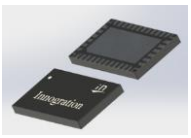
# 2.4-2.5GHz,1 stage 1W, S band 28V GaN MMIC PA module

## Description



The XMAH2425-1 is a 1-watt ， single stage integrated Power Amplifier Module with high gain，high efficiency, designed for CW or linear back off applications, with frequencies from 2.4 to 2.5GHz. The module is 50 Ω input，and output matched and requires minimal external components, without DC block needed

The module implements innovative MMIC concept, housed in cost effective 10*6mm plastic open cavity package.

- VDS= 28V ， Vgs =-2.44V，IDQ=5 mA, CW， **as Amplifier**

| Freq (MHz) | P1dB (dBm) | P1dB (W) | P1dB Eff(%) | P1dB Gain(dB) | P3dB (dBm) | P3dB (W) | P3dB Eff(%) |
|---|---|---|---|---|---|---|---|
| 2400 | 30.21 | 1.1 | 52.1 | 12.78 | 31.17 | 1.3 | 57.0 |
| 2450 | 30.27 | 1.1 | 54.3 | 13.13 | 31.12 | 1.3 | 58.7 |
| 2500 | 30.11 | 1.0 | 54.8 | 13.75 | 30.73 | 1.2 | 57.7 |

- VDS= 28V ， Vgs =-2.5V，CW.， **as Oscillator**

| Vc (V) | Pout (mW) | Ids (mA) | Osc Freq (MHz) | Eff (%) |
|---|---|---|---|---|
| 0 | 1160 | 77.4 | 2357 | 53.53 |
| 1 | 1200 | 76.6 | 2400 | 55.95 |
| 2 | 1160 | 72 | 2442 | 57.54 |
| 3 | 1160 | 70 | 2496 | 59.18 |
| 3.3 | 1150 | 69.3 | 2510 | 59.27 |
| 4 | 1160 | 67.6 | 2541 | 61.28 |
| 5 | 1090 | 62.8 | 2581 | 61.99 |

## Product Features

- Operating Frequency Range: 2.4-2.5GHz
- Operating Drain Voltage: +28 V (Up to 32V)
- 50 Ω Input/Output
- Psat: ≥1W @28V (CW)
- Power gain:>10dB
- Efficiency:>55%
- 6x10 mm Surface Mount Package

## Applications

- 2450MHz ISM applications

## Pin Configuration and Description

| Pin No. | Symbol | Description |
|---|---|---|
| 8 | RF in | |
| 35 | RF out | |
| 11 | Vgs | |
| 32 | Vds | |
| Others | NC | No internal connection |
| 2,5,7,12, 13,18,20,23,25, 30, 31,36<br>Package Base | GND | DC/RF Ground. Must be soldered to EVB ground plane over array of vias for thermal and RF performance. Solder voids under Pkg Base will result in excessive junction temperatures causing permanent damage. |

**Table 1. Maximum Ratings**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Drain--Source Voltage | $V_{DSS}$ | 150 | Vdc |
| Gate--Source Voltage | $V_{GS}$ | -10 to +2 | Vdc |
| Operating Voltage | $V_{DD}$ | +36 | Vdc |
| Input CW Power | RFin | 25 | dBm |
| Storage Temperature Range | Tstg | -65 to +150 | °C |
| Case Operating Temperature | $T_C$ | +150 | °C |
| Operating Junction Temperature | $T_J$ | +225 | °C |

**Table 2. Thermal Characteristics**

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case, FEA<br>$T_C$= 25°C, 1W Pulsed CW at 3GHz | RθJC | TBD | °C/W |

**Table 3. Electrical Characteristics**

| Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Frequency Range | | 2400 | | 2500 | MHz |
| Power Gain | | 11 | | | dB |
| $P_{OUT}$ | Pin=20dBm | | 31 | | dBm |
| Drain Efficiency @ $P_{SAT}$ | | | 55 | | % |
| Unless otherwise noted: TA = 25°C, $V_{DD}$ =28 V, Pulse Width=20 us, Duty cycle=10% | | | | | |

