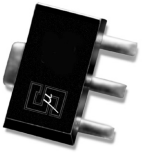
SCA-17

DC-3 GHz, Cascadable GaAs HBT MMIC Amplifier

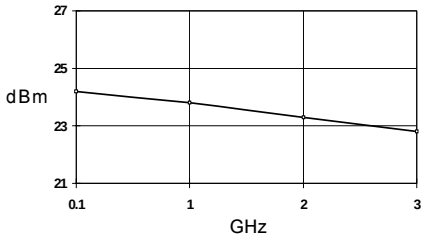


Product Description

Sirenza Microdevices' SCA-17 is a high performance Gallium Arsenide Heterojunction Bipolar Transistor MMIC Amplifier. A Darlington configuration is utilized for broadband performance up to 3 GHz. The heterojunction increases breakdown voltage and minimizes leakage current between junctions. Cancellation of emitter junction non-linearities results in higher suppression of intermodulation products. Typical IP3 at 40mA is +23dBm.

These unconditionally stable amplifiers provides 21dB of gain and +12dBm of 1dB compressed power and requires only a single positive voltage supply. Only 2 DC-blocking capacitors, a bias resistor and an optional inductor are needed for operation.

Output IP3 vs. Frequency



Product Features

- **High Output IP3 : +23dBm**
- **High Gain : Up to 21dB**
- **Cascadable 50 Ohm : 1.5:1 VSWR**
- **Patented GaAs HBT Technology**
- **Operates From Single Supply**
- **Low Thermal Resistance Package**

Applications

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

Symbol	Parameter	Units	Frequency	Min.	Typ.	Max.
G_P	Small Signal Power Gain	dB dB dB	850 MHz 1950 MHz 2400 MHz	19.4	21.5 20.5 20.0	23.7
G_F	Gain Flatness	dB	0.1-2 GHz		+/- 1.2	
P_{1dB}	Output Power at 1dB Compression	dBm	1950 MHz		12.0	
OIP_3	Output Third Order Intercept Point	dBm	1950 MHz		23.0	
NF	Noise Figure	dB	1950 MHz		3.8	
VSWR	Input / Output	-	0.1-3 GHz		1.5:1	
ISOL	Reverse Isolation	dB	0.1-3 GHz		22	
V_D	Device Operating Voltage	V		3.3	3.7	4.1
I_D	Device Operating Current	mA		35	40	45
dG/dT	Device Gain Temperature Coefficient	dB/°C			-0.003	
R_{TH}, j-l	Thermal Resistance (junction to lead)	°C/W			510	

Test Conditions: V_S = 8 V, I_D = 40 mA Typ., OIP_3 Tone Spacing = 1 MHz, Pout per tone = 0 dBm; R_{BIAS} = 110 Ohms, T_L = 25ºC, $Z_S = Z_L$ = 50 Ohms

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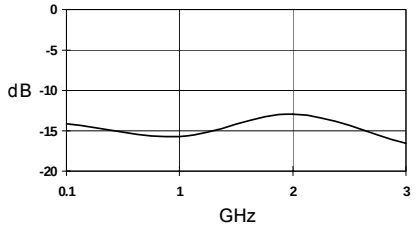
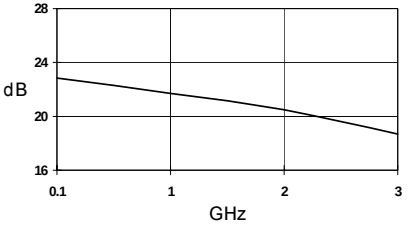
Typical Performance at 25° C (Vds = 3.7V, Ids = 40mA)

