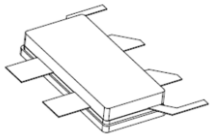
GaN HEMT 50V, 350W,1.8-2.2GHz Full band RF Power Transistor

STBV22W350BY4V



Description

The STBV22W350BY4V is a dual path 350watt,Internally matched GaN HEMT, ideal for applications from 1.8 to 2.2GHz full band operation especially for LTE/5G

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

- Typical RF performance on **1.8-2.2GHz** full band asymmetrical Doherty with device soldered

VDS= 50V, IDQ=260mA(Vgm=-3.34V，Vgp=-5.6V)

Freq (GHz)	Pulse CW Signal(1)			P_{avg}=47dBm WCDMA Signal(2)		
	P3 (dBm)	P4 (dBm)	P4 (W)	Gp (dB)	η_D (%)	$ACPR_{5M}$ (dBc)
1.8	55.48	55.88	387	15.89	53.30	-26.16
1.85	55.20	55.80	380	15.73	54.58	-28.20
1.9	54.90	55.45	350	15.85	54.84	-29.54
2.0	55.05	55.65	367	15.55	53.90	-31.54
2.1	55.45	55.90	389	15.95	53.30	-33.10
2.15	55.36	55.96	400	15.81	53.20	-31.38
2.2	55.17	55.70	370	15.97	53.60	-29.49

(1) Pulsed condition: 100us and 10%, (2)1C WCDMA; Signal PAR = 10 dB @ 0.01% Probability on CCDF.

Recommended driver: Class AB (1 stage discrete solution): STAV58025P2

Applications

- Asymmetrical Doherty amplifier within 1.8-2.2GHz full band
- 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)

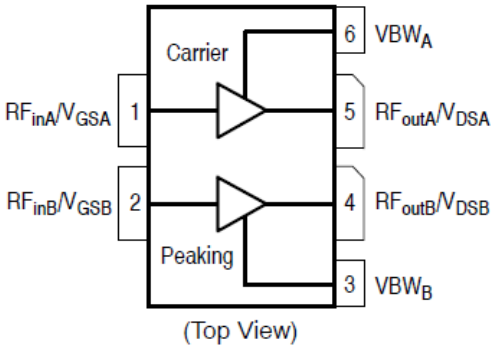


Table 1. Maximum Ratings

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	46.8	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	$R_{\theta JC}$	1.9	°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=16.8mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 16.8mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=350mA, Measured in Functional Test	$V_{GS(Q)}$		-3.3		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=30mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 30mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=550mA, Measured in Functional Test	$V_{GS(Q)}$		-3.3		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	2.14GHz, Pout=50W WCDMA 1 Carrier in Doherty circuit All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature

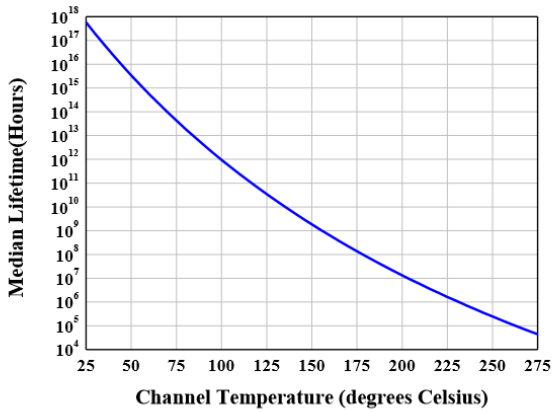


Figure 3: Efficiency and power gain as function of Pout (1.8-2.2GHz Doherty)

