



Gallium Nitride 28V, 200W, 1-2GHz RF Power Transistor

Description

The GTAH21201BY4 is a 200W, both input and output matched GaN HEMT, ideal for multiple applications from 1-2GHz.

It can support CW, pulse or any modulated signal. It can be configured as push pull or Doherty.

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

- Typical performance across 1.35-1.78GHz class AB application circuit with device soldered
VDS= 28V, IDQ=100mA(Vgs=-2.59V) T=25 C,
Pulsed CW Signal: 100us width , 10% duty cycle

Freq(GHz)	Psat(W)	Gp(dB)	Eff(%)
1.35	212	17.2	62
1.45	217	17.6	59
1.55	216	17.4	65
1.65	214	17.5	62
1.78	214	16.4	61

CW signal

Freq(GHz)	Psat(W)	Gp(dB)	Eff(%)
1.35	204	17.6	60
1.45	200	17	56
1.55	205	17.3	62
1.65	203	17.5	59
1.78	200	16.2	58



Applications

- 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)

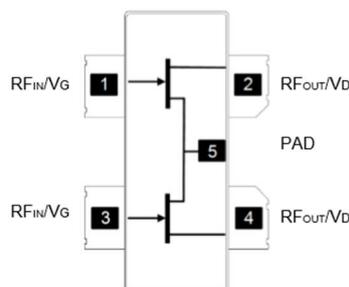




Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	+150	Vdc
Gate--Source Voltage	V_{GS}	-10 to +2	Vdc
Operating Voltage	V_{DD}	32	Vdc
Maximum gate current	I_{gs}	49	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 $T_j = 200^\circ\text{C}$	$R_{\theta JC}$	0.9	°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	$V_{GS} = -8\text{V}$; $I_{DS} = 49\text{mA}$	V_{DSS}		150		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$, $I_D = 49\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 50\text{V}$, $I_{DS} = 100\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-2.59		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	2 GHz, $P_{out} = 200\text{W}$ Pulsed CW All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature

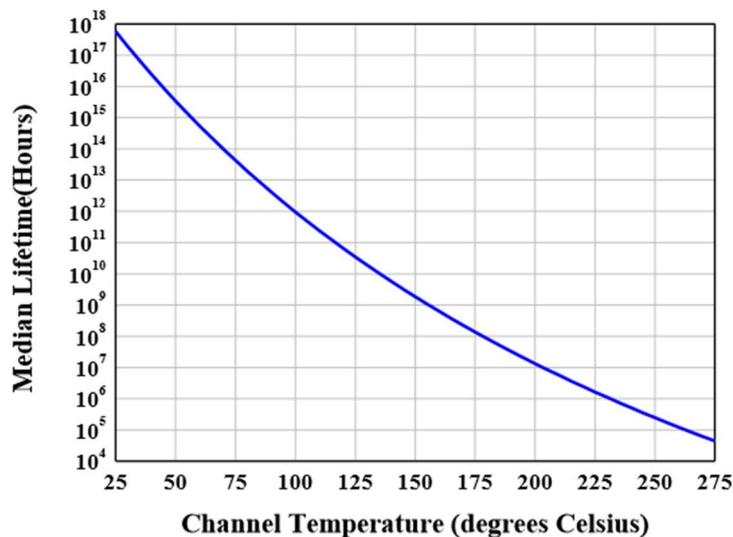




Figure 3: Efficiency and power gain as function of Pout (1.35-1.78GHz class AB) Pulsed CW: 100us width , 10% duty cycle

