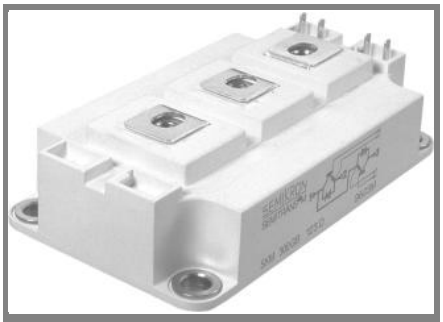
SKM 400GB066D



SEMITRANS^{TM} 3

Trench IGBT Modules

SKM 400GB066D

Preliminary Data

Features

- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_C

Typical Applications

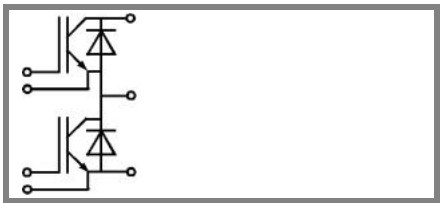
- AC inverter drives
- UPS
- Electronic welders

Remarks

- Case temperature limited to T_c = 125°C max, recommended T_{op} = -40 ... +150°C
- Product reliability results are valid for $T_j \leq 150°C$
- Short circuit data: $t_p \leq 6\mu s$; $V_{GE} \leq 15V$; $T_j = 150°C$; $V_{cc} \leq 360V$, use of soft R_G necessary !
- Take care of over-voltage caused by stray inductances

Absolute Maximum Ratings	T_{case} = 25°C, unless otherwise specified		
Symbol	**Conditions**	**Values**	**Units**
IGBT			
V_{CES}		600	V
I_C	T_c = 25 (80) °C, T_j = 150 °C	460 (330)	A
I_C	T_c = 25 (80) °C, T_j = 175 °C	470 (370)	A
I_{CRM}	t_p = 1 ms	600	A
V_{GES}		± 20	V
T_{vj}, (T_{stg})		- 40 ... +175 (125)	°C
V_{isol}	AC, 1 min.	4000	V
Inverse diode			
I_F	T_c = 25 (80) °C, T_j = 150 °C	430 (320)	A
I_F	T_c = 25 (80) °C, T_j = 175 °C	430 (320)	A
I_{FRM}	t_p = 1 ms	800	A
I_{FSM}	t_p = 10 ms; sin.; T_j = 175 °C		A

Characteristics	T_{case} = 25°C, unless otherwise specified				
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Units**
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CE}$, I_C = 6,4 mA	5	5,8	6,5	V
I_{CES}	V_{GE} = 0, $V_{CE} = V_{CES}$, T_j = 25 () °C		0,25	0,75	mA
$V_{CE(TO)}$	T_j = 25 () °C		0,9 (0,85)	1 (0,9)	V
r_{CE}	V_{GE} = 15 V, T_j = 25 (150) °C		1,4 (2,1)	2,3 (3)	mΩ
$V_{CE(sat)}$	I_{Cnom} = 400 A, V_{GE} = 15 V, chip level		1,45 (1,7)	1,9 (2,1)	V
C_{ies}	under following conditions		24,7		nF
C_{oes}	V_{GE} = 0, V_{CE} = 25 V, f = 1 MHz		1,54		nF
C_{res}			0,73		nF
L_{CE}				20	nH
$R_{CC'+EE'}$	res., terminal-chip T_c= 25 (125) °C		0,35 (0,5)		mΩ
$t_{d(on)}$	V_{CC} = 300 V, I_{Cnom} = 400 A		200		ns
t_r	$R_{Gon} = R_{Goff}$ = 1,5 Ω, T_j = 150 °C		60		ns
$t_{d(off)}$	V_{GE} = -8V / +15V		560		ns
t_f			53		ns
E_{on} (E_{off})			8 (16)		mJ
Inverse diode					
$V_F = V_{EC}$	I_{Fnom} = 400 A; V_{GE} = 0 V; T_j = 25 (150) °C		1,4	1,6	V
$V_{(TO)}$	T_j = 25 (150) °C		0,95	1	V
r_T	T_j = 25 (150) °C		1,1	1,5	mΩ
I_{RRM}	I_{Fnom} = 400 A; T_j = 150 ( ) °C		410		A
Q_{rr}	di/dt = 7250 A/µs		62		µC
E_{rr}	V_{GE} = 0 V		14		mJ
Thermal characteristics					
$R_{th(j-c)}$	per IGBT			0,12	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,2	K/W
$R_{th(c-s)}$	per module			0,038	K/W
Mechanical data					
M_s	to heatsink M6	3		5	Nm
M_t	to terminals M6	2,5		5	Nm
w				325	g



