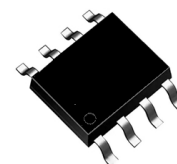


Micropower Voltage Reference Diode

Features

- Operating Current from 10uA to 20mA
- 1% Initial Tolerance
- Low Temperature Coefficient
- 0.6Ω Dynamic Impedance
- Low Voltage Reference 1.24V
- 2.5V Device and 5.0V Device
- Adjustable from 1.24V to 5.7V for ADJ

Package



SOP8



SOT-23



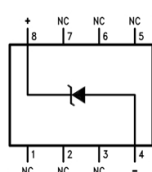
TO92

Pin Configurations

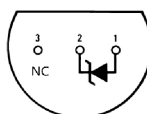
Fixed Voltage versions



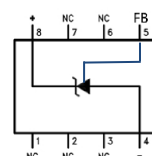
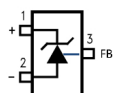
* Pin 3 is attached to the Die Attach Pad (DAP) and should be connected to Pin 2 or left floating.



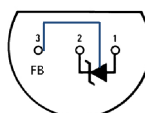
Bottom View



Adjustable versions



Bottom View



Ordering Information

Device	Operating Temperature Range	Package	Shipping
LM385M3X	-40°C to +85°C	SOT-23	3000/Tape & Reel
LM385P	-40°C to +85°C	SOP8	4000/Tape & Reel
LM385T	-40°C to +85°C	TO92	2500/Tape & Reel

MARKING	Designator	Description	
385	LM385	Product code	
XX	AD	ADJ	Vref=1.240V
	1.2	Output Voltage	1.240V
	2.5	Output Voltage	2.5V
	5.0	Output Voltage	5.0V

Function Block

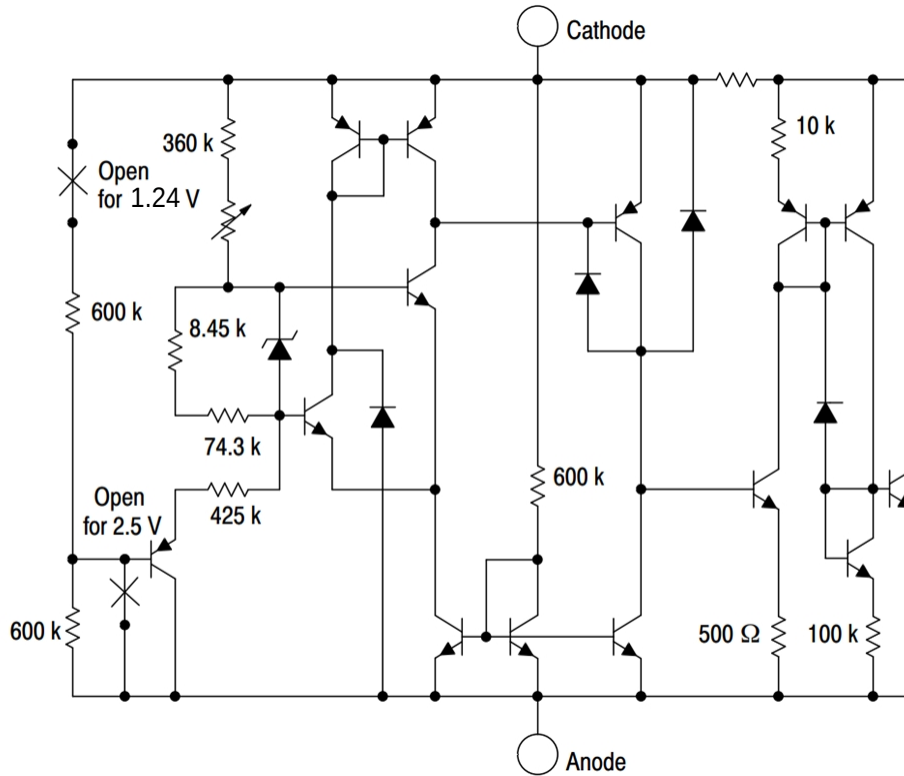


Figure1 Function Block Diagram of LM385

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)	ESD	4000	V
Human Body Model (HBM)		400	
Machine Model (MM)		2000	
Charged Device Model (CDM)			

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.

