LX1004

1.2V & 2.5V Micropower Voltage References

THE INFINITE POWER OF INNOVATION

PRODUCTION DATA SHEET

DESCRIPTION

The LX1004 Micropower Voltage References are two terminal bandgap reference diodes designed and optimized for accurate low power operation in portable and other power sensitive systems. Operating currents are guaranteed from as low as 10µA up to 20mA giving designers a great deal of flexibility in optimizing power consumption, noise and ultimate application performance.

The LX1004 is available in fixed 1.2V and 2.5V reference values.

Process and circuit design optimization provide for high accuracy with initial tolerance values of ±4mV and ±20mV, respectively. Complementing their initial accuracy, the bandgap reference is temperature compensated to deliver 20ppm performance over the 0° to 70°C operating temperature range.

The LX1004 from Linfinity is a pin-for-pin replacement for the LT1004 and LM385 families of voltage references.

KEY FEATURES

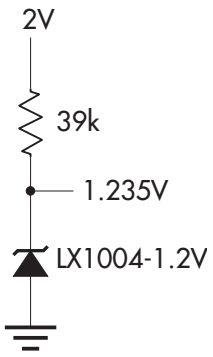
- **GUARANTEED ±4mV INITIAL ACCURACY LX1004-1.2**
- **GUARANTEED ±20mV INITIAL ACCURACY LX1004-2.5**
- GUARANTEED 10µA OPERATING CURRENT
- GUARANTEED TEMPERATURE PERFORMANCE
- OPERATES UP TO 20mA
- VERY LOW DYNAMIC IMPEDANCE

APPLICATIONS

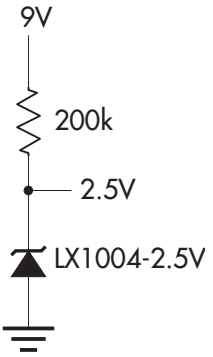
- **PORTABLE METER REFERENCES**
- PORTABLE TEST INSTRUMENTS
- BATTERY OPERATED SYSTEMS
- CURRENT LOOP INSTRUMENTATION

PRODUCT HIGHLIGHT

Micropower Reference From 2 Cell Battery



Micropower Reference From 9V Battery



PACKAGE ORDER INFORMATION

T_A (°C)	Reference Voltage	Initial Tolerance	DM Plastic SOIC 8-pin	LP Plastic TO-92 3-pin
0 to 70	1.2V	±4mV	LX1004CDM-1.2	LX1004CLP-1.2
	2.5V	±20mV	LX1004CDM-2.5	LX1004CLP-2.5

Note: All surface-mount packages are available in Tape & Reel.
Append the letter "T" to part number. (i.e. LX1004CDM-2.5T)

FOR FURTHER INFORMATION CALL (714) 898-8121

11861 Western Avenue, Garden Grove, CA. 92841

ABSOLUTE MAXIMUM RATINGS (Note 1)

Reverse Breakdown Current 30mA
Forward Current 10mA
Operating Temperature Range ..... 0°C to 70°C
Storage Temperature Range ..... -65°C to 150°C
Lead Temperature (soldering, 10 seconds) ..... 300°C

Note 1. Values beyond which damage may occur. All voltages are specified with respect to ground, and all currents are positive into the specified terminal

THERMAL DATA

DM PACKAGE:

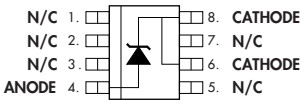
THERMAL RESISTANCE-JUNCTION TO AMBIENT, θ_{JA}	165°C/W

LP PACKAGE:

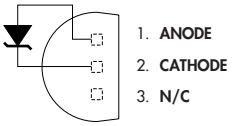
THERMAL RESISTANCE-JUNCTION TO AMBIENT, θ_{JA}	165°C/W

The θ_{JA} numbers are guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

PACKAGE PIN OUTS



DM PACKAGE
(Top View)



LP PACKAGE
(Top View)

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, these specifications apply to T_A = 25ºC for LX1004C. Typ. number represents T_A = 25ºC value.

