

VOLTAGE REFERENCES

DESCRIPTION

The SG103 is a two-terminal integrated circuit designed for analog and/or digital applications requiring precision voltage reference. The SG103 is an improved version of the National LM103 voltage reference. The design uses the band-gap voltage of the silicon as an internal reference for a tightly regulated output voltage. The advantages of this method over single junction zener diodes are: lower turn on drift, better temperature coefficient, sharper breakdown characteristics (line regulation) and lower dynamic impedance (load regulation). The I.C. is available in thirteen different voltages ranging from 1.8V to 5.6V (See Table 1). The SG103 is packaged in a hermetically sealed, modified TO-46 header and is specified for operation over the full military ambient temperature range of -55° C to +125° C.

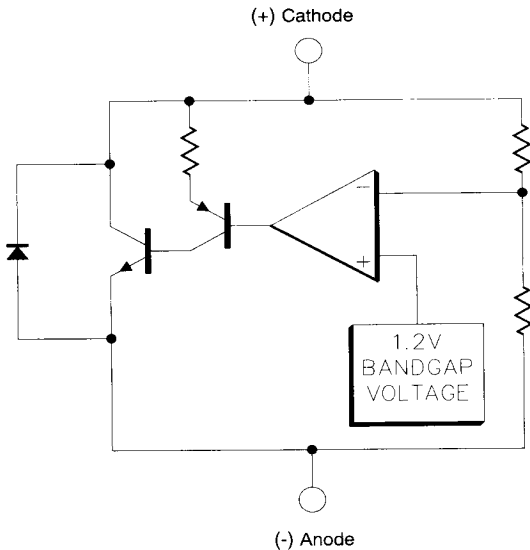
FEATURES

- Standard voltage tolerance $\pm 10\%$
- Precision band gap design
- Exceptionally sharp breakdown
- Low dynamic impedance from $10\mu\text{A}$ to 10mA (improved over LM103)
- Improved temperature coefficient
- Low capacitance
- Performance guaranteed over full military temperature range

HIGH RELIABILITY FEATURES -SG103

- ◆ Available to MIL-STD - 883 and DESC SMD
- ◆ SG level "S" processing available

BLOCK DIAGRAM



REFERENCE VOLTAGES

TABLE 1

Measured at $I_R = 1\text{mA}$, Voltage Tolerance $\pm 10\%$

- SG103 - 1.8*
- SG103 - 2.0
- SG103 - 2.2
- SG103 - 2.4*
- SG103 - 2.7*
- SG103 - 3.0
- SG103 - 3.3
- SG103 - 3.6
- SG103 - 3.9
- SG103 - 4.3
- SG103 - 4.7*
- SG103 - 5.1*
- SG103 - 5.6

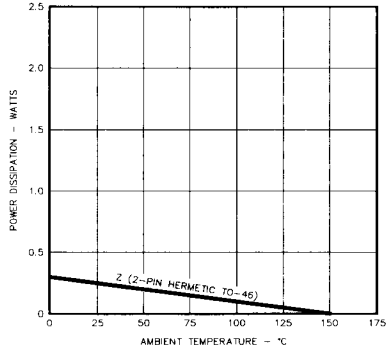
* These are the voltages that are currently available. Contact factory for product availability for additional voltages.

ABSOLUTE MAXIMUM RATINGS (Note 1)

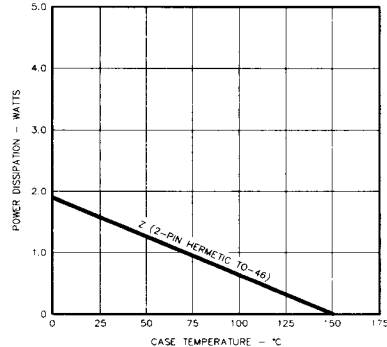
Reference Current 20mA Operating Junction Temperature 150°C
 Storage Temperature Range -65°C to +150°C
 Forward Current 100mA Lead Temperature (Soldering, 10 Seconds) 300°C

Note 1. Exceeding these ratings could cause damage to the device. All voltages are with respect to ground. All currents are positive into the specified terminal.

