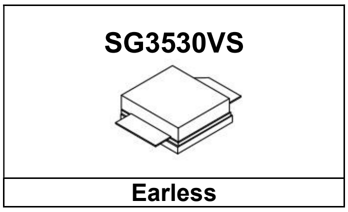
SG3530VS GaN TRANSISTOR

GaN HEMT 50V, 250W,S band RF Power Transistor



Description

The SG3530VS is a 250-watt, internally matched GaN HEMT, designed for pulsed amplifier applications with frequencies from 2700 to 3500MHz.

When used in narrower band like 2700-2900MHz etc, it can be a 300W transistor.

There is no guarantee of performance when this part is used in applications designed outside of these frequencies.

It is recommended to use this device only at pulse condition, and power rating will be different according to different pulse width and duty cycle

- Typical **pulse** Performance (On Innogration fixture with device soldered):

V_{DD} = 50 Volts, I_{DQ} = 200 mA, Pulse CW, Pulse width=20us, Duty cycle=10%.

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
2700	53.38	217.8	50.0	9.6	54.68	293.7	54.0
2800	53.3	213.9	48.8	9.66	54.56	285.9	53.0
2900	53.47	222.4	48.9	9.46	54.8	302.1	53.2
3000	53.49	223.2	48.1	9.17	54.87	306.7	52.6
3100	53.45	221.3	46.4	8.89	54.9	309.3	51.0
3200	53.41	219.1	45.9	8.98	54.9	308.8	50.7
3300	53.4	218.6	47.8	9.44	54.9	308.7	52.9
3400	53.17	207.7	49.1	9.49	54.73	297.3	54.8
3500	52.82	191.3	48.1	8.84	54.42	276.7	54.0

Applications and Features

- Suitable for broad band application in S band pulse amplifier applications.
- Thermally Enhanced Industry Standard Package
- High Reliability Metallization Process
- Excellent thermal Stability and Excellent Ruggedness
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

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 (50 V)
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	Vdc
Operating Voltage	V_{DD}	0 to 55	Vdc
Maximum Forward Gate Current @ T_C = 25°C	Igmax	39.6	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,P_{OUT}=250W @3GHz by FEA 20us/10%, Tcase=85°C, 50 Vdc, I_{DQ} =200 mA	$R_{\theta JC}$	0.8	°C/W

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

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=-8V; I_{DS}=39.6mA	V_{DSS}	——	200	——	V
Gate Threshold Voltage	V_{DS} = 10V, I_D = 39.6mA	V_{GS}(th)	-4		-2	V
Gate Quiescent Voltage	V_{DS} =50V, I_{DS}=200mA, Measured in Functional Test	$V_{GS(Q)}$	——	-3.17	——	V

Functional Tests (In Innogration Test Fixture, 50 ohm system) :V_{DD} = 50Vdc, I_{DQ} =200 mA, f = 3000MHz, Pulse CW, Pulse width=20us, Duty cycle=20%.