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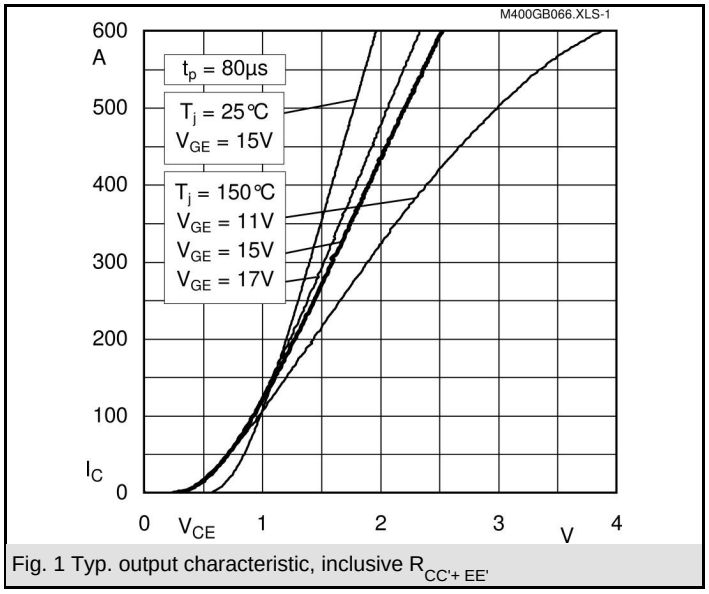


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

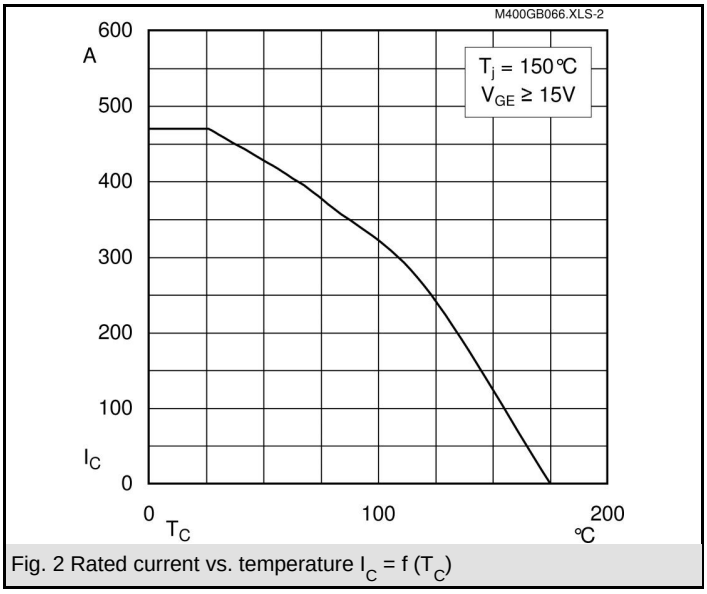


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

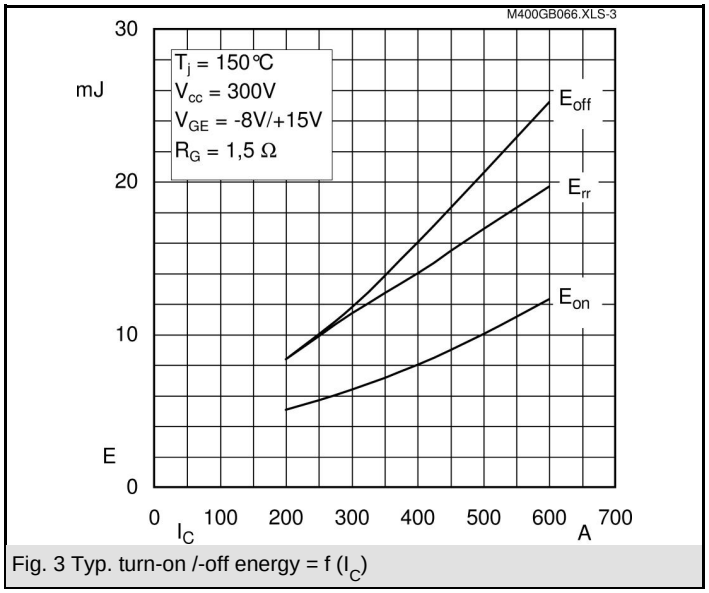


Fig. 3 Typ. turn-on /-off energy = f (I_C)

