Preliminary

SGL-0263

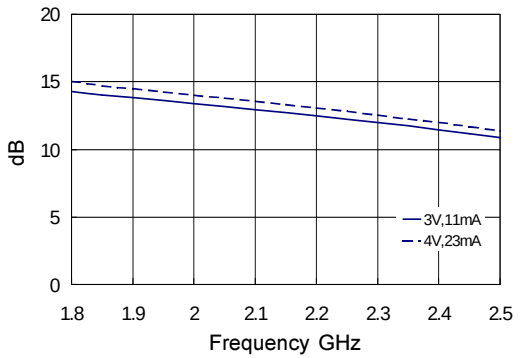
1900-2400 MHz Low Noise Amplifier 50 Ohm, Silicon Germanium

Product Description

Stanford Microdevices' SGL-0263 is a high performance cascadeable 50-ohm low noise amplifier designed for operation at voltages as low as 2.5V. The SGL-0263 can be operated at 3V for low power or 4V for medium power applications. This RFIC uses the latest Silicon Germanium Heterostructure Bipolar Transistor (SiGe HBT) process featuring 1 micron emitters with F_T up to 50 GHz.

The SGL-0263 requires input LC match, an RF choke, DC blocking and bypass capacitors for external components. This device has an internal temperature compensation circuit and can be operated directly from 3-4V supply.

Small Signal Gain vs. Frequency



Product Features

- Low Noise Figure
- High Input Intercept
- Internal Temp. Compensation Circuit
- Unconditionally Stable
- Low Power Consumption
- Single Voltage Supply
- Small Package: SOT-363

Applications

- Receivers
- Cellular, Fixed Wireless, Land Mobile

Symbol	Parameters: Test Conditions: Z_0 = 50 Ohms, T = 25°C		Units	Vcc = 3V Min.	Vcc = 3V Typ.	Vcc = 3V Max.	Vcc = 4V Typ.
P_{1dB}	Output Power at 1dB Compression	f = 1900 MHz f = 2400 MHz	dBm dBm		4.8 6.0		10.6 11.1
IIP_3	Input Third Order Intercept Point Tone spacing = 1 MHz	f = 1900 MHz f = 2400 MHz	dBm dBm		7.3 10.6		11.9 15.2
S_{21}	Small Signal Gain	f = 1900 MHz f = 2400 MHz	dB dB	12.5	14.0 11.4	15.5	14.5 12.0
NF	Noise Figure, Z_S = 50 Ohms	f = 1900 MHz f = 2400 MHz	dB dB		1.3 1.8		1.7 2.3
-	Input VSWR	f = 1900 MHz f = 2400 MHz	- -		1.4:1 1.3:1		1.2:1 1.4:1
-	Output VSWR	f = 1900 MHz f = 2400 MHz	- -		1.5:1 1.5:1		1.4:1 1.5:1
S_{12}	Reverse Isolation	f = 1900 MHz f = 2400 MHz	dB dB		22.6 21.7		23.0 21.9
I_D	Device Current		mA	8.0	11.0	14.0	23.0
R_{th}, j-l	Thermal Resistance (junction - lead)		°C/W		255		255

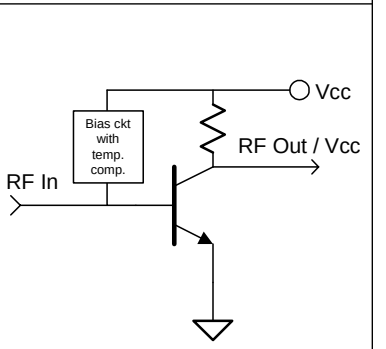
522 Almanor Ave., Sunnyvale, CA 94085 Phone: (800) SMI-MMIC http://www.stanfordmicro.com

