

FEATURES

- 10 μ A to 20mA Operating Range
- *Guaranteed* 1% Initial Voltage Tolerance
- *Guaranteed* 1 Ω Dynamic Impedance
- Very Low Power Consumption

APPLICATIONS

- Portable Meter References
- Portable Test Instruments
- Battery Operated Systems
- Current Loop Instrumentation

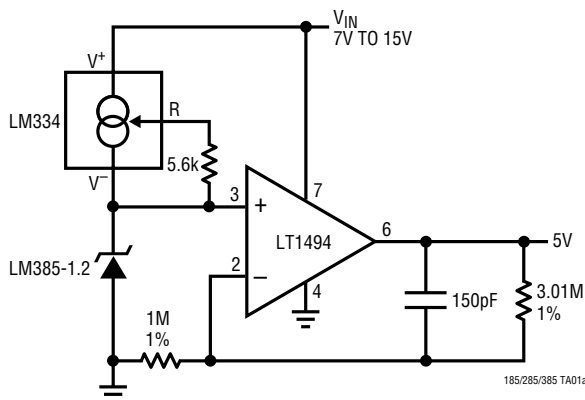
DESCRIPTION

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 μ A. The nominal voltage is 1.235V with both 1% and 2% tolerances available. Some additional features are: maximum dynamic impedance of 1 Ω , 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 micropower 5V reference application is shown below. For guaranteed TC, micropower references, see the LT1034 data sheet.

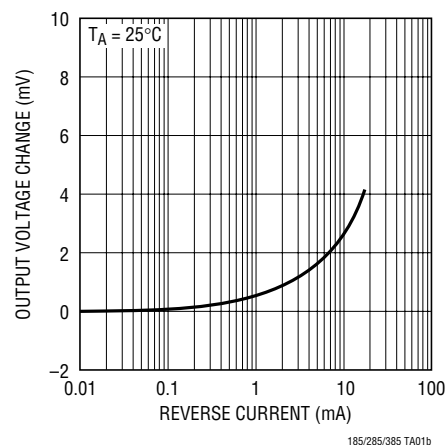
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TYPICAL APPLICATION

Micropower 5V Reference



Reverse Voltage Change with Current

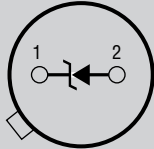
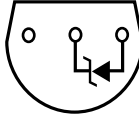
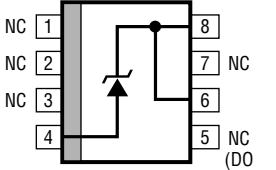


LM185-1.2/
LM285-1.2/LM385-1.2

ABSOLUTE MAXIMUM RATINGS

Operating Temperature Range	Storage Temperature Range	–65°C to 150°C
LM185-1.2(OBSOLETE)	Lead Temperature (Soldering, 10 sec)	300°C
LM285-1.2	Reverse Breakdown Current	30mA
LM385-1.2	Forward Current	10mA

PACKAGE/ORDER INFORMATION

BOTTOM VIEW  H PACKAGE 2-LEAD TO-46 METAL CAN $T_{JMAX} = 150^{\circ}C$, $\theta_{JA} = 440^{\circ}C/W$, $\theta_{JC} = 80^{\circ}C/W$ (NOTE 3) OBSOLETE PACKAGE Consider the S8 or Z Packages for Alternate Source	ORDER PART NUMBER LM185H-1.2 LM285H-1.2 LM385H-1.2 LM385BH-1.2	BOTTOM VIEW  Z PACKAGE 3-LEAD PLASTIC TO-92 $T_{JMAX} = 150^{\circ}C$, $\theta_{JA} = 160^{\circ}C/W$ (NOTE 3)	ORDER PART NUMBER LM285Z-1.2 LM385Z-1.2 LM385BZ-1.2
TOP VIEW  S8 PACKAGE 8-LEAD PLASTIC SO $T_{JMAX} = 150^{\circ}C$, $\theta_{JA} = 190^{\circ}C/W$			ORDER PART NUMBER LM385BS8-1.2 LM385S8-1.2
			S8 PART MARKING 3851 3851B

Consult LTC Marketing for parts specified with wider operating temperature ranges.

