



Gallium Nitride, 220W,2.0-3.5GHz RF Power Transistor

Description

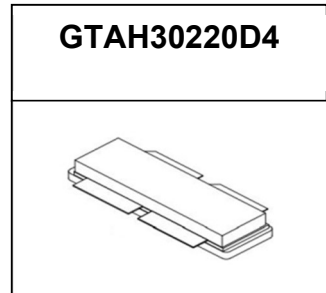
The GTAH30220D4 is a 200W 28V, both input and output matched GaN HEMT, ideal for multiple applications from 2.0-3.5GHz, and at higher voltage 32V, capable to output more than 250W.

It can support linear and saturated application, for both CW and pulsed CW.

There is no guarantee of performance when this part is used outside of stated frequencies.

- Typical performance across 2.7-3.5GHz class AB application circuit with device soldered

V_{ds}= 28V, I_{dq}=100mA(V_{gs}=-2.7V) ,CW



Freq(MHz)	Pin(dBm)	Psat(dBm)	Psat(W)	IDS(A)	Gain(dB)	Eff(%)
2700	38.57	54.63	290.40	16.73	16.06	61.99
2800	38.4	54.26	266.69	15.08	15.86	63.16
2900	39.65	54.17	261.22	15.05	14.52	61.99
3000	41.37	54.27	267.30	15.45	12.9	61.79
3100	40.76	54.11	257.63	14.78	13.35	62.25
3200	40.01	54.17	261.22	14.76	14.16	63.21
3300	39.41	54.07	255.27	14.81	14.66	61.56
3400	40.01	54.11	257.63	15.2	14.1	60.53
3500	41.48	53.75	237.14	13.9	12.27	60.93

Other application data upon request: 2.4-2.5GHz etc

Applications

- S band pulse power amplifier
- S band CW amplifier
- 5G wideband power amplifier

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

1. Set V_{GS} to the pinch--off (V_P) voltage, typically -5 V
2. Turn on V_{DS} to nominal supply voltage
3. Increase V_{GS} until I_{DS} current is attained
4. Apply RF input power to desired level

Turning the device OFF

1. Turn RF power off
2. Reduce V_{GS} down to V_P, typically -5 V
3. Reduce V_{DS} down to 0 V
4. Turn off V_{GS}

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V _{DSS}	+150	Vdc
Gate--Source Voltage	V _{GS}	-10 to +2	Vdc
Operating Voltage	V _{DD}	32	Vdc



Maximum gate current	I _{gs}	57.6	mA
Storage Temperature Range	T _{stg}	-65 to +150	°C
Case Operating Temperature	T _c	+150	°C
Operating Junction Temperature	T _j	+225	°C

Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case by FEA T _c = 85°C, at P _{out} =220W at 3.1GHz	R _{θJC}	0.3	°C /W

Table 3. Electrical Characteristics (TA = 25°C unless otherwise noted)

DC Characteristics (measured on wafer prior to packaging)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V _{GS} =-8V; I _{DS} =57.6mA	V _{DSS}		150		V
Gate Threshold Voltage	V _{DS} =10V, I _D = 57.6mA	V _{GS(th)}	-4		-2	V
Gate Quiescent Voltage	V _{DS} =28V, I _{DS} =80mA, Measured in Functional Test	V _{GS(Q)}		-2.7		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	3.1 GHz, P _{out} =220W Pulsed CW All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature

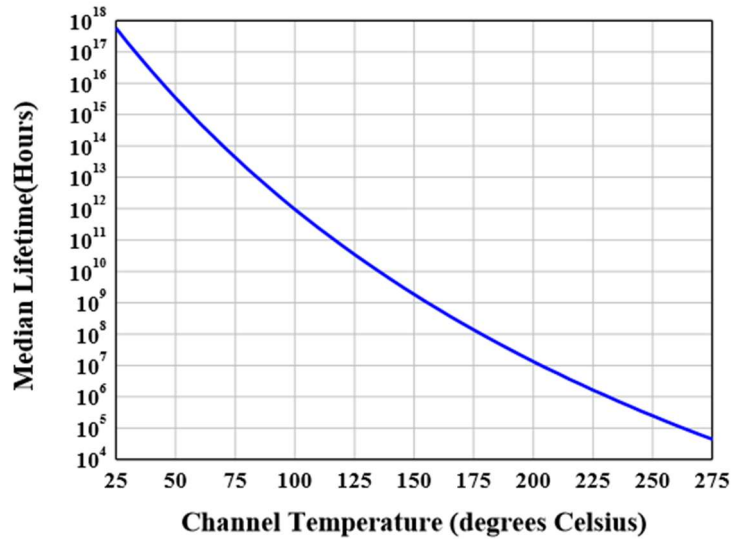




Figure 3: Efficiency and power gain as function of Pout (Pulsed CW Signal: 100us width , 10% duty cycle)

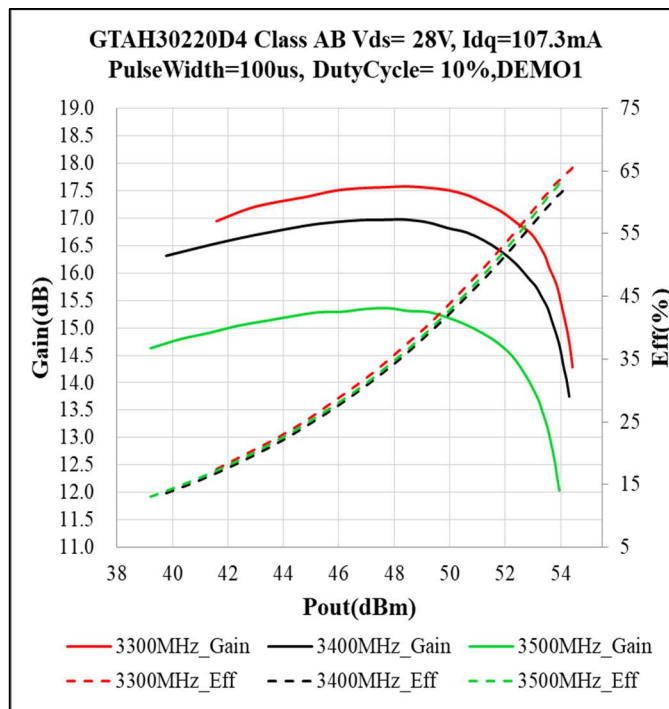
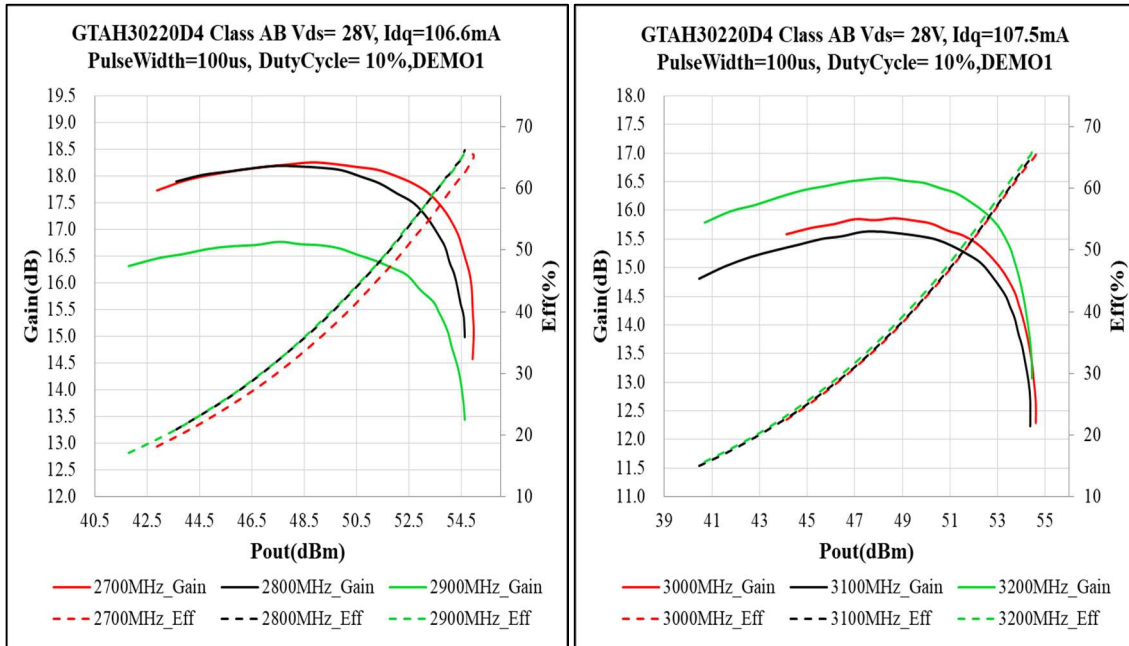




