

PRECISION 1.25 VOLT MICROPOWER VOLTAGE REFERENCE

ZRA124

ISSUE 1 - OCTOBER 1995

DEVICE DESCRIPTION

The ZRA124 uses a bandgap circuit design to achieve a precision micropower voltage reference of 1.24 volts. The device is available in small outline surface mount packages, ideal for applications where space saving is important, as well as packages for through hole requirements.

The ZRA124 design provides a stable voltage without an external capacitor and is stable with capacitive loads. The ZRA124 is recommended for operation between 50 μ 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.

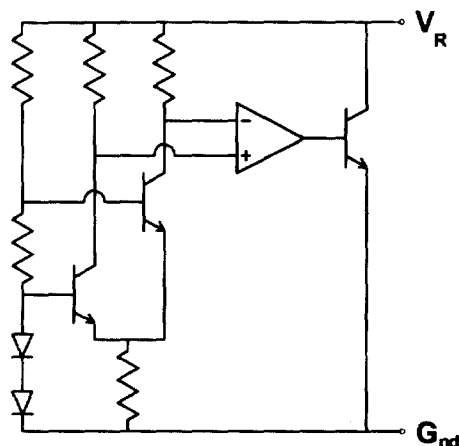
FEATURES

- Small outline SOT23, SO8 and TO92 style packages
- No stabilising capacitor required
- Typical T_c 30ppm/ $^{\circ}$ C
- Typical slope resistance 0.65 Ω
- $\pm 1\%$ tolerance
- Industrial temperature range
- Operating current 50 μ A to 5mA
- Transient response, stable in less than 10 μ s

APPLICATIONS

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

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					

ZRA124

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
S08	625mW

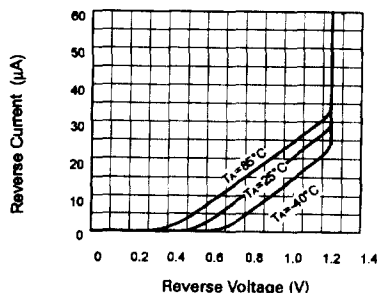
ELECTRICAL CHARACTERISTICS

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	$I_R=150\mu\text{A}$	1.228	1.24	1.252	1	V
I_{MIN}	Minimum Operating Current			30	50		μA
I_R	Recommended Operating Current		0.05		5		mA
$T_C \uparrow$	Average Reverse Breakdown Voltage Temp. Co.	$I_{R(min)}$ to $I_{R(max)}$		30	90		ppm/ $^{\circ}\text{C}$
$R_S \S$	Slope Resistance			0.65	2		Ω
Z_R	Reverse Dynamic Impedance	$I_R = 1\text{mA}$ $f = 100\text{Hz}$ $I_{AC} = 0.1 I_R$		0.5	1		Ω
E_N	Wideband Noise Voltage	$I_R = 150\mu\text{A}$ $f = 100\text{Hz to } 10\text{kHz}$		70			$\mu\text{V(rms)}$

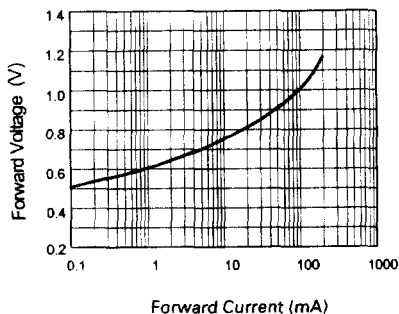
$$\uparrow T_C = \frac{V_R \text{ Change} \times 1000000}{V_R \times \text{Temperature Change}}$$

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

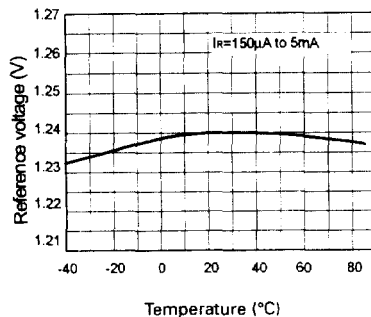


Reverse Characteristics

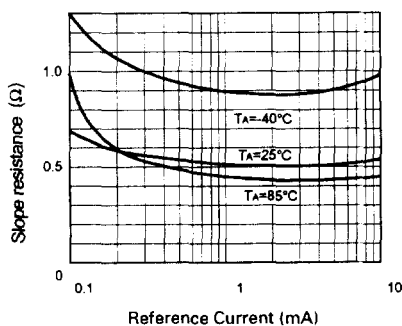
TYPICAL CHARACTERISTICS



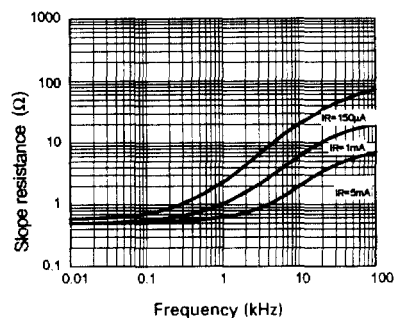
Forward Characteristics



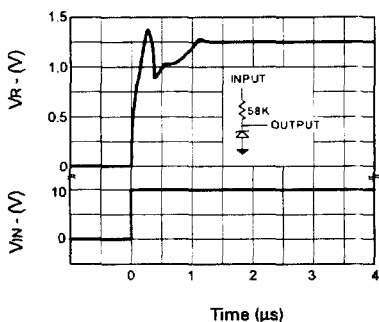
Temperature Drift



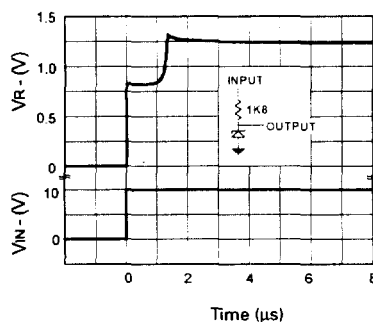
Slope Resistance v Current



Slope Resistance v Frequency



Transient Response ($I_R = 150\mu A$)



Transient Response ($I_R = 5mA$)