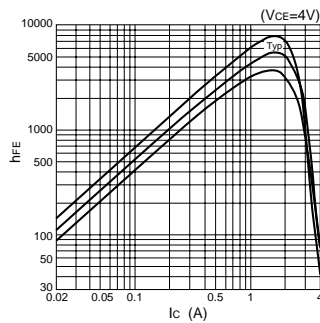


Characteristic curves

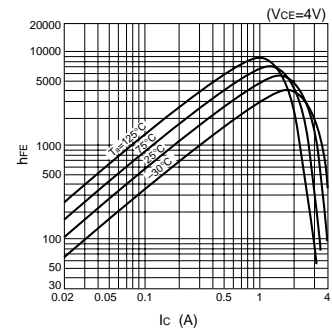
I_c - V_{CE} Characteristics (Typical)



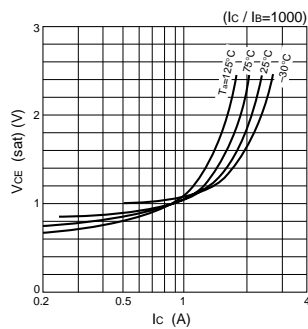
h_{FE} - I_c Characteristics (Typical)



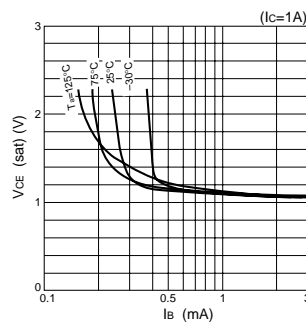
h_{FE} - I_c Temperature Characteristics (Typical)



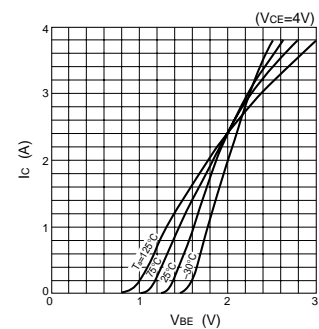
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



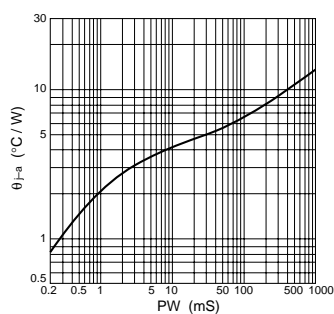
$V_{CE(sat)}$ - I_B Temperature Characteristics (Typical)



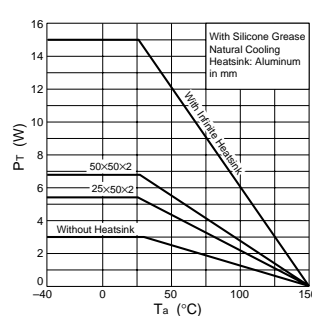
I_c - V_{BE} Temperature Characteristics (Typical)



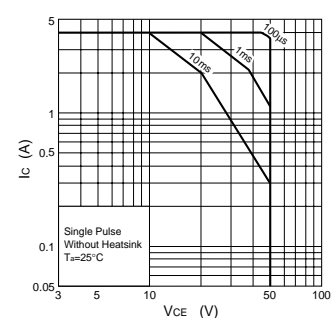
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

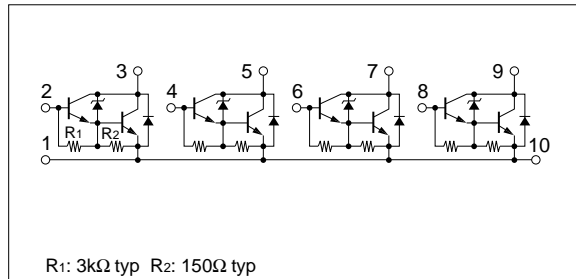
Symbol	Ratings	Unit
V_{CB0}	60 ± 10	V
V_{CEO}	60 ± 10	V
V_{EBO}	6	V
I_c	4	A
I_{cP}	8 (PW \leq 10ms, $D_u\leq$ 50%)	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

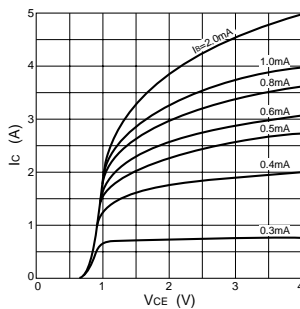
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			100	μA	$V_{CB}=50\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$
V_{CEO}	50	60	70	V	$I_c=10\text{mA}$
h_{FE}	1000				$V_{CE}=4\text{V}$, $I_c=3\text{A}$
$V_{CE(sat)}$			2.0	V	$I_c=3\text{A}$, $I_b=10\text{mA}$
t_{on}		1.0		μs	$V_{CC}\doteq 30\text{V}$, $I_c=3\text{A}$, $I_{B1}=-I_{B2}=10\text{mA}$
t_{stg}		4.0		μs	
t_f		1.5		μs	

Equivalent circuit diagram

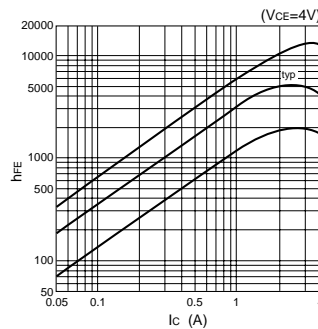


Characteristic curves

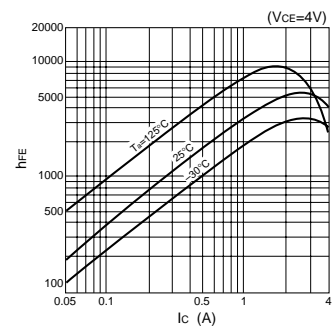
I_c - V_{CE} Characteristics (Typical)



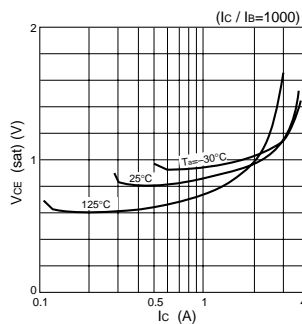
h_{FE} - I_c Characteristics (Typical)



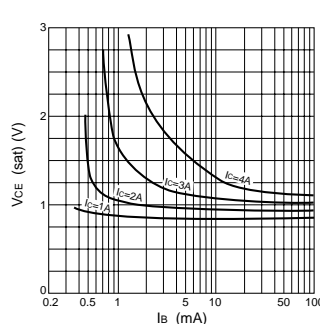
h_{FE} - I_c Temperature Characteristics (Typical)



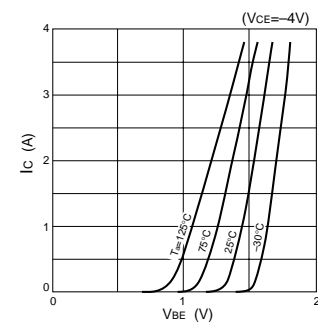
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



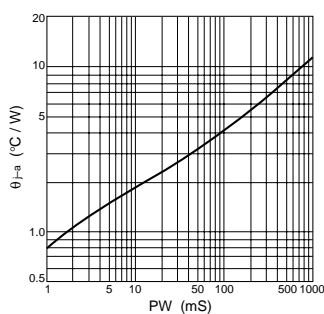
$V_{CE(sat)}$ - I_b Characteristics (Typical)



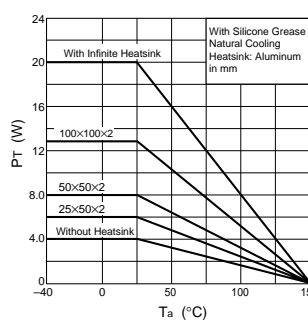
I_c - V_{BE} Temperature Characteristics (Typical)



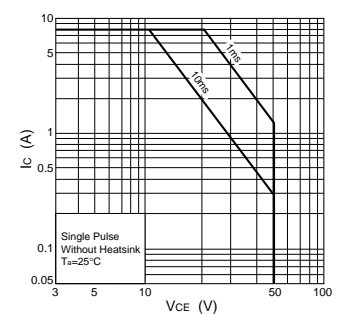
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



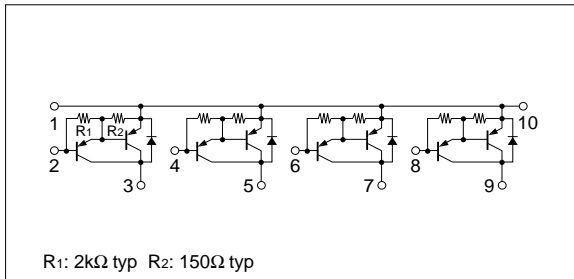
Absolute maximum ratings (Ta=25°C)

Symbol	Ratings	Unit
V _{CB0}	-50	V
V _{CEO}	-50	V
V _{EBO}	-6	V
I _c	-4	A
I _{CP}	-8 (PW≤10ms, Du≤50%)	A
P _T	4 (Ta=25°C)	W
	20 (Tc=25°C)	
T _j	150	°C
T _{stg}	-40 to +150	°C

Electrical characteristics (Ta=25°C)

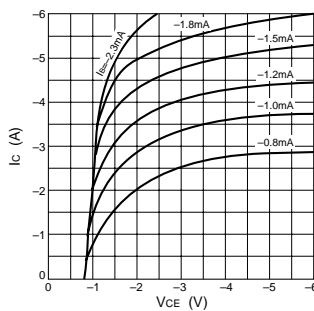
Symbol	Specification			Unit	Conditions
	min	typ	max		
I _{CB0}			-100	μA	V _{CB} =-50V
I _{EBO}			-10	mA	V _{EB} =-6V
V _{CEO}	-50			V	I _c =-10mA
h _{FE}	1000				V _{CE} =-4V, I _c =-3A
V _{CE(sat)}			-2.0	V	I _c =-3A, I _B =-10mA
t _{on}		0.4		μs	V _{CC} =-30V, I _c =-3A, I _{B1} =-I _{B2} =-10mA
t _{stg}		0.8		μs	
t _f		0.6		μs	

Equivalent circuit diagram

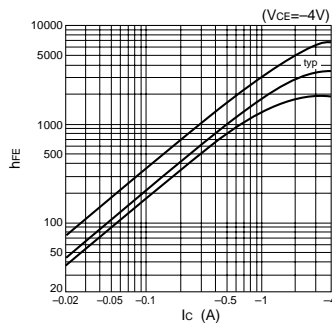


Characteristic curves

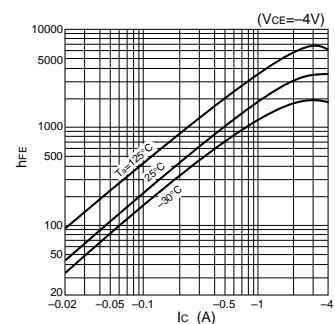
I_c-V_{CE} Characteristics (Typical)



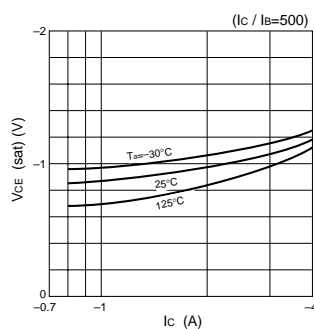
h_{FE}-I_c Characteristics (Typical)



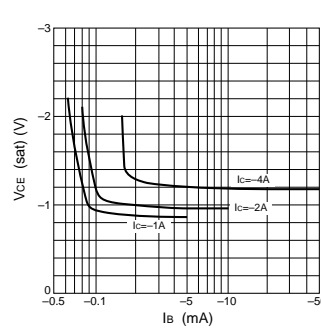
h_{FE}-I_c Temperature Characteristics (Typical)



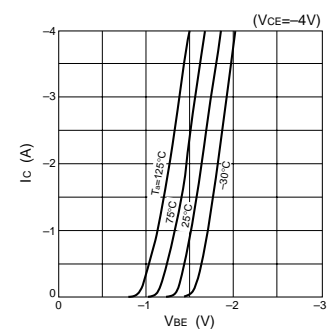
V_{CE(sat)}-I_c Temperature Characteristics (Typical)



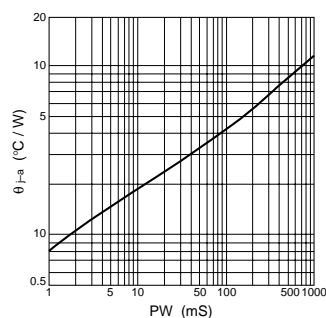
V_{CE(sat)}-I_B Characteristics (Typical)



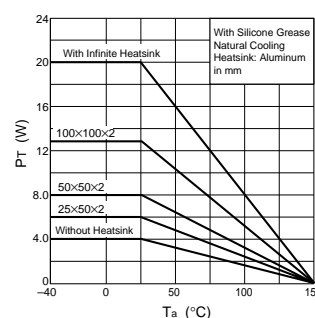
I_c-V_{BE} Temperature Characteristics (Typical)



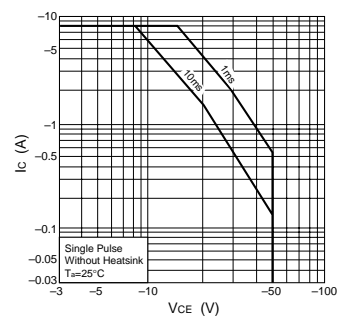
θ_{J-a}-PW Characteristics



P_T-T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

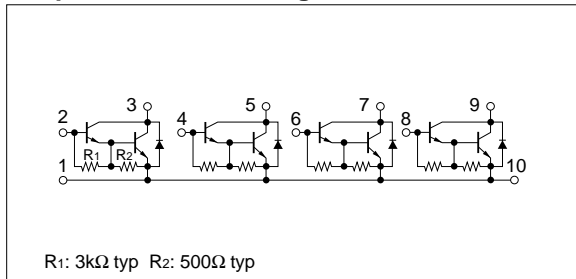
Symbol	Ratings	Unit
V_{CB0}	120	V
V_{CEO}	100	V
V_{EBO}	6	V
I_c	4	A
I_{CP}	8 ($PW \leq 10\text{ms}$, $D_u \leq 50\%$)	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

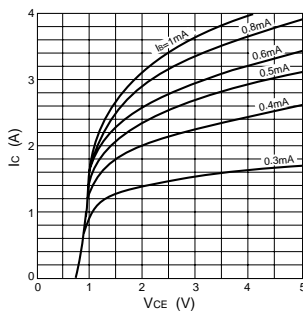
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			100	μA	$V_{CB}=120\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$
V_{CEO}	100			V	$I_c=10\text{mA}$
h_{FE}	1000				$V_{CE}=4\text{V}$, $I_c=2\text{A}$
$V_{CE(sat)}$			2.0	V	$I_c=2\text{A}$, $I_b=10\text{mA}$
t_{on}		0.6		μs	$V_{CC} \doteq 40\text{V}$, $I_c=2\text{A}$, $I_{B1}=-I_{B2}=10\text{mA}$
t_{stg}		5.0		μs	
t_f		2.0		μs	

Equivalent circuit diagram

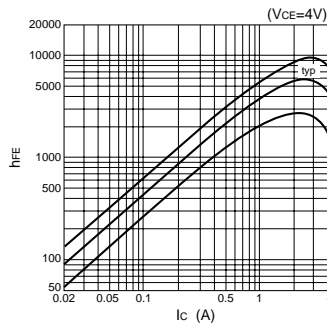


Characteristic curves

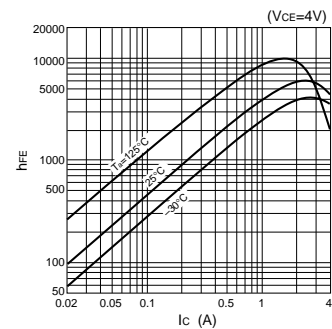
I_c - V_{CE} Characteristics (Typical)



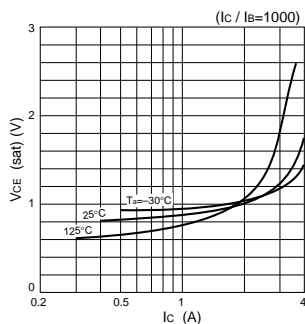
h_{FE} - I_c Characteristics (Typical)



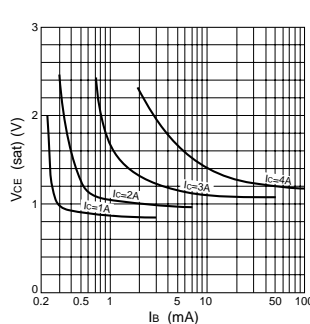
h_{FE} - I_c Temperature Characteristics (Typical)



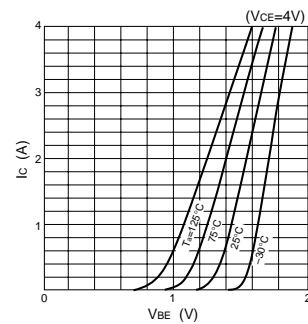
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



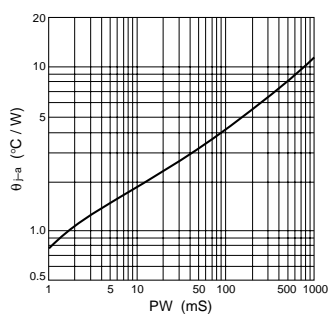
$V_{CE(sat)}$ - I_b Characteristics (Typical)



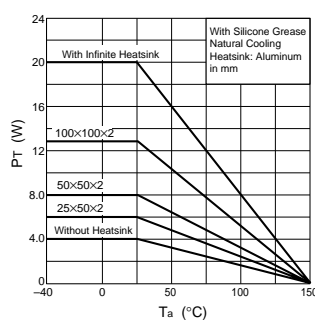
I_c - V_{BE} Temperature Characteristics (Typical)



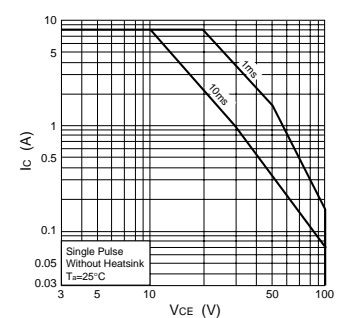
θ_{j-a} - PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

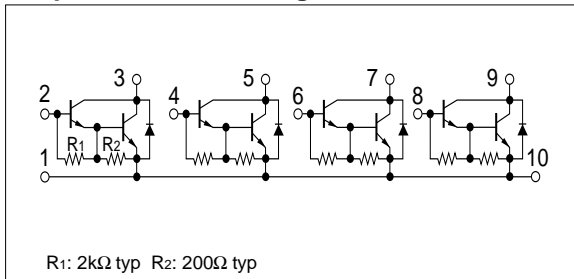
Symbol	Ratings	Unit
V_{CB0}	200	V
V_{CEO}	200	V
V_{EBO}	6	V
I_c	3	A
I_{CP}	6 (PW \leq 10ms, $D_u\leq$ 50%)	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

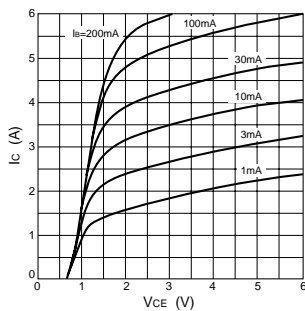
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			100	μA	$V_{CB}=200\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$
V_{CEO}	200			V	$I_c=10\text{mA}$
h_{FE}	1000				$V_{CE}=4\text{V}$, $I_c=1\text{A}$
$V_{CE(sat)}$			2.0	V	$I_c=1\text{A}$, $I_b=1.5\text{mA}$

Equivalent circuit diagram

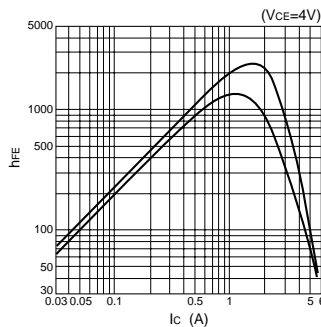


Characteristic curves

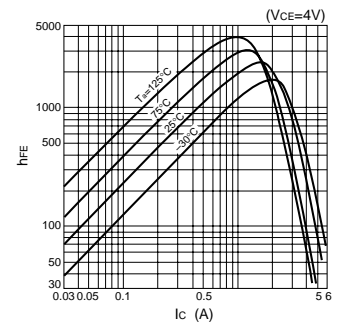
I_c - V_{CE} Characteristics (Typical)



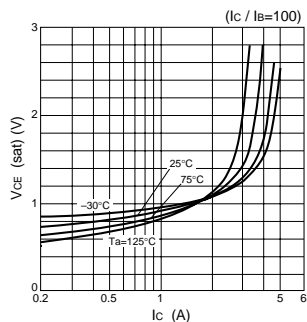
h_{FE} - I_c Characteristics (Typical)



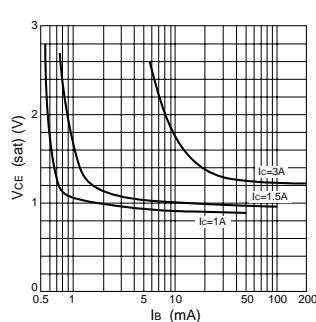
h_{FE} - I_c Temperature Characteristics (Typical)



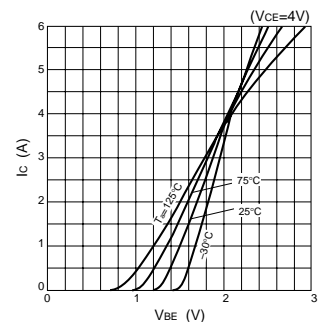
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



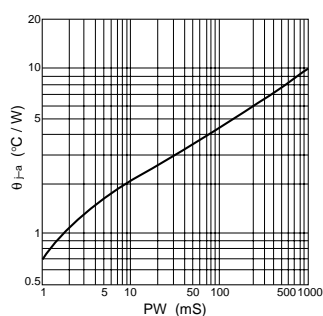
$V_{CE(sat)}$ - I_b Characteristics (Typical)



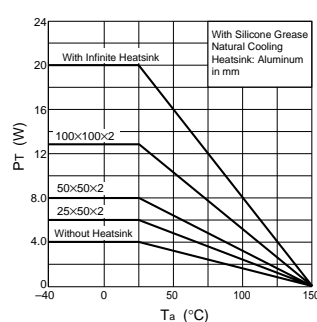
I_c - V_{BE} Temperature Characteristics (Typical)



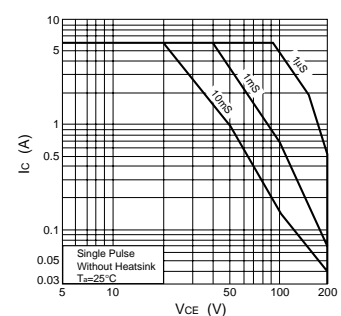
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

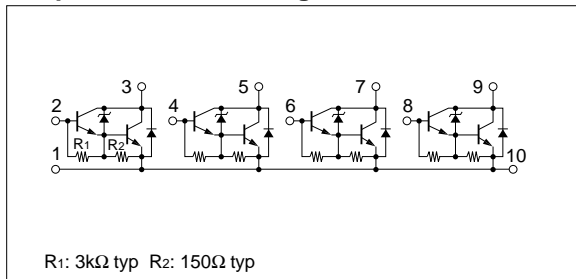
Symbol	Ratings	Unit
V_{CB0}	60 ± 10	V
V_{CE0}	60 ± 10	V
V_{EB0}	6	V
I_c	6	A
I_B	1	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

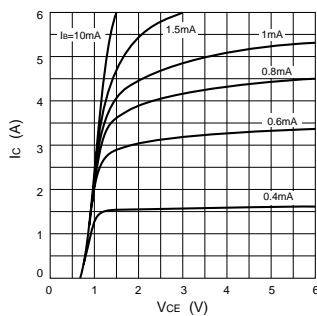
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=50\text{V}$
I_{EB0}			10	mA	$V_{EB}=6\text{V}$
V_{CE0}	50	60	70	V	$I_c=50\text{mA}$
h_{FE}	2000		15000		$V_{CE}=2\text{V}, I_c=3\text{A}$
$V_{CE(sat)}$			1.5	V	$I_c=3\text{A}, I_B=10\text{mA}$
$V_{BE(sat)}$			2.0	V	
$E_{S/B}$	200			mJ	$V_{CC}=20\text{V}, L=10\text{mH}, I_c=6.4\text{A}$

