

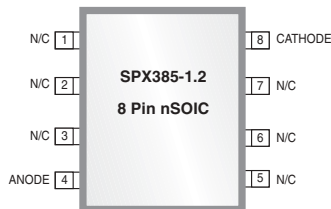
Micropower Voltage Reference

FEATURES

- Low Output Voltage 1.235V
- Dynamic Impedance.....1Ω max
- Low Temperature Coefficient.....30ppm/°C (typ)
- Operating Current..... 10μA to 20mA
- Extended Temperature Range .. -40°C to +85°C
- Initial Tolerance.....1% and 2%
- Pin Compatible with LM185/285/385, 1.23V

APPLICATIONS

- Portable Meter Reference
- Portable Test Instruments
- Battery Operated Systems
- Panel Meters



Now Available in Lead Free Packaging

DESCRIPTION

The SPX385-1.2 is a micropower 2-terminal band-gap voltage reference with a very wide operating current range from 10μA to 20mA that provides a stable voltage. The high stability of this device is primarily the result of the low temperature coefficient Thin Film Resistor process and Laser Trimming of the output voltage at the wafer level.

The SPX385-1.2 is available in a TO-92, SOIC-8 and SOT-89 package with an operating temperature range of -40°C to 85°C. A 2.5 and 5.0 volt devices are also available - SPX385-2.5, SPX385-5.0.

BLOCK DIAGRAM

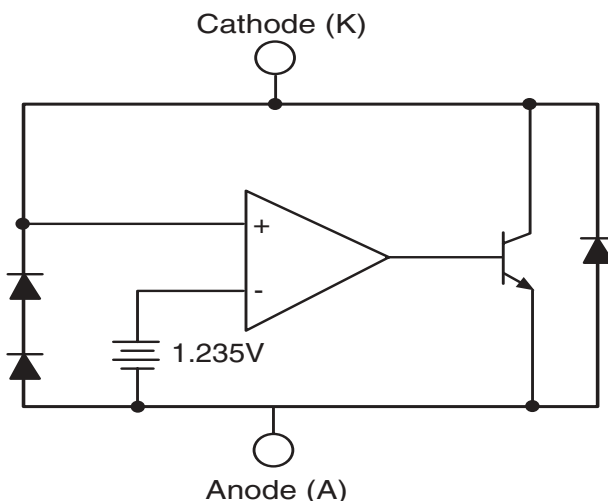


Figure 1: Block Diagram

Reverse Current (I_{KA})	30mA
Forward Current (I_{AK})	10mA
Operating Temperature Range (T_A)	-40 to +85°C
Continuous Power Dissipation at 25°C (P_D)	
TO-92	775mW
SOIC-8	750mW
SOT-89	1000mW
Junction Temperature (T_J)	150°C
Storage Temperature (T_{STG})	- 65 to 150°C
Lead Temperature (Soldering 10 sec.), T_L	300°C

PACKAGE	θ_{JA}	θ_{JA}	TYPICAL DERATING
TO-92	160°C/W	80°C/W	6.3 mW/°C
SOIC-8	175°C/W	45°C/W	5.7mW/°C
SOT-89	110°C/W	8°C/W	9.1mW/°C

PARAMETER	CONDITIONS	SPX385A-1.2			SPX385-1.2			UNIT
		MIN.	TYP.	MAX	MIN.	TYP.	MAX.	
Reference Voltage		1.223	1.235	1.247	1.205	1.235	1.260	V
Dynamic Output Impedance	F = 20Hz I _R = 100μA		0.6	1.0		0.6	1.0	Ω
Reference Voltage Change with I _R	10μA ≤ I _R ≤ 20mA		10	20		10	20	mV
Temperature Coefficient	Note 1		30	50		30	50	ppm/°C
Minimum Operating Current			8	10		8	10	μA
Output Wideband Noise	10Hz ≤ f ≤ 10kHz		60			60		μVrms
Operating Temperature		-40		+85	-40		+85	°C

