



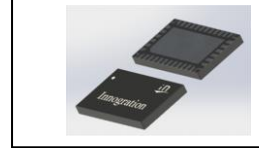
## GaN HEMT 28V, 5.8GHz 12W, RF Power Transistor

### Description

The GTAH58012C6 is a 12W GaN HEMT, designed for ISM/RF Energy application around 5.8GHz. The transistor is available in a highly cost effective 10\*6mm, surface mount, QFN package with 100% production test to ensure the quality and consistency.

It can be used in CW, Pulse and any other modulation modes.

### GTAH58012C6



- Typical Class AB RF Performance with device soldered through high density and plated grounding vias

5.1-5.9GHz CW, Vds=28V, Idq=20mA

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
5100	40.31	10.75	52.35	15.06	41.58	14.39	56.03
5200	40.46	11.11	52.78	14.77	41.46	14	55.44
5300	40.53	11.31	52.73	14.33	41.37	13.72	54.61
5400	40.55	11.35	52.03	14.38	41.43	13.89	54.14
5500	40.38	10.92	50.71	14.53	41.59	14.4	54.24
5600	40.39	10.95	49.63	14.18	41.59	14.43	53.73
5700	39.94	9.87	47.6	14.36	41.67	14.69	53.27
5800	39.93	9.84	48.79	14.27	41.6	14.44	54.28
5900	39.66	9.44	47.48	14.36	41.32	13.55	54.66

4-6GHz CW, Vds=28V, Idq=20mA

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
4000	40.83	12.1	46.1	9.4	42.95	19.7	55.7
4200	41.55	14.3	52.5	10.68	42.92	19.6	58.9
4400	41.47	14.0	56.6	11.75	42.56	18.0	60.9
4600	41.12	13.0	57.8	12.24	42.1	16.2	61.1
4800	40.67	11.7	57.0	11.99	41.75	15.0	60.4
5000	40.33	10.8	54.4	11.32	41.47	14.0	57.5
5200	40.08	10.2	50.3	11.13	41.38	13.7	53.6
5400	40	10.0	48.6	10.85	41.5	14.1	52.7
5600	39.67	9.3	45.5	10.84	41.65	14.6	52.1
5800	39.27	8.5	42.6	11.18	41.82	15.2	52.2
6000	38.83	7.6	44.3	11.87	41.25	13.3	53.2

### Applications

- C band power amplifier
- ISM/RF Energy 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

#### Turning the device OFF

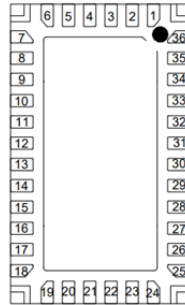
1. Turn RF power off
2. Reduce VGS down to VP, typically -5 V



3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level
3. Reduce VDS down to 0 V
4. Turn off VGS

Figure 1: Pin Connection definition

Transparent top view (Backside grounding for source)



Pin No.	Symbol	Description
8,9,10,11	RF IN/Vgs	RF Input, Vgs bias
32,33,34,35	RF OUT/VDD	RFOutput, Drain bias
Rest Pins and Package Base	GND	DC/RF Ground. Must be soldered directly to heatsink or copper coin for CW application.

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	$V_{DSS}$	+150	Vdc
Gate--Source Voltage	$V_{GS}$	-8 to +0.5	Vdc
Operating Voltage	$V_{DD}$	36	Vdc
Maximum gate current	$I_{GS}$	3	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 $T_C = 85^\circ\text{C}$ , at $P_{diss} = 8\text{W}$	$R_{\theta JC}$	10	°C /W

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

DC Characteristics (main path, measured on wafer prior to packaging)

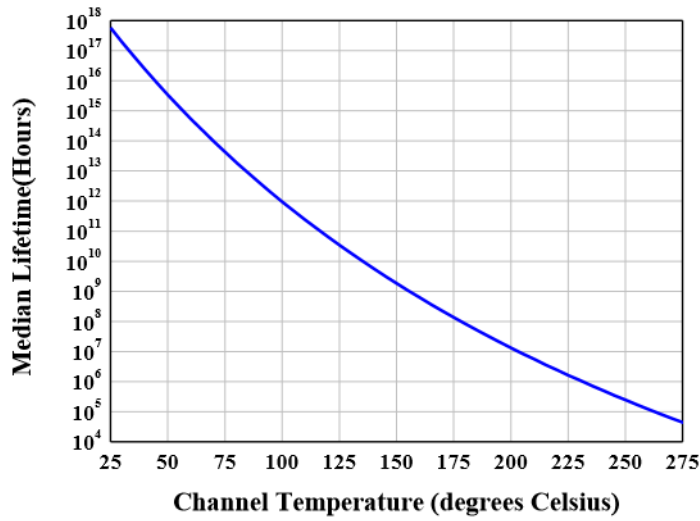
Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = -8\text{V}$ ; $I_{DS} = 3\text{mA}$	$V_{DSS}$		200		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$ , $I_D = 3\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 28\text{V}$ , $I_{DS} = 20\text{mA}$ , Measured in Functional Test	$V_{GS(Q)}$		-2.6		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	5.8GHz, $P_{out} = 12\text{W}$ Pulsed CW All phase, No device damages	VSWR		10:1		



