Descriptions

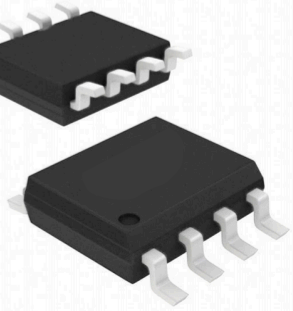
The LM385 series are micropower two-terminal bandgap voltage regulator diodes. Designed to operate over a wide current range of 10uA to 20mA, these devices feature exceptionally low dynamic impedance, low noise and stable operation over time and temperature. Tight voltage tolerances are achieved by on-chip trimming. The large dynamic operating range enables these devices to be used in applications with widely varying supplies with excellent regulation. Extremely low operating current make these devices ideal for micropower circuitry like portable instrumentation, regulators and other analog circuitry where extended battery life is required.

The LM385 series are packaged in SOP-8, SOT23-3L and TO-92 plastic case and areavailable in versions of 1.24V、2.5V.

Features

- Operating Current from 10uA to 20mA
- 1% Initial Tolerance
- Low Temperature Coefficient
- 0.6Ω Dynamic Impedance
- Low Voltage Reference 1.24V

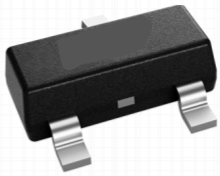
TO-92



SOP-8

Applications

- Instrumentation
- Process Control
- Energy Management
- Data Acquisition Systems
- Battery-Powered Equipment
- Precision Audio Components



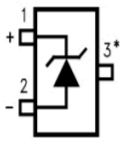
SOT-23-3L

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW LM385Z-1.2	TO-92	LM385Z1.2	Bag	2000Pcs/Bag
XBLW LM385M3X-1.2	SOT23-3L	R11	Tape	3000Pcs/Reel
XBLW LM385MX-1.2	SOP-8	LM385M1.2	Tape	2500Pcs/Reel
XBLW LM385Z-2.5	TO-92	LM385Z2.5	Bag	2000Pcs/Bag
XBLW LM385M3X-2.5	SOT23-3L	R12	Tape	3000Pcs/Reel
XBLW LM385MX-2.5	SOP-8	LM385M2.5	Tape	2500Pcs/Reel

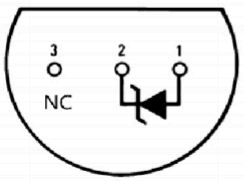
Pin Configurations Bottom View

Fixed Voltage versions

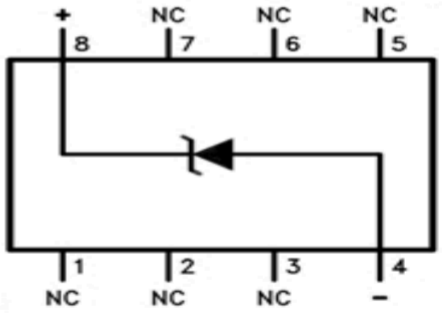


* Pin 3 is attached to the Die Attach Pad (DAP) and should be connected to Pin 2 or left floating.

SOT23-3L



TO-92



SOP-8

Function Block

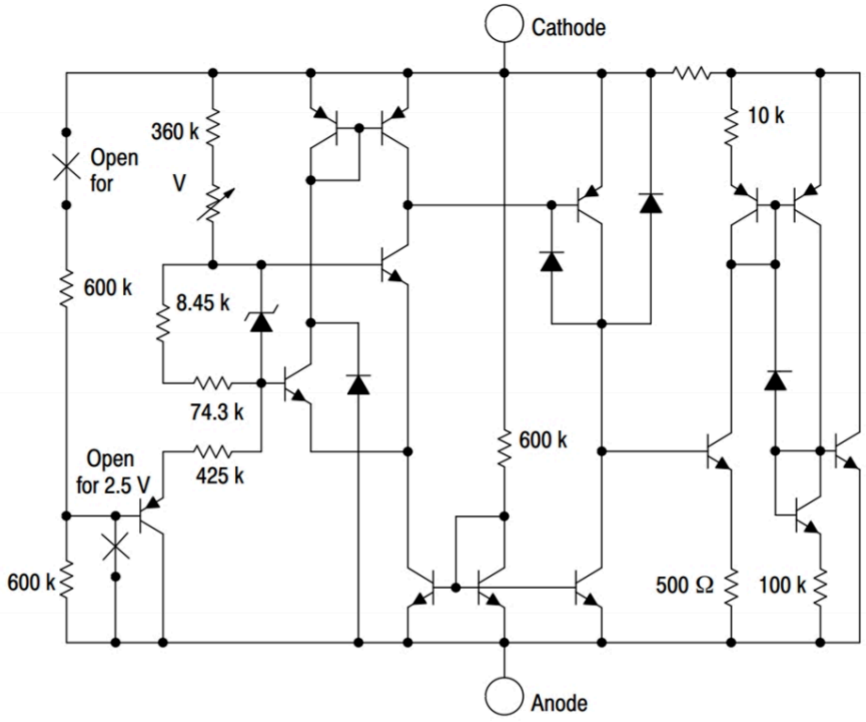


Figure1 Function Block Diagram of LM385

Absolute Maximum Ratings

(TA = 25°C, unless otherwise noted)

