PRECISION 5.0 VOLT MICROPOWER VOLTAGE REFERENCE

Description

The DIODES™ ZR4040-5 uses a bandgap circuit design to achieve a precision micropower voltage reference of 5.0 volts. The device is available in a small outline surface mount package, ideal for applications where space saving is important, as well as packages for through hole requirements.

The ZR4040-5 design provides a stable voltage without an external capacitor and is stable with capacitive loads. The ZR4040-5 is recommended for operation between 60µA and 15mA and so is ideally suited for low power and battery powered applications.

Excellent performance is maintained to an absolute maximum of 25mA, however the rugged design and 20 volt processing allows the reference to withstand transient effects and currents up to 200mA. Superior switching capability allows the device to reach stable operating conditions in only a few microseconds.

Features

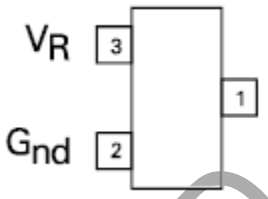
- Small Outline SOT23 Package
- No Stabilizing Capacitor Required
- Typical T_C 20ppm/°C
- Typical Slope Resistance 0.33Ω
- 2% and 1% Tolerance
- Automotive Temperature Range
- Operating Current 60µA to 15mA
- Transient Response, Stable in Less than 10µs
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Applications

- Battery powered and portable equipment
- Metering and measurement systems
- Instrumentations
- Test equipment
- Data acquisition systems
- Precision power supplies

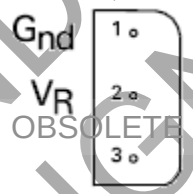
Pin Assignments

SOT23 Package Suffix - F



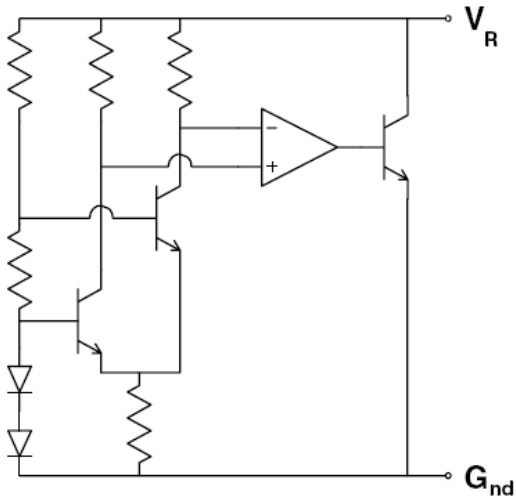
Top View
Pin 1 Floating or Connected to Pin 2

E-Line, 3 Pins, Rev Package Suffix - R



Bottom View
Pin 3 Floating or Connected to Pin 1

Typical Application Circuit



Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Absolute Maximum Ratings (Voltages to GND, unless otherwise stated.)

Parameter	Rating	Unit
Reverse Current	25	mA
Forward Current	25	mA
Operating Temperature	-55 to +125	°C
Storage Temperature	-55 to +125	°C
Power Dissipation (T_{AMB} = +25°C) SOT23	330	mW

Electrical Characteristics (Test condition: T_{AMB} = +25°C, unless otherwise specified.)

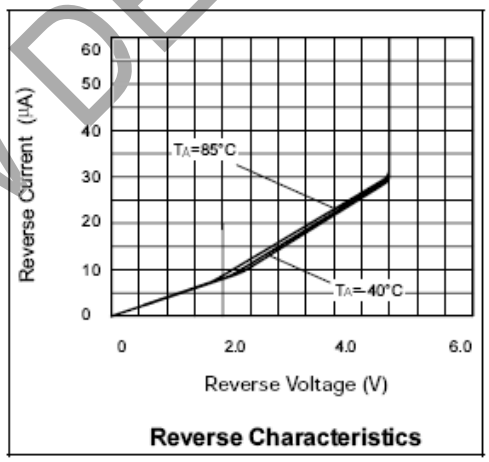
Symbol	Parameter	Condition	Min.	Typ.	Max.	Tol. (%)	Unit
V_R	Reverse Breakdown Voltage	I_R = 150µA	4.95	5.0	5.05	1	V
I_{MIN}	Minimum Operating Current	—	—	30	60	—	µA
I_R	Recommended Operating Current	—	0.06	—	15	—	mA
T_C(*)	Average Reverse Breakdown Voltage Temperature Coefficient	-40 to +85°C $I_{R(MIN)}$ to $I_{R(MAX)}$	—	20	100	—	ppm/°C
T_C(*)	Average Reverse Breakdown Voltage Temperature Coefficient	-40 to +125°C $I_{R(MIN)}$ to $I_{R(MAX)}$	—	40	125	—	ppm/°C
R_S(†)	Slope Resistance	—	—	0.33	1.5	—	Ω
Z_R	Reverse Dynamic Impedance	I_R = 1mA f = 100Hz I_{AC} = 0.1I_R	—	0.4	1.0	—	Ω
E_N	Wideband Noise Voltage	I_R = 1mA f = 10Hz to 10kHz	—	105	—	—	µV(rms)

