

Broadband Driver Amplifier 50 to 2000 MHz

MAAM-007865-0P1R00

V1

Features

- High Gain: 20 dB (TYP.)
- Flat Broadband Gain Response: +/- 1.3 dB (TYP)
- P1dB: +18.0 dBm (TYP.)
- Flexibility for Multi-Band Systems
- On-Chip Active Bias Network
- Lead Free 3 mm PQFN Surface Mount Package
- 260°C Reflow Capability

Applications

- LO Buffer Amplifier
- Driver Stage for Power Amplifiers
- Basestation / Repeater Applications
- Broadband RF Gain Block

Description

M/A-COM's MAAM-007865-0P1R00 amplifier utilizes GaAs HBT technology with an +18 Volt BV_{ceo} process for improved linearity performance, power efficiency, and high reliability, in a low cost 3 mm PQFN surface mount plastic package.

The MAAM-007865-0P1R00 incorporates an on-chip active bias network for ease of implementation, and maintains high linearity over temperature. The device operates from a single +5 volt supply and has a +5 volt reference pin for power down control capability. An external dropping resistor can be added to lower the P1dB level by 4 dB.

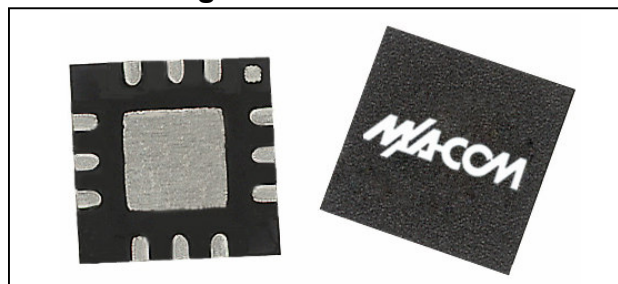
The MAAM-007865-0P1R00 requires a minimal number of external bias components to achieve a flat gain response across the entire 50 to 2000 MHz frequency band.

Ordering Information¹

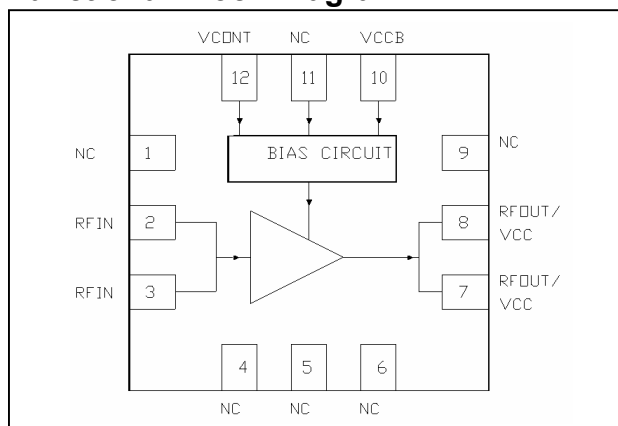
| Part Number | Package |
|--------------------|------------------------|
| MAAM-007865-0P1R00 | 3 mm 12 lead PQFN |
| MAAM-007865-0P1RA1 | Sample Application Kit |
| MAAM-007865-0P1RTR | 1000 Piece Tape & Reel |

1. Reference Application Note M513 for reel size information.

Product Image



Functional Block Diagram



Pin Configuration

| Pin No. | Function | Description |
|----------|----------------------|---|
| 1 | No Connection | No connection |
| 2 | RF Input | RF Input Signal |
| 3 | RF Input | RF Input Signal |
| 4 | No Connection or GND | No Connection. GND preferred |
| 5 | No Connection or GND | No Connection. GND preferred |
| 6 | No Connection or GND | No Connection. GND preferred |
| 7 | RF Output / VCC | RF Output & VCC Supply Input |
| 8 | RF Output / VCC | RF Output & VCC Supply Input |
| 9 | No Connection | No Connection |
| 10 | VCCB | VCC Supply to Bias Circuit. Connected to VCONT on PCB. Optionally could be connected to VCC instead of VCONT. |
| 11 | No Connection | Normally not connected or Open. Must not be connected to GND. |
| 12 | VCONT | DC Control Input to PA. External resistor required for normal operation @ +5 V. See Application Circuit. |
| Pkg Base | GND | RF/DC GND and thermal Path to PCB Vias. Sufficient Vias must be provided for thermal considerations. See PCB Layout |

