SOT23 MICROPOWER (4µA) 1.22V VOLTAGE REFERENCE

Description

The DIODES™ ZXRE1004 is a 1.22 volt bandgap reference circuit designed for ultra low current operation, typically 4µA. The device is available in a SOT23 surface mount package, offering the ultimate in space and power saving. These features make the ZXRE1004 particularly suitable for portable and battery powered applications.

SOT23 tolerance selection is available to 0.5% for precision applications. Excellent performance is maintained over the 8µA to 20mA operating current range with a typical temperature coefficient of only 20ppm/°C. The device has been designed to be highly tolerant of capacitive loads so maintaining excellent stability.

As well as the SOT23, the ZXRE1004 can offer a pin for pin compatible alternative to the REF1004, LT1004 and LM185/385 series of voltage references with an E-Line (TO92 style) equivalent.

Features

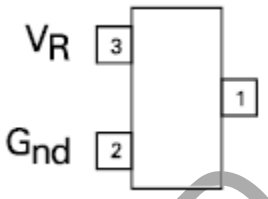
- High Performance Alternative to REF1004, LT1004 and LM185/385 References
- 4µA Typical Knee Current
- Small Outline SOT23 Package
- 20ppm/°C Typical Temperature Coefficient
- Unconditionally Stable
- 1% Tolerance
- Contact Diodes Incorporated Marketing for Availability of Tighter Tolerance Devices
- **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 equipment
- Precision power supplies
- Portable instrumentations
- Portable communication devices
- Notebooks and palmtop computers
- Data acquisition systems
- A/D and D/A converters
- Test equipment

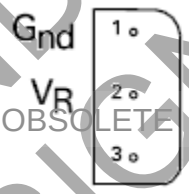
Pin Assignments

SOT23 Package Suffix - F



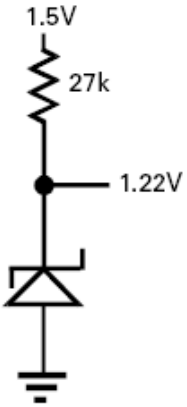
Top View
Pin 1 Floating or Connected to Pin 2

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



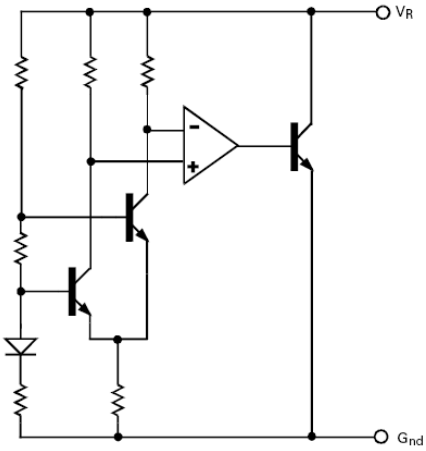
Bottom View
Pin 3 Floating or Connected to Pin 1

Applications 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.

Schematic Diagram



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

Parameter	Rating	Unit
Reverse Current	30	mA
Forward Current	10	mA
Operating Temperature	-40 to +85	°C
Storage Temperature	-55 to +125	°C
Power Dissipation (T_{AMB} = +25°C) SOT23	330	mW

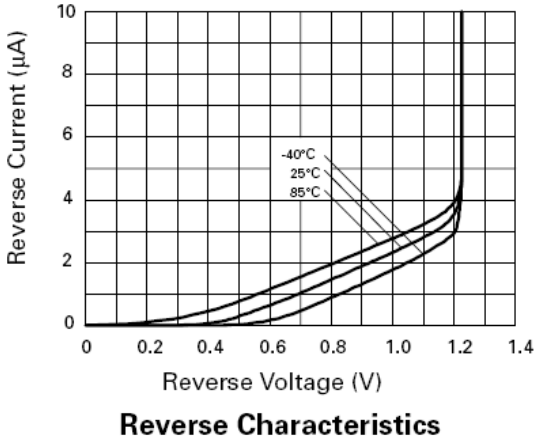
Electrical Characteristics (Test conditions: T_{AMB} = +25°C, unless otherwise specified.)

