

# MMA-273334D-M5 27 – 33 GHz, 2.5W MMIC Power Amplifier

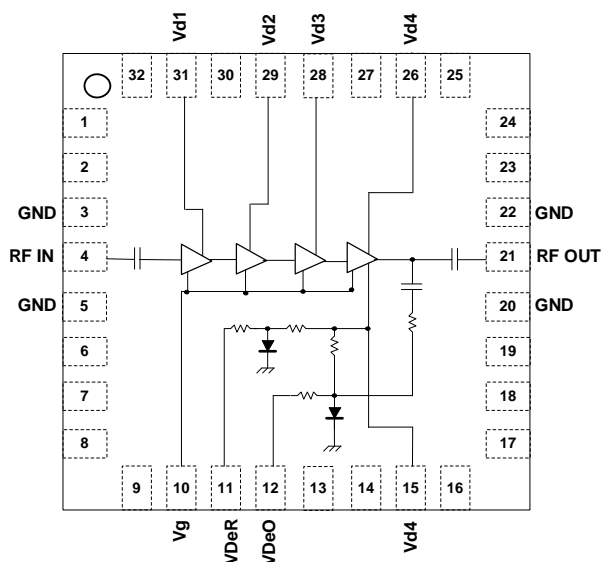
## Features:

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

## Applications:

- Point-to-Point Radio
- VSAT

Functional Block Diagram



## Description:

The MMA-273334D-M5 is a 2.5W GaAs pHEMT MMIC power amplifier in a compact 5 mm QFN surface mount package. The MMA-273334D-M5 provides 33dBm of output power (P-1dB) and 26dB of small-signal gain from 27GHz to 33GHz.

## 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.

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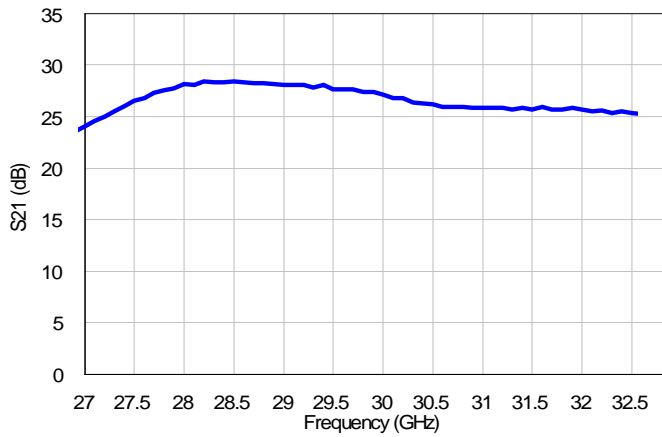
## Electrical Specifications: $V_d = 6V, I_{dq} = 1600mA, T_a = 25\text{ }^\circ\text{C}, Z_o = 50\text{ ohm}$

Parameter	Units	Typical Data
Frequency Range	GHz	27-33
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

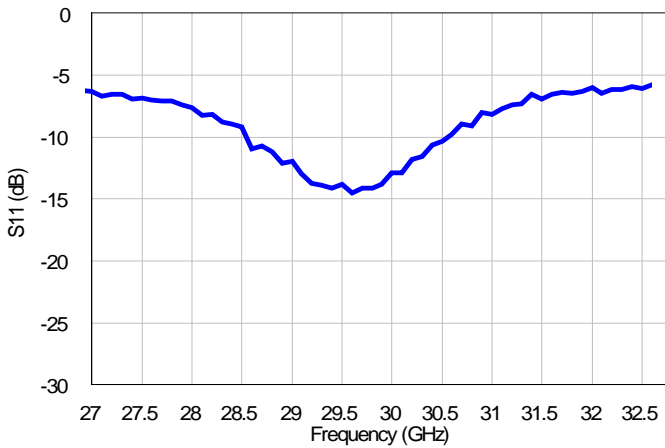
(1) Output IP3 is measured with two tones at output power of 27 dBm/tone separated by 20 MHz.

