# Silicon Bipolar MMIC Cascadable Amplifier
# DC - 2 GHz

**MAAM-011007**
**Rev. V1**

## Features

- Cascadable 50 Ω Gain Block
- 3dB Bandwidth: DC to 2 GHz
- Gain: 11.5 dB @ 1 GHz
- Unconditionally Stable (k>1)
- Low Voltage Operation
- 370 x 370 x 120 µm
- RoHS* Compliant

## Applications

- Narrow and Wide Band IF and RF Amplifiers
- Industrial
- Military

## Description

The MAAM-011007 is a high performance silicon bipolar MMIC chip. This amplifier is ideally suited for use where a general purpose 50 Ω gain block is required. Typical applications include narrow and wide band IF and RF amplifiers in industrial and military applications.

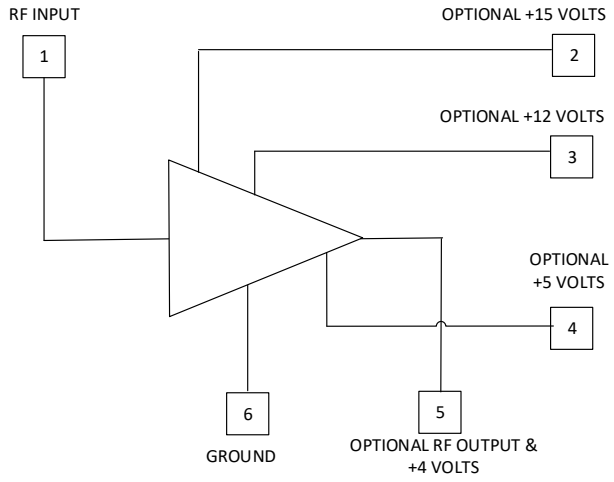
The MAAM-011007 is fabricated using a 10 GHz fT silicon bipolar technology that features gold metallization and IC passivation for increased performance and reliability.

## Ordering Information

| Part Number | Package |
|---|---|
| MAAM-011007-DIE | Gel Pack[1] |

1. Die quantity varies.

## Functional Schematic




## Pad Configuration

| Pad | Function | Comment |
|---|---|---|
| 1 | RF Input | — |
| 2 | Bias | Optional +15 Volts |
| 3 | Bias | Optional +12 Volts |
| 4 | Bias | Optional +5 Volts |
| 5 | RF Output and Bias[2] | Optional RF Output and +4 Volts |
| 6 | Ground | — |

