SIRENZA MICRODEVICES

Preliminary

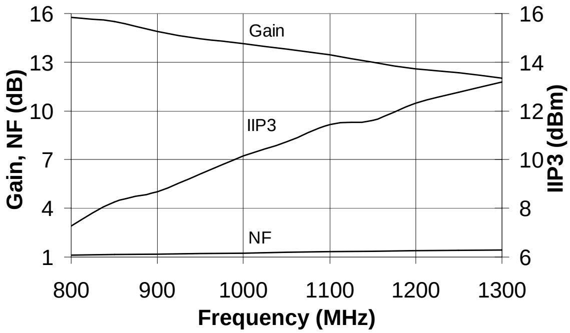
SGL-0163

0.8 - 1.3 GHz, Cascadable SiGe HBT MMIC Low Noise Amplifier

Product Description

Sirenza Microdevices' SGL-0163 is a high performance SiGe HBT MMIC low noise amplifier featuring 1 micron emitters with F_T up to 50 GHz. It is designed for operation at voltages as low as 2.5V. The SGL-0163 has been characterized at Vd = 3V for low power and 4V for medium power applications. This device has an internal temperature compensation circuit and can be operated directly from a 3-4V supply. Only 2 DC-blocking capacitors, a bias resistor, and an optional RF choke are required for operation.

Gain, Noise Figure, IIP3 vs. Frequency
I_B = 11mA, T = +25C



Product Features

- Low Noise Figure
- High Input /Output Intercept
- Internal Temp. Compensation Circuit
- Internally Matched to 50 Ω
- Low Power Consumption
- Single Voltage Supply
- Small Package: SOT-363

Applications

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

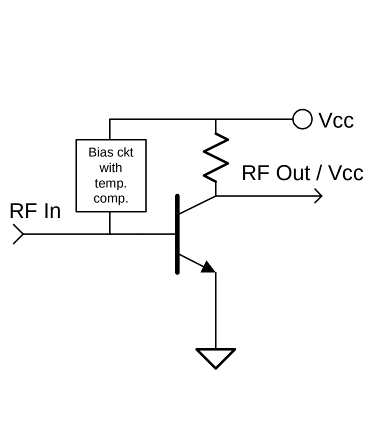
Symbol	Parameters: Test Conditions: Application Ckt Z_0 = 50 Ohms, T = 25ºC		Units	Min. (I_D=11 mA)	Typ. (I_D=11 mA)	Max. (I_D =11 mA)	Typ. (I_D =23 mA)	Notes
P_{1dB}	Output Power at 1dB Compression	f = 800 MHz f = 900 MHz f = 1000 MHz	dBm		3.9 4.1 4.6		9.9 10.1 10.5	App. Ckt See Sht. 2,3
IIP_3	Input Third Order Intercept Point Tone spacing = 1 MHz	f = 800 MHz f = 900 MHz f = 1000 MHz	dBm		7.2 8.6 10.1		12.1 13.4 14.8	App. Ckt See Sht. 2,3
S_{21}	Small Signal Gain	f = 800 MHz f = 900 MHz f = 1000 MHz	dB		15.7 14.9 14.1		16.6 15.8 15.0	App. Ckt See Sht. 2,3
NF	Noise Figure, Z_S = 50 Ohms	f = 800 MHz f = 900 MHz f = 1000 MHz	dB		1.1 1.2 1.2		1.6 1.7 1.7	App. Ckt See Sht. 2,3
S_{11}	Input Return Loss	f = 800 MHz f = 900 MHz f = 1000 MHz	dB		10.8 12.2 13.5		14.3 15.7 17.4	App. Ckt See Sht. 2,3
S_{22}	Output Return Loss	f = 800 MHz f = 900 MHz f = 1000 MHz	dB		15.2 15.6 16.1		17.1 17.6 18.1	App. Ckt See Sht. 2,3
S_{12}	Reverse Isolation	f = 800 MHz f = 900 MHz f = 1000 MHz	dB		21.8 20.9 20.0		21.9 20.9 20.0	App. Ckt See Sht. 2,3
V_D	Device Voltage		Volts		3.0		4.0	
R_{TH},j-l	Thermal Resistance (junction to lead)		ºC/W		255			

