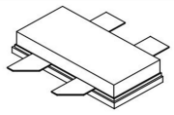
GaN 140W,2-5GHz ,28V,RF Power Transistor

GTAH50141BY4



Description

The GTAH50141BY4 is a 28V 140W device, both input and output matched GaN HEMT, ideal for multiple applications within 2 to 5GHz. It can support CW and pulse CW , and any other modulation signals

In its typical wideband application, it can deliver 100W across the full band of 2 to 5GHz

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

- Typical performance across 2-5GHz class AB application circuit with device soldered

Vds=28V Vgs=-2.62V Idq=100mA

Freq(MHz)	Pin(dBm)	Psat(dBm)	Psat(W)	Ids(A)	Gain(dB)	Eff(%)	2nd(dBc)	3rd(dBc)
2000	43.50	50.75	118.9	7.56	7.3	56.1	-11.3	-13.7
2100	43.50	50.83	121.1	7.87	7.3	54.9	-10.4	-20.2
2200	43.50	51.17	130.9	8.29	7.7	56.4	-11.6	-20.0
2300	43.50	51.24	133.0	8.09	7.7	58.7	-12.6	-23.4
2400	43.50	51.46	140.0	8.25	8.0	60.6	-10.1	-23.4
2500	43.50	51.55	142.9	9.04	8.1	56.5	-13.5	-25.1
2600	43.50	51.29	134.6	8.09	7.8	59.4	-12.8	-26.8
2700	43.50	51.30	134.9	8.08	7.8	59.6	-12.0	-23.4
2800	43.50	51.11	129.1	7.50	7.6	61.5	-13.2	-19.3
2900	43.50	50.85	121.6	7.11	7.4	61.1	-14.0	-14.8
3000	43.50	50.82	120.8	6.86	7.3	62.9	-15.8	-20.0
3100	43.50	50.67	116.7	6.48	7.2	64.3	-22.3	-17.0
3200	43.50	50.52	112.7	6.54	7.0	61.6	-22.5	-23.7
3300	43.50	50.45	110.9	6.42	7.0	61.7	-26.3	-30.0
3400	43.50	50.37	108.9	6.46	6.9	60.2	-29.8	-30.4
3500	43.50	50.62	115.3	7.21	7.1	57.1	/	/
3600	43.50	50.71	117.8	7.42	7.2	56.7	/	/
3700	43.50	51.10	128.8	8.50	7.6	54.1	/	/
3800	43.50	51.60	144.5	9.33	8.1	55.3	/	/
3900	43.50	51.53	142.2	8.84	8.0	57.5	/	/
4000	43.50	51.41	138.4	8.44	7.9	58.5	/	/
4100	43.50	50.97	125.0	7.62	7.5	58.6	/	/
4200	43.50	50.74	118.6	7.66	7.2	55.3	/	/
4300	43.50	50.80	120.2	8.01	7.3	53.6	/	/
4400	43.50	50.65	116.1	7.80	7.2	53.2	/	/
4500	43.50	50.56	113.8	7.81	7.1	52.0	/	/
4600	43.50	50.53	113.0	7.85	7.0	51.4	/	/

4700	43.50	50.54	113.2	8.00	7.0	50.6	/	/
4800	43.50	50.80	120.2	8.49	7.3	50.6	/	/
4900	43.50	50.90	123.0	8.55	7.4	51.4	/	/
5000	43.50	51.20	131.8	9.51	7.7	49.5	/	/

Applications

- S and C band power 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

Figure 1: Pin Connection definition

Transparent top view (Backside grounding for source)

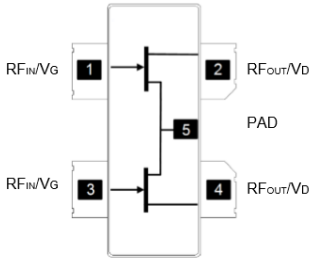


Table 1. Maximum Ratings

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	Igs	36	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=140W Pulsed CW at 4GHz	$R_{\theta JC}$	1	°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=36mA	V_{DSS}		150		V
Gate Threshold Voltage	VDS =10V, ID = 36mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =28V, IDS=110mA, Measured in Functional Test	$V_{GS(Q)}$		-2.57		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	4GHz, Pout=140W Pulsed CW All phase, No device damages	VSWR		10:1		

