STANFORD MICRODEVICES

Product Description

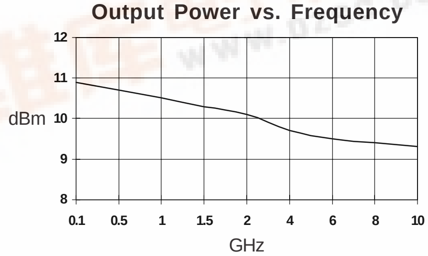
Stanford Microdevices' SNA-300 is a GaAs monolithic broadband amplifier (MMIC) in die form. This amplifier provides 22dB of gain when biased at 35mA and 4V.

External DC decoupling capacitors determine low frequency response. The use of an external resistor allows for bias flexibility and stability.

These unconditionally stable amplifiers are designed for use as general purpose 50 ohm gain blocks. Also available in packaged form (SNA-376, -386 & -387), its small size (0.33mm x 0.33mm) and gold metallization make it an ideal choice for use in hybrid circuits.

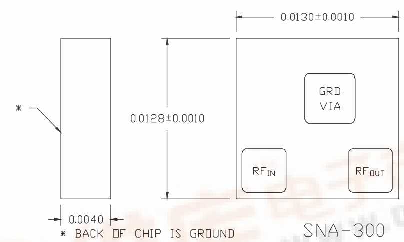
The SNA-300 is available in gel paks at 100 devices per container.

Output Power vs. Frequency



SNA-300

DC-3 GHz, Cascadable GaAs MMIC Amplifier



Product Features

- **Cascadable 50 Ohm Gain Block**
- **22dB Gain, +10dBm P1dB**
- **1.5:1 Input and Output VSWR**
- **Operates From Single Supply**
- **Chip Back is Ground**

Applications

- **Narrow and Broadband Linear Amplifiers**
- **Commercial and Industrial Applications**

50 Ohm Gain Blocks

Electrical Specifications at Ta = 25C

Symbol	Parameters: Test Conditions: Id = 35mA, Z_0 = 50 Ohms		Units	Min.	Typ.	Max.
G_P	Small Signal Power Gain	f = 0.1-1.0 GHz f = 1.0-2.0 GHz f = 2.0-3.0 GHz	dB dB dB	21.0 20.0 19.0	23.0 22.0 21.0	
G_F	Gain Flatness	f = 0.1-3.0 GHz	dB		+/- 1.5	
BW3dB	3dB Bandwidth		GHz		3.0	
P_{1dB}	Output Power at 1dB Compression	f = 2.0 GHz	dBm		10.0	
NF	Noise Figure	f = 2.0 GHz	dB		4.0	5.0
VSWR	Input / Output	f = 0.1-3.0 GHz			1.5:1	
IP_3	Third Order Intercept Point	f = 2.0 GHz	dBm		23.0	
T_D	Group Delay	f = 2.0 GHz	psec		100	
ISOL	Reverse Isolation	f = 0.1-3.0 GHz	dB		22.0	
VD	Device Voltage		V	3.5	4.0	4.5
dG/dT	Device Gain Temperature Coefficient		dB/degC		-0.003	
dV/dT	Device Voltage Temperature Coefficient		mV/degC		-4.0	

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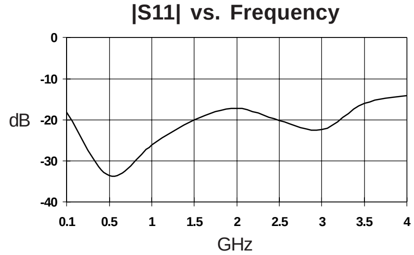
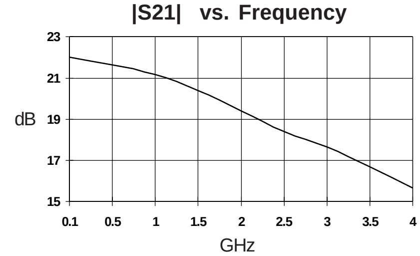
SNA-300 DC-3 GHz Cascadable MMIC Amplifier

Typical Performance at 25° C (Vds = 4.0V, Ids = 35mA)

