

# PRECISION 3.3 VOLT LOW KNEE CURRENT VOLTAGE REFERENCE

## ZRC330

ISSUE 1 - OCTOBER 1995

### DEVICE DESCRIPTION

The ZRC330 uses a bandgap circuit design to achieve a precision micropower voltage reference of 3.3 volts. The device is available in small outline surface mount packages, ideal for applications where space saving is important.

The ZRC330 design provides a stable voltage without an external capacitor and is stable with capacitive loads. The ZRC330 is recommended for operation between 20 $\mu$ A and 5mA and so is ideally suited to low power and battery powered applications.

Excellent performance is maintained to a suggested 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.

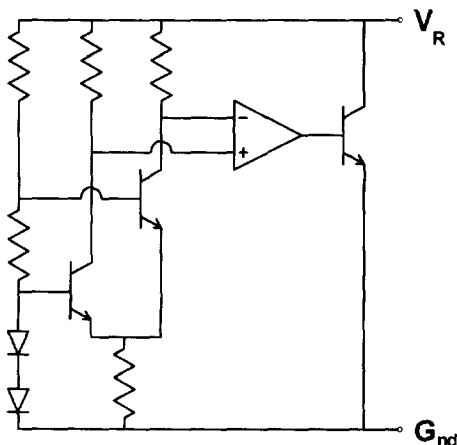
### FEATURES

- Small outline SOT23, SO8 and TO92 style packages
- No stabilising capacitor required
- Low knee current, 15 $\mu$ A typical
- Typical slope resistance 0.6 $\Omega$
- $\pm 3\%$ , 2% and 1% tolerance
- Industrial temperature range
- Operating current 20 $\mu$ A to 5mA

### APPLICATIONS

- Battery powered and portable equipment.
- Metering and measurement systems.
- Instrumentation.
- Test equipment.
- Data acquisition systems.
- Precision power supplies.
- Crystal oscillators

### SCHEMATIC DIAGRAM



### CONNECTION TABLE

Pin	SO8	SOT23	E-LINE 3 pin	E-LINE 3 pin R	E-LINE 2 pin
1	N/C	-	-	$G_{nd}$	$G_{nd}$
2	N/C	$G_{nd}$	$V_R$	$V_R$	$V_R$
3	N/C	$V_R$	$G_{nd}$	-	-
4	$G_{nd}$	-	-	-	-
5	N/C	-	-	-	-
6	N/C	-	-	-	-
7	N/C	-	-	-	-
8	$V_R$	-	-	-	-
Pack	N8	F	A	R	Y

see Diagrams Page 1 - 8

# ZRC330

## ABSOLUTE MAXIMUM RATING

Reverse Current	25mA
Forward Current	25mA
Operating Temperature	-40 to 85°C
Storage Temperature	-55 to 125°C

