SCA-1

0.3-3 GHz, Cascadable GaAs MMIC Amplifier

Product Description

Stanford Microdevices' SCA-1 is a high performance Gallium Arsenide MESFET MMIC Amplifier. This device is fabricated using Stanford's reliable 0.5 micron gate MESFET process.

This amplifier is internally matched with typical VSWR of 1.6:1. Its positive gain slope makes it an ideal choice for cascading multiple amplifiers without sacrificing high frequency response.

These unconditionally stable amplifiers provides 10dB of gain and 100mW of 1dB compressed power and require only a single positive voltage supply. Only 2 DC-blocking capacitors and an optional inductor are needed for operation.

This MMIC is an ideal choice for wireless applications such as cellular, PCS, CDPD, wireless data and SONET.

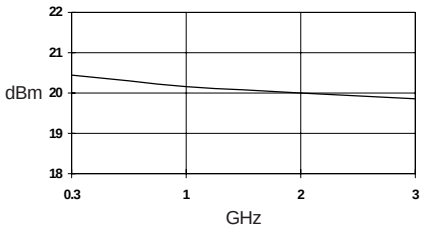
Product Features

- **High Output Power : +20dBm P1dB**
- **Very Flat Gain : +/-0.5dB from 0.3-2.0 GHz**
- **Cascadable 50 Ohm : 1.6:1 VSWR**
- **Operates From Single Supply**
- **Low Thermal Resistance Package**

Applications

- **Cellular, PCS, CDPD, Wireless Data, SONET**

Output Power vs. Frequency
Vd= 5V



Electrical Specifications at Ta = 25C

Symbol	Parameters: Test Conditions: V_D = +5.0V, Z_0 = 50 Ohms		Units	Min.	Typ.	Max.
G_P	Power Gain	f = 0.3-3.0 GHz	dB	8	10	
G_F	Gain Flatness Gain Flatness over any 100 MHz band	f = 0.3-2.0 GHz	dB dB		+/- 0.5 +/- 0.1	
P_{1dB}	Output Power at 1dB Compression	f = 0.3-3.0 GHz	dBm		+20	
NF	Noise Figure	f = 0.3-3.0 GHz	dB		3.5	
VSWR	Input / Output	f = 0.3-2.0 GHz	-		1.6:1	
IP_3	Third Order Intercept Point Output Tones @ 0dBm 10 MHz apart	f = 0.3-2.0 GHz	dBm	+28	+32	
T_D	Group Delay	f = 1.9 GHz	psec		100	
ISOL	Reverse Isolation	f = 0.3-3.0 GHz	dB		14	
I_D	Device Current	V_D= +5.0V	mA	60	90	140
dG/dT	Device Gain Temperature Coefficient		dB/degC		-0.0015	

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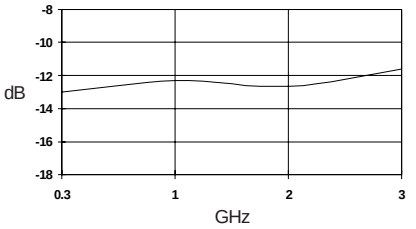
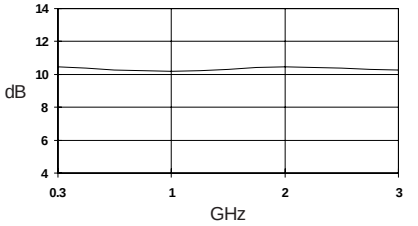
SCA-1 0.3-3 GHz Cascadable MMIC Amplifier

Typical Performance at 25° C (Vds = 5.0V, Ids = 90mA)

