LM129/LM329
6.9V Precision Voltage Reference

FEATURES

- *Guaranteed* 10 ppm/°C temperature coefficient
- *Guaranteed* 1.0Ω max. dynamic impedance
- *Guaranteed* 20μV max. wideband noise
- Wide operating current range 0.6mA to 15mA

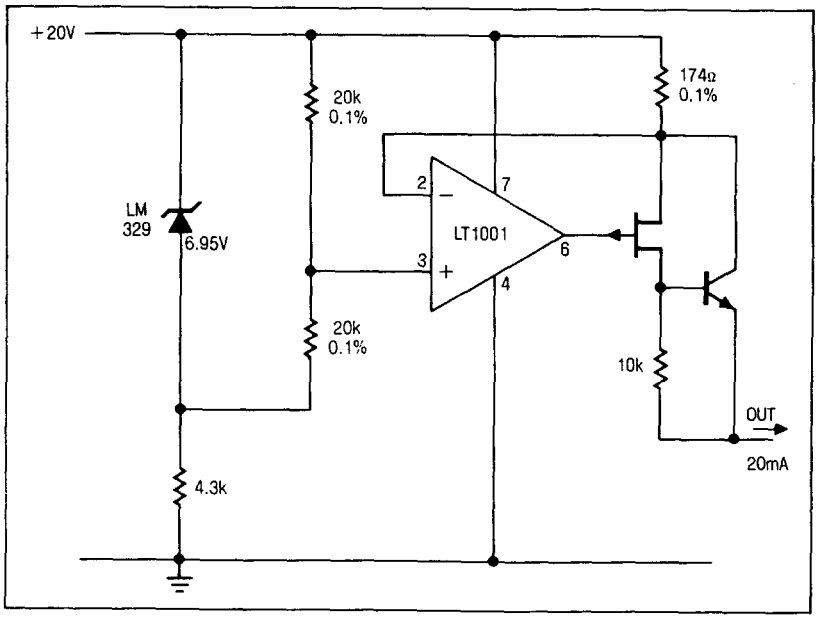
APPLICATIONS

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

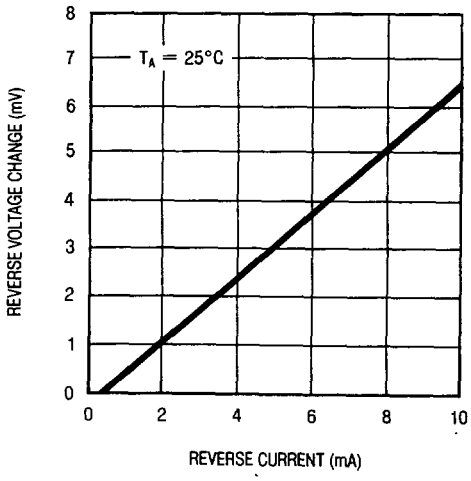
DESCRIPTION

The LM129 temperature compensated 6.9 Volt 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.

20mA Positive Current Source



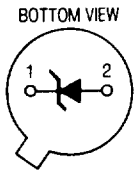
Reverse Voltage Change



ABSOLUTE MAXIMUM RATINGS

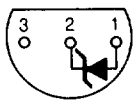
Reverse Breakdown Current 30mA
Forward Current 2mA
Operating Temperature Range
LM129 ..... −55°C to 125°C
LM329 ..... 0°C to 70°C
Storage Temperature Range
LM129 ..... −65°C to 150°C
LM329 ..... −65°C to 150°C
Lead Temperature (Soldering, 10 sec.)..... 300°C

PACKAGE/ORDER INFORMATION



H PACKAGE
TO-46 METAL CAN

LM129AH LM329AH
LM129BH LM329BH
LM129CH LM329CH
LM329DH



Z PACKAGE
TO-92 PLASTIC

LM329AZ
LM329BZ
LM329CZ
LM329DZ

ELECTRICAL CHARACTERISTICS (See Note 1)

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

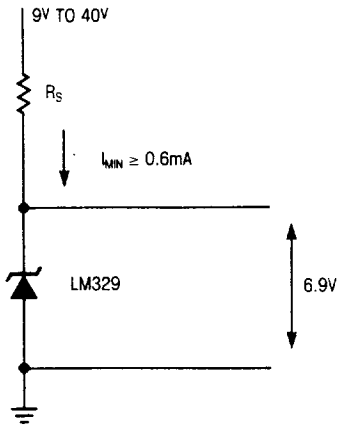
The ● denotes the specifications which apply over full operating temperature range.

Note 1: These specifications apply over the full operating temperature range unless otherwise noted. To determine the junction temperature as a function of the ambient temperature, see θ_{JA} for each package.

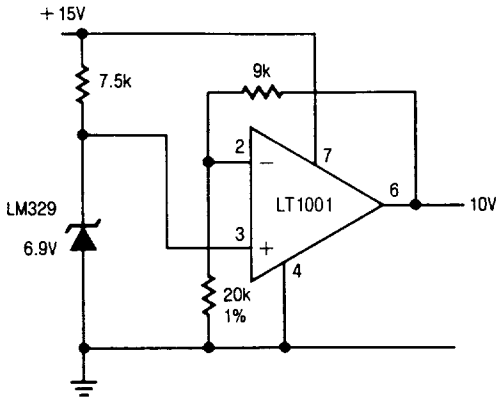
Note 2: Dynamic impedance guaranteed by "Reverse Breakdown Voltage Change with Current".

