

# MMA-243034D-M5 24 – 30 GHz, 2.5W MMIC Power Amplifier

## Features:

- Frequency Range: 24 – 30 GHz
- P1dB: 34 dBm
- IM3 Level: -25 dBc @ Po = 27 dBm/tone
- Gain: 23 dB
- Vdd = 6V
- Idsq = 1100 to 1800mA
- Input and Output Fully Matched to 50 Ω
- Output Power Detector

## Applications:

- Point-to-Point Radio
- VSAT
- 5G

## Description:

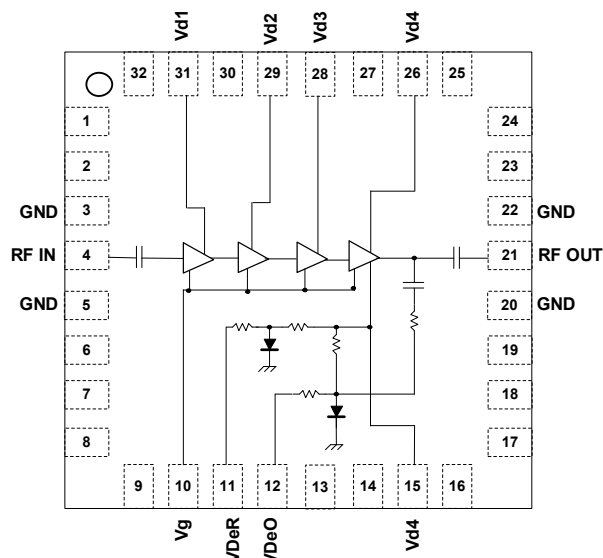
The MMA-243034D-M5 is a 2.5W GaAs pHEMT MMIC power amplifier in a compact 5 mm QFN surface mount package. The MMA-243034D-M5 provides 34 dBm of output power (P-1dB) and 23 dB of small-signal gain from 24GHz to 30GHz.

## Absolute Maximum Ratings: (Ta= 25 °C)\*

| SYMBOL  | PARAMETERS                      | UNITS | Min. | Max.        |
|---------|---------------------------------|-------|------|-------------|
| Vd      | Drain Voltage                   | V     |      | 6.5         |
| Vg      | Gate Voltage                    | V     | -2.1 | 0           |
| Ig      | Gate Current                    | mA    | -17  | 17          |
| Pd      | Power Dissipation               | W     |      | 24          |
| Pin max | RF Input Power                  | dBm   |      | 20          |
| Tch     | Channel Temperature             | °C    |      | +150        |
| Tstg    | Storage Temperature             | °C    |      | -55 to +150 |
| Tmax    | Max. Assembly Temp (20 sec max) | °C    |      | +250        |

\*Operation of this device above any one of these parameters may cause permanent damage.

Functional Block Diagram



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### Electrical Specifications: $V_d = 6V$ , $I_{dq} = 1600mA$ , $T_a = 25^\circ C$ , $Z_o = 50\ \Omega$

| Parameter                   | Units         | Typical Data |
|-----------------------------|---------------|--------------|
| Frequency Range             | GHz           | 24-30        |
| Gain                        | dB            | 23           |
| Gain Flatness               | +/- dB        | 2            |
| Input Return Loss           | dB            | 8            |
| Output Return Loss          | dB            | 10           |
| VdeR                        | V             | 0.9          |
| VdeO @28GHz, @ Po = +20dBm  | V             | 0.82         |
| @ Po = +33dBm               | V             | 0.0          |
| Output P1dB                 | dBm           | 34           |
| Output P3dB                 | dBm           | 34.5         |
| IM3 Level <sup>(1)</sup>    | dBc           | -25          |
| Thermal Resistance          | $^{\circ}C/W$ | 5.3          |
| Total Drain Current at P1dB | mA            | 2100         |

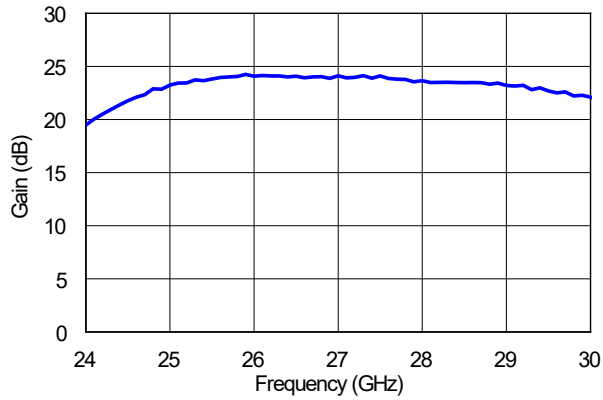
(1) Output IP3 is measured with two tones at output power of 27 dBm/tone separated by 20 MHz.

