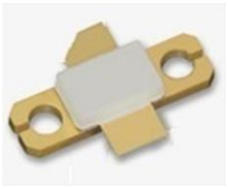
XU6009H GaN TRANSISTOR

Document Number: XU6009H
Preliminary Datasheet V1.0

Gallium Nitride 28V 90W, RF Power Transistor

XU6009H



Description

The XU6009H is a 90W 28V, unmatched GaN HEMT, designed for multiple applications with frequencies up to 4GHz.It can support pulse, CW at saturated condition or any modulation signal at backoff condition.

In typical broadband application from 0.1-0.5GHz, it can deliver >70W across the full band with higher efficiency and gain

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

- Typical performance (on Innogration 0.5-3GHz wideband fixture with device soldered)

XU6009HS^{V0} Vgs=-2.4V Vds=28V Idq=160mA CW								
Freq (MHz)	**Psat (dBm)**	**Psat (W)**	**IDS (A)**	**Pin (dBm)**	**Gain (dB)**	**Eff (%)**	**2nd （dBc）**	**3rd （dBc）**
100	50.03	100.7	4.82	26.94	23.09	74.61	-9.20	-14.50
150	48.95	78.5	3.92	26.45	22.50	71.54	-22.80	-14.00
200	49.22	83.6	3.97	26.73	22.49	75.17	-10.40	-12.30
250	49.00	79.4	4.25	27.40	21.60	66.75	-9.20	-16.00
300	49.94	98.6	5.35	28.24	21.70	65.84	-10.50	-22.00
350	49.00	79.4	3.66	26.40	22.60	77.51	-16.70	-35.30
400	48.99	79.3	3.43	26.43	22.56	82.52	-21.80	-40.20
450	49.90	97.7	4.31	27.43	22.47	80.98	-27.30	-52.00
500	49.41	87.3	4.36	28.16	21.25	71.51	-27.00	-24.70

Recommended driver: ITEH40001P3

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	21.8	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, DC Power Dissipation(See note 1)	$R_{\theta JC-DC}$	1.2	°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}=21.8mA	V_{DSS}	150			V
Gate Threshold Voltage	V_{DS} = 28V, I_D =21.8mA	V_{GS}(th)	-4	-	-2	V
Gate Quiescent Voltage	V_{DS} =28V, I_{DS}=160mA, Measured in Functional Test	$V_{GS(Q)}$		-2.4		V

0.1-0.5GHz

Figure 1. Network Analyzer S11/S21 output (Vds=28V,Vgs=-2.71V,Idq=150mA, Input Power =0dBm)

