



Gallium Nitride,140W,2.0-4.0GHz RF Power Transistor

Description

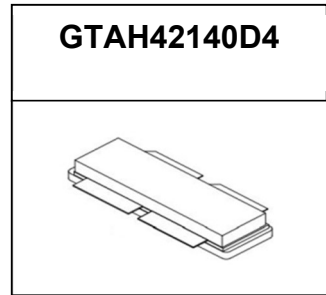
The GTAH42140D4 is a 140W 28V, both input and output matched GaN HEMT, ideal for multiple applications within full band of 2.0-4.0GHz.

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 2.0-4.0GHz class AB application circuit with device soldered

V_{ds}= 28V, I_{dq}=100mA(V_{gs}=-2.5V) ,CW



Freq(MHz)	Pin(dBm)	Pout(dBm)	Pout(W)	IDS(A)	Gain(dB)	Eff(%)
2000	39.85	50.54	113.24	11.32	10.69	35.73
2100	39.53	51	125.89	11.95	11.47	37.62
2200	38.61	50.95	124.45	12.2	12.34	36.43
2300	38.38	50.3	107.15	9.94	11.92	38.50
2400	38.29	50.54	113.24	8.9	12.25	45.44
2500	39.59	50.45	110.92	7.63	10.86	51.92
2600	40.77	50.53	112.98	7.07	9.76	57.07
2700	40.32	50.46	111.17	6.49	10.14	61.18
2800	39.05	50.76	119.12	7.36	11.71	57.80
2900	39.21	51	125.89	8.41	11.79	53.46
3000	39.68	51.35	136.46	9.07	11.67	53.73
3100	39.12	51.37	137.09	8.62	12.25	56.80
3200	37.87	50.99	125.60	7.766	13.12	57.76
3300	40.27	50.59	114.55	7.68	10.32	53.27
3400	39.75	50.49	111.94	7.86	10.74	50.87
3500	39.91	50.71	117.76	7.96	10.8	52.84
3600	39.87	50.39	109.40	8.3	10.52	47.07
3700	40.12	50.43	110.41	9.06	10.31	43.52
3800	39.83	50.68	116.95	9.61	10.85	43.46
3900	38.8	50.69	117.22	9.88	11.89	42.37
4000	39.74	50.58	114.29	10.28	10.84	39.71

- Recommended driver: GMAH0742-20C9



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}	36	Vdc
Maximum gate current	I _{gs}	36	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 Pout=100W at 4GHz	R _{θJC}	0.45	°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	VGS=-8V; IDS=36mA	V _{DSS}		150		V
Gate Threshold Voltage	VDS =10V, ID = 36mA	V _{GS(th)}	-4		-2	V
Gate Quiescent Voltage	VDS =28V, IDS=100mA, Measured in Functional Test	V _{GS(Q)}		-2.5		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	4GHz, Pout=100W Pulsed CW All phase, No device damages	VSWR		10:1		



Figure 2: Median Lifetime vs. Channel Temperature

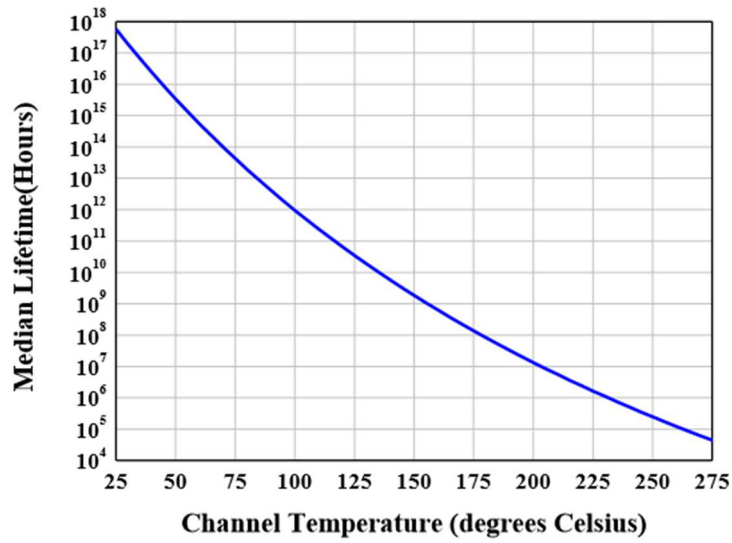


Figure 3: Network analyzer output, S11 and S21 (2.0-4.0GHz Class AB) Vds=28V, Idq=500mA

