SNA-100S

DC-10 GHz, Cascadable GaAs HBT MMIC Amplifier

Product Description

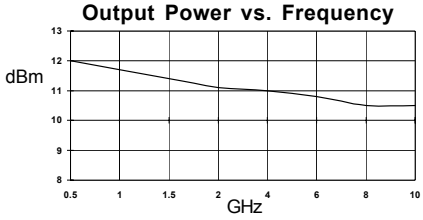
Sirenza Microdevices' SNA-100S is a GaAs monolithic broadband amplifier (MMIC) in die form. This amplifier provides 12.2dB of gain at 1950 MHz and 10.3dB at 10,000 MHz.

These unconditionally stable amplifiers are designed for use as general purpose 50 ohm gain blocks. Its small size (0.350mm x 0.345mm) and gold metallization make it an ideal choice for use in hybrid circuits. The SNA-100S is 100% DC tested and sample tested for RF performance.

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

The SNA-100S is supplied in gel paks of 100 devices. Also available in packaged form (SNA-176 & SNA-186)

Output Power vs. Frequency



Product Features

- **Cascadable 50 Ohm Gain Block**
- **12.2dB Gain, +11dBm P1dB**
- **1.5:1 Input and Output VSWR**
- **Operates From Single Supply**
- **Through wafer via for ground**

Applications

- **Broadband Driver Amplifier for Fiber & CATV transmitters**
- **IF Amplifier or gain stage for VSAT, LMDS, WLAN, and Cellular Systems**

Symbol	Parameter	Units	Frequency	Min.	Typ.	Max.
G_p	Small Signal Power Gain [2]	dB	850 MHz		12.5	
		dB	1950 MHz	10.7	12.2	13.7
		dB	2400 MHz		12.0	
		dB	6000 MHz		12.5	
		dB	10000 MHz	8.8	10.3	11.8
G_F	Gain Ripple	dB	0.1-8 GHz		+/- 0.5	
BW3dB	3dB Bandwidth	GHz			10.5	
P_{1dB}	Output Power at 1dB Compression [2]	dBm	1950 MHz	9	11.0	
		dBm	10000 MHz	9.5	11.5	
OIP_3	Output Third Order Intercept Point [2]	dBm	1950 MHz	21	24.0	
		dBm	10000 MHz	21	24.0	
NF	Noise Figure	dB	1950 MHz		5	
RL	Input / Output Return Loss	dB	1950 MHz		13	
ISOL	Reverse Isolation	dB	0.1-10 GHz		16	
V_D	Device Operating Voltage [1]	V		3.1	3.6	4.1
I_D	Device Operating Current [1]	mA		35	40	45
dG/dT	Device Gain Temperature Coefficient	dB/°C			-0.0015	
R_{TH}, j-b	Thermal Resistance (junction to backside)	°C/W			280	

Test Conditions: V_S = 8 V, R_{BIAS} = 110 Ohms, I_D = 40 mA Typ., OIP_3 Tone Spacing = 1.2 MHz, Pout per tone = 0 dBm, T_L = 25ºC, Z_S = Z_L = 50 Ohms, [1] 100% DC Tested, [2] Sample Tested

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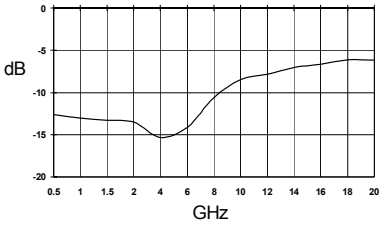
http://www.sirenza.com

Typical Performance at 25° C (Vds =3.8V, Ids = 40mA)

