

500mA Low Dropout Linear Regulator

FEATURES

- Low Dropout Voltage of 650mV at 500mA Output Current (3V Output Version).
- Guaranteed 500mA Output Current.
- Maximum Input Voltage is 8V
- Low Ground Current at 65 μ A.
- 2% Accuracy Output Voltage of 1.5V/1.8V/ 2.0V /2.5V /2.7V/ 3.0V/ 3.3V/ 3.5V/ 3.7V/ 3.8V/ 5.0V/ 5.2V.
- Only needs 4.7 μ F Output Capacitor for Stability.
- Current and Thermal Limiting.

APPLICATIONS

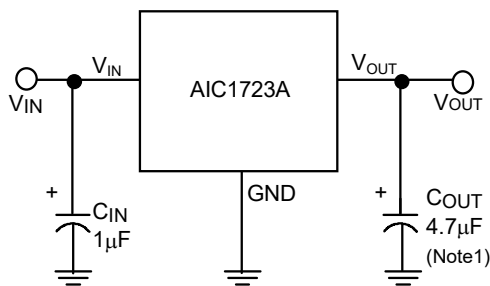
- CD-ROM Drivers.
- LAN Cards.
- Microprocessor.
- RAM Module.
- Wireless Communication Systems.
- Battery Powered Systems.

DESCRIPTION

The AIC1723A is a 3-pin low dropout linear regulator. The superior characteristics of the AIC1723A include zero base current loss, very low dropout voltage, and 2% accuracy output voltage. Typical ground current remains approximately 65 μ A, for loading ranging from zero to maximum. Dropout voltage turns substantially low when output current is 500mA. Built-in output current limiting and thermal limiting provide maximal protection to the AIC1723A against fault conditions.

The AIC1723A is available with popular SOT23-3, SOT223-3, SOT89-3 and TO252-3 packages.

TYPICAL APPLICATION CIRCUIT



Low Dropout Linear Regulator

■ ORDERING INFORMATION

AIC1723A-XXXX XX

PACKING TYPE
TR: TAPE & REEL
TB: TUBE

PACKAGE TYPE
E: TO252-3
U: SOT23-3
X: SOT89-3
Y: SOT223-3

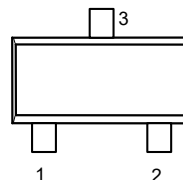
G: Green Package

OUTPUT VOLTAGE

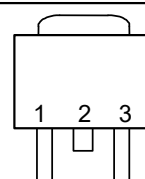
15: 1.5V
18: 1.8V
20: 2.0V
25: 2.5V
27: 2.7V
30: 3.0V
33: 3.3V
35: 3.5V
37: 3.7V
38: 3.8V
50: 5.0V
52: 5.2V

PIN CONFIGURATION

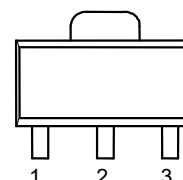
SOT23-3
TOP VIEW
1: GND
2: VOUT
3: VIN



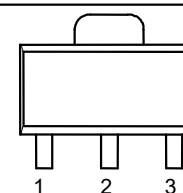
TO252-3
TOP VIEW
1: VOUT
2: GND
3: VIN



SOT89-3
TOP VIEW
1: GND
2: VIN
3: VOUT



SOT223-3
TOP VIEW
1: VOUT
2: GND
3: VIN



Example: AIC1723A-18GETR

→ 1.8V Version, in TO252-3 Green Package & Tape & Reel Packing Type

AIC1723A-18GYTR

→ 1.8V Version, in SOT223-3 Green Package & Tape & Reel Packing Type

● SOT23-3 MARKING

Part No.	GU	Part No.	GU
AIC1723A-15GU	BT15G	AIC1723A-33GU	BT33G
AIC1723A-18GU	BT18G	AIC1723A-35GU	BT35G
AIC1723A-20GU	BT20G	AIC1723A-37GU	BT37G
AIC1723A-25GU	BT25G	AIC1723A-38GU	BT38G
AIC1723A-27GU	BT27G	AIC1723A-50GU	BT50G
AIC1723A-30GU	BT30G	AIC1723A-52GU	BT52G

