



Gallium Nitride 50V, 200W, 1.3-1.8GHz RF Power Transistor

Description

The STBV18200BY4 is a 200watt Doherty pair capable, GaN HEMT, ideal for 4G/5G cellular applications from 1.3 to 1.8GHz..

It can be configured as asymmetrical Doherty delivering 25-30W average power, according to normal 8 to 9dB back off.

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

- Typical WCDMA 1 carrier performance on 1320-1750MHz wideband Doherty

$V_{DD} = 50 \text{ Vdc}$, $I_{DQ_main} = 200\text{mA}$, $V_{gs_peak} = -5.0\text{V}$, $T_c = 25^\circ\text{C}$

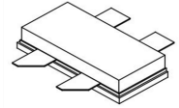
Freq (MHz)	Pout (dBm)	CCDF (dB)	ACPR (dBc)	Gain (dB)	Efficiency (%)
1320	44.50	7.95	-28.7	14.5	51.5
1400	44.49	7.95	-32.3	15.2	56.1
1500	44.49	7.88	-32.6	15.4	55.0
1600	44.50	8.34	-35.5	15.1	50.3
1700	44.49	8.69	-37.8	15.6	50.7
1750	44.50	7.98	-34.0	15.7	53.5

- Typical WCDMA 1 carrier performance on 1432-1517MHz narrow band Doherty

$V_{DD} = 50 \text{ Vdc}$, $I_{DQ_main} = 100\text{mA}$, $V_{gs_peak} = -5.5\text{V}$, $T_c = 25^\circ\text{C}$

Freq (MHz)	Pout (dBm)	CCDF (dB)	ACPR (dBc)	Gain (dB)	Efficiency (%)
1432	44.56	9.20	-30.7	15.2	55.5
1475	44.61	9.46	-32.5	15.0	55.1
1517	44.58	9.49	-35.3	15.3	55.2

STBV18200BY4



Applications

- Asymmetrical Doherty amplifier
- 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)

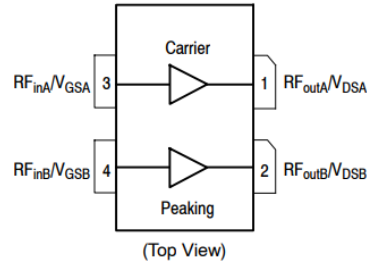


Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DS}	+200	Vdc
Gate--Source Voltage	V_{GS}	-8 to +0.5	Vdc
Operating Voltage	V_{DD}	55	Vdc
Maximum gate current	I_{gs}	27	mA
Storage Temperature Range	T_{stg}	-65 to +150	°C
Case Operating Temperature	T_C	+150	°C
Operating Junction Temperature	T_J	+225	°C

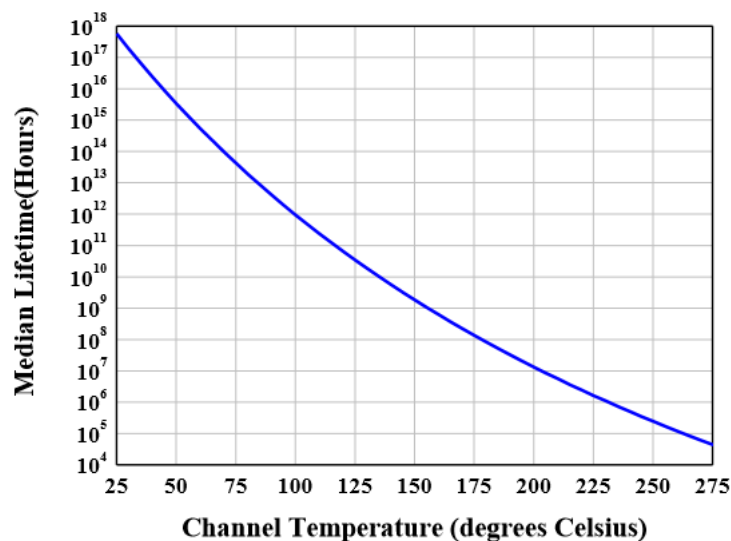
Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case by FEA $T_C = 85^\circ\text{C}$, at $P_d = 25\text{W}$, on Doherty application board	$R_{\theta JC}$	2.2	°C /W

