LT1004-1.2, LT1004-2.5 MICROPOWER INTEGRATED VOLTAGE REFERENCES

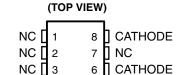
ANODE [

SLVS022M - JANUARY 1989 - REVISED MAY 2008

- Initial Accuracy
 - $-\pm4$ mV for LT1004-1.2
 - $-\pm 20$ mV for LT1004-2.5
- Micropower Operation
- Operates up to 20 mA
- Very Low Reference Impedance
- Applications:
 - Portable Meter Reference
 - Portable Test Instruments
 - Battery-Operated Systems
 - Current-Loop Instrumentation

description/ordering information

The LT1004 micropower voltage reference is a two-terminal band-gap reference diode designed to provide high accuracy and excellent temperature characteristics at very low operating currents. Optimizing the key parameters in the design, processing, and testing of the device results in specifications previously attainable only with selected units.

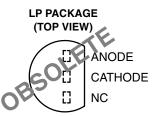


D OR PW PACKAGE

NC – No internal connection Terminals 6 and 8 are internally connected.

5

NC



NC - No internal connection

The LT1004 is a pin-for-pin replacement for the LM285 and LM385 series of references, with improved specifications. It is an excellent device for use in systems in which accuracy previously was attained at the expense of power consumption and trimming.

The LT1004C is characterized for operation from 0°C to 70°C. The LT1004I is characterized for operation from –40°C to 85°C.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



LT1004-1.2, LT1004-2.5 MICROPOWER INTEGRATED VOLTAGE REFERENCES

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description/ordering information (continued)

ORDERING INFORMATION[†]

T _A	V _Z TYP	PACKAGE [‡]		ORDERABLE PART NUMBER	TOP-SIDE MARKING
		0010 (P)	Tube of 75	LT1004CD-1-2	40.40
	401/	SOIC (D)	Reel of 2500	LT1004CDR-1-2	4C-12
	1.2 V	TOCOR (DM)	Tube of 150	LT1004CPW-1-2	40.40
000 to 7000		TSSOP (PW)	Reel of 2000	LT1004CPWR-1-2	4C-12
0°C to 70°C		0010 (P)	Tube of 75	LT1004CD-2-5	40.05
	2.5 V	SOIC (D)	Reel of 2500	LT1004CDR-2-5	4C-25
		TSSOP (PW)	Tube of 150	LT1004CPW-2-5	40.05
			Reel of 2000	LT1004CPWR-2-5	4C-25
		SOIC (D)	Tube of 75	LT1004ID-1-2	41.40
	401/		Reel of 2500	LT1004IDR-1-2	4l-12
	1.2 V	TOCOD (DIA)	Tube of 150	LT1004IPW-1-2	41.40
-40°C to 85°C		TSSOP (PW)	Reel of 2000	LT1004IPWR-1-2	4l-12
-40 C to 65 C		COIC (D)	Tube of 75	LT1004ID-2-5	41.05
	2.5 V	SOIC (D)	Reel of 2500	LT1004IDR-2-5	41-25
	2.5 V	TSSOP (PW)	Tube of 150	LT1004IPW-2-5	41-25
		1000F (FW)	Reel of 2000	LT1004IPWR-2-5	41-20

[†] For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at http://www.ti.com.

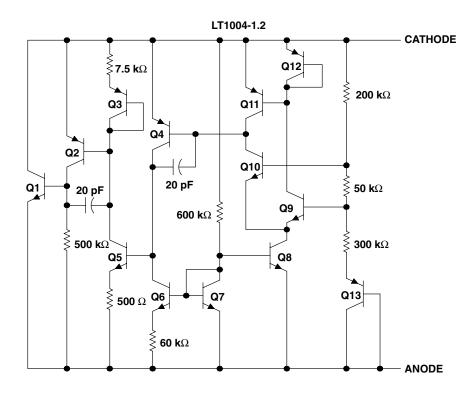
symbol

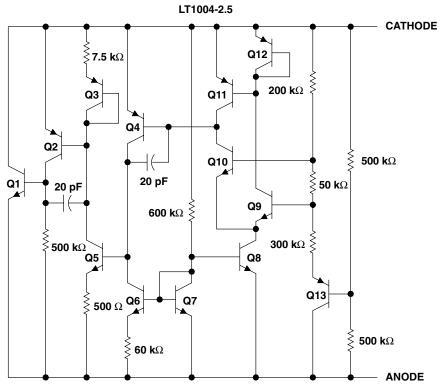




[‡] Package drawings, thermal data, and symbolization are available at http://www.ti.com/packaging.

schematic





NOTE A: All component values shown are nominal.