# MMA-243034D-M5

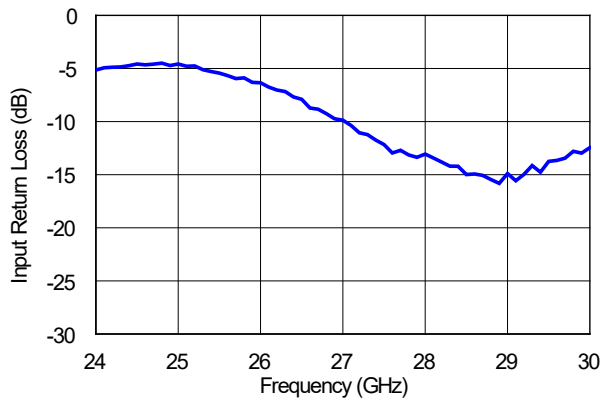
24 – 30 GHz, 2.5W MMIC Power Amplifier

**Typical RF Performance:**  $V_d = 6V$ ,  $I_{dq} = 1600mA$ ,  $V_g = -0.85V$  typical,  $Z_o = 50\ \Omega$

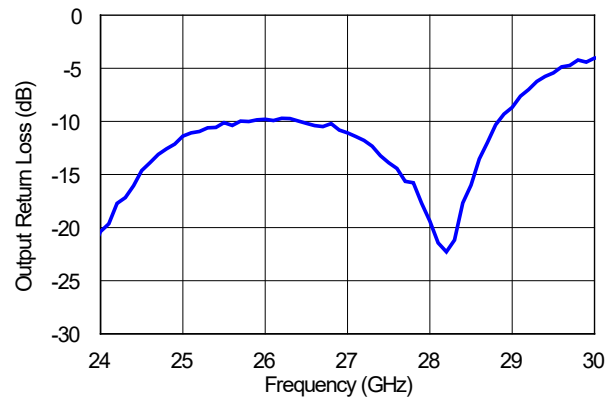
**Small Signal Gain vs. Frequency**



**Input Return Loss vs. Frequency**



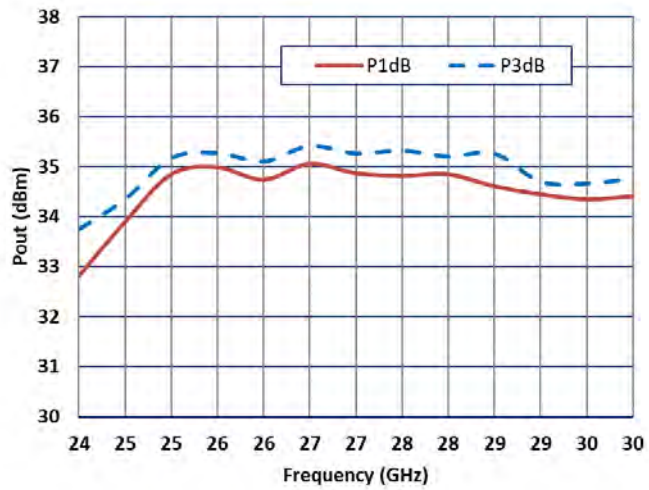
**Output Return Loss vs. Frequency**



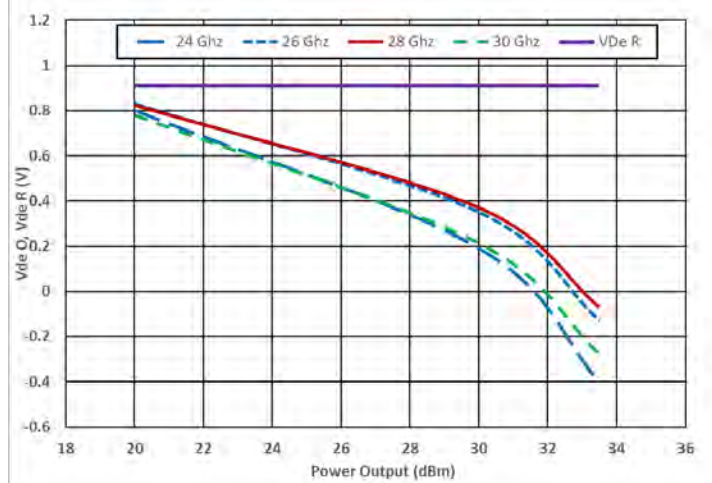
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Output Power



