NU6006H GaN TRANSISTOR

Document Number: NU6006H
Product Datasheet V1.0

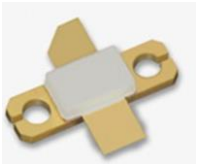
Gallium Nitride 28V 50W, RF Power Transistor

Description

The NU6006H is a 60W, GaN HEMT, designed for multiple applications with frequencies up to 4GHz.

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

NU6006H



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

V_{DD}=28V I_{DQ}=300mA, CW,(Psat defined as Ig = 1 mA)

Freq (MHz)	Pin (dBm)	Pout (dBm)	Pout (W)	Ids (A)	Eff (%)	Gain (dB@Psat)
2300	36.77	48.3	67.6	4.51	53.54	11.5
2400	35.91	48.5	71.9	4.18	61.47	12.6
2500	34.39	48.6	72.4	3.89	66.51	14.2
2600	34.38	48.2	66.1	3.52	67.03	13.8
2700	35.51	47.7	58.9	3.25	64.71	12.2

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	14.4	mA
Storage Temperature Range	Tstg	-65 to +150	°C
Case Operating Temperature	T_C	+150	°C
Operating Junction Temperature(See note 1)	T_J	+200	°C
Total Device Power Dissipation (Derated above 25°C, see note 2)	Pdiss	70	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)	$R_{\theta JC\text{-}DC}$	2.5	C/W

1. **$R_{\theta JC\text{-}DC}$ 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}=14.4mA	V_{DSS}	150			V
Gate Threshold Voltage	V_{DS} = 28V, I_D = 14.4mA	V_{GS}(th)		-2.7		V
Gate Quiescent Voltage	V_{DS} =28V, I_{DS}=300mA, Measured in Functional Test	$V_{GS(Q)}$		-2.29		V

Functional Tests (In Innogration broadband Test Fixture, 50 ohm system) :V_{DD} = 28 Vdc, I_{DQ} = 300 mA, f = 1300 MHz, CW

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain@ P_{Sat}	Gp		18		dB
Drain Efficiency @ P_{sat}	Eff		65		%
Saturated power	P_{SAT}	60	70		W
Input Return Loss	IRL		-7		dB
Mismatch stress at all phases (Device no damage)	VSWR		10:1		Ψ

Figure 1: Small singal gain and return loss Vs Frequency

Vgs=-2.29V, Vds=28V, Idq=300mA, input power=0dBm

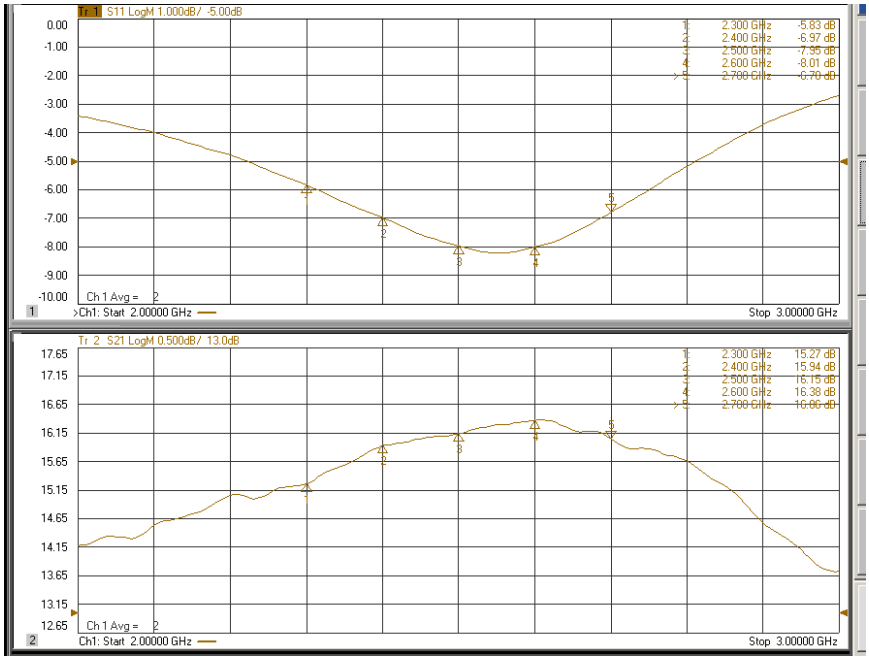
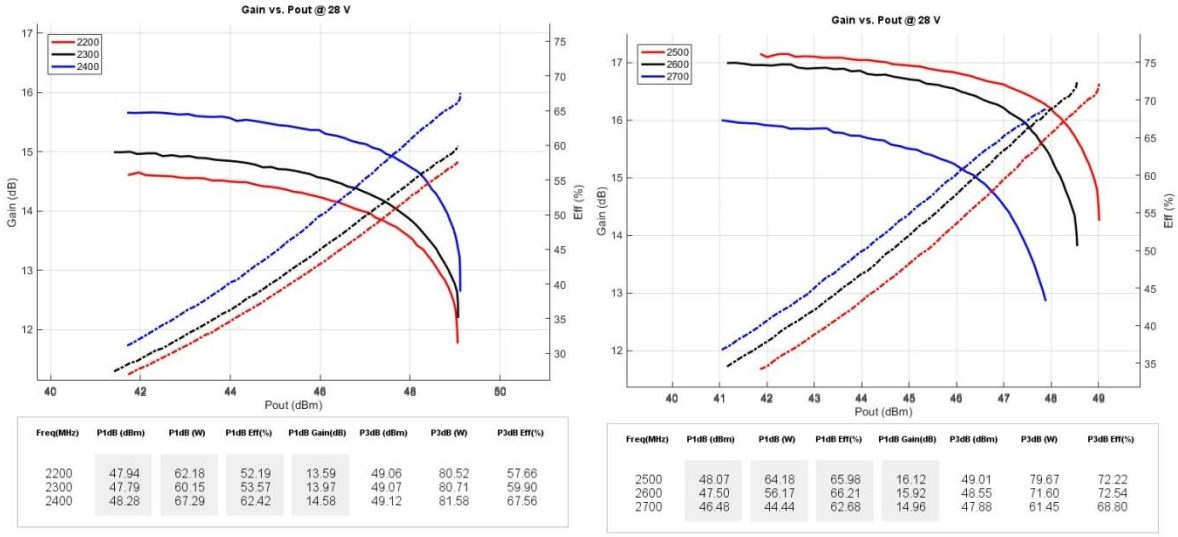


