DESCRIPTION

The A7501 Series is a CMOS PFM-control step-up switching regulator that mainly consists of a reference voltage source, an oscillator, and a comparator. Enabling products with a low ripple over a wide range, high efficiency, and high output current. Products with a fixed duty ratio of 75 %(Lower Output Voltage) or 88%(Higher Output Voltage) are also available.

The A7501 features step-up switching regulator can be configured by using an external coil, capacitor, and diode. A protection circuit turns off the built-in MOS FET when the voltage at the LX pin exceeds the limit to prevent it from being damaged. This feature, along with the mini package and low current consumption, makes the A7501 ideal for the power supply unit of portable equipment applications.

A7501 is available in SOT-89-3 and SOT-23 package.

FEATURES

- Low voltage operation: Startup at 0.9V min (I_{OUT} = 1mA) guaranteed
- Low input current: During maximum operation: 23μA (V_{OUT} = 3.3V, typ.)
- Frequency: 300KHz.
- Duty ratio: 75% Built-in fixed-type PFM controller
- External parts: Coil, capacitor, and diode
- Output voltage: 1.5V to 6.0V accuracy of 2%
- Available in SOT-89-3 and SOT-23 Package

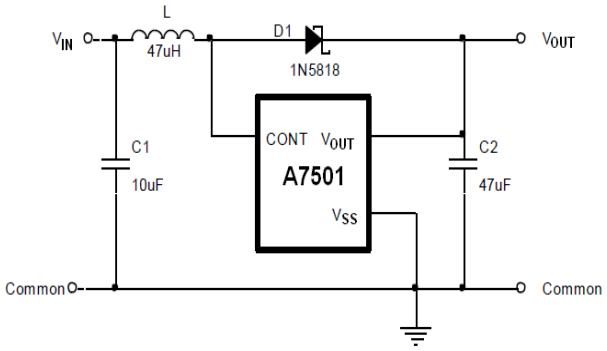
APPLICATION

- Power supply for portable equipment such as digital cameras, electronic notebooks, and PDA
- Power supply for audio equipment such as portable CD/MD players
- Constant voltage power supply for cameras, video equipment, and communications equipment
- Power supply for microcomputers

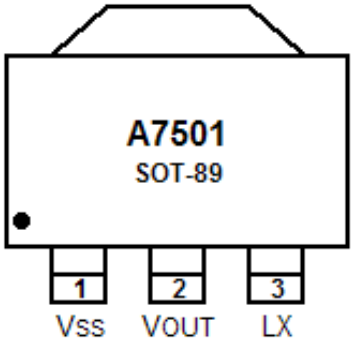
ORDER INFORMATION

Package Type	Part Number	
SOT-89-3	K3	A7501K3R-XX
		A7501K3VR –XX
SOT-23	E3	A7501E3R-XX
		A7501E3VR –XX
XX: Output Voltage, 30=3.0V, 33=3.3V, 36=3.6V, 50=5.0V, 57=5.7V R: Tape & Reel V: Green Package		
AiT provides all Pb free products Suffix " V " means Green Package		

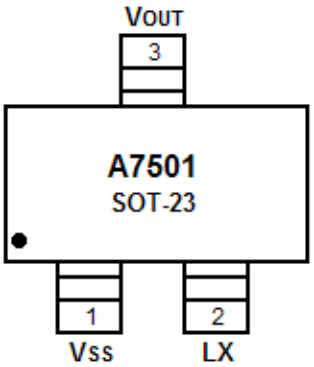
TYPICAL APPLICATION CIRCUIT



PIN DESCRIPTION



Top View



Top View

Pin #		Symbol	Function
SOT89-3	SOT-23		
1	1	V_{SS}	Ground
2	3	V_{OUT}	Output
3	2	LX	External Coil Connection

ABSOLUTE MAXIMUM RATINGS

V_{DD}, Input voltage	V_{SS} -0.3V ~ V_{SS}+10V
V_{OUT}, Output voltage	V_{SS}-0.3V ~ V_{SS}+10V
V_{LX}, Output voltage	V_{SS}-0.3V ~ V_{SS}+10V
I_{LX}, Output Current	300mA
PD, Power dissipation	
SOT-89-3	500mW
SOT-23	150mW
T_{OPR}, Operating ambient temperature	-40℃ ~ + 80℃
T_{STG}, Storage ambient temperature	-40℃ ~ + 125℃