0.033 mV/°C

0.0027 %/°C

27 ppm/°C

2

TYPICAL PERFORMANCE CHARACTERISTICS

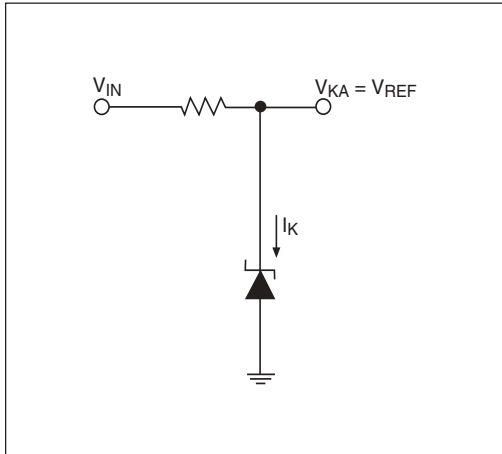


Figure 3. Test Circuit for $V_{KA} = V_{REF}$

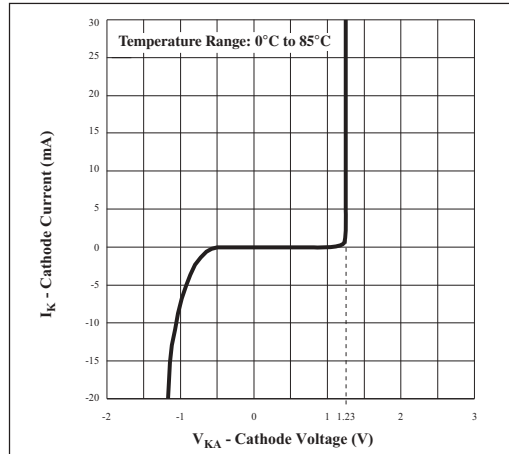


Figure 4. High Current Operating Characteristics

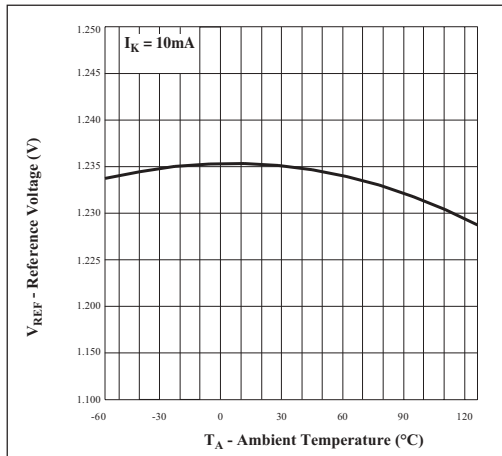


Figure 5. Reference Voltage vs. Ambient Temperature

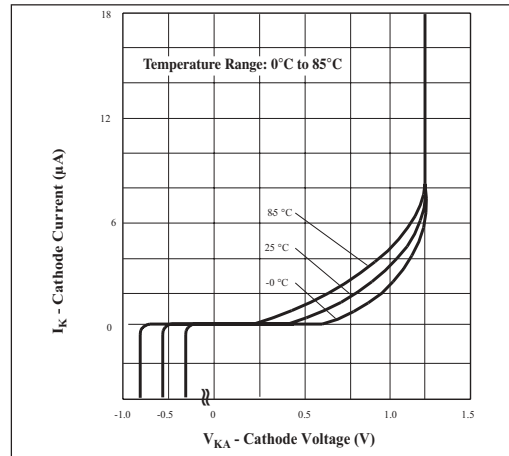


