300mA Low Dropout Linear Regulator

FEATURES

- Low Dropout Voltage of 470mV at 300mA Output Current (3.0V Output Version).
- Guaranteed 300mA Output Current.
- Maximum Input Voltage is 8V
- Low Ground Current at 55μA.
- 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.
- Needs only 1μF for Stability.
- Current and Thermal Limiting.

APPLICATIONS

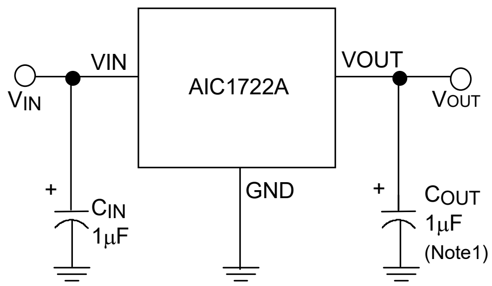
- Voltage Regulator for CD-ROM Drivers.
- Voltage Regulator for LAN Cards.
- Voltage Regulator for Microprocessor.
- Wireless Communication Systems.
- Battery Powered Systems.

DESCRIPTION

The AIC1722A is a 3-pin low dropout linear regulator. The superior characteristics of the AIC1722A include zero base current loss, very low dropout voltage, and 2% accuracy output voltage. Typical ground current remains approximately 55μA, from no load to maximum loading conditions. Dropout voltage at 300mA output current is exceptionally low. Output current limiting and thermal limiting are built in to provide maximal protection to the AIC1722A against fault conditions.

The AIC1722A comes in the popular 3-pin SOT89-3 and SOT23-3 packages.

TYPICAL APPLICATION CIRCUIT

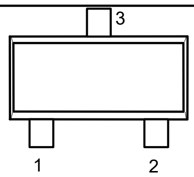
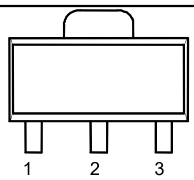
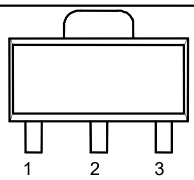


Low Dropout Linear Regulator

■ ORDERING INFORMATION

AIC1722A-XXXXX XX

- PACKING TYPE
  - TR: REEL
  - BG: BAG
- PACKAGE TYPE
  - U: SOT23-3
  - XA: SOT89-3
  - XT: SOT89-3
- 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 (U) TOP VIEW 1: GND 2: VOUT 3: VIN	
SOT89-3 (XA) TOP VIEW 1: GND 2. VIN 3. VOUT	
SOT89-3 (XT) TOP VIEW 1: VOUT 2. GND 3. VIN	

Example: AIC1722A-18GUTR
→ 1.8V Version, in SOT23-3 Green Package & Tape & Reel Packing Type

AIC1722A-18GXATR
→ 1.8V Version, in SOT89-3 Green Package & Tape & Reel Packing Type

- **SOT23-3 MARKING**

Part No.	GU	Part No.	GU
AIC1722A-15GU	BN15G	AIC1722A-33GU	BN33G
AIC1722A-18GU	BN18G	AIC1722A-35GU	BN35G
AIC1722A-20GU	BN20G	AIC1722A-37GU	BN37G
AIC1722A-25GU	BN25G	AIC1722A-38GU	BN38G
AIC1722A-27GU	BN27G	AIC1722A-50GU	BN50G
AIC1722A-30GU	BN30G	AIC1722A-52GU	BN52G

- **SOT89-3 MARKING**

Part No.	GXA	Part No.	GXT
AIC1722A-15GXA	AL15G	AIC1722A-15GXT	BA15G
AIC1722A-18GXA	AL18G	AIC1722A-18GXT	BA18G
AIC1722A-20GXA	AL20G	AIC1722A-20GXT	BA20G
AIC1722A-25GXA	AL25G	AIC1722A-25GXT	BA25G
AIC1722A-27GXA	AL27G	AIC1722A-27GXT	BA27G
AIC1722A-30GXA	AL30G	AIC1722A-30GXT	BA30G
AIC1722A-33GXA	AL33G	AIC1722A-33GXT	BA33G
AIC1722A-35GXA	AL35G	AIC1722A-35GXT	BA35G
AIC1722A-37GXA	AL37G	AIC1722A-37GXT	BA37G
AIC1722A-38GXA	AL38G	AIC1722A-38GXT	BA38G
AIC1722A-50GXA	AL50G	AIC1722A-50GXT	BA50G
AIC1722A-52GXA	AL52G	AIC1722A-52GXT	BA52G

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...130°C /W
SOT89-3..30°C /W
Thermal Resistance Junction to Ambient SOT23-3...180°C /W
(Assume no ambient airflow, no heatsink) SOT89-3.. 160°C /W

Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

TEST CIRCUIT

Refer to the TYPICAL APPLICATION CIRCUIT.