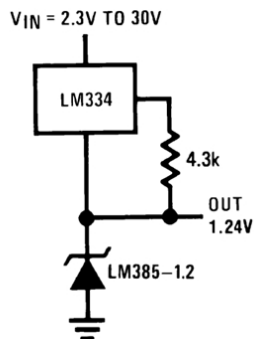
Electrical Characteristics

(TA = 25°C, unless otherwise noted)

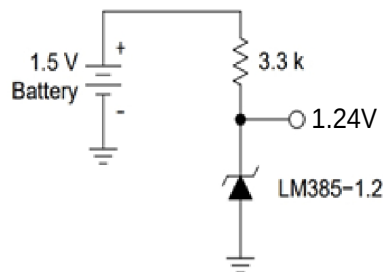
Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Reverse Breakdown Voltage LM385M3X-1.2 LM385-2.5	V(BR)R	$I_{Rmin} \leq I_R \leq 20mA$	1.220 2.475	1.240 2.500	1.250 2.525	V
Reverse Breakdown Voltage LM385M3X-1.2 LM385-2.5		$I_{Rmin} \leq I_R \leq 20mA$ -40°C to +85°C	1.210 2.450		1.260 2.550	V
Minimum Operating Current	IRmin			6	10	uA
		-40°C to +85°C			20	uA
Reverse Breakdown Voltage Change with Current	$\Delta V(BR)R$	$I_{Rmin} \leq I_R \leq 1mA$			1.5	mV
		-40°C to +85°C			5	mV
		$1mA \leq I_R \leq 20mA$		4	10	mV
		-40°C to +85°C			20	mV
Reverse Dynamic Impedance	Z	$I_R = 100uA$		0.6		Ω
Average Temperature Coefficient	$\Delta V(BR)/\Delta T$	$10uA \leq I_R \leq 20mA$ -40°C to +85°C		80		ppm/°C
Wideband Noise (RMS)	n	$I_R = 100uA, 10Hz \leq f \leq 10kHz$		60		uV
Long Term Stability	S	$I_R = 100uA, T_A = +25^\circ C \pm 0.1^\circ C$		20		ppm/kHR