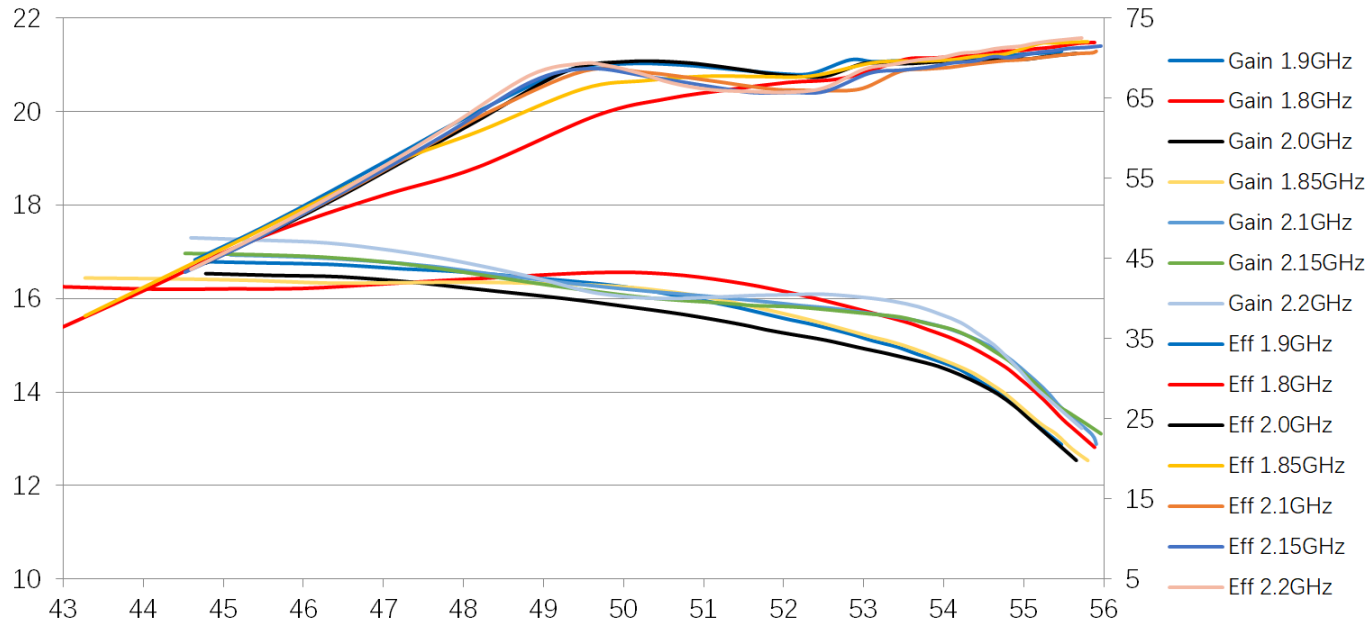


Figure 4: Network analyzer output, S11 and S21 (1.8-2.2GHz Doherty)