Figure 2: Median Lifetime vs. Channel Temperature



### 5.1-5.9GHz

### Typical performance

Figure 3: Efficiency and power gain as function of Pout

GTAH58012C6 Class AB Vds= 28V, Idq=19.1mA  
PulseWidth= 20us, DutyCycle= 10%, DEMO1

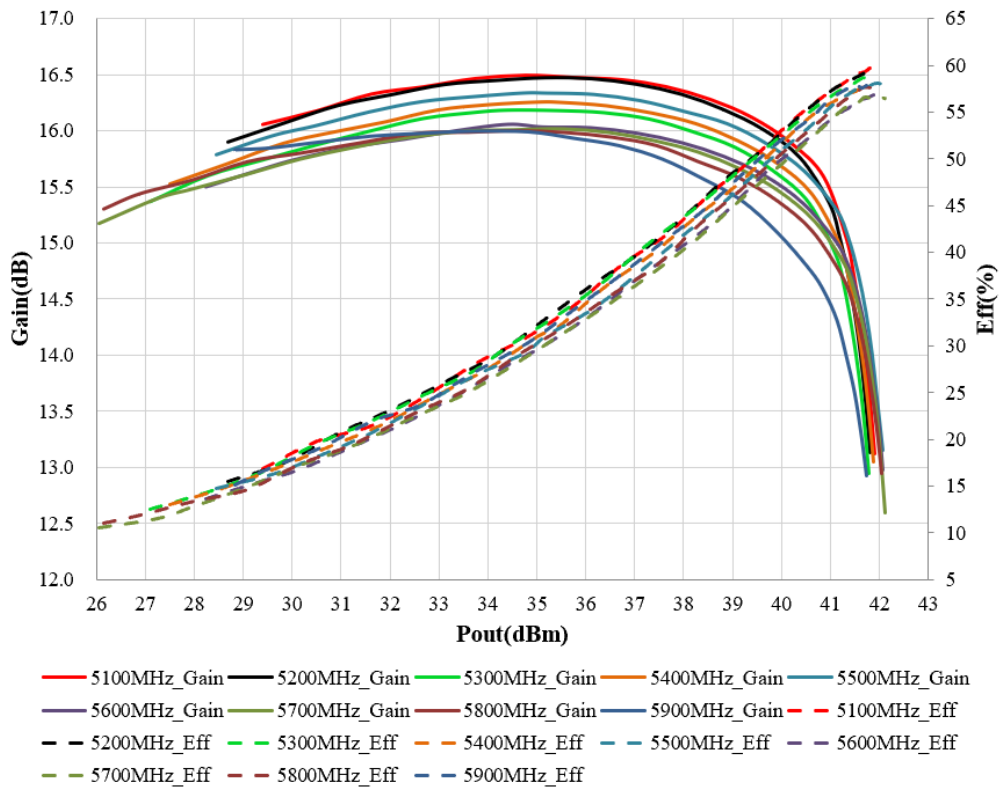




Figure 4: Network analyzer output S11/S21

