

**ZXRE1004**  
**SOT23 MICROPOWER (4µA) 1.22V VOLTAGE REFERENCE**

**Description**

The 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.

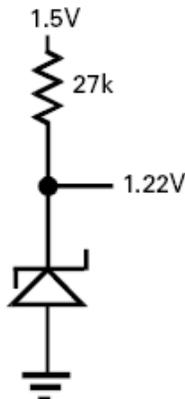
**Features**

- 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 marketing for availability of tighter tolerance devices
- "Green molding compound"

**Applications**

- Battery powered equipment
- Precision power supplies
- Portable instrumentation
- Portable communications devices
- Notebook and palmtop computers
- Data acquisition systems
- A/D and D/A converters
- Test equipment

**Applications Circuit**



**Pin Assignments**

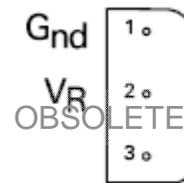
**SOT23 Package Suffix - F**



(Top View)

Pin 1 floating or connected to pin 2

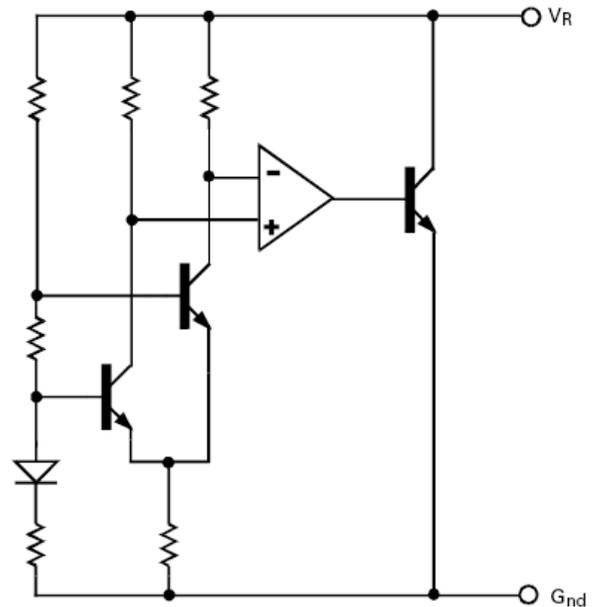
**E-Line, 3 pin, Rev Package Suffix – R**



(Bottom View)

Pin 3 floating or connected to pin 1

**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 <sub>AMB</sub> = 25°C) SOT23	330	mW

**Electrical Characteristics** (Test conditions: T<sub>amb</sub> = 25°C, unless otherwise specified.)

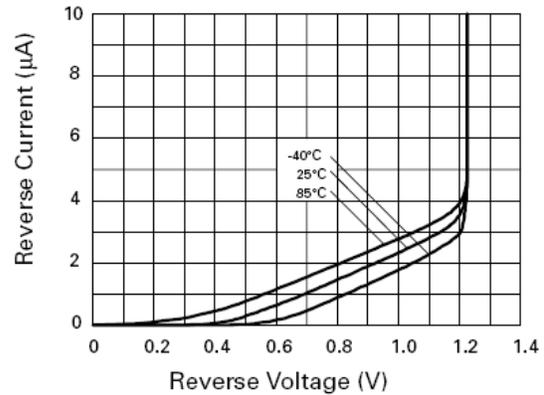
Symbol	Parameter	Condition	Min.	Typ.	Max.	Tol. (%)	Unit
V <sub>R</sub>	Reverse breakdown voltage	I <sub>R</sub> = 100µA	1.208 1.183	1.22 1.22	1.232 1.257	1 3	V
I <sub>MIN</sub>	Minimum knee current			4	8		µA
I <sub>R</sub>	Recommended operating current range		0.008		20		mA
T <sub>C</sub> <sup>(*)</sup>	Average reverse breakdown voltage temperature coefficient	I <sub>R</sub> (MIN) to I <sub>R</sub> (MAX)		20	75		ppm/°C
$\frac{\Delta V_R}{\Delta I_R}$	Reverse breakdown voltage change with current	I <sub>R</sub> =8µA to 1mA I <sub>R</sub> =1mA to 20mA			1 10		mV
Z <sub>R</sub>	Reverse dynamic impedance	I <sub>R</sub> = 1mA f = 100Hz I <sub>AC</sub> = 0.1I <sub>R</sub>		0.2	0.6		Ω
E <sub>N</sub>	Wideband noise voltage	I <sub>R</sub> =8µA to 100µA f=10Hz to 10kHz		60			µV(rms)

Notes:

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

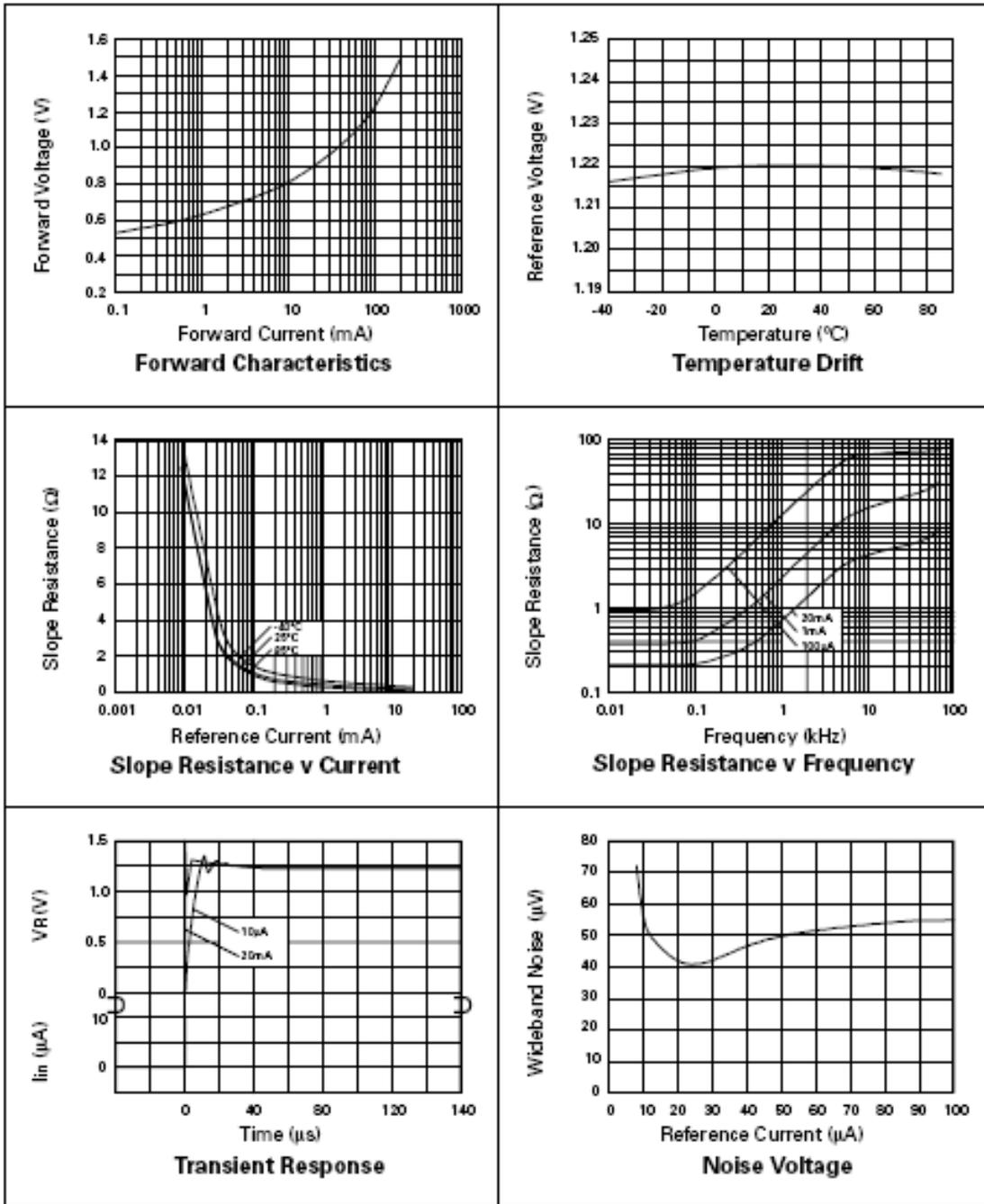
Note: V<sub>R(MAX)</sub> - V<sub>R(MIN)</sub> is the maximum deviation in reference voltage measured over the full operating temperature range.

(†) 0.5% SOT23 only



**Reverse Characteristics**

**Typical Characteristics**



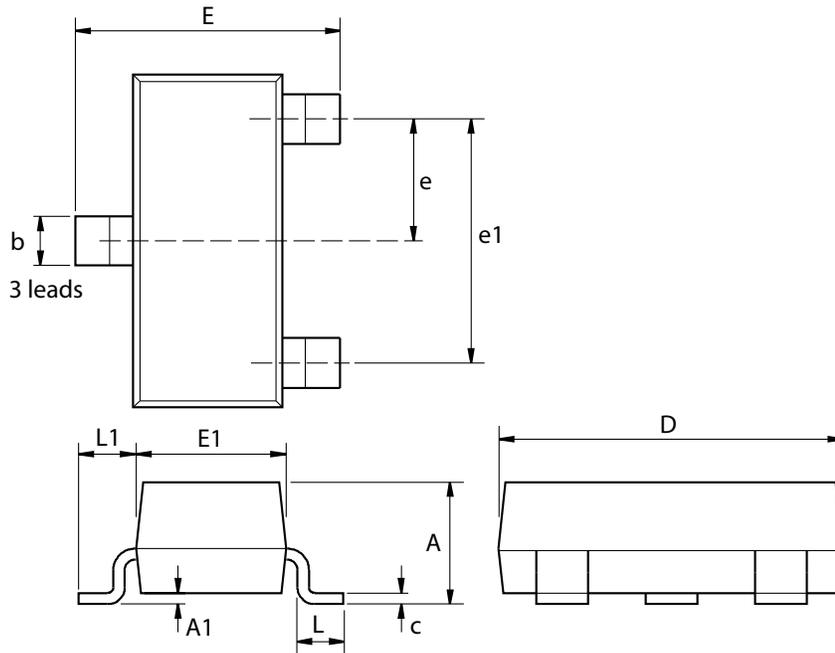
**Ordering Information<sup>(\*)</sup>**

Order Reference	Tol (%)	Package	Device Mark	Status (*)	Reel Size (inches)	Quantity per reel	Tape Width (mm)
ZXRE1004CF TA	0.5	SOT23	10D	Obsolete	7	3000	8
ZXRE1004DF TA	1	SOT23	10C	Released	7	3000	8
ZXRE1004EF TA	2	SOT23	10B	NRND	7	3000	8
ZXRE1004FF TA	3	SOT23	10A	Released	7	3000	8

Notes: \*All ZXRE1004xR variants (E-Line) are obsolete.  
NRND = Not Recommended for New Designs  
For tape and reel options add suffix TA to the part number eg ZXRE1004DF TA

**Package Outline Dimensions**

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

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