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

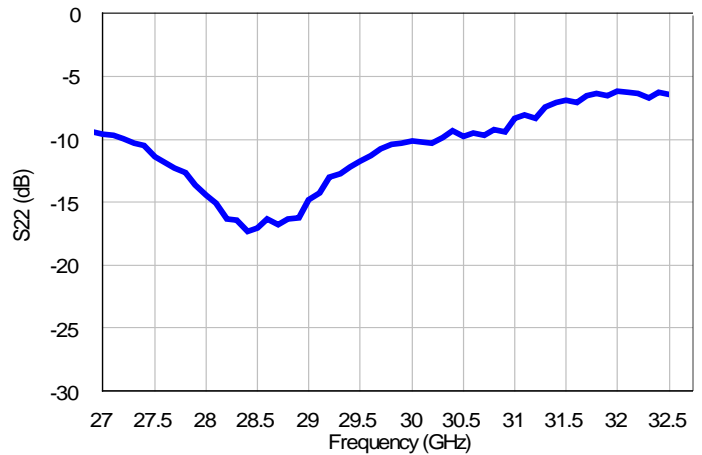
**Small Signal Gain vs. Frequency**



**Input Return Loss vs. Frequency**



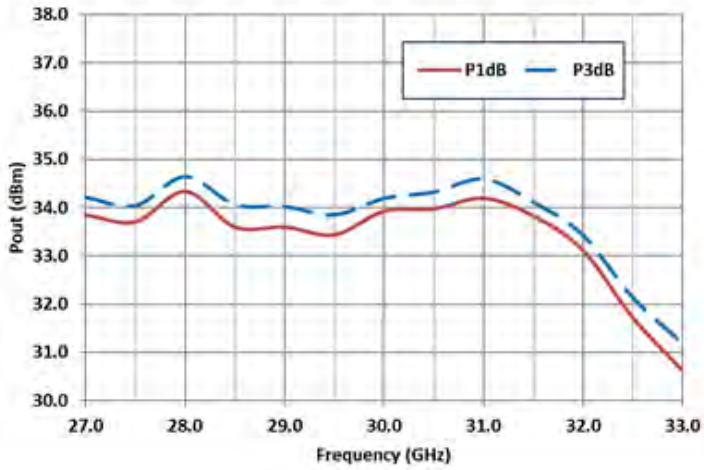
**Output Return Loss vs. Frequency**



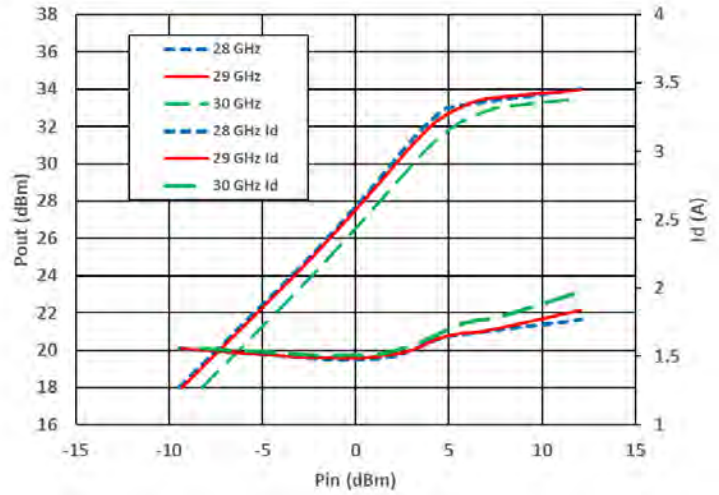
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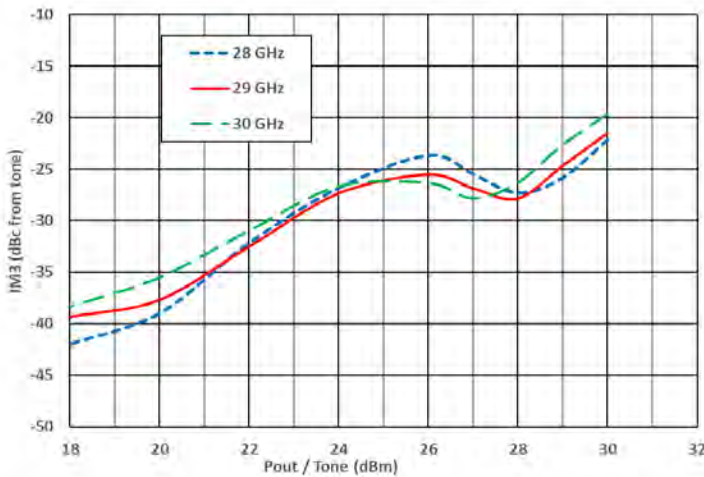
Pout at P1dB and P3dB Gain Compression