● SOT89-3 MARKING

Part No.	GX	Part No.	GX
AIC1723A-15GX	AV15G	AIC1723A-33GX	AV33G
AIC1723A-18GX	AV18G	AIC1723A-35GX	AV35G
AIC1723A-20GX	AV20G	AIC1723A-37GX	AV37G
AIC1723A-25GX	AV25G	AIC1723A-38GX	AV38G
AIC1723A-27GX	AV27G	AIC1723A-50GX	AV50G
AIC1723A-30GX	AV30G	AIC1723A-52GX	AV52G

● SOT223-3 MARKING

Part No.	GY	Part No.	GY
AIC1723A-15GY	BU15G	AIC1723A-33GY	BU33G
AIC1723A-18GY	BU18G	AIC1723A-35GY	BU35G
AIC1723A-20GY	BU20G	AIC1723A-37GY	BU37G
AIC1723A-25GY	BU25G	AIC1723A-38GY	BU38G
AIC1723A-27GY	BU27G	AIC1723A-50GY	BU50G
AIC1723A-30GY	BU30G	AIC1723A-52GY	BU52G

■ ABSOLUTE MAXIMUM RATINGS

Input Supply Voltage	-0.3~8V
Operating Temperature Range	-40°C~ 85°C
Junction Temperature	125°C
Storage Temperature Range	-65°C~150°C
Lead Temperature (Soldering, 10sec)	260°C
Thermal Resistance Junction to Case	
SOT23-3 Package	130°C/W
TO252-3 Package	12.5°C/W
SOT89-3 Package	30°C/W
SOT223-3 Package	15°C/W
Thermal Resistance Junction to Ambient	
SOT23-3 Package	180°C/W
(Assume no Ambient Airflow, no Heatsink)	
TO252-3 Package	100°C/W
SOT89-3 Package	160°C/W
SOT223-3 Package.....	130°C/W

Absolute Maximum Rating are those value beyond which the life of a device may be impaired.

■ TEST CIRCUIT

Refer to the TYPICAL APPLICATION CIRCUIT

■ **ELECTRICAL CHARACTERISTICS** ($T_A=25^{\circ}\text{C}$, $C_{IN}=1\mu\text{F}$, $C_{OUT}=4.7\mu\text{F}$, unless otherwise specified.) (Note 2)

PARAMETER	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{IN}=8\text{V}$, No Load	-2		+2	%
Line Regulation	$I_L=1\text{mA}$, $1.8\text{V}\leq V_{OUT}\leq 3.2\text{V}$		3	10	mV
	$3.3\text{V}\leq V_{OUT}\leq 5.2\text{V}$		3	15	
Load Regulation (Note 3)	$I_L=0.1\sim 500\text{mA}$ $1.8\text{V}\leq V_{OUT}\leq 3.9\text{V}$		10	30	mV
	$4.0\text{V}\leq V_{OUT}\leq 5.2\text{V}$		20	50	
Current Limit (Note 4)	$V_{IN}=7\text{V}$, $V_{OUT}=0\text{V}$	500			mA
Dropout Voltage (Note 5)	$I_L=500\text{mA}$		510	710	mV
	$4.0\text{V}\leq V_{OUT}\leq 5.2\text{V}$		650	850	
	$3.0\text{V}\leq V_{OUT}\leq 3.9\text{V}$		780	980	
	$2.5\text{V}\leq V_{OUT}\leq 2.9\text{V}$		1100	1300	
	$2.0\text{V}\leq V_{OUT}\leq 2.4\text{V}$		1400	1600	
Ground Current	$I_O=0.1\text{mA}\sim I_{MAX}$ $1.8\text{V}\leq V_{OUT}\leq 3.9\text{V}$		65	90	μA
	$4.0\text{V}\leq V_{OUT}\leq 5.2\text{V}$		65	90	
Thermal Shutdown Hysteresis	Guaranteed by design		20		$^{\circ}\text{C}$

Note 1: To avoid output oscillation, aluminum electrolytic output capacitor is recommended and ceramic capacitor is not suggested.

Note 2: Specifications are production tested at $T_A=25^{\circ}\text{C}$. Specifications over the -40°C to 85°C operating temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).

Note 3: Regulation is measured at constant junction temperature, using pulse testing with a low ON time.

Note 4: Current limit is measured by pulsing a short time.

Note 5: Dropout voltage is defined as the input to output differential at which the output voltage drops 100mV below the value measured with a 1V differential.

■ TYPICAL PERFORMANCE CHARACTERISTICS

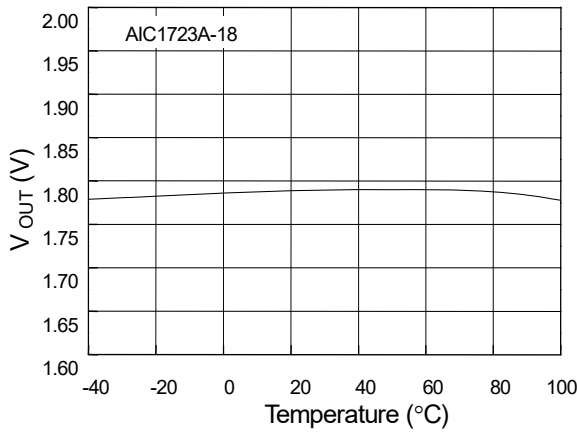


Fig. 1 V_{OUT} vs. Temperature

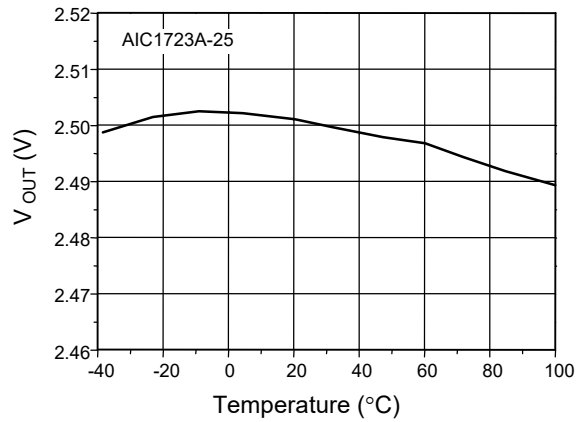


Fig. 2 V_{OUT} vs. Temperature

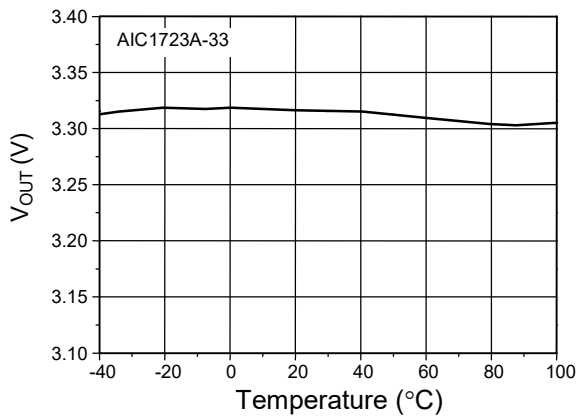


Fig. 3 V_{OUT} vs. Temperature

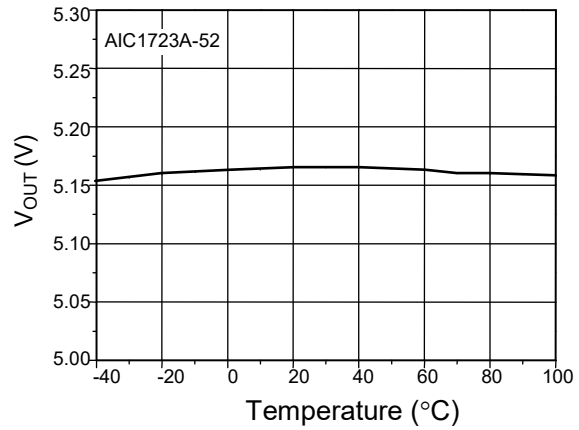


Fig. 4 V_{OUT} vs. Temperature

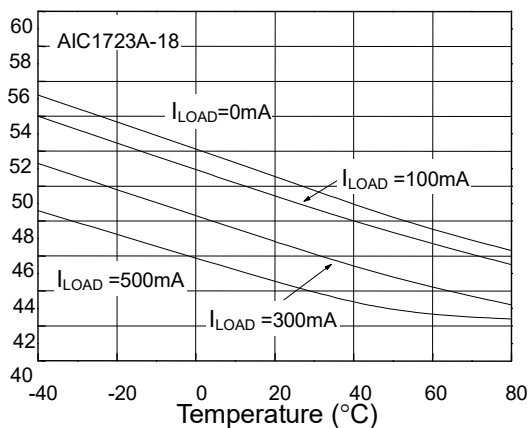


Fig. 5 Ground Current vs. Temperature

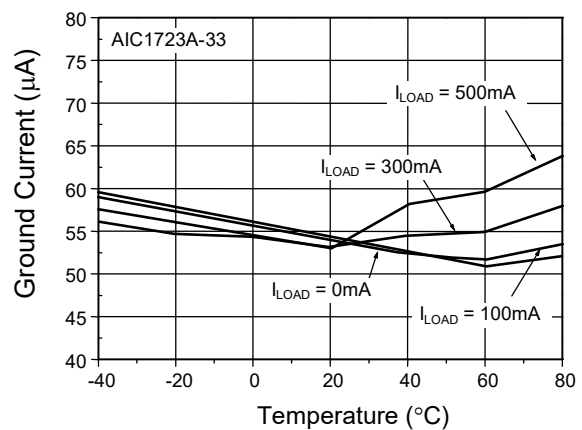


Fig. 6 Ground Current vs. Temperature

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

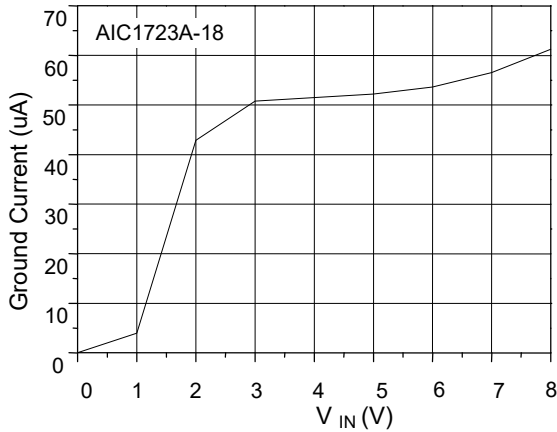


Fig. 7 Ground Current vs. V_{IN}

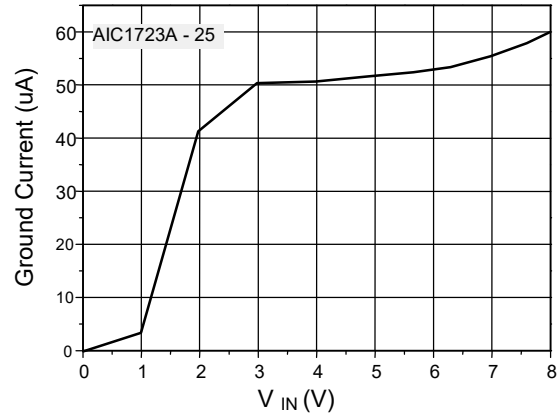


Fig. 8 Ground Current vs. V_{IN}

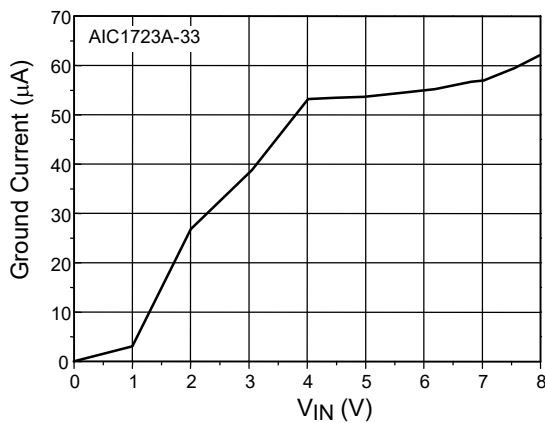


Fig. 9 Ground Current vs. V_{IN}

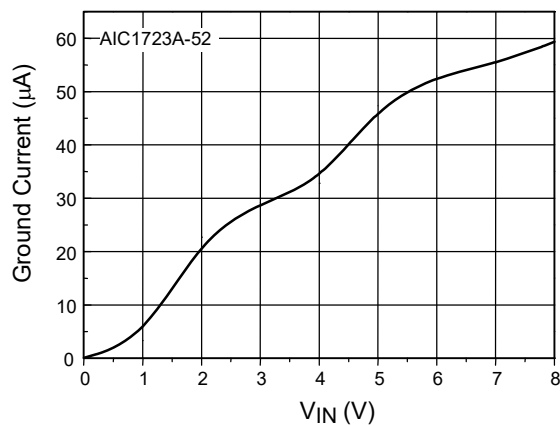


Fig. 10 Ground Current vs. V_{IN}

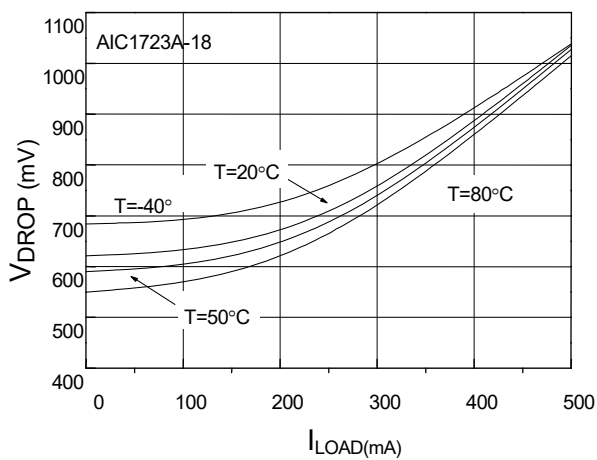


Fig. 11 V_{DROP} vs. I_{LOAD}

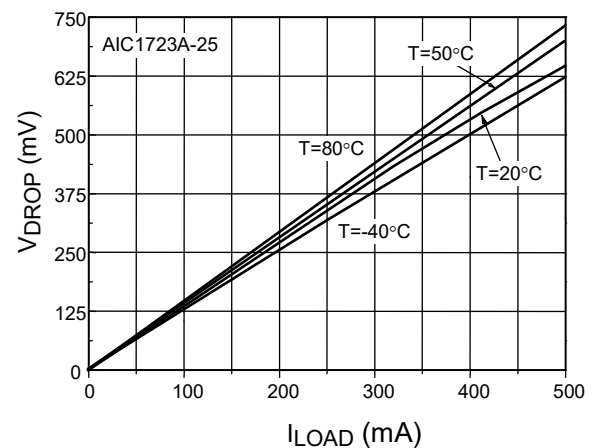


Fig. 12 V_{DROP} vs. I_{LOAD}

■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

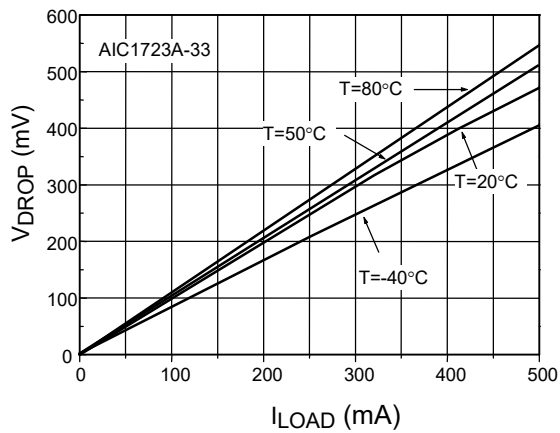


Fig. 13 V_{DROP} vs. I_{LOAD}

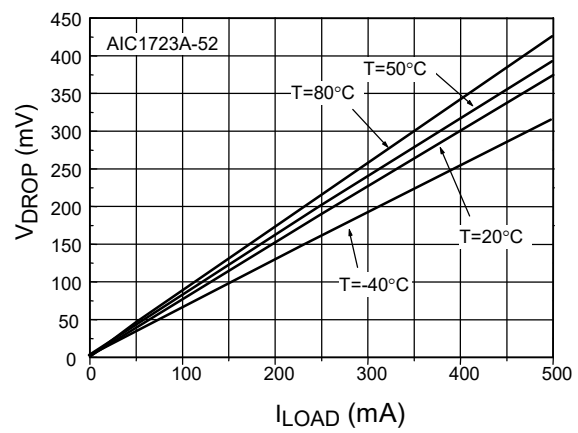


Fig. 14 V_{DROP} vs. I_{LOAD}

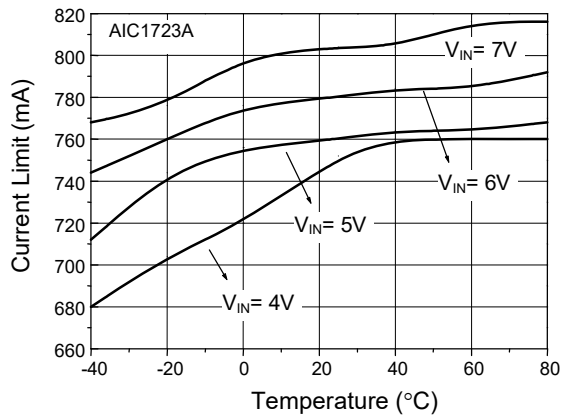
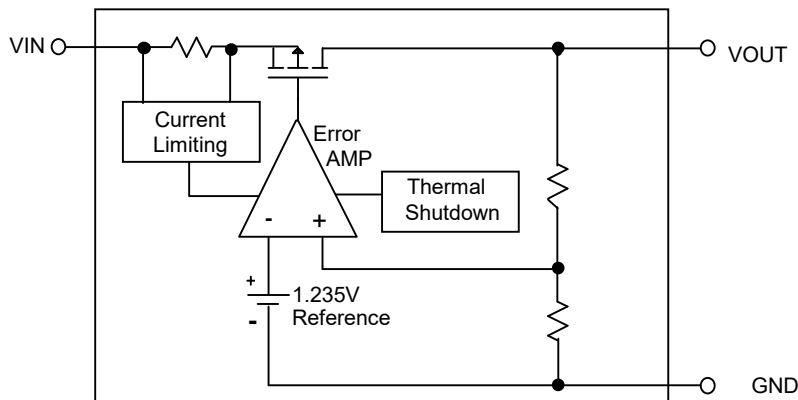


Fig. 15 Current Limit vs. Temperature

■ BLOCK DIAGRAM



■ PIN DESCRIPTIONS

VOOUT PIN - Output pin.

GND PIN - Power GND.

VIN PIN - Power Supply Input.

■ APPLICATION INFORMATION

INPUT-OUTPUT CAPACITORS

Linear regulators require input and output capacitors to maintain stability. Input capacitor at 1 μ F with 4.7 μ F aluminum electrolytic output capacitor is recommended.

POWER DISSIPATION

The AIC1723A obtains thermal-limiting circuitry, which is designed to protect the device against overload condition. For continuous load condition, maximum rating of junction temperature must not be exceeded. It is important to pay more attention in thermal resistance. It includes junction to case, junction to ambient. The maximum power dissipation of AIC1723A depends on the thermal resistance of its case and circuit board, the temperature difference between the die junction and ambient air, and the rate of airflow. The rate of temperature rise is greatly affected by the mounting pad configuration on the PCB, the board material, and the ambient temperature. When the IC mounting with good thermal

conductivity is used, the junction temperature will be low even when large power dissipation applies.

The power dissipation across the device is

$$P = I_{OUT} (V_{IN} - V_{OUT}).$$

The maximum power dissipation is:

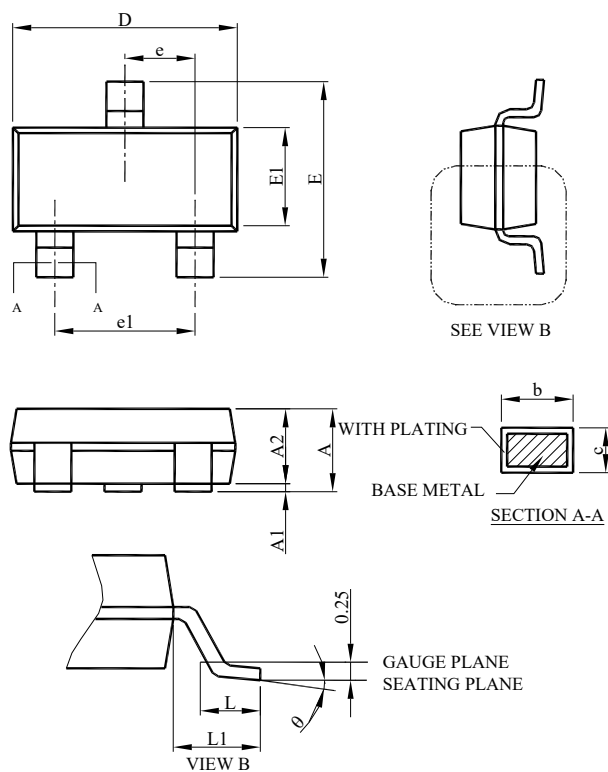
$$P_{MAX} = \frac{(T_{J-max} - T_A)}{R\theta_{JA}}$$

Where T_{J-max} is the maximum allowable junction temperature (125°C), and T_A is the ambient temperature suitable in application.

As a general rule, the lower temperature is, the better reliability of the device is. So the PCB mounting pad should provide maximum thermal conductivity to maintain low device temperature. GND pin performs a dual function for providing an electrical connection to ground and channeling heat away. Therefore, connecting the GND pin to ground with a large pad or ground plane would increase the power dissipation and reduce the device temperature.

■ PHYSICAL DIMENSIONS (unit: mm)

● SOT23-3

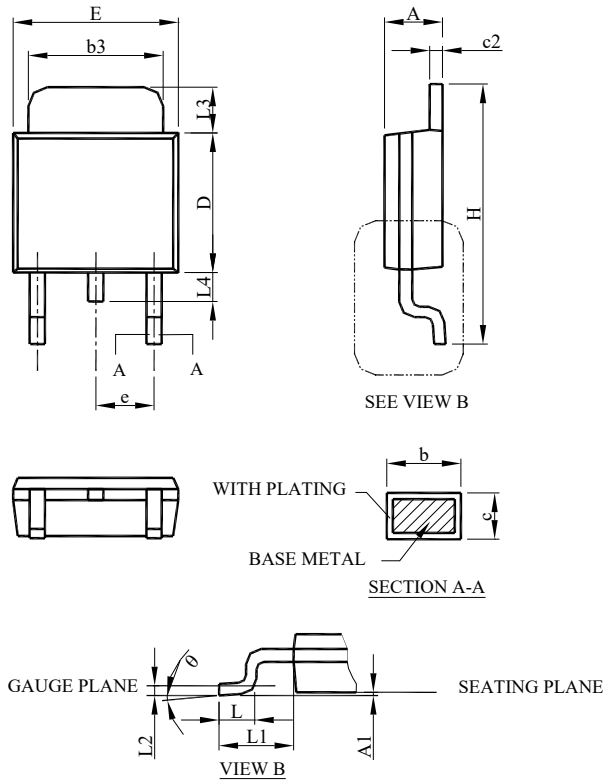


SYMBOL	SOT23-3	
	MILLIMETERS	
	MIN.	MAX.
A	0.95	1.45
A1	0.00	0.15
A2	0.90	1.30
b	0.30	0.50
c	0.08	0.22
D	2.80	3.00
E	2.60	3.00
E1	1.50	1.70
e	0.95 BSC	
e1	1.90 BSC	
L	0.30	0.60
L1	0.60 REF	
θ	0°	8°

Note:

- 1.Refer to JEDEC MO-178.
- 2.Dimension D and E1 do not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 10 mil per side.
- 3.Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

● TO252-3

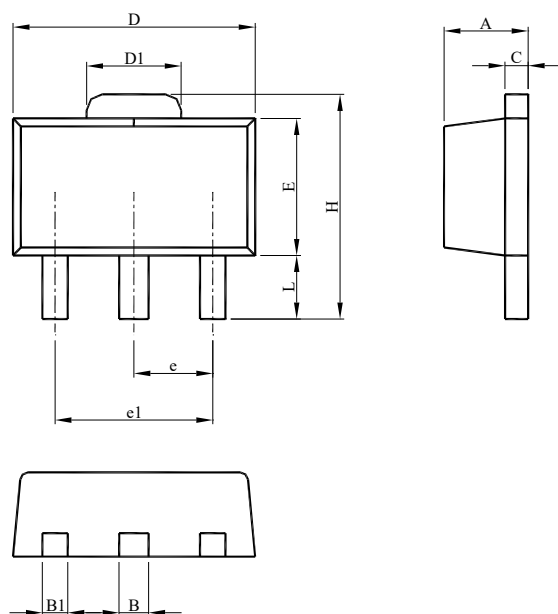


S Y M B O L	TO252-3	
	MILLIMETERS	
	MIN.	MAX.
A	2.19	2.38
A1	0.00	0.13
b	0.64	0.89
b3	4.95	5.46
c	0.46	0.61
c2	0.46	0.89
D	5.33	6.22
D1	4.60	6.00
E	6.35	6.73
E1	3.90	5.46
e	2.28 BSC	
H	9.40	10.41
L	1.40	1.78
L1	2.67 REF	
L2	0.51 BSC	
L3	0.89	2.03
L4	--	1.02
θ	0°	8°

Note:

- 1.Refer to JEDEC TO-252AA and AB.
- 2.Dimension D and E do not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.
- 3.Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

● SOT89-3

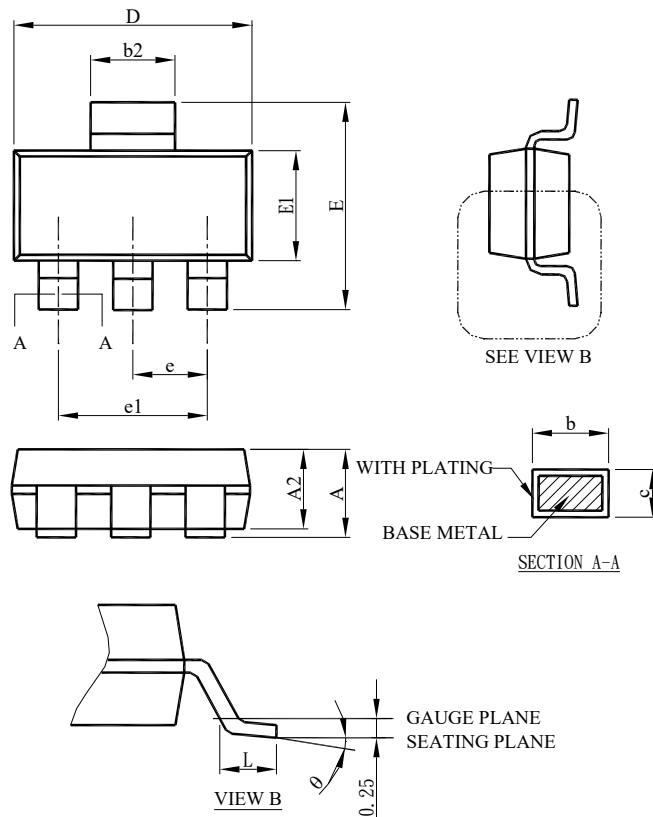


SYMBOL	SOT89-3	
	MILLIMETERS	
	MIN.	MAX.
A	1.40	1.60
B	0.44	0.56
B1	0.36	0.48
C	0.35	0.44
D	4.40	4.60
D1	1.50	1.83
E	2.29	2.60
e	1.50 BSC	
e1	3.00 BSC	
H	3.94	4.25
L	0.89	1.20

Note:

- 1.Refer to JEDEC TO-243AA.
- 2.Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

● **SOT223-3**



SYMBOL	SOT223-3	
	MILLIMETERS	
	MIN.	MAX.
A		1.80
A1	0.02	0.10
A2	1.55	1.65
b	0.66	0.84
b2	2.90	3.10
c	0.23	0.33
D	6.30	6.70
E	6.70	7.30
E1	3.30	3.70
e	2.30 BSC	
e1	4.60 BSC	
L	0.90	
θ	0°	8°

Note:

1. Refer to JEDEC TO-261AA.

2. Dimension D and E1 are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs, and interlead flash, but including any mismatch between the top and bottom of the plastic body.

3. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

Note:

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