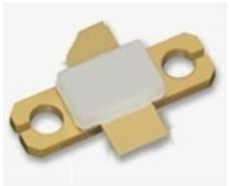
NU3013H GaN TRANSISTOR

Document Number: NU3013H
Preliminary Datasheet V1.1

Gallium Nitride 28V 130W, RF Power Transistor

NU3013H



Description

The NU3013H is a 130W 28V, GaN HEMT, designed for multiple applications with frequencies up to 2.7GHz.

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

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

NU3013H Vgs=-2.70V Vds=28V Idq=200mA CW								
Freq (MHz)	Psat (dBm)	Psat (W)	IDS (A)	Pin (dBm)	Gain (dB)	Eff(%)	2nd （dBc）	3rd （dBc）
1700	52.10	162.2	8.37	38.70	13.40	69.20	-29.20	-22.20
1720	52.00	158.5	8.09	38.70	13.30	69.97	-26.80	-22.10
1740	52.00	158.5	7.96	38.70	13.30	71.11	-24.60	-23.10
1760	51.97	157.4	7.80	38.70	13.27	72.07	-28.00	-24.80
1780	51.92	155.6	7.55	38.60	13.32	73.60	-32.50	-26.60
1800	51.82	152.1	7.23	38.57	13.25	75.11	-31.60	-29.00

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}	40	Vdc
Maximum Forward Gate Current	Igmax	30.2	mA
Storage Temperature Range	Tstg	-65 to +150	°C
Case Operating Temperature	T_C	+150	°C
Operating Junction Temperature(See note 1)	T_J	+225	°C
Total Device Power Dissipation (Derated above 25°C, see note 2)	Pdiss	140	W

1. **Continuous operation at maximum junction temperature will affect MTTF**
2. **Bias Conditions should also satisfy the following expression: Pdiss < (Tj – Tc) / RJC and Tc = Tcase**

Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case T_C= 85°C, T_J=200°C, DC Power Dissipation(See note 1)	$R_{\theta JC-DC}$	1.4	C/W

$R_{\theta JC-DC}$ is tested at only DC condition, it is related to the highest thermal resistor value among all test conditions. It might be differently lower in different RF operation conditions like CW signal ,pulsed RF signal etc.

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

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=-8V; I_{DS}=30.2mA	V_{DSS}	150			V
Gate Threshold Voltage	V_{DS} = 28V, I_D =30.2mA	V_{GS}(th)		-2.7		V
Gate Quiescent Voltage	V_{DS} =28V, I_{DS}=100mA, Measured in Functional Test	$V_{GS(Q)}$		-2.48		V

Functional Tests (In Innogration narrow band Test Fixture, 50 ohm system) :V_{DD} = 28 Vdc, I_{DQ} = 100 mA, f = 1650 MHz, CW

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain	Gp		14		dB
Drain Efficiency @ P_{SAT}	Eff	70	76		%
Saturated Power	P_{SAT}	120	150		W
Input Return Loss	IRL		-7		dB
Mismatch stress at all phases (Device no damage)	VSWR		10:1		Ψ