ELECTRICAL CHARACTERISTICS (T_A=25°C, C_{IN}=1μF, C_{OUT}=1μF, unless otherwise specified.) (Note 2)

PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{IN}=8V, No Load		-2		+2	%
Line Regulation	I_L=1mA,					mV
	1.4V≤V_{OUT}≤3.2V	V_{IN}=4V~8V		3	10	
	3.3V≤V_{OUT}≤5.2V	V_{IN}=5.5V~8V		3	15	
Load Regulation (Note 3)	I_L=0.1~300mA					mV
	1.4V≤V_{OUT}≤3.9V	V_{IN}=5V		7	20	
	4.0V≤V_{OUT}≤5.2V	V_{IN}=7V		15	40	
Current Limit (Note 4)	V_{IN}=7V, V_{OUT}=0V		300			mA
Dropout Voltage (Note 5)	I_L=300mA	4.0V≤V_{OUT}≤5.2V		400	500	mV
		3.0V≤V_{OUT}≤3.9V		470	570	
		2.5V≤V_{OUT}≤2.9V		570	670	
		2.0V≤V_{OUT}≤2.4V		800	900	
		1.4V≤V_{OUT}≤1.9V		1260	1360	
Ground Current	I_O=0.1mA~I_{MAX}					μA
	1.4V≤V_{OUT}≤3.9V	V_{IN}=5~8V		55	80	
	4.0V≤V_{OUT}≤5.2V	V_{IN}=7~8V		55	80	
Thermal Shutdown Hysteresis	Guaranteed by design			20		ºC

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°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