2. RF output contact & +DC voltage Is normally made on the backside of the chip at die attach.

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

## Electrical Specifications: $T_A$ = 25°C, $I_D$ = 22 mA, $Z_0$ = 50 Ω

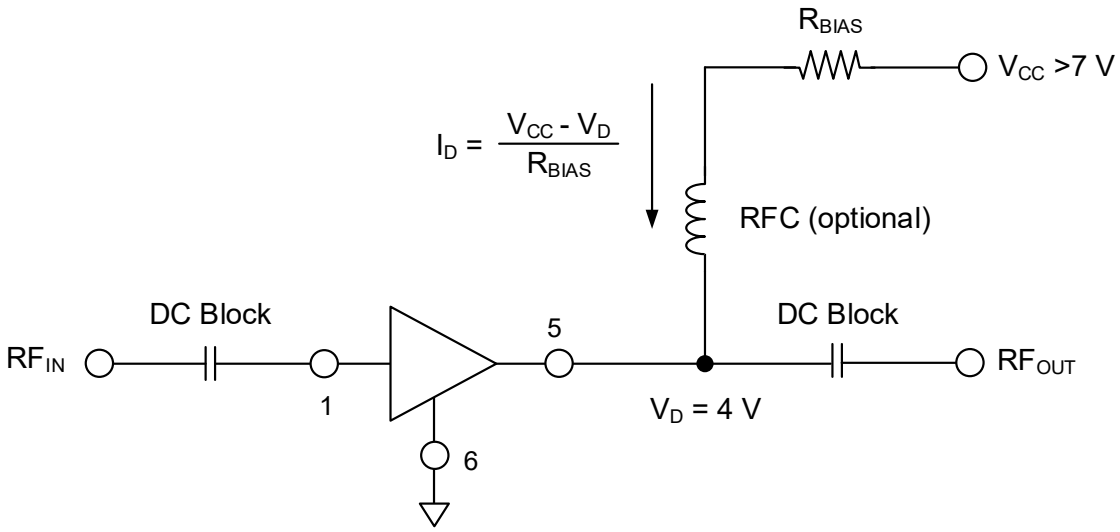
| Parameter | Freq | Units | Min. | Typ. | Max. |
|---|---|---|---|---|---|
| Power Gain ($\|S_{21}\|^2$) | 0.1 GHz | dB | — | 11.5 | — |
| Gain Flatness | 0.1 - 1.5 GHz | dB | — | ±1 | — |
| 3 dB Bandwidth | — | GHz | — | 2 | — |
| Input Return Loss | 0.1 - 2.0 GHz | dB | — | 18 | — |
| Output Return Loss | 0.1 - 2.0 GHz | dB | — | 12 | — |
| Power Output at 1 dB Gain Compression | 1 GHz | dBm | — | 9 | — |
| 50W Noise Figure | 1 GHz, 50 Ω | dB | — | 4.5 | — |
| Third Order Intercept Point | 1 GHz | dBm | — | 16 | — |
| Group Delay | 1 GHz | ps | — | 140 | — |
| Device Voltage | — | V | 3.5 | 4.0 | 4.5 |
| Device Voltage Temperature Coefficient | — | mV/°C | — | -7.0 | — |

## Absolute Maximum Ratings[3,4]

| Parameter | Absolute Maximum |
|---|---|
| Device Current | 60 mA |
| Junction Temperature[5,6] | +200°C |
| Storage Temperature | -65°C to +200°C |
| Power Dissipation[7] | 275 mW |
| RF Input Power | +13 dBm |

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. MACOM does not recommend sustained operation near these survivability limits.
5. Operating at nominal conditions with $T_J \leq$ +150°C will ensure MTTF > 1 x $10^6$ hours.
6. Junction Temperature ($T_J$) = $T_C$ + Θjc * (V * I)
   Typical thermal resistance (Θjc) = 188 °C/W.
   a) For $T_C$ = +25°C,
   $T_J$ = 70.1 °C @ 4 V, 60 mA
   b) For $T_C$ = +100°C,
   $T_J$ = 145.1 °C @ 4 V, 60 mA
7. Derate at 5.2 mW/°C for Tc > 148 °C

## Typical Bias Configuration




## Handling Procedures

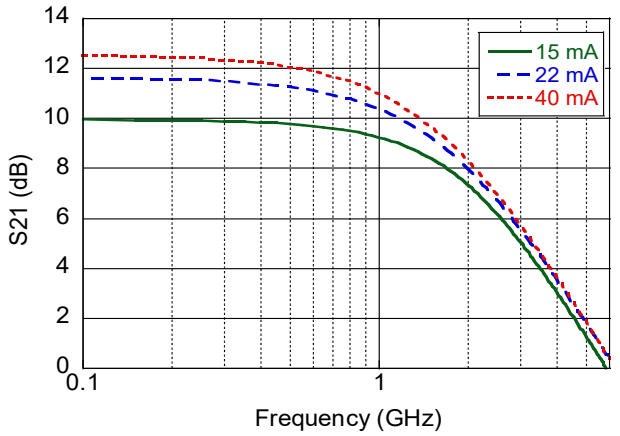
Please observe the following precautions to avoid damage:

## Static Sensitivity

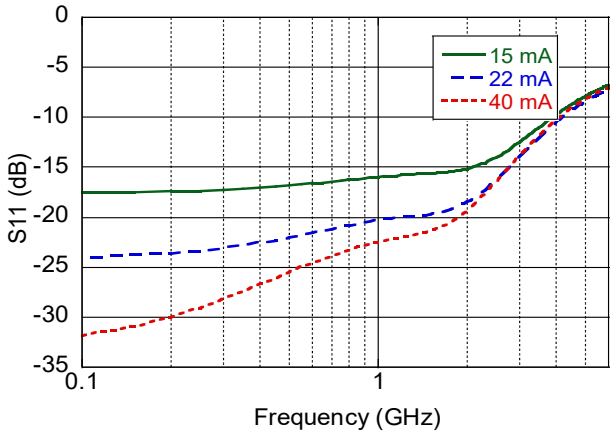
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Class 1B (500 V) HBM devices.

