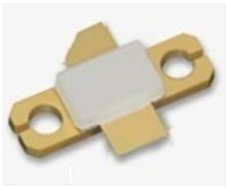
NU2515H GaN TRANSISTOR

Document Number: NU2515H
Preliminary Datasheet V1.2

Gallium Nitride 28V 150W, RF Power Transistor

NU2515H



Description

The NU2515H is a 150W 28V, unmatched GaN HEMT, designed for multiple applications with frequencies up to 2.5GHz.

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

- Typical performance (on Innogration 1.5-1.7GHz wideband fixture with device soldered)

V_{DD}=28V I_{DQ}=100mA, CW, Vgs=-2.71V

Freq(MHz)	Pin(dBm)	Psat(dBm)	Psat(W)	IDS(A)	Gain(dB)	Eff(%)
1500	38.5	51.68	147.2	7.6	13.18	69
1600	38	51.47	140.3	7.07	13.47	71
1700	38.3	50.85	121.6	5.98	12.55	73

Typical performance (on Innogration 1.1-1.3GHz wideband fixture with device soldered)

V_{DD}=28V I_{DQ}=100mA, CW, Vgs=-2.71V

Freq(MHz)	Pin(dBm)	Psat(dBm)	Psat(W)	IDS(A)	Gain(dB)	Eff(%)
1100	35.3	51.6	145	7.1	16.3	72
1200	35.1	50.9	123	5.7	15.8	77
1300	35.2	50.9	123	6.2	15.7	71

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	36	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	165	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)	$R_{\theta JC\text{-}DC}$	1.2	°C/W

$R_{\theta JC\text{-}DC}$ 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}=36mA	V_{DSS}	150			V
Gate Threshold Voltage	V_{DS} = 28V, I_D =36mA	V_{GS}(th)	-4	-	-2	V
Gate Quiescent Voltage	V_{DS} =28V, I_{DS}=100mA, Measured in Functional Test	$V_{GS(Q)}$		-2.71		V

Functional Tests (In Innogration 1.6GHz narrow band Test Fixture, 50 ohm system) : V_{DD} = 28 Vdc, I_{DQ} = 80 mA, f = 1650 MHz, CW

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain	Gp		14.3		dB
Drain Efficiency @ P_{SAT}	Eff		71.3		%
Saturated Power	P_{SAT}		52.7		dBm
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

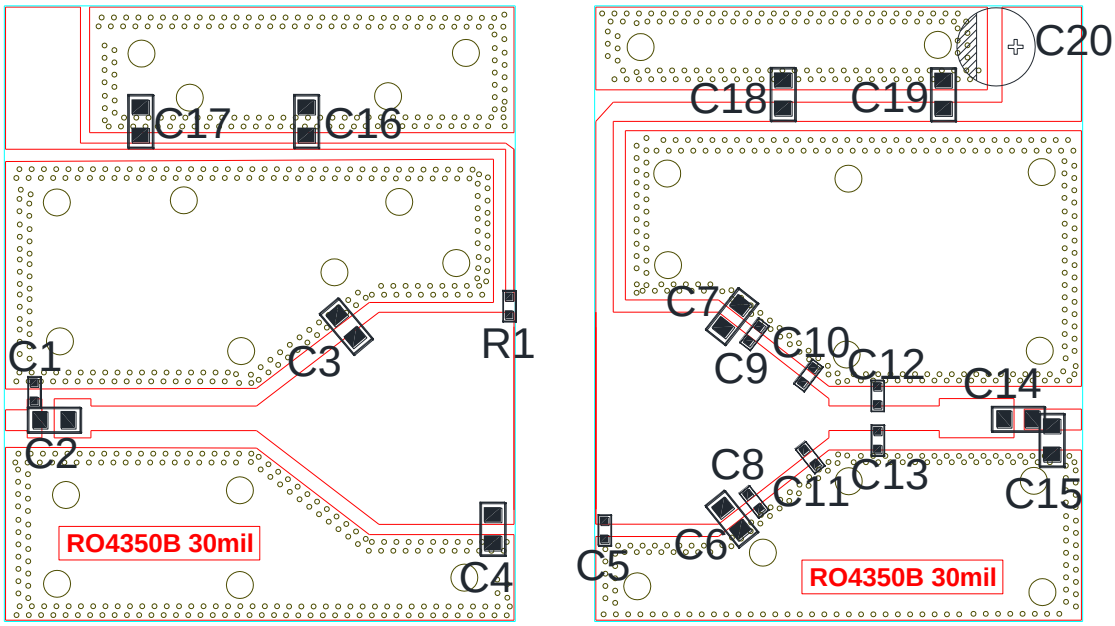


Figure 1. Test Circuit Component Layout (1500-1700MHz)

Table 4. Test Circuit Component Designations and Values (1500-1700MHz)