**Load Mismatch of per Section (On Test Fixture, 50 ohm system):** $V_{DD}$ =28 V,

| | |
|---|---|
| VSWR 10:1 at pulse CW Output Power @Pin=13Bm 2.45GHz | No Device Degradation |

# Amplifier

## TYPICAL CHARACTERISTICS

**Figure 1. Network analyzer output S11/S21 (Pin=0dBm)**

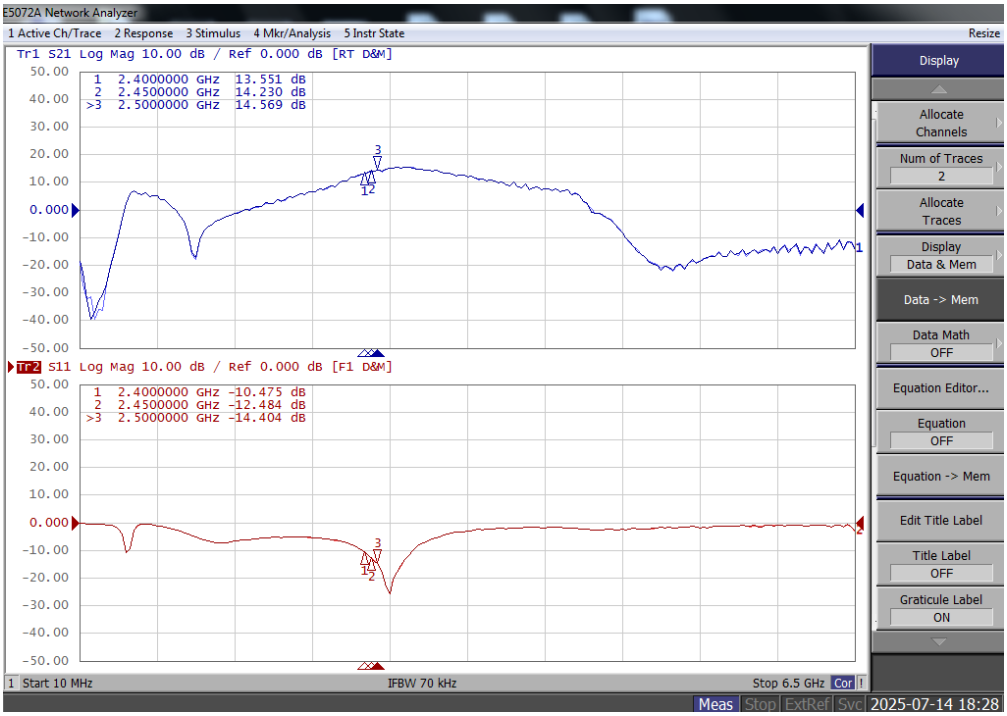
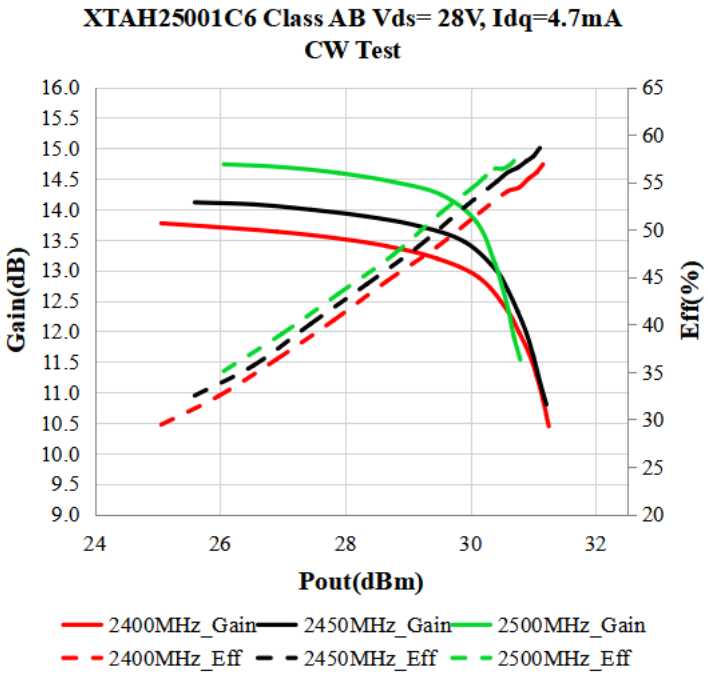
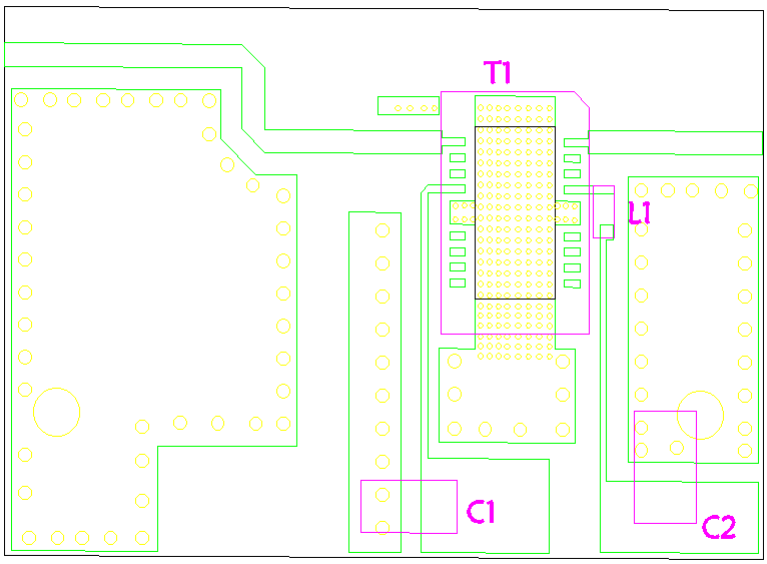



