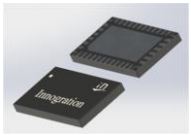
GaN HEMT 28V, 20W, C band General purpose RF Power Transistor

XTAH78020C6



Description

The XTAH78020C6 is a 20W GaN HEMT, designed for multiple applications, within 6-8GHz.

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.

There is no guarantee of performance when this part is used in applications designed Outside of these frequencies.

- Typical 7.2-7.8GHz broadband performance with device soldered

  VDS = 28V, IDQ = 60mA, VGS=-2.6V，CW

Signal	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
Pulsed CW	41.3	13.5	44	12.5	43.2	21	51
CW	40.8	12.5	40	12	43	20	46

Applications

- C band power amplifier
- ISM/RF Energy power amplifier

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

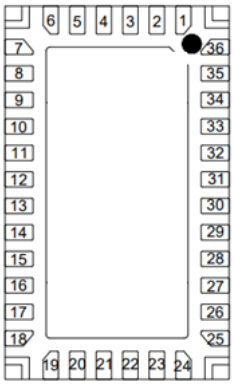
1. Set VGS to the pinch--off (VP) voltage, typically –5 V
2. Turn on VDS to nominal supply voltage
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

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)



Pin No.	Symbol	Description
8,9,10,11,14,15,16,17	RF IN/Vgs	RF Input, Vgs bias
26,27,28,29,32,33,34,35	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	Igs	5	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 Pdiss=20W	$R_{\theta JC}$	4	°C /W

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

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

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=5mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 5mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =28V, IDS=10mA, Measured in Functional Test	$V_{GS(Q)}$		-2.6		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	8GHz, Pout=20W Pulsed CW All phase, No device damages	VSWR		10:1		