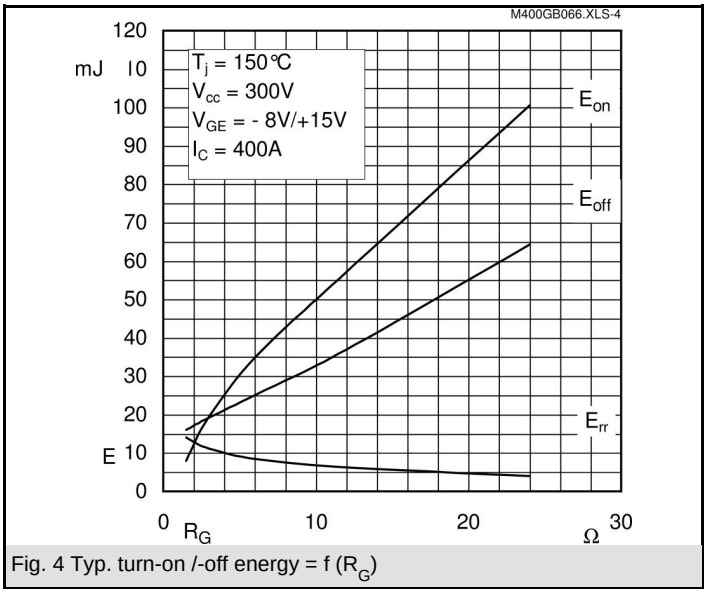


Fig. 4 Typ. turn-on /-off energy = f (R_G)

