

## FEATURES

- **Guaranteed 20 ppm/°C Drift**
- **Guaranteed 40 ppm/°C Drift (SO-8 Package)**
- **20 $\mu$ A to 20mA Operation (1.2V)**
- **Dynamic Impedance: 1 $\Omega$**
- **7V, 100 $\mu$ A Reference**

## APPLICATIONS

- Portable Meters
- Precision Regulators
- Calibrators

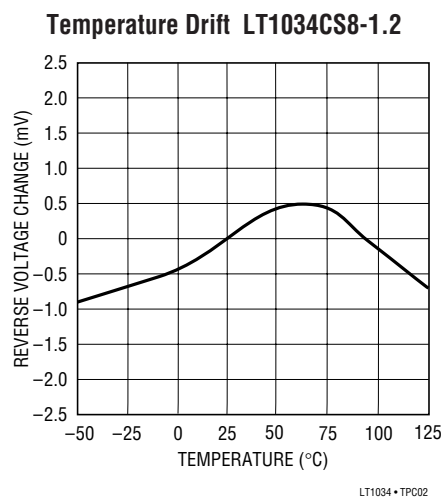
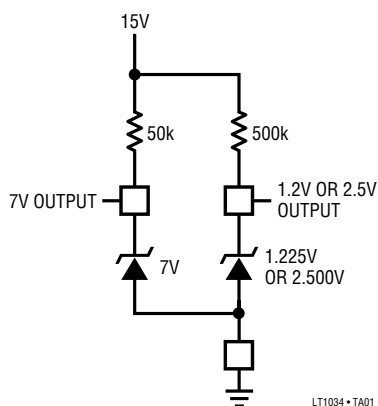
## DESCRIPTION

The LT<sup>®</sup>1034 is a micropower, precision 1.2V/2.5V reference combined with a 7V auxiliary reference. The 1.2V/2.5V reference is a trimmed, thin-film, band-gap, voltage reference with 1% initial tolerance and guaranteed 20ppm/°C temperature drift. Operating on only 20 $\mu$ A, the LT1034 offers guaranteed drift, low temperature cycling hysteresis and good long-term stability. The low dynamic impedance makes the LT1034 easy to use from unregulated supplies. The 7V reference is a subsurface zener device for less demanding applications.

The LT1034 reference can be used as a high performance upgrade of the LM385 or LT1004, where guaranteed temperature drift is desired.

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

## TYPICAL APPLICATION

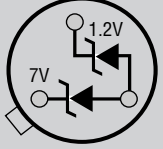
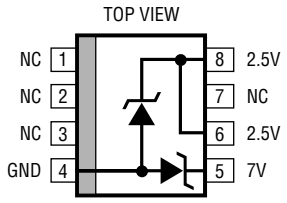
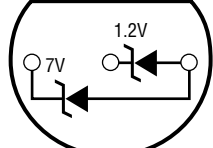


# LT1034-1.2/LT1034-2.5

## ABSOLUTE MAXIMUM RATINGS (Note 1)

|                                            |                |                                    |                |
|--------------------------------------------|----------------|------------------------------------|----------------|
| Operating Current .....                    | 20mA           | Operating Temperature              |                |
| Forward Current (Note 2) .....             | 20mA           | Commercial .....                   | 0° to 70°C     |
| Storage Temperature Range .....            | –65°C to 150°C | Industrial .....                   | –40°C to 85°C  |
| Lead Temperature (Soldering, 10 sec) ..... | 300°C          | Military ( <b>OBSOLETE</b> ) ..... | –55°C to 125°C |