LX1004 - 1.2

Parameter	Symbol	Test Conditions	LX1004 - 1.2			Units
			Min.	Typ.	Max.	
Reverse Breakdown Voltage	V_Z	I_R = 100µA, T_A = 25°C	1.231	1.235	1.239	V
		0°≤ T_A ≤ 70°C	1.225	1.235	1.245	V
Average Temperature Coefficient	$\frac{\Delta V_Z}{\Delta Temp}$	$I_{MIN} \le I_R \le$ 20mA		20		ppm/°C
Minimum Operating Current	I_{MIN}	0°≤ T_A ≤ 70°C		8	10	µA
Reverse Breakdown Voltage Change with Current	$\frac{\Delta V_Z}{\Delta I_R}$	$I_{MIN} \le I_R \le$ 1mA, T_A = 25°C			1	mV
		$I_{MIN} \le I_R \le$ 1mA, 0° ≤ T_A ≤ 70°C			1.5	mV
		1mA ≤ I_R ≤ 20mA, T_A = 25°C			10	mV
		1mA ≤ I_R ≤ 20mA, 0° ≤ T_A ≤ 70°C			20	mV
Reverse Dynamic Impedance	r_z	I_R = 100µA, T_A = 25°C		0.2	0.6	Ω
		I_R = 100µA, 0° ≤ T_A ≤ 70°C			1.5	Ω
Wide Band Noise (RMS)	e_n	I_R = 100µA; 10Hz ≤ f ≤ 10kHz		60		µV
Long Term Stability	$\frac{\Delta V_Z}{\Delta Time}$	I_R = 100µA; T_A = 25°C ± 0.1°C		20		ppm/kHr

LX1004 - 2.5

Parameter	Symbol	Test Conditions	LX1004 - 2.5			Units
			Min.	Typ.	Max.	
Reverse Breakdown Voltage	V_Z	I_R = 100µA, T_A = 25°C	2.480	2.500	2.520	V
		0°≤ T_A ≤ 70°C	2.470		2.530	V
Average Temperature Coefficient	$\frac{\Delta V_Z}{\Delta Temp}$	$I_{MIN} \le I_R \le$ 20mA		20		ppm/°C
Minimum Operating Current	I_{MIN}	0°≤ T_A ≤ 70°C		12	20	µA
Reverse Breakdown Voltage Change with Current	$\frac{\Delta V_Z}{\Delta I_R}$	$I_{MIN} \le I_R \le$ 1mA, T_A = 25°C			1	mV
		$I_{MIN} \le I_R \le$ 1mA, 0° ≤ T_A ≤ 70°C			1.5	mV
		1mA ≤ I_R ≤ 20mA, T_A = 25°C			10	mV
		1mA ≤ I_R ≤ 20mA, 0° ≤ T_A ≤ 70°C			20	mV
Reverse Dynamic Impedance	r_z	I_R = 100µA, T_A = 25°C		0.2	0.6	Ω
		I_R = 100µA, 0° ≤ T_A ≤ 70°C			1.5	Ω
Wide Band Noise (RMS)	e_n	I_R = 100µA; 10Hz ≤ f ≤ 10kHz		120		µV
Long Term Stability	$\frac{\Delta V_Z}{\Delta Time}$	I_R = 100µA; T_A = 25°C ± 0.1°C		20		ppm/kHr

GRAPH / CURVE INDEX

Characteristic Curves — LX1004-1.2V

FIGURE #

1. TEMPERATURE DRIFT
2. REVERSE CHARACTERISTICS
3. REVERSE VOLTAGE CHANGE
4. FORWARD CHARACTERISTICS
5. REVERSE DYNAMIC IMPEDANCE
6. NOISE VOLTAGE
7. RESPONSE TIME

Characteristic Curves — LX1004-2.5V

FIGURE #

1. RESPONSE TIME
2. REVERSE CHARACTERISTICS
3. FORWARD CHARACTERISTICS
4. TEMPERATURE DRIFT
5. NOISE VOLTAGE
6. REVERSE DYNAMIC IMPEDANCE

