

## Low Noise FTTx Amplifier 50 - 1000 MHz

Rev. V3

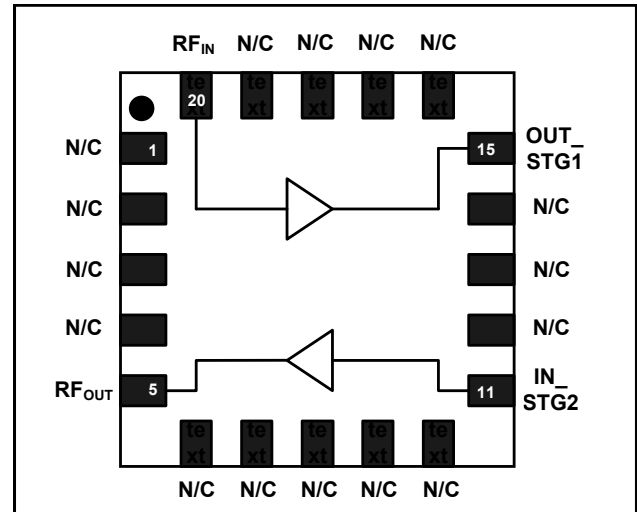
### Features

- 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 <sup>1,2</sup>

| 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 <sup>3,4</sup>

| 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 <sup>5</sup>

| 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.

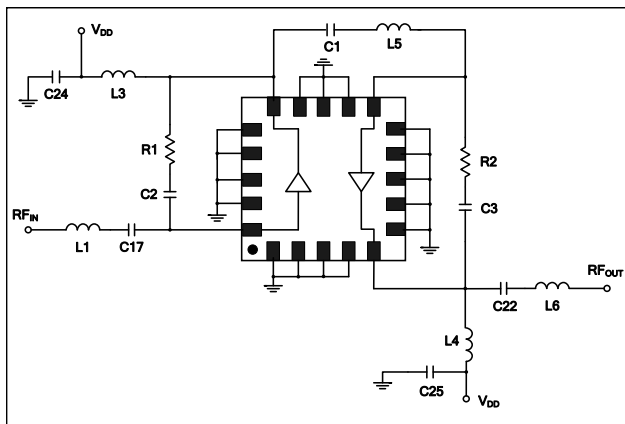
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**Electrical Specifications:**  $T_A = 25^\circ\text{C}$ , Freq: 50 - 1000 MHz,  $V_{DD} = +5$  Volts,  $Z_0 = 75 \Omega$

| 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



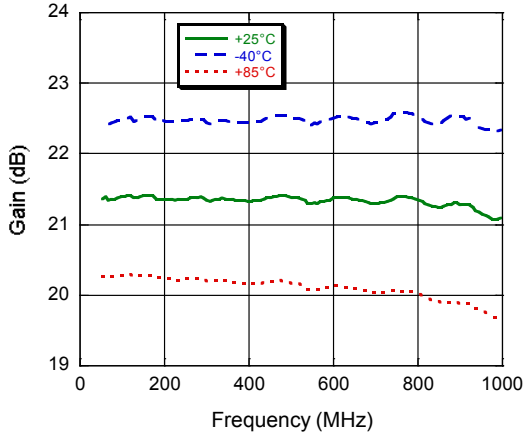
### Off-Chip Component Values <sup>6</sup>

| Component                | Value              | Package |
|--------------------------|--------------------|---------|
| C1-C3, C17, C22, C24-C25 | 0.01 $\mu\text{F}$ | 0402    |
| L1                       | 5.6 nH             | 0402    |
| L3, L4                   | 1.0 $\mu\text{H}$  | 1210    |
| L5                       | 3.9 nH             | 0402    |
| L6                       | 4.7 nH             | 0402    |
| R1, R2                   | 300 $\Omega$       | 0402    |

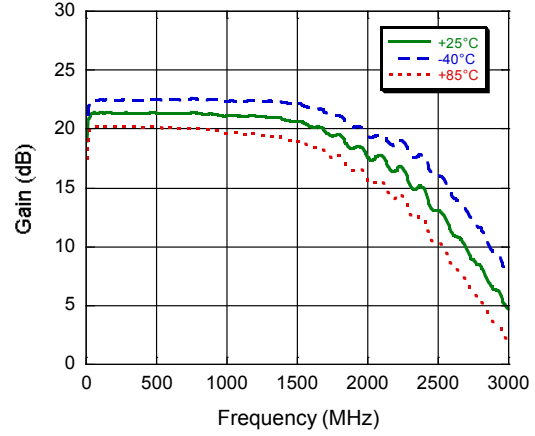
6. L3 and L4 supplied from EPCOS, part number B82422A1102K100.

