

## FEATURES

- 10 $\mu$ A to 20mA operating range
- *Guaranteed* 1% initial voltage tolerance
- *Guaranteed* 1 $\Omega$  dynamic impedance
- Very low power consumption

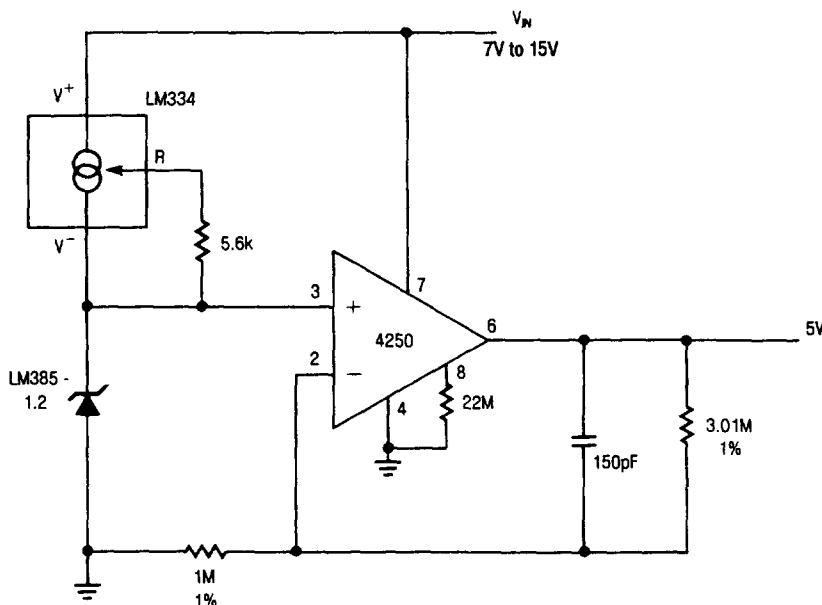
## APPLICATIONS

- Portable meter references
- Portable test instruments
- Battery operated systems
- Current loop instrumentation

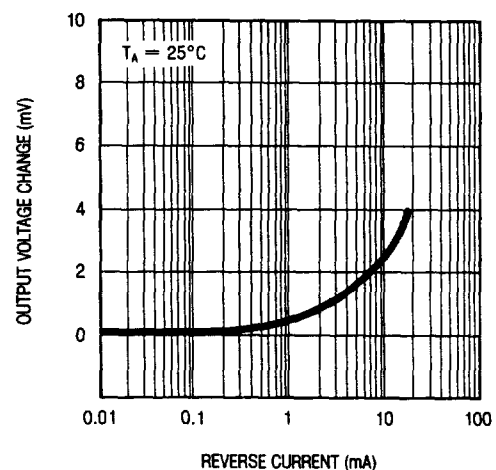
## DESCRIPTION

The LM185-1.2 is a two terminal band gap reference diode that has been designed for applications which require precision performance with micropower operation. The device provides guaranteed operating specifications at currents as low as 10 $\mu$ A. The nominal voltage is 1.235V with both 1% and 2% tolerances available. Some additional features are: maximum dynamic impedance of 1 $\Omega$ , low noise and excellent stability over time and temperature. Advanced design, processing and testing techniques make Linear's LM185-1.2 a superior choice over previous designs. A micro-power 5V reference application is shown below. For guaranteed TC, micropower references, see the LT1034 data sheet.

Micro-power 5V Reference



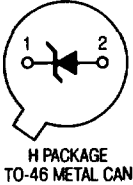
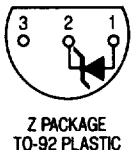
Reverse Voltage Change  
 with Current



**ABSOLUTE MAXIMUM RATINGS**

Reverse Breakdown Current..... 30mA  
 Forward Current..... 10mA  
 Operating Temperature Range  
 LM185-1.2..... -55°C to 125°C  
 LM385-1.2..... 0°C to 70°C  
 Storage Temperature Range  
 LM185-1.2..... -65°C to 150°C  
 LM385-1.2..... -65°C to 150°C  
 Lead Temperature (Soldering, 10 sec.)..... 300°C

**PACKAGE/ORDER INFORMATION**

 <p>BOTTOM VIEW H PACKAGE TO-46 METAL CAN</p>	ORDER PART NUMBER
	LM185H-1.2 LM385H-1.2 LM385BH-1.2 (NOTE 3)
 <p>BOTTOM VIEW Z PACKAGE TO-92 PLASTIC</p>	LM385Z-1.2 LM385BZ-1.2 (NOTE 3)

