



GaN HEMT 50V, 450W, 2.1-2.2GHz RF Power Transistor

Description

The STBV22450B4C is a dual path 450watt , Input matched GaN HEMT, ideal for applications from 2.1 to 2.2GHz especially for LTE/5G.

It is the cost reduction version of STBV22500BY4 using more cost effective components with Similar performance

- Typical WCDMA 1C performance on 2.1GHz asymmetrical Doherty with device soldered

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Efficiency (%)
2110	48.6	8.44	57.07	509.0	-29.5	15.4	58.4
2140	48.6	8.54	57.12	515.5	-29.5	15.3	58.2
2170	48.6	8.29	56.88	487.9	-29.8	15.1	58.7

Applications

- Asymmetrical Doherty amplifier within 2.1-2.2GHz
- S band power amplifier
- CW or pulsed 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)

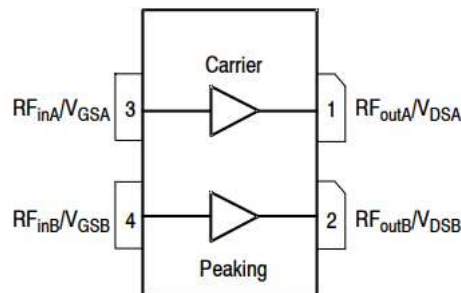


Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DS}	+200	Vdc
Gate--Source Voltage	V_{GS}	-8 to +0.5	Vdc
Operating Voltage	V_{DD}	55	Vdc
Maximum gate current	I_{gs}	61	mA
Storage Temperature Range	T_{stg}	-65 to +150	°C

STBV22450B4C





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	$R_{\theta JC}$	1.2	°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	$V_{GS} = -8\text{V}$; $I_{DS} = 25\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$, $I_D = 25\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 50\text{V}$, $I_{DS} = 250\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-3.0		V

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

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = -8\text{V}$; $I_{DS} = 36\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$, $I_D = 36\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 50\text{V}$, $I_{DS} = 250\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-3.1		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	2.14GHz, $P_{out} = 60\text{W}$ WCDMA 1 Carrier in Doherty circuit All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature

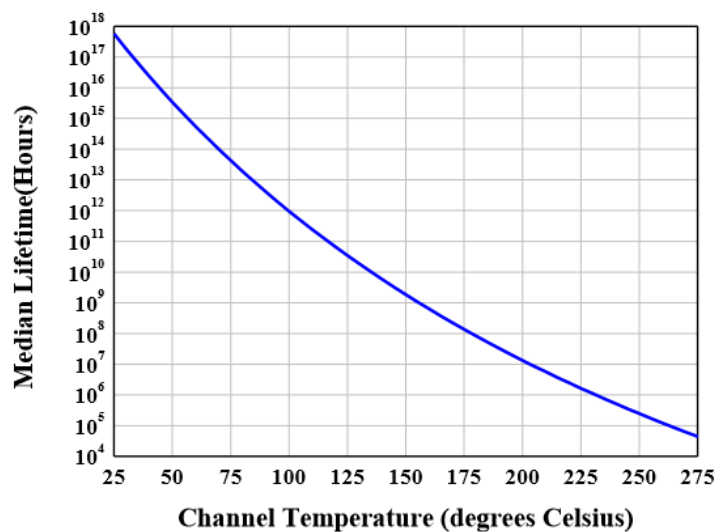




Figure 3: Efficiency and power gain as function of Pout (2.1GHz Doherty)

