



- Frequency Range: 27 – 30 GHz
- P1dB: 33 dBm
- IM3 Level: -25 dBc @  $P_o = 27$  dBm/tone
- Gain: 26 dB
- Vdd = 6V
- Idsq = 1100 to 1800mA
- Input and Output Fully Matched to 50  $\Omega$
- Output Power Detector

- **Point-to-Point Radio**
- **VSAT**

The MMA-273034D-M5 is a 2.5W GaAs pHEMT MMIC power amplifier in a compact 5 mm QFN surface mount package. The MMA-273034D-M5 provides 33dBm of output power (P-1dB) and 26dB of small-signal gain from 27GHz to 30GHz.

| Parameter                    | Units  | Typical Data |
|------------------------------|--------|--------------|
| Frequency Range              | GHz    | 27-30        |
| Gain                         | dB     | 26           |
| Gain Flatness                | +/- dB | 2            |
| Input Return Loss            | dB     | 10           |
| Output Return Loss           | dB     | 10           |
| VdeR                         | V      | 0.89         |
| VdeO @29.5GHz, @ Po = +20dBm | V      | 0.85         |
| @ Po = +33dBm                | V      | 0.0          |
| Output P1dB                  | dBm    | 33           |
| Output P3dB                  | dBm    | 34           |
| IM3 Level <sup>(1)</sup>     | dBc    | -25          |
| Thermal Resistance           | °C/W   | 5.3          |
| Total Drain Current at P1dB  | mA     | 1600         |

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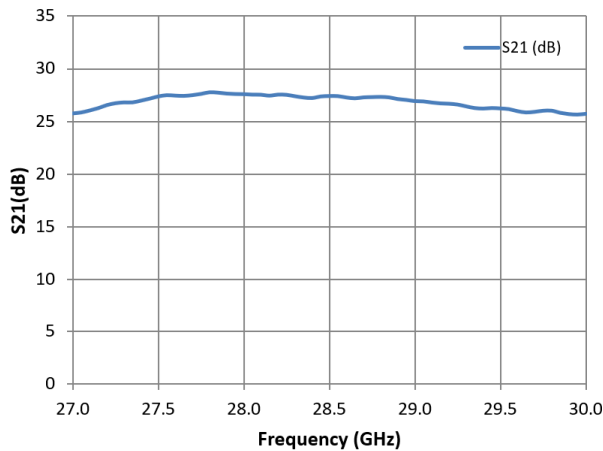
## Absolute Maximum Ratings: ( $T_a = 25^\circ\text{C}$ )\*

| 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             | $^\circ\text{C}$ |      | +150        |
| Tstg    | Storage Temperature             | $^\circ\text{C}$ |      | -55 to +150 |
| Tmax    | Max. Assembly Temp (20 sec max) | $^\circ\text{C}$ |      | +250        |

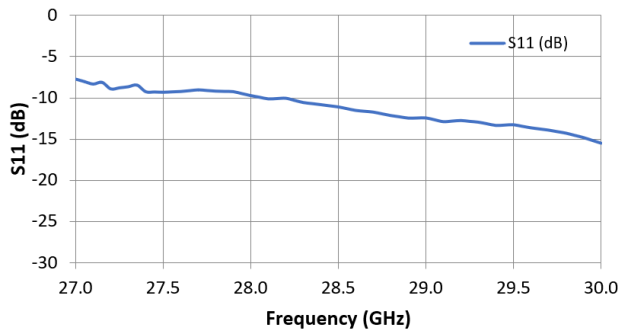
\*Operation of this device above any one of these parameters may cause permanent damage.

