



Gallium Nitride 50V, 100W, 0.1-4.2GHz RF Power Transistor

Description

The STBV38100E2 is a 100watt, GaN HEMT, ideal for general applications from 0.1 to 4.2GHz.

It can support CW, pulse or any modulated signal.

It features high gain, wide band and low cost, in 6.5*6.5mm ceramic package with copper flange.

Its gullwing leads enable surface mounted on PCB through grounding vias or soldered on heatsink

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

STBV38100E2



- Typical Class AB pulse CW performance across 3.7-4GHz:

Pulse width=50us, duty cycle=20% (On innogration wideband application board with device soldered)

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
3700.00	49.96	99.11	55.40	15.11	51.05	127.29	58.84
3800.00	49.69	93.20	56.40	15.38	50.89	122.70	60.62
3900.00	49.31	85.31	54.89	15.15	50.80	120.12	60.35
4000.00	48.54	71.37	50.83	14.60	50.36	108.67	57.99

- Typical Class AB pulse CW performance across 3.4-3.8GHz:

Pulse width=50us, duty cycle=20% (On innogration wideband application board with device soldered)

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
3400	50.30	107.10	53.51	14.35	51.21	132.00	56.06
3500	49.52	89.47	54.60	15.25	50.99	125.47	59.52
3600	49.46	88.36	57.87	15.20	50.56	113.82	61.45
3700	48.65	73.20	55.73	15.26	50.32	107.59	61.27
3800	48.58	72.13	55.26	14.69	50.04	100.95	59.62

Applications

- 5G, 4G wireless infrastructure
- S band power amplifier
- Test instruments
- Jammer

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

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	I _{gs}	12	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°C, at P _{avg} =8W WCDMA 1 carrier	R _{θJC}	2.4	°C /W

Table 3. Electrical Characteristics (TA = 25°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} =-8V; I _{DS} =12mA	V _{DSS}		200		V
Gate Threshold Voltage	V _{DS} =10V, I _D = 12mA	V _{GS(th)}	-4	-3	-2	V
Gate Quiescent Voltage	V _{DS} =50V, I _{DS} =120mA, Measured in Functional Test	V _{GS(Q)}		-3.04		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	3.8GHz, P _{out} =100W pulse CW All phase, No device damages	VSWR		10:1		

3.4-3.8GHz

Figure 1: Efficiency and power gain as function of P_{out} (Measured on 3.4-3.8GHz application board)