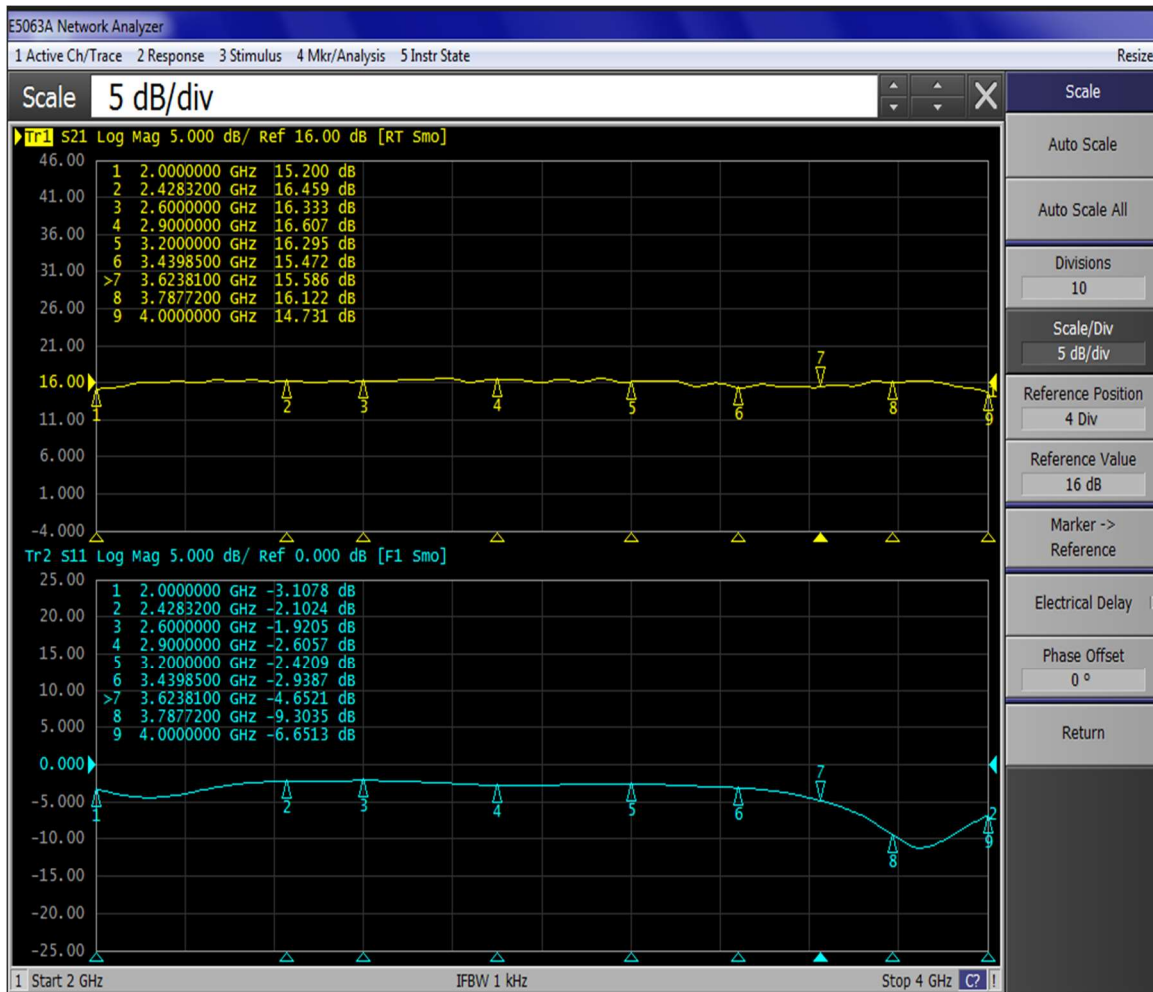


Figure 4: Picture of application board 2.0-4.0GHz class AB

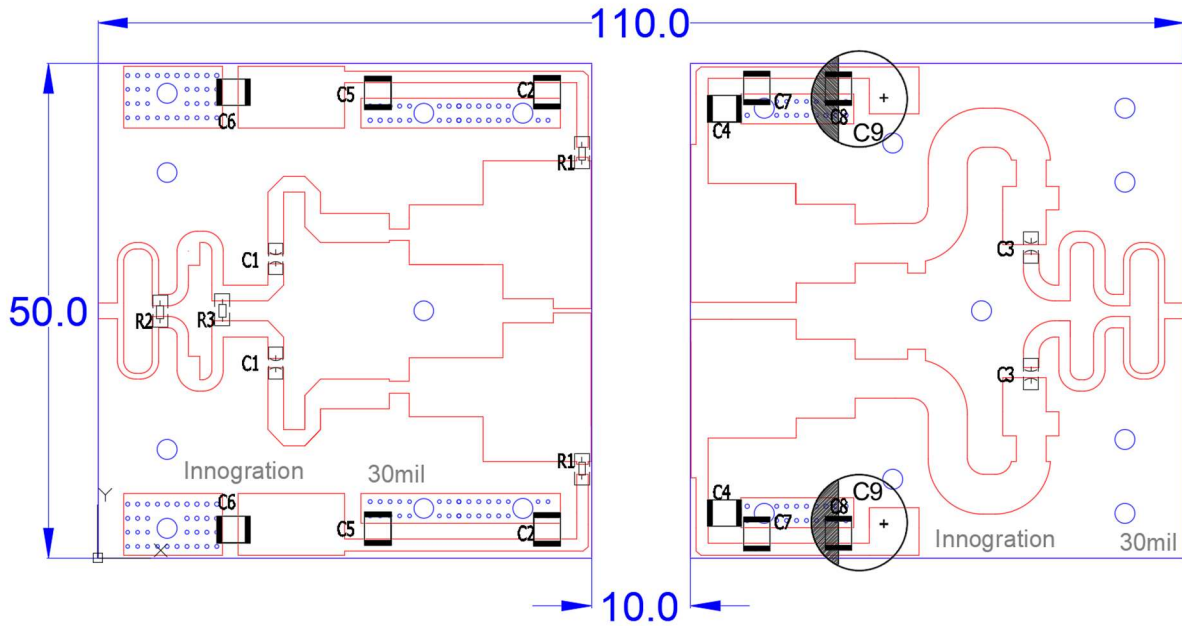


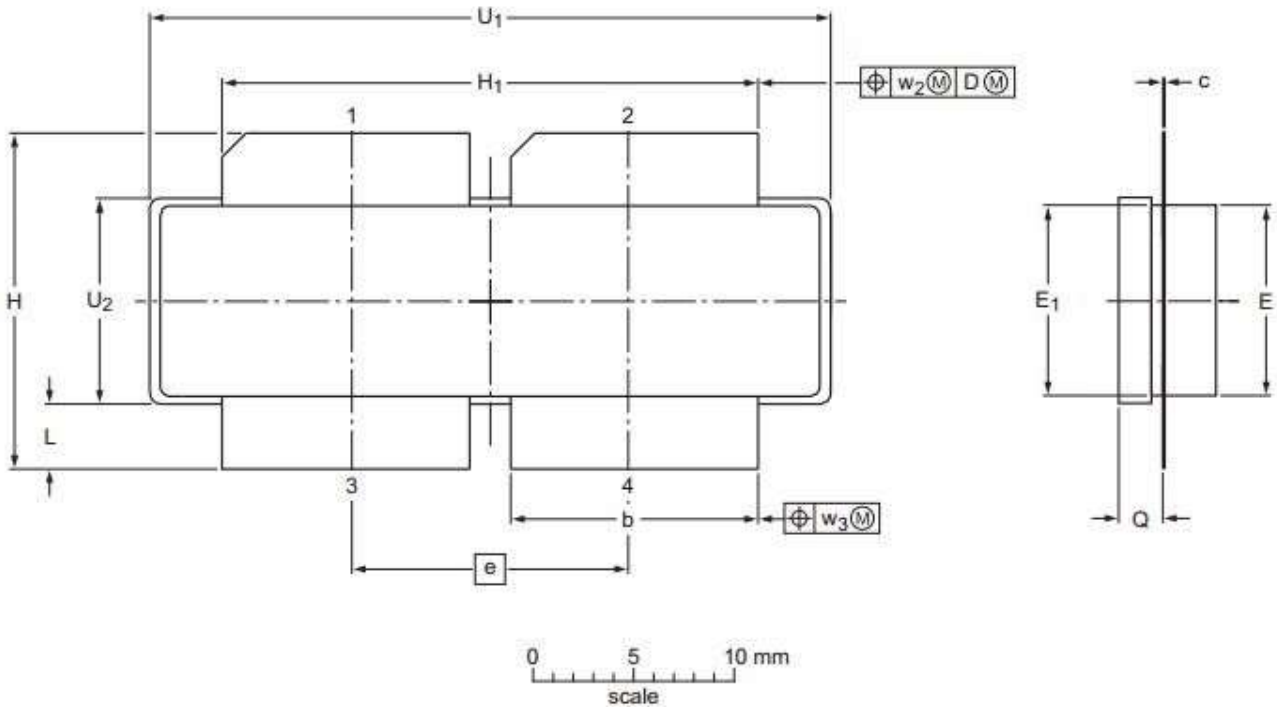
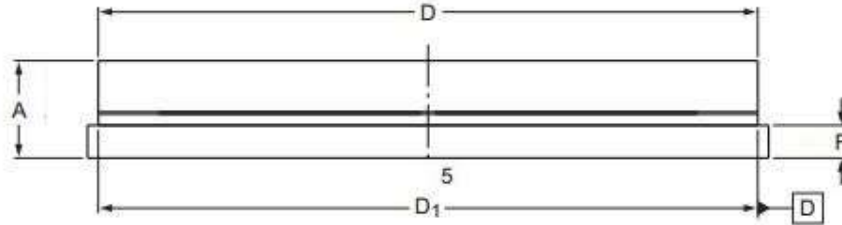
Table 4. Bill of materials of application board (PCB layout upon request)

Component	Description	Suggestion
C9	1000uF/63V	
C5,C6, C7,C8	10uF	1210
C1,C3	9.1pF	MQ300805
C2,C4	9.1pF	MQ301111
R1	Chip Resistor,10Ω	0805
R2	Chip Resistor,100Ω	1206
R3	Chip Resistor,240Ω	1812
PCB	30 mil Rogers 4350B	



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
2023/11/17	V1.0	Preliminary Datasheet Creation

Application data based on: YHG-23-30

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