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

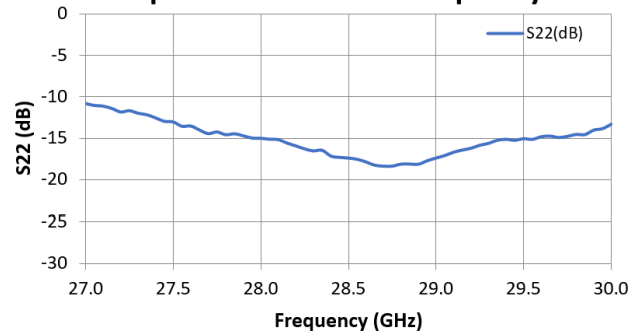
**Small Signal Gain vs Frequency**



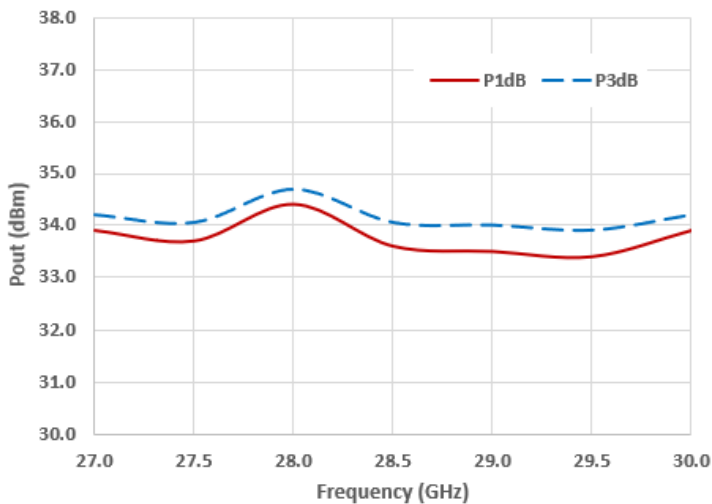
**Input Return Loss vs Frequency**



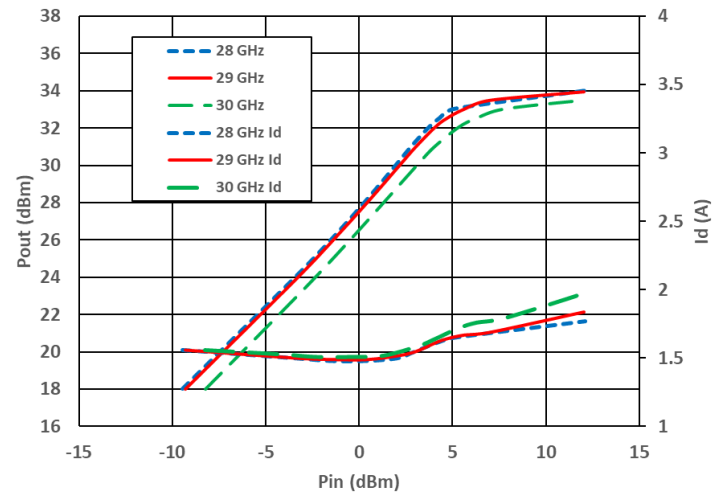
**Output Return Loss vs Frequency**



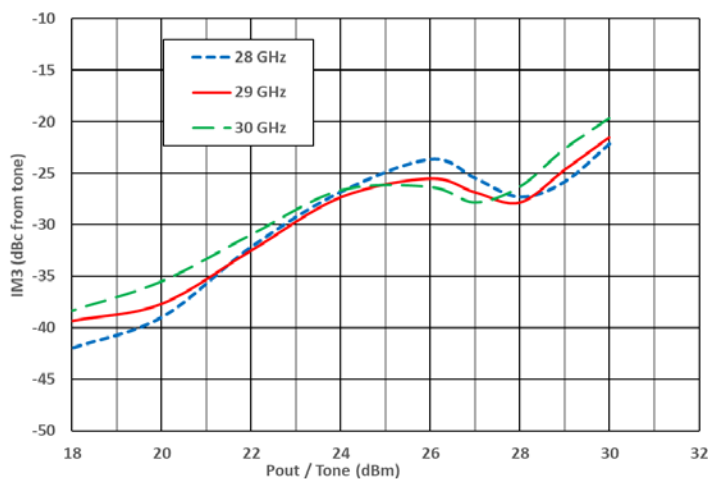
**Pout at P1dB and P3dB Gain Compression**



