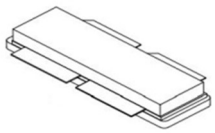
Gallium Nitride, 200W,3.0-4.2GHz RF Power Transistor

Description

STAH42200D4



The STAH42200D4 is a 200W 28V， both input and output matched GaN HEMT, ideal for multiple applications from 3.0-4.2GHz, 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 3.0-4.0GHz class AB application circuit with device soldered

Vds= 28V, Idq=200mA(Vgs=-3.13V) ,CW

Freq(MHz)	Pin(dBm)	Psat(dBm)	Psat(W)	Id(A)	Gain(dB)	Eff(%)
3000	43.13	53.47	222.33	13.69	10.34	58.00
3100	42.47	53.63	230.67	13.92	11.16	59.18
3200	42.54	53.72	235.50	14.01	11.18	60.03
3300	42.6	53.65	231.74	13.54	11.05	61.13
3400	42.44	53.38	217.77	12.84	10.94	60.57
3500	42.39	53.4	218.78	13.04	11.01	59.92
3600	42.12	53.54	225.94	13.64	11.42	59.16
3700	41.73	53.63	230.67	13.94	11.9	59.10
3800	40.8	53.52	224.91	13.97	12.72	57.50
3900	41.84	53.5	223.87	14.52	11.66	55.06
4000	42.21	53.23	210.38	14.6	11.02	51.46

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 VGS to the pinch--off (VP) voltage, typically –5 V
2. Turn on VDS to nominal supply voltage
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

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	Igs	50.4	mA
Storage Temperature Range	Tstg	-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 Pout=220W at 3.1GHz	$R_{\theta JC}$	0.3	°C /W

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

DC Characteristics (measured on wafer prior to packaging)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=50.4mA	V_{DSS}		150		V
Gate Threshold Voltage	VDS =10V, ID = 50.4mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =28V, IDS=200mA, Measured in Functional Test	$V_{GS(Q)}$		-3.1		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	4GHz, Pout=200W Pulsed CW All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature

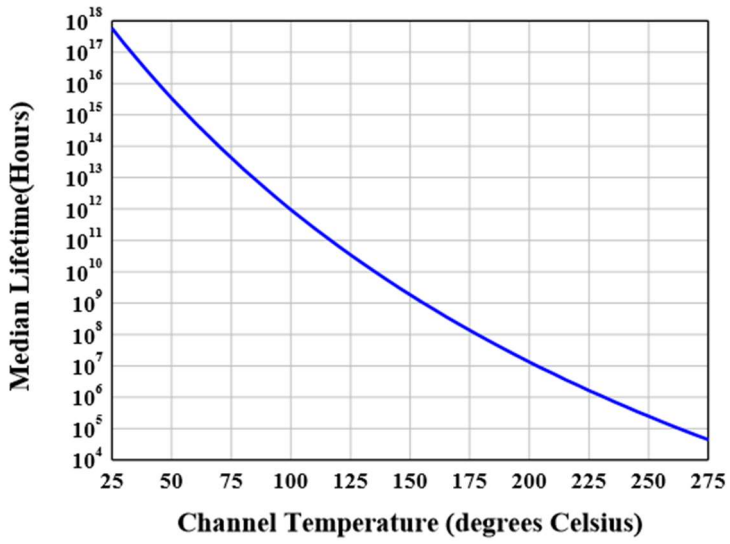


Figure 3: Network analyzer output, S11 and S21 (3.0-4.0GHz Class AB) Vds=28V, Idq=400mA