Characteristics	Symbol	Value	Unit
Reverse Current	IR	30	mA
Forward Current	IF	10	mA
Operating Ambient Temperature Range	TA	-40 to +85	°C
Operating Junction Temperature	TJ	+150	°C
Storage Temperature Range	Tstg	-65 ~ +150	°C
Electrostatic Discharge Sensitivity (ESD) Human Body Model (HBM) Machine Model (MM) Charged Device Model (CDM)	ESD	 4000 400 2000	V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

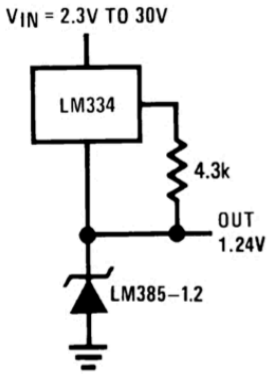
Electrical Characteristics

(TA = 25°C, unless otherwise noted)

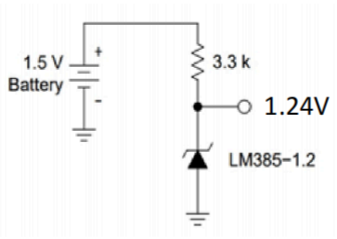
Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Reverse Breakdown Voltage LM385-1.2 LM385-2.5	V(BR)R	IRmin≤IR≤20mA	1.220 2.475	1.240 2.500	1.250 2.525	V
Reverse Breakdown Voltage LM385-1.2 LM385-2.5		IRmin≤IR≤20mA −40°C to +85°C	1.210 2.450		1.260 2.550	V
Minimum Operating Current	IRmin			6	10	uA
		−40°C to +85°C			20	uA
Reverse Breakdown Voltage Change with Current	ΔV(BR)R	IRmin≤IR≤1mA			1.5	mV
		−40°C to +85°C			5	mV
		1mA≤IR≤20mA		4	10	mV
		−40°C to +85°C			20	mV
Reverse Dynamic Impedance	Z	IR= 100uA		0.6		Ω
Average Temperature Coefficient	ΔV(BR)/ ΔT	10uA≤IR≤20 mA −40°C to +85°C		80		ppm/°C
Wideband Noise (RMS)	n	IR= 100uA, 10Hz≤f≤10 kHz		60		uV
Long Term Stability	S	IR= 100uA,TA=+25°C±0.1°C		20		ppm/kHR

