



### Product Description

The SGL0263Z is a high performance SiGe HBT MMIC low noise amplifier featuring 1 micron emitters with  $F_T$  up to 50GHz. This device has an internal temperature compensation circuit permitting operation directly from supply voltages as low as 2.5V. The SGL0263Z has been characterized at  $V_D=3V$  for low power and 4V for medium power applications. Only two DC-blocking capacitors, 2 input matching components, a bias resistor, and an optional RF choke are required for operation from 1400MHz to 2500MHz.

### Features

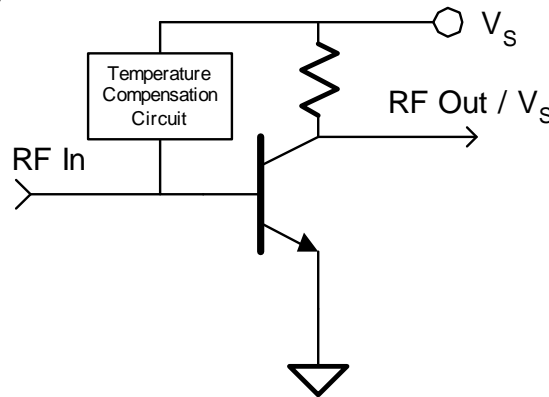
- High Input/Output Intercept
- Low Noise Figure: 1.3dB typ. at 1900MHz
- Low Power Consumption
- Single Voltage Supply Operation
- Internal Temperature Compensation

### Applications

- Receivers, GPS, RFID
- Cellular, Fixed Wireless, Land Mobile

#### Optimum Technology Matching® Applied

- GaAs HBT
- GaAs MESFET
- InGaP HBT
- SiGe BiCMOS
- Si BiCMOS
- SiGe HBT
- GaAs pHEMT
- Si CMOS
- Si BJT
- GaN HEMT
- InP HBT



Parameter	Specification ( $V_S=3V$ )			Specification ( $V_S=4V$ )			Unit	Condition
	Min.	Typ.	Max.	Min.	Typ.	Max.		
Small Signal Gain	12.1	13.4	14.7		13.8		dB	1900MHz
		12.5			12.9		dB	2100MHz
		10.8			11.3		dB	2400MHz
Output Power at 1dB Compression	3.5	5.5			11.4		dBm	1900MHz
		6.8			12.3		dBm	2100MHz
		7.9			12.8		dBm	2400MHz
Input Third Order Intercept Point Tone Spacing=1MHz, $P_{OUT}$ per tone=-13dBm	7.5	9.5			15.1		dBm	1900MHz
		13.5			16.8		dBm	2100MHz
		15.5			18.4		dBm	2400MHz
Noise Figure		1.3	1.7		1.9		dB	1900MHz, $Z_S=50\Omega$
		1.5			2.1		dB	2100MHz, $Z_S=50\Omega$
		2.0			2.8		dB	2400MHz, $Z_S=50\Omega$
Input Return Loss	10.0	13.3			21.9		dB	1900MHz
Output Return Loss	10.0	12.9			17.4		dB	1900MHz
Reverse Isolation		20.7			21.0		dB	1900MHz
Device Current	9.0	12.5	15.0		23.0		mA	
Thermal Resistance (Junction to Lead)		255					$^{\circ}C/W$	

Test Conditions: 1400MHz to 2500MHz Application Circuit,  $T_{LEAD}=25^{\circ}C$ ,  $Z_0=Z_L=50\Omega$

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## Absolute Maximum Ratings

Parameter	Rating	Unit
Max Device Current ( $I_D$ )	45	mA
Max Device Voltage ( $V_D$ )	5	V
Max RF Input Power	+10	dBm
Max Junction Temp ( $T_J$ )	+150	°C
Operating Temp Range ( $T_L$ )	-40 to +85	°C
Max Storage Temp	+150	°C
ESD	1A	Class
MSL	1	