## PACKAGE/ORDER INFORMATION

|                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                |                                                                                                                                                                                                                                                            |                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>BOTTOM VIEW</b></p>  <p><b>H PACKAGE</b><br/>3-LEAD TO-46 METAL CAN<br/><math>T_{JMAX} = 150^{\circ}\text{C}</math>, <math>\theta_{JA} = 440^{\circ}\text{C/W}</math>,<br/><math>\theta_{JC} = 80^{\circ}\text{C/W}</math></p> <p><b>OBSOLETE PACKAGE</b><br/>Consider the Z Package for Alternate Source</p> | <p><b>ORDER PART NUMBER</b></p> <p>LT1034BCH-1.2<br/>LT1034BCH-2.5<br/>LT1034BMH-1.2<br/>LT1034BMH-2.5<br/>LT1034CH-1.2<br/>LT1034CH-2.5<br/>LT1034MH-1.2<br/>LT1034MH-2.5</p> | <p><b>TOP VIEW</b></p>  <p><b>S8 PACKAGE</b><br/>8-LEAD PLASTIC SO<br/><math>T_{JMAX} = 175^{\circ}\text{C}</math>, <math>\theta_{JA} = 150^{\circ}\text{C/W}</math></p> | <p><b>ORDER PART NUMBER</b></p> <p>LT1034CS8-1.2<br/>LT1034CS8-2.5<br/>LT1034IS8-1.2<br/>LT1034IS8-2.5</p> <p><b>PART MARKING</b></p> <p>3401<br/>3402<br/>1034I12<br/>34I02</p> |
| <p><b>BOTTOM VIEW</b></p>  <p><b>Z PACKAGE</b><br/>3-LEAD TO-92 PLASTIC<br/><math>T_{JMAX} = 100^{\circ}\text{C}</math>, <math>\theta_{JA} = 160^{\circ}\text{C/W}</math></p>                                                                                                                                     | <p><b>ORDER PART NUMBER</b></p> <p>LT1034BCZ-1.2<br/>LT1034BCZ-2.5<br/>LT1034BIZ-1.2<br/>LT1034BIZ-2.5<br/>LT1034CZ-1.2<br/>LT1034CZ-2.5<br/>LT1034IZ-1.2<br/>LT1034IZ-2.5</p> |                                                                                                                                                                                                                                                            |                                                                                                                                                                                  |

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  $T_A = 25^\circ\text{C}$ .

| PARAMETER                             | CONDITIONS                                                      |   | LT1034-1.2 |       |       | LT1034-2.5 |      |      | UNITS                      |
|---------------------------------------|-----------------------------------------------------------------|---|------------|-------|-------|------------|------|------|----------------------------|
|                                       |                                                                 |   | MIN        | TYP   | MAX   | MIN        | TYP  | MAX  |                            |
| Reverse Breakdown Voltage             | $I_R = 100\mu\text{A}$                                          | ● | 1.210      | 1.225 | 1.240 | 2.46       | 2.5  | 2.54 | V                          |
|                                       |                                                                 |   | 1.205      | 1.225 | 1.245 | 2.43       | 2.5  | 2.57 | V                          |
| Reverse Breakdown Change with Current | (Note 4)                                                        | ● |            | 0.5   | 2.0   |            | 1.0  | 3.0  | mV                         |
|                                       |                                                                 | ● |            | 1.0   | 4.0   |            | 1.5  | 6.0  | mV                         |
|                                       | $2\text{mA} \leq I_R \leq 20\text{mA}$                          | ● |            | 4.0   | 8.0   |            | 6.0  | 16.0 | mV                         |
|                                       |                                                                 | ● |            | 6.0   | 15.0  |            | 10.0 | 20.0 | mV                         |
| Minimum Operating Current             |                                                                 | ● |            | 10    | 20    |            | 15   | 30   | $\mu\text{A}$              |
| Temperature Coefficient               | $I_R = 100\mu\text{A}$ LT1034B                                  | ● |            | 10    | 20    |            | 10   | 20   | ppm/ $^\circ\text{C}$      |
|                                       | LT1034                                                          |   |            | 20    | 40    |            | 20   | 40   | ppm/ $^\circ\text{C}$      |
| Reverse Dynamic Impedance (Note 3)    | $I_R = 100\mu\text{A}$                                          | ● |            | 0.25  | 1.0   |            | 0.5  | 1.5  | $\Omega$                   |
|                                       |                                                                 | ● |            | 0.50  | 2.0   |            | 1.0  | 2.5  | $\Omega$                   |
| Low Frequency Noise                   | $I_R = 100\mu\text{A}$ , $0.1\text{Hz} \leq F \leq 10\text{Hz}$ | ● |            | 4     |       |            | 6    |      | $\mu\text{V}_{\text{P-P}}$ |
| Long-Term Stability                   | $I_R = 100\mu\text{A}$                                          |   |            | 20    |       |            | 20   |      | ppm/ $\sqrt{\text{kh}}$    |