Equivalent circuit diagram

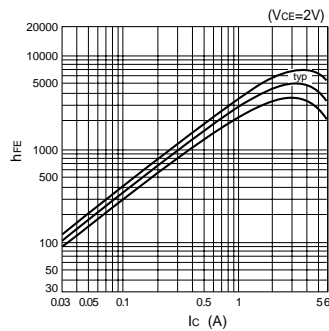


Characteristic curves

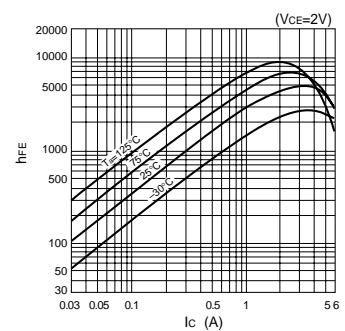
I_c - V_{CE} Characteristics (Typical)



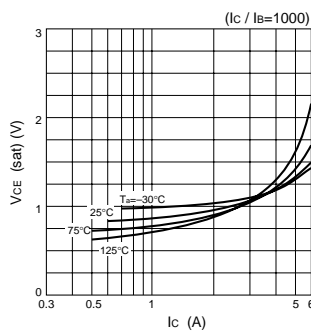
h_{FE} - I_c Characteristics (Typical)



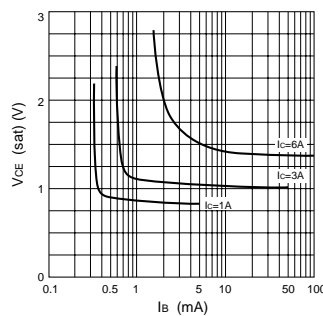
h_{FE} - I_c Temperature Characteristics (Typical)



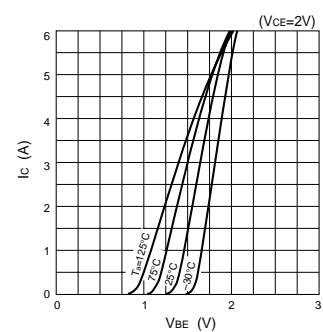
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



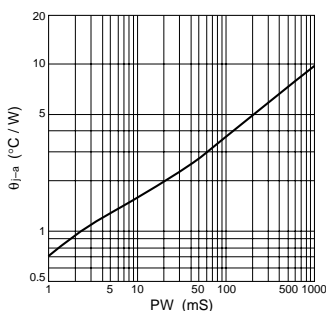
$V_{CE(sat)}$ - I_B Characteristics (Typical)



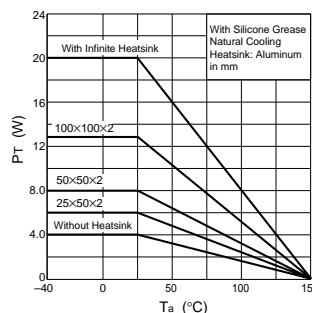
I_c - V_{BE} Temperature Characteristics (Typical)



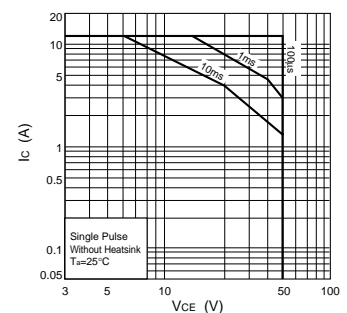
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

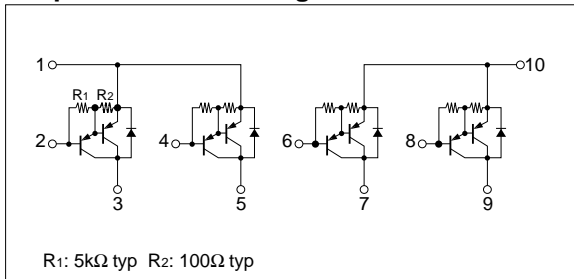
Symbol	Ratings	Unit
V_{CBO}	-120	V
V_{CEO}	-120	V
V_{EBO}	-6	V
I_C	-4	A
I_B	-1	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

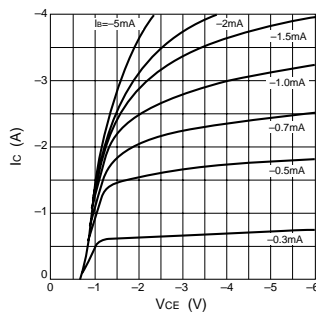
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			-10	μA	$V_{CB}=-120\text{V}$
I_{EBO}			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	-120			V	$I_C=-10\text{mA}$
h_{FE}	2000				$V_{CE}=-4\text{V}, I_C=-2\text{A}$
$V_{CE(sat)}$			-1.5	V	$I_C=-2\text{A}, I_B=-4\text{mA}$
$V_{BE(sat)}$			-2.5	V	

Equivalent circuit diagram

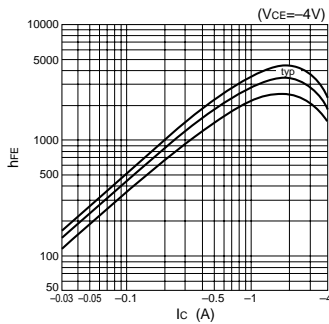


Characteristic curves

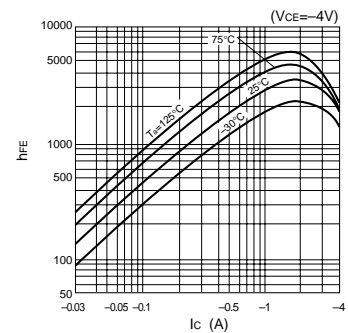
I_C - V_{CE} Characteristics (Typical)



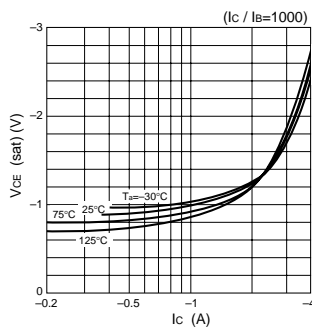
h_{FE} - I_C Characteristics (Typical)



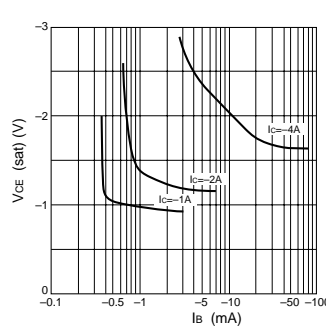
h_{FE} - I_C Temperature Characteristics (Typical)



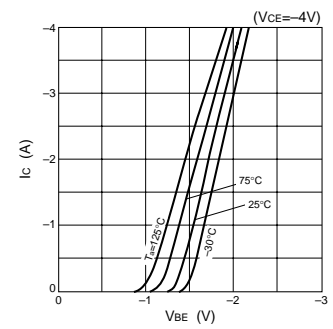
$V_{CE(sat)}$ - I_C Temperature Characteristics (Typical)



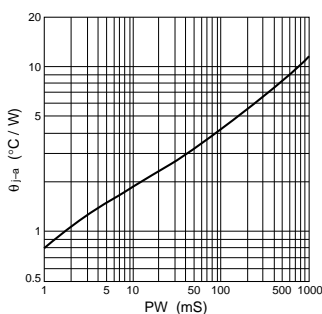
$V_{CE(sat)}$ - I_B Characteristics (Typical)



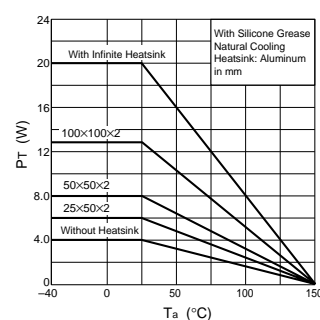
I_C - V_{BE} Temperature Characteristics (Typical)



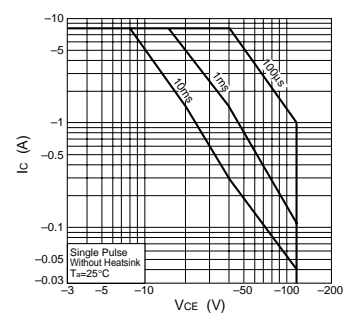
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

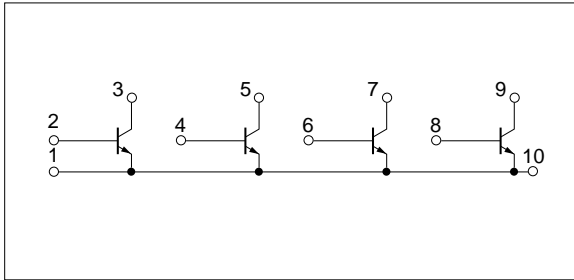
Symbol	Ratings	Unit
V_{CB0}	60	V
V_{CE0}	60	V
V_{EB0}	6	V
I_c	3	A
I_{cP}	6 (PW \leq 10ms, Du \leq 50%)	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

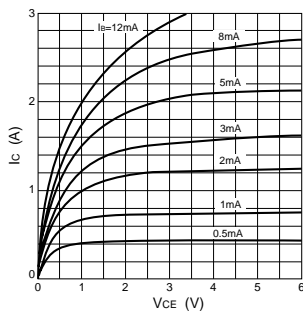
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			100	μA	$V_{CB}=60\text{V}$
I_{EBO}			100	μA	$V_{EB}=6\text{V}$
V_{CE0}	60			V	$I_c=25\text{mA}$
h_{FE}	300				$V_{CE}=4\text{V}$, $I_c=0.5\text{A}$
$V_{CE(sat)}$			1.0	V	$I_c=1\text{A}$, $I_B=10\text{mA}$
t_{on}		0.8		μs	$V_{CC}\approx 20\text{V}$, $I_c=1\text{A}$, $I_{B1}=15\text{mA}$, $I_{B2}=-30\text{mA}$
t_{stg}		3.0		μs	
t_f		1.2		μs	

Equivalent circuit diagram

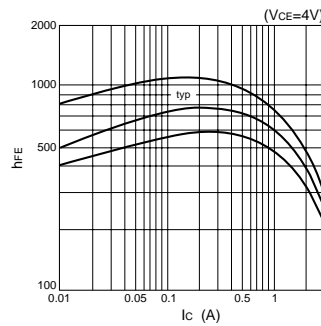


Characteristic curves

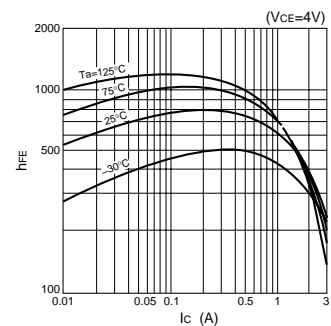
I_c - V_{CE} Characteristics (Typical)



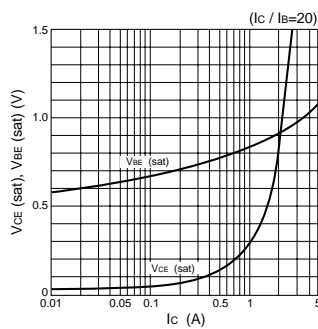
h_{FE} - I_c Characteristics (Typical)



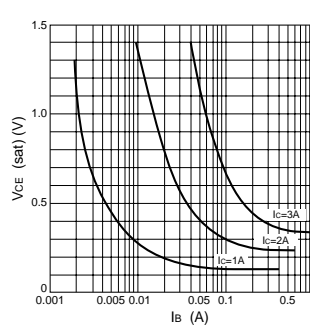
h_{FE} - I_c Temperature Characteristics (Typical)



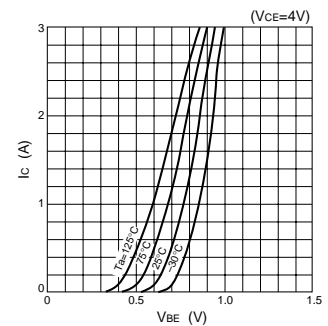
$V_{CE(sat)}$, $V_{BE(sat)}$ - I_c Characteristics (Typical)



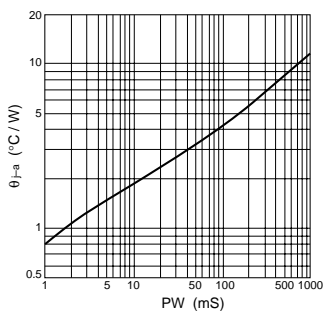
$V_{CE(sat)}$ - I_B Characteristics (Typical)



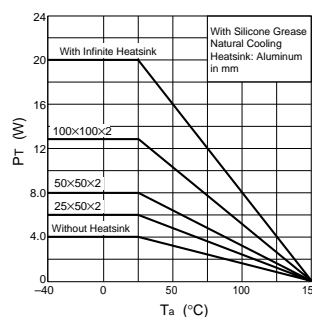
I_c - V_{BE} Temperature Characteristics (Typical)



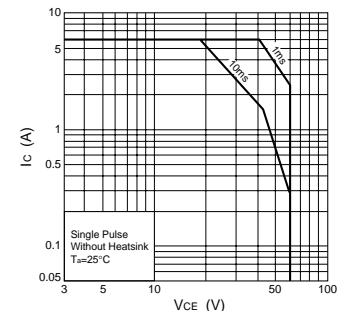
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

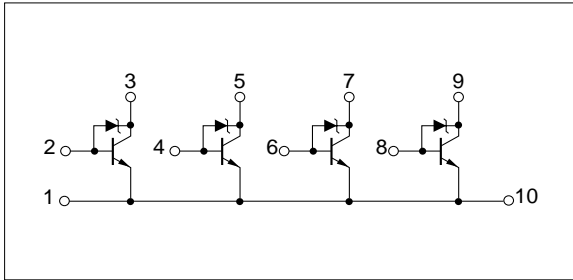
Symbol	Ratings	Unit
V_{CB0}	35±5	V
V_{CE0}	35±5	V
V_{EBO}	6	V
I_C	3	A
I_B	1	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

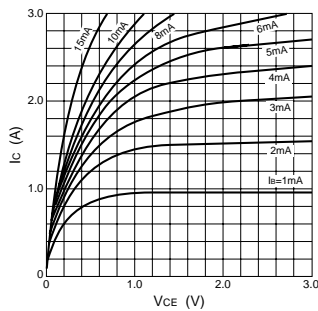
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=30\text{V}$
I_{EBO}			10	μA	$V_{EB}=6\text{V}$
V_{CE0}	30		40	V	$I_C=25\text{mA}$
h_{FE}	500				$V_{CE}=4\text{V}$, $I_C=0.5\text{A}$
$V_{CE(sat)}$			0.5	V	$I_C=1\text{A}$, $I_B=5\text{mA}$

Equivalent circuit diagram

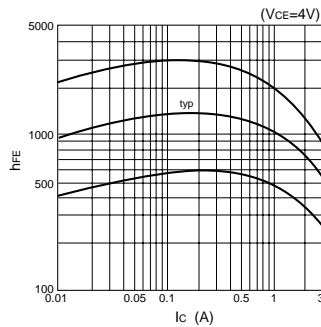


Characteristic curves

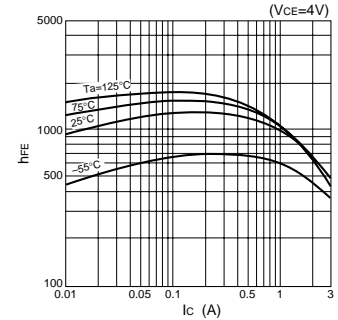
I_C - V_{CE} Characteristics (Typical)



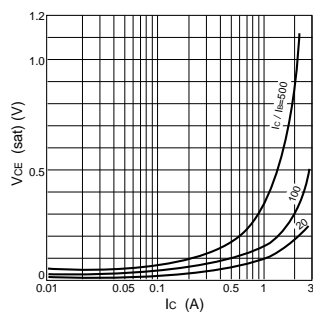
h_{FE} - I_C Characteristics (Typical)



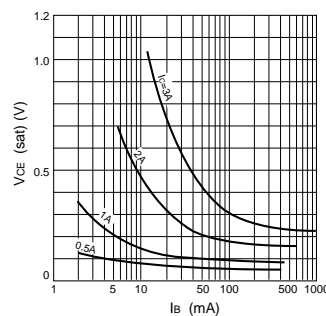
h_{FE} - I_C Temperature Characteristics (Typical)



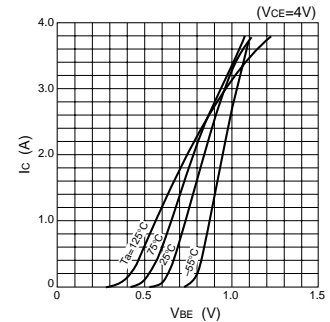
$V_{CE(sat)}$ - I_C Characteristics (Typical)



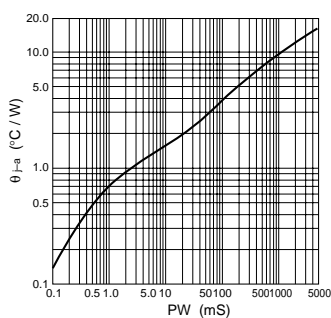
$V_{CE(sat)}$ - I_B Characteristics (Typical)



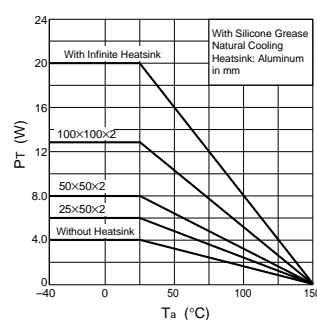
I_C - V_{BE} Temperature Characteristics (Typical)



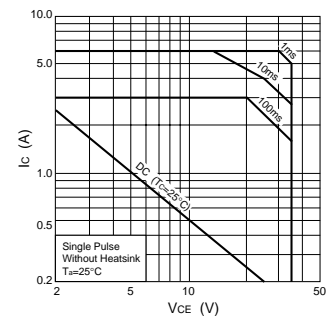
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

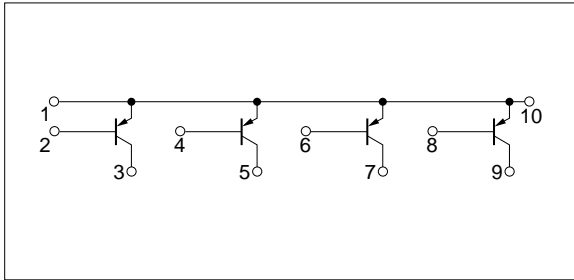
Symbol	Ratings	Unit
V_{CB0}	-60	V
V_{CEO}	-60	V
V_{EBO}	-6	V
I_c	-3	A
I_{cP}	-6 (PW \leq 10ms, Du \leq 50%)	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

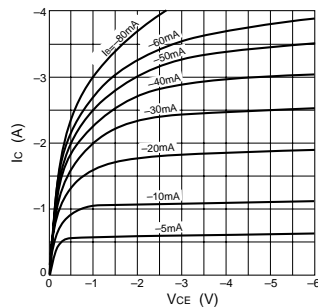
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			-100	μA	$V_{CB}=-60\text{V}$
I_{EBO}			-100	μA	$V_{EB}=-6\text{V}$
V_{CEO}	-60			V	$I_c=-25\text{mA}$
h_{FE}	40				$V_{CE}=-4\text{V}$, $I_c=-1\text{A}$
$V_{CE(sat)}$			-1.0	V	$I_c=-2\text{A}$, $I_B=-0.2\text{A}$
t_{on}		0.25		μs	$V_{CC}=-12\text{V}$, $I_c=-2\text{A}$, $I_{B1}=-I_{B2}=-0.2\text{A}$
t_{stg}		0.75		μs	
t_f		0.25		μs	

Equivalent circuit diagram

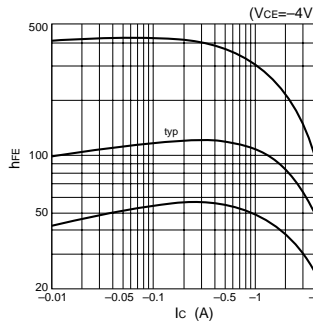


Characteristic curves

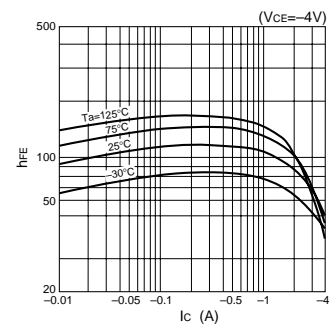
I_c - V_{CE} Characteristics (Typical)



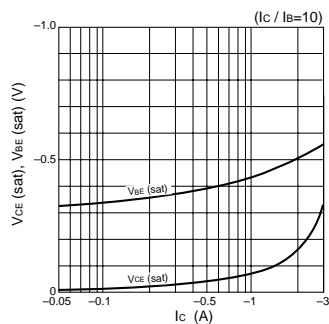
h_{FE} - I_c Characteristics (Typical)



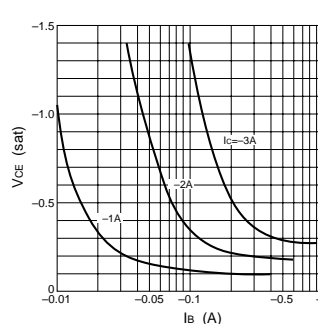
h_{FE} - I_c Temperature Characteristics (Typical)



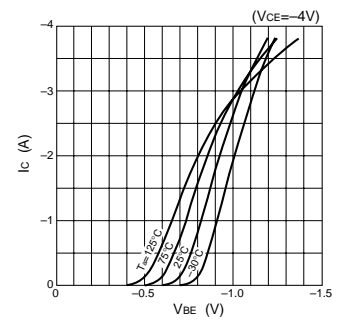
$V_{CE(sat)}$, $V_{BE(sat)}$ - I_c Characteristics (Typical)



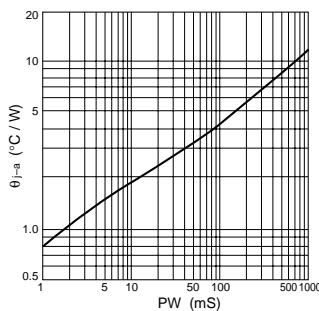
$V_{CE(sat)}$ - I_B Characteristics (Typical)



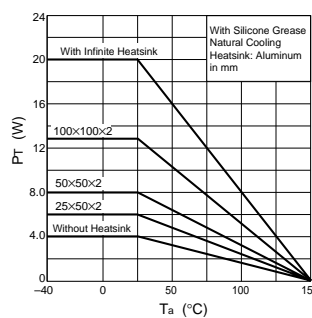
I_c - V_{BE} Temperature Characteristics (Typical)



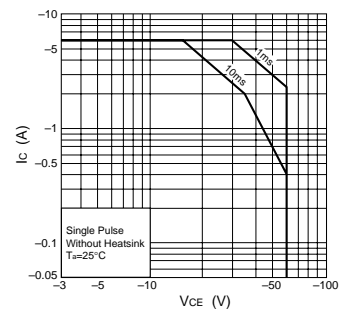
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)