Figure 2: Pulse CW performance across the band

Vgs=-2.29V, Vds=28V, Idq=300mA, Pin=36.5dBm (Pulse width:20us,duty cycle: 20%)



Freq(MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
2200	47.94	62.18	52.19	13.59	49.06	80.52	57.66
2300	47.79	60.15	53.57	13.97	49.07	80.71	59.90
2400	48.28	67.29	62.42	14.58	49.12	81.58	67.56

Freq(MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
2500	48.07	64.18	65.98	16.12	49.01	79.67	72.22
2600	47.50	56.17	66.21	15.92	48.55	71.60	72.54
2700	46.48	44.44	62.68	14.96	47.88	61.45	68.80

Figure 3: CW performance across the band

Vgs=-2.29V, Vds=28V, Idq=300mA

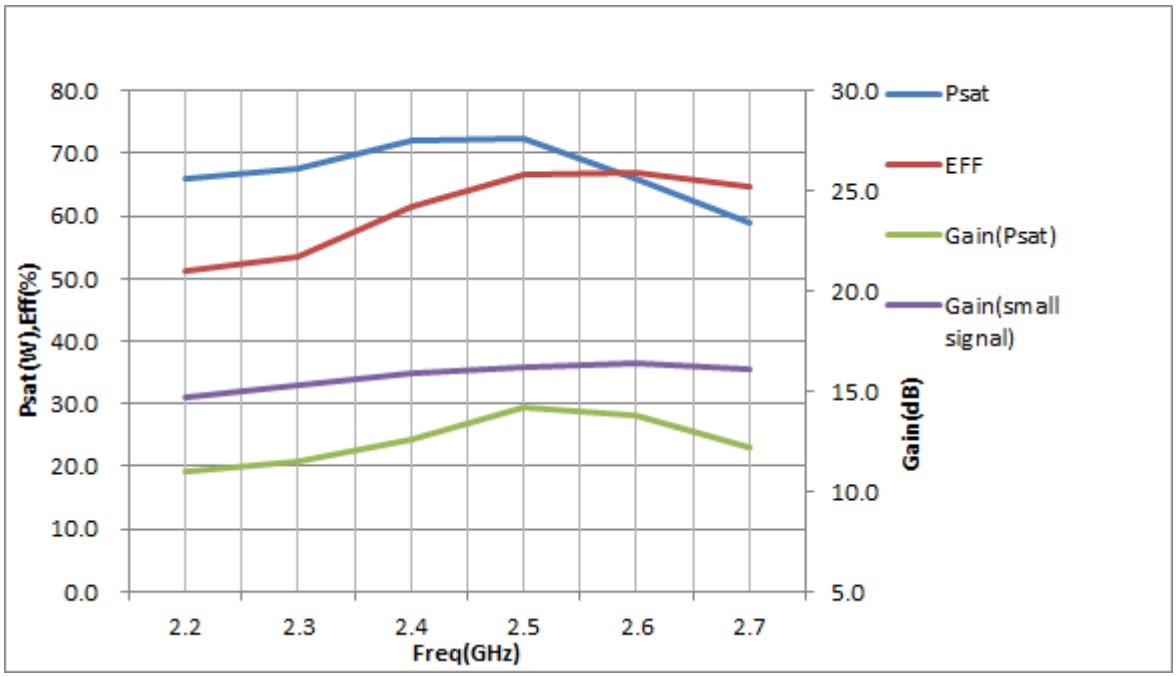
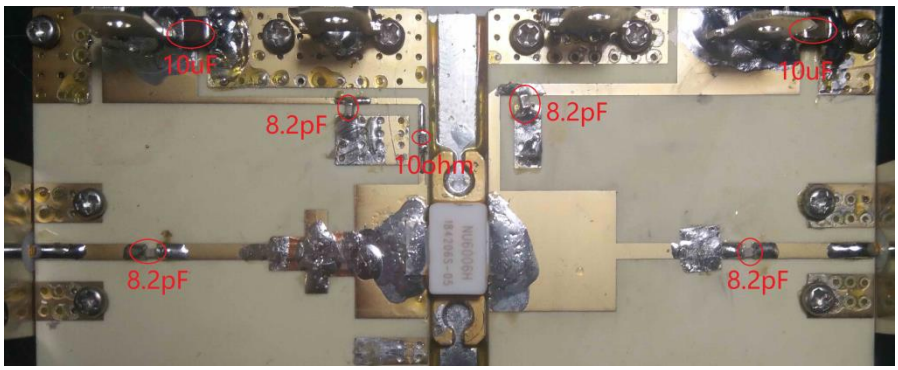
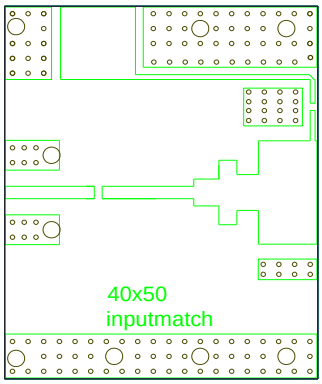
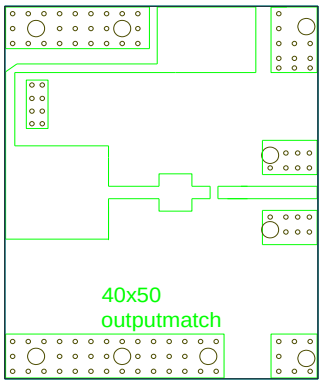