Notes:

(*) $$T_C = \frac{(V_{R(MAX)} - V_{R(MIN)}) \times 1000000}{V_R \times (T_{(MAX)} - T_{(MIN)})}$$

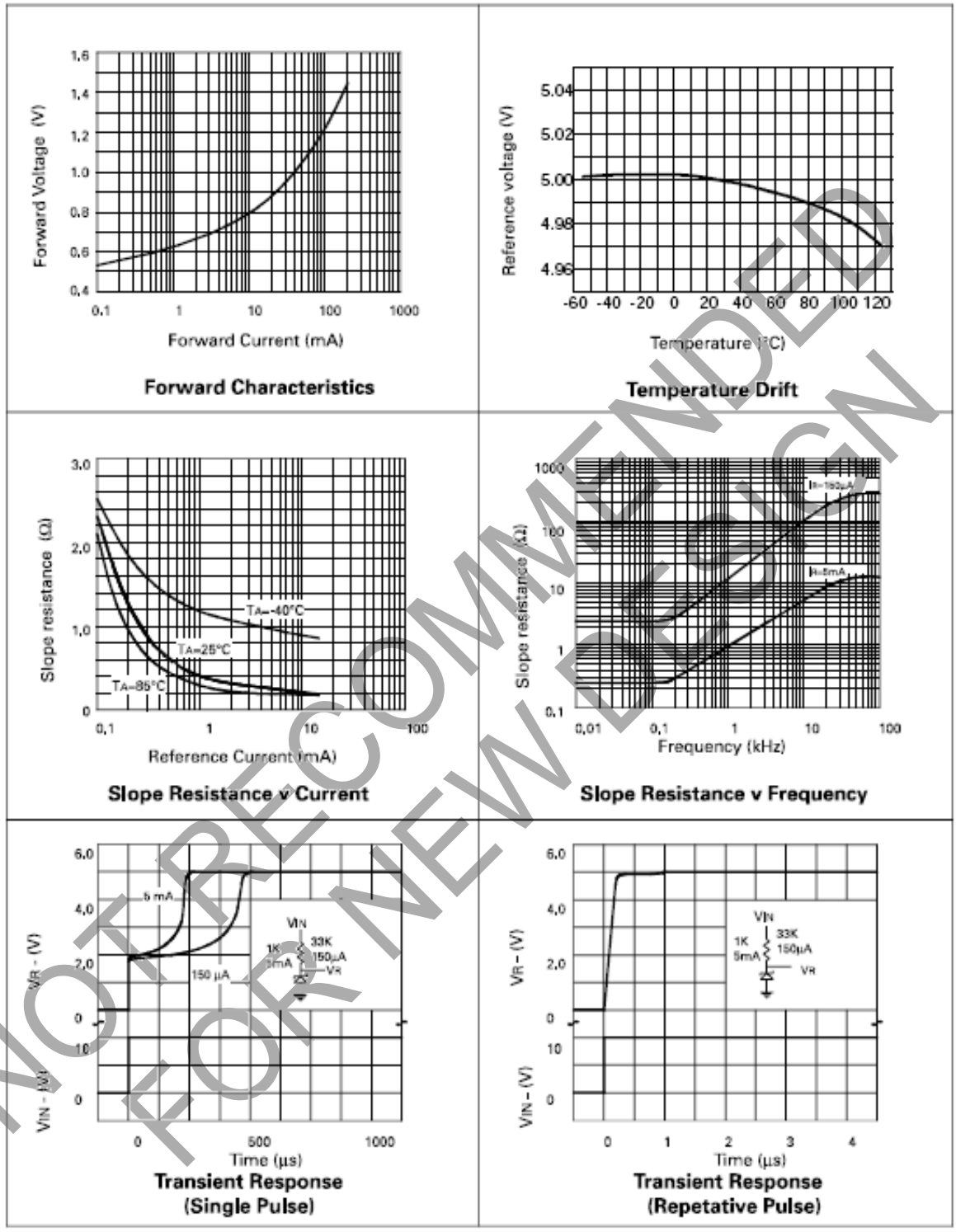
Note: $V_{R(MAX)}$ - $V_{R(MIN)}$ is the maximum deviation in reference voltage measured over the full operating temperature range.

