

Low Noise FTTx Amplifier 50 - 1000 MHz

Rev. V3

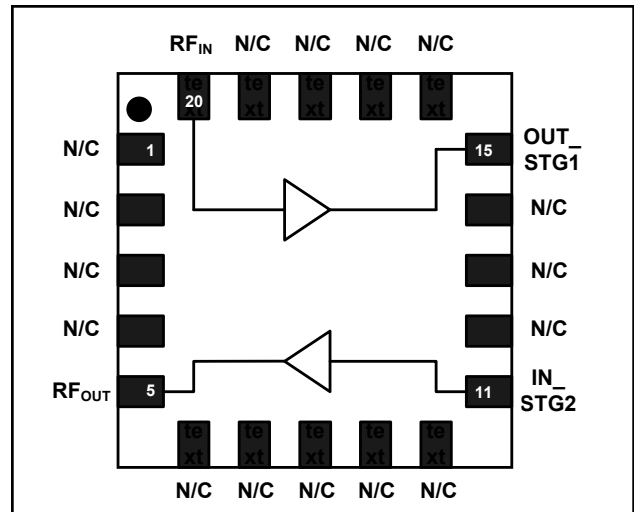
Features

- Low Distortion
- Low Noise Figure
- Lead-Free 4 mm 20-Lead PQFN Package
- Halogen-Free “Green” Mold Compound
- 260°C Reflow Compatible

Description

M/A-COM’s MAAM-007796 is a GaAs PHEMT MMIC amplifier in a lead-free 4 mm 20-lead PQFN package. The Amplifier is designed to meet the high gain, high linearity and low noise requirements of FTTx receivers.

Functional Schematic



Ordering Information ^{1,2}

| Part Number | Package |
|--------------------|-------------------|
| MAAM-007796-TR1000 | 1000 piece reel |
| MAAM-007796-TR3000 | 3000 piece reel |
| MAAM-007796-000SMB | Sample Test Board |

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

Absolute Maximum Ratings ^{3,4}

| Parameter | Absolute Maximum |
|-----------------------|------------------|
| Input Power | +5 dBm |
| Operating Voltage | +10 volts |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +150°C |

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. M/A-COM does not recommend sustained operation near these survivability limits.

Pin Configuration ⁵

| Pin No. | Pin Name | Description |
|---------|----------|-------------------|
| 1 | N/C | No Connection |
| 2 | N/C | No Connection |
| 3 | N/C | No Connection |
| 4 | N/C | No Connection |
| 5 | RF_OUT | RF Output |
| 6 | N/C | No Connection |
| 7 | N/C | No Connection |
| 8 | N/C | No Connection |
| 9 | N/C | No Connection |
| 10 | N/C | No Connection |
| 11 | IN_STG2 | STAGE 2 RF Input |
| 12 | N/C | No Connection |
| 13 | N/C | No Connection |
| 14 | N/C | No Connection |
| 15 | OUT_STG1 | STAGE 1 RF Output |
| 16 | N/C | No Connection |
| 17 | N/C | No Connection |
| 18 | N/C | No Connection |
| 19 | N/C | No Connection |
| 20 | RF_IN | RF Input |

5. The exposed pad centered on the package bottom must be connected to RF and DC ground.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

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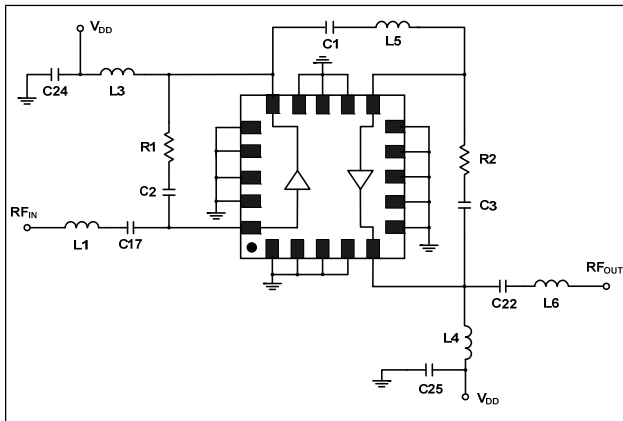
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Electrical Specifications: $T_A = 25^\circ\text{C}$, Freq: 50 - 1000 MHz, $V_{DD} = +5$ Volts, $Z_0 = 75 \Omega$