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

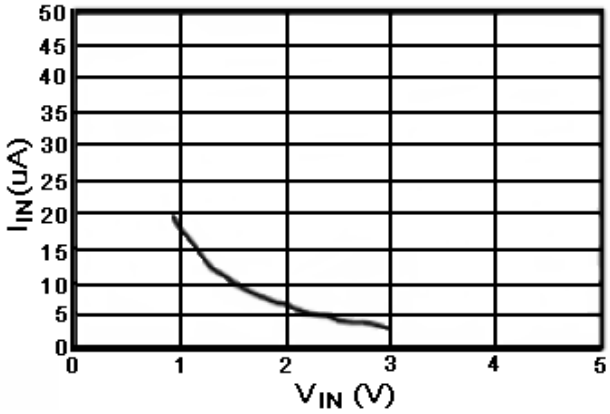
T_A = 25°C, unless otherwise specified.

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit	Test circuit
Output voltage	V_{OUT}		$V_{OUT(s)}$ ×0.98	$V_{OUT(s)}$	$V_{OUT(S)}$ ×1.02	V	1
Input Voltage	V_{IN}		-	-	10		
Operation start voltage	V_{ST1}	I_{OUT} = 1mA	-	-	0.9		
OSC start voltage	V_{ST2}	No external parts, Voltage applied to V_{OUT}, LX pin pulled up to V_{OUT} via 300 resistor	-	-	0.8		2
Input current without load	I_{IN}	I_{OUT} = 0	-	9.0	-	uA	1
Current consumption 1	I_{SS1}	V_{OUT} = Output voltage×0.95	-	23.2	38.6	uA	2
Current consumption2	I_{SS2}	V_{OUT} = Output voltage + 0.5	-	2.9	4.4		
Switching current	I_{SW}	V_{LX}=0.4V	65.0	118.2	-	mA	
LX pin limit voltage	V_{LXLMT}	Apply to LX pin, Confirm oscillation stop	-	0.9	-	V	
Line regulation	$\triangle V_{OUT1}$	V_{IN} = $V_{OUT(S)}$ ×0.4 ~ 0.6	-	30	60	mV	1
Load regulation	$\triangle V_{OUT2}$	I_{OUT}=10uA ~ $V_{OUT(S)}$/250×1.25	-	30	60		
Output voltage Temperature coefficient	$\frac{\triangle V_{OUT}}{\triangle T_A * V_{OUT}}$	T_A=-40℃ ~ + 85℃	-	±50	-	ppm/℃	
Maximum oscillation frequency	fosc	V_{OUT} = Output voltage× 0.95, Measured waveform at LX pin	0.75fo	fo	1.25fo	kHz	2
Duty ratio	Duty	V_{OUT} = Output voltage× 0.95,Measured waveform at LX pin	70	75	80	%	
			84	88	92		
Efficiency	EFFI		-	88	-	%	1

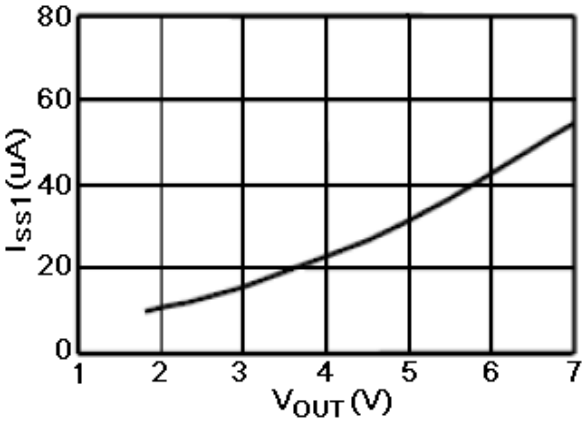
NOTE: $V_{OUT(S)}$ specified above is the set output voltage value, and V_{OUT} is the typical value of the actual output voltage. fo is the working frequency.