THERMAL DERATING CURVES



MAXIMUM POWER DISSIPATION vs AMBIENT TEMPERATURE



MAXIMUM POWER DISSIPATION vs CASE TEMPERATURE

RECOMMENDED OPERATING CONDITIONS (Note 2)

Reference Current <10mA Operating Ambient Temperature Range
 Forward Current <30mA SG103 -55°C to 125°C
 SG203 -25°C to 85°C
 SG303 0°C to 70°C

Note 2. Range over which the device is functional

ELECTRICAL SPECIFICATIONS

(These specifications apply for $T_A = 25^\circ\text{C}$ and $1.8\text{V} < V_Z < 5.6\text{V}$ unless stated otherwise. The diode should not be operated with shunt capacitances between 100 pF and 0.01 μF , unless isolated by at least a 300 Ω resistor, as it may oscillate at some currents. For voltages between 4.3V and 5.6V, the maximum shunt capacitance is 50pF rather than 100pF. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

Parameter	Test Conditions	SG103/203/303			Units
		Min.	Typ.	Max.	
Reference Voltage Change	$10\mu\text{A} \leq I_R \leq 100\mu\text{A}$ $100\mu\text{A} \leq I_R \leq 1\text{mA}$ $1\text{mA} \leq I_R \leq 10\text{mA}$	60	120	120	mV
Reverse Dynamic Impedance (Note 3)	$I_R = 3\text{mA}$	5	25	150	Ω
	$I_R = 0.3\text{mA}$	15	60	150	Ω
Reverse Leakage Current	$V_R = V_Z - 0.2\text{V}$	2	5	5	μA
Forward Voltage Drop	$I_F = 10\text{mA}$	0.7	0.8	1.0	V
Peak-to-Peak Broadband Noise Voltage	$10\text{Hz} \leq f \leq 100\text{kHz}$, $I_R = 1\text{mA}$		300		μV
Reference Voltage Change with Current (Note 4)	$10\mu\text{A} \leq I_R \leq 100\mu\text{A}$			200	mV
	$100\mu\text{A} \leq I_R \leq 1\text{mA}$			60	mV
	$1\text{mA} \leq I_R \leq 10\text{mA}$			200	mV
Reference Voltage Temperature Coefficient (Note 4)	$100\mu\text{A} \leq I_R \leq 1\text{mA}$		-1.0		mV/°C

Note 3. Measured with the peak-to-peak change of reverse current equal to 10% of the DC reverse current.

Note 4. These specifications apply for $-55^\circ\text{C} < T_A < +125^\circ\text{C}$.

CHARACTERISTIC CURVES

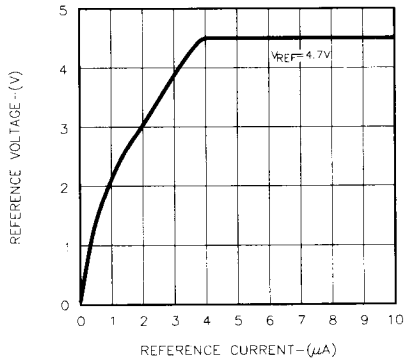


FIGURE 1. REFERENCE VOLTAGE VS. CURRENT

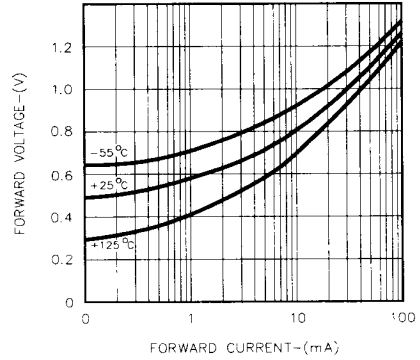


FIGURE 2. FORWARD DIODE CHARACTERISTICS

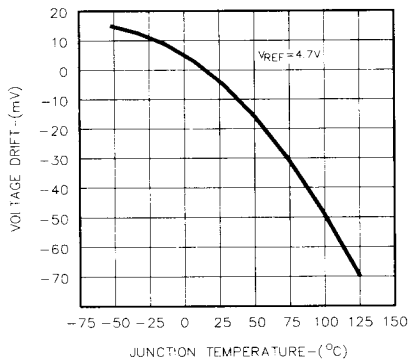


FIGURE 3. TEMPERATURE DRIFT

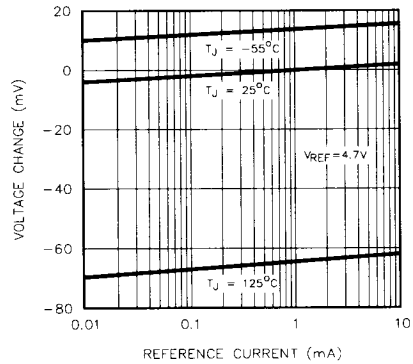
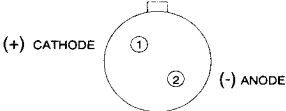


FIGURE 4. REFERENCE VOLTAGE CHANGE VS. CURRENT

CONNECTION DIAGRAMS & ORDERING INFORMATION (See Notes Below)

Package	Part No.	Ambient Temperature Range	Connection Diagram
2-PIN TO-46 METAL CAN Z - PACKAGE	SG103-x.xZ/883B SG103-x.xZ SG203-x.xZ SG303-x.xZ x.x = See first page of data sheet for reference voltages available.	-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.
 Note 2. All packages are viewed from the top.

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