300mA Low Dropout Linear Regulator

FEATURES

- Low Dropout Voltage of 470mV at 300mA Output Current (3.0V Output Version).
- Wide Operating Voltage Range: 4.0V to 12V
- Guaranteed 300mA Output Current.
- Low Ground Current at 55μA.
- 2% Accuracy Output Voltage of 1.8V/ 2.0V /2.5V /2.7V/ 3.0V/ 3.3V/ 3.5V/ 3.7V/ 3.8V/ 5.0V/ 5.2V.
- Only needs 1μF Output Capacitor for Stability.
- Current and Thermal Limiting.

APPLICATIONS

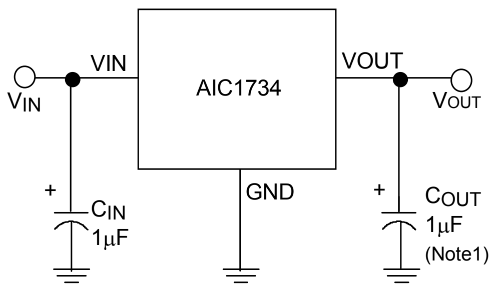
- CD-ROM Drivers.
- LAN Cards.
- Microprocessor.
- RAM Module.
- Wireless Communication Systems.
- Battery Powered Systems.

DESCRIPTION

The AIC1734 is a 3-pin low dropout linear regulator. The superior characteristics of the AIC1734 include zero base current loss, very low dropout voltage, and 2% accuracy output voltage. Typical ground current remains approximately 55μA, for loading ranging from zero to maximum. Dropout voltage at 300mA output current is exceptionally low. Built-in output current limiting and thermal limiting provide maximal protection to the AIC1734 against fault conditions.

The AIC1734 is available in popular SOT-23, SOT-89 packages.

TYPICAL APPLICATION CIRCUIT



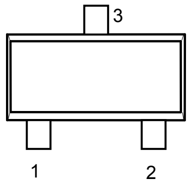
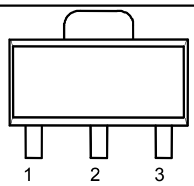
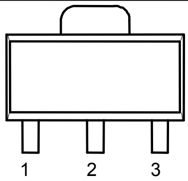
Low Dropout Linear Regulator

ORDERING INFORMATION

AIC1734-XXXXX XX

- PACKING TYPE
  - TR: REEL
  - BG: BAG
- PACKAGE TYPE
  - U: SOT-23
  - XA: SOT-89
  - XT: SOT-89
- G: Green Package
- OUTPUT VOLTAGE
  - 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

Example: AIC1734-18GXATR
→ 1.8V Version, in Green SOT-89 Package & Reel Packing Type
AIC1734-18GUTR
→ 1.8V Version, in Green SOT-23 Package & Reel Packing Type

PIN CONFIGURATION	
SOT-23(U) TOP VIEW 1: GND 2: VOUT 3: VIN	
SOT-89(XA) TOP VIEW 1: GND 2. VIN 3. VOUT	
SOT-89(XT) TOP VIEW 1: VOUT 2. GND 3. VIN	

- **SOT-23 MARKING**

Part No.	GU	Part No.	GU
AIC1734-18XU	CD18G	AIC1734-35XU	CD35G
AIC1734-20XU	CD20G	AIC1734-37XU	CD37G
AIC1734-25XU	CD25G	AIC1734-38XU	CD38G
AIC1734-27XU	CD27G	AIC1734-50XU	CD50G
AIC1734-30XU	CD30G	AIC1734-52XU	CD52G
AIC1734-33XU	CD33G		

- **SOT-89 MARKING**

Part No.	GXA	Part No.	GXT
AIC1734-18XXA	CA18G	AIC1734-18XXT	CB18G
AIC1734-20XXA	CA20G	AIC1734-20XXT	CB20G
AIC1734-25XXA	CA25G	AIC1734-25XXT	CB25G
AIC1734-27XXA	CA27G	AIC1734-27XXT	CB27G
AIC1734-30XXA	CA30G	AIC1734-30XXT	CB30G
AIC1734-33XXA	CA33G	AIC1734-33XXT	CB33G
AIC1734-35XXA	CA35G	AIC1734-35XXT	CB35G
AIC1734-37XXA	CA37G	AIC1734-37XXT	CB37G
AIC1734-38XXA	CA38G	AIC1734-38XXT	CB38G
AIC1734-50XXA	CA50G	AIC1734-50XXT	CB50G
AIC1734-52XXA	CA52G	AIC1734-52XXT	CB52G