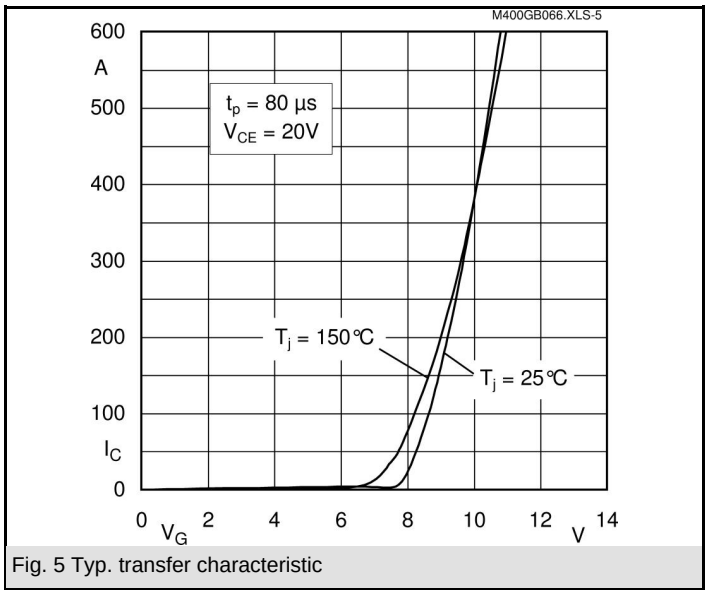


Fig. 5 Typ. transfer characteristic

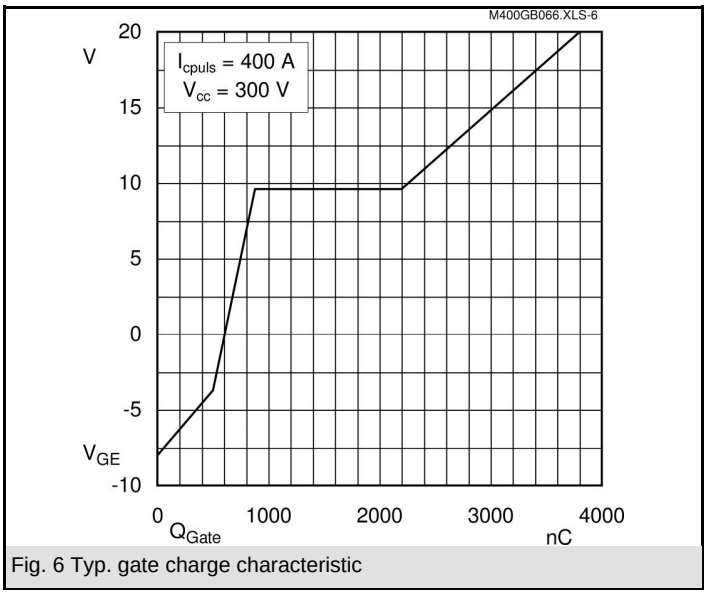


Fig. 6 Typ. gate charge characteristic

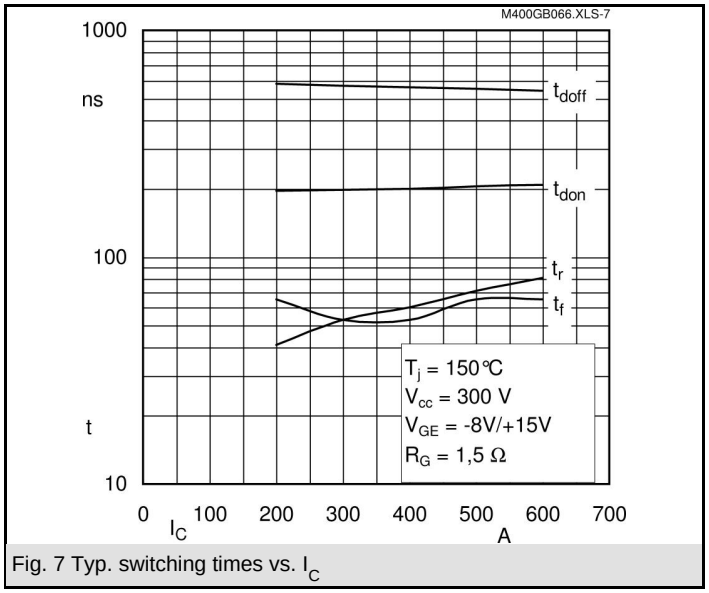


Fig. 7 Typ. switching times vs. I_C

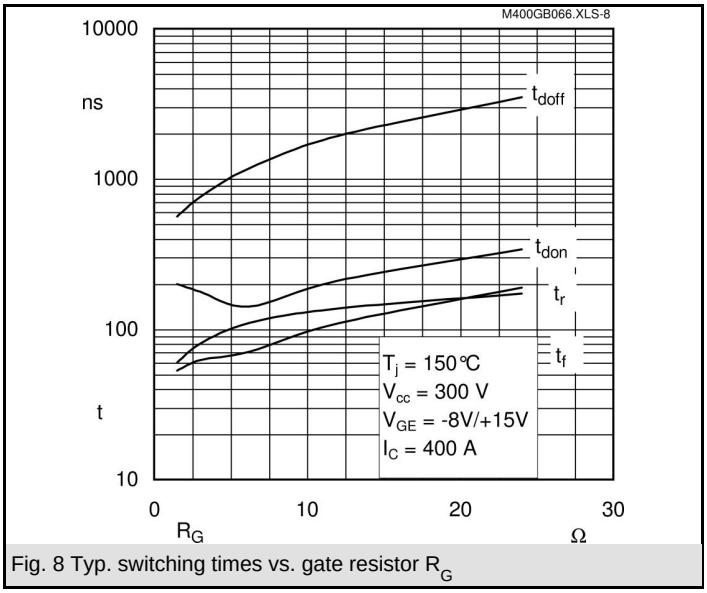


Fig. 8 Typ. switching times vs. gate resistor R_G

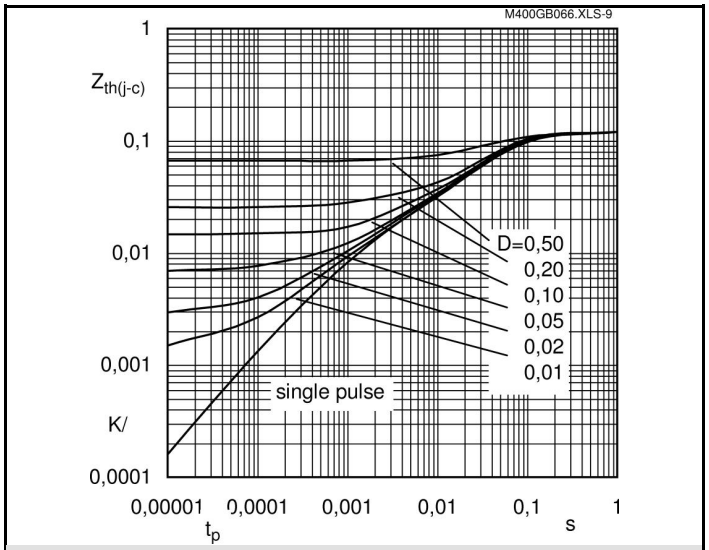