Reference Circuit of Test Fixture Assembly Diagram

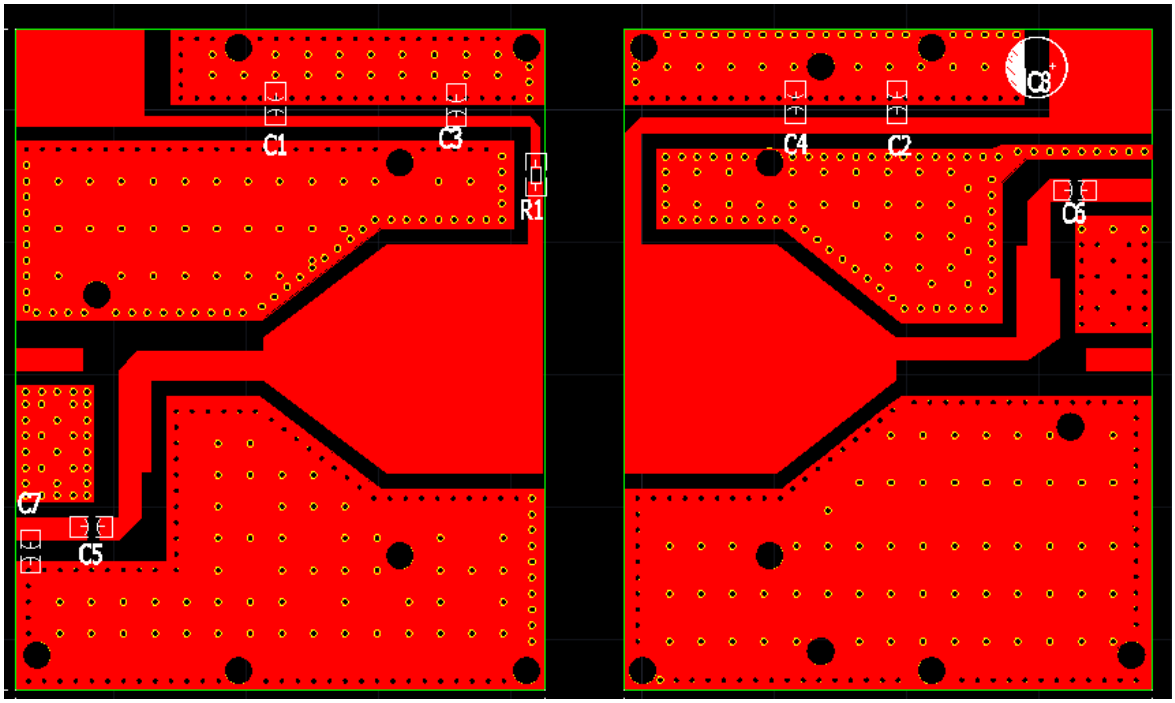


Figure 1. Test Circuit Component Layout

Table 4. Test Circuit Component Designations and Values

Component	Description	Suggestion
C1~C2	10uF/200V-1812	Ceramic multilayer capacitor
C3	56pF	MQ400805
C4	56pF	MQ301111
C5,C6	30pF	MQ400805
C7	1pF	MQ400805
C8	470uF/63V	Electrolytic Capacitor
R1	10Ω-1206	Chip Resistor
PCB	Rogers4350,30mil	