**ELECTRICAL CHARACTERISTICS (See Note 1)**

SYMBOL	PARAMETER	CONDITIONS	LM185-1.2			LM385-1.2/385B-1.2			UNITS
			MIN	TYP	MAX	MIN	TYP	MAX	
$V_Z$	Reverse Breakdown Voltage	$T_A = 25^\circ\text{C}$ , $I_{min} \leq I_R \leq 20\text{mA}$ LM185-1.2 LM385-1.2 LM385B-1.2 (Note 3)	1.223	1.235	1.247				V
						1.205	1.235	1.260	V
						1.223	1.235	1.247	V
$\frac{\Delta V_Z}{\Delta \text{Temp}}$	Average Temperature Coefficient	$I_{min} \leq I_R \leq 20\text{mA}$ (Note 2 and Note 3)		20			20		ppm/°C
$I_{min}$	Minimum Operating Current	$T_{min} \leq T_A \leq T_{max}$	●	8	10		8	15	μA
$\frac{\Delta V_Z}{\Delta I_R}$	Reverse Breakdown Voltage Change with Current	$I_{min} \leq I_R \leq 1\text{mA}$ $T_A = 25^\circ\text{C}$ $T_{min} \leq T_A \leq T_{max}$	●		1		1		mV
					1.5		1.5		mV
		$1\text{mA} \leq I_R \leq 20\text{mA}$ $T_A = 25^\circ\text{C}$ $T_{min} \leq T_A \leq T_{max}$	●		10		20		mV
				20		25		mV	
$r_Z$	Reverse Dynamic Impedance	$I_R = 100\mu\text{A}$ $T_A = 25^\circ\text{C}$ $T_{min} \leq T_A \leq T_{max}$	●	0.2	0.6		0.4	1	Ω
					1.5		1.5		Ω
$e_n$	Wide Band Noise (RMS)	$I_R = 100\mu\text{A}$ $10\text{Hz} \leq f \leq 10\text{kHz}$		60			60		μV
$\frac{\Delta V_Z}{\Delta \text{Time}}$	Long Term Stability	$I_R = 100\mu\text{A}$ $T_A = 25^\circ\text{C} \pm 0.1^\circ\text{C}$		20			20		ppm/kHr

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

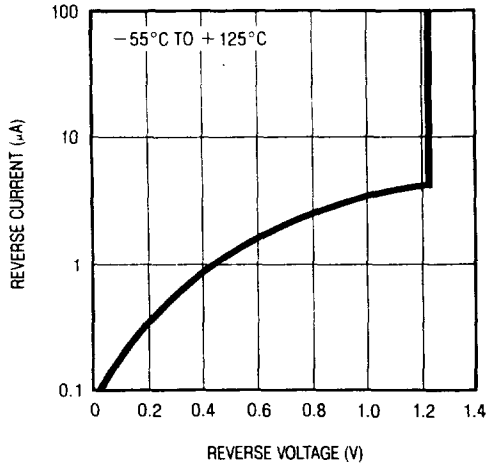
**Note 1:** All specifications are for  $T_A = 25^\circ\text{C}$  unless otherwise noted. For the LM185-1.2  $T_{min} = -55^\circ\text{C}$  and  $T_{max} = +125^\circ\text{C}$ . For LM385-1.2  $T_{min} = 0^\circ\text{C}$  and  $T_{max} = +70^\circ\text{C}$ .

**Note 2:** Selected devices with guaranteed maximum temperature coefficient are available upon request.

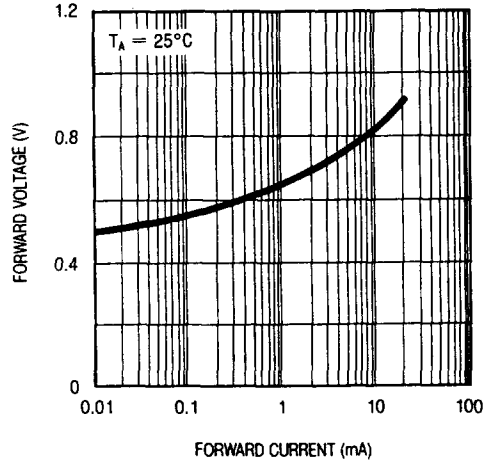
**Note 3:** For applications requiring low initial tolerance guaranteed over temperature consult LT1004 data sheet. The LT1004 is a low cost pin for pin substitution device

