6.9V Precision Voltage Reference

FEATURES

- *Guaranteed* 10ppm/°C Temperature Coefficient
- *Guaranteed* 1Ω Maximum Dynamic Impedance
- *Guaranteed* 20µV Maximum Wideband Noise
- Wide Operating Current Range: 0.6mA to 15mA

APPLICATIONS

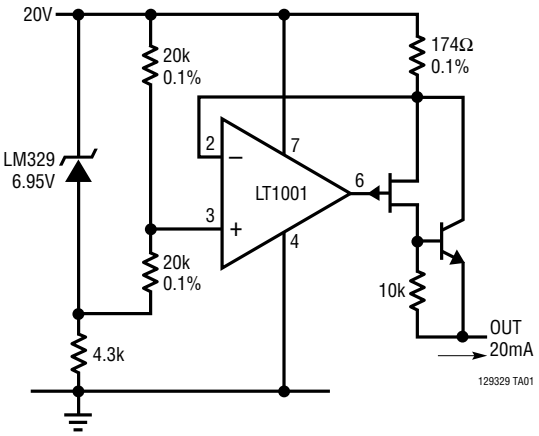
- Transducers
- A/D and D/A Converters
- Calibration Standards
- Instrumentation Reference

DESCRIPTION

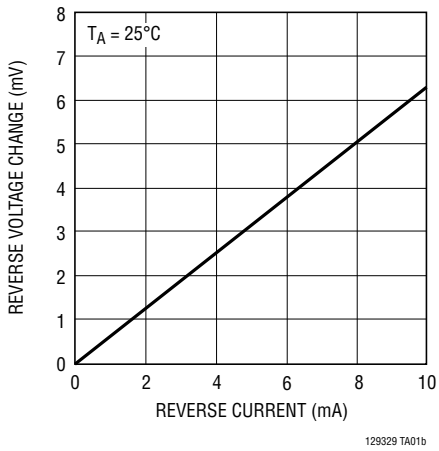
The LM®329 temperature compensated 6.9V Zener references provide excellent stability over time and temperature, very low dynamic impedance and a wide operating current range. The device achieves low dynamic impedance by incorporating a high gain shunt regulator around the Zener. The excellent noise performance of the device is achieved by using a "buried Zener" design which eliminates surface noise phenomenon associated with ordinary Zeners. To serve a wide variety of applications, the LM129 is available in several temperature coefficient grades and two package styles. A 20mA positive current source application is shown below.

TYPICAL APPLICATION

20mA Positive Current Source



Reverse Voltage Change



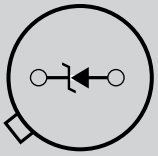
ABSOLUTE MAXIMUM RATINGS (Note 1)

Operating Temperature Range
LM129 (OBSOLETE) ..... –55°C to 125°C
LM329 ..... 0°C to 70°C
Storage Temperature Range..... –65°C to 150°C

Lead Temperature (Soldering, 10 sec) ..... 300°C
Reverse-Breakdown Current 30mA
Forward Current.....2mA