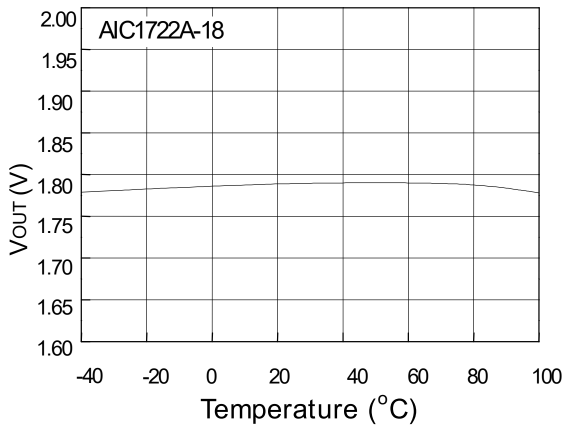


Fig. 1 V_{OUT} vs. Temperature

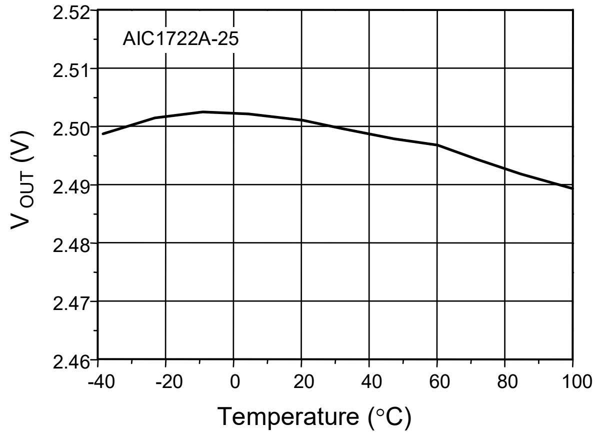


Fig. 2 V_{OUT} vs. Temperature

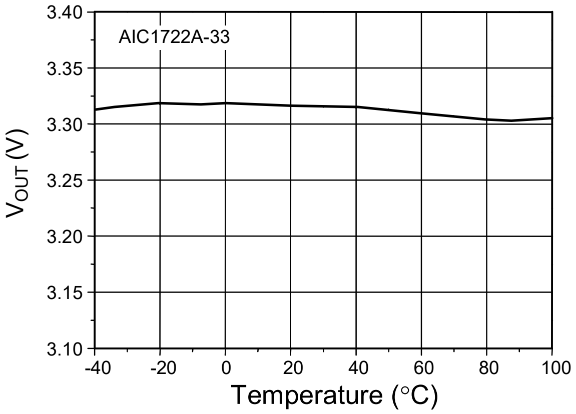


Fig. 3 V_{OUT} vs. Temperature

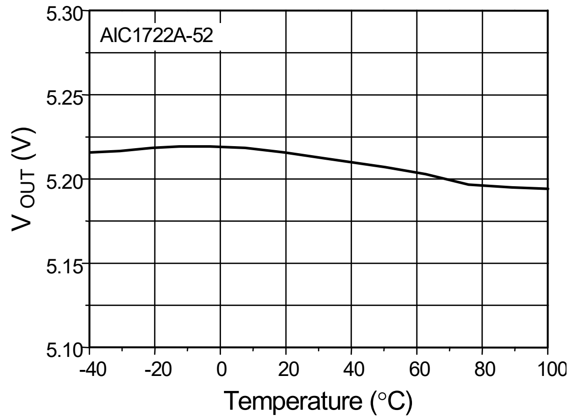


Fig. 4 V_{OUT} vs. Temperature

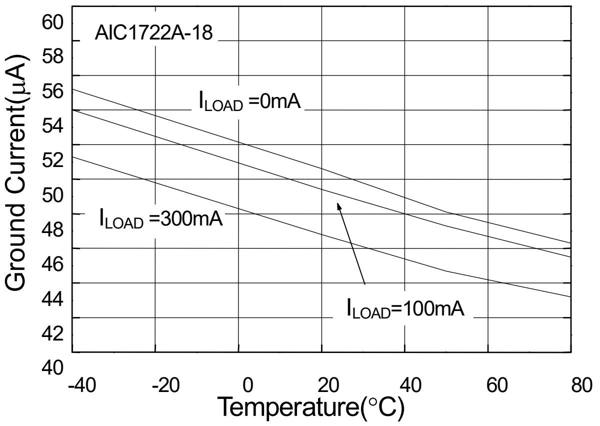


Fig. 5 Ground Current vs. Temperature

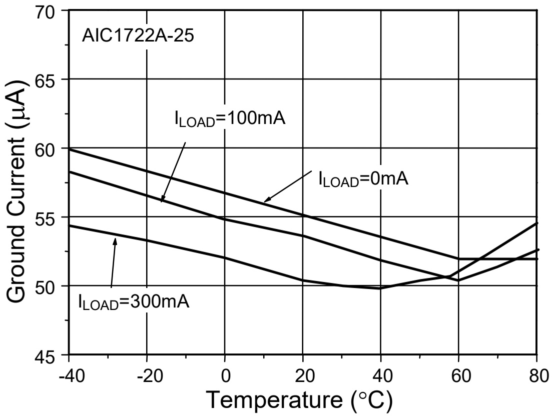


Fig. 6 Ground Current vs. Temperature

■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