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|-----------------------------|--|-------|------|------|------|
| Gain | RF _{IN} to RF _{OUT} | dB | 20 | 21 | 22 |
| Gain Flatness | RF _{IN} to RF _{OUT} | dB | 0 | 0.4 | 0.7 |
| Noise Figure | RF _{IN} to RF _{OUT} | dB | 3 | 3.8 | 5.3 |
| Input Return Loss | RF _{IN} | dB | - | 15 | - |
| Output Return Loss | RF _{OUT} | dB | - | 15 | - |
| Output IP3 | Two tones at 397 & 403 MHz, +5 dBm output per tone | dBm | - | 35 | - |
| Composite Triple Beat, CTB | 132 Channels, +20 dBmV/Channel at the Output | dBc | - | -70 | - |
| Composite Second Order, CSO | 132 Channels, +20 dBmV/Channel at the Output | dBc | - | -70 | -68 |
| Cross modulation | 132 Channels, +20 dBmV/Channel at the Output | dBc | - | -70 | - |
| P1dB | 400 MHz | dBm | - | 20 | - |
| I _{DD} | V _{DD} = +5 Volts | mA | 140 | 160 | 180 |

Test Circuit Schematic



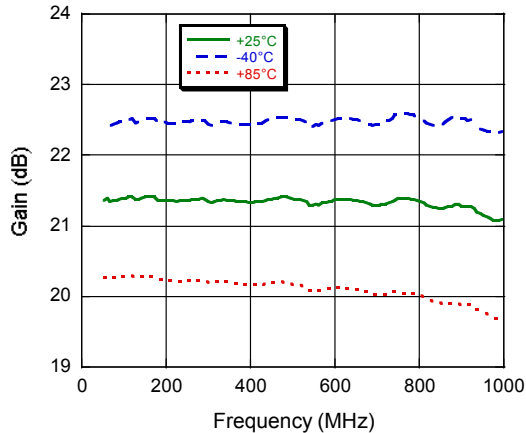
Off-Chip Component Values ⁶

| Component | Value | Package |
|--------------------------|--------------------|---------|
| C1-C3, C17, C22, C24-C25 | 0.01 μF | 0402 |
| L1 | 5.6 nH | 0402 |
| L3, L4 | 1.0 μH | 1210 |
| L5 | 3.9 nH | 0402 |
| L6 | 4.7 nH | 0402 |
| R1, R2 | 300 Ω | 0402 |

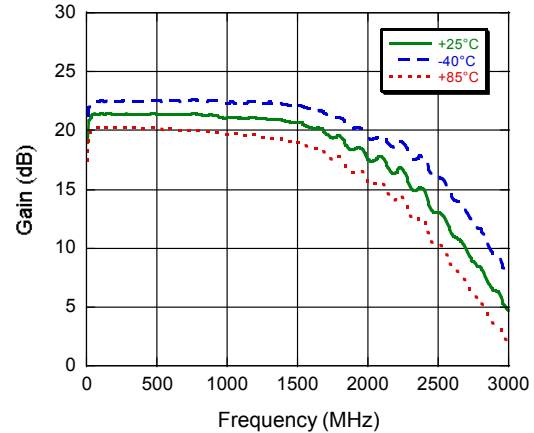
6. L3 and L4 supplied from EPCOS, part number B82422A1102K100.

Typical Performance Curves

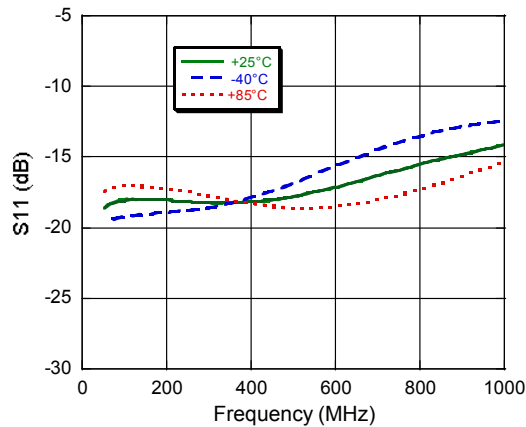
Gain vs. Frequency over Temperature to 1 GHz



