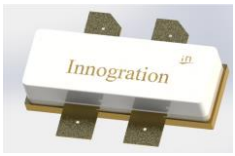
XTAH20150RL4 GaN TRANSISTOR

Document Number:
XTAH20150RL4
Preliminary Datasheet V1.0

GaN 28V 150W, 2GHz RF Power Transistor

XTAH20150RL4



Description

The XTAH20150RL4 is a 150W internally matched, GaN HEMT, designed for multiple applications, up to 2GHz. There is no guarantee of performance when this part is used in applications designed outside of these frequencies.

In its typical wideband application like 0.25-2GHz, it can deliver 100W CW

- Typical **CW** performance (on 0.25-2.0GHz fixture with device soldered)：

XTAH20150RL4 Vdd=28V Idq=200mA Vgs=-2.25V CW							Harmonic	
F (MHz)	Pin（dBm）	Pout（dBm）	Pout (W)	I (A)	Gain (dB)	Eff(%)	2nd	3th
225	36.2	49.8	95	7.38	13.6	46.2	-8	-9.2
250	37.8	51.5	141	7.81	13.7	64.6	-12.7	-11
275	36.0	51.45	140	6.62	15.5	75.3	-17.2	-11.2
300	37.2	50.9	123	5.57	13.7	78.9	-11.7	-20
400	36.7	50.5	112	5.55	13.8	72.2	-11	-13.5
500	37.5	50.7	117	7.5	13.2	55.9	-10.8	-12.1
600	37.6	51.55	143	9.07	14.0	56.3	-13.3	-14
700	36.5	52.30	170	9.20	15.8	65.9	-14.7	-15.5
800	37.0	51.43	139	6.80	14.4	73.0	-12.4	-21
900	37.4	50.58	114	5.50	13.2	74.2	-16.7	-19.1
1000	38.5	50.45	111	5.71	12.0	69.4	-20.8	-15.6
1100	38.5	51.07	128	7.21	12.6	63.4	-20.3	-18.2
1200	38.5	51.35	136	7.80	12.9	62.5	-34	-19.7
1300	38.5	50.91	123	7.30	12.4	60.3	-30.9	-26.6
1400	38.5	51.15	130	8.50	12.7	54.8	-36.3	-26.8
1500	38.4	51.49	141	8.80	13.1	57.2	-22.2	-32
1600	38.5	50.90	123	7.73	12.4	56.8	-19.6	-28.6
1700	37.4	50.75	119	6.81	13.4	62.3	-21.1	-32.5
1800	37.2	50.57	114	7.28	13.4	55.9	-27.1	-21.3
1900	37.2	51.24	133	8.10	14.0	58.7	-35.2	-26.3
2000	37.9	51.19	132	7.00	13.3	67.1	-47.2	-35.7

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

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Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

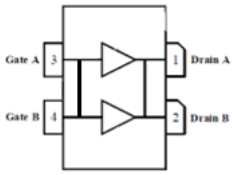
1. Set VGS to the pinch--off (VP) voltage, typically –5 V
2. Turn on VDS to nominal supply voltage (28V)
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

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

Figure 1: Pin Connection definition

Transparent top view (Backside grounding for source)



***Notice: Both leads at input and output are internally connected, device is only usable as single ended**

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	150	Vdc
Gate--Source Voltage	V_{GS}	-10,+2	Vdc
Operating Voltage	V_{DD}	32	Vdc
Maximum Forward Gate Current @ TC = 25°C	Igmax	33.6	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	225	W

Note: 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, RF CW operation，Pout=150W, 2GHz	$R_{\theta JC}$	0.85	C/W

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}=33.6mA	V_{DSS}	150			V
Gate Threshold Voltage	V_{DS} = 28V, I_D =33.6mA	V_{GS}(th)	-4		-2	V
Gate Quiescent Voltage	V_{DS} =28V, I_{DS}=300mA, Measured in Functional Test	$V_{GS(Q)}$		-2.3		V

