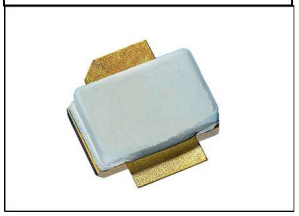
Gallium Nitride 50V, 100W,4.4-6GHz RF Power Transistor

STAV58100G2



Description

The STAV58100G2 is a single ended 100watt, GaN HEMT, ideal for 5G NR applications from 4.8-5GHz and LTE-U application from 5.3-5.9GHz.

It is an internally matched transistor capable of supporting CW, pulse or any modulated signal.

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

- Typical performance across **4.8-5GHz** (On innogration application board with device soldered)

V_{DD} = 48 Vdc, I_{DQ} = 130mA, Tc=25°C

Pulse CW: Pulse width=100us, duty cycle=10%,

Freq(MHz)	P_1dB(dBm)	P_1dB(W)	P_1dBEff(%)	Gain(p_1dB)	P_3dB(dBm)	P_3dB(W)	P_3dB Eff(%)
4800	49.96	99.05	54.34	13.49	50.83	121.12	58.32
4900	49.95	90.93	54.65	14.26	50.66	116.49	58.66
5000	49.23	83.69	52.86	14.06	50.53	112.94	57.21

CW:

Freq(MHz)	Pin(dBm)	Psat(dBm)	Psat(W)	IDS(A)	Gain(dB)	Eff(%)
4800	38	50.18	104.23	4.04	12.18	51.60
4900	37.93	50.1	102.33	3.93	12.17	52.08
5000	38.08	50.12	102.80	4	12.04	51.40

- Typical performance across **5.2-5.9GHz** (On innogration application board with device soldered)

V_{DD} = 50 Vdc, I_{DQ} = 100mA, Tc=25°C, Pulse CW: Pulse width=100us, duty cycle=10%,

FREQ (MHZ)	P1dB(dBm)	P1dB(W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB(dBm)	P3dB(W)	P3dB Eff(%)
5150	49.43	87.66	56.55	12.17	50.43	110.47	57.77
5250	49.54	89.94	56.03	12.44	50.67	116.65	58.25
5350	49.77	94.75	54.99	12.5	50.94	124.15	57.76
5720	49.92	98.1	51.17	13.77	51.27	134.11	55.21
5800	49.71	93.46	51.13	14.49	51	125.91	54.56
5850	49.52	89.44	51.98	13.27	50.77	119.53	55.31

CW:

FREQ (MHZ)	P1dB(dBm)	P1dB(W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB(dBm)	P3dB(W)	P3dB Eff(%)
5150	48.92	78.01	51.71	11.81	50.14	103.31	54.09
5250	49	79.52	50.93	11.88	50.29	106.74	53.91
5350	49.11	81.38	49.38	11.66	50.48	111.72	52.9
5720	48.51	70.9	43.16	13.04	50.62	115.26	50.32
5800	48.96	78.71	46.16	13.58	50.5	112.25	50.52
5850	48.97	78.88	47.93	12.49	50.33	107.86	51.44

Applications

- Sub-6GHz C band pulse or CW amplifier
- 5G or LTE-U Class AB amplifier
- Wideband 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

Figure 1: Pin Connection definition

Transparent top view (Backside grounding for source)

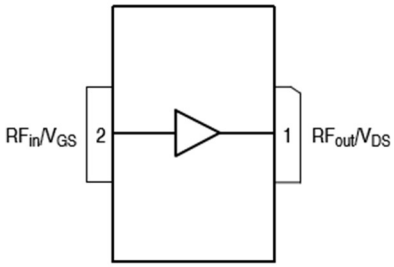


Table 1. Maximum Ratings

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	16	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 Pout=100W, Pulsed CW	$R_{\theta JC}$	1.3	°C /W

Table 3. Electrical Characteristics (TA = 25℃ unless otherwise noted)