Typical Application Circuit

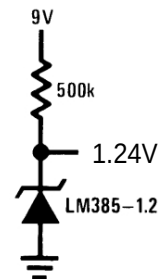
Fixed Vref Type Circuit



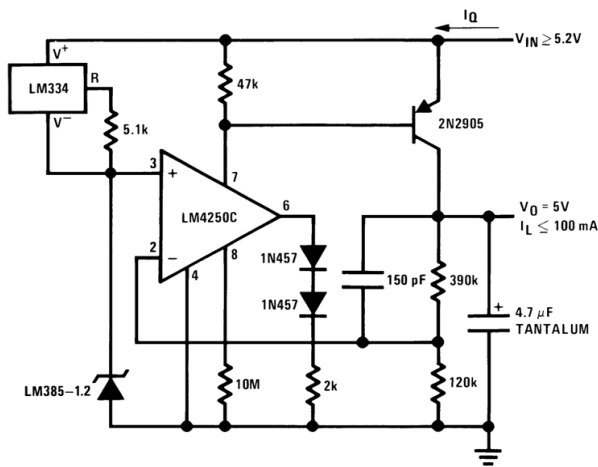
Wide Input Range Reference



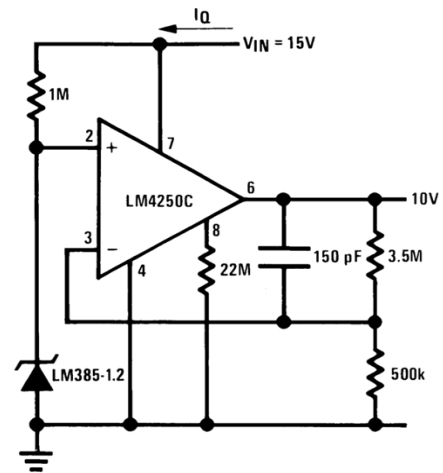
Reference from 1.5V Battery



Micropower Reference from 9V Battery



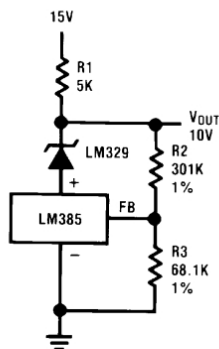
Micropower* 5V Regulator



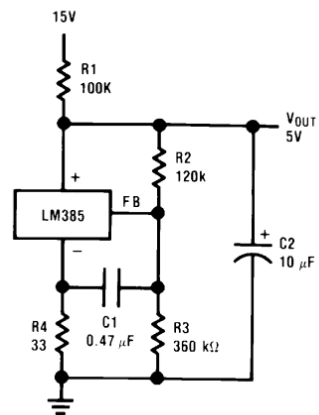
Micropower* 10V Reference

Adjustable Type Circuit

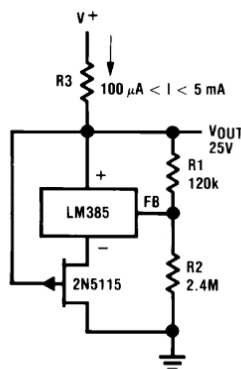
Precision 10V Reference



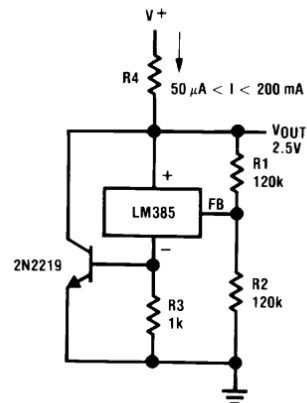
Low AC Noise Reference



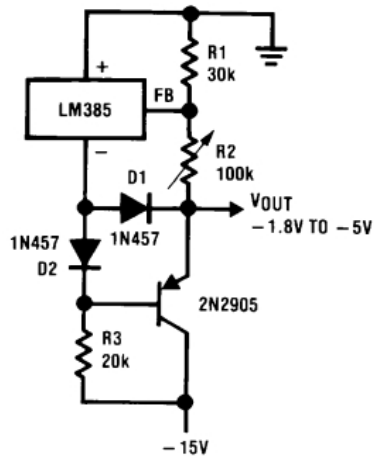
25V Low Current Shunt Regulator



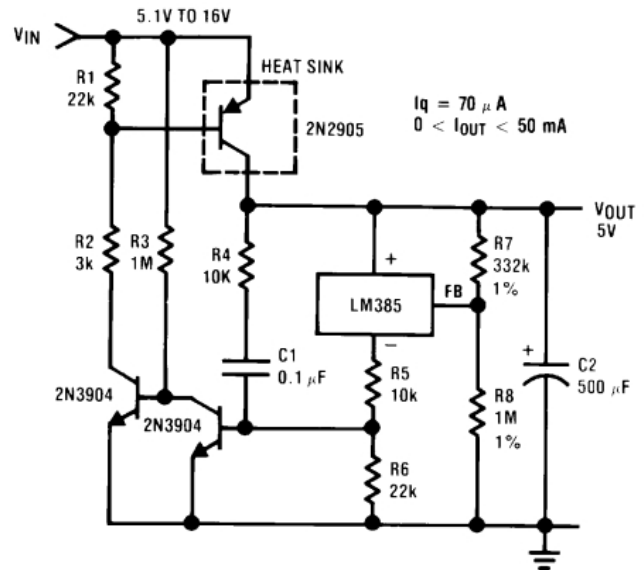
200 mA Shunt Regulator



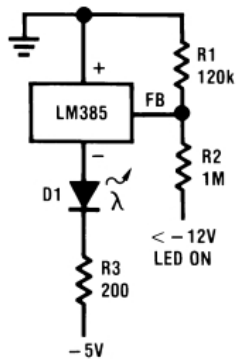
Series-Shunt 20 mA Regulator



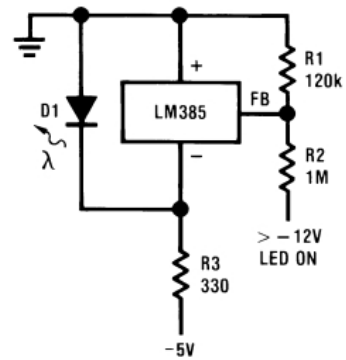
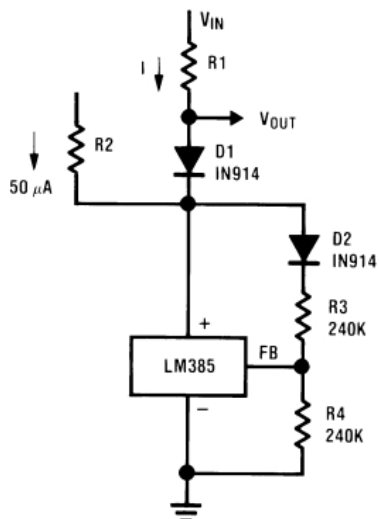
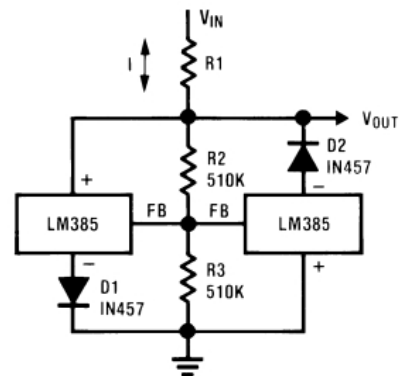
High Efficiency Low Power Regulator