CHARACTERISTIC CURVES — LX1004-1.2V

FIGURE 1. — TEMPERATURE DRIFT

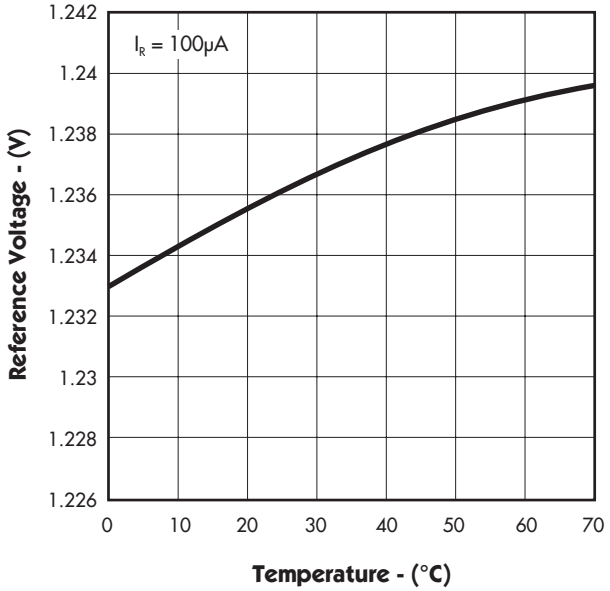


FIGURE 2. — REVERSE CHARACTERISTICS

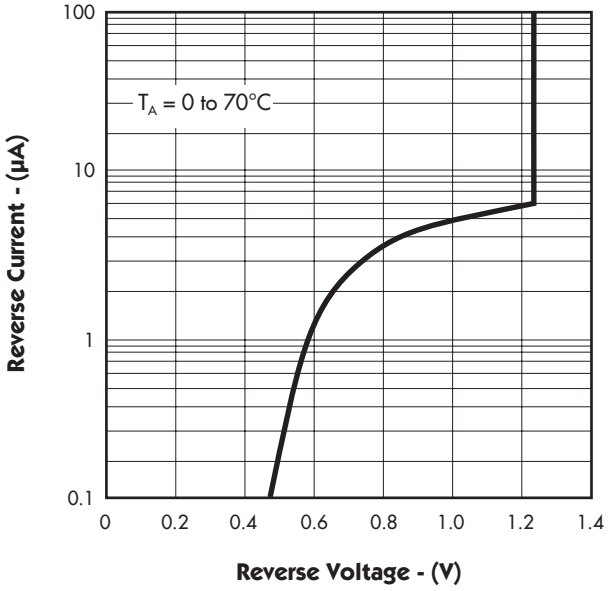


FIGURE 3. — REVERSE VOLTAGE CHANGE

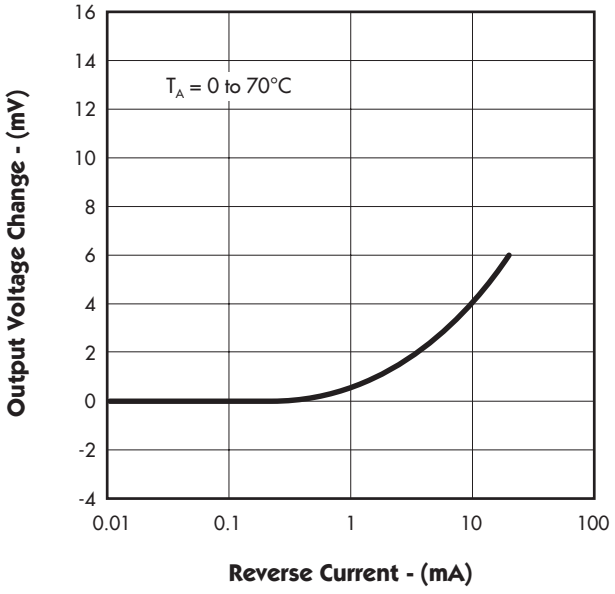
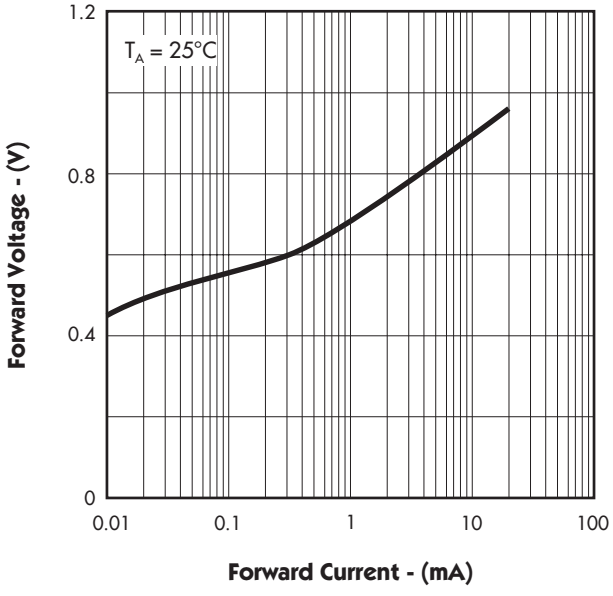


