



Gallium Nitride 50V, 300W, 1.8-2.2GHz RF Power Transistor

Description

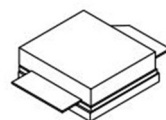
The STBV22W300AY2 is a single ended 300watt, GaN HEMT, ideal for applications from 1.8 to 2.2GHz.

It is an input and output matched transistor, and There is no guarantee of performance when this part is used outside of stated frequencies.

- Typical pulse CW and CW performance across **1.8-2.2GHz** with device soldered

$V_{DD} = 50 \text{ Vdc}$, $I_{DQ} = 300\text{mA}$, Pulse width=20us, duty cycle10%

STBV22W300AY2



Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
1800	53.64	231.2	55.0	18.33	55.46	351.3	64.7
1850	53.59	228.5	55.1	18.3	55.39	345.7	64.7
1900	53.45	221.4	54.9	18.45	55.3	339.2	64.9
1950	53.35	216.1	55.2	18.76	55.28	337.2	65.7
2000	53.28	212.7	55.6	18.7	55.21	331.8	66.3
2050	53.05	202.0	54.8	18.98	55.07	321.7	66.0
2100	52.9	194.8	54.4	18.79	55	315.9	66.2
2150	52.9	194.8	54.5	18.58	55.05	319.7	67.0
2200	52.86	193.1	54.8	18.39	55.01	317.0	67.8

Pout=45dBm 1carrier WCDMA, $V_{DQ} = 50 \text{ Vdc}$, $I_{DQ} = 300\text{mA}$

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Efficiency (%)
1800	44.99	9.02	54.01	251.7	-41.4	18.3	23.7
1850	44.97	8.96	53.93	247.2	-41.4	18.2	23.7
1900	44.99	8.94	53.93	247.3	-41.6	18.4	24.0
1950	44.96	8.93	53.89	245.0	-41.3	18.6	24.2
2000	44.99	8.91	53.90	245.3	-41.5	18.6	24.6
2050	44.97	8.83	53.80	239.9	-41.7	18.8	24.7
2100	44.96	8.78	53.74	236.7	-41.8	18.6	24.9
2150	44.99	8.76	53.76	237.5	-41.9	18.5	25.0
2200	44.98	8.78	53.76	237.6	-42.2	18.3	25.2

Applications

- L/S band power amplifier
- 5G base station amplifier

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

1. Set V_{GS} to the pinch-off (V_P) voltage, typically -5 V
2. Turn on V_{DS} to nominal supply voltage
3. Increase V_{GS} until I_{DS} current is attained
4. Apply RF input power to desired level

Turning the device OFF

1. Turn RF power off
2. Reduce V_{GS} down to V_P , typically -5 V
3. Reduce V_{DS} down to 0 V
4. Turn off V_{GS}



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}	39.6	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 $T_C = 25^\circ\text{C}$, at $P_d = 75\text{W}$, WCDMA $P_{out} = 25\text{W}$	$R_{\theta JC}$	1.1	°C /W

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

DC Characteristics (measured on wafer prior to packaging)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = -8\text{V}$; $I_{DS} = 39.6\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$, $I_D = 39.6\text{mA}$	$V_{GS(th)}$	-4	-3	-2	V
Gate Quiescent Voltage	$V_{DS} = 50\text{V}$, $I_{DS} = 300\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-3.2		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	2.2GHz, $P_{out} = 300\text{W}$ pulse CW for each path All phase, No device damages	VSWR		10:1		