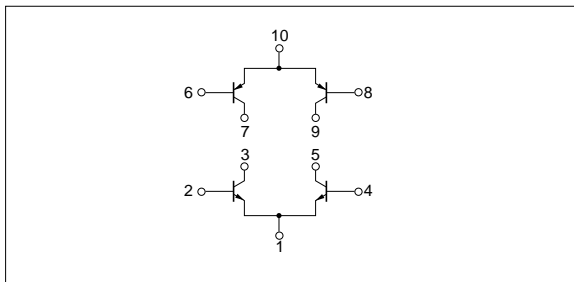


Absolute maximum ratings

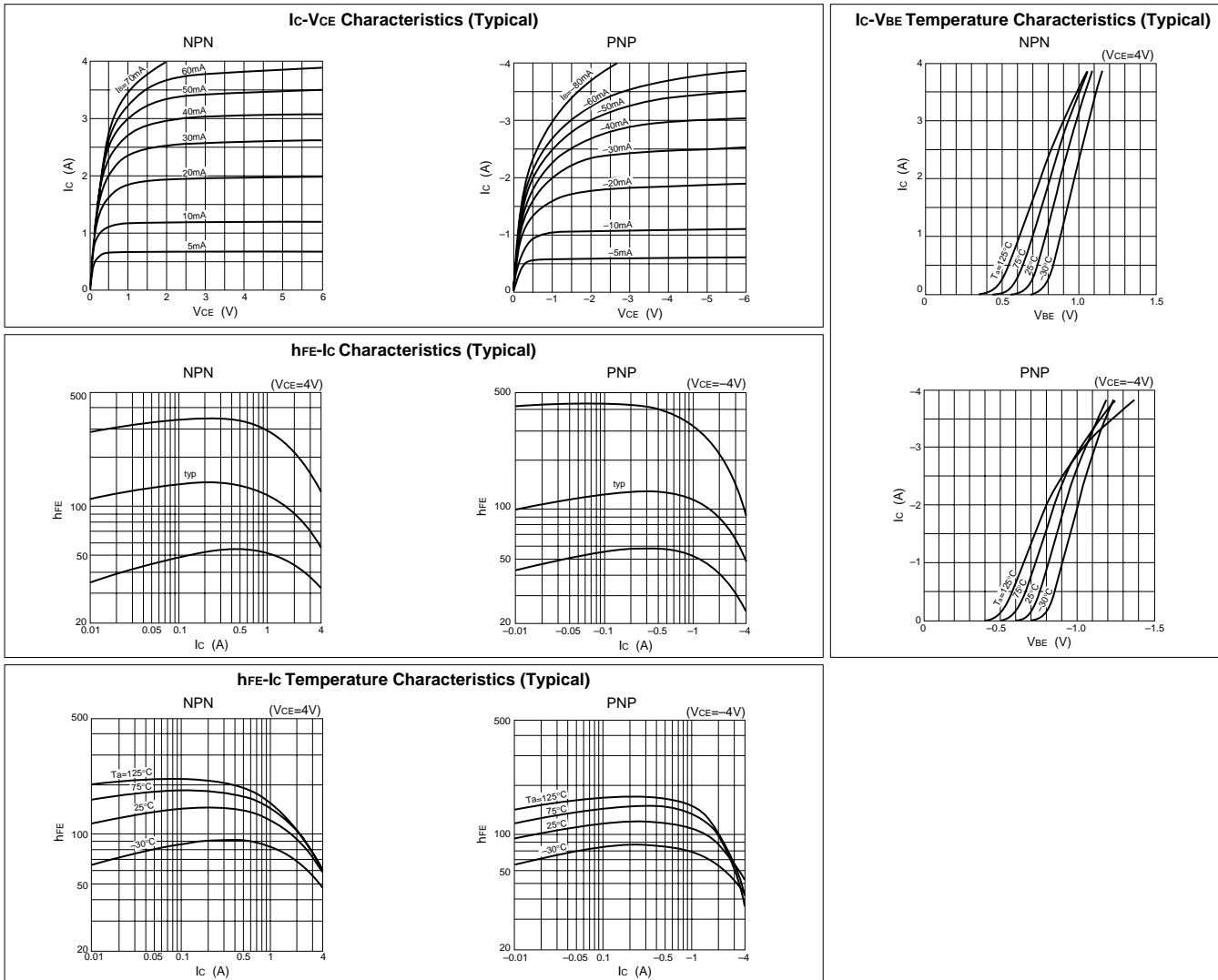
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	60	-60	V
V_{CEO}	60	-60	V
V_{EBO}	6	-6	V
I_C	3	-3	A
I_{CP}	6 (PW \leq 10ms, Du \leq 50%)	-6 (PW \leq 10ms, Du \leq 50%)	A
P_T	4 ($T_a=25^\circ\text{C}$)		W
	20 ($T_c=25^\circ\text{C}$)		
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$

Equivalent circuit diagram



Characteristic curves

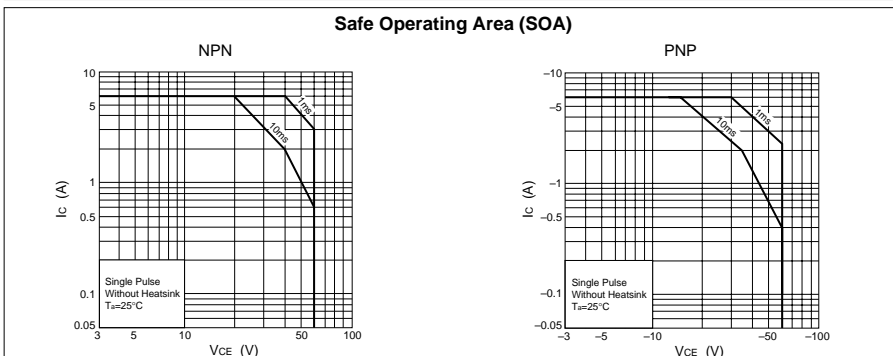
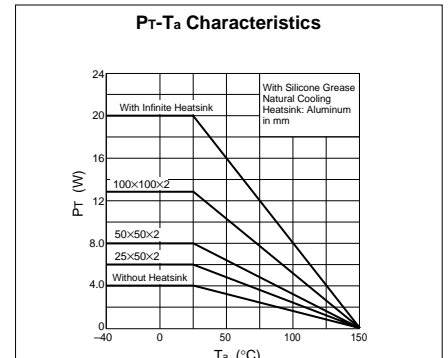
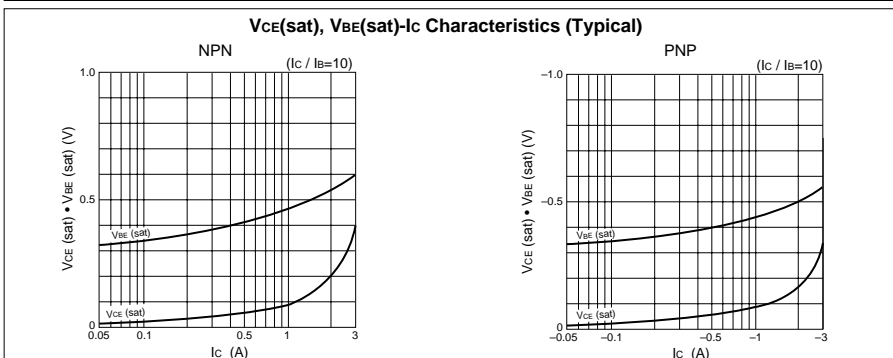
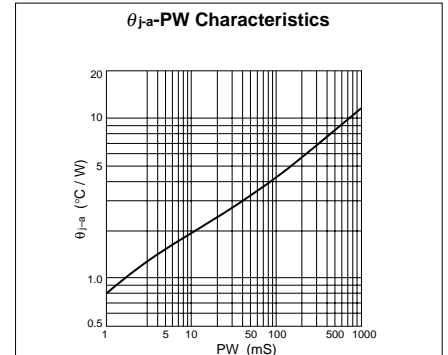
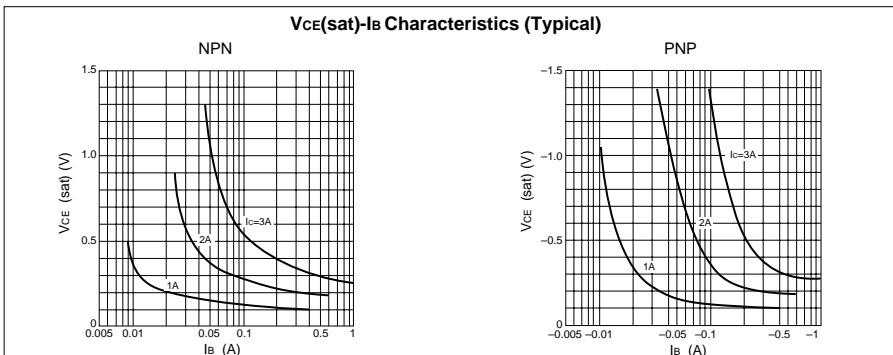


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			100	μA	$V_{CB}=60\text{V}$			-100	μA	$V_{CB}=-60\text{V}$
I_{EBO}			100	μA	$V_{EB}=6\text{V}$			-100	μA	$V_{EB}=-6\text{V}$
V_{CEO}	60			V	$I_C=25\text{mA}$	-60			V	$I_C=-25\text{mA}$
hFE	40				$V_{CE}=4\text{V}, I_C=1\text{A}$	40				$V_{CE}=-4\text{V}, I_C=-1\text{A}$
$V_{CE(sat)}$			1.0	V	$I_C=2\text{A}, I_B=0.2\text{A}$			-1.0	V	$I_C=-2\text{A}, I_B=-0.2\text{A}$
t_{on}		0.2		μs	$V_{CC} \doteq 12\text{V},$ $I_C=2\text{A},$ $I_{B1}=-I_{B2}=0.2\text{A}$		0.25		μs	$V_{CC} \doteq -12\text{V},$ $I_C=-2\text{A},$ $I_{B1}=-I_{B2}=-0.2\text{A}$
t_{stg}		1.0		μs			0.75		μs	
t_f		0.3		μs			0.25		μs	

Characteristic curves

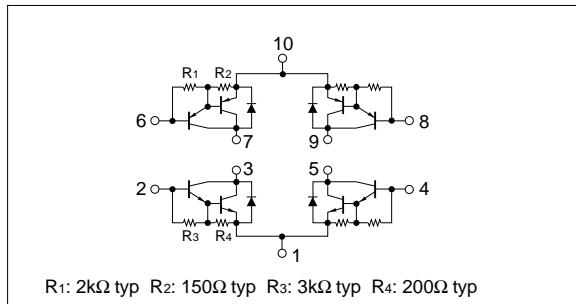


Absolute maximum ratings

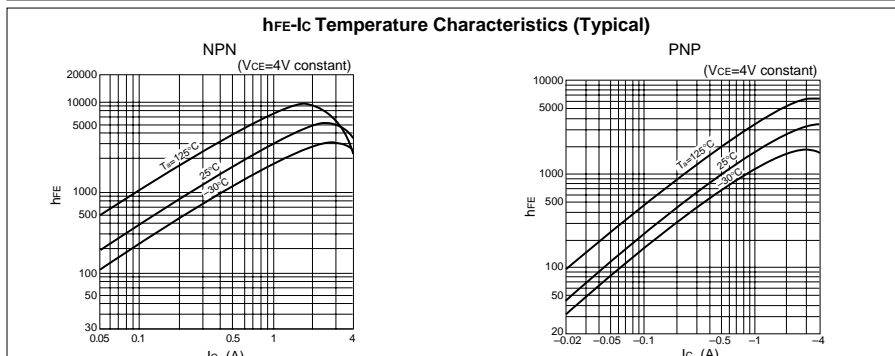
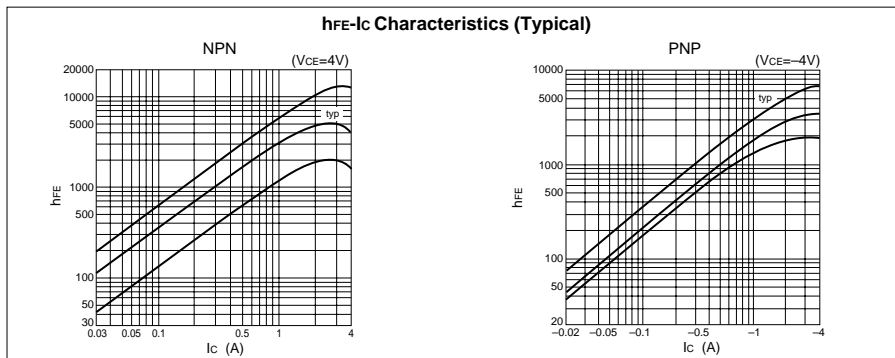
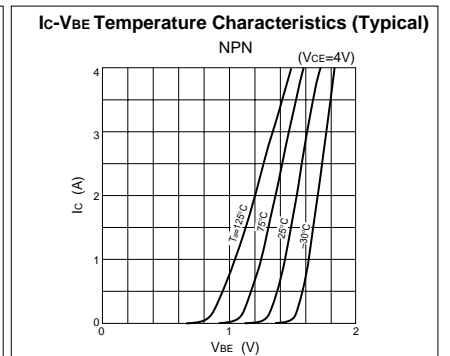
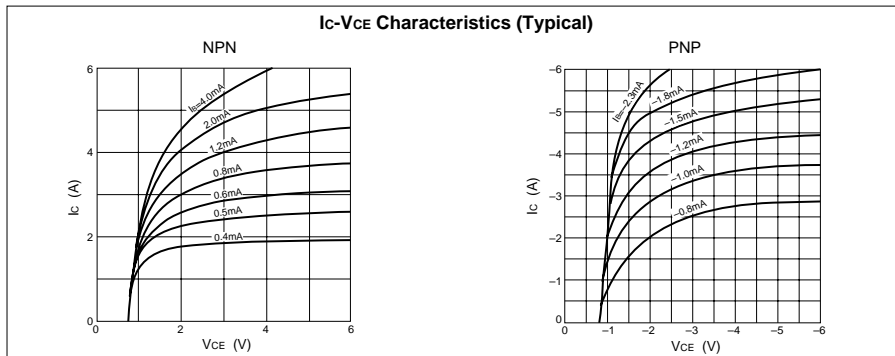
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	80	-60	V
V_{CEO}	60	-60	V
V_{EBO}	6	-6	V
I_c	4	-4	A
I_{CP}	8 (PW \leq 10ms, Du \leq 50%)	-8 (PW \leq 10ms, Du \leq 50%)	A
P_T	4 ($T_a=25^\circ\text{C}$)		W
	20 ($T_c=25^\circ\text{C}$)		
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$

Equivalent circuit diagram



Characteristic curves

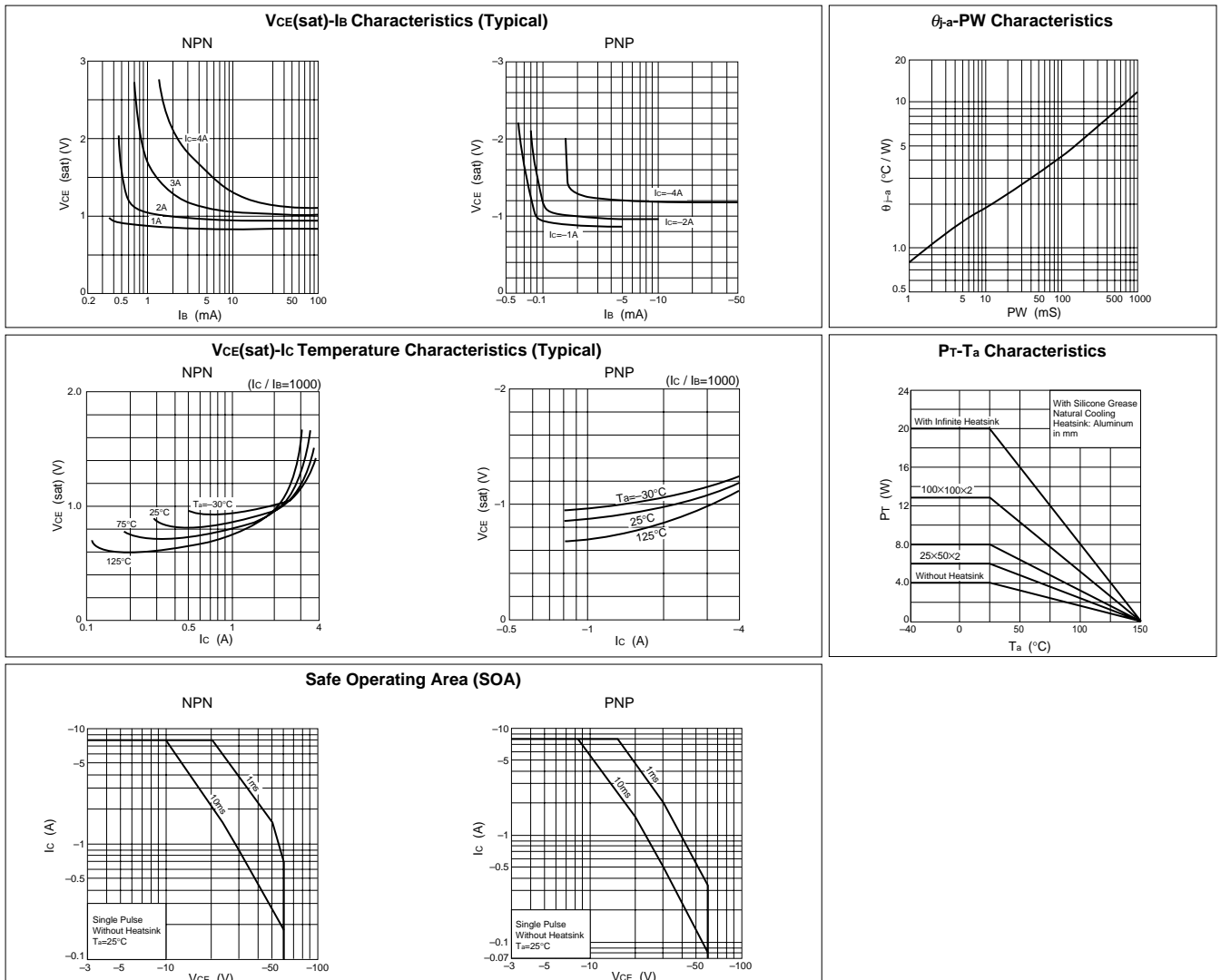


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			100	μA	$V_{CB}=80\text{V}$			-100	μA	$V_{CB}=-60\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	60			V	$I_C=10\text{mA}$	-60			V	$I_C=-10\text{mA}$
hFE	1000				$V_{CE}=4\text{V}, I_C=3\text{A}$	1000				$V_{CE}=-4\text{V}, I_C=-3\text{A}$
$V_{CE}(\text{sat})$			2.0	V	$I_C=3\text{A}, I_B=10\text{mA}$			-2.0	V	$I_C=-2\text{A}, I_B=-10\text{mA}$
t_{on}		1.0		μs	$V_{CC} \doteq 30\text{V},$ $I_C=3\text{A},$ $I_{B1}=-I_{B2}=10\text{mA}$		0.4		μs	$V_{CC} \doteq -30\text{V},$ $I_C=-3\text{A},$ $I_{B1}=-I_{B2}=-10\text{mA}$
t_{stg}		4.0		μs			0.8		μs	
t_f		1.5		μs			0.6		μs	

Characteristic curves



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

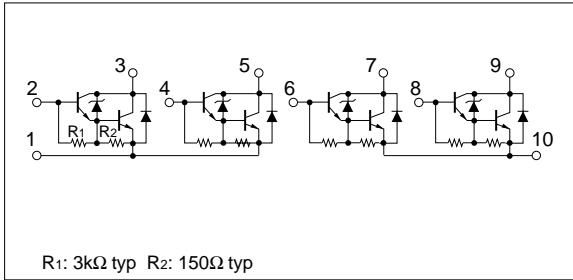
Symbol	Ratings	Unit
V_{CB0}	65±15	V
V_{CEO}	65±15	V
V_{EBO}	6	V
I_c	4	A
I_{CP}	8 (PW≤10ms, $D_u\leq 50\%$)	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

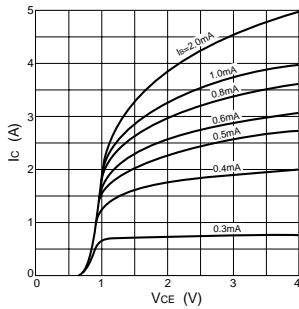
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			100	μA	$V_{CB}=50\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$
V_{CEO}	50	65	80	V	$I_c=10\text{mA}$
h_{FE}	1000				$V_{CE}=4\text{V}$, $I_c=3\text{A}$
$V_{CE(sat)}$			2.0	V	$I_c=3\text{A}$, $I_B=10\text{mA}$
t_{on}		1.0		μs	$V_{CC}\doteq 30\text{V}$, $I_c=3\text{A}$, $I_{B1}=-I_{B2}=10\text{mA}$
t_{stg}		4.0		μs	
t_f		1.5		μs	

Equivalent circuit diagram

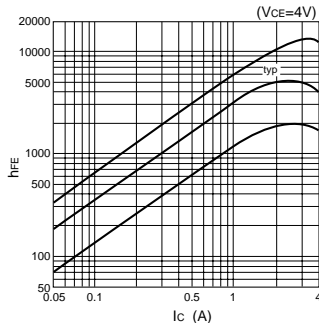


Characteristic curves

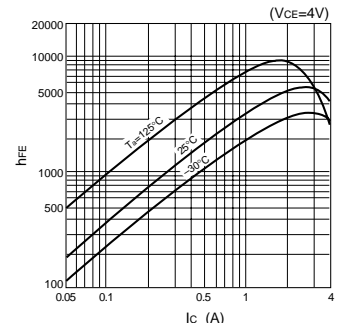
I_c - V_{CE} Characteristics (Typical)



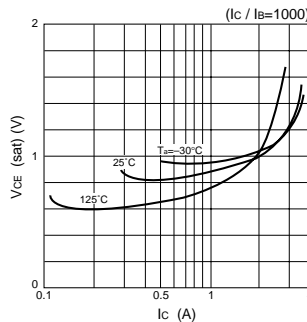
h_{FE} - I_c Characteristics (Typical)



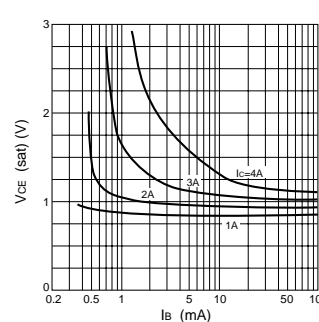
h_{FE} - I_c Temperature Characteristics (Typical)



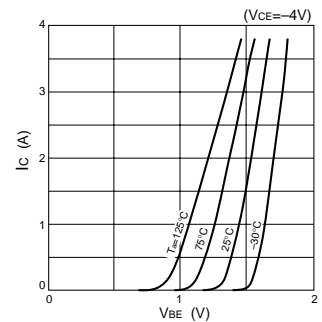
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



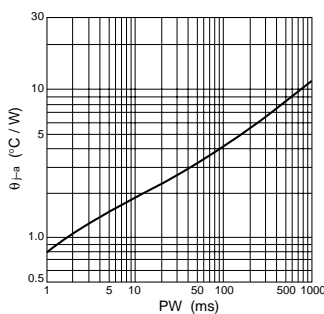
$V_{CE(sat)}$ - I_B Characteristics (Typical)



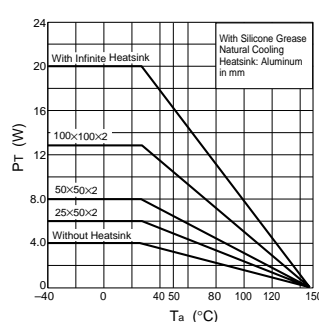
I_c - V_{BE} Temperature Characteristics (Typical)



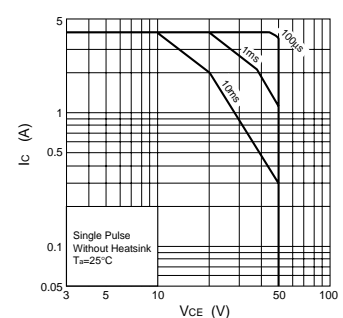
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)

