

ZRT040

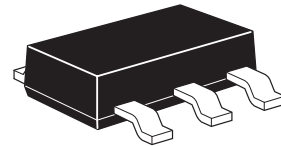
4.01V LOW POWER PRECISION REFERENCE SOURCE

DESCRIPTION

The ZRT040 is a monolithic integrated circuit providing a precise stable reference voltage of 4.01V at 500 μ A.

The circuit features a knee current of 150 μ A and operation over a wide range of temperatures and currents.

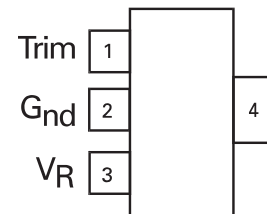
The ZRT040 is available in a SOT223 package for surface mount applications. This device offers a trim facility whereby the output voltage can be adjusted as shown in Fig.1. This facility is used when compensating for system errors or setting the reference output to a particular value. When the trim facility is not used, the pin should be left open circuit.



SOT223

FEATURES

- Trimmable output
- Excellent temperature stability
- Low output noise figure
- Available in three temperature ranges
- 1 and 2% initial voltage tolerance versions available
- No external stabilising capacitor required in most cases
- Low slope resistance
- SOT223 small outline packages



SOT223
Package suffix G
Top view (pin 4 floating or
connected to pin 2)

ORDERING INFORMATION

| DEVICE | TOL% | OPERATING TEMP. | PACKAGE | PARTMARK |
|-----------|------|-----------------|---------|----------|
| ZRT040GC2 | 2 | -40 to 85°C | SOT223 | ZRT040C2 |
| ZRT040GC1 | 1 | -40 to 85°C | SOT223 | ZRT040C1 |
| ZRT040GA1 | 1 | -55 to 125°C | SOT223 | ZRT040A1 |

A grade -55°C to 125°C
C grade -40°C to 85°C

ZRT040

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | LIMIT | UNIT |
|-----------------------------------|------------------|------------|------|
| Reverse current ⁽¹⁾ | | 75 | mA |
| Operating temperature: A grade | T _{OMP} | -55 to 125 | °C |
| C grade | | -40 to 85 | °C |
| Storage temperature | T _{STG} | -55 to 150 | °C |

⁽¹⁾ Above 25°C this figure should be linearly derated to 15mA at 125°C

POWER DISSIPATION (at T_{amb} = 25°C unless otherwise stated)

