DEVICE DESCRIPTION

The ZR12D uses a bandgap circuit design to achieve a precision micropower voltage reference of 1.25 volts. The device is available in a small outline SOT23 surface mount package, ideal for applications where space saving is important.

The ZR12D design provides a stable voltage without an external capacitor and is stable with capacitive loads. The ZR12D 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

- Small outline SOT23 package
- No stabilising capacitor required
- Typical \(T_C\) 30ppm/\(^°\)C
- Typical slope resistance 0.65\(\Omega\)
- \(\pm\) 3% tolerance
- Industrial temperature range
- Operating current 50\(\mu\)A to 5mA
- Transient response, stable in less than 10\(\mu\)s
- Alternative package options and tolerances are available

APPLICATIONS

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

SCHEMATIC DIAGRAM

![Schematic Diagram](image-url)
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

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

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>LIMITS</th>
<th>TOL. %</th>
<th>UNITS</th>
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<tr>
<td></td>
<td></td>
<td>MIN</td>
<td>TYP</td>
<td>MAX</td>
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<tr>
<td>VR</td>
<td>Reverse Breakdown Voltage</td>
<td>I_R=150µA</td>
<td>1.21</td>
<td>1.25</td>
<td>1.29</td>
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<tr>
<td>I_{MIN}</td>
<td>Minimum Operating Current</td>
<td></td>
<td>30</td>
<td>50</td>
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<tr>
<td>I_R</td>
<td>Recommended Operating Current</td>
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<td>0.05</td>
<td>5</td>
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<tr>
<td>T_{C}</td>
<td>Average Reverse Breakdown Voltage Temp. Co.</td>
<td>I_R(min) to I_R(max)</td>
<td>30</td>
<td>90</td>
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<td>R_{S}</td>
<td>Slope Resistance</td>
<td></td>
<td>0.65</td>
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<tr>
<td>Z_R</td>
<td>Reverse Dynamic Impedance</td>
<td>I_R = 1mA</td>
<td>0.5</td>
<td>1</td>
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<td>E_N</td>
<td>Wideband Noise Voltage</td>
<td>I_R= 150µA for f = 100Hz to 10kHz</td>
<td>60</td>
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\[ T_C = \frac{(V_R(\text{max}) - V_R(\text{min})) \times 1000000}{V_R \times (T(\text{max}) - T(\text{min}))} \]

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

\[ R_S = \frac{\text{Change}(I_R\text{ (min)} \text{ to } I_R\text{ (max)})}{I_R\text{ (max)} - I_R\text{ (min)}} \]

Reverse Characteristics
TYPICAL CHARACTERISTICS

**Forward Characteristics**

- **Forward Current (mA)**
  - Reference Current (mA)
  - Frequency (kHz)

- **Temperature Drift**
  - Slope Resistance vs Current
  - Slope Resistance vs Frequency

**Slope Resistance v Current**

- **Reference Current (mA)**
  - Temperature (°C)

**Slope Resistance v Frequency**

- **Frequency (kHz)**

**Transient Response**

- **I_R=150μA**
- **I_R=5mA**

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**CONNECTION DIAGRAM**

**SOT23**

```
   VR   
    3  
   Gnd  
    2  
```

*Top View – pin 1 floating or connected to Gnd*

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**ORDERING INFORMATION**

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<th>Part No</th>
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<th>Package</th>
<th>Partmark</th>
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<tr>
<td>ZR12D</td>
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<td>SOT23</td>
<td>12E</td>
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Not Recommended for New Design
Please Use ZXRE125FF