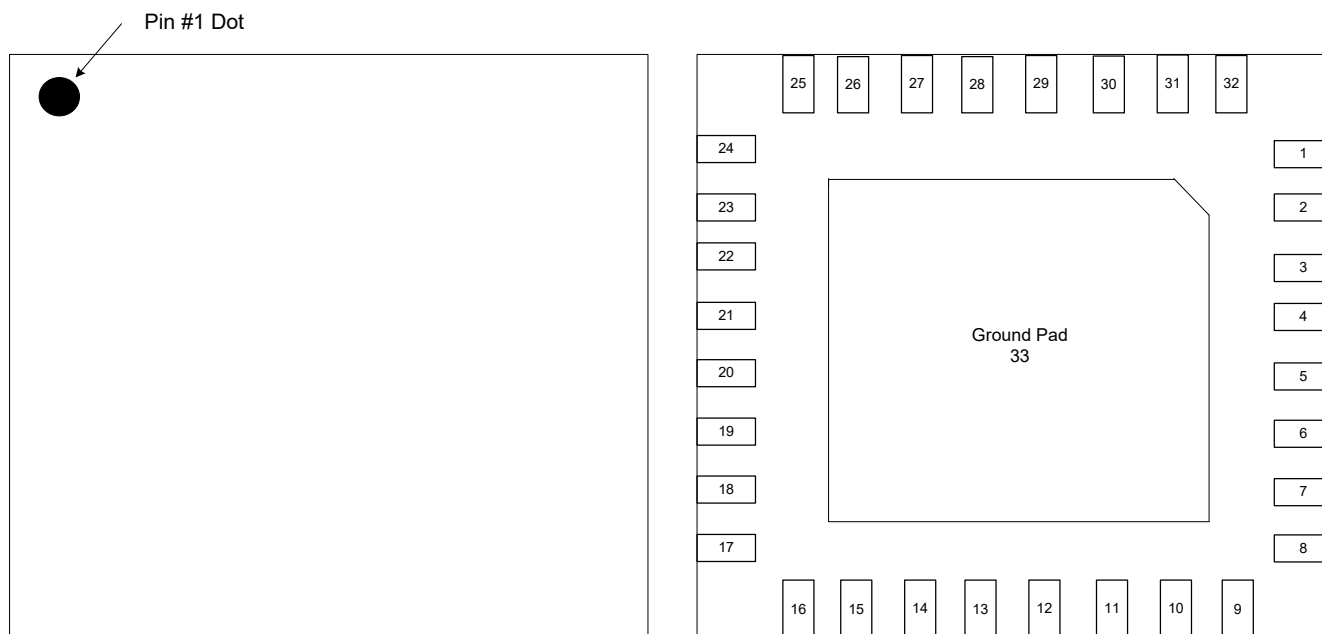
Detector Output vs. Output Power



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## Package Pin Designations:



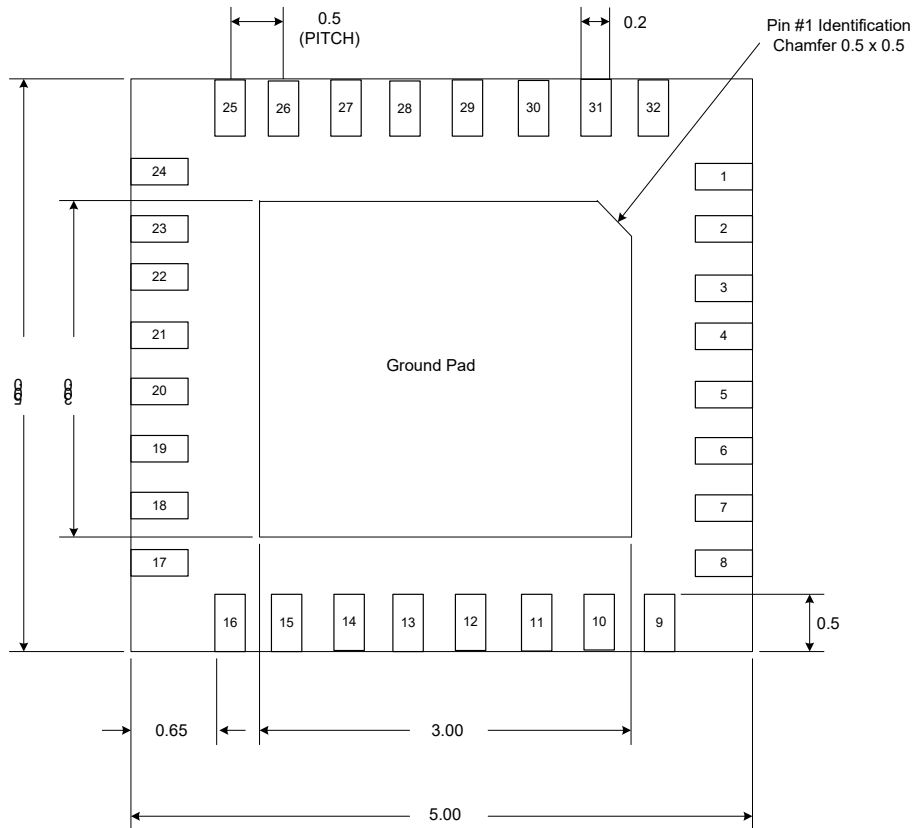
| Pin                                           | Description |
|-----------------------------------------------|-------------|
| 4                                             | RF Input    |
| 21                                            | RF Output   |
| 10                                            | Vg          |
| 31                                            | Vd1         |
| 29                                            | Vd2         |
| 28                                            | Vd3         |
| 15, 26                                        | Vd4         |
| 11                                            | VdeR        |
| 12                                            | VdeO        |
| 1, 3, 5, 8, 9, 16, 17, 20, 22, 24, 25, 32, 33 | Ground      |
| 2, 6, 7, 11, 12, 13, 14, 18, 19, 23, 27, 30   | N/C         |

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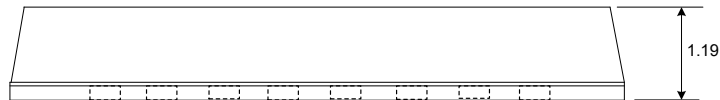
## 24 – 30 GHz, 2.5W MMIC Power Amplifier

### Mechanical Drawing

The package is a 32-Lead 5x5mm air-cavity QFN package that is compatible with industry standard surface mount PCB assembly processes.