## Typical S-Parameters: $T_A$ = 25°C, $Z_0$ = 50 Ω

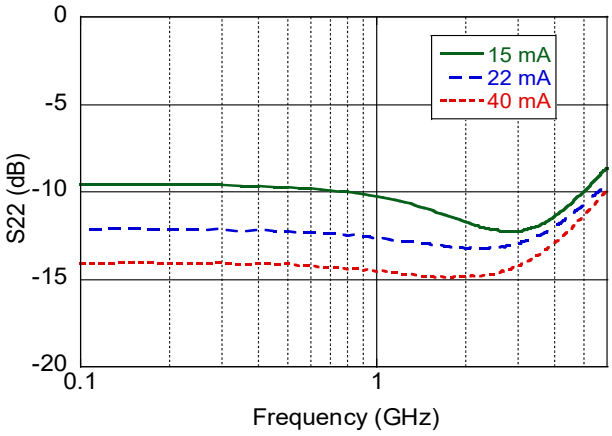
***Gain***



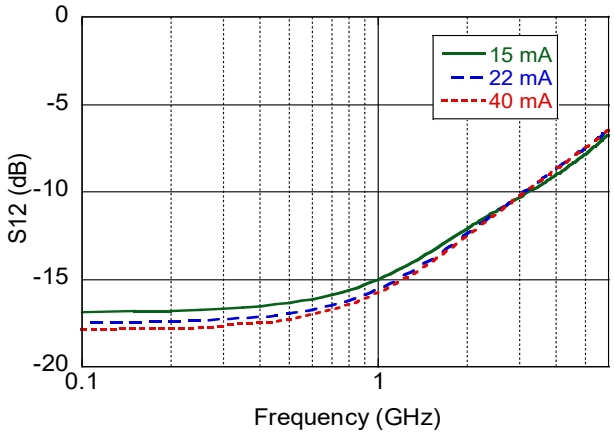

***Input Return Loss***




***Output Return Loss***

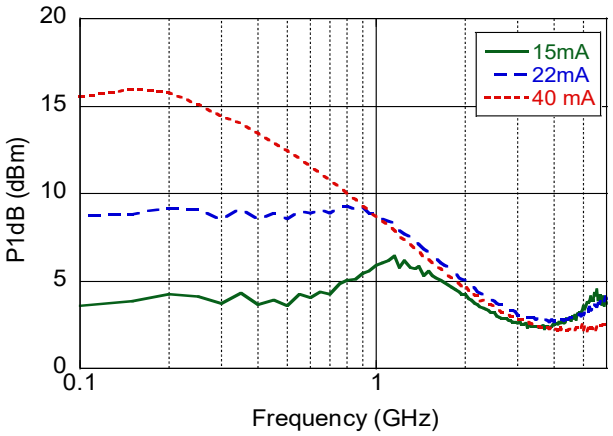



***Reverse Isolation***

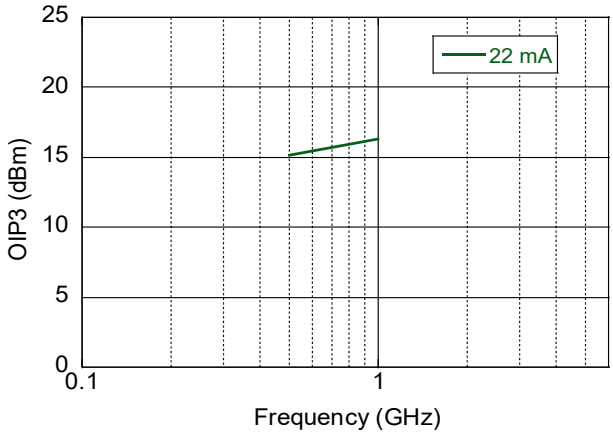


