

Precision Micropower Shunt Voltage Reference SOT23 and TO92 Package

**Product Specification** 

Revision 1.2

February 08, 2008

## **General Description**

The LDS4041P is a precision voltage reference offered in the very small SOT23 package for applications where power and space are critical. Its precision reference is trimmed during wafer sort to insure accuracy and tight distributions centered at 1.225V. The minimum operating current is less than 40 µA to keep power consumption at a minimum. The bandgap reference has curvature correction and low dynamic impedance to ensure stable accuracy over a wide range of operating currents and temperatures

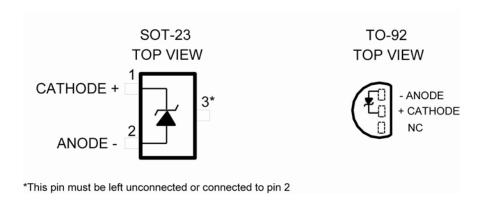
## **Applications**

- Power supplies
- Low TC low voltage reference
- Portable, Battery-Powered Equipment
- Instrumentation

### **Features**

- Offered in small SOT23-3 package
- 40uA to 12mA operation
- Low TC voltage reference 100ppm/°C
- Stable with no load capacitance
- RoHS compliant

## **Pin Configuration**



## **Pin Descriptions**

| Pin Name | Function   |  |  |  |
|----------|--|--|--|--|
| CATH     | + Input, nominally 1.225V in normal operation.     |  |  |  |
| Anode    | - Ground   |  |  |  |
| NC       | This pin must be left floating or connect to Anode |  |  |  |

## **Absolute Maximum Ratings**

Stress greater than 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 conditions beyond those indicated under recommended Operating Conditions is not implied. Exposure to "Absolute Maximum Rating" for extended periods may affect device reliability. Use of standard ESD handling precautions is required.

| Parameter                               | Value       | Units |
|---|-------------|-------|
| ANODE Forward Current                   | +50         | mA    |
| ANODE Reverse Current                   | -50         | mA    |
| Operating Junction Temperature          | 150         | °C    |
| Lead Temperature (soldering 10 seconds) | 260         | °C    |
| Storage Temperature Range               | -65 to +150 | °C    |
| ESD (Human Body Model)                  | 2           | KV    |

## **Electrical Specifications**

Electrical characteristics are guaranteed at 25°C unless otherwise stated. Ambient temperature must be de-rated based upon power dissipation and package thermal characteristics.

| Symbol                      | Parameter                                    | Conditions   |  | Min   | Тур   | Max   | Units         |
|-----------------------------|--|--|--|-------|-------|-------|---------------|
| $V_R$                       | Reverse Breakdown Voltage                    | I <sub>R</sub> =100μA  | 0.5% option  | 1.219 | 1.225 | 1.231 | V             |
| VR.                         | Treverse Breakdown voltage                   |  | -40°C <tj<85°c< td=""><td>1.211</td><td></td><td>1.239</td><td>V</td></tj<85°c<> | 1.211 |       | 1.239 | V             |
| $V_R$                       | Reverse Breakdown Voltage                    | L =100A  | 1.0% option  | 1.213 | 1.225 | 1.237 | V             |
| <b>v</b> <sub>R</sub>       | Reverse Breakdown voltage                    | 1 <sub>R</sub> = 100μΑ   | I <sub>R</sub> =100μA  |       |       | 1.249 | V             |
| $\Delta V_R$                | V <sub>R</sub> Temperature deviation         | –40°C <tj<85°c.< td=""><td></td><td>50</td><td>100</td><td>ppm/°C</td></tj<85°c.<> |  |       | 50    | 100   | ppm/°C        |
| I <sub>R(min)</sub>         | Minimum Operating Current                    |  |  |       | 18    | 40    | μΑ            |
| $\Delta V_{R}/\Delta I_{R}$ | V <sub>R</sub> deviation with I <sub>R</sub> | $I_{R(min)} \le I_R \le 12 \text{ mA}$   |  |       | 2     | 6     | mV            |
|                             |  | -40°C <tj<85°c< td=""><td></td><td>2</td><td>8</td><td>mV</td></tj<85°c<>          |  |       | 2     | 8     | mV            |
| ZR                          | Dynamic Output Impedance                     | $I_R$ =1mA, IAC = 0.1 $I_R$ , f = 120Hz  |  |       | 0.1   | 1.5   | Ω             |
| θΝ                          | Wideband Noise                               | $I_R$ =1mA, 10Hz $\leq$ f $\leq$ 10 kHz  |  |       | 20    |       | $\mu V_{rms}$ |
| $\Delta V_R$                | Long term stability                          | T =1000 hrs,   |  | 120   |       | ppm   |               |