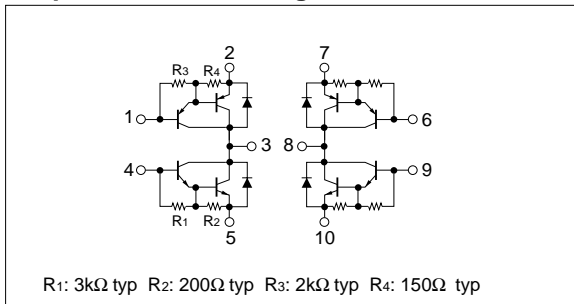


Absolute maximum ratings

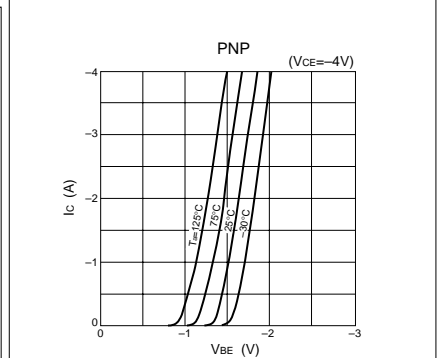
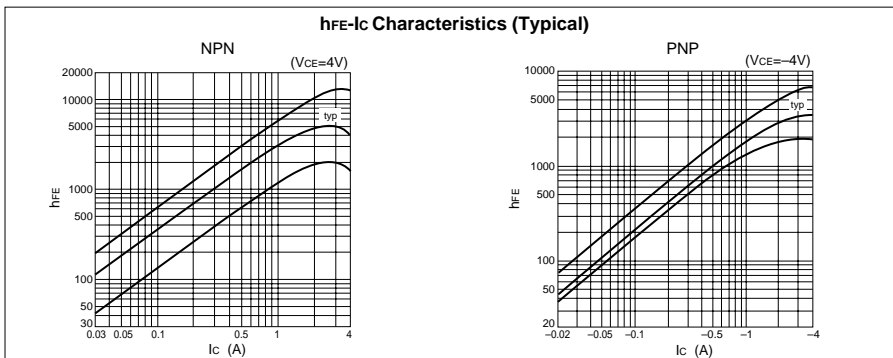
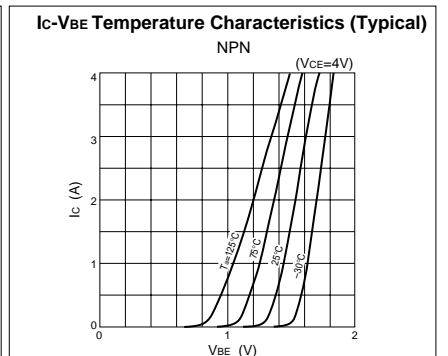
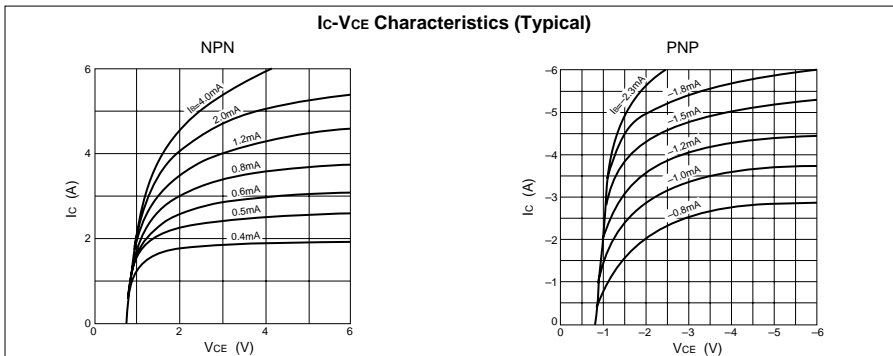
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	60	-60	V
V_{CEO}	60	-60	V
V_{EBO}	6	-6	V
I_c	4	-4	A
I_{CP}	8 ($PW \leq 10\text{ms}$, $D_u \leq 50\%$)	-8 ($PW \leq 10\text{ms}$, $D_u \leq 50\%$)	A
P_T	4 ($T_a=25^\circ\text{C}$)		W
	20 ($T_c=25^\circ\text{C}$)		
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$

Equivalent circuit diagram



Characteristic curves

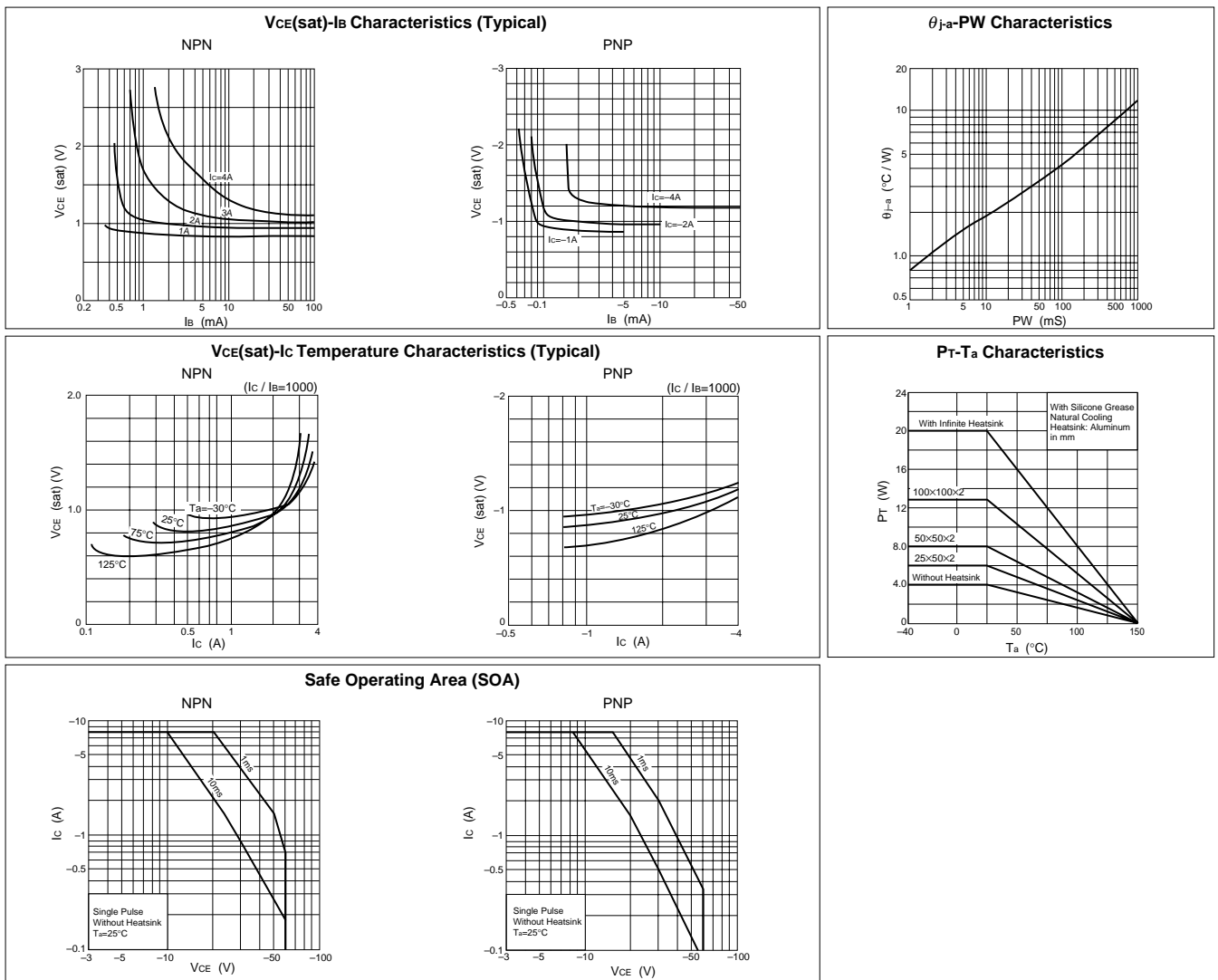


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=60\text{V}$			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			10	mA	$V_{EB}=6\text{V}$			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	60			V	$I_C=10\text{mA}$	-60			V	$I_C=-10\text{mA}$
hFE	2000				$V_{CE}=4\text{V}, I_C=2\text{A}$	2000				$V_{CE}=-4\text{V}, I_C=-2\text{A}$
$V_{CE}(\text{sat})$			1.5	V	$I_C=2\text{A}, I_B=4\text{mA}$			-1.5	V	$I_C=-2\text{A}, I_B=-4\text{mA}$
$V_{BE}(\text{sat})$			2.0	V				-2.0	V	
V_{FEC}			1.6	V	$I_{FEC}=2\text{A}$			-1.6	V	$I_{FEC}=-2\text{A}$

Characteristic curves

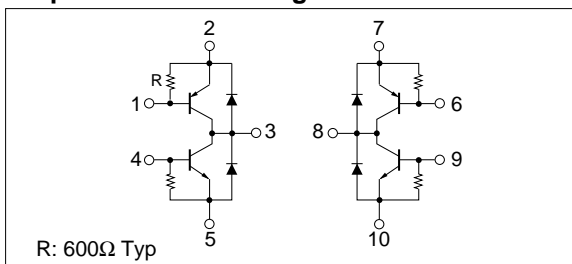


Absolute maximum ratings

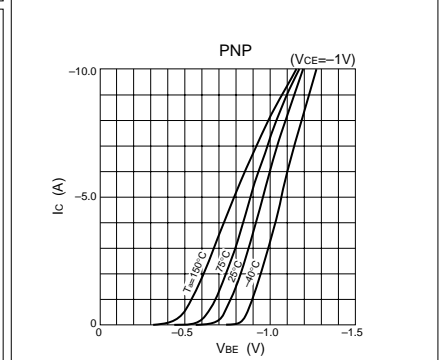
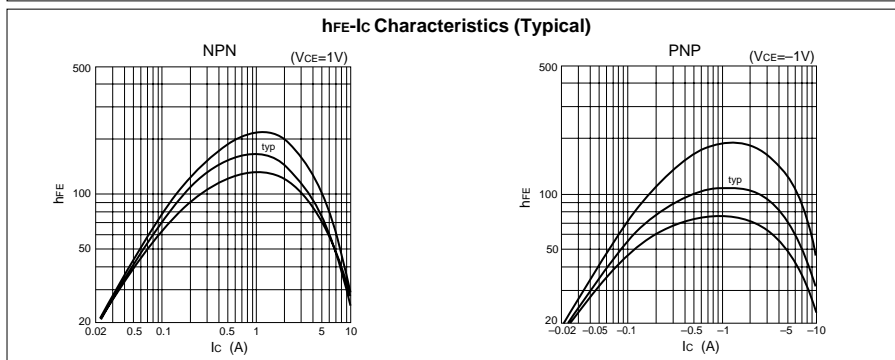
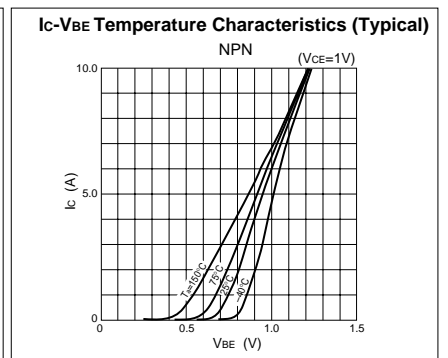
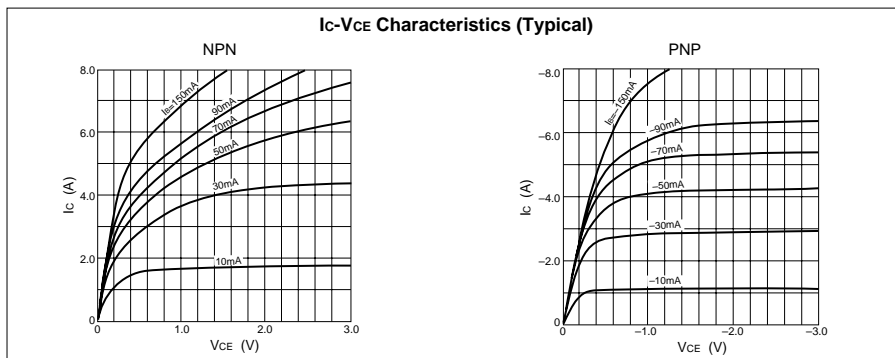
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	50	-50	V
V_{CEO}	30	-30	V
V_{EBO}	6	-6	V
I_c	5	-5	A
I_{cP}	10($PW \leq 10\text{ms}$, $D_u \leq 50\%$)		A
I_B	1	-1	A
P_T	4 ($T_a=25^\circ\text{C}$)		W
	20 ($T_c=25^\circ\text{C}$)		
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +50		$^\circ\text{C}$
T_{FSM}	20 (Single half-cycle sinewave)		A

Equivalent circuit diagram



Characteristic curves

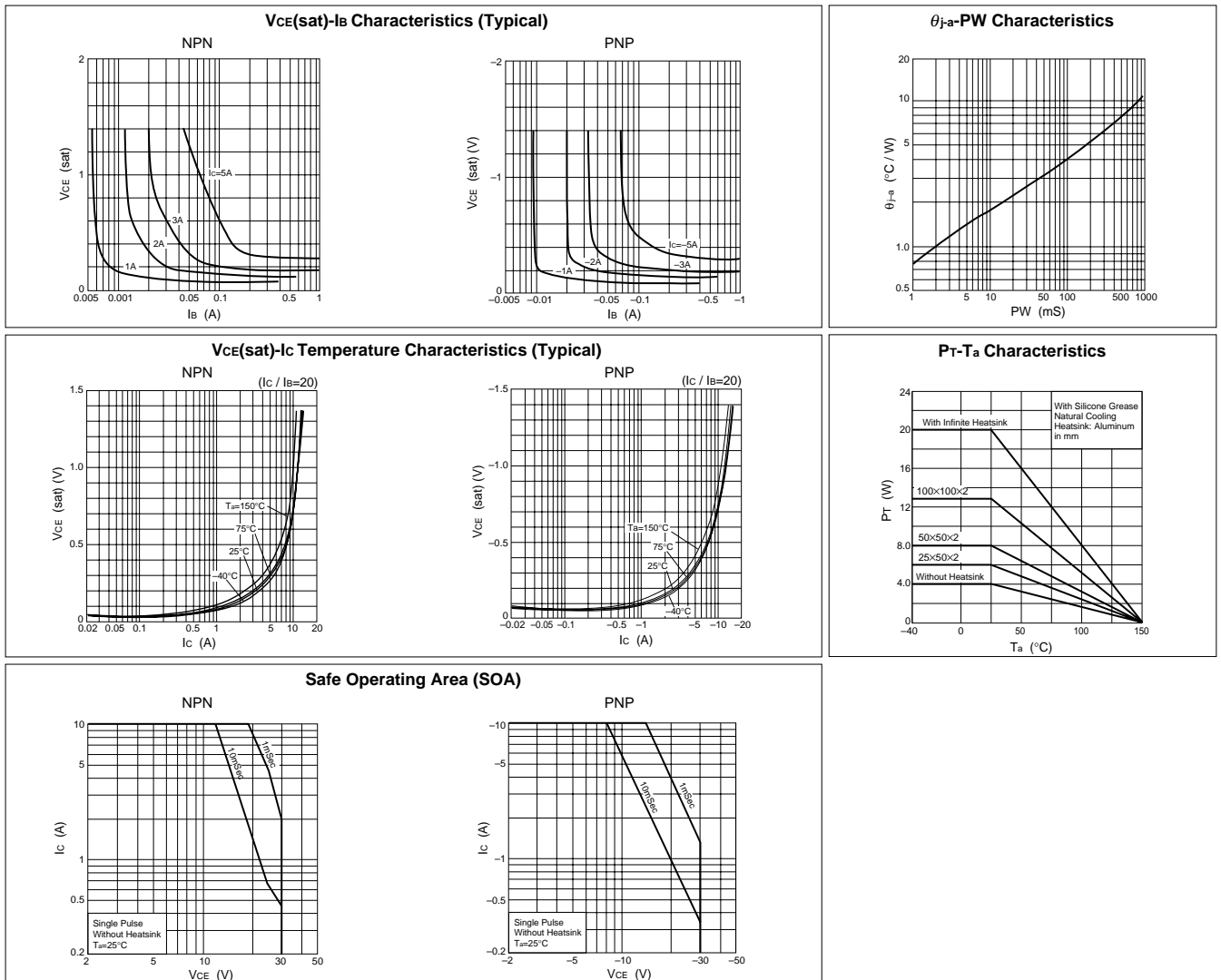


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=50\text{V}$			-10	μA	$V_{CB}=-50\text{V}$
I_{EBO}			20	mA	$V_{EB}=6\text{V}$			-20	mA	$V_{EB}=-6\text{V}$
V_{CEO}	30			V	$I_C=25\text{mA}$	-30			V	$I_C=-25\text{mA}$
h_{FE}	70				$V_{CE}=1\text{V}, I_C=1\text{A}$	70				$V_{CE}=-1\text{V}, I_C=-1\text{A}$
	40				$V_{CE}=1\text{V}, I_C=4\text{A}$	40				$V_{CE}=-1\text{V}, I_C=-4\text{A}$
$V_{CE(sat)}$			0.5	V	$I_C=3\text{A}, I_B=0.1\text{A}$			-0.5	V	$I_C=-3\text{A}, I_B=-0.1\text{A}$
t_{on}		0.3		μs	$V_{CC}\approx 12\text{V},$ $I_C=3\text{A},$ $I_{B1}=-I_{B2}=100\text{mA}$ $I_F=I_R=100\text{mA}$		0.3		μs	$V_{CC}\approx -12\text{V},$ $I_C=-3\text{A},$ $I_{B1}=-I_{B2}=-100\text{mA}$ $I_F=I_R=100\text{mA}$
t_{stg}		0.5		μs			0.5		μs	
t_f		0.1		μs			0.1		μs	
t_{rr}		2.0		μs			2.0		μs	

Characteristic curves



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

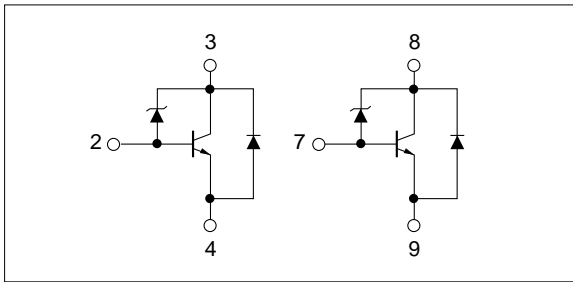
Symbol	Ratings	Unit
V_{CBO}	60±10	V
V_{CEO}	60±10	V
V_{EBO}	6	V
I_C	±6	A
I_{CP}	±10 (PW≤1ms, Du≤50%)	A
P_T	3.2 ($T_a=25^\circ\text{C}$)	W
	18 ($T_c=25^\circ\text{C}$)	
T_j	150	°C
T_{stg}	-40 to +150	°C

Electrical characteristics

($T_a=25^\circ\text{C}$)

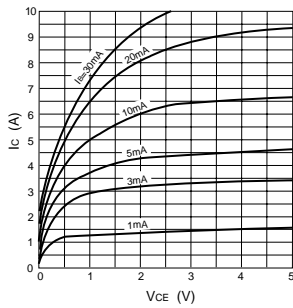
Symbol	Specification			Ratings	Unit
	min	typ	max		
I_{CBO}			10	μA	$V_{CB}=50\text{V}$
I_{EBO}			10	μA	$V_{EB}=6\text{V}$
V_{CEO}	50	60	70	V	$I_C=50\text{mA}$
h_{FE}	700	1500	3000		$V_{CE}=1\text{V}, I_C=1\text{A}$
$V_{CE(sat)}$		0.09	0.15	V	$I_C=1.5\text{A}, I_B=15\text{mA}$
V_{FEC}		1.25	1.5	V	$I_{FEC}=6\text{A}$
E_S/B	200			mJ	L=10mH, Single pulse

Equivalent circuit diagram

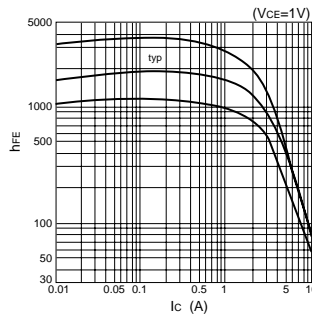


Characteristic curves

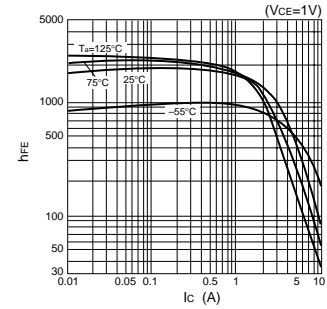
I_C - V_{CE} Characteristics (Typical)



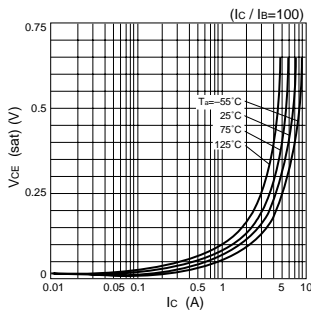
h_{FE} - I_C Characteristics (Typical)



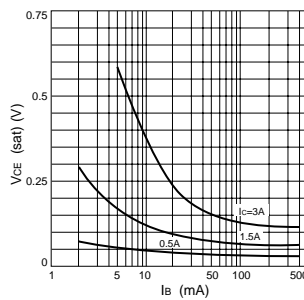
h_{FE} - I_C Temperature Characteristics (Typical)



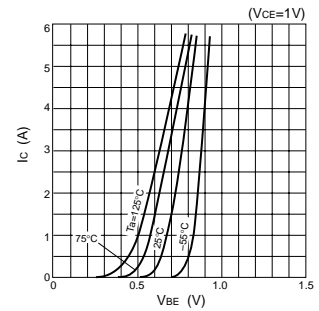
$V_{CE(sat)}$ - I_C Temperature Characteristics (Typical)



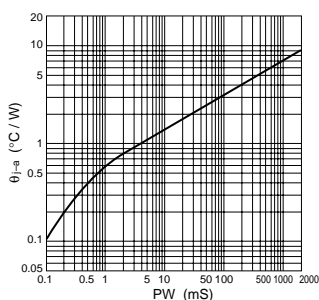
$V_{CE(sat)}$ - I_B Characteristics (Typical)



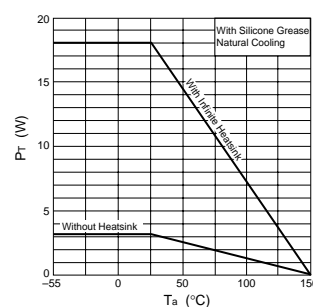
I_C - V_{BE} Temperature Characteristics (Typical)



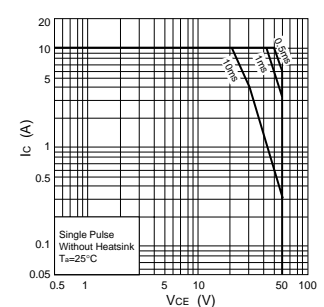
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

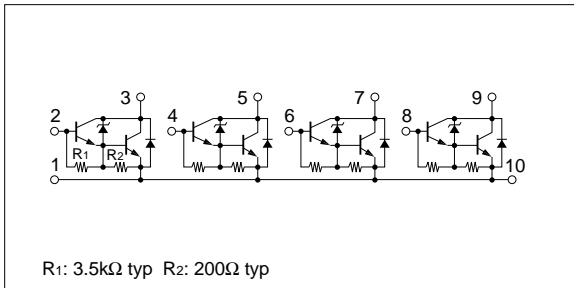
($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{CB0}	60 ± 10	V
V_{CE0}	60 ± 10	V
V_{EB0}	6	V
I_c	2	A
I_{CP}	4 ($PW \leq 1\text{ms}$, $D_u \leq 25\%$)	A
I_B	0.5	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

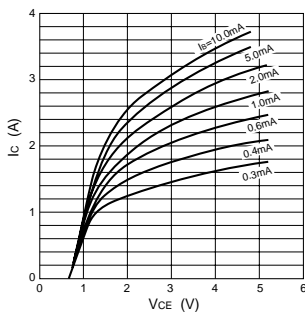
($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=50\text{V}$
I_{EB0}			5	mA	$V_{EB}=6\text{V}$
V_{CE0}	50	60	70	V	$I_c=10\text{mA}$
h_{FE}	2000	5000	10000		$V_{CE}=4\text{V}$, $I_c=1\text{A}$
$V_{CE(sat)}$		1.1	1.5	V	$I_c=1\text{A}$, $I_B=2\text{mA}$
$V_{BE(sat)}$		1.8	2.2	V	
V_{FEC}		1.3	1.8	V	$I_{FEC}=1\text{A}$
t_{on}		0.5		μs	$V_{CC} \doteq 30\text{V}$, $I_c=1\text{A}$,
t_{stg}		4.0		μs	
t_f		1.0		μs	$I_{B1}=-I_{B2}=2\text{mA}$
f_T		50		MHz	$V_{CE}=12\text{V}$, $I_E=-0.1\text{A}$
C_{ob}		25		pF	$V_{CB}=10\text{V}$, $f=1\text{MHz}$

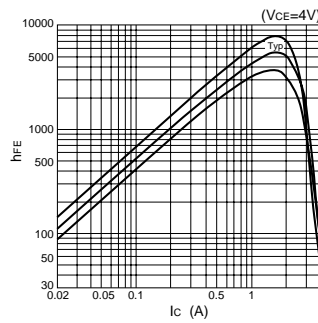


Characteristic curves

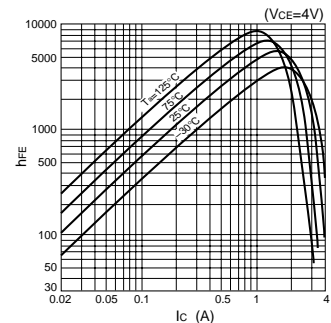
I_c - V_{CE} Characteristics (Typical)



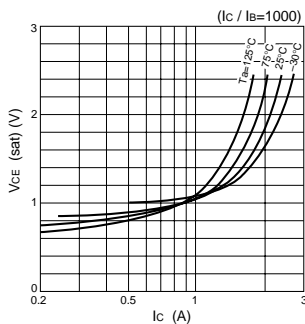
h_{FE} - I_c Characteristics (Typical)