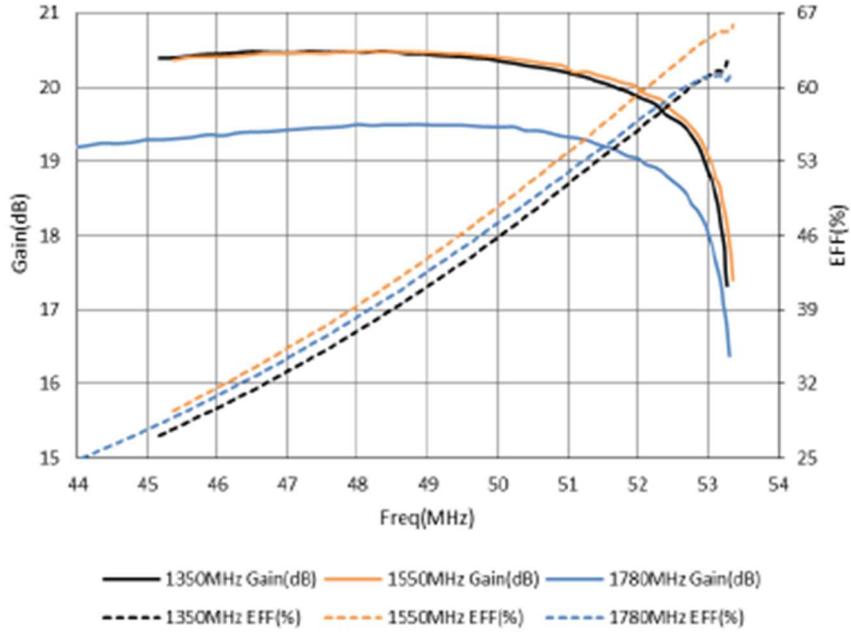


Figure 4: Network analyzer output, S11 and S21 (1.35-1.78GHz Class AB)