■ ABSOLUTE MAXIMUM RATINGS

Input Supply Voltage .... -0.3 ~14V

Operating Temperature Range .... -40°C~ 85°C

Storage Temperature Range .... -65°C~150°C

Maximum Junction Temperature .... 150°C

Lead Temperature (Soldering 10 sec.) .... 260°C

Thermal Resistance Junction to Case — SOT-89 Package .... 100°C/W

SOT-23 Package .... 130°C/W

Thermal Resistance Junction to Ambient — SOT-89 Package .... 160°C/W

(Assume no Ambient Airflow, no Heatsink) — SOT-23 Package .... 180°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.) (Note2)

PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Output Voltage	No Load					V
	AIC1734-52	V_{IN}=5.5~12V	5.100	5.200	5.300	
	AIC1734-50	V_{IN}=5.5~12V	4.900	5.000	5.100	
	AIC1734-38	V_{IN}=4.1~12V	3.725	3.800	3.875	
	AIC1734-37	V_{IN}=4.0~12V	3.625	3.700	3.775	
	AIC1734-35	V_{IN}=4.0~12V	3.430	3.500	3.570	
	AIC1734-33	V_{IN}=4.0~12V	3.235	3.300	3.365	
	AIC1734-30	V_{IN}=4.0~12V	2.940	3.000	3.060	
	AIC1734-27	V_{IN}=4.0~12V	2.646	2.700	2.754	
	AIC1734-25	V_{IN}=4.0~12V	2.450	2.500	2.550	
	AIC1734-20	V_{IN}=4.0~12V	1.960	2.000	2.040	
	AIC1734-18	V_{IN}=4.0~12V	1.764	1.800	1.836	
Output Voltage Temperature Coefficiency	(Note 3)			50		PPM/°C
Line Regulation	I_L=1mA,					mV
	1.4V≤V_{OUT}≤3.2V	V_{IN}=4V~12V		3	10	
	3.3V≤V_{OUT}≤5.2V	V_{IN}=5.5V~12V		3	10	
Load Regulation (Note 4)	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 5)	V_{IN}=7V, V_{OUT}=0V		300			mA
Dropout Voltage (Note 6)	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}=5~12V		55	80	
	4.0V≤V_{OUT}≤5.2V	V_{IN}=7~12V		55	80	

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: Guaranteed by design.

Note 4: Regulation is measured at constant junction temperature, using pulse testing with a low ON time.

Note 5: Current limit is measured by pulsing a short time.

Note 6: Dropout voltage is defined as the input to output differential at which the output voltage drops 100mV.