Fig. 9 Transient thermal impedance of IGBT

$Z_{thp(j-c)} = f(t_p)$; $D = t_p/t_c = t_p * f$

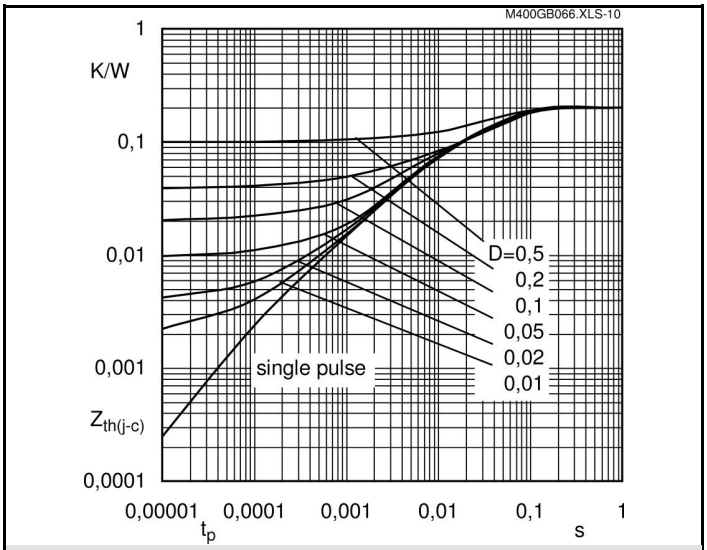


Fig. 10 Transient thermal impedance of FWD

$Z_{thp(j-c)} = f(t_p)$; $D = t_p/t_c = t_p * f$

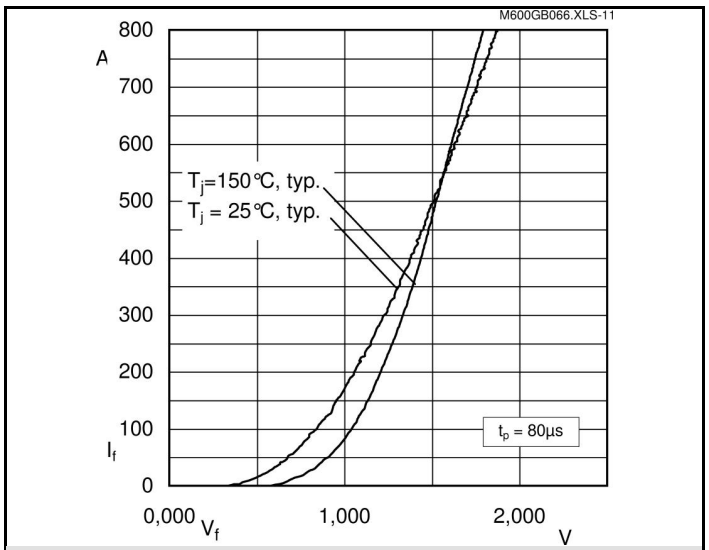


Fig. 11 CAL diode forward characteristic

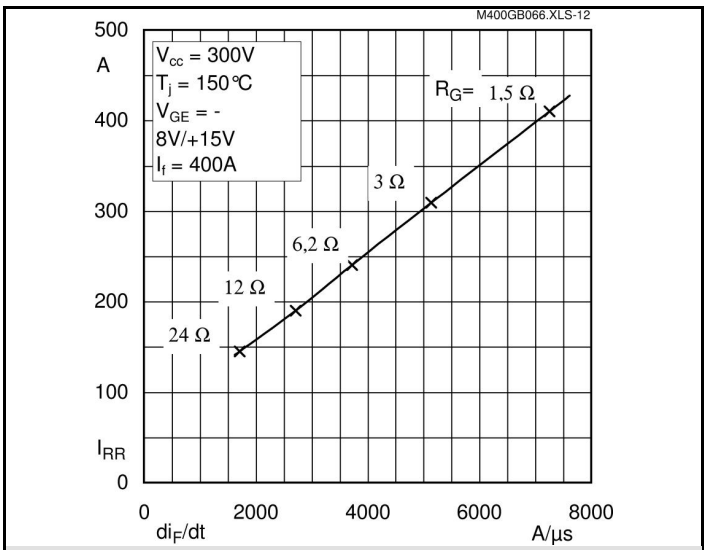


Fig. 12 Typ. CAL diode peak reverse recovery current