Absolute Maximum Ratings

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

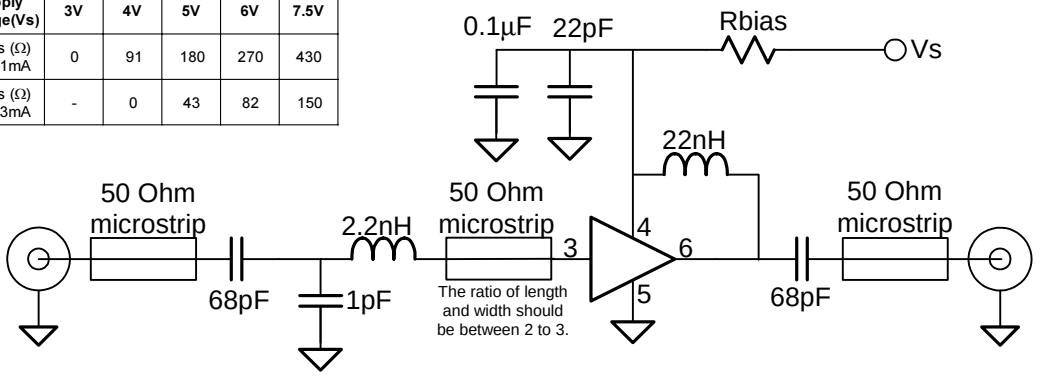
Bias Conditions should also satisfy the following expression: $I_D V_D$ (max) < (T_J - T_{OP})/R_{th},j-l

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	Connection 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.	

Recommended Bias Resistor Values					
Supply Voltage(Vs)	3V	4V	5V	6V	7.5V
Rbias (Ω) 3V, 11mA	0	91	180	270	430
Rbias (Ω) 4V, 23mA	-	0	43	82	150

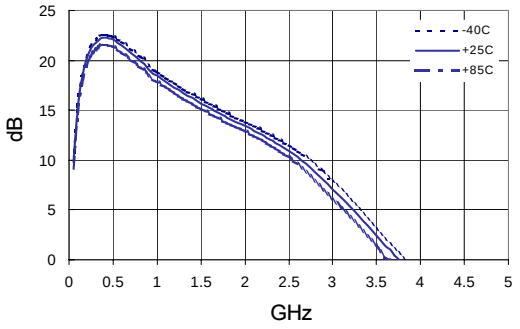
Application Schematic



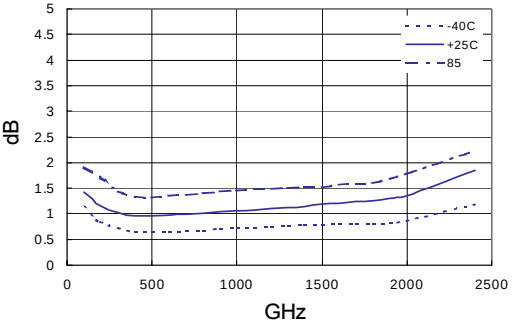
SGL-0263 1.9-2.4GHz SiGe Low Noise Amplifier

Bias Voltage: 3V

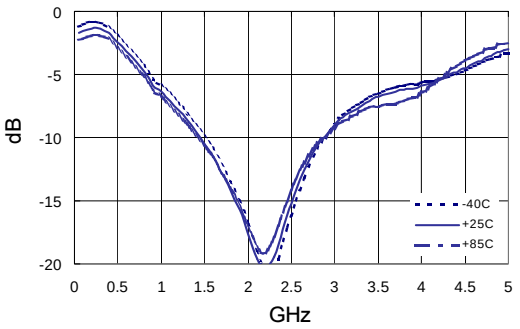
S21 vs. Frequency



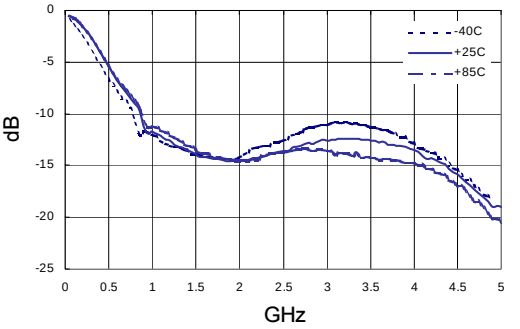
NF vs. Frequency



S11 vs. Frequency



S22 vs. Frequency



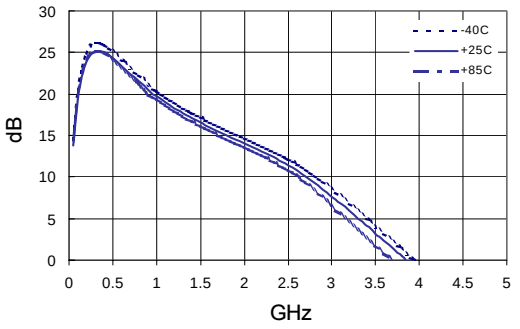
Typical S-Parameters including evaluation board @ T = 25ºC