# TYPICAL PERFORMANCE CHARACTERISTICS

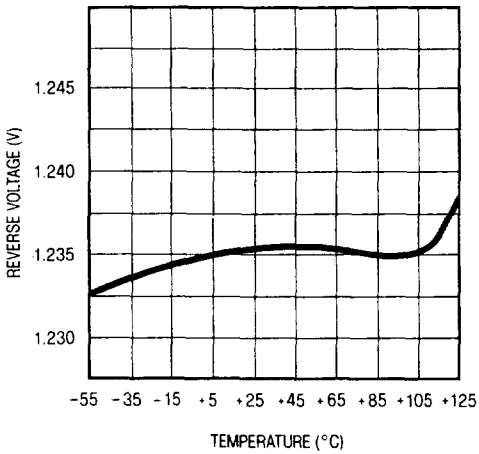
**Reverse Characteristics**



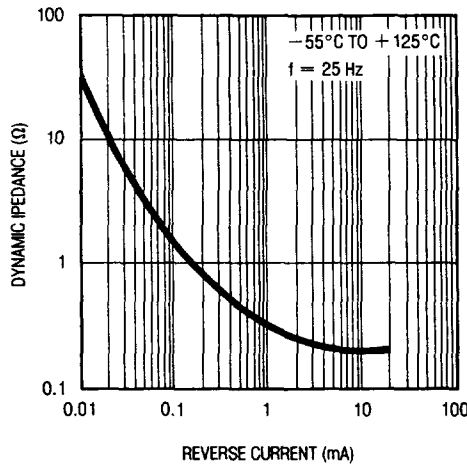
**Forward Characteristics**



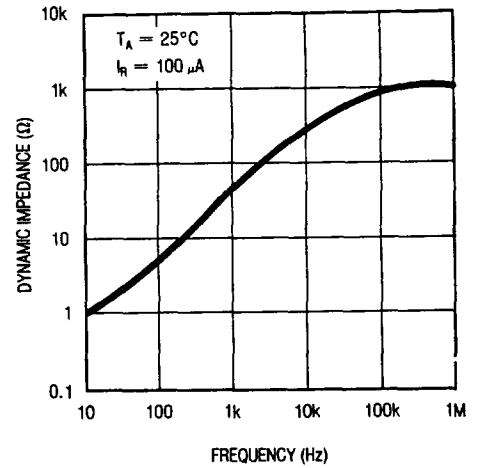
**Temperature Drift**



**Reverse Dynamic Impedance**

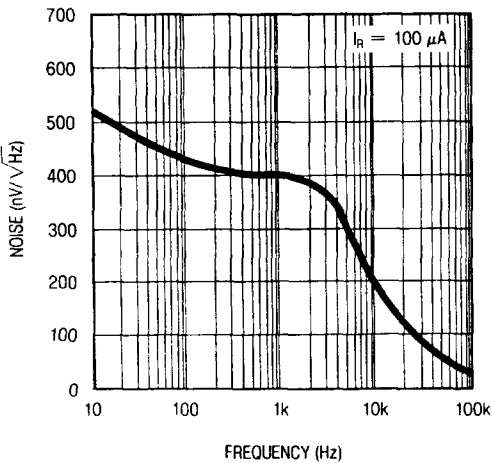


**Reverse Dynamic Impedance**

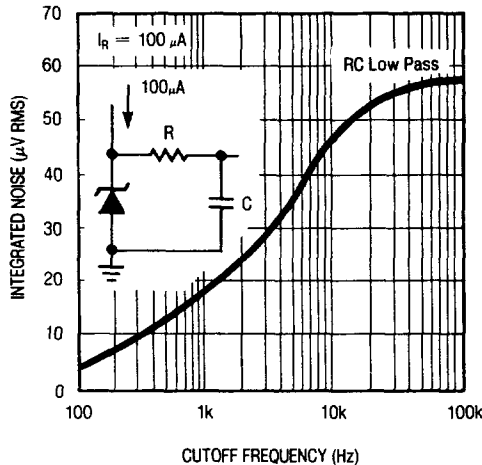


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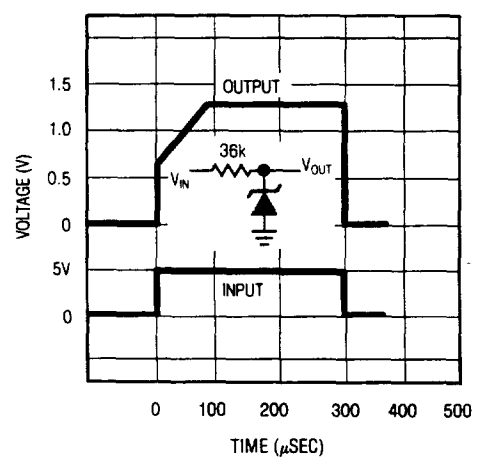
**Noise Voltage**