V_{DD} = 50 Vdc, I_{DQ} = 150 mA, Pulse width=20us, duty cycle=20%

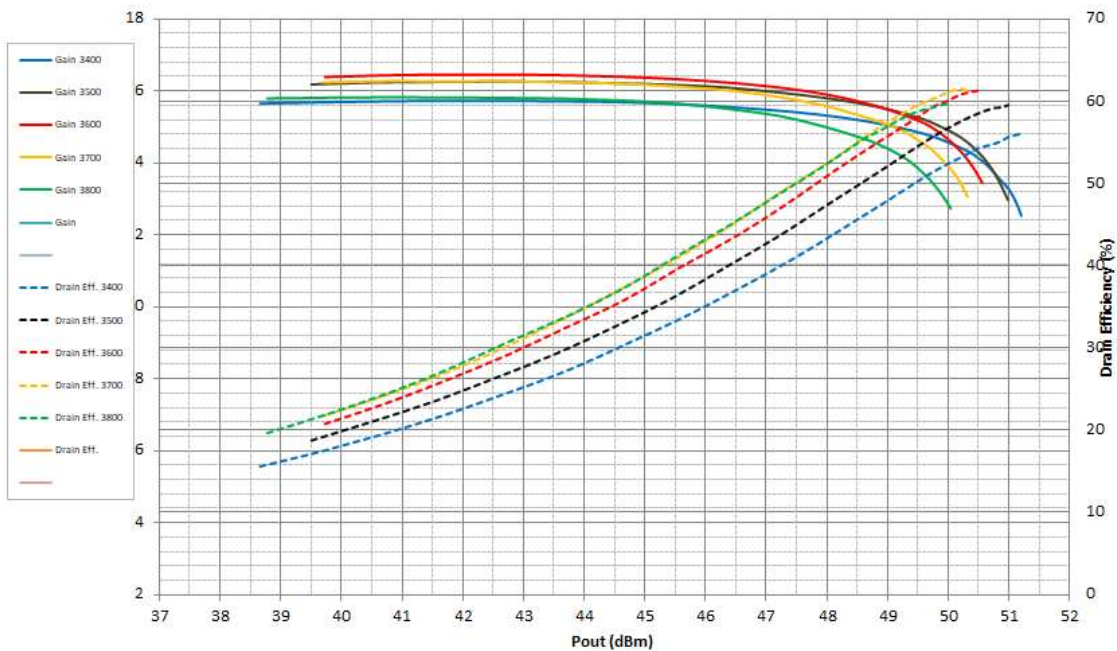


Figure 2: Network plot for S11/S21

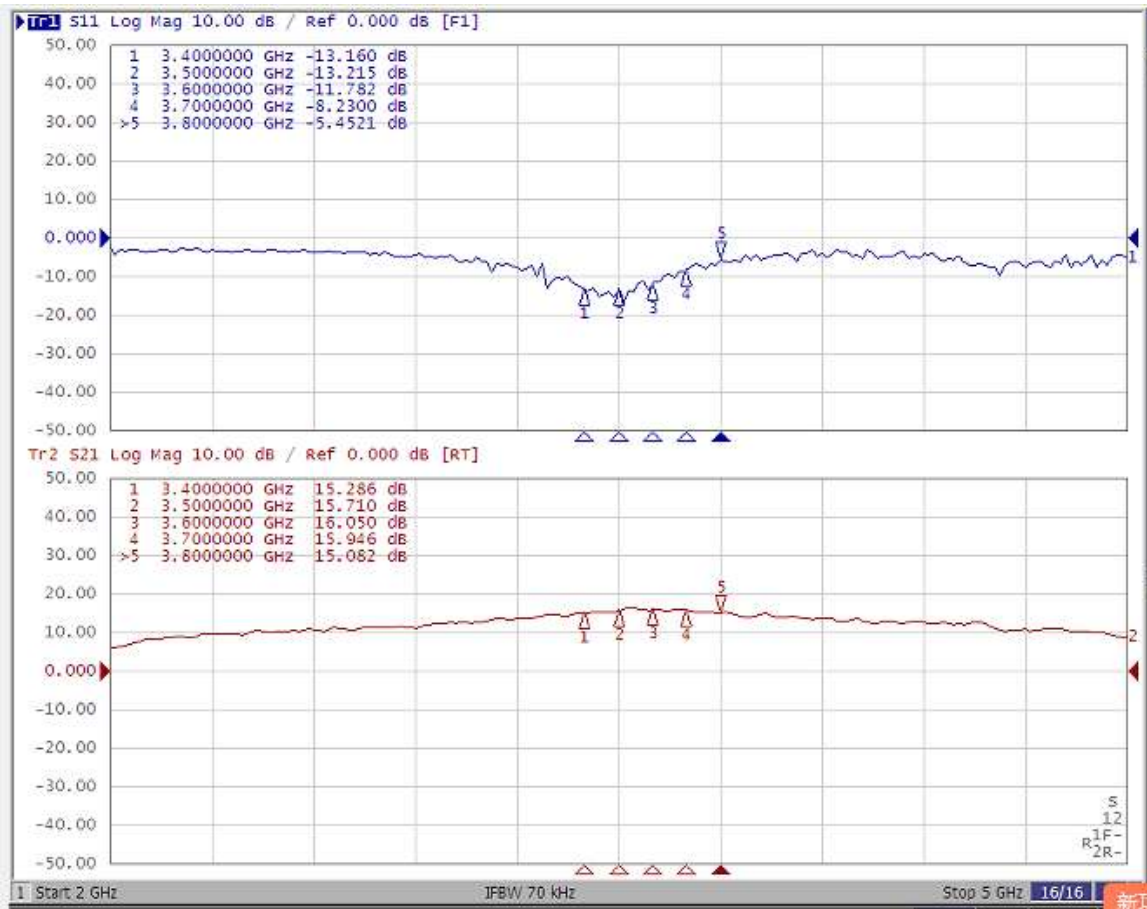


Figure 3: Picture of application board of 3.4-3.8GHz

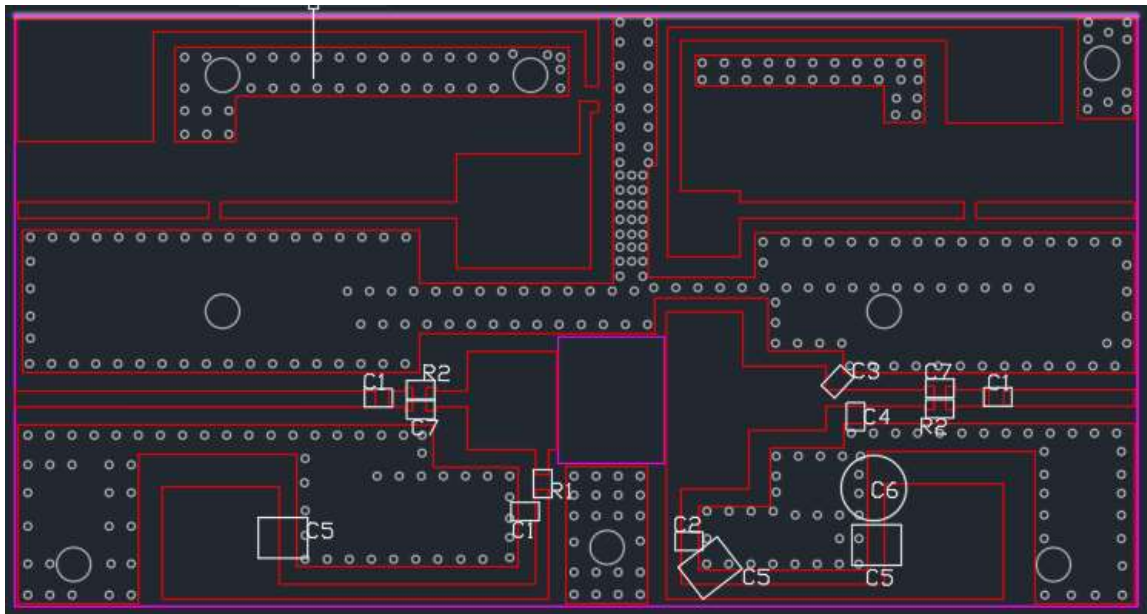




Table 4. Bill of materials of application board, RO4350B 30Mils (PCB layout upon request)

Component	Value	Quantity
C1	8.2pF	3
C2	5.6pF	1
R1	10 ohm	1
C3	0.2pF	1
C4	0.3pF	1
C5	10uF/63V	3
C6	470uF	1
C7	3.9pF	2
R2	50 ohm	2

3.7-4.0GHz

Figure 4: Efficiency and power gain as function of Pout (Measured on 3.7-4.0GHz application board)