TYPICAL PERFORMANCE CHARACTERISTICS

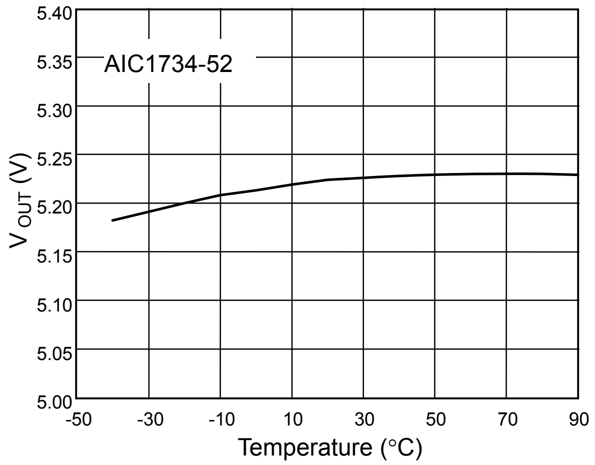


Fig. 1 V_{OUT} vs. Temperature

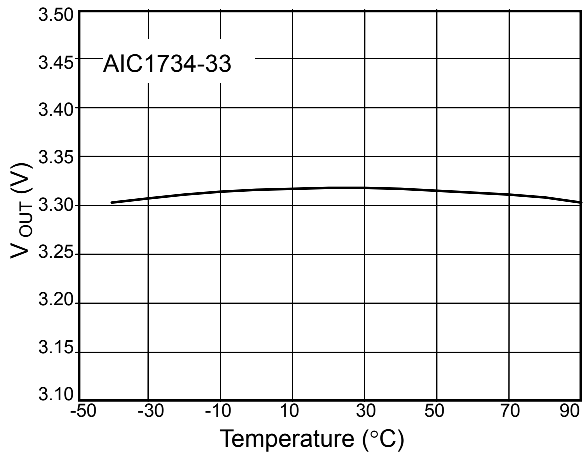


Fig. 2 V_{OUT} vs. Temperature

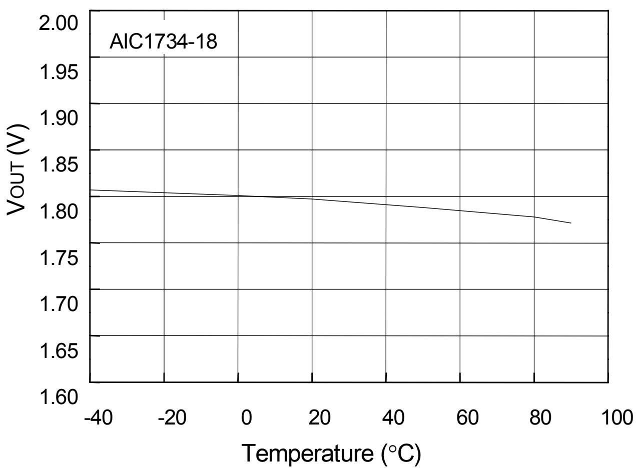


Fig 3 V_{OUT} vs. Temperature

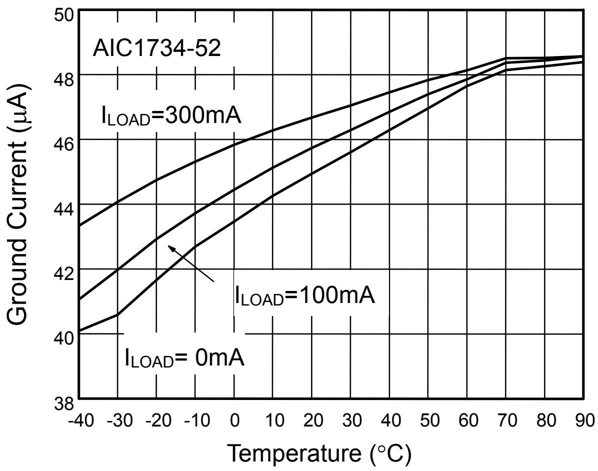


Fig. 4 Ground Current vs. Temperature

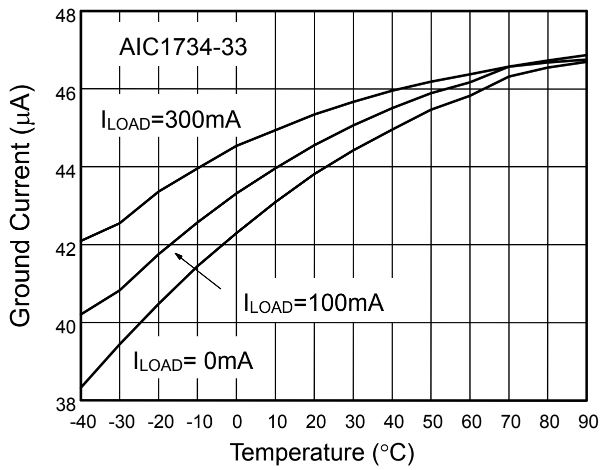


Fig. 5 Ground Current vs. Temperature

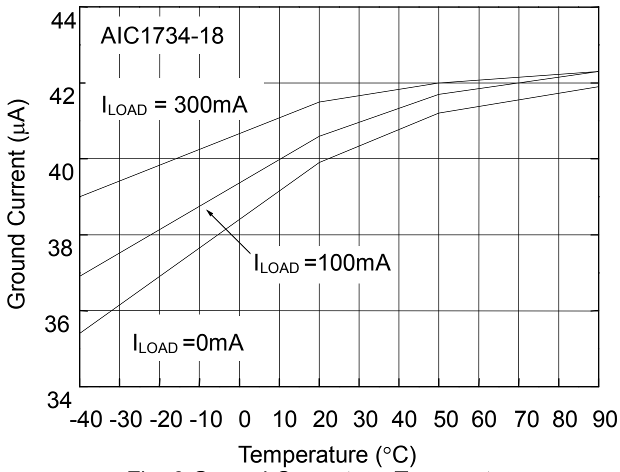


Fig. 6 Ground Current vs. Temperature

■ TYPICAL PERFORMANCE CHARACTERISTIC (Continued)