PIN CONFIGURATION

BOTTOM VIEW

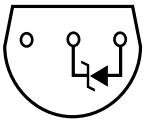


H PACKAGE
2-LEAD TO-46 METAL CAN

T_{JMAX} = 150°C,
θ_{JA} = 440°C/W, θ_{JC} = 80°C/W

OBSOLETE PACKAGE
Consider the Z Package for Alternate Source

BOTTOM VIEW



Z PACKAGE
3-LEAD PLASTIC TO-92

T_{JMAX} = 150°C, θ_{JA} = 160°C/W

ORDER INFORMATION

LEAD FREE FINISH	TAPE AND REEL	PART MARKING	PACKAGE DESCRIPTION	TEMPERATURE RANGE
LM129AH#PBF	LM129AH#TRPBF	LM129AH	2-Lead Plastic TO-46 Metal Can	–55°C to 125°C
LM129BH#PBF	LM129BH#TRPBF	LM129BH	2-Lead Plastic TO-46 Metal Can	–55°C to 125°C
LM129CH#PBF	LM129CH#TRPBF	LM129CH	2-Lead Plastic TO-46 Metal Can	–55°C to 125°C
LM329AH#PBF	LM329AH#TRPBF	LM329AH	2-Lead Plastic TO-46 Metal Can	0°C to 70°C
LM329BH#PBF	LM329BH#TRPBF	LM329BH	2-Lead Plastic TO-46 Metal Can	0°C to 70°C
LM329CH#PBF	LM329CH#TRPBF	LM329CH	2-Lead Plastic TO-46 Metal Can	0°C to 70°C
LM329DH#PBF	LM329DH#TRPBF	LM329DH	2-Lead Plastic TO-46 Metal Can	0°C to 70°C
LM329AZ#PBF	LM329AZ#TRPBF	LM329BZ	3-Lead Plastic TO-92	0°C to 70°C
LM329BZ#PBF	LM329BZ#TRPBF	LM329BZ	3-Lead Plastic TO-92	0°C to 70°C
LM329CZ#PBF	LM329CZ#TRPBF	LM329BZ	3-Lead Plastic TO-92	0°C to 70°C
LM329DZ#PBF	LM329DZ#TRPBF	LM329BZ	3-Lead Plastic TO-92	0°C to 70°C

Consult LTC Marketing for parts specified with wider operating temperature ranges.
Consult LTC Marketing for information on non-standard lead based finish parts.

For more information on lead free part marking, go to: http://www.linear.com/leadfree/
For more information on tape and reel specifications, go to: http://www.linear.com/tapeandreel/

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. (Note 2)

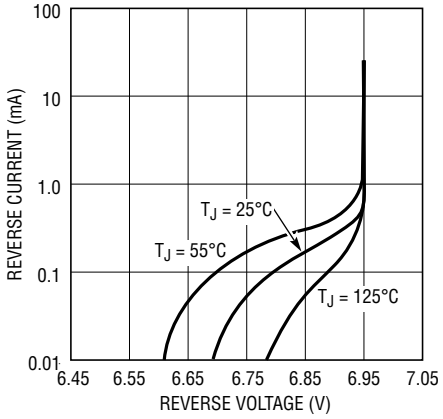
SYMBOL	PARAMETER	CONDITIONS		LM129A/ LM129B/LM129C MIN	LM129A/ LM129B/LM129C TYP	LM129A/ LM129B/LM129C MAX	LM329A/LM329B/ LM329C/LM329D MIN	LM329A/LM329B/ LM329C/LM329D TYP	LM329A/LM329B/ LM329C/LM329D MAX	UNITS
V_Z	Reverse-Breakdown Voltage	T_A = 25°C, 0.6mA ≤ I_R ≤ 15mA		6.7	6.9	7.2	6.6	6.9	7.25	V
$\frac{\Delta V_Z}{\Delta I_R}$	Reverse-Breakdown Voltage Change with Current	T_A = 25°C, 0.6mA ≤ I_R ≤ 15mA 1mA ≤ I_R ≤ 15mA	 ●		9 12	14		9 12	20	mV mV
$\frac{\Delta V_Z}{\Delta Temp}$	Temperature Coefficient	I_R = 1mA, LM129A/LM329A LM129B/LM329B LM129C/LM329C LM329D	 ● ● ● ●		 6 15 30	 10 20 50		 6 15 30 50	 10 20 50 100	 ppm/°C ppm/°C ppm/°C ppm/°C
	Change in Temperature Coefficient	1mA ≤ I_R ≤ 15mA	●		1			1		ppm/°C
r_Z	Dynamic Impedance	T_A = 25°C, I_R = 1mA 1mA ≤ I_R ≤ 15mA	 ●		0.6 0.8	1		0.8 1	2	Ω Ω
e_n	RMS Noise	T_A = 25°C, 10Hz ≤ f ≤ 10kHz			7	20		7	100	µV
$\frac{\Delta V_Z}{\Delta Time}$	Long-Term Stability	T_A = 45°C ±0.1°C, I_R = 1mA ±0.3%			20			20		ppm/kHr

Note 1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

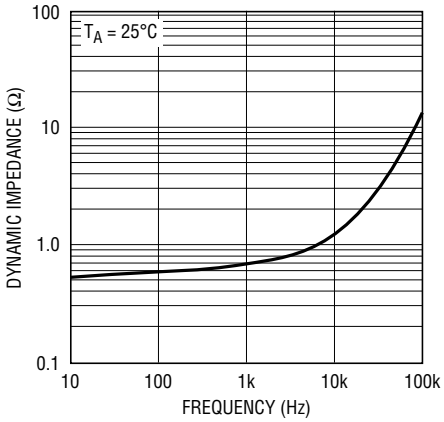
Note 2: To determine the junction temperature as a function of the ambient temperature, see θ_{JA} for each package.