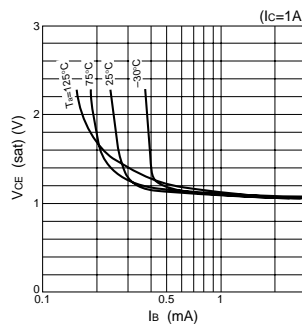
h_{FE} - I_c Temperature Characteristics (Typical)



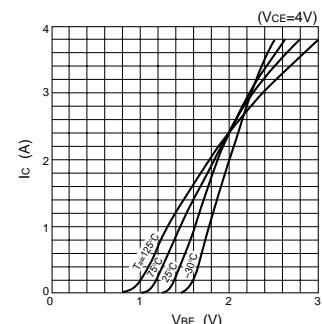
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



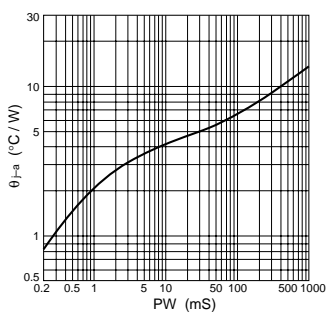
$V_{CE(sat)}$ - I_B Temperature Characteristics (Typical)



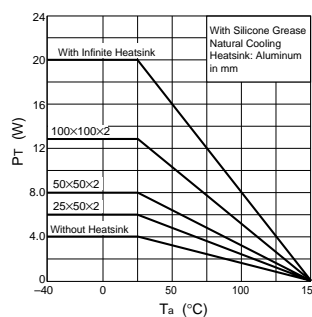
I_c - V_{BE} Temperature Characteristics (Typical)



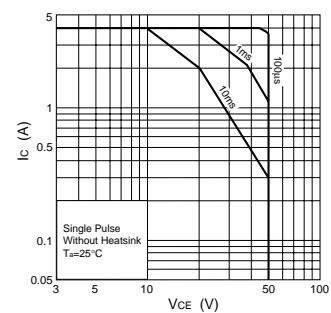
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

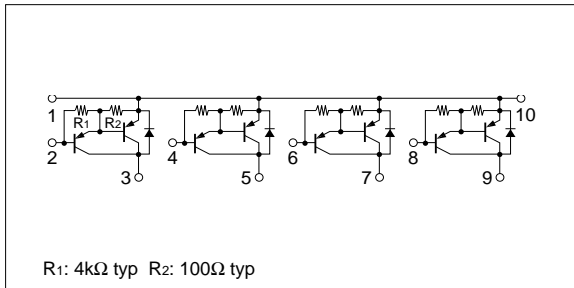
Symbol	Ratings	Unit
V_{CB0}	-60	V
V_{CEO}	-60	V
V_{EBO}	-6	V
I_c	-2	A
I_{cP}	-4 (PW \leq 1ms, $D_u\leq$ 25%)	A
I_B	-0.5	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

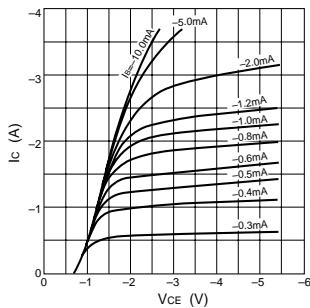
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			-5	mA	$V_{EB}=-6\text{V}$
V_{CEO}	-60			V	$I_c=-10\text{mA}$
h_{FE}	2000	4000	10000		$V_{CE}=-4\text{V}$, $I_c=-1\text{A}$
$V_{CE(sat)}$		-1.2	-1.5	V	$I_c=-1\text{A}$, $I_B=-2\text{mA}$
$V_{BE(sat)}$		-1.9	-2.2	V	
V_{FEC}		-1.3	-1.8	V	$I_{FEC}=-1\text{A}$
t_{on}		0.4		μs	$V_{CC}=-30\text{V}$, $I_c=-1\text{A}$,
t_{stg}		1.0		μs	
t_f		0.4		μs	$I_{B1}=-I_{B2}=-2\text{mA}$
f_T		100		MHz	$V_{CE}=12\text{V}$, $I_E=-0.1\text{A}$
C_{ob}		30		pF	$V_{CB}=10\text{V}$, $f=1\text{MHz}$

Equivalent circuit diagram

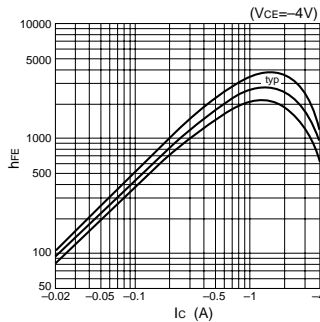


Characteristic curves

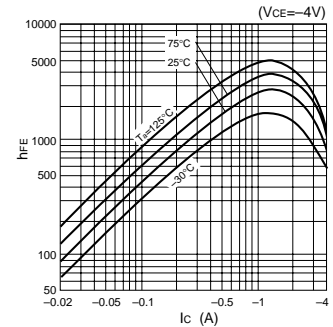
I_c - V_{CE} Characteristics (Typical)



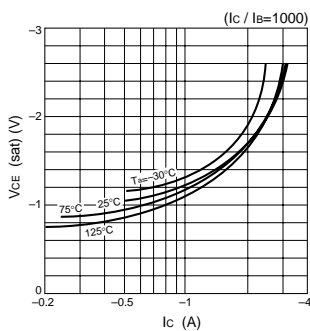
h_{FE} - I_c Characteristics (Typical)



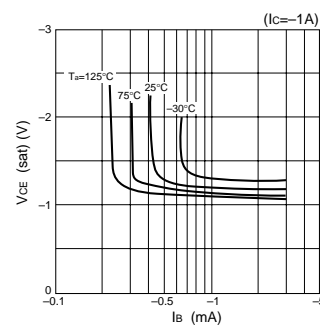
h_{FE} - I_c Temperature Characteristics (Typical)



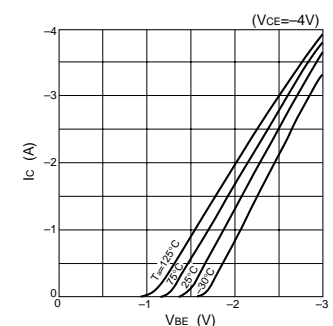
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



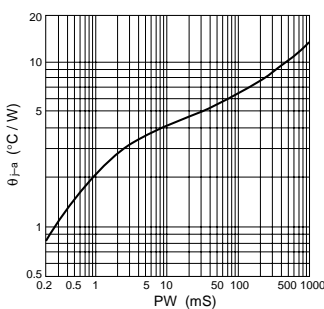
$V_{CE(sat)}$ - I_B Temperature Characteristics (Typical)



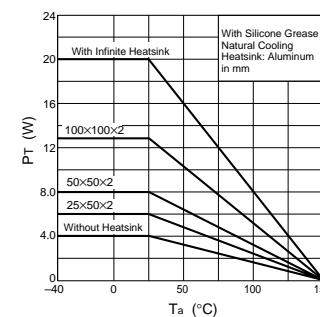
I_c - V_{BE} Temperature Characteristics (Typical)



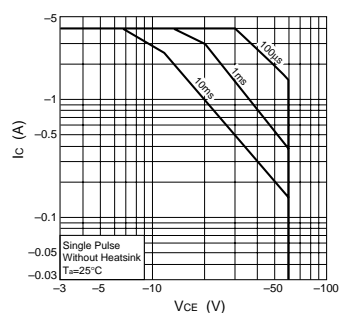
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

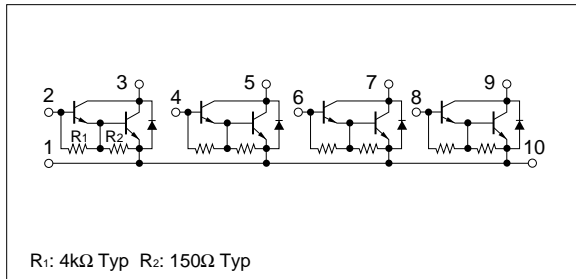
Symbol	Ratings	Unit
V_{CB0}	120	V
V_{CEO}	100	V
V_{EBO}	6	V
I_c	2	A
I_{CP}	4 ($PW \leq 1\text{ms}$, $D_u \leq 25\%$)	A
I_B	0.5	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

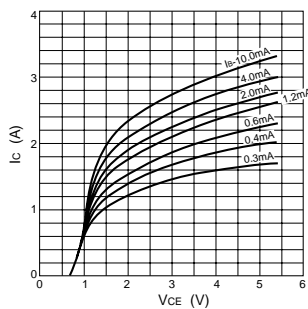
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			10	μA	$V_{CB}=120\text{V}$
I_{EBO}			5	mA	$V_{EB}=6\text{V}$
V_{CEO}	100			V	$I_c=10\text{mA}$
h_{FE}	2000	5000	12000		$V_{CE}=4\text{V}$, $I_c=1\text{A}$
$V_{CE(sat)}$		1.1	1.5	V	$I_c=1\text{A}$, $I_B=2\text{mA}$
$V_{BE(sat)}$		1.8	2.2	V	
V_{FEC}		1.3	1.8	V	$I_{FEC}=1\text{A}$
t_{on}		0.5		μs	$V_{CC} \doteq 30\text{V}$, $I_c=1\text{A}$,
t_{stg}		4.5		μs	
t_f		1.2		μs	$I_{B1}=-I_{B2}=2\text{mA}$
f_T		50		MHz	$V_{CE}=12\text{V}$, $I_E=-0.1\text{A}$
C_{ob}		20		pF	$V_{CB}=10\text{V}$, $f=1\text{MHz}$

Equivalent circuit diagram

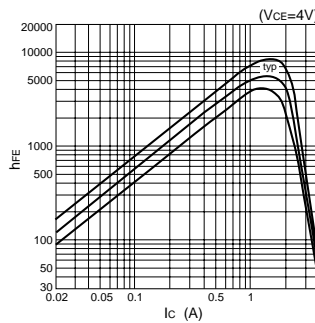


Characteristic curves

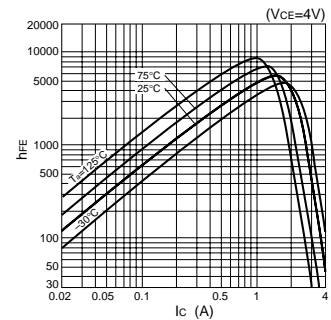
I_c - V_{CE} Characteristics (Typical)



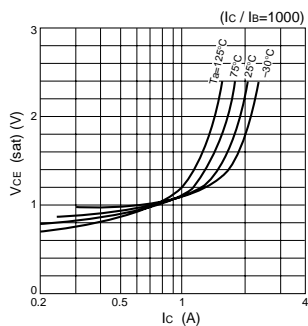
h_{FE} - I_c Characteristics (Typical)



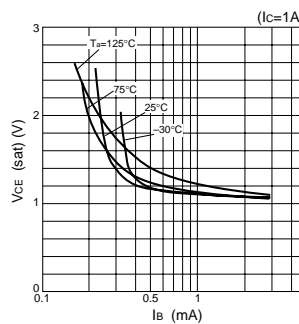
h_{FE} - I_c Temperature Characteristics (Typical)



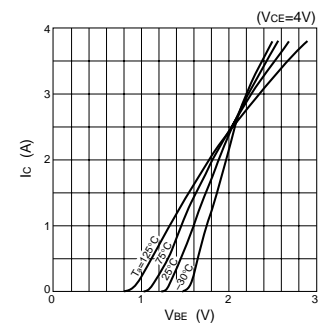
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



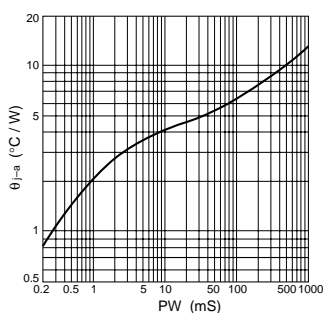
$V_{CE(sat)}$ - I_B Temperature Characteristics (Typical)



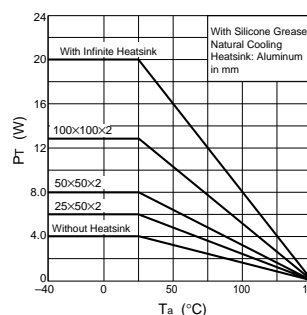
I_c - V_{BE} Temperature Characteristics (Typical)



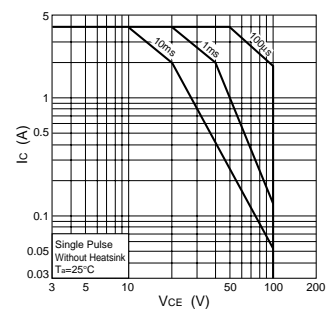
θ_{JA} - PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

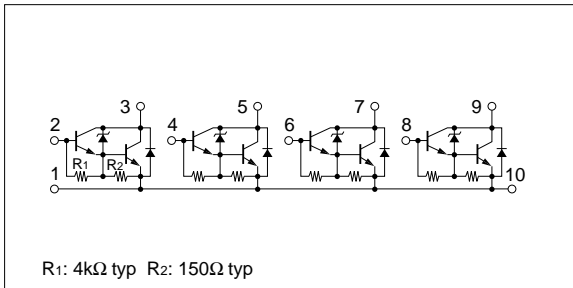
Symbol	Ratings	Unit
V_{CB0}	100±15	V
V_{CE0}	100±15	V
V_{EB0}	6	V
I_c	2	A
I_{cP}	4 (PW≤1ms, $D_u\leq 25\%$)	A
I_B	0.5	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

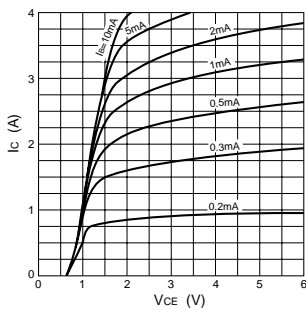
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=85\text{V}$
I_{EB0}			5	mA	$V_{EB}=6\text{V}$
V_{CE0}	85	100	115	V	$I_c=10\text{mA}$
h_{FE}	2000	5000	12000		$V_{CE}=4\text{V}$, $I_c=1\text{A}$
$V_{CE(sat)}$			1.5	V	$I_c=1\text{A}$, $I_B=2\text{mA}$
$V_{BE(sat)}$			2.2	V	
V_{FEC}			1.8	V	$I_{FEC}=1\text{A}$
t_{on}		0.6		μs	$V_{CC}\doteq 30\text{V}$, $I_c=1\text{A}$, $I_{B1}=-I_{B2}=2\text{mA}$
t_{stg}		3.0		μs	
t_f		1.0		μs	

Equivalent circuit diagram

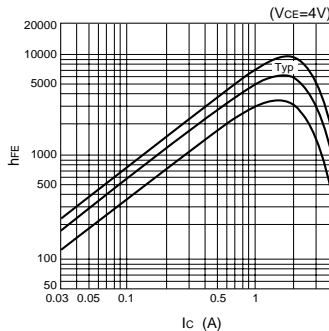


Characteristic curves

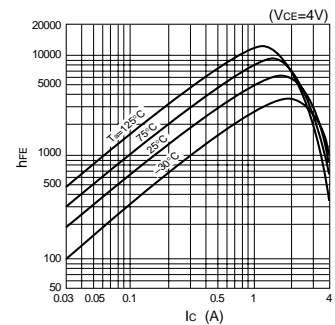
I_c - V_{CE} Characteristics (Typical)



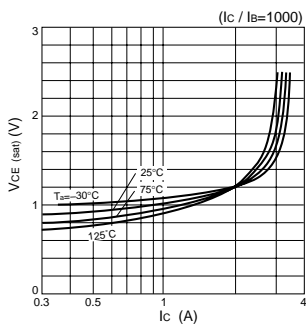
h_{FE} - I_c Characteristics (Typical)



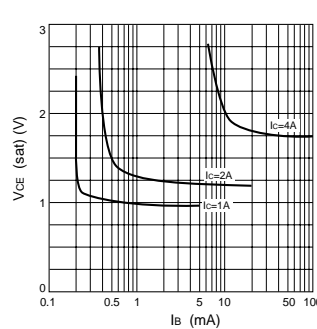
h_{FE} - I_c Temperature Characteristics (Typical)



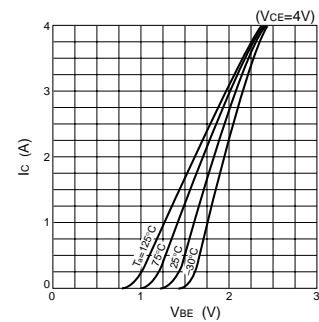
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



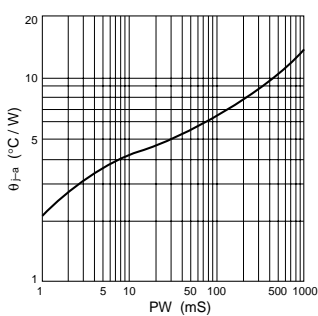
$V_{CE(sat)}$ - I_B Characteristics (Typical)



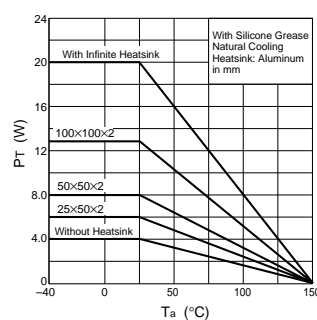
I_c - V_{BE} Temperature Characteristics (Typical)



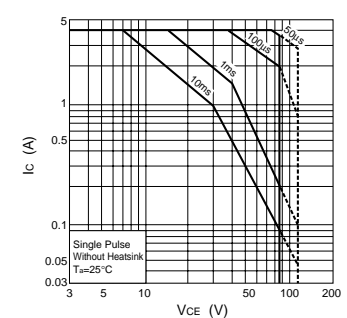
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

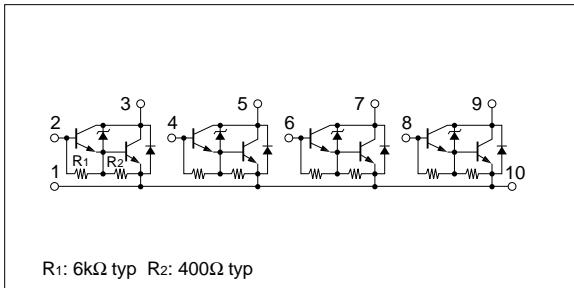
Symbol	Ratings	Unit
V_{CB0}	60±10	V
V_{CEO}	60±10	V
V_{EBO}	6	V
I_c	1	A
I_{CP}	2.5 (PW≤1ms, $D_u\leq 25\%$)	A
I_B	0.5	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	16 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

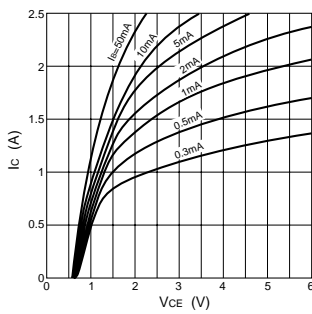
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=50\text{V}$
I_{EBO}			3	mA	$V_{EB}=6\text{V}$
V_{CEO}	50	60	70	V	$I_c=1\text{mA}$
h_{FE}	2000	5000	10000		$V_{CE}=4\text{V}$, $I_c=0.5\text{A}$
$V_{CE(sat)}$		1.0	1.5	V	$I_c=0.5\text{A}$, $I_B=1\text{mA}$
$V_{BE(sat)}$		1.6	2.2	V	
V_{FEC}		1.4	1.8	V	$I_{FEC}=0.5\text{A}$
t_{on}		0.5		μs	$V_{CC}\doteq 30\text{V}$,
t_{stg}		2.5		μs	$I_c=0.5\text{A}$,
t_f		1.0		μs	$I_{B1}=-I_{B2}=1\text{mA}$
f_T		50		MHz	$V_{CE}=12\text{V}$, $I_E=-0.1\text{A}$
C_{ob}		14		pF	$V_{CB}=10\text{V}$, $f=1\text{MHz}$

Equivalent circuit diagram

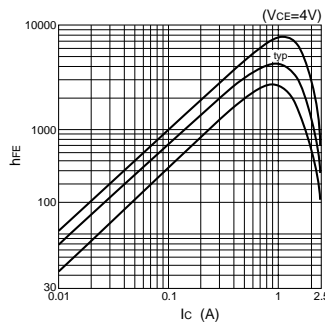


Characteristic curves

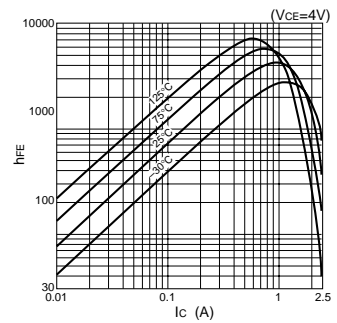
I_c - V_{CE} Characteristics (Typical)



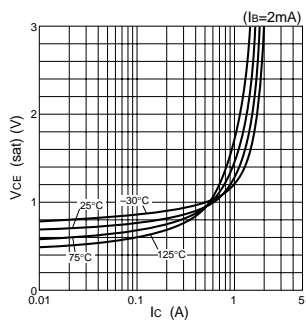
h_{FE} - I_c Characteristics (Typical)



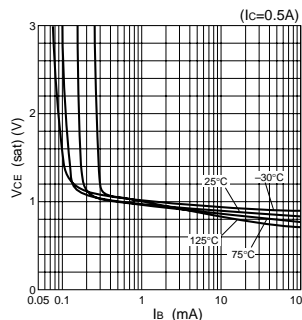
h_{FE} - I_c Temperature Characteristics (Typical)



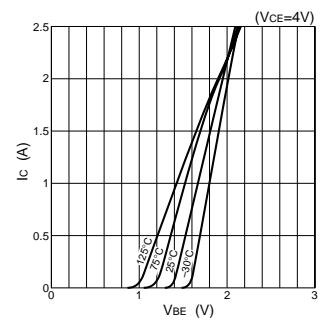
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



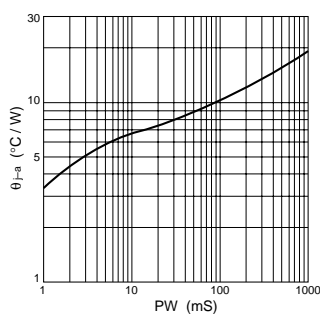
$V_{CE(sat)}$ - I_B Temperature Characteristics (Typical)



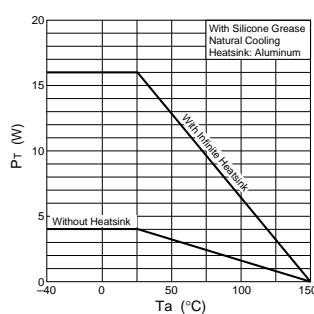
I_c - V_{BE} Temperature Characteristics (Typical)



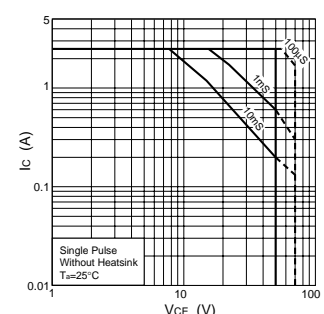
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

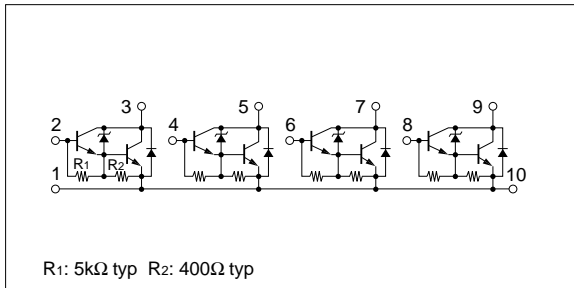
Symbol	Ratings	Unit
V_{CB0}	100±15	V
V_{CEO}	100±15	V
V_{EBO}	6	V
I_C	1	A
I_{CP}	2.5 (PW≤1ms, $D_u\leq 25\%$)	A
I_B	0.5	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	16 ($T_c=25^\circ\text{C}$)	
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