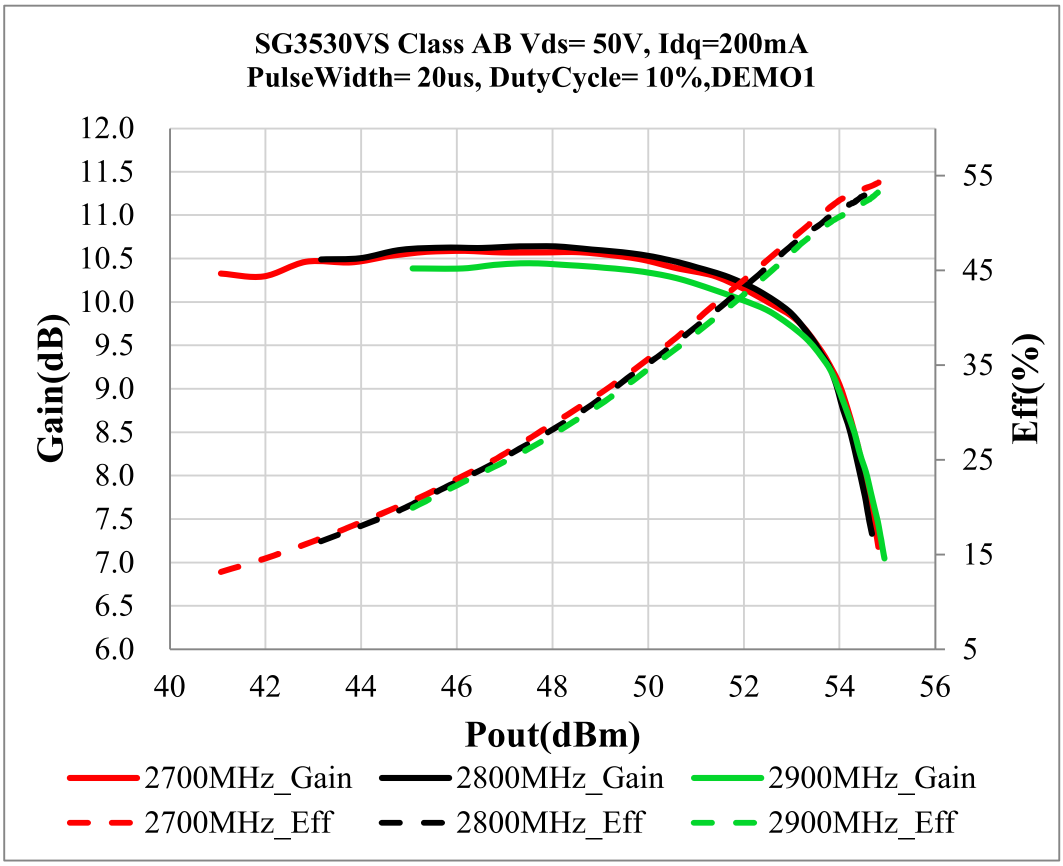
Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain @ $P_{\_3dB}$	G_P	——	7	——	dB
Drain Efficiency@P_{3dB}	η_D	——	52	——	%
3dB compression Power	P_{3dB}	——	300	——	W

Load Mismatch (In Innogration Test Fixture, 50 ohm system): V_{DD} = 50 Vdc, I_{DQ} = 200 mA, f = 3000 MHz