Figure 6. Low Current Operating Characteristics

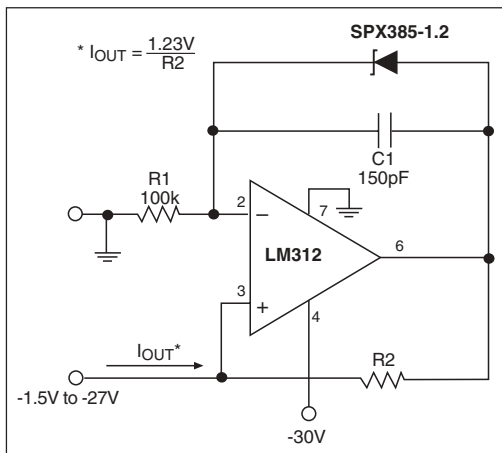


Figure 7a. Precision $1\mu\text{A}$ to 1mA Current Sink

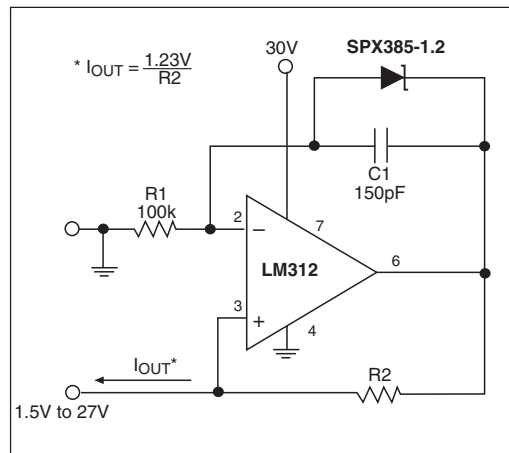


Figure 7b. Precision $1\mu\text{A}$ to 1mA Current Source

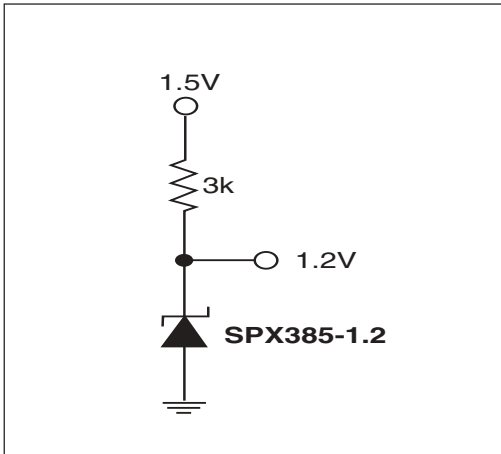


Figure 8. Reference from 1.5V Battery

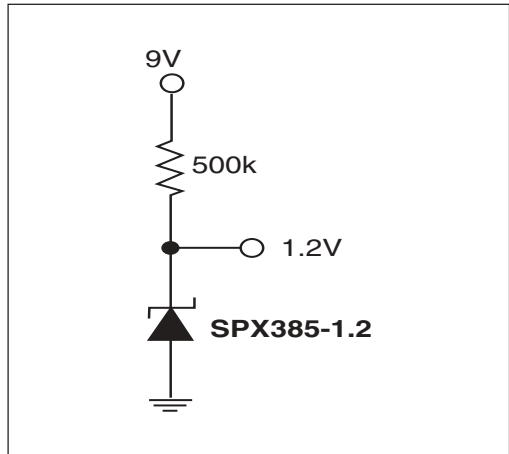