Component	Description	Suggested Manufacturer
C1,C10	0.5 pF	DLC70D0R5BW251NT
C2,C16,C18	33pF	DLC70B330JW501TX
C3	1.2pF	DLC70B1R2BW501TX
C4	2.2pF	DLC70B2R2BW501TX
C5,C13	0.8pF	DLC70D0R8BW251NT
C6,C7	1pF	DLC70B1R0BW501TX
C8,C9,C12	0.3pF	DLC70D0R3BW251NT
C11	0.2 pF	DLC70D0R2BW251NT
C14	12pF	DLC70B120JW501TX
C15	0.5pF	DLC70B0R5BW501TX
C17,C19	Ceramic multilayer capacitor,10uF/100V	10uF/100V
C20	470uF	63V/470uF
R1	16 Ω	0805
PCB	30mil thick, εr=3.48, Rogers RO4350B, 1 oz. copper	

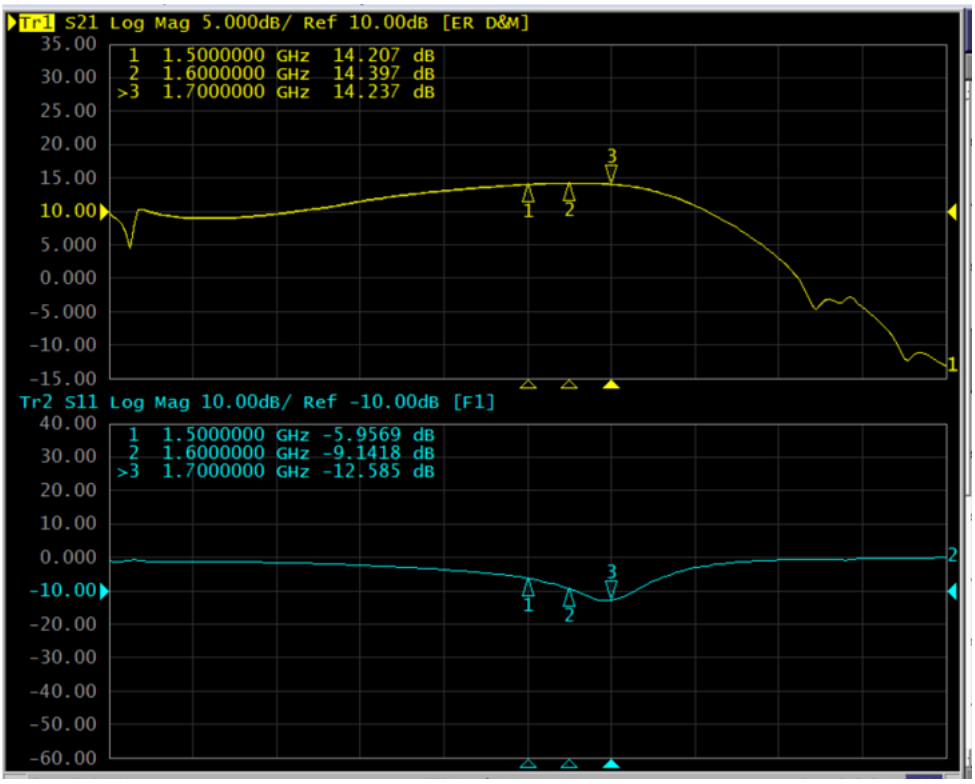


Figure 2. Network Analyzer S11/S21 output (Vds=28V,Vgs=-2.71V,Idq=100mA, Input Power =0dBm)

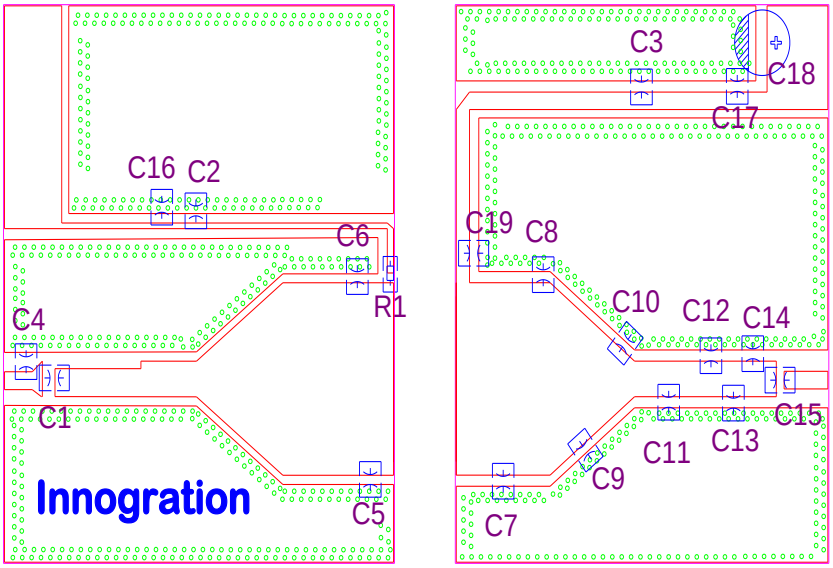


Figure 3. Test Circuit Component Layout (1100-1300MHz)

Table 5. Test Circuit Component Designations and Values(1100-1300MHz)

