

PRECISION 5.0 VOLT MICROPPOWER VOLTAGE REFERENCE

ZRB500

ISSUE 2 - MARCH 1998

DEVICE DESCRIPTION

The ZRB500 uses a bandgap circuit design to achieve a precision micropower voltage reference of 5.0 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 ZRB500 design provides a stable voltage without an external capacitor and is stable with capacitive loads. The ZRB500 is recommended for operation between 50 μ A and 15mA 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.

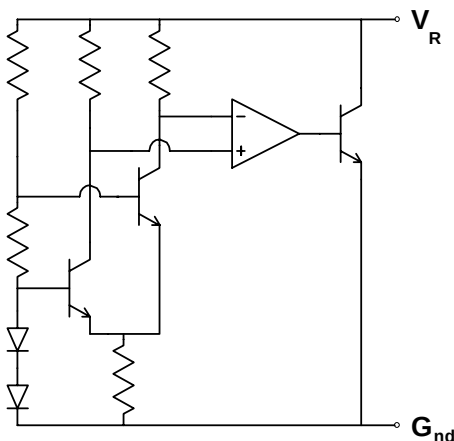
FEATURES

- Small outline SOT23,SO8 and TO92 style packages
- No stabilising capacitor required
- Typical T_C 15ppm/ $^{\circ}$ C
- Typical slope resistance 0.33 Ω
- $\pm 3\%$, 2% and 1% tolerance
- Industrial temperature range
- Operating current 50 μ A to 15mA
- Transient response, stable in less than 10 μ s

APPLICATIONS

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

SCHEMATIC DIAGRAM



ZRB500

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

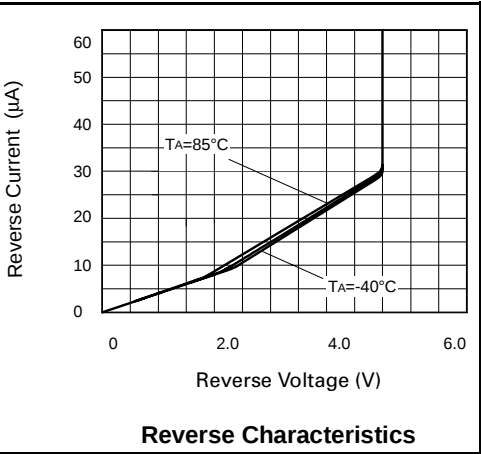
TEST CONDITIONS (Unless otherwise stated) T_{amb}=25°C

SYMBOL	PARAMETER	CONDITIONS	LIMITS			TOL. %	UNITS
			MIN	TYP	MAX		
V _R	Reverse Breakdown Voltage	I _R =150μA	4.95	5.0	5.05	1	V
			4.90	5.0	5.10	2	
			4.85	5.0	5.15	3	
I _{MIN}	Minimum Operating Current			30	50		μA
I _R	Recommended Operating Current		0.05		15		mA
T _C †	Average Reverse Breakdown Voltage Temp. Co.	I _{R(min)} to I _{R(max)}		15	50		ppm/°C
R _S §	Slope Resistance			0.33	1.5		Ω
Z _R	Reverse Dynamic Impedance	I _R = 1mA f = 100Hz I _{AC} =0.1 I _R		0.4	1		Ω
E _N	Wideband Noise Voltage	I _R = 150μA f = 10Hz to 10kHz		105			μV(rms)

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

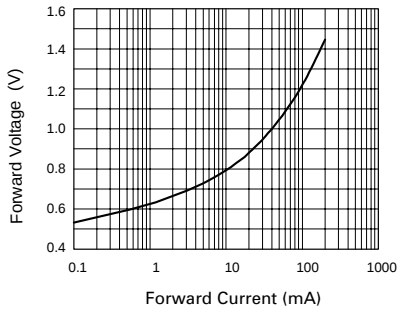
Note: V_{R(max)} - V_{R(min)} is the maximum deviation in reference voltage measured over the full operating temperature range.