TYPICAL PERFORMANCE CHARACTERISTICS

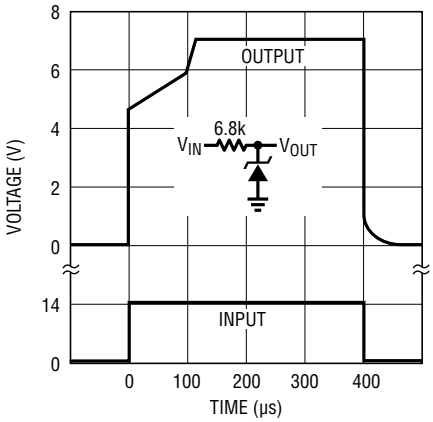
Reverse Characteristics



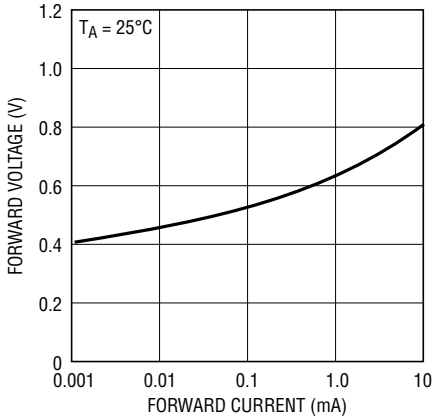
Dynamic Impedance



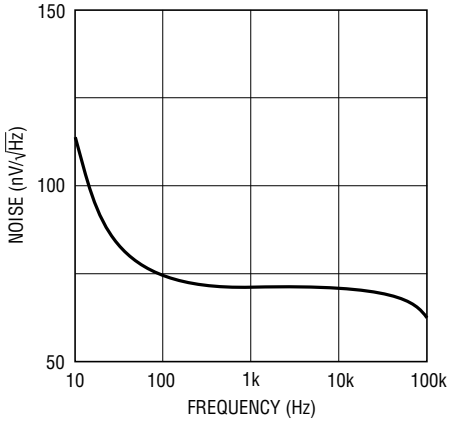
Response Time



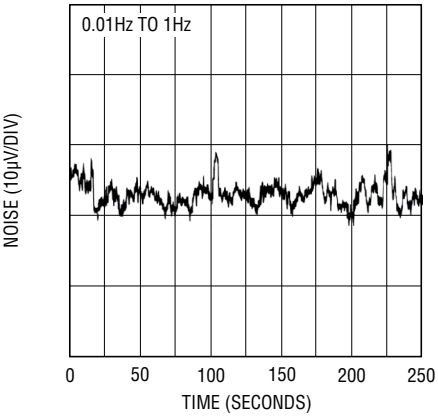
Forward Characteristics



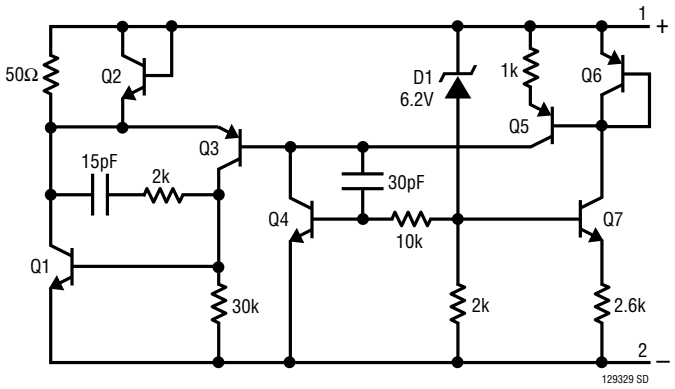
Noise Voltage



Low Frequency Noise Voltage

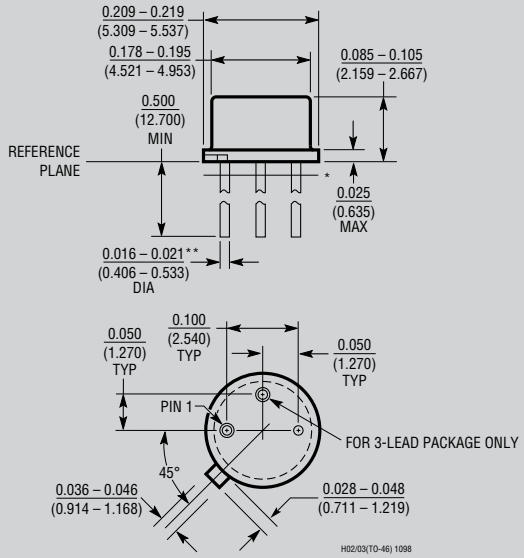


SCHEMATIC DIAGRAM



PACKAGE DESCRIPTION

H Package
2-Lead and 3-Lead TO-46 Metal Can
(Reference LTC DWG # 05-08-1340)