Typical performance

Figure 2: Network analyzer output S11/S21

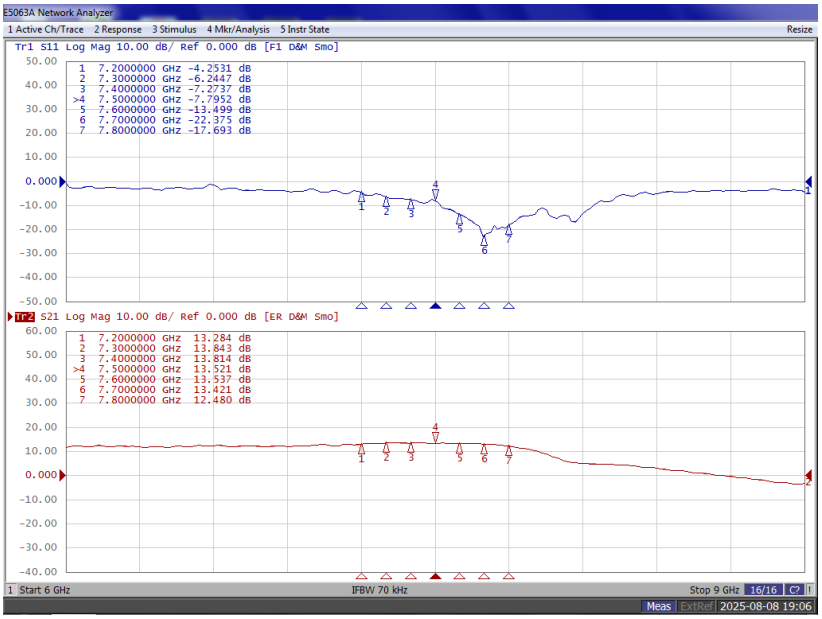


Figure 3: Picture of application board

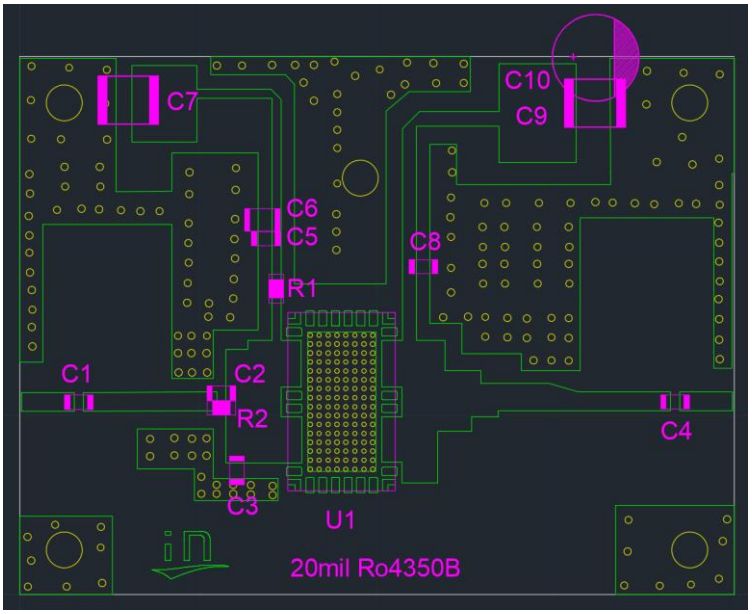
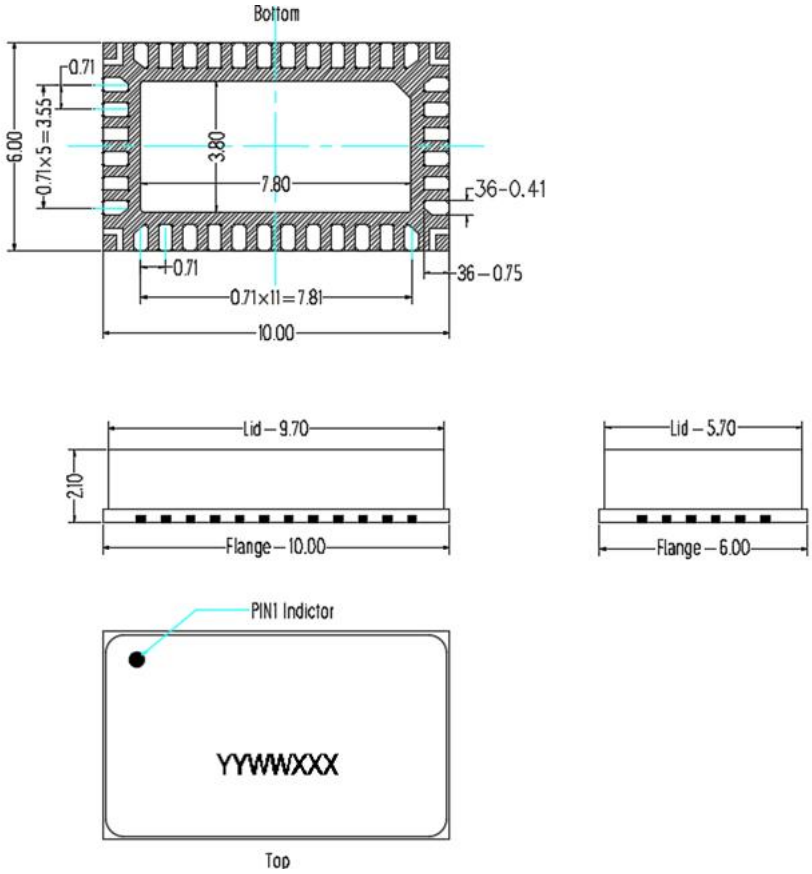


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Reference	Footprint	Value	Quantity
C1,C2,C4,C5,C8	0603	3.9 pF	5
C3	0603	0.2 pF	1
C6	0805	10 nF	1
C7,C9	1210	10 uF/63V	2
C10	/	470 uF	1
R1	0603	10 ohm	1
R2	0603	30 ohm	1
U1	C6	XTAH78020C6	1

10*6 Plastic Package



Notes:

1. All dimensions are in mm;
2. The tolerances unless specified are ±0.2mm.

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2025/8/8	**V1.0**	**Preliminary Datasheet Creation**

Application data based on: CWZ-25-13

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