TYPICAL PERFORMANCE CHARACTERISTICS

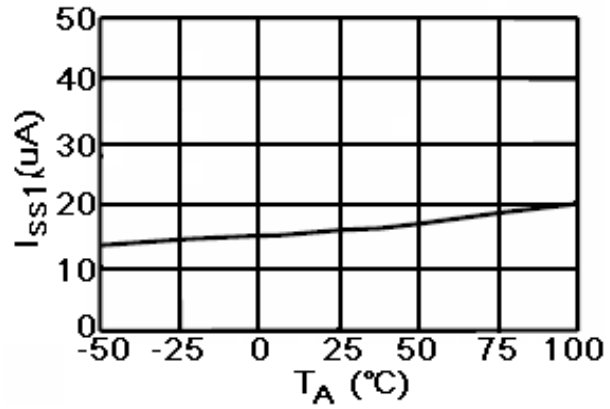
1. Input Voltage vs. Power Supply Input Current at No Load, T_A = 25°C



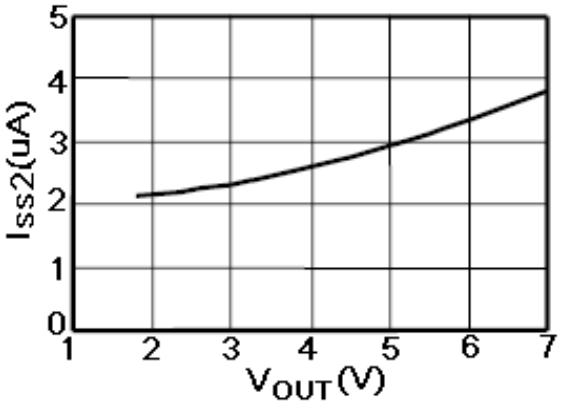
2. Output Voltage vs Current Consumption 1



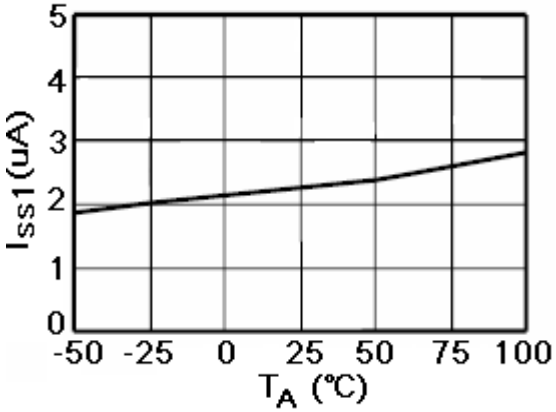
3. Temperature vs Current consumption 1



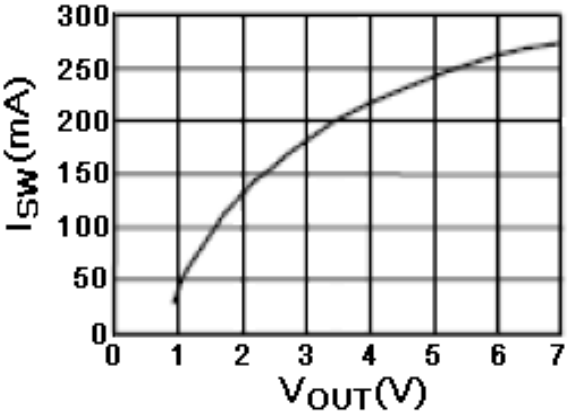
4. Output Voltage vs Current consumption 2, T_A = 25°C



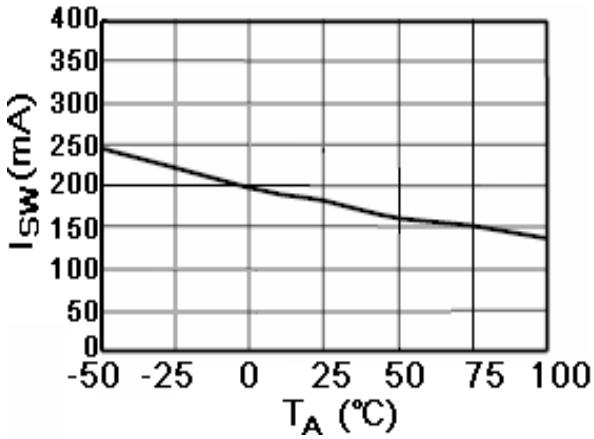
5. Temperature vs Current consumption 2



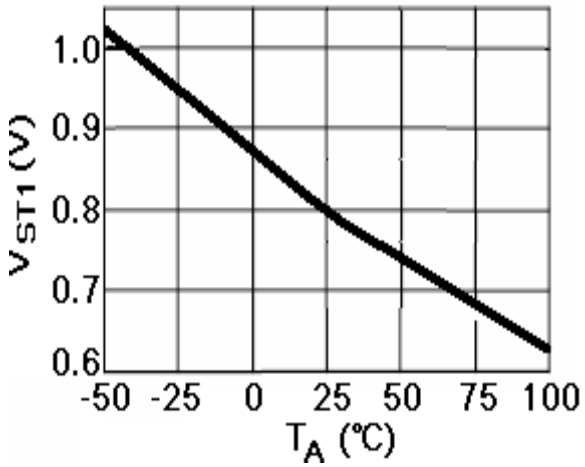
6. Output Voltage vs Switching Current ,T_A = 25°C