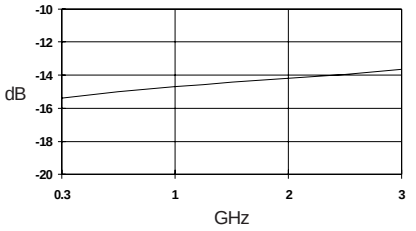
|S11| vs. Frequency



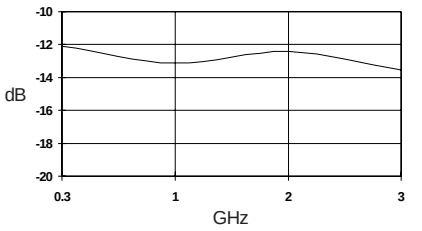
|S21| vs. Frequency



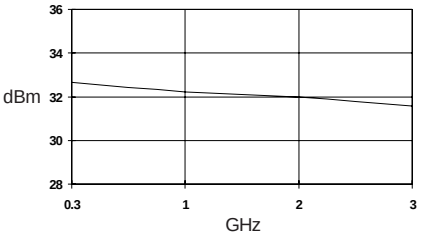
|S12| vs. Frequency



|S22| vs. Frequency



TOIP vs. Frequency



Typical S-Parameters Vd = 5.0V

Freq GHz	|S11|	S11 Ang	|S21|	S21 Ang	|S12|	S12 Ang	|S22|	S22 Ang
.300	.175	-73	2.942	160	.132	-27	.104	-131
.500	.115	-107	3.220	139	.119	-44	.104	136
.750	.075	-134	3.188	114	.113	-59	.114	60
.900	.065	-149	3.116	101	.112	-69	.168	30
1.00	.063	-162	3.077	91	.111	-76	.183	12
1.50	.077	131	3.007	48	.103	-117	.250	-63
2.00	.136	86	3.025	6	.085	-164	.304	-136
2.50	.282	35	3.179	-38	.045	139	.339	135
3.00	.431	-30	3.341	-91	.013	-69	.344	35

(S-Parameters include the effects of two 1.0 mil diameter bond wires, each 20 mils long, connected to the gate and drain pads on the die)

Absolute Maximum Ratings

Parameter	Absolute Maximum
Device Current	135mA
Power Dissipation	820mW
RF Input Power	200mW
Junction Temperature	+150C
Operating Temperature	-45C to +85C
Storage Temperature	-65C to +150C

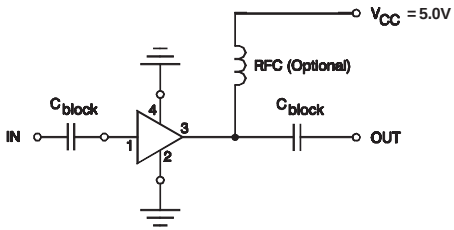
Notes:

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

MTTF vs. Temperature @ Id =90mA, Vd =5V

Lead Temperature	MTTF (hrs)
+85C	1,000,000
+120C	100,000
+150C	10,000

Thermal Resistance (Lead-Junction): 155° C/W



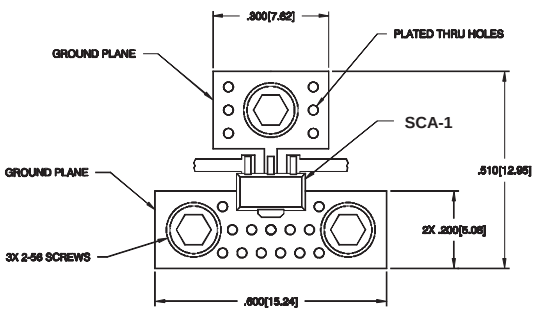
Typical Biasing Configuration

Pin Designation	
1	RF in
2	GND
3	RF out and Bias
4	GND

Mounting Instructions

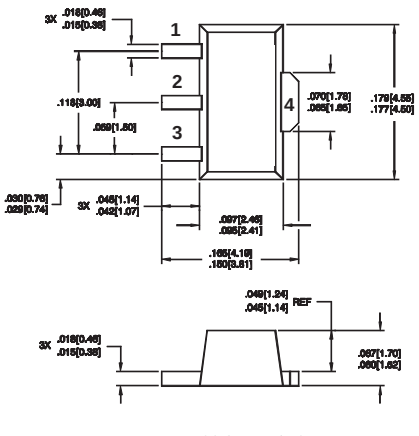
The data shown was taken on a 31 mil thick FR-4 board with 1 ounce of copper on both sides.
The board was mounted to a baseplate with 3 screws as shown.
The screws bring the top side copper temperature to the same value as the baseplate.

1. Use 1 or 2 ounce copper, if possible.
2. Solder the copper pad on the backside of the device package to the ground plane.
3. Use a large ground pad area with many plated through-holes as shown.
4. If possible, use at least one screw no more than 0.2 inch from the device package to provide a low thermal resistance path to the baseplate of the package.
5. Thermal resistance from ground lead to screws is 2 deg. C/W.



DIMENSIONS ARE IN INCHES [MM]

Outline Drawing



DIMENSIONS ARE IN INCHES [MM]

Pin assignments shown for reference only, not marked on part

50 Ohm Gain Blocks