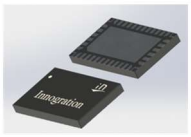
GaN HEMT 28V, 40W, 1.8-2.7GHz Power Transistor

GTAH27040C6



Description

The GTAH27040C6 is a dual path 40W, internal matched GaN HEMT, operated from 1.8-2.7GHz.

It features high gain, high efficiency, wide band and low cost, in 10*6mm open cavity plastic package.

It can be configured as a single stage Doherty capable of delivering Pavg up to 6W，according to normal 8dB back off.

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

➢ Typical Doherty Single--Carrier W--CDMA Characterization Performance at **wideband Doherty of 2.1-2.4GHz**

Input Signal :WCDMA 1 Carrier with PAR = 10 dB @ 0.01% Probability on CCDF , Pulsed CW: 20us, 10%

● V_{DD} = 28 Vdc, I_{DQA} = 68mA, V_{GSB} = –3.58Vdc,

Freq (MHz)	Pout (dBm)	P3dB (W)	ACPR (dBc)	Gain (dB)	Eff (%)
2100	35	37.0	-28.2	15.4	47.7
2150	35	32.3	-28.2	16.0	48.3
2200	35	31.7	-28.4	17.4	47.9
2250	35	36.0	-28.4	17.5	47.4
2300	35	38.6	-29.9	17.3	46.8
2350	35	38.1	-32.3	17.1	46.9
2400	35	32.9	-34.3	16.4	47.6

Applications

- 5G Doherty amplifier within 2.5-2.7, 2.1-2.2, 1.8-1.9G either as driver or as final
- S band power amplifier
- L band power amplifier

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

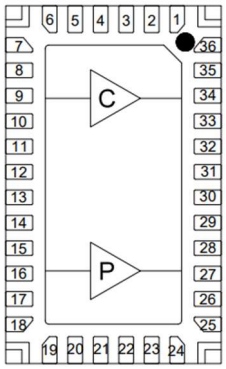
1. Set VGS to the pinch--off (VP) voltage, typically –5 V
2. Turn on VDS to nominal supply voltage
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

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
9,10	RF IN/Vgs1	RF Input, Vgs bias for main path
15,16	RF IN/Vgs2	RF Input, Vgs bias for peak path
33,34	RF OUT/VDD1	RF Output, VDD bias for Main path
27,28	RF OUT/VDD2	RF Output, VDD bias for Peak path
Rest pins	NC	No connection
2,5,7,12,13,18,20,23,25,30,31,36, 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	10	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, Pdiss=4W at Pavg=35dBm WCDMA 1 carrier	$R_{\theta JC}$	6.5	°C /W

Notes: Based on expected carrier amplifier efficiency of Doherty, Pavg assumes 10% peaking amplifier contribution of total average Doherty rated power. Thermal resistance is measured to package backside

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=4mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 4mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =28V, IDS=65mA, Measured in Functional Test	$V_{GS(Q)}$		-2.4		V

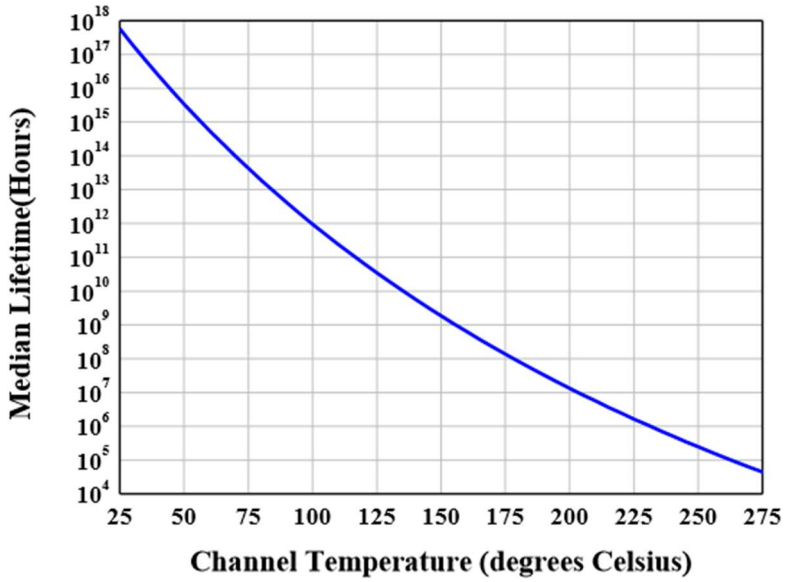
DC Characteristics (peak path, measured on wafer prior to packaging)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=6mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 6mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =28V, IDS=90mA, Measured in Functional Test	$V_{GS(Q)}$		-2.4		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	2.1GHz, Pout=35dBm WCDMA 1 Carrier, All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature



Typical performance

Figure 3: Network analyzer output, S11 and S21 (2.1-2.4GHz Doherty)

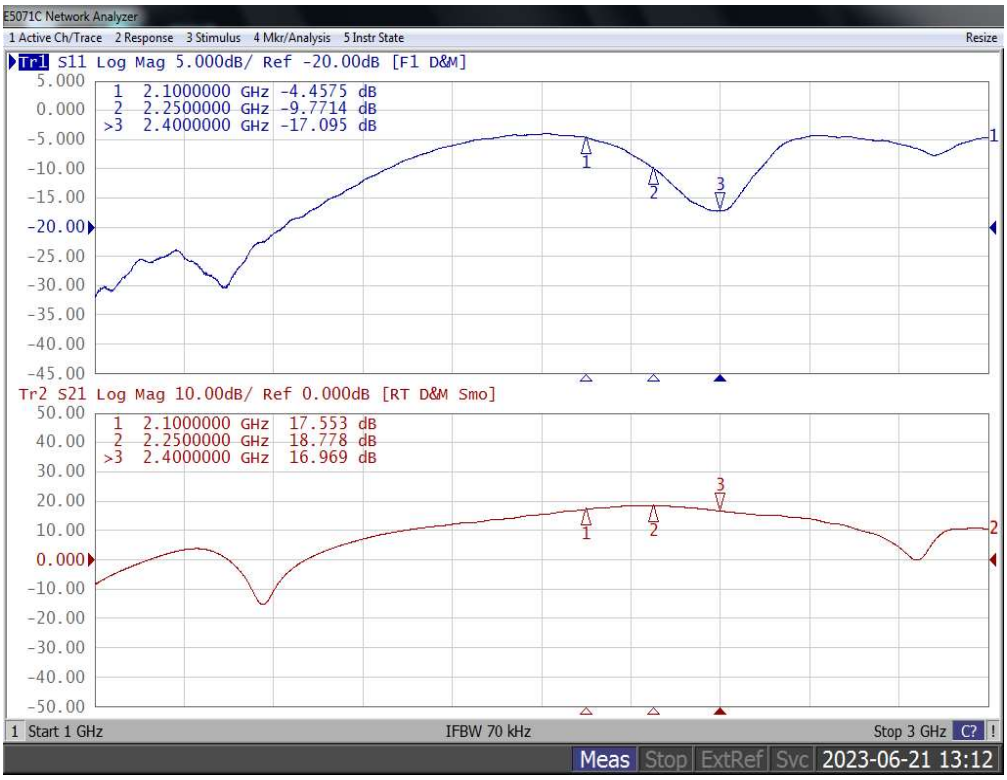


Figure 4: Picture of application board Doherty circuit for 2.1-2.4GHz

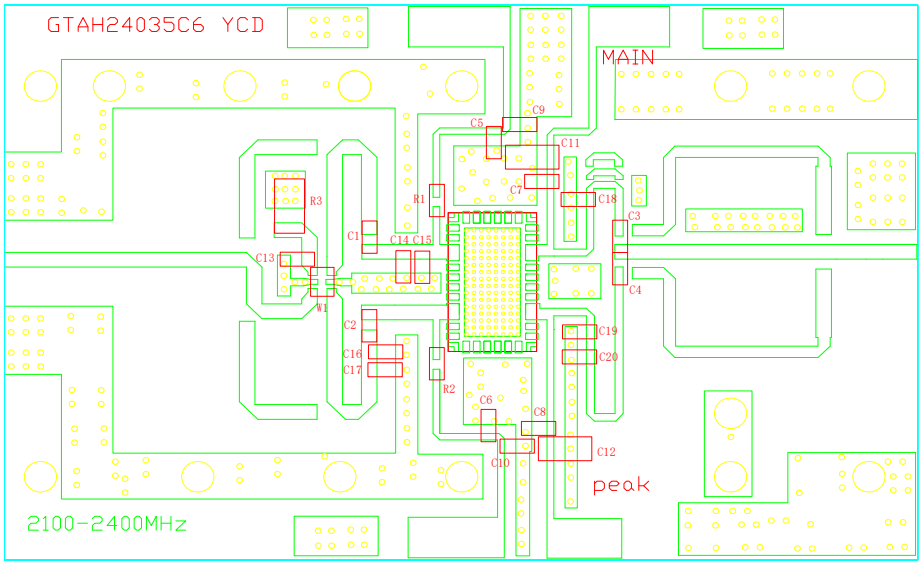
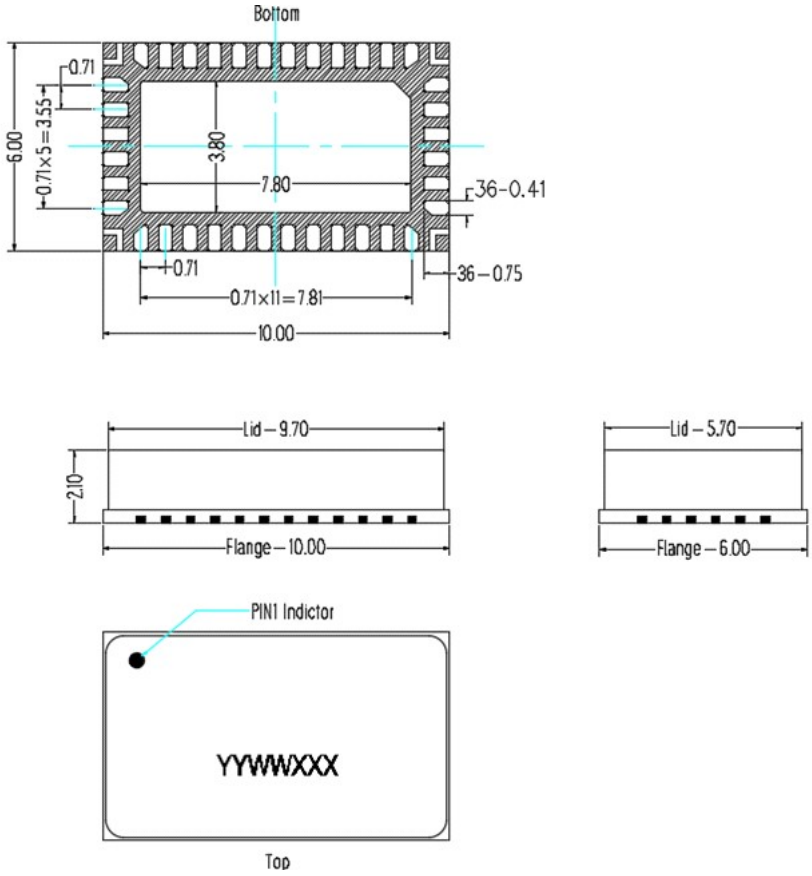


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Designator	Comment	Footprint	Quantity
C1, C2, C3, C4, C5, C6, C7, C8	15 pF	0603	8
C9, C10	1 uF	0603	2
C11, C12	10 uF	1210	2
C13, C17	0.7	0603	2
C14, C15, C16	1.1	0603	3
C18, C20	1.2 pF	0603	2
C19	1.0 pF	0603	1
R1, R2	10 Ω	0603	2
R3	51 Ω	1206	2
W1(Xinger)	X4C25J1-03G	0805	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
2023/10/22	**V1.0**	**Preliminary Datasheet Creation**

Application data based on: LSM-23-21

Notice

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