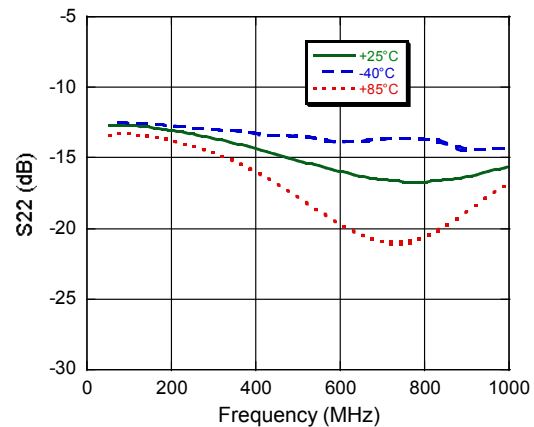
Gain vs. Frequency over Temperature to 3 GHz



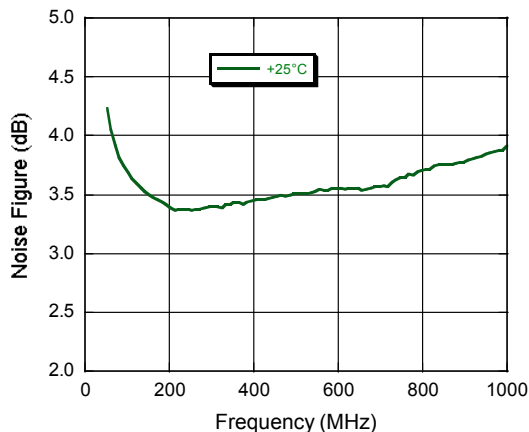
Input Return Loss vs. Frequency over Temperature



Output Return Loss vs. Frequency over Temperature



Noise Figure vs. Frequency



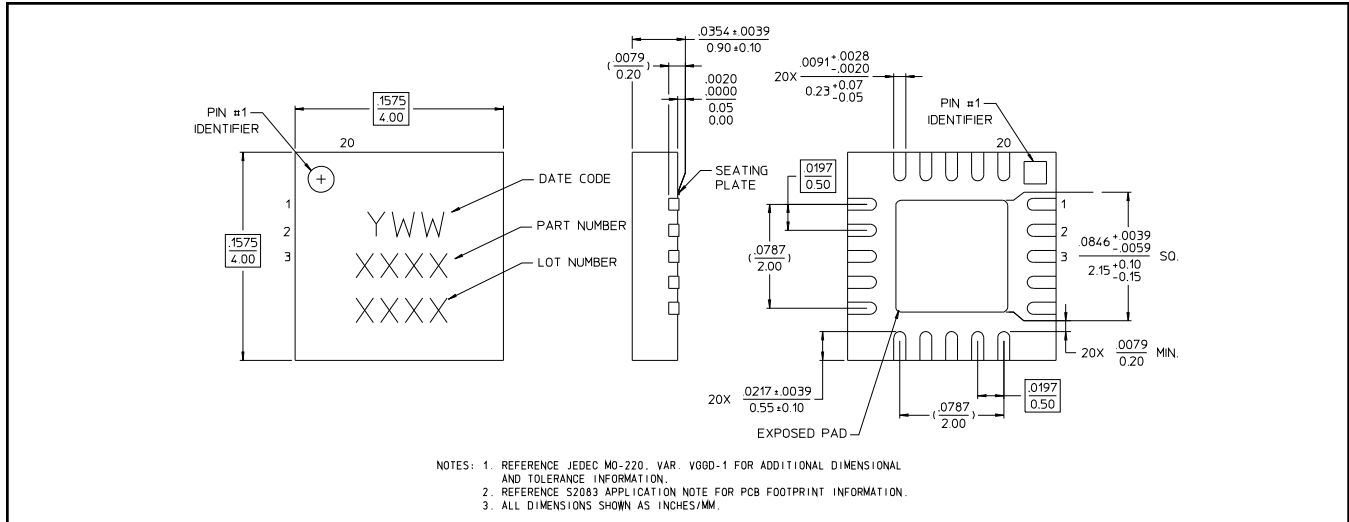
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Lead-Free 4 mm 20-Lead PQFN†



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.