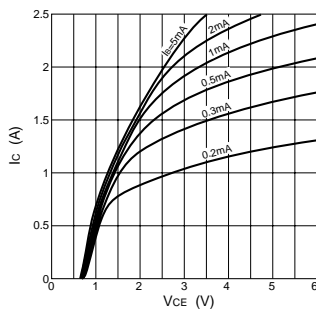
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=85\text{V}$
I_{EBO}			3	mA	$V_{EB}=6\text{V}$
V_{CEO}	85	100	115	V	$I_C=1\text{mA}$
h_{FE}	2000	5000	10000		$V_{CE}=4\text{V}$, $I_C=0.5\text{A}$
$V_{CE(sat)}$		1.0	1.5	V	$I_C=0.5\text{A}$, $I_B=1\text{mA}$
$V_{BE(sat)}$		1.6	2.2	V	
V_{FEC}		1.4	1.8	V	$I_{FEC}=0.5\text{A}$
t_{on}		0.5		μs	$V_{CC}\doteq 30\text{V}$,
t_{stg}		2.5		μs	$I_C=0.5\text{A}$,
t_f		1.0		μs	$I_{B1}=-I_{B2}=1\text{mA}$
f_T		50		MHz	$V_{CE}=12\text{V}$, $I_E=-0.1\text{A}$
C_{ob}		14		pF	$V_{CE}=10\text{V}$, $f=1\text{MHz}$

Equivalent circuit diagram

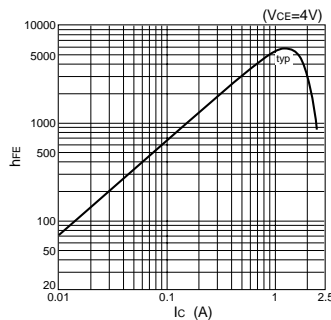


Characteristic curves

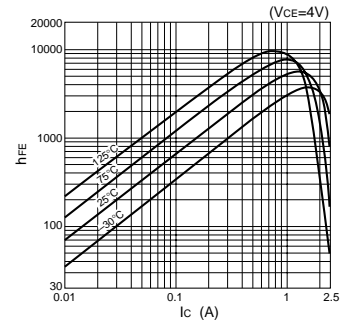
I_C - V_{CE} Characteristics (Typical)



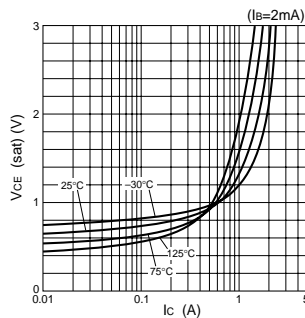
h_{FE} - I_C Characteristics (Typical)



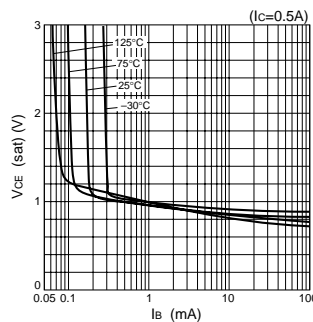
h_{FE} - I_C Temperature Characteristics (Typical)



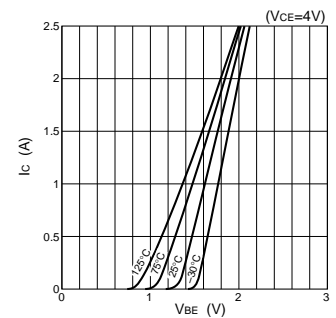
$V_{CE(sat)}$ - I_C Temperature Characteristics (Typical)



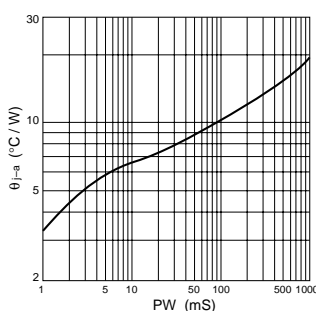
$V_{CE(sat)}$ - I_B Temperature Characteristics (Typical)



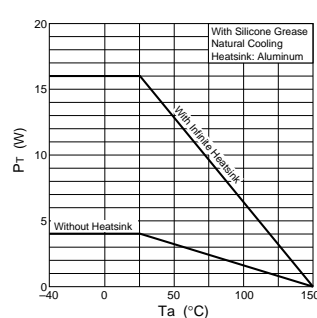
I_C - V_{BE} Temperature Characteristics (Typical)



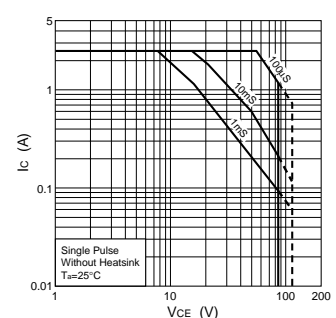
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

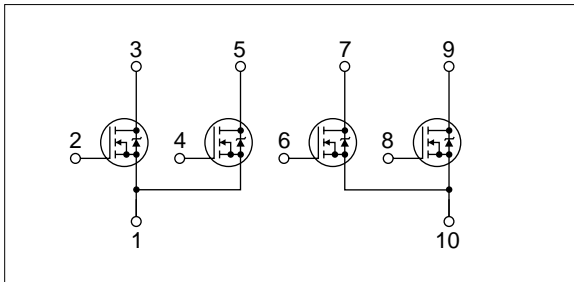
Symbol	Ratings	Unit
V_{DSS}	60	V
V_{GSS}	± 10	V
I_D	± 5	A
$I_{D(\text{pulse})}$	± 20 ($PW \leq 100\mu\text{s}$, $D_u \leq 1\%$)	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	W
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	60			V	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 500	nA	$V_{GS}=\pm 10\text{V}$
I_{DSS}			250	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	2.0			S	$V_{DS}=10\text{V}$, $I_D=2.5\text{A}$
$R_{DS(ON)}$		0.15	0.20	Ω	$V_{GS}=10\text{V}$, $I_D=2.5\text{A}$
		0.23	0.28	Ω	$V_{GS}=4\text{V}$, $I_D=2.5\text{A}$
C_{iss}		400		pF	$V_{DS}=25\text{V}$,
C_{oss}		160		pF	$f=1.0\text{MHz}$,
C_{rSS}		35		pF	$V_{GS}=0\text{V}$
$t_{d(on)}$		20		ns	$I_D=2.5\text{A}$, $V_{DD} \approx 30\text{V}$, $R_L=12\Omega$, $V_{GS}=5\text{V}$, see Fig. 3 on page 16.
t_r		25		ns	
$t_{d(off)}$		40		ns	
t_f		20		ns	
V_{SD}		1.0	1.5	V	
t_{rr}		150		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram



Characteristic curves

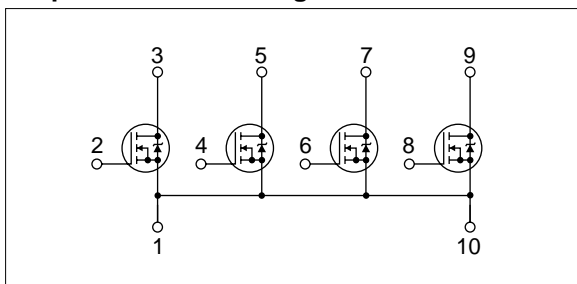
Absolute maximum ratings (Ta=25°C)

Symbol	Rated	Unit
V _{DSS}	60	V
V _{GSS}	±20	V
I _D	±4	A
I _{D(pulse)}	±8 (PW≤100μs, Du≤1%)	A
P _T	4 (Ta=25°C)	W
	20 (Tc=25°C)	W
T _{ch}	150	°C
T _{stg}	-40 to +150	°C

Electrical characteristics (Ta=25°C)

Symbol	Specification			Unit	Conditions
	min	typ	max		
V _{(BR)DSS}	60			V	I _D =100μA, V _{GS} =0V
I _{GSS}			±100	nA	V _{GS} =±20V
I _{DSS}			100	μA	V _{DS} =60V, V _{GS} =0V
V _{TH}	2.0		4.0	V	V _{DS} =10V, I _D =250μA
R _{e(yfs)}	1.2			S	V _{DS} =10V, I _D =2A
R _{DS(ON)}		0.33	0.45	Ω	V _{GS} =10V, I _D =2A
C _{iss}		120		pF	V _{DS} =25V, f=1.0MHz, V _{GS} =0V
C _{oss}		60		pF	
C _{rss}		14		pF	
V _{SD}		1.1	1.5	V	I _{SD} =4A, V _{GS} =0V
t _{rr}		100		ns	I _{SD} =±100mA

Equivalent circuit diagram



Characteristic curves

Absolute maximum ratings

($T_a=25^\circ\text{C}$)

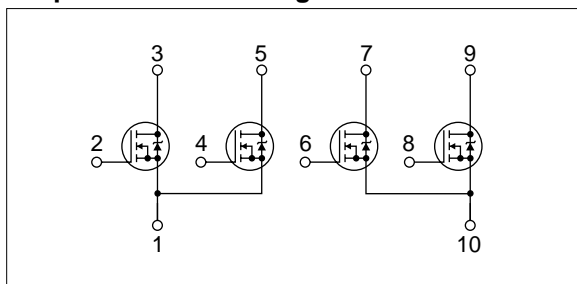
Symbol	Ratings	Unit
V_{DSS}	100	V
V_{GSS}	± 20	V
I_D	± 3	A
$I_{D(\text{pulse})}$	± 12 ($PW \leq 100\mu\text{s}$, $D_u \leq 1\%$)	A
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	W
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	2.0		3.0	S	$V_{DS}=10\text{V}$, $I_D=1.5\text{A}$
$R_{DS(ON)}$		0.35	0.50	Ω	$V_{GS}=10\text{V}$, $I_D=1.5\text{A}$
		0.40	0.60	Ω	$V_{GS}=4\text{V}$, $I_D=1.5\text{A}$
C_{iss}		240		pF	$V_{DS}=25\text{V}$,
C_{oss}		60		pF	$f=1.0\text{MHz}$,
C_{rss}		12		pF	$V_{GS}=0\text{V}$
V_{SD}		1.0	1.5	V	$I_{SD}=3\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		150		ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram



Characteristic curves

Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	100	V
V_{GSS}	± 20	V
I_D	± 2	A
$I_{D(\text{pulse})}$	± 5 ($PW \leq 100\mu\text{s}$, $D_u \leq 1\%$)	A
E_{AS}^*	5.6	mJ
P_T	4 ($T_a=25^\circ\text{C}$)	W
	20 ($T_c=25^\circ\text{C}$)	W
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

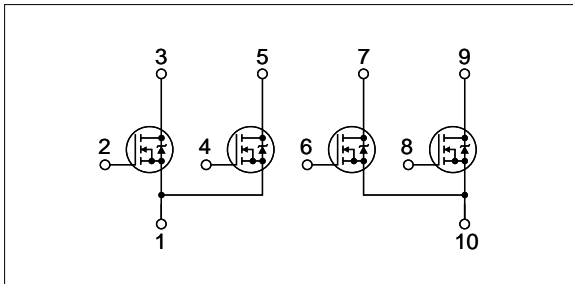
* : $V_{DD}=25\text{V}$, $L=2.2\text{mH}$, $I_L=2\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Electrical characteristics

($T_a=25^\circ\text{C}$)

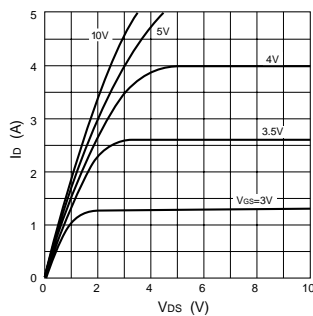
Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	1.5	2.0		S	$V_{DS}=10\text{V}$, $I_D=1\text{A}$
		0.55	0.80	Ω	$V_{GS}=10\text{V}$, $I_D=1\text{A}$
$R_{DS(ON)}$		0.70	0.95	Ω	$V_{GS}=4\text{V}$, $I_D=1\text{A}$
				pF	$V_{DS}=25\text{V}$, $f=1.0\text{MHz}$,
C_{iss}	150				$V_{GS}=0\text{V}$
C_{oss}	45				$V_{GS}=0\text{V}$
C_{rss}	9				$V_{GS}=0\text{V}$
$t_{d(on)}$	15			ns	$I_D=1\text{A}$, $V_{DD}=50\text{V}$, $R_L=50\Omega$, $V_{GS}=5\text{V}$, see Fig. 3 on page 16.
t_r	30			ns	
$t_{d(off)}$	40			ns	
t_f	30			ns	
V_{SD}	1.0	1.5		V	$I_{SD}=2\text{A}$, $V_{GS}=0\text{V}$
t_{rr}	160			ns	$I_{SD}=\pm 100\text{mA}$

Equivalent circuit diagram

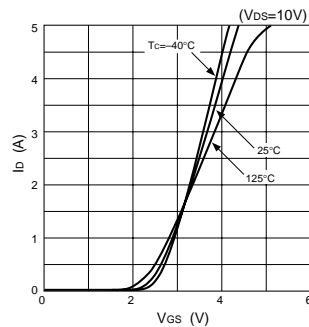


Characteristic curves

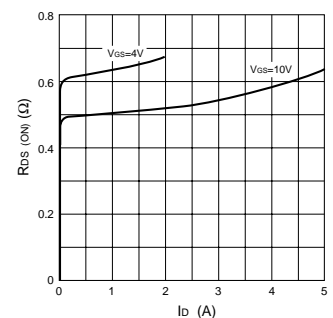
I_D - V_{DS} Characteristics (Typical)



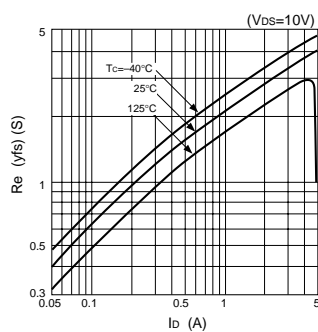
I_D - V_{GS} Characteristics (Typical)



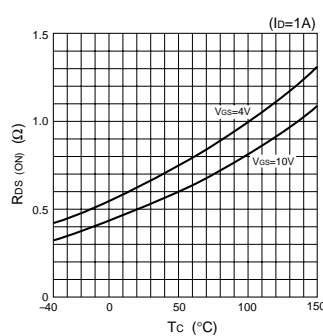
$R_{DS(ON)}$ - I_D Characteristics (Typical)



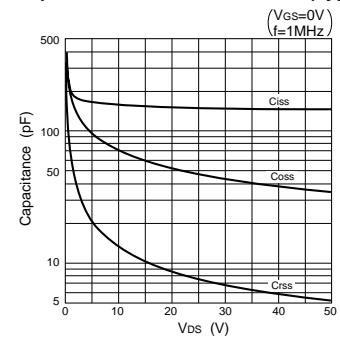
$R_{e(yfs)}$ - I_D Characteristics (Typical)



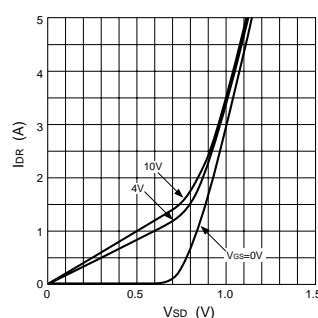
$R_{DS(ON)}$ - T_c Characteristics (Typical)



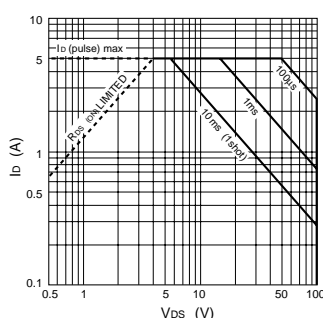
Capacitance- V_{DS} Characteristics (Typical)



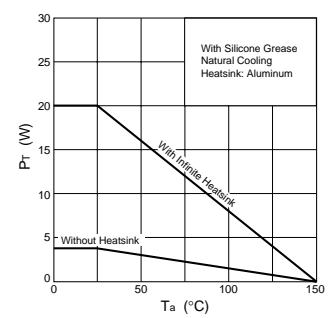
I_{DR} - V_{SD} Characteristics (Typical)



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

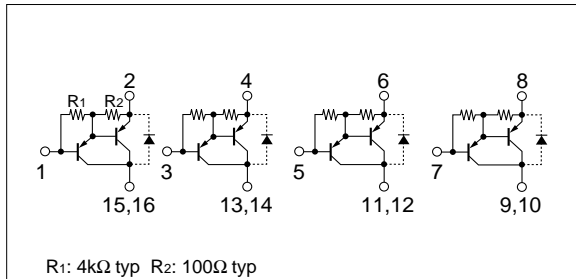
Symbol	Ratings	Unit
V_{CB0}	-60	V
V_{CEO}	-60	V
V_{EBO}	-6	V
I_c	-1.5	A
I_{cP}	-2.5 (PW \leq 1ms, Du \leq 10%)	A
I_B	-0.1	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$
θ_{j-a}	41.6	$^\circ\text{C}/\text{W}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

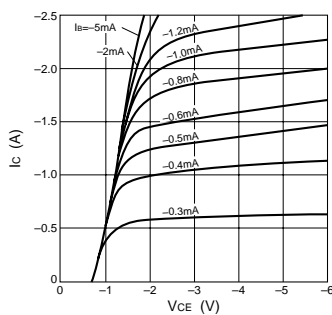
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			-3	mA	$V_{EB}=-6\text{V}$
V_{CEO}	-60			V	$I_c=-10\text{mA}$
h_{FE}	2000		12000		$V_{CE}=-4\text{V}$, $I_c=-1\text{A}$
$V_{CE(sat)}$			-1.4	V	$I_c=-1\text{A}$, $I_B=-2\text{mA}$
$V_{BE(sat)}$			-2.2	V	

Equivalent circuit diagram

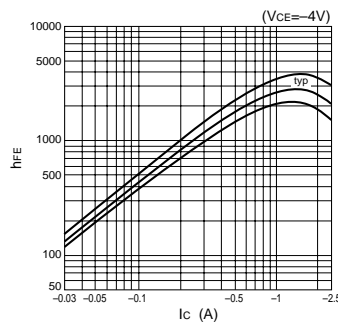


Characteristic curves

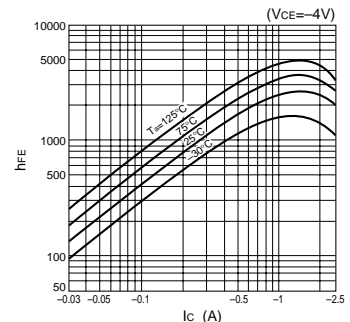
I_c - V_{CE} Characteristics (Typical)



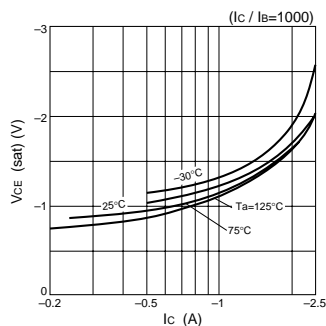
h_{FE} - I_c Characteristics (Typical)



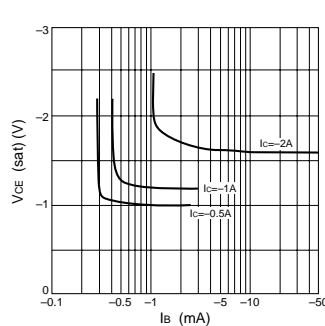
h_{FE} - I_c Temperature Characteristics (Typical)



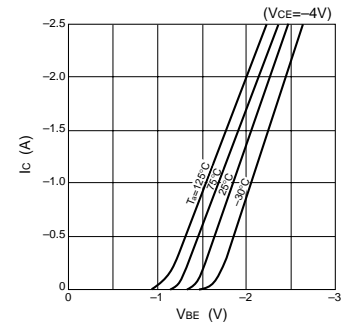
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



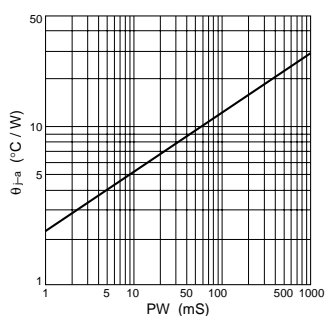
$V_{CE(sat)}$ - I_B Characteristics (Typical)



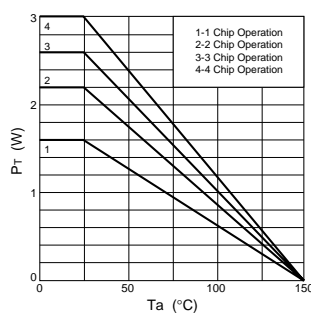
I_c - V_{BE} Temperature Characteristics (Typical)



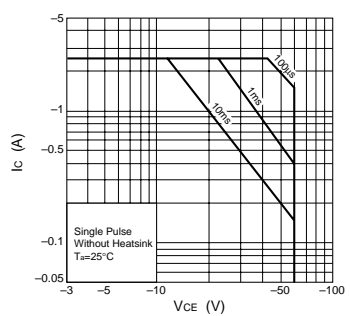
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)

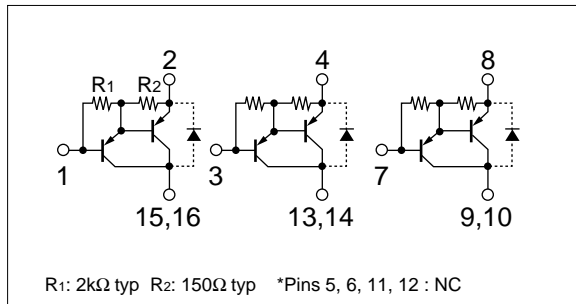


Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{CBO}	-60	V
V_{CEO}	-60	V
V_{EBO}	-6	V
I_c	-4	A
I_{cP}	-6 (PW \leq 1ms, Du \leq 50%)	A
I_B	-0.5	A
P_T	2.6 ($T_a=25^\circ\text{C}$)	W
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

Equivalent circuit diagram



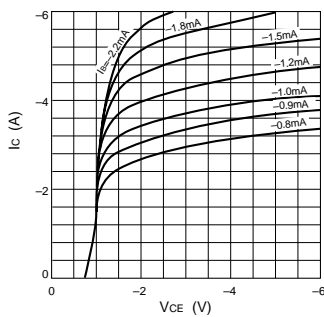
Electrical characteristics

($T_a=25^\circ\text{C}$)

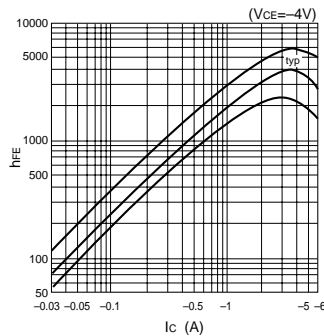
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			-10	mA	$V_{EB}=-6\text{V}$
V_{CEO}	-60			V	$I_c=-10\text{mA}$
h_{FE}	2000		12000		$V_{CE}=-4\text{V}$, $I_c=-3\text{A}$
$V_{CE(sat)}$			-1.5	V	$I_c=-3\text{A}$, $I_B=-6\text{mA}$
$V_{BE(sat)}$			-2.0	V	
V_{FEC}			1.8	V	$I_{FEC}=1\text{A}$
t_{on}		0.4		μs	$V_{CC}=-30\text{V}$, $I_c=-3\text{A}$,
t_{stg}		0.8		μs	$I_c=-3\text{A}$,
t_f		0.6		μs	$I_{B1}=-I_{B2}=-10\text{mA}$
f_T		200		MHz	$V_{CE}=-12\text{V}$, $I_E=0.2\text{A}$
C_{ob}		75		pF	$V_{CB}=-10\text{V}$, $f=1\text{MHz}$

Characteristic curves

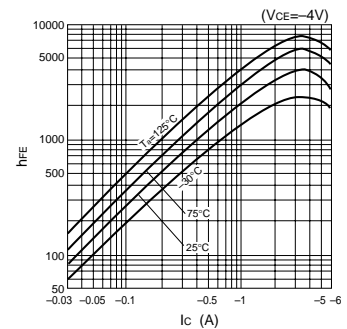
I_c - V_{CE} Characteristics (Typical)



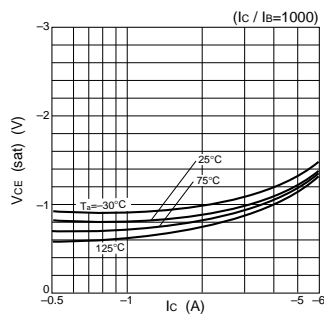
h_{FE} - I_c Characteristics (Typical)



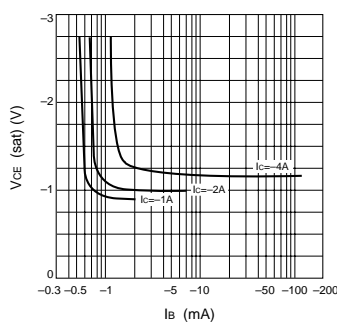
h_{FE} - I_c Temperature Characteristics (Typical)