LT1004-1.2, LT1004-2.5 **MICROPOWER INTEGRATED VOLTAGE REFERENCES**

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Reverse current, I _R	30 mA
Forward current, I _F	10 mA
Package thermal impedance, θ _{JA} (see Notes 1 and 2): D package	97°C/W
PW package	149°C/W
Operating virtual junction temperature, T _J	150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C
Storage temperature range, T _{stg}	–65°C to 150°C

- NOTES: 1. Maximum power dissipation is a function of $T_J(max)$, θ_{JA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
 - 2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

			MIN	MAX	UNIT
_	Operation from his temperature	LT1004C	0	70	<u>ې</u>
ΙA	Operating free-air temperature	LT1004I	-40	85	٠.

electrical characteristics at specified free-air temperature

	24244555	TEST			Ľ	Γ1004-1.	2	LT	1004-2.	5		
	PARAMETER	CONDITIONS	T _A ‡		MIN	TYP	MAX	MIN	TYP	MAX	UNIT	
				25°C	1.231	1.235	1.239	2.48	2.5	2.52		
VZ	Reference voltage	$I_Z = 100 \mu A$	Full	LT1004C	1.225		1.245	2.47		2.53	V	
			range	LT1004I	1.225		1.245	2.47		2.53		
g.,	Average	$I_Z = 10 \mu A$] ,	NE00		20					/OC	
$\alpha_{ m V_Z}$ temperature coefficient of reference voltage§		I _Z = 20 μA	25°C						20		ppm/°C	
	25°C				1			1				
 	Change in reference voltage	$I_Z = I_Z(min)$ to 1 mA	Full range				1.5			1.5	mV	
ΔV_Z	with current	1 m A to 00 m A	25°C				10			10	mv	
		$I_Z = 1 \text{ mA to } 20 \text{ mA}$	Full range				20			20		
$\Delta V_{Z}/\Delta t$	Long-term change in reference voltage	I _Z = 100 μA	2	25°C		20			20		ppm/khr	
I _Z (min)	Minimum reference current		Ful	l range		8	10		12	20	μΑ	
	.		2	25°C		0.2	0.6		0.2	0.6		
Z _Z	Reference impedance	$I_Z = 100 \mu A$	Ful	Full range		1.5			1.5		Ω	
V _n	Broadband noise voltage	I _Z = 100 μA, f = 10 Hz to 10 kHz	2	25°C		60			120	_	μV	

[‡] Full range is 0°C to 70°C for the LT1004C and -40°C to 85°C for the LT1004I.



[†] Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

[§] The average temperature coefficient of reference voltage is defined as the total change in reference voltage divided by the specified temperature range.

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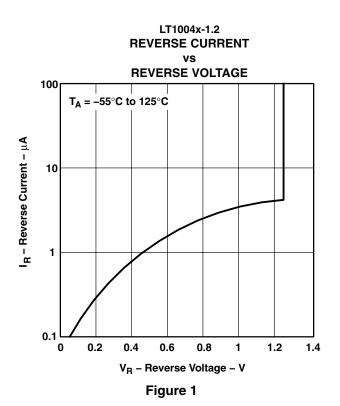
TYPICAL CHARACTERISTICS

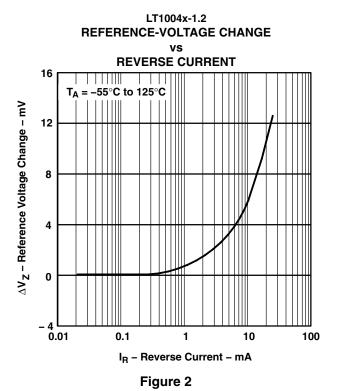
Table of Graphs

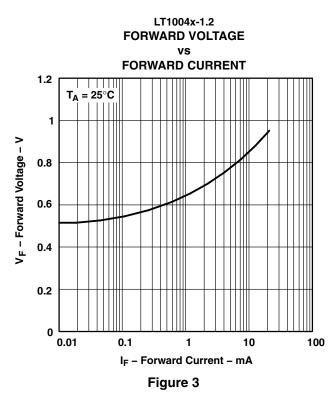
GRAPH TITLE	FIGURE
LT1004x-1.2	
Reverse current vs Reverse voltage	1
Reference-voltage change vs Reverse current	2
Forward voltage vs Forward current	3
Reference voltage vs Free-air temperature	4
Reference impedance vs Reference current	5
Noise voltage vs Frequency	6
Filtered output noise voltage vs Cutoff frequency	7
LT1004x-2.5	
Transient response	8
Reverse current vs Reverse voltage	9
Forward voltage vs Forward current	10
Reference voltage vs Free-air temperature	11
Reference impedance vs Reference current	12
Noise voltage vs Frequency	13
Filtered output noise voltage vs Cutoff frequency	14
Transient response	15

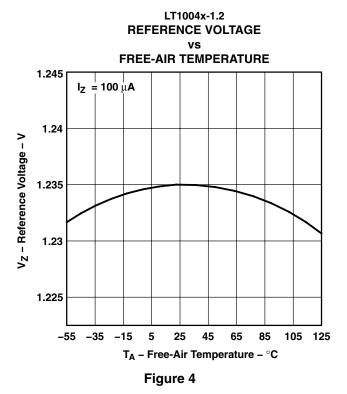


TYPICAL CHARACTERISTICS[†]





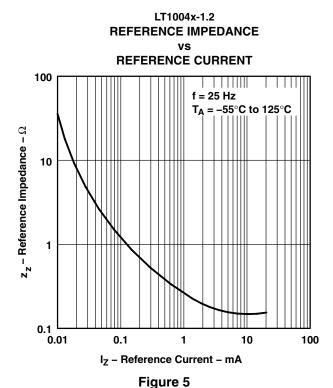


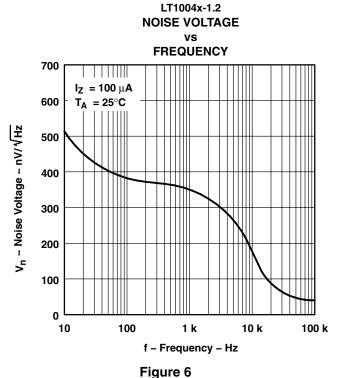


[†] Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

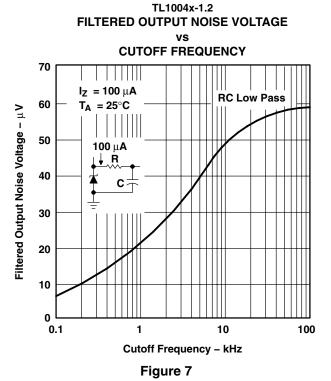


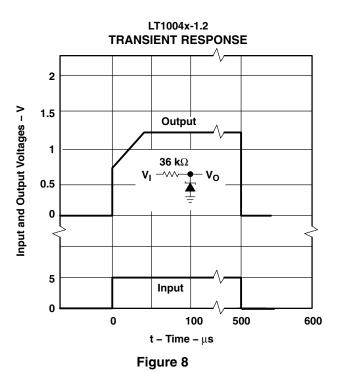
TYPICAL CHARACTERISTICS†





i iguie 3

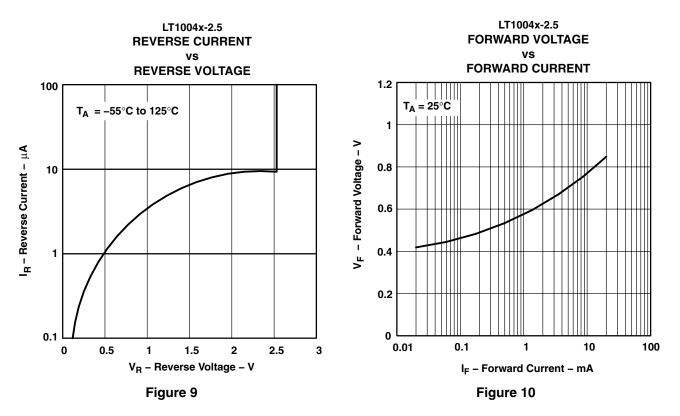




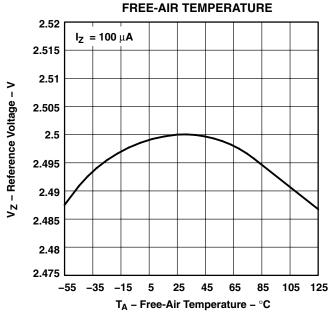
[†] Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.



TYPICAL CHARACTERISTICS†



LT1004x-2.5 REFERENCE VOLTAGE vs

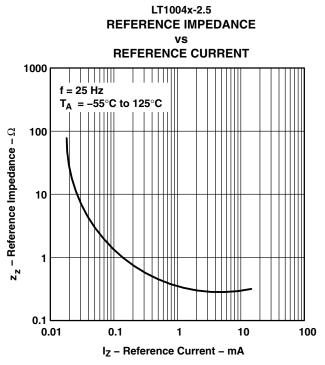


[†] Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.



Figure 11

TYPICAL CHARACTERISTICS†

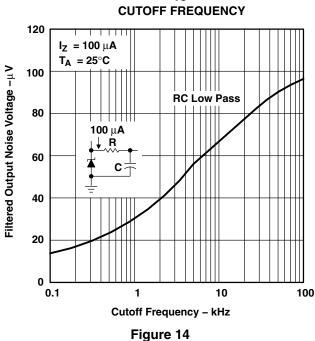


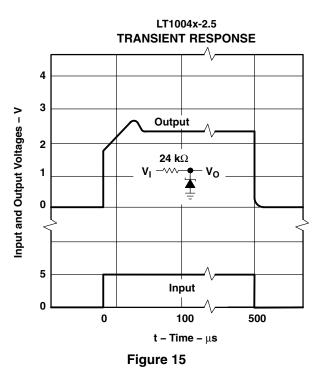
LT1004x-2.5 **NOISE VOLTAGE** ٧S **FREQUENCY** 1400 $I_Z = 100 \mu A$ = 25°C 1200 V_n - Noise Voltage - nV/VHz 1000 800 600 400 200 10 100 1 k 10 k 100 k f - Frequency - Hz

Figure 13

Figure 12

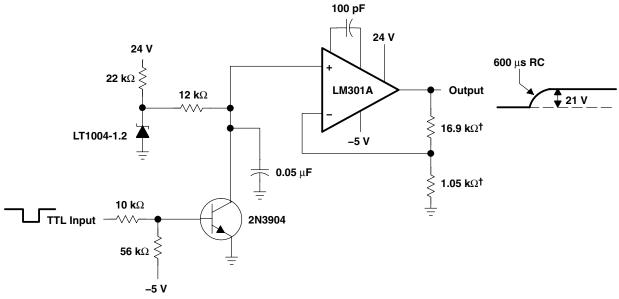
TL1004x-2.5
FILTERED OUTPUT NOISE VOLTAGE
VS
CUTOFF FREQUENCY





[†] Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.





† 1% metal-film resistors

Figure 16. V_{I(PP)} Generator for EPROMs (No Trim Required)