TYPICAL APPLICATIONS

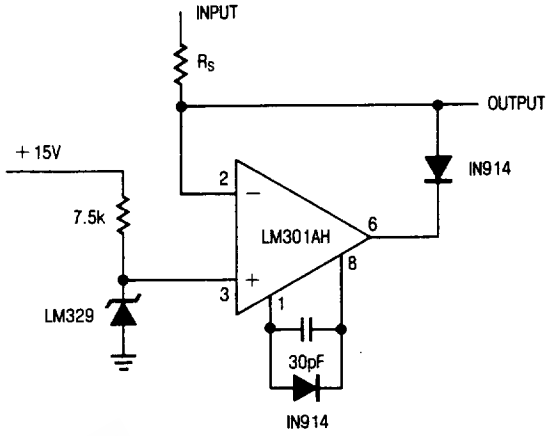
Common Reference



Buffered Reference Using a Single Supply

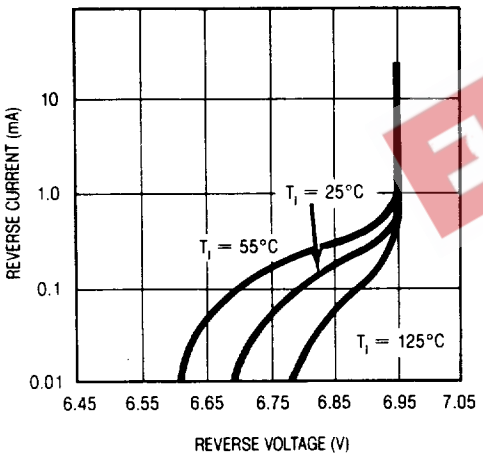


Precision Clamp

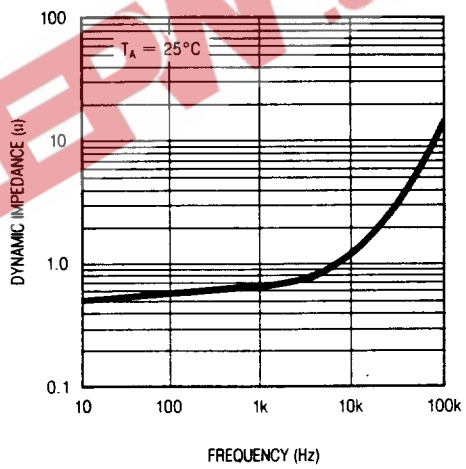


TYPICAL PERFORMANCE CHARACTERISTICS

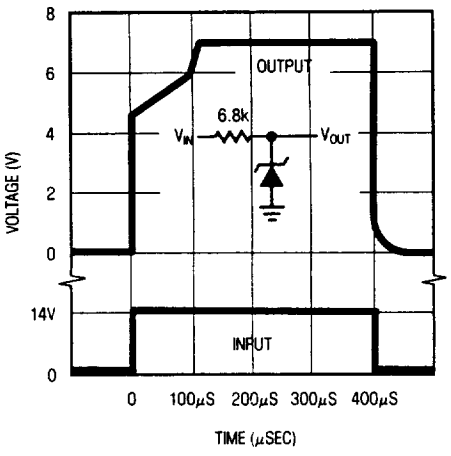
Reverse Characteristics



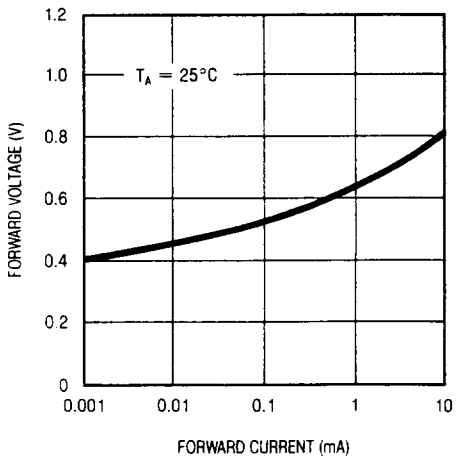
Dynamic Impedance



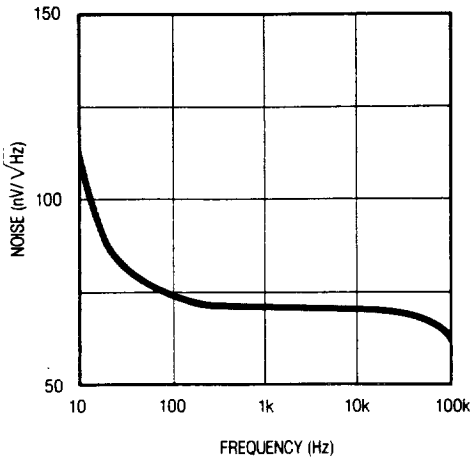
