

NU5904H GaN TRANSISTOR

Document Number: NU5904H
Preliminary Datasheet V1.0

Gallium Nitride 28V 30W, 2-6GHz RF Power Transistor

Description

The NU5904H is a 30W 28V GaN HEMT, implemented with patented match topology at both input and output side, enable extremely wideband applications with frequencies from 2 to 6GHz. It can support CW, and pulse or any modulation format.

There is no guarantee of performance when this part is used in applications designed Outside of these frequencies.



•Typical performance (on Innogration wide band fixture with device soldered)

| Freq(MHz) | Pin(dBm) | Psat(dBm) | Psat(W) | Ids(A) | Gain(dB) | Eff(%) |
|-----------|----------|-----------|---------|--------|----------|--------|
| 1400 | 37.56 | 45.64 | 36.6 | 2.71 | 8.1 | 49.1 |
| 1600 | 39.44 | 46.17 | 41.4 | 2.80 | 6.7 | 53.5 |
| 1800 | 38.01 | 45.91 | 39.0 | 2.88 | 7.9 | 48.9 |
| 2000 | 37.72 | 45.22 | 33.3 | 2.11 | 7.5 | 58.7 |
| 2200 | 39.51 | 45.90 | 38.9 | 2.48 | 6.4 | 57.4 |
| 2400 | 40.17 | 46.30 | 42.7 | 2.87 | 6.1 | 53.7 |
| 2600 | 40.05 | 46.10 | 40.7 | 2.81 | 6.1 | 52.4 |
| 2800 | 40.06 | 45.94 | 39.3 | 2.88 | 5.9 | 49.2 |
| 3000 | 38.51 | 46.35 | 43.2 | 3.00 | 7.8 | 51.7 |
| 3200 | 38.06 | 45.80 | 38.0 | 3.00 | 7.7 | 45.6 |
| 3400 | 37.94 | 45.61 | 36.4 | 2.94 | 7.7 | 44.6 |
| 3600 | 37.53 | 45.27 | 33.7 | 3.11 | 7.7 | 38.8 |
| 3800 | 39.49 | 45.71 | 37.2 | 4.21 | 6.2 | 31.1 |
| 4000 | 39.54 | 46.42 | 43.9 | 4.32 | 6.9 | 35.7 |
| 4200 | 39.38 | 46.38 | 43.5 | 4.10 | 7.0 | 37.3 |
| 4400 | 38.25 | 46.07 | 40.5 | 3.89 | 7.8 | 36.7 |
| 4600 | 37.93 | 46.01 | 39.9 | 3.97 | 8.1 | 35.5 |
| 4800 | 37.75 | 45.95 | 39.4 | 3.90 | 8.2 | 35.6 |
| 5000 | 37.40 | 45.94 | 39.3 | 3.87 | 8.5 | 35.9 |
| 5200 | 36.89 | 45.57 | 36.1 | 3.76 | 8.7 | 34.0 |
| 5400 | 37.42 | 45.50 | 35.5 | 3.80 | 8.1 | 33.0 |
| 5600 | 37.50 | 46.42 | 43.9 | 3.75 | 8.9 | 41.4 |
| 5800 | 38.28 | 45.95 | 39.4 | 3.32 | 7.7 | 42.3 |
| 6000 | 39.16 | 45.30 | 33.9 | 3.09 | 6.1 | 39.4 |

Note: Data for extended 1-6GHz upon request, resulting lower output power

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Applications and Features

- Suitable for wireless communication infrastructure, wideband amplifier, EMC testing, ISM etc.
- High Efficiency and Linear Gain Operations
- Thermally Enhanced Industry Standard Package
- High Reliability Metallization Process
- Excellent thermal Stability and Excellent Ruggedness
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

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 (28V)
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 (Not simultaneous, TC = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|--|-------------------|-------------|------|
| Drain--Source Voltage | V _{DSS} | 150 | Vdc |
| Gate--Source Voltage | V _{GS} | -10,+2 | Vdc |
| Operating Voltage | V _{DD} | 32 | Vdc |
| Maximum Forward Gate Current | I _{gmax} | 10.8 | mA |
| Storage Temperature Range | T _{stg} | -65 to +150 | °C |
| Case Operating Temperature | T _c | +150 | °C |
| Operating Junction Temperature(See note 1) | T _j | +225 | °C |

1. Continuous operation at maximum junction temperature will affect MTTF

Table 2. Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|---------------------|-------|------|
| Thermal Resistance, Junction to Case T _c = 85°C, T _j =200°C,FEA | R _{θJC-DC} | 2.2 | °C/W |