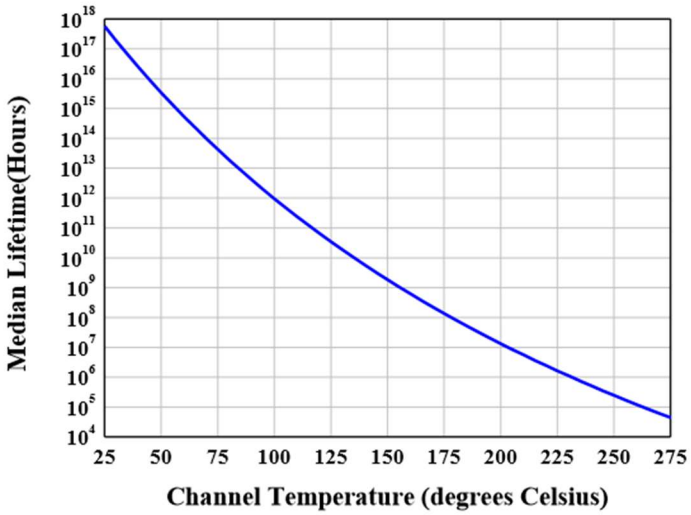
DC Characteristics (measured on wafer prior to packaging)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=16mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 16mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=100mA, Measured in Functional Test	$V_{GS(Q)}$		-3.1		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	5.9GHz, Pout=100W pulse CW All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature



Typical performance

4.8-5GHz

Figure 3: Efficiency and power gain as function of Pout

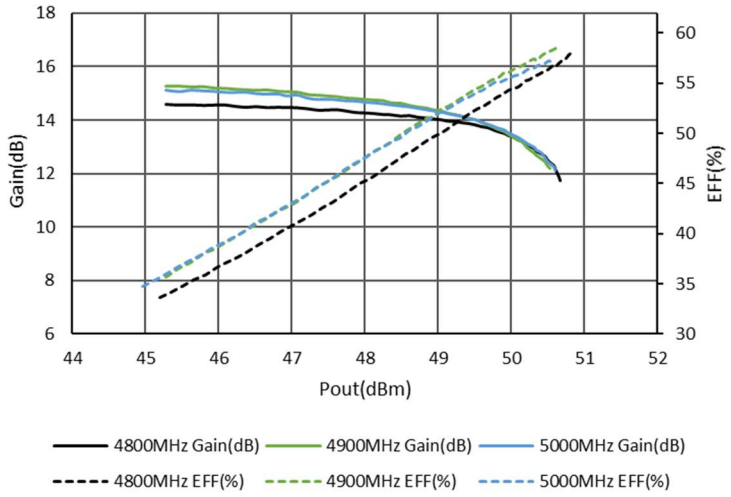


Figure 4: S11 / S21 output from network analyzer on 4.8-5GHz application board

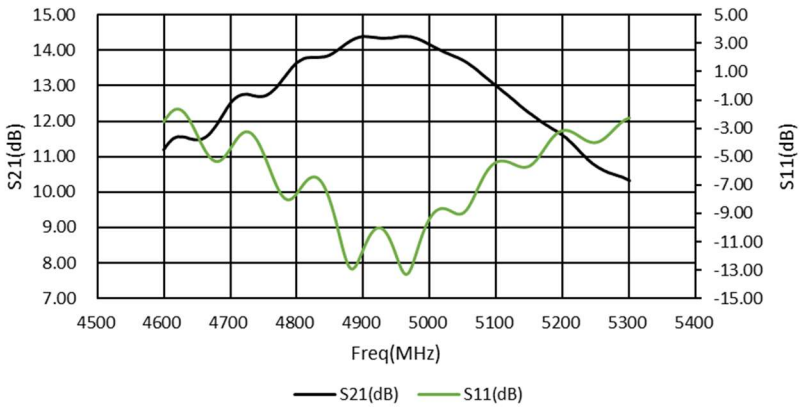
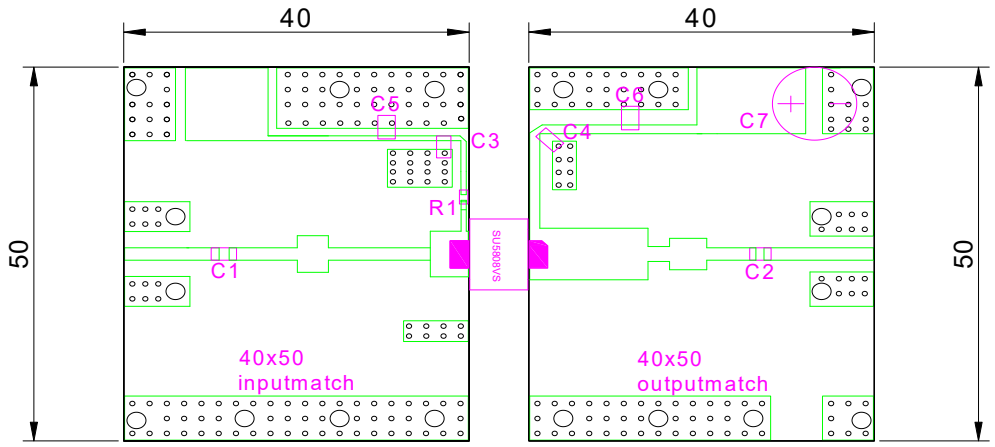


Figure 5: Picture of application board of 4.8-5GHz and bill of materials



Component	Description	Suggested Manufacturer
C1,C2,C3,C4	3.3pF	DLC75D
C5,C6	Ceramic multilayer capacitor, 10uF, 100V	10uF/100V
C7	470UF	63V/470UF
R1	Chip Resistor,11Ω,0603	
PCB	0.508mm [0.020"] thick, εr=3.48, Rogers RO4350B, 1 oz. copper	

