

General Description

The LTP431/LTP432 device is a three-terminal adjustable shunt regulator, with specified thermal stability over applicable industry and automotive temperature range. The output voltage can be set to any value between V_{ref} (Typical 2.50 V) and 36 V, with two external resistors. These devices have a typical output impedance of 0.2 Ω . These high performances make it very suitable for multiple applications, such as onboard regulation, adjustable power supplies, and switching power supplies.

The LTP431/LTP432 devices are offered in two grades, with initial tolerances (at 25 °C) of 0.5% and 1%, for the B and A grade, respectively. In addition, low output drift versus temperature ensures good stability over the entire temperature range.

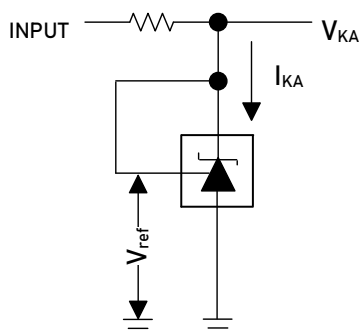
LTP431/LTP432 is specified for the wide operating temperature range of -40 to +125 °C. and is offered in SOT23-3 and SOT89-3 package.

Features and Benefits

- Adjustable output Voltage: V_{ref} to 36 V
- Reference voltage tolerance at 25 °C :
 - 0.5% (B grade)
 - 1% (A grade)
- Equivalent Full – Range Temperature Coefficient of 50 ppm/°C (Typical)
- 0.2 Ω Typical output impedance
- Sink-current capability: $I_{KA} = 1.0$ to 100 mA
- Operating temperature: -40 to 125 °C

Applications

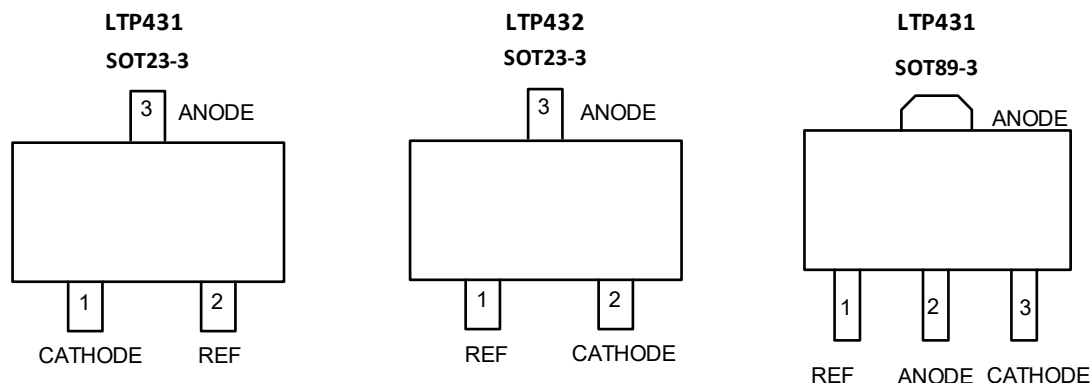
- Adjustable voltage and current referencing
- Secondary side regulation in flyback SMPSs
- Zener replacement
- Voltage monitoring
- Comparator with integrated reference



Pin Description

Pin. Name	Pin Description
CATHODE	Shunt Current / Voltage input
ANODE	Common pin, normally connected to ground
REF	Threshold relative to common anode

Pin Configurations (Top View)



Ordering Information ⁽¹⁾

Type Number	Initial Accuracy	Operating Temperature	Package Name	Packing Option	Silk Printing
LTP431AXT3/R6	1%	-40 to 125 °C	SOT23-3	Tape and Reel, 3000	SR1XX
LTP431BXT3/R6	0.5%	-40 to 125 °C	SOT23-3	Tape and Reel, 3000	SR1XX
LTP432AXT3/R6	1%	-40 to 125 °C	SOT23-3	Tape and Reel, 3000	SR2XX
LTP432BXT3/R6	0.5%	-40 to 125 °C	SOT23	Tape and Reel, 3000	SR2XX
LTP431AXT89/R2	1%	-40 to 125 °C	SOT89-3	Tape and Reel, 1000	SR1XX
LTP431BXT89/R2	0.5%	-40 to 125 °C	SOT89-3	Tape and Reel, 1000	SR1XX

(1) Please contact your Linearin representative for the latest availability information and product details.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Cathode Voltage	V_{KA}		37	V
Continuous Cathode Current Range	I_{KA}	-100	150	mA
Reference Input Current Range	$I_{I(REF)}$	-0.05	10	mA
Junction Temperature Range	T_J		150	°C
Storage Temperature Range	T_{stg}		150	°C
Thermal Resistance Junction-Air	θ_{JA}		250	°C/W

Note: Stresses exceeding those listed in the Maximum Rating table may damage the device. Operation beyond the maximum Rating conditions or under harsh conditions may affect product reliability and function.