Table 3. Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	1400MHz, $P_{out} = 25\text{W}$ pulse CW for All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature





1.32-1.75GHz

Figure 3: Efficiency and power gain as function of Pout (1320-1750MHz Doherty)

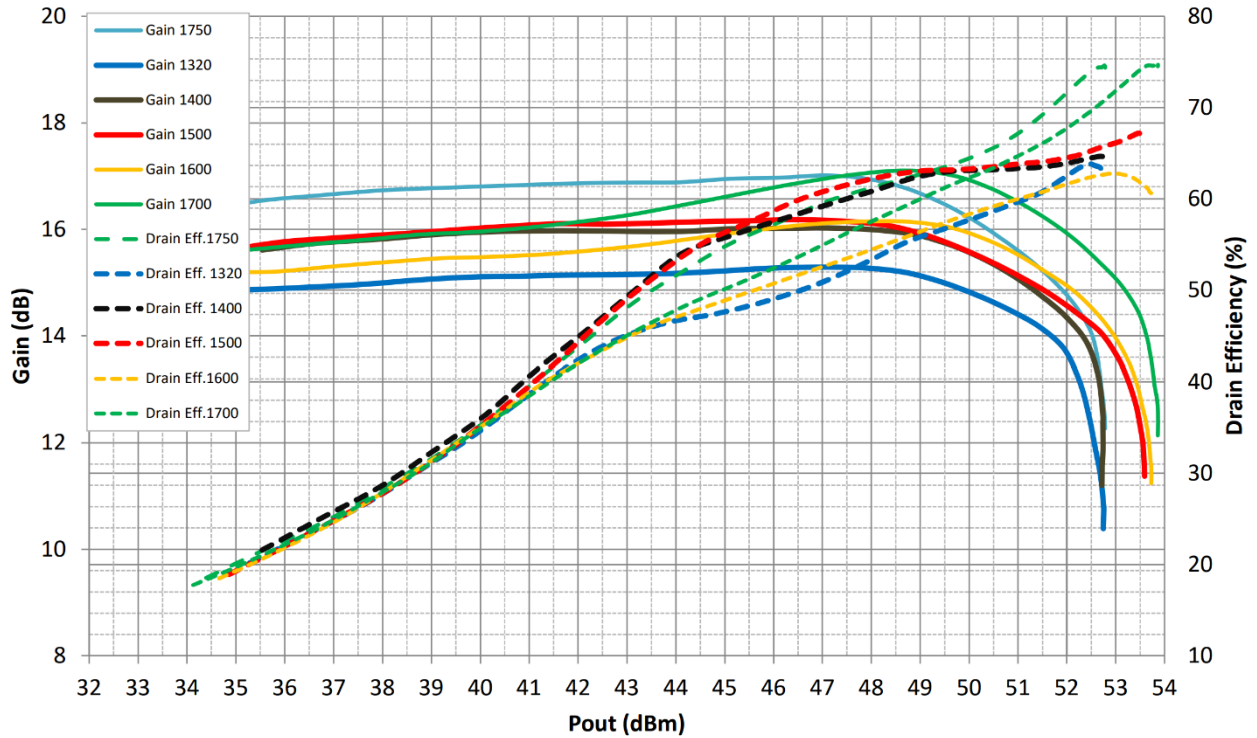


Figure 4: Network analyzer output, S11 and S21 (1320-1750MHz Doherty)