VDD = 50 Vdc, IDQ = 150 mA, Pulse width=20us, duty cycle=20%

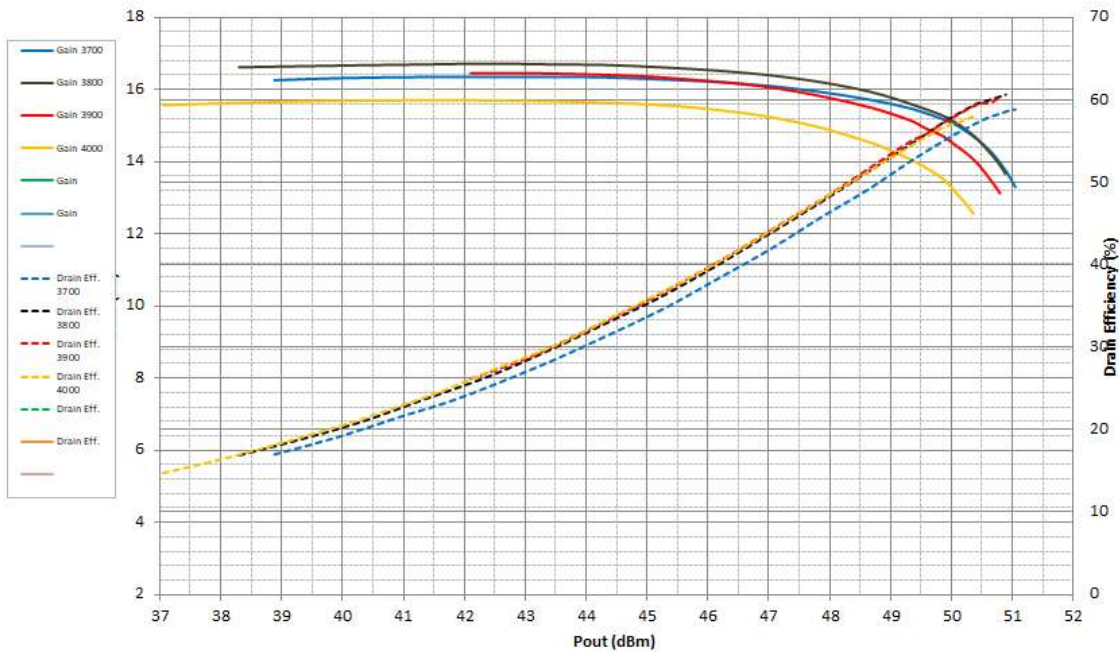


Figure 5: Network plot for S11/S21

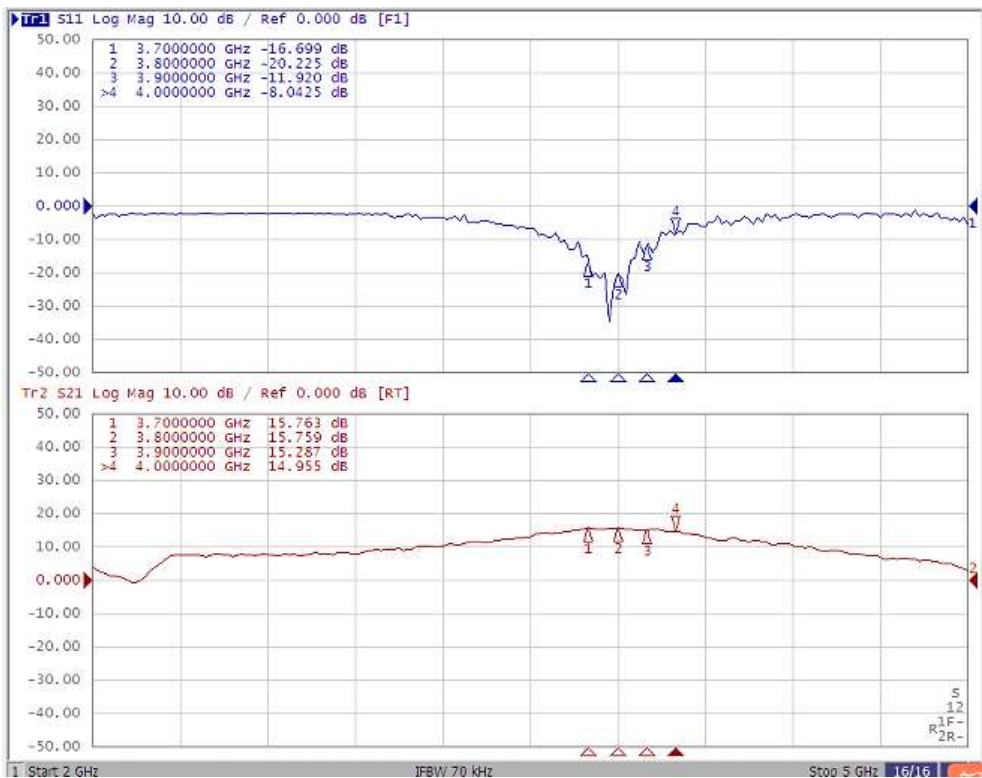


Figure 6: Picture of application board of 3.7-4.0GHz

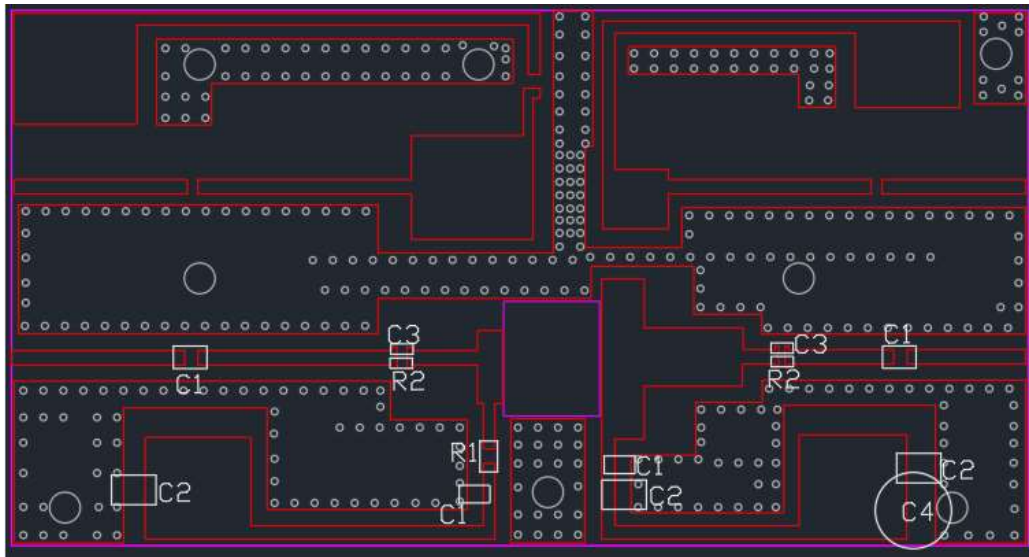


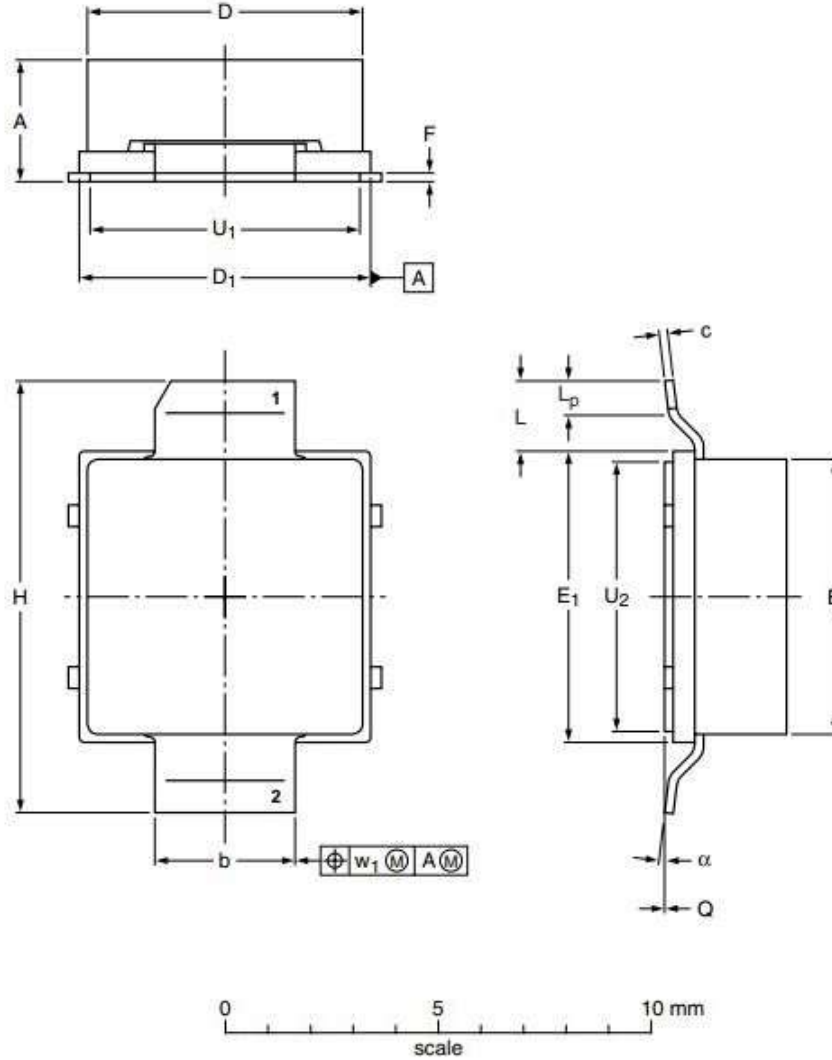
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R1	10 ohm	1
C3	3.9pF	2
R2	50 ohm	2
C4	470uF	1



Package Outline

Earless Flanged ceramic package; 2 leads



UNIT	A	b	c	D	D ₁	E	E ₁	F	H	L	L _p	Q	U ₁	U ₂	w ₁	α
mm	3.63	3.38	0.23	6.55	6.93	6.55	6.93	0.23	10.29	1.65	1.02	+0.05	6.43	6.43	0.51	7°
	3.05	3.23	0.18	6.40	6.78	6.40	6.78	0.18	10.03		0.51	-0.05	6.27	6.27		0°
inches	0.143	0.133	0.009	0.258	0.273	0.258	0.273	0.009	0.405	0.065	0.040	+0.002	0.253	0.253	0.02	7°
	0.120	0.127	0.007	0.252	0.267	0.252	0.267	0.007	0.395		0.020	-0.002	0.247	0.247		0°

OUTLINE VERSION	REFERENCE				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
PKG-E-A						10/22/2013



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2024/4/10	V1.0	Preliminary Datasheet Creation

Application data based on: ZXY-24-07/08

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