ZRT040

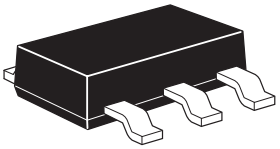
4.01V LOW POWER PRECISION REFERENCE SOURCE

DESCRIPTION

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

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

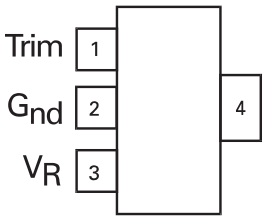
The ZRT040 is available in a SOT223 package for surface mount applications. This device offers a trim facility whereby the output voltage can be adjusted as shown in Fig.1. This facility is used when compensating for system errors or setting the reference output to a particular value. When the trim facility 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

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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Reverse current [1]		75	mA
Operating temperature:	T_{OMP}		
A grade		-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					
	1% tolerance (A1,C1)	I_R=500µA	3.97	4.01	4.05	V
	2% tolerance (C2)		3.93	4.01	4.09	V
ΔV_{TRIM}	Output voltage adjustment range	R_T=100kΩ		±5		%
$T_C \Delta V_{TRIM}$	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

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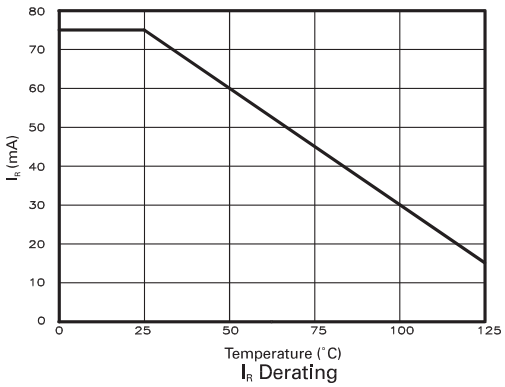
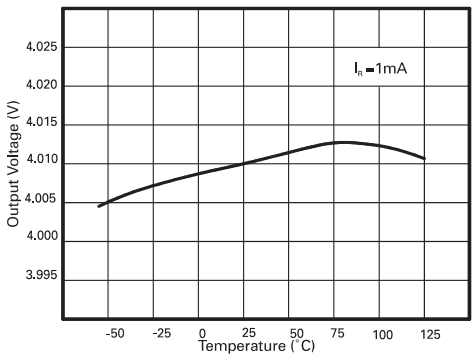
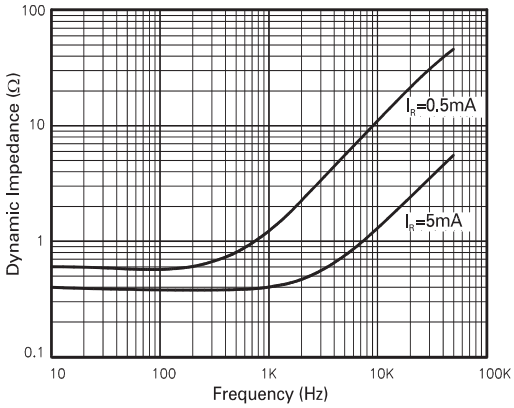
TYPICAL CHARACTERISTICS



I_R Derating



Temperature Drift



Dynamic Impedance vs. Frequency

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 (T_CV_R)

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

$$T_C V_R = \frac{\Delta V_R x 10^6}{V_R x \Delta T} ppm°C$$

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:

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

$\Delta I = 5 - 0.5 = 4.5mA$ *(typically)*

(e) Line regulation

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

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

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SCHEMATIC DIAGRAM

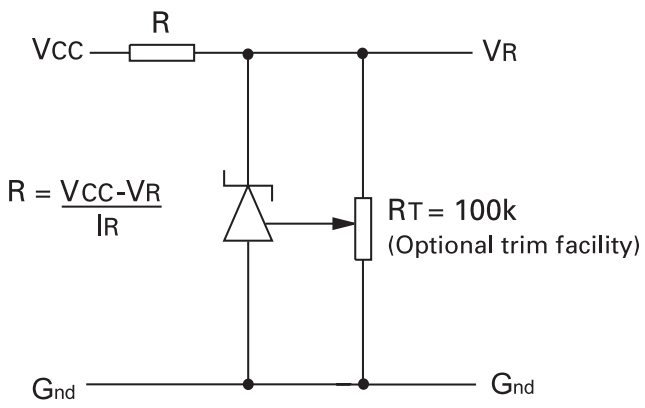

Figure 1:
This circuit will allow the reference to be trimmed over a wide range. The device is specified over a ±5% trim range.

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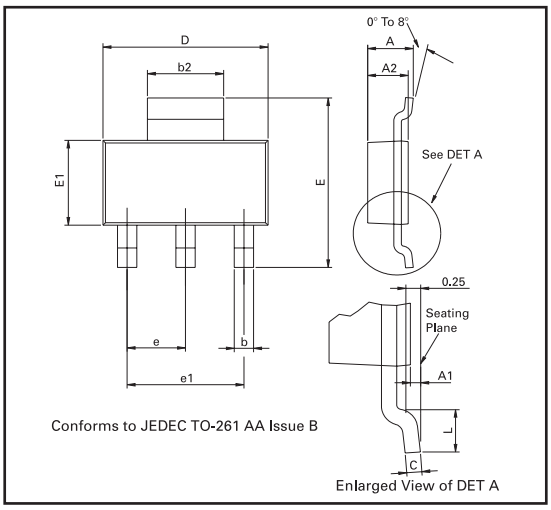
PACKAGE OUTLINE



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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