

Low Noise Amplifier 0.5 - 3.0 GHz

Rev. V4

Features

- Low Noise Figure: 0.7 dB at 2.3 GHz
- Single +3 to +5 V Supply Bias
- Low Current: 11.5 mA typical
- Lead-Free SOT-26 Plastic Package
- RoHS* Compliant and 260°C Reflow Compatible

Description

M/A-COM's MAAL-007304 low noise amplifier is a GaAs MMIC amplifier in a lead-free SOT-26 surface mount plastic package. The MAAL-007304 employs a monolithic 2-stage self-biased design and can be biased between +3 to +5 volts, depending on system requirements. The MAAL-007304 offers low noise, low current, and high gain. It can be tuned for various applications from 0.5 to 3 GHz.

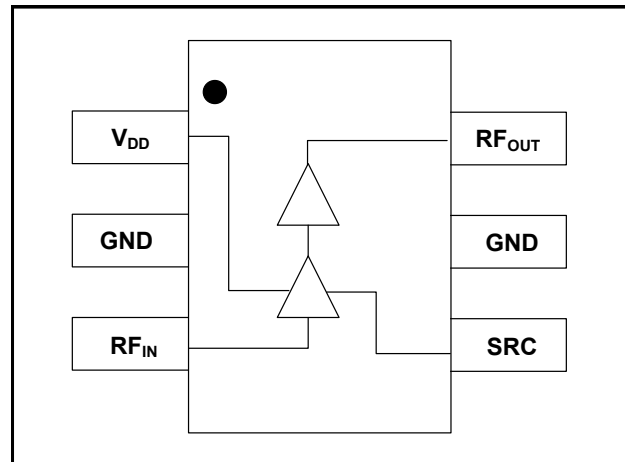
M/A-COM fabricates the MAAL-007304 using a low noise pHEMT process to realize low noise and high gain. The process features full passivation for performance and reliability.

Ordering Information ^{1,2}

| Part Number | Package |
|--------------------|--------------------------------------|
| MAAL-007304-000000 | Bulk Packaging |
| MAAL-007304-TR3000 | 3000 piece reel |
| MAAL-007304-001SMB | Sample Board 2.3 - 2.5 GHz Tuning |

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

Functional Schematic



Pin Configuration

| Pin No. | Pin Name | Description |
|---------|-------------------|-------------|
| 1 | V _{DD} | Bias |
| 2 | GND | Ground |
| 3 | RF _{IN} | RF Input |
| 4 | SRC | Source |
| 5 | GND | Ground |
| 6 | RF _{OUT} | RF Output |

Absolute Maximum Ratings ^{3,4}

| Parameter | Absolute Maximum |
|-----------------------|------------------|
| RF Input Power | +10 dBm |
| Voltage | 6.0 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.

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

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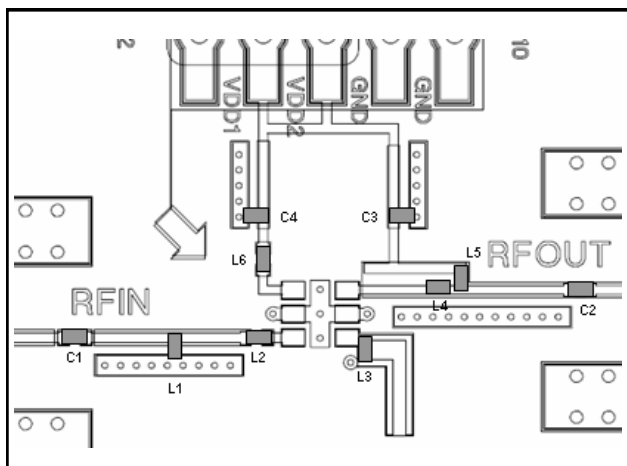
Electrical Specifications: F = 2.3 GHz, V_{DD} = +3 V, T_A = +25°C, Z_O = 50 Ω

| Parameter | Units | Min. | Typ. | Max. |
|--------------|-------|------|------|------|
| Gain | dB | 24.0 | 25.5 | 27.0 |
| Noise Figure | dB | — | 0.7 | 0.85 |
| Current | mA | — | 11.5 | 13.0 |

Typical Performance: F = 2.3 GHz, V_{DD} = +3 V, T_A = +25°C, Z_O = 50 Ω

| Parameter | Units | Typ. |
|------------------------|-------|------|
| Input Return Loss | dB | 15 |
| Output Return Loss | dB | 10 |
| Input IP ₃ | dBm | -6 |
| Output IP ₃ | dBm | 19 |
| Output P1dB | dBm | 7 |