m1 freq=1.320 GHz dB(S(2,1))=16.875 dB(S(1,1))=-12.159	m2 freq=1.400 GHz dB(S(2,1))=17.568 dB(S(1,1))=-11.383	m3 freq=1.500 GHz dB(S(2,1))=17.339 dB(S(1,1))=-10.875	m4 freq=1.600 GHz dB(S(2,1))=16.770 dB(S(1,1))=-9.541	m5 freq=1.700 GHz dB(S(2,1))=17.215 dB(S(1,1))=-9.013	m6 freq=1.750 GHz dB(S(2,1))=17.720 dB(S(1,1))=-11.687
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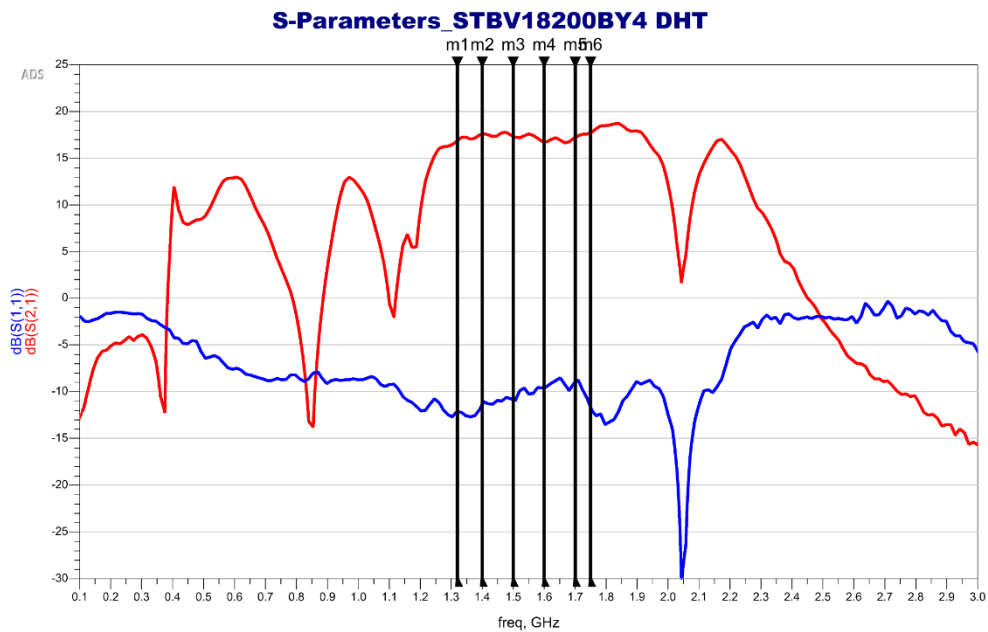


