

# XU6009H GaN TRANSISTOR

Document Number: XU6009H  
Preliminary Datasheet V1.1

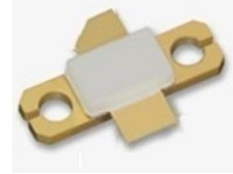
## Gallium Nitride 28V 90W, RF Power Transistor

### 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, from 0.3-2GHz, it can deliver >50W across the full band

**XU6009H**



- Typical performance (on Innogration 0.1-0.5GHz wideband fixture with device soldered)

XU6009HS <sup>V0</sup> V <sub>gs</sub> =-2.4V V <sub>ds</sub> =28V Id <sub>q</sub> =160mA CW								
Freq (MHz)	Psat (dBm)	Psat (W)	IDS (A)	Pin (dBm)	Gain (dB)	Eff (%)	2 <sup>nd</sup> (dBc)	3 <sup>rd</sup> (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

- Typical performance (on Innogration 225-2000MHz wideband fixture with device soldered)

XU6009HS <sup>V0</sup> V <sub>gs</sub> =-2.26V V <sub>ds</sub> =28V Id <sub>q</sub> =240mA CW								
Freq (MHz)	Psat (dBm)	Psat (W)	IDS (A)	Pin (dBm)	Gain (dB)	Eff (%)	2 <sup>nd</sup> (dBc)	3 <sup>rd</sup> (dBc)
225	48.30	68	6.00	32.4	15.9	40.2	-8	-14.9
300	49.75	94	4.60	33.6	16.2	73.3	-15	-15.4
500	49.50	89	6.18	34.0	15.5	51.5	-13.3	-14.7
1000	48.60	72	5.00	34.2	14.4	51.7	-26.5	-20
1100	50.10	102	7.00	34.3	15.9	52.2	-21	-24
1500	47.75	60	2.97	34.0	13.8	71.6	-13	-40
2000	47.40	55	3.54	33.5	13.9	55.4	-33	-42

Recommended driver: IMEH0030-6

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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 <sub>DSS</sub>	150	Vdc
Gate--Source Voltage	V <sub>GS</sub>	-10,+2	Vdc
Operating Voltage	V <sub>DD</sub>	40	Vdc
Maximum Forward Gate Current	I <sub>gmax</sub>	21.8	mA
Storage Temperature Range	T <sub>stg</sub>	-65 to +150	°C
Case Operating Temperature	T <sub>C</sub>	+150	°C
Operating Junction Temperature(See note 1)	T <sub>J</sub>	+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 <sub>C</sub> = 85°C, T <sub>J</sub> =200°C, DC Power Dissipation(See note 1)	R <sub>θJC-DC</sub>	1.2	°C/W

R<sub>θJC-DC</sub> 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<sub>C</sub> = 25°C unless otherwise noted)**

### DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V <sub>GS</sub> =-8V; I <sub>DS</sub> =21.8mA	V <sub>DSS</sub>	150			V
Gate Threshold Voltage	V <sub>DS</sub> = 28V, I <sub>D</sub> =21.8mA	V <sub>GS(th)</sub>	-4	-	-2	V
Gate Quiescent Voltage	V <sub>DS</sub> =28V, I <sub>DS</sub> =160mA, Measured in Functional Test	V <sub>GS(Q)</sub>		-2.4		V

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## 0.1-0.5GHz

Figure 1. Network Analyzer S11/S21 output ( $V_{ds}=28V, V_{gs}=-2.71V, I_{dq}=150mA$ , Input Power =0dBm)