Absolute Maximum Ratings

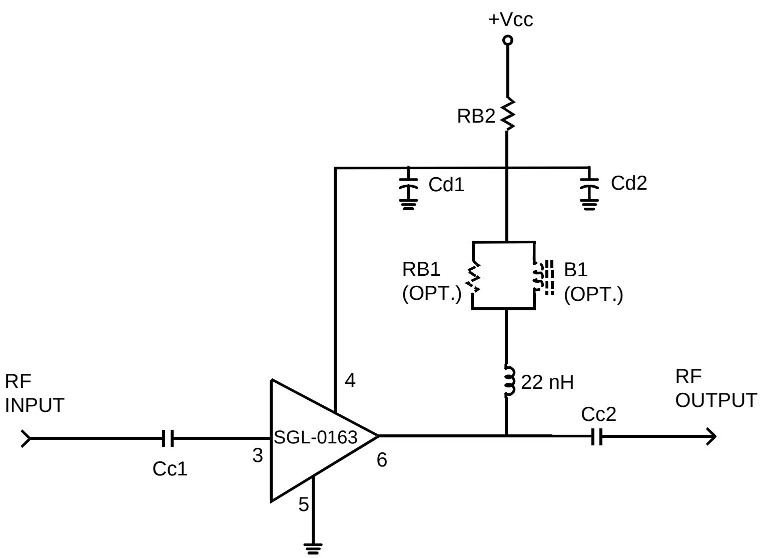
Operation of this device above any one of these parameters may cause permanent damage.

Bias Conditions should also satisfy the following expression: $I_D V_D \text{ (max)} < (T_J - T_{OP})/R_{TH}, j\text{-}l$

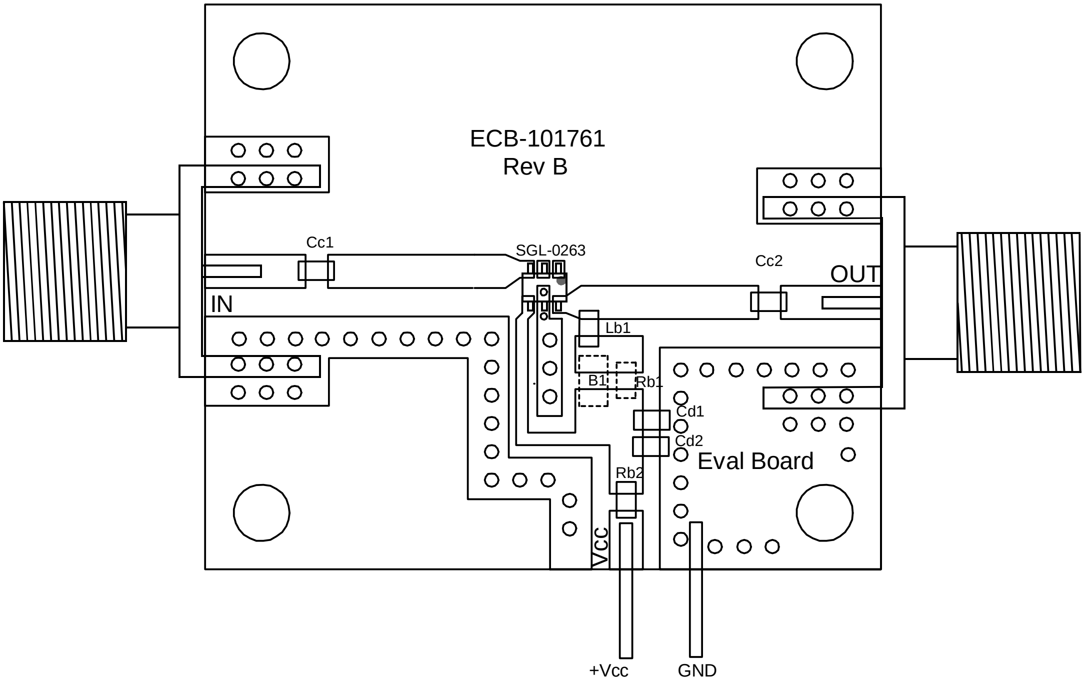
Parameter	Value	Unit
Supply Current	45	mA
Operating Temperature	-40 to +85	ºC
Maximum Input Power	10	dBm
Storage Temperature Range	-40 to +150	ºC
Operating Junction Temperature	+150	ºC
ESD voltage (Human Body Model)	400	V

Pin #	Function	Description	Device Schematic
1	N/C	No Connection.	
2	N/C	No Connection.	
3	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.	
4	Vcc	Supply connection. This pin should be bypassed with a suitable capacitor(s).	
5	GND	Connected to ground. For best performance use via holes as close to ground leads as possible.	
6	RF OUT VCC	RF output and DC supply. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.	