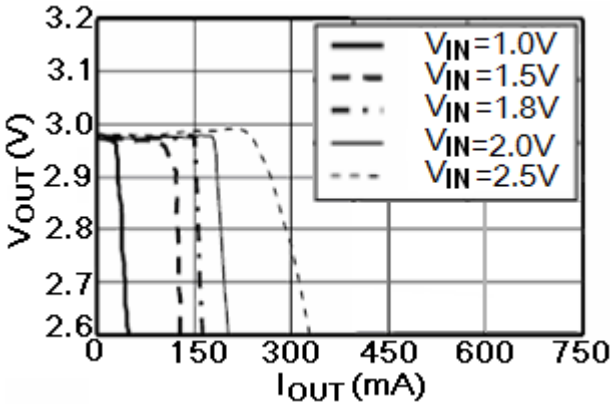
7. Temperature vs Switching Current



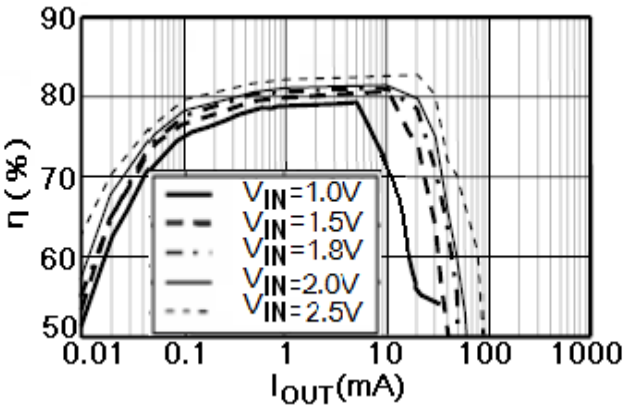
8. Temperature vs Operation Start Voltage



