

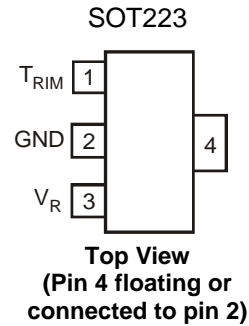
**Description**

The ZRT050 is a monolithic integrated circuit providing a precise stable reference voltage of 4.9V at 500µA.

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

The ZRT050 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 the schematic diagram. 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.

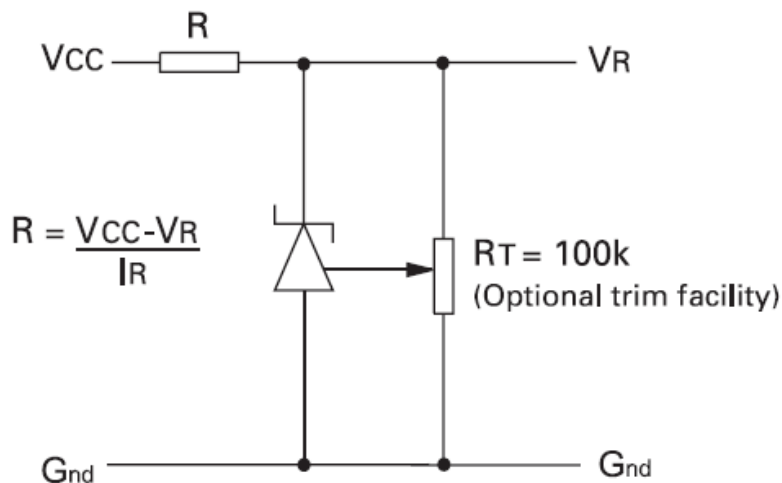
**Pin Assignments**



**Features**

- Trimmable output
- Excellent temperature stability
- Low output noise figure
- -40 to 85°C operating temperature range
- 1% initial voltage tolerance
- No external stabilizing capacitor required in most cases
- Low slope resistance
- No derating required at low temperatures
- SOT223 small outline package

**Schematic Diagram**



This circuit will allow the reference to be trimmed over a wide range. The device is specified over a ±5% trim range.

**Absolute Maximum Ratings**

| Parameter                      | Symbol           | Value       | Unit |
|--------------------------------|------------------|-------------|------|
| Reverse Current (Note 1)       |                  | 60          | mA   |
| Operating Temperature: C grade | T <sub>OMP</sub> | -40 to +85  | °C   |
| Storage Temperature            | T <sub>STG</sub> | -55 to +150 | °C   |

Notes: 1. Above 72°C this figure should be linearly derated to 15mA @ 125°C

**Power Dissipation (@T<sub>amb</sub> = 25°C unless otherwise stated)**

| Package | Value | Unit |
|---------|-------|------|
| SOT223  | 2     | W    |

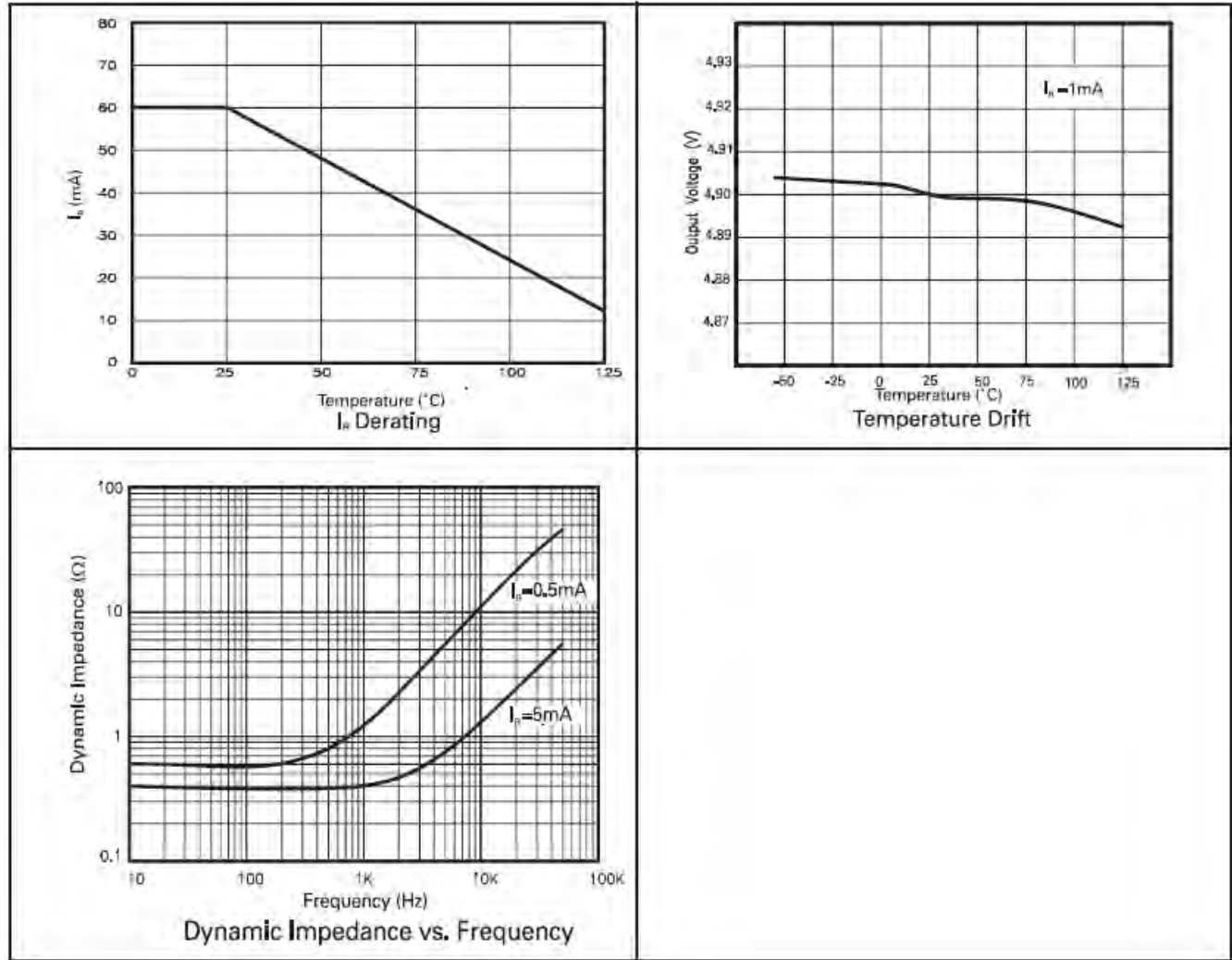
**Temperature Dependent Electrical Characteristics**

| Symbol                        | Parameter  | Grade C<br>-40 to 85°C |      | Unit   |
|-------------------------------|--|------------------------|------|--------|
|                               |  | Typ.                   | Max. |        |
| $\Delta V_R$                  | Output voltage change over operating temperature range | 5.4                    | 17.2 | mV     |
| T <sub>C</sub> V <sub>R</sub> | Output voltage temperature coefficient (see Note B)    | 15.0                   | 50.0 | ppm/°C |

**Electrical Characteristics (@T<sub>amb</sub> = 25°C unless otherwise stated)**

| Symbol                              | Parameter  | Conditions                    | Min. | Typ.       | Max. | Unit   |
|-------------------------------------|--|-------------------------------|------|------------|------|--------|
| V <sub>R</sub>                      | Output voltage:<br>1% tolerance                                | I <sub>R</sub> = 500 μA       | 4.85 | 4.90       | 4.95 | V      |
| V <sub>TRIM</sub>                   | Output voltage adjustment range                                | R <sub>T</sub> = 100kΩ        |      | ±5         |      | %      |
| T <sub>C</sub> V <sub>TRIM</sub>    | Change in T <sub>C</sub> V <sub>R</sub> with output adjustment |                               |      | 2.5        |      | ppm/°C |
| I <sub>R</sub>                      | Operating current range  | (See Note C)                  | 0.15 |            | 60   | mA     |
| t <sub>on</sub><br>t <sub>off</sub> | Turn-on time<br>Turn-off time                                  | R <sub>L</sub> = 1kΩ          |      | 100<br>0.3 |      | μs     |
| e <sub>np-p</sub>                   | Output voltage noise<br>(over the range 0.1 to 10Hz)           | Peak to peak measurement      |      | 50         |      | μV     |
| R <sub>S</sub>                      | Slope resistance (see Note D)                                  | I <sub>R</sub> = 0.5mA to 5mA |      | 1.25       | 2.0  | Ω      |

**Typical Characteristics**



**(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 ( $T_C V_R$ )**

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

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

$\Delta T$  = 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:

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

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

**(e) Line regulation**

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

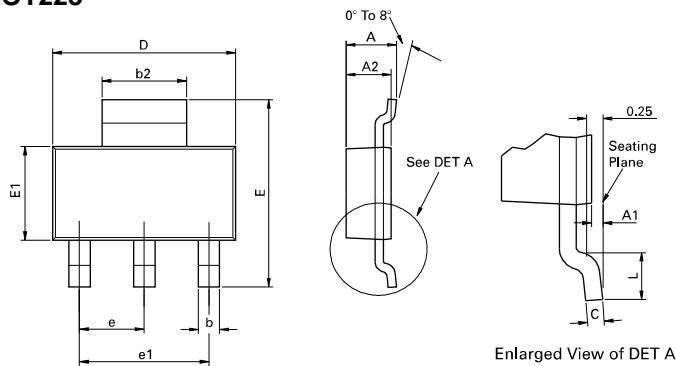
$$\frac{R_S \times 100}{V_R \times R_{SOURCE}} \% / V$$

**Ordering Information**

| Device    | Tol % | Operating Temperature | Part Mark | Reel Size | Tape Width | Quantity Per Reel |
|-----------|-------|-----------------------|-----------|-----------|------------|-------------------|
| ZRT050GC1 | 1     | -40 to +85°C          | ZRT050C1  | 7"        | 12mm       | 1000              |

**Package Outline Dimensions (All Dimensions in mm)**

**SOT223**



Conforms to JEDEC TO-261 AA Issue B

| 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        | -    | 0.355      | -     |
| D   | 6.30        | 6.70 | 0.248  | 0.264 | -   | -           | -    | -          | -     |

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inches.

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