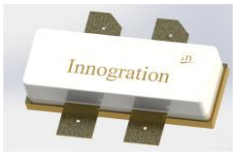
Gallium Nitride 50V, 200W,DC-4GHz RF Power Transistor

S3L3020VS



Description

The S3L3020VS is an internally matched 200W, **single ended** GaN HEMT, designed for multiple applications with frequencies up to 4GHz. It is optimized thermally to support wideband CW application.

In typical broadband application within 0.5-3.0GHz, it can deliver minimum 160W CW and 200W pulsed CW at room temperature.

- Typical RF performance of Broadband 0.5-3GHz with device soldered

  Vds=50V, Idq=100mA, CW, (Pulse data upon request)

Freq(GHz)	Pin(dBm)	Psat(dBm)	Psat(W)	Ids(A)	Gain(dB)	Eff(%)
0.5	39.89	52.93	196.3	8.97	13.0	43.8
0.6	40.50	54.30	**269.2**	8.76	13.8	61.5
0.7	40.41	53.57	227.5	7.32	13.2	62.2
0.8	37.80	53.35	216.3	8.42	15.6	51.4
0.9	43.05	53.35	216.3	9.80	10.3	44.1
1.0	41.69	53.03	200.9	9.18	11.3	43.8
1.1	39.72	53.60	229.1	8.82	13.9	51.9
1.2	41.57	53.95	248.3	7.78	12.4	63.8
1.3	42.57	53.87	243.8	7.26	11.3	67.2
1.4	39.71	53.20	208.9	6.97	13.5	60.0
1.5	40.54	53.22	209.9	8.88	12.7	47.3
1.6	39.83	52.91	195.4	9.31	13.1	42.0
1.7	39.73	53.48	222.8	10.00	13.8	44.6
1.8	39.01	53.96	248.9	8.96	15.0	55.6
1.9	41.44	53.71	235.0	7.59	12.3	61.9
2.0	41.59	52.74	187.9	7.40	11.2	50.8
2.1	41.37	52.68	185.4	8.16	11.3	45.4
2.2	40.55	52.46	**176.2**	8.57	11.9	41.1
2.3	42.07	52.73	187.5	9.25	10.7	40.5
2.4	41.79	52.94	196.8	9.70	11.2	40.6
2.5	42.79	53.59	228.6	9.94	10.8	46.0
2.6	41.61	53.42	219.8	8.53	11.8	51.5
2.7	41.93	53.00	199.5	8.20	11.1	48.7
2.8	41.35	52.87	193.6	8.41	11.5	46.1
2.9	40.82	52.91	195.4	8.52	12.1	45.9
3.0	40.18	53.06	202.3	8.66	12.9	46.7

Data of 40V operation upon request

Applications

- L band power amplifier application
- P band power amplifier application
- S band power amplifier application

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

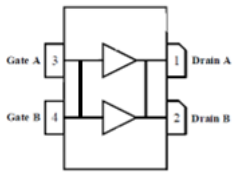
1. Set VGS to the pinch--off (VP) voltage, typically –5 V
2. Turn on VDS to nominal supply voltage
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

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)



***Notice: Both leads at input and output are internally connected, device is only usable as single ended**

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	25.2	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= 25°C, at Pd=240W,	$R_{\theta JC}$	0.75	°C /W

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

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=25.2mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 25.2mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=100mA, Measured in Functional Test	$V_{GS(Q)}$		-3.0		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	50V 2GHz, Pout=200W pulsed CW, All phase, No device damages	VSWR		10:1		