Typical performance

2000-5000MHz

Figure 3: Picture of application board ,class AB

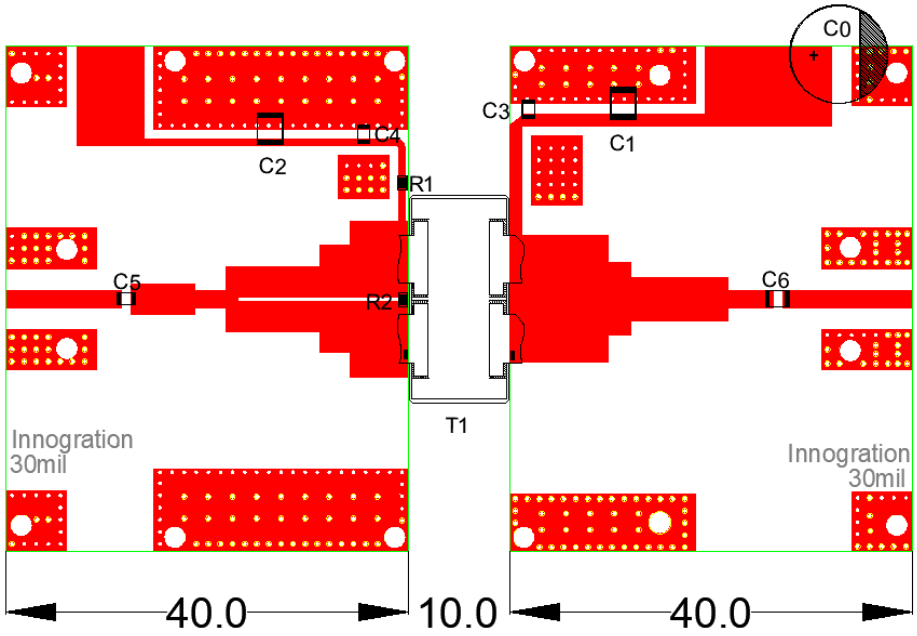
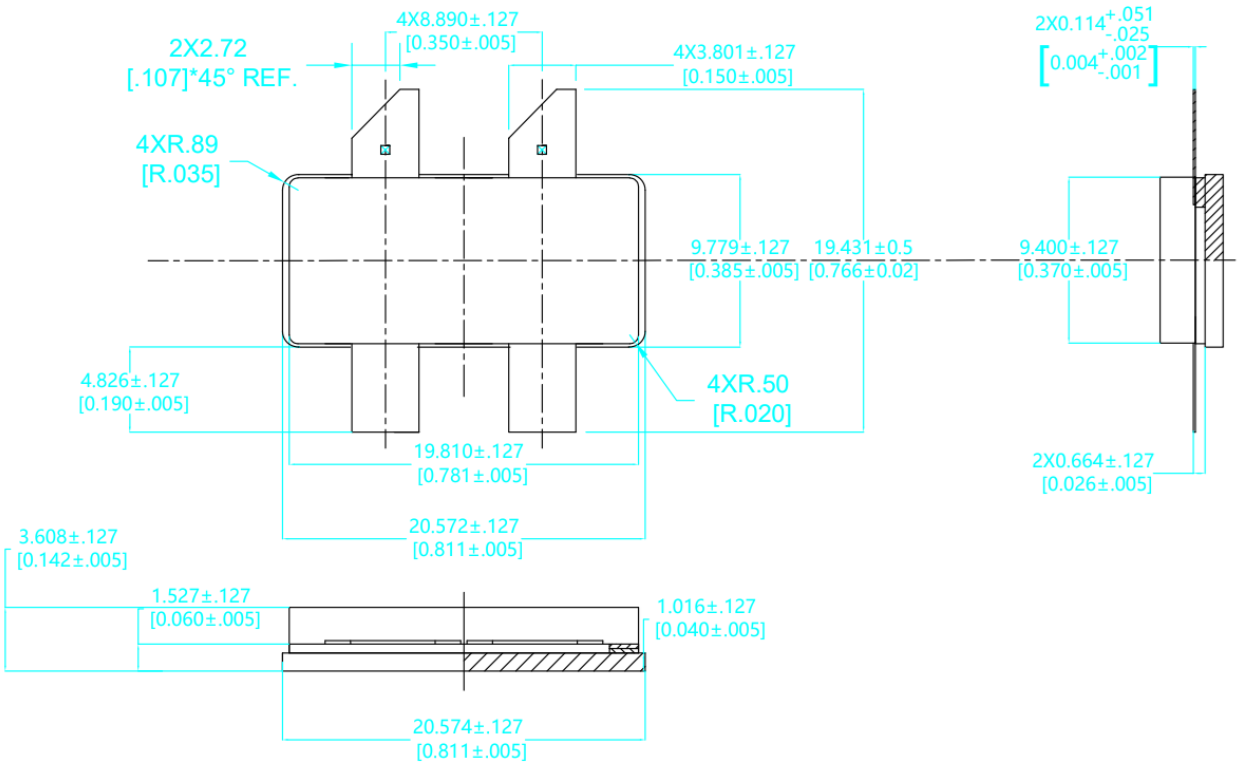


Table 4. Bill of materials of application board (PCB layout upon request)

Component	Description	Suggestion
C0	470uF/100V	Electrolytic Capacitor
C1, C2	10uF	1210
C3, C4, C5	5.6pF	BMQ400805
C6	5.6pF	MQ301111
R1	Chip Resistor,10Ω	0805
R2	Chip Resistor,10Ω	0603
T1	GTAH50141BY4	Innogration
PCB	Rogers 4350B, thickness 30 mils, 1oz copper	

Earless Flanged Ceramic Package; 4 leads



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2023/11/10	V1.0	Product Datasheet Creation
2025/7/2	V1.1	Change application data with improved efficiency and gain flatness

Application data based on: RXT-23-44/25-23

Notice

Specifications are subject to change without notice. Innogration believes the information within the data sheet to be reliable. Innogration makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose.
"Typical" parameter is the average values expected by Innogration in quantities and are provided for information purposes only. It can and do vary in different applications and related performance can vary over time. All parameters should be validated by customer's technical experts for each application.
Innogration products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Innogration product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility.
For any concerns or questions related to terms or conditions, please check with Innogration and authorized distributors