	S11		S21		S12		S22	
Freq GHz	dB	Ang	dB	Ang	dB	Ang	dB	Ang
0.05	-1.65	-10.65	9.80	-109.91	-65.40	-176.03	-0.47	167.49
0.10	-1.55	-21.55	15.32	-129.63	-51.82	139.31	-0.71	142.59
0.50	-2.42	-117.84	22.04	106.07	-30.43	43.17	-5.42	4.95
1.00	-6.39	148.32	18.46	12.24	-26.42	-33.78	-11.71	-87.79
1.20	-7.83	115.81	17.27	-18.36	-25.46	-57.73	-12.65	-117.76
1.40	-9.48	83.76	16.19	-47.43	-24.51	-81.97	-13.53	-147.59
1.60	-11.47	51.70	15.18	-75.90	-23.74	-105.04	-14.16	-175.89
1.80	-14.11	16.50	14.26	-104.18	-23.09	-128.52	-14.43	153.70
1.90	-15.73	-4.72	13.82	-118.38	-22.69	-141.72	-14.56	139.08
2.00	-17.71	-30.24	13.36	-132.58	-22.46	-153.55	-14.46	124.06
2.10	-19.56	-61.33	12.93	-147.00	-22.13	-165.49	-14.46	106.81
2.20	-20.55	-101.27	12.47	-161.28	-22.08	-178.28	-14.24	90.93
2.30	-19.42	-143.07	11.98	-176.06	-21.69	167.20	-14.06	74.02
2.40	-17.26	-174.29	11.45	169.06	-21.66	155.26	-13.80	57.54
2.50	-15.23	159.76	10.88	154.42	-21.58	142.55	-13.60	40.39
2.60	-13.27	139.18	10.27	139.43	-21.61	129.44	-13.29	22.46
2.80	-10.64	104.42	8.80	109.91	-21.85	101.41	-12.82	-11.89
3.00	-9.04	74.11	7.08	81.92	-22.47	76.46	-12.58	-46.52
4.00	-5.87	-34.22	-2.37	-36.39	-26.82	-32.99	-13.51	168.07
5.00	-3.01	-120.33	-11.41	-138.05	-32.77	-132.09	-19.03	10.36

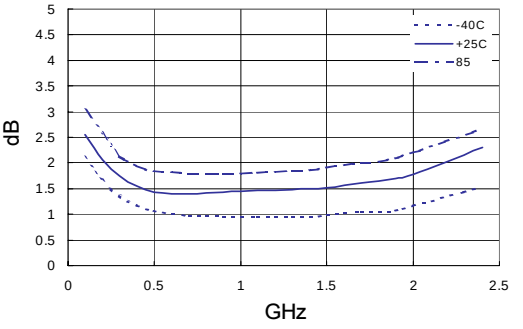
SGL-0263 1.9-2.4GHz SiGe Low Noise Amplifier