**Caution!** ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

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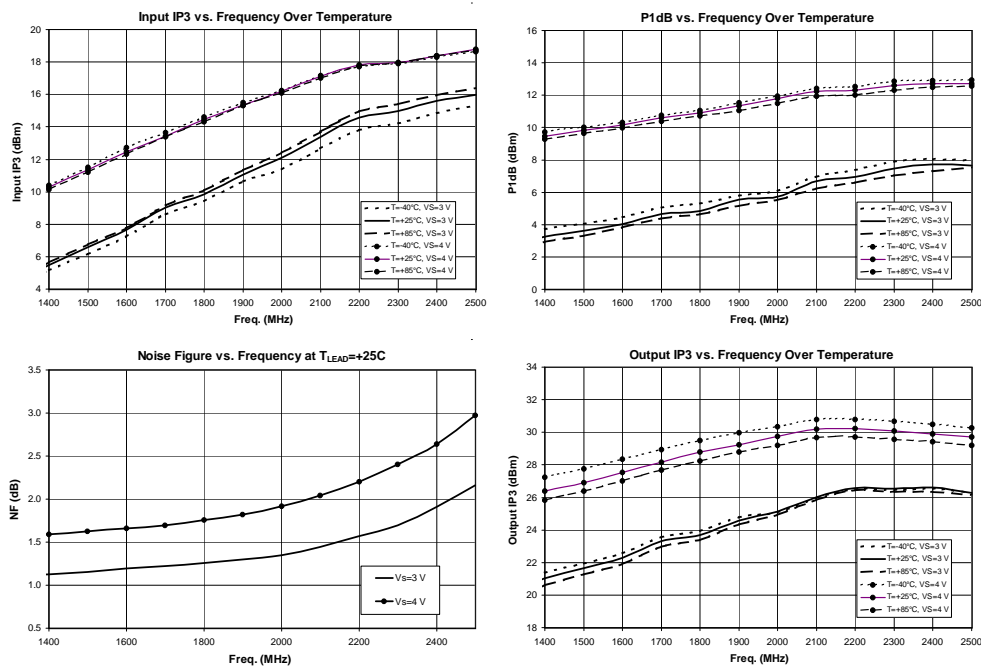
RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

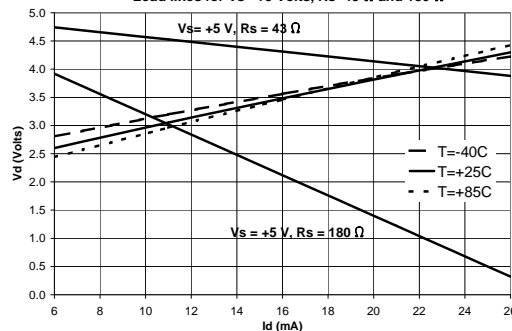
Bias Conditions should also satisfy the following expression:

$$I_D V_D < (T_J - T_L) / R_{TH, J-L}$$

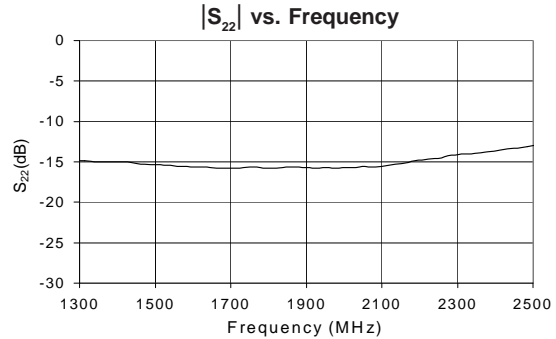
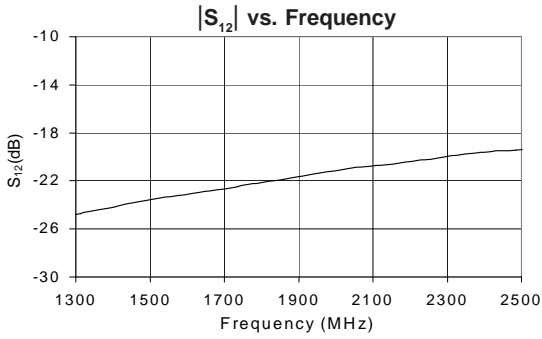
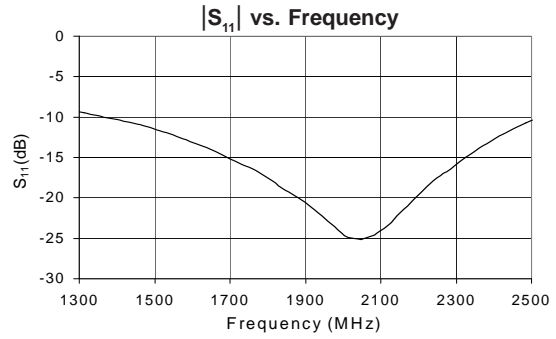
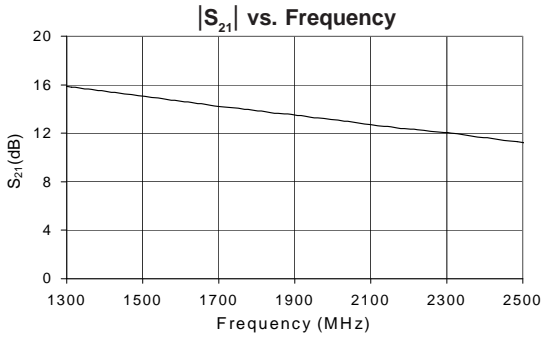
## Typical RF Performance Over Lead Temperature at 3 V and 4 V -- 1400-2500 MHz Evaluation Board