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at  $T_A = 25^\circ\text{C}$ .  
**7V Reference.**

| PARAMETER                             | CONDITIONS                                |   | MIN  | TYP | MAX | UNITS                   |
|---------------------------------------|-------------------------------------------|---|------|-----|-----|-------------------------|
| Reverse Breakdown Voltage             | $I_R = 100\mu\text{A}$                    | ● | 6.80 | 7.0 | 7.3 | V                       |
|                                       |                                           |   | 6.75 | 7.0 | 7.4 | V                       |
| Reverse Breakdown Change with Current | $100\mu\text{A} \leq I_R \leq 1\text{mA}$ | ● |      | 90  | 140 | mV                      |
|                                       | $100\mu\text{A} \leq I_R \leq 1\text{mA}$ | ● |      | 100 | 190 | mV                      |
|                                       | $1\text{mA} \leq I_R \leq 20\text{mA}$    | ● |      | 160 | 250 | mV                      |
|                                       | $1\text{mA} \leq I_R \leq 20\text{mA}$    | ● |      | 200 | 350 | mV                      |
| Temperature Coefficient               | $I_R = 100\mu\text{A}$                    | ● |      | 40  |     | ppm/ $^\circ\text{C}$   |
| Long-Term Stability                   | $I_R = 100\mu\text{A}$                    |   |      | 20  |     | ppm/ $\sqrt{\text{kh}}$ |

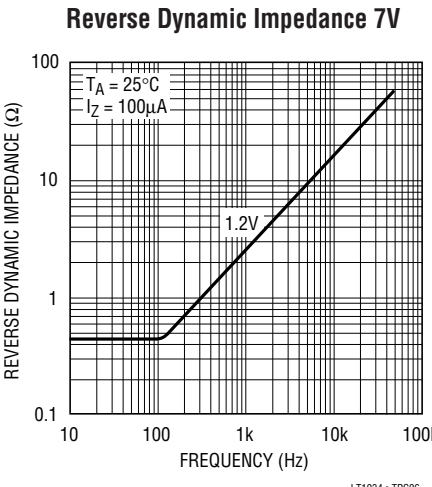
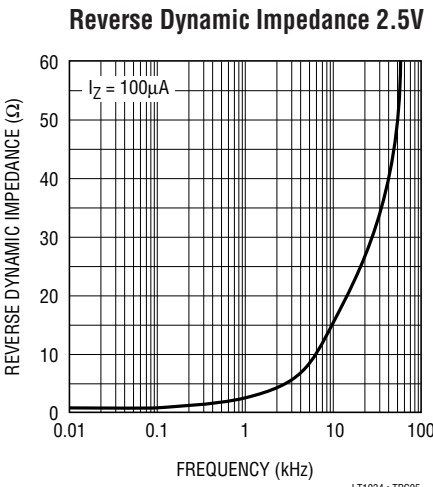
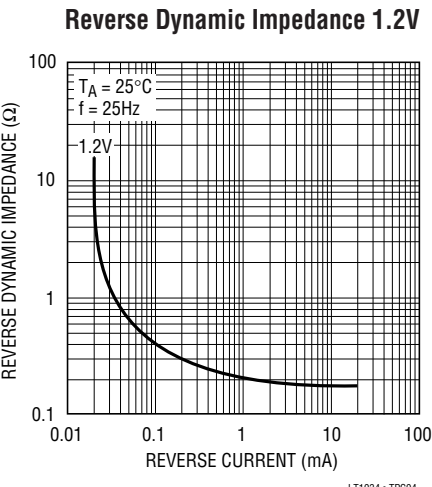
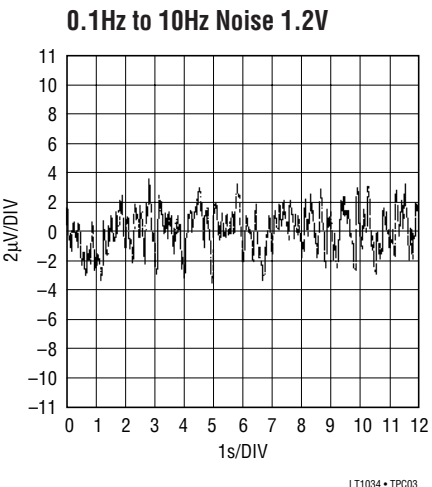
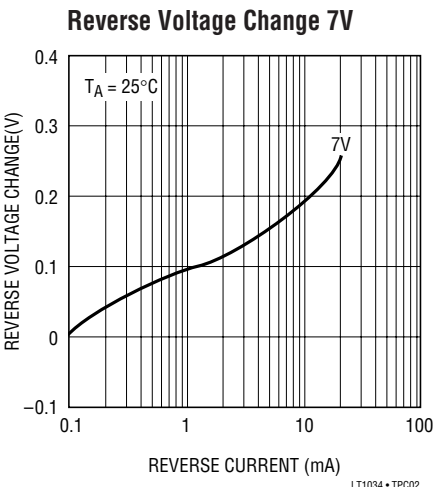
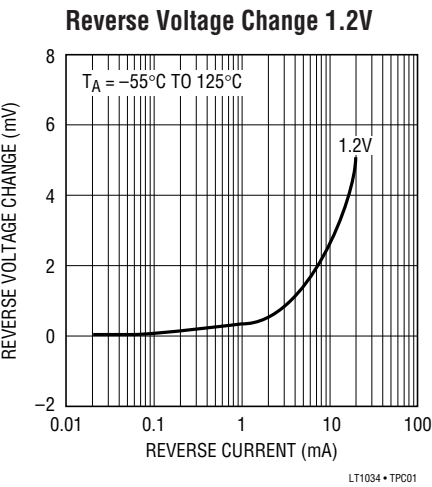
**Note 1:** Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

**Note 2:** Forward biasing either diode will affect the operation of the other diode.

**Note 3:** This parameter guaranteed by “reverse breakdown change with current” test.

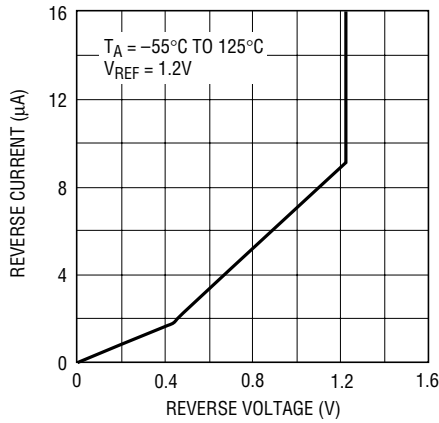
**Note 4:** For the LT1034-1.2:  $20\mu\text{A} \leq I_R \leq 2\text{mA}$ . For the LT1034-2.5:  $30\mu\text{A} \leq I_R \leq 2\text{mA}$ .

TYPICAL PERFORMANCE CHARACTERISTICS



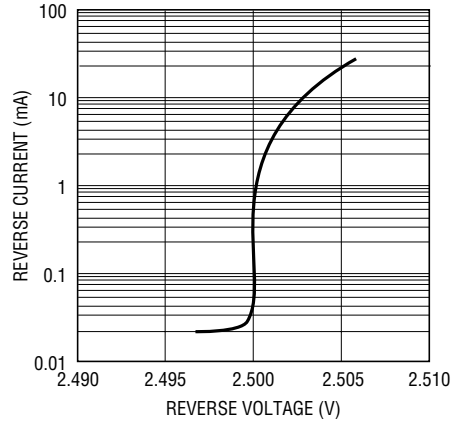
# TYPICAL PERFORMANCE CHARACTERISTICS

Reverse Characteristics 1.2V



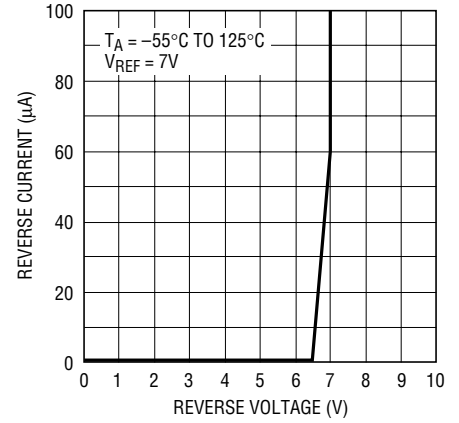
LT1034 • TPC07

Reverse Characteristics 2.5V



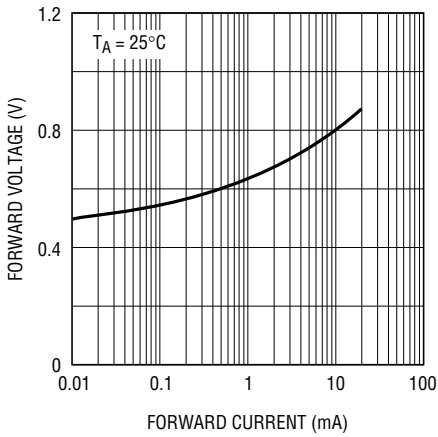
LT1034 • TPC02

Reverse Characteristics 7V



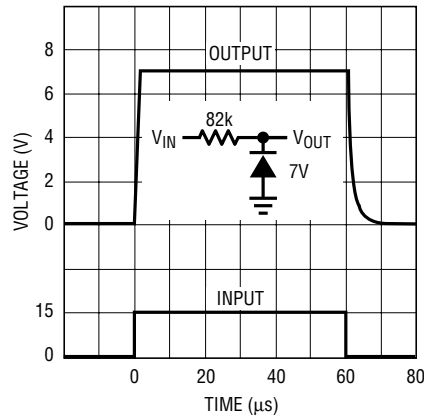
LT1034 • TPC09

Forward Characteristics



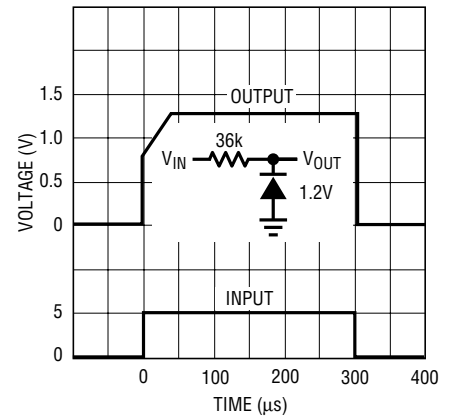
LT1034 • TPC10