Recommended Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Cathode Voltage	V_{KA}		36	V
Continuous Cathode Current Range	I_{KA}	1	100	mA
Operating Temperature Range	T_A	-40	125	°C

Electrical Characteristics, LTP431B, LTP432B

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Reference Voltage	V_{ref}	$V_{KA} = V_{ref}$, $I_{KA} = 10\text{ mA}$	2.4825	2.495	2.5075	V
Deviation of reference input voltage over full temperature range ⁽¹⁾	$V_{I(dev)}$	$V_{KA} = V_{ref}$, $I_{KA} = 10\text{ mA}$		5	25	mV
Ratio of change in reference voltage to the change in cathode voltage	$\Delta V_{ref} / \Delta V_{KA}$	$\Delta V_{KA} = 10\text{ V} - V_{ref}$ $\Delta V_{KA} = 36\text{ V} - 10\text{ V}$		-1.5 -1.5	-2.2 -1.8	mV / V
Reference Input Current	I_{ref}	$I_{KA} = 10\text{ mA}$, $R_1 = 10\text{ k}\Omega$, $R_2 = \infty$		1	2	μA
Deviation of reference input current over full temperature range ⁽¹⁾	$I_{I(dev)}$	$I_{KA} = 10\text{ mA}$, $R_1 = 10\text{ k}\Omega$, $R_2 = \infty$		0.8	2	μA
Minimum cathode current for regulation	I_{zmin}	$V_{KA} = V_{ref}$		0.3	0.5	mA
Off-state cathode current	I_{off}	$V_{KA} = 36\text{ V}$, $V_{ref} = 0\text{ V}$		0.1	1	μA
Dynamic Impedance ⁽²⁾	$ Z_{KA} $	$V_{KA} = V_{ref}$, $I_{KA} = 1\sim 15\text{ mA}$		0.2	0.5	Ω

Note:
(1) The deviation parameters $V_{I(dev)}$ and $I_{I(dev)}$ are defined as the differences between the maximum and minimum values obtained over the rated temperature range.
(2) The dynamic impedance is defined by $|Z_{KA}| = \Delta V_{KA} / \Delta I_{KA}$.

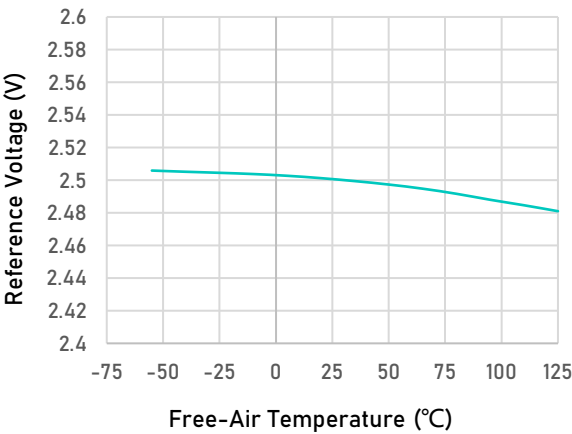
Electrical Characteristics, LTP431A, LTP432A

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Reference Voltage	V_{ref}	$V_{KA} = V_{ref}, I_{KA} = 10 \text{ mA}$	2.47	2.495	2.52	V
Deviation of reference input voltage over full temperature range ⁽¹⁾	$V_{I(dev)}$	$V_{KA} = V_{ref}, I_{KA} = 10 \text{ mA}$		15	32	mV
Ratio of change in reference voltage to the change in cathode voltage	$\Delta V_{ref} / \Delta V_{KA}$	$\Delta V_{KA} = 10\text{V} - V_{ref}$		-1.5	-2.2	mV / V
		$\Delta V_{KA} = 36\text{V} - 10\text{V}$		-1.5	-1.8	
Reference Input Current	I_{ref}	$I_{KA} = 10 \text{ mA}, R_1 = 10\text{k}\Omega, R_2 = \infty$		1	2	μA
Deviation of reference input current over full temperature range ⁽¹⁾	$I_{I(dev)}$	$I_{KA} = 10 \text{ mA}, R_1 = 10\text{k}\Omega, R_2 = \infty$		0.8	2	μA
Minimum cathode current for regulation	$I_{z_{min}}$	$V_{KA} = V_{ref}$		0.3	0.5	mA
Off-state cathode current	I_{off}	$V_{KA} = 36 \text{ V}, V_{ref} = 0 \text{ V}$		0.1	1	μA
Dynamic Impedance ⁽²⁾	$ Z_{KA} $	$V_{KA} = V_{ref}, I_{KA} = 1 \sim 15 \text{ mA}$		0.2	0.5	Ω