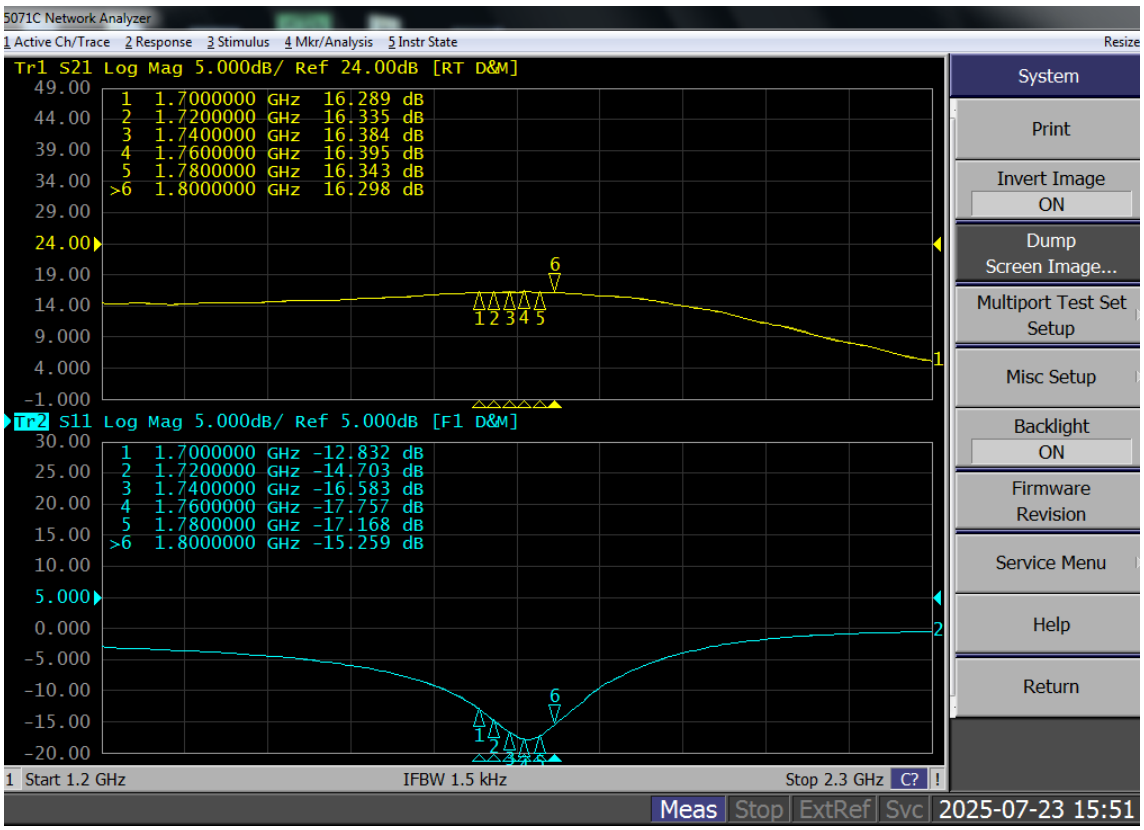
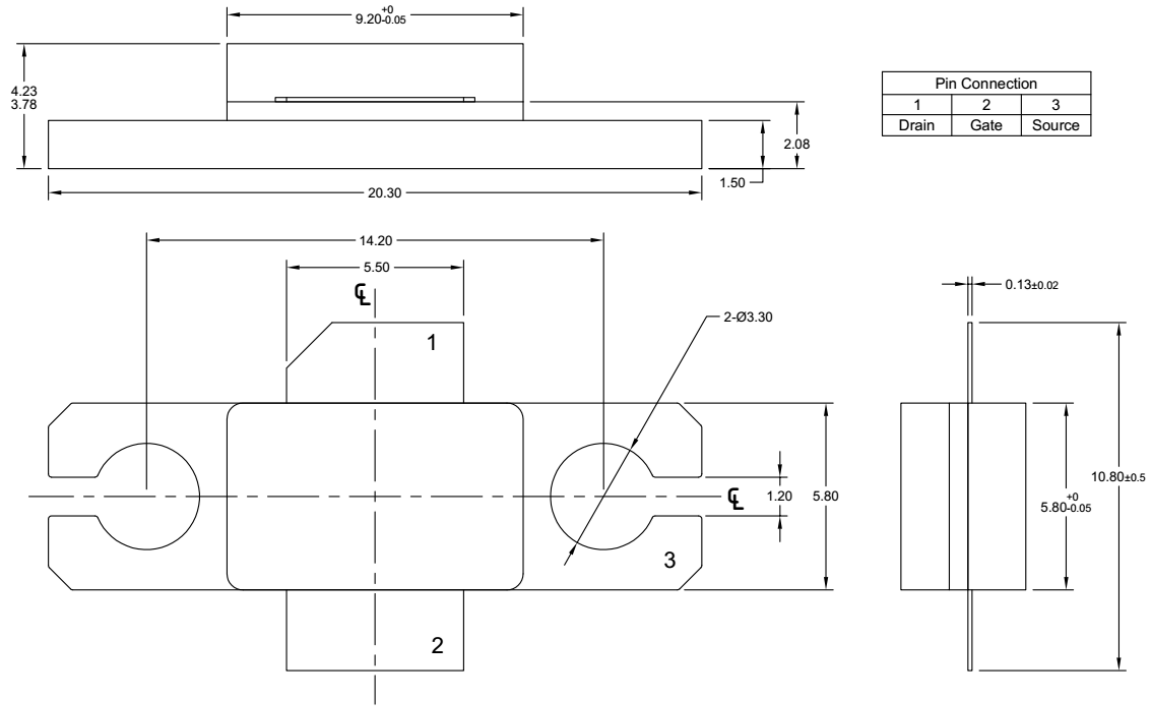


Figure 2. Network Analyzer S11/S21 output

Package Outline

Flanged ceramic package; 2 leads



Pin Connection		
1	2	3
Drain	Gate	Source

Unit: mm
Tolerances(unless specified): x.x ±0.1
x.xx ±0.05

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-GXB					10/10/2017

Figure 1. Package Outline PKG-G2E

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2019/12/27	V1.0	Preliminary Datasheet Creation
2025/7/23	V1.1	Change carrier application to 1.7-1.8GHz

Application based on TC-25-29

Notice