Typical Application Circuit

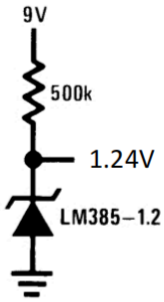
Fixed Vref Type Circuit



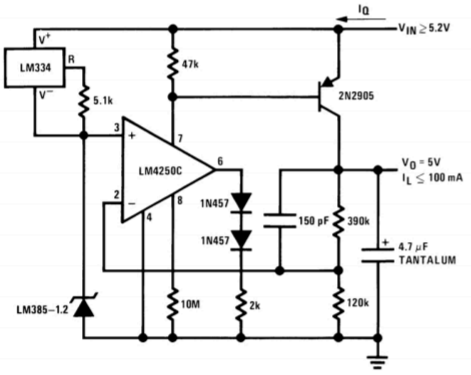
Wide Input Range Reference



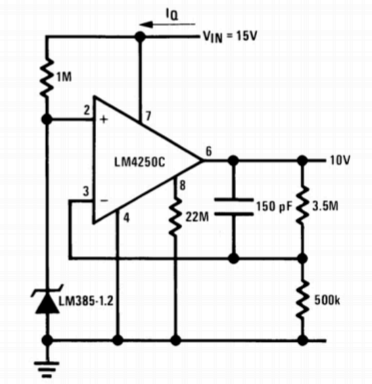
Reference from 1.5V Battery



Micropower Reference from 9V Battery



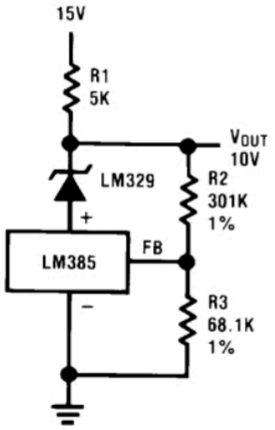
Micropower* 5V Regulator



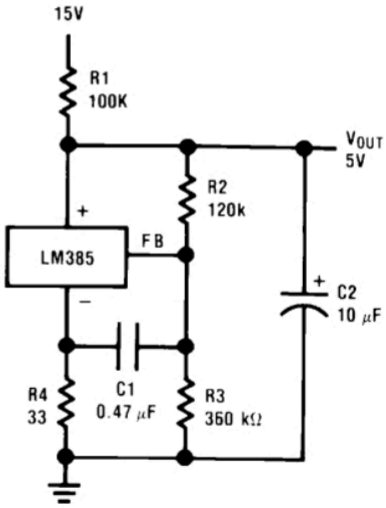
Micropower* 10V Reference

Adjustable Type Circuit

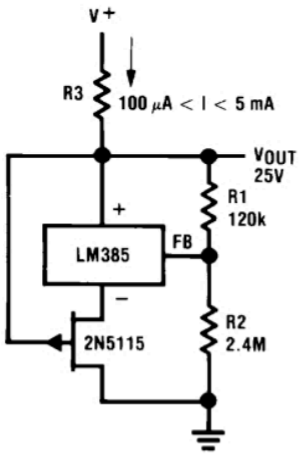
Precision 10V Reference



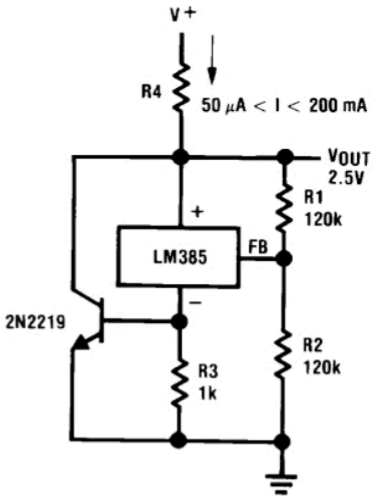
Low AC Noise Reference



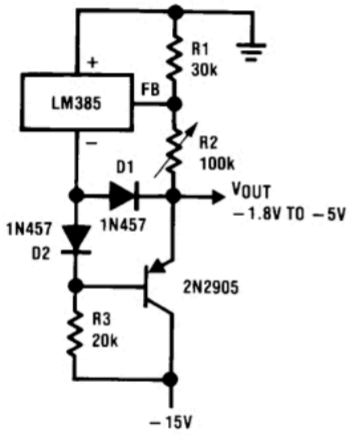
25V Low Current Shunt Regulator