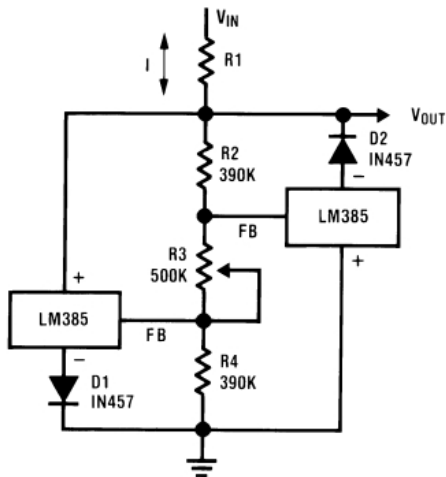
Voltage Level Detector



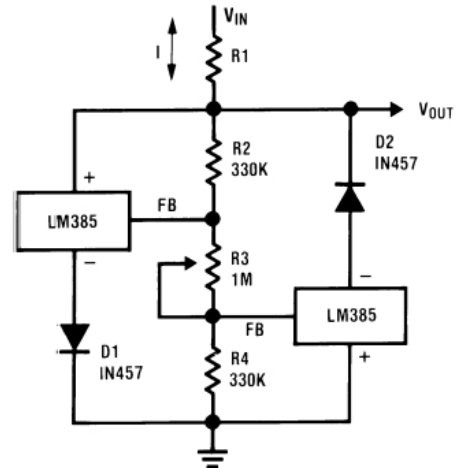
Voltage Level Detector


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

Bidirectional Clamp
 $\pm 2.4V$


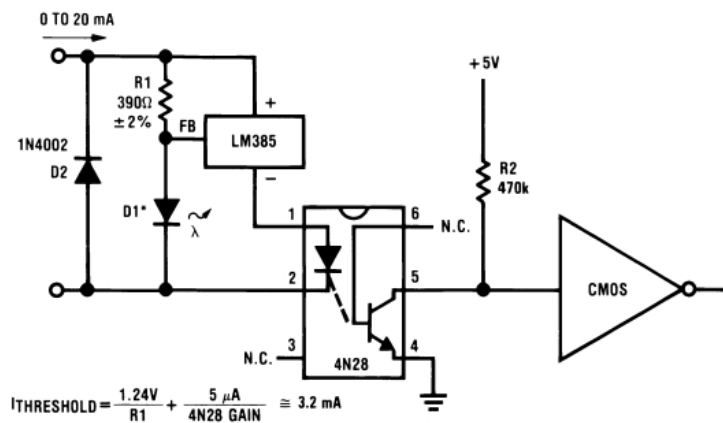
Bidirectional Adjustable Clamp
 $\pm 1.8\text{V}$ to $\pm 2.4\text{V}$



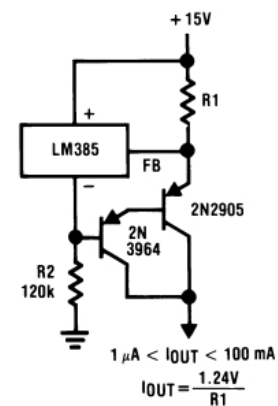
Bidirectional Adjustable Clamp
 $\pm 2.4\text{V}$ to $\pm 6\text{V}$



