

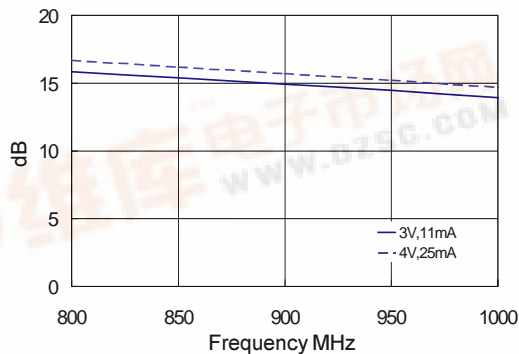


Product Description

Stanford Microdevices' SGL-0163 is a high performance cascadeable 50-ohm low noise amplifier designed for operation at voltages as low as 2.5V. The SGL-0163 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.

Internally matched to 50 Ohm impedance, the SGL-0163 requires only 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



Preliminary

SGL-0163

800-1000 MHz Low Noise Amplifier
50 Ohm, Silicon Germanium



Product Features

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

Applications

- Receivers
- Cellular, Fixed Wireless, Land Mobile

Symbol	Parameters: Test Conditions: $Z_0 = 50 \text{ Ohms}$, $T = 25^\circ\text{C}$	Units	$V_{CC} = 3V$ Min.	$V_{CC} = 3V$ Typ.	$V_{CC} = 3V$ Max.	$V_{CC} = 4V$ Typ.
P_{1dB}	Output Power at 1dB Compression	f = 900 MHz	dBm		5.0	11.0
IIP_3	Input Third Order Intercept Point Tone spacing = 1 MHz	f = 900 MHz	dBm		6.4	11.8
S_{21}	Small Signal Gain	f = 900 MHz	dB	13.5	15.0	15.7
NF	Noise Figure, $Z_s = 50 \text{ Ohms}$	f = 900 MHz	dB		1.1	1.5
-	Input VSWR	f = 900 MHz	-		1.8:1	1.5:1
-	Output VSWR	f = 900 MHz	-		1.7:1	1.6:1
S_{12}	Reverse Isolation	f = 900 MHz	dB		20.6	20.7
I_b	Device Current		mA	8.0	11.0	25.0
$R_{\theta JA}$	Thermal Resistance (junction - lead)		$^\circ\text{C/W}$		255	255

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EDS-101501 Rev A





Preliminary
SGL-0163 800-1000 MHz SiGe Low Noise Amplifier

Absolute Maximum Ratings

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

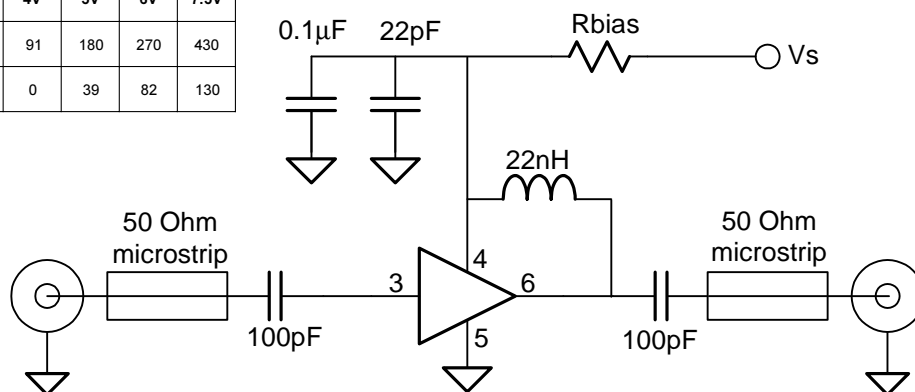
Bias Conditions should also satisfy the following expression: $I_D V_D (\text{max}) < (T_J - T_{OP})/R_{th,j-l}$

Parameter	Value	Unit
Supply Current	45	mA
Operating Temperature	-40 to +85	°C
Maximum Input Power	10	dBm
Storage Temperature Range	-40 to +150	°C
Operating Junction Temperature	+150	°C
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.	