Figure 5: Picture of application board Doherty circuit for 1320-1750MHz

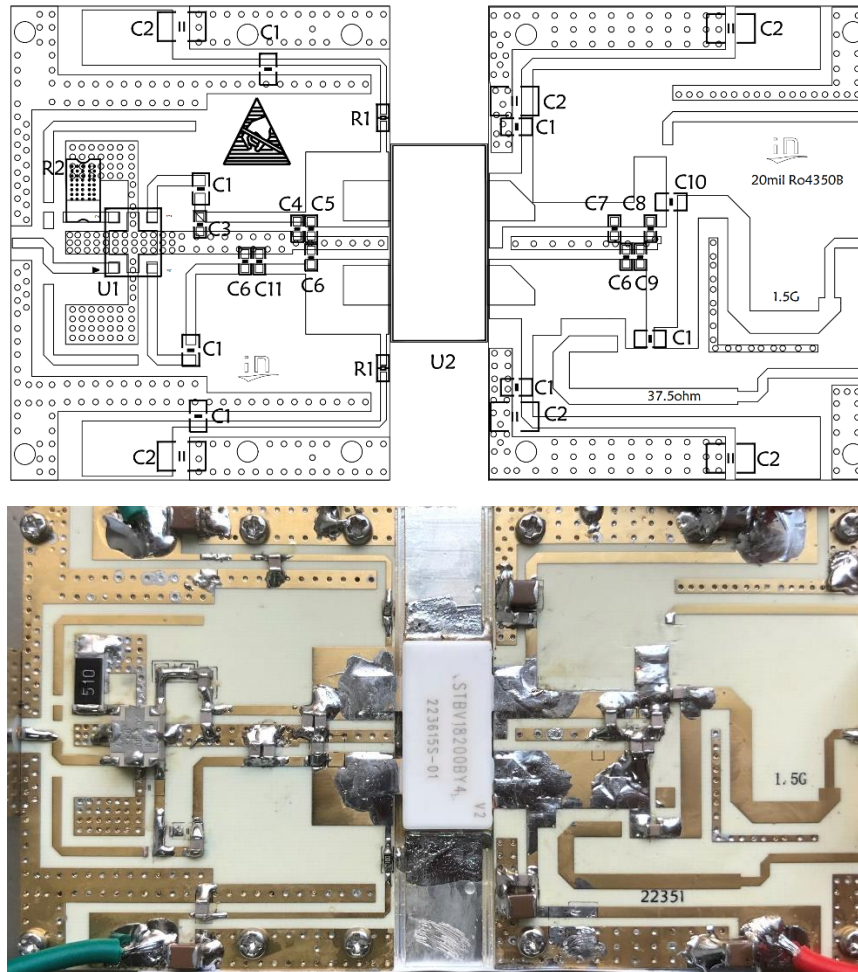


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Quantity	Reference	Value	PCB Footprint	Part number
2	R1	10ohm	R0603	
1	R2	51ohm	R2512	
7	C1	20pF	C0805	GQM1875G2E200GB12
6	C2	10uF/100V	C1210	
2	C3,C11	0.8pF	C0603	GQM1875G2E0R8BB12
1	C4	0.5pF	C0603	GQM1875G2E0R5BB12
1	C5	2.7pF	C0603	GQM1875C2E2R7BB12
3	C6	1pF	C0603	GQM1875G2E1R0BB12
1	C7	1.3pF	C0603	GQM1875G2E1R3BB12
1	C8	1.2pF	C0603	GQM1875G2E1R2BB12
1	C9	2.4pF	C0603	GQM1875C2E2R4BB12
1	C10	18pF	C0603	GQM1875G2E180GB12
1	U1	XC1400P-03S	250X200	XC1400P-03S
1	U2	STBV18200BY4	BY4	STBV18200BY4



