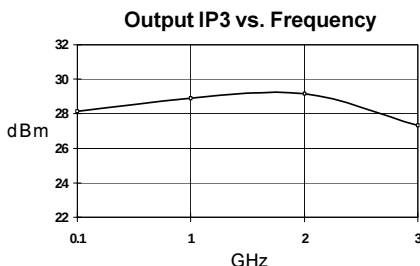




## Product Description

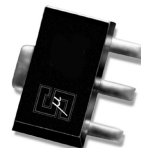
Sirenza Microdevices' SCA-16 is a high performance Gallium Arsenide Heterojunction Bipolar Transistor MMIC Amplifier. A Darlington configuration is utilized for broadband performance up to 3 GHz. The heterojunction increases breakdown voltage and minimizes leakage current between junctions. Cancellation of emitter junction non-linearities results in higher suppression of intermodulation products. Typical IP3 at 50mA is +28dBm.

These unconditionally stable amplifiers provides 15dB of gain and +14.5dBm 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.



## SCA-16

### DC-3 GHz, Cascadable GaAs HBT MMIC Amplifier



## Product Features

- High Output IP3 : +28dBm
- Flat Gain : +/- 0.7dB Over Full Band
- Cascadable 50 Ohm : 1.5:1 VSWR
- Patented GaAsHBT 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    | 850 MHz     | 14.4 | 16.0    | 17.6 |
|                |                                       | dB    | 1950 MHz    |      | 15.5    |      |
|                |                                       | dB    | 2400 MHz    |      | 15.0    |      |
| $G_F$          | Gain Flatness                         | dB    | 0.1-2.0 GHz |      | +/- 0.7 |      |
| $P_{1dB}$      | Output Power at 1dB Compression       | dBm   | 1950 MHz    |      | 14.5    |      |
| $OIP_3$        | Output Third Order Intercept Point    | dBm   | 1950 MHz    |      | 28.0    |      |
| NF             | Noise Figure                          | dB    | 1950 MHz    |      | 5.5     |      |
| VSWR           | Input / Output                        | -     | 0.1-3.0 GHz |      | 1.5:1   |      |
| ISOL           | Reverse Isolation                     | dB    | 0.1-3.0 GHz |      | 20      |      |
| $V_D$          | Device Operating Voltage              | V     |             | 3.3  | 3.8     | 4.3  |
| $I_D$          | Device Operating Current              | mA    |             | 45   | 50      | 55   |
| dG/dT          | Device Gain Temperature Coefficient   | dB/°C |             |      | -0.0018 |      |
| $R_{TH}$ , j-I | Thermal Resistance (junction to lead) | °C/W  |             |      | 510     |      |

#### Test Conditions:

$$V_S = 8 \text{ V}$$

$$R_{BIAS} = 82 \text{ Ohms}$$

$$I_D = 50 \text{ mA Typ.}$$

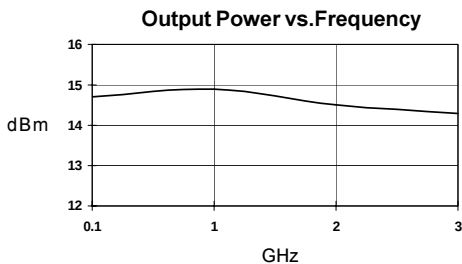
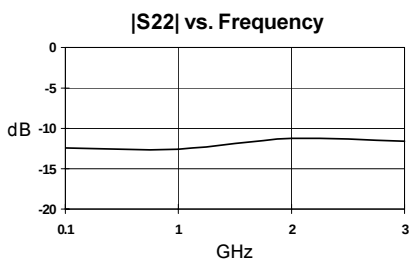
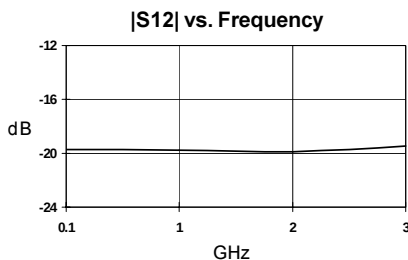
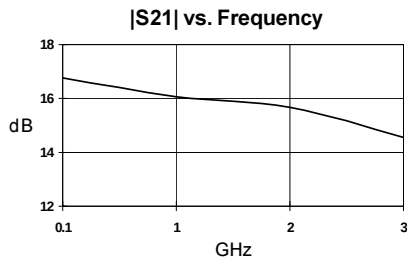
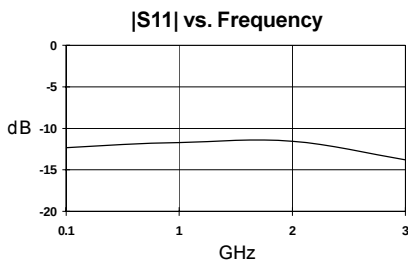
$$T_L = 25^\circ\text{C}$$

$$OIP_3 \text{ Tone Spacing} = 1 \text{ MHz, } P_{out} \text{ per tone} = 0 \text{ dBm}$$

$$Z_S = Z_L = 50 \text{ Ohms}$$

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## Typical Performance at 25°C (V<sub>ds</sub> = 3.8V, I<sub>ds</sub> = 50mA)



