

# PRECISION 1.25 VOLT MICROPOWER VOLTAGE REFERENCE

# ZR423

ISSUE 3 - FEBRUARY 1998

## DEVICE DESCRIPTION

The ZR423 uses a bandgap circuit design to achieve a precision micropower voltage reference of 1.25 volts. The device is available in a TO92 style package for through hole requirements.

The ZR423 design provides a stable voltage without an external capacitor and is stable with capacitive loads. The ZR423 is recommended for operation between 50 $\mu$ 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.

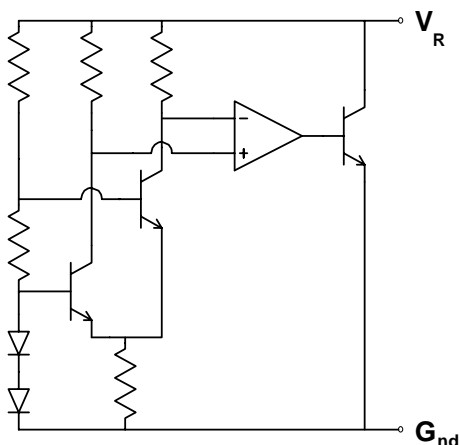
## FEATURES

- TO92 style package
- No stabilising capacitor required
- Typical  $T_C$  30ppm/ $^{\circ}$ C
- Typical slope resistance 0.65 $\Omega$
- $\pm 3\%$  tolerance
- Industrial temperature range (Military temperature range available on request)
- Operating current 50 $\mu$ A to 5mA
- Transient response, stable in less than 10 $\mu$ s
- Alternative package options and tolerances available

## APPLICATIONS

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

## SCHEMATIC DIAGRAM



# ZR423

## ABSOLUTE MAXIMUM RATING

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

## Power Dissipation (T<sub>amb</sub>=25°C)

E-Line, 2 pin (TO92) 500mW

## ELECTRICAL CHARACTERISTICS

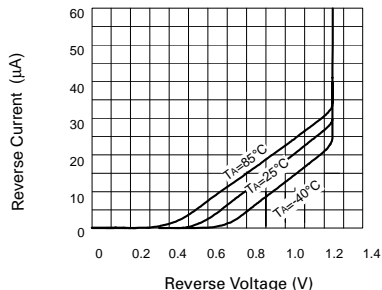
### TEST CONDITIONS (Unless otherwise stated) T<sub>amb</sub>=25°C

| SYMBOL           | PARAMETER                                   | CONDITIONS   | LIMITS |      |      | TOL. % | UNITS   |
|------------------|---|--|--------|------|------|--------|---------|
|                  |   |  | MIN    | TYP  | MAX  |        |         |
| V <sub>R</sub>   | Reverse Breakdown Voltage                   | I <sub>R</sub> =150μA  | 1.21   | 1.25 | 1.29 | 3      | V       |
| I <sub>MIN</sub> | Minimum Operating Current                   |  |        | 30   | 50   |        | μA      |
| I <sub>R</sub>   | Recommended Operating Current               |  | 0.05   |      | 5    |        | mA      |
| T <sub>C</sub> † | Average Reverse Breakdown Voltage Temp. Co. | I <sub>R(min)</sub> to I <sub>R(max)</sub>                               |        | 30   | 90   |        | ppm/°C  |
| R <sub>S</sub> § | Slope Resistance                            |  |        | 0.65 | 2    |        | Ω       |
| Z <sub>R</sub>   | Reverse Dynamic Impedance                   | I <sub>R</sub> = 1mA<br>f = 100Hz<br>I <sub>AC</sub> =0.1 I <sub>R</sub> |        | 0.5  | 1    |        | Ω       |
| E <sub>N</sub>   | Wideband Noise Voltage                      | I <sub>R</sub> = 150μA<br>f = 100Hz to 10kHz                             |        | 60   |      |        | μV(rms) |

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

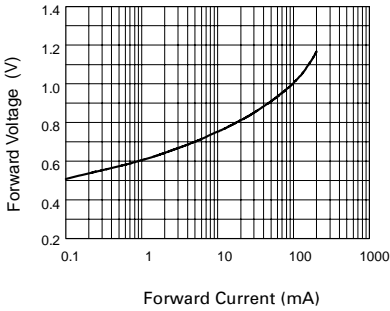
Note: V<sub>R(max)</sub> - V<sub>R(min)</sub> is the maximum deviation in reference voltage measured over the full operating temperature range.

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

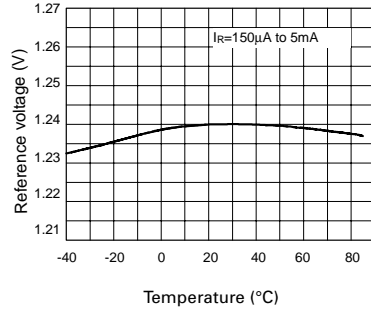


Reverse Characteristics

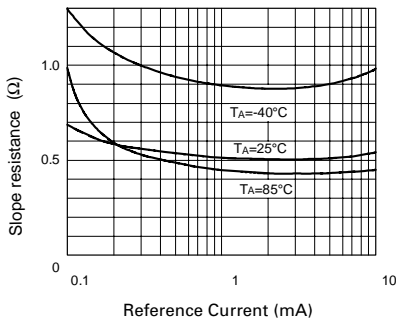
## TYPICAL CHARACTERISTICS



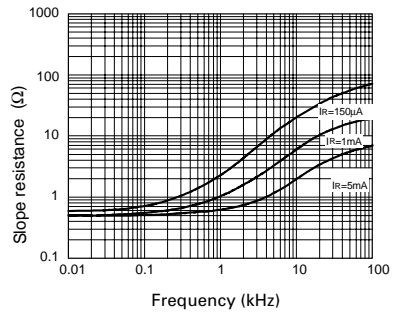
**Forward Characteristics**



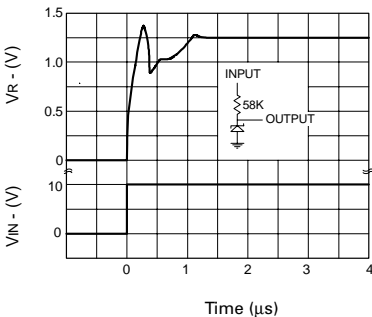
**Temperature Drift**



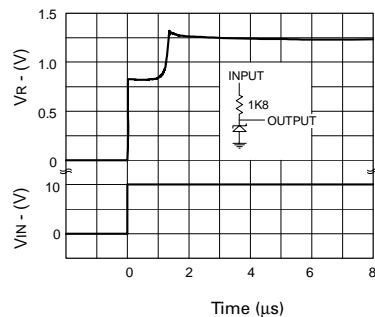
**Slope Resistance v Current**



**Slope Resistance v Frequency**



**Transient Response ( $I_R=150\mu\text{A}$ )**

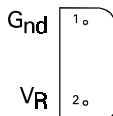


**Transient Response ( $I_R=5\text{mA}$ )**

# ZR423

## CONNECTION DIAGRAMS

E-Line, 2 pin, Package Suffix – Y



*Bottom View*

## ORDERING INFORMATION

| Part Number | Tol% | Package  | Partmark |
|-------------|------|----------|----------|
| ZR423       | 3    | E-Line † | ZR423    |

† E-Line, 2 pin