Response Time



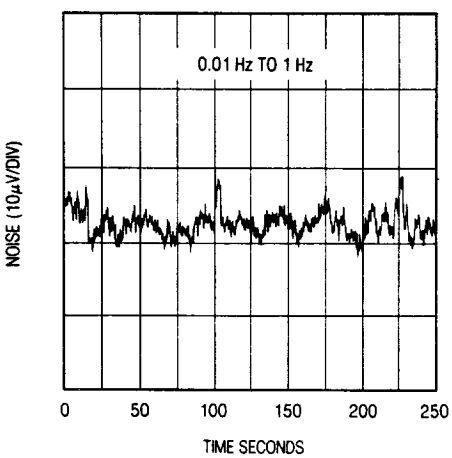
Forward Characteristics



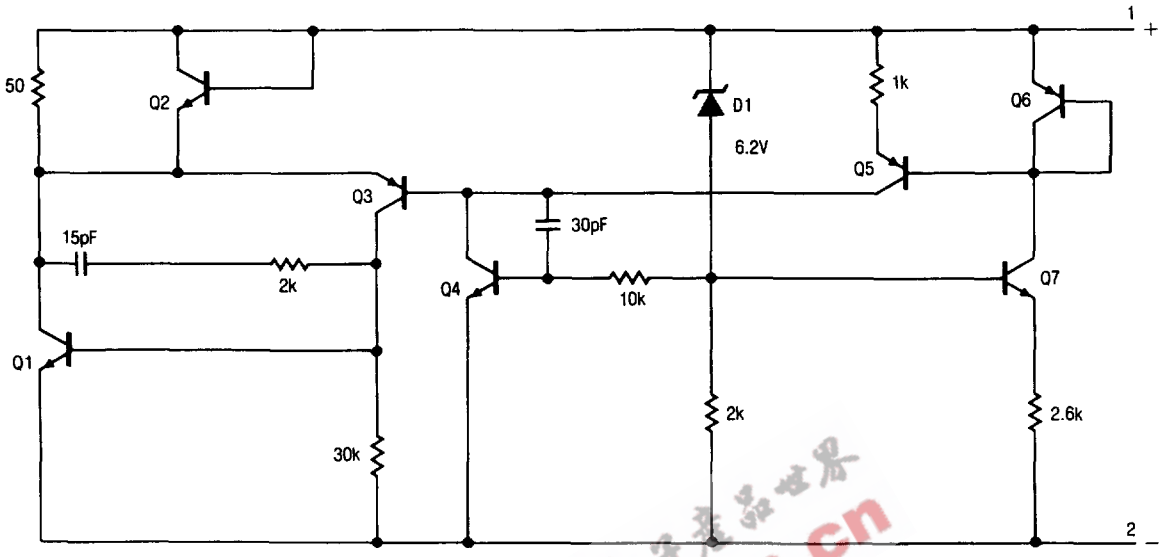
Noise Voltage



Low Frequency Noise Voltage

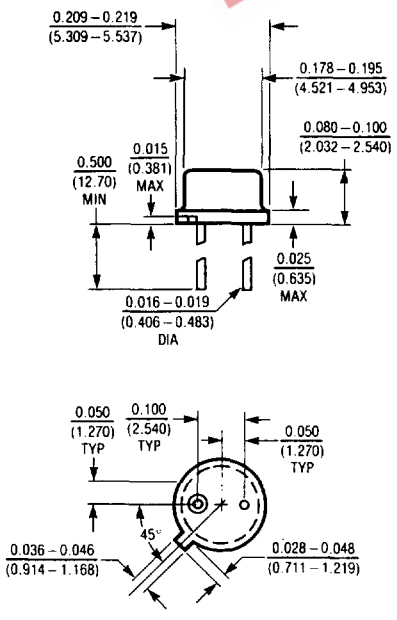


SCHEMATIC DIAGRAM



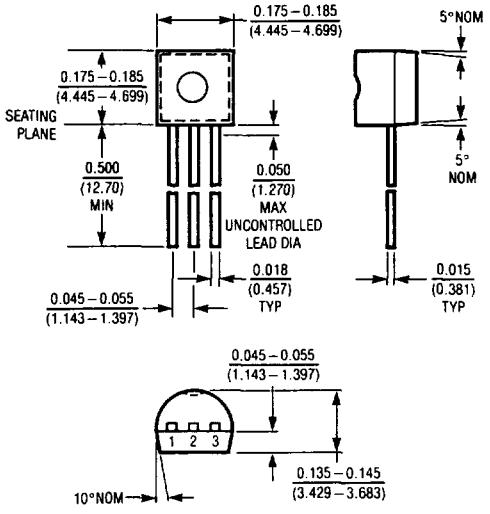
PACKAGE DESCRIPTION

H Package, 2 Lead TO-46 Metal Can



$T_j$max	Θ_{ja}	Θ_{jc}
150°C	440°C/W	80°C/W

Z Package, 3 Lead TO-92 Plastic



$T_j$max	Θ_{ja}
100°C	160°C/W