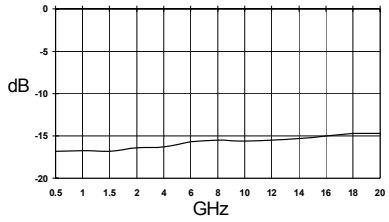
(data includes bond wires)

|S11| vs. Frequency

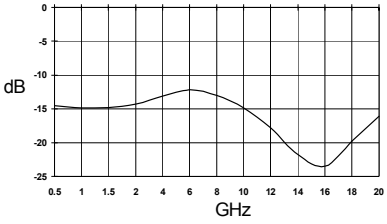


|S21| vs. Frequency

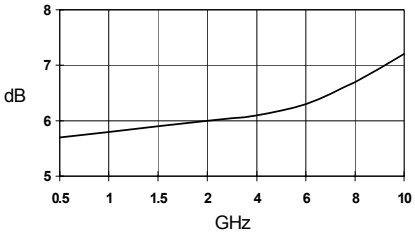
|S12| vs. Frequency



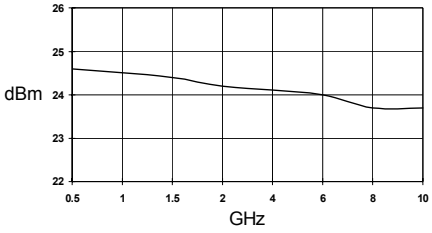
|S22| vs. Frequency



Noise Figure vs. Frequency



TOIP vs. Frequency



Absolute Maximum Ratings

Parameter	Absolute Limit
Max. Device Current (I_D)	90 mA
Max. Device Voltage (V_D)	6 V
Max. RF Input Power	+20 dBm
Max. Junction Temp. (T_J)	+200°C
Operating Temp. Range (T_L)	-40°C to +85°C
Max. Storage Temp.	+150°C

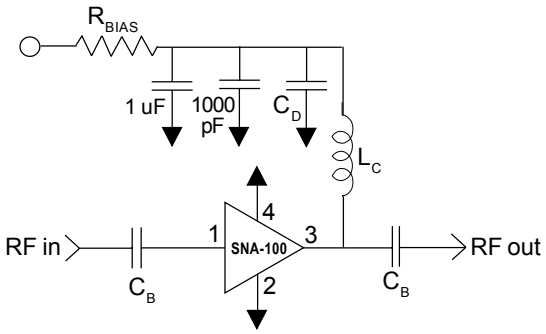
Operation of this device beyond any one of these limits may cause permanent damage. For reliable continous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

Bias Conditions should also satisfy the following expression:

$$I_D V_D < (T_J - T_L) / R_{TH, j-l}$$

SNA-100S DC-10 GHz Cascadable MMIC Amplifier

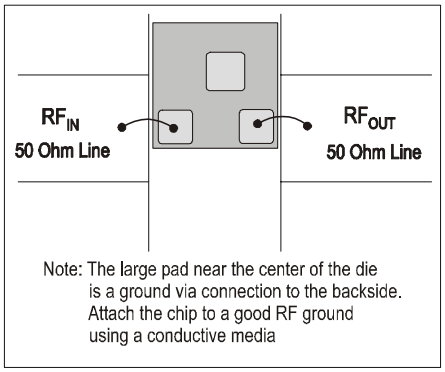
Typical Application Circuit



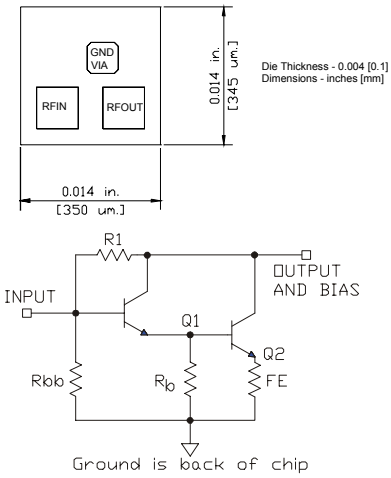
Application Circuit Element Values

Reference Designator	Frequency (Mhz)				
	500	850	1950	2400	3500
C_B	220 pF	100 pF	68 pF	56 pF	39 pF
C_D	100 pF	68 pF	22 pF	22 pF	15 pF
L_C	68 nH	33 nH	22 nH	18 nH	15 nH

Recommended Bias Resistor Values for I_D = 40mA $R_{BIAS} = (V_S - V_D) / I_D$				
Supply Voltage (V_S)	6V	8V	10V	12V
R_{BIAS}	60Ω	110Ω	160Ω	210Ω
Note: R_{BIAS} 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.***

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-100S	100 pcs. per pack

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