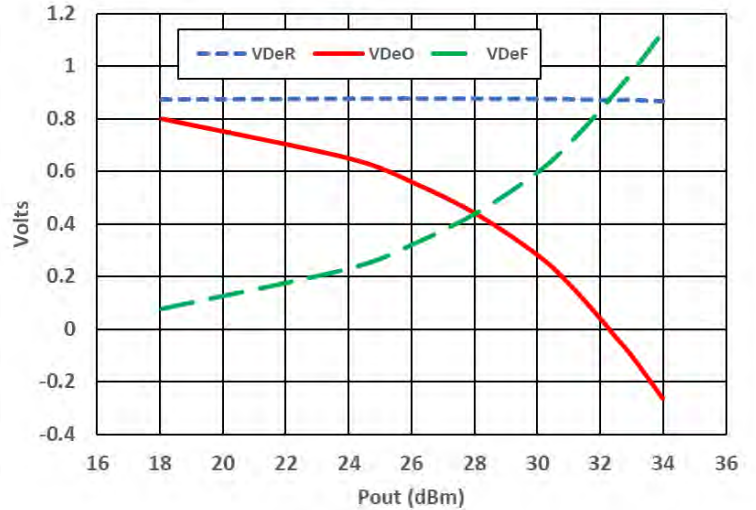
Pout and Supply Current Id vs. Input Power



IM3 vs. Output Power



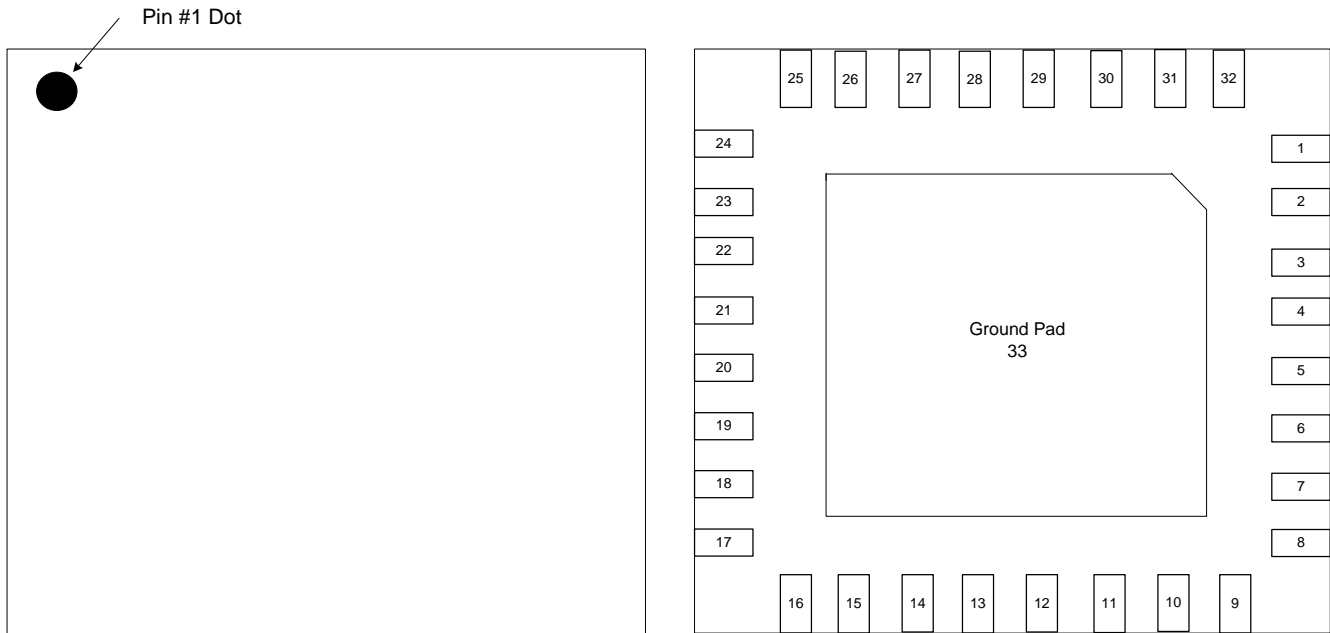
Detector Outputs vs. Output Power at 30 GHz



