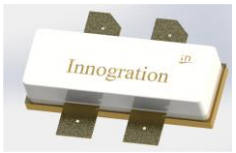
Gallium Nitride 50V, 100W,DC-4.2GHz RF Power Transistor

Description

The S3L4210VS is a 100W, **single ended** GaN HEMT, designed for multiple applications with Frequencies up to 4GHz. It is optimized thermally to support wideband CW application. In typical 2.3-3.9GHz wideband CW application, it can deliver 80W with high efficiency. There is no guarantee of performance when this part is used in applications designed Outside of these frequencies.

S3L4210VS



- Vds= 50V, Idq=200 mA Vgs=-3.2V，CW，with device solded

Freq(MHz)	Pin(dBm)	Psat(dBm)	Psat(W)	Ids(A)	Gain(dB)	Eff(%)
2300	39.5	50.3	107.6	4.07	10.8	52.9
2400	38.4	50.5	111.2	3.62	12.1	61.4
2500	37.6	50.3	107.2	3.55	12.8	60.4
2600	37.4	50.2	105.2	3.50	12.8	60.1
2700	37.2	50.0	98.9	3.38	12.8	58.5
2800	37.6	49.8	94.4	3.42	12.2	55.2
2900	37.7	49.4	86.3	3.55	11.7	48.6
3000	38.9	49.4	87.7	3.98	10.5	44.1
3100	39.2	49.2	83.2	4.04	10.0	41.2
3200	38.5	49.2	83.2	4.11	10.7	40.5
3300	38.9	49.3	85.1	4.50	10.4	37.8
3400	39.1	49.6	90.8	4.76	10.5	38.1
3500	38.6	49.9	96.6	4.72	11.2	40.9
3600	38.5	50.0	100.0	4.64	11.5	43.1
3700	37.7	49.6	92.0	4.41	11.9	41.7
3800	38.3	49.8	95.5	4.38	11.5	43.6
3900	39.9	50.1	101.2	4.30	10.2	47.1

Applications

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

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

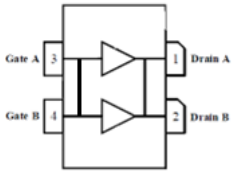
1. Set VGS to the pinch--off (VP) voltage, typically –5 V
2. Turn on VDS to nominal supply voltage
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

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}	32	Vdc
Maximum gate current	Igs	12.6	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 by FEA T_C= 25°C, at Pd=120W,	RθJC	1.3	°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=12.6mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 12.6mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=200mA, Measured in Functional Test	$V_{GS(Q)}$		-3.2		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	50V 3GHz, Pout=100W pulsed CW, All phase, No device damages	VSWR		10:1		

Figure 2: Network analyzer output, S11 and S21 of 2.3-3.9GHz Class AB

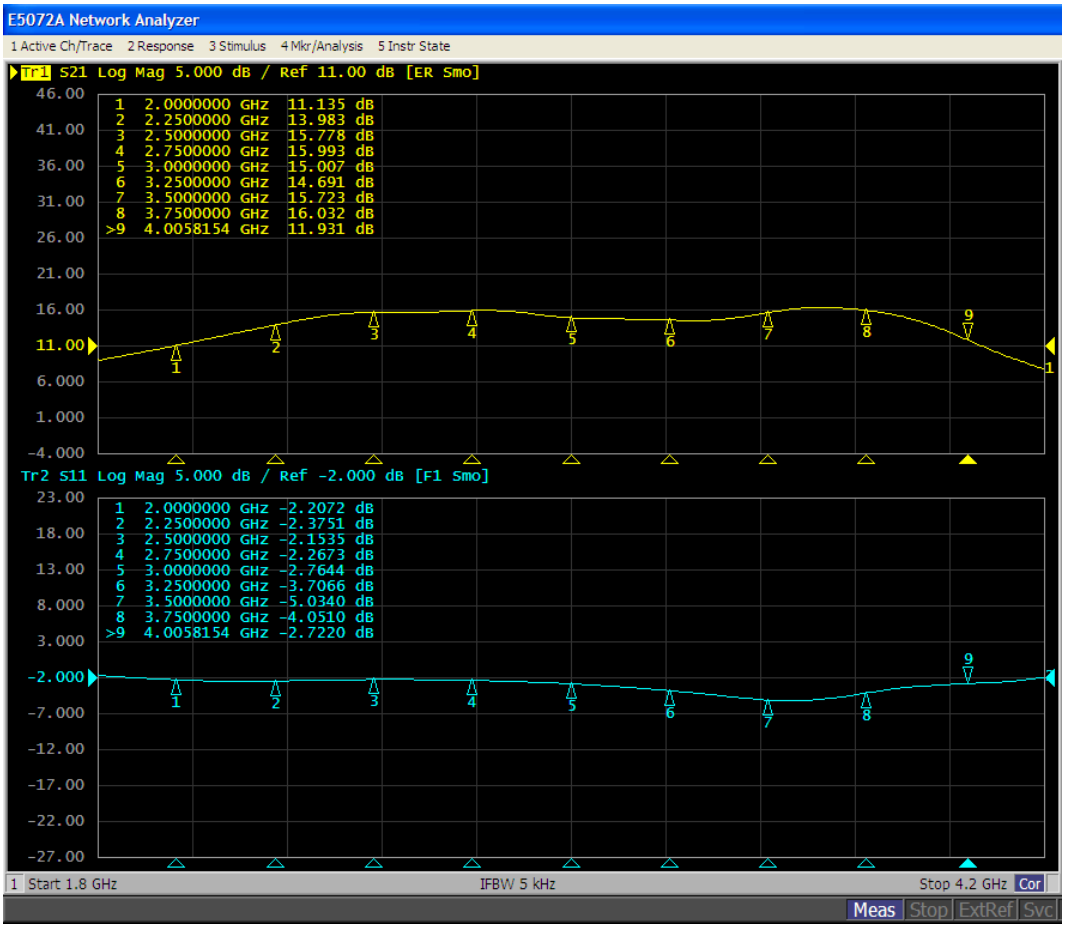


Figure 4: Picture of application board for 3-4GHz Class AB

