



Gallium Nitride, 400W,2.7-3.5GHz RF Power Transistor

Description

The GTAH35400BY2 is a 400W 28V, both input and output matched GaN HEMT, ideal for pulsed amplifier applications from 2.7-3.5GHz, and at higher voltage 32V, capable to output more than 500W.

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

- Typical performance across 2.7-3.5GHz class AB application circuit with device soldered

Pulsed CW Signal: 100us width , 10% duty cycle,

Vds=28V Idq=100mA

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
2700	54.85	305.8	55.2	12.61	56.3	427.0	62.0
2800	54.68	293.7	55.3	12.96	56.14	410.9	62.2
2900	54.66	292.4	54.7	12.46	56.06	403.8	61.5
3000	54.9	309.1	54.1	12.03	56.21	417.7	60.2
3100	55.69	370.8	55.1	11.56	56.72	469.4	59.8
3200	56.12	408.9	56.3	11.5	57.07	508.9	60.3
3300	56.08	405.6	56.0	11.72	57.12	515.7	61.2
3400	55.77	377.7	56.3	11.79	56.89	488.7	62.4
3500	55.05	319.8	56.2	11.16	56.29	425.1	63.1

Vds=32V Idq=100mA

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
2700	55.82	382.4	53.9	12.9	57.23	528.1	60.2
2800	55.63	365.9	54.3	13.38	57.16	520.5	61.6
2900	55.69	370.5	54.5	12.98	57.1	512.9	61.2
3000	55.92	390.7	54.0	12.45	57.16	519.5	59.9
3100	56.57	453.8	54.5	12.04	57.59	573.7	59.3
3200	57.03	504.4	55.5	11.92	57.91	618.6	59.6
3300	57	501.2	55.5	12.12	58.01	632.4	60.7
3400	56.76	474.1	56.0	12.2	57.82	605.0	62.2
3500	56.15	412.3	56.4	11.67	57.3	537.2	63.6

Recommended driver: G2MAH2435-50 (2 stage Quasi-MMIC transistor)

Applications

- S band pulse 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

GTAH35400BY2

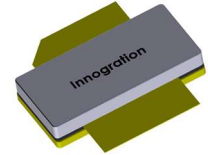




Table 1. Maximum Ratings

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}	108	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 $P_{out} = 400\text{W}$ Pulse at 3.1GHz	$R_{\theta JC}$	0.2	°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	$V_{GS} = -8\text{V}$; $I_{DS} = 108\text{mA}$	V_{DSS}		150		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$, $I_D = 108\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 28\text{V}$, $I_{DS} = 100\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-2.85		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	3.1 GHz, $P_{out} = 400\text{W}$ Pulsed CW All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature

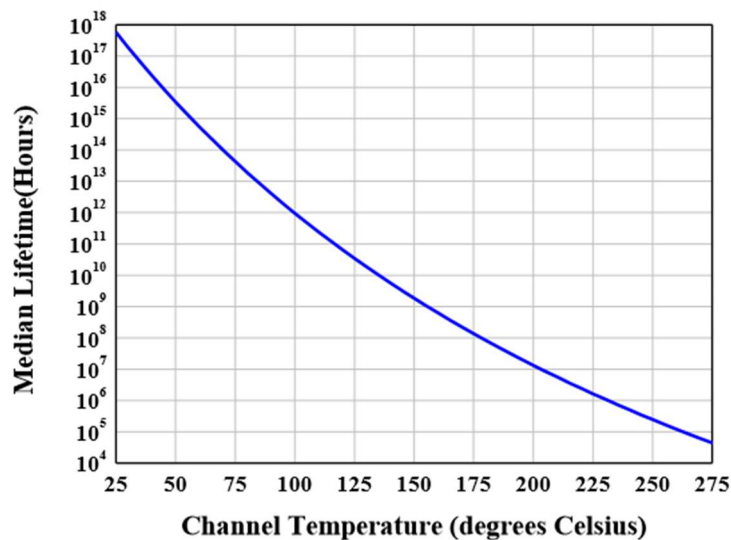
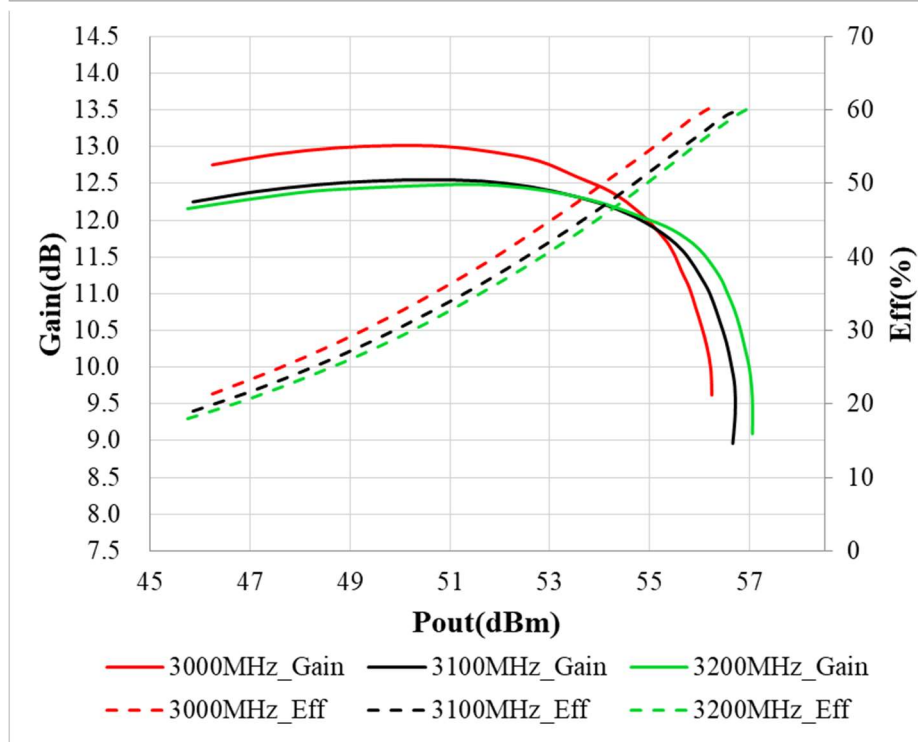
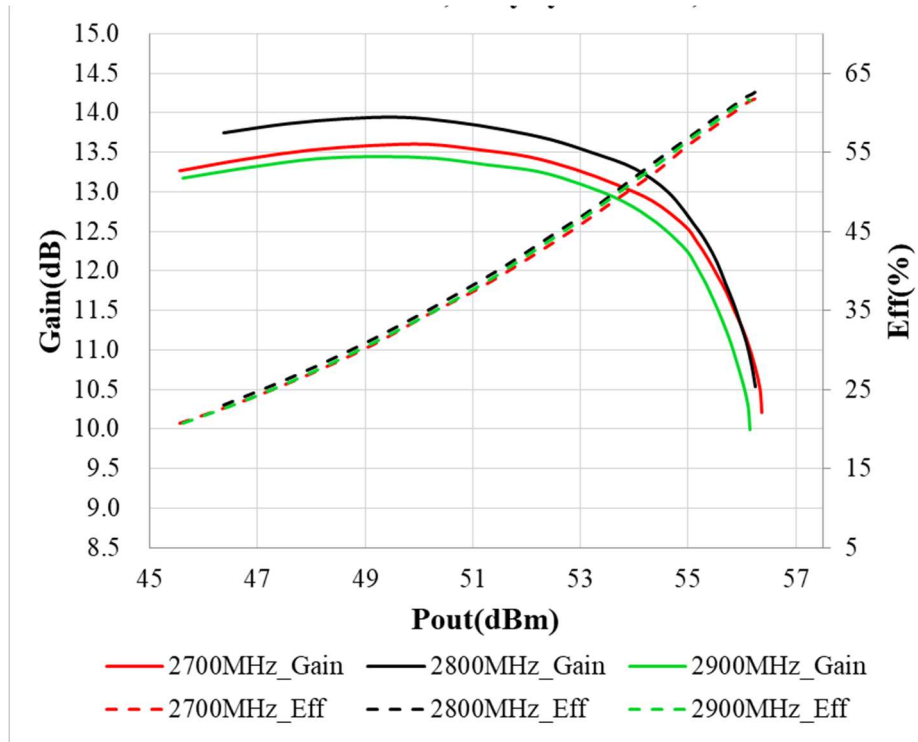




Figure 3: Efficiency and power gain as function of Pout at different VDD (Pulsed CW Signal: 100us width , 10% duty cycle)

28V:



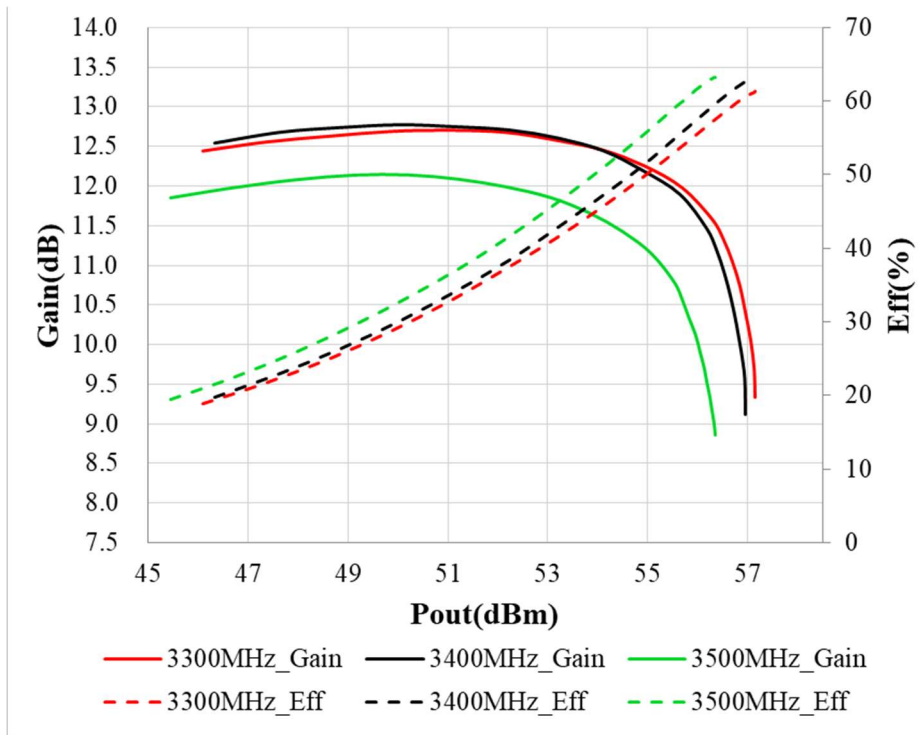


Figure 4: Network analyzer output, S11 and S21 (2.7-3.5GHz Class AB)

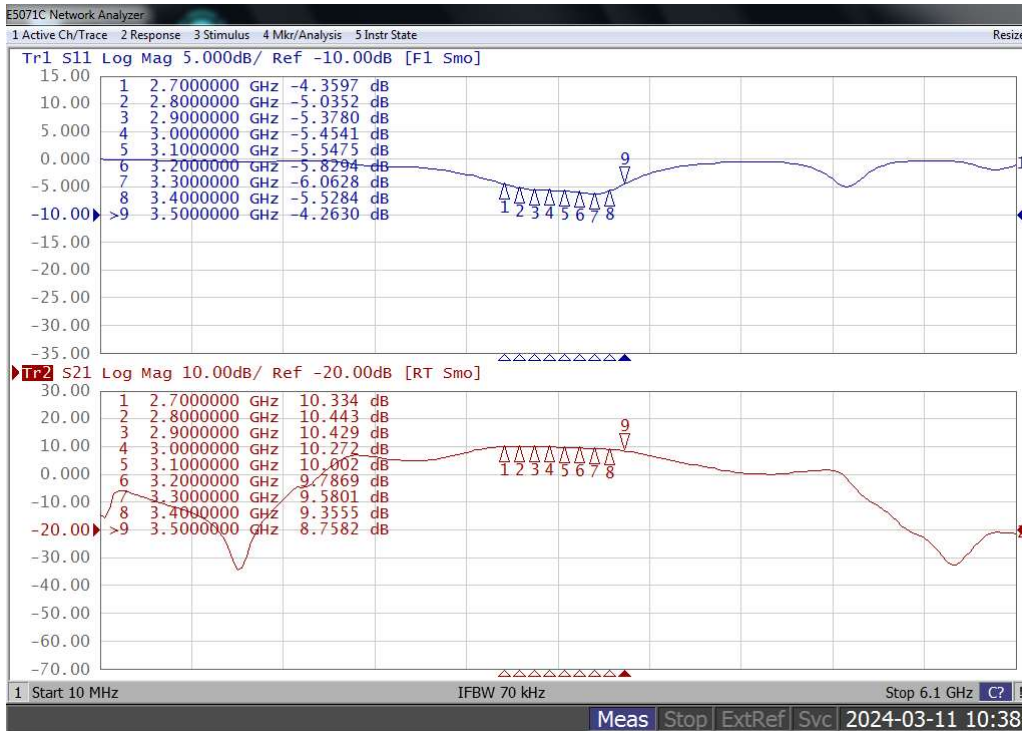


Figure 5: Picture of application board 2.7-3.5GHz class AB

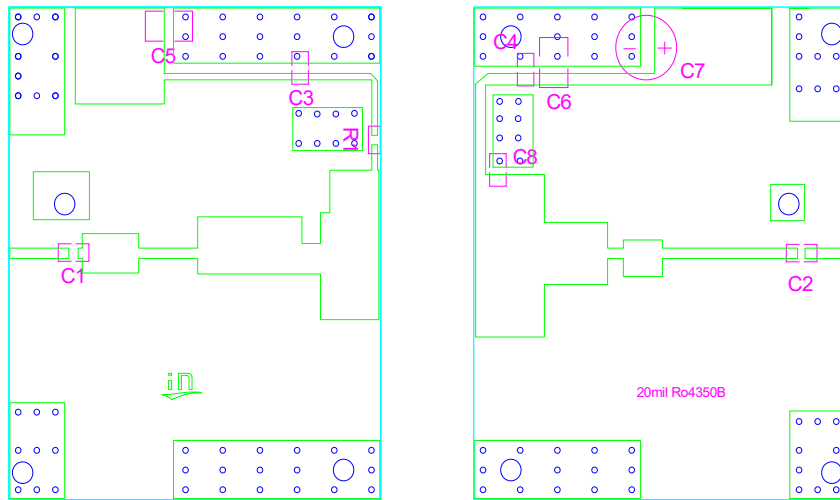


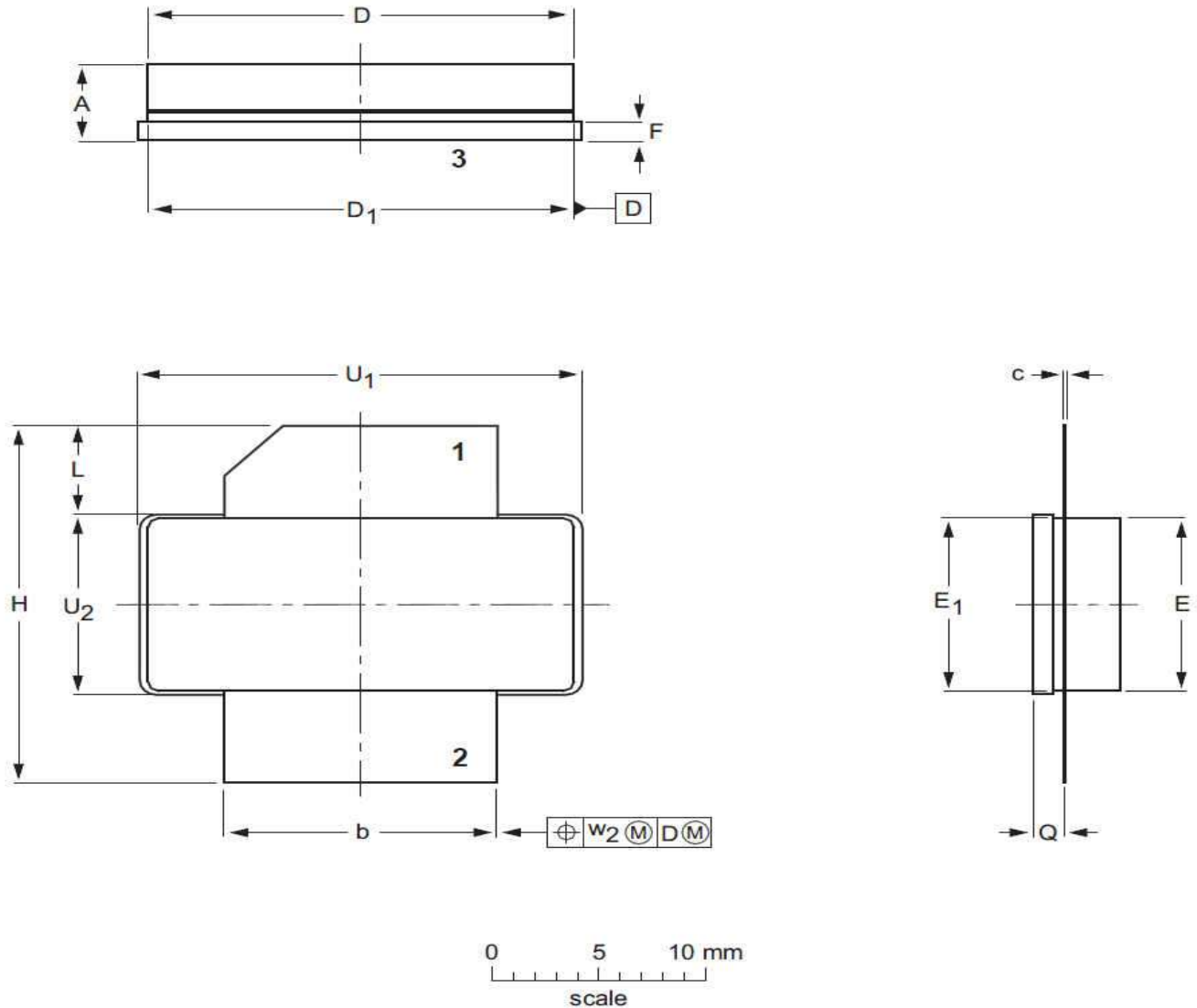
Table 4. Bill of materials of application board (PCB layout upon request)

Designator	Comment	Footprint	Quantity
C1, C2, C3, C4	8.2 pF	0805	4
C5, C6	10 uF/100V	1210	2
C7	4700 uF/63V		1
C8	0.5 pF	0603	1
R1	10 Ω	0603	1



Package Outline

Earless flanged ceramic package; 2 leads (1—DRAIN、2—GATE、3—SOURCE)



UNIT	A	b	c	D	D ₁	E	E ₁	F	H	L	Q	U ₁	U ₂	W ₂
mm	4.72	12.83	0.15	20.02	19.96	9.50	9.53	1.14	19.94	5.33	1.70	20.70	9.91	0.25
	3.43	12.57	0.08	19.61	19.66	9.30	9.25	0.89	18.92	4.32	1.45	20.45	9.65	
inches	0.186	0.505	0.006	0.788	0.786	0.374	0.375	0.045	0.785	0.210	0.067	0.815	0.390	0.010
	0.135	0.495	0.003	0.772	0.774	0.366	0.364	0.035	0.745	0.170	0.057	0.805	0.380	

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-B2					03/12/2013



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2024/3/6	V1.0	Preliminary Datasheet Creation based on NK3520HS
2024/3/11	V1.1	Name from GTAH31400BY2 to GTAH35400BY2 to support 2.7-3.5GHz full band

Application data based on: LSM-24-08/09

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