

PRECISION 1.25 VOLT MICROPOWER VOLTAGE REFERENCE

ISSUE 3 - FEBRUARY 1998

ZRA124

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 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.

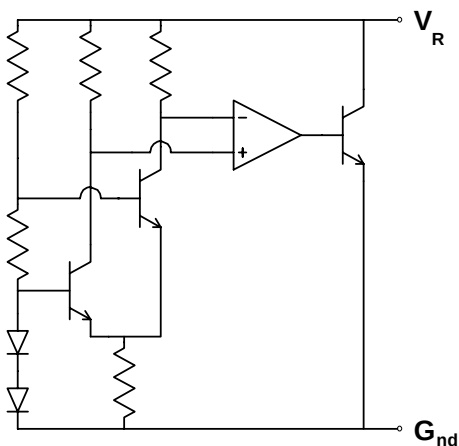
FEATURES

- Small outline SOT23, 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



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°C)

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

ELECTRICAL CHARACTERISTICS

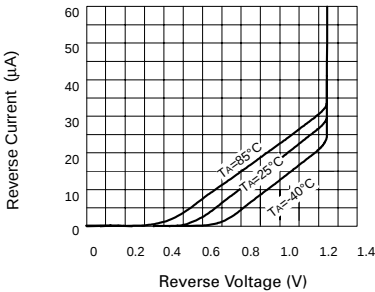
TEST CONDITIONS (Unless otherwise stated) T_{amb}=25°C

SYMBOL	PARAMETER	CONDITIONS	LIMITS			TOL.%	UNITS
			MIN	TYP	MAX		
V _R	Reverse Breakdown Voltage	I _R =150μA	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 †	Average Reverse Breakdown Voltage Temp. Co.	I _{R(min)} to I _{R(max)}		30	90		ppm/°C
R _S §	Slope Resistance			0.65	2		Ω
Z _R	Reverse Dynamic Impedance	I _R = 1mA f = 100Hz I _{AC} =0.1 I _R		0.5	1		Ω
E _N	Wideband Noise Voltage	I _R = 150μA f = 100Hz to 10kHz		60			μV(rms)

$$\dagger \quad T_C = \frac{(V_{R(max)} - V_{R(min)}) \times 1000000}{V_R \times (T_{(max)} - T_{(min)})}$$

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

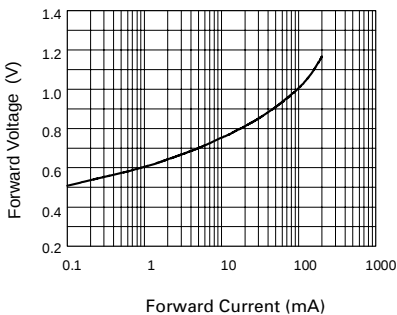
$$\S \quad R_S = \frac{V_R \text{ Change}(I_R(min) \text{ to } I_R(max))}{I_R(max) - I_R(min)}$$



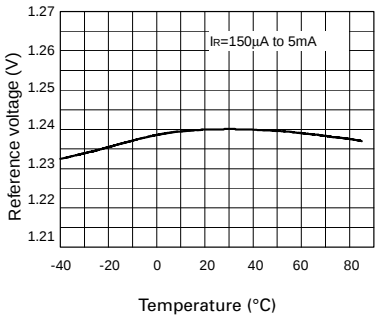
Reverse Characteristics

ZRA124

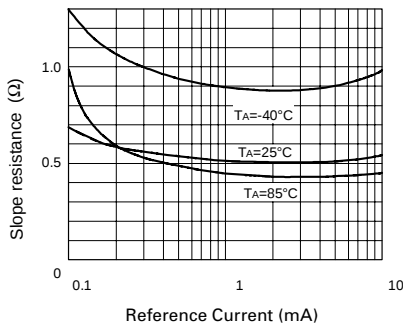
TYPICAL CHARACTERISTICS



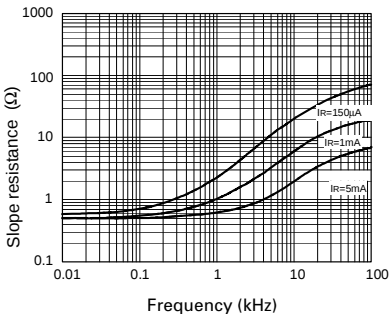
Forward Characteristics



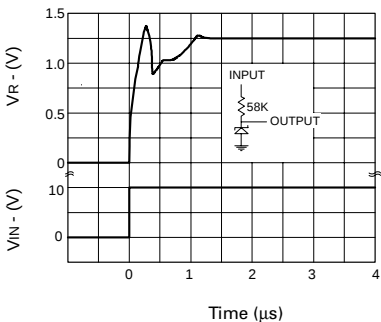
Temperature Drift



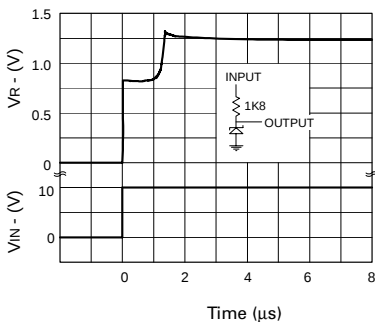
Slope Resistance v Current



Slope Resistance v Frequency



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

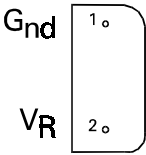


Transient Response ($I_R = 5mA$)

ZRA124

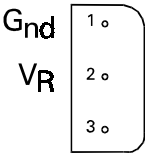
CONNECTION DIAGRAMS

E-Line, 2 pin Package Suffix – Y



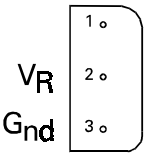
Bottom View

E-Line, 3 pin, Rev Package Suffix – R



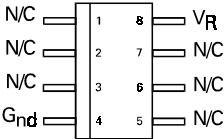
Bottom View –
Pin 3 floating or connected to pin 1

E-Line, 3 pin Package Suffix – A



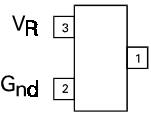
Bottom View –
Pin 1 floating or connected to pin 3

SO8 Package Suffix – N8



Top View

SOT23 Package Suffix – F



Top View –
Pin 1 floating or connected to pin 2

ORDERING INFORMATION

Part No	Tol%	Package	Partmark
ZRA124A01	1	E-Line •	ZRA12401
ZRA124F01	1	SOT23	12C
ZRA124N801	1	SO8	ZRA12401
ZRA124R01	1	E-Line *	ZRA124R1
ZRA124Y01	1	E-Line †	ZRA12401

* E-Line 3 pin Reversed

† E-Line 2 pin

• E-Line 3 pin