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Electrical Specifications¹: T_c = +25°C, V_{CONT} = 5 V, V_{CC} = 5 V, Z₀ = 50 Ω, CW

| Parameter | Test Conditions | Units | Min | Typ | Max |
|--|---|-------|-----|--------|------|
| Frequency Range | | MHz | 50 | | 2000 |
| Gain | | dB | | 20 | |
| Gain Flatness | | dB | | +/-1.3 | |
| Gain Variation | Over Temp = - 40°C to +85°C | dB | | 1.6 | |
| Input Return Loss | Over Frequency | dB | | | -10 |
| Output Return Loss | Over Frequency | dB | | | -10 |
| Reverse Isolation | | dB | | -28 | |
| Output P-1dB | 50 to 1000 MHz | dBm | | 18.5 | |
| | 1000 to 2000 MHz | dBm | | 17 | |
| Output IP3 | P _{out} = - 1dBm / tone, Δf = 1MHz | dBm | | 29.5 | |
| Noise Figure | | dB | | 5 | |
| Bias Supply | VCC | V | | 5 | 6 |
| Control Voltage | VCONT Amp ON | V | | 5 | |
| | VCONT Amp OFF | V | | | 2 |
| Bias Current | Quiescent Current I _{ccq} | mA | | 42 | 47 |
| | Control current I _{cont} | mA | | 13 | 15 |
| Thermal Resistance θ _{jc} | | °C/W | | TBD | |
| Junction Temperature Rise Above Case T _{jc} | | °C | | TBD | |

1. All data is based on the Evaluation Circuit Board (page 5).
2. Caution: Operation beyond Absolute Maximum Ratings can degrade performance or cause permanent damage.

Operating the MAAM-007865-0P1R00

The MAAM-007865-0P1R00 can be damaged by electrostatic discharge (ESD). Use proper ESD control techniques when handling this device. To operate the MAAM-007865-0P1R00, follow these steps:

- 1.) Connect the 50 ohm load
- 2.) Apply VCC (+5.0 Vdc)
- 3.) Apply VCONT (+5.0 Vdc)
- 4.) Set the Input Power Level (P_{in})
- 5.) Turn off in reverse order

Absolute Maximum Ratings²

| Parameter | Absolute Maximum |
|---|------------------|
| RF Input Power | + 3 dBm |
| Supply Voltage VCC | + 6 V |
| Control Voltage VCONT | + 5.5 V |
| VCC Supply Current | 55 mA |
| Operating Temperature | -40°C to + 85°C |
| Storage Temperature | -65°C to +150°C |
| Device Junction Temperature T _{J, max} | 150°C |