## Typical Performance Curves

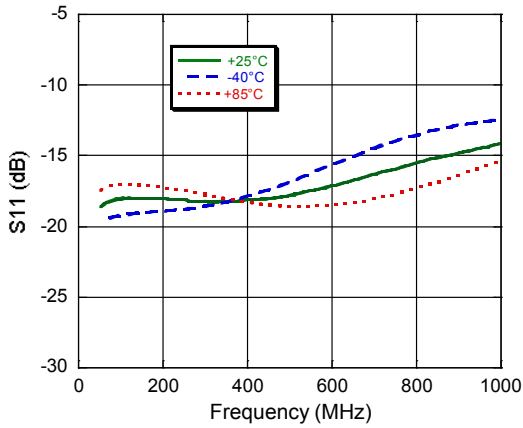
**Gain vs. Frequency over Temperature to 1 GHz**



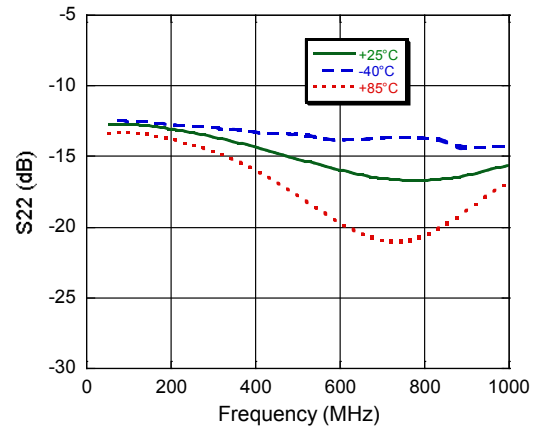
**Gain vs. Frequency over Temperature to 3 GHz**



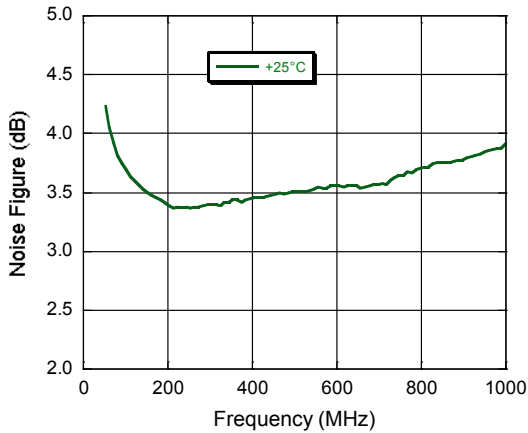
**Input Return Loss vs. Frequency over Temperature**



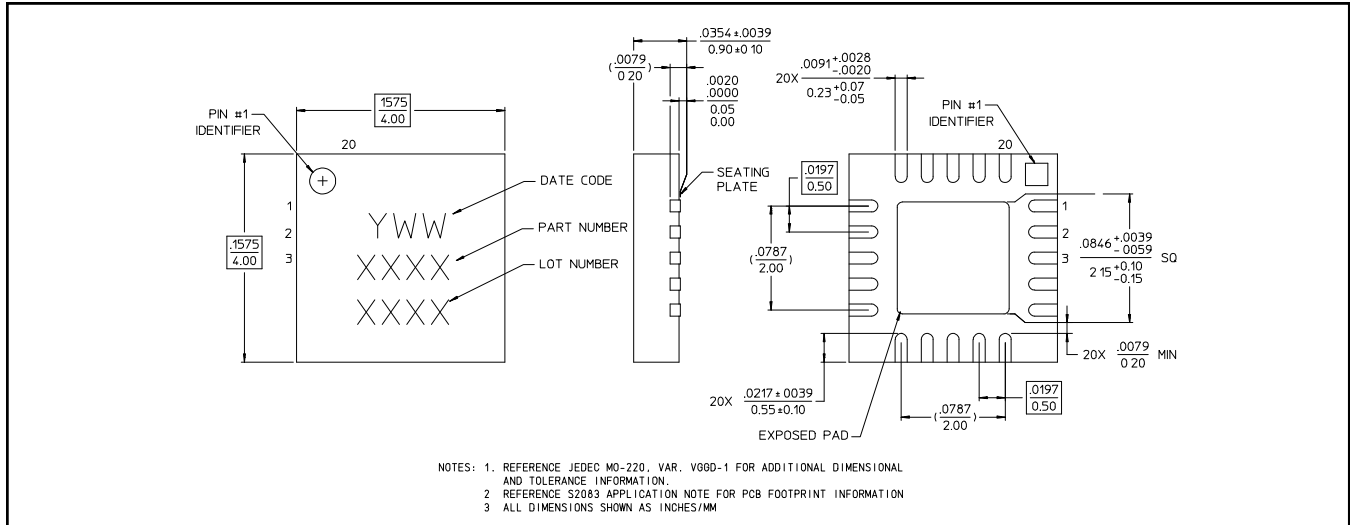
**Output Return Loss vs. Frequency over Temperature**



**Noise Figure vs. Frequency**



## 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.

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