Symbol	Parameter	Condition	Min	Typ	Max	Tol. (%)	Unit
V_R	Reverse Breakdown Voltage	I_R = 100µA	1.208 1.183	1.22 1.22	1.232 1.257	1 3	V
I_{MIN}	Minimum Knee Current	—	—	4	8	—	µA
I_R	Recommended Operating Current Range	—	0.008	—	20	—	mA
T_C(*)	Average Reverse Breakdown Voltage Temperature Coefficient	$I_{R(MIN)}$ to $I_{R(MAX)}$	—	20	75	—	ppm/°C
$\frac{\Delta V_R}{\Delta I_R}$	Reverse Breakdown Voltage Change with Current	I_R = 8µA to 1mA I_R = 1mA to 20mA	—	—	1 10	—	mV
Z_R	Reverse Dynamic Impedance	I_R = 1mA f = 100Hz I_{AC} = 0.1I_R	—	0.2	0.6	—	Ω
E_N	Wideband Noise Voltage	I_R = 8µA to 100µA f = 10Hz to 10kHz	—	60	—	—	µV(rms)

Notes:

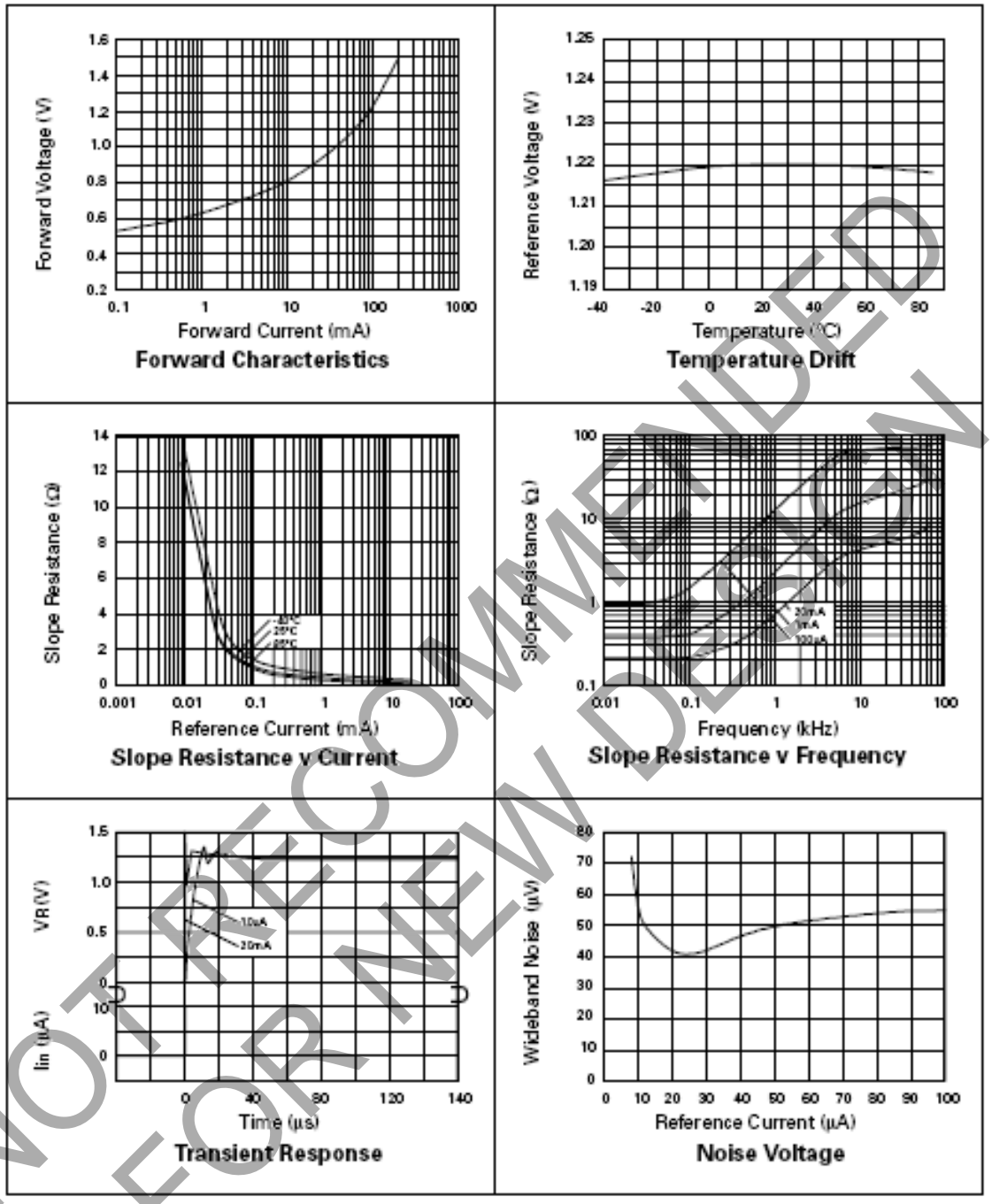
(*) $T_C = \frac{(V_{R(MAX)} - V_{R(MIN)}) \times 1000000}{V_R \times (T_{(MAX)} - T_{(MIN)})}$