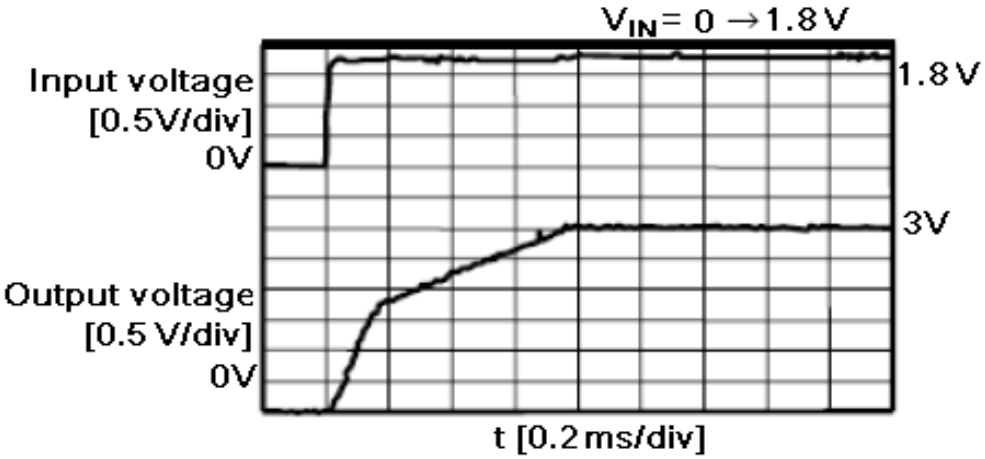
9. Output Current vs Output Voltage



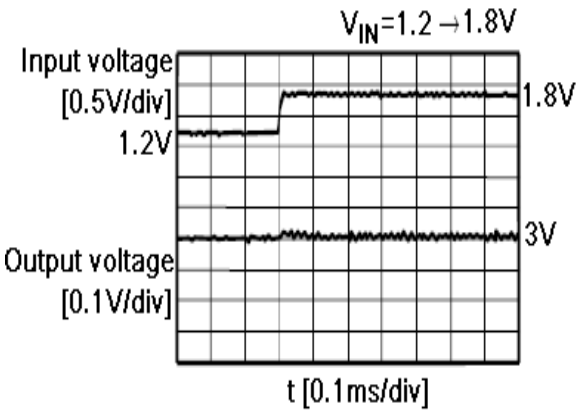
10. Output Current vs Efficiency

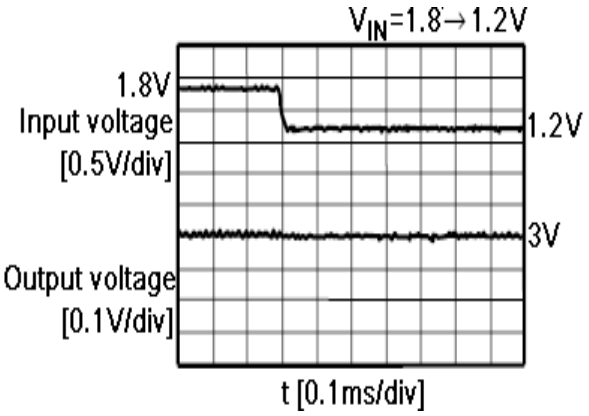


11. Power On

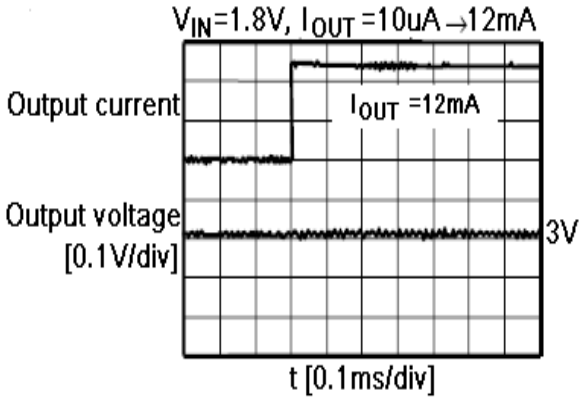


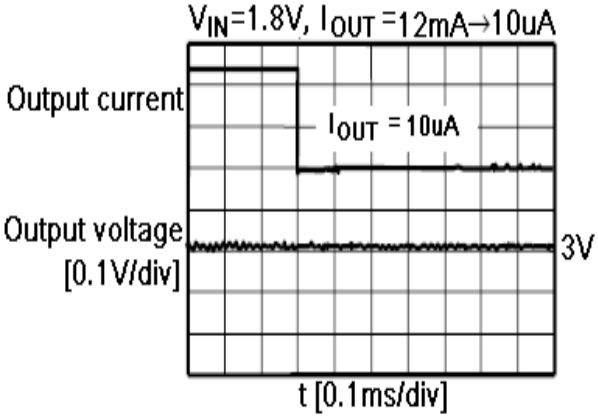
12. Power Supply Voltage Fluctuation (T_A=25℃, R_L=250Ω)