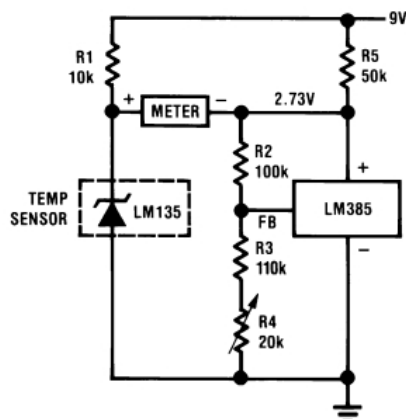
Simple Floating Current Detector



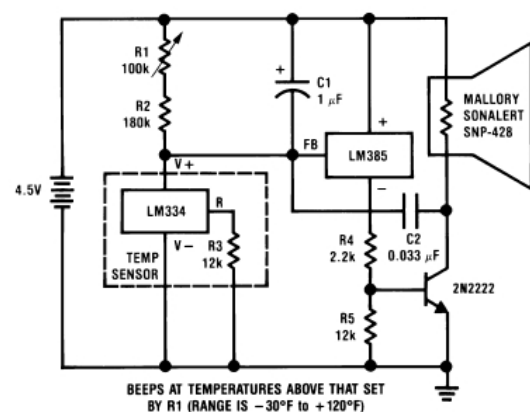
Current Source



Centigrade Thermometer, 10mV/°C

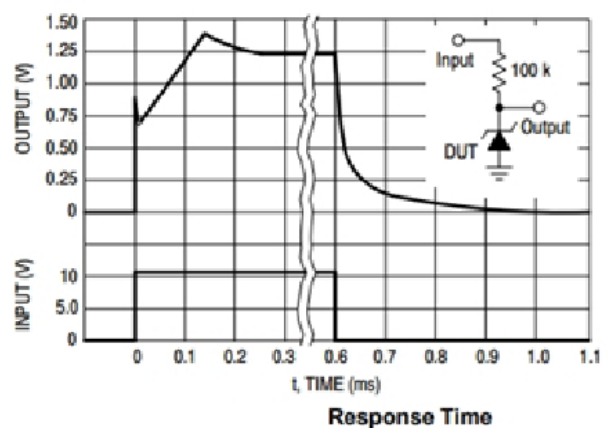
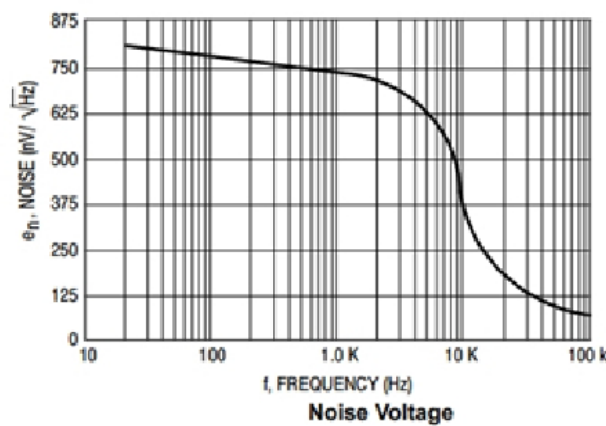
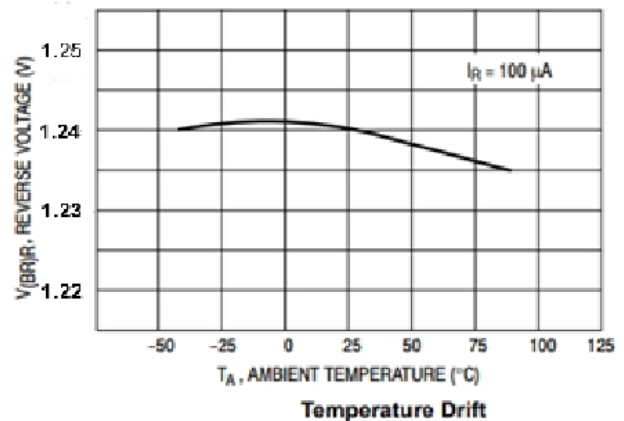
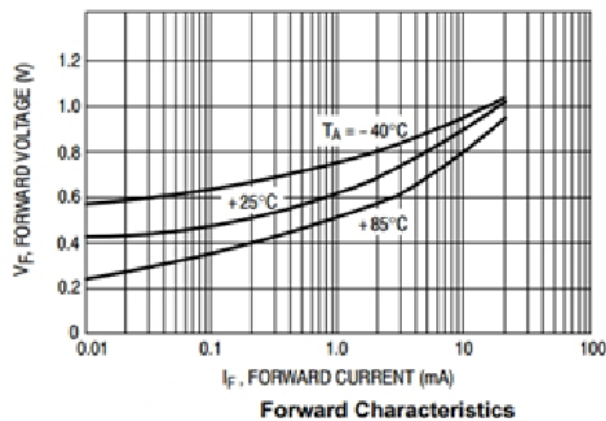
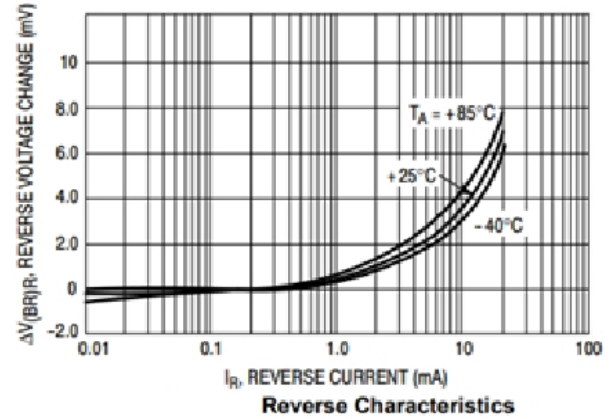
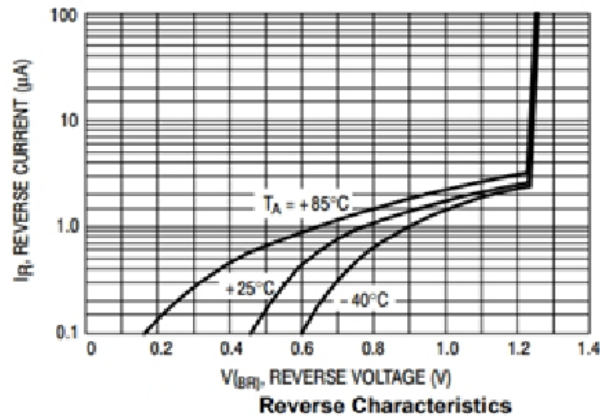


Freezer Alarm

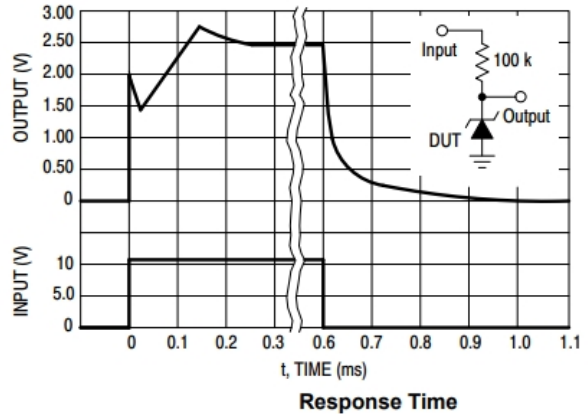
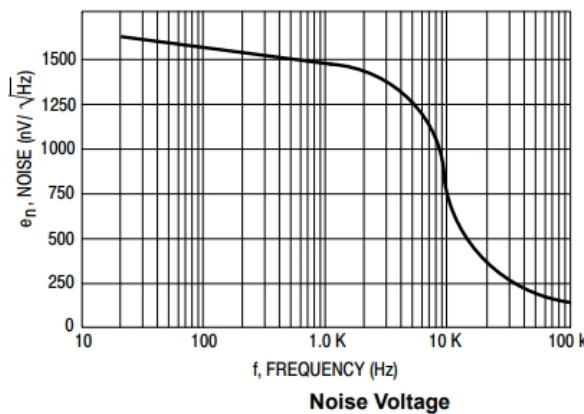
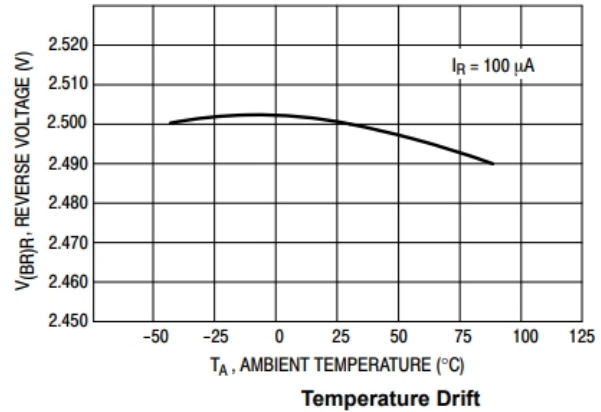
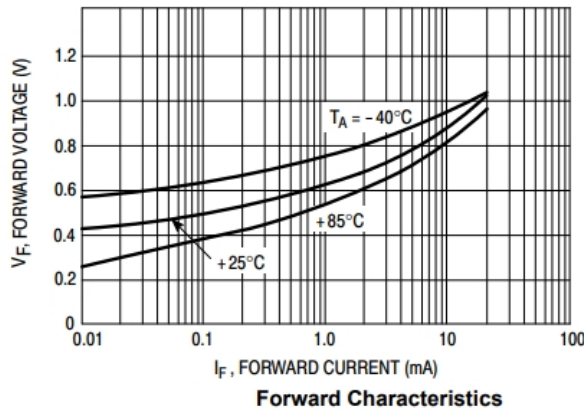
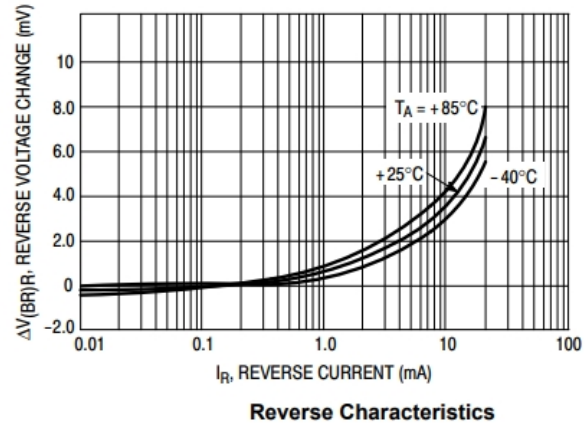
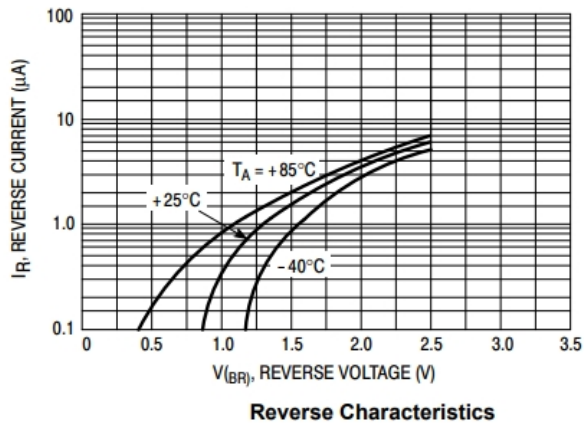


Characteristics Curves

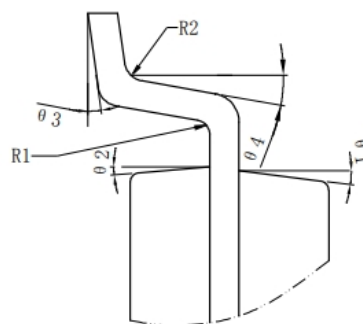
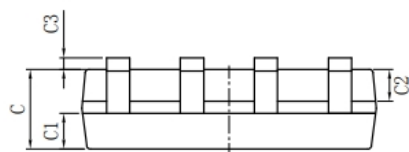
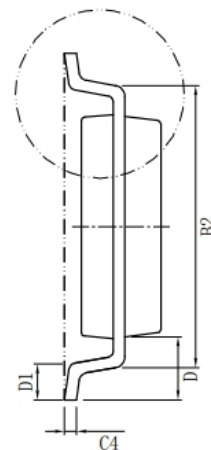
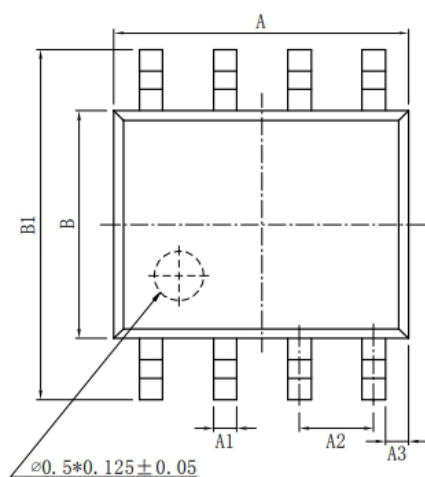
LM385-1.2/ADJ



LM385-2.5

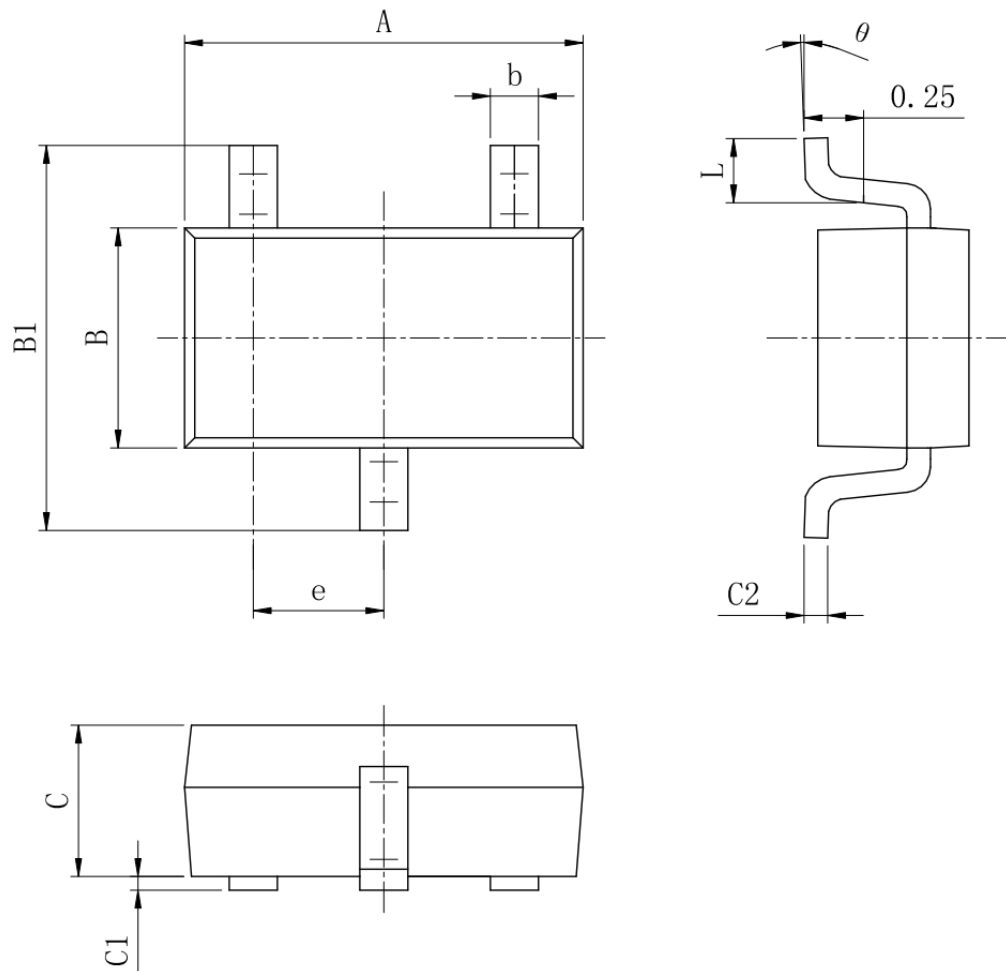


SOP-8 Package Outline Dimensions



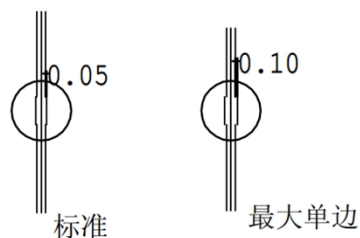
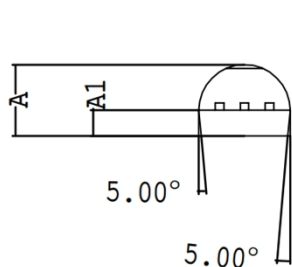
标注	尺寸	MIN (mm)	MAX (mm)	标注	尺寸	MIN (mm)	MAX (mm)
A		4.80	5.00	C3		0.05	0.20
A1		0.356	0.456	C4		0.203	0.233
A2		1.27TYP		D		1.05TYP	
A3		0.345TYP		D1		0.40	0.80
B		3.80	4.00	R1		0.20TYP	
B1		5.80	6.20	R2		0.20TYP	
B2		5.00TYP		$\theta 1$		17° TYP4	
C		1.30	1.60	$\theta 2$		13° TYP4	
C1		0.55	0.65	$\theta 3$		0° ~ 8°	
C2		0.55	0.65	$\theta 4$		4° ~ 12°	

SOT-23 Package Outline Dimensions

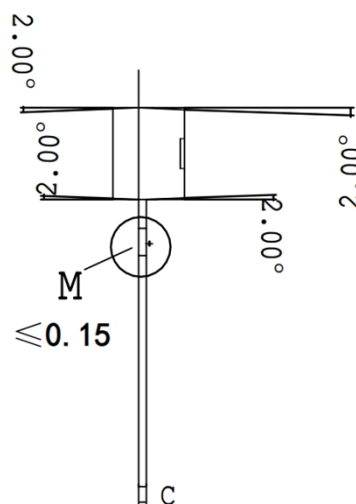
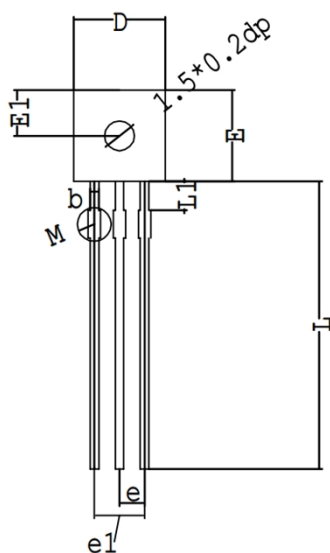


尺寸 标注	最小 (mm)	最大 (mm)	尺寸 标注	最小 (mm)	最大 (mm)
A	2.82	3.02	C	1.05	1.15
e	0.95 (BSC)		C1	0.03	0.15
b	0.28	0.45	C2	0.12	0.23
B	1.50	1.70	L	0.35	0.55
B1	2.60	3.00	θ	0°	8°

T092 Package Outline Dimensions



M(2:1)



COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER			
SYMBOL	MIN	NOM	MAX
A	3.40	3.50	3.60
A1	1.20	1.25	1.30
b	0.40	0.45	0.50
c	0.295	0.300	0.305
D	4.40	4.50	4.60
e	-	1.27TYP	-
e1	2.44	2.54	2.64
E	4.40	4.50	4.60
E1	2.20	2.30	2.40
L	14.0	14.5	15.0
L1	1.45	1.50	1.55