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



Reverse Characteristics

Typical Characteristics



Ordering Information (Note 4)

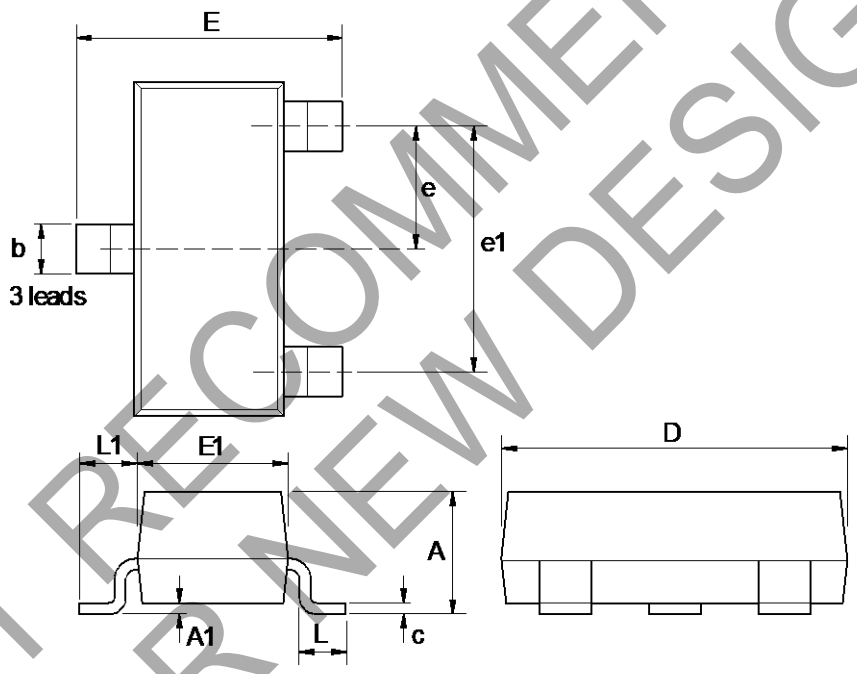
Part Number	Tol (%)	Package	Device Mark	Status (Note 4)	Reel Size (inches)	Tape Width (mm)	Packing	
							Qty.	Carrier
ZXRE1004CFTA	0.5	SOT23	10D	Obsolete	7	8	3000	Reel
ZXRE1004DFTA	1	SOT23	10C	Not Recommended for New Design	7	8	3000	Reel
ZXRE1004EFTA	2	SOT23	10B	Not Recommended for New Design	7	8	3000	Reel
ZXRE1004FFTA	3	SOT23	10A	Not Recommended for New Design	7	8	3000	Reel

Note: 4. All ZXRE1004xR variants (E-Line) are obsolete. For tape and reel options, add suffix TA to the part number eg ZXRE1004DFTA.

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.

IMPORTANT NOTICE

1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes' products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes' products. Diodes' products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of Diodes' products for their intended applications, (c) ensuring their applications, which incorporate Diodes' products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.

3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.

4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.

5. Diodes' products are provided subject to Diodes' Standard Terms and Conditions of Sale (https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

6. Diodes' products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes' products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.

7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.

8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.

9. This Notice may be periodically updated with the most recent version available at https://www.diodes.com/about/company/terms-and-conditions/important-notice

www.diodes.com