PRECISION 5.0 VOLT MICROPOWER VOLTAGE REFERENCE

ZR4040-5.0

ISSUE 2 - MARCH 1998

DEVICE DESCRIPTION

The ZR4040-5.0 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 ZR4040-5.0 design provides a stable voltage without an external capacitor and is stable with capacitive loads. The ZR4040-5.0 is recommended for operation between 60μA 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 SO8 and SOT23 packages
- TO92 style package
- No stabilising capacitor required
- Typical T_C 20ppm/°C
- Typical slope resistance 0.33Ω
- 2% and 1% tolerance
- Industrial temperature range
- Operating current 60μA to 15mA
- Transient response,stable in less than 10μs

APPLICATIONS

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

SCHEMETIC DIAGRAM
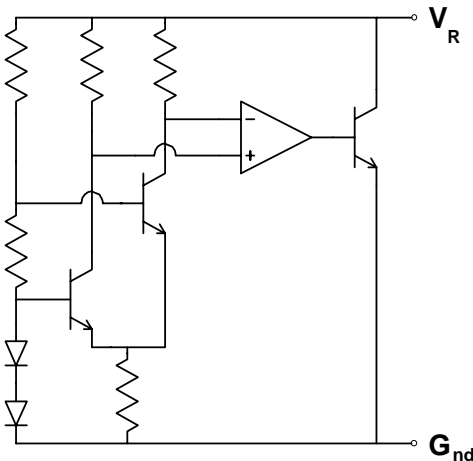
ZR4040-5.0

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

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 4.90	5.0 5.0	5.05 5.10	1 2	V
I_{MIN}	Minimum Operating Current			30	60		μA
I_R	Recommended Operating Current		0.06		15		mA
T_C †	Average Reverse Breakdown Voltage Temp. Co.	$I_{R(min)}$ to $I_{R(max)}$		20	100		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	1.0		Ω
E_N	Wideband Noise Voltage	I_R= 1mA f = 10Hz to 10kHz		105			μV (rms)

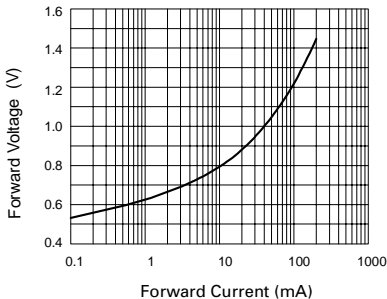† $$T_C = \frac{(V_{R(max)} - V_{R(min)})\ x\ 1000000}{V_R\ x\ (T_{(max)} - T_{(min)})}$$

Note: $V_{R(max)}$ - $V_{R(min)}$ is the maximum deviation in reference voltage measured over the full operating temperature range.
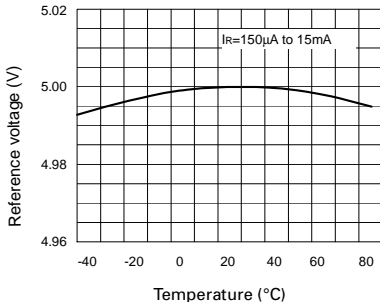
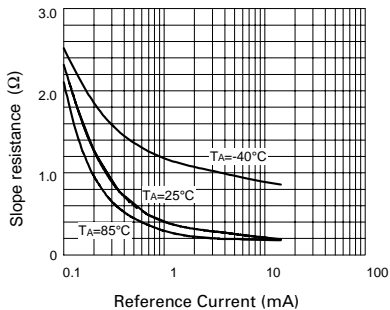§ $$R_S = \frac{V_R\ Change(I_R\ (min)\ to\ I_R\ (max))}{I_R\ (max) - I_R\ (min)}$$

Reverse Characteristics
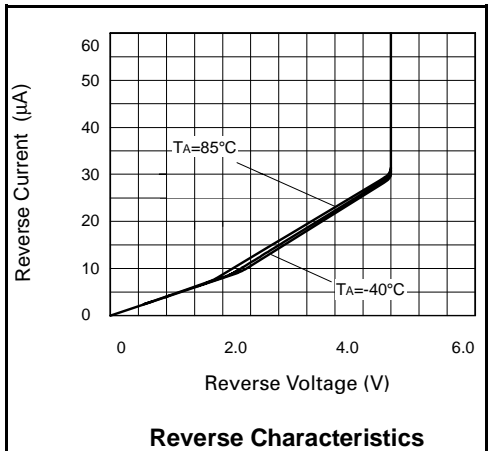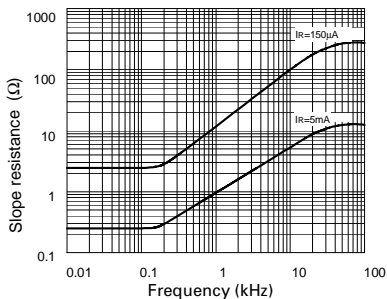
TYPICAL CHARACTERISTICS
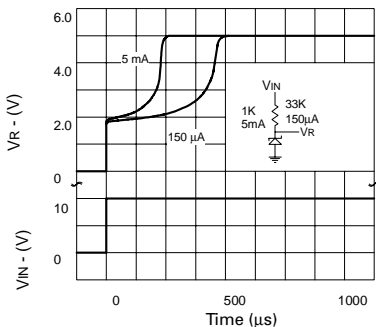

Forward Characteristics
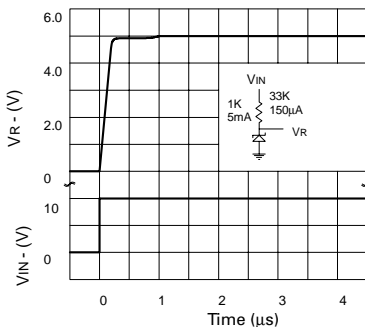

Temperature Drift

Slope Resistance v Current

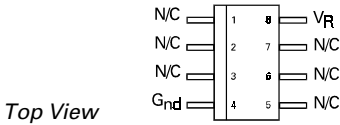**Slope Resistance v Frequency**

**Transient Response
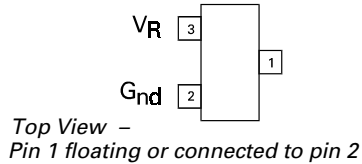(Single Pulse)**

**Transient Response
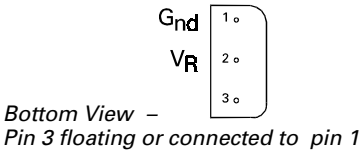(Repetitive Pulse)**

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CONNECTION DIAGRAMS

SO8   Package Suffix – N8

```
N/C  1   8  VR
N/C  2   7  N/C
N/C  3   6  N/C
Gnd  4   5  N/C
```

Top View

SOT23   Package Suffix – F

```
VR   3
          1
Gnd  2
```

Top View –
Pin 1 floating or connected to pin 2

E-Line, 3 pin, Rev Package Suffix – R

```
Gnd  1 o
VR   2 o
     3 o
```

Bottom View –
Pin 3 floating or connected to pin 1

ORDERING INFORMATION

Part Number	Tol%	Package	Partmark
ZR40402F50	2	SOT23	50L
ZR40401F50	1	SOT23	50M
ZR40402N850	2	SO8	ZR4040250
ZR40401N850	1	SO8	ZR4040150
ZR40402R50	2	E-Line *	ZR4040250
ZR40401R50	1	E-Line *	ZR4040150

* E-Line, 3 pin Reversed