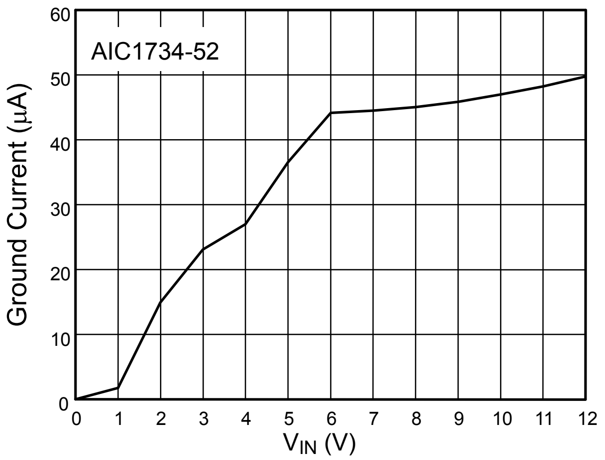


Fig. 7 Ground Current vs. V_{IN}

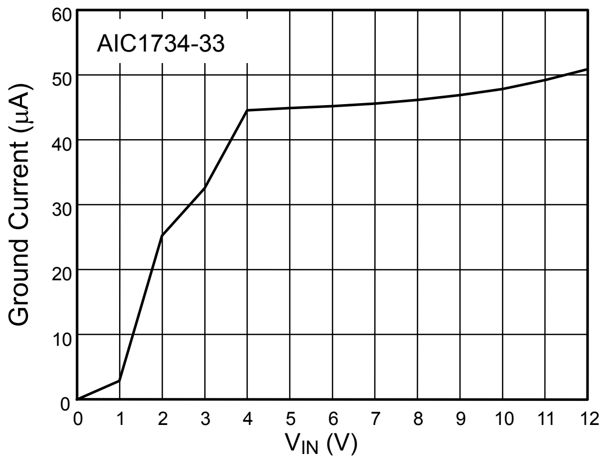


Fig. 8 Ground Current vs. V_{IN}

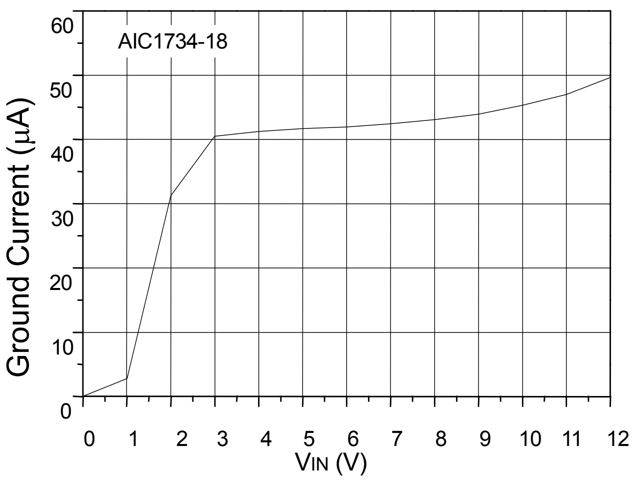


Fig. 9 Ground Current vs. V_{IN}

