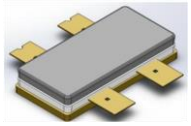
GaN HEMT 50V, 450W,1.8-2.0GHz RF Power Transistor

STBV20450B4C



Description

The STBV20450B4C is a dual path 450watt , Input matched GaN HEMT, ideal for applications from 1.8 to 2.0GHz especially for LTE/5G.

It is the cost reduction version of STBV20500BY4 using more cost effective components with Similar performance

- Typical WCDMA 1C performance on 1.8GHz asymmetrical Doherty with device soldered

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Efficiency (%)
1805	48.55	8.56	57.12	514.7	-28.6	16.8	58.1
1842.5	48.59	8.26	56.85	483.9	-28.3	17.3	59.4
1880	48.59	8.19	56.78	476.5	-29.8	16.6	58.4

Applications

- Asymmetrical Doherty amplifier within 1.8-2.0GHz
- Sub-2GHz 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)

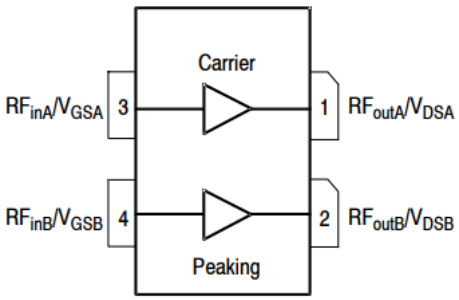


Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	+200	Vdc
Gate--Source Voltage	V_{GS}	-8 to +0.5	Vdc
Operating Voltage	V_{DD}	55	Vdc
Maximum gate current	Igs	61	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, at Pd=50W, on Doherty application board	$R_{\theta JC}$	1.2	°C /W

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=25mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 25mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=250mA, 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	VGS=-8V; IDS=36mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 36mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=250mA, Measured in Functional Test	$V_{GS(Q)}$		-3.1		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	1.84GHz, Pout=80W WCDMA 1 Carrier in Doherty circuit All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature

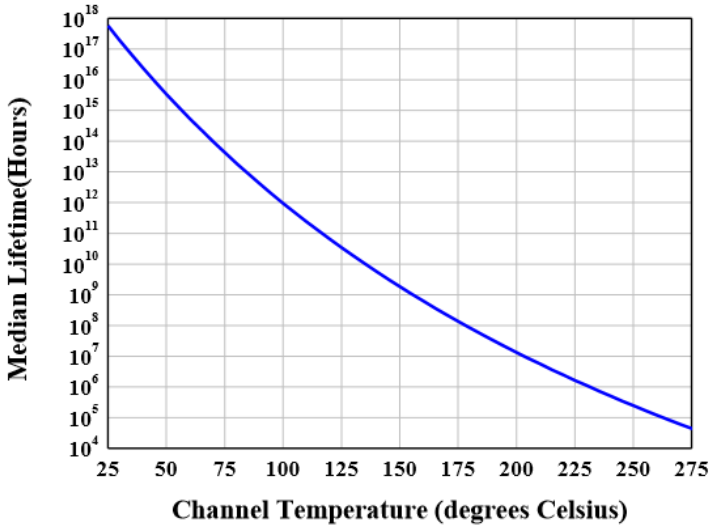


Figure 3: Efficiency and power gain as function of Pout (1.8GHz Doherty)