Figure 9. Micropower Reference from 9V Battery

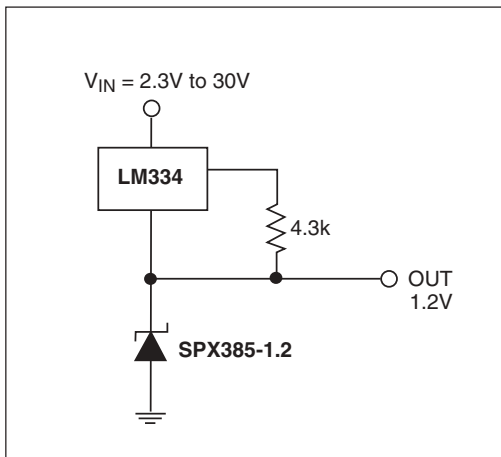


Figure 10. Wide Input Range Reference

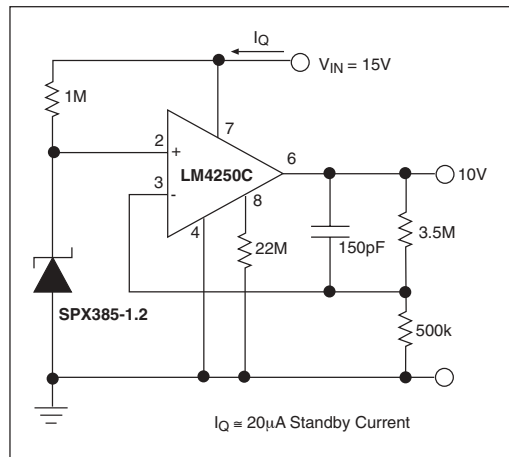
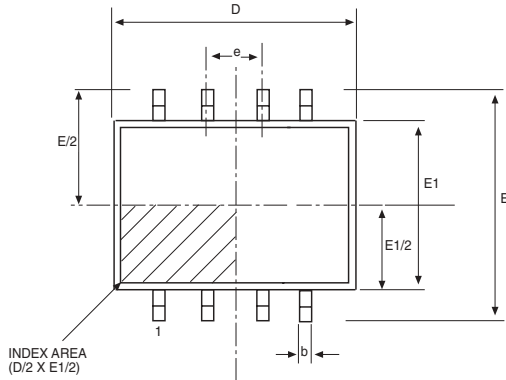
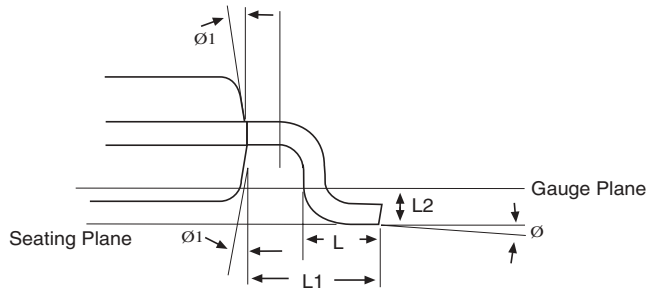
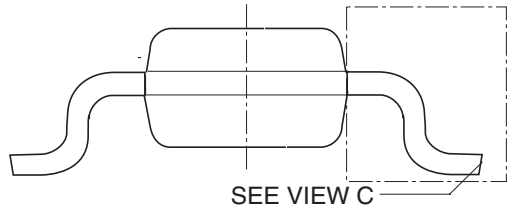


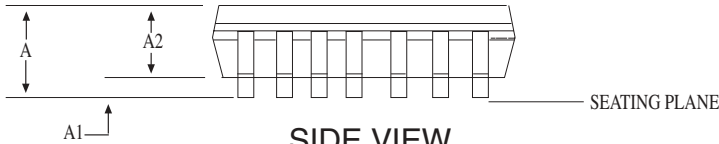
Figure 11. Precision Micropower 10V Reference