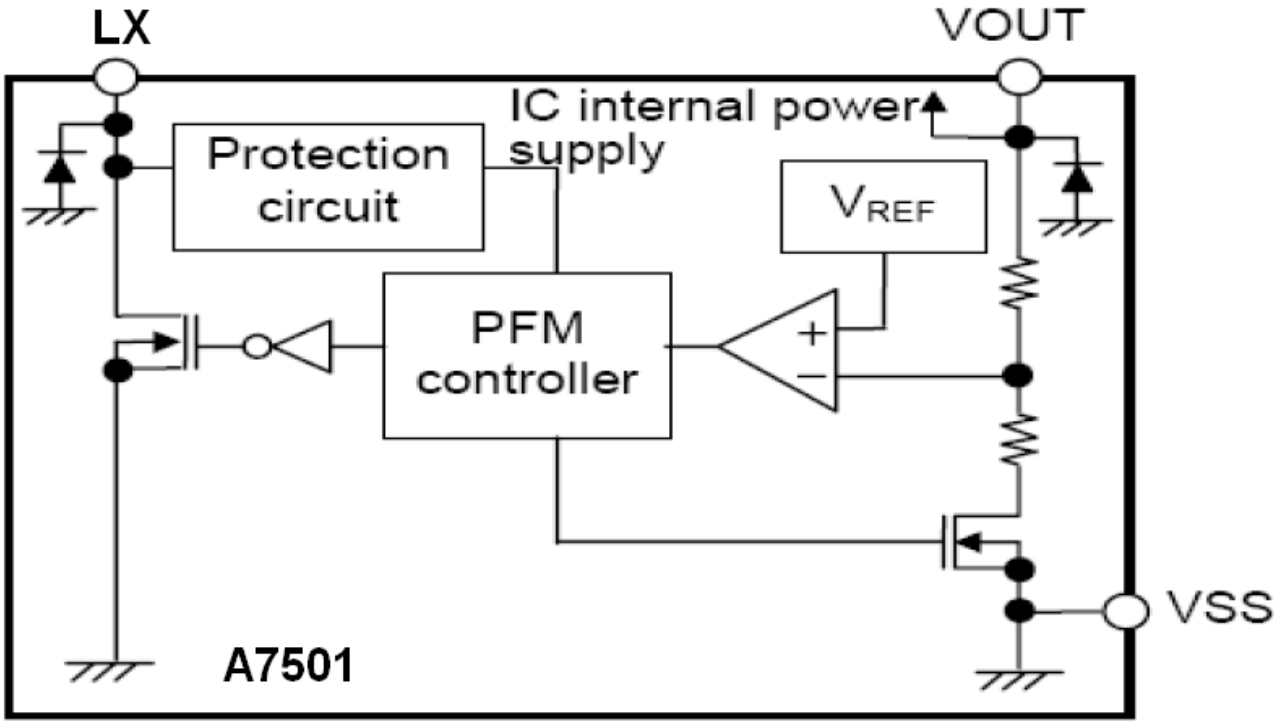


13. Load Current Fluctuation, T_A=25℃



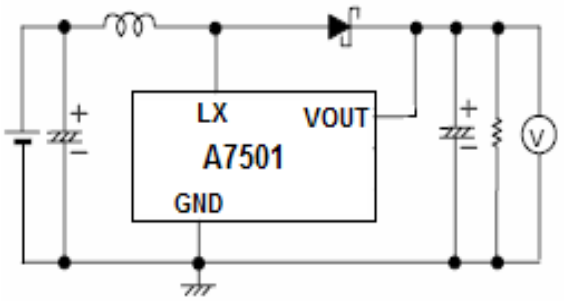


BLOCK DIAGRAM

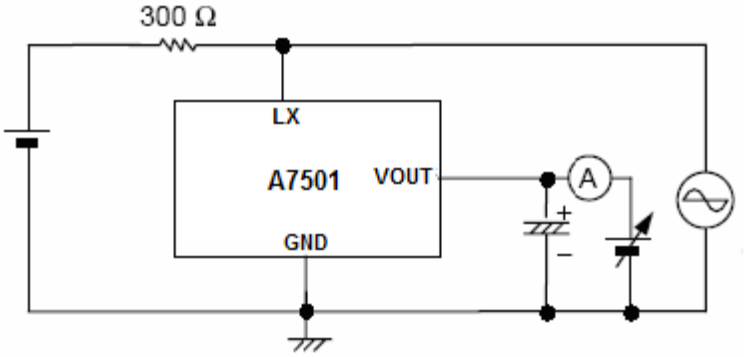


TEST CIRCUITS

Test circuits 1

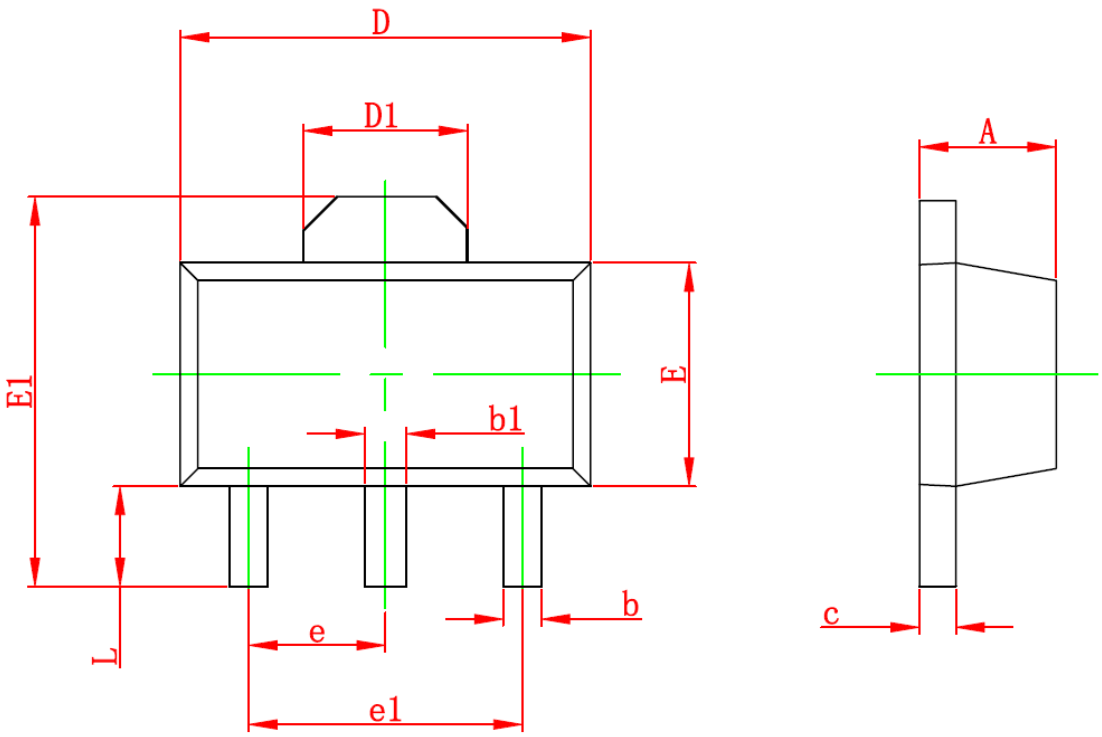


Test circuits 2



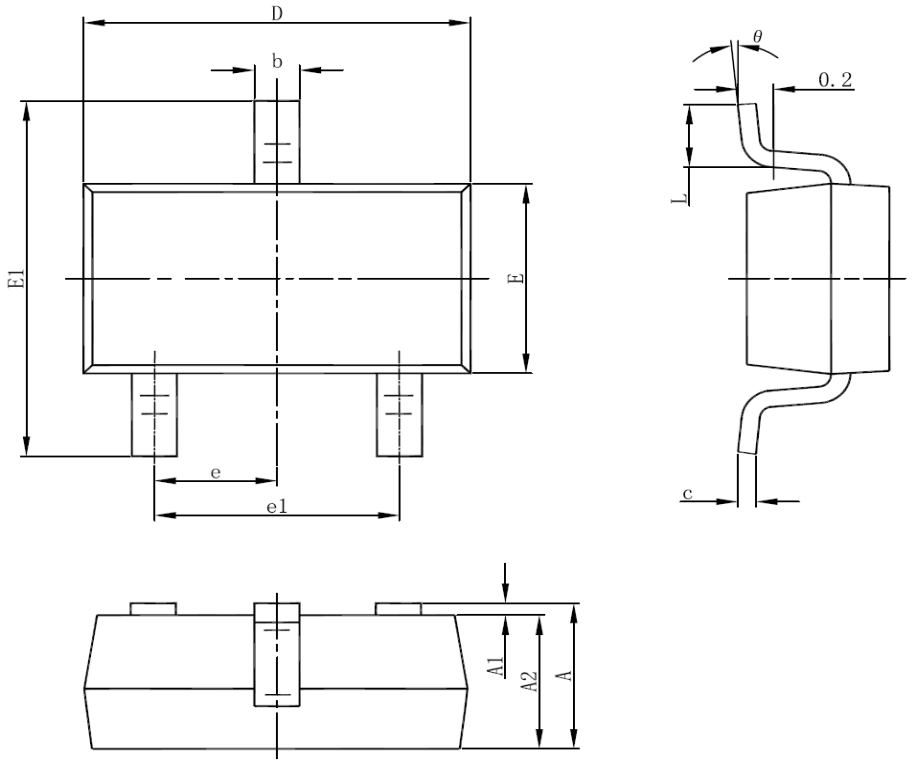
PACKAGE INFORMATION

Dimension in SOT-89-3 (Unit: mm)



Symbol	Min	Max
A	1.400	1.600
b	0.320	0.520
b1	0.400	0.580
c	0.350	0.440
D	4.400	4.600
D1	1.550 REF	
E	2.300	2.600
E1	3.940	4.250
e	1.500 TYP	
e1	3.000 TYP	
L	0.900	1.200

Dimension in SOT-23 Package (Unit: mm)



SYMBOL	MIN	MAX
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950(BSC)	
e1	1.800	2.000
L	0.300	0.600
θ	0°	8°

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