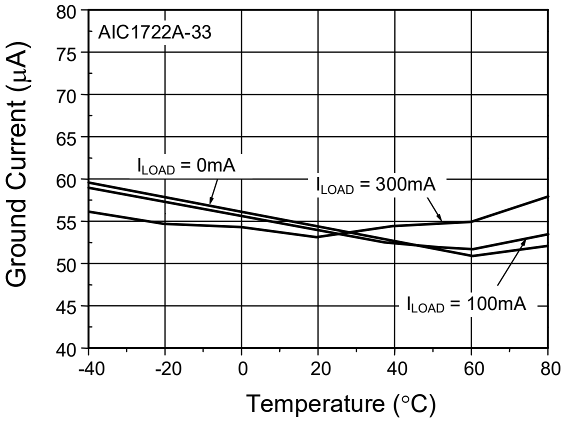


Fig. 7 Ground Current vs. Temperature

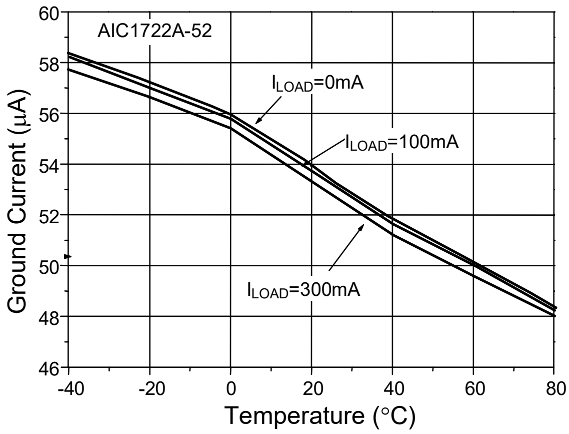


Fig. 8 Ground Current vs. Temperature

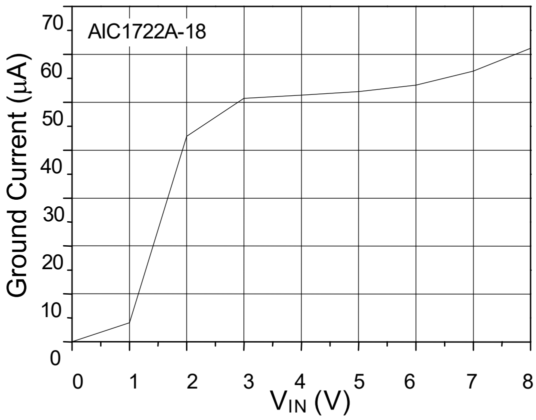


Fig. 9 Ground Current vs. V_{IN}

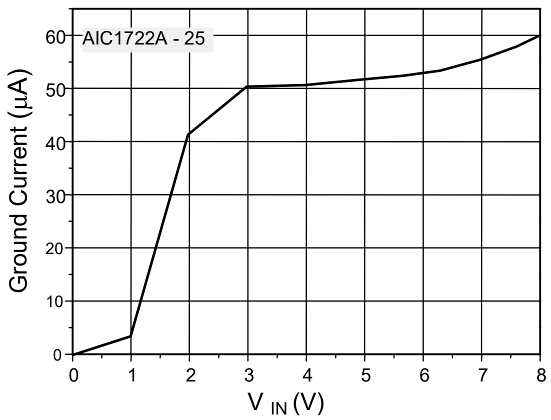


Fig. 10 Ground Current vs. V_{IN}

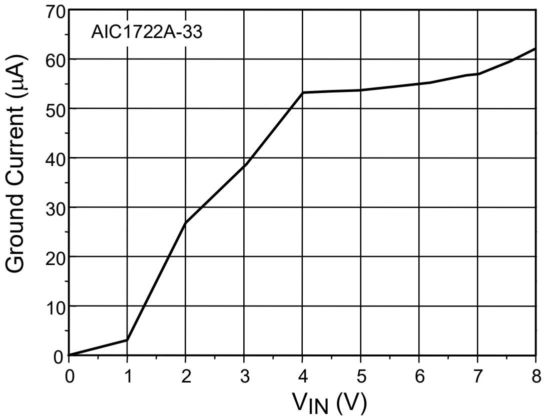


Fig. 11 Ground Current vs. V_{IN}

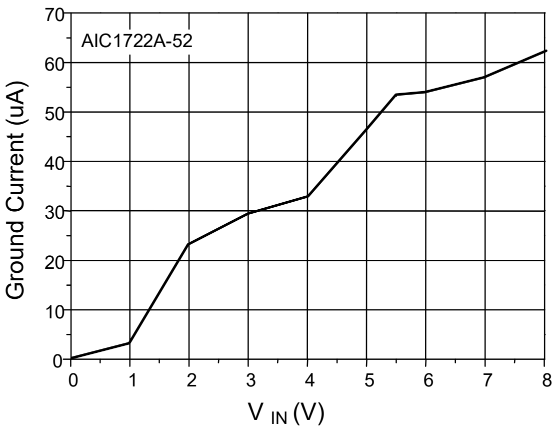


Fig.12 Ground Current vs. V_{IN}