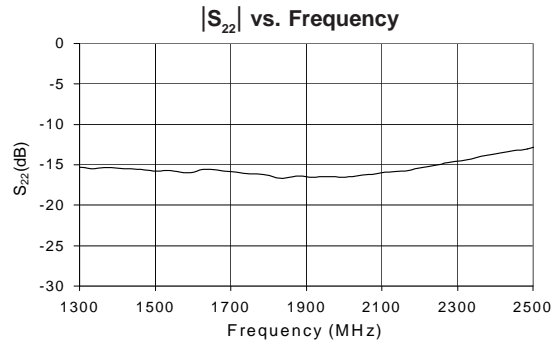
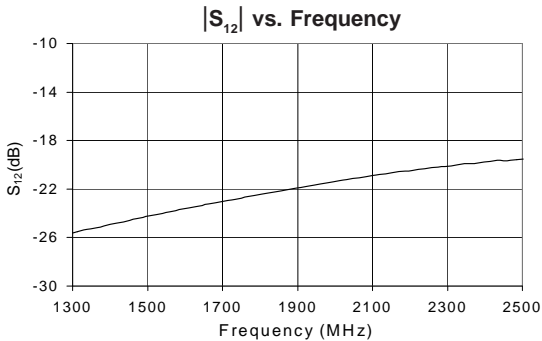
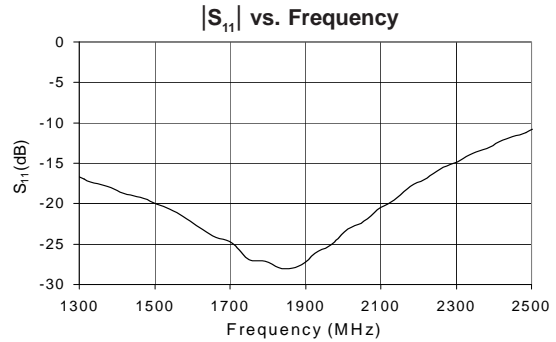
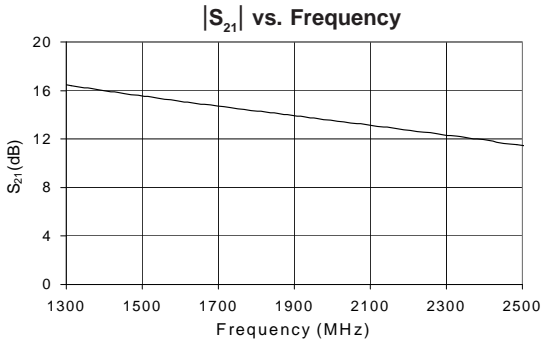
Device Voltage ( $V_d$ ) vs. Device Current ( $I_d$ )  
for  $T = -40C, +25C, \& +85C$   
Load lines for  $V_s = +5$  Volts,  $R_s = 43 \Omega$  and  $180 \Omega$