**Figure 3. Power Gain and, efficiency Vs Pout**



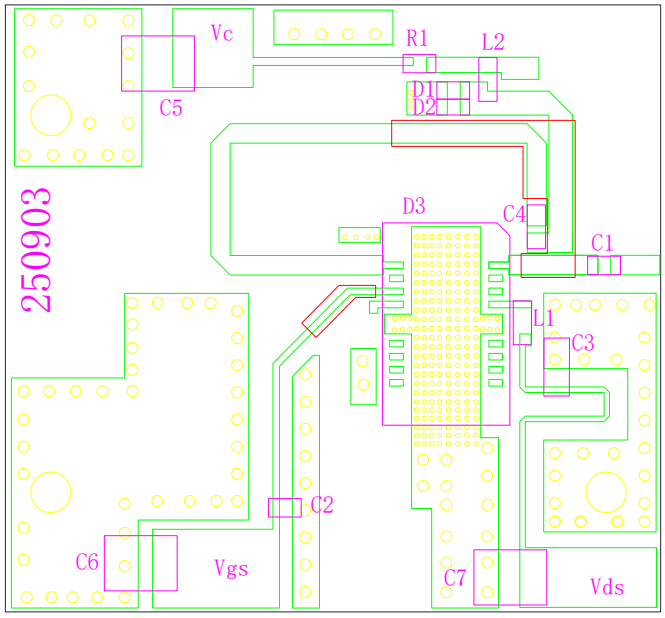



**BOM of Test Circuit**

| Designator | Footprint | Comment | Quantity |
|---|---|---|---|
| C1,C2 | 1210 | 10uF/100V | 2 |
| L1 | 0603 | 1.5nH | 1 |
| T1 | | XTAH25001C6 | 1 |