Response Time



LT1180A • TPC11

Response Time



LT1180A • TPC12

0.209 – 0.219  
(5.309 – 5.537)

0.178 – 0.195  
(4.521 – 4.953)

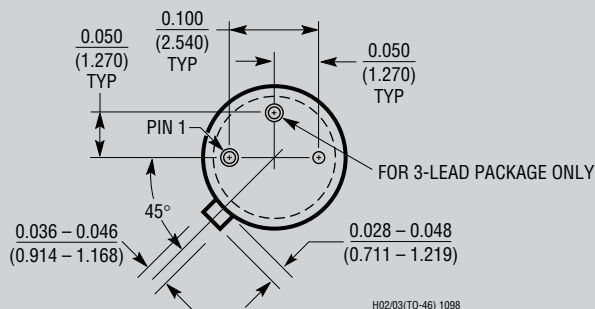
0.500  
(12.700)  
MIN

0.085 – 0.105  
(2.159 – 2.667)

0.025  
(0.635)  
MAX

0.016 – 0.021\*\*  
(0.406 – 0.533)  
DIA

REFERENCE PLANE

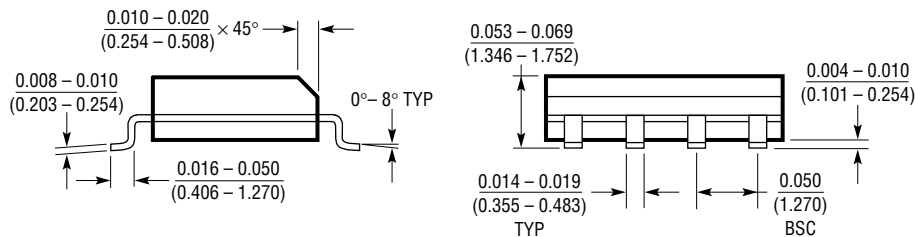


\*LEAD DIAMETER IS UNCONTROLLED BETWEEN THE REFERENCE PLANE AND 0.045" BELOW THE REFERENCE PLANE

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

## OBSOLETE PACKAGE

Figure 1: Dimensions of the test chip. The diagram shows a square chip with pins numbered 1 to 8. Dimensions are given in inches and mils. Top width: 0.189 - 0.197\* (4.801 - 5.004). Left height: 0.228 - 0.244 (5.791 - 6.197). Right height: 0.150 - 0.157\*\* (3.810 - 3.988). Bottom right label: S08 1298.