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

DC Characteristics

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------------|--|---------------------|-----|-------|-----|------|
| Drain-Source Breakdown Voltage | V _{GS} =-8V; I _{DS} =10.8mA | V _{DSS} | 150 | | | V |
| Gate Threshold Voltage | V _{DS} = 28V, I _D =10.8mA | V _{GS(th)} | | -2.7 | | V |
| Gate Quiescent Voltage | V _{DS} =28V, I _{DS} =160mA, Measured in Functional Test | V _{GS(Q)} | | -2.47 | | V |

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Reference Circuit of Test Fixture Assembly Diagram

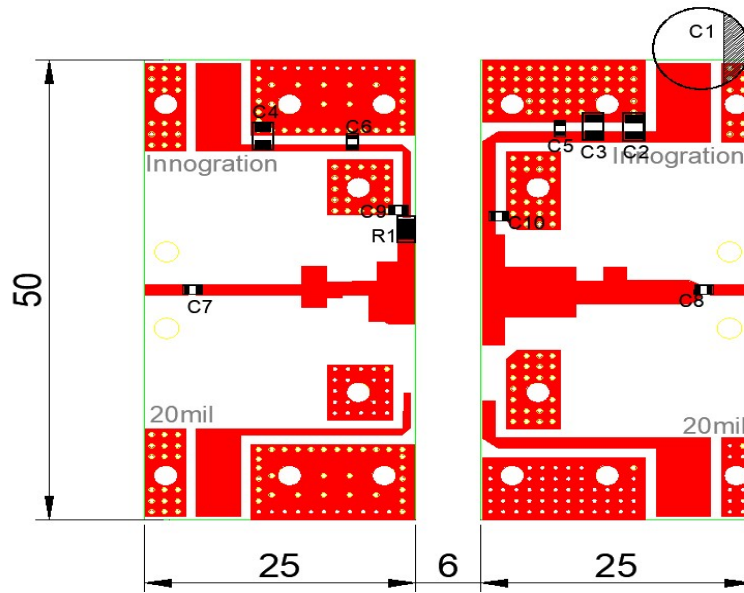
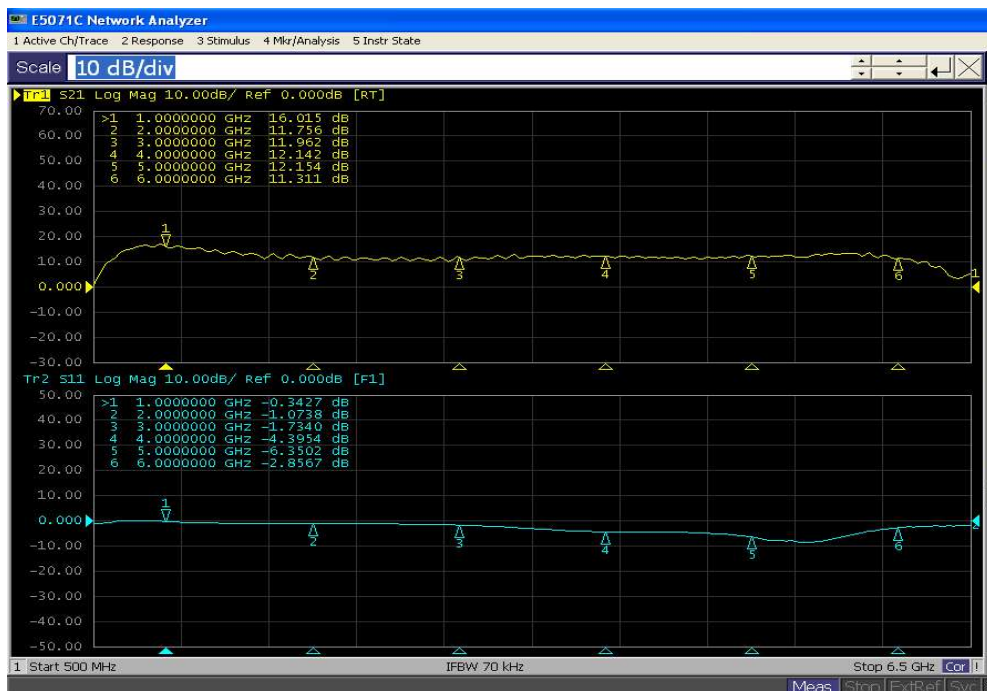


Figure 1. Test Circuit Component Layout (1.5-6GHz)

Table 4. Test Circuit Component Designations and Values

| Component | Description | Suggestion |
|-------------|--------------------|------------|
| C1 | 4700uF/63V | |
| C2,C3,C4 | 10uF | 1210 |
| C9,C10 | 100pF | 0805 |
| C5,C6,C7,C8 | 5.6pF | 0805 |
| R1 | Chip Resistor,9.1Ω | 1206 |
| PCB | 20mil Rogers 4350B | |