# Oscillator

## TYPICAL CHARACTERISTICS

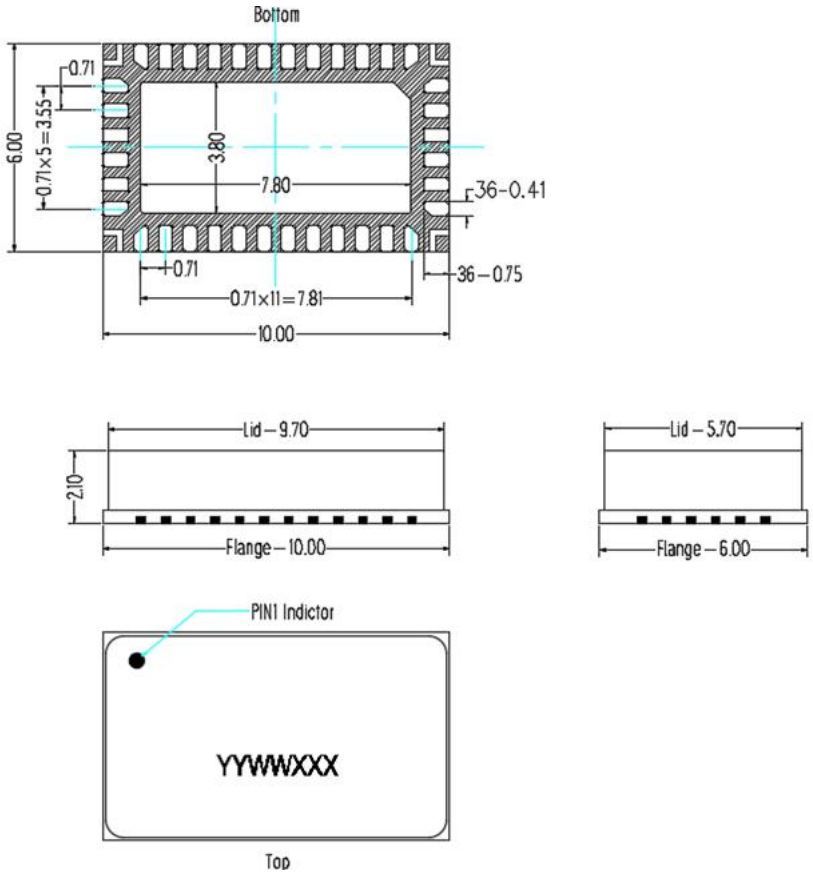



**BOM of Test Circuit**

| Designator | Footprint | Comment | Quantity |
|---|---|---|---|
| C1, C2, C3 | 0603 | 0.7pF | 3 |
| C4 | 0603 | 0.2pF | 1 |
| C5, C6, C7 | 1210 | 10uF/100V | 3 |
| R1 | 0603 | 560R | 1 |
| L1 | 0603 | 8.2nH | 1 |
| L2 | 0603 | 82nH | 1 |
| D1, D2 | SC-79 | SMV1234-079 | 2 |
| D3 | C6 | XMAH2425-1 | 1 |

## Package Dimensions

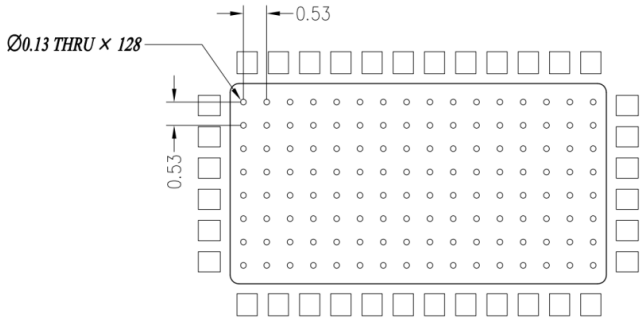
**10*6 Plastic Package**




Notes:

1. All dimensions are in mm;
2. The tolerances unless specified are ±0.2mm.

## Mounting Footprint Pattern




Notes:

1. All dimensions are in mm;
2. Vias are required under the backside paddle of this device for proper RF/DC grounding and thermal dissipation. ALL vias are PTH to ground.

## Revision history

**Table 6. Document revision history**

| Date | Revision | Datasheet Status |
|---|---|---|
| 2025/7/15 | Rev 1.0 | Advanced Datasheet Creation |
| 2025/9/16 | Rev 2.0 | Add Osc application data |
| | | |

**Application data based on LWH-25-30/LSM-25-29**

## Disclaimers