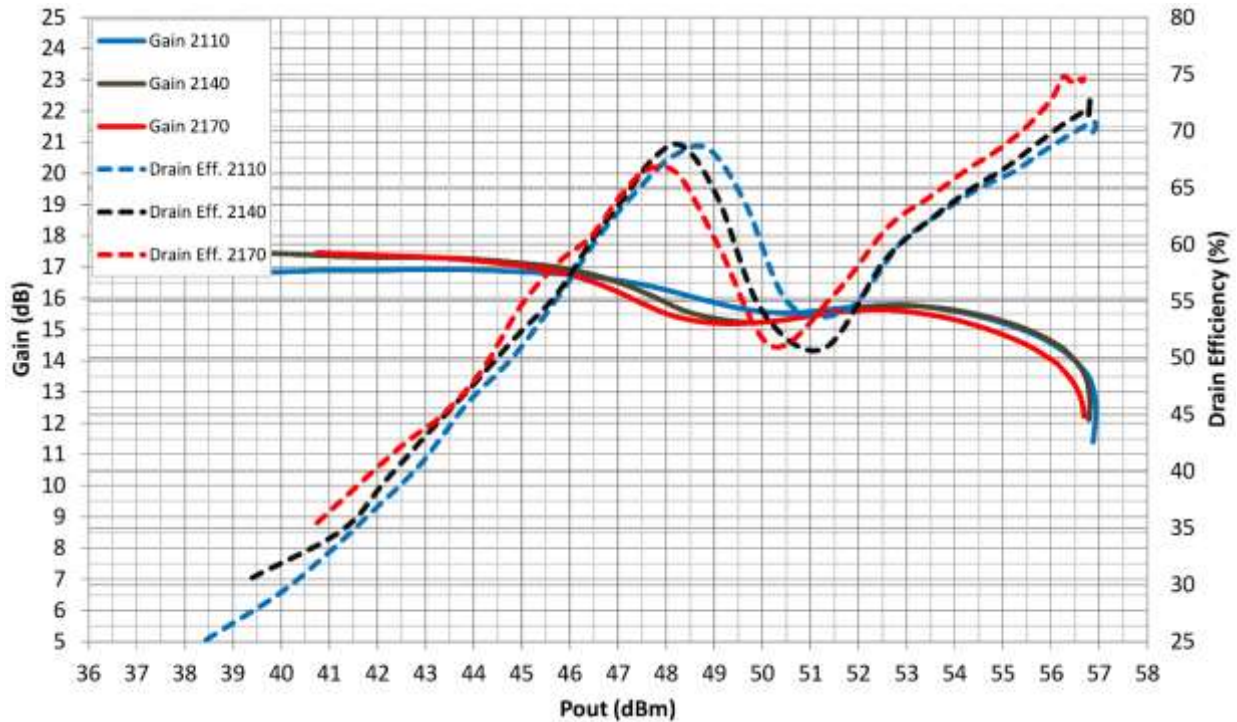


Figure 4: Network analyzer output, S11 and S21

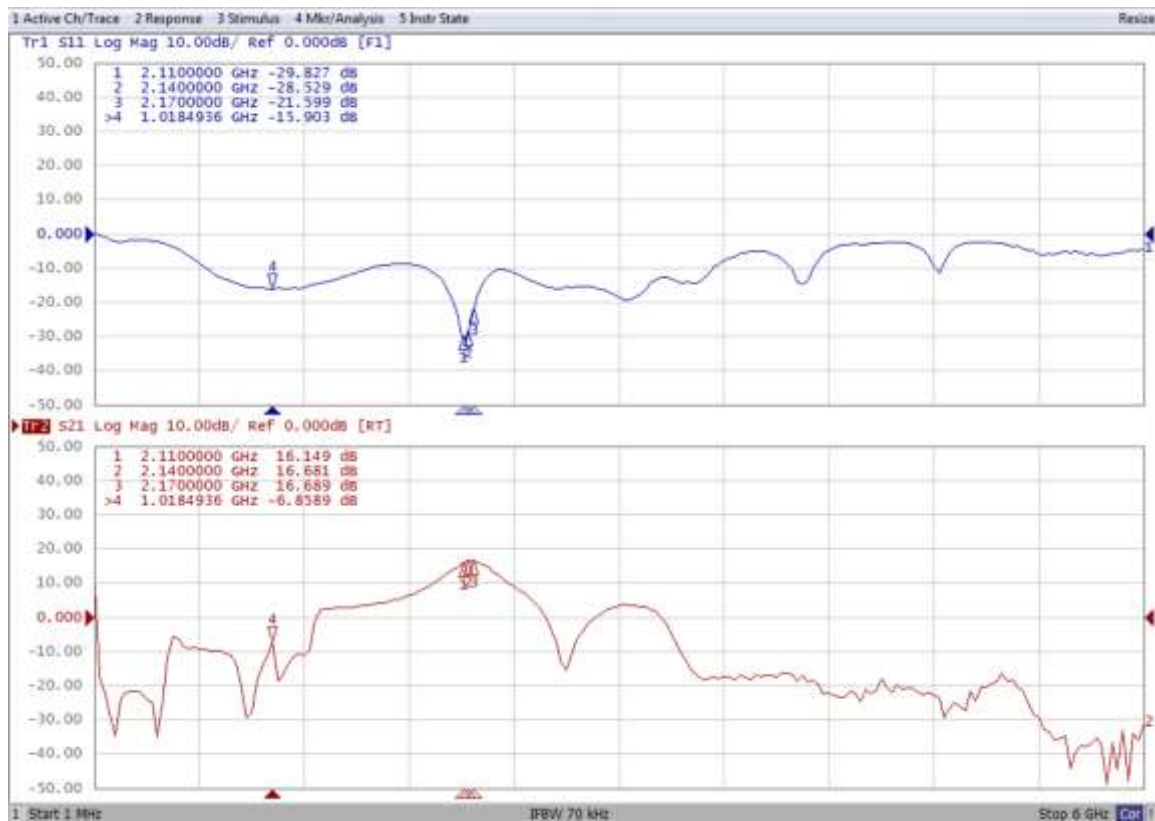


Figure 5: Picture of application board Doherty circuit for 2.1GHz

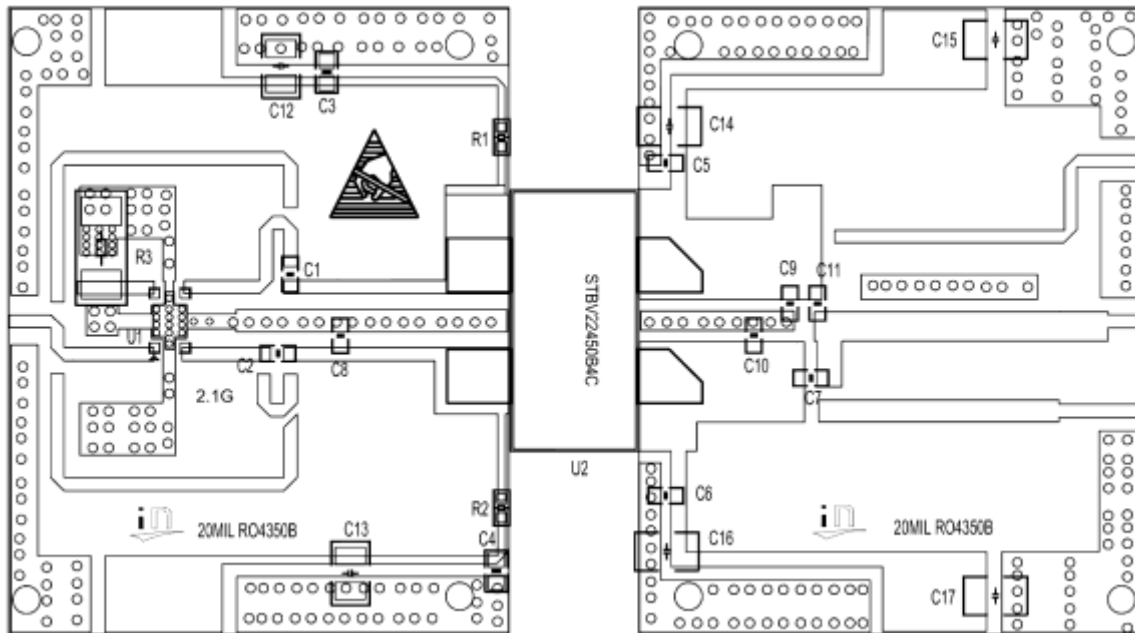
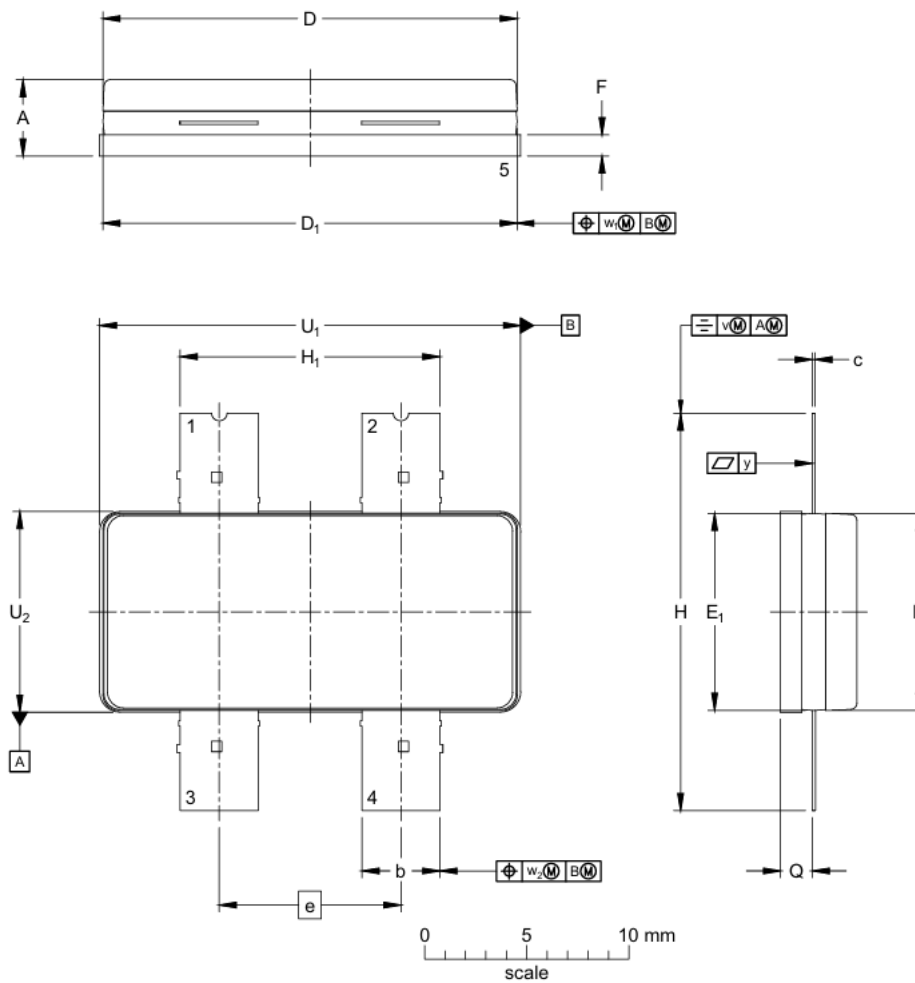


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Reference	Footprint	Value	Quantity
C1, C2, C3, C4, C5, C6, C7	0603	20pF/250V	7
C12, C13, C14, C15, C16, C17	1210	10uF/100V	6
C8	0805	0.6pF/250V	1
C9	0603	1.0pF/250V	1
C10	0603	0.5pF/250V	1
C11	0603	2.4pF/250V	1
R1, R2	0603	10R	2
R3	2512	51R	1
U2	B4C	STBV22450B4C ^{V1.1}	1
U1	5.08*3.18mm	X3C20F1-02S	1



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
2025/4/3	V1.0	Preliminary Datasheet Creation

Application data based on: ZBB-25-12

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