Application Schematic (See Sheet 3 for layout)



SGL-0163 0.8-1.3 GHz Evaluation Board Layout (component side)



Refer to layout above and Schematic on Sheet 2 for Tables below

Application Circuit Parts List

Ref. Designator	Description	Value	Manufact. Part No.
Lb	Inductor	33 nH	TOKO LL1608-FS27NJ
B1 [2]	Ferrite Bead	1500 Ohms @100 MHz	FAIR-RITE 2508051527y0
Cc1,Cc2,Cd1	Capacitor,SM,0603	0.1 uF	SAMSUNG CL10B103KBNC T/R
Cd2	Capacitor,SM,0603	22 pF	ROHM MCH185AA220DJK
Rb1 [2]	Resistor,SM,0603	47 Ohms	PHILLIPS 9C06031A47R0 JL HFT
Rb2	Resistor,SM,0603	0 Ohms	PHILLIPS 9C06031A0R00 JL HFT
N/A [1]	Circuit Board	N/A	Stanford Microdevices ECB101761 Rev B

I/O Microstrip Parameters

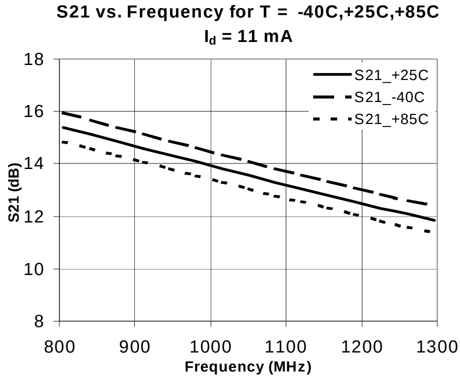
I/O Microstrip Parameters	Value	Units
Width	.059	Inches
Dielectric Thickness	.029	Inches
Conductor Thickness	.001	Inches
Dielectric Constant	4.1	None

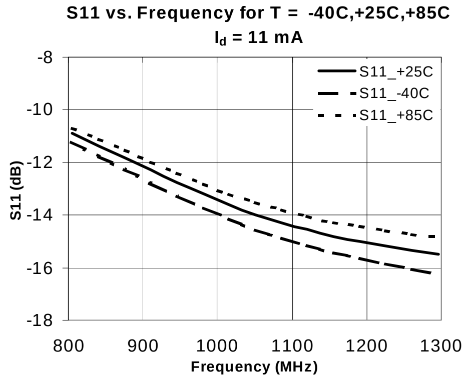
Notes:

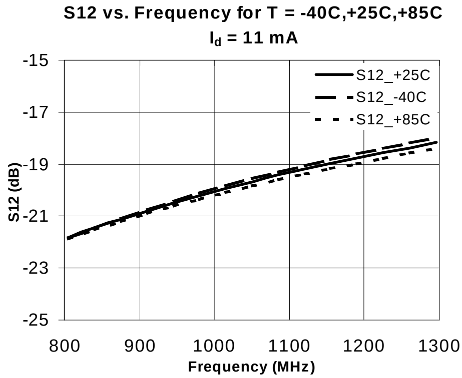
(1) Circuit board dielectric material is GETEK,ML200C

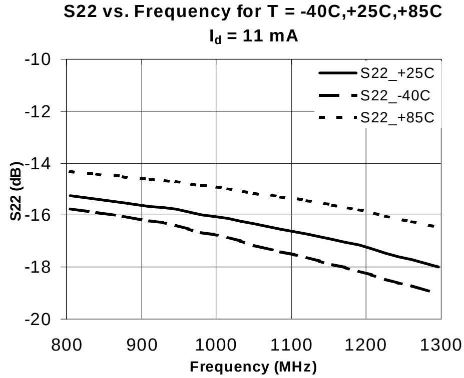
(2) B1 and Rb1 recommended for improved K-factor but are optional *

