



GaN HEMT 50V, 500W, 0.6-1GHz RF Power Transistor

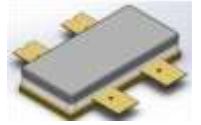
Description

The STBV10500BY4 is a 500watt Doherty pair capable, GaN HEMT, ideal for 4G cellular applications from 0.6 to 1GHz. It can be configured as asymmetrical Doherty delivering 80W average power, according to normal 8dB back off.

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

As part of 4GaN™, it is featured by comparable low cost as LDMOS counterpart to enable affordable replacement while with significant performance improvement

XTAV10500B4C



- Typical WCDMA 1C performance on 900MHz asymmetrical Doherty with device soldered

$$V_{DS} = 50V, I_{DQ} = 200mA (V_m = -3.72V, V_p = -5.4V)$$

Freq (MHz)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)	P1dB Gain(dB)	P4dB (dBm)	P4dB (W)	P4dB Eff(%)
925	57.53	565.6	73.3	17.94	57.71	590.3	72.7
945	57.67	584.8	78.0	18.38	57.86	610.7	77.4
960	57.42	552.4	81.1	18.50	57.51	563.8	80.2

ACPR @49.1dBm_1C-WCDMA

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Efficiency (%)
925	49.11	8.51	57.62	578.2	-31.1	17.6	64.2
945	49.08	8.66	57.74	594.4	-31.2	17.9	64.3
960	49.09	8.56	57.65	581.5	-30.9	17.9	64.9

Applications

- Asymmetrical Doherty amplifier within 0.6-1GHz
- UHF or P band amplifier
- CW or pulsed Amplifier

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

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

Turning the device OFF

- Turn RF power off
- Reduce VGS down to VP, typically -5 V
- Reduce VDS down to 0 V
- Turn off VGS

Figure 1: Pin Connection definition

Transparent top view (Backside grounding for source)

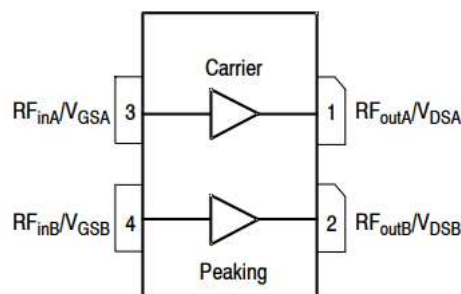




Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DS}	+200	Vdc
Gate--Source Voltage	V_{GS}	-8 to +0.5	Vdc
Operating Voltage	V_{DD}	55	Vdc
Maximum gate current	I_{gs}	66	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 $P_d = 50\text{W}$, on Doherty application board	$R_{\theta JC}$	1.1	°C /W

Table 3. Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

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

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = -8\text{V}$; $I_{DS} = 22\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$, $I_D = 22\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 50\text{V}$, $I_{DS} = 130\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-3.78		V

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

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = -8\text{V}$; $I_{DS} = 44\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$, $I_D = 44\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 50\text{V}$, $I_{DS} = 250\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-3.78		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	1.84GHz, $P_{out} = 55\text{W}$ WCDMA 1 Carrier in Doherty circuit All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature

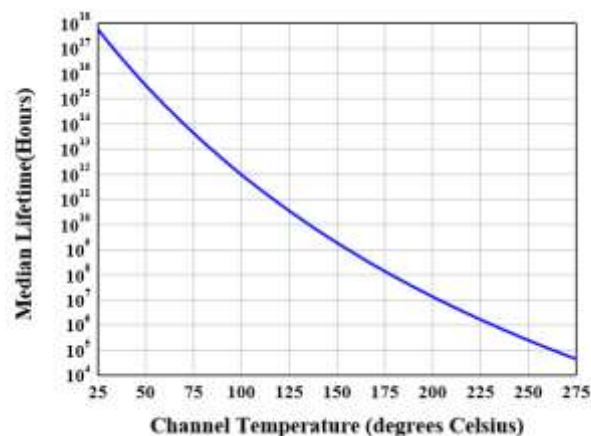




Figure 3: Efficiency and power gain as function of Pout

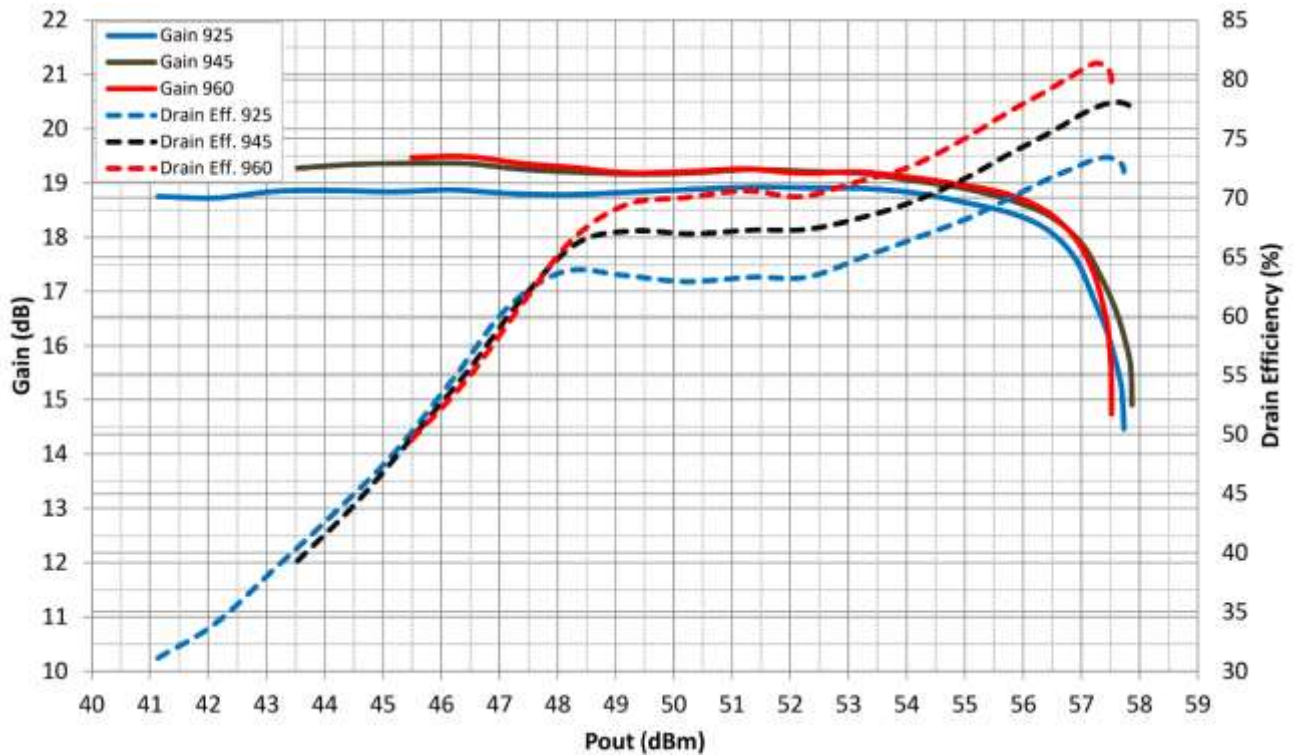