## Typical S-Parameters V<sub>ds</sub> = 3.8V, I<sub>d</sub> = 50mA

| Freq GHz | S <sub>11</sub> | S <sub>11</sub> Ang | S <sub>21</sub> | S <sub>21</sub> Ang | S <sub>12</sub> | S <sub>12</sub> Ang | S <sub>22</sub> | S <sub>22</sub> Ang |
|----------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|
| .100     | 0.247           | 125                 | 6.531           | 148                 | 0.108           | -42                 | 0.212           | 124                 |
| .500     | 0.241           | 117                 | 6.606           | 136                 | 0.103           | -31                 | 0.206           | 117                 |
| .900     | 0.256           | 70                  | 6.397           | 103                 | 0.102           | -55                 | 0.228           | 71                  |
| 1.00     | 0.260           | 58                  | 6.362           | 93                  | 0.103           | -61                 | 0.235           | 59                  |
| 1.50     | 0.272           | 3                   | 6.174           | 52                  | 0.102           | -93                 | 0.260           | 3                   |
| 2.00     | 0.265           | -50                 | 6.078           | 10                  | 0.101           | -122                | 0.273           | -52                 |
| 2.50     | 0.240           | -104                | 5.638           | -32                 | 0.104           | -153                | 0.274           | -109                |
| 3.00     | 0.204           | -160                | 5.343           | -70                 | 0.106           | 172                 | 0.264           | -167                |

(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

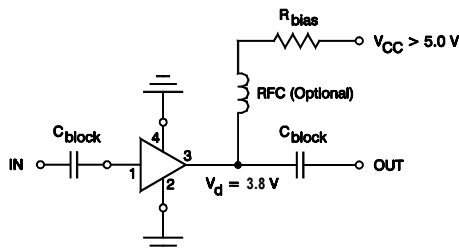
| Parameter                       | Absolute Limit |
|---------------------------------|----------------|
| Max. Device Current ( $I_D$ )   | 75 mA          |
| Max. Device Voltage ( $V_D$ )   | 6 V            |
| Max. RF Input Power             | +20 dBm        |
| Max. Junction Temp. ( $T_J$ )   | +150°C         |
| Operating Temp. Range ( $T_U$ ) | -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:

$$I_{D,D} V_D < (T_H - T_L) / R_{TH}, j=1$$

### Typical Biasing Configuration



| Recommended Bias Resistor Values |    |      |     |     |     |     |
|----------------------------------|----|------|-----|-----|-----|-----|
| Supply Voltage (Vs)              | 5V | 7.5V | 9V  | 12V | 15V | 20V |
| Rbias (Ohms)                     | 20 | 70   | 100 | 160 | 220 | 320 |

## Mounting Instructions

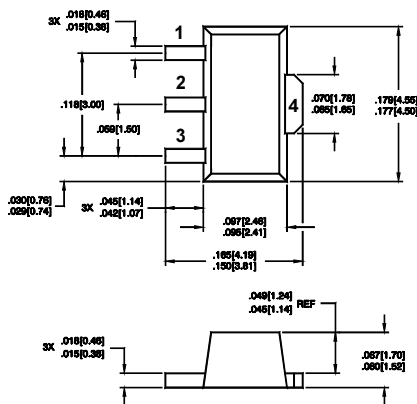
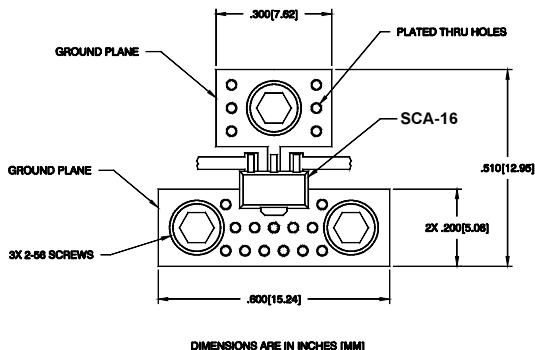
The data shown was taken on a 31mil thick FR-4 board with 1 ounce of copper on both sides.

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.

| 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 card