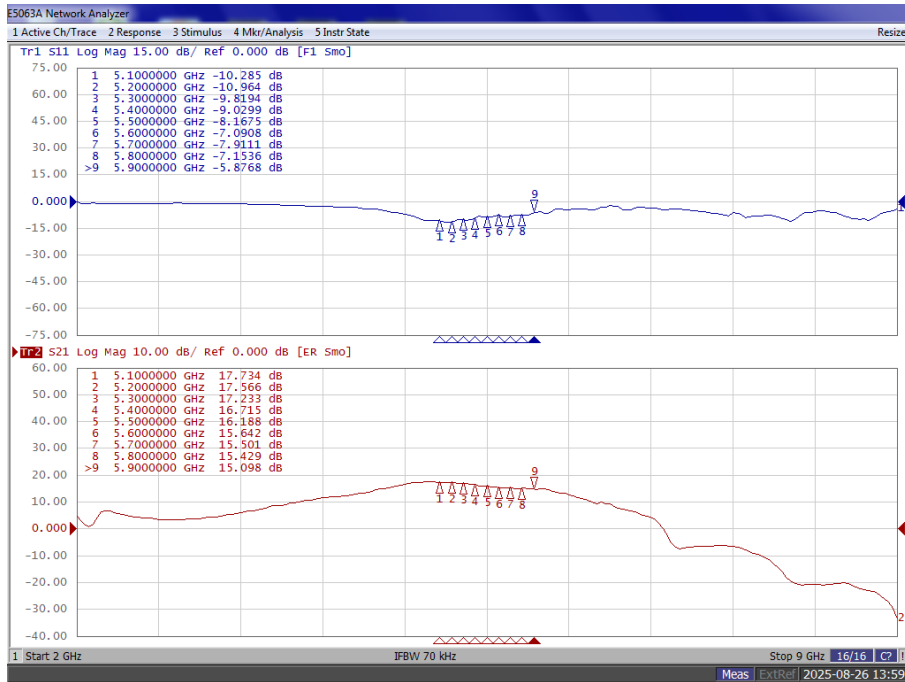


Figure 5: Picture of application board

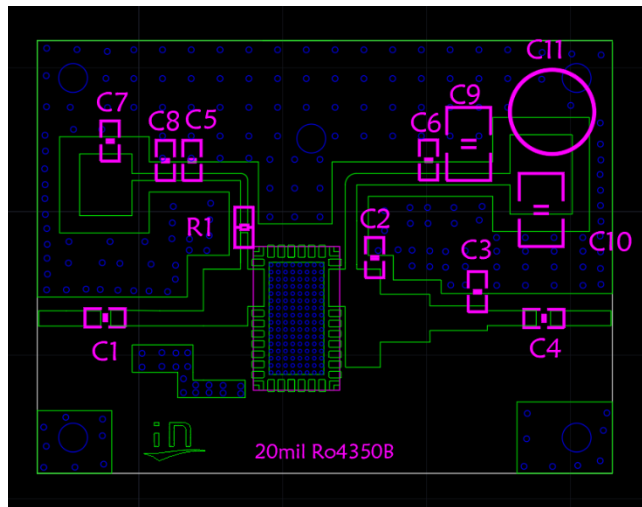


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Component	Value	Quantity
U1	GTAH58012C6	1
C1、C4、C5、C6	3.3pF	4
C2、C3	0.3pF	2
C7	10nF	1
C8	1nF	1
C9、C10	10uF/63V	2
R1	10 Ω	1
C11	470uF/63V	1