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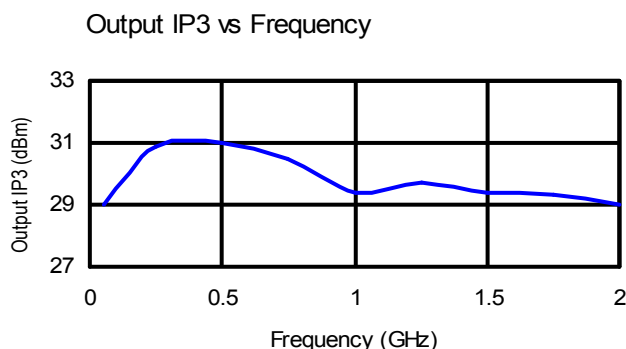
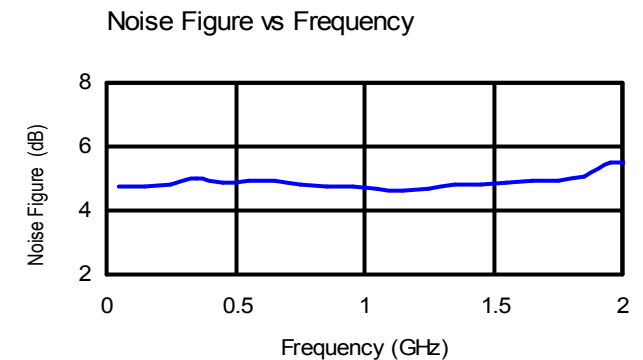
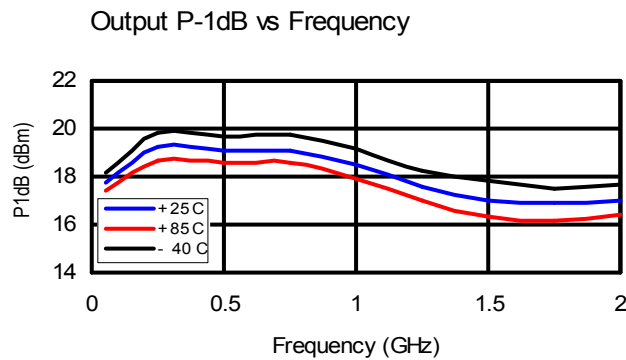
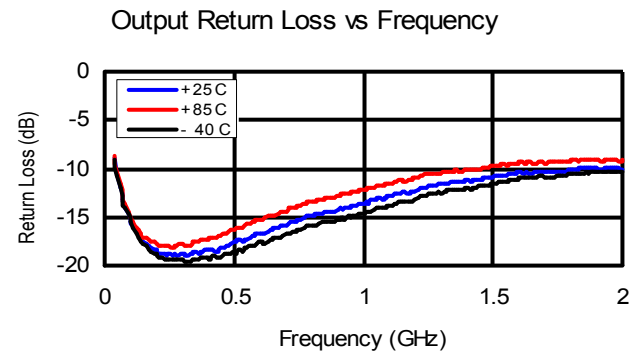
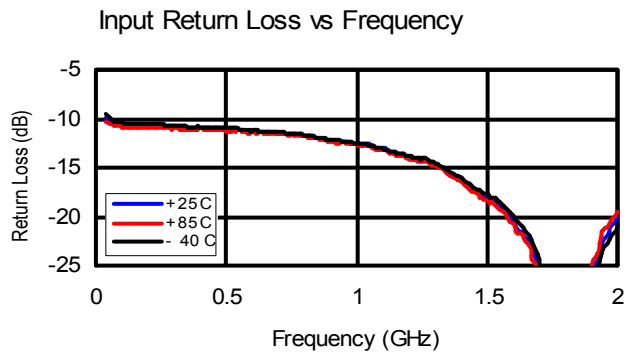
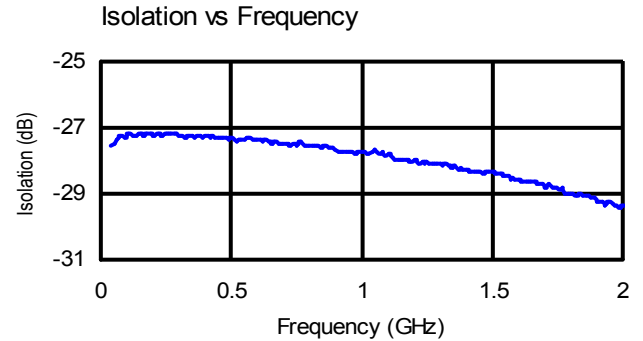
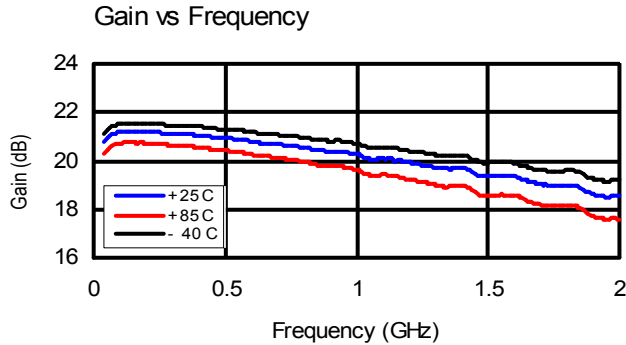
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Typical Performance Curves at +25°C (VCONT = +5V, 12mA, VCC = +5 V, 41 mA)