FIGURE 4. — FORWARD CHARACTERISTICS



CHARACTERISTIC CURVES — LX1004-1.2V

FIGURE 5. — REVERSE DYNAMIC IMPEDANCE

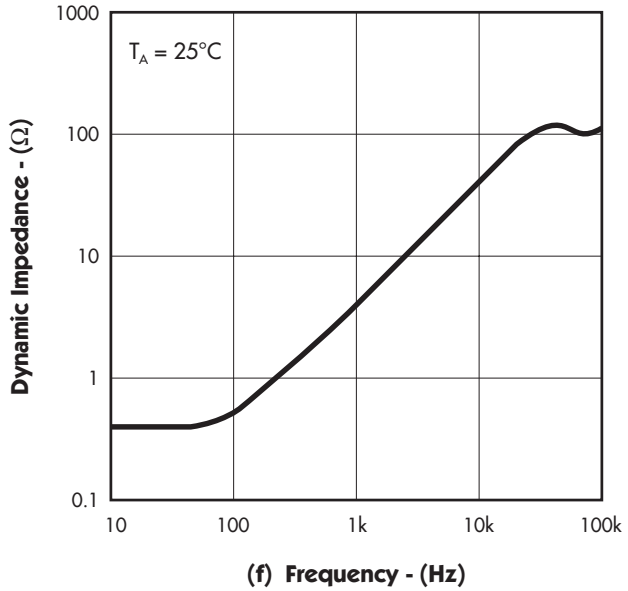


FIGURE 6. — NOISE VOLTAGE

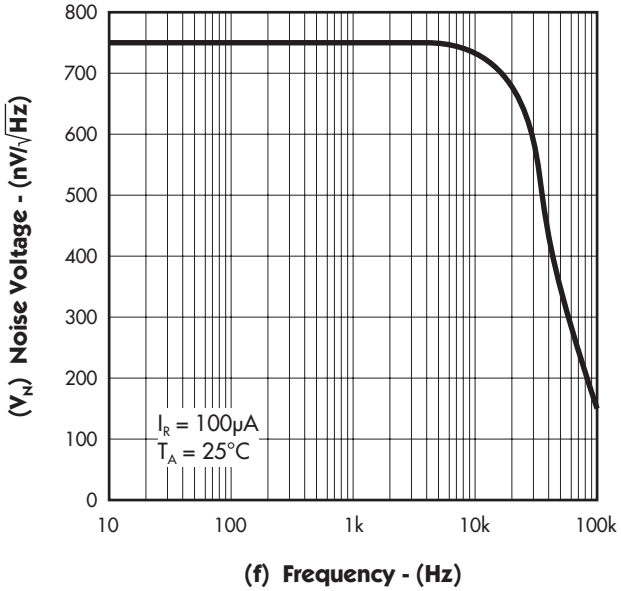
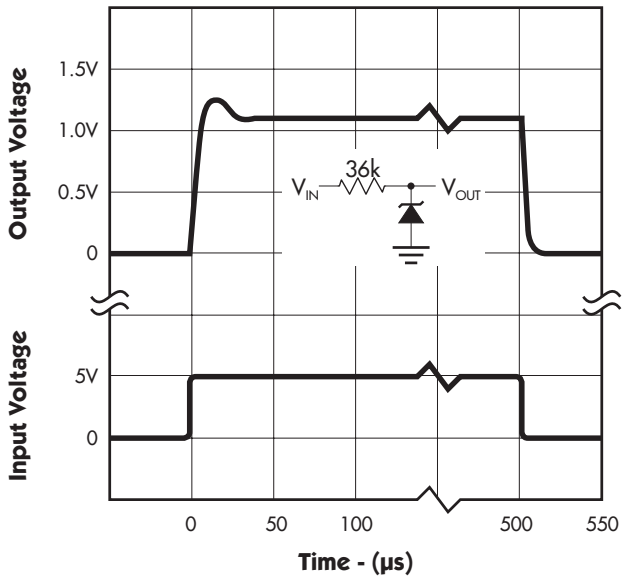