1.43-1.72GHz

Figure 6: Efficiency and power gain as function of Pout

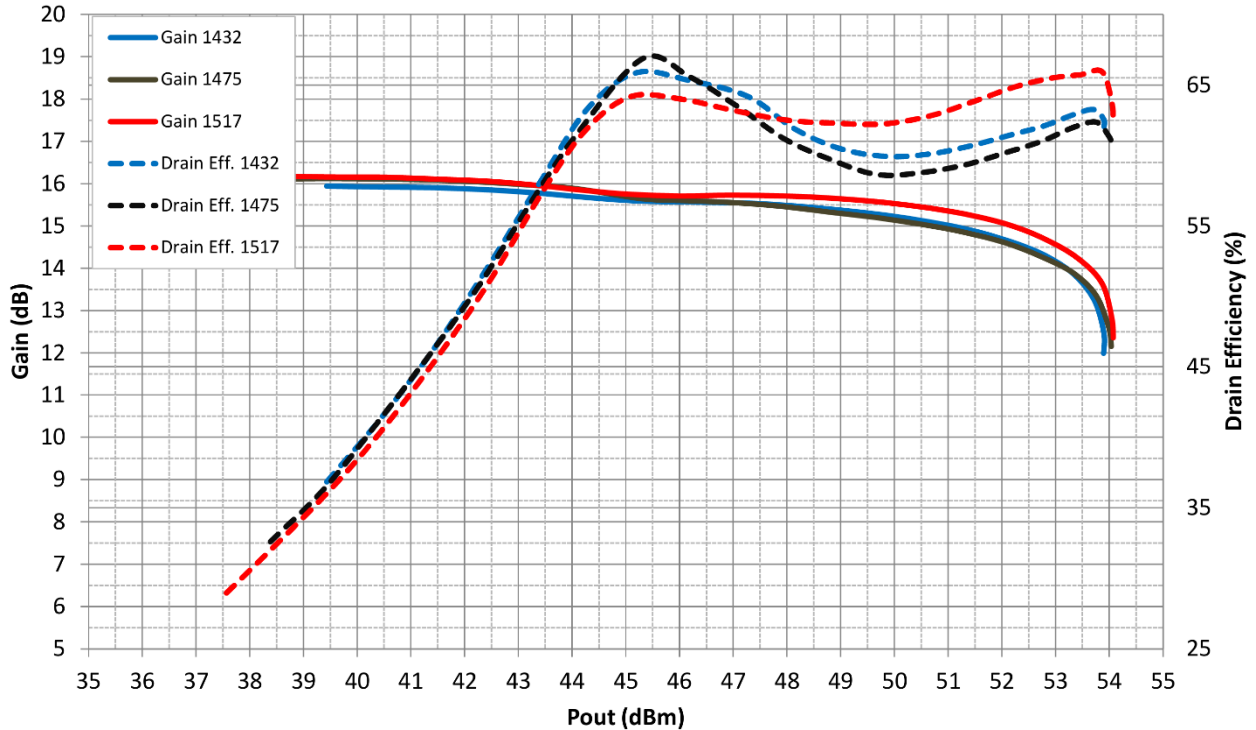


Figure 7: Network analyzer output, S11 and S21

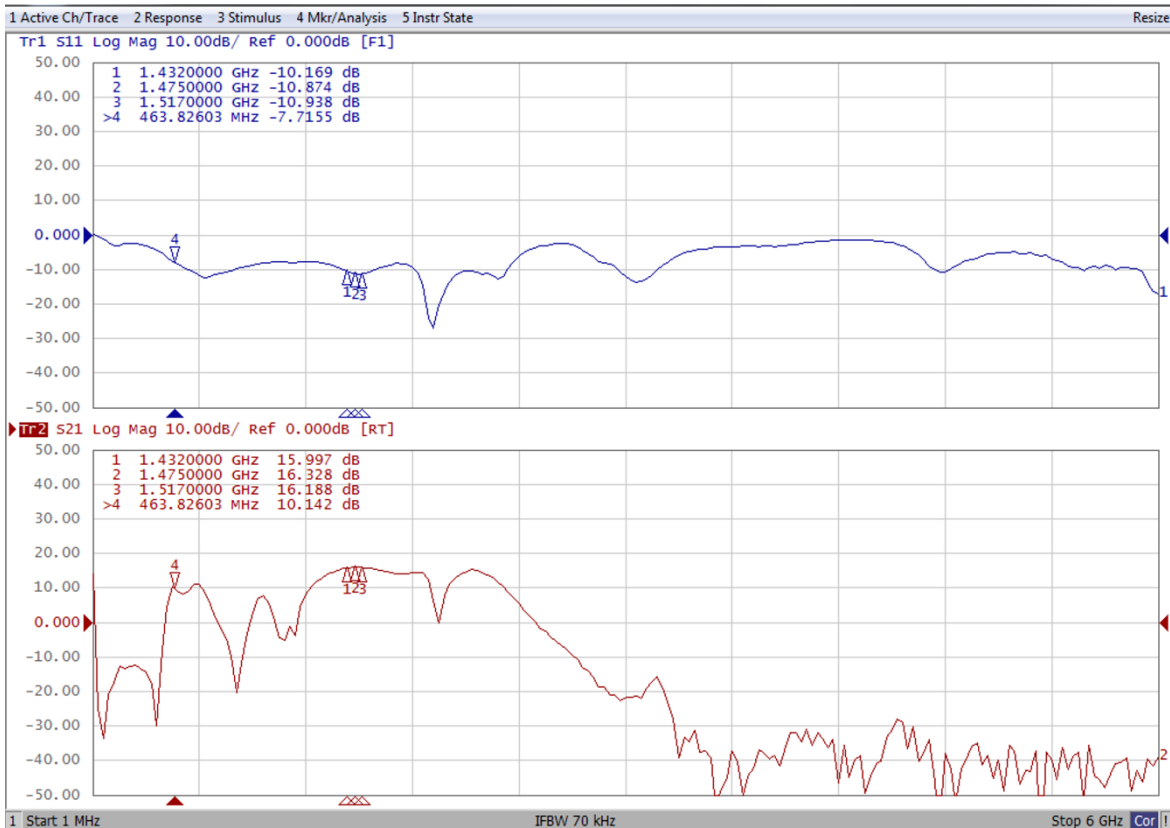


Figure 8: Picture of application board Doherty circuit

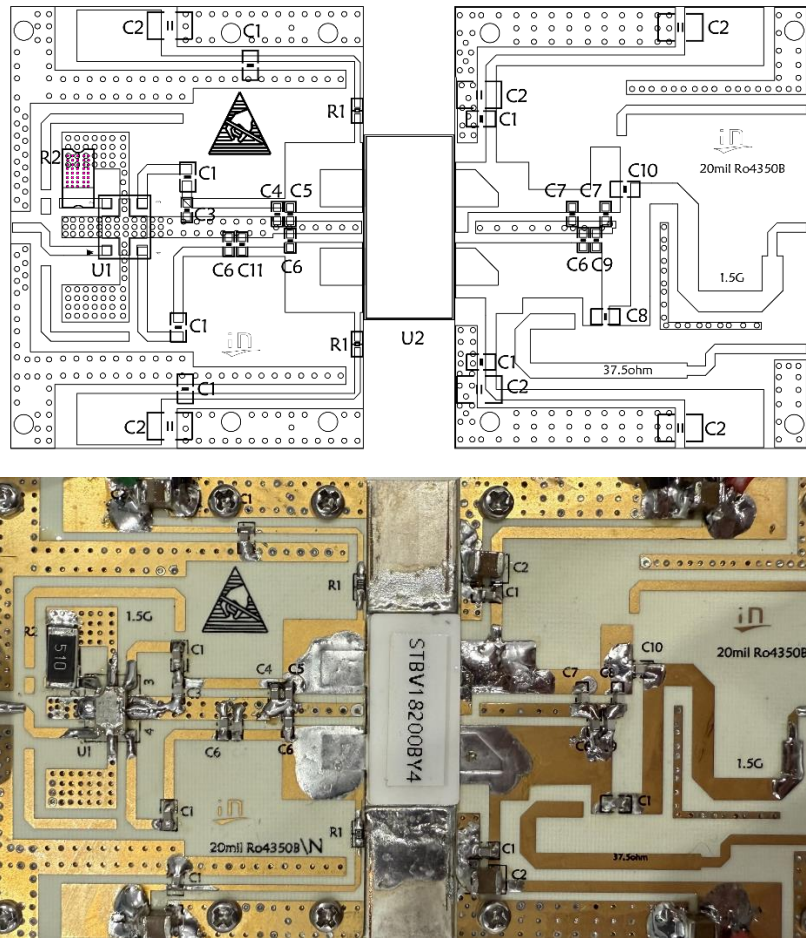
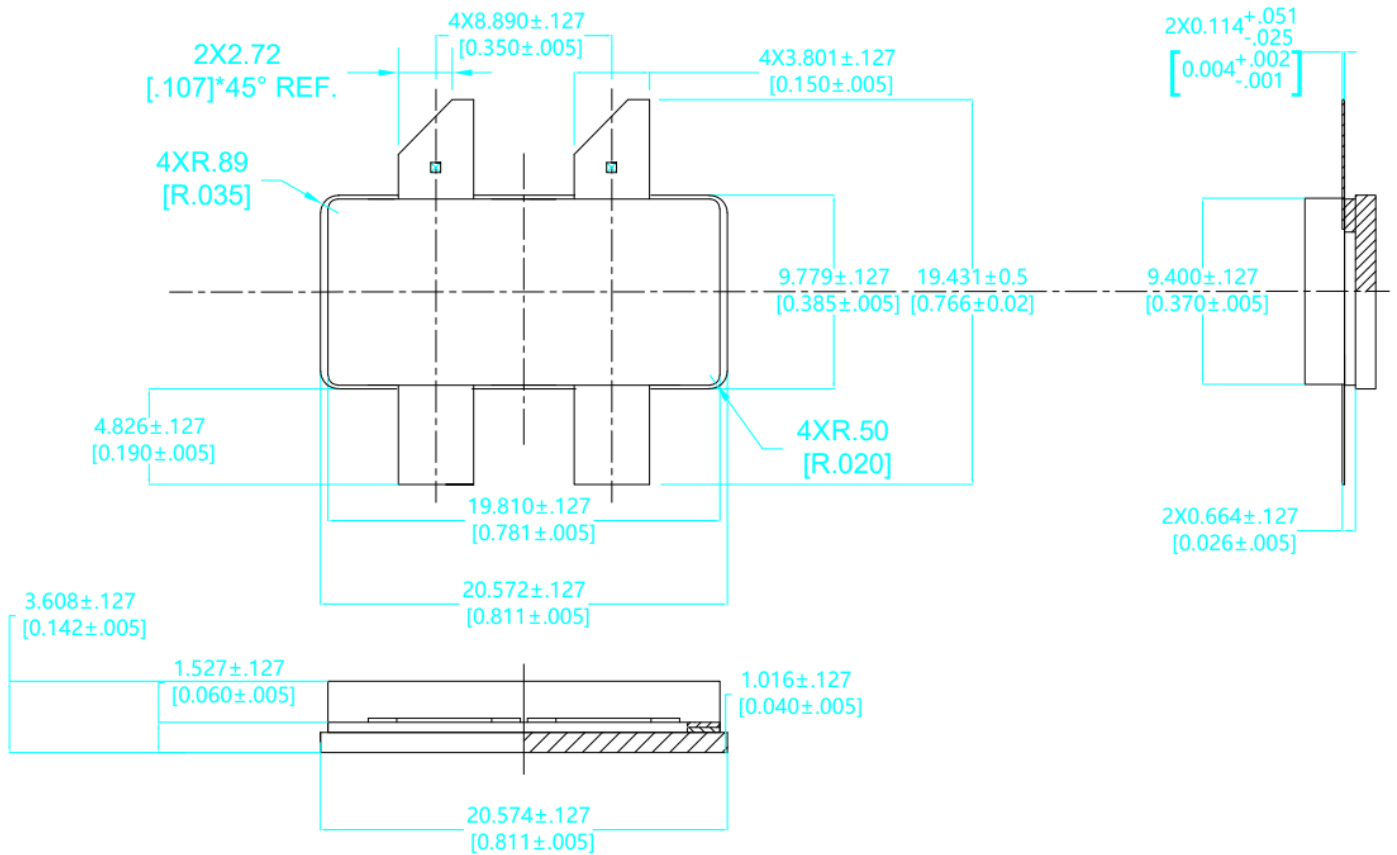


Table 5. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Quantity	Reference	Value	PCB Footprint
2	R1	10ohm	R0603
1	R2	51ohm	R2512
6	C1	20pF/250V	C0805
6	C2	10uF/100V	C1210
1	C3	0.8pF/250V	C0603
1	C11	0.8pF/250V	C0603
1	C4	0.5pF/250V	C0603
1	C5	2.7pF/250V	C0603
3	C6	1.0pF/250V	C0603
2	C7	1.2pF/250V	C0603
1	C8	22pF/250V	C0603
1	C9	3.0pF/250V	C0603
1	C10	9.1pF/250V	C0603
1	U1	X3C14F1-02S	200X125
1	U2	STBV18200BY4	BY4



Earless Flanged Ceramic Package; 4 leads



OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-BY4					07/27/2023



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2022/9/7	V1.0	Preliminary Datasheet Creation
2023/7/11	V1.1	Correct typo of board materials thickness and pin drawings
2023/7/27	V1.2	Update BY4 drawing
2025/3/27	V1.3	Add 1.5GHz narrow band application data with increased Psat up to 250W
2025/8/1	V1.1	Modify the typo of Rth

Application data based on: ZBB-22-09/ZBB-25-11

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