## Power Dissipation ( $T_{amb}=25^{\circ}\text{C}$ )

SOT23	330mW
E-line, 3 pin (TO92)	500mW
E-line, 2 pin (TO92)	500mW
SO8	625mW

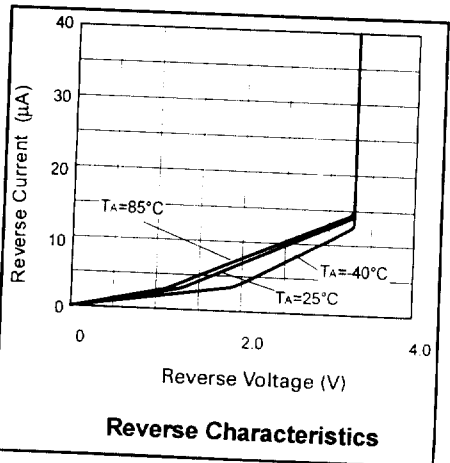
## ELECTRICAL CHARACTERISTICS

TEST CONDITIONS (Unless otherwise stated)  $T_{amb}=25^{\circ}\text{C}$

SYMBOL	PARAMETER	CONDITIONS	LIMITS			TOL. %	UNITS
			MIN	TYP	MAX		
$V_R$	Reverse Breakdown Voltage	$I_R=150\mu\text{A}$	3.27 3.234 3.2	3.3 3.3 3.3	3.33 3.366 3.4	1 2 3	V
$I_{MIN}$	Minimum Operating Current			15	20		$\mu\text{A}$
$I_R$	Recommended Operating Current		0.02		5		mA
$T_C$ †	Average Reverse Breakdown Voltage Temp. Co.	$I_{R(min)}$ to $I_{R(max)}$		15	50		ppm/°C
$R_S$ §	Slope Resistance			0.6	2		$\Omega$
$Z_R$	Reverse Dynamic Impedance	$I_R = 1\text{mA}$ $f = 100\text{Hz}$ $I_{AC} = 0.1 I_R$		0.5	1.2		$\Omega$

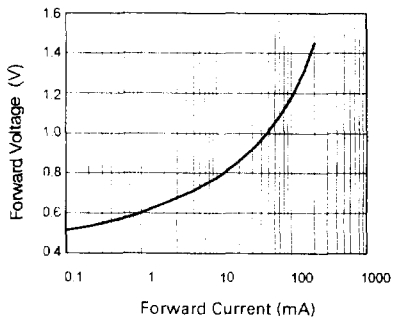
$$\dagger T_C = \frac{V_R \text{ Change} \times 1000000}{V_R \times \text{Temperature Change}}$$

$$\S R_S = \frac{V_R \text{ Change} (I_R (min) \text{ to } I_R (max))}{I_R (max) - I_R (min)}$$

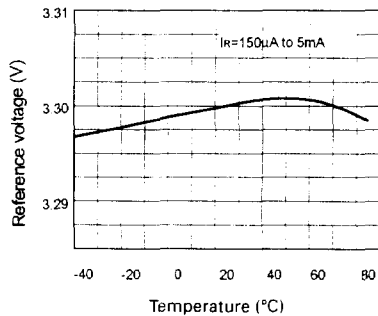


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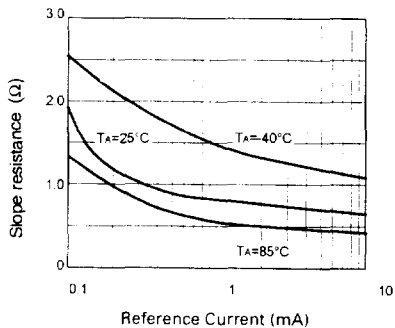
## TYPICAL CHARACTERISTICS



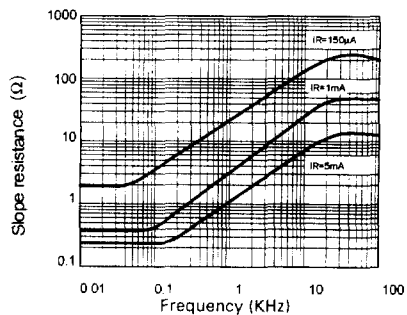
**Forward Characteristics**



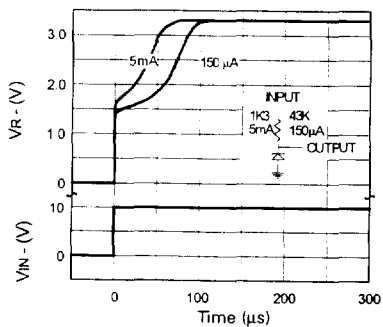
**Temperature Drift**



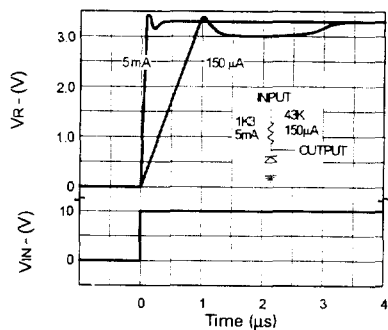
**Slope Resistance v Current**



**Slope Resistance v Frequency**



**Transient Response  
(Single Pulse)**



**Transient Response  
(Repetitive Pulse)**