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## Package Pin Designations:



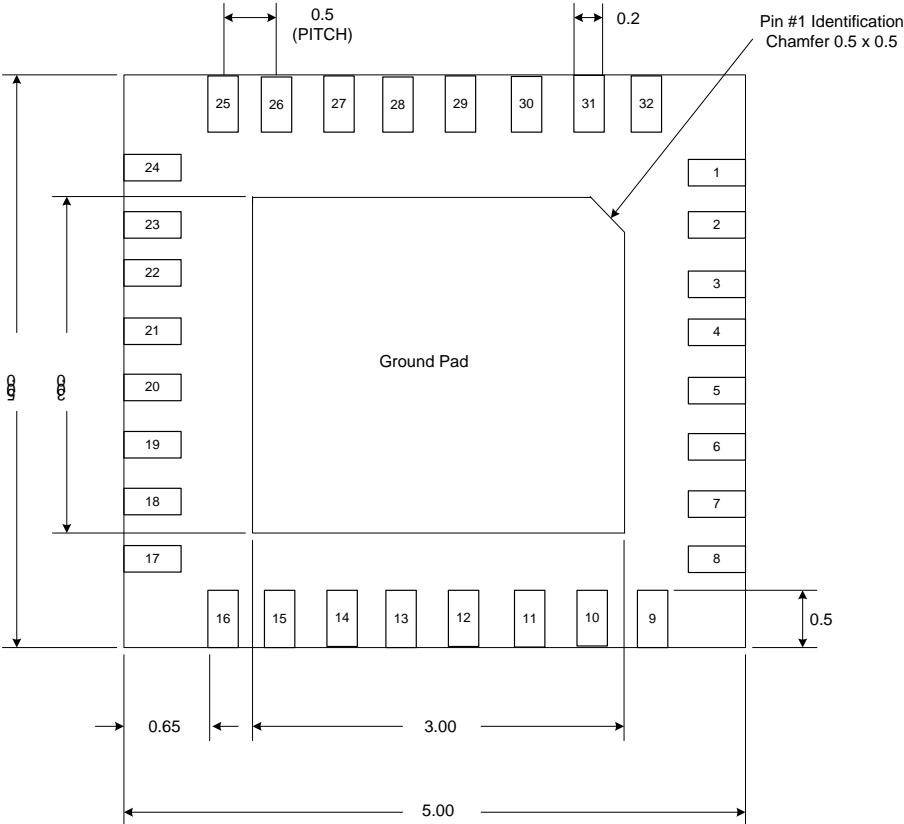
Pin	Description
4	RF Input
21	RF Output
10	Vg
31	Vd1
29	Vd2
28	Vd3
15, 26	Vd4
11	VdeR
12	VdeO
1, 3, 5, 8, 9, 16, 17, 20, 22, 24, 25, 32, 33	Ground
2, 6, 7, 11, 12, 13, 14, 18, 19, 23, 27, 30	N/C

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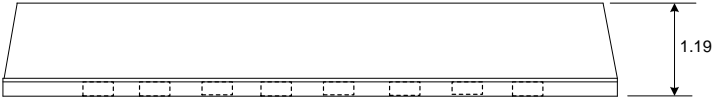
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## Mechanical Drawing