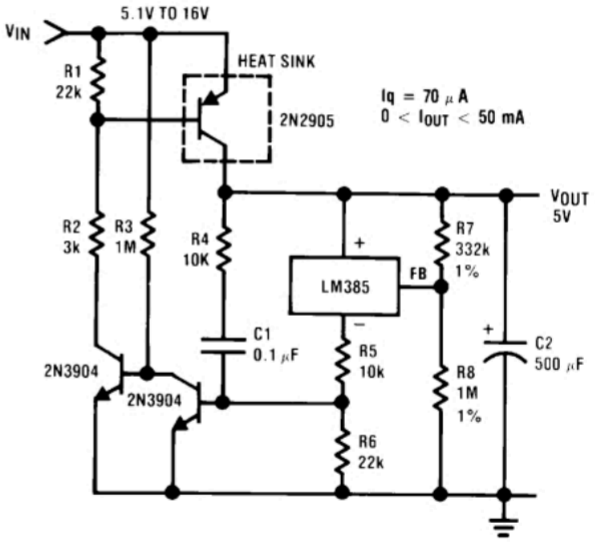
200 mA Shunt Regulator



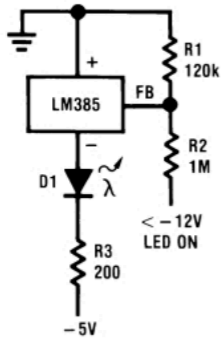
Series-Shunt 20 mA Regulator



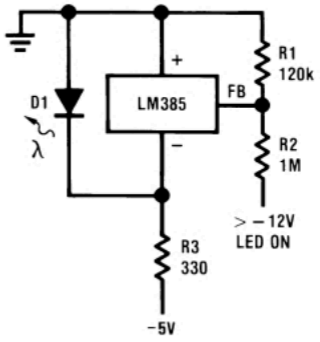
High Efficiency Low Power Regulator



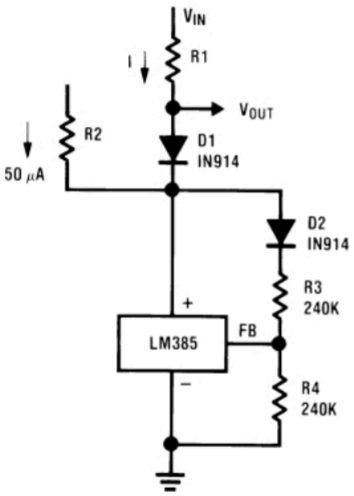
Voltage Level Detector



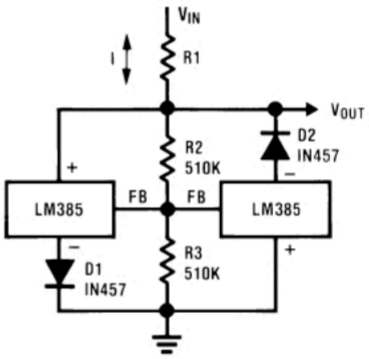
Voltage Level Detector



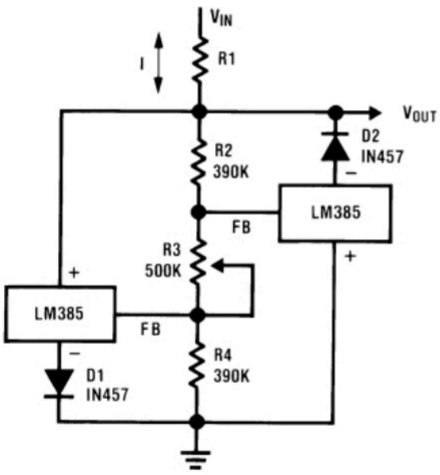
Fast Positive Clamp
$2.4V + \Delta V_{D1}$



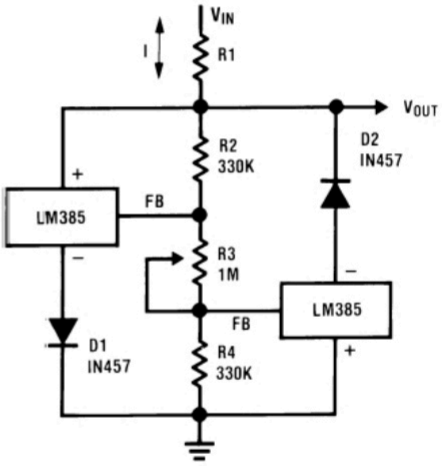
Bidirectional Clamp
±2.4V



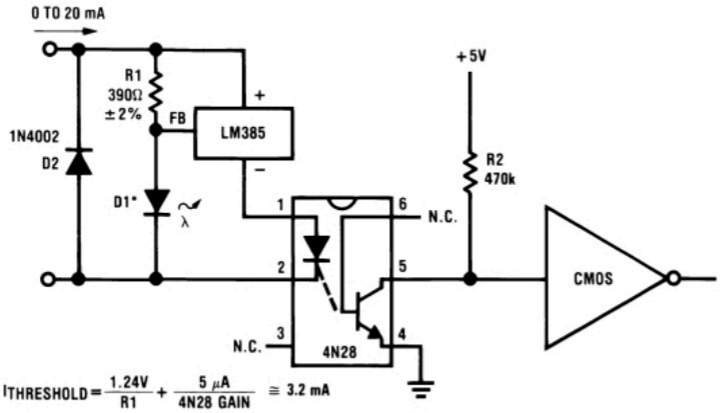
Bidirectional Adjustable Clamp
±1.8V to ±2.4V



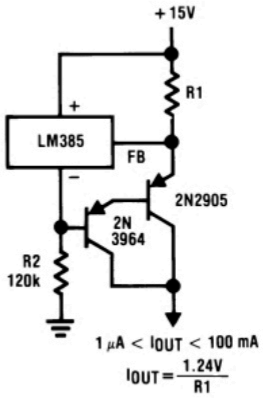
Bidirectional Adjustable Clamp
±2.4V to ±6V



