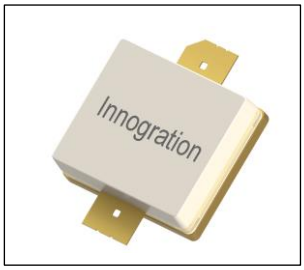
# GaN HEMT 28V,HF-1.5GHz 120W, RF Power Transistor




## Description

The XTAH15120A2C is a 120W GaN HEMT, designed for multiple application up to 1.5GHz
It can be used in CW, Pulse and any other modulation modes. There is no guarantee of performance when this part is used in applications designed Outside of these frequencies.

- Typical 650-860MHz class AB RF Performance with device soldered on heatsink **with single device**

  Vds=28V, Idq=100mA, CW

| Freq (MHz) | P1dB (dBm) | P1dB (W) | P1dB Eff(%) | P1dB Gain(dB) | P3dB (dBm) | P3dB (W) | P3dB Eff(%) |
|---|---|---|---|---|---|---|---|
| 650 | 50.42 | 110.2 | 50.1 | 17.1 | 51.83 | 152.5 | 58.6 |
| 700 | 50.06 | 101.3 | 55.0 | 17.15 | 51.41 | 138.5 | 64.2 |
| 750 | 50.02 | 100.5 | 60.8 | 17.27 | 51.24 | 133.2 | 69.1 |
| 800 | 50 | 100.0 | 60.0 | 17.27 | 51.36 | 136.8 | 69.8 |
| 860 | 50.24 | 105.7 | 59.1 | 16.75 | 51.5 | 141.3 | 67.9 |

- Typical 100-678MHz class AB RF Performance with device soldered on heatsink **with 2 devices in form of push pull**

  Vds=28V, Idq=300mA, CW

| Freq (MHz) | Psat (dBm) | Psat (W) | IDS (A) | Pin (dBm) | Gain (dB) | Eff (%) | 2nd （dBc） | 3rd （dBc） |
|---|---|---|---|---|---|---|---|---|
| 100 | 52.47 | 176.6 | 9.20 | 32.33 | 20.14 | 68.56 | -25.50 | -11.70 |
| 150 | 52.87 | 193.6 | 10.07 | 32.01 | 20.86 | 68.68 | -24.30 | -11.10 |
| 200 | 53.07 | 202.8 | 10.94 | 32.47 | 20.60 | 66.19 | -24.60 | -11.40 |
| 250 | 53.13 | 205.6 | 11.05 | 32.78 | 20.35 | 66.45 | -23.30 | -10.50 |
| 300 | 52.61 | 182.4 | 10.63 | 33.02 | 19.59 | 61.28 | -22.80 | -11.00 |
| 350 | 52.15 | 164.1 | 9.90 | 33.07 | 19.08 | 59.18 | -27.90 | -12.10 |
| 400 | 52.54 | 179.5 | 10.07 | 32.52 | 20.02 | 63.65 | -26.10 | -15.20 |
| 450 | 52.26 | 168.3 | 10.00 | 32.44 | 19.82 | 60.10 | -32.00 | -15.60 |
| 500 | 52.21 | 166.3 | 8.73 | 32.50 | 19.71 | 68.05 | -26.20 | -24.10 |
| 550 | 52.40 | 173.8 | 9.11 | 31.91 | 20.49 | 68.13 | -29.20 | -34.90 |
| 600 | 52.28 | 169.0 | 9.18 | 32.32 | 19.96 | 65.77 | -29.90 | -39.70 |
| 650 | 52.25 | 167.9 | 9.54 | 32.34 | 19.91 | 62.85 | -29.70 | -48.10 |
| 678 | 52.13 | 163.3 | 9.63 | 33.00 | 19.13 | 60.56 | -34.40 | -38.20 |

## Applications

- L band power amplifier
- P band power amplifier
- ISM/RF Energy power amplifier

## Important Note: Proper Biasing Sequence for GaN HEMT Transistors

**Turning the device ON**

1. Set VGS to the pinch--off (VP) voltage, typically –5 V
2. Turn on VDS to nominal supply voltage
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

**Turning the device OFF**

1. Turn RF power off
2. Reduce VGS down to VP, typically –5 V
3. Reduce VDS down to 0 V
4. Turn off VGS

**Table 1. Maximum Ratings**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Drain--Source Voltage | $V_{DSS}$ | +150 | Vdc |
| Gate--Source Voltage | $V_{GS}$ | -8 to +0.5 | Vdc |
| Operating Voltage | $V_{DD}$ | 36 | Vdc |
| Maximum gate current | Igs | 27.2 | mA |
| 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 by FEA<br>$T_C$= 85°C, at Pdiss=50W | RθJC | 1.65 | °C /W |

**Table 3. Electrical Characteristics (TA = 25℃ unless otherwise noted)**

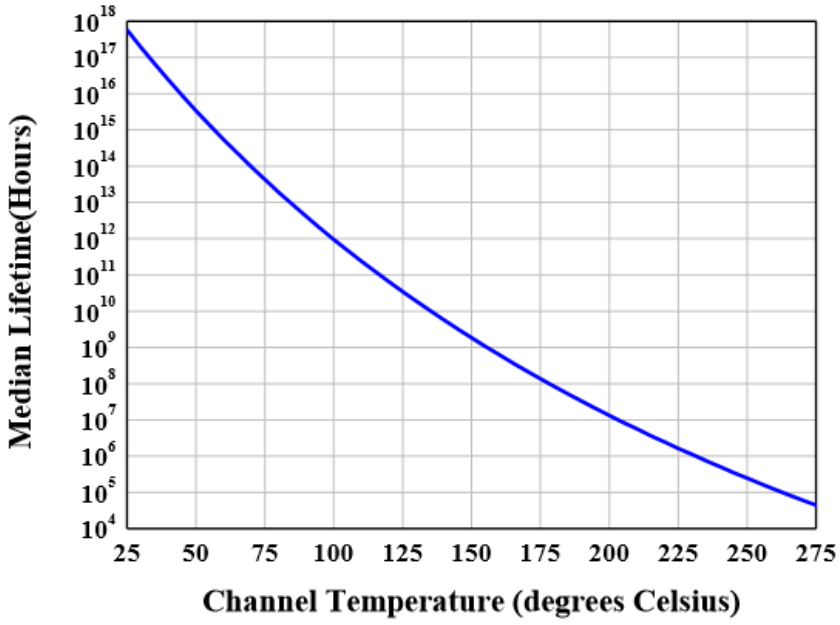
**DC Characteristics ( measured on wafer prior to packaging)**

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | VGS=-8V; IDS=27.2mA | $V_{DSS}$ | | 150 | | V |
| Gate Threshold Voltage | VDS =10V, ID = 27.2mA | $V_{GS(th)}$ | -4 | | -2 | V |
| Gate Quiescent Voltage | VDS =28V, IDS=100mA, Measured in Functional Test | $V_{GS(Q)}$ | | -2.3 | | V |

**Ruggedness Characteristics**

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Load mismatch capability | 1.5GHz, Pout=120W Pulsed CW<br>All phase,<br>No device damages | VSWR | | 10:1 | | |

**Figure 2: Median Lifetime vs. Channel Temperature**



# 650-860MHz(1 device)

## Typical performance

**Figure 3: Efficiency and power gain as function of Pout at 28V**

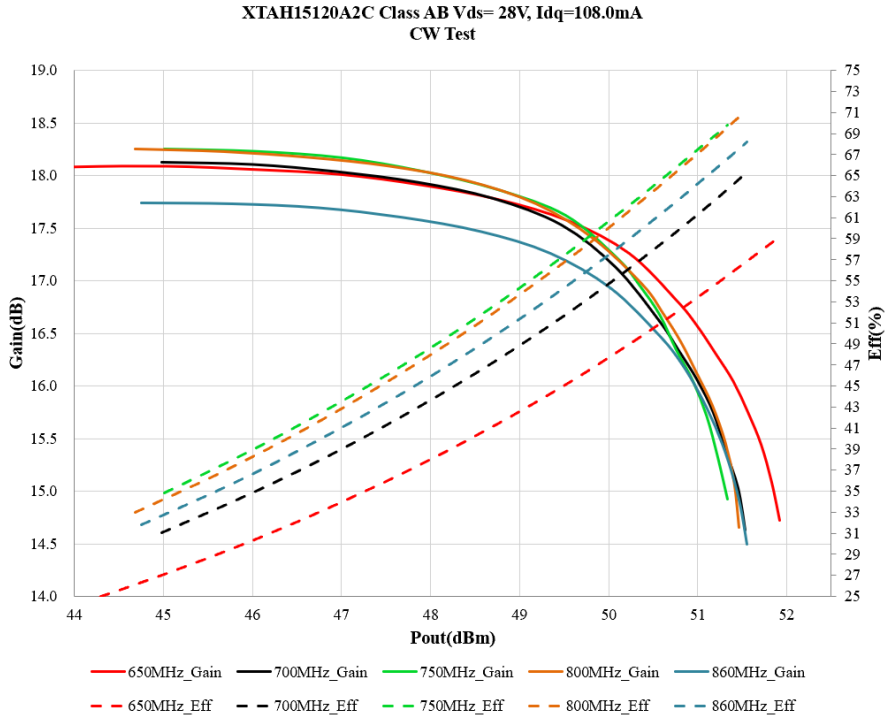



**Figure 4: Network analyzer output S11/S21**

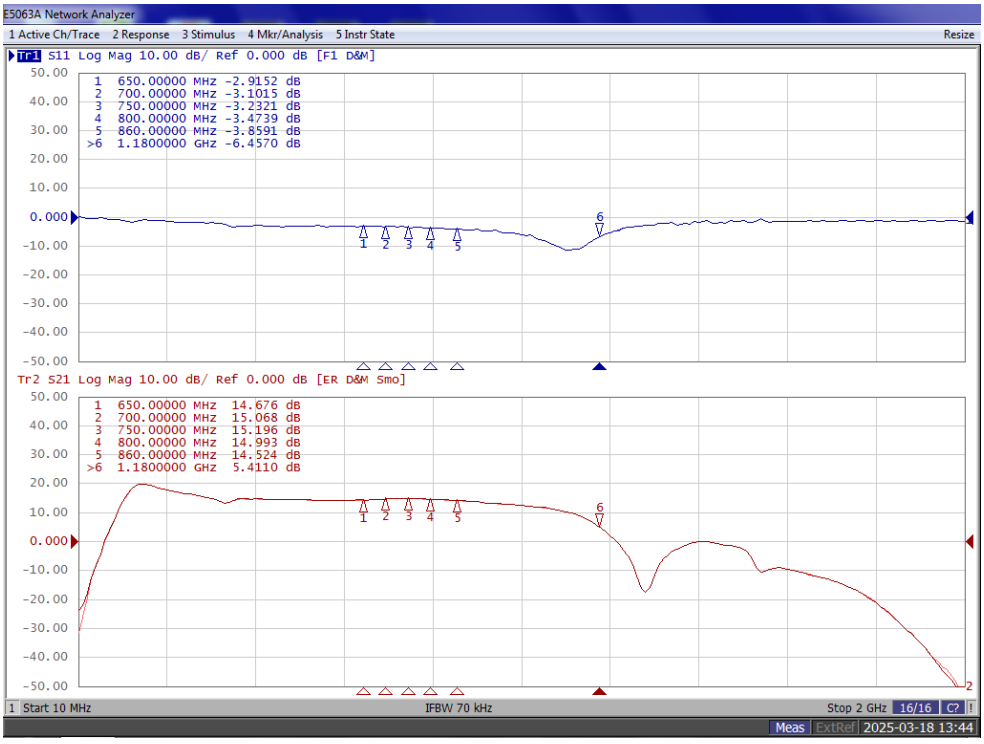


**Figure 5: Picture of application board**

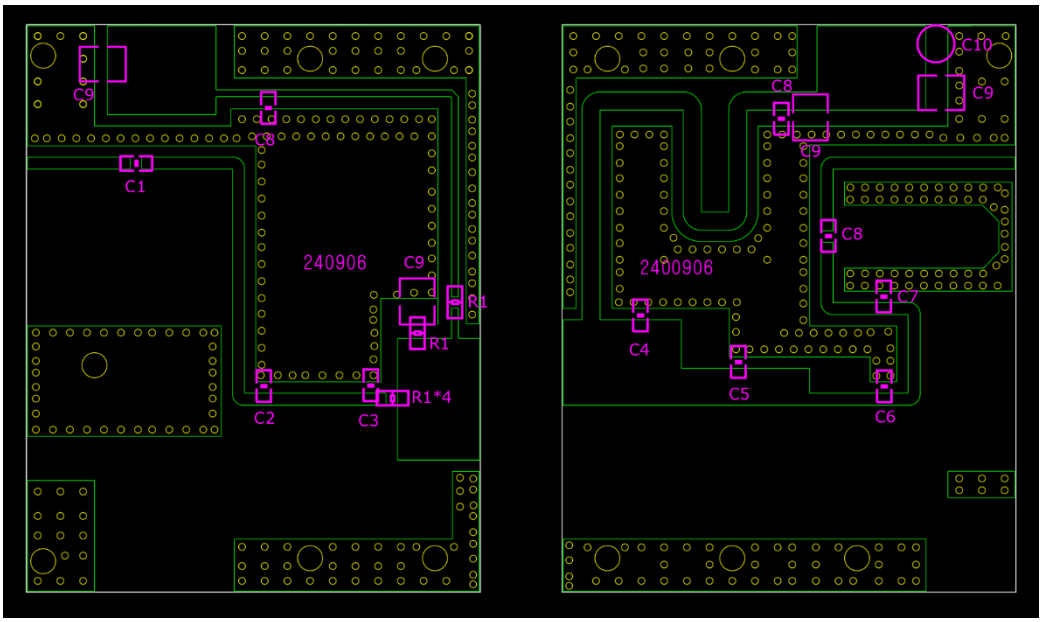



**Table 4. Bill of materials of application board (PCB layout upon request)**

| Reference | Footprint | Value | Quantity |
|---|---|---|---|
| C1, | 0805 | 10pF | 1 |
| C2 | 0805 | 2pF | 1 |
| C3 | 0805 | 8.2pF | 1 |
| C4 | 0805 | 18pF | 1 |
| C5 | 0805 | 7.5pF | 1 |
| C6 | 0805 | 5.6pF | 1 |
| C7 | 0805 | 3pF | 1 |
| C8 | 0805 | 82pF | 3 |
| C9 | 1210 | 10uF/63V | 4 |
| C10 | | 470uF/63V | 1 |
| R1 | 0603 | 10ohm | 6 |

# 100-678MHz(2 device)

## Typical performance

**Figure 6: Network analyzer output S11/S21**

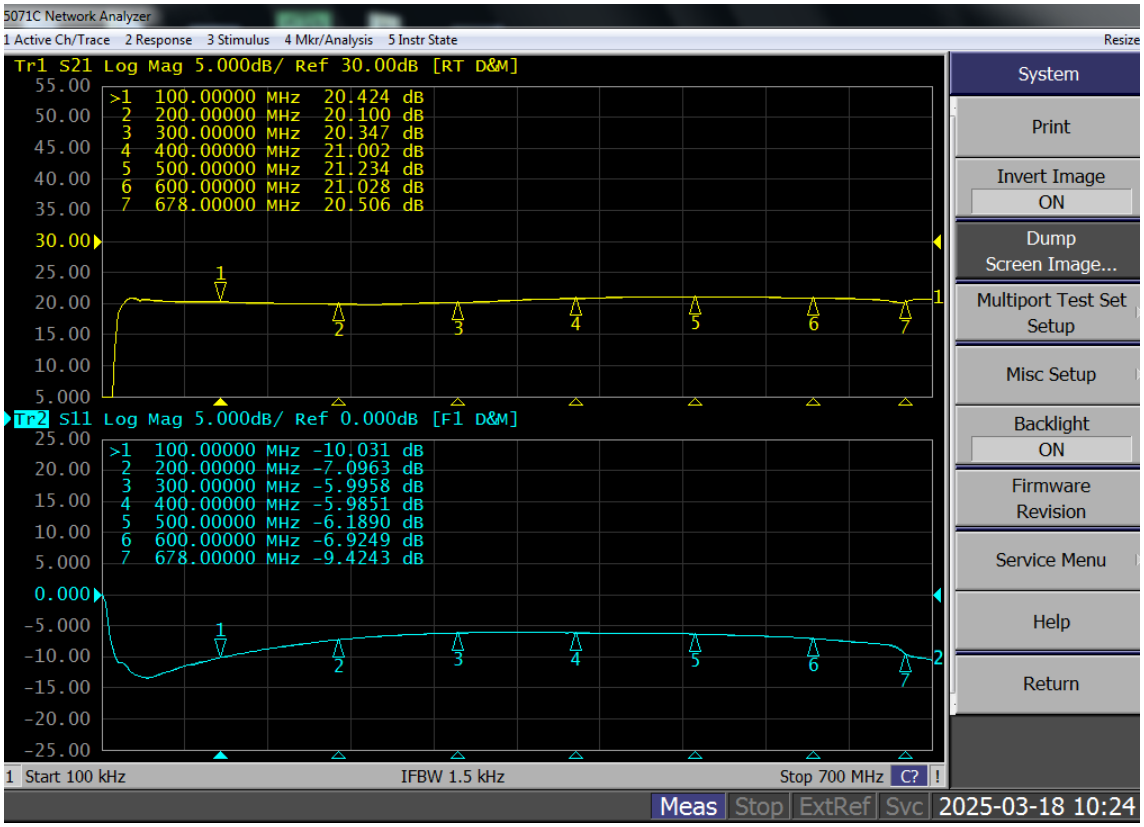



**Figure 7: Picture of application board**

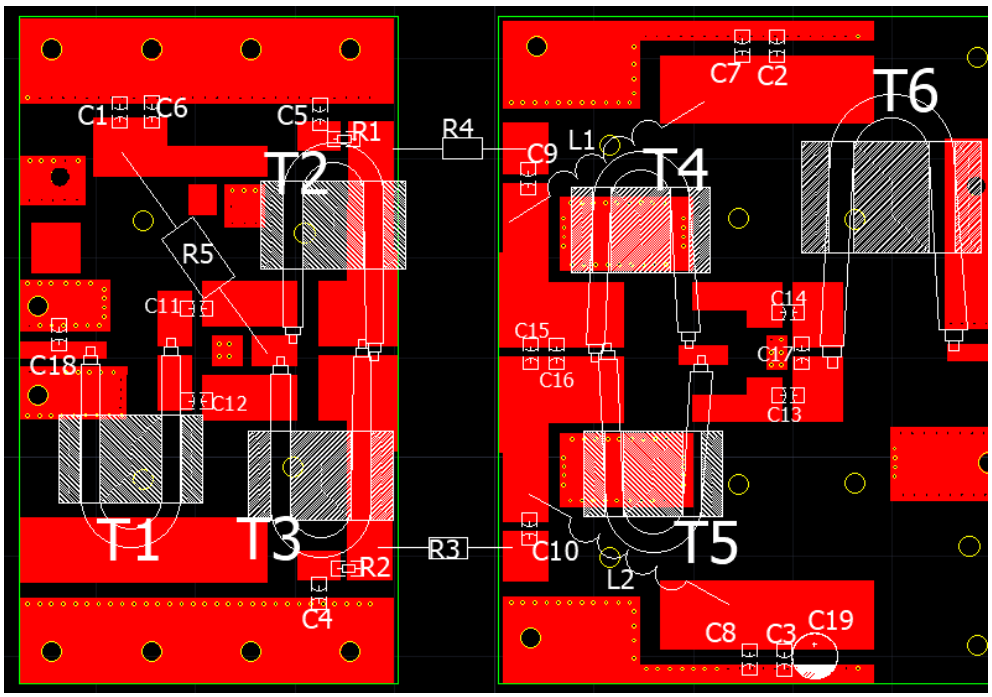
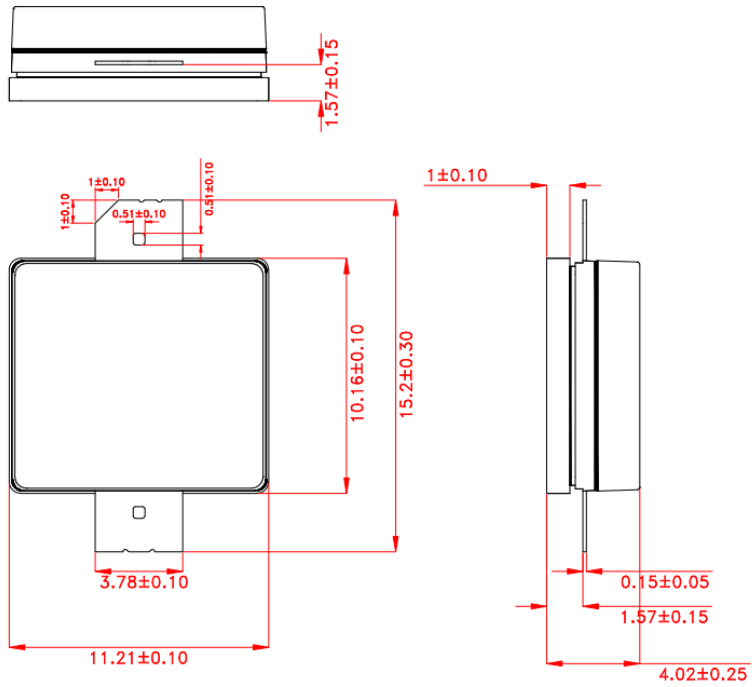
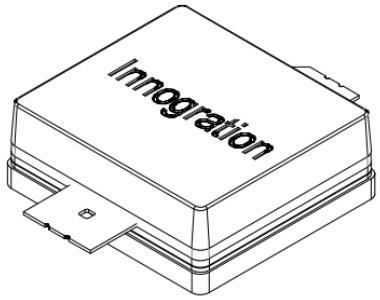


**Table 5. Bill of materials of application board (PCB layout upon request)**

| Component | Description | Suggestion |
|---|---|---|
| C1~C5 | 10uF/200V-1210 | Ceramic multilayer capacitor |
| C6~C10 | 10nF | Ceramic multilayer capacitor |
| C11,C12 | 470pF | |
| C13,C14 | 300pF | |
| C15 | 10pF | |
| C16 | 1pF | |
| C17 | 2pF | |
| C18 | 0.8pF | |
| C19 | 470uF/63V | electrolytic capacitor |
| L1，L2 | 1mm wire，3mm innerdiameter，5turns | DIY |
| T1 | 50 ohm -60mm;BN-61-1502 | RFSFBU-086-50;BN-61-1502 |
| T2,T3 | 16.7 ohm-60mm;BN-61-1502 | SFF-16.7-1.5;BN-61-1502 |
| T4,T5 | 25 ohm-65mm;NXO-60 | SFF-25-1.5;NXO-60 |
| T6 | 50 ohm-65mm;NXO-60 | RFSFBU-086-50;;NXO-60 |
| R1,R2 | 25Ω-1206 | Chip Resistor |
| R3,R4 | 300Ω-50W | RFT-300Ω |
| R5 | 300Ω-2W | Color ring resistance |
| PCB | 30Mil Rogers4350 | |

## Package Dimensions （Unit:mm）




Unit:mm

Tolerance ±0.10mm,Except as Noted.

## Revision history

**Table 4. Document revision history**

| Date | Revision | Datasheet Status |
|---|---|---|
| 2025/3/26 | V1.0 | Preliminary Datasheet Creation |
| | | |

**Application data based on: ZYX-25-05/TC-25-14**

## Notice

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