

NU4012H GaN TRANSISTOR

Document Number: NU4012H
Preliminary Datasheet V1.0

Gallium Nitride 28V 120W, RF Power Transistor

Description

The NU4012H is a 120W 28V, GaN HEMT, designed for multiple applications with frequencies up to 3GHz.

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

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

$V_{DD}=28V$ $I_{DQ}=700mA$, CW.

Frequency(MHz)	Gp (dB)	P _{1dB} (W)	Efficiency (%)
1300	18	120	65



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	I_{gmax}	27	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	+200	°C
Total Device Power Dissipation (Derated above 25°C, see note 2)	P_{diss}	110	W

1. **Continuous operation at maximum junction temperature will affect MTTF**
2. **Bias Conditions should also satisfy the following expression: $P_{diss} < (T_j - T_c) / R_{JC}$ and $T_c = T_{case}$**

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Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case $T_C = 85^\circ\text{C}$, $T_J = 200^\circ\text{C}$, DC Power Dissipation(See note 1)	$R_{\theta\text{JC-DC}}$	1.6	C/W

$R_{\theta\text{JC-DC}}$ 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 ($T_C = 25^\circ\text{C}$ unless otherwise noted)

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{\text{GS}} = -8\text{V}$; $I_{\text{DS}} = 27\text{mA}$	V_{DSS}	150			V
Gate Threshold Voltage	$V_{\text{DS}} = 28\text{V}$, $I_{\text{D}} = 27\text{mA}$	$V_{\text{GS(th)}}$		-2.7		V
Gate Quiescent Voltage	$V_{\text{DS}} = 28\text{V}$, $I_{\text{DS}} = 700\text{mA}$, Measured in Functional Test	$V_{\text{GS(Q)}}$		-2.4		V

Functional Tests (In Innogration narrow band Test Fixture, 50 ohm system) : $V_{\text{DD}} = 28\text{Vdc}$, $I_{\text{DQ}} = 700\text{mA}$, $f = 1300\text{MHz}$, CW

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain@ $P_{1\text{dB}}$	G_p		19		dB
Drain Efficiency @ $P_{1\text{dB}}$	Eff		65		%
1dB compressed Power	$P_{1\text{dB}}$		120		W
Input Return Loss	IRL		-7		dB
Mismatch stress at all phases (Device no damage)	VSWR		10:1		Ψ

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Package Outline

Flanged ceramic package; 2 leads

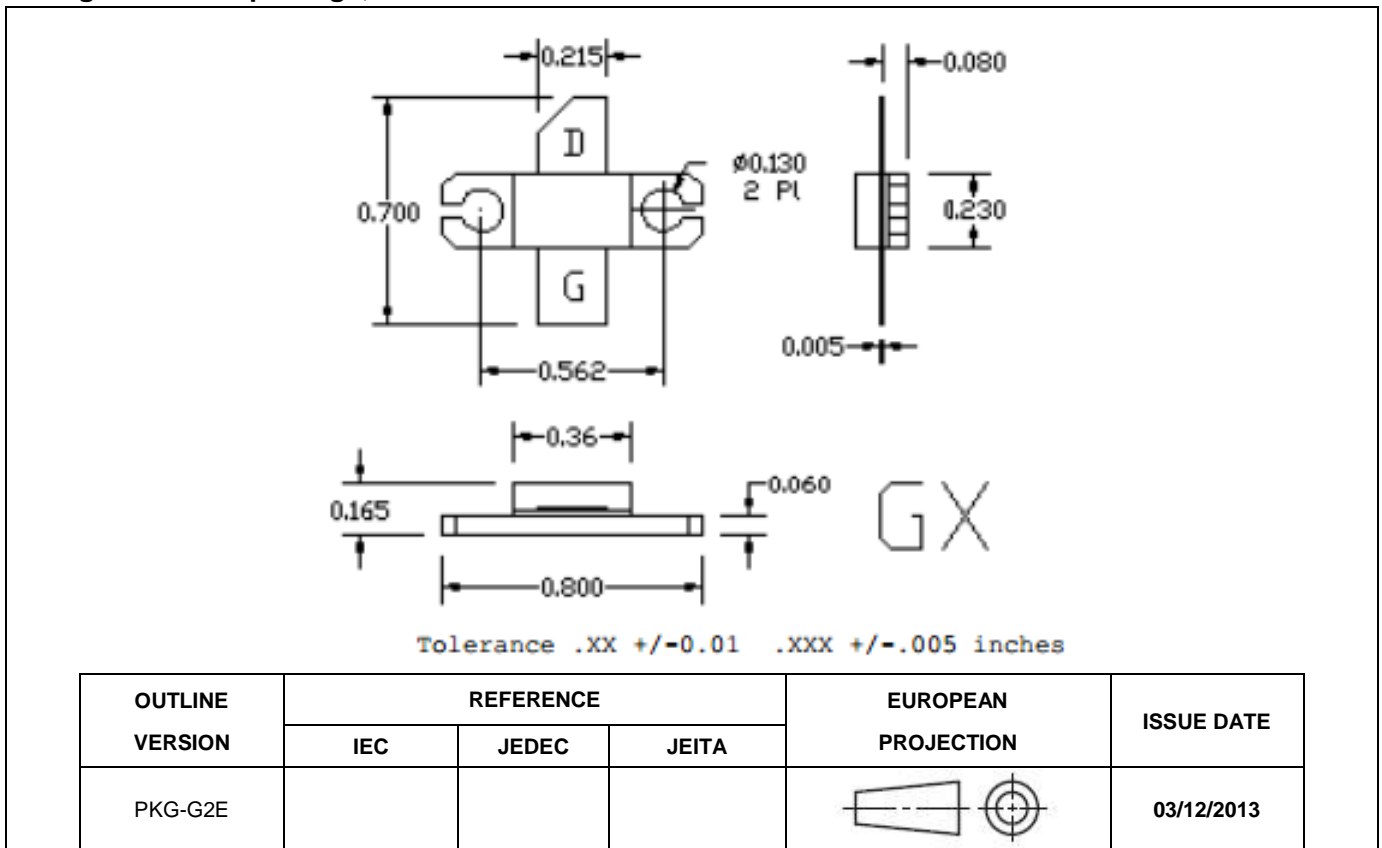


Figure 1. Package Outline PKG-G2E

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2017/3/10	V1.0	Objective Datasheet Creation
2017/6/19	V1.0	Preliminary Datasheet Creation

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