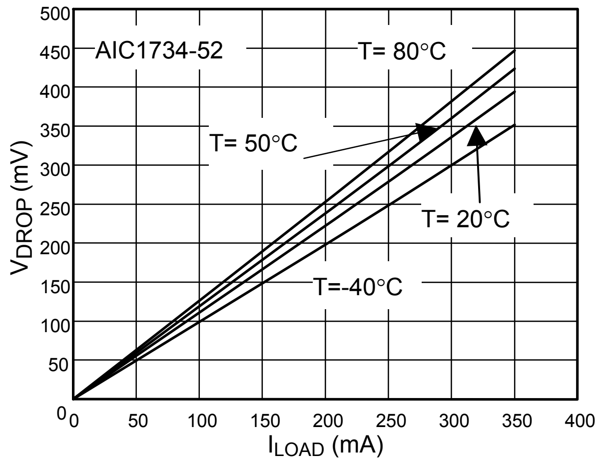


Fig. 10 V_{DROP} vs. I_{LOAD}

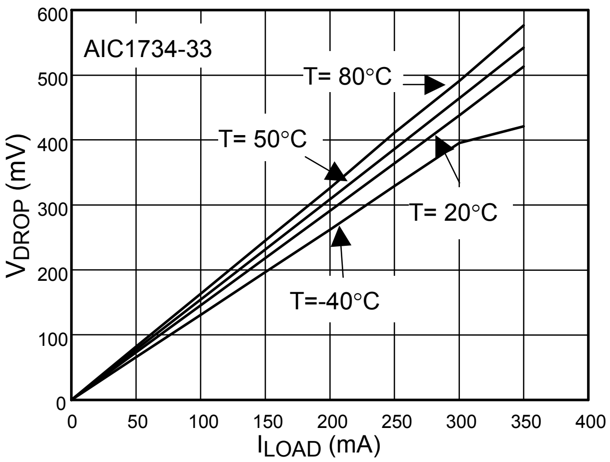


Fig. 11 V_{DROP} vs. I_{LOAD}

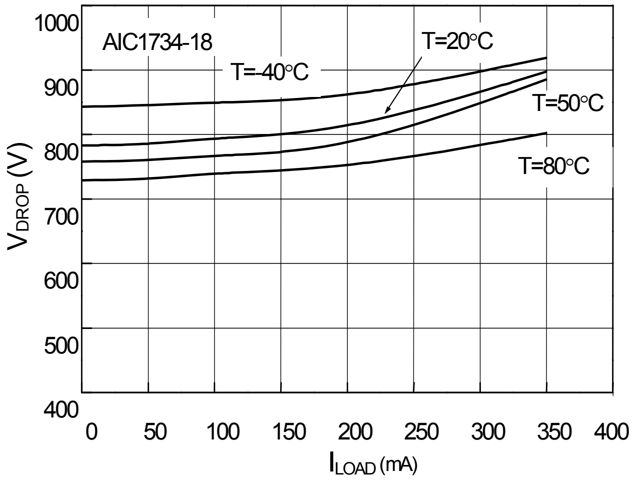


Fig. 12 V_{DROP} vs. I_{LOAD}

■ TYPICAL PERFORMANCE CHARACTERISTIC (Continued)