VSWR 10:1 at 350W pulse CW Output Power	No Device Degradation

TYPICAL CHARACTERISTICS

Figure 1. Power Gain and Drain Efficiency as Function of Pulse Output Power



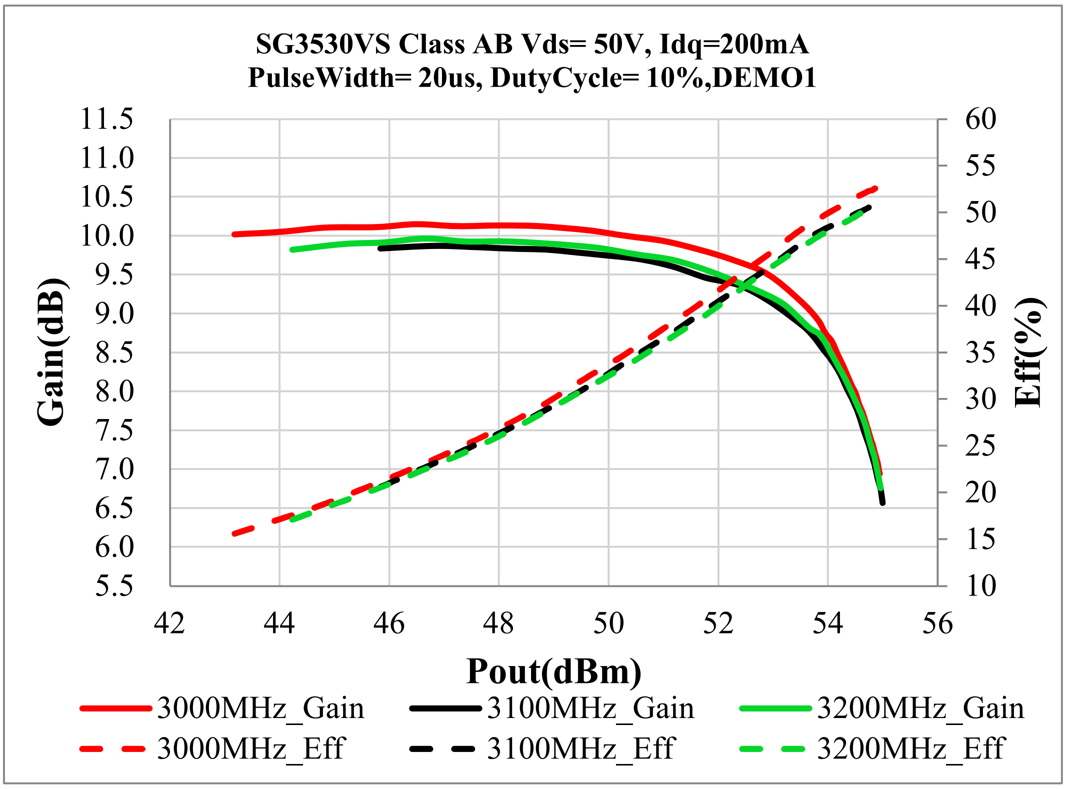


Figure 2. Network analyzer output S11/S21

VDS=50V IDQ=550mA VGS=-3.08V

```
Tr1 S21 Log Mag 2.000 dB/ Ref 26.00 dB [RT Smo]
>1  2.7000000 GHz  12.124 dB
 2  2.8000000 GHz  12.018 dB
 3  2.9000000 GHz  11.826 dB
 4  3.0000000 GHz  11.598 dB
 5  3.1000000 GHz  11.581 dB
 6  3.2000000 GHz  11.686 dB
 7  3.3000000 GHz  11.886 dB
 8  3.4000000 GHz  11.926 dB
 9  3.5000000 GHz  11.491 dB
```

```
Tr2 S11 Log Mag 2.000 dB/ Ref 12.00 dB [F1]
>1  2.7000000 GHz -1.7942 dB
 2  2.8000000 GHz -1.8568 dB
 3  2.9000000 GHz -1.8802 dB
 4  3.0000000 GHz -1.9384 dB
 5  3.1000000 GHz -2.0473 dB
 6  3.2000000 GHz -2.1550 dB
 7  3.3000000 GHz -2.1877 dB
 8  3.4000000 GHz -2.0900 dB
 9  3.5000000 GHz -1.9562 dB
```

```
1  Start 2.3 GHz                IFBW 1 kHz                Stop 3.9 GHz
```

