

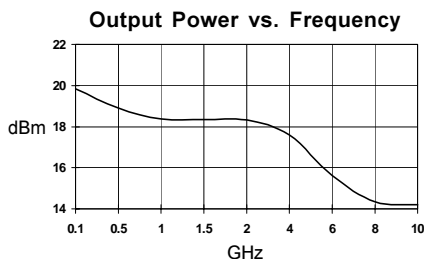
## Product Description

Sirenza Microdevices' SNA-400 is a GaAs monolithic broadband amplifier (MMIC) in die form. This amplifier provides 13dB of gain when biased at 65mA and 5.0V.

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

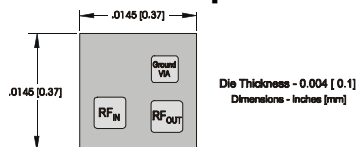
These unconditionally stable amplifiers are designed for use as general purpose 50 ohm gain blocks. Its small size (0.4mm x 0.4mm) and gold metallization make it an ideal choice for use in hybrid circuits.

The SNA-400 is available in gel pak at 100 devices per container. Also available in packaged form (SNA-476 and SNA-486).



## SNA-400

### DC-8 GHz, Cascadable GaAs MMIC Amplifier



## Product Features

- Cascadable 50 Ohm Gain Block
- 13dB Gain, +17dBm P1dB
- 1.5:1 Input and Output VSWR
- Operates From Single Supply
- Chip Back Is Ground

## Applications

- PA Driver Amplifier
- Cellular, PCS, GSM, UMTS
- IF Amplifier
- Wireless Data, Satellite

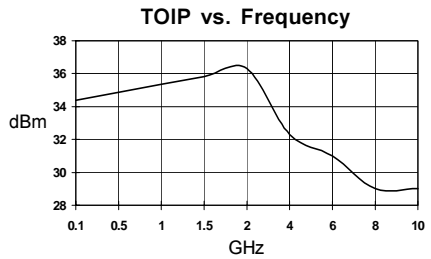
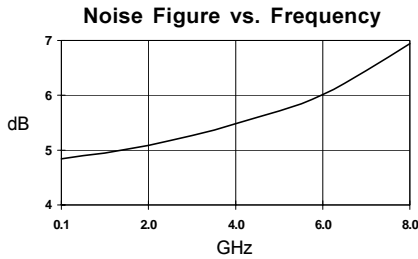
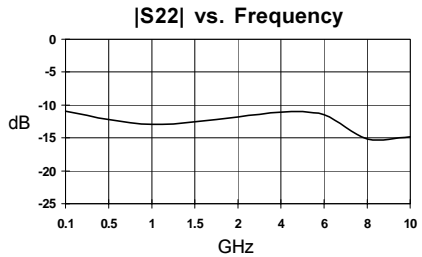
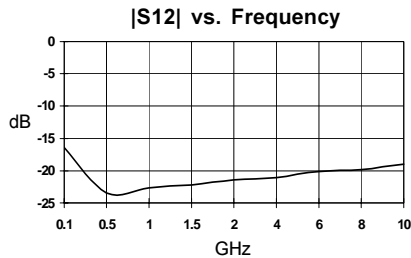
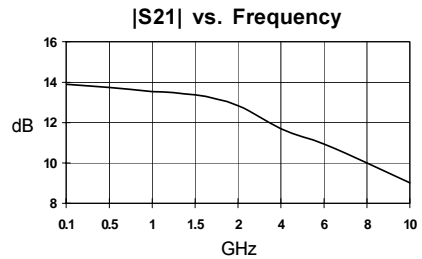
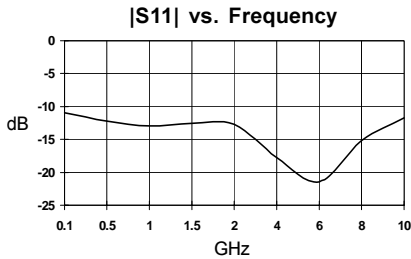
Symbol	Parameter	Frequency	Units	Min.	Typ.	Max.
P <sub>1dB</sub>	Output Power at 1dB Compression	850 MHz	dBm		17.1	
		1950 MHz	dBm		17.5	
		2400 MHz	dBm		17.5	
OIP <sub>3</sub>	Output Third Order Intercept Point	850 MHz	dBm		32.3	
		1950 MHz	dBm		30.9	
		2400 MHz	dBm		30.6	
S <sub>21</sub>	Small Signal Gain	850 MHz	dB		13.9	
		1950 MHz	dB		13.6	
		2400 MHz	dB		13.5	
Bandwidth	(Determined by S <sub>11</sub> , S <sub>22</sub> Values)		MHz		6500	
VSWR <sub>IN</sub>	Input VSWR	DC-6500 MHz	-		1.7:1	
VSWR <sub>OUT</sub>	Output VSWR	DC-6500 MHz	-		1.6:1	
S <sub>12</sub>	Reverse Isolation	850 MHz	dB		18.3	
		1950 MHz	dB		18.2	
		2400 MHz	dB		18.2	
NF	Noise Figure	1950 MHz	dB		5.0	
V <sub>D</sub>	Device Operating Voltage		V	4.5	5.0	5.5
I <sub>D</sub>	Device Operating Current		mA	58	65	72
R <sub>TH</sub> j-b	Thermal Resistance (junction -backside)		° C/W		200	