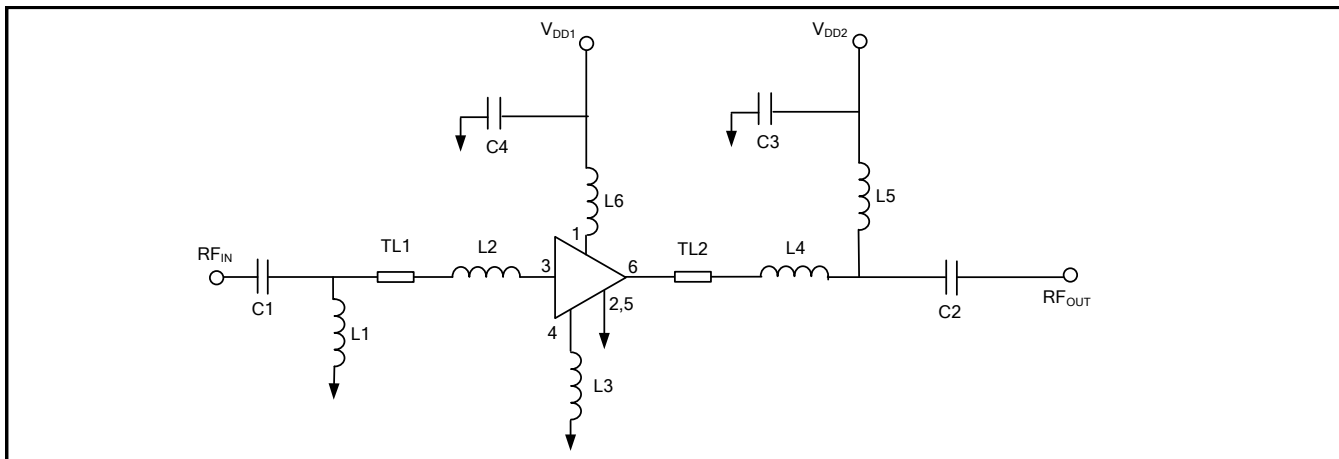
Recommended PCB Configuration



External Parts List

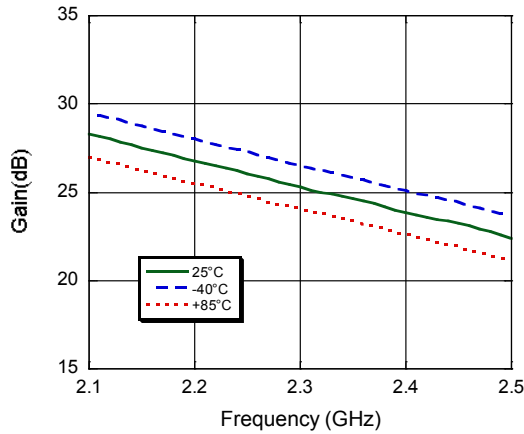
| Component | Value | Footprint | Manufacturer |
|-----------|-------------------------|-----------|--------------|
| C1 | 3 pF | 0603 | ATC |
| C2 | 8.2 pF | 0603 | ATC |
| C3, C4 | 0.1 μF | 0402 | Panasonic |
| L1 | 5.6 nH | 0402 | Panasonic |
| L2, L5 | 6.8 nH | 0402 | Coilcraft |
| L3 | 1.5 nH | 0402 | Toko |
| L4 | 3.9 nH | 0402 | Toko |
| L6 | 7.5 nH | 0402 | Coilcraft |
| TL1 | 47.5 Ω, 34° @ 2.3 GHz | | |
| TL2 | 47.5 Ω, 15.5° @ 2.3 GHz | | |