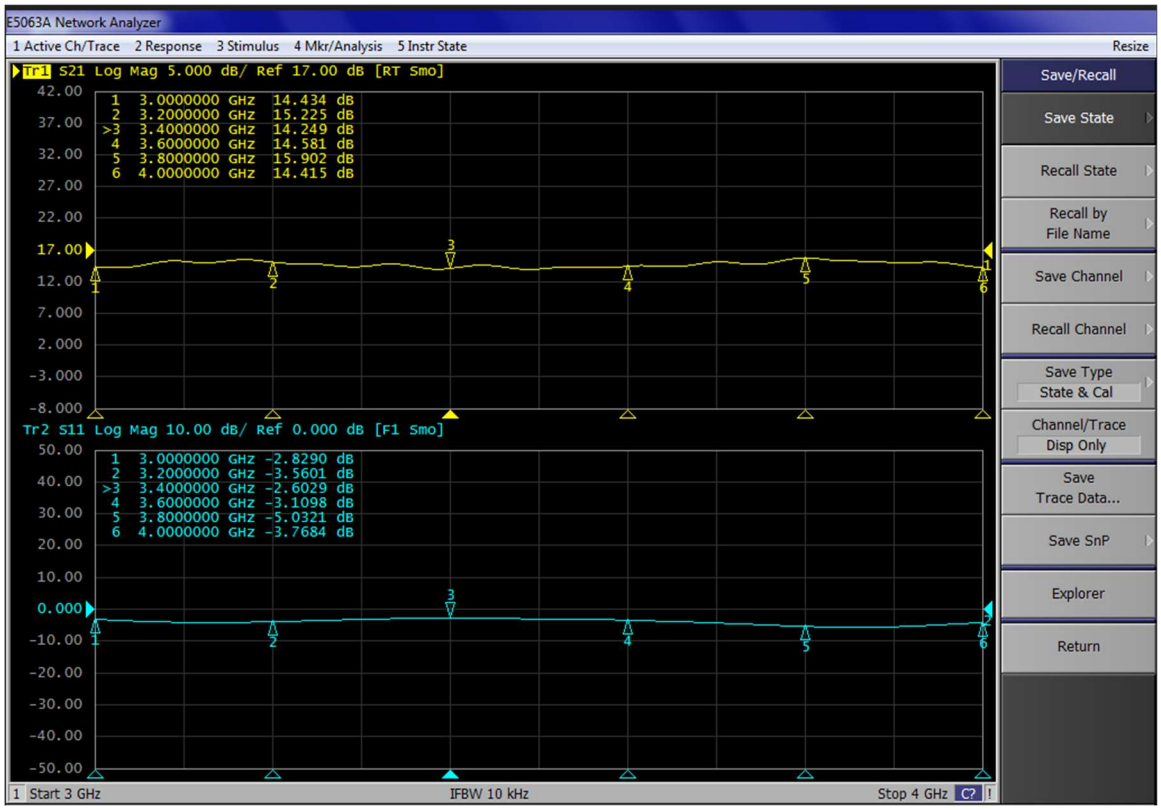


Figure 4: Picture of application board 3.0-4.0GHz class AB

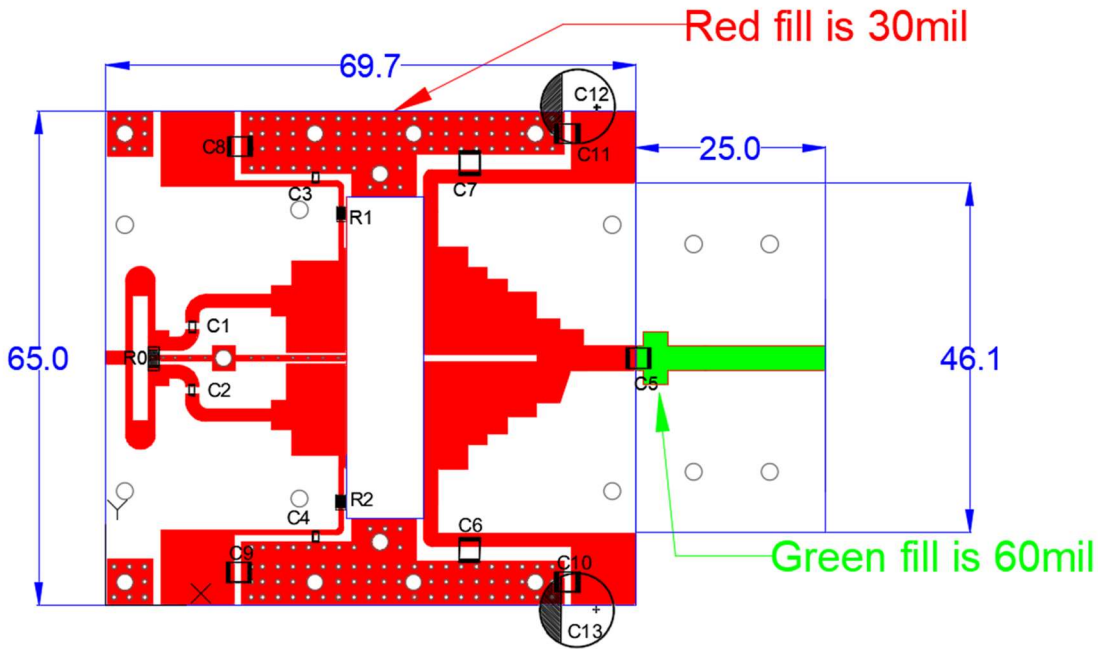
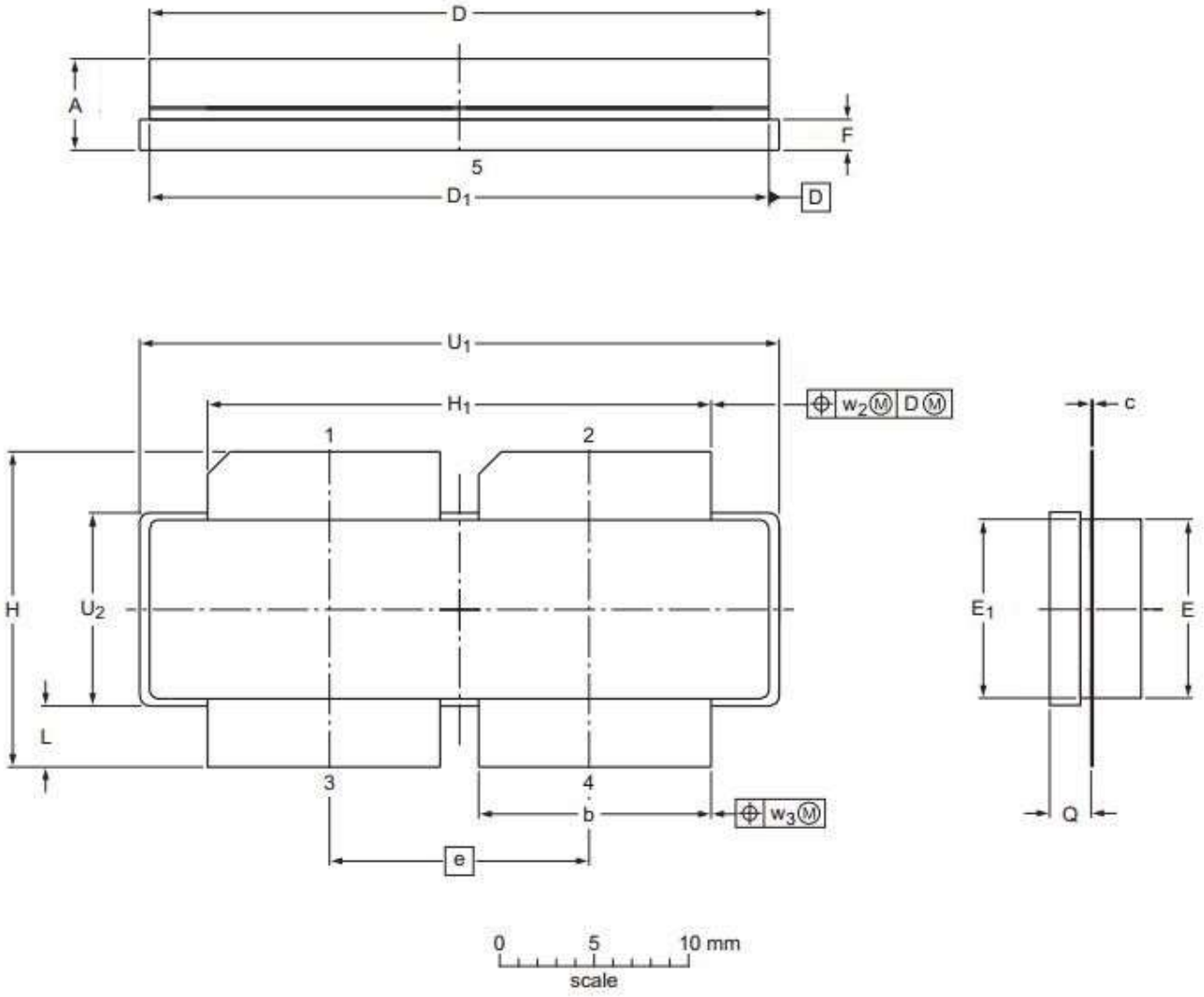


Table 4. Bill of materials of application board (PCB layout upon request)

Component	Description	Suggestion
C12,C13	1000uF/63V	
C8,C9,C10,C11	10uF	1210
C5	MCM-1-300V-D-100J	Huamao
C6,C7	6.8pF	MQ101111
C1,C2,C3,C4	6.8pF	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 4.2	11.81 11.56	0.18 0.10	31.55 30.94	31.52 30.96	13.72	9.50 9.30	9.53 9.27	1.75 1.50	17.12 16.10	25.53 25.27	3.48 2.97	2.26 2.01	32.39 32.13	10.29 10.03	0.25	0.25
inches	0.185 0.165	0.465 0.455	0.007 0.004	1.242 1.218	1.241 1.219	0.540	0.374 0.366	0.375 0.365	0.069 0.059	0.674 0.634	1.005 0.995	0.137 0.117	0.089 0.079	1.275 1.265	0.405 0.395	0.01	0.01

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
2023/10/9	**V1.0**	**Preliminary Datasheet Creation**

Application data based on: YHG-23-27

Notice