TOP VIEW

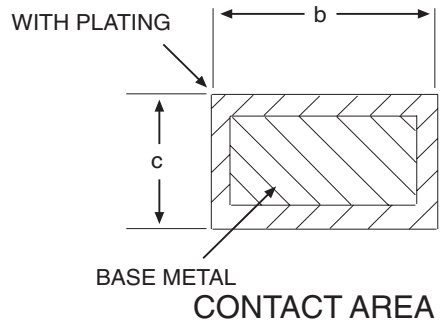


VIEW C

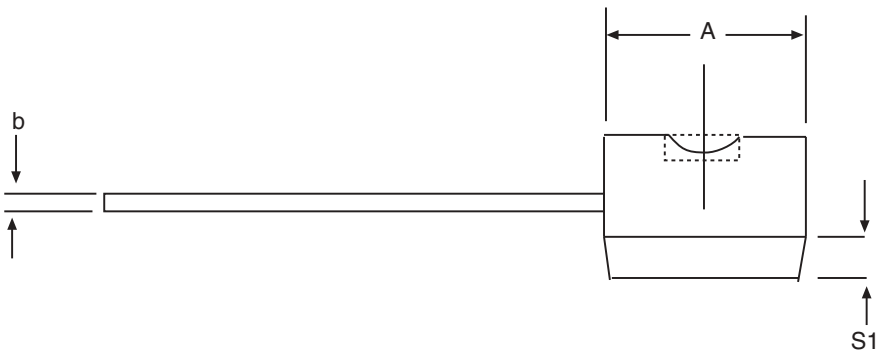
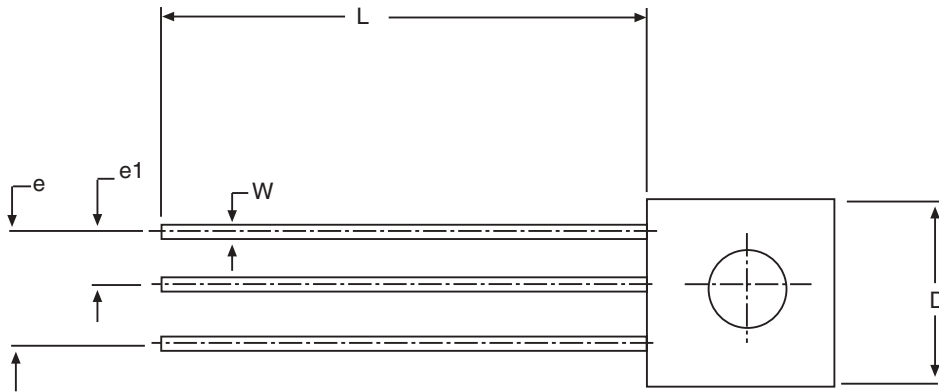


SIDE VIEW

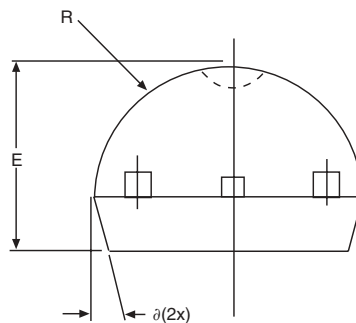
8 Pin NSOIC (JEDEC MS-012, AA - VARIATION)	DIMENSIONS Minimum/Maximum (mm)		
COMMON HEIGHT DIMENSION			
SYMBOL	MIN	NOM	MAX
A	1.35	-	1.75
A1	0.10	-	0.25
A2	1.25	-	1.65
b	0.31	-	0.51
c	0.17	-	0.25
D	4.90 BSC		
E	6.00 BSC		
E1	3.90 BSC		
e	1.27 BSC		
L	0.40	-	1.27
L1	1.04 REF		
L2	0.25 BSC		
Ø	0°	-	8°
Ø1	5°	-	15°



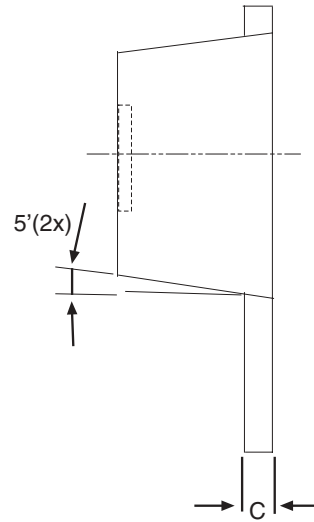
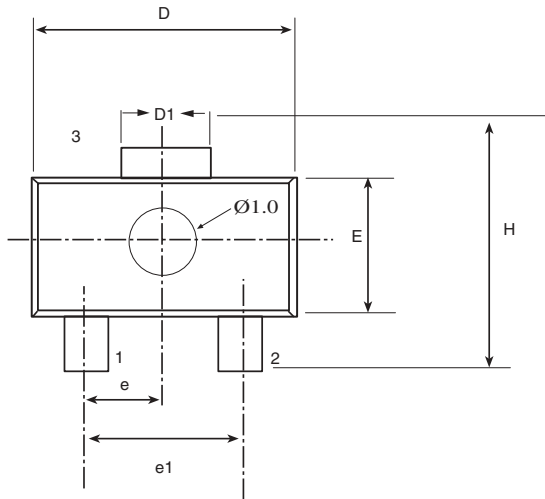
8 PIN NSOIC