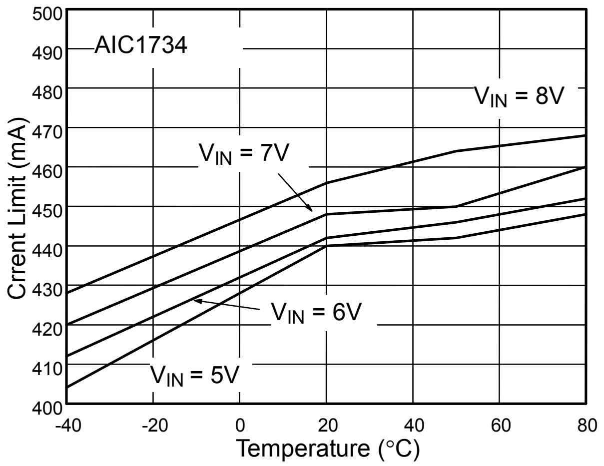


Fig. 13 Current Limit vs. Temperature

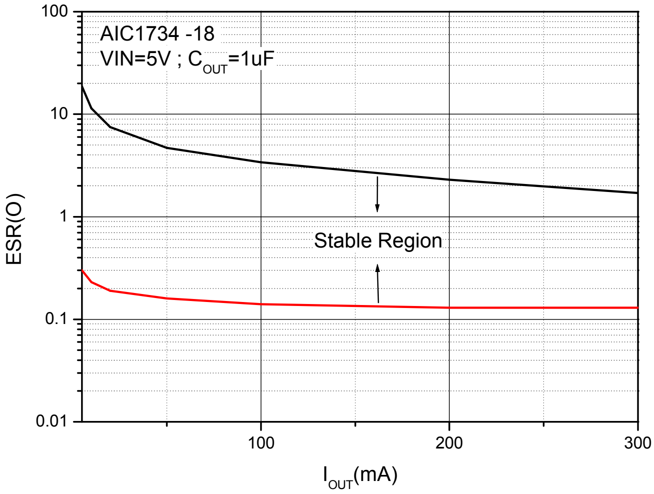


Fig. 14 Region of Stable COUT ESR vs. Load Current

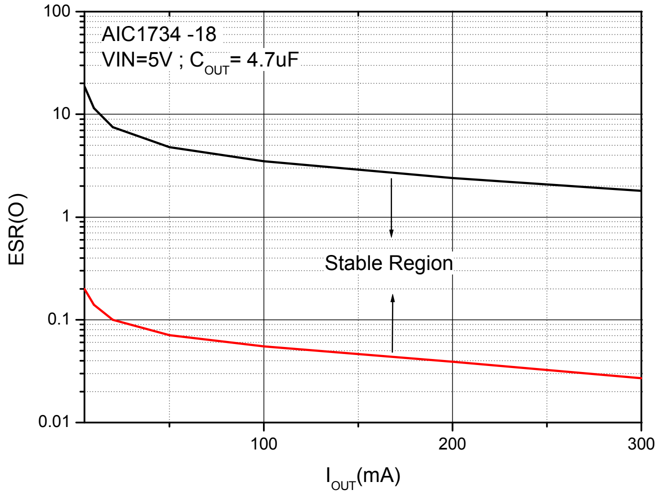


Fig. 15 Region of Stable COUT ESR vs. Load Current

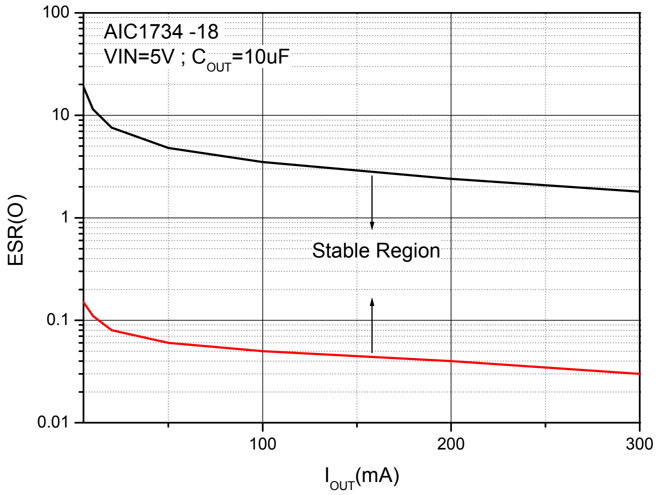
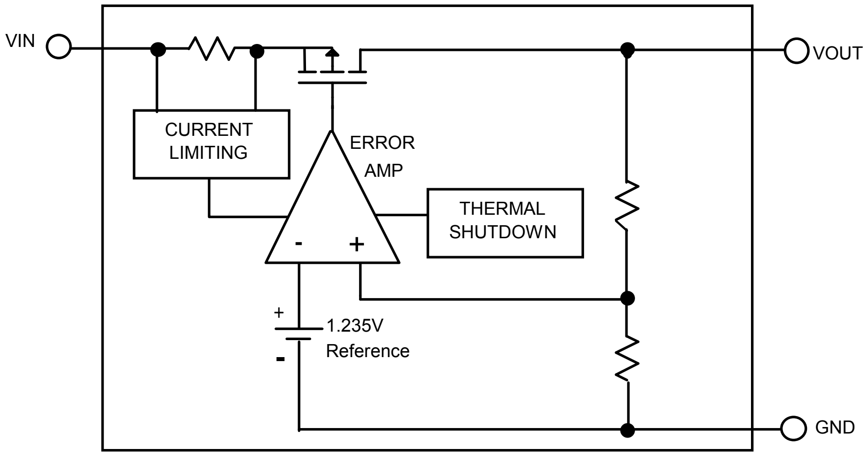