1.210

# **Typical performance curves**

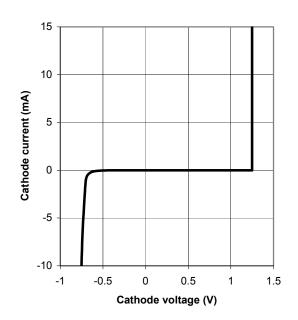
1.240
1.235
1.230
1.225
1.220
1.215

-40 -20 0 20 40 60 80 100 120

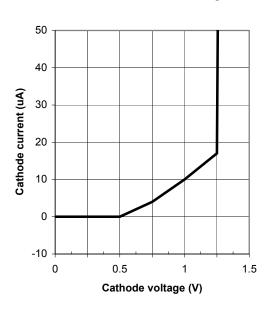
Junction temperature (degrees C)

Reference voltage

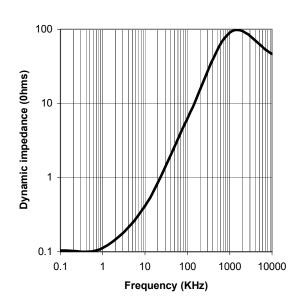
### Cathode current vs Cathode voltage



#### Cathode current vs Cathode voltage

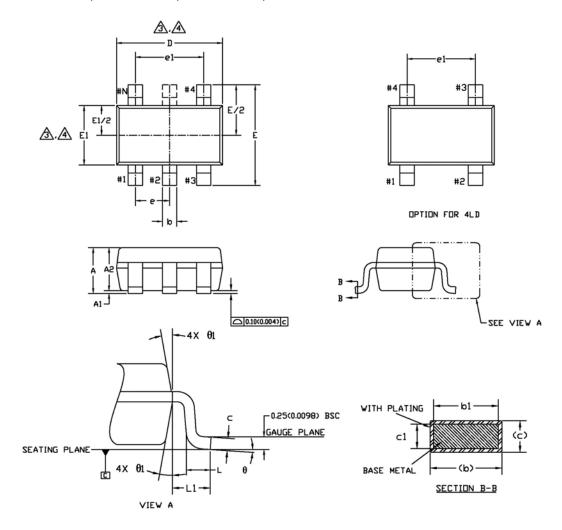


### Dynamic impedance vs frequency



## **Package Dimensions**

## SOT23-3, SOT23-4, SOT23-5, SOT23-6



| S  | COMMON                |              |           |                 |           |       |  |
|----|-----------------------|--------------|-----------|-----------------|-----------|-------|--|
| B  | DIMENSIONS MILLIMETER |              |           | DIMENSIONS INCH |           |       |  |
| Ľ  | MIN.                  | N□M.         | MAX.      | MIN.            | N□M.      | MAX.  |  |
| Α  | 1.20                  | 1.30         | 1.40      | 0.047           | 0.051     | 0.055 |  |
| A1 | 0.05                  | -            | 0.15      | 0.002           | -         | 0.006 |  |
| A2 | 0.90                  | 1.15         | 1.30      | 0.035           | 0.045     | 0.051 |  |
| b  | 0.35                  | -            | 0.50      | 0.013           | -         | 0.020 |  |
| b1 | 0.35                  | 35 0.40 0.45 |           |                 | 0.015     | 0.017 |  |
| С  | 0.08                  | -            | 0.22      | 0.003           | -         | 0.008 |  |
| c1 | 0.08                  | 0.13         | 0.20      | 0.003           | 0.005     | 0.007 |  |
| ם  | 2.90 BSC              |              |           | 0.114 BSC       |           |       |  |
| Ε  | 2.80 B2C              |              |           | 0.110 BSC       |           |       |  |
| E1 |                       | 1.60 BSC     |           |                 | 0.062 BSC |       |  |
| 6  |                       | 0.95 BSC     |           |                 | 0.037 BSC |       |  |
| e1 | 1.90 BSC              |              | 0.074 BSC |                 |           |       |  |
| L  | 0.35                  | 0.45         | 0.55      | 0.013           | 0.017     | 0.021 |  |
| L1 | 0.60 REF.             |              |           | 0.023 REF.      |           |       |  |
| θ  | 0*                    | 4*           | 8*        | 0.              | 4*        | 8*    |  |
| 61 |                       | 10° TYP      |           |                 | 10° TY    |       |  |