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at $T_A = 25^\circ\text{C}$. For the LM185-1.2 $T_{\text{MIN}} = -55^\circ\text{C}$ and $T_{\text{MAX}} = 125^\circ\text{C}$. For LM285-1.2 $T_{\text{MIN}} = -40^\circ\text{C}$ and $T_{\text{MAX}} = 85^\circ\text{C}$. For LM385-1.2 $T_{\text{MIN}} = 0^\circ\text{C}$ and $T_{\text{MAX}} = 70^\circ\text{C}$. For MIL-STD components, please refer to LTC883C data sheet for test listing and parameters.

SYMBOL	PARAMETER	CONDITIONS	LM185-1.2/LM285-1.2			LM385-1.2/LM385B-1.2			UNITS
			MIN	TYP	MAX	MIN	TYP	MAX	
V_Z	Reverse Breakdown Voltage	$T_A = 25^\circ\text{C}$, $I_{\text{MIN}} \leq I_R \leq 20\text{mA}$ LM185-1.2 LM385-1.2 LM385B-1.2 (Note 3)	1.223	1.235	1.247	1.205 1.223	1.235 1.235	1.260 1.247	V V V
$\frac{\Delta V_Z}{\Delta \text{Temp}}$	Average Temperature Coefficient	$I_{\text{MIN}} \leq I_R \leq 20\text{mA}$ (Notes 2, 3)	20			20			ppm/ $^\circ\text{C}$
I_{MIN}	Minimum Operating Current	$T_{\text{MIN}} \leq T_A \leq T_{\text{MAX}}$	●	8	10	8	15		μA
$\frac{\Delta V_Z}{\Delta I_R}$	Reverse Breakdown Voltage Change with Current	$I_{\text{MIN}} \leq I_R \leq 1\text{mA}$ $T_A = 25^\circ\text{C}$ $T_{\text{MIN}} \leq T_A \leq T_{\text{MAX}}$			1 1.5			1 1.5	mV mV
		$1\text{mA} \leq I_R \leq 20\text{mA}$ $T_A = 25^\circ\text{C}$ $T_{\text{MIN}} \leq T_A \leq T_{\text{MAX}}$			10 20			10 25	mV mV
r_Z	Reverse Dynamic Impedance	$I_R = 100\mu\text{A}$ $T_A = 25^\circ\text{C}$ $T_{\text{MIN}} \leq T_A \leq T_{\text{MAX}}$	●	0.2	0.6 1.5	0.4	1.0 1.5		Ω Ω
e_n	Wideband 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

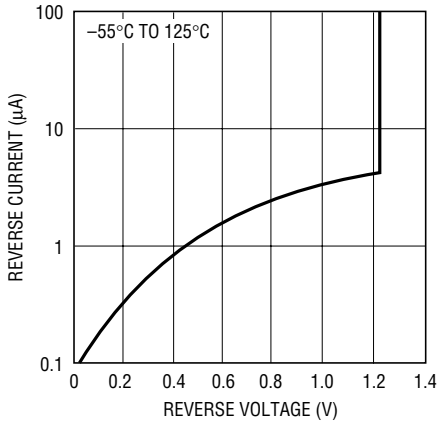
Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

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 the LT1004 data sheet.