0.25-2.0GHz

Figure 1: Small singal gain and return loss Vs Frequency

Vgs=-2.3V, Vds=28V, Idq=500mA, input power=0dBm

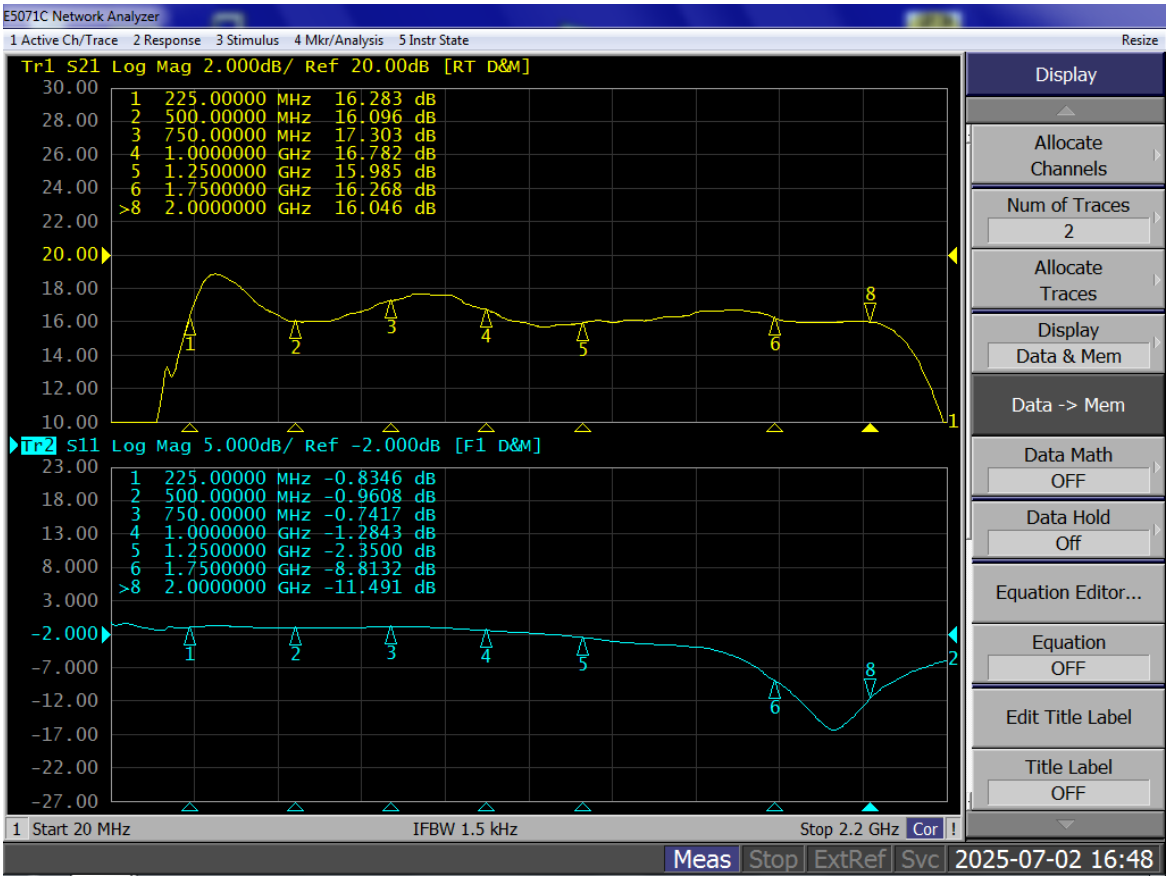
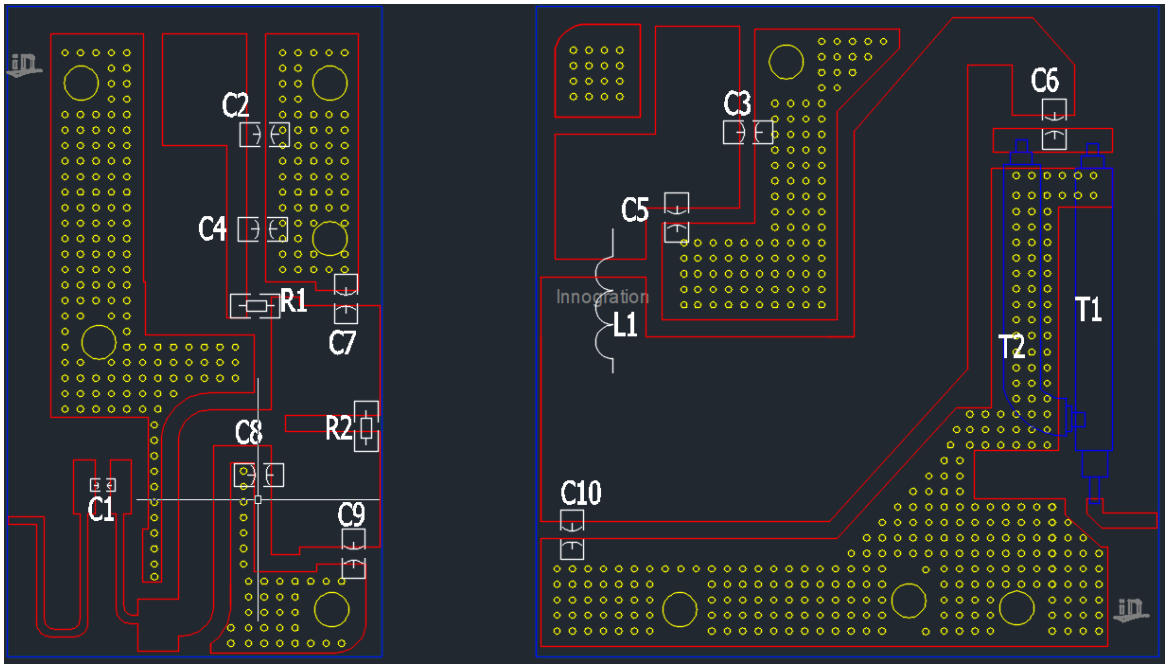
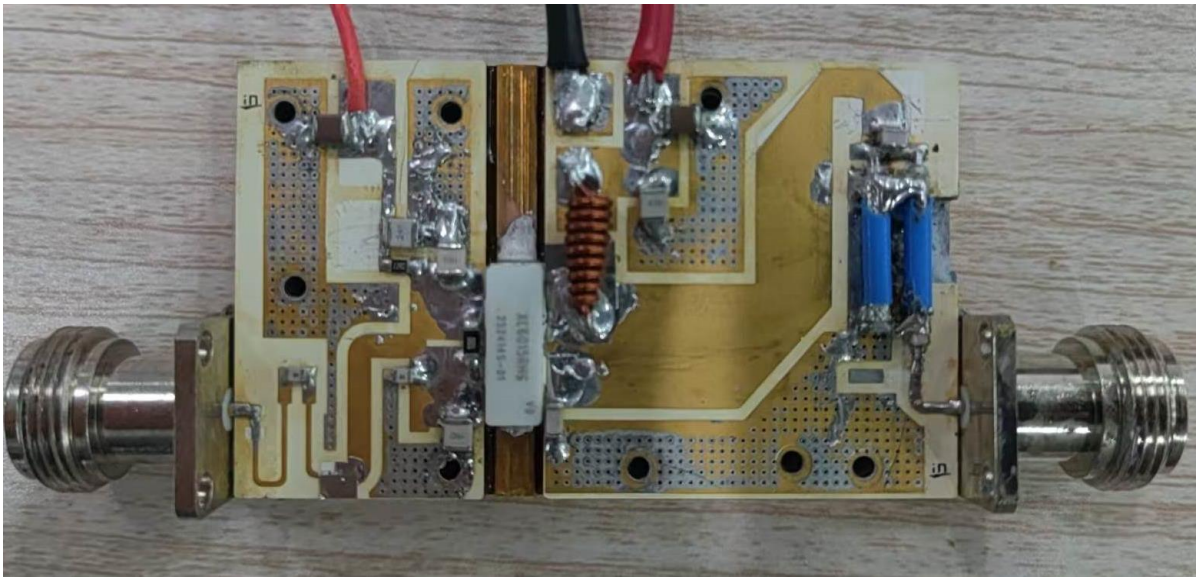