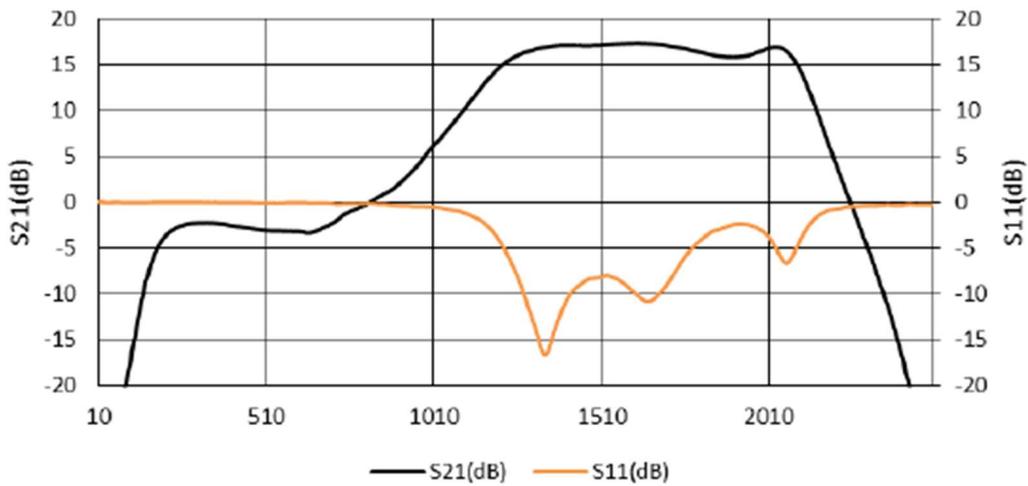


Figure 5: Picture of application board 1.35-1.78GHz class AB

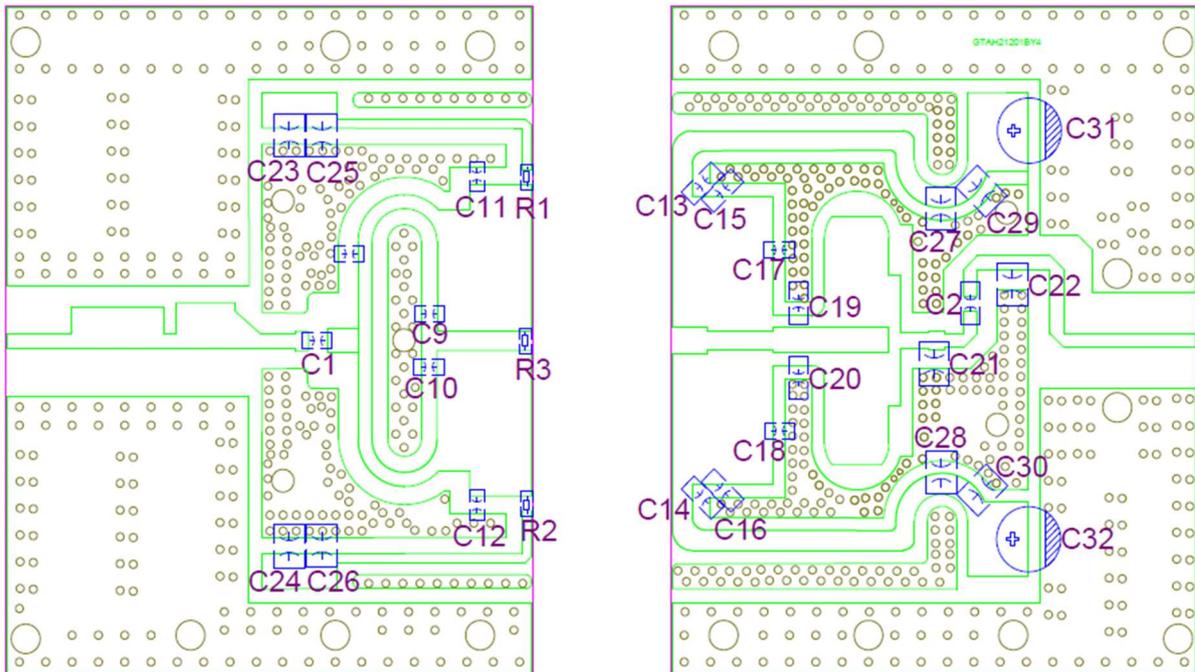
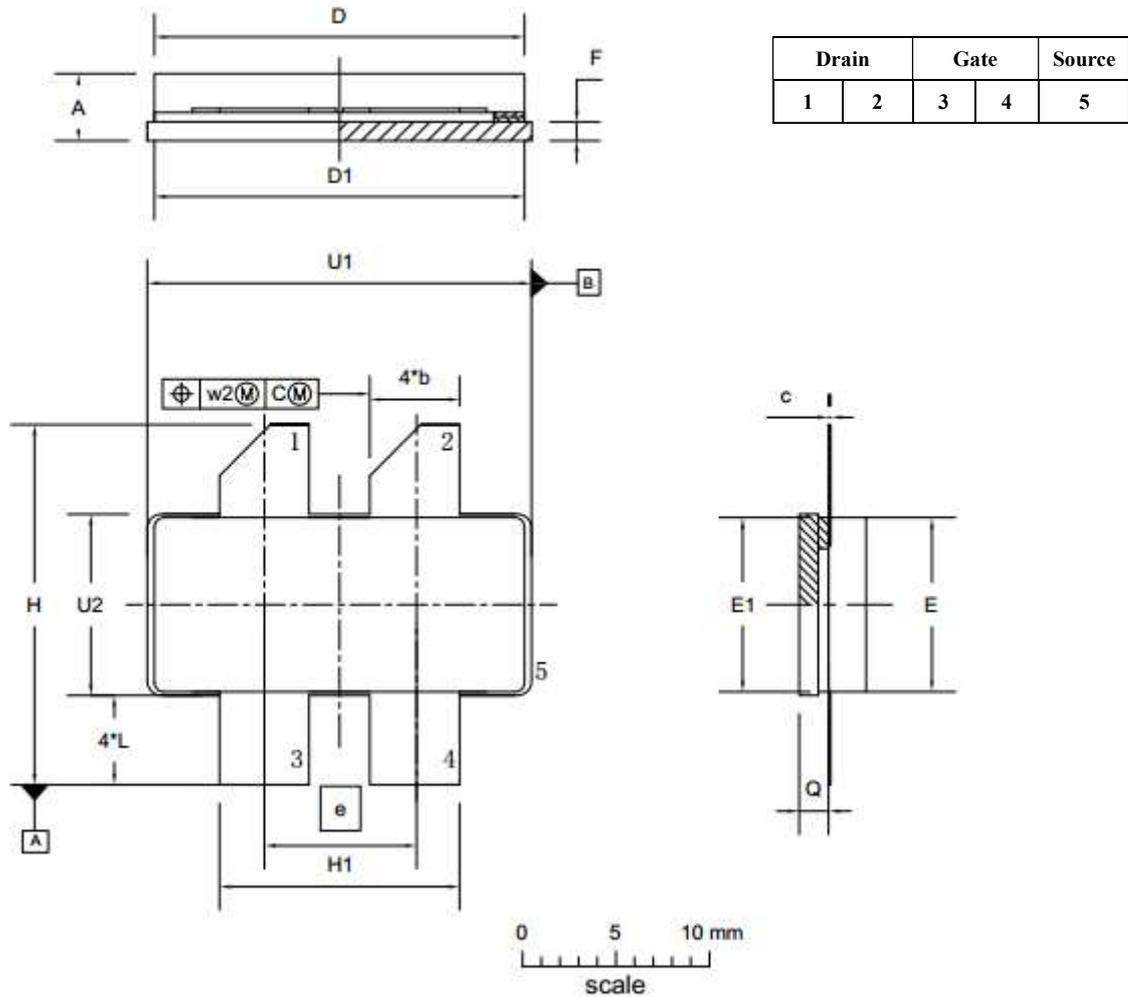