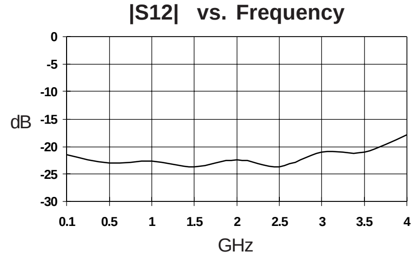
|S11| vs. Frequency



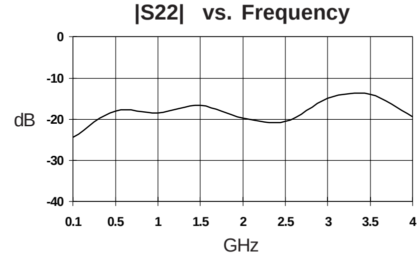
|S21| vs. Frequency



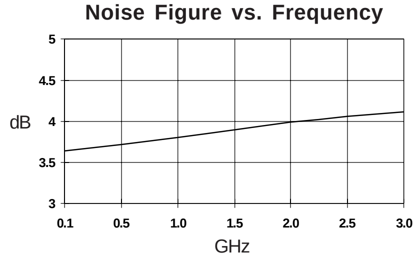
|S12| vs. Frequency



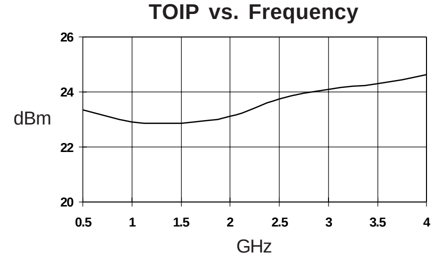
|S22| vs. Frequency

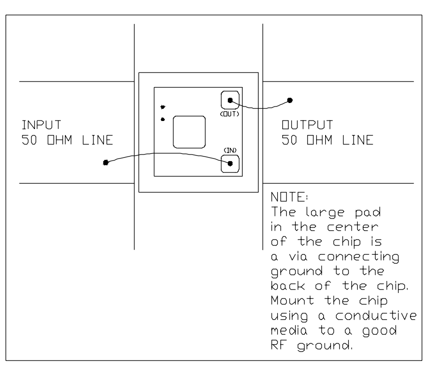


Noise Figure vs. Frequency

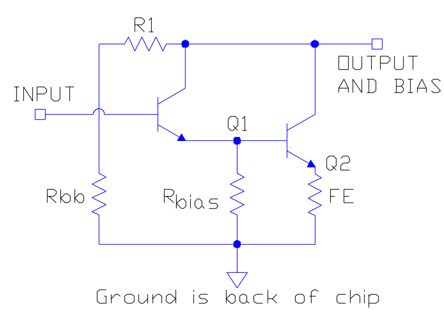


TOIP vs. Frequency





Suggested Bonding Arrangement



Simplified Schematic of MMIC

50 Ohm Gain Blocks

Absolute Maximum Ratings

Parameter	Absolute Maximum
Device Current	90mA
Power Dissipation	400mW
RF Input Power	20mW
Junction Temperature	+200C
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.

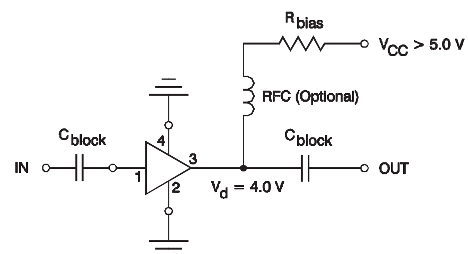
Part Number Ordering Information

Part Number	Devices Per Pak
SNA-300	100

MTTF vs. Temperature @ Id = 35mA

Die Bottom Temperature	Junction Temperature	MTTF (hrs)
+65C	+120C	10000000
+100C	+155C	1000000
+135C	+190C	100000

Thermal Resistance (Lead-Junction): 407° C/W



Typical Biasing Configuration

Die Attach
The die attach process mechanically attaches the die to the circuit substrate. In addition, it electrically connects the ground to the trace on which the die is mounted and establishes the thermal path by which heat can leave the die.

Assembly Techniques
Epoxy die attach is recommended. The top and bottom metallization is gold. Conductive silver-filled epoxies are recommended. This method involves the use of epoxy to form a joint between the backside gold of the chip and the metallized area of the substrate. A 150 C cure for 1 hour is necessary. Recommended epoxy is Ablebond 84-1LMIT1 from Ablestik.

Wire Bonding
Electrical connections to the die are through wire bonds. Stanford Microdevices recommends wedge bonding or ball bonding to the pads of these devices.

Recommended Wedge Bonding Procedure
1. Set the heater block temperature to 260C +/- 10C.
2. Use pre-stressed (annealed) gold wire between 0.0005 to 0.001 inches in diameter.
3. Tip bonding pressure should be between 15 and 20 grams and should not exceed 20 grams. The footprint that the wedge leaves on the gold wire should be between 1.5 and 2.5 wire diameters across for a good bond.