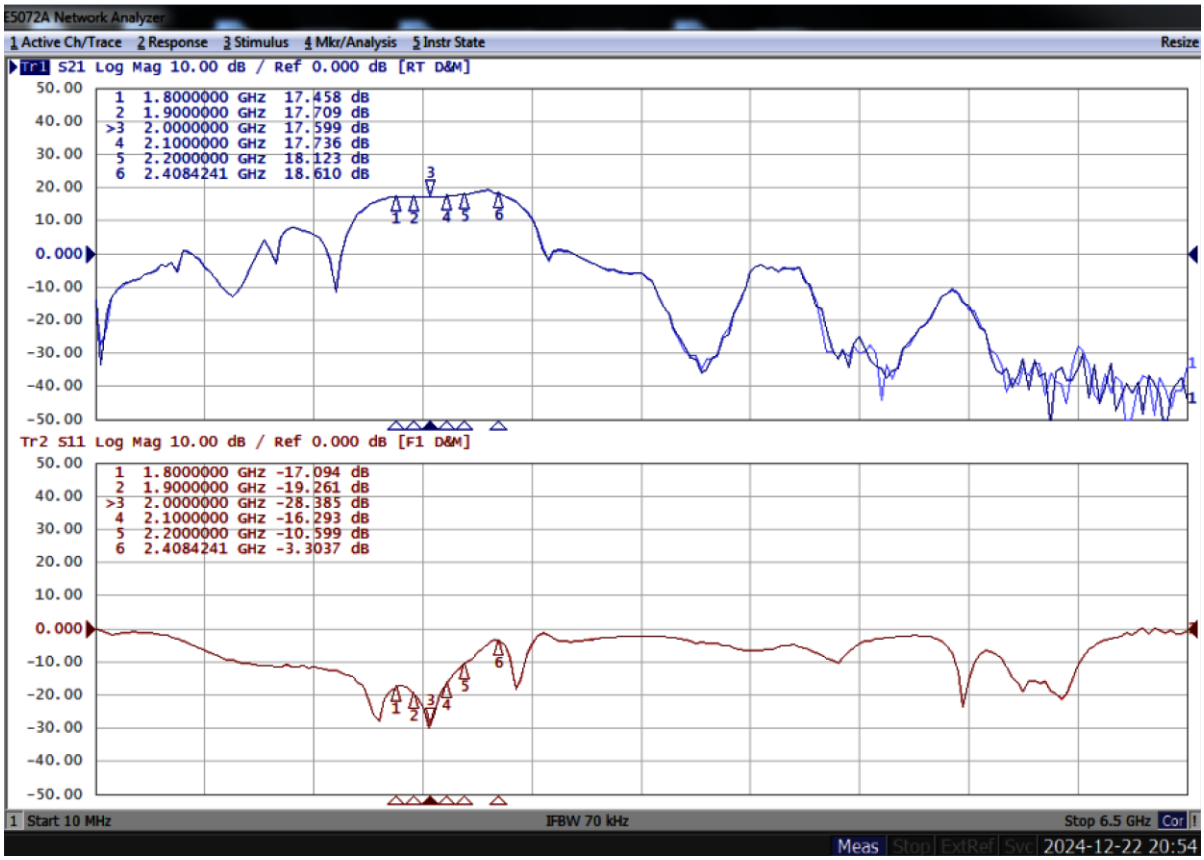


Figure 5: Picture of application board Doherty circuit for 1.8-2.2GHz

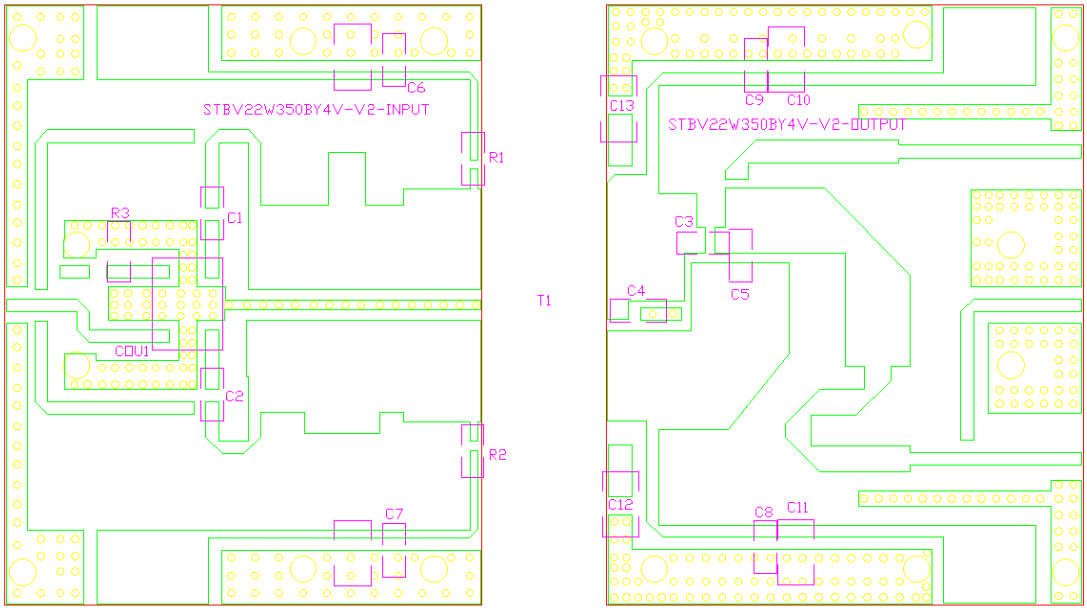
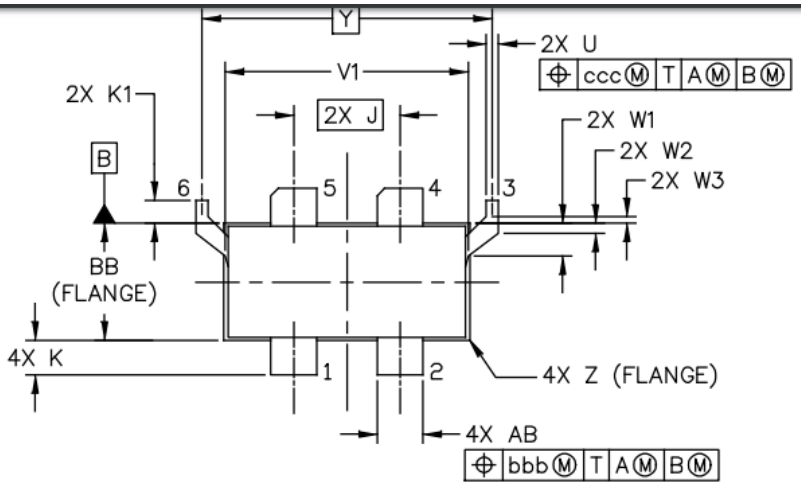
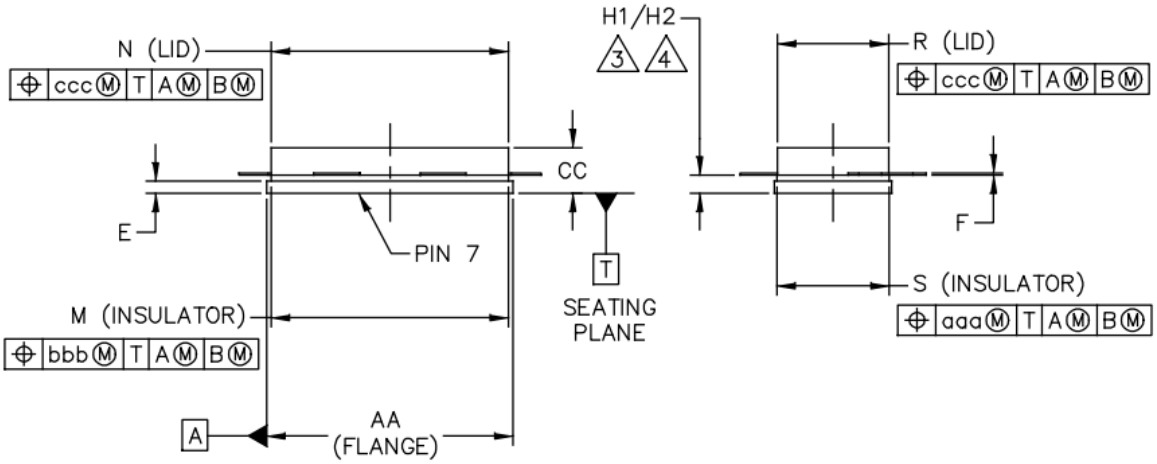


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Part	Quantity	Description	Part Number	Manufacture
C1,C2,C6, C9,C7,C8	6	20pFHigh Q Capacitor	251SHS200BSE	TEMEX
C5	1	5.6pFHigh Q Capacitor	ATC600F5R6	ATC
C3	1	10pFHigh Q Capacitor	ATC600S10R0	ATC
C10,C11,C12,C13	4	10uF MLCC	RS80R2A106M	MARUWA
C4	1	1.2pFHigh Q Capacitor	251SHS1R2BSE	TEMEX
R1,R2	2	10Ω Power Resistor	ESR03EZPF100	ROHM
R3	1	50Ω Power Resistor	S1206N	RN2
COU1	1	3 dB Bridge	HC2100P03H	YANTEL
T1	1	350W GaN Dual Transistor	STBV22W350BY4V	Innogration

Earless Flanged Ceramic Package; 6 leads- BY4V





DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX	DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX
AA	.805	.815	20.45	20.70	R	.365	.375	9.27	9.53
BB	.380	.390	9.65	9.91	S	.365	.375	9.27	9.53
CC	.125	.170	3.18	4.32	U	.035	.045	0.89	1.14
E	.035	.045	0.89	1.14	V1	.795	.805	20.19	20.45
F	.004	.007	0.10	0.18	W1	.0975	.1175	2.48	2.98
H1	.057	.067	1.45	1.70	W2	.0225	.0425	0.57	1.08
H2	.054	.070	1.37	1.78	W3	.0125	.0325	0.32	0.83
J	.350 BSC		8.89 BSC		Y	.956 BSC		24.28 BSC	
K	.0995	.1295	2.53	3.29	Z	R.000	R.040	R0.00	R1.02
K1	.070	.090	1.78	2.29	AB	.145	.155	3.68	3.94
M	.774	.786	19.66	19.96	aaa	.005		0.13	
N	.772	.788	19.61	20.02	bbb	.010		0.25	
					ccc	.015		0.38	

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2024/12/23	**V1.0**	**Preliminary Datasheet Creation**

Application data based on: LWH-24-37

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