Figure 4: Photo of 2.3-2.7GHz application circuit



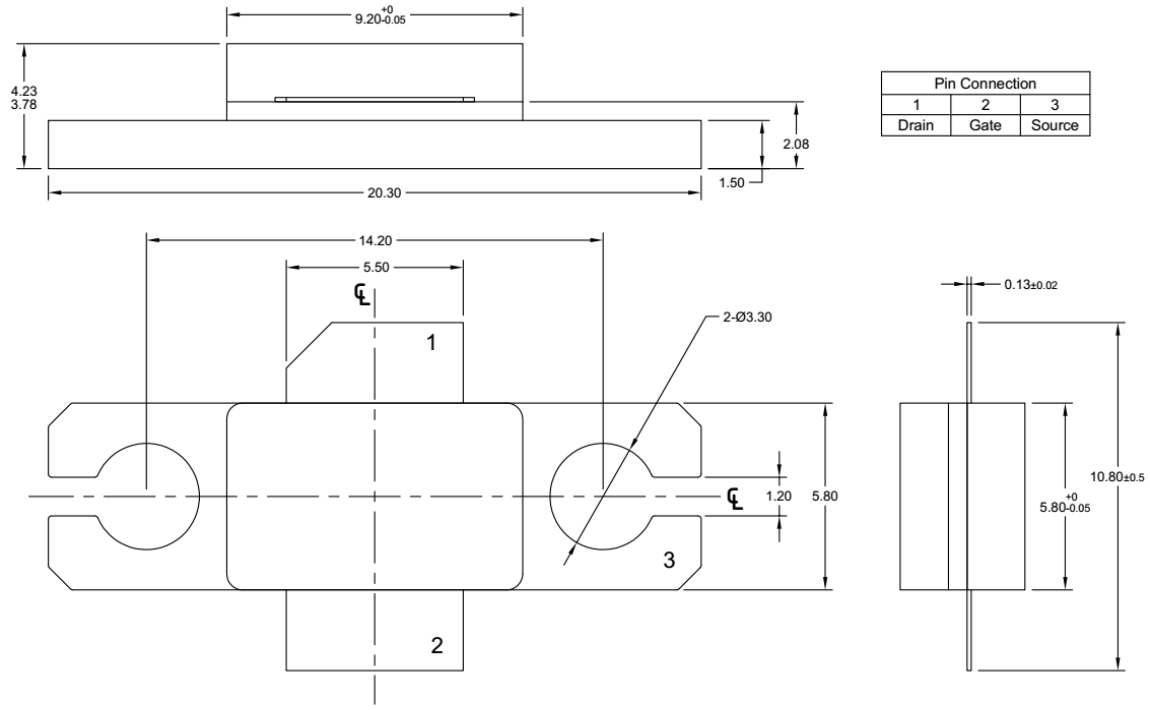
PCB:Rogers R4350B 30mil(Layout Gerber file upon request)





Package Outline

Flanged ceramic package; 2 leads



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
2018/10/26	**V1.0**	**Product Datasheet Creation**

Notice

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