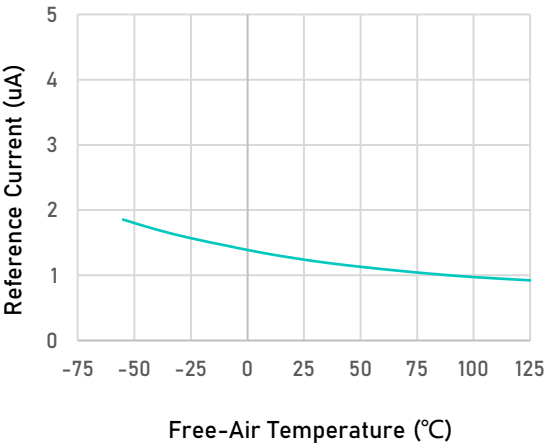
Note:
 (1) The deviation parameters $V_{I(dev)}$ and $I_{I(dev)}$ are defined as the differences between the maximum and minimum values obtained over the rated temperature range.
 (2) The dynamic impedance is defined by $|Z_{KA}| = \Delta V_{KA} / \Delta I_{KA}$.

Typical Performance Characteristics

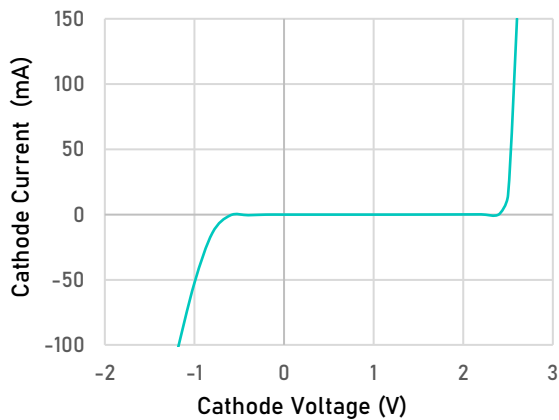
Data at high and low temperatures are applicable only within the recommended operating free-air temperature ranges of the various devices.



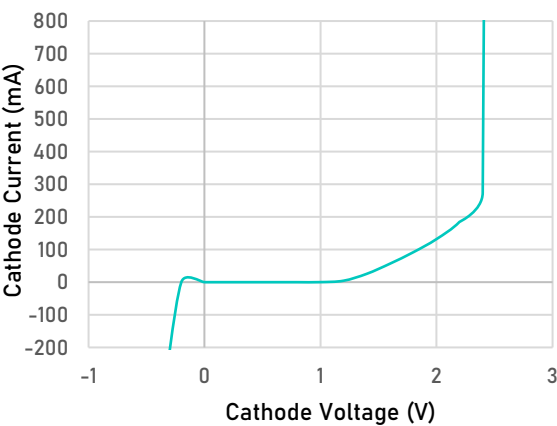
Reference Voltage vs Free-Air Temperature



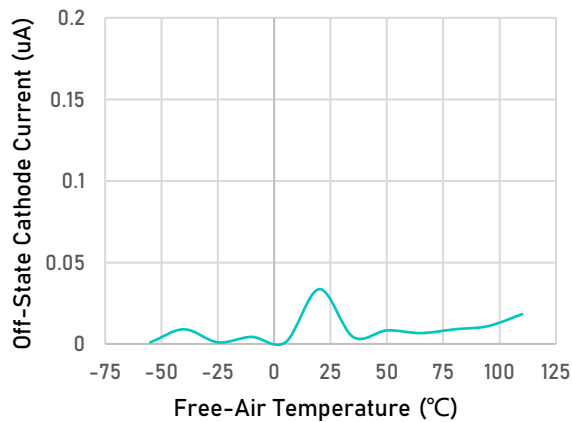
Reference Current vs Free-Air Temperature



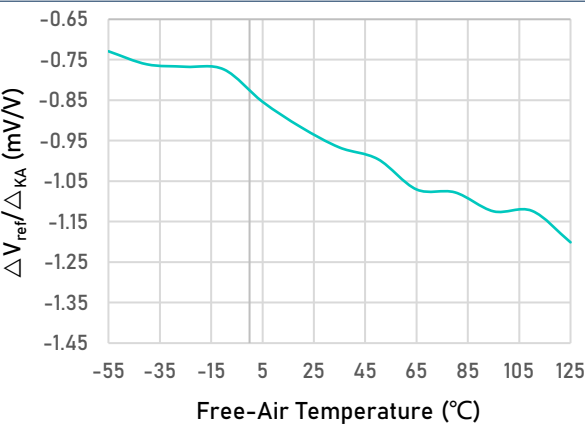
Cathode Current vs Cathode Voltage



Cathode Current vs Cathode Voltage



Off-State Cathode Current vs Free-Air Temperature



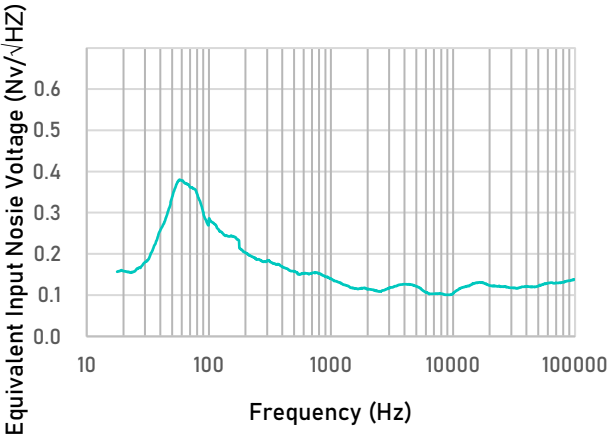
Ratio of Delta Reference Voltage to Delta Cathode vs Free-Air Temperature

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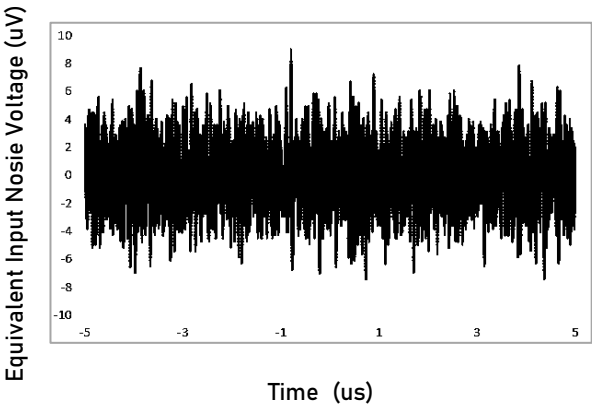


Typical Performance Characteristics

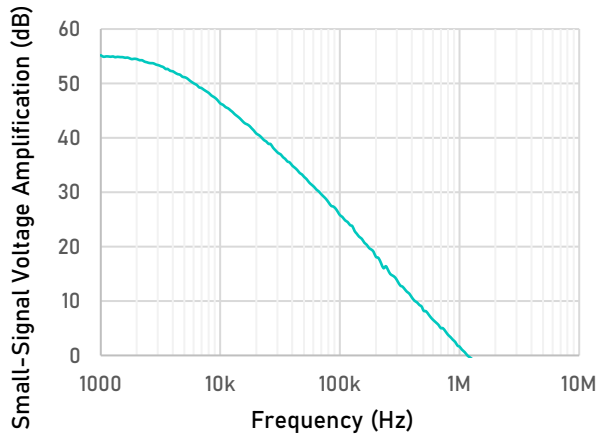
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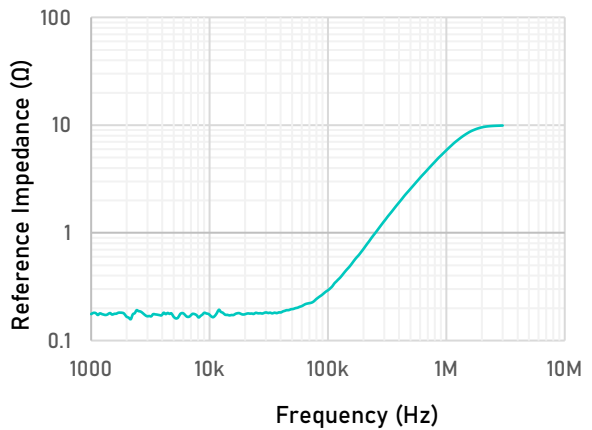
Equivalent Input Noise Voltage vs Frequency