| PACKAGE | VALUE | UNIT |
|---------|-------|------|
| SOT223 | 2 | W |

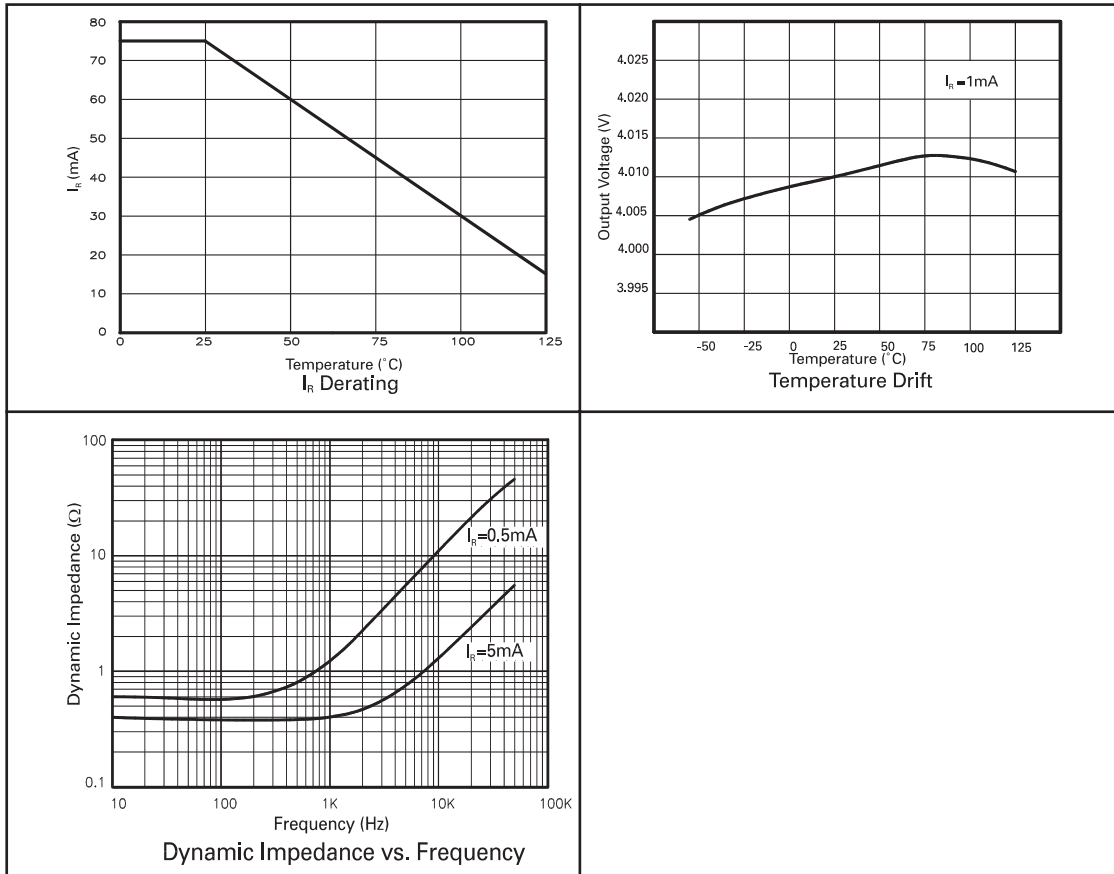
TEMPERATURE DEPENDENT ELECTRICAL CHARACTERISTICS

| SYMBOL | PARAMETER | INITIAL VOLTAGE TOLERANCE % | GRADE A | | GRADE C | | UNIT |
|-------------------------------|---|-----------------------------|---------|------|---------|------|--------|
| | | | TYP | MAX | TYP | MAX | |
| ΔV _R | Output voltage change over relevant temperature range(See note (a)) | 1 & 2 | 11.0 | 36.0 | 7.5 | 24.0 | mV |
| T _C V _R | Output voltage temperature coefficient (See note (b)) | 1 & 2 | 15.0 | 50.0 | 15.0 | 50.0 | ppm/°C |

ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated)

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-------------------------------------|--|---|------|-----------|------|----------|
| V _R | Output voltage | I _R =500μA | 3.97 | 4.01 | 4.05 | V |
| | 1% tolerance (A1,C1) | | | | | |
| | 2% tolerance (C2) | | 3.93 | 4.01 | 4.09 | V |
| ΔV _{TRIM} | Output voltage adjustment range | R _T =100kΩ | | ±5 | | % |
| T _C ΔV _{TRIM} | Change in T _C V _R with output adjustment | | | 2.5 | | ppm/°C/% |
| I _R | Operating current range | | 0.15 | | 75 | mA |
| t _{on} t _{off} | Turn-on time Turn-off time | R _L =1kΩ | | 40 0.3 | | μs |
| e _{np-p} | Output voltage noise (over the range 0.1 to 10Hz) | Peak to peak measurement | | 50 | | μV |
| R _S | Slope resistance | I _R = 0.5mA to 5mA (See note (c)) | | 1.1 | 3.0 | Ω |

TYPICAL CHARACTERISTICS



NOTES:

(a) Output change with temperature

The absolute maximum difference between the maximum output voltage and the minimum output voltage over the specified temperature range:

$$\Delta V_R = V_{max} - V_{min}$$

(b) Output temperature coefficient (TCVR)

The ratio of the output change with temperature to the specified temperature range expressed in ppm/°C:

$$T_C V_R = \frac{\Delta V_R \times 10^6}{V_R \times \Delta T} \text{ ppm/}^\circ\text{C}$$

ΔT = Full temperature range

(c) Operating current (I_R)

Maximum operating current must be derated as indicated in maximum ratings.

(d) Slope resistance (RS)

The slope resistance is defined as:

$$R_S = \frac{\text{change in } V_R}{\text{specific current range}}$$

$$\Delta I = 5 - 0.5 = 4.5 \text{ mA (typically)}$$

(e) Line regulation

The ratio of change in output voltage to the change in input voltage producing it:

$$\frac{R_S \times 100}{V_R \times R_{SOURCE}} \% / V$$

ZRT040

SCHEMATIC DIAGRAM

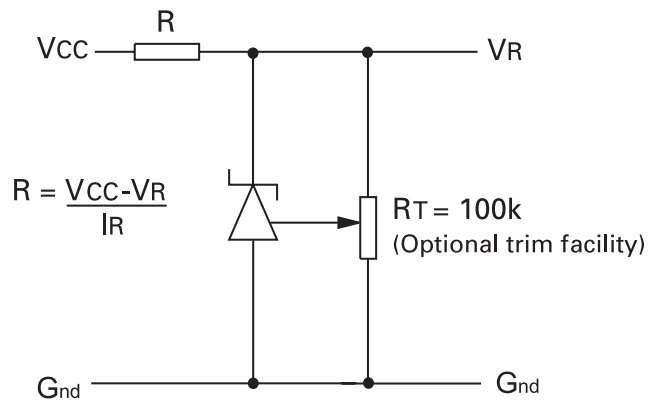
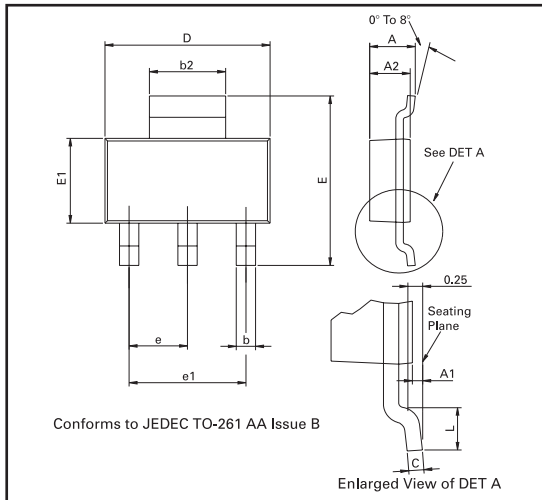


Figure 1:
This circuit will allow the reference to be trimmed over a wide range. The device is specified over a $\pm 5\%$ trim range.

ZRT040

PACKAGE OUTLINE



Controlling dimensions are in millimeters. Approximate conversions are given in inches

PACKAGE DIMENSIONS

| DIM | Millimeters | | Inches | | DIM | Millimeters | | Inches | |
|-----|-------------|------|--------|-------|-----|-------------|------|------------|-------|
| | Min | Max | Min | Max | | Min | Max | Min | Max |
| A | - | 1.80 | - | 0.071 | e | 2.30 BSC | | 0.0905 BSC | |
| A1 | 0.02 | 0.10 | 0.0008 | 0.004 | e1 | 4.60 BSC | | 0.181 BSC | |
| b | 0.66 | 0.84 | 0.026 | 0.033 | E | 6.70 | 7.30 | 0.264 | 0.287 |
| b2 | 2.90 | 3.10 | 0.114 | 0.122 | E1 | 3.30 | 3.70 | 0.130 | 0.146 |
| C | 0.23 | 0.33 | 0.009 | 0.013 | L | 0.90 | - | 0.0355 | - |
| D | 6.30 | 6.70 | 0.248 | 0.264 | | - | - | - | - |

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