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, 25mA	-	0	39	82	130

Application Schematic



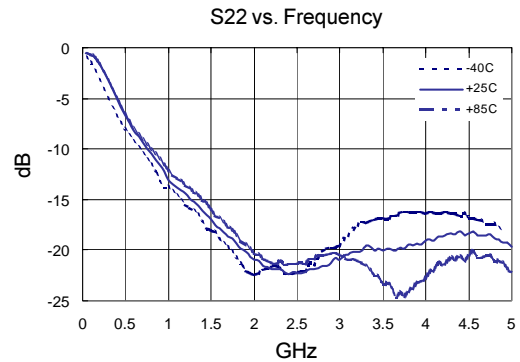
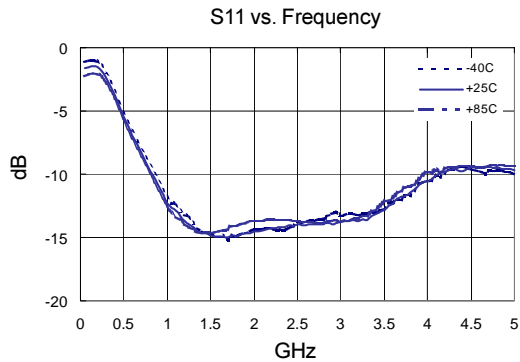
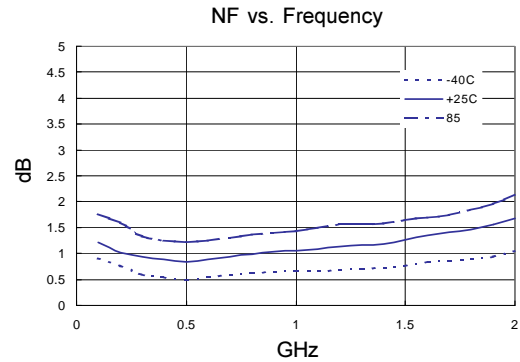
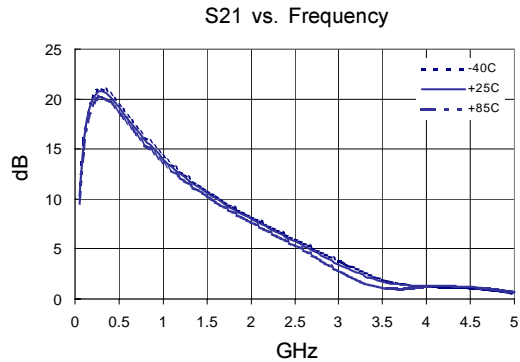
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Bias Voltage: 3V

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SGL-0163 800-1000 MHz SiGe Low Noise Amplifier



Typical S-Parameters including evaluation board @ T = 25°C

Freq GHz	S11		S21		S12		S22	
	dB	Ang	dB	Ang	dB	Ang	dB	Ang
0.05	-1.65	-10.10	10.33	-113.20	-57.01	-159.32	-0.46	167.29
0.10	-1.53	-21.04	15.73	-136.59	-43.87	151.51	-0.66	141.56
0.20	-1.56	-46.05	19.90	-179.32	-34.97	116.17	-1.57	97.58
0.40	-3.78	-94.95	20.19	113.44	-26.97	68.69	-4.98	29.78
0.60	-6.95	-133.10	17.99	68.94	-23.59	36.36	-8.16	-15.35
0.70	-8.39	-149.91	16.89	51.21	-22.57	22.87	-9.40	-33.66
0.80	-9.73	-166.33	15.86	35.23	-21.42	10.59	-10.52	-50.18
0.90	-10.98	176.74	14.92	20.19	-20.60	-1.18	-11.55	-66.62
1.00	-12.35	161.19	13.95	5.93	-19.97	-13.73	-13.08	-82.02
1.10	-12.93	145.25	13.22	-6.67	-19.28	-24.32	-13.78	-91.62
1.20	-13.69	129.17	12.49	-19.64	-18.65	-35.19	-14.45	-105.95
1.40	-14.65	94.20	11.18	-44.96	-17.49	-56.66	-16.14	-133.73
1.60	-14.89	62.41	10.05	-69.31	-16.61	-78.17	-17.81	-161.98
1.80	-14.93	32.92	8.97	-93.12	-15.73	-99.63	-19.40	169.38
2.00	-14.55	5.79	7.99	-116.42	-15.11	-120.88	-20.92	139.03
3.00	-13.78	-98.28	3.45	132.95	-13.36	136.24	-20.92	-10.75
4.00	-10.54	167.77	1.28	38.56	-11.59	45.79	-19.10	-132.43
5.00	-9.66	43.52	0.66	-68.46	-9.48	-57.19	-19.70	109.26

