



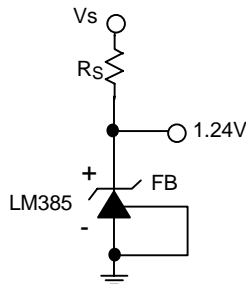
FEATURES

- Adjustable from 1.24V to 5.3V.
- Operating Current of 10 μ A to 20mA.
- Low Temperature Coefficient.
- 1% and 2% Initial Tolerance.
- Low Dynamic Impedance.

APPLICATIONS

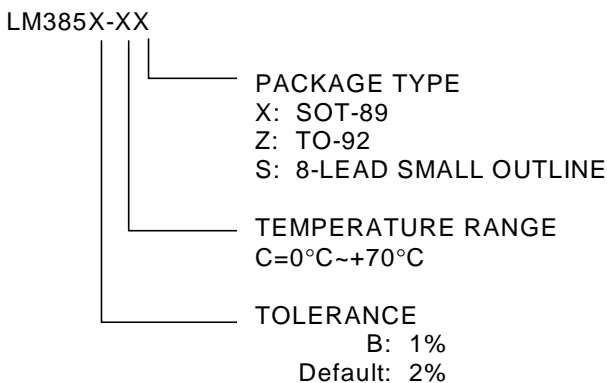
- Portable, Battery-Powered Equipment.
- Instrumentation.
- Process Control.
- Energy Management.
- Product Testing.
- Automotive.
- Precision Audio Components.

TYPICAL APPLICATION CIRCUITS



Precision 1.24V Voltage Reference

ORDERING INFORMATION



DESCRIPTION

The LM385 is micropower 3-terminal adjustable band-gap voltage reference diodes. Operating from 1.24V to 5.3V and over 10 μ A to 20mA current range. They feature exceptionally low dynamic impedance and good temperature stability. On-chip trimming is used to achieve tight voltage tolerance. Since the LM385 band-gap reference uses only transistors and resistors, low noise and good longterm stability result.

Careful design of the LM385 has made the device tolerant of capacitive loading, making it easy to use in almost any reference application. The wide dynamic operating range allows its use with widely varying supplies with excellent regulation.

The extremely low power drain of the LM385 makes it useful for micropower circuitry. This voltage reference can be used to make portable meters, regulators or general purpose analog circuitry with battery life approaching shelf life. Further, the wide operating current allows it to replace older references with a tighter tolerance part.

ORDER NUMBER	PIN CONFIGURATION
LM385B-CX LM385-CX (SOT-89)	FRONT VIEW 1: FB 2: - 3: +
LM385B-CZ LM385-CZ (TO-92)	TOP VIEW 1: FB 2: + 3: -
LM385B-CS LM385-CS (PLASTIC SO)	TOP VIEW NC 1 NC 2 NC 3 - 4 8 + 7 NC 6 NC 5 FB

**ABSOLUTE MAXIMUM RATINGS**

Reverse Current	30mA
Forward Current	10mA
Operating Temperature Range.	0°C to 70°C
Storage Temperature	-65°C to 150°C

Lead Temperature

TO-92 Package Soldering (10 seconds)	260°C
SO Package Vapor phase (60 seconds)	215°C

TEST CIRCUIT

Refer to TYPICAL APPLICATION CIRCUIT.

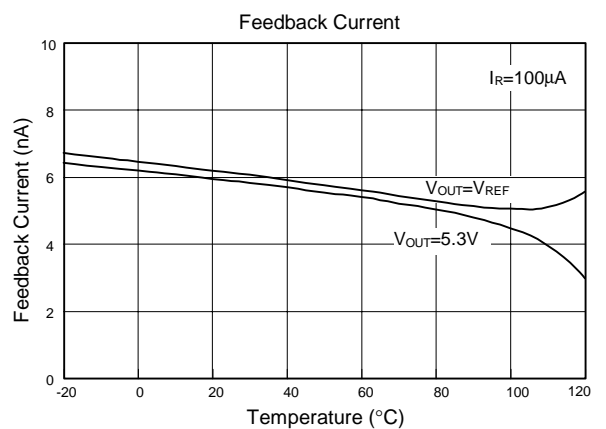
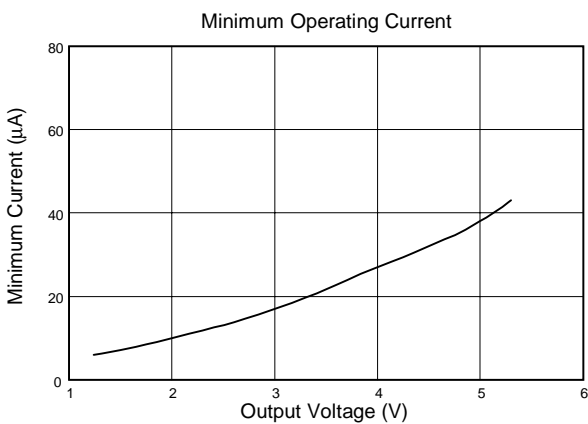
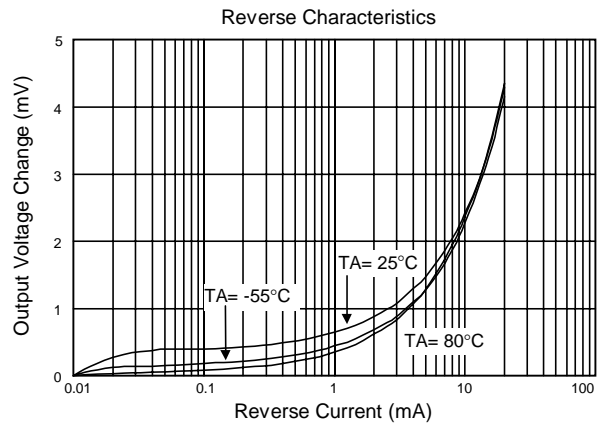
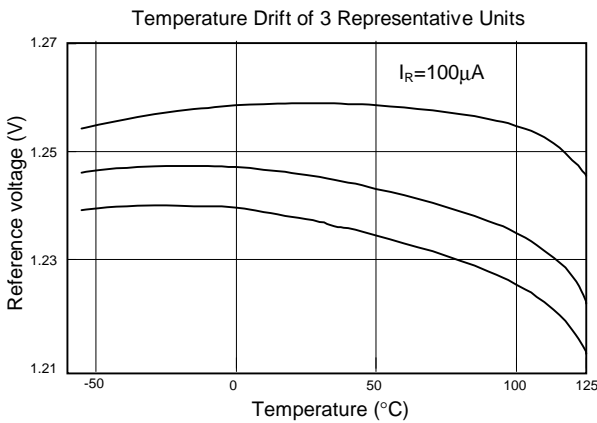
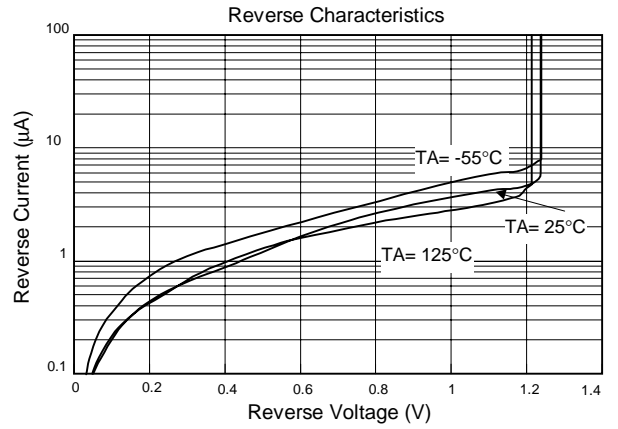
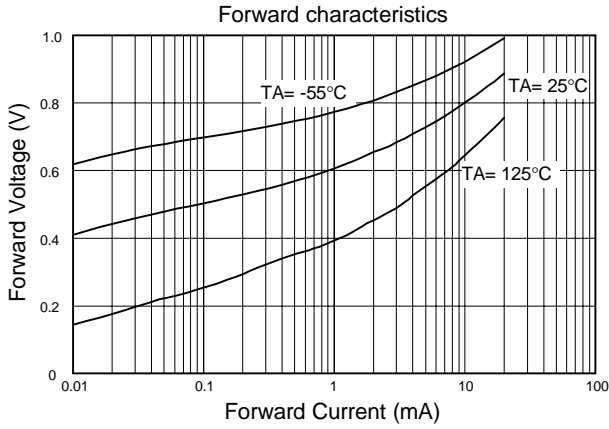
ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise specified.)

PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Reverse Voltage	$I_R=100\mu A$ LM385B LM385	V_R	1.228 1.215	1.240 1.240	1.252 1.265	V
Reverse Voltage Change with Current	$I_{RMIN} \leq I_R \leq 1mA$ $1mA \leq I_R \leq 20mA$	ΔV_R		0.2 5	1 15	mV
Minimum Operating Current	$V_{OUT}=1.24V$ $V_{OUT}=5.3V$	I_{RMIN}		7 35	11 55	μA
Dynamic Output Impedance	$I_R=100\mu A, f=100Hz$ $I_{AC}=0.1I_R, V_{OUT}=1.24V,$ $V_{OUT}=5.3V$	Z_R		0.4 1		Ω
Reference Voltage Change with Output Voltage	$I_R=100\mu A$			2	5	mV
Feedback Current		I_{FB}		8	20	nA
Output Wideband Noise	$I_R=100\mu A, 10Hz < f < 10KHz$ $V_{OUT}=1.24V,$ $V_{OUT}=5.3V$	e_N		50 170		μV_{RMS}
Average Temperature Coefficient (Note)	$I_R=100\mu A$	αV_R		100		ppm/°C
Long Term Stability	$I_R=100\mu A, T=1000Hrs,$ $T_A=25^\circ C \pm 0.1^\circ C$	$\Delta V_R/\Delta t$		20		ppm

Note : The average temperature coefficient is defined as the maximum deviation of reverse voltage at all measured temperatures from T_{MIN} to T_{MAX} , divided by $T_{MAX} - T_{MIN}$. The measured temperature are 0°C, 25°C, 50°C and 70°C.

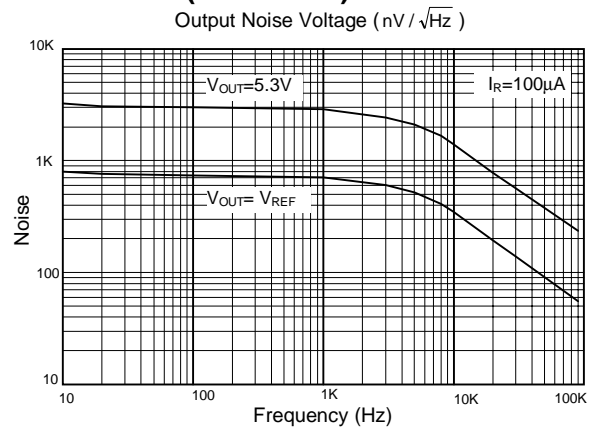
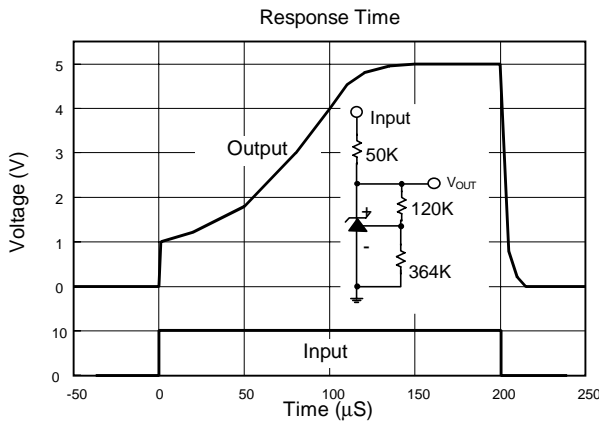


TYPICAL PERFORMANCE CHARACTERISTICS

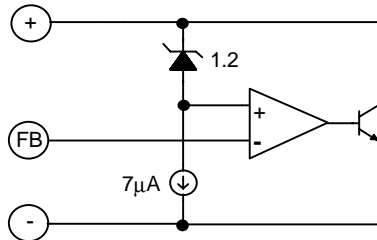




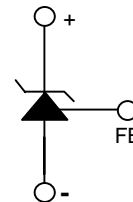
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



BLOCK DIAGRAM



SYMBOL



APPLICATION EXAMPLES

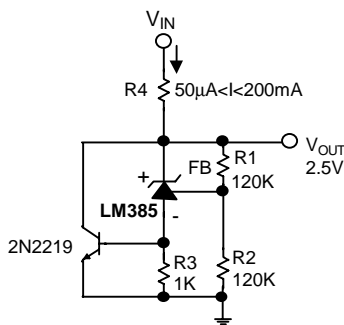


Fig. 1 200mA Shunt Regulator

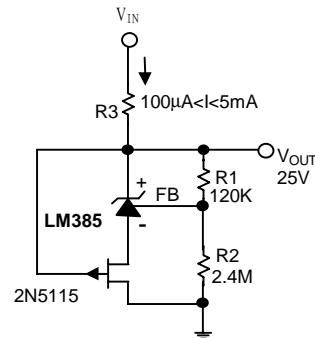


Fig. 2 25V Low Current Shunt Regulator

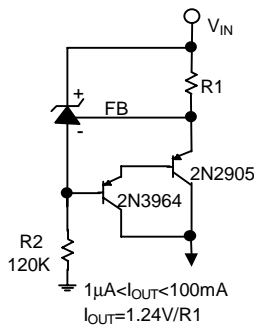


Fig. 3 Current Source

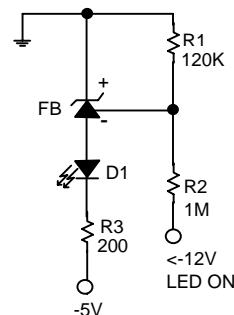


Fig. 4 Voltage Level Detector



■ APPLICATION EXAMPLES (Continued)

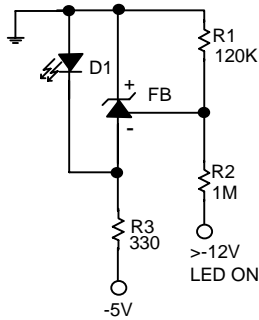


Fig. 5 Voltage Level Detector

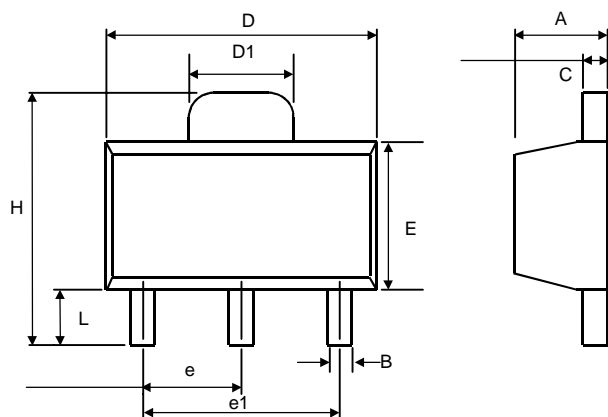
■ SOT-89 Marking

Part No.	Marking
LM385CX	AI01
LM385BCX	AIB01



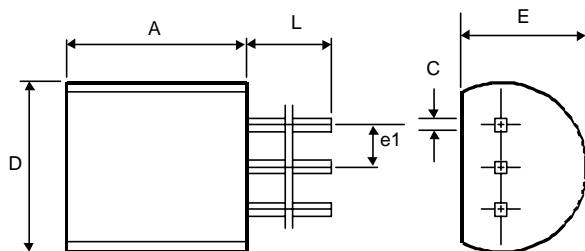
PHYSICAL DIMENSIONS

● SOT-89 (unit: mm)



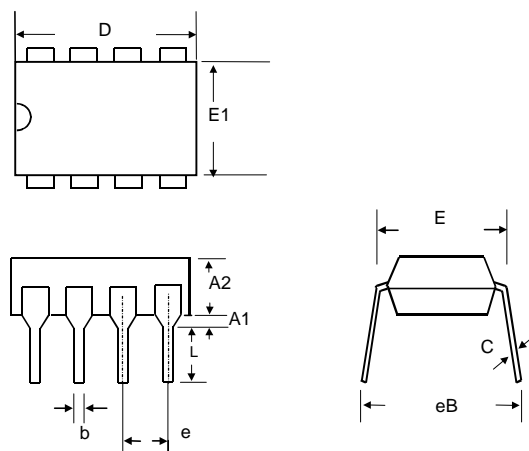
SYMBOL	MIN	MAX
A	1.40	1.60
B	0.36	0.48
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 (TYP.)	
e1	3.00 (TYP.)	
H	3.94	4.25
L	0.89	1.20

● TO-92 (unit: mm)



SYMBOL	MIN	MAX
A	4.32	5.33
C	0.38 (TYP.)	
D	4.40	5.20
E	3.17	4.20
e1	1.27 (TYP.)	
L	12.7	-

● 8 LEAD PLASTIC DIP (unit: mm)



SYMBOL	MIN	MAX
A1	0.381	—
A2	2.92	4.96
b	0.35	0.56
C	0.20	0.36
D	9.01	10.16
E	7.62	8.26
E1	6.09	7.12
e	2.54 (TYP.)	
eB	—	10.92
L	2.92	3.81