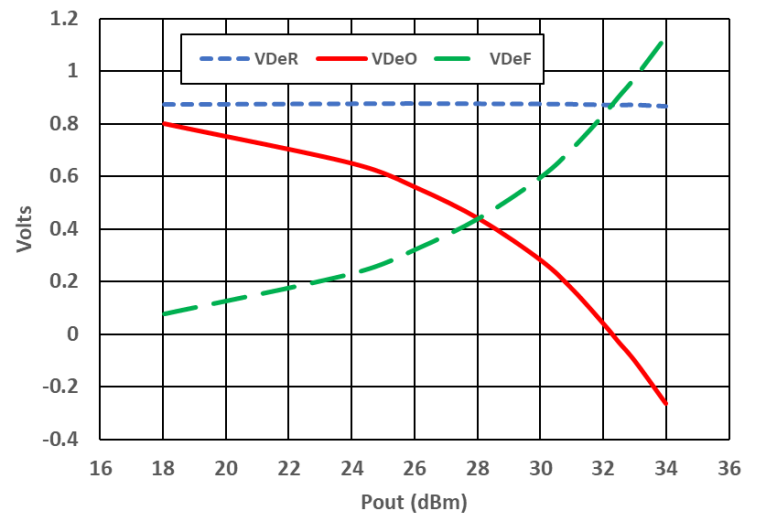
**Pout and Supply Current Id vs. Input Power**