Figure 4: Network analyzer output, S11 and S21 (2.7-3.5GHz Class AB) Vds=28V, Idq=450mA

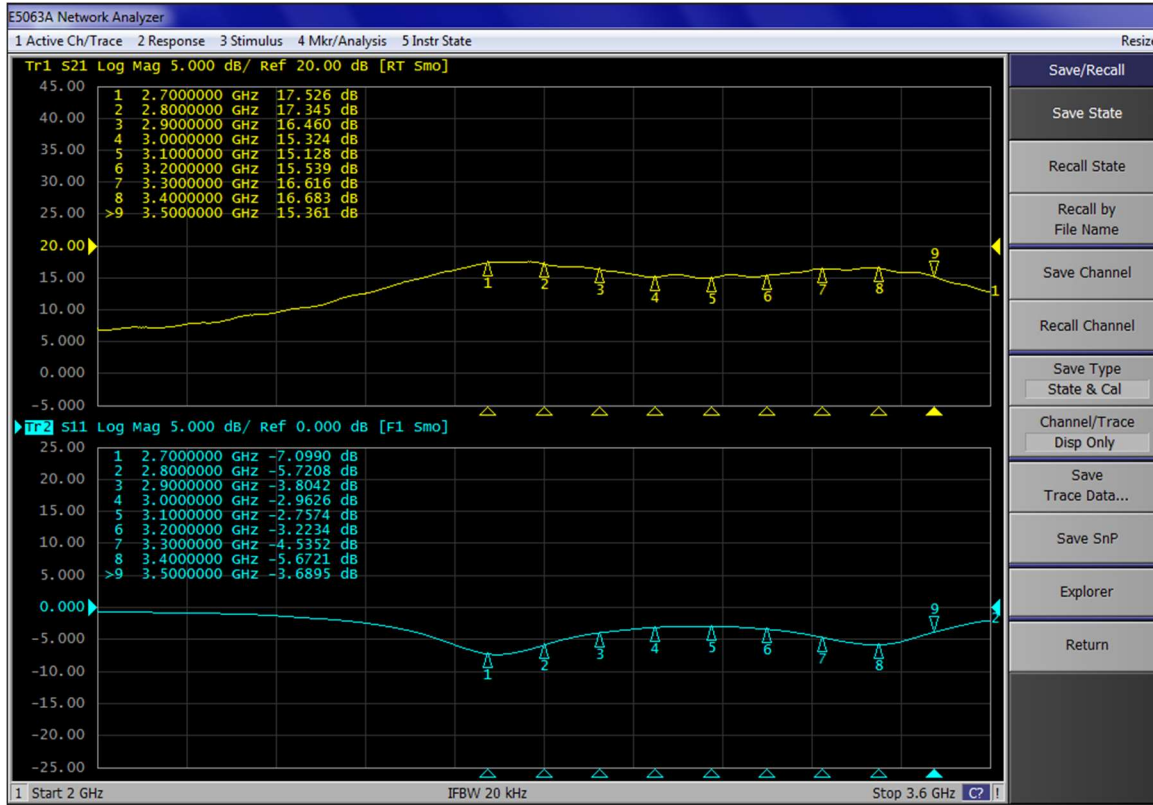


Figure 5: Picture of application board 2.7-3.5GHz class AB

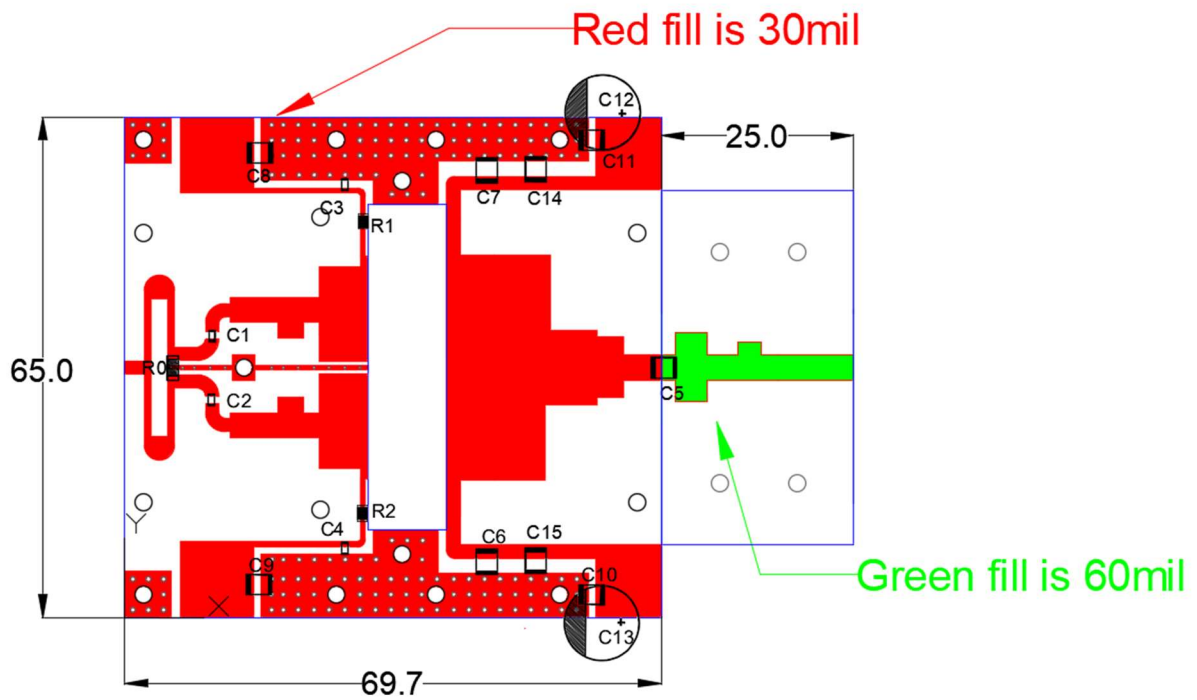




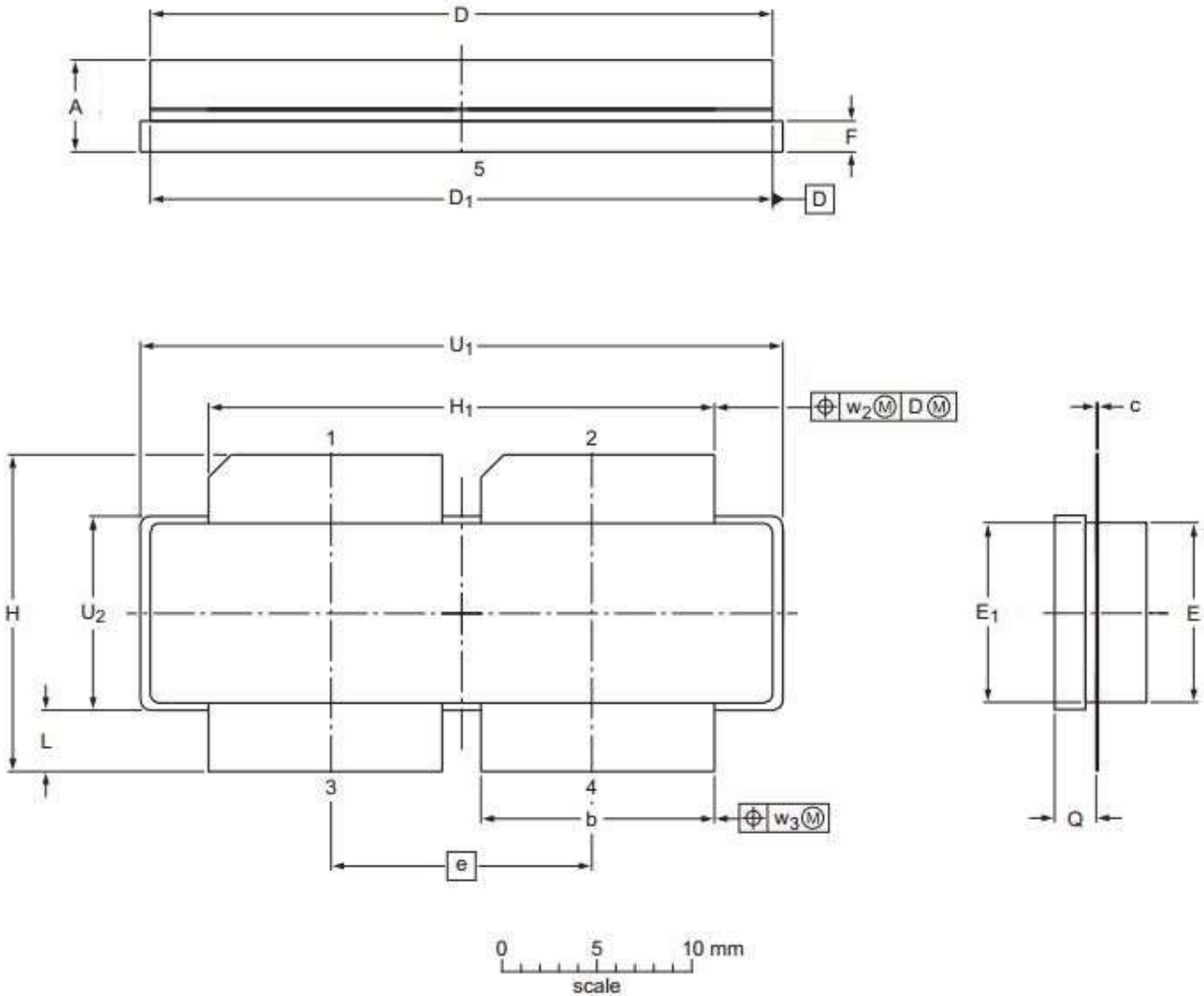
Table 4. Bill of materials of application board (PCB layout upon request)

Component	Description	Suggested Manufacturer
C12,C13	1000uF/63V	
C8,C9,C10,C11, C14, C15	10uF	1210
C5	MCM-1-300V-D-6R8D	
C6,C7	8.2pF	MQ101111