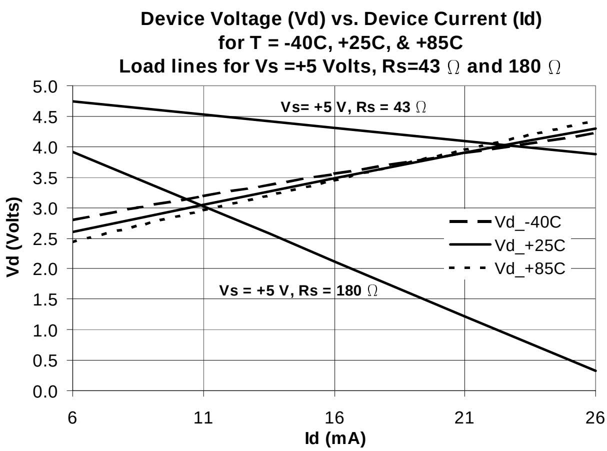
SGL-0263 1.5-2.4 GHz Evaluation Board
Scalar S-Parameters at Id=11mA



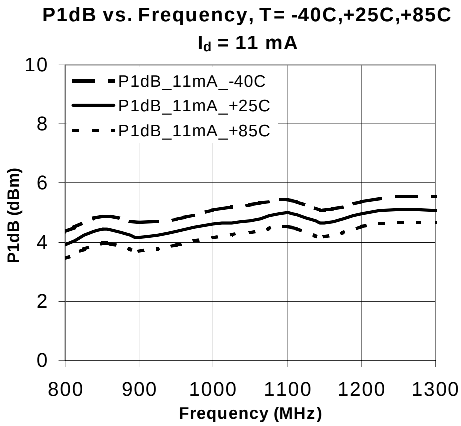


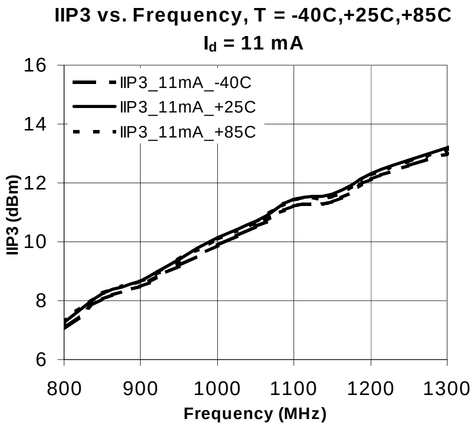


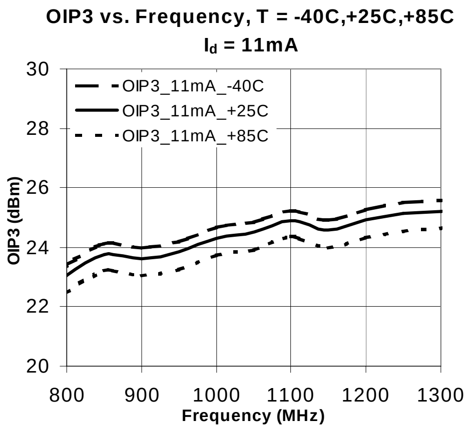


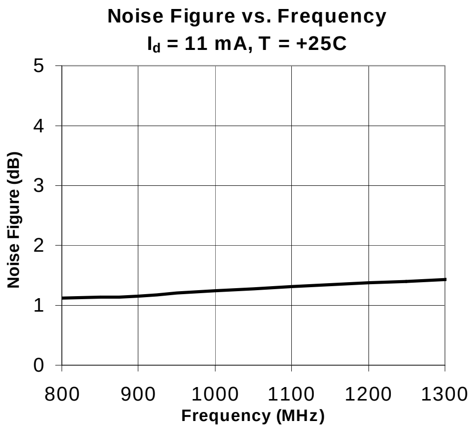


SGL-0263 1.5-2.4 GHz Evaluation Board
RF Performance at Id=11mA

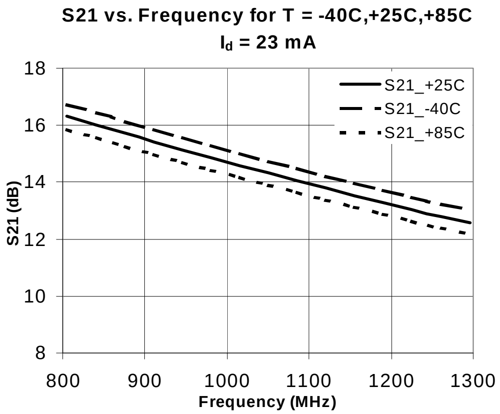


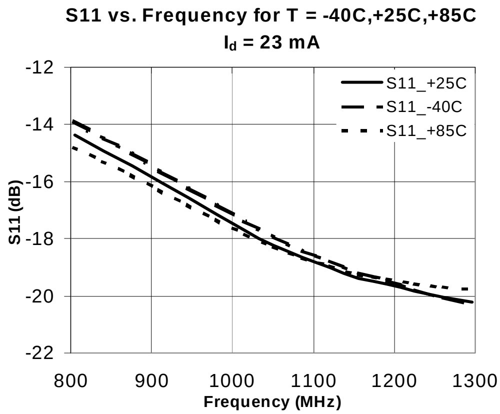