Figure 2: Network analyzer output, S11 and S21

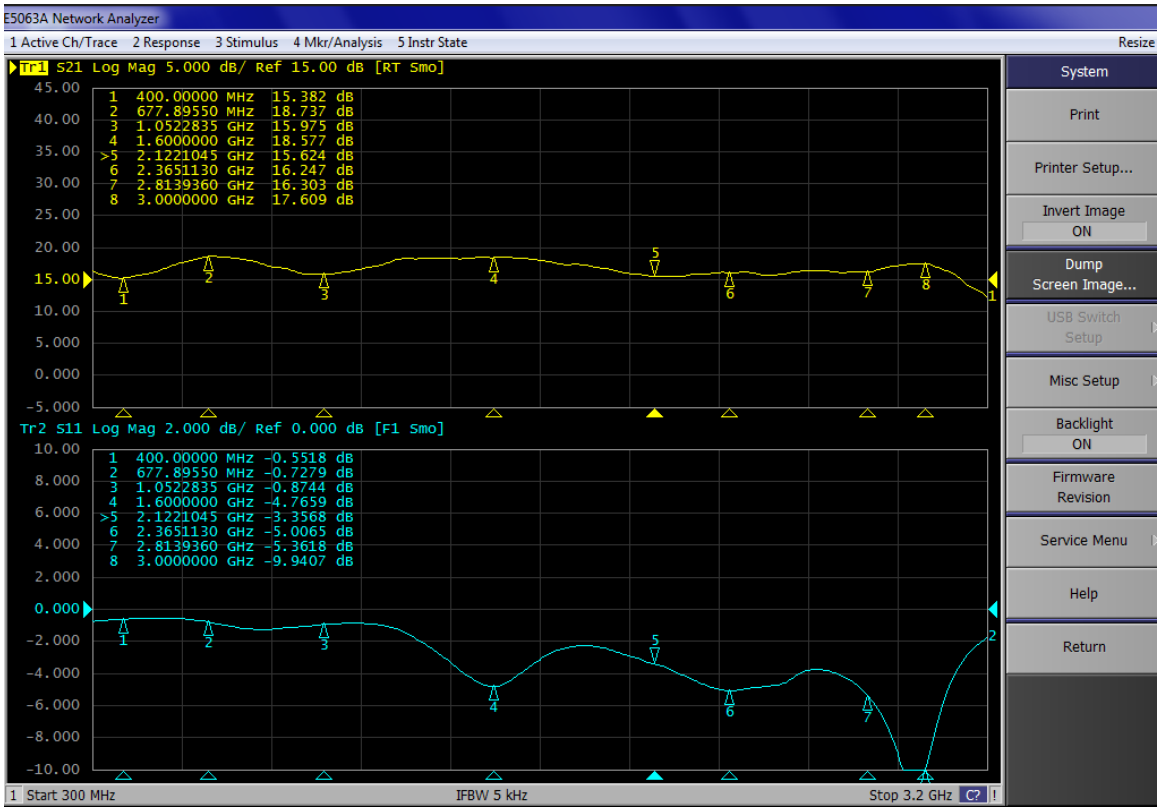


Figure 4: Picture of application board for 0.5-3GHz Class AB

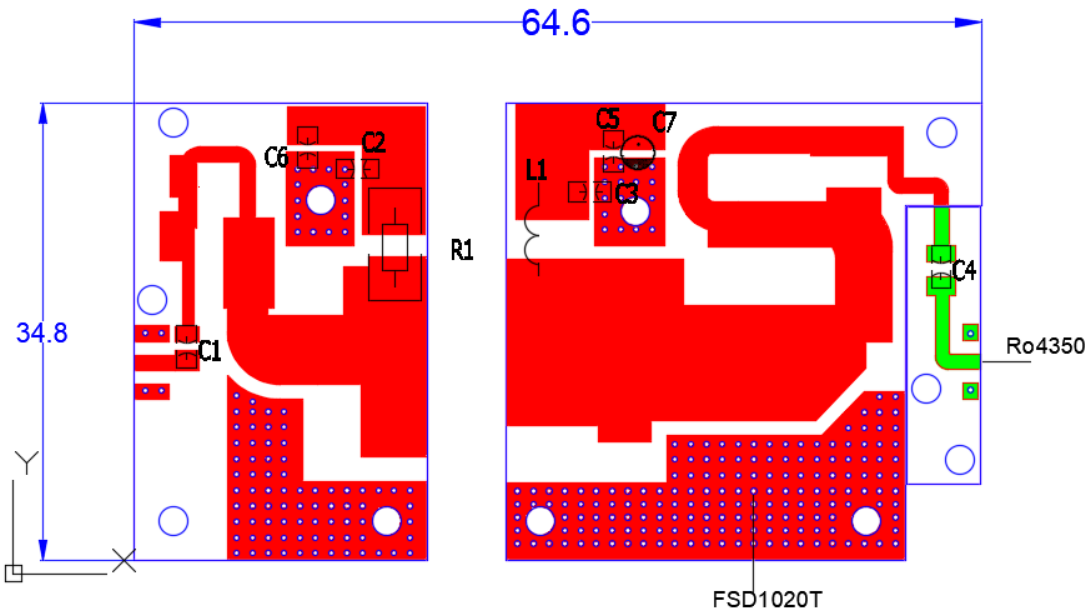
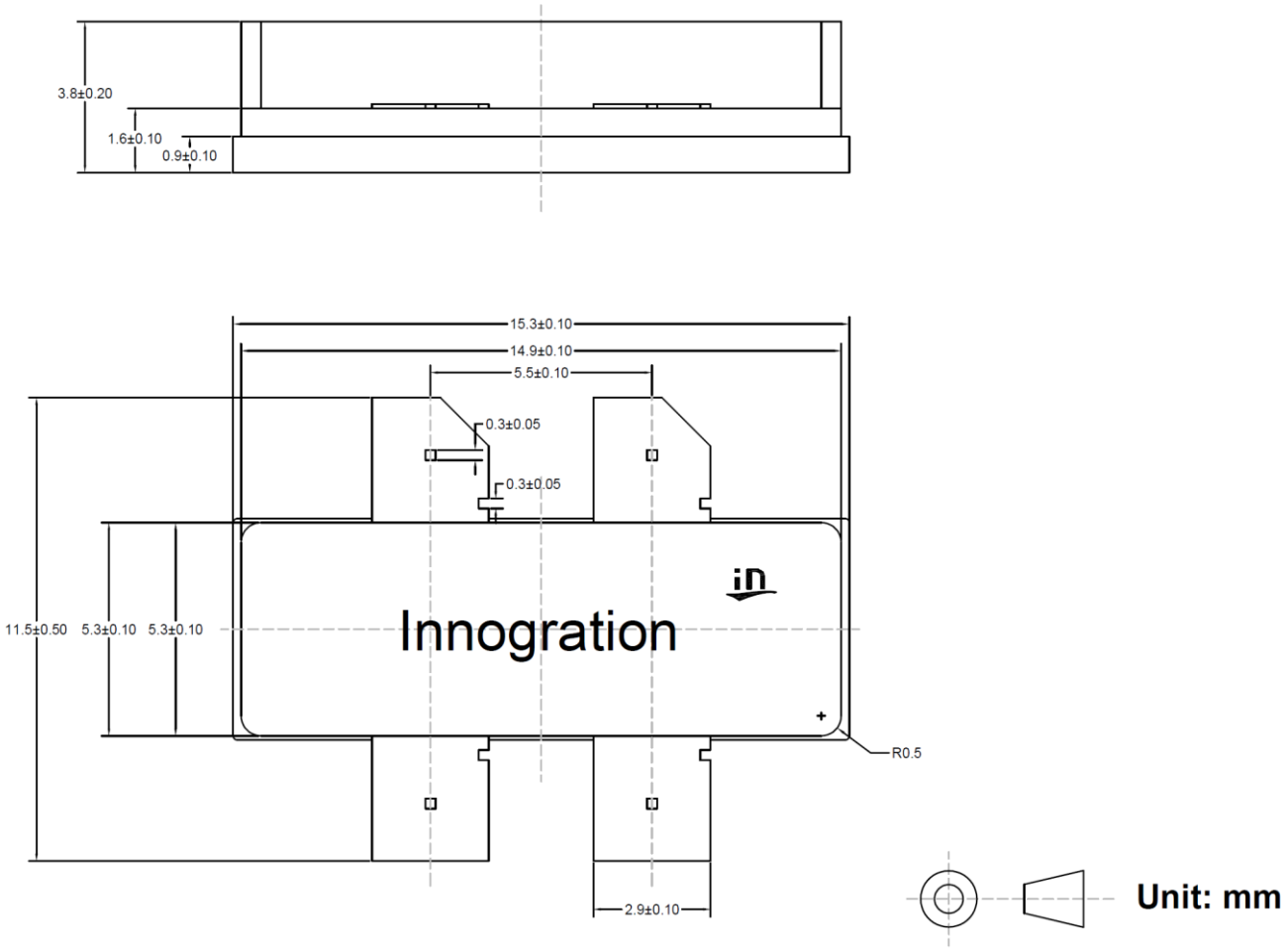


Table 4. Bill of materials of application board (PCB layout upon request)

Component	Description	Suggestion
C7	470uF/63V	
C5,C6	10uF	1210
C1	100pF	MQ300805
C2，C3,C4	18pF	MQ101111
R1	Chip Resistor ,100Ω	2512
L1	d=1mm，3turns,D=3.5mm	
PCB	FSD1020T ， Dk=10.2 ， 20mil / Rogers 4350 20mil	

Earless Flanged Ceramic Package; 4 leads



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2023/12/26	V1.0	Production Datasheet Creation
2025/7/8	V1.1	Update the dimension of the package outline

Application data based on YHG-23-34

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
Copyright © by Innogration (Suzhou) Co.,Ltd.