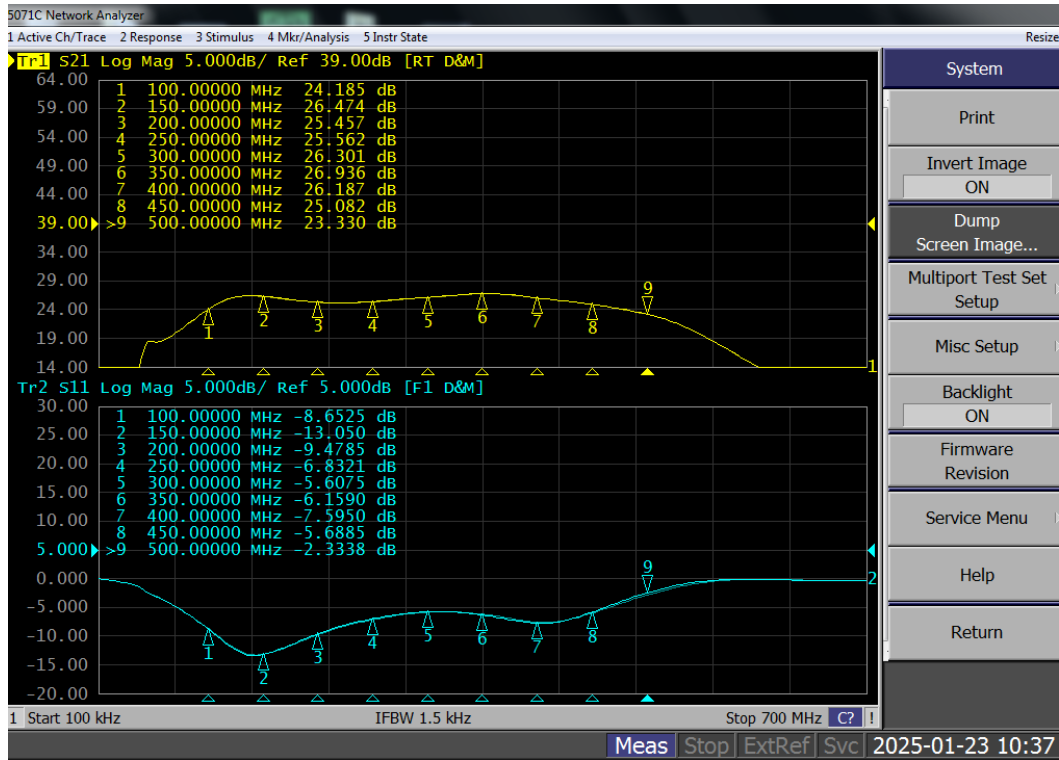
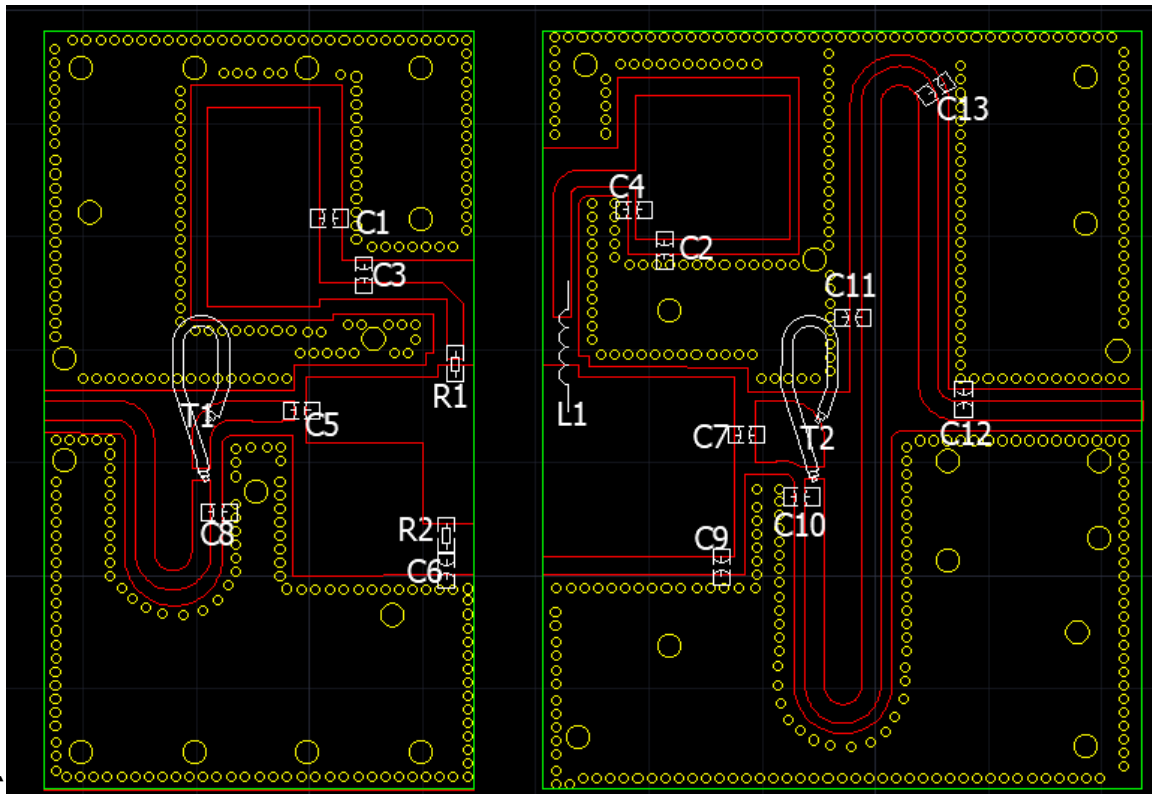