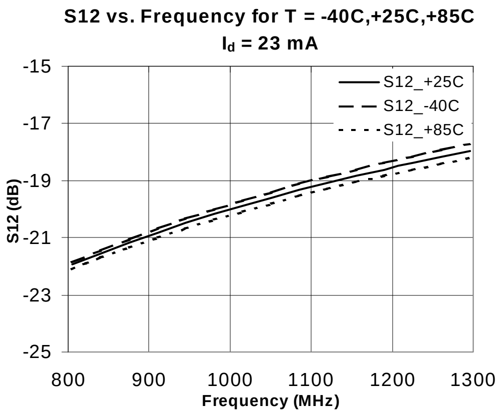


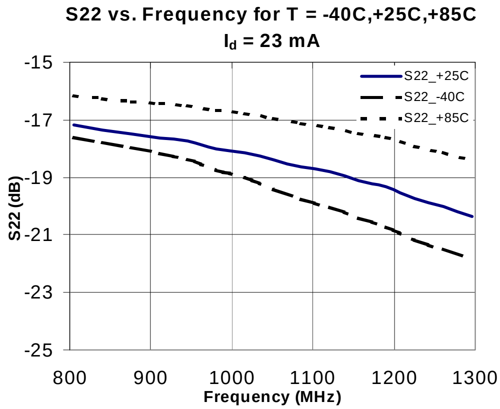


SGL-0263 1.5-2.4 GHz Evaluation Board
Scalar S-Parameters at Id=23mA



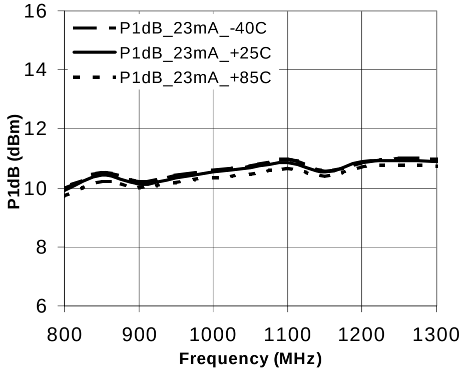




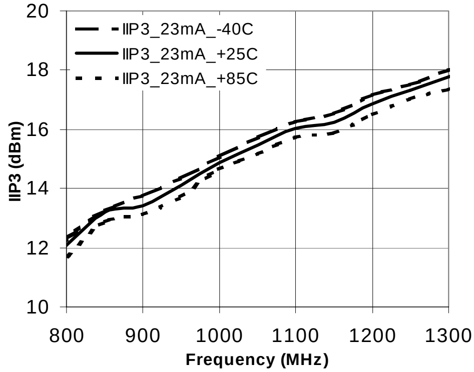


SGL-0263 1.5-2.4 GHz Evaluation Board
RF Performance at Id=23mA

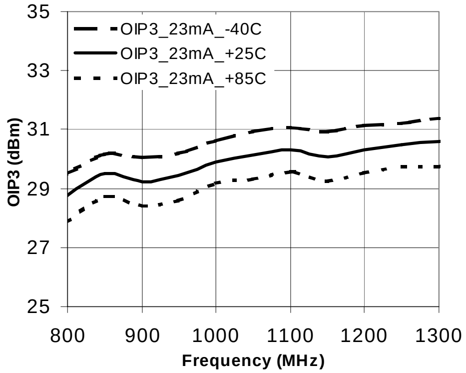
P1dB vs. Frequency, T = -40C,+25C,+85C
I_d = 23 mA