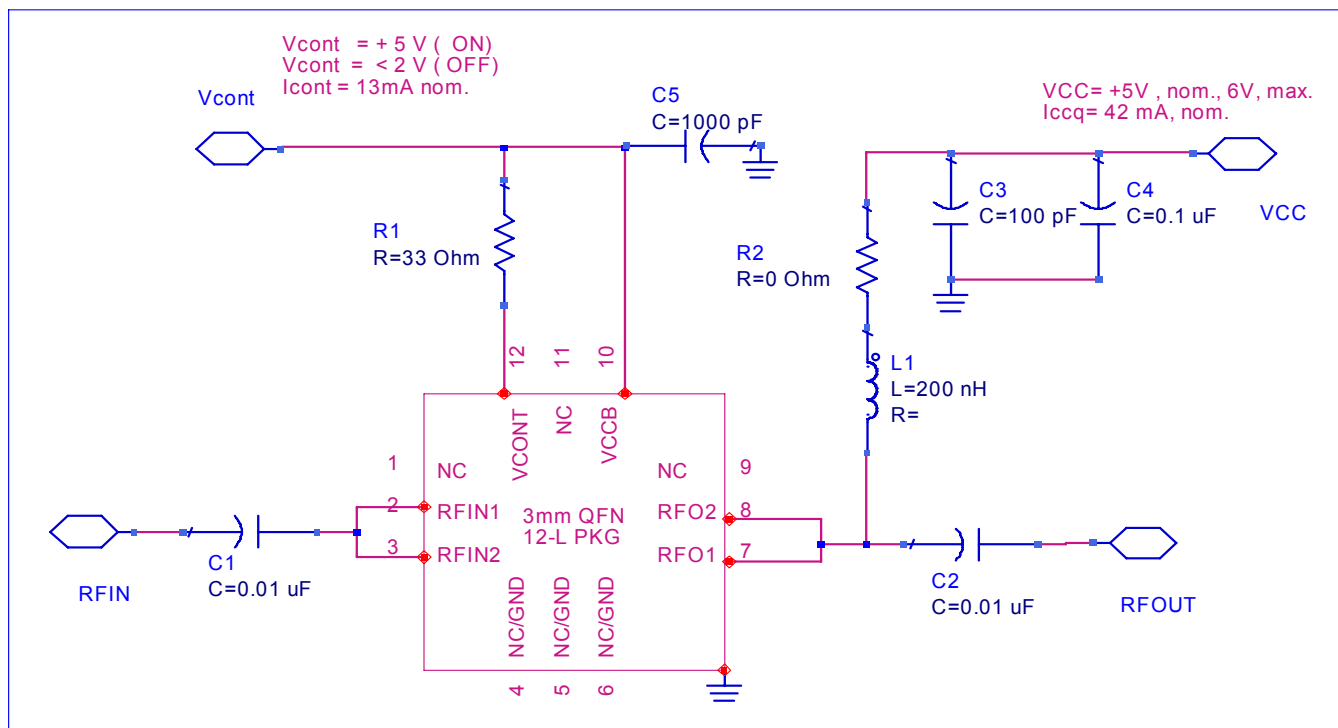


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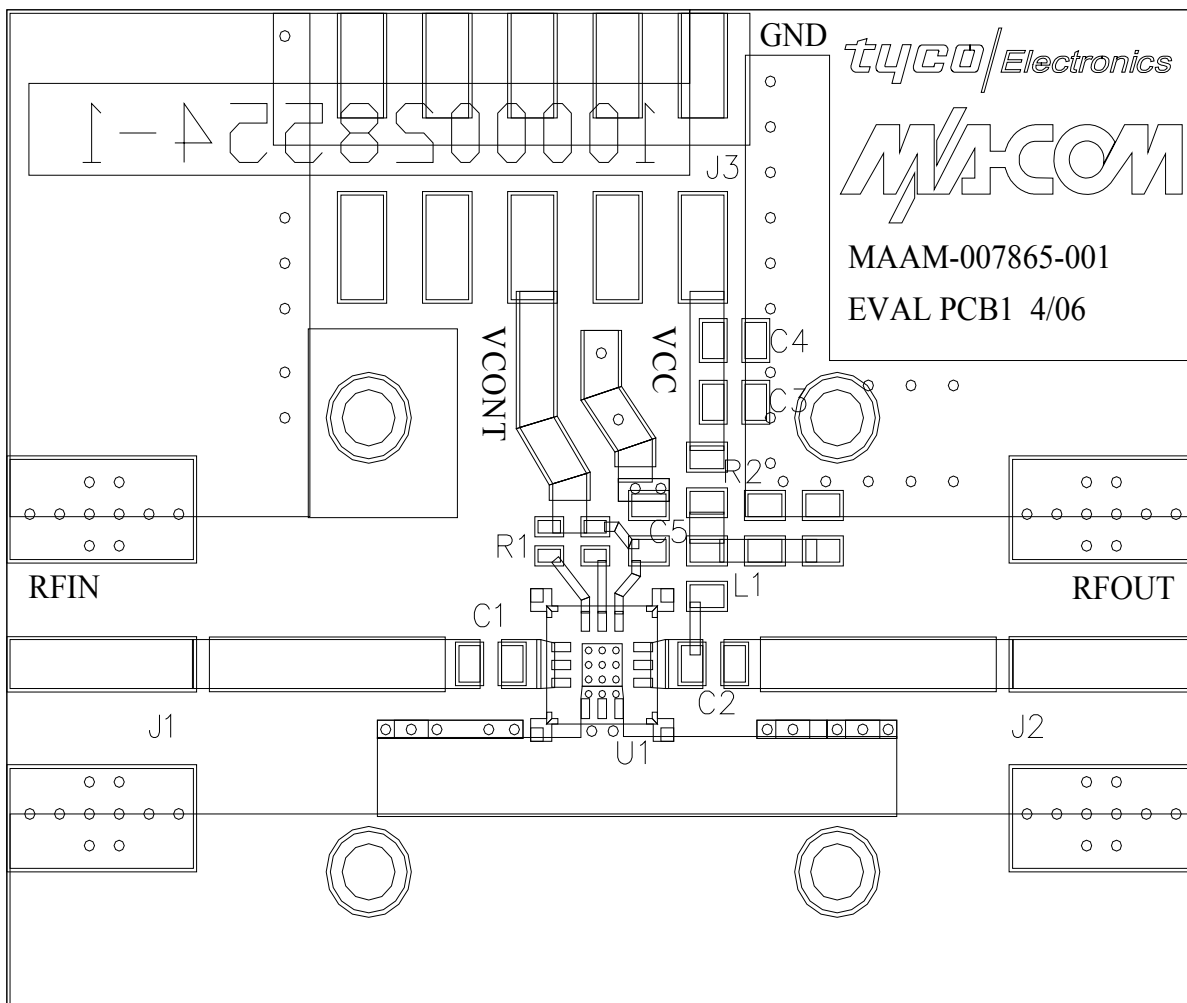
Application Circuit Schematic



Evaluation Circuit Board Bill of Material

| COMPONENT | PART NO | VALUE | SUGGESTED VENDOR |
|-----------|----------------------|--------------|------------------|
| C1,C2 | X7R0603HTTD103K | 0.01uF | KOA |
| C3 | NPO0402HHTTP101J | 100pF | KOA |
| C4 | X7R0603CTTD104K | 0.1uF | KOA |
| C5 | X7R0603HTTD102K | 1000pF | KOA |
| L1 | 0603CS-R20XJBU | 200nH | COILCRAFT |
| R1 | RK73B1ETTP330J(0402) | 33 OHM | KOA |
| R2 | RK73Z1ELTP(0402) | 000 OHM | KOA |
| J1, J2 | 142-0701-881 | RF CONN | JOHNSON |
| J3 | TSM-105-01-S-DV | DC CONN | |
| U1 | MAAM-007865-0P1R00 | 3mm PQFN 12L | TYCO |
| PCB | 1000028554-1 | GETEK,28mil | TYCO |

EVALUATION CIRCUIT BOARD LAYOUT^{1,2,3}



1. GETEK, 2-layer, Total Board Thickness = 32 mil.
Microstrip 50 Ohm Line width = 54 mil
Board Size: 1.4 x 1.1 inches.
2. Via Geometry shown must be used for the 3 mm PQFN package backside to provide a low-inductance & low thermal resistance path to the PCB backside ground.
At least 9 vias are required. Via Diameter = 8 mils finished size with 1.0 mils minimum plating.
3. Evaluation circuit board assemblies use SnPb (tin lead) soldering process to attach all components, and are therefore not RoHS compliant.

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Lead-Free 3 mm 12-Lead PQFN Package Outline Dimensions