■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

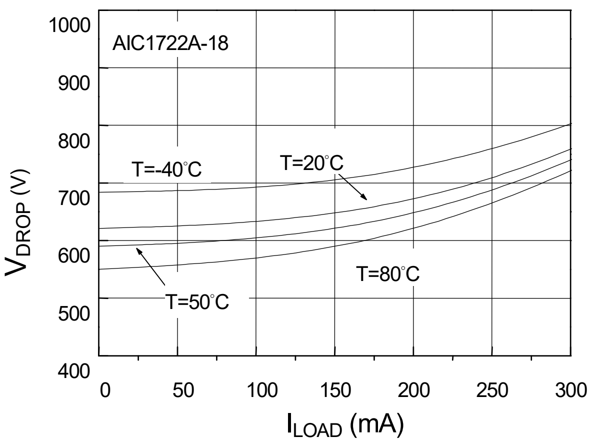


Fig. 13 V_{DROP} vs. I_{LOAD}

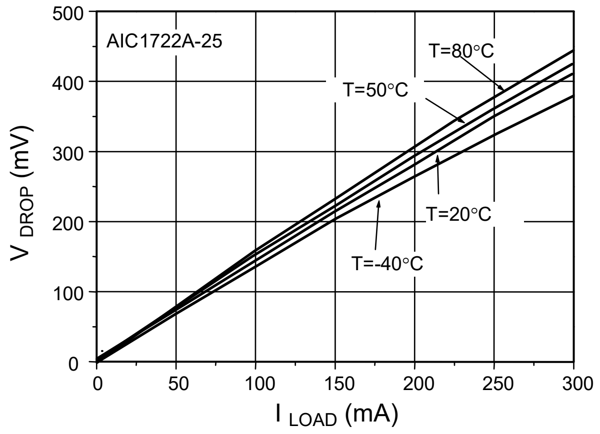


Fig. 14 V_{DROP} vs. I_{LOAD}

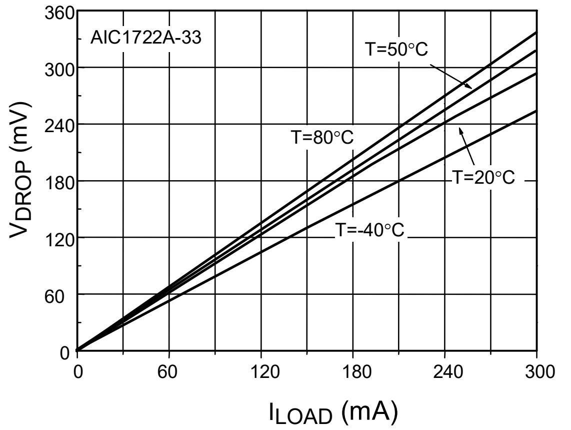


Fig. 15 V_{DROP} vs. I_{LOAD}

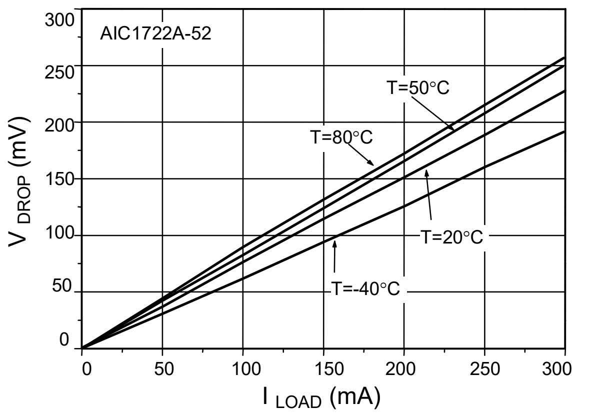


Fig. 16 V_{DROP} vs. I_{LOAD}

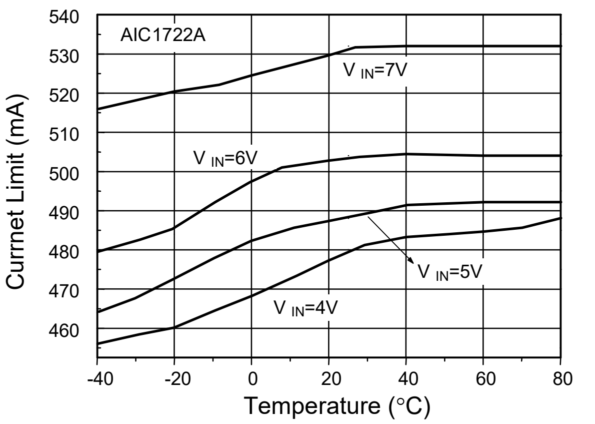
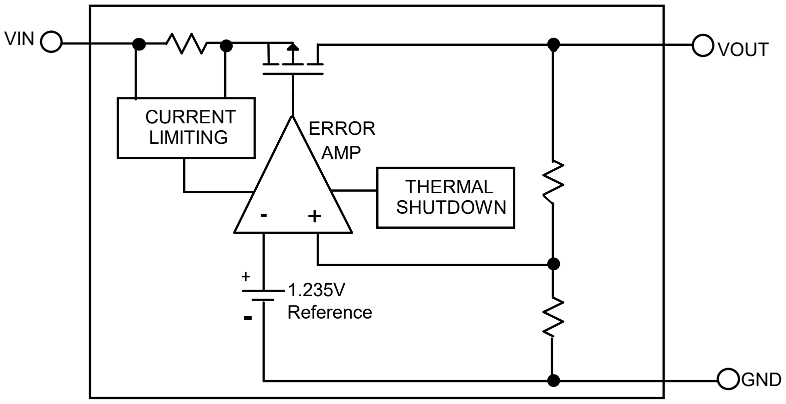


Fig. 17 Current Limit vs. Temperature

■ BLOCK DIAGRAM



■ PIN DESCRIPTIONS