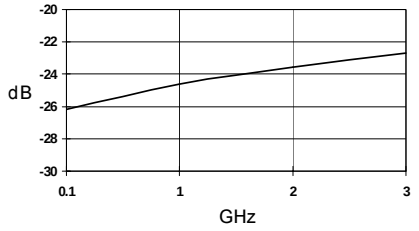
|S11| vs. Frequency



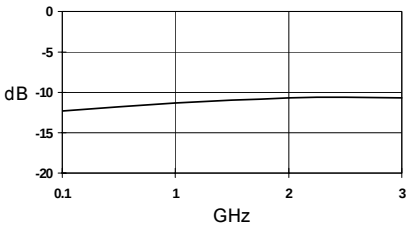
|S21| vs. Frequency



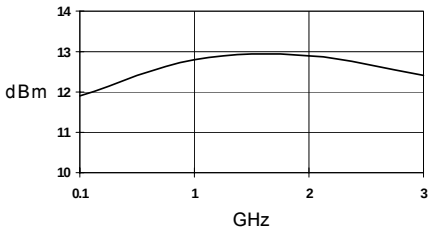
|S12| vs. Frequency



|S22| vs. Frequency



Output Power vs.Frequency



Typical S-Parameters Vds = 3.7V, Id = 40mA

Freq GHz	|S11|	S11 Ang	|S21|	S21 Ang	|S12|	S12 Ang	|S22|	S22 Ang
.100	0.338	117	13.126	139	0.064	-19	0.326	118
.500	0.322	112	13.096	130	0.056	-25	0.317	113
.900	0.310	61	12.333	93	0.057	-46	0.320	64
1.00	0.305	47	12.165	83	0.059	-50	0.320	51
1.50	0.271	-13	11.356	38	0.062	-79	0.316	-9
2.00	0.225	-71	10.626	-7	0.066	-107	0.307	-67
2.50	0.179	-129	9.175	-52	0.070	-138	0.298	-126
3.00	0.148	172	8.363	-90	0.073	-173	0.291	177

(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

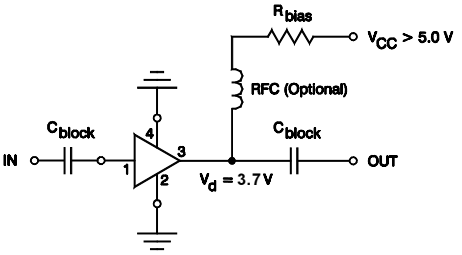
Parameter	Absolute Limit
Max. Device Current (I_D)	75 mA
Max. Device Voltage (V_D)	6 V
Max. RF Input Power	+20 dBm
Max. Junction Temp. (T_J)	+150°C
Operating Temp. Range (T_L)	-40°C to +85°C
Max. Storage Temp.	+150°C

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:

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

Typical Biasing Configuration

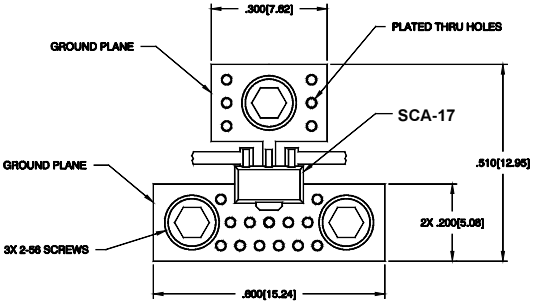


Recommended Bias Resistor Values						
Supply Voltage (Vs)	5V	7.5V	8V	9V	10V	12V
Rbias (Ohms)	33	91	110	130	160	200

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.

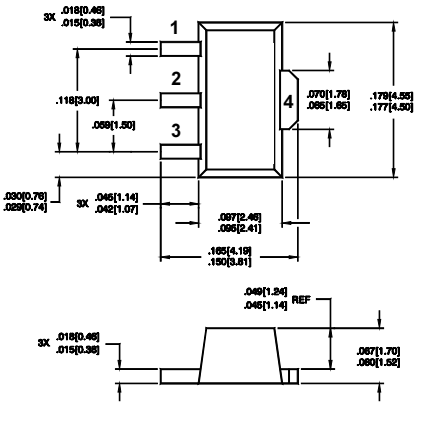
1. Use 1 or 2 ounce copper, if possible.
2. Solder the copper pad on the backside of the device package to the ground plane.
3. Use a large ground pad area with many plated through-holes as shown.
4. If possible, use at least one screw no more than 0.2 inch from the device package to provide a low thermal 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]

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

Outline Drawing



DIMENSIONS ARE IN INCHES [MM]
Pin assignments shown for reference only, not marked on part