C1,C2,C3,C4	8.2pF	MQ300805
R0	Chip Resistor,100Ω	1206
R1,R2	Chip Resistor,10Ω	0805
PCB	Rogers tc350-plus, r= 3.5, thickness 30 mils, 1oz copper (red fill) ; //Taconic RF-35TC-0600-A, thickness 60 mils, 1oz copper(green fill)	



Package Outline

Earless flanged ceramic package; 4 leads (1、2—DRAIN、3、4—GATE、5—SOURCE)



UNIT	A	b	c	D	D ₁	e	E	E ₁	F	H	H ₁	L	Q	U ₁	U ₂	W ₂	W ₂
mm	4.7	11.81	0.18	31.55	31.52	13.72	9.50	9.53	1.75	17.12	25.53	3.48	2.26	32.39	10.29	0.25	0.25
	4.2	11.56	0.10	30.94	30.96		9.30	9.27	1.50	16.10	25.27	2.97	2.01	32.13	10.03		
inches	0.185	0.465	0.007	1.242	1.241	0.540	0.374	0.375	0.069	0.674	1.005	0.137	0.089	1.275	0.405	0.01	0.01
	0.165	0.455	0.004	1.218	1.219		0.366	0.365	0.059	0.634	0.995	0.117	0.079	1.265	0.395		

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-D4					03/12/2013



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2023/9/15	V1.0	Preliminary Datasheet Creation

Application data based on: YHG-23-22

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