

## Micropower Precision Shunt Voltage Reference

### FEATURES

- **Initial Voltage Accuracy: 0.05%**
- **Low Operating Current: 10 $\mu$ A**
- **Low Drift: 25ppm/ $^{\circ}$ C Max**
- Less Than 1 $\Omega$  Dynamic Impedance
- Available in MSOP, SO-8 and TO-92 Packages
- Available in Commercial and Industrial Grades

### APPLICATIONS

- Portable Meters
- Precision Regulators
- A/D and D/A Converters
- Calibrators

### DESCRIPTION

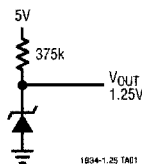
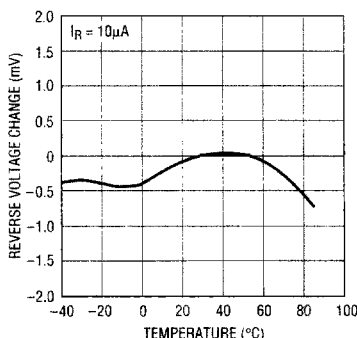
The LT<sup>®</sup>1634 is a micropower, precision, shunt voltage reference. The bandgap reference uses trimmed precision thin film resistors to achieve 0.05% initial voltage accuracy. Improved curvature correction technique guarantees 25ppm/ $^{\circ}$ C maximum temperature drift. Advances in design, processing and packaging techniques guarantee 10 $\mu$ A operation and low temperature cycling hysteresis. The LT1634 does not require an output compensation capacitor, but is stable with capacitive loads. Low dynamic impedance makes the LT1634 reference easy to use from unregulated supplies.

The LT1634 reference can be used as a high performance upgrade to the LM185/LM385, LT1004 and LT1034 where lower power and guaranteed temperature drift is required. 2.5V, 4.096V and 5V versions are also available.

LT, LTC and LT are registered trademarks of Linear Technology Corporation.

**7**

### TYPICAL APPLICATION


**Temperature Drift**

1634-1.25 TA02

# LT1634-1.25

## ABSOLUTE MAXIMUM RATINGS

Operating Current ..... 100mA  
 Forward Current ..... 20mA  
 Storage Temperature Range ..... -65°C to 150°C  
 Lead Temperature (Soldering, 10 sec) ..... 300°C

Operating Temperature Range  
 Commercial ..... 0°C to 70°C  
 Industrial ..... -40°C to 85°C

## PACKAGE/ORDER INFORMATION

TOP VIEW	ORDER PART NUMBER	TOP VIEW	ORDER PART NUMBER	BOTTOM VIEW	ORDER PART NUMBER
<p>MS8 PACKAGE 8-LEAD PLASTIC MSOP T<sub>JMAX</sub> = 125°C, θ<sub>JA</sub> = 250°C/W</p>	LT1634BCMS8-1.25	<p>S8 PACKAGE 8-LEAD PLASTIC SO T<sub>JMAX</sub> = 125°C, θ<sub>JA</sub> = 190°C/W</p>	LT1634BCS8-1.25 LT1634BIS8-1.25	<p>Z PACKAGE 3-LEAD PLASTIC TO-92 T<sub>JMAX</sub> = 125°C, θ<sub>JA</sub> = 190°C/W</p>	LT1634CCZ-1.25
	MS8 PART MARKING LTCV		S8 PART MARKING 634B1 634B11		

\*Connected internally. Do not connect external circuitry to these pins. \*\*Connect to ground in user application. Consult factory for Military grade parts.

## AVAILABLE OPTIONS

TEMPERATURE	ACCURACY (%)	TEMPERATURE COEFFICIENT (ppm/°C)	PACKAGE TYPE		
			MS8	S8	Z
0°C to 70°C	0.05	25	LT1634BCMS8-1.25	LT1634BCS8-1.25	
-40°C to 85°C	0.05	25		LT1634BIS8-1.25	
0°C to 70°C	0.20	25			LT1634CCZ-1.25

## ELECTRICAL CHARACTERISTICS (Note 1)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Reverse Breakdown Voltage	LT1634BCS8/LT1634BIS8/LT1634BCMS8 (I <sub>R</sub> = 10μA)	1.24937 -0.05	1.250	1.25062 0.05	V %
	LT1634CCZ (I <sub>R</sub> = 10μA)	1.24750 -0.20	1.250	1.25250 0.20	V %
	LT1634BCS8/LT1634BCMS8 (I <sub>R</sub> = 10μA)	● 1.24718 -0.225	1.250	1.25281 0.225	V %
	LT1634BIS8 (I <sub>R</sub> = 10μA)	● 1.24547 -0.362	1.250	1.25453 0.362	V %
	LT1634CCZ (I <sub>R</sub> = 10μA)	● 1.24531 -0.375	1.250	1.25469 0.375	V %
Reverse Breakdown Change with Current (Note 2)	10μA ≤ I <sub>R</sub> ≤ 2mA	●	0.25 0.30	1 2	mV mV
	2mA ≤ I <sub>R</sub> ≤ 20mA	●	2 2	8 10	mV mV
Minimum Operating Current		●	3	7	μA
Temperature Coefficient	I <sub>R</sub> = 10μA	●	10	25	ppm/°C
Reverse Dynamic Impedance (Note 3)	10μA ≤ I <sub>R</sub> ≤ 2mA	●	0.125	0.5	Ω
		●	0.150	1.0	Ω
Low Frequency Noise (Note 4)	I <sub>R</sub> = 10μA, 0.1Hz ≤ f ≤ 10Hz	●	10		μV <sub>p-p</sub>