Figure 2: Picture of application board (PCB: 30 Mil Rogers 4350, Layout file upon request)



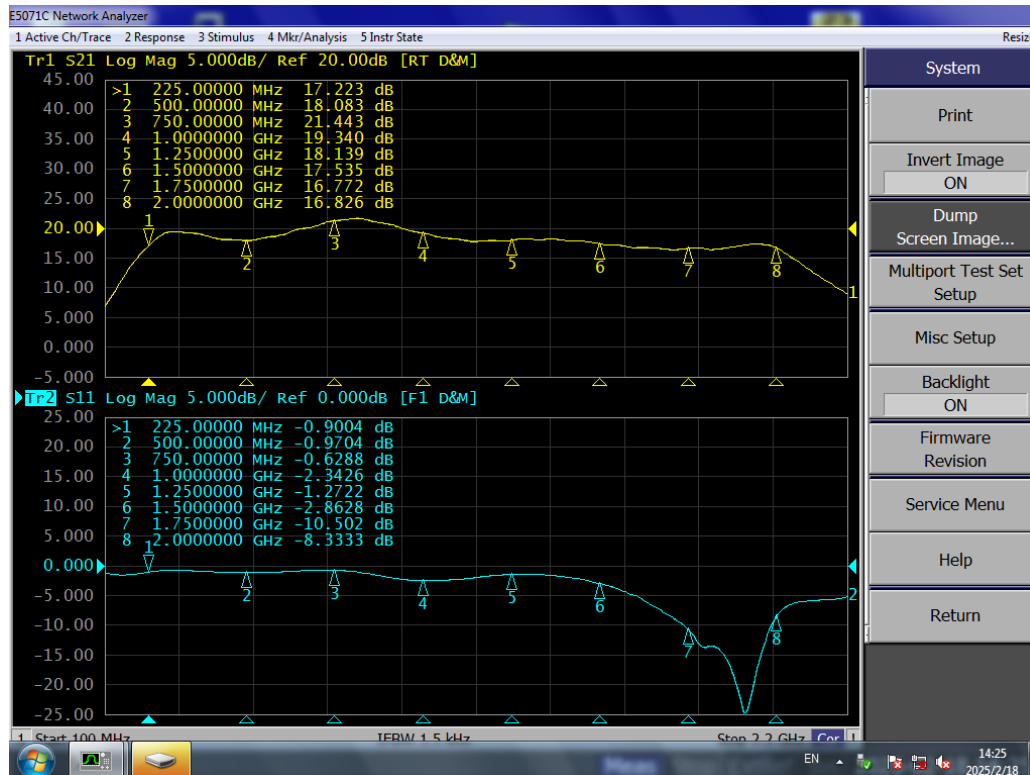
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Component	Description	Suggestion
C1, C2	10uF/200V-1210	Ceramic multilayer capacitor
C3~C6	10nF/200V-1812	Ceramic multilayer capacitor
C7	220pF	
C8,C9	2pf	
C10	9.1pF	
C11	3.9pF	
C12,C13	2.7pF	
L1	1mm wire, 3mm innerdiameter, 6turns	DIY
T1	12.5ohm -65mm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