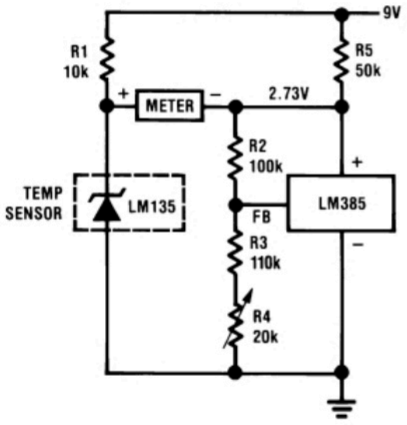
Simple Floating Current Detector



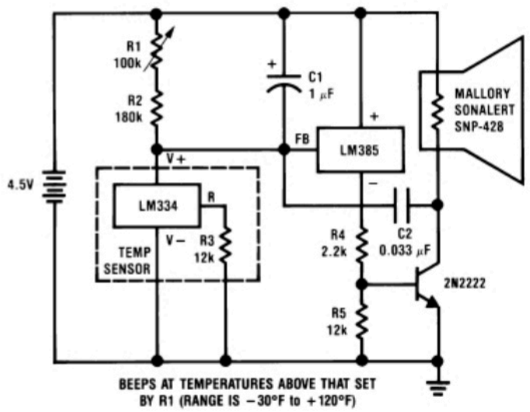
Current Source



Centigrade Thermometer, 10mV/°C

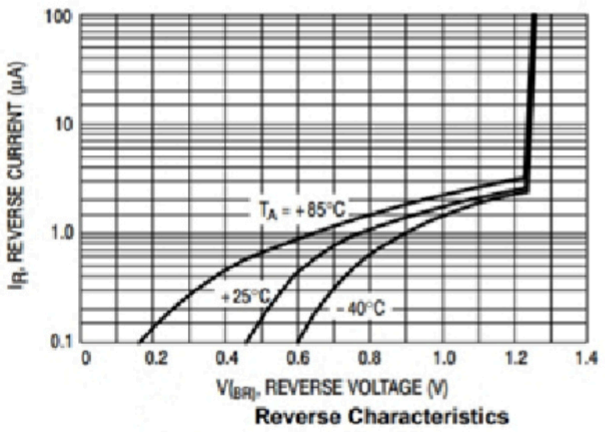


Freezer Alarm

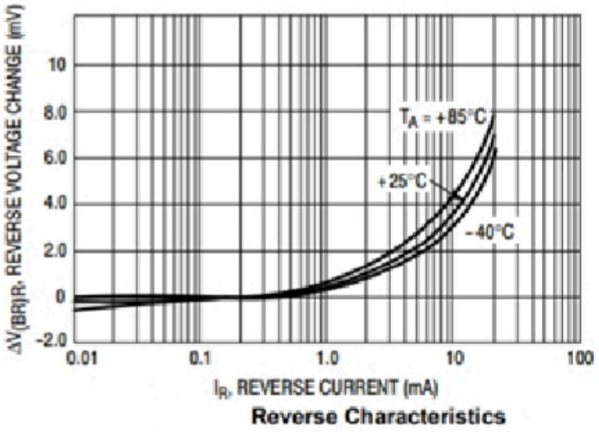


Characteristics Curves

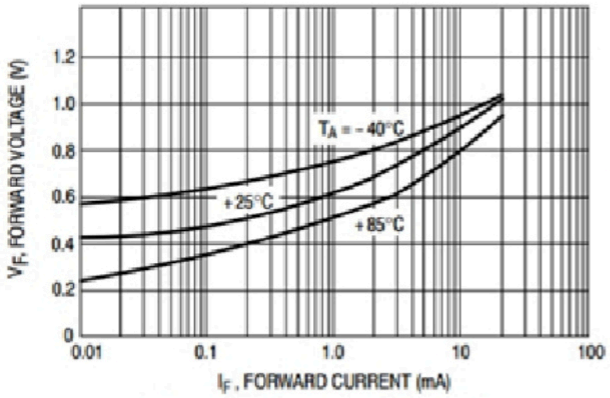
LM385-1.2/ADJ



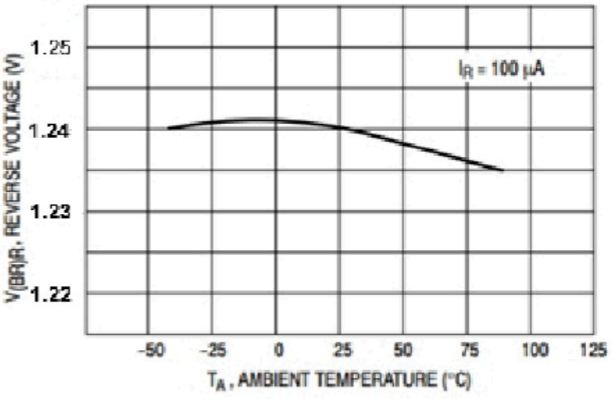
Reverse Characteristics



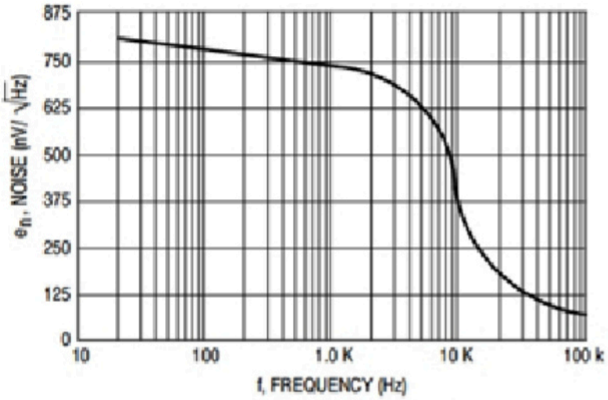
Reverse Characteristics



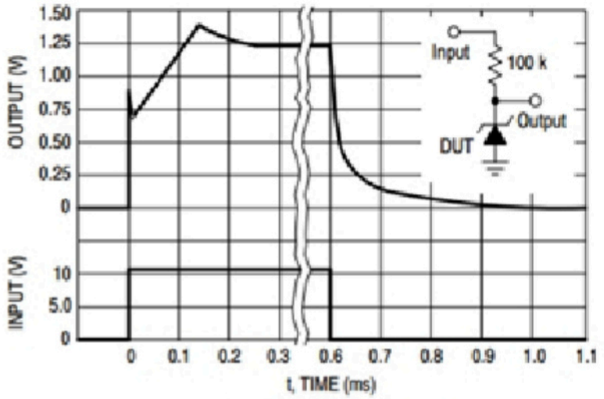
Forward Characteristics



Temperature Drift