Figure 3. Test Circuit Component Layout

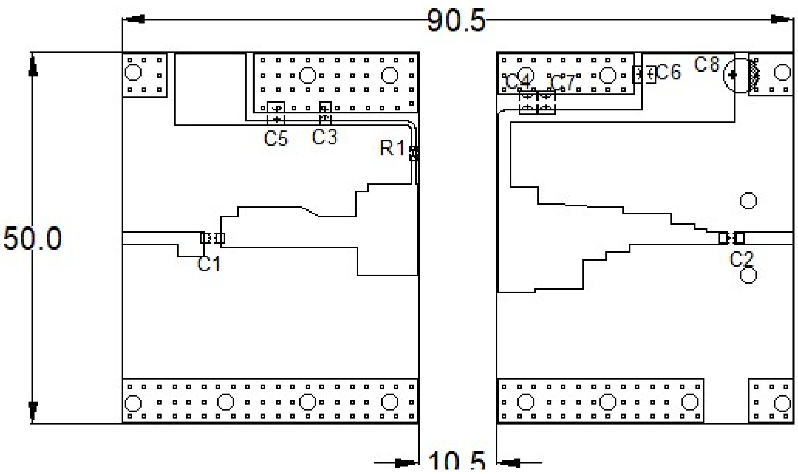
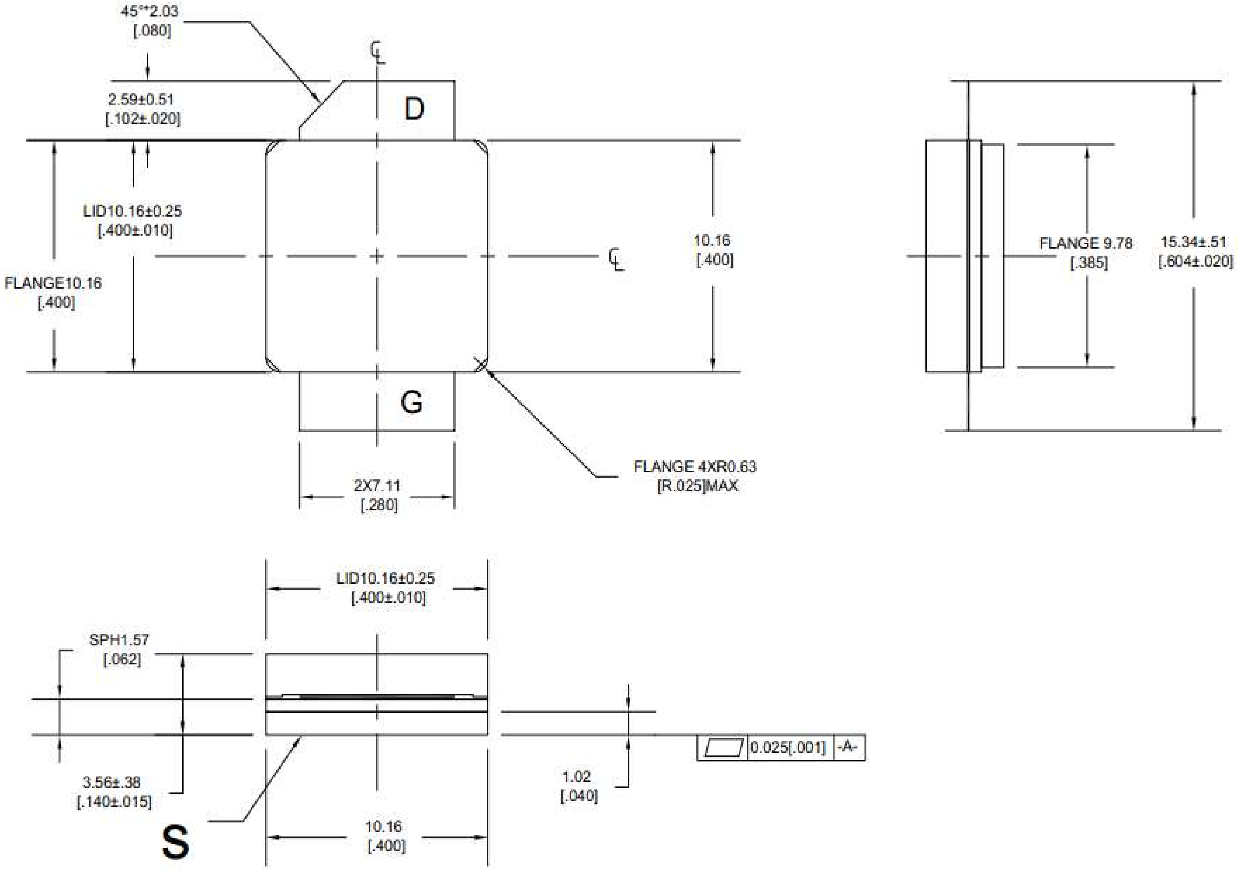


Table 4. Test Circuit Component Designations and Values

Component	Description	Suggested Manufacturer
C1,C3,	6.8pF	MQ200805C0G2E6R8NDB
C2,C4	6.8pF	MQ101111M7G2H6R8NMB
C5,C6,C7	Ceramic multilayer capacitor, 10uF, 100V	10uF/100V
C8	470uF	63V/470uF
R1	Chip Resistor,9.1 Ω	
PCB	Rogers tc350-plus, εr = 3.5, thickness 30 mils, 1oz copper	

Earless Flanged Ceramic Package; 2 leads



Unit: mm [inch]

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

Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2022/6/16	Rev 1.0	Preliminary Datasheet based on SDBV technology

Application data based on YHG-22-14

Notice

Specifications are subject to change without notice. Innogration believes the information within the data sheet to be reliable. Innogration makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose.
“Typical” parameter is the average values expected by Innogration in quantities and are provided for information purposes only. It can and do vary in different applications and related performance can vary over time. All parameters should be validated by customer’s technical experts for each application.
Innogration products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Innogration product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility.
For any concerns or questions related to terms or conditions, please check with Innogration and authorized distributors