Schematic

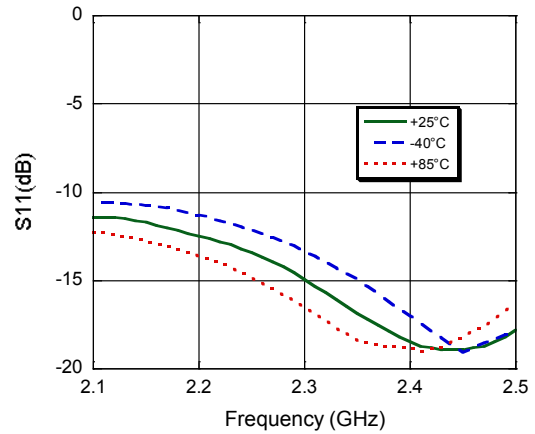


Typical Performance Curves

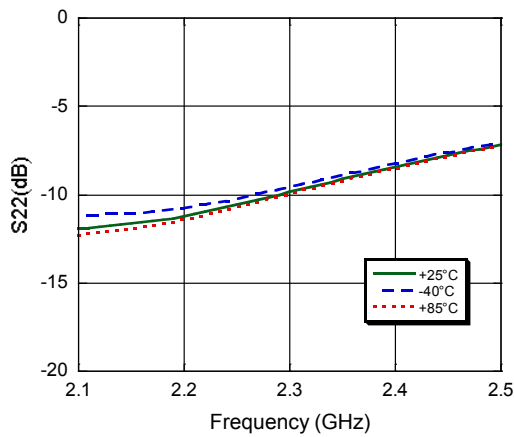
Gain



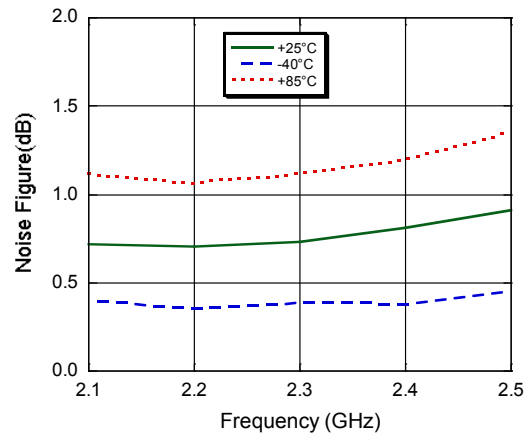
Input Return Loss



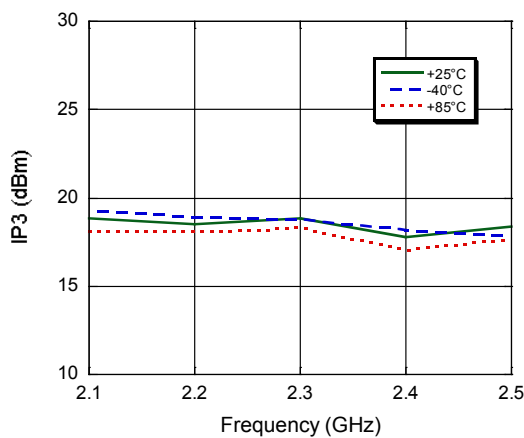
Output Return Loss



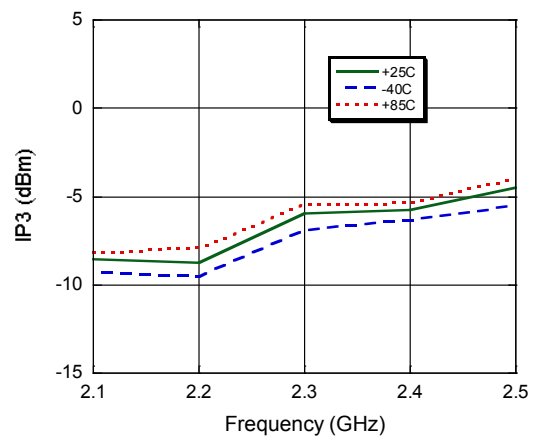
Noise Figure



Output IP3

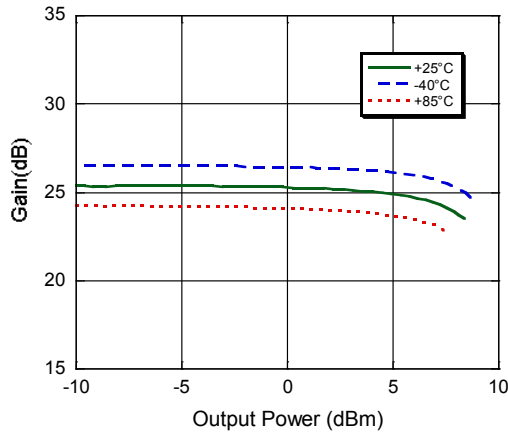


Input IP3

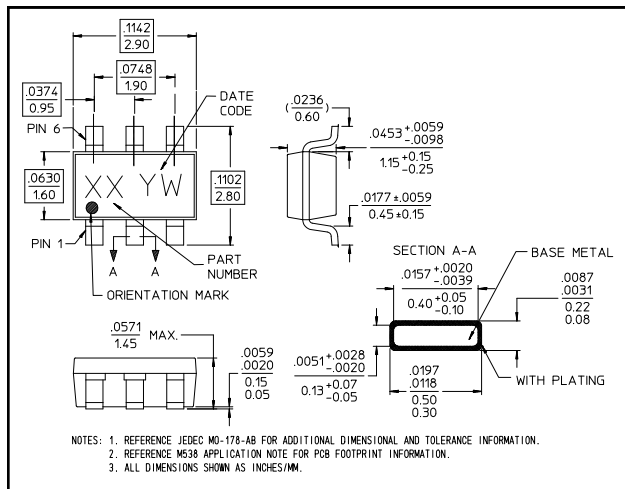


Typical Performance Curves

P1dB @ 2.3 GHz



Lead-Free SOT-26 Plastic Package[†]



[†] Reference Application Note M538 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.

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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