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

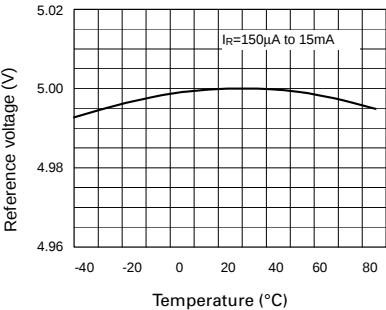


ZRB500

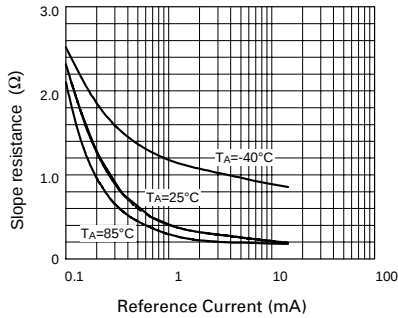
TYPICAL CHARACTERISTICS



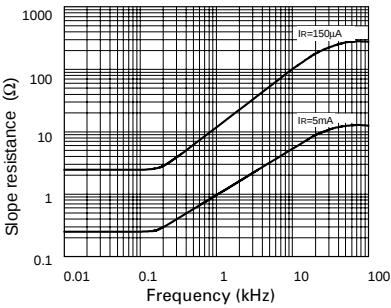
Forward Characteristics



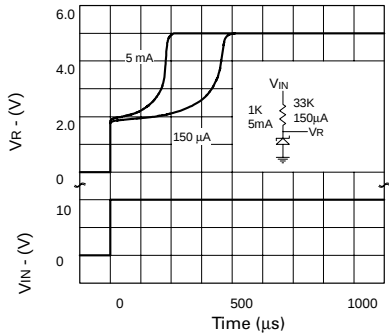
Temperature Drift



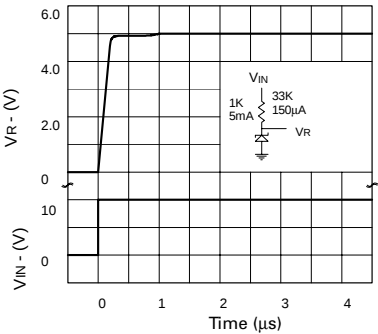
Slope Resistance v Current



Slope Resistance v Frequency



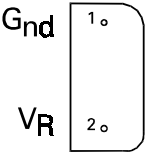
Transient Response
(Single Pulse)



Transient Response
(Repetitive Pulse)

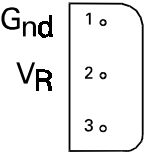
CONNECTION DIAGRAMS

E-Line, 2 pin Package Suffix – Y



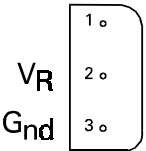
Bottom View

E-Line, 3 pin, Rev Package Suffix – R



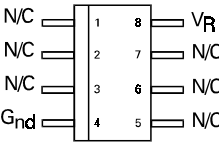
Bottom View –
Pin 3 floating or connected to pin 1

E-Line, 3 pin Package Suffix – A



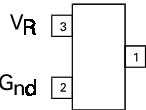
Bottom View –
Pin 1 floating or connected to pin 3

SO8 Package Suffix – N8



Top View

SOT23 Package Suffix – F



Top View –
Pin 1 floating or connected to pin 2

ZRB500

ORDERING INFORMATION

Part No	Tol%	Package	Partmark	Part No	Tol%	Package	Partmark
ZRB500A03	3	E-Line •	ZRB50003	ZRB500R03	3	E-Line *	ZRB500R3
ZRB500A02	2	E-Line •	ZRB50002	ZRB500R02	2	E-Line *	ZRB500R2
ZRB500A01	1	E-Line •	ZRB50001	ZRB500R01	1	E-Line *	ZRB500R1
ZRB500F03	3	SOT23	50G	ZRB500Y03	3	E-Line †	ZRB50003
ZRB500F02	2	SOT23	50H	ZRB500Y02	2	E-Line †	ZRB50002
ZRB500F01	1	SOT23	50I	ZRB500Y01	1	E-Line †	ZRB50001
ZRB500N803	3	SO8	ZRB50003	* E-Line 3 pin Reversed † E-Line 2 pin • E-Line 3 pin			
ZRB500N802	2	SO8	ZRB50002				
ZRB500N801	1	SO8	ZRB50001				