FIGURE 7. — RESPONSE TIME



CHARACTERISTIC CURVES — LX1004-2.5V

FIGURE 8. — RESPONSE TIME

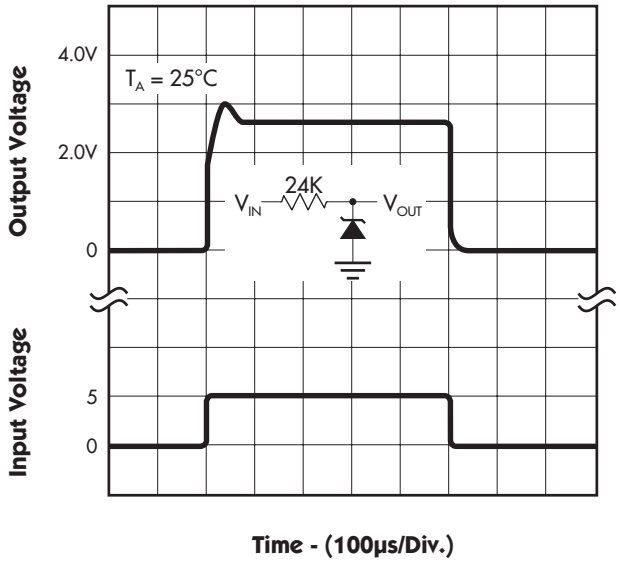


FIGURE 9. — REVERSE CHARACTERISTICS

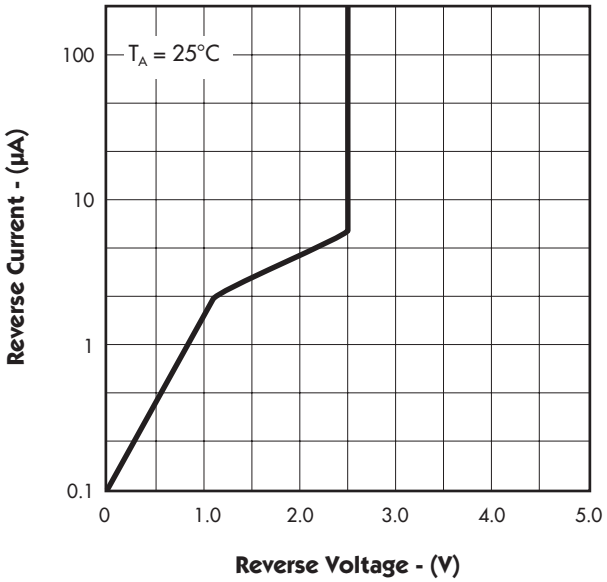


FIGURE 10. — FORWARD CHARACTERISTICS