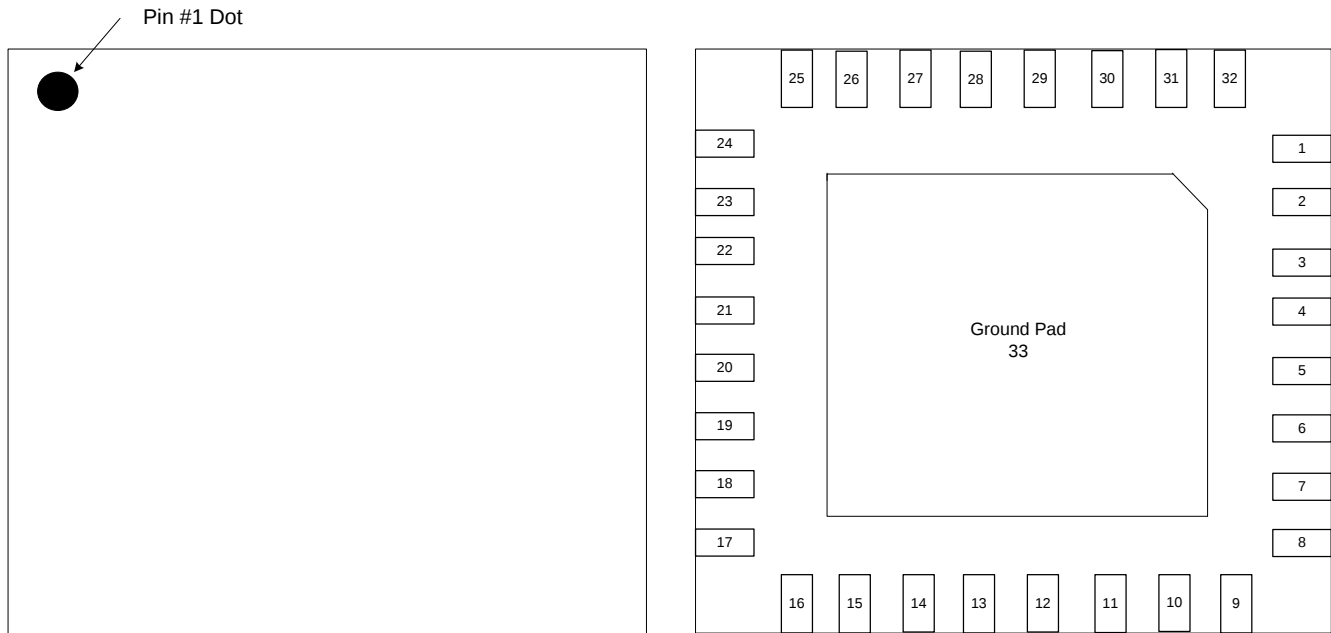
**IM3 vs. Output Power**



**Detector Outputs vs. Output Power at 30 GHz**



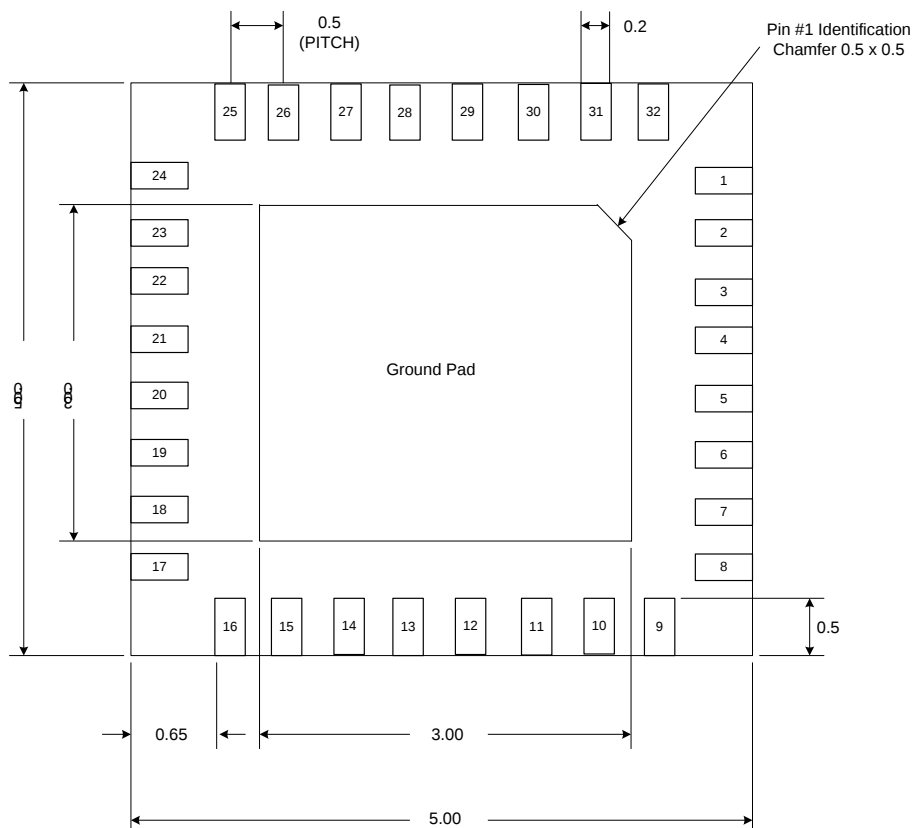
## Package Pin Designations:



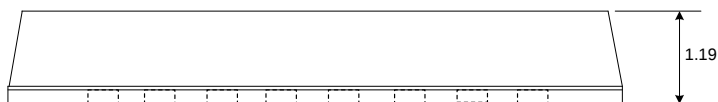
| Pin                                           | Description |
|-----------------------------------------------|-------------|
| 4                                             | RF Input    |
| 21                                            | RF Output   |
| 10                                            | 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         |