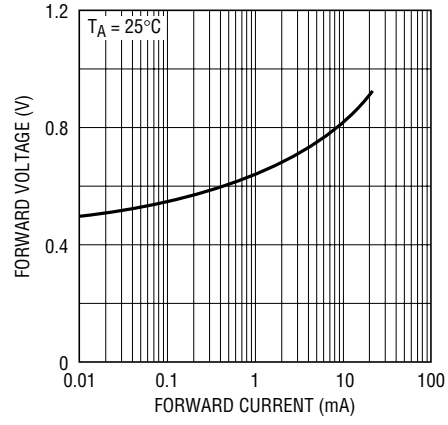
TYPICAL PERFORMANCE CHARACTERISTICS

Reverse Characteristics



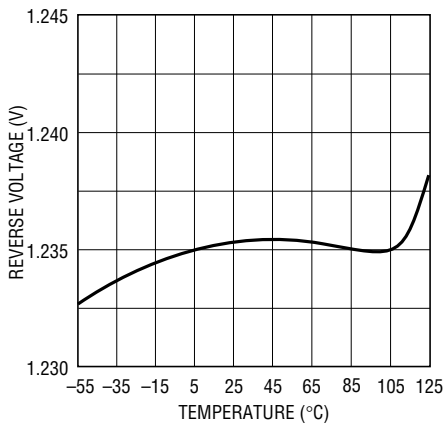
185/285/385 G01

Forward Characteristics



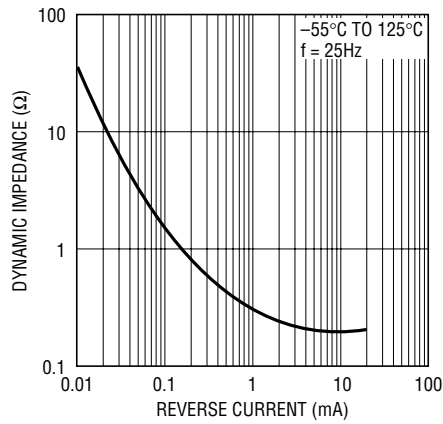
185/285/385 G02

Temperature Drift



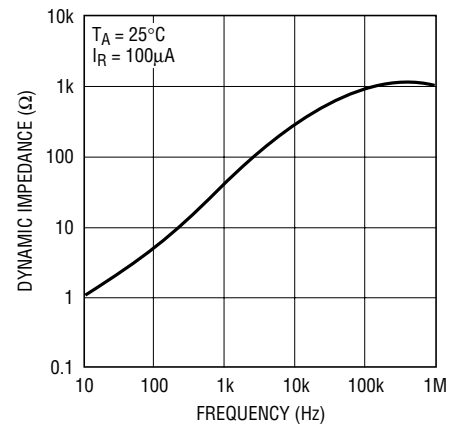
185/285/385 G03

Reverse Dynamic Impedance



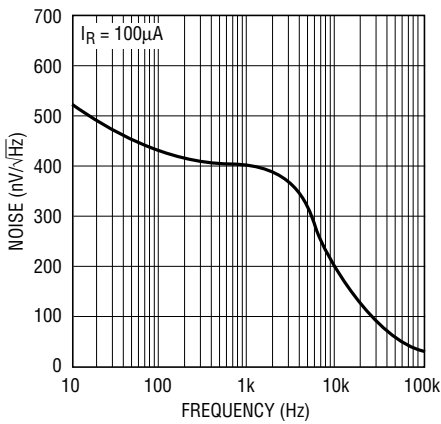
185/285/385 G04

Reverse Dynamic Impedance



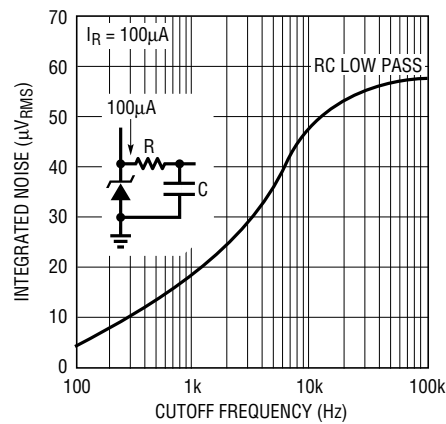