**Filtered Output Noise**

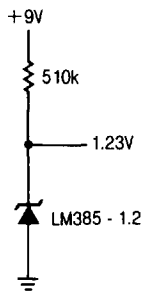


**Response Time**

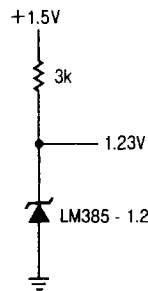


## TYPICAL APPLICATIONS

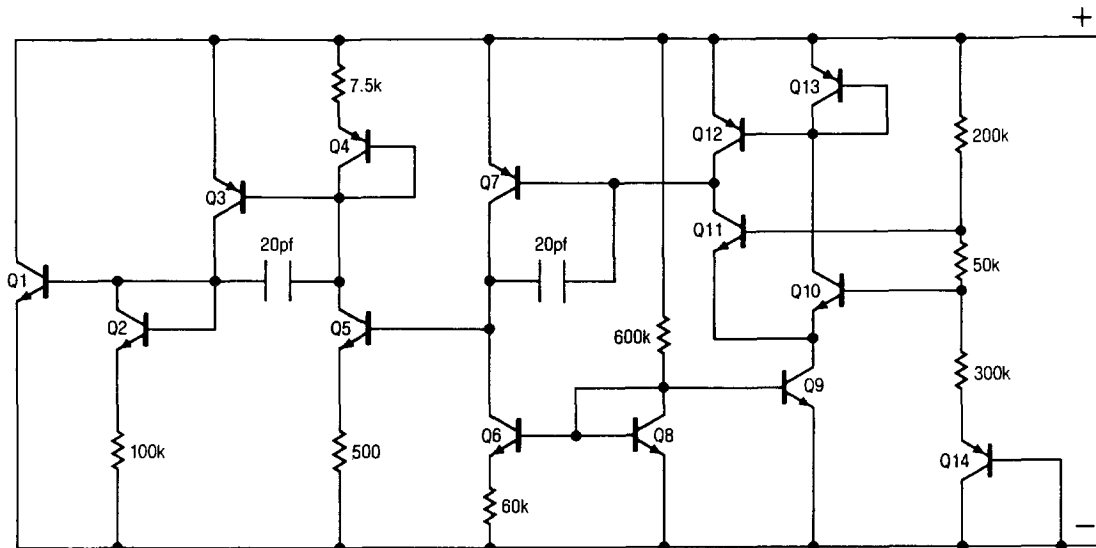
Micropower Reference for 9V Battery



1.2V Reference from 1.5V Battery

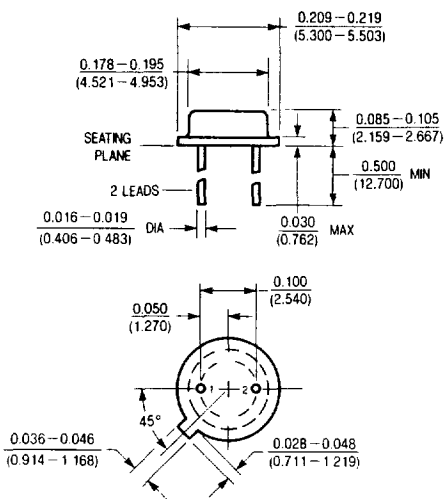


## SCHEMATIC DIAGRAM



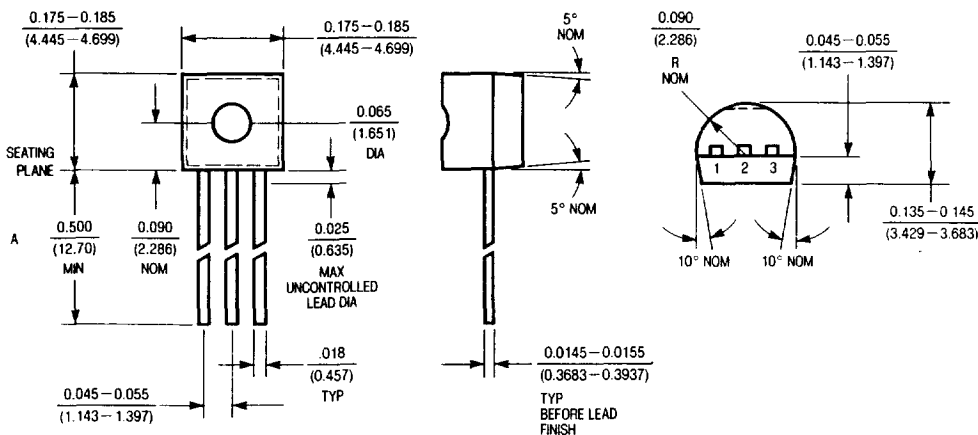
## PACKAGE DESCRIPTION

H Package, 2 Lead TO-46 Metal Can



$T_{jmax}$	$\theta_{ja}$	$\theta_{jc}$
150°C	440°C/W	80°C/W

Z Package, 3 Lead TO-92 Plastic



$T_{jmax}$	$\theta_{ja}$
150°C	160°C/W