## Mechanical Drawing

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



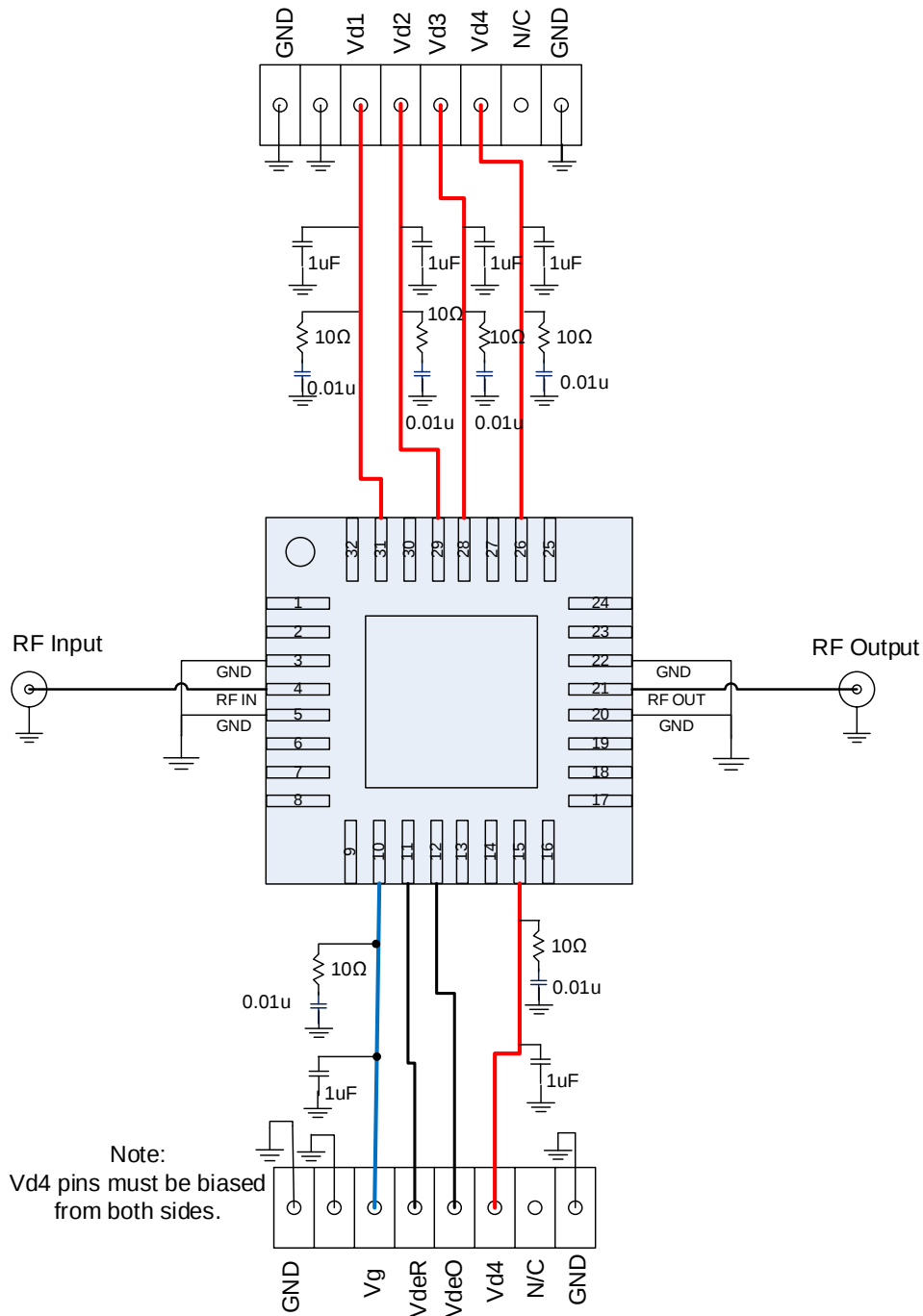
BOTTOM VIEW



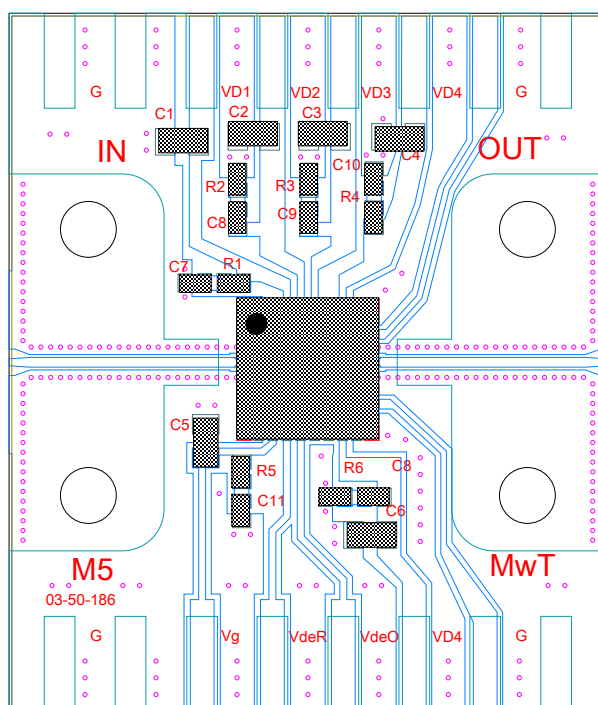
SIDE VIEW

The units are in [mm].

## Sample Application Circuit:



## 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 |

## Biasing and Operation

The recommended bias conditions for optimum performance for the **MMA-273034D-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. An electronic drawing of the sample board layout is available upon request from MwT Sales & Application Engineering.