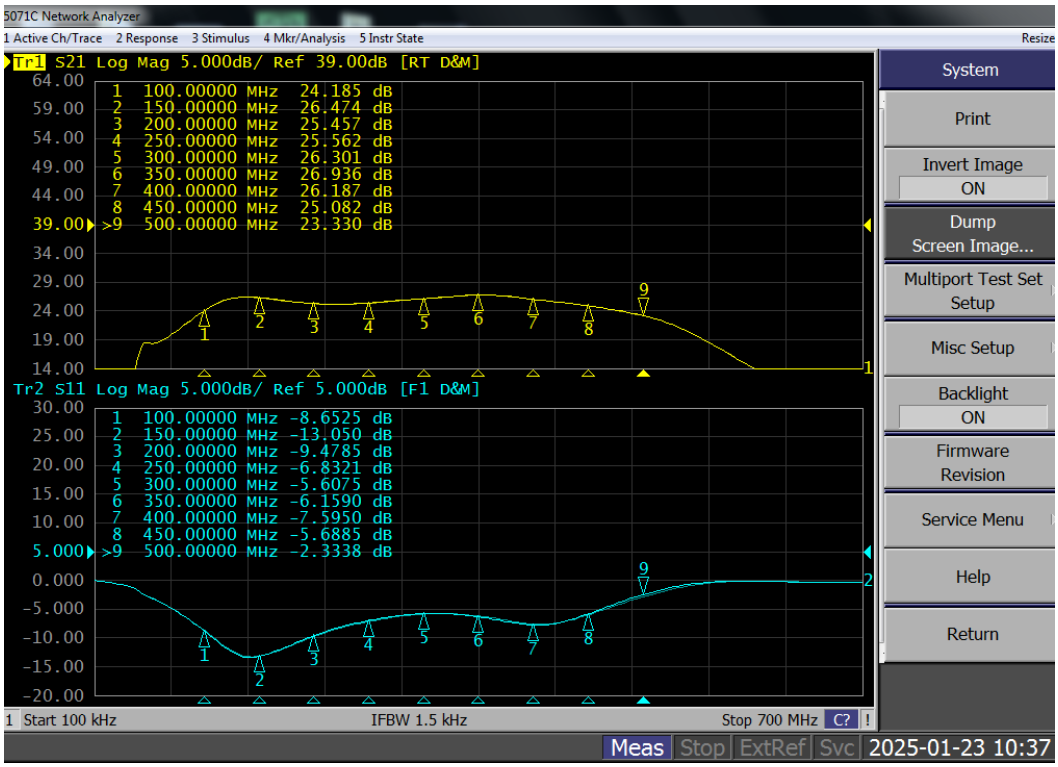
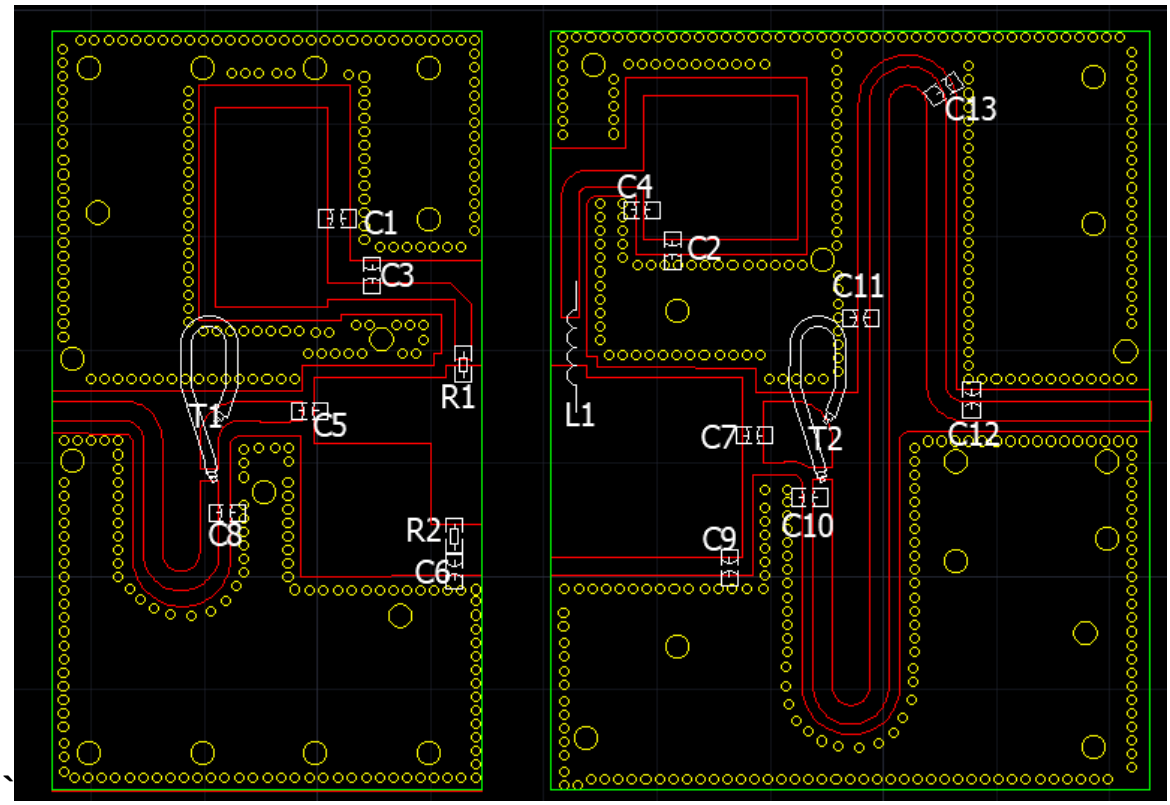