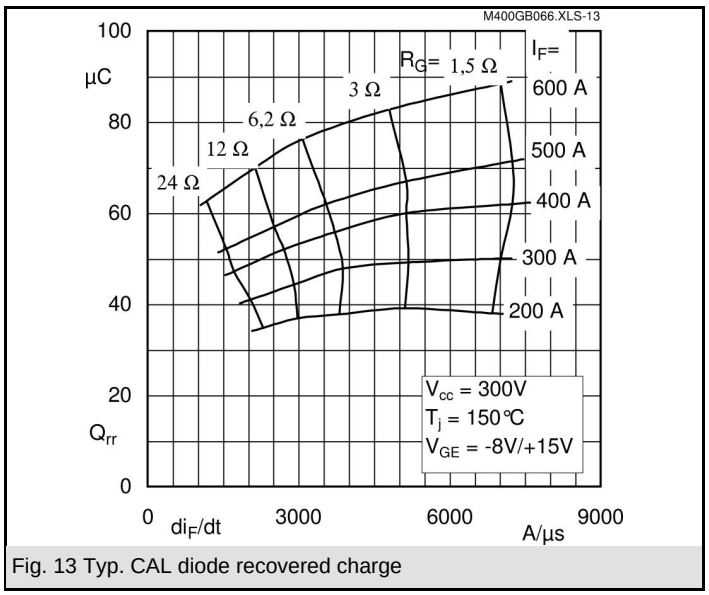
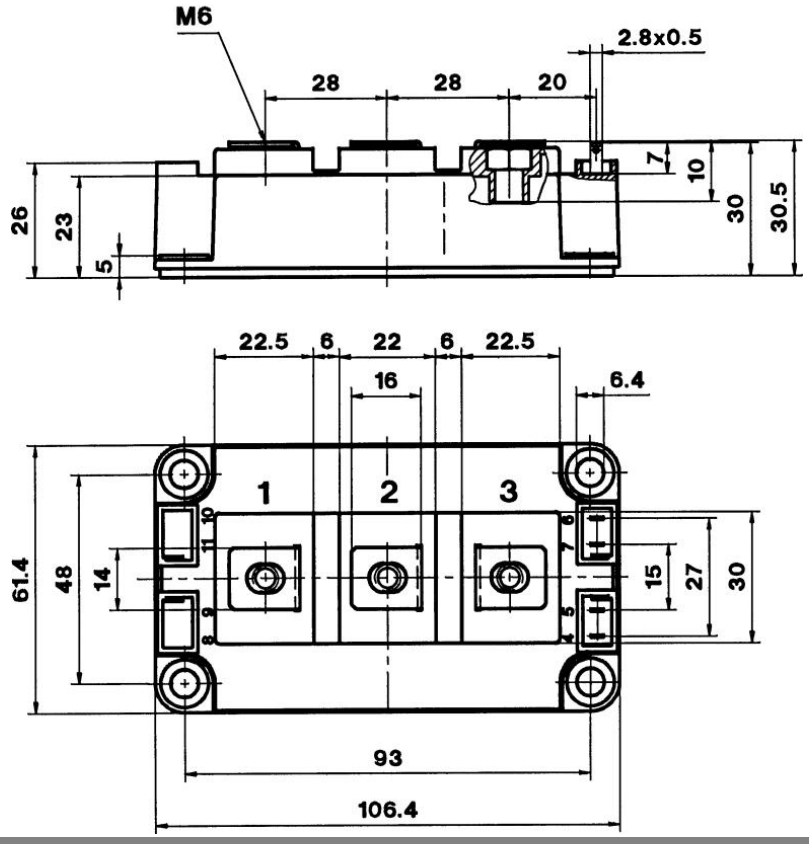


Fig. 13 Typ. CAL diode recovered charge

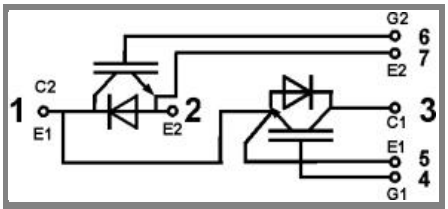
UL Recognized
File no. E 63 532

Dimensions in mm

CASED56



Case D 56



GB Case D56

This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

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