185/285/385 G05

Noise Voltage



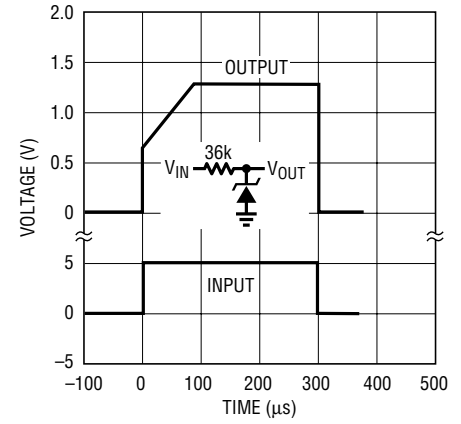
185/285/385 G06

Filtered Output Noise



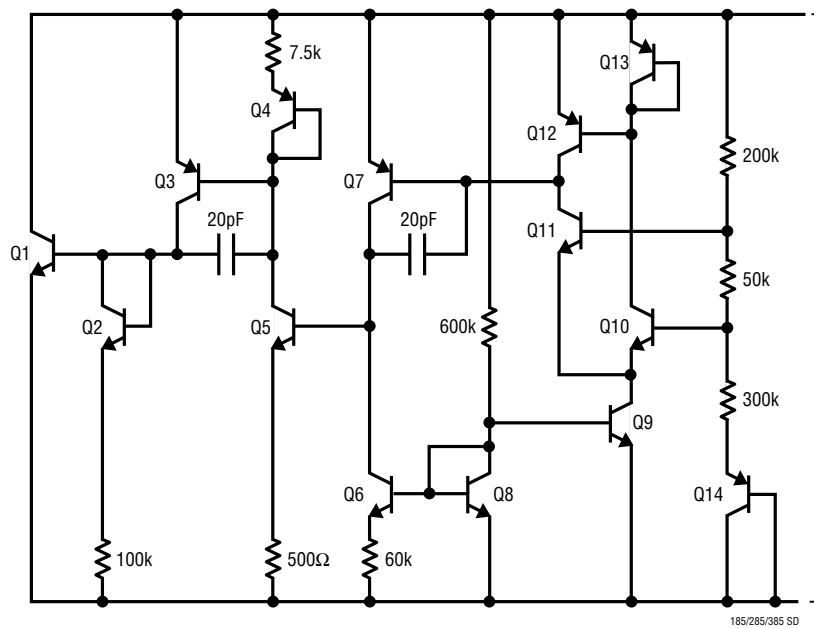
185/285/385 G07

Response Time



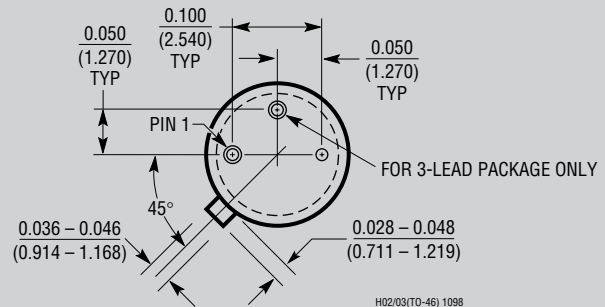
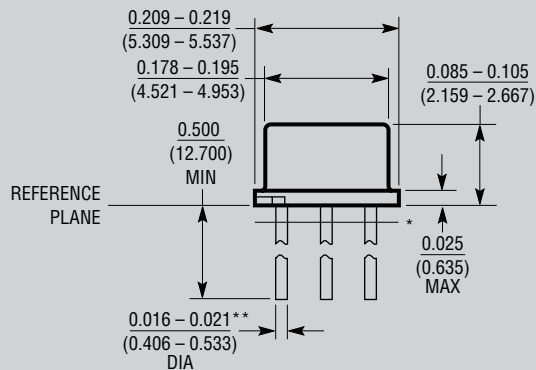
185/285/385 G08

SCHEMATIC DIAGRAM



PACKAGE DESCRIPTION

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

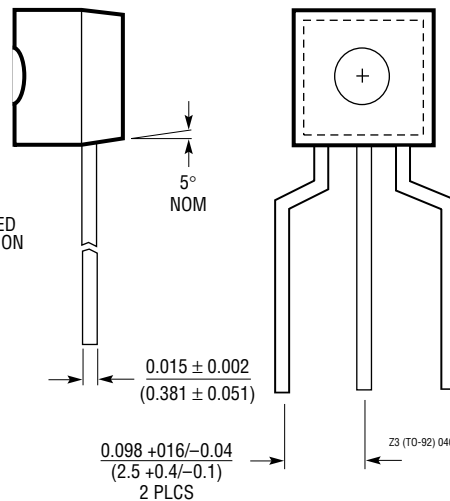
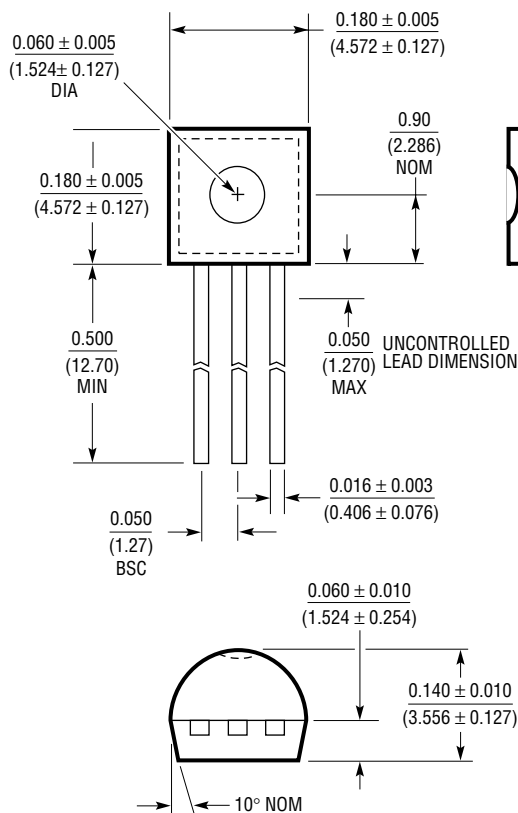