Bias Voltage: 4V

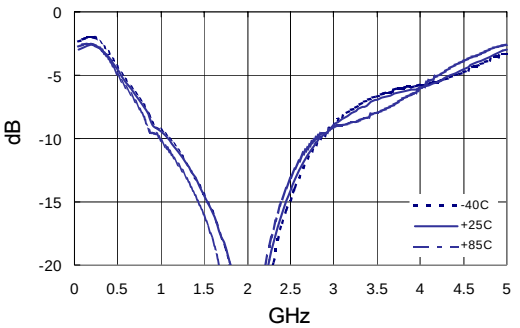
S21 vs. Frequency



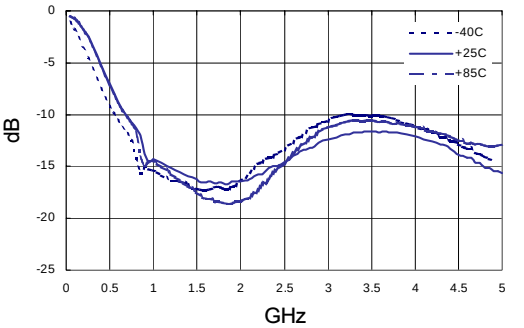
NF vs. Frequency



S11 vs. Frequency



S22 vs. Frequency

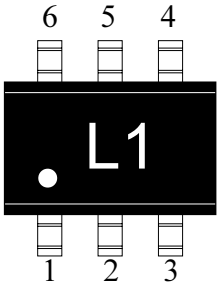


Typical S-Parameters including evaluation board @ T = 25ºC

	S11		S21		S12		S22	
Freq GHz	dB	Ang	dB	Ang	dB	Ang	dB	Ang
0.05	-2.9714	-11.64	13.786	-111.5	-61.161	-159.92	-0.4872	167.51
0.10	-2.8341	-23.709	19.259	-133.16	-52.214	130.7	-0.7481	142.35
0.50	-4.5417	-128.56	24.318	94.142	-32.043	41.482	-7.022	5.7472
1.00	-9.4463	139.96	19.67	3.8411	-27.98	-30.298	-14.29	-79.047
1.20	-11.037	108.26	18.308	-25.453	-26.216	-51.651	-15.204	-108.73
1.40	-13.091	76.672	17.101	-53.648	-25.044	-73.531	-15.957	-138.12
1.60	-15.8	44.812	16.005	-81.208	-24.354	-97.811	-16.512	-167.95
1.80	-19.771	4.834	15.033	-108.87	-23.582	-122.38	-16.593	160.11
1.90	-22.383	-23.18	14.508	-122.76	-23.025	-133.23	-16.462	144.33
2.00	-24.402	-66.253	14.018	-136.53	-22.631	-147.24	-16.409	127.67
2.10	-23.713	-114.99	13.585	-150.54	-22.228	-159.68	-16.242	108.9
2.20	-21.433	-154.11	13.085	-164.6	-22.112	-172.77	-15.796	92.322
2.30	-18.186	178.19	12.548	-178.9	-21.902	174.68	-15.338	74.686
2.40	-15.922	158.85	12.034	166.92	-21.881	161.12	-14.982	56.589
2.50	-14.093	141.07	11.401	152.56	-21.773	146.93	-14.531	39.368
2.60	-12.469	124.64	10.767	137.84	-21.503	134.89	-14.007	20.374
2.80	-10.341	94.871	9.3182	109.39	-21.945	107.42	-13.149	-14.332
3.00	-8.9817	68.089	7.6574	82.187	-22.447	82.711	-12.436	-49.359
4.00	-5.9681	-34.823	-1.4215	-35.708	-26.825	-33.576	-12.104	163.83
5.00	-2.9932	-119.89	-10.505	-138.21	-31.324	-131.44	-15.687	9.5897

SGL-0263 1.9-2.4GHz SiGe Low Noise Amplifier

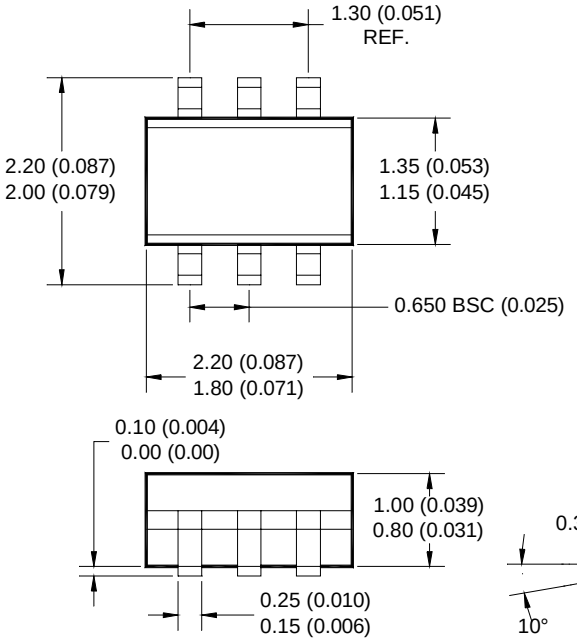
Caution: ESD sensitive
Appropriate precautions in handling, packaging and testing devices must be observed.



