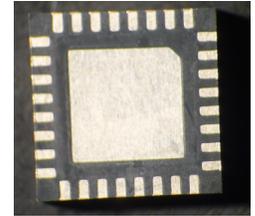
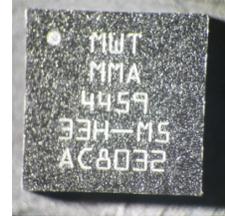


## Features:

- 31 dB Gain
- 33 dBm P<sub>-1dB</sub>
- OIP3 45 dBm
- 25.0 dBm Linear Pout @ 2.5% EVM (802.11 64QAM)
- Fully Matched Input and Output for Easy Cascade
- Internal Bias Tee
- Surface Mount, RoHS Compliant QFN 5x5mm Package



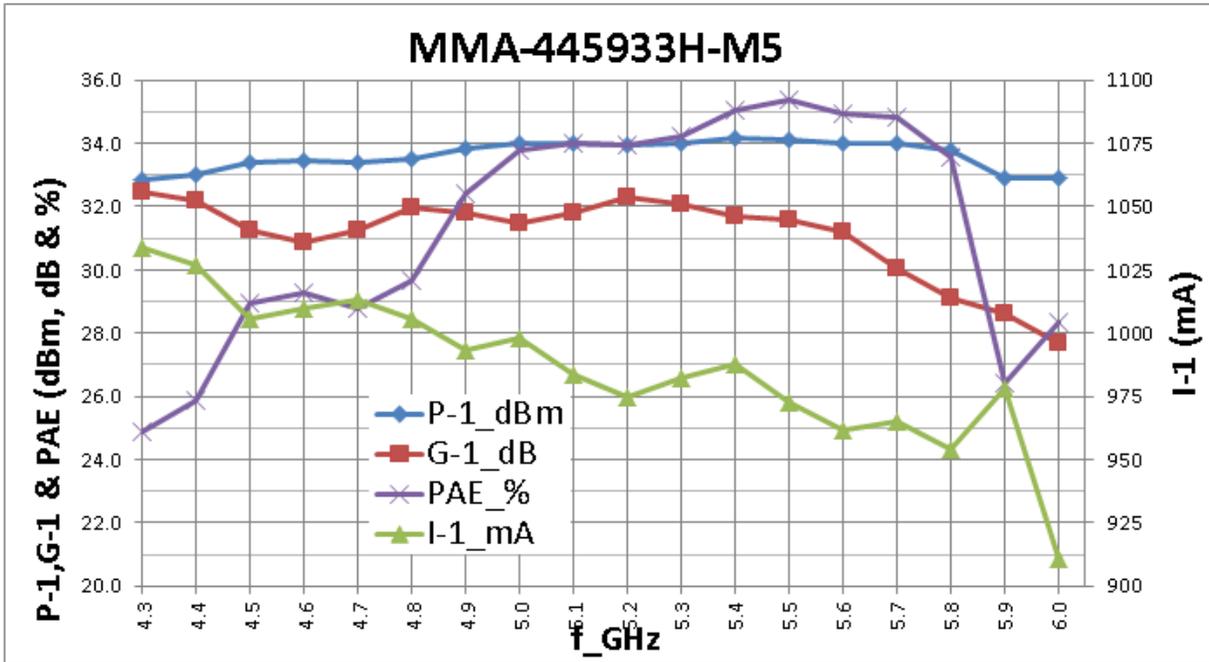
## Description:

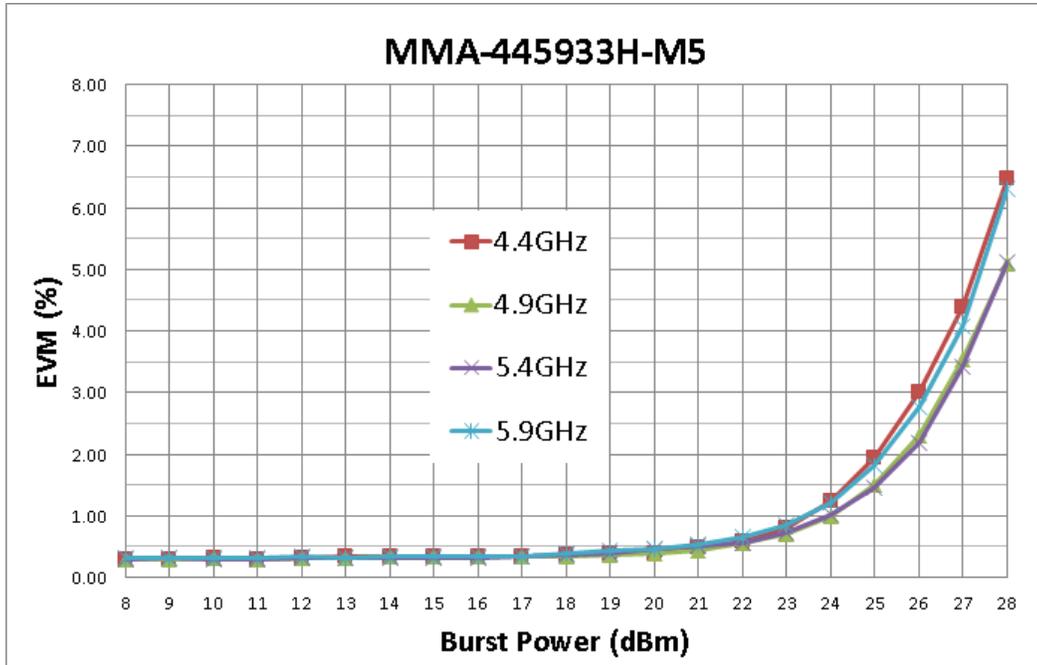
The MMA-445933H-M5 is a power amplifier with the State-of-the-Art linear power between 4.4 GHz and 5.9 GHz frequency band. Based on advanced robust HFET device technology, the linearity of this power amplifier is 25 dBm linear power at 2.5% EVM and achieves an ACPR better than -36 dBc. The modulation test pattern is 802.16x 64QAM. This linear power amplifier also has high gain. Ideal applications include the driver and the output power stage of WiMax and WLAN infrastructures and access points. It also can be used for PTP (Point-To-Point) radio applications for this band.

**Typical RF Performance:**  $V_{d1}=7.5V$ ,  $V_{d2}=7.5V$ ,  $V_{g1}=-0.8V$ ,  $V_{g2}=-0.8V$ ,  $I_{dq1}=410mA$   
 $I_{dq2}=622mA$ ,  $T_a=25\text{ }^\circ\text{C}$ ,  $Z_0=50\text{ ohm}$

| Parameter                         | Units                       | Typical Data |
|-----------------------------------|-----------------------------|--------------|
| Frequency Range                   | MHz                         | 4400-5900    |
| Gain (Typ)                        | dB                          | 31           |
| Gain Flatness (Typ)               | +/-dB                       | 2.5          |
| Input Return Loss (Typ)           | dB                          | 10           |
| Output Return Loss (Typ)          | dB                          | 10           |
| Output P1dB (Typ)                 | dBm                         | 33           |
| OIP3 (Typ)                        | dBm                         | 45           |
| Pout @ 2.5% EVM (Typ)             | dBm                         | 25.0         |
| Operating Current Range           | mA                          | 1050         |
| Thermal Resistance (Driver Stage) | $^\circ\text{C} / \text{W}$ | 20           |
| Thermal Resistance (Output Stage) | $^\circ\text{C} / \text{W}$ | 16           |

**Typical RF Performance:**  $Vd1=7.5V$ ,  $Vd2=7.5V$ ,  $Vg1=-0.8$ ,  $Vg2=-0.8V$ ,  $Idq1=410mA$ ,  
 $Idq2=620mA$ ,  $Z0=50\ ohm$ ,  $Ta=25\ ^\circ C$