VOUT 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 1μF with 1uF aluminum electrolytic output capacitor is recommended.

POWER DISSIPATION

The AIC1722A 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 AIC1722A 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:

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

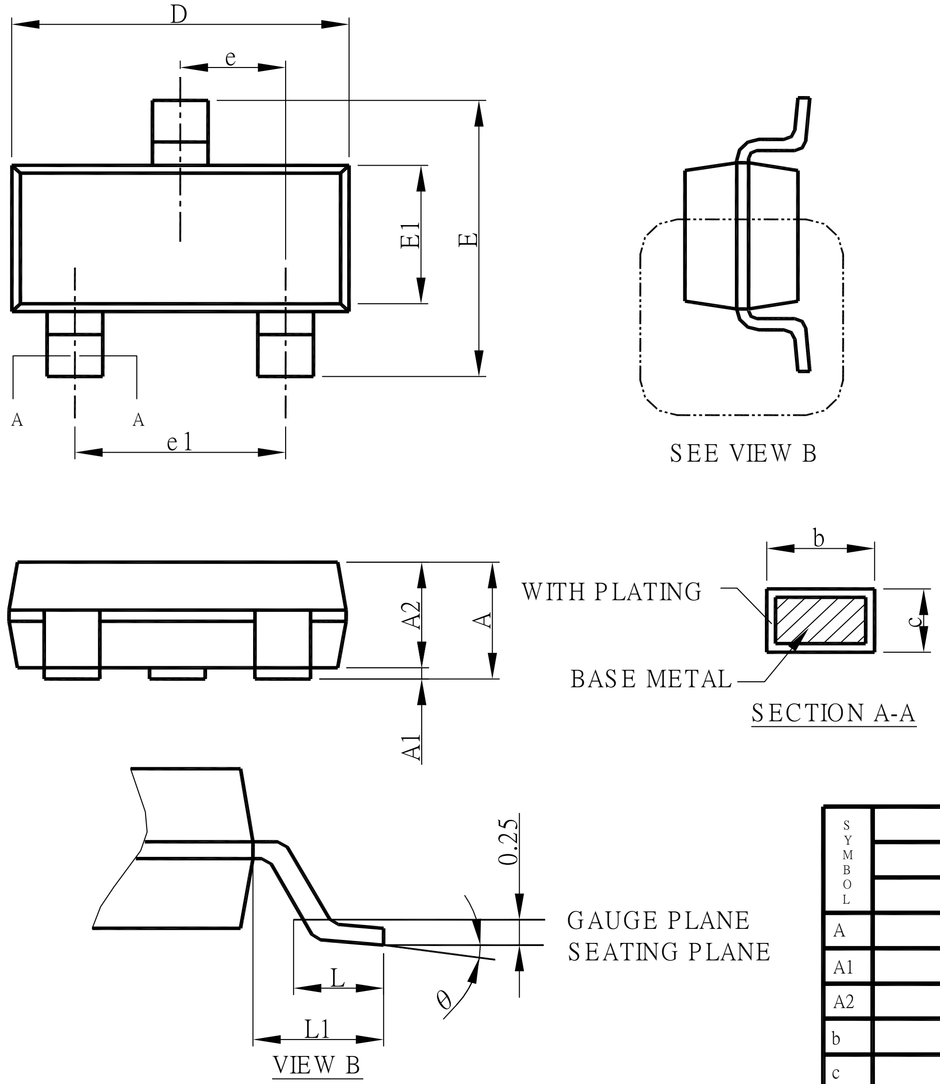
Where $T_{J\text{-}max}$ is the maximum allowable junction temperature (125°C), and T_A is the ambient temperature suitable in application.

