

# PRECISION 2.45 VOLT VOLTAGE REFERENCE

## ZRA245

ISSUE 3 — MARCH 1998

### DEVICE DESCRIPTION

The ZRA245 uses a bandgap circuit design to achieve a precision voltage reference of 2.45 volts. The device is available in small outline surface mount packages, ideal for applications where space saving is important.

The ZRA245 design provides a stable voltage without an external capacitor and is stable with capacitive loads. The ZRA245 is recommended for operation between 2mA and 120mA.

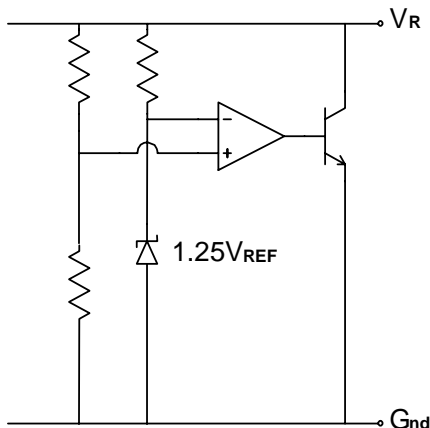
### FEATURES

- Small outline SOT23, SO8 and TO92 style package
- No stabilising capacitor required
- Typical  $T_C$  15ppm/°C
- Typical slope resistance  $0.26\Omega$
- $\pm 3\%$ ,  $2\%$  and  $1\%$  tolerance
- Industrial temperature range
- Operating current 2mA to 120mA

### APPLICATIONS

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

### SCHEMATIC DIAGRAM



# ZRA245

## ABSOLUTE MAXIMUM RATING

|                       |              |
|-----------------------|--------------|
| Reverse Current       | 200mA        |
| Forward Current       | 25mA         |
| Operating Temperature | -40 to 85°C  |
| Storage Temperature   | -55 to 125°C |

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

| SYMBOL           | PARAMETER                                   | CONDITIONS   | LIMITS               |                      |                      | TOL.<br>%   | UNITS   |
|------------------|---|--|----------------------|----------------------|----------------------|-------------|---------|
|                  |   |  | MIN                  | TYP                  | MAX                  |             |         |
| V <sub>R</sub>   | Reverse Breakdown Voltage                   | I <sub>R</sub> =5mA  | 2.43<br>2.40<br>2.38 | 2.45<br>2.45<br>2.45 | 2.47<br>2.50<br>2.52 | 1<br>2<br>3 | V       |
| I <sub>MIN</sub> | Minimum Operating Current                   |  |                      |                      | 2                    |             | mA      |
| I <sub>R</sub>   | Recommended Operating Current               |  | 2                    |                      | 120                  |             | mA      |
| T <sub>C</sub> † | Average Reverse Breakdown Voltage Temp. Co. | I <sub>R(min)</sub> to<br>I <sub>R(max)</sub>                            |                      | 15                   | 50                   |             | ppm/°C  |
| R <sub>S</sub> § | Slope Resistance                            |  |                      | 0.26                 | 0.5                  |             | Ω       |
| Z <sub>R</sub>   | Reverse Dynamic Impedance                   | I <sub>R</sub> = 5mA<br>f = 100Hz<br>I <sub>AC</sub> =0.1 I <sub>R</sub> |                      | 0.28                 | 1                    |             | Ω       |
| E <sub>N</sub>   | Wideband Noise Voltage                      | I <sub>R</sub> = 5mA<br>f = 10Hz to 10kHz                                |                      | 65                   |                      |             | μV(rms) |

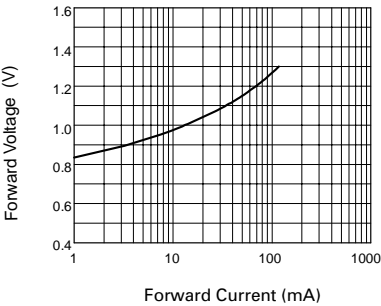
$$\dagger \quad T_C = \frac{(V_{R(max)} - V_{R(min)}) \times 1000000}{V_R \times (T_{(max)} - T_{(min)})}$$

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.