**Test Conditions:** V<sub>S</sub> = 8 V I<sub>D</sub> = 65 mA Typ. OIP<sub>3</sub> Tone Spacing = 1 MHz, Pout per tone = 0 dBm  
R<sub>BIAS</sub> = 47 Ohms T<sub>L</sub> = 25°C Z<sub>S</sub> = Z<sub>L</sub> = 50 Ohms

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## SNA-400 DC-8 GHz Cascadable MMIC Amplifier

Typical Performance at 25 °C ( $V_{ds} = 5.0V$ ,  $I_{ds} = 65mA$ )



### Absolute Maximum Ratings

Parameter	Absolute Limit
Max. Device Current ( $I_D$ )	130 mA
Max. Device Voltage ( $V_D$ )	6 V
Max. RF Input Power	+23 dBm
Max. Junction Temp. ( $T_J$ )	+200 °C
Operating Temp. Range ( $T_L$ )	-40 °C to +85 °C
Max. Storage Temp.	+150 °C

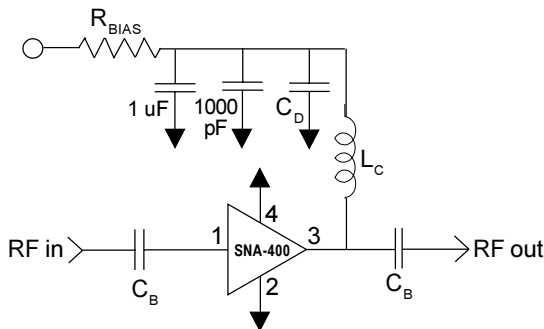
Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

Bias Conditions should also satisfy the following expression:

$$I_D V_D < (T_J - T_L) / R_{TH} \quad \text{J-1}$$

## SNA-400 DC-8 GHz Cascadable MMIC Amplifier

### Typical Application Circuit



### Application Circuit Element Values

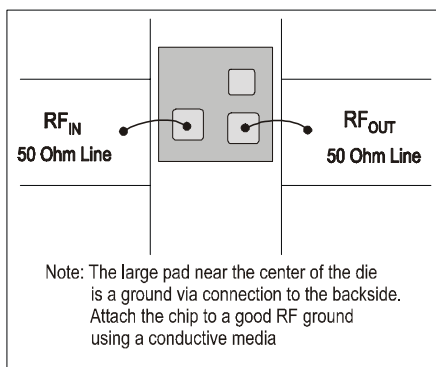
Reference Designator	Frequency (Mhz)				
	500	850	1950	2400	3500
C <sub>B</sub>	220 pF	100 pF	68 pF	56 pF	39 pF
C <sub>D</sub>	100 pF	68 pF	22 pF	22 pF	15 pF
L <sub>C</sub>	68 nH	33 nH	22 nH	18 nH	15 nH

### Recommended Bias Resistor Values for I<sub>D</sub>=65mA

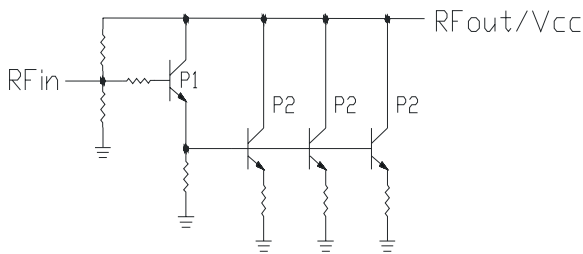
$$R_{BIAS} = (V_s - V_o) / I_D$$

Supply Voltage(V <sub>s</sub> )	8 V	9 V	10 V	12 V
R <sub>BIAS</sub>	47 Ω	62 Ω	75 Ω	110 Ω

Note: R<sub>BIAS</sub> provides DC bias stability over temperature.



**Suggested Bonding Arrangement**  
(above configuration used for S-parameter data)



**Simplified Schematic of MMIC**

For recommended handling, die attach, and bonding methods, see the following application note at [www.sirenza.com](http://www.sirenza.com).

### AN-041 (PDF) Handling of Unpackaged Die



#### Caution: ESD sensitive

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

### Part Number Ordering Information

Part Number	Gel Pack
SNA-400	100 pcs. per pack

Die are shipped per Sirenza application note AN-039 Visual Criteria For Unpackaged Die

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