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)

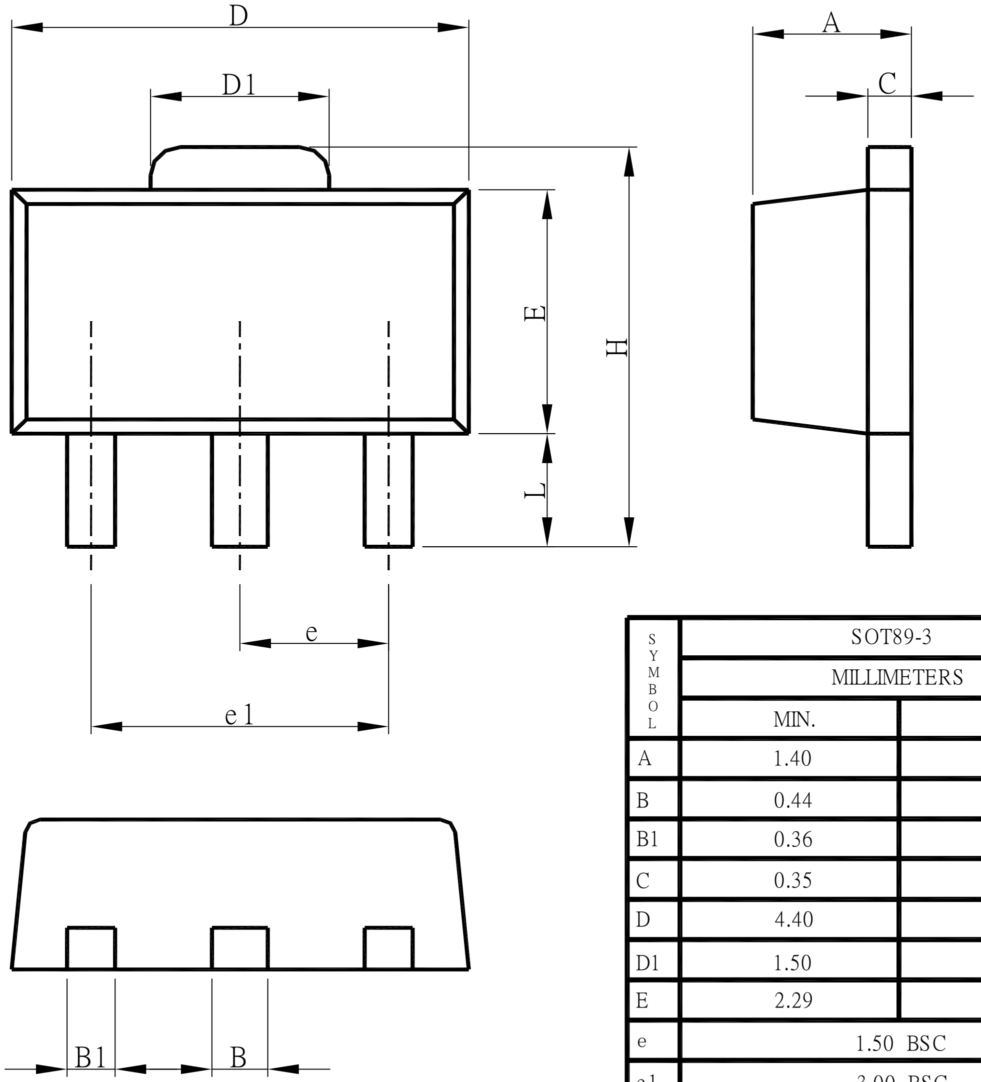
- **SOT23-3**



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" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 10 mil per side.
3. Dimension "E1" does not include inter-lead flash or protrusions.
4. 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. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.
3. Dimension "E" does not include inter-lead flash or protrusions.
4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

Note: