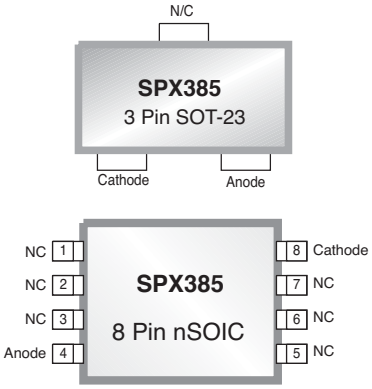
5V Micropower Voltage Reference

FEATURES

- Trimmed Bandgap 1%
- Wide Operating Current ..... 50μA to 20mA
- Extended Temperature Range ... -40°C to +85°C
- Dynamic Impedance ..... 1Ω max
- Offered in Small SOT-23, TO-92, NSOIC, and SOT-89
- Low Cost Solution



Now Available in Lead Free Packaging

APPLICATIONS

- Battery Operated Equipment
- Adjustable Supplies
- Switching Power Supplies
- Error Amplifiers
- Single Supply Amplifier
- Monitors / VCR / TV
- Personal Computers
- Power use meter

DESCRIPTION

The SPX385-5.0 is a micropower 2-terminal band-gap voltage reference with a very wide operating current range from 50μA to 20mA that provides a stable voltage.

The SPX385-5.0 is available in SOT-23, TO-92, NSOIC, and SOT-89 packages with an operating temperature range of -40°C to 85°C. A 1.2 and 2.5 volt device are also available - SPX385-1.2, SPX385-2.5.

BLOCK DIAGRAM

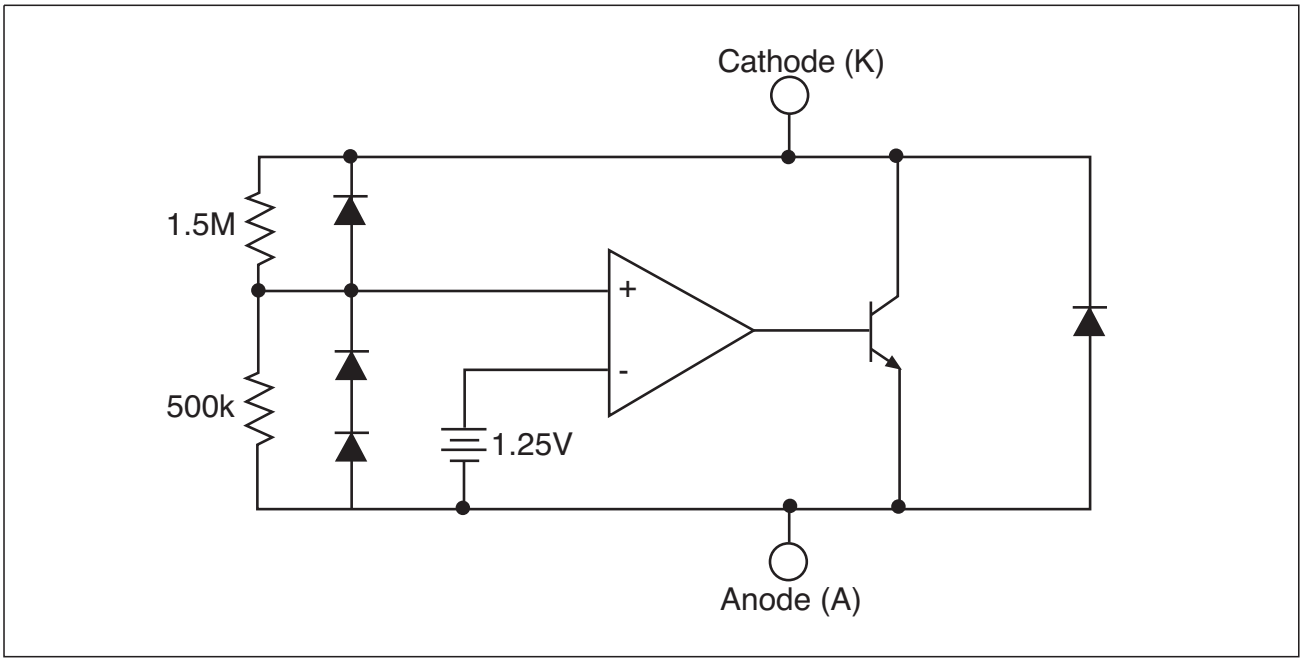


Figure 1: Block Diagram

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ABSOLUTE MAXIMUM RATINGS

Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Reverse Current (I_{KA}) 30mA
Forward Current (I_{AK}) 10mA
Operating Temperature Range (T_A) ..... -40 to +85°C
Junction Temperature (T_J) ..... 150°C
Storage Temperature (T_{STG}) ..... - 65 to 150°C
Lead Temperature (Soldering 10 sec.), T_L ..... 300°C

ELECTRICAL CHARACTERISTICS

I_{IN} = 100µA, T_A = 25°C, unless otherwise specified. The ♦ denotes the specifications which apply over the full operating temperature range.

PARAMETER	MIN.	TYP.	MAX		UNIT	CONDITIONS
Reference Voltage	4.90 4.95	5.00 5.00	5.10 5.05	♦	V	2% 1%
Dynamic Output Impedance		0.6	1.0	♦ ♦	Ω	F = 20Hz I_R = 100µA
Reference Voltage Change with I_R.		10	20	♦	mV	20µA ≤ I_R ≤ 20mA
Temperature Coefficient		30	50	♦	ppm/°C	Note 1
Minimum Operating Current	30		50	♦	µA	
Output Wideband Noise		120		♦	µVrms	10Hz ≤ f ≤ 10kHz
Long Term Stability		60		♦	ppm	T=1000Hr; T_A = 25°C ±0.1°C
Operating Temperature	-40		+85		°C	

Note 1. Three-point measurement guarantees the error band over the specified temperature range.

*CALCULATING AVERAGE TEMPERATURE COEFFICIENT (TC)

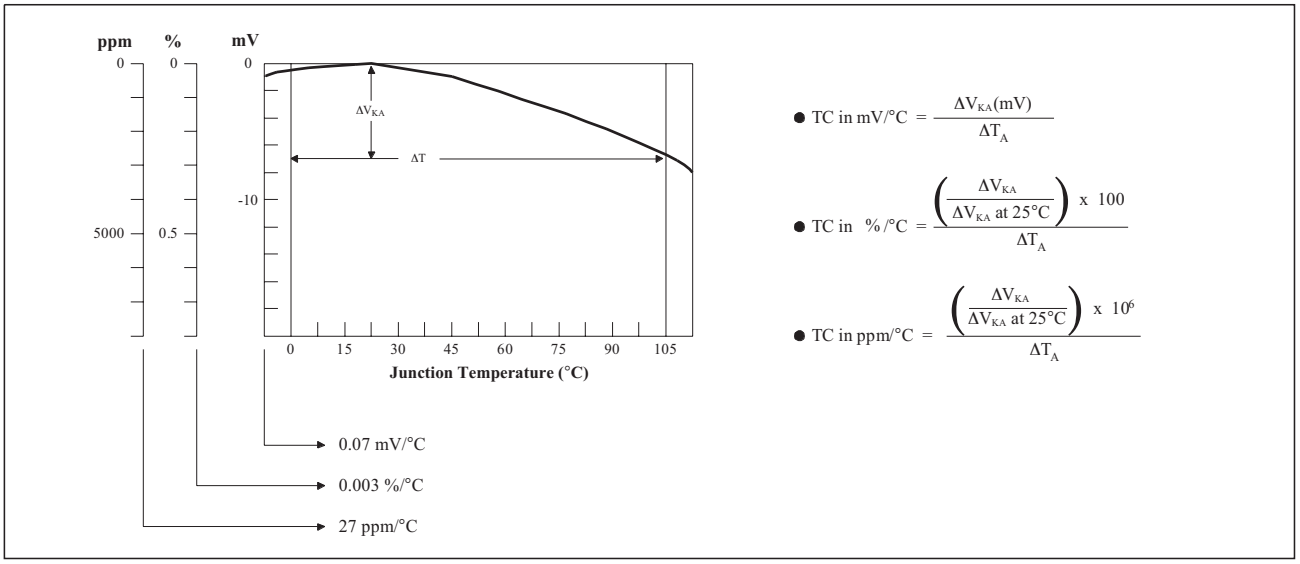

Figure 2. V_{KA} vs. Temperature

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TYPICAL PERFORMANCE CHARACTERISTICS

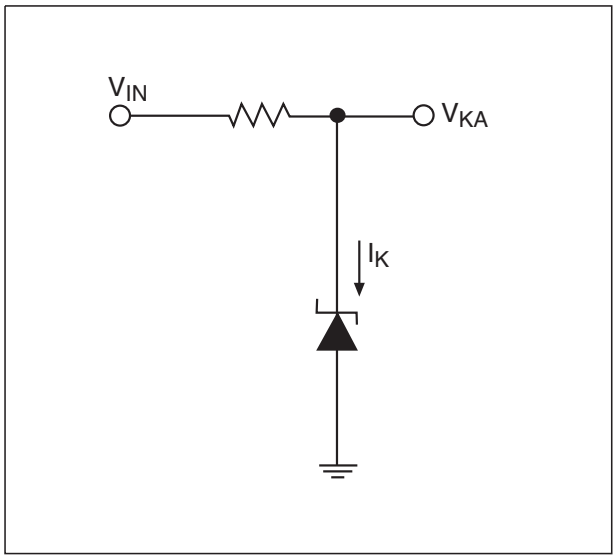

Figure 1. Improving Regulation of Adjustable Regulators

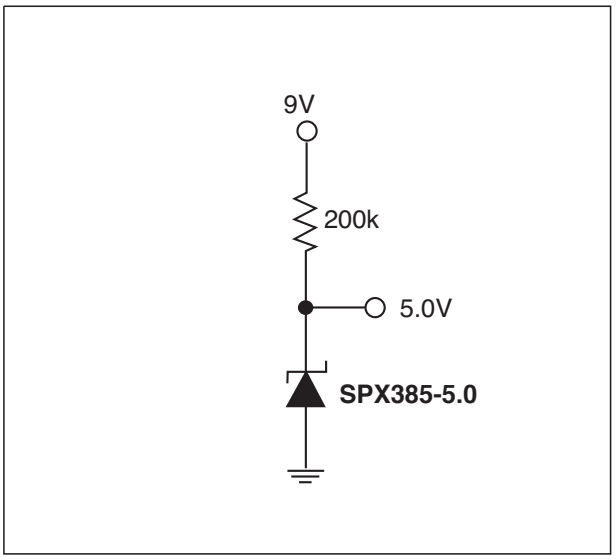

Figure 2. Micropower Reference from 9V Battery

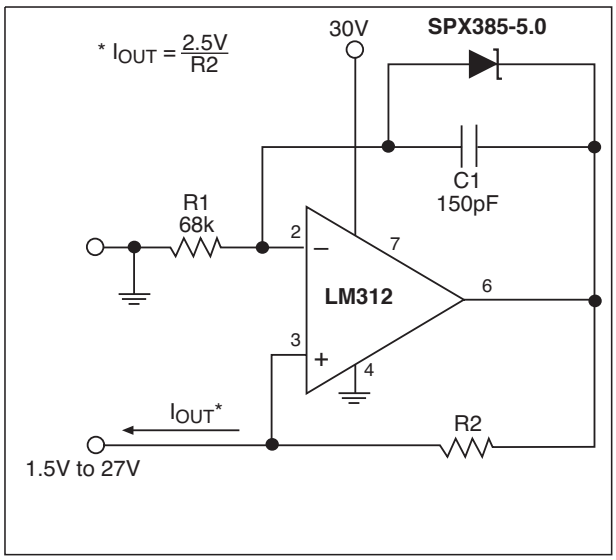

Figure 3. Precision 1μA to 1mA Current Source

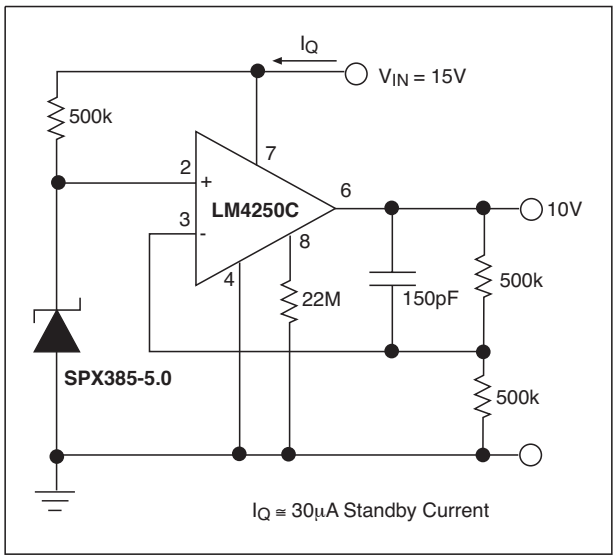

Figure 4: Precision Micropower 10V Reference

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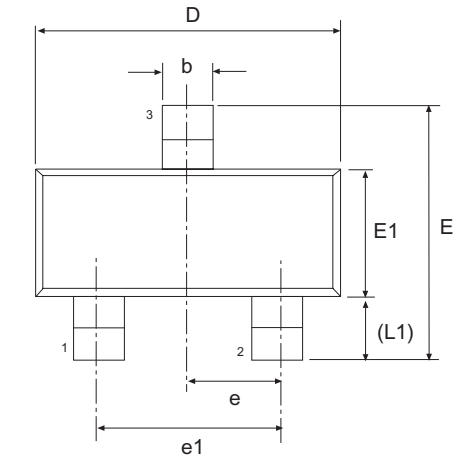
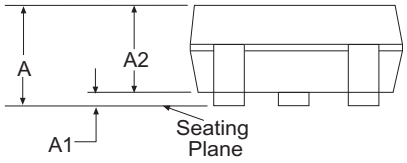
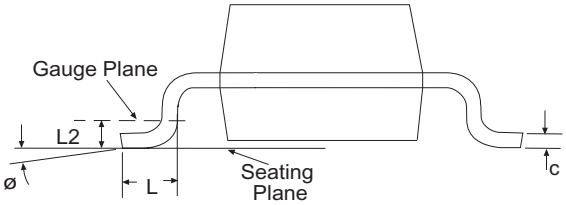


TOP VIEW

SIDE VIEW



FRONT VIEW



3 Pin SOT-23 JEDEC TO-236 Variation AB						
SYMBOL	Dimensions in Millimeters: Controlling Dimension			Dimensions in Inches Conversion Factor: 1 Inch = 25.40 mm		
	MIN	NOM	MAX	MIN	NOM	MAX
b	0.30	-	0.50	0.012	-	0.020
c	0.08	-	0.20	0.003	-	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	2.10	-	2.64	0.083	-	0.104
E1	1.20	1.30	1.40	0.047	0.051	0.055
e	0.95 BSC			0.038 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.40	0.50	0.60	0.016	0.020	0.024
L1	0.54 REF			0.021 REF		
L2	0.25 BSC			0.010 BSC		
Ø	0º	-	8º	0º	-	8º
A	0.89	-	1.12	0.035	-	0.044
A1	0.01	-	0.10	0.000	-	0.004
A2	0.88	0.95	1.02	0.035	0.037	0.040
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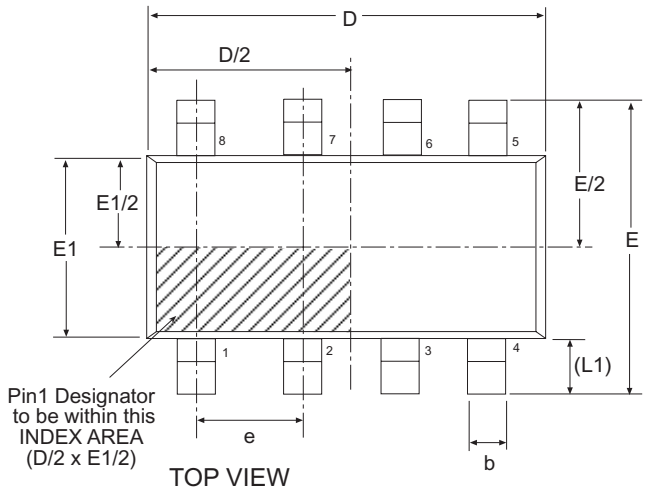

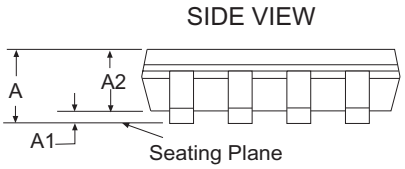

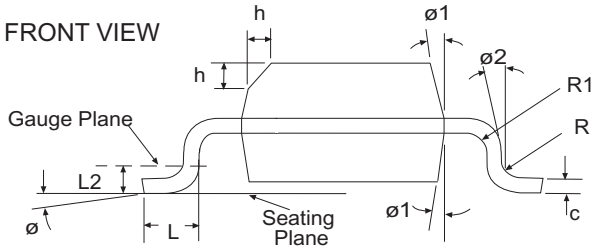

8 Pin NSOIC	JEDEC MS-012	Variation AA				
SYMBOL	Dimensions in Millimeters: Controlling Dimension			Dimensions in Inches Conversion Factor: 1 Inch = 25.40 mm		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.35	-	1.75	0.053	-	0.069
A1	0.10	-	0.25	0.004	-	0.010
A2	1.25	-	1.65	0.049	-	0.065
b	0.31	-	0.51	0.012	-	0.020
c	0.17	-	0.25	0.007	-	0.010
E	6.00 BSC			0.236 BSC		
E1	3.90 BSC			0.154 BSC		
e	1.27 BSC			0.050 BSC		
h	0.25		0.50	0.010	-	0.020
L	0.40	-	1.27	0.016	-	0.050
L1	1.04 REF			0.041 REF		
L2	0.25 BSC			0.010 BSC		
R	0.07	-	-	0.003	-	-
R1	0.07	-	-	0.003	-	-
ø	0º	-	8º	0º	-	8º
ø1	5º	-	15º	5º	-	15º
ø2	0º	-	-	0º	-	-
D	4.90 BSC			0.193 BSC		
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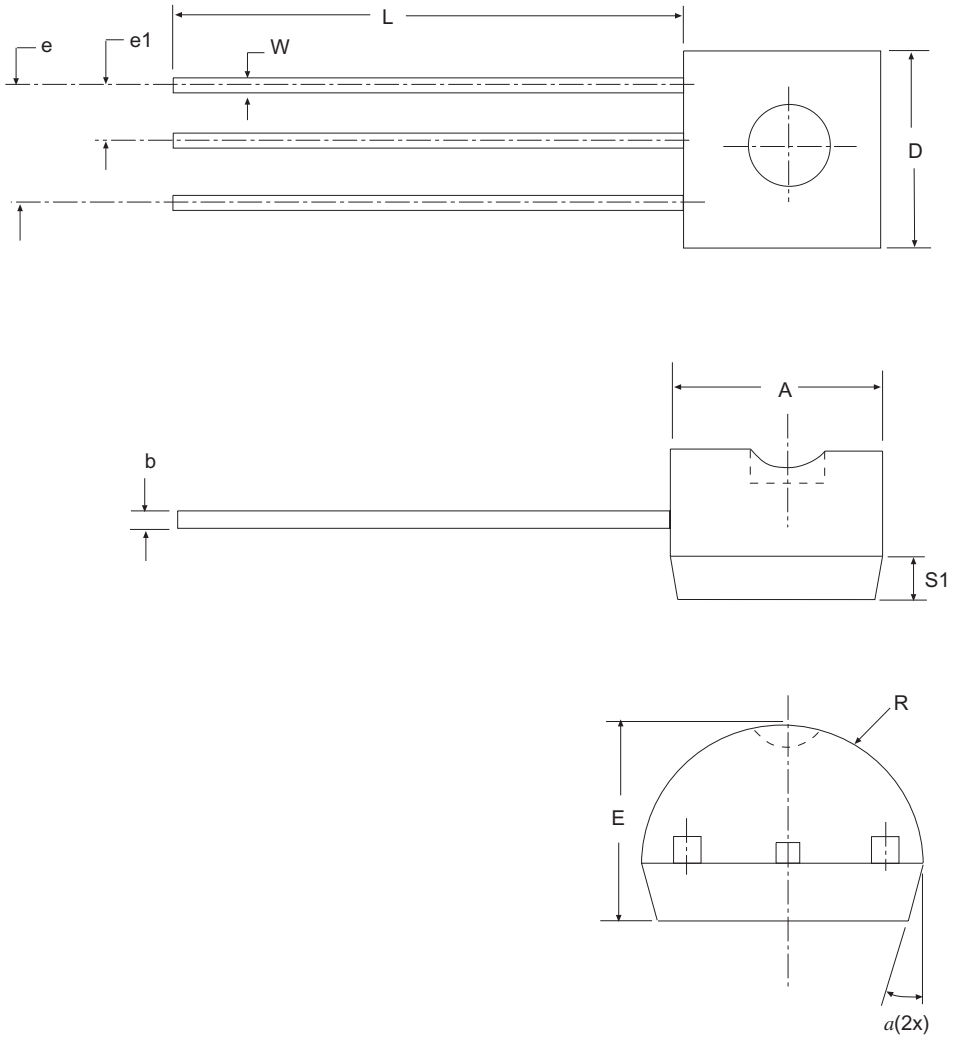

3 Pin TO-92						
SYMBOL	Dimensions in Inches: Controlling Dimension			Dimensions in Millimeters Conversion Factor: 1 Inch = 25.40 mm		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.170	-	0.195	4.32	-	4.95
b	0.014	-	0.020	0.36	-	0.51
E	0.130	-	0.155	3.30	-	3.94
e	0.095	-	0.105	2.41	-	2.67
e1	0.045	-	0.055	1.14	-	1.40
L	0.500	-	0.610	12.70	-	15.49
R	0.085	-	0.095	2.16	-	2.41
S1	0.045	-	0.060	1.14	-	1.52
W	0.016	-	0.022	0.41	-	0.56
D	0.175	-	0.195	4.45	-	4.95
α	4°	-	6°	4°	-	6°
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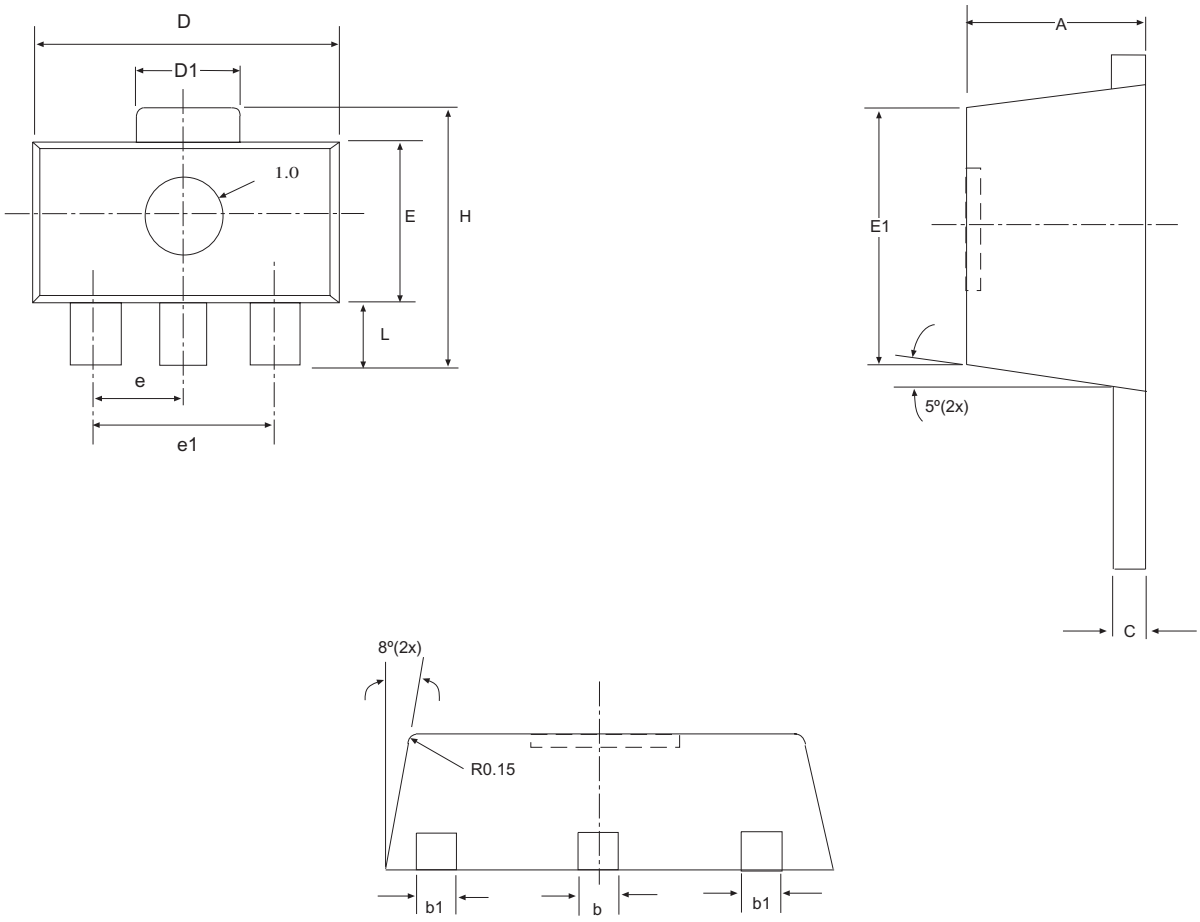

