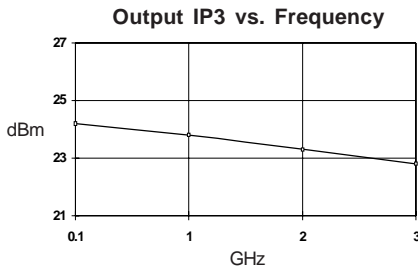


Product Description

Stanford 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.

This MMIC is an ideal choice for wireless applications such as cellular, PCS, CDPD, wireless data and SONET.



Electrical Specifications at Ta = 25C

| Symbol | Parameters: Test Conditions: Id = 40 mA, Z _o = 50 Ohms | | Units | Min. | Typ. | Max. |
|------------------|--|-----------------|---------|------|---------|------|
| G _P | Power Gain | f = 0.1-2.0 GHz | dB | 18 | 20 | |
| | | f = 2.0-3.0 GHz | dB | | 18 | |
| G _F | Gain Flatness Gain Flatness over any 100 MHz band | f = 0.1-2.0 GHz | dB | | +/- 1.2 | |
| | | | dB | | +/- 0.1 | |
| P _{1dB} | Output Power at 1dB Compression | f = 0.1-2.0 GHz | dBm | | 12.0 | |
| NF | Noise Figure | f = 0.1-3.0 GHz | dB | | 3.8 | |
| VSWR | Input and Output VSWR | f = 0.1-3.0 GHz | - | | 1.5 | |
| IP ₃ | Third Order Intercept Point Output Tone @ 0dBm 10 MHz Apart | f = 0.1-2.0 GHz | dBm | | 23.0 | |
| T _D | Group Delay | f = 1.9 GHz | psec | | 100 | |
| ISOL | Reverse Isolation | f = 0.1-3.0 GHz | dB | | 22 | |
| 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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SCA-17

DC-3 GHz, Cascadable GaAs HBT MMIC Amplifier



Product Features

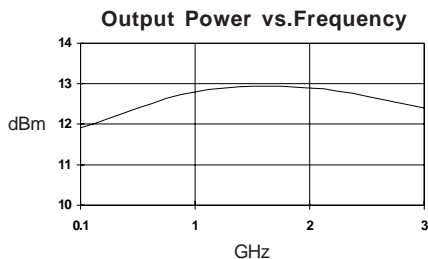
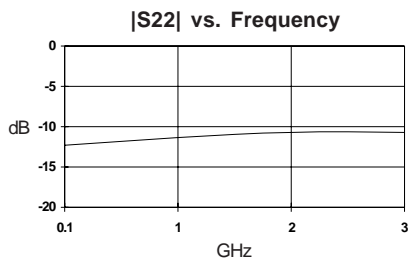
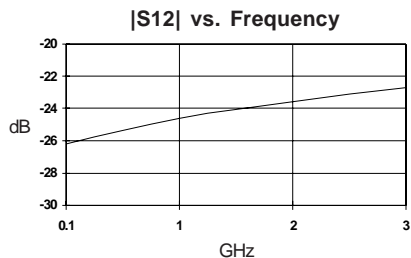
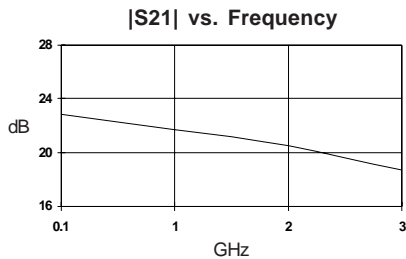
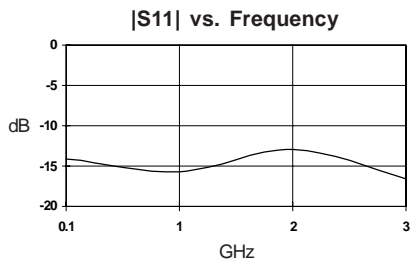
- High Output IP₃ : +23dBm
- High Gain : Up to 21dB
- Cascadable 50 Ohm : 1.5:1 VSWR
- Patented GaAs HBT Technology
- Operates From Single Supply
- Low Thermal Resistance Package

Applications

- Cellular, PCS, CDPD
- Wireless Data, SONET

SCA-17 DC-3 GHz Cascadable MMIC Amplifier

Typical Performance at 25° C ($V_{ds} = 4.0V$, $I_{ds} = 40mA$)



Typical S-Parameters $V_{ds} = 4.0V$, $I_d = 40mA$

| 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)

SCA-17 DC-3 GHz Cascadable MMIC Amplifier

Absolute Maximum Ratings

| Parameter | Absolute Maximum |
|-----------------------|------------------|
| Device Current | 75 mA |
| Power Dissipation | 350 mW |
| RF Input Power | 100 mW |
| Junction Temperature | +200°C |
| Operating Temperature | -45°C to +85°C |
| Storage Temperature | -65°C to +150°C |

Notes:

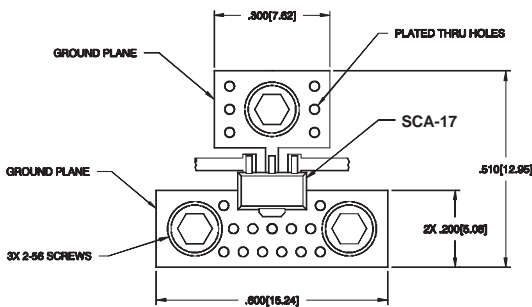
- Operation of this device above any one of these parameters may cause permanent damage.

| Recommended Bias Resistor Values | | | | | | |
|----------------------------------|----|------|-----|-----|-----|-----|
| Supply Voltage (Vs) | 5V | 7.5V | 9V | 12V | 15V | 20V |
| Rbias (Ohms) | 25 | 88 | 125 | 200 | 275 | 400 |

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.

- Use 1 or 2 ounce copper, if possible.
- Solder the copper pad on the backside of the device package to the ground plane.
- Use a large ground pad area with many plated through-holes as shown.
- 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.
- Thermal resistance from ground lead to screws is 2 deg. C/W.

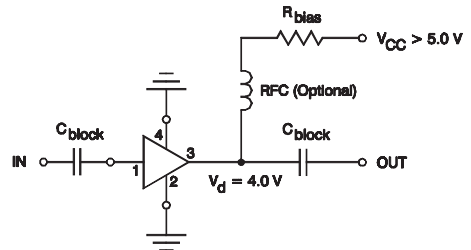


DIMENSIONS ARE IN INCHES [MM]

MTTF vs. Temperature @ Id = 40mA

| Lead Temperature | MTTF (hrs) |
|------------------|------------|
| +85°C | 1,000,000 |
| +120°C | 100,000 |
| +150°C | 10,000 |

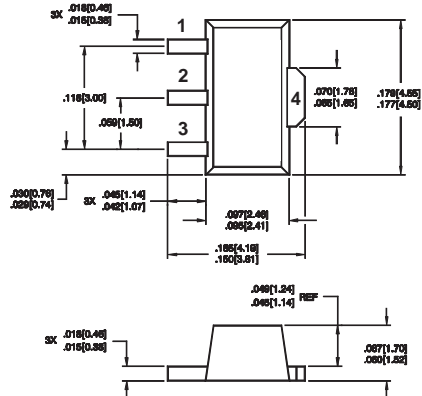
Thermal Resistance (Lead-Junction): 412° C/W



Typical Biasing Configuration

| 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