## Typical Performance: $T_A$ = 25°C, $Z_0$ = 50 Ω

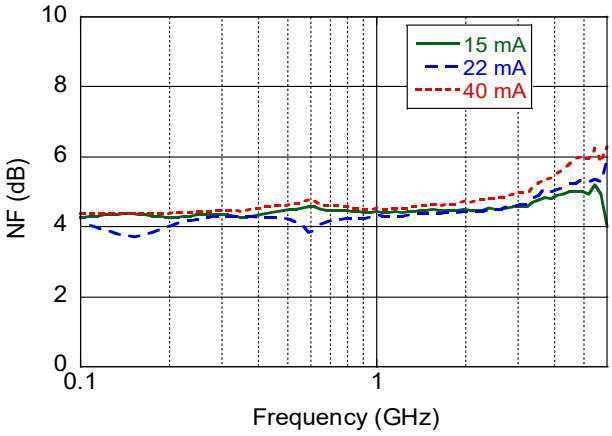
***P1dB***



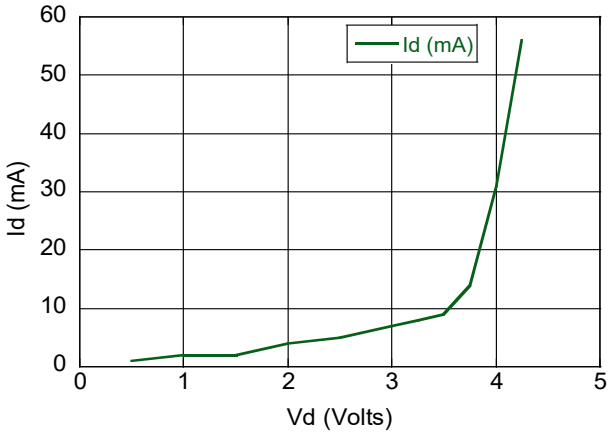

***Output 3rd Order Intercept Point***



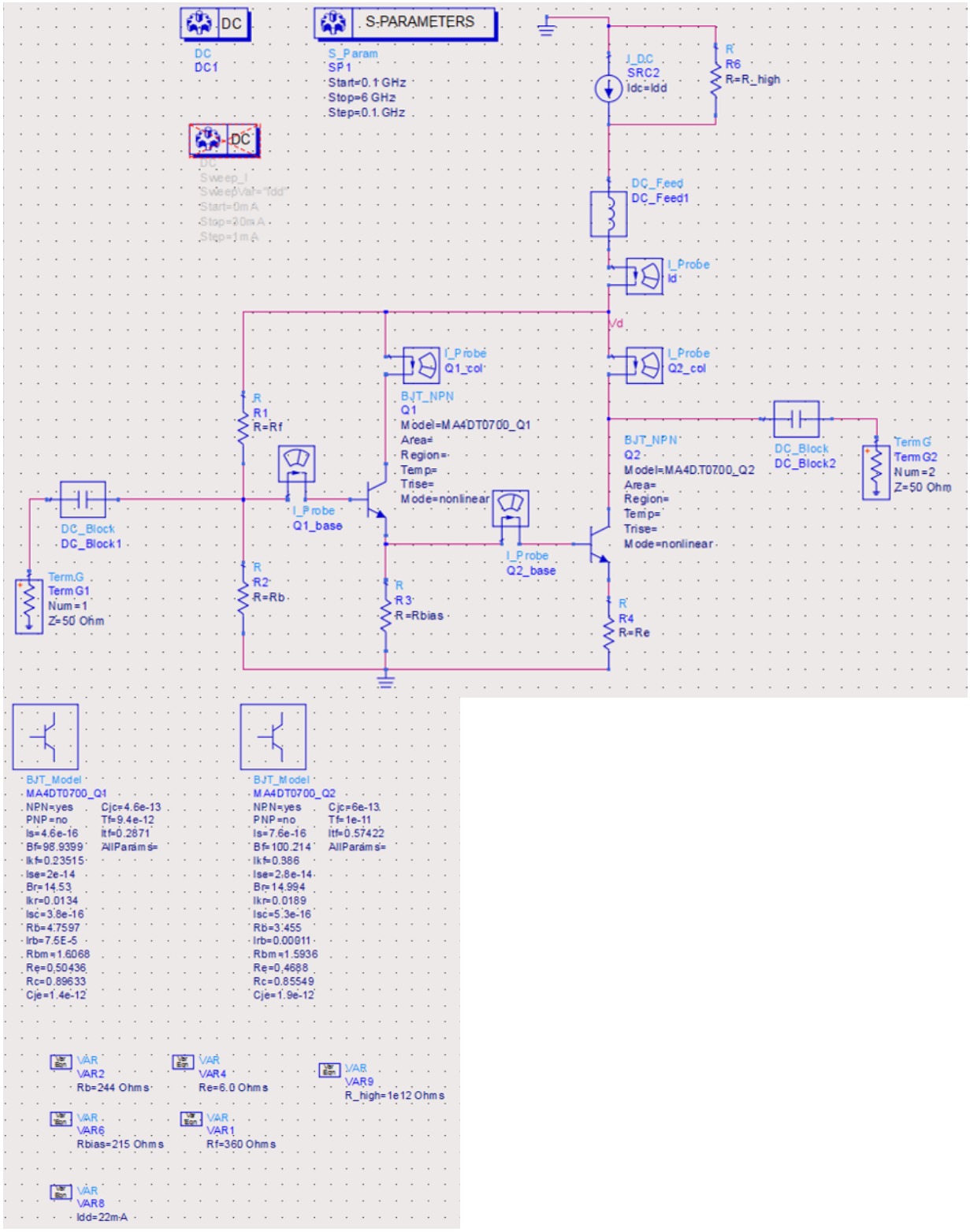

***Noise Figure***



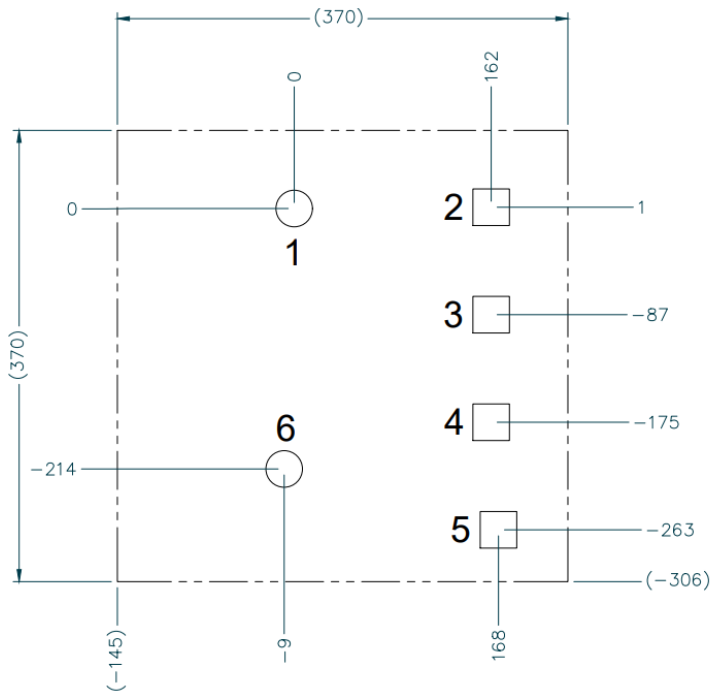

***Bias Current vs Voltage***



## Schematic and Model



## Chip Outline Drawing




| BONDPAD DETAIL | |
|---|---|
| PAD | SIZE(um) |
| 1,6 | ø30 |
| 2,3,4,5 | 30x30 |

NOTES:
1. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS SHOWN ARE μm WITH A TOLERANCE OF ±5μm.
2. DIE THICKNESS IS 120 ±10μm
3. DIE SIZE REFLECTS FINAL DIMENSIONS.