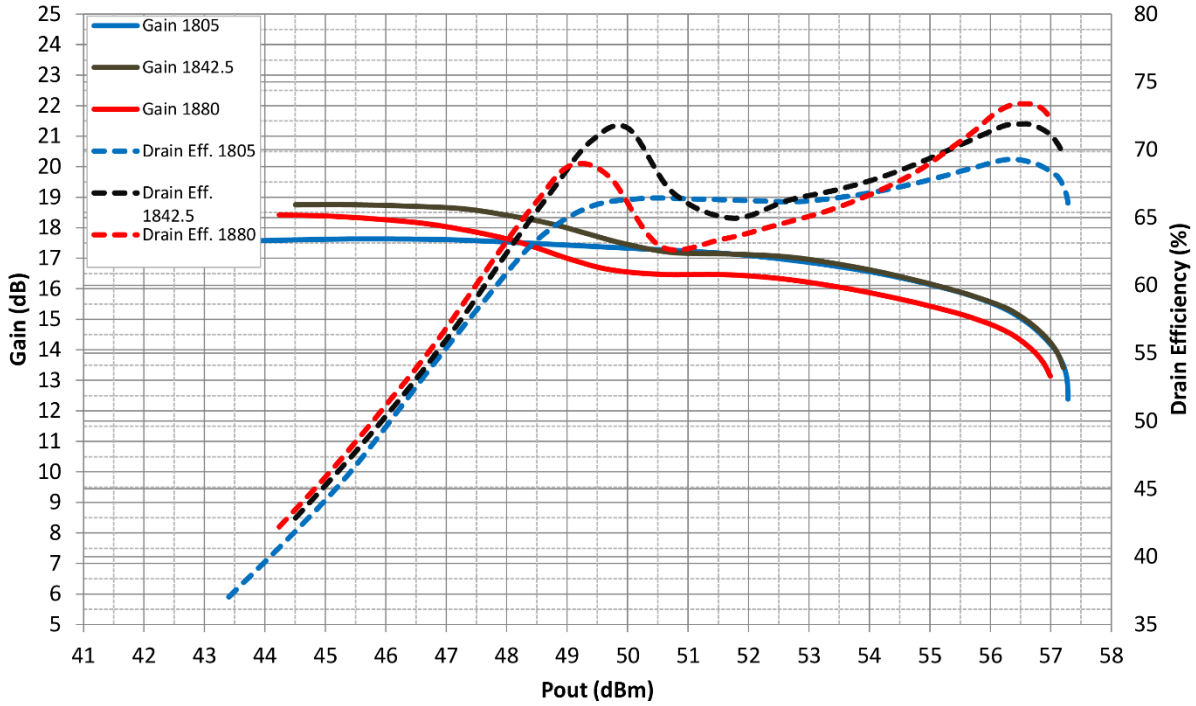


Figure 4: Network analyzer output, S11 and S21

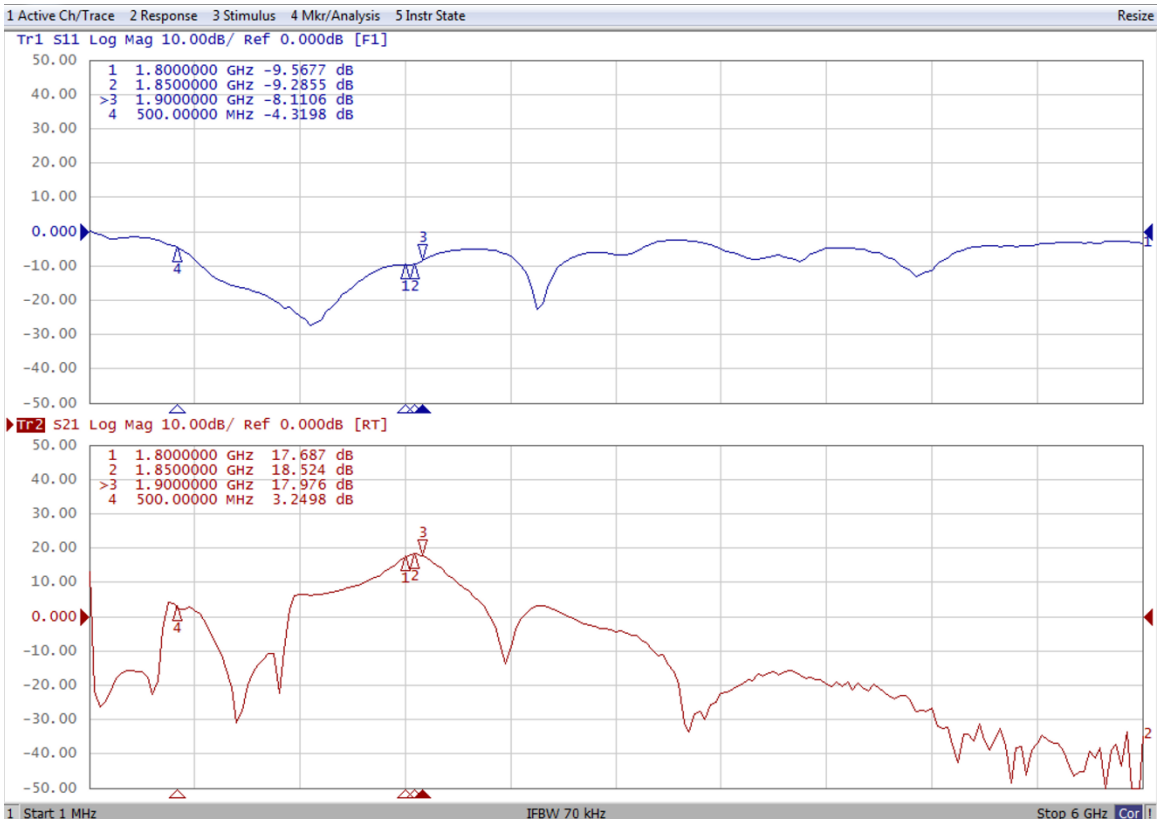


Figure 5: Picture of application board Doherty circuit for 1.8GHz

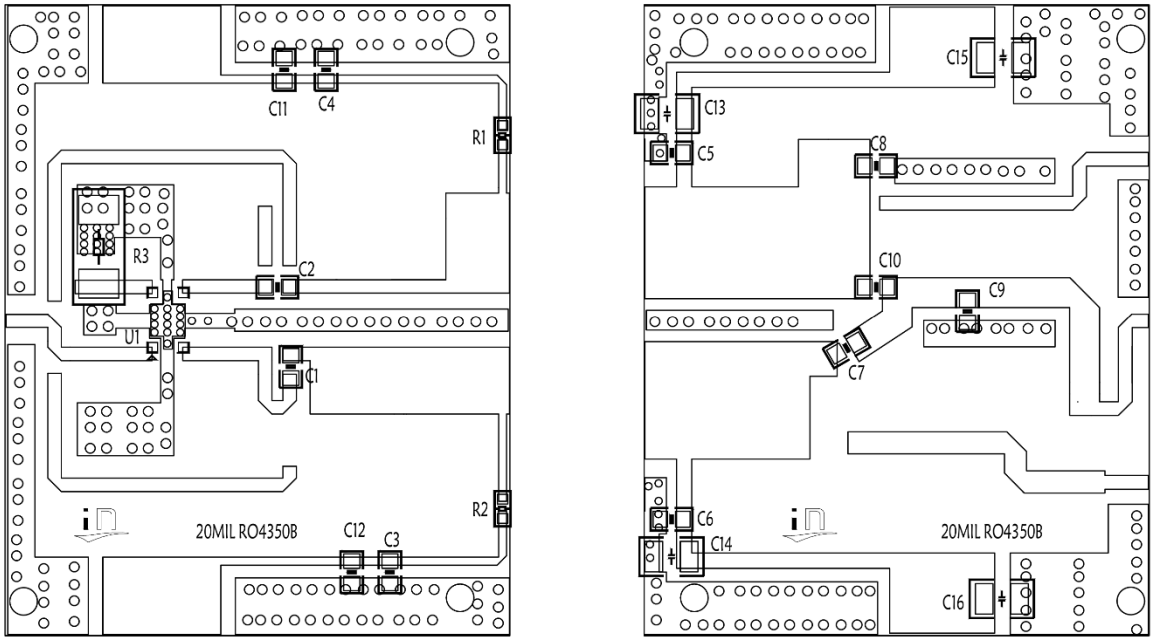
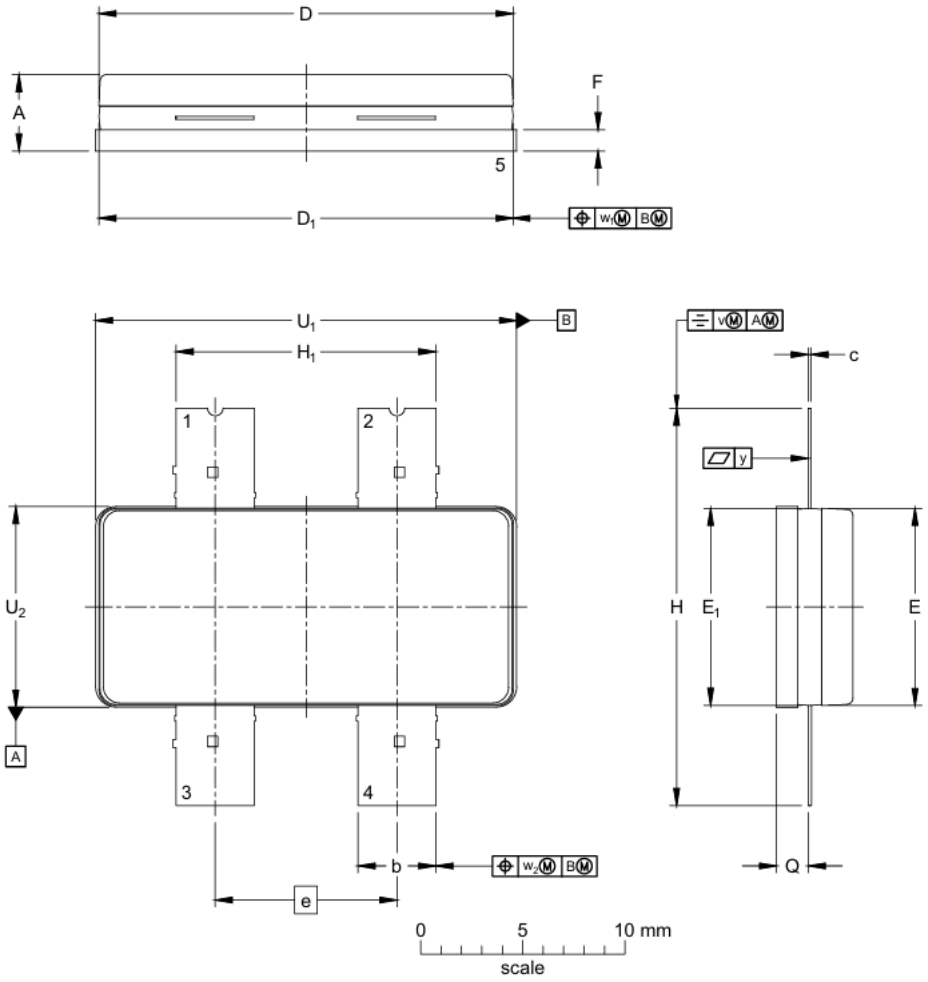


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Reference	Footprint	Value	Quantity
C1, C2, C3, C4, C5, C6, C7	0603	20pF/250V	7
C13, C14, C15, C16	1210	10uF/100V	4
C11, C12	0603	4.7nF/50V	2
C8	0805	0.3pF/250V	1
C9	0603	0.2pF/250V	1
C10	0603	3.9pF/250V	1
R1, R2	0603	10R	2
R3	2512	51R	1
	B4C	STBV20450B4C^{V1}	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		1.14	19.53	12.83	1.68	20.70	9.91	0.50	0.50	0.50	0.10
	nom								8.89										
	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
2025/3/25	**V1.0**	**Preliminary Datasheet Creation**

Application data based on: ZBB-25-10

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