## 225-2000MHz

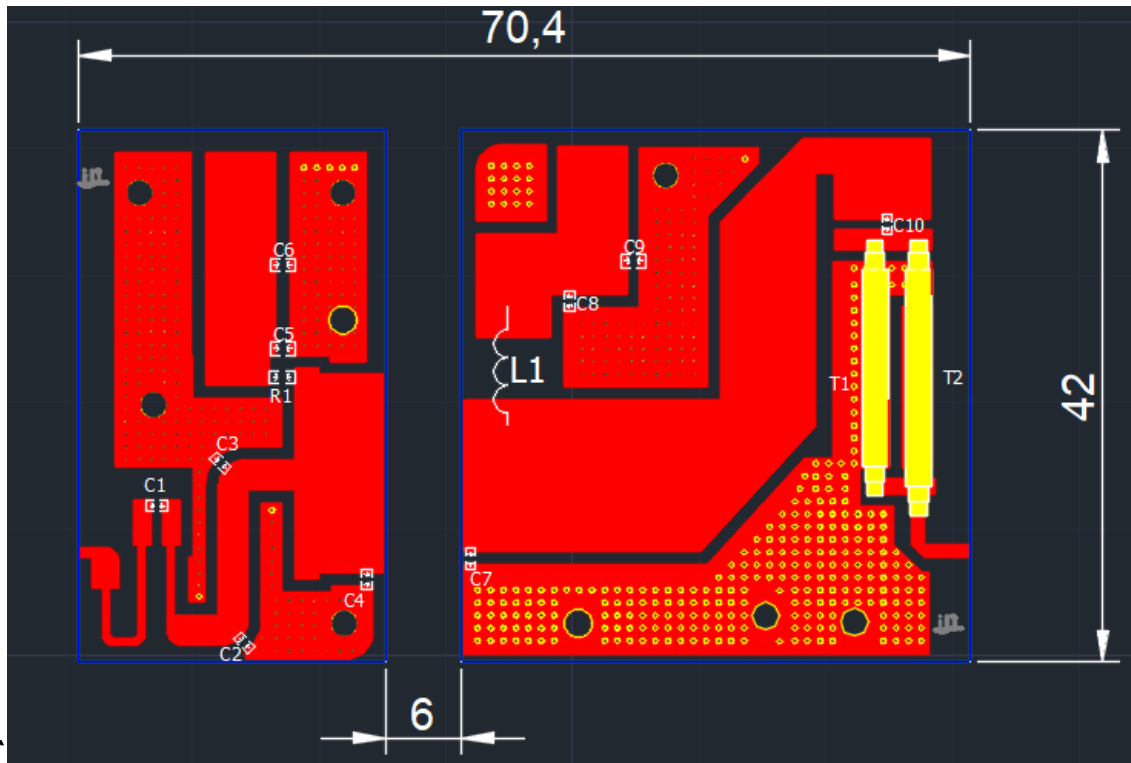
Figure 3. Network Analyzer S11/S21 output (Vds=28V,Vgs=-2.71V,I<sub>dq</sub>=150mA, Input Power =0dBm)



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Figure 4: Picture of application board and BOM



Part	description	Model
C6,C9	10uF/100V	Ceramic multilayer capacitor
C1	27PF MQ300709	
C2	1PF MQ301111	
C3	1.8PF MQ301111	
C4,C7	1.2PF MQ301111	
C5	24 PF MQ301111	
C8	33 PF MQ301111	
C10	33 PF MQ300709	
R1,	51Ω/1206	Chip Resistor
T1	RFSFBU-086-25 18mm	/
T2	RFSFBU-086-25 20mm	/
L1	8turns,锥形电感 d=0.47mm	DIY
PCB	Rogers 3010, Er = 3.5, thickness 20 mils, 1oz copper	