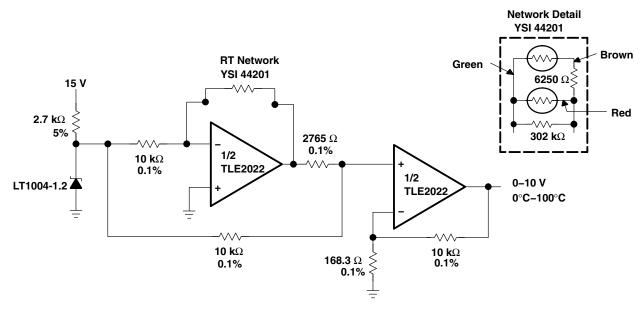


Figure 17. 0°C-to-100°C Linear-Output Thermometer

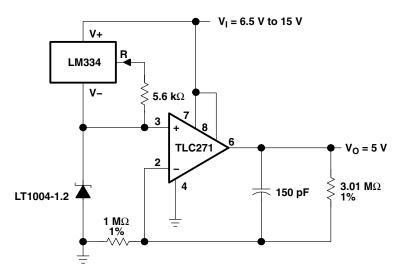
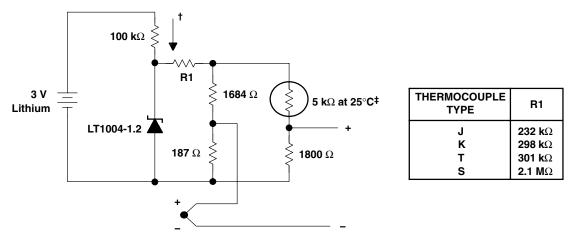


Figure 18. Micropower 5-V Reference



Figure 19. Low-Noise Reference

Figure 20. Micropower Reference From 9-V Battery



[†] Quiescent current \cong 15 μ A

NOTE A: This application compensates within $\pm 1^{\circ}$ C from 0° C to 60° C.

Figure 21. Micropower Cold-Junction Compensation for Thermocouples



[‡] Yellow Springs Inst. Co., Part #44007

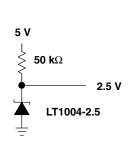


Figure 22. 2.5-V Reference

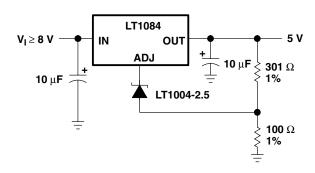
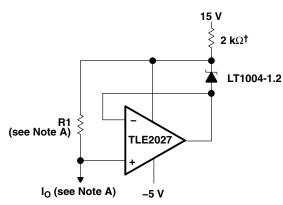


Figure 23. High-Stability 5-V Regulator

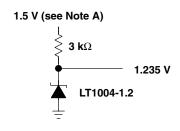


 † May be increased for small output currents NOTE A: R1 $\approx \frac{2~V}{I_O + 10~\mu A}$, $I_O = \frac{1.235~V}{R1}$

 $250 \text{ k}\Omega$ $250 \text{ k}\Omega$ $200 \text{ k}\Omega$ $200 \text{ k}\Omega$ $200 \text{ k}\Omega$ $V_{CC+} \ge 5 \text{ V}$

Figure 25. Amplifier With Constant Gain Over Temperature

Figure 24. Ground-Referenced Current Source



NOTE A: Output regulates down to 1.285 V for $I_O = 0$.

Figure 26. 1.2-V Reference From 1.5-V Battery

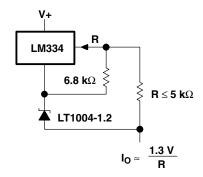
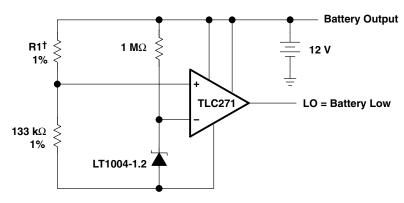


Figure 27. Terminal Current Source With Low Temperature Coefficient





 $^{^{\}dagger}$ R1 sets trip point, 60.4 k Ω per cell for 1.8 V per cell.

Figure 28. Lead-Acid Low-Battery-Voltage Detector

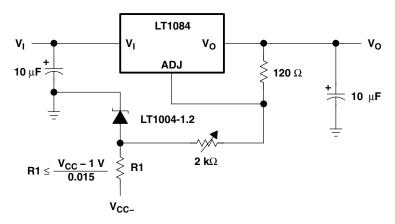


Figure 29. Variable-Voltage Supply



28-Aug-2010

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
LT1004CD-1-2	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004CD-2-5	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
LT1004CD-2-5G4	ACTIVE	SOIC	D	8		TBD	Call TI	Call TI	Purchase Samples
LT1004CDE4-1-2	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004CDE4-2-5	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
LT1004CDG4-1-2	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004CDG4-2-5	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
LT1004CDR-1-2	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributo or Sales Office
LT1004CDR-2-5	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004CDRE4-1-2	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributo or Sales Office
LT1004CDRE4-2-5	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004CDRG4-1-2	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributo or Sales Office
LT1004CDRG4-2-5	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004CLP-1-2	OBSOLETE	TO-92	LP	3		TBD	Call TI	Call TI	Samples Not Availabl
LT1004CLP-2-5	OBSOLETE	TO-92	LP	3		TBD	Call TI	Call TI	Samples Not Availabl
LT1004CPW-1-2	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004CPWE4-1-2	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004CPWG4-1-2	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples



28-Aug-2010

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
LT1004CPWR-1-2	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributo or Sales Office
LT1004CPWR-2-5	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributo or Sales Office
LT1004CPWRE4-1-2	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributo or Sales Office
LT1004CPWRE4-2-5	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributo or Sales Office
LT1004CPWRG4-1-2	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distribute or Sales Office
LT1004CPWRG4-2-5	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distribute or Sales Office
LT1004ID-1-2	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004ID-2-5	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distribute or Sales Office
LT1004IDE4-1-2	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004IDE4-2-5	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distribute or Sales Office
LT1004IDG4-1-2	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004IDG4-2-5	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distribute or Sales Office
LT1004IDR-1-2	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004IDR-2-5	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004IDRE4-1-2	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004IDRE4-2-5	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004IDRG4-1-2	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004IDRG4-2-5	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples





www.ti.com 28-Aug-2010

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
LT1004ILP-2-5	OBSOLETE	TO-92	LP	3		TBD	Call TI	Call TI	Samples Not Available
LT1004IPW-1-2	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
LT1004IPW-2-5	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004IPWE4-1-2	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
LT1004IPWE4-2-5	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004IPWG4-1-2	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
LT1004IPWG4-2-5	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
LT1004IPWR-1-2	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
LT1004IPWR-2-5	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
LT1004IPWRE4-1-2	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
LT1004IPWRE4-2-5	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
LT1004IPWRG4-1-2	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
LT1004IPWRG4-2-5	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
LT1004MD-1-2	OBSOLETE	SOIC	D	8		TBD	Call TI	Call TI	Samples Not Available
LT1004MD-2-5	OBSOLETE	SOIC	D	8		TBD	Call TI	Call TI	Samples Not Available
LT1004MDR-1-2	OBSOLETE	SOIC	D	8		TBD	Call TI	Call TI	Samples Not Available
LT1004MDR-2-5	OBSOLETE	SOIC	D	8		TBD	Call TI	Call TI	Samples Not Available
LT1004MLP-1-2	OBSOLETE	TO-92	LP	3		TBD	Call TI	Call TI	Samples Not Available
LT1004MLP-2-5	OBSOLETE	TO-92	LP	3		TBD	Call TI	Call TI	Samples Not Available

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.



PACKAGE OPTION ADDENDUM

28-Aug-2010

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

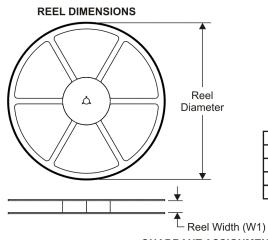
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PACKAGE MATERIALS INFORMATION

www.ti.com 8-Jul-2011

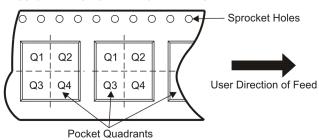
TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LT1004CDR-1-2	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
LT1004CDR-2-5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
LT1004CPWR-1-2	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
LT1004CPWR-2-5	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
LT1004IDR-1-2	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
LT1004IDR-2-5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
LT1004IPWR-1-2	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
LT1004IPWR-2-5	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1

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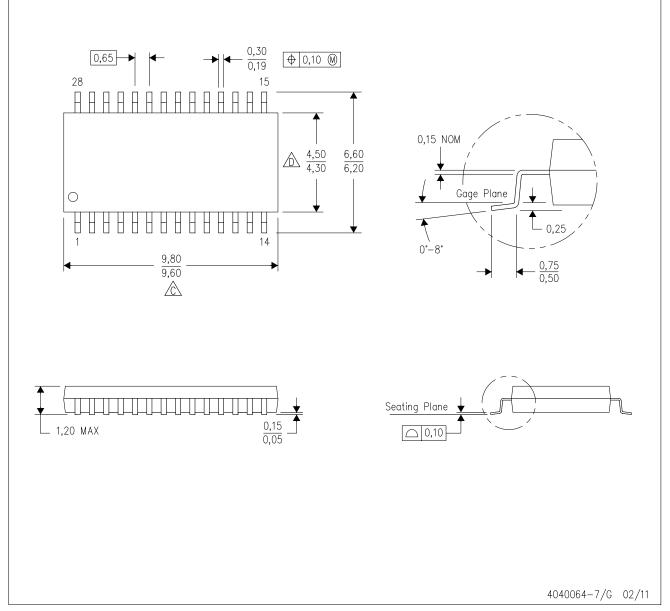


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LT1004CDR-1-2	SOIC	D	8	2500	346.0	346.0	29.0
LT1004CDR-2-5	SOIC	D	8	2500	340.5	338.1	20.6
LT1004CPWR-1-2	TSSOP	PW	8	2000	346.0	346.0	29.0
LT1004CPWR-2-5	TSSOP	PW	8	2000	346.0	346.0	29.0
LT1004IDR-1-2	SOIC	D	8	2500	340.5	338.1	20.6
LT1004IDR-2-5	SOIC	D	8	2500	340.5	338.1	20.6
LT1004IPWR-1-2	TSSOP	PW	8	2000	346.0	346.0	29.0
LT1004IPWR-2-5	TSSOP	PW	8	2000	346.0	346.0	29.0

PW (R-PDSO-G28)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



D (R-PDSO-G8)

PLASTIC SMALL OUTLINE

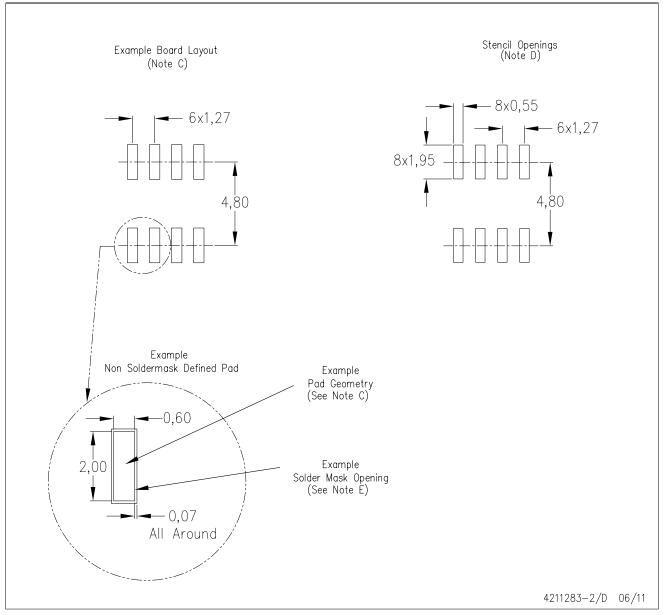


- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AA.



D (R-PDSO-G8)

PLASTIC SMALL OUTLINE

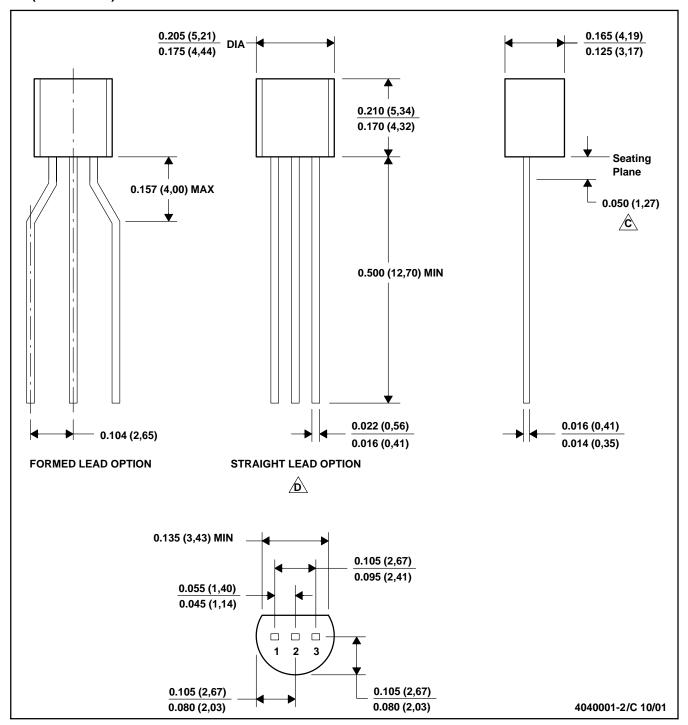


- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



LP (O-PBCY-W3)

PLASTIC CYLINDRICAL PACKAGE



NOTES: A. All linear dimensions are in inches (millimeters).

B. This drawing is subject to change without notice. $\hfill \hfill \$

C.\ Lead dimensions are not controlled within this area

D. FAlls within JEDEC TO -226 Variation AA (TO-226 replaces TO-92)

E. Shipping Method:

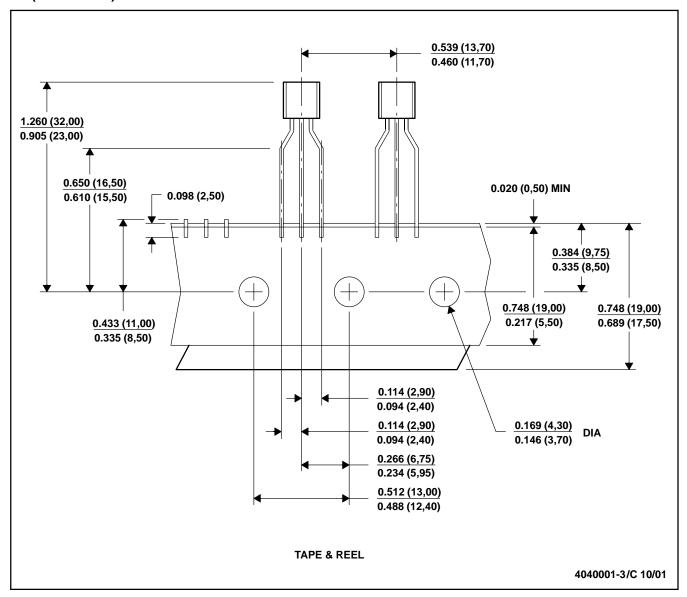
Straight lead option available in bulk pack only.

Formed lead option available in tape & reel or ammo pack.



LP (O-PBCY-W3)

PLASTIC CYLINDRICAL PACKAGE



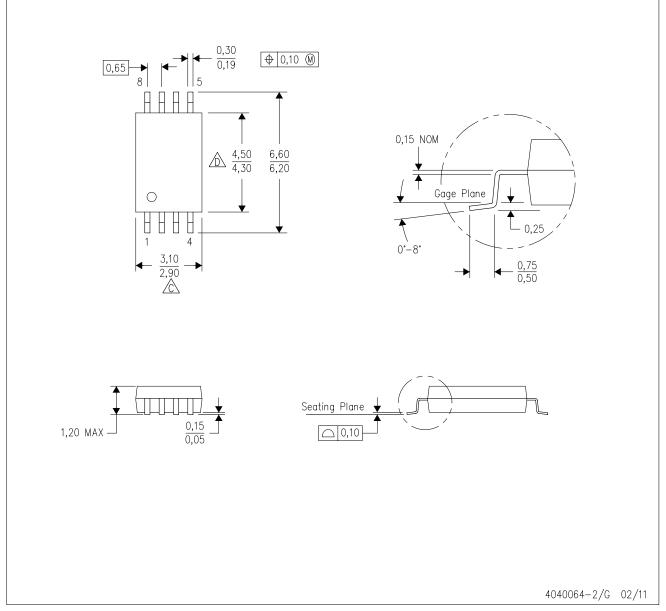
NOTES: A. All linear dimensions are in inches (millimeters).

B. This drawing is subject to change without notice.

C. Tape and Reel information for the Format Lead Option package.

PW (R-PDSO-G8)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



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