Table 4. Bill of materials of application board (PCB layout upon request)

Component	Description	Suggested Manufacturer
C1	5.6pF	ATC 600F
C2,C19,C20	18pF	ATC 800B
C3,C4	1.5pF	ATC 600F
C5,C6	1.8pF	ATC 600F
C7,C8	2.2pF	ATC 800B
C9,C10	0.3pF	ATC 800B
C11,C12	0.5pF	ATC 600F
C13,C14	1.0pF	ATC 800B
C15	0.3pF	ATC 800B
C16	1pF	ATC 800B
C17,C18,C23,C24	Ceramic multilayer capacitor, 10uF 50V	
C21,C22	22pF	ATC 800B
C25,C26	Electrolytic Capacitor ,470uF,63V	
R1,R2	Chip Resistor,13 Ω , 0805	
R3	Chip Resistor,8.2 Ω , 0805	
PCB	0.508mm [0.020"] thick, εr=3.50, Taconic RF-35TC-A, 1 oz. copper	



Earless Flanged Ceramic Package; 4 leads



UNIT	A	b	c	D	D ₁	e	E	E ₁	F	H	H ₁	L	Q	U ₁	U ₂	W ₁	W ₂
mm	4.72	4.67	0.15	20.02	19.96	7.90	9.50	9.53	1.14	19.94	12.98	5.33	1.70	20.70	9.91	0.25	0.51
	3.43	4.93	0.08	19.61	19.66		9.30	9.25	0.89	18.92	12.73	4.32	1.45	20.45	9.65		
inches	0.186	0.194	0.006	0.788	0.786	0.311	0.374	0.375	0.045	0.785	0.511	0.210	0.067	0.815	0.390	0.01	0.02
	0.135	0.184	0.003	0.772	0.774		0.366	0.364	0.035	0.745	0.501	0.170	0.057	0.805	0.380		

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-B4					03/12/2013



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2020/7/17	V1.0	Preliminary Datasheet Creation by upgrading GTAH21200B2 to GTAH21200BY4

Application data based on: TK-20-09

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