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## Package Outline

Flanged ceramic package; 2 leads

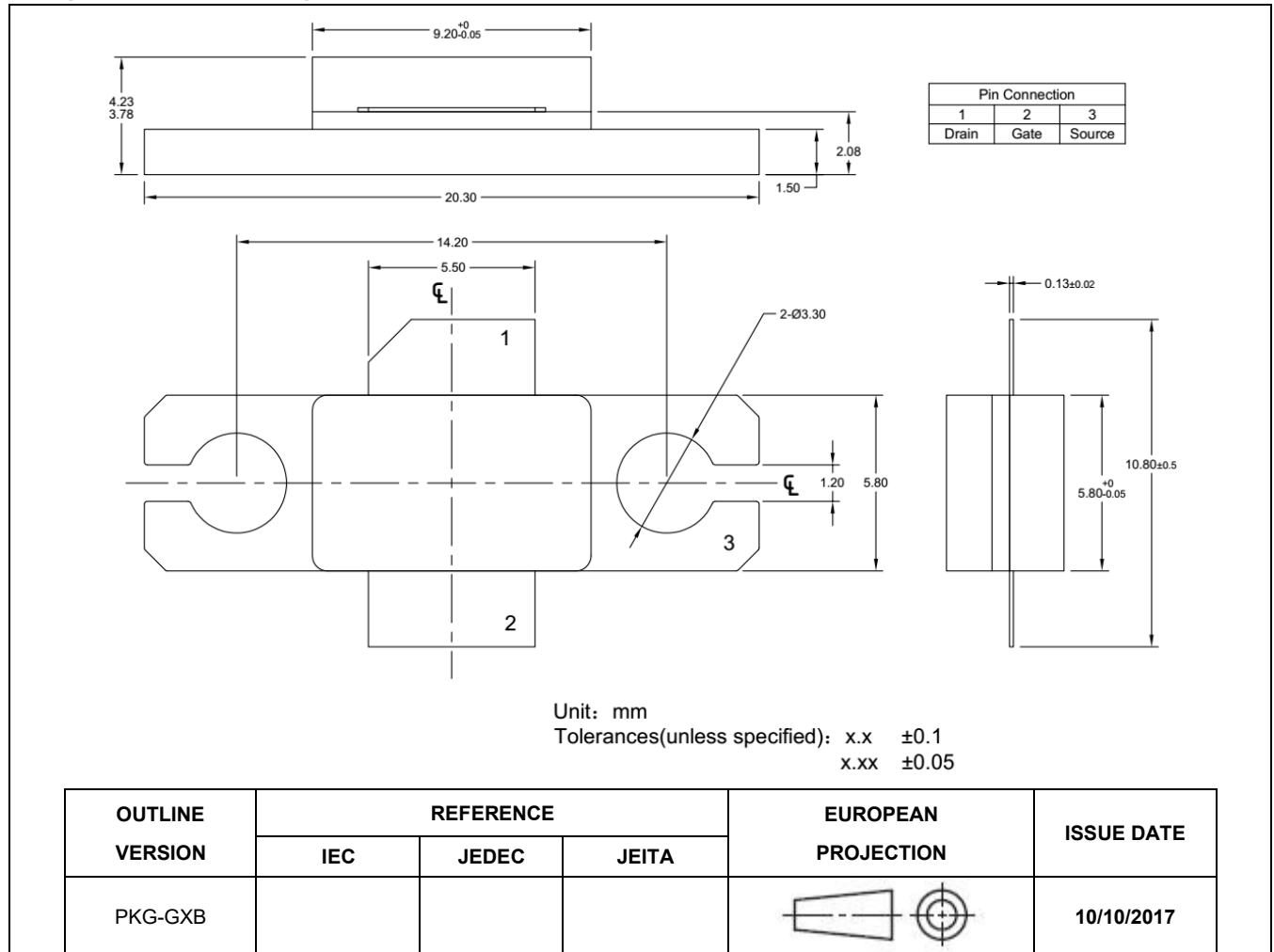


Figure 1. Package Outline PKG-G2E

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## Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2025/1/23	V1.0	Preliminary Datasheet Creation
2025/10/18	V1.1	Add 225-2000M application data

Application data based on TC-25-05/06

## Notice

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