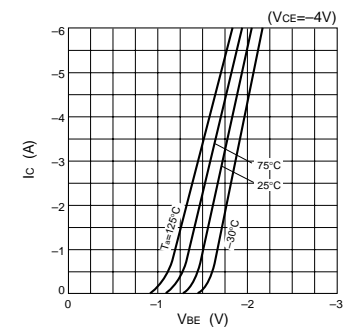
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



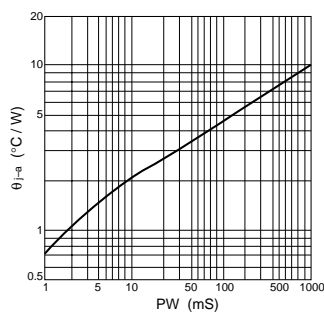
$V_{CE(sat)}$ - I_B Characteristics (Typical)



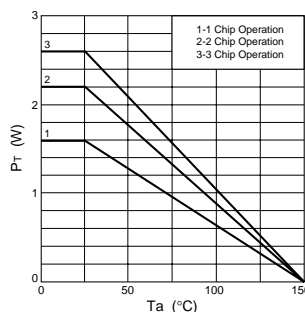
I_c - V_{BE} Temperature Characteristics (Typical)



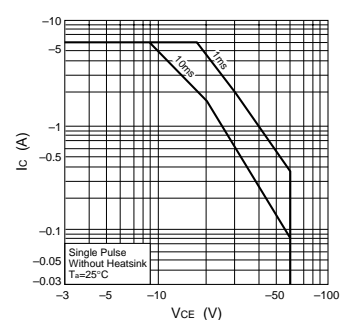
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

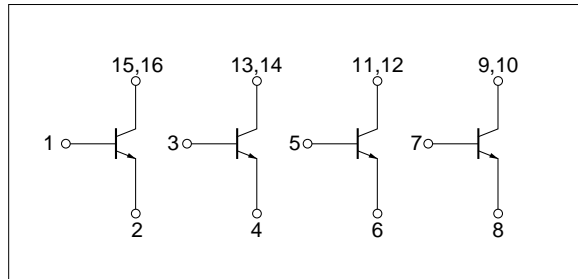
Symbol	Ratings	Unit
V_{CB0}	80	V
V_{CEO}	50	V
V_{EBO}	6	V
I_c	2	A
I_{cP}	3 ($PW \leq 1\text{ms}$, $D_u \leq 10\%$)	A
I_B	0.5	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$
θ_{j-a}	41.6	$^\circ\text{C/W}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

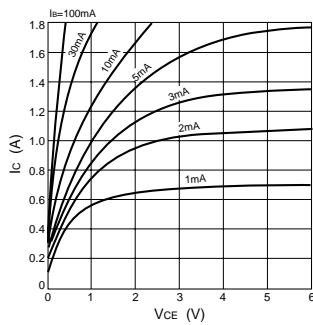
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=80\text{V}$
I_{CES}			100	μA	$V_{CES}=50\text{V}$
I_{EBO}			10	μA	$V_{EB}=6\text{V}$
V_{CEO}	50			V	$I_c=10\text{mA}$
h_{FE}	500		2000		$V_{CE}=4\text{V}$, $I_c=0.5\text{A}$
$V_{CE(sat)}$			0.4	V	$I_c=0.5\text{A}$, $I_B=5\text{mA}$
$V_{BE(sat)}$			1.1	V	
f_T		40		MHz	$V_{CE}=12\text{V}$, $I_E=-0.1\text{A}$

Equivalent circuit diagram

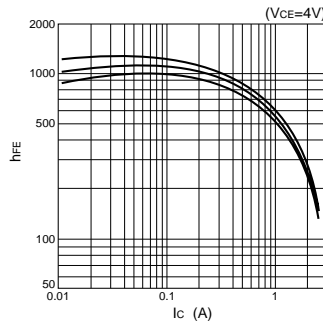


Characteristic curves

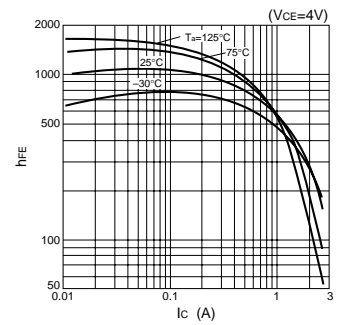
I_c - V_{CE} Characteristics (Typical)



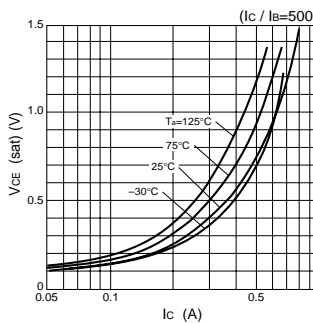
h_{FE} - I_c Characteristics (Typical)



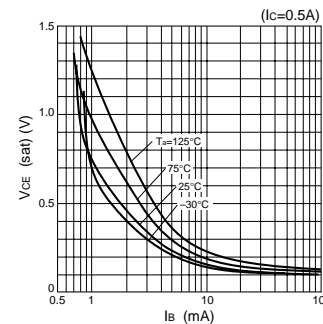
h_{FE} - I_c Temperature Characteristics (Typical)



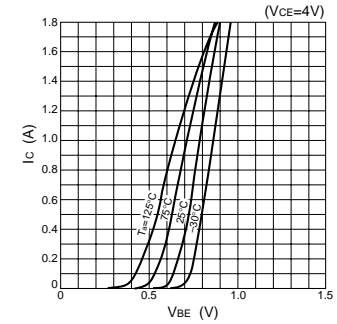
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



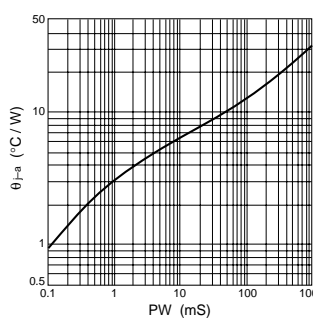
$V_{CE(sat)}$ - I_B Temperature Characteristics (Typical)



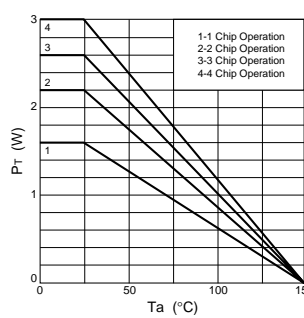
I_c - V_{BE} Temperature Characteristics (Typical)



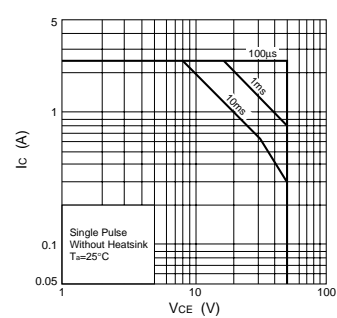
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

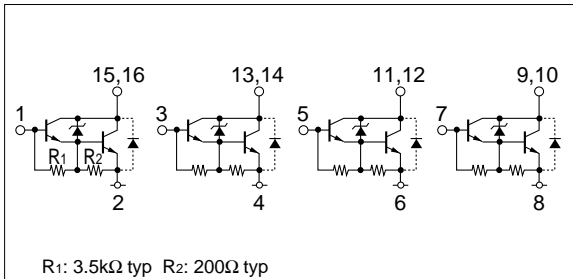
Symbol	Ratings	Unit
V_{CB0}	60 ± 10	V
V_{CEO}	60 ± 10	V
V_{EBO}	6	V
I_c	1.5	A
I_{CP}	2.5 (PW \leq 1ms, Du \leq 10%)	A
I_B	0.1	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$
θ_{j-a}	41.6	$^\circ\text{C}/\text{W}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

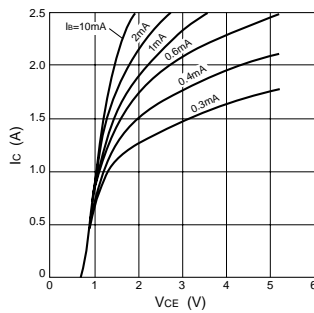
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CBO}			10	μA	$V_{CB}=50\text{V}$
I_{EBO}	1.1		3.5	mA	$V_{EB}=6\text{V}$
V_{CEO}	50	60	70	V	$I_c=10\text{mA}$
h_{FE}	2000	5000	12000		$V_{CE}=4\text{V}$, $I_c=1\text{A}$
$V_{CE(sat)}$		1.2	1.4	V	$I_c=1\text{A}$, $I_B=2\text{mA}$
$V_{BE(sat)}$		1.8	2.2	V	
V_{FEC}		1.3	1.8	V	$I_{FEC}=1\text{A}$
t_{on}		0.5		μs	$V_{CC}\doteq 30\text{V}$,
t_{stg}		4.0		μs	$I_c=1\text{A}$,
t_f		1.0		μs	$I_{B1}=-I_{B2}=2\text{mA}$
f_T		50		MHz	$V_{CE}=12\text{V}$, $I_E=-0.1\text{A}$
C_{ob}		25		pF	$V_{CB}=10\text{V}$, $f=1\text{MHz}$

Equivalent circuit diagram

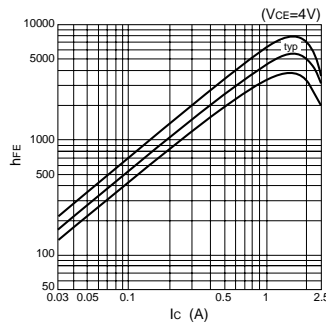


Characteristic curves

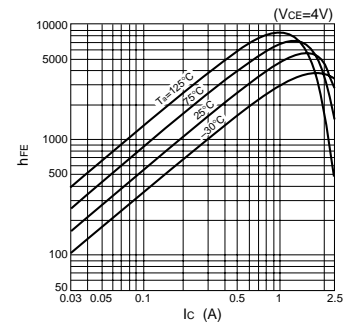
I_c - V_{CE} Characteristics (Typical)



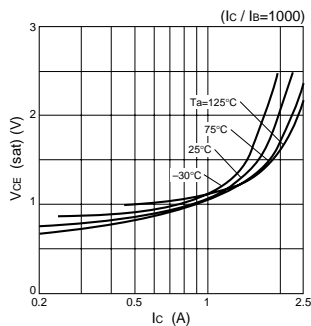
h_{FE} - I_c Characteristics (Typical)



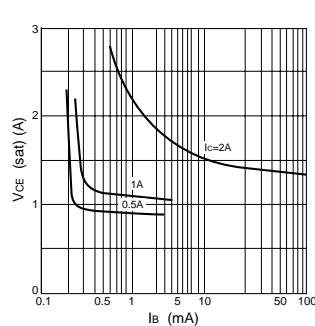
h_{FE} - I_c Temperature Characteristics (Typical)



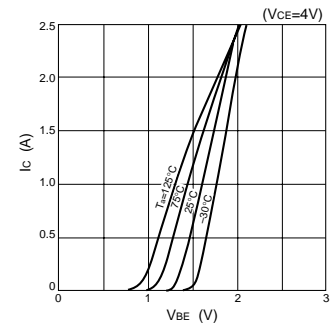
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



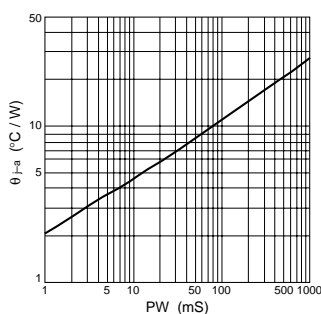
$V_{CE(sat)}$ - I_B Characteristics (Typical)



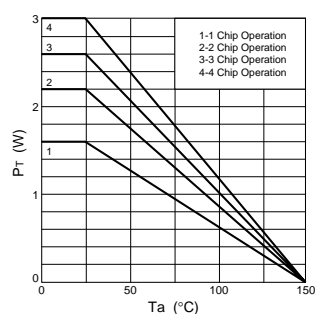
I_c - V_{BE} Temperature Characteristics (Typical)



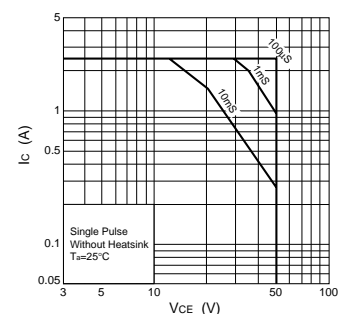
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

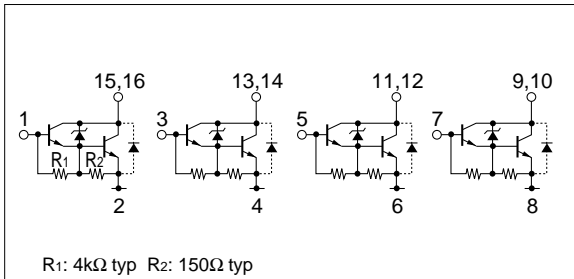
Symbol	Ratings	Unit
V_{CB0}	100±15	V
V_{CEO}	100±15	V
V_{EBO}	6	V
I_c	1.5	A
I_{CP}	2.5 (PW≤1ms, $D_u\leq 10\%$)	A
I_B	0.1	A
P_T	3 ($T_a=25^\circ\text{C}$)	W
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$
θ_{j-a}	41.6	$^\circ\text{C}/\text{W}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

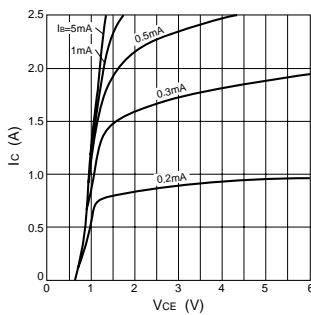
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{CB0}			10	μA	$V_{CB}=85\text{V}$
I_{EBO}	1		3	mA	$V_{EB}=6\text{V}$
V_{CEO}	85	100	115	V	$I_c=10\text{mA}$
h_{FE}	2000	5000	12000		$V_{CE}=4\text{V}$, $I_c=1\text{A}$
$V_{CE(sat)}$		1.0	1.3	V	$I_c=1\text{A}$, $I_B=2\text{mA}$
$V_{BE(sat)}$		1.7	2.2	V	
V_{FEC}		1.2	1.8	V	$I_{FEC}=1\text{A}$
t_{on}		0.6		μs	$V_{CC}\doteq 30\text{V}$,
t_{stg}		3.0		μs	$I_c=1\text{A}$,
t_f		1.0		μs	$I_{B1}=-I_{B2}=2\text{mA}$
f_T		30		MHz	$V_{CE}=12\text{V}$, $I_E=-0.1\text{A}$
C_{ob}		20		pF	$V_{CB}=10\text{V}$, $f=1\text{MHz}$

Equivalent circuit diagram

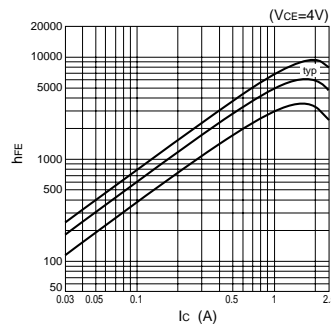


Characteristic curves

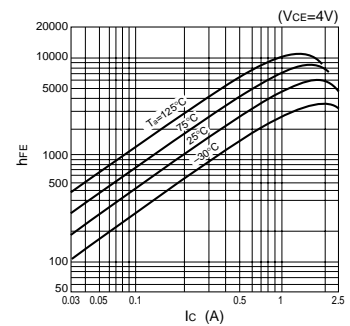
I_c - V_{CE} Characteristics (Typical)



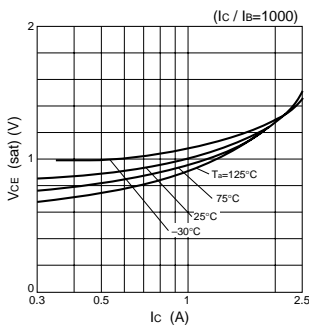
h_{FE} - I_c Characteristics (Typical)



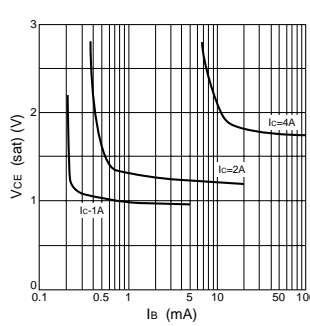
h_{FE} - I_c Temperature Characteristics (Typical)



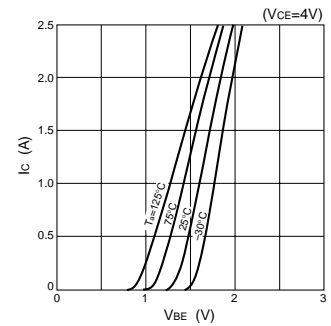
$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)



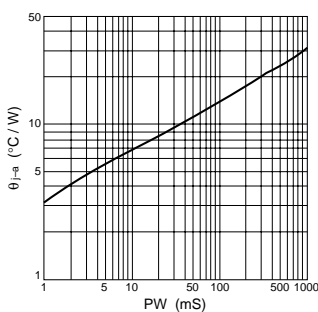
$V_{CE(sat)}$ - I_B Characteristics (Typical)



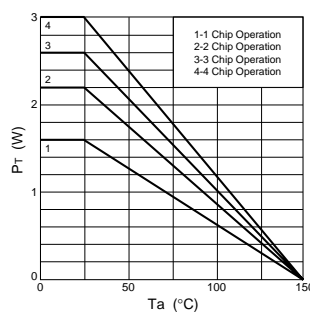
I_c - V_{BE} Temperature Characteristics (Typical)



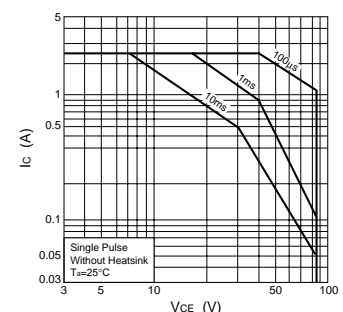
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



Absolute maximum ratings

($T_a=25^\circ\text{C}$)

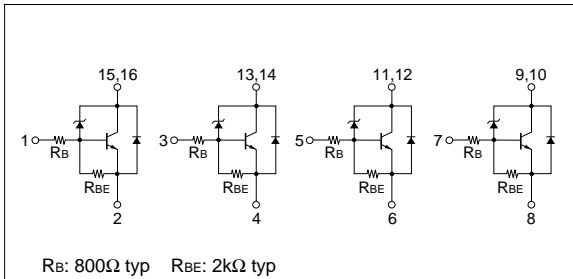
Symbol	Ratings	Unit
V_{CB0}	30 to 45	V
V_{CEO}	30 to 45	V
V_{EBO}	6	V
I_c	2	A
I_{cP}	3 (PW \leq 1ms, Du \leq 10%)	A
I_B	30	mA
P_T	3 ($T_a=25^\circ\text{C}$)	W
T_j	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$
θ_{j-a}	41.6	$^\circ\text{C}/\text{W}$

Electrical characteristics

($T_a=25^\circ\text{C}$)

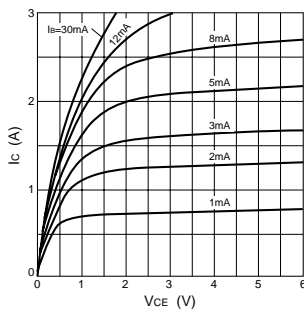
Symbol	Specification			Unit	Conditions
	min	typ	max		
I_{cB0}			10	μA	$V_{CB}=30\text{V}$
I_{EBO}	1.2		2.8	mA	$V_{EB}=6\text{V}$
V_{CEO}	30		45	V	$I_c=10\text{mA}$
h_{FE}	400	700	2000		$V_{CE}=4\text{V}$, $I_c=0.5\text{A}$
$V_{CE(sat)}$			0.2	V	$I_c=0.5\text{A}$, $I_B=5\text{mA}$
			0.6	V	$I_c=1\text{A}$, $I_B=5\text{mA}$
V_{FEC}			2.0	V	$I_{FEC}=1\text{A}$
t_{on}		1.2		μs	$V_{CC} \doteq 10\text{V}$, $I_c=0.5\text{A}$,
t_{stg}		18.0		μs	$I_{c1}=5\text{mA}$, $I_{c2}=0\text{A}$
t_f		3.6		μs	
f_T		20		MHz	$V_{CE}=12\text{V}$, $I_E=-0.2\text{A}$
C_{ob}		50		pF	$V_{CB}=10\text{V}$, $f=1\text{MHz}$
E_S/B	40			mJ	$L=10\text{mH}$, Single pulse

Equivalent circuit diagram

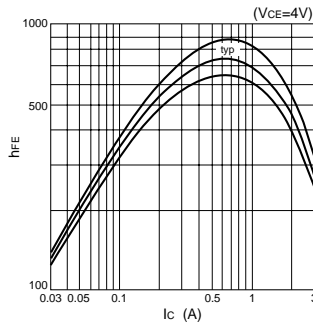


Characteristic curves

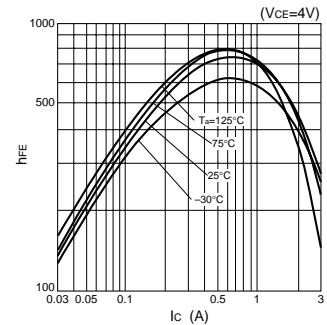
I_c - V_{CE} Characteristics (Typical)



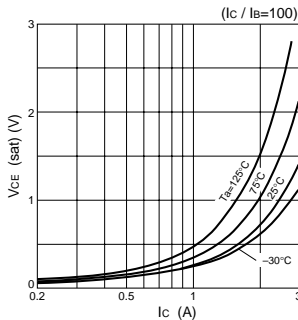
h_{FE} - I_c Characteristics (Typical)



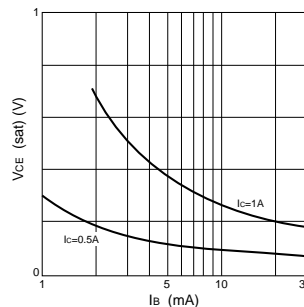
h_{FE} - I_c Temperature Characteristics (Typical)



$V_{CE(sat)}$ - I_c Temperature Characteristics (Typical)

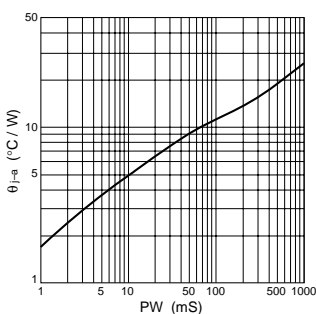


$V_{CE(sat)}$ - I_B Characteristics (Typical)

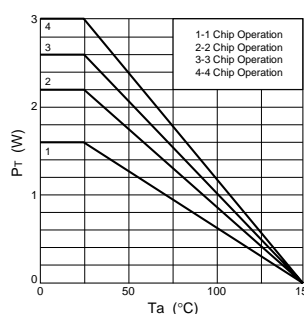


I_c - V_{BE} Temperature Characteristics (Typical)

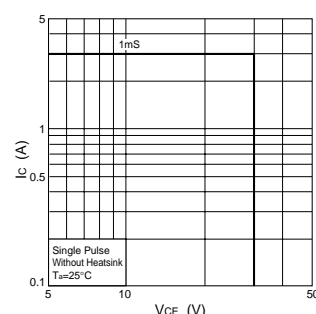
θ_{j-a} -PW Characteristics



P_T - T_a Characteristics



Safe Operating Area (SOA)



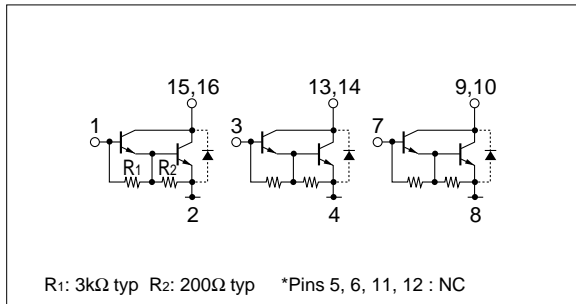
Absolute maximum ratings (Ta=25°C)

Symbol	Ratings	Unit
V _{CB0}	60	V
V _{CEO}	60	V
V _{EB0}	6	V
I _c	4	A
I _{cP}	6 (PW≤1ms, Du≤50%)	A
I _B	0.5	A
P _T	2.6 (Ta=25°C)	W
T _j	150	°C
T _{stg}	-40 to +150	°C

Electrical characteristics (Ta=25°C)