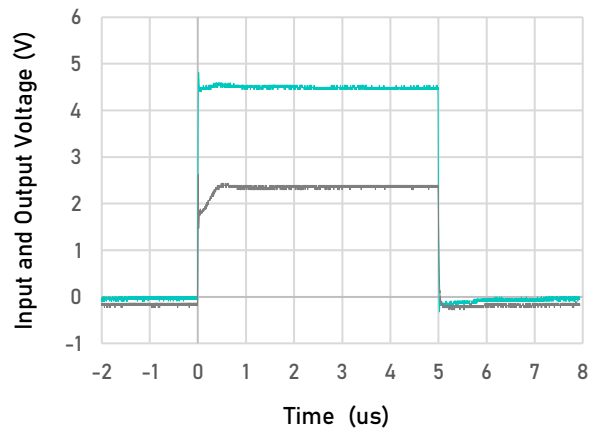
Equivalent Input Noise Voltage Over a 10-s Period



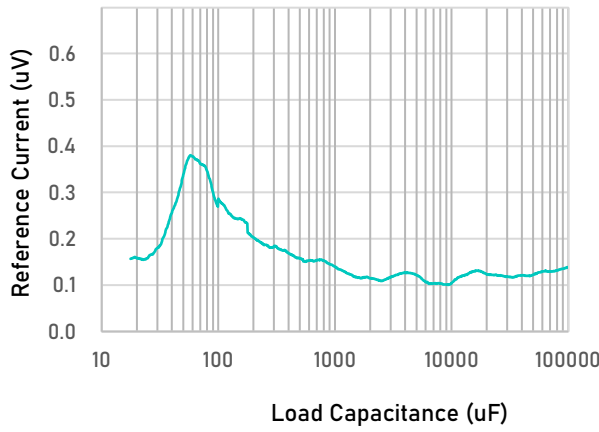
Small-Signal Voltage Amplification vs Frequency



Reference Impedance vs Frequency



Pulse Response



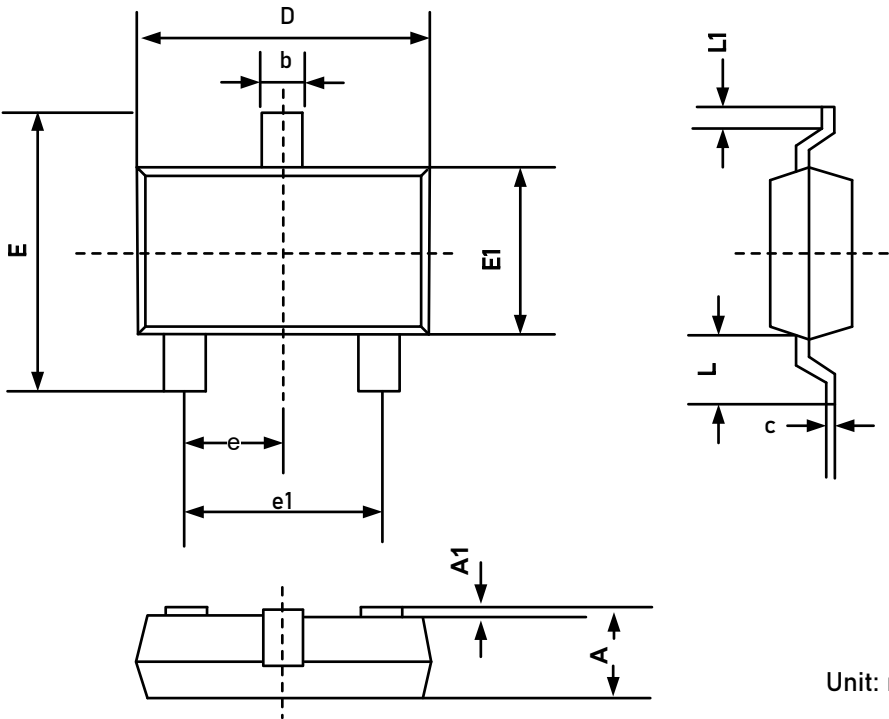
Stability Boundary Conditions for All Devices