Fig. 16 Region of Stable COUT ESR vs. Load Current

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. A 1uF aluminum electrolytic input capacitor with a 1uF aluminum electrolytic output capacitor is recommended. To avoid oscillation, it is recommended to follow the figures of "Region of Stable C_{OUT} ESR vs. Load Current" to choose proper capacitor specifications.

POWER DISSIPATION

The AIC1734 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 AIC1734 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:

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

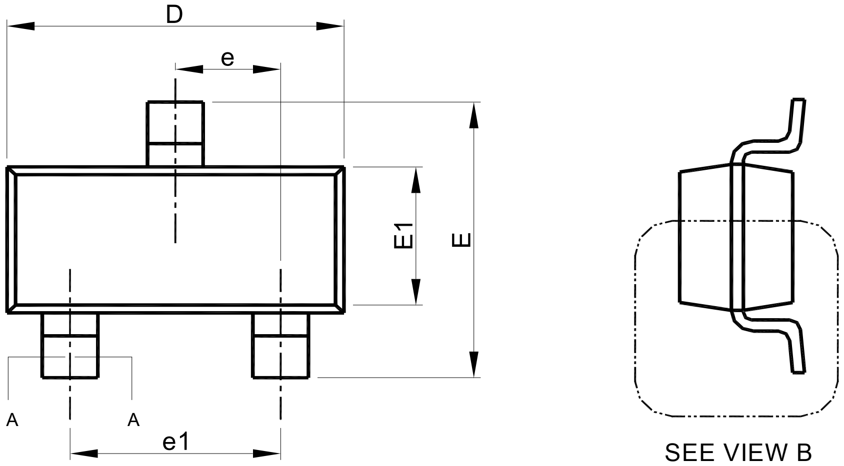
Where $T_{J\text{-}max}$ is the maximum allowable junction temperature (125°C), and T_A is the ambient temperature suitable in application.

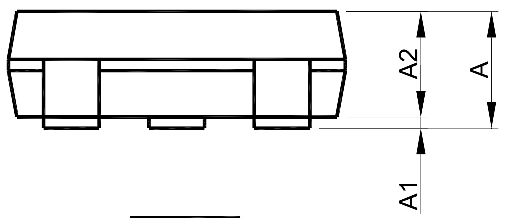
As a general rule, the lower temperature is, the better reliability of the device is. So the PCB mounting pad should provide maximum thermal conductivity to maintain low device temperature.

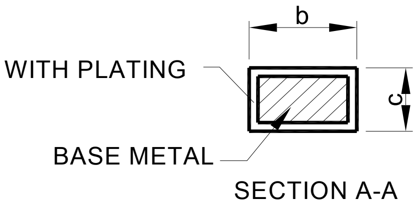
GND pin performs a dual function for providing an electrical connection to ground and channeling heat away. Therefore, connecting the GND pin to ground with a large pad or ground plane would increase the power dissipation and reduce the device temperature.