Figure 4: Network analyzer output, S11 and S21

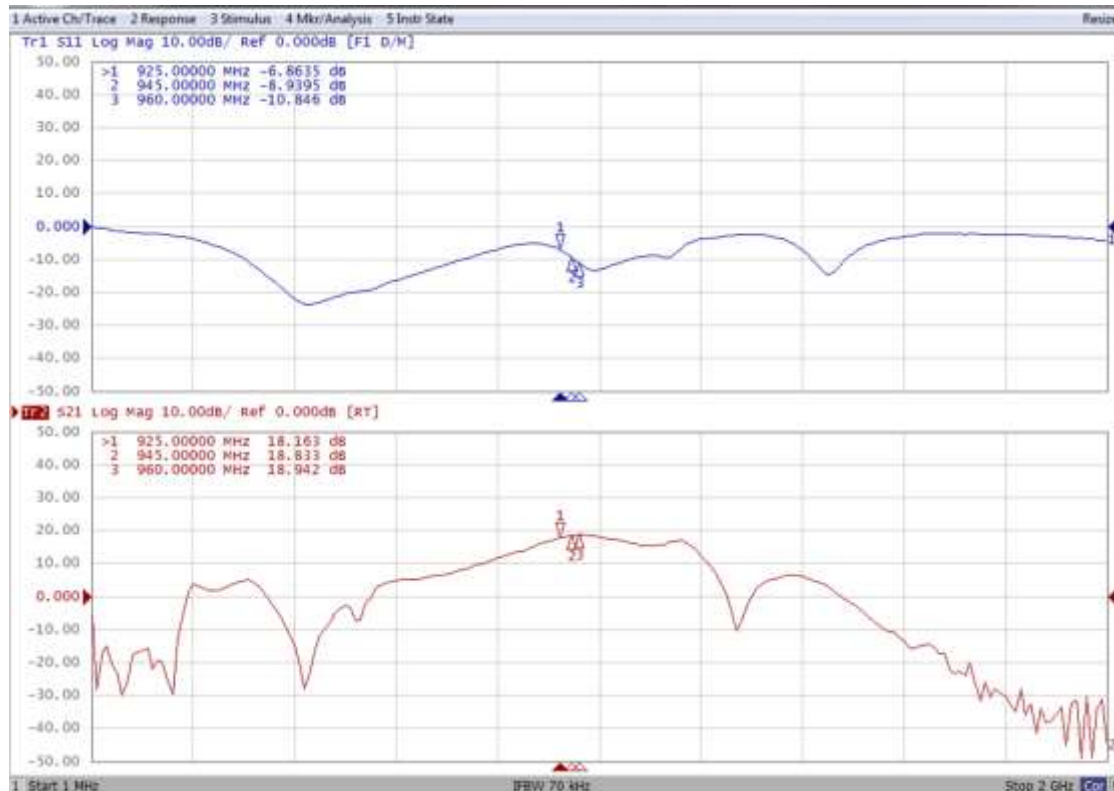
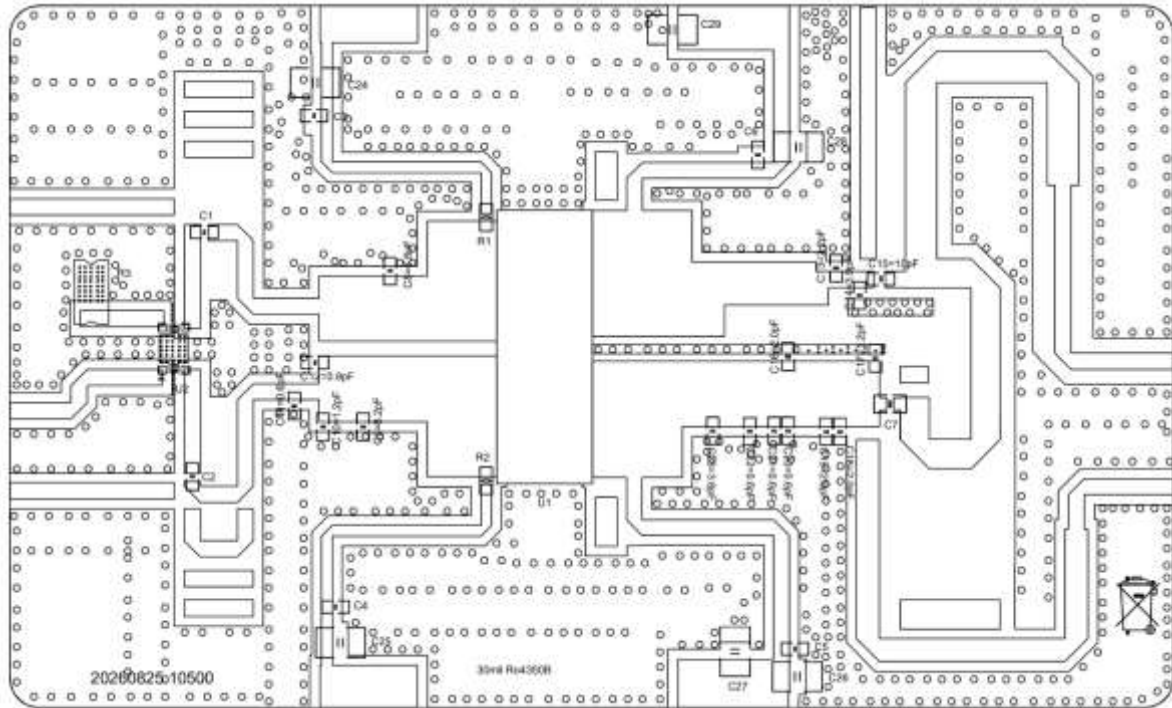




Figure 5: Picture of application board Doherty circuit



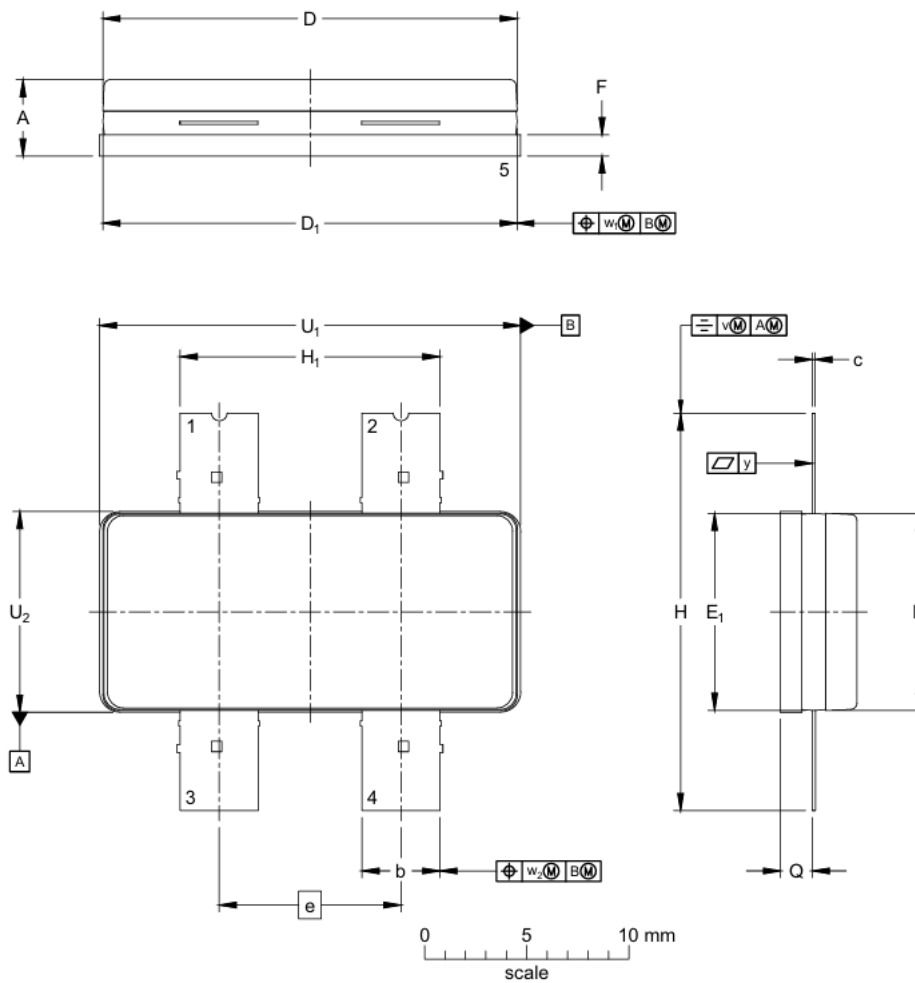
Size reduction version also available upon request

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

Quantity	Reference	Value	PCB Footprint	Manufacturer
2	R1, R2	10ohm	R0603	
1	R3	10ohm	R1206	
7	C1, C2, C3, C4, C5, C6, C7	47pF	C0603	元六鸿远
1	C8	6.8pF	C0603	元六鸿远
1	C9	8.2pF	C0603	元六鸿远
2	C10, C17	1.2pF	C0603	元六鸿远
4	C11, C20, C21, C22	0.6pF	C0603	元六鸿远
1	C12	0.9pF	C0603	元六鸿远
1	C13	2.2pF	C0603	元六鸿远
1	C14	3.9pF	C0603	元六鸿远
1	C15	10pF	C0603	元六鸿远
3	C16, C18, C19	2.0pF	C0603	元六鸿远
1	C23	3.6pF	C0603	元六鸿远
6	C24, C25, C26, C27, C28, C29	10uF/100V	C1210	
1	U2	DC07F02	5.08*3.18mm	
1	U1	XTAV10500B4C	B4C	



Earless Flanged Plastic Air Cavity Package; 4 leads



Dimensions																			
	Unit	A	b	c	D	D ₁	E	E ₁	e	F	H	H ₁	Q ⁽¹⁾	U ₁	U ₂	v	w ₁	w ₂	y
mm	max	4.01	3.91	0.18	20.42	20.37	9.80	9.75	8.89	1.14	19.53	12.83	1.68	20.70	9.91	0.50	0.50	0.50	0.10
	nom min	3.40	3.71	0.13	20.12	20.17	9.50	9.55		0.94	19.33	12.57	1.45	20.50	9.70				

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2026/9/21	V1.0	Preliminary Datasheet Creation

Application data based on: ZBB-26-20

Notice

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