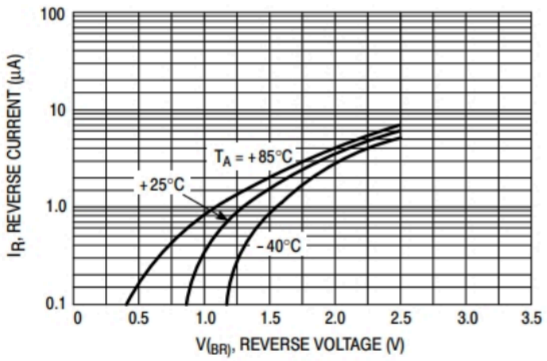


Noise Voltage

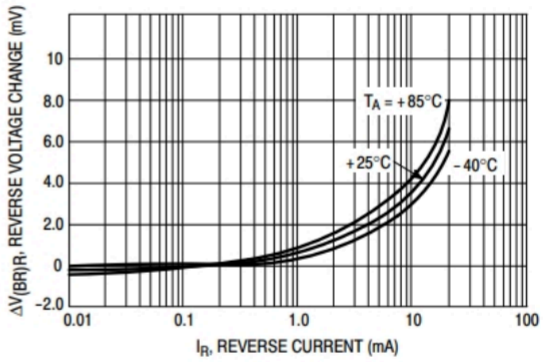


Response Time

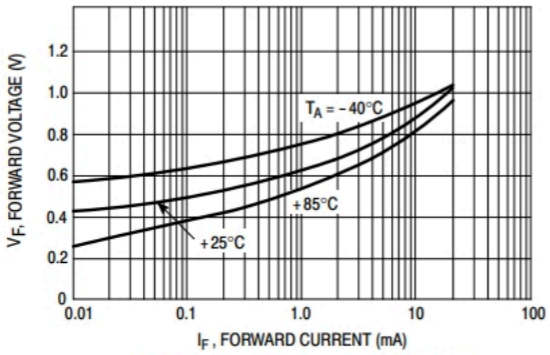
LM385-2.5



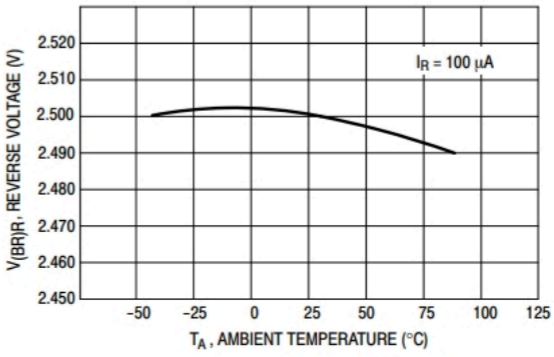
Reverse Characteristics



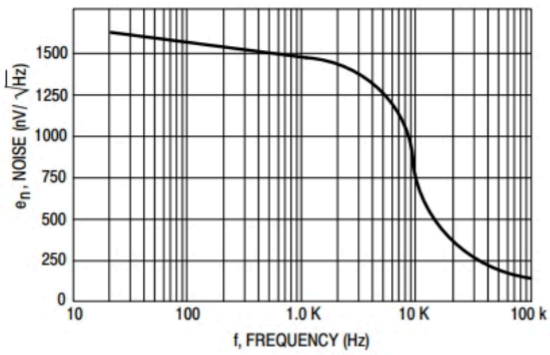
Reverse Characteristics



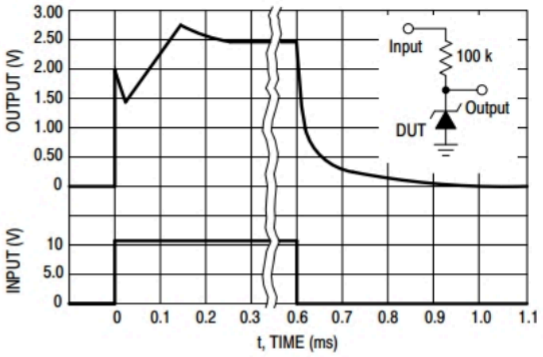
Forward Characteristics



Temperature Drift



Noise Voltage

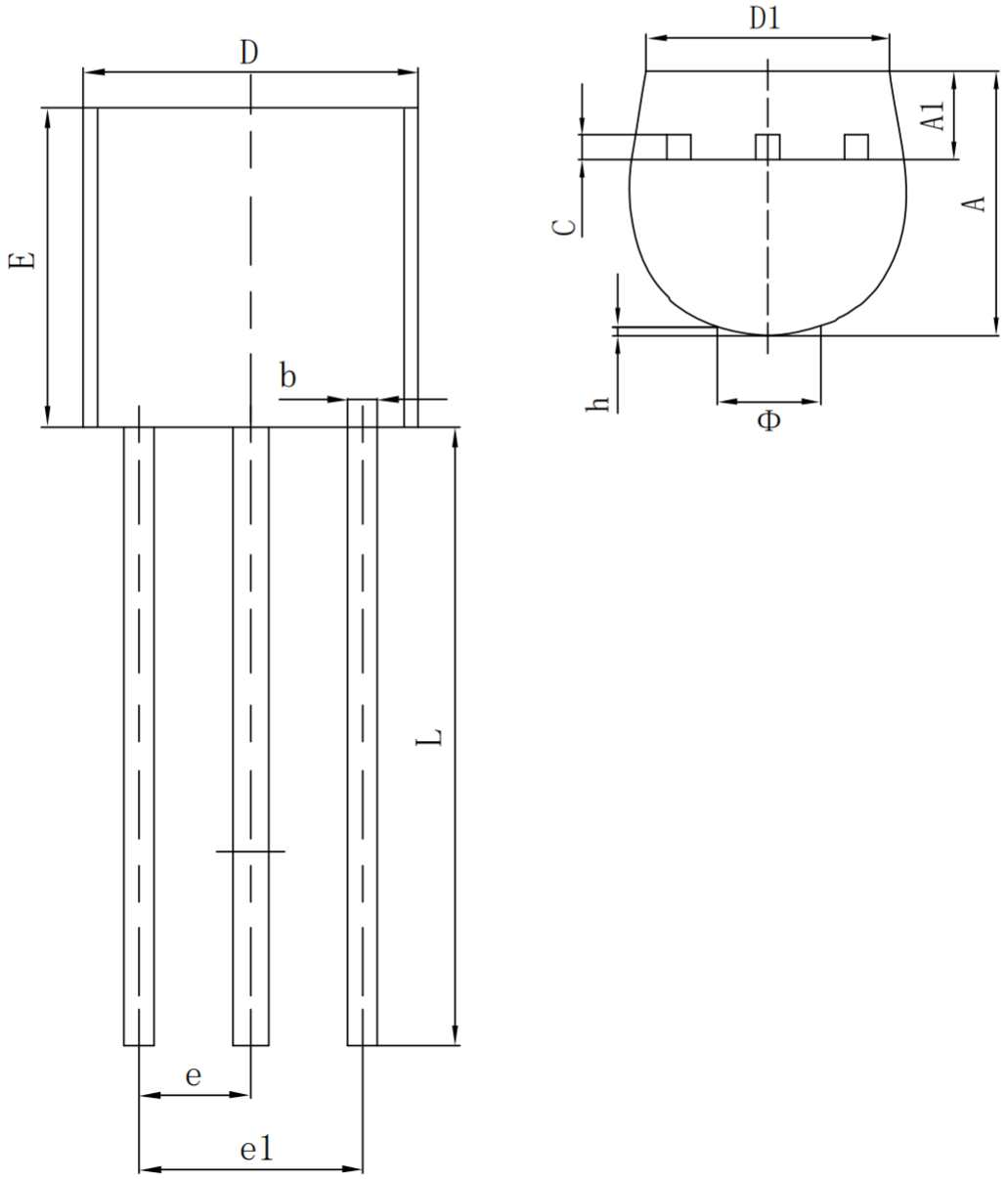


Response Time

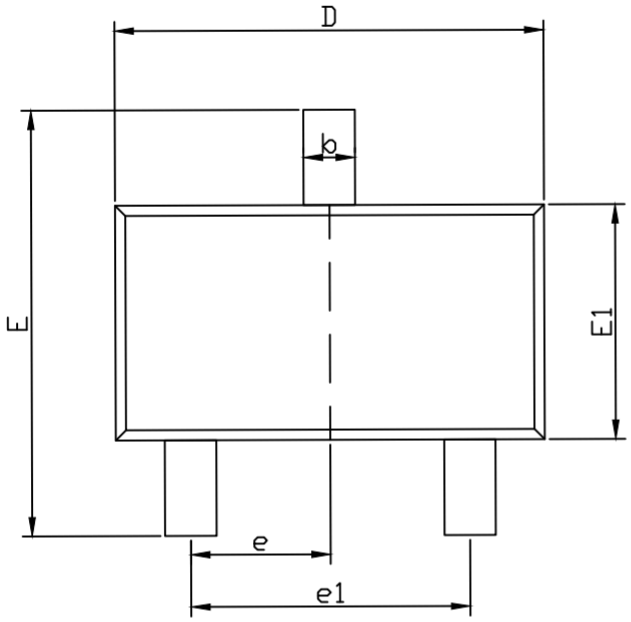
Package Information

· T0-92