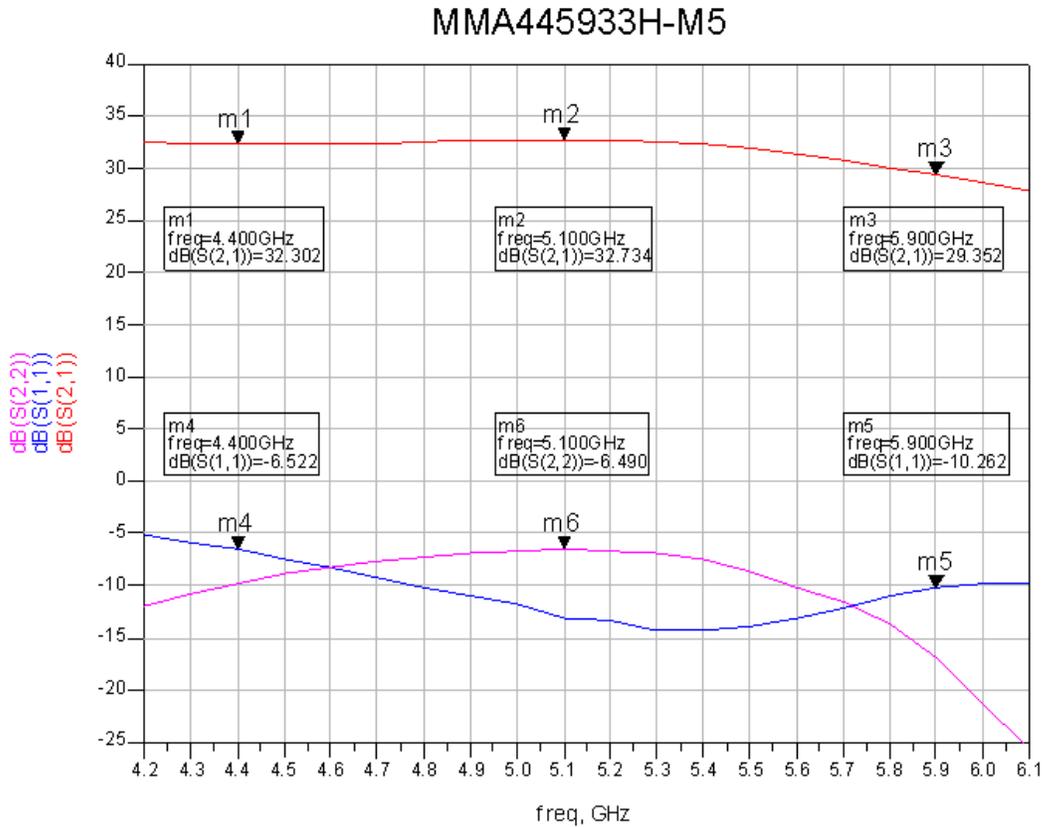


**Maximum Ratings:** ( $T_a = 25\text{ }^\circ\text{C}$ )\*

| SYMBOL              | PARAMETERS                        | UNITS | ABSOLUTE MAXIMUM |
|---------------------|-----------------------------------|-------|------------------|
| Vdd1                | Drain-Source Voltage Driver Stage | V     | 10               |
| Vdd2                | Drain-Source Voltage Output Stage | V     | 10               |
| Vgg1                | Gate-Source Voltage Driver Stage  | V     | -5               |
| Vgg2                | Gate-Source Voltage Output Stage  | V     | -5               |
| Idq1                | Drain Current Driver Stage        | mA    | 500              |
| Idq2                | Drain Current Output Stage        | mA    | 750              |
| Ig1 and Ig2         | Gate Current                      | mA    | 10               |
| I <sub>p</sub>      | Pinch-Off Current                 | mA    | 10               |
| P <sub>diss</sub>   | DC Power Dissipation              | W     | 9.0              |
| P <sub>in max</sub> | RF Input Power                    | dBm   | +10              |
| T <sub>oper</sub>   | Operating Temperature             | °C    | -40 to +85       |
| T <sub>ch</sub>     | Channel Temperature               | °C    | 175              |
| T <sub>stg</sub>    | Storage Temperature               | °C    | -55 to 150       |