Figure 2. Network Analyzer S11/S21 output (Vgs=-2.41V, Vds=28V, Idq=210mA)



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Package Outline

Flanged ceramic package; 2 leads

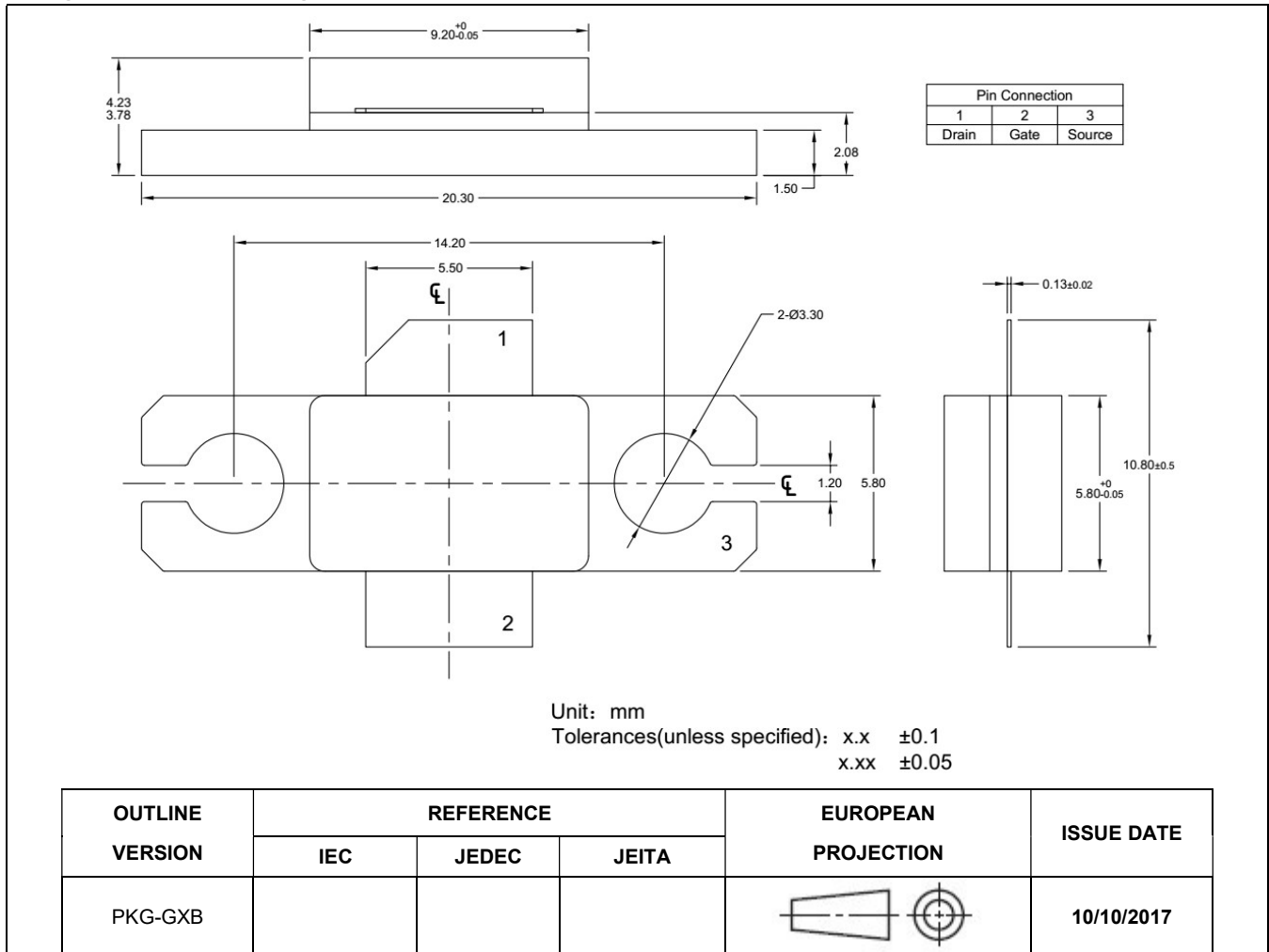


Figure 1. Package Outline PKG-G2E

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Revision history

Table 5. Document revision history

| Date | Revision | Datasheet Status |
|----------|----------|--|
| 2023/1/6 | V1.0 | Preliminary datasheet creation, GTAH58040GX renamed to NU5904H |
| | | |

Application data based on RXT-23-01

Notice

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