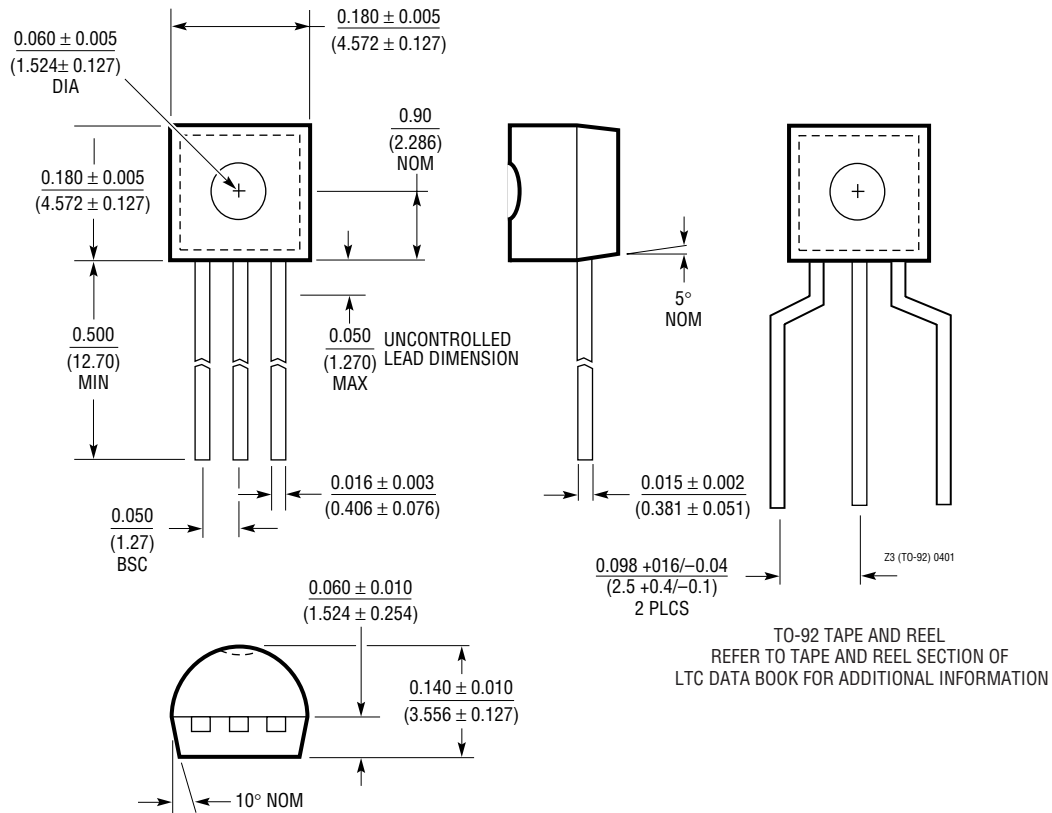


\* DIMENSION DOES NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.006" (0.152mm) PER SIDE

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

# PACKAGE DESCRIPTION

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



# LT1034-1.2/LT1034-2.5

---

## RELATED PARTS

| PART NUMBER | DESCRIPTION                            | COMMENTS                                         |
|-------------|----------------------------------------|--------------------------------------------------|
| LT1004      | Low Cost Precision Band-Gap            | Micropower, SO-8, Industrial Temperature Options |
| LT1019      | Precision Series or Shunt Band-Gap     | Low Dropout, Multiple Output Options             |
| LT1236      | Precision Series or Shunt Buried Zener | Low Noise, Low Power, Multiple Output Options    |