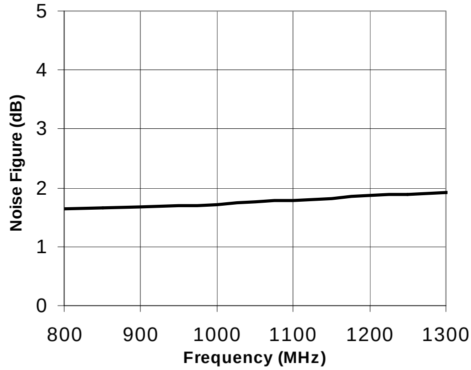
IIP3 vs. Frequency, T = -40C,+25C,+85C
Id = 23 mA

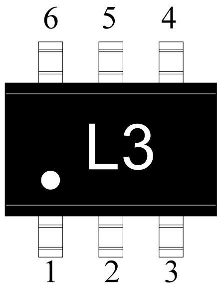


OIP3 vs. Frequency, T = -40C,+25C,+85C
I_d = 23 mA



Noise Figure vs. Frequency
I_d = 23 mA , T = +25C

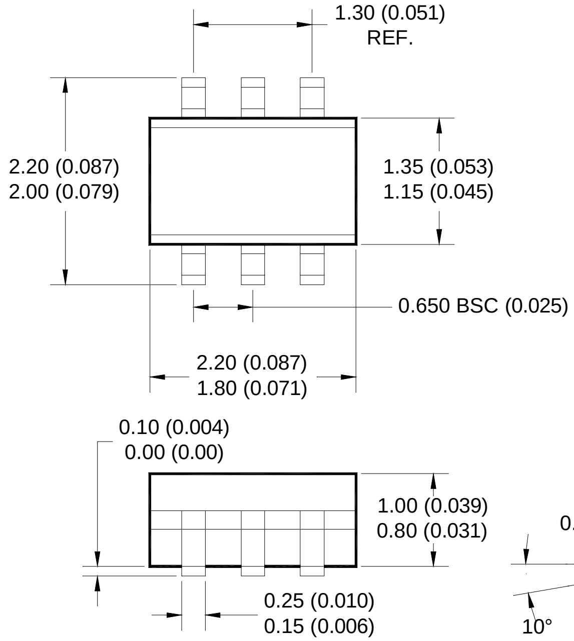




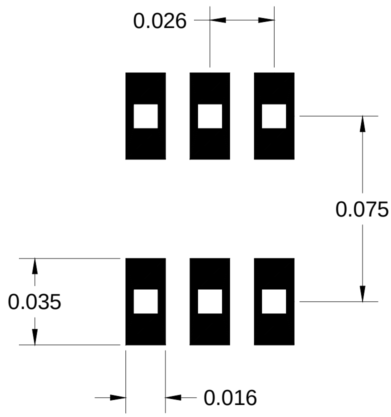
Pin Designation	
1	N/C
2	N/C
3	RF in
4	Vcc
5	GND
6	RF out / Vcc

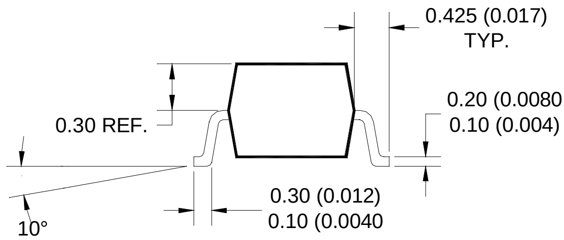
Note: Pin 1 is on lower left when you can read package marking

Package Dimensions



Pad Layout





DIMENSIONS ARE IN INCHES [MM]

Caution: ESD sensitive
Appropriate precautions in handling, packaging and testing devices must be observed.