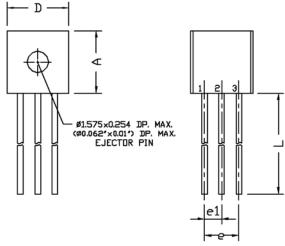
#### NOTE :

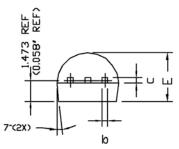
Dimensioning and tolerancing per ASME Y 14.5 M - 1994. Dimensions are in millimeters. Converted inch dimension are not necessarily exact. Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 0.15 mm per side. Dimension E1 does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.15 mm per side. Top package may be smaller than the bottom package Dimension D and E1 are determine at the outermost extremes of the plastic body exclusive of mold flash gate burrs and interlead flash.

gate burrs and interlead flash. Terminal numbers are shown for reference only. Die is facing up for molding. Die is facing down for

# **Package Dimensions**

## TO92-2, TO92-3





| Ş            | COMMON                |       |       |                 |             |       |  |
|--------------|-----------------------|-------|-------|-----------------|-------------|-------|--|
| 38<br>D<br>L | DIMENSIONS MILLIMETER |       |       | DIMENSIONS INCH |             |       |  |
| Ľ            | MIN. NOM. MAX. MIN.   |       | MIN.  | NDM.            | MAX.        |       |  |
| Α            | 4,472                 | 4,572 | 4.672 | 0.176           | 0.180       | 0.184 |  |
| b            | 0.381                 | 0.406 | 0.431 | 0.015           | 0.016       | 0.017 |  |
| c            | 0.356                 | 0.406 | 0.456 | 0.014           | 0.014 0.016 |       |  |
| D            | 4.472                 | 4.572 | 4.672 | 0.176 0.180     |             | 0.184 |  |
| Ε            | 3.456                 | 3.556 | 3.656 | 0.136           | 0.140       | 0.144 |  |
| 6            | 2.413                 | 2.540 | 2.667 | 0.095           | 0.100       | 0.105 |  |
| e1           | 1.143                 | 1.270 | 1.397 | 0.045           | 0.050       | 0.055 |  |
| L            | 13.87                 | 13.97 | 14.07 | 0.546           | 0.550       | 0.554 |  |

#### NOTES :

- 1. CONTROLLING DIMENSION : MILLIMETER. CONVERTED INCH DIMENSION ARE NOT NECESSARILY EXACT.
  2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1973.
- 3. FOR 2 LEAD PACKAGE CENTER LEAD IS CLIPPED

## **Ordering Information**

| Device   | Operating Tj | %Tol | PKG Type | Vout   | Wrap | Ordering Number    |
|----------|--------------|------|----------|--------|------|--------------------|
| LDS4041P | -40C° ≤ 85C° | 0.5  | SOT-23-3 | 1.225V | T&R  | LDS4041EZ-M3-12-TL |
| LDS4041P | -40C° ≤ 85C° | 1.0  | SOT-23-3 | 1.225V | T&R  | LDS4041EY-M3-12-TL |
| LDS4041P | -40C° ≤ 85C° | 0.5  | TO92-3   | 1.225V | T&R  | LDS4041EZ-N3-12-TL |
| LDS4041P | -40C° ≤ 85C° | 1.0  | TO92-3   | 1.225V | T&R  | LDS4041EY-N3-12-TL |

Note: Lead Free and RoHS compliant.

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