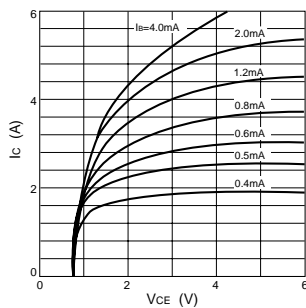
Symbol	Specification			Unit	Conditions
	min	typ	max		
I _{CB0}			10	μA	V _{CB} =60V
I _{EB0}			10	mA	V _{EB} =6V
V _{CEO}	60			V	I _c =10mA
h _{FE}	2000		12000		V _{CE} =4V, I _c =3A
V _{CE(sat)}			1.5	V	I _c =3A, I _B =6mA
V _{BE(sat)}			2.0	V	
V _{FEC}			1.8	V	I _{FEC} =1A
t _{on}		1.0		μs	V _{CC} ≐30V,
t _{stg}		4.0		μs	I _c =3A,
t _f		1.5		μs	I _{B1} =-I _{B2} =10mA
f _T		75		MHz	V _{CE} =12V, I _E =-0.1A
C _{ob}		50		pF	V _{CB} =10V, f=1MHz

Equivalent circuit diagram

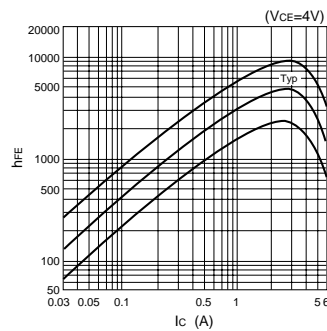


Characteristic curves

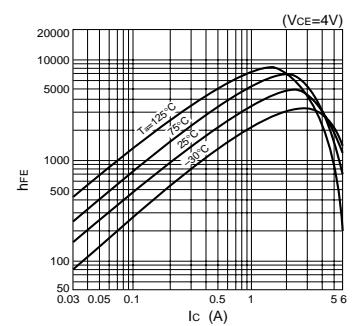
I_c-V_{CE} Characteristics (Typical)



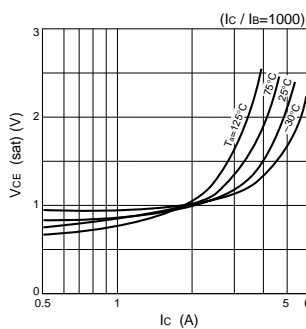
h_{FE}-I_c Characteristics (Typical)



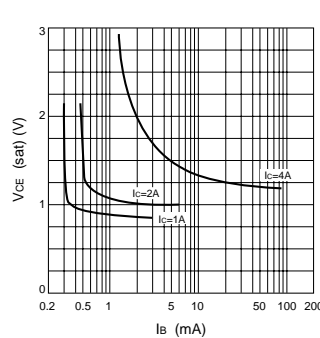
h_{FE}-I_c Temperature Characteristics (Typical)



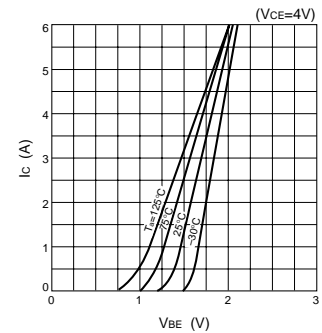
V_{CE(sat)}-I_c Temperature Characteristics (Typical)



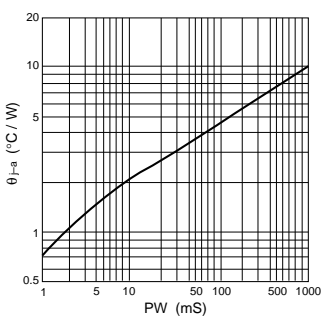
V_{CE(sat)}-I_B Characteristics (Typical)



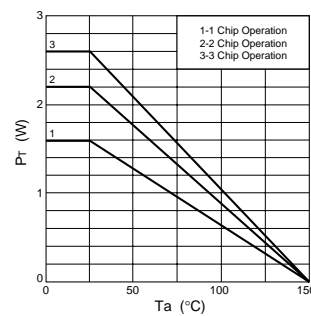
I_c-V_{BE} Temperature Characteristics (Typical)



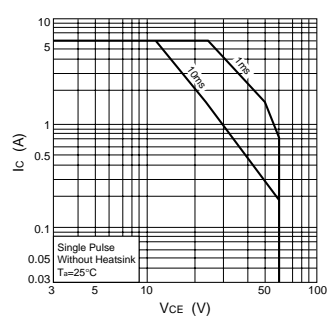
θ_{j-a}-PW Characteristics



P_T-T_a Characteristics



Safe Operating Area (SOA)



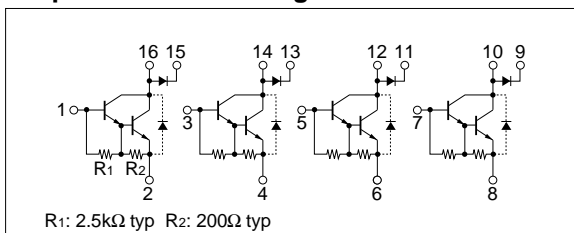
Absolute maximum ratings (Ta=25°C)

Symbol	Ratings	Unit
V _{CB0}	120	V
V _{CEO}	100	V
V _{EBO}	6	V
I _C	1.5	A
I _{CP}	2.5 (PW≤1ms, Du≤10%)	A
I _B	0.2	A
I _F	1.5	A
I _{FSM}	2.5 (PW≤0.5ms, Du≤10%)	A
V _R	120	V
P _T	3 (Ta=25°C)	W
T _j	150	°C
T _{stg}	-40 to +150	°C

Electrical characteristics (Ta=25°C)

Symbol	Specification			Unit	Conditions
	min	typ	max		
I _{CBO}			10	μA	V _{CB} =120V
I _{EBO}			3	mA	V _{EB} =6V
V _{CEO}	100			V	I _C =10mA
h _{FE}	2000	6000	12000		V _{CE} =4V, I _C =1A
V _{CE(sat)}		1.1	1.3	V	I _C =1A, I _B =2mA
V _{BE(sat)}		1.7	2.2	V	
t _{on}		0.5		μs	V _{CC} ≐30V, I _C =1A,
t _{stg}		4.5		μs	
t _f		1.2		μs	I _{B1} =-I _{B2} =2mA
f _T		50		MHz	V _{CE} =12V, I _E =-0.1A
C _{ob}		20		pF	V _{CB} =10V, f=1MHz

Equivalent circuit diagram

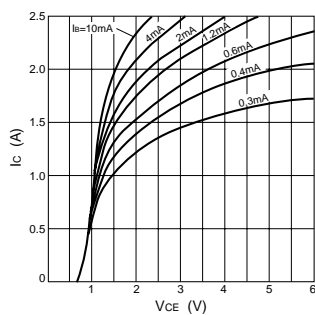


Diode for flyback voltage absorption (Ta=25°C)

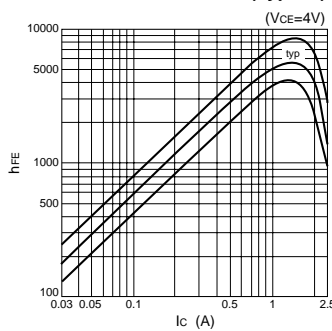
Symbol	Specification			Unit	Conditions
	min	typ	max		
V _R	120			V	I _R =10μA
V _F			1.6	V	I _F =1A
I _R			10	μA	V _R =120V
t _{rr}		100		ns	I _F =±100mA

Characteristic curves

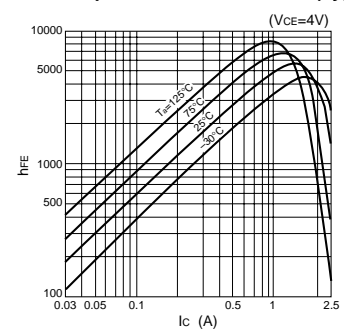
I_C-V_{CE} Characteristics (Typical)



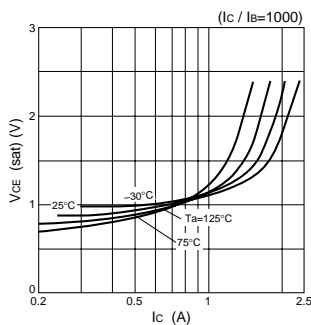
h_{FE}-I_C Characteristics (Typical)



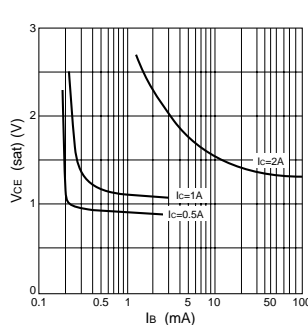
h_{FE}-I_C Temperature Characteristics (Typical)



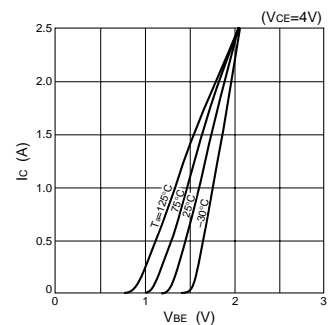
V_{CE(sat)}-I_C Temperature Characteristics (Typical)



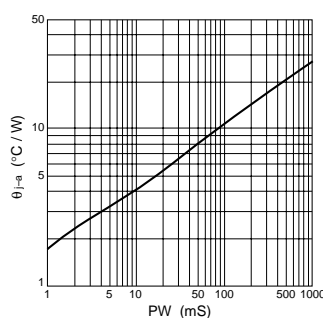
V_{CE(sat)}-I_B Characteristics (Typical)



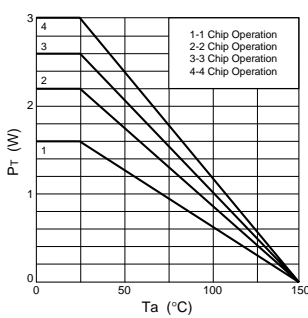
I_C-V_{BE} Temperature Characteristics (Typical)



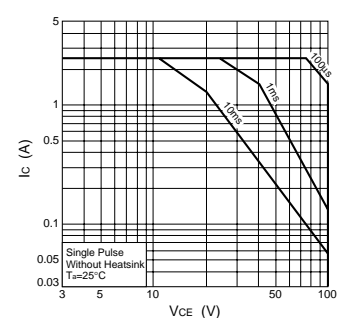
θ_{J-a}-PW Characteristics



P_T-T_a Characteristics



Safe Operating Area (SOA)

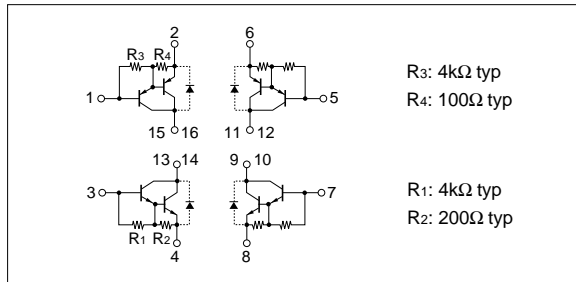


Absolute maximum ratings

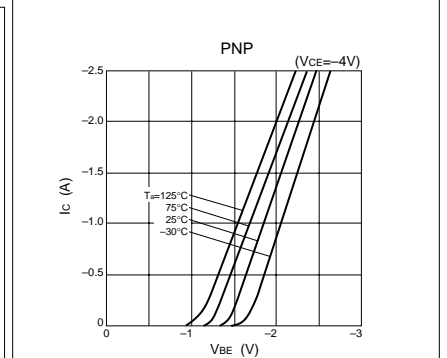
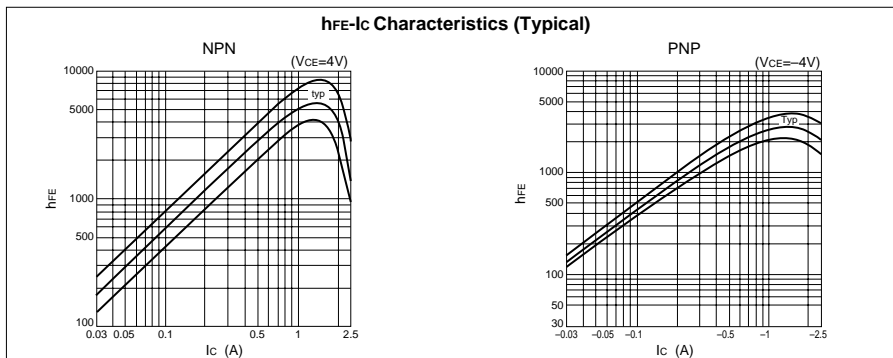
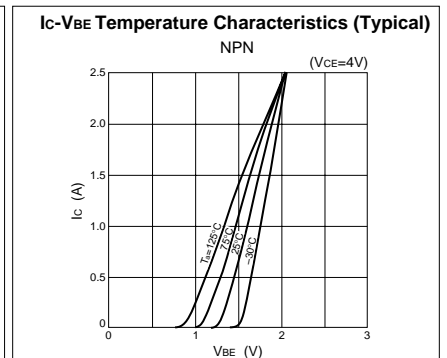
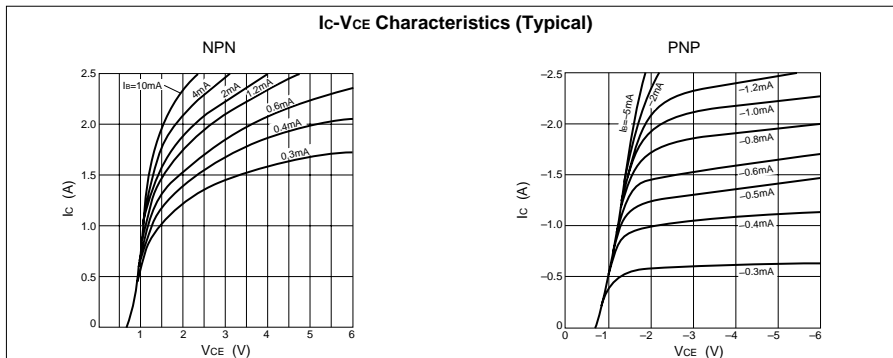
($T_a=25^\circ\text{C}$)

Symbol	Ratings		Unit
	NPN	PNP	
V_{CBO}	100	-60	V
V_{CEO}	100	-60	V
V_{EBO}	6	-6	V
I_c	1.5	-1.5	A
I_{cP}	2.5 ($PW \leq 1\text{ms}$, $D_u \leq 100\%$)		A
I_B	0.1	-0.1	A
P_T	3 ($T_a=25^\circ\text{C}$)		W
T_j	150		$^\circ\text{C}$
T_{stg}	-40 to +150		$^\circ\text{C}$
θ_{j-a}	41.6		$^\circ\text{C/W}$

Equivalent circuit diagram



Characteristic curves

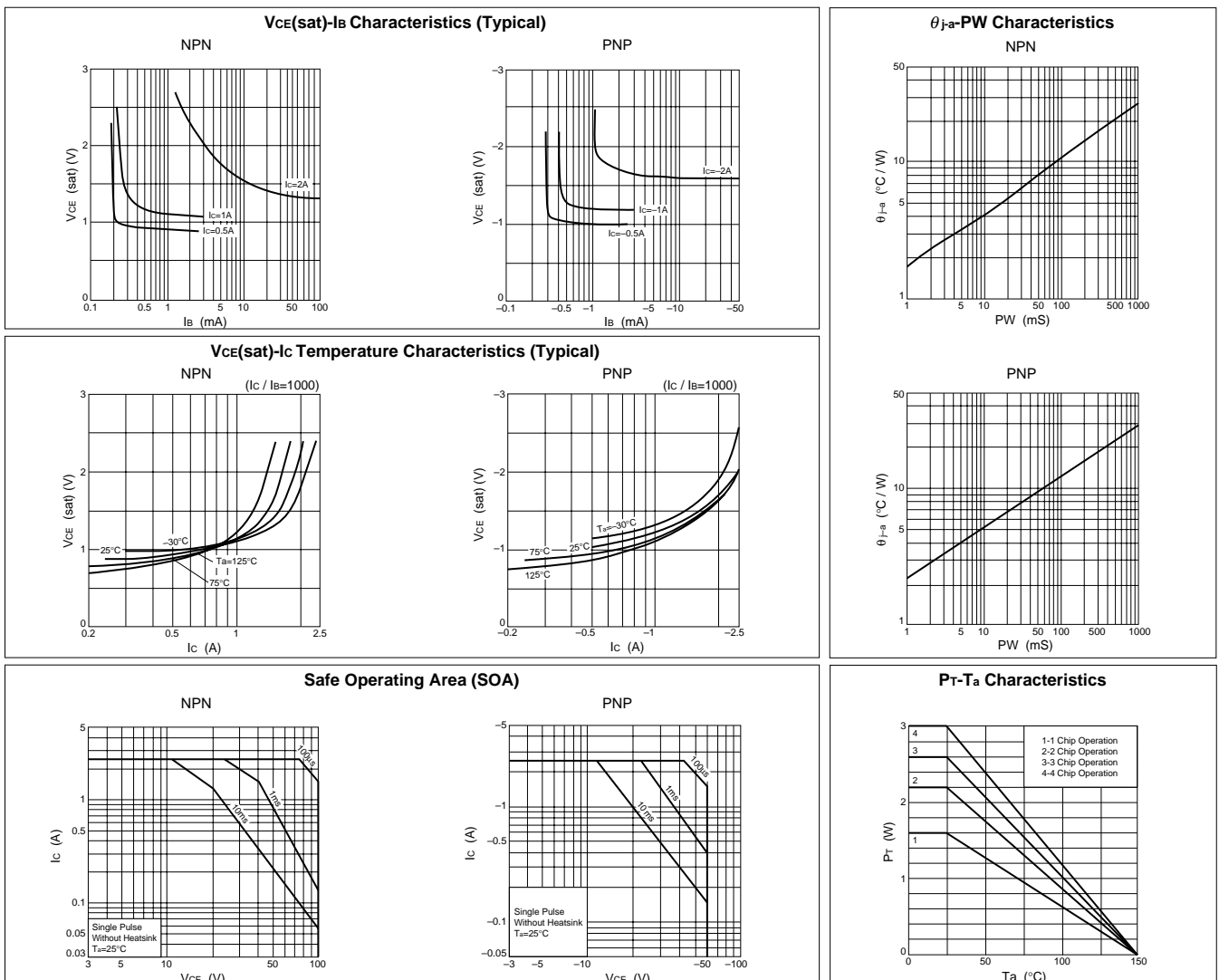


Electrical characteristics

($T_a=25^\circ\text{C}$)

Symbol	NPN					PNP				
	Specification			Unit	Conditions	Specification			Unit	Conditions
	min	typ	max			min	typ	max		
I_{CBO}			10	μA	$V_{CB}=100\text{V}$			-10	μA	$V_{CB}=-60\text{V}$
I_{EBO}			3	mA	$V_{EB}=6\text{V}$			-3	mA	$V_{EB}=-6\text{V}$
V_{CEO}	100			V	$I_C=10\text{mA}$	-60			V	$I_C=-10\text{mA}$
h_{FE}	2000		12000		$V_{CE}=4\text{V}, I_C=1\text{A}$	2000		12000		$V_{CE}=-4\text{V}, I_C=-1\text{A}$
$V_{CE(sat)}$			1.3	V	$I_C=1\text{A}, I_B=2\text{mA}$			-1.4	V	$I_C=-1\text{A}, I_B=-2\text{mA}$
$V_{BE(sat)}$			2.2	V				-2.2	V	

Characteristic curves

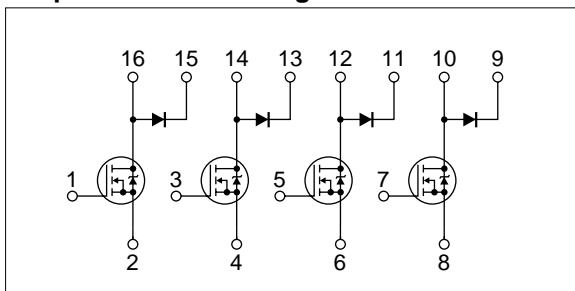


Absolute maximum ratings

(Ta=25°C)

Symbol	Ratings	Unit
V _{DSS}	60	V
V _{GSS}	±10	V
I _D	±2	A
I _{D(pulse)}	±3 (PW≤100μs, Du≤1%)	A
I _F	1.5	A
I _{FSM}	2.5 (PW≤0.5ms, Du≤10%)	A
V _R	120	V
P _T	3 (Ta=25°C, 4-circuit operation)	W
T _{ch}	150	°C
T _{stg}	-40 to +150	°C

Equivalent circuit diagram



Electrical characteristics

(Ta=25°C)

Symbol	Specification			Unit	Conditions
	min	typ	max		
V _{(BR)DSS}	60			V	I _D =250μA, V _{GS} =0V
I _{GSS}			±500	nA	V _{GS} =±10V
I _{DSS}			250	μA	V _{DS} =60V, V _{GS} =0V
V _{TH}	1.0		2.0	V	V _{DS} =10V, I _D =250μA
R _{e(yfs)}	1.2			S	V _{DS} =10V, I _D =1.0A
R _{DS(ON)}		0.19	0.24	Ω	V _{GS} =10V, I _D =1.0A
		0.25	0.30	Ω	V _{GS} =4V, I _D =1.0A
C _{iss}		400		pF	V _{DS} =25V,
C _{oss}		160		pF	f=1.0MHz,
C _{rss}		35		pF	V _{GS} =0V
V _{SD}		1.0	1.5	V	I _{SD} =2A, V _{GS} =0V
t _{rr}		150		ns	I _{SD} =±100mA

Diode for flyback voltage absorption

Symbol	Specification			Unit	Conditions
	min	typ	max		
V _R	120			V	I _R =10μA
V _F			1.6	V	I _F =1A
I _R			100	μA	V _R =120V
t _{rr}		100		ns	I _F =±100mA

Characteristic curves

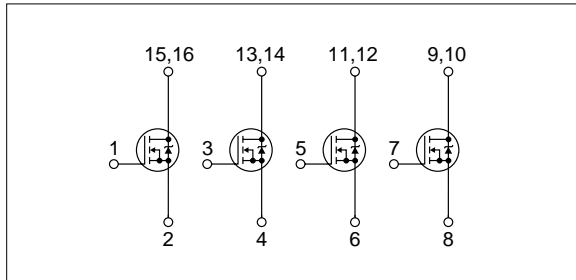
Absolute maximum ratings

($T_a=25^\circ\text{C}$)

Symbol	Ratings	Unit
V_{DSS}	100	V
V_{GSS}	± 20	V
I_D	± 2	A
$I_{D(\text{pulse})}$	± 5 ($PW \leq 100\mu\text{s}$, $D_u \leq 1\%$)	A
E_{AS}^*	2.7	mJ
P_T	3 ($T_a=25^\circ\text{C}$, 4-circuit operation)	W
T_{ch}	150	$^\circ\text{C}$
T_{stg}	-40 to +150	$^\circ\text{C}$

* : $V_{DD}=25\text{V}$, $L=1\text{mH}$, $I_L=2\text{A}$, unclamped, $R_G=50\Omega$, see Fig. E on page 15.

Equivalent circuit diagram



($T_a=25^\circ\text{C}$)

Symbol	Specification			Unit	Conditions
	min	typ	max		
$V_{(BR)DSS}$	100			V	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$
I_{GSS}			± 100	nA	$V_{GS}=\pm 20\text{V}$
I_{DSS}			100	μA	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$
V_{TH}	1.0		2.0	V	$V_{DS}=10\text{V}$, $I_D=250\mu\text{A}$
$R_{e(yfs)}$	1.5			S	$V_{DS}=10\text{V}$, $I_D=1.0\text{A}$
$R_{DS(ON)}$		0.60	0.80	Ω	$V_{GS}=10\text{V}$, $I_D=1.0\text{A}$
		0.75	0.95	Ω	$V_{GS}=4\text{V}$, $I_D=1.0\text{A}$
C_{iss}		160		pF	$V_{DS}=25\text{V}$,
C_{oss}		40		pF	$f=1.0\text{MHz}$,
C_{rss}		10		pF	$V_{GS}=0\text{V}$
$t_{d(on)}$		7		ns	$I_D=1\text{A}$, $V_{DD} \div 50\text{V}$,
t_r		20		ns	$R_L=50\Omega$,
$t_{d(off)}$		35		ns	$V_{GS}=10\text{V}$,
t_f		30		ns	see Fig. 3 on page 16.
V_{SD}		1.0	1.5	V	$I_{SD}=2\text{A}$, $V_{GS}=0\text{V}$
t_{rr}		140		ns	$I_{SD}=\pm 100\text{mA}$

Characteristic curves



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