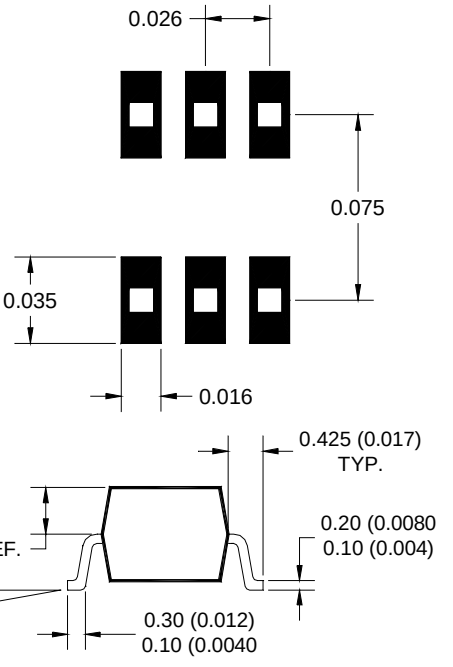
Pin Designation	
1	N/C
2	N/C
3	RF in
4	Vcc
5	GND
6	RF out / Vcc

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

Package Dimensions

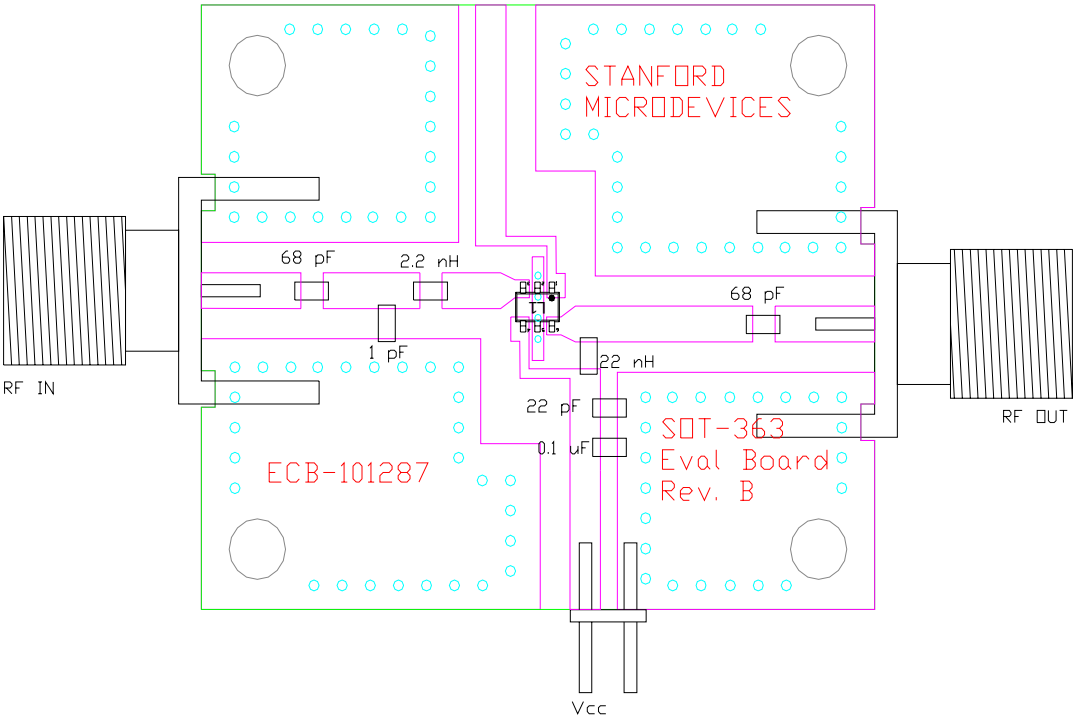


Pad Layout



DIMENSIONS ARE IN INCHES [MM]

Evaluation Board layout



Suggested Components

Manufacture	Part Number	Description	Value
Rohm	MCH185A010CK	Capacitor	1 pF
Rohm	MCH185A200JK	Capacitor	22 pF
Rohm	MCH185A680JK	Capacitor	68 pF
Rohm	MCH182FN104ZK	Capacitor	0.1 uF
TOKO	LL1608-FH2N2S	Inductor	2.2 nH
TOKO	LL1608-FH22NJ	Inductor	22 nH