(†) $$R_S = \frac{V_R \text{ Change } (I_{R(MIN)} \text{ to } I_{R(MAX)})}{I_{R(MAX)} - I_{R(MIN)}}$$



Reverse Characteristics

Typical Characteristics



Ordering Information (Note 4)

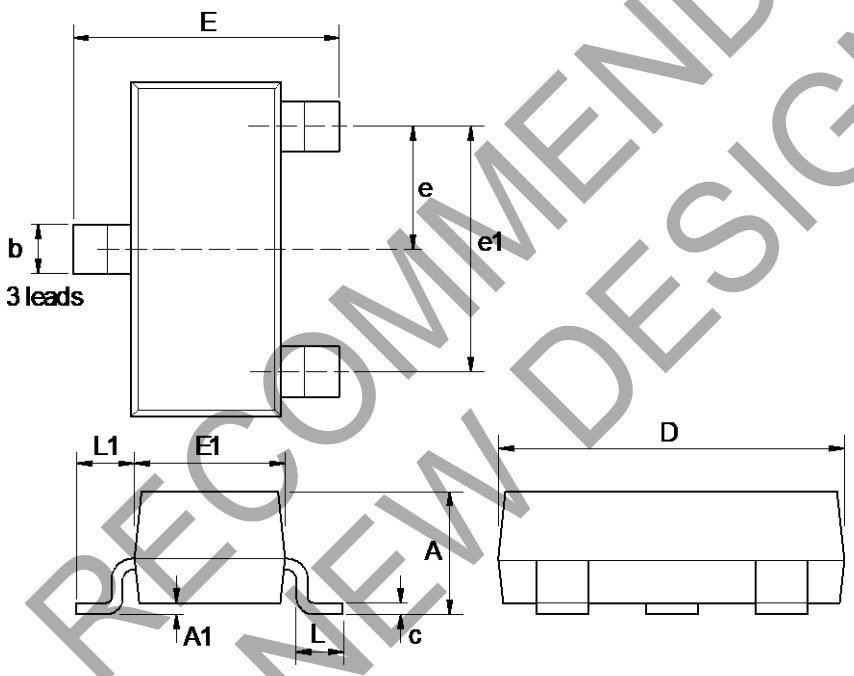
Part Number	Tol (%)	Package	Device Mark	Status (Note 4)	Reel Size (inches)	Tape Width (mm)	Packing	
							Qty.	Carrier
ZR40401F50TA	1	SOT23	50M	Not Recommended for New Design	7	8	3000	Reel
ZR40402F50TA	2	SOT23	50L	Not Recommended for New Design	7	8	3000	Reel

Note: 4. All ZR4040R50 variants (E-Line) are obsolete.

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT23



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	-	1.12	-	0.044	e1	1.90 NOM		0.075 NOM	
A1	0.01	0.10	0.0004	0.004	E	2.10	2.64	0.083	0.104
b	0.30	0.50	0.012	0.020	E1	1.20	1.40	0.047	0.055
c	0.085	0.20	0.003	0.008	L	0.25	0.60	0.0098	0.0236
D	2.80	3.04	0.110	0.120	L1	0.45	0.62	0.018	0.024
e	0.95 NOM		0.037 NOM		-	-	-	-	-

Note: 5. Controlling dimensions are in millimeters. Approximate dimensions are provided in inches.

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