**Typical RF Performance at  $V_S = 3\text{ V}$  -- 1400-2500 MHz Evaluation Board --  $T_{LEAD} = +25^\circ\text{C}$**

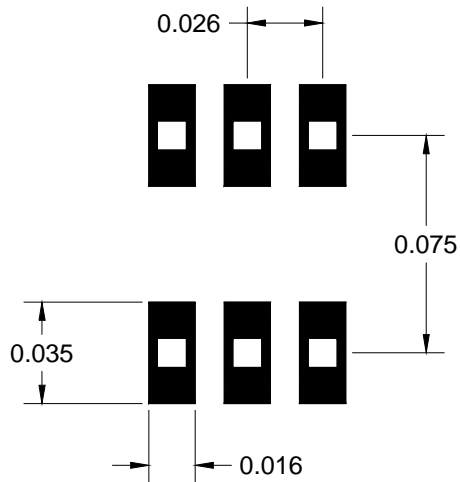


**Typical RF Performance at  $V_S = 4\text{ V}$  -- 1400-2500 MHz Evaluation Board --  $T_{LEAD} = +25^\circ\text{C}$**



Pin	Function	Description
1	N/C	No electrical connection. Provide an isolated (ungrounded) solder pad for mounting integrity.
3	RF IN	RF input pin. This pin requires the use of an external DC-blocking capacitor chosen for the frequency of operation.
4	DC BIAS	Voltage supply connection. Bypass with suitable capacitors.
2, 5	GND	Connection to ground. Provide via holes as close to ground leads as possible to reduce ground inductance and achieve optimum RF performance.
6	RF OUT/BIAS	RF output and voltage supply. DC voltage is present on this pin, therefore a DC-blocking capacitor is necessary for proper operation.

## Suggested Pad Layout



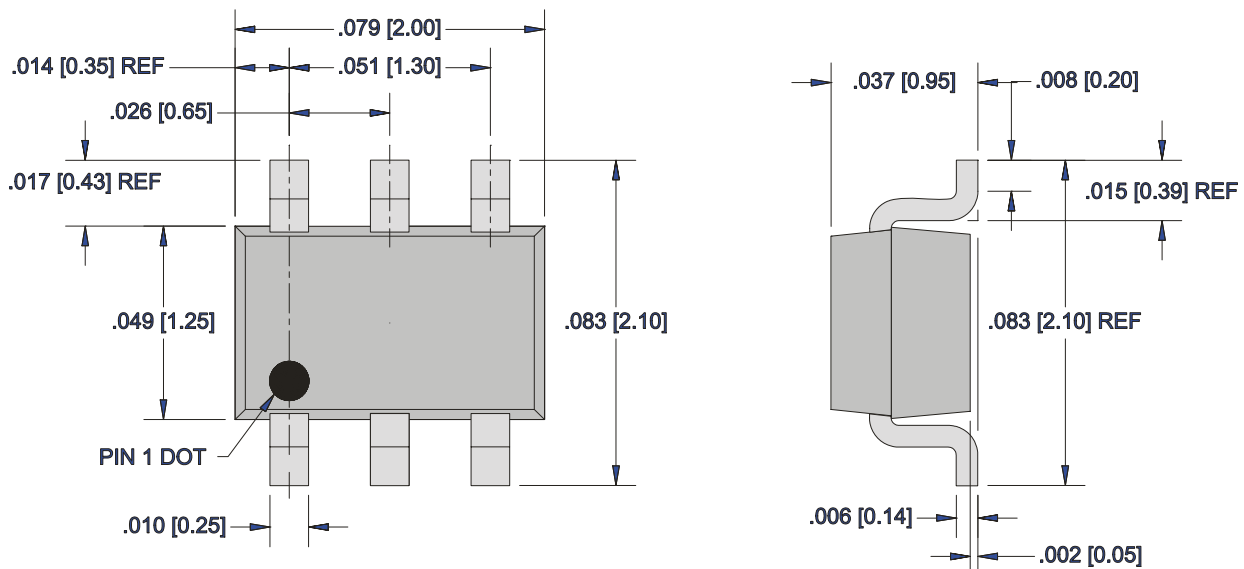
### Notes:

1. Provide a ground pad area under device pins 2 & 5 with plated via holes to the PCB ground plane.
2. We recommend 1 or 2 ounce copper. Measurements for this data sheet were made on a 31 mil thick Getek with 1 ounce copper on both sides.