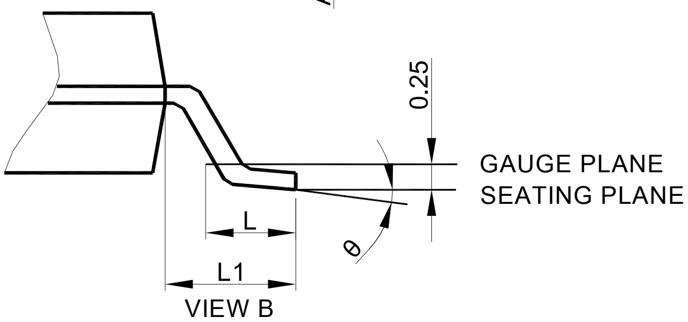
PHYSICAL DIMENSIONS (unit: mm)

- **SOT-23**





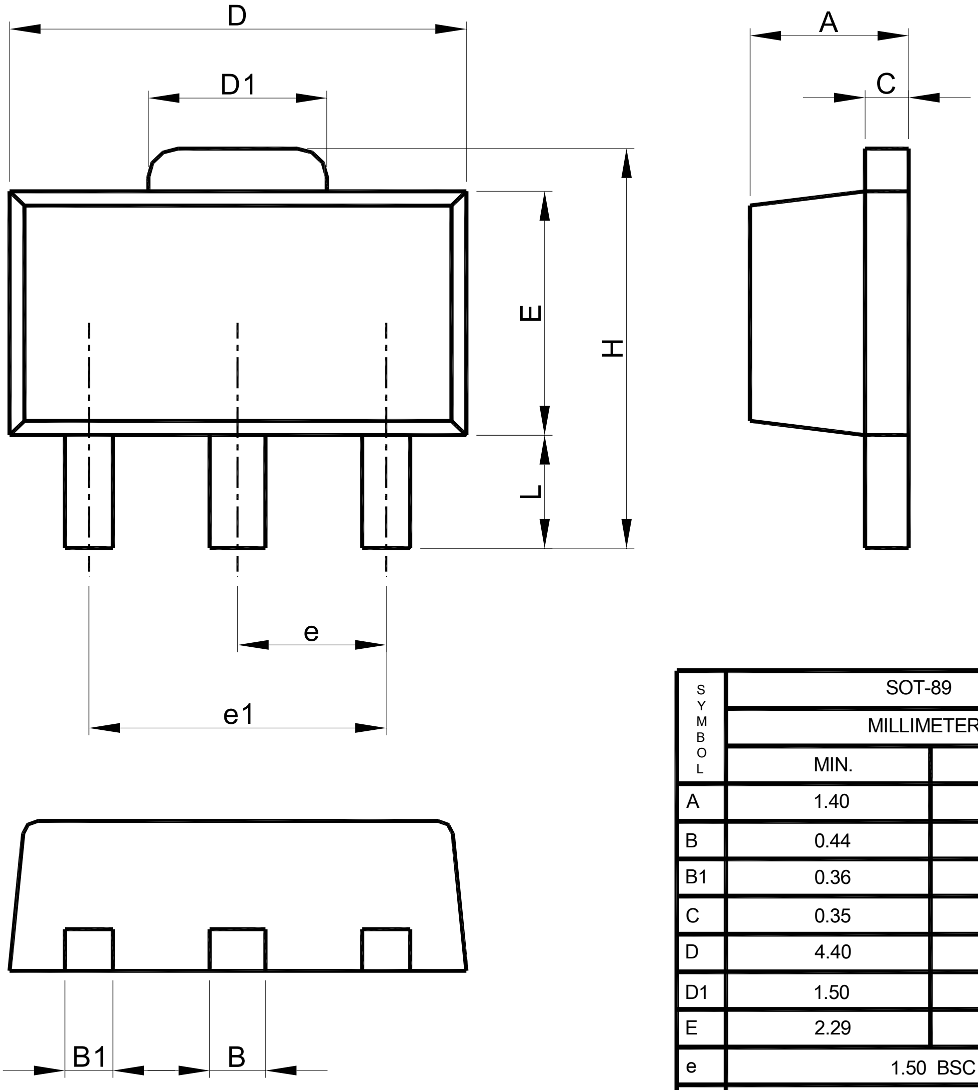




Note: 1. Refer to JEDEC MO-178.
2. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 10 mil per side.
3. Dimension "E1" does not include inter-lead flash or protrusions.
4. Controlling dimension is millimeter, converted inch dimensions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

SYMBOL	SOT-23	
	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°

- **SOT-89**



SYMBOL	SOT-89	
	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: