

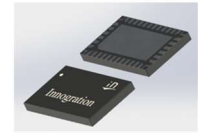


GaN HEMT 28V, 40W, General purpose RF Power Transistor

GTAH40040C6

Description

The GTAH40040C6 is a 40W GaN HEMT, designed for multiple applications, up to 4GHz.
The transistor is available in a highly cost effective 10*6mm, surface mount, QFN package with 100% DC production test to ensure the quality and consistency.
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 Class AB RF Performance with device soldered through high density and plated grounding vias
Vds = 28V, Idq = 35mA, Vgs=-2.64V

| Freq (MHz) | P1dB (dBm) | P1dB (W) | P1dB Eff (%) | P1dB Gain (dB) | P3dB (dBm) | P3dB (W) | P3dB Eff (%) |
|------------|------------|----------|--------------|----------------|------------|----------|--------------|
| 2400 | 46.41 | 43.7 | 63.7 | 18.44 | 47.5 | 56.2 | 70.8 |
| 2450 | 45.96 | 39.4 | 64.3 | 18.24 | 47.12 | 51.5 | 71.5 |
| 2500 | 45.37 | 34.5 | 63.8 | 17.91 | 46.78 | 47.6 | 71.9 |

Applications

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

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

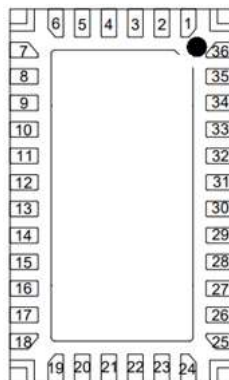
1. Set VGS to the pinch-off (VP) voltage, typically -5 V
2. Turn on VDS to nominal supply voltage
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

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

Figure 1: Pin Connection definition

Transparent top view (Backside grounding for source)



| Pin No. | Symbol | Description |
|-------------------------|------------|----------------------|
| 8,9,10,11,14,15,16,17 | RF IN/Vgs | RF Input, Vgs bias |
| 26,27,28,29,32,33,34,35 | RF OUT/VDD | RFOutput, Drain bias |



| | | |
|----------------------------|-----|--|
| Rest Pins and Package Base | GND | DC/RF Ground. Must be soldered directly to heatsink or copper coin for CW application. |
|----------------------------|-----|--|

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 | I_{gs} | 10.8 | mA |
| Storage Temperature Range | T_{stg} | -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 $T_C = 85^\circ\text{C}$, at $P_{diss} = 20\text{W}$ | $R_{\theta JC}$ | 3 | °C /W |

Table 3. Electrical Characteristics (TA = 25°C unless otherwise noted)

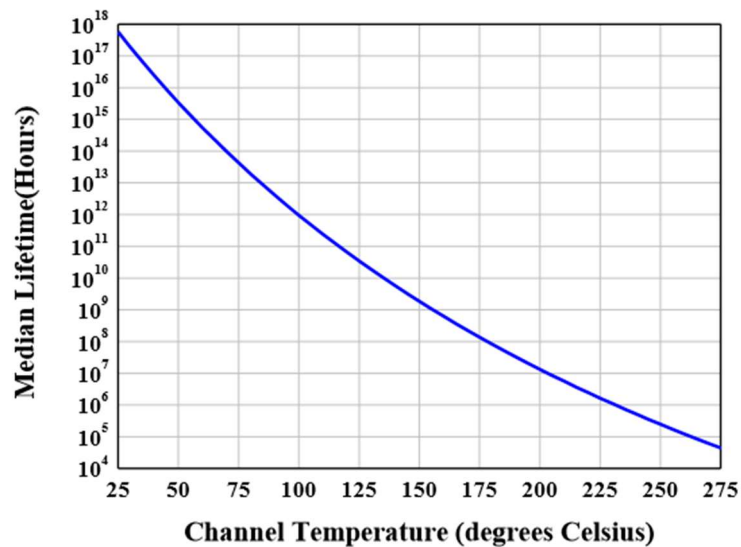
DC Characteristics (main path, measured on wafer prior to packaging)

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------------|---|--------------|-----|-------|-----|------|
| Drain-Source Breakdown Voltage | $V_{GS} = -8\text{V}$; $I_{DS} = 10.8\text{mA}$ | V_{DSS} | | 200 | | V |
| Gate Threshold Voltage | $V_{DS} = 10\text{V}$, $I_D = 10.8\text{mA}$ | $V_{GS(th)}$ | -4 | | -2 | V |
| Gate Quiescent Voltage | $V_{DS} = 28\text{V}$, $I_{DS} = 35\text{mA}$, Measured in Functional Test | $V_{GS(Q)}$ | | -2.64 | | V |

Ruggedness Characteristics

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------|---|--------|-----|------|-----|------|
| Load mismatch capability | 2.5GHz, $P_{out} = 40\text{W}$ Pulsed CW All phase, No device damages | VSWR | | 10:1 | | |