Figure 2: Power Gain, Efficiency as function of P_{out}

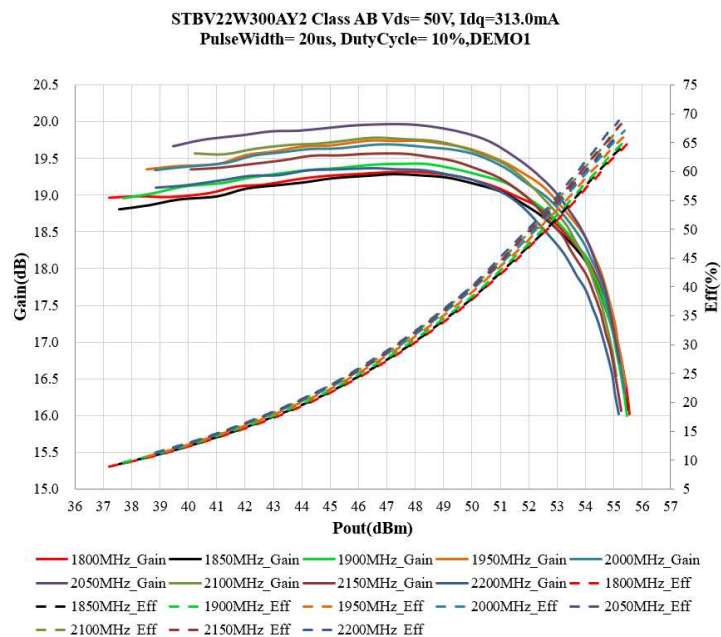




Figure 3: S11 / S21 output from network analyzer

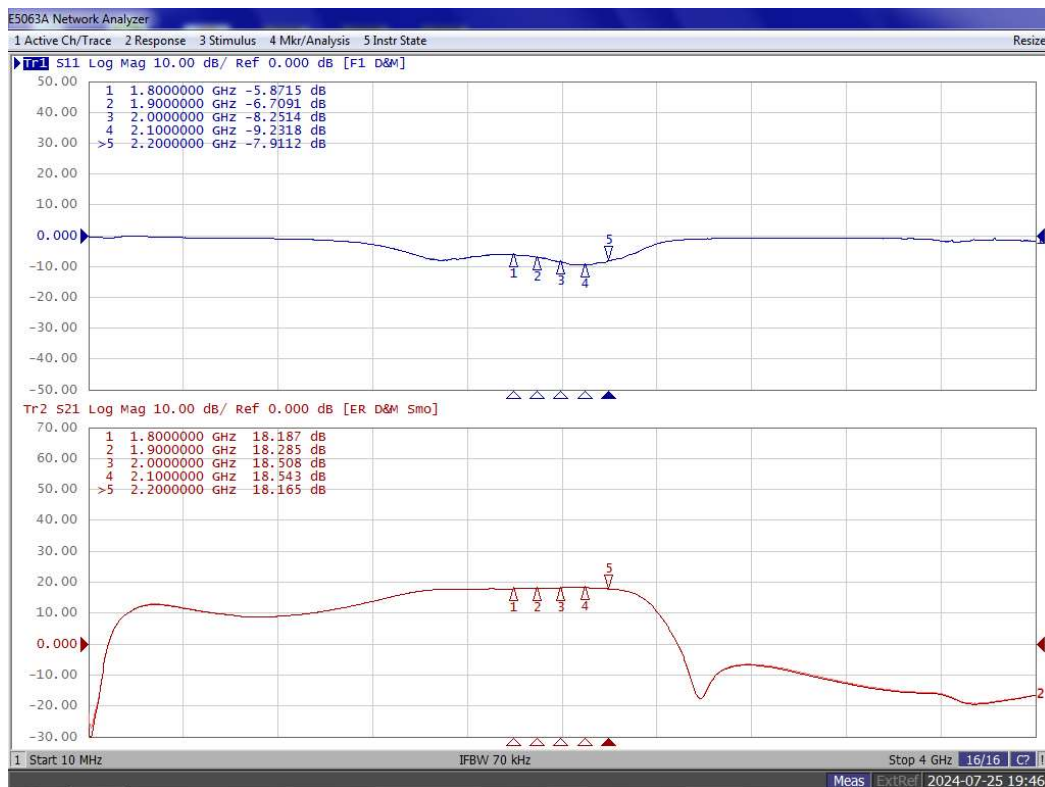


Figure 4: Picture of application board

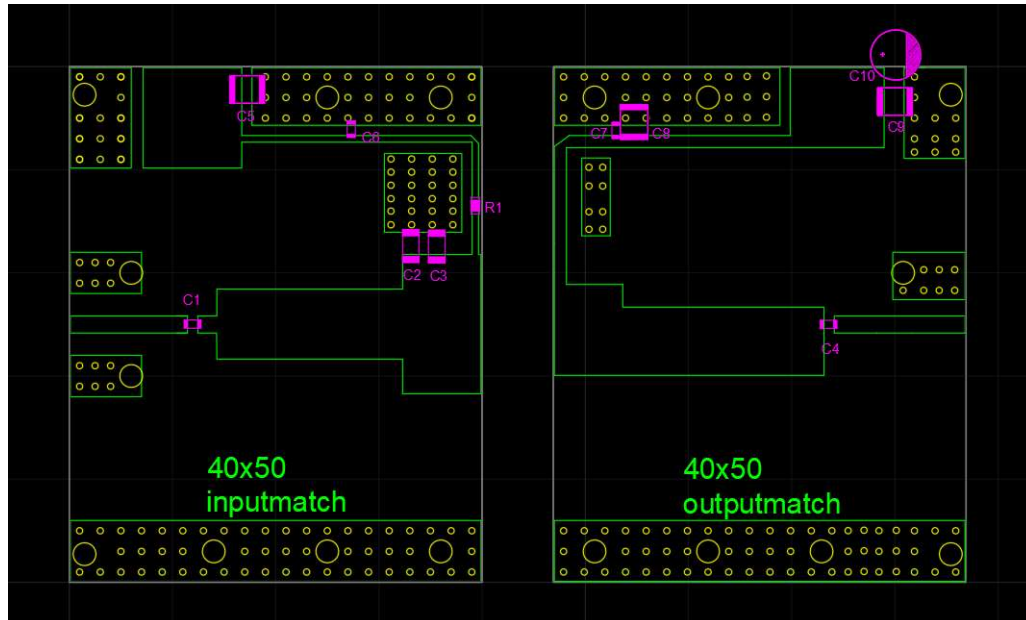
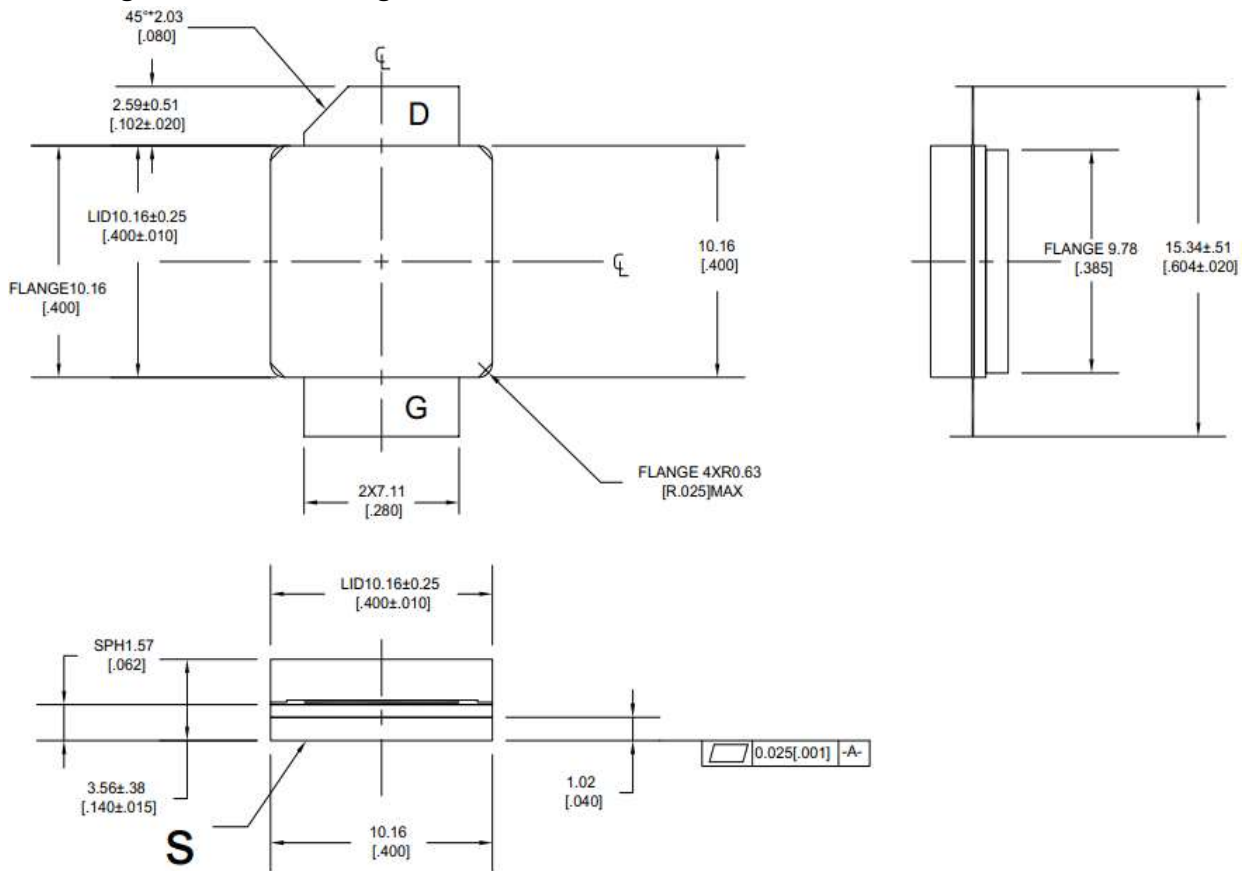


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Component	Value	Quantity
C1、C4、C6、C7	15pF	4
C5、C8、C9	10uF/63V	3
C2、C3	1.2pF	2
C10	470uF/63V	1
R1	10 Ω	1

Earless Flanged Ceramic Package; 2 leads



Unit: mm [inch]

Tolerance .xx +/- 0.01 .xxx +/- 0.005 inches



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2024/7/26	V1.0	Preliminary datasheet creation

Application data based on: ZYX-24-50

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