

# ZRT040

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## 4.01V LOW POWER PRECISION REFERENCE SOURCE

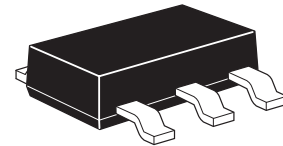
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### DESCRIPTION

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

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

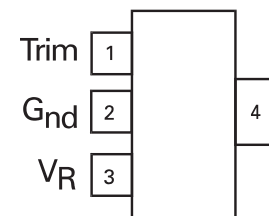
The ZRT040 is available in a SOT223 package for surface mount applications. This device offers a trim facility whereby the output voltage can be adjusted as shown in Fig.1. This facility is used when compensating for system errors or setting the reference output to a particular value. When the trim facility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

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## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Reverse current <sup>(1)</sup>		75	mA
Operating temperature: A grade	T <sub>OMP</sub>	-55 to 125	°C
C grade		-40 to 85	°C
Storage temperature	T <sub>STG</sub>	-55 to 150	°C

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

## POWER DISSIPATION (at T<sub>amb</sub> = 25°C unless otherwise stated)

PACKAGE	VALUE	UNIT
SOT223	2	W

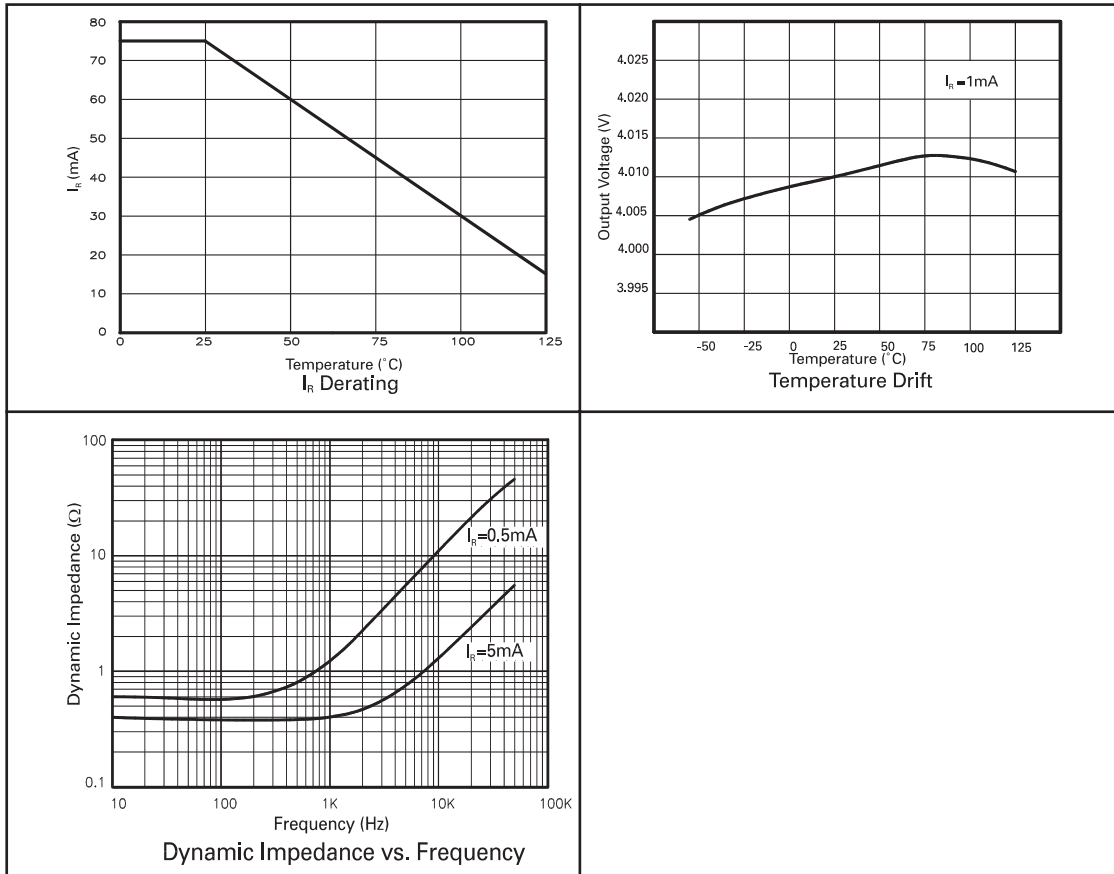
## TEMPERATURE DEPENDENT ELECTRICAL CHARACTERISTICS

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

## ELECTRICAL CHARACTERISTICS (at T<sub>amb</sub> = 25°C unless otherwise stated)

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V <sub>R</sub>	Output voltage	I <sub>R</sub> =500μA	3.97	4.01	4.05	V
	1% tolerance (A1,C1)					
	2% tolerance (C2)		3.93	4.01	4.09	V
ΔV <sub>TRIM</sub>	Output voltage adjustment range	R <sub>T</sub> =100kΩ		±5		%
T <sub>C</sub> ΔV <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		0.15		75	mA
t <sub>on</sub> t <sub>off</sub>	Turn-on time Turn-off time	R <sub>L</sub> =1kΩ		40 0.3		μs
e <sub>np-p</sub>	Output voltage noise (over the range 0.1 to 10Hz)	Peak to peak measurement		50		μV
R <sub>S</sub>	Slope resistance	I <sub>R</sub> = 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:

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

$\Delta T$  = Full temperature range

#### (c) Operating current (I<sub>R</sub>)

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

#### (d) Slope resistance (RS)

The slope resistance is defined as:

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

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

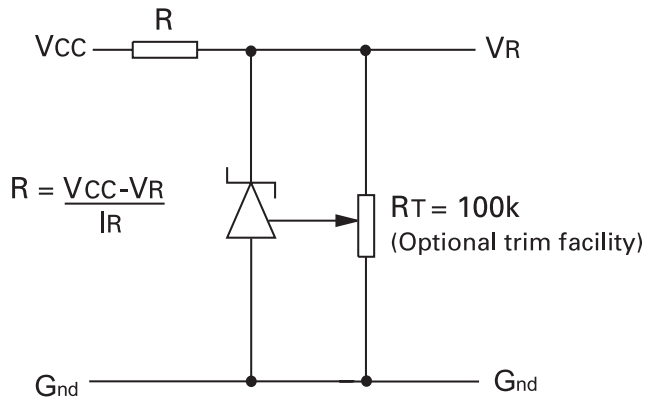
#### (e) Line regulation

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

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

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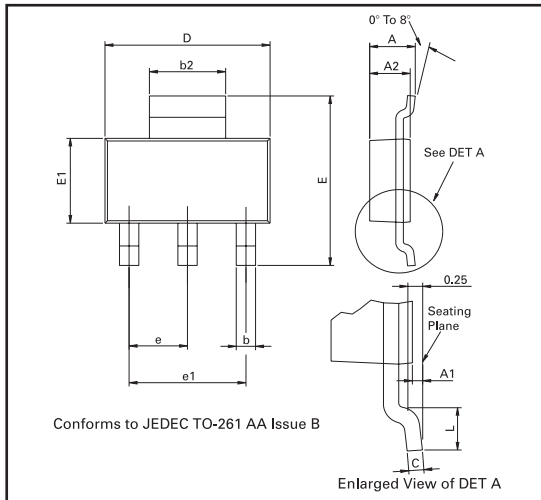
## SCHEMATIC DIAGRAM



**Figure 1:**  
This circuit will allow the reference to be trimmed over a wide range. The device is specified over a  $\pm 5\%$  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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Europe	Americas	Asia Pacific
Zetex plc Fields New Road Chadderton Oldham, OL9 8NP United Kingdom Telephone (44) 161 622 4444 Fax: (44) 161 622 4446 hq@zetex.com	Zetex GmbH Streitfeldstraße 19 D-81673 München Germany Telefon: (49) 89 45 49 49 0 Fax: (49) 89 45 49 49 49 europe.sales@zetex.com	Zetex Inc 700 Veterans Memorial Hwy Hauppauge, NY 11788 USA Telephone: (1) 631 360 2222 Fax: (1) 631 360 8222 usa.sales@zetex.com
		Zetex (Asia) Ltd 3701-04 Metroplaza Tower 1 Hing Fong Road Kwai Fong Hong Kong Telephone: (852) 26100 611 Fax: (852) 24250 494 asia.sales@zetex.com

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