Figure 2: Median Lifetime vs. Channel Temperature



Typical performance

Figure 3: Efficiency and power gain as function of Pout

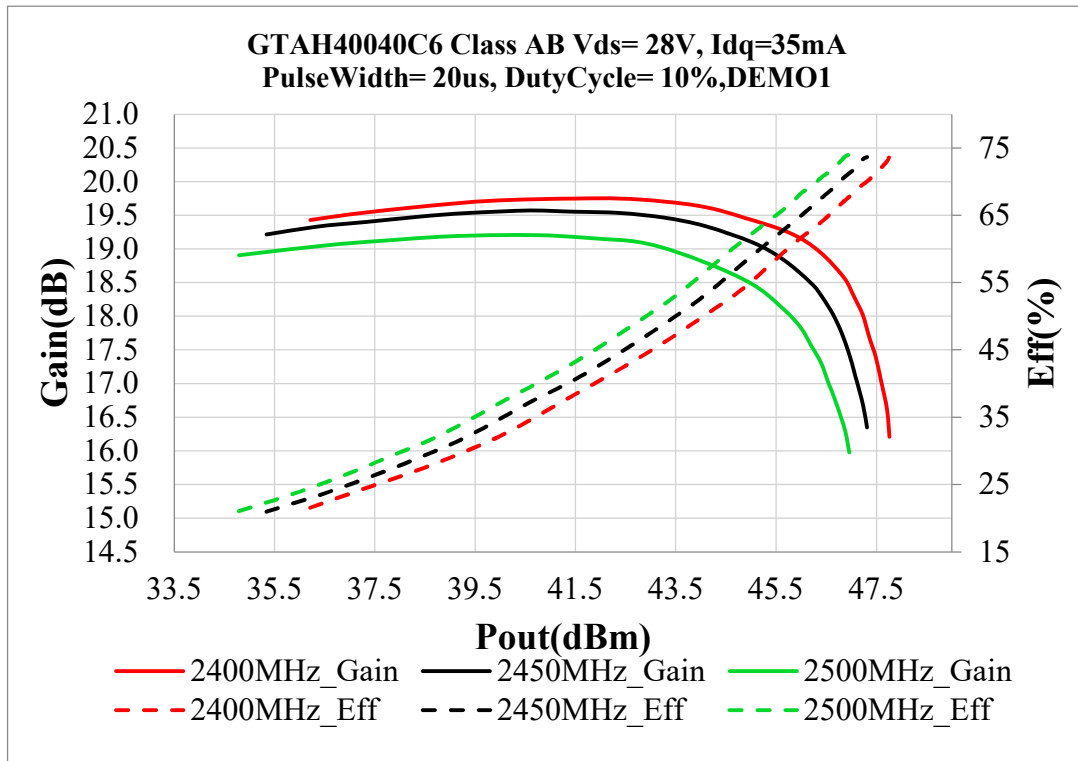


Figure 4: Network analyzer output S11/S21

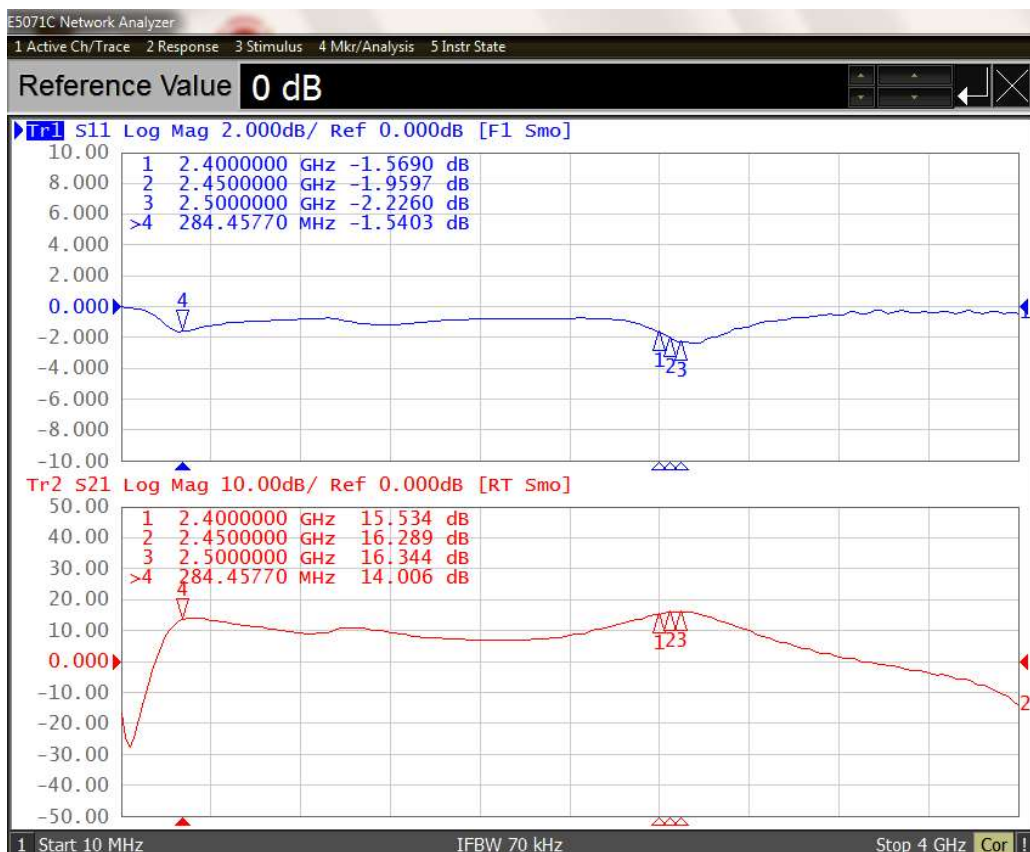


Figure 5: Picture of application board

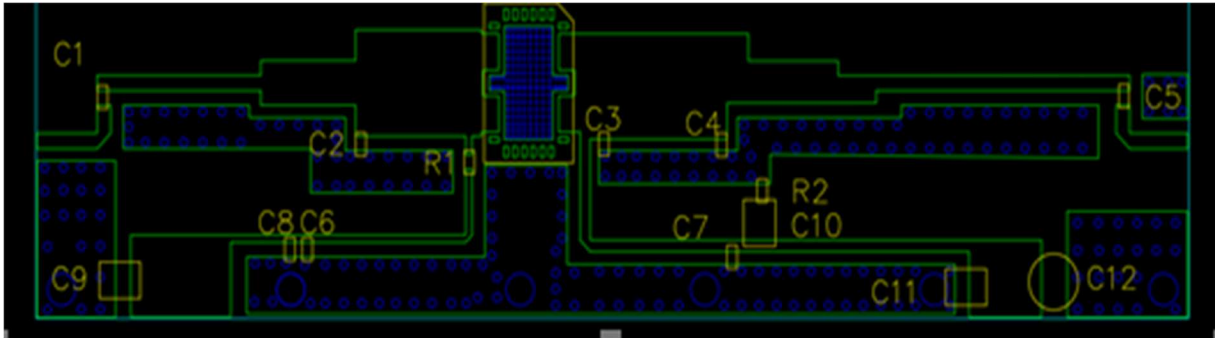
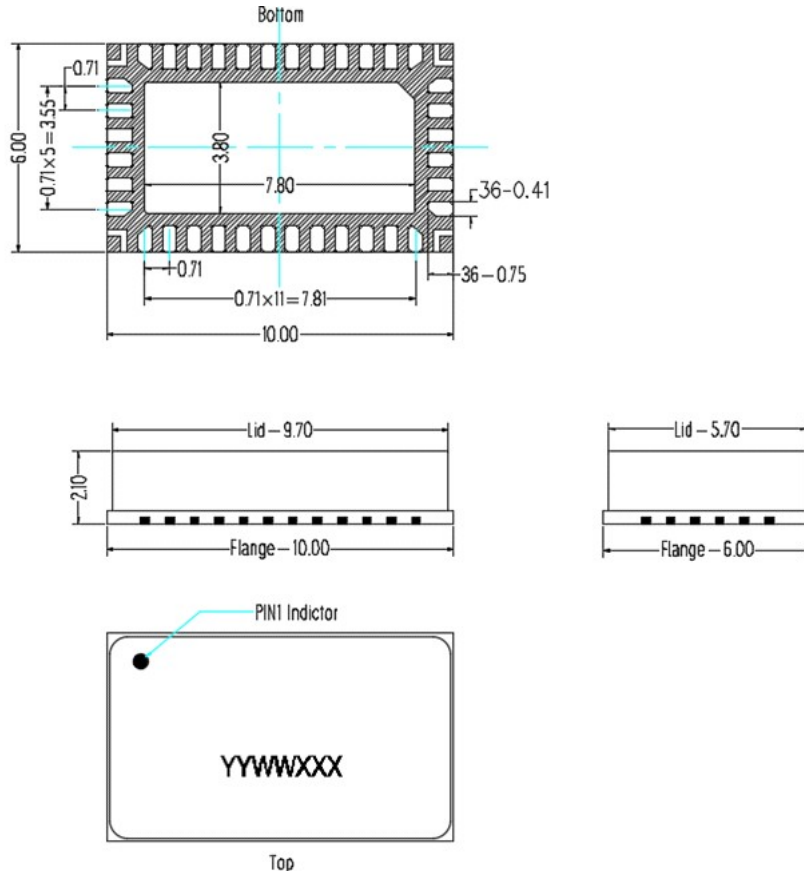


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

| Component | Value | Quantity |
|------------|-------------|----------|
| U1 | GTAH40040C6 | 1 |
| C1 | 5.1pF | 1 |
| C5、C6、C7 | 12pF | 3 |
| C9、C10、C11 | 10uF/63V | 3 |
| C8 | 10uF/16V | 1 |
| R1、R2 | 10 Ω | 2 |
| C12 | 470uF/63V | 1 |
| C2、C3 | 1.6pF | 2 |
| C4 | 0.8pF | 1 |



10*6 Plastic Package



Notes:

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

Revision history

Table 4. Document revision history

| Date | Revision | Datasheet Status |
|-----------|----------|--------------------------------|
| 2023/11/8 | V1.0 | Preliminary Datasheet Creation |
| | | |
| | | |
| | | |

Application data based on: ZYX-23-11

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