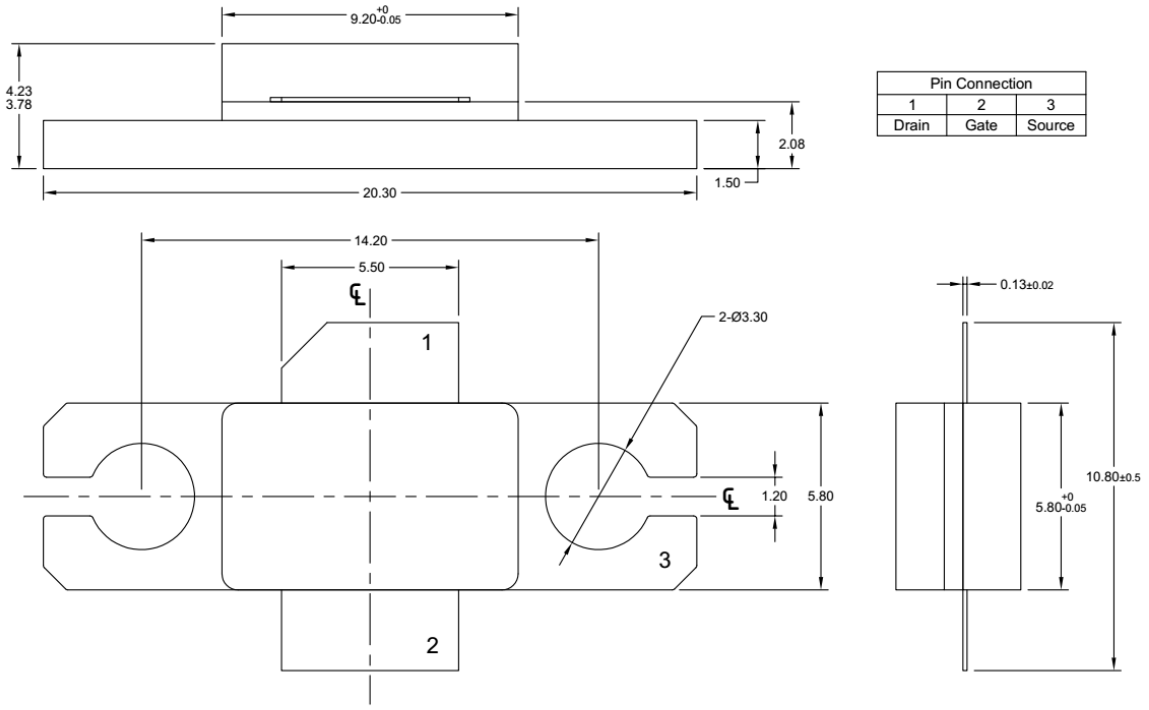
Figure 2: Picture of application board （PCB: 30 Mil Rogers 4350, Layout file upon request）



Component	Description	Suggestion
C1，C2	10uF/200V-1210	Ceramic multilayer capacitor
C3~C6	10nF/200V-1812	Ceramic multilayer capacitor
C7	220pF	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.MQ301111
C8,C9	2pf	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.MQ301111
C10	9.1pF	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.MQ301111
C11	3.9pF	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.MQ301111
C12,C13	2.7pF	BEIJING YUANLU HONGYUAN ELECTRONIC TECHNOLOGY CO., LTD.MQ301111
L1	1mm wire，3mm innerdiameter，6turns	DIY
T1	12.5ohm -65mm	SFF-12.5-1.5
T2	12.5ohm-50mm	SFF-12.5-1.5
R1,R2	51Ω-1206	Chip Resistor
PCB	30Mil Rogers4350	

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 5. Document revision history

Date	Revision	Datasheet Status
2025/1/23	V1.0	Preliminary Datasheet Creation

Application data based on TC-25-05

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