

## 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  $70^{\circ}\text{C}$ .

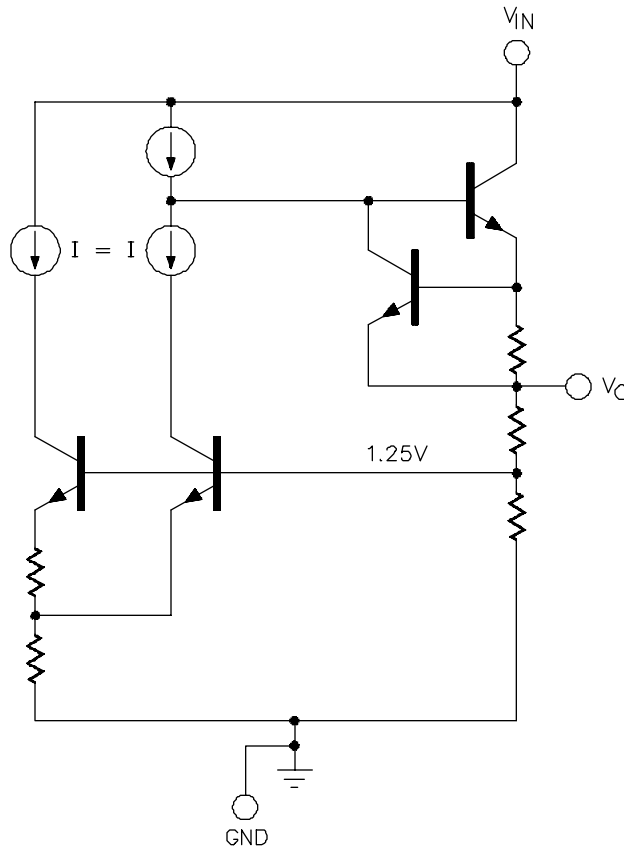
### FEATURES

- 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

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
	$V_{IN} = 40\text{V}$		1.5	2.0		1.5	2.0	mA
Short Circuit Current	$T_A = 25^\circ\text{C}$	15	20	30	15	20	30	mA
Ripple Rejection	$f = 120\text{Hz}, T_A = 25^\circ\text{C}$		76			76		dB
Output Noise	$\text{BW} = 10\text{KHz}, T_A = 25^\circ\text{C}$		100			100		$\mu\text{V rms}$
Voltage Stability			250			250		$\mu\text{V/Khr}$

## CHARACTERISTIC CURVES

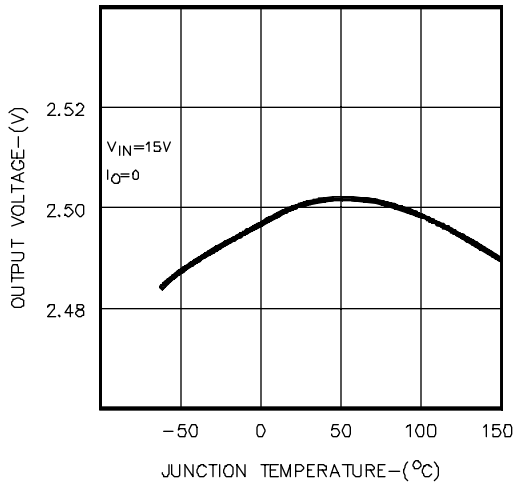


FIGURE 1.  
OUTPUT VOLTAGE VS.  
TEMPERATURE

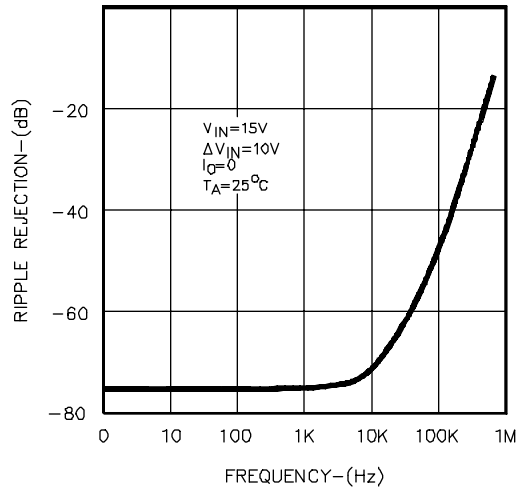


FIGURE 2.  
RIPPLE REJECTION

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

Package	Part No.	Ambient Temperature Range	Connection Diagram
8-PIN CERAMIC DIP Y - PACKAGE	SG1503Y/883B SG1503Y/DESC SG1503Y SG2503Y SG3503Y	-55°C to 125°C -55°C to 125°C -55°C to 125°C -25°C to 85°C 0°C to 70°C	
8-PIN PLASTIC DIP M - PACKAGE	SG2503M SG3503M	-25°C to 85°C 0°C to 70°C	
8-PIN PLASTIC SOIC DM - PACKAGE	SG3503DM SG2503DM	0°C to 70°C -25°C to 85°C	
3-PIN TO-39 METAL CAN T - PACKAGE	SG1503T/883B SG1503T/DESC SG1503T SG2503T SG3503T	-55°C to 125°C -55°C to 125°C -55°C to 125°C -25°C to 85°C 0°C to 70°C	

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