## Package Drawing

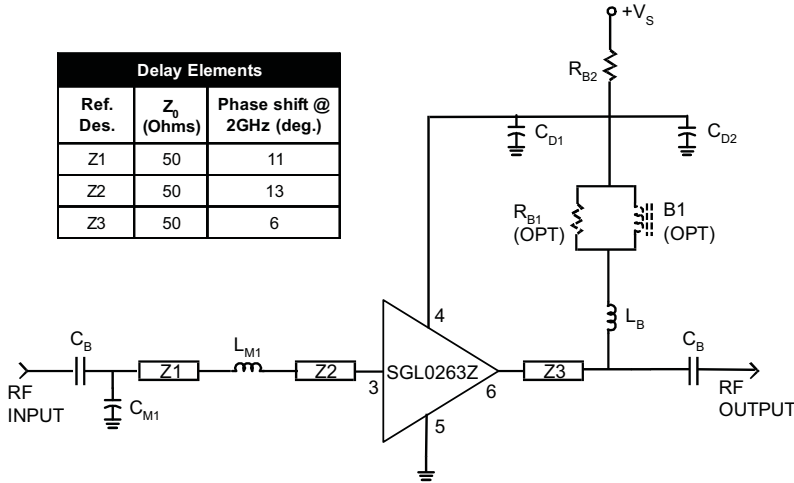
Dimensions in inches (millimeters)

Refer to drawing posted at [www.rfmd.com](http://www.rfmd.com) for tolerances.



**1400MHz to 2500MHz Application Circuit**

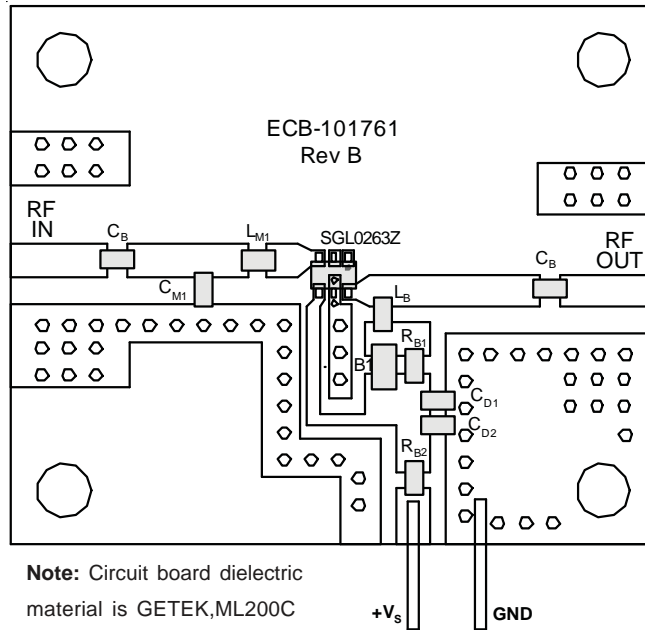
Delay Elements		
Ref. Des.	Z <sub>0</sub> (Ohms)	Phase shift @ 2GHz (deg.)
Z1	50	11
Z2	50	13
Z3	50	6



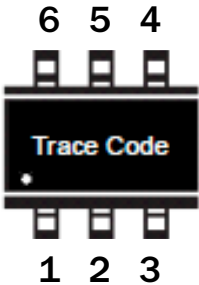
Application Circuit Element Values		
Reference Designator	Value	Manufacturer & Part No.
L <sub>B</sub>	27 nH	TOKO LL1608-FS27NJ
L <sub>M1</sub>	1.2 nH	TOKO LL1608-FS1R2NJ
B1 <sup>1</sup>	1500 Ohms @100 MHz Ferrite Bead	FAIR-RITE 2508051527y0
C <sub>B</sub> , C <sub>D1</sub>	0.1 uF	SAMSUNG CL10B103KBNC
C <sub>D2</sub>	22 pF	ROHM MCH185AA220DJK
C <sub>M1</sub>	1.0 pF	ROHM MCH185A1R0CK
R <sub>B1</sub> <sup>1</sup>	47 Ohms	PHILLIPS 9C06031A47R0 JL HFT
R <sub>B2</sub> <sup>2</sup>	0 Ohms	PHILLIPS 9C06031A0R00 JL HFT

Notes:  
 1. B1 and R<sub>B1</sub> provide improved K-factor but are optional.  
 2. R<sub>B2</sub> may be introduced as a voltage dropping resistor for use with supply voltages greater than the desired device bias voltage.

**Evaluation Board Layout**



### Alternate Marking with Trace Code Only



### Ordering Information

Part Number	Description
SGL0263Z	7" Reel with 3000 pieces
SGL0263ZSQ	Sample Bag with 25 pieces
SGL0263ZSR	7" Reel with 100 pieces
SGL0263ZPCK1	1400MHz to 2500MHz PCBA with 5-piece Sample Bag