5.1-5.9GHz

Figure 6: Efficiency and power gain as function of Pout

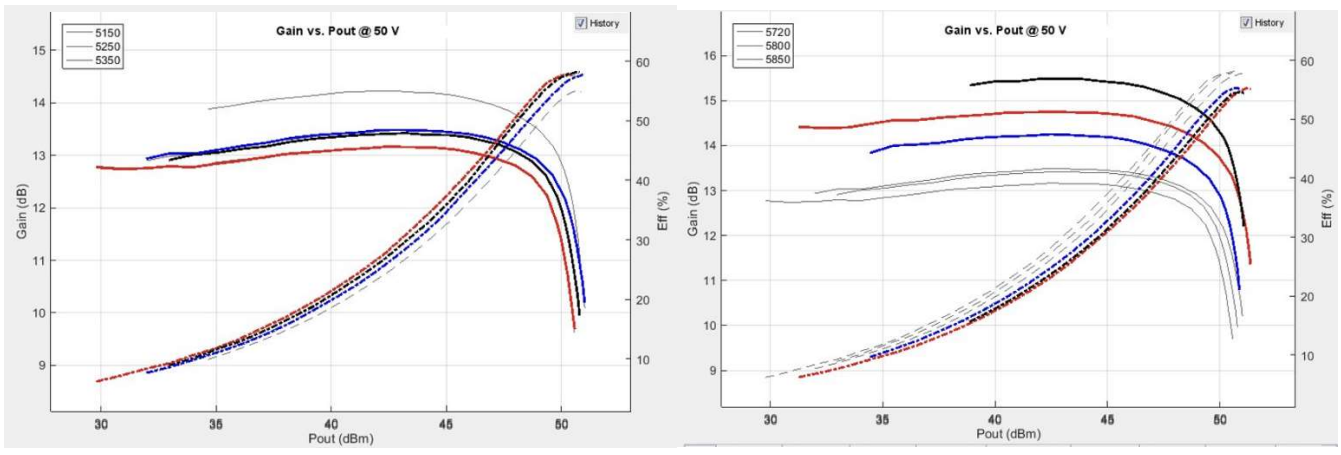


Figure 7: S11 / S21 output from network analyzer on 5.1-5.9GHz application board

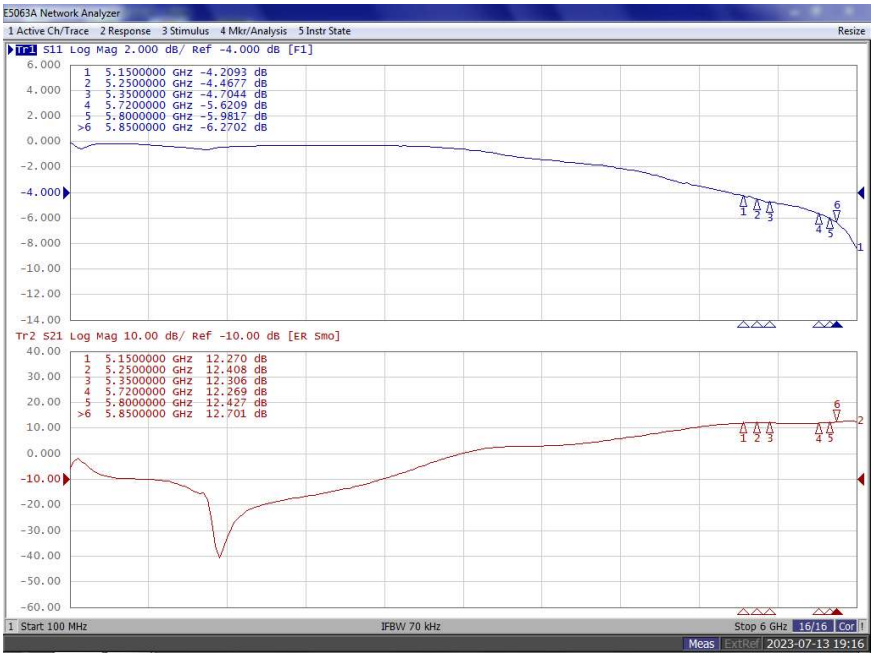
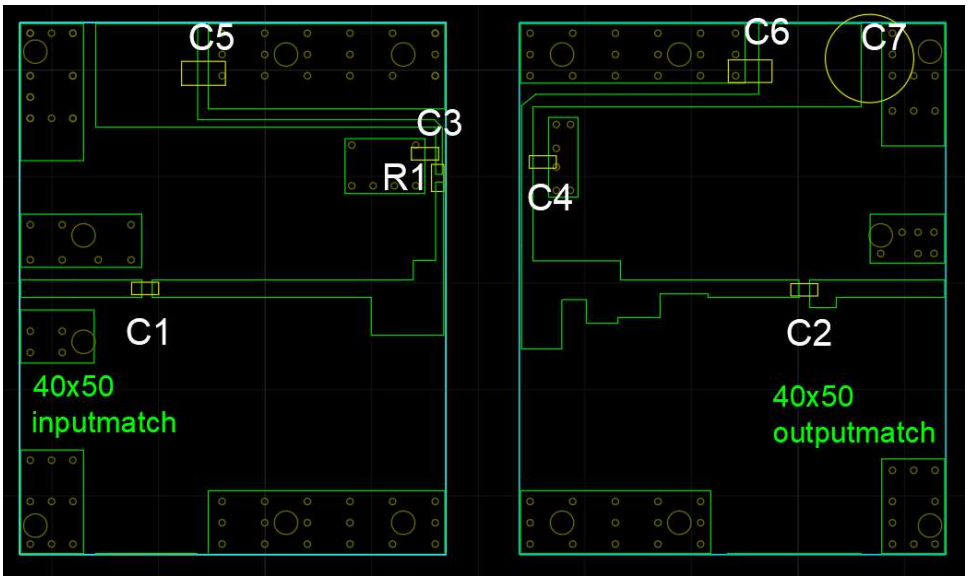