* LEAD DIAMETER IS UNCONTROLLED BETWEEN THE REFERENCE PLANE AND 0.045" BELOW THE REFERENCE PLANE

**FOR SOLDER DIP LEAD FINISH, LEAD DIAMETER IS $\frac{0.016 - 0.024}{(0.406 - 0.610)}$

OBsolete PACKAGE

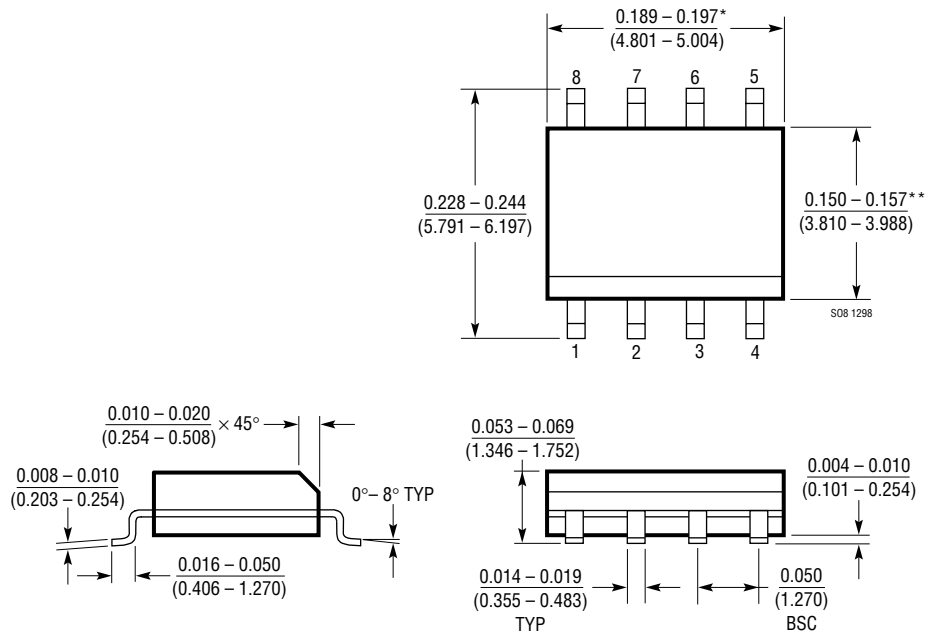
Z Package 3-Lead Plastic TO-92 (Similar to TO-226) (Reference LTC DWG # 05-08-1410)



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

PACKAGE DESCRIPTION

S8 Package
8-Lead Plastic Small Outline (Narrow .150 Inch)
(Reference LTC DWG # 05-08-1610)

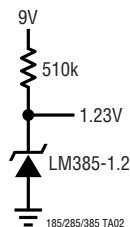


*DIMENSION DOES NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.006" (0.152mm) PER SIDE

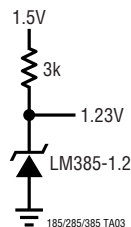
**DIMENSION DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED 0.010" (0.254mm) PER SIDE

TYPICAL APPLICATIONS

Micropower Reference for 9V Battery



1.2V Reference from 1.5V Battery



RELATED PARTS

PART NUMBER	DESCRIPTION	COMMENTS
LT1004-1.2	Micropower Shunt Reference	0.3% Initial Accuracy
LT1034	1.2V Micropower Shunt Reference	40ppm/°C Max Temperature Coefficient