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



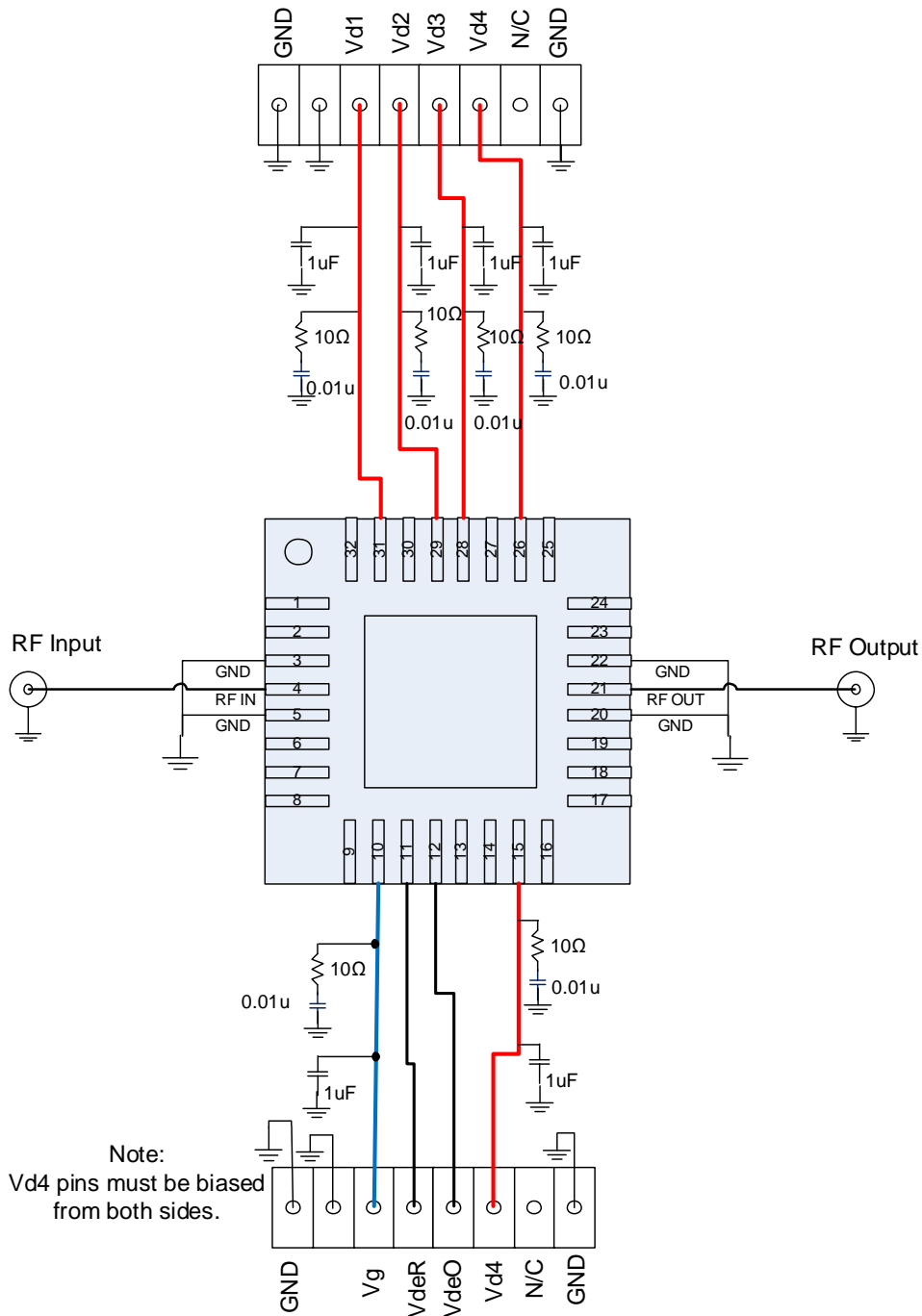
BOTTOM VIEW



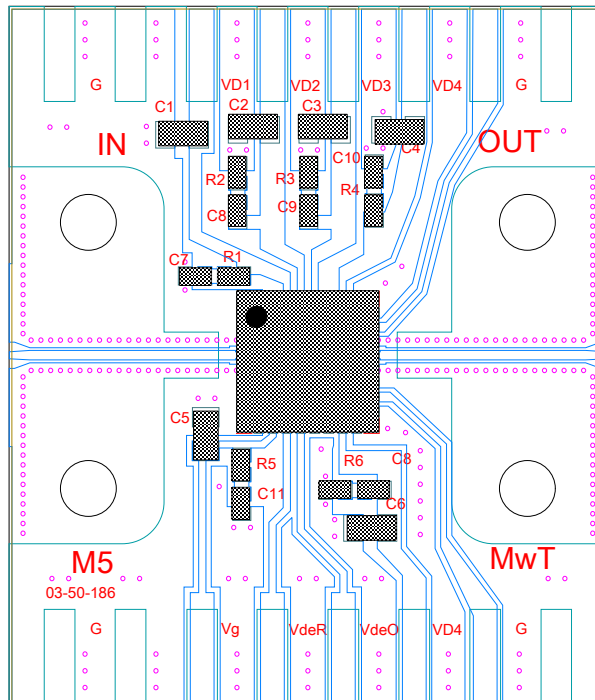
SIDE VIEW

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, 10 Mil Dielectric Thickness ½ oz. Copper Cladding, Copper-Filled Via Holes



## Biasing and Operation

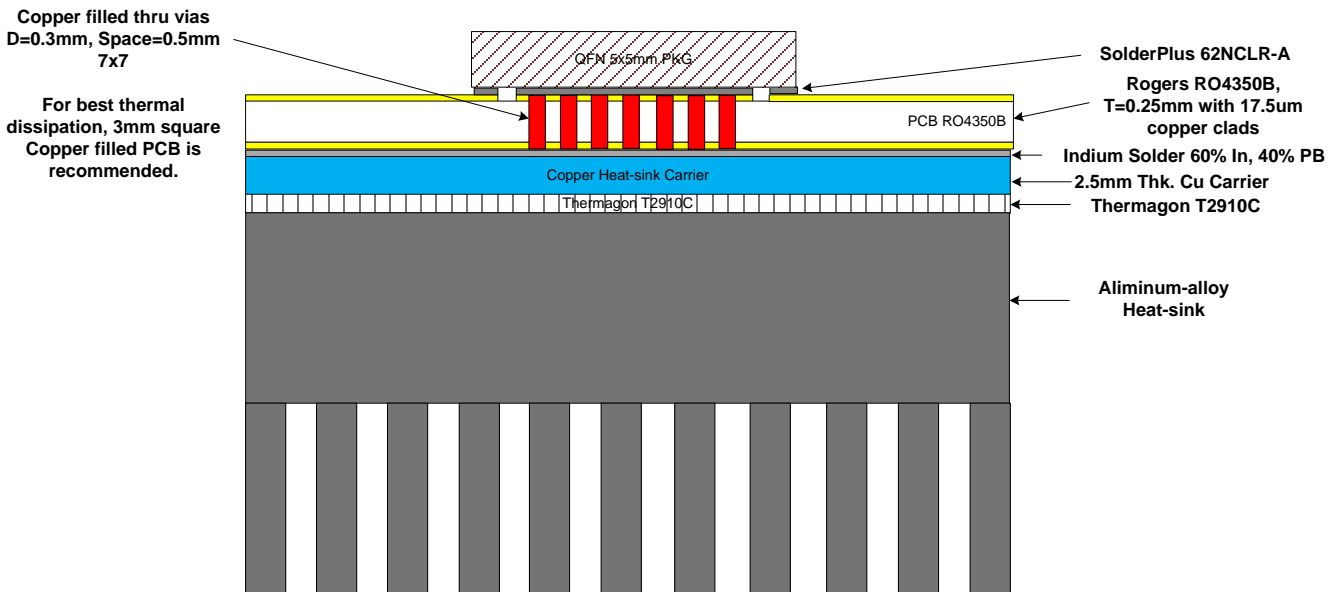
The recommended bias conditions for optimum performance for the **MMA-273334D-M5** are  $V_{DD} = 6.0V$ ,  $I_{dq} = 1600mA$ . The gate voltage ( $V_g$ ) must be applied prior to the drain voltages ( $V_{d1}$ ,  $V_{d2}$ ,  $V_{d3}$ ,  $V_{d4}$ ) during power up and removed after the drain voltages during 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  $V_{d4}$  pins.

## Assembly and Handling

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

## Application Board Design:

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



# **MMA-273334D-M5**

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## **Contact Information**

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

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