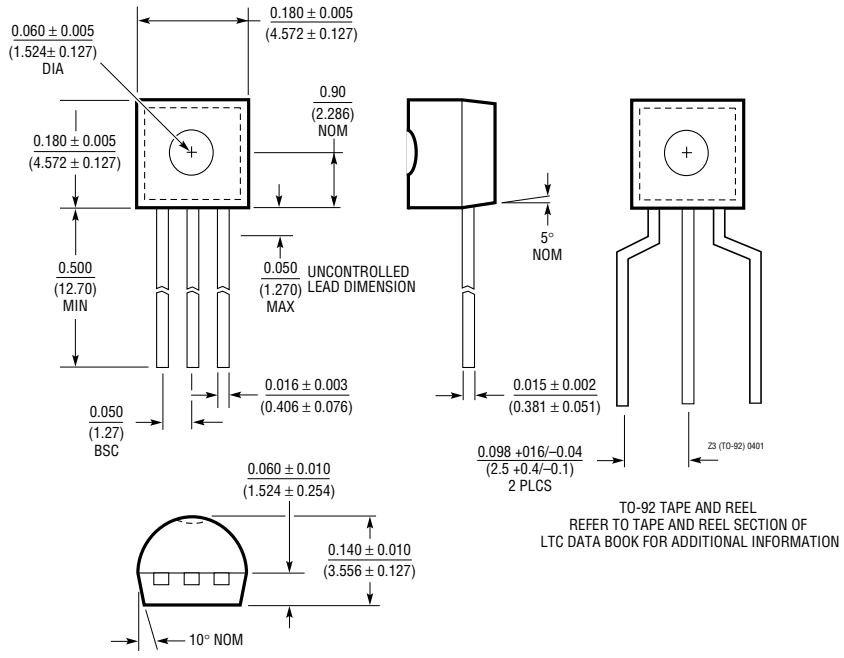


*LEAD DIAMETER IS UNCONTROLLED BETWEEN THE REFERENCE PLANE AND 0.045" BELOW THE REFERENCE PLANE

**FOR SOLDER DIP LEAD FINISH, LEAD DIAMETER IS 0.016 – 0.024 (0.406 – 0.610)

OBSOLETE PACKAGE

Z Package
3-Lead TO-92 (Similar to TO-226)
(Reference LTC DWG # 05-08-1410)



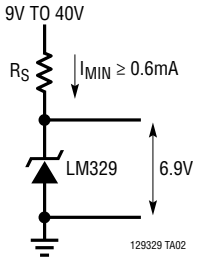
TO-92 TAPE AND REEL
REFER TO TAPE AND REEL SECTION OF
LTC DATA BOOK FOR ADDITIONAL INFORMATION

REVISION HISTORY (Revision history begins at Rev D)

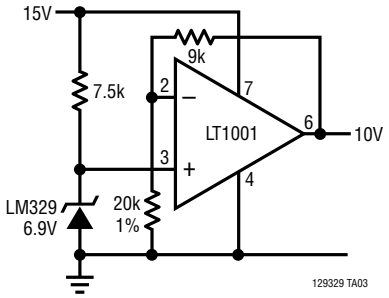
REV	DATE	DESCRIPTION	PAGE NUMBER
D	12/14	Web Links Added Package/Order Information Updated Revision History Added	All 2 7

TYPICAL APPLICATION

Common Reference



Buffered Reference Using a Single Supply



RELATED PARTS

PART NUMBER	DESCRIPTION	COMMENTS
LT1460	Micropower, Precise Series Reference	10ppm/°C, Output Voltages: 2.5V, 3V, 3.3V, 5V, 10V
LT1634	0.05% Accurate, 10ppm/°C, Shunt Reference	Output Voltages: 1.25V, 2.5V, 4.096V, 5V

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