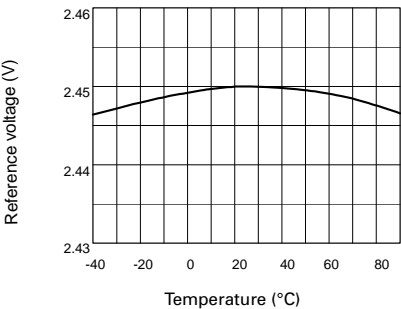
$$\S \quad R_S = \frac{V_R \text{ Change}(I_R(min) \text{ to } I_R(max))}{I_R(max) - I_R(min)}$$

# ZRA245

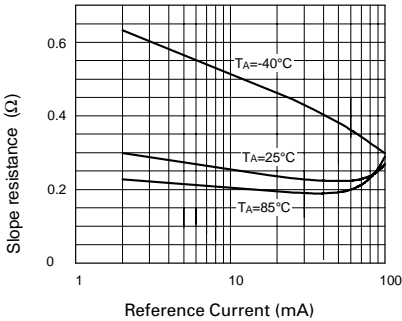
## TYPICAL CHARACTERISTICS



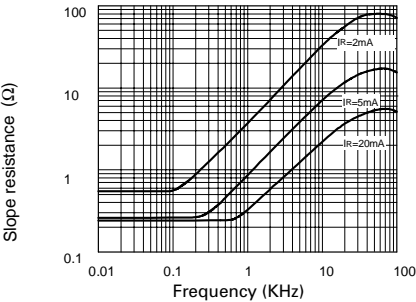
**Forward Characteristics**



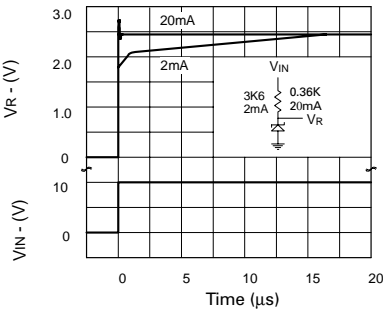
**Temperature Drift**



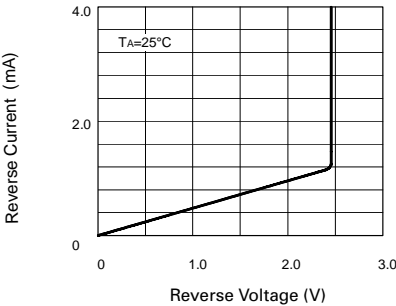
**Slope Resistance v Current**



**Slope Resistance v Frequency**



**Transient Response**

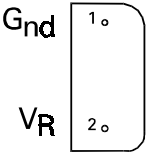


**Reverse Characteristics**

# ZRA245

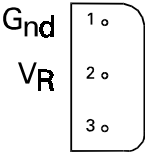
## CONNECTION DIAGRAMS

**E-Line, 2 pin Package Suffix – Y**



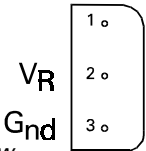
*Bottom View*

**E-Line, 3 pin, Rev Package Suffix – R**



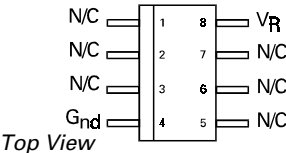
*Bottom View –  
Pin 3 floating or connected to pin 1*

**E-Line, 3 pin Package Suffix – A**



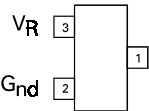
*Bottom View –  
Pin 1 floating or connected to pin 3*

**SO8 Package Suffix – N8**



*Top View*

**SOT23 Package Suffix – F**



*Top View –  
Pin 1 floating or connected to pin 2*

# ZRA245

## ORDERING INFORMATION

| Part No    | Tol% | Package  | Partmark |
|------------|------|----------|----------|
| ZRA245A03  | 3    | E-Line • | ZRA24503 |
| ZRA245A02  | 2    | E-Line • | ZRA24502 |
| ZRA245A01  | 1    | E-Line • | ZRA24501 |
| ZRA245F03  | 3    | SOT23    | 24A      |
| ZRA245F02  | 2    | SOT23    | 24B      |
| ZRA245F01  | 1    | SOT23    | 24C      |
| ZRA245N803 | 3    | SO8      | ZRA24503 |
| ZRA245N802 | 2    | SO8      | ZRA24502 |
| ZRA245N801 | 1    | SO8      | ZRA24501 |

| Part No   | Tol% | Package  | Partmark |
|-----------|------|----------|----------|
| ZRA245R03 | 3    | E-Line * | ZRA245R3 |
| ZRA245R02 | 2    | E-Line * | ZRA245R2 |
| ZRA245R01 | 1    | E-Line * | ZRA245R1 |
| ZRA245Y03 | 3    | E-Line † | ZRA24503 |
| ZRA245Y02 | 2    | E-Line † | ZRA24502 |
| ZRA245Y01 | 1    | E-Line † | ZRA24501 |

\* E-Line 3 pin Reversed

† E-Line 2 pin

• E-Line 3 pin