BOTTOM VIEW



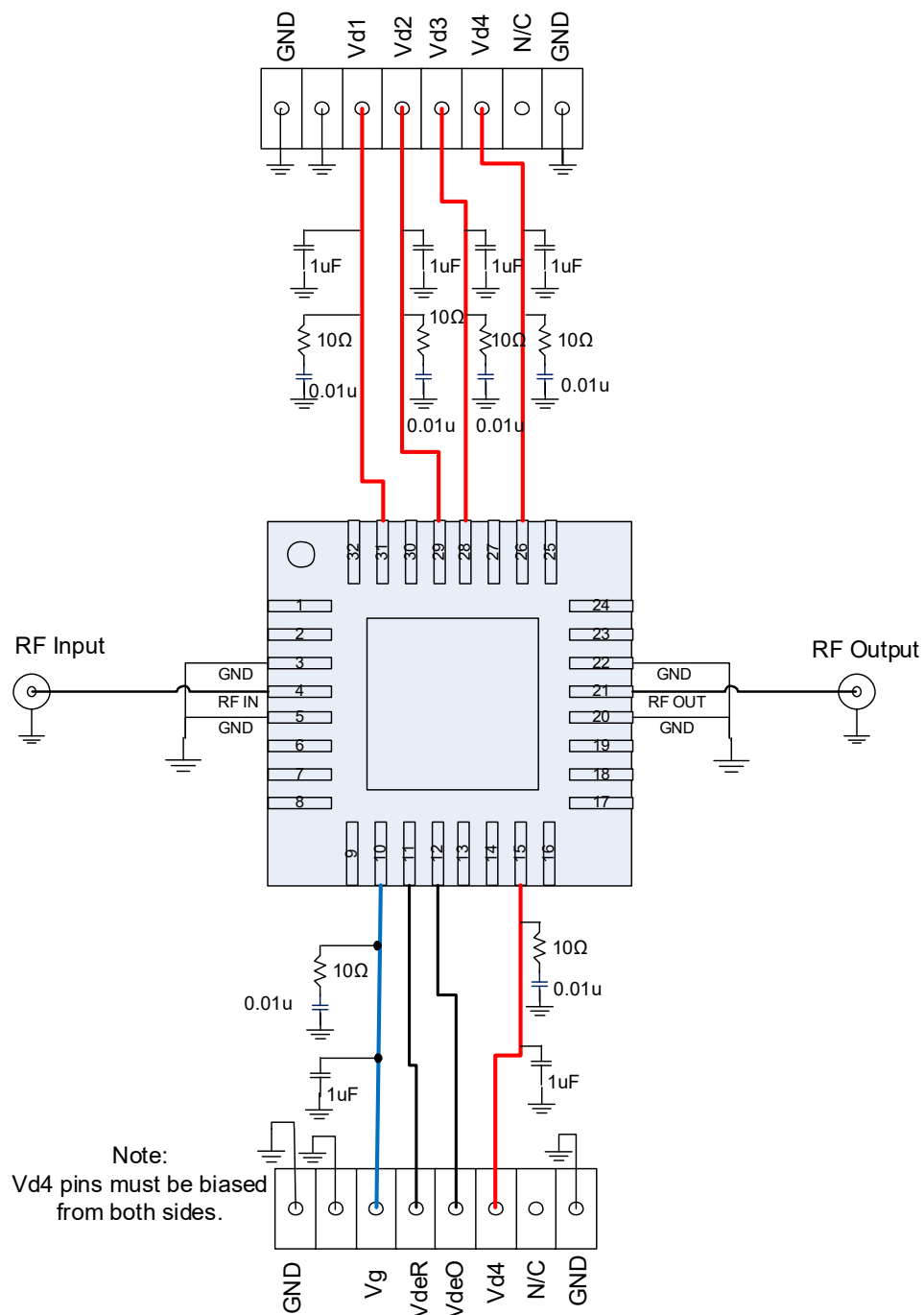
SIDE VIEW

The units are in [mm].

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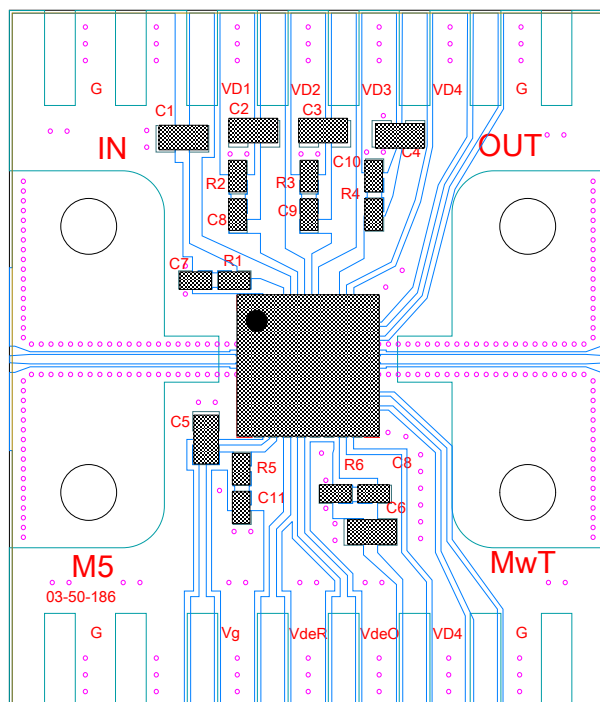
## Sample Application Circuit:



# MMA-243034D-M5

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## Sample Application Board Design



| Part                      | Description                                                                                         |
|---------------------------|-----------------------------------------------------------------------------------------------------|
| C1, C2, C3, C4, C5, C6    | 1uF capacitor (0603)                                                                                |
| C7, C8, C9, C10, C11, C12 | 0.01uF Capacitor (0402)                                                                             |
| R1, R2, R3, R4, R5, R6    | 10Ω Resistor (0402)                                                                                 |
| Board Material            | Rogers RO4350B,<br>10 Mil Dielectric Thickness<br>½ oz. Copper Cladding,<br>Copper-Filled Via Holes |

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## 24 – 30 GHz, 2.5W MMIC Power Amplifier

### Biasing and Operation

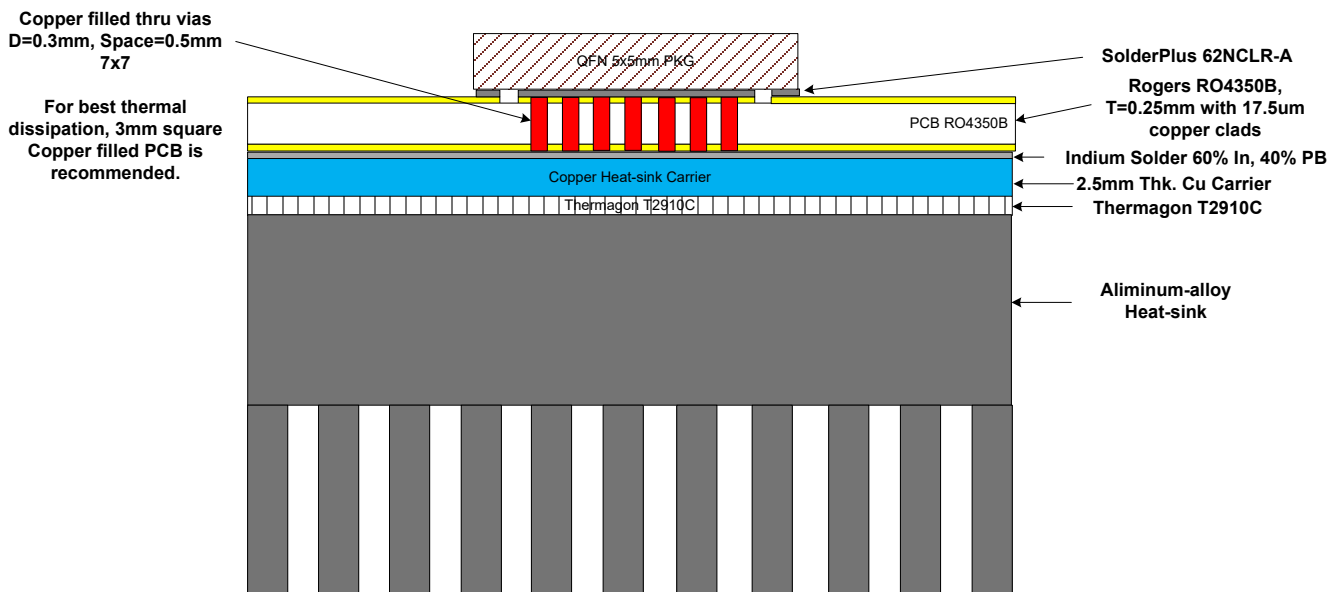
The recommended bias conditions for optimum performance for the **MMA-243034D-M5** are  $V_{DD} = 6.0V$ ,  $I_{dq} = 1600mA$ . The gate voltage ( $V_g$ ) must be applied prior to the drain voltages ( $V_{d1}$ ,  $V_{d2}$ ,  $V_{d3}$ ,  $V_{d4}$ ) during power up and removed after the drain voltages during power down. A single DC gate supply connected to  $V_g$  will bias all the amplifier stages. Muting can be accomplished by setting  $V_g$  to the pinch-off voltage ( $V_p = -2V$ ).  $V_{d4}$  must be connected to both  $V_{d1}$  pins.

### Assembly and Handling

GaAs MMICs are ESD sensitive. ESD preventive measures must be employed in all aspects of storage, handling, and assembly.

### Sample Application Board Design:

Proper heatsinking and board mounting pattern with filled thermal vias are recommended for optimum performance.



**MMA-243034D-M5**

## 24 – 30 GHz, 2.5W MMIC Power Amplifier

## Contact Information

For additional information please visit [www.cmlmicro.com](http://www.cmlmicro.com) or contact a sales office.

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