

## PRECISION 2.5-VOLT REFERENCE

### DESCRIPTION

This monolithic integrated circuit is a fully self-contained precision voltage reference generator, internally trimmed for  $\pm 1\%$  accuracy. Requiring less than 2mA in quiescent current, this device can deliver in excess of 10mA with total load- and line-induced tolerances of less than 0.5%. In addition to voltage accuracy, internal trimming achieves a temperature coefficient of output voltage of typically 10 ppm/ $^{\circ}\text{C}$ . As a result, these references are excellent choices for application to critical instrumentation and D-to-A converter systems.

The SG1503 is specified for operation over the full military ambient temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ , while the SG2503 is designed for  $-25^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  and the SG3503 for commercial applications of  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

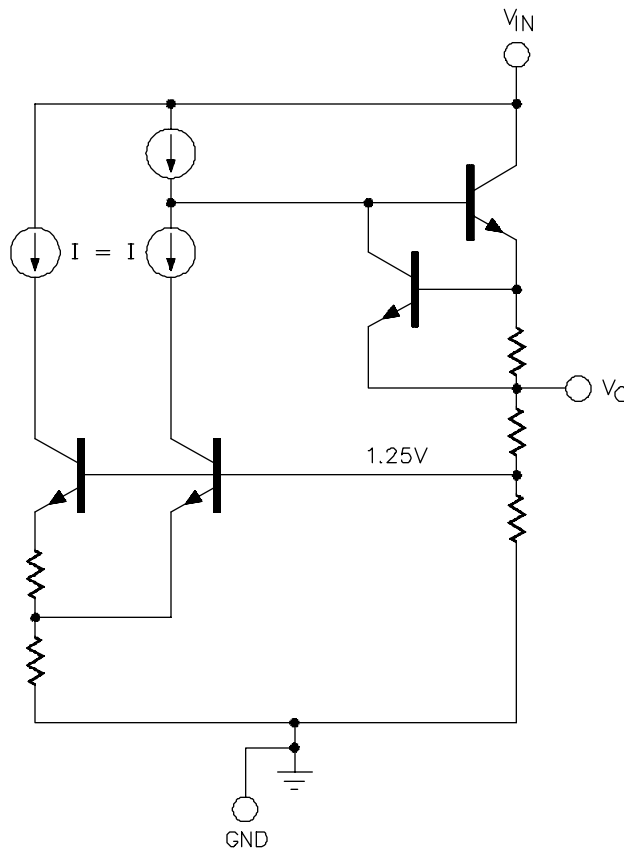
### FEATURES

- Output voltage trimmed to  $\pm 1\%$
- Input voltage range of 4.5 to 40V
- Temperature coefficient of 10ppm/ $^{\circ}\text{C}$
- Quiescent current typically 1.5mA
- Output current in excess of 10mA
- Interchangeable with MC1503 and AD580

### HIGH RELIABILITY FEATURES - SG1503

- ◆ Available to MIL-STD-883 and DESC SMD
- ◆ Radiation data available
- ◆ LMI level "S" processing available

### FUNCTIONAL DIAGRAM



## ABSOLUTE MAXIMUM RATINGS (Note 1)

Input Voltage ..... 40V  
 Storage Temperature Range ..... -65°C to 150°C

Operating Junction Temperature  
 Hermetic (T, Y - Package) ..... 150°C  
 Plastic (M, DM - Package) ..... 150°C  
 Lead Temperature (Soldering, 10 Seconds) ..... 300°C  
 Pb-free / RoHS Peak Solder Reflow Temp (40 sec. max. exp.)..... 260°C (+0, -5)

Note 1. Exceeding these ratings could cause damage to the device.

## THERMAL DATA

T Package:

Thermal Resistance-Junction to Case,  $\theta_{JC}$  ..... 15°C/W  
 Thermal Resistance-Junction to Ambient,  $\theta_{JA}$  ..... 120°C/W

Y Package:

Thermal Resistance-Junction to Case,  $\theta_{JC}$  ..... 50°C/W  
 Thermal Resistance-Junction to Ambient,  $\theta_{JA}$  ..... 130°C/W

M Package:

Thermal Resistance-Junction to Case,  $\theta_{JC}$  ..... 60°C/W  
 Thermal Resistance-Junction to Ambient,  $\theta_{JA}$  ..... 95°C/W

DM Package:

Thermal Resistance-Junction to Case,  $\theta_{JC}$  ..... 55°C/W  
 Thermal Resistance-Junction to Ambient,  $\theta_{JA}$  ..... 165°C/W

Note A. Junction Temperature Calculation:  $T_J = T_A + (P_D \times \theta_{JA})$ .

Note B. The above numbers for  $\theta_{JC}$  are maximums for the limiting thermal resistance of the package in a standard mounting configuration. The  $\theta_{JA}$  numbers are meant to be guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

## RECOMMENDED OPERATING CONDITIONS (Note 2)

Input Voltage ..... 4.5V to 40V

Operating Ambient Temperature Range  
 SG1503 ..... -55°C to 125°C  
 SG2503 ..... -25°C to 85°C  
 SG3503 ..... 0°C to 70°C

Note 2. Range over which the device is functional.

## ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, these specifications apply over the operating ambient temperatures for SG1503 with  $-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$ , SG2503/SG3503 with  $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ ,  $V_{IN} = 15\text{V}$ , and  $I_L = 0\text{mA}$ . Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

| Parameter              | Test Conditions                                    | SG1503/2503 |       |       | SG3503 |       |       | Units             |
|------------------------|--|-------------|-------|-------|--------|-------|-------|-------------------|
|                        |  | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |                   |
| Output Voltage         | $T_A = 25^\circ\text{C}$                           | 2.485       | 2.500 | 2.515 | 2.475  | 2.500 | 2.525 | V                 |
| Input Voltage          |  | 4.7         |       | 40    | 4.7    |       | 40    | V                 |
| Line Regulation        | $T_A = 25^\circ\text{C}$                           | 4.5         |       | 40    | 4.5    |       | 40    | V                 |
|                        | $V_{IN} = 5\text{V to }15\text{V}$                 |             | 1     | 3     |        | 1     | 3     | mV                |
| Load Regulation        | $V_{IN} = 15\text{V to }40\text{V}$                |             | 3     | 5     |        | 3     | 10    | mV                |
|                        | $\Delta I_L = 10\text{mA}$                         |             | 3     | 5     |        | 3     | 10    | mV                |
| Temperature Regulation | $\Delta I_L = 10\text{mA}, V_{IN} = 30\text{V}$    |             | 4     | 8     |        | 4     | 15    | mV                |
|                        | (SG1503 only)                                      |             | 15    | 20    |        |       |       | mV                |
| Quiescent Current      | (SG2503/3503 only)                                 |             | 2.5   | 5     |        | 5     | 10    | mV                |
| Short Circuit Current  | $V_{IN} = 40\text{V}$                              |             | 1.5   | 2.0   |        | 1.5   | 2.0   | mA                |
| Ripple Rejection       | $T_A = 25^\circ\text{C}$                           | 15          | 20    | 30    | 15     | 20    | 30    | dB                |
| Output Noise           | $f = 120\text{Hz}, T_A = 25^\circ\text{C}$         |             | 76    |       |        | 76    |       | dB                |
| Voltage Stability      | $\text{BW} = 10\text{KHz}, T_A = 25^\circ\text{C}$ |             | 100   |       |        | 100   |       | $\mu\text{V rms}$ |
|                        |  |             | 250   |       |        | 250   |       | $\mu\text{V/Khr}$ |

## CHARACTERISTIC CURVES

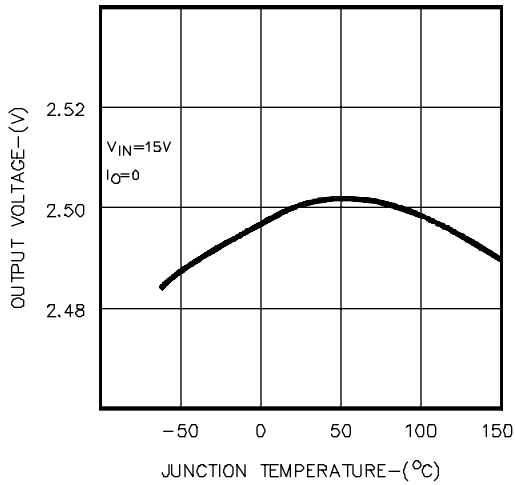


FIGURE 1.  
OUTPUT VOLTAGE VS.  
TEMPERATURE

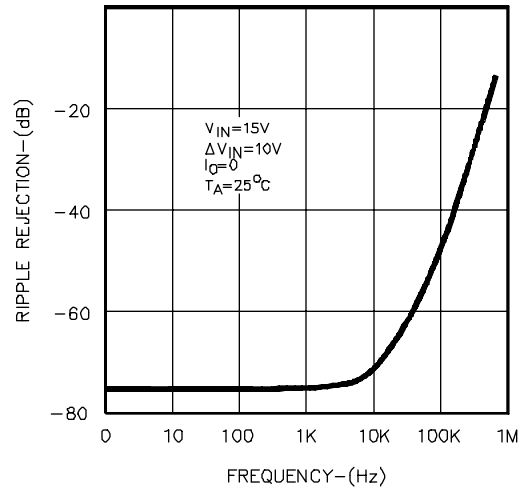


FIGURE 2.  
RIPPLE REJECTION

## CONNECTION DIAGRAMS & ORDERING INFORMATION (See Notes Below)

| Package   | Part No.  | Ambient Temperature Range  | Connection Diagram  |
|---|---|--|---|
| 8-PIN CERAMIC DIP<br>Y - PACKAGE  | SG1503Y/883B<br>SG1503Y/DESC<br>SG1503Y<br>SG2503Y<br>SG3503Y | -55°C to 125°C<br>-55°C to 125°C<br>-55°C to 125°C<br>-25°C to 85°C<br>0°C to 70°C | <p>M Package: Pb-free / RoHS 100% Matte Tin Lead Finish</p> |
| 8-PIN PLASTIC DIP<br>M - PACKAGE<br>Pb-free / RoHS Transition DC: 0503*   | SG2503M<br>SG3503M  | -25°C to 85°C<br>0°C to 70°C   | <p>Pb-free / RoHS 100% Matte Tin Lead Finish</p>            |
| 8-PIN PLASTIC SOIC<br>DM - PACKAGE<br>Pb-free / RoHS Transition DC: 0440* | SG3503DM<br>SG2503DM  | 0°C to 70°C<br>-25°C to 85°C   | <p>Pb-free / RoHS 100% Matte Tin Lead Finish</p>            |
| 3-PIN TO-39 METAL CAN<br>T - PACKAGE                                      | SG1503T/883B<br>SG1503T/DESC<br>SG1503T<br>SG2503T<br>SG3503T | -55°C to 125°C<br>-55°C to 125°C<br>-55°C to 125°C<br>-25°C to 85°C<br>0°C to 70°C |   |

Note 1. Contact factory for JAN and DESC product availability.  
2. All packages are viewed from the top.

\*RoHS compliant