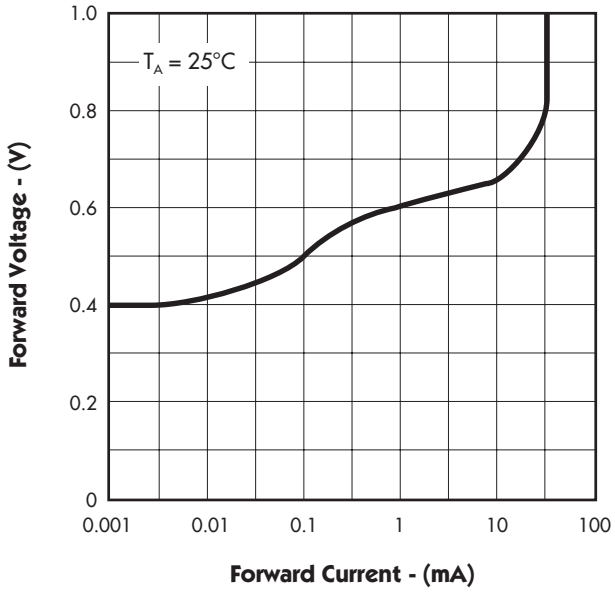
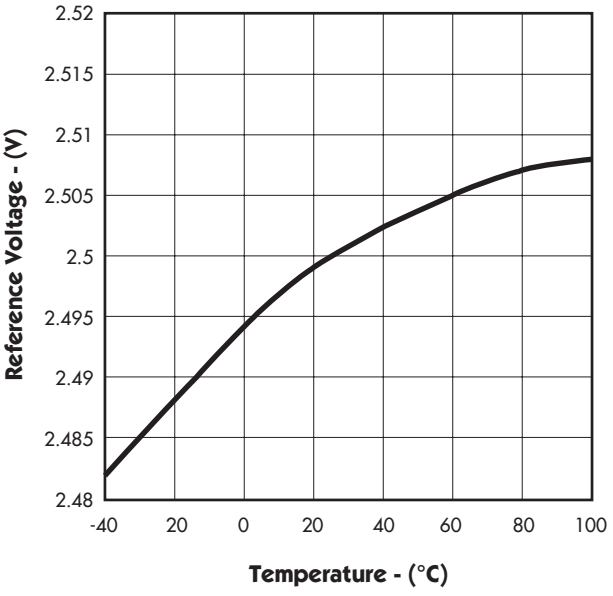


FIGURE 11. — TEMPERATURE DRIFT



CHARACTERISTIC CURVES — LX1004-2.5V

FIGURE 12. — NOISE VOLTAGE

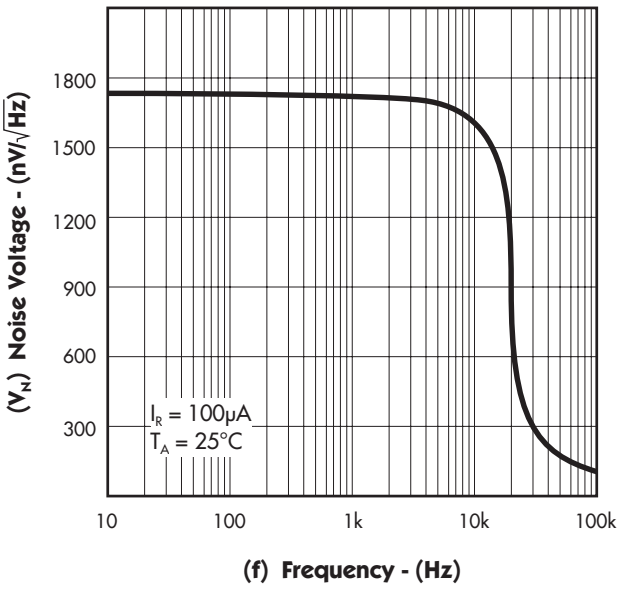


FIGURE 13. — REVERSE DYNAMIC IMPEDANCE