3 Pin SOT-89	JEDEC TO-243			Variation AA		
SYMBOL	Dimensions in Millimeters: Controlling Dimension			Dimensions in Inches Conversion Factor: 1 Inch = 25.40 mm		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.40	-	1.60	0.055	-	0.063
B	0.44	-	0.56	0.017	-	0.022
B1	0.36	-	0.48	0.014	-	0.019
C	0.35	-	0.44	0.014	-	0.017
D	4.40	-	4.60	0.173	-	0.181
D1	1.62	-	1.83	0.064	-	0.072
E	2.29	-	2.60	0.090	-	0.102
E1	2.13	-	2.29	0.084	-	0.090
e	1.50 BSC			0.059 BSC		
e1	3.00 BSC			0.118 BSC		
H	3.94	-	4.25	0.155	-	0.167
L	0.89	-	1.20	0.035	-	0.047
SIPEX Pkg Signoff Date/Rev:				JL Feb2-06/ RevA		

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ORDERING INFORMATION

Part Number	Accuracy	Output Voltage	Package Type
SPX385AM-5-0	1.0%	5.0V	3 Pin SOT-23
SPX385AM-5-0/TR	1.0%	5.0V	3 Pin SOT-23
SPX385AM1-5-0	1.0%	5.0V	3 Pin SOT-89
SPX385AM1-5-0/TR	1.0%	5.0V	3 Pin SOT-89
SPX385AN-5-0	1.0%	5.0V	3 Pin TO-92
SPX385AN-5-0/TR	1.0%	5.0V	3 Pin TO-92
SPX385AS-5-0	1.0%	5.0V	8 Pin NSOIC
SPX385AS-5-0/TR	1.0%	5.0V	8 Pin NSOIC
SPX385BM-5-0	2.0%	5.0V	3 Pin SOT-23
SPX385BM-5-0/TR	2.0%	5.0V	3 Pin SOT-23
SPX385BM1-5-0	2.0%	5.0V	3 Pin SOT-89
SPX385BM1-5-0/TR	2.0%	5.0V	3 Pin SOT-89
SPX385BN-5-0	2.0%	5.0V	3 Pin TO-92
SPX385BN-5-0/TR	2.0%	5.0V	3 Pin TO-92
SPX385BS-5-0	2.0%	5.0V	8 Pin NSOIC
SPX385BS-5-0/TR	2.0%	5.0V	8 Pin NSOIC
SPX385M-5-0	2.0%	5.0V	3 Pin SOT-23
SPX385M-5-0/TR	2.0%	5.0V	3 Pin SOT-23
SPX385N-5-0	2.0%	5.0V	3 Pin TO-92
SPX385N-5-0/TR	2.0%	5.0V	3 Pin TO-92
SPX385S-5-0	2.0%	5.0V	8 Pin NSOIC
SPX385S-5-0/TR	2.0%	5.0V	8 Pin NSOIC

Available in lead free packaging. To order add “-L” suffix to part number.
Example: SPX385BS-5-0/TR = standard; SPX385BS-L-5-0/TR = lead free

/TR = Tape and Reel
Pack quantity is 2,000 for TO-92 and 2,500 NSOIC, SOT-23, SOT-89.

ANALOG EXCELLENCE

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