## 4-6GHz

### Typical performance

Figure 6: Network analyzer output S11/S21

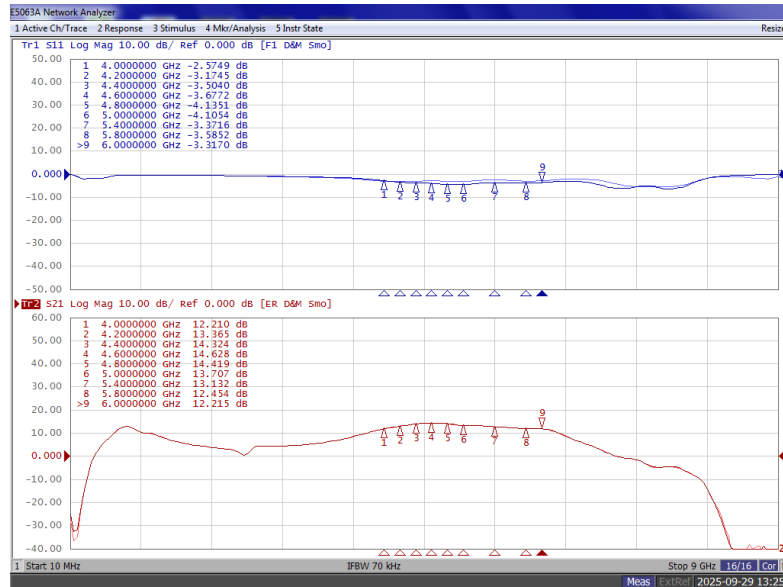


Figure 7: Picture of application board

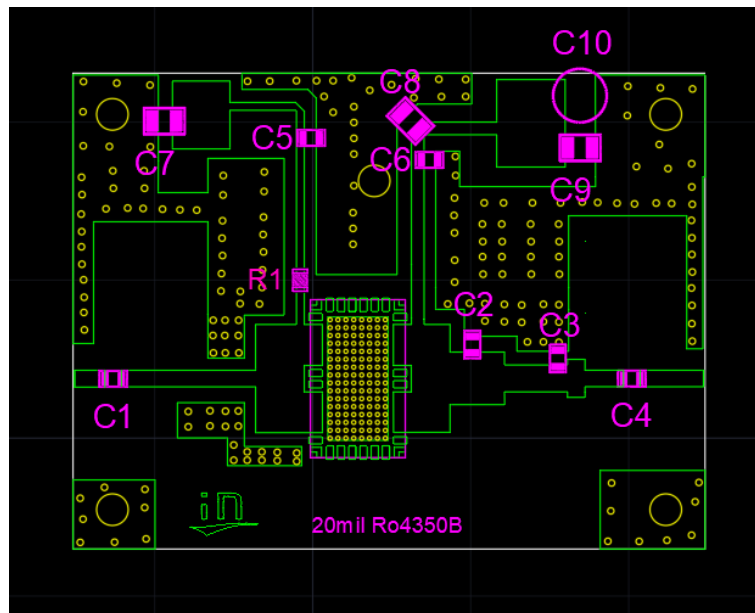
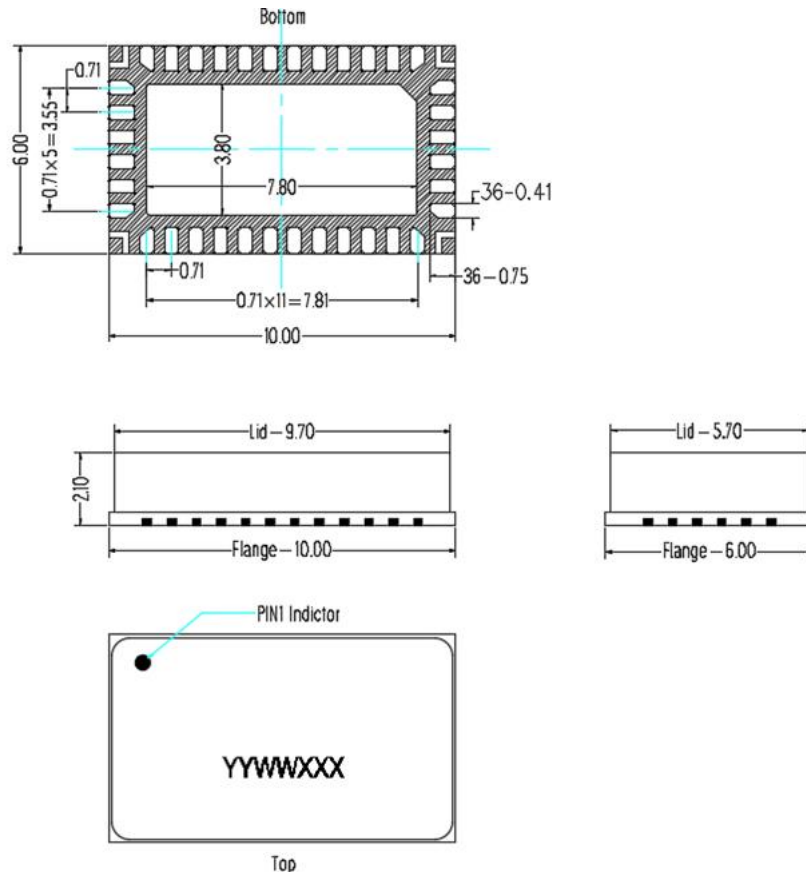


Table 5. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Component	Value	Quantity
C1、C4、C5、C6	3.9pF	4
C2、C3	0.3pF	2
C7、C8、C9	10uF/63V	3
C10	470uF/63V	1
R1	10 Ω	1



**10\*6 Plastic Package**



**Notes:**

1. All dimensions are in mm;
2. The tolerances unless specified are  $\pm 0.2$ mm.

**Revision history**

Table 4. Document revision history

Date	Revision	Datasheet Status
2024/4/26	V1.0	Preliminary Datasheet Creation
2025/8/26	V1.1	Modify S11/S21 with increased Idq
2025/10/24	V1.2	Add 4-6GHz data

Application data based on: ZYX-24-37/25-43

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