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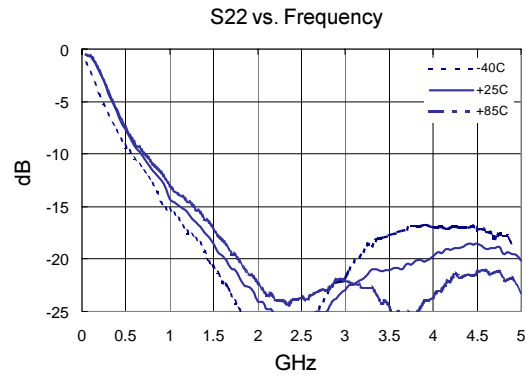
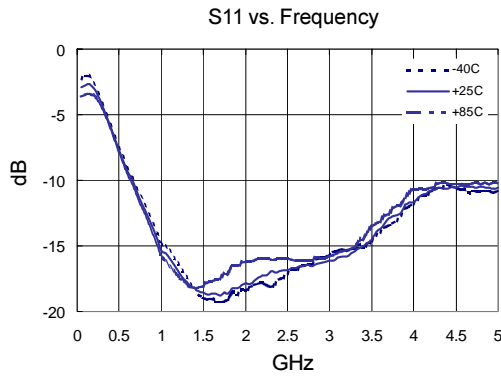
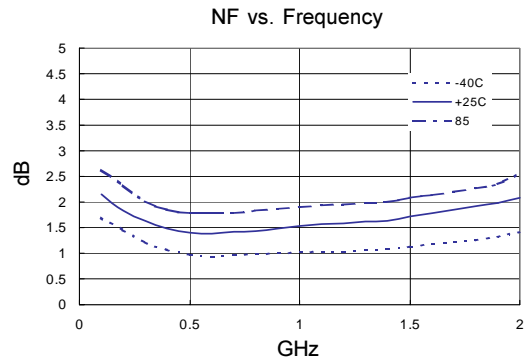
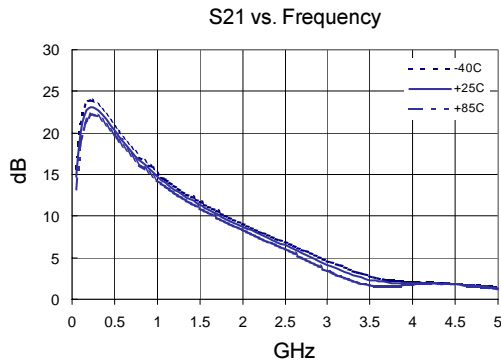
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Preliminary

SGL-0163 800-1000 MHz SiGe Low Noise Amplifier

Bias Voltage: 4V



Typical S-Parameters including evaluation board @ T = 25°C

Freq GHz	S11		S21		S12		S22	
	dB	Ang	dB	Ang	dB	Ang	dB	Ang
0.05	-2.92	-9.82	14.77	-117.69	-53.54	-168.24	-0.47	167.24
0.10	-2.70	-21.07	19.88	-145.20	-47.07	144.73	-0.72	141.30
0.20	-2.99	-47.78	23.03	166.72	-36.16	112.72	-2.08	97.31
0.40	-5.89	-93.30	21.61	101.88	-27.73	73.01	-5.97	35.05
0.60	-9.23	-127.00	18.96	61.46	-23.92	41.45	-9.22	-6.88
0.70	-10.80	-142.17	17.77	45.17	-22.81	28.77	-10.36	-24.66
0.80	-12.27	-157.37	16.71	30.14	-21.62	16.21	-11.55	-40.64
0.90	-13.74	-173.18	15.74	15.93	-20.65	2.77	-12.54	-57.27
1.00	-15.40	173.72	14.73	2.28	-19.80	-9.68	-14.27	-71.95
1.10	-16.01	157.95	13.98	-9.74	-19.18	-20.32	-14.92	-81.26
1.20	-16.97	140.99	13.24	-22.31	-18.40	-31.19	-15.57	-95.79
1.40	-18.21	105.07	11.96	-46.63	-17.18	-54.02	-17.56	-123.51
1.60	-18.61	69.18	10.81	-70.42	-16.19	-75.95	-19.69	-150.83
1.80	-18.63	37.53	9.70	-93.66	-15.42	-97.56	-21.78	179.48
2.00	-17.83	8.83	8.73	-116.57	-14.77	-119.57	-24.06	149.53
3.00	-16.16	-91.56	4.14	133.65	-13.07	135.52	-23.01	-11.64
4.00	-11.67	174.62	1.90	40.37	-11.41	45.11	-19.80	-138.02
5.00	-10.59	46.68	1.36	-66.52	-9.32	-59.16	-20.12	98.21

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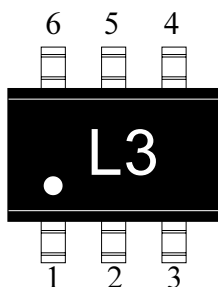
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Caution: ESD sensitive