Part	description	Model
C1,C2,C3	47pF	ATC800B
C4,C7,C8,C9,C10	2.2pF	DLC70B
C5,C6,C19	5.6pF	DLC70B
C11,C12,C13,C14	1pF	DLC70B
C15	33pF	DLC70B
C16,C17	10UF	100V/10UF
C18	2200UF	63V/2200UF
R1	27Ω*2	0805
PCB	30mil thick, εr=3.48, Rogers RO4350B, 1 oz. copper	

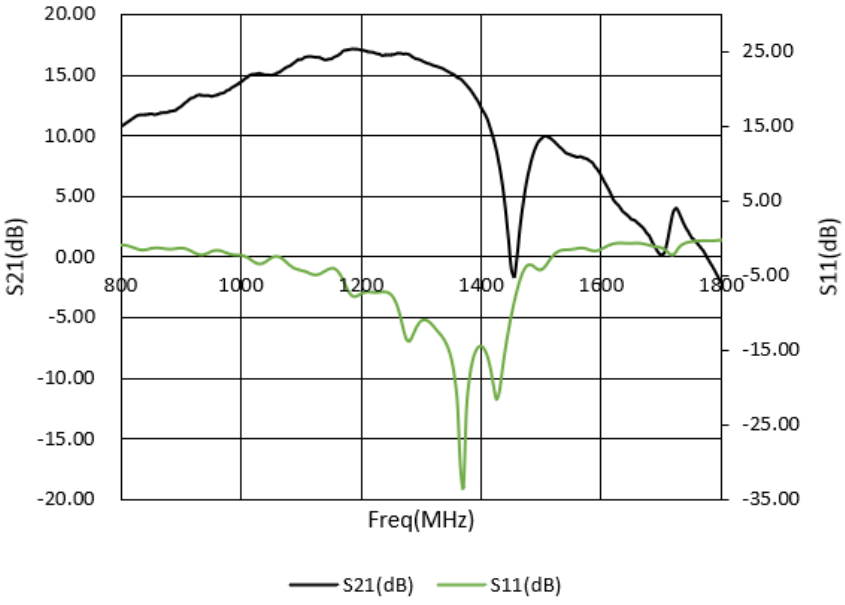
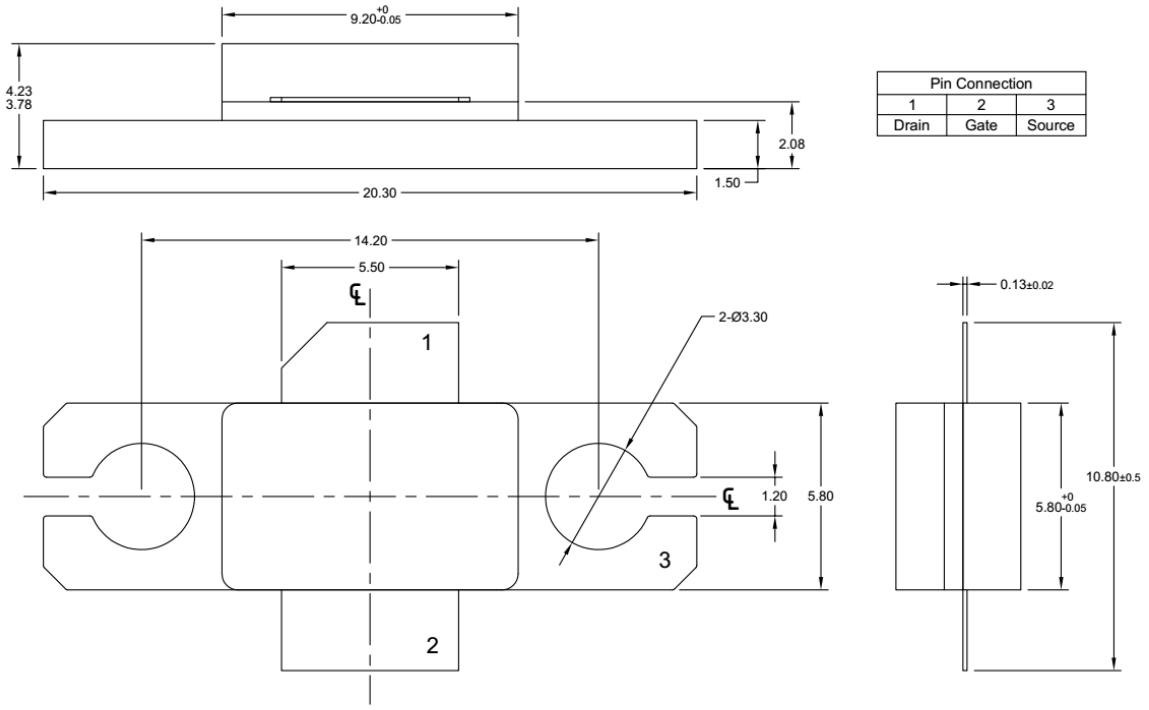


Figure 2. Network Analyzer S11/S21 output (Vds=28V,Vgs=-2.71V,Idq=100mA, Input Power =0dBm)

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
2019/12/27	V1.0	Preliminary Datasheet Creation
2020/2/17	V1.1	Correct typo of package info on first page
2020/9/14	V1.2	Modified application data based on the latest report

Application data based on ZL-20-15/GZY-20-37

Notice