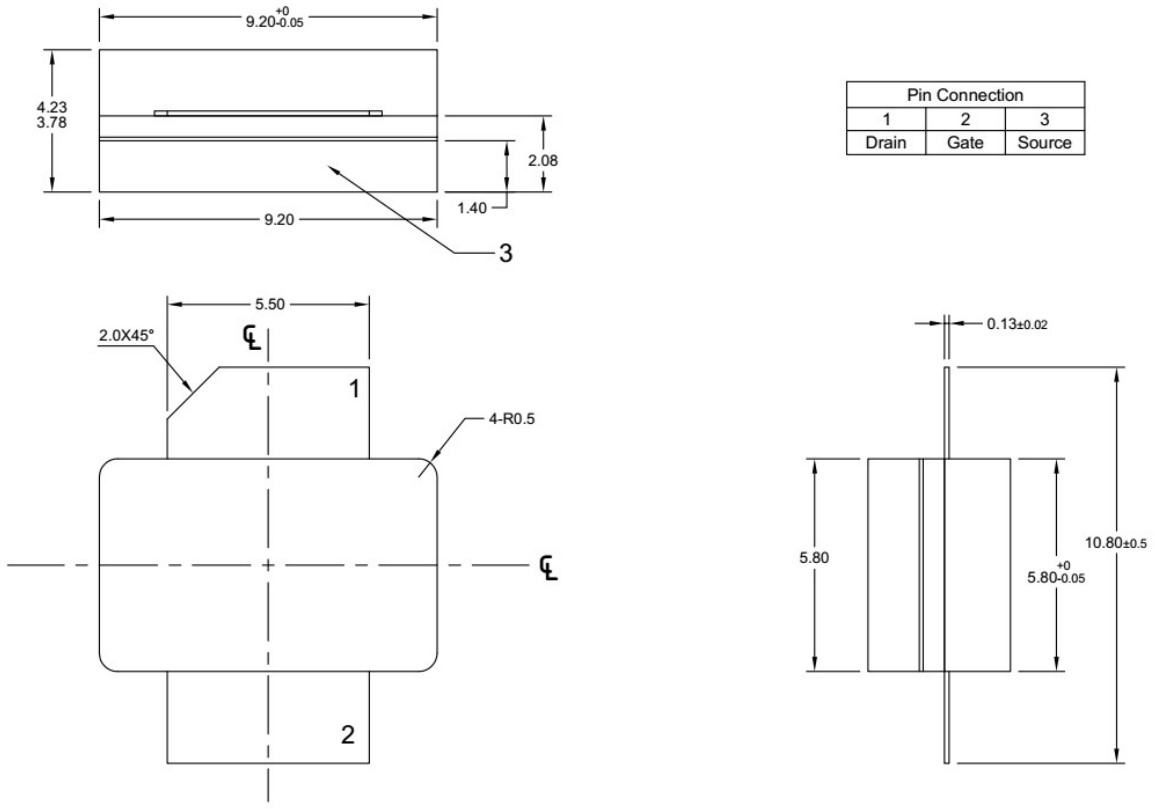
Figure 8: Picture of application board of 5.1-5.9GHz and bill of materials



Component	Value	Quantity
U1	STAV58100G2	1
C1、C2、C3、C4	3.3pF	4
C5、C6	10uF/63V	2
R1	10Ω	1
C7	470uF/63V	1
PCB	0.508mm [0.020"] thick, εr=3.48, Rogers RO4350B, 1 oz. copper	

Package Outline

Flanged ceramic package; 2 leads



Pin Connection		
1	2	3
Drain	Gate	Source

Unit：mm
Tolerances(unless specified)： x.x ±0.25
x.xx ±0.13

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-GXB-2EL-9.2					2018.1.31

Figure 2. Package Outline PKG-G2

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2020/12/30	V1.0	Preliminary Datasheet Creation
2023/7/13	V1.1	Update 5.1-5.9GHz application data

Application data based on:YHG-20-08/05/ZYX-23-07

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