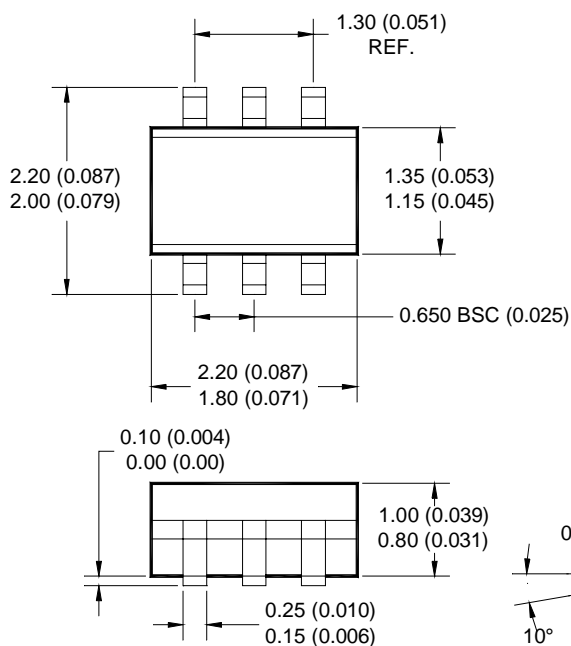
Appropriate precautions in handling, packaging and testing devices must be observed.



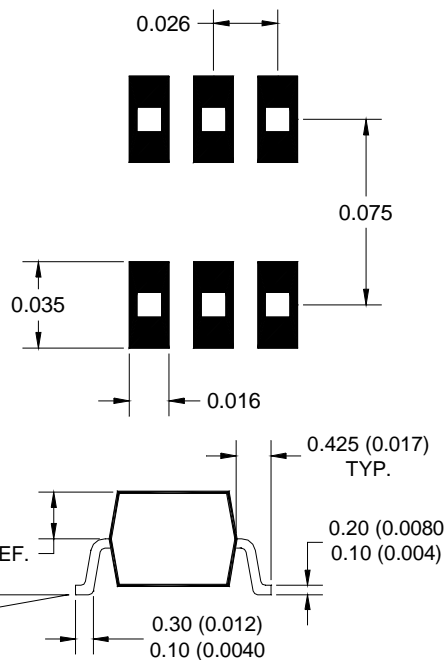
Pin Designation	
1	N/C
2	N/C
3	RF in
4	Vcc
5	GND
6	RF out / Vcc

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

Package Dimensions



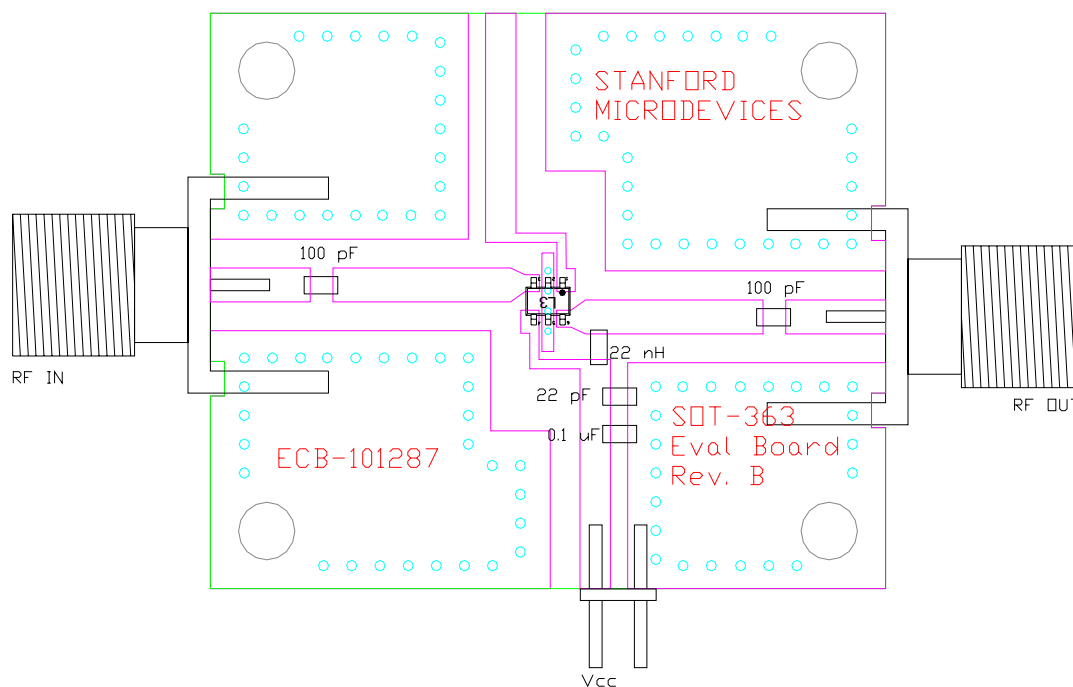
Pad Layout



DIMENSIONS ARE IN INCHES [MM]

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Evaluation Board layout



Suggested Components

Manufacture	Part Number	Description	Value
Rohm	MCH185A200JK	Capacitor	22 pF
Rohm	MCH185A101JK	Capacitor	100 pF
Rohm	MCH182FN104ZK	Capacitor	0.1 uF
TOKO	LL1608-FH22NJ	Inductor	22 nH

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