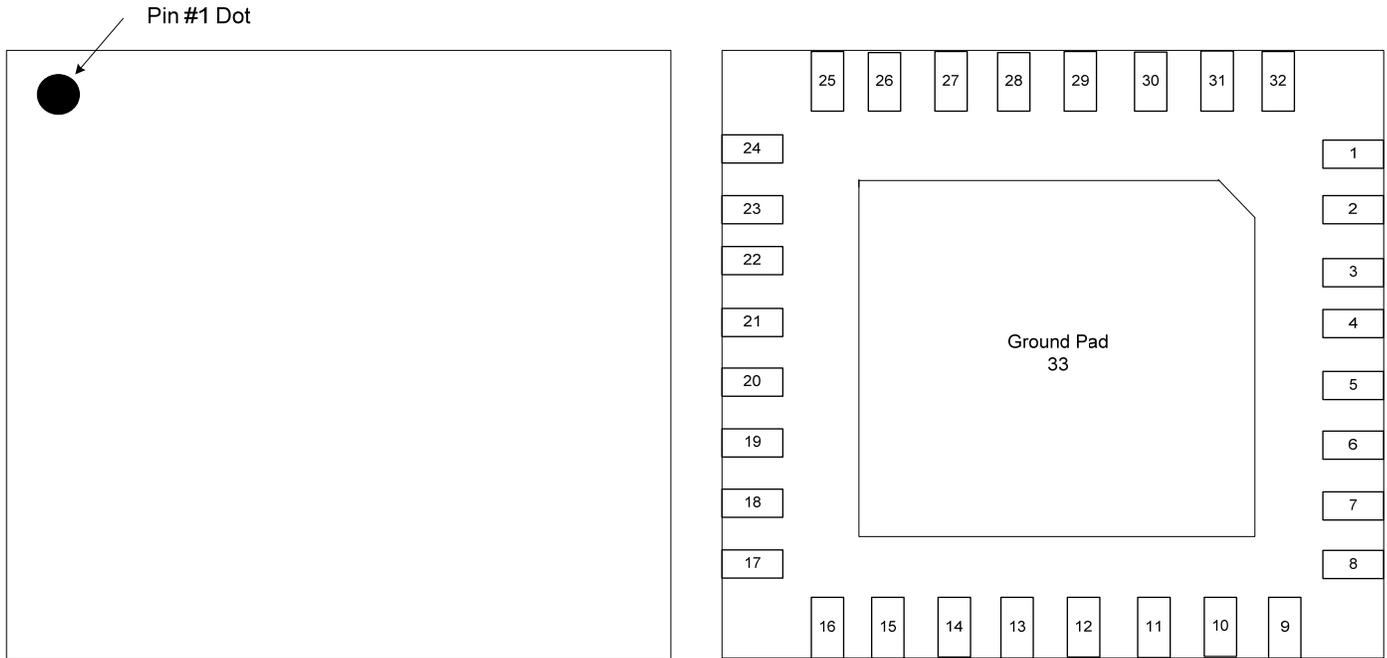
\*Operation of this device above any one of these parameters may cause permanent damage.

**Small Signal Gain and S-Parameters**



**S11, S22, S21**

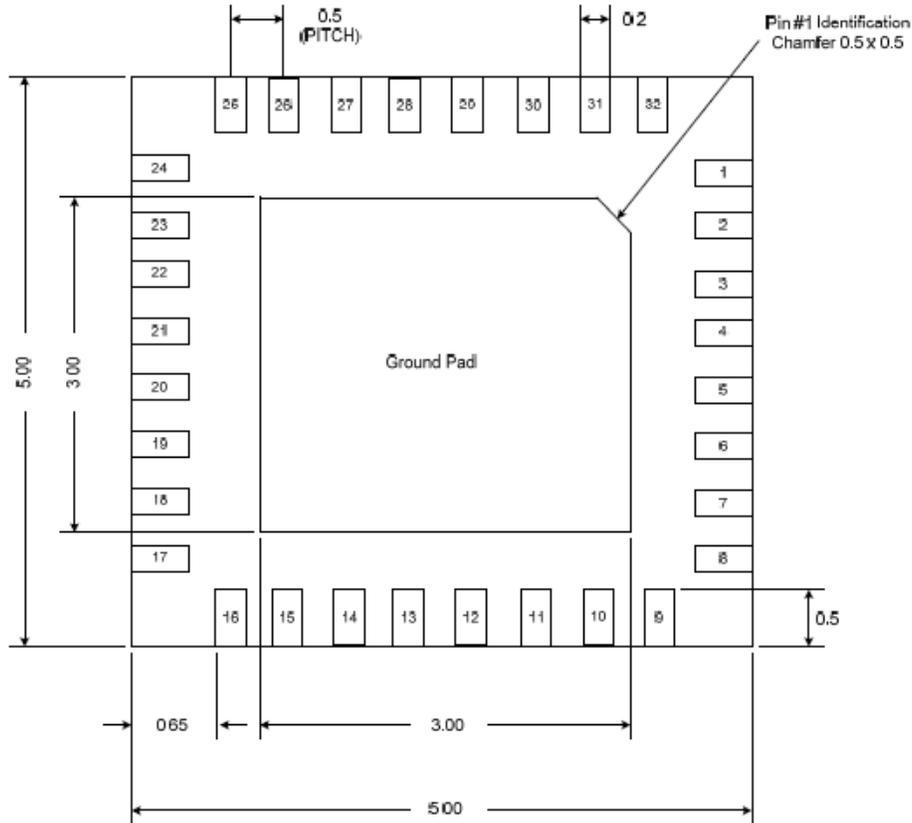
## Mechanical Information:



## Pin Configurations:

| Pin                            | Descriptions  |
|--------------------------------|---------------|
| 4,5                            | RFin          |
| 20,21                          | RFout         |
| 30,29                          | Vgs1a,Vgs1b   |
| 27                             | Vgs2          |
| 11,12                          | Vds1a,Vds1b   |
| 14                             | Vds2          |
| 1,2,32,7,8,9,16,17,18,23,24,25 | GND           |
| 3,6,10,13,15,19,22,26,28,31    | No connection |

**Mechanical Information:**



BOTTOM VIEW

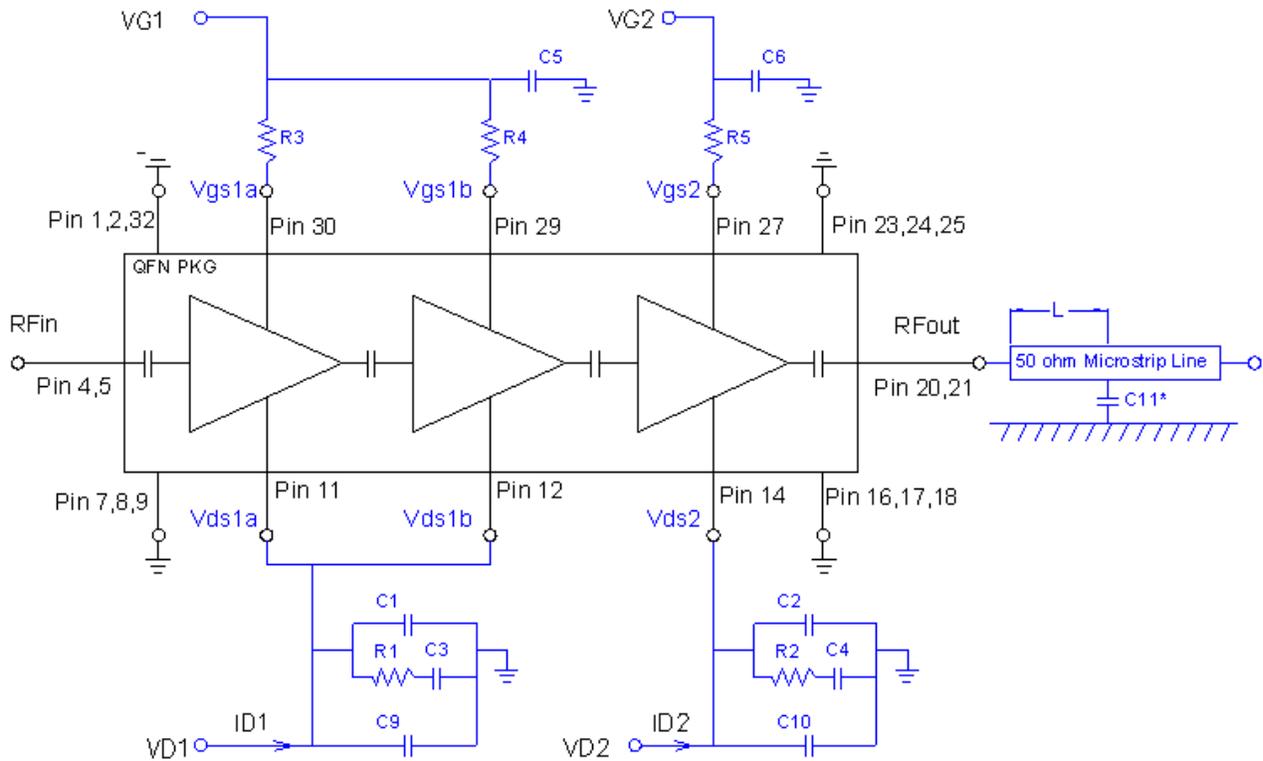


SIDE VIEW

The units are in [mm].



**Diagram:**



| Components                    | Value  |
|-------------------------------|--|
| R1,R2                         | 50 ohm   |
| R3,R4                         | 39 ohm   |
| R5                            | 22 ohm   |
| C1,C2                         | 100~1000 pF  |
| C3,C4,C5,C6                   | 0.1 uF   |
| C9,C10                        | >0.1 uF  |
| C11* (Option for better VSWR) | 0.15 - 0.2 pF, Distance = L                          |
|                               | $L = \frac{0.203}{\sqrt{\epsilon_e}} \text{ (inch)}$ |

$\epsilon_e$  is the effective dielectric constant of the 50 ohm micro-strip transmission line of the PCB circuit. For example, this length will be 0.1215 inch from the package edge to the capacitor center for 50 ohm line with Rogers RO 4003C substrate (Line width will be 0.042 inch for