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

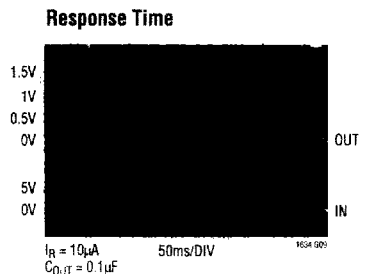
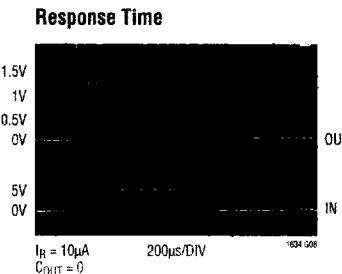
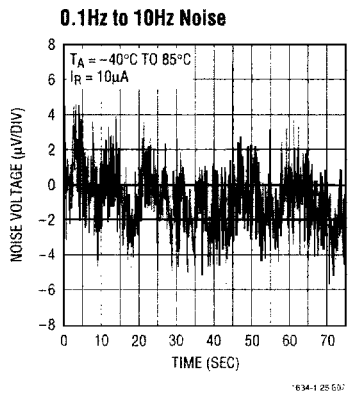
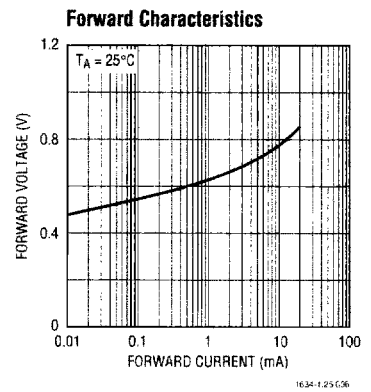
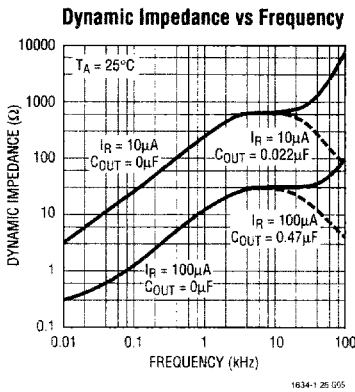
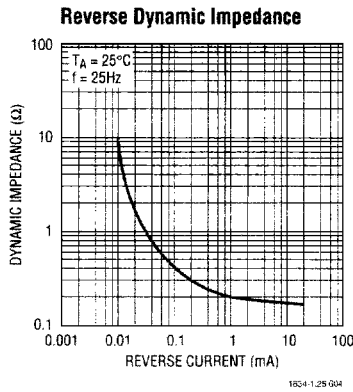
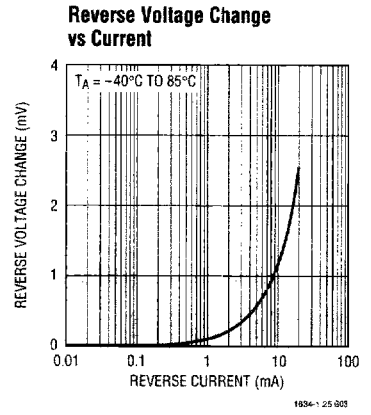
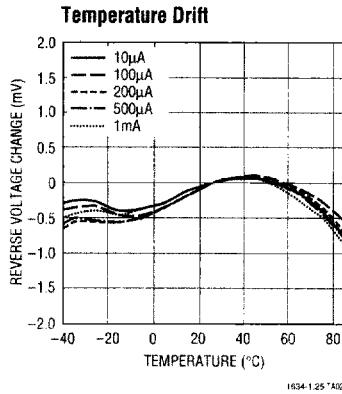
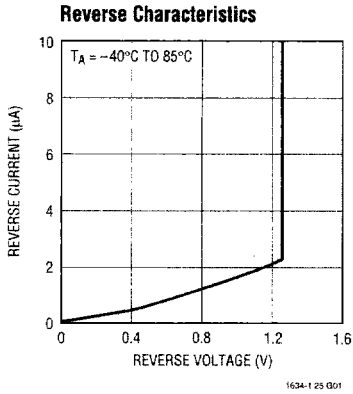
**Note 1:** ESD (Electrostatic Discharge) sensitive device. Use proper ESD handling precautions.

**Note 2:** Output requires 0.1μF for operating current greater than 1mA.

**Note 3:** This parameter is guaranteed by "reverse breakdown change with current" test.

**Note 4:** Peak-to-peak noise is measured with a single highpass filter at 0.1Hz and 2-pole lowpass filter at 10Hz.

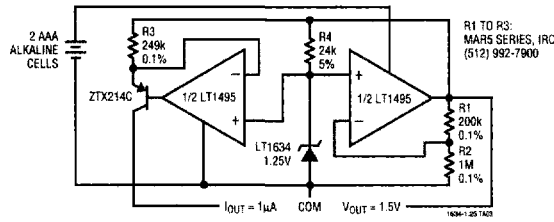
# TYPICAL PERFORMANCE CHARACTERISTICS



7

**TYPICAL APPLICATION**

**Micropower Voltage and Current Reference**



**RELATED PARTS**

PART NUMBER	DESCRIPTION	COMMENTS
LTC <sup>®</sup> 1440	Micropower Comparator with Reference	3.7µA Max Supply Current, 1% 1.182V Reference
LT1460	Micropower Series Reference	0.075% Max, 10ppm/°C Max Drift, 2.5V, 5V and 10V Versions
LT1495	1.5µA Precision Rail-to-Rail Dual Op Amp	1.5µA Max Supply Current, 100pA Max $i_{OS}$
LTC1540	Nanopower Comparator with Reference	600nA Max Supply Current, 2% 1.182V Reference