Figure 2: Picture and Bill of materials of 0.25-2GHz wide band application circuit

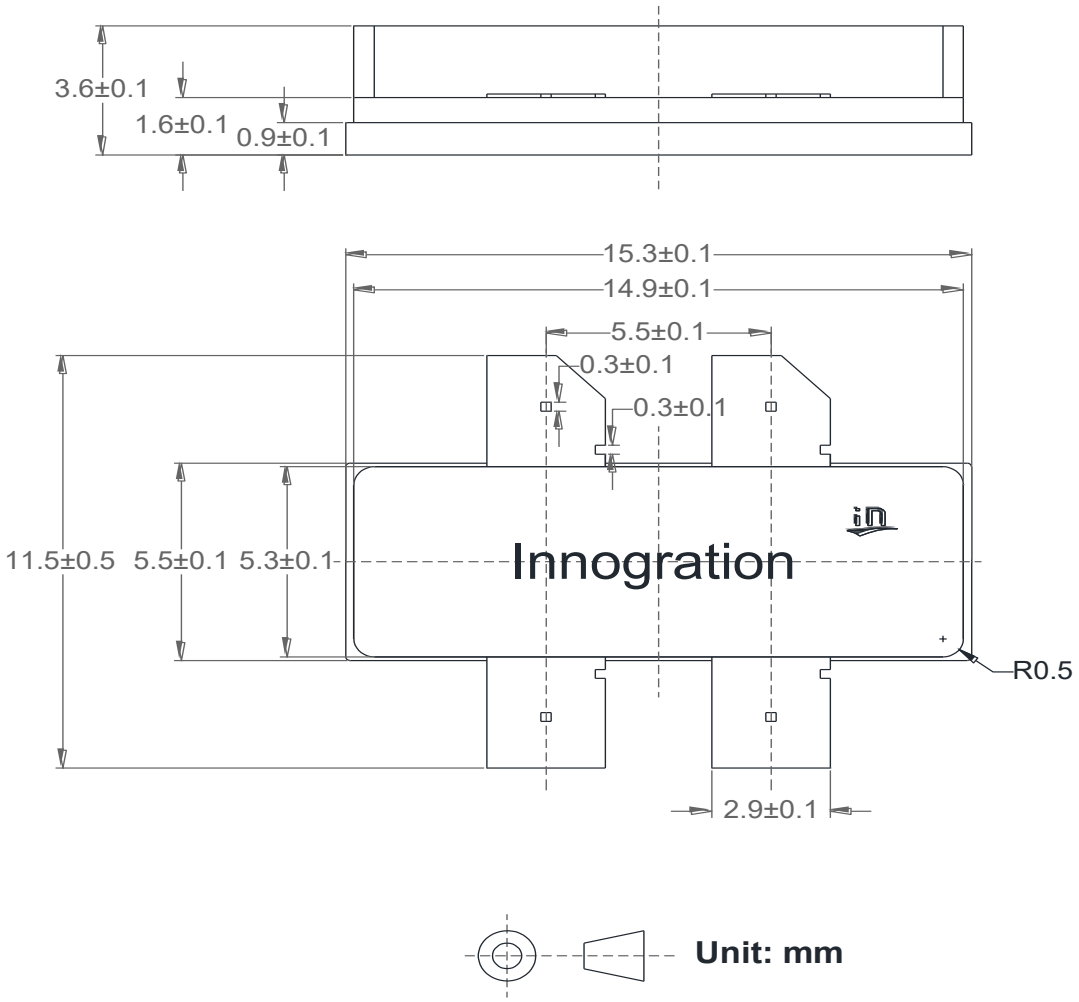
(Layout Gerber file upon request)





Component	Description	Suggested Manufacturer
C1	33pF/MQ300805	
C2,C3	10uF	
C4	240 p F/MQ301111	
C6	33pF / MQ300709	
C7,C9	3.3pF/ MQ301111	
C8	33pF/MQ300805	
C10	3.3pF MQ301111	
C5	47pF / MQ301111	
L1	9turns，conical inductor d=0.47mm	DIY air core inductance
R1	22 ohm/1206	Chip Resistor
R2	10 ohm/1206	Chip Resistor
T1	25ohm，19mm	RFSFBU-086-25
T2	25ohm，17mm	RFSFBU-086-25
PCB	FSD1020T ， Dk=10.2 ， 20mil	

Earless Flanged Ceramic Package; 4 leads



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2025/4/17	**V1.0**	**Preliminary Datasheet Creation**

Application data based on YHG-25-16

Notice

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