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Package Outlines

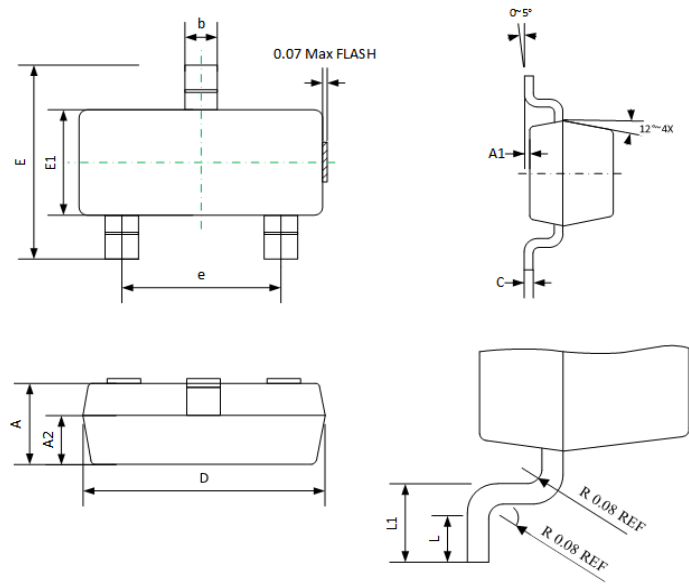
DIMENSIONS, SOT23-3



Symbol	Dimensions In Millimeters	
	MIN	MAX
A	1.050	1.250
A1	0.000	0.100
b	0.300	0.400
c	0.100	0.200
D	2.820	3.020
E	2.600	3.000
E1	1.500	1.700
e	0.950BSC	
e1	1.800	2.000
L1	0.300	0.600
L	/	0.700

Package Outlines

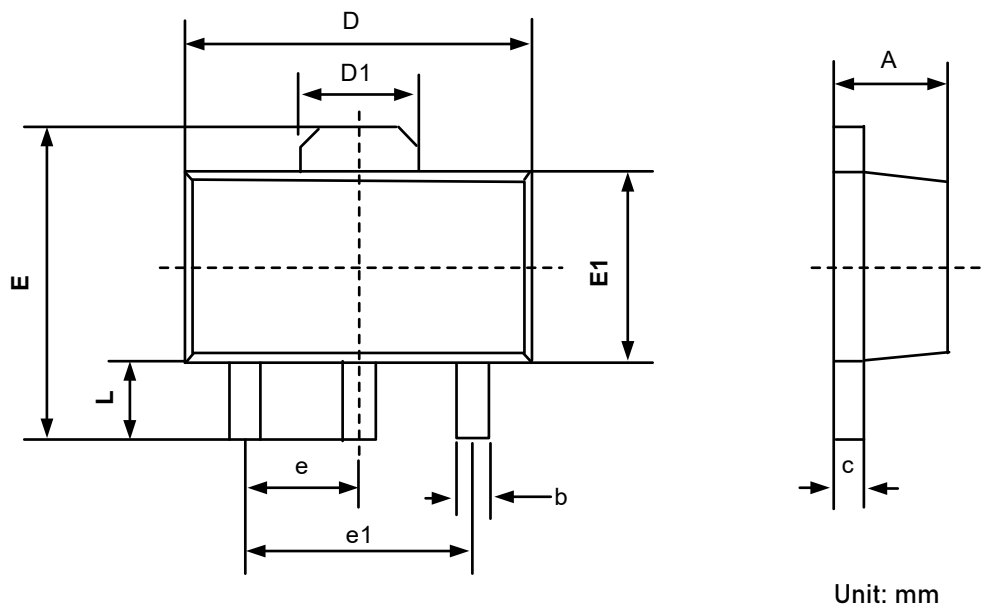
DIMENSIONS, SOT23



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.95	1.00	1.05
A1	0.01	0.05	0.10
b	0.35	0.40	0.45
c	0.11 BSC		
D	2.80	2.90	3.00
E	2.10	2.40	2.50
E1	1.20	1.30	1.40
e	0.95 BSC		
L	0.20	-	-
L1	0.30	0.40	0.50
A2	0.60 REF		

Package Outlines

DIMENSIONS, SOT89-3



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.400	1.600
b	0.320	0.520
c	0.350	0.440
D	4.400	4.600
D1	1.550REF	
E	3.940	4.250
E1	2.300	2.600
e	1.500BSC	
e1	3.000BSC	
L	0.900	1.200