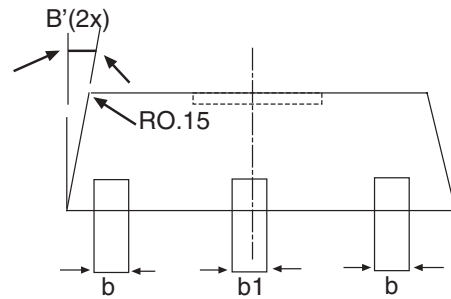
3 PIN TO-92 CARSEM DWG # TLG920001		DIMENSIONS Minimum/Maximum (mm)		
COMMON HEIGHT DIMENSION				
SYMBOL	MIN	NOM	MAX	
A	4.32	-	4.95	
b	0.36	-	0.51	
E	3.30	-	3.94	
e	2.41	-	2.67	
e1	1.14	-	1.40	
L	12.70	-	15.49	
R	2.16	-	2.41	
S1	1.14	-	1.52	
W	0.41	-	0.56	
D	4.45	-	4.95	
θ	4°	-	6°	



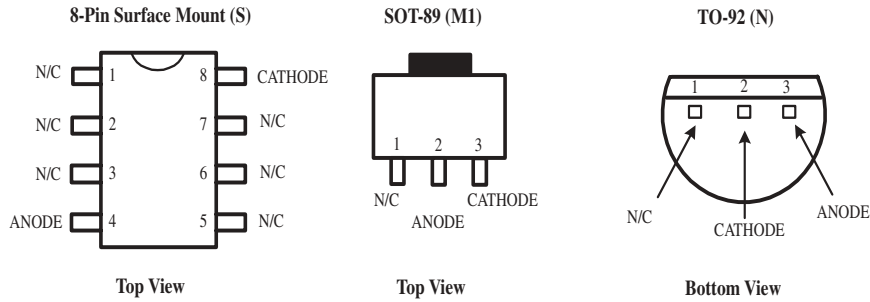
3 PIN TO-92



3 PIN SOT-89 LINGSSEN # PO-SOT-004	Dimensions in (mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
b	0.36	0.42	0.48
b1	0.41	0.47	0.53
C	0.38	0.40	0.43
D	4.40	4.50	4.60
D1	1.40	1.60	1.75
E	2.40	2.50	2.60
e	1.45	1.50	1.55
e1	2.90	3.00	3.10
H	3.94	-	4.25
L	0.80	-	1.20



3 PIN SOT-89



ORDERING INFORMATION

Part Number	Accuracy	Output Voltage	Package Type
SPX385AM1-1.2	1.0%	1.235V	3-Pin SOT-89
SPX385AM1-1.2/TR	1.0%	1.235V	3-Pin SOT-89
SPX385AS-1.2	1.0%	1.235V	8-Pin NSOIC
SPX385AS-1.2/TR	1.0%	1.235V	8-Pin NSOIC
SPX385AN-1.2	1.0%	1.235V	3-Pin TO-92
SPX385AN-1.2/TR	1.0%	1.235V	3-Pin TO-92
SPX385M1-1.2	2.0%	1.235V	3-Pin SOT-89
SPX385M1-1.2/TR	2.0%	1.235V	3-Pin SOT-89
SPX385S-1.2	2.0%	1.235V	8-Pin NSOIC
SPX385S-1.2/TR	2.0%	1.235V	8-Pin NSOIC
SPX385N-1.2	2.0%	1.235V	3-Pin TO-92
SPX385N-1.2/TR	2.0%	1.235V	3-Pin TO-92

Available in lead free packaging. To order add "-L" suffix to part number.

Example: SPX385S-1.2/TR = standard; SPX385S-L-1.2/TR = lead free

/TR = Tape and Reel

Pack quantity is 2000 for TO-92; 2500 for NSOIC and SOT-89.



ANALOG EXCELLENCE

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