Size / Symbol	Dimensions In Millimeters		Size / Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	3.300	3.700	A	0.130	0.146
A1	1.100	1.400	A1	0.043	0.055
b	0.380	0.550	b	0.015	0.022
c	0.360	0.510	c	0.014	0.020
D	4.300	4.700	D	0.169	0.185
D1	3.430		D1	0.135	
E	4.300	4.700	E	0.169	0.185
e	1.270(TYP)		e	0.050(TYP)	
e1	2.440	2.640	e1	0.096	0.104
L	14.10	14.50	L	0.555	0.571
Φ		1.600	Φ		0.063
h	0.000	0.380	h	0.000	0.015

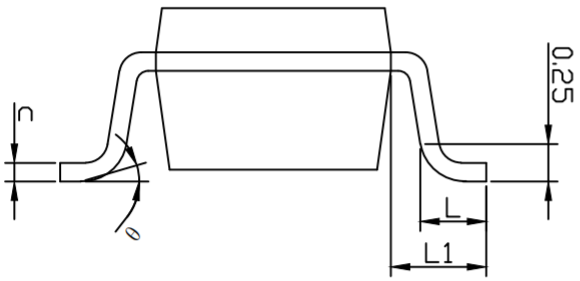


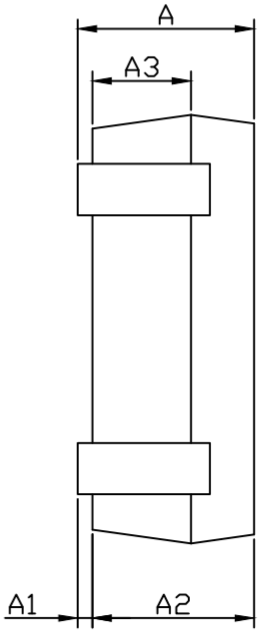
- SOT23-3L



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	–	–	1.25
*A1	0.01	–	0.08
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.33	–	0.41
c	0.11	–	0.20
D	2.82	2.92	3.02
*E	2.60	2.80	3.00
*E1	1.50	1.60	1.70
*e	0.90	0.95	1.00
e1	1.90BSC		
L	0.30	–	0.60
*L1	0.55	0.60	0.75
θ	0°	–	8°





- SOP-8

Size / Symbol	Dimensions In Millimeters		Size / Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	1.350	1.750	A	0.053	0.069
A1	0.100	0.250	A1	0.004	0.010
A2	1.350	1.550	A2	0.053	0.061
b	0.330	0.510	b	0.013	0.020
c	0.170	0.250	c	0.006	0.010
D	4.700	5.100	D	0.185	0.200
E	3.800	4.000	E	0.150	0.157
E1	5.800	6.200	E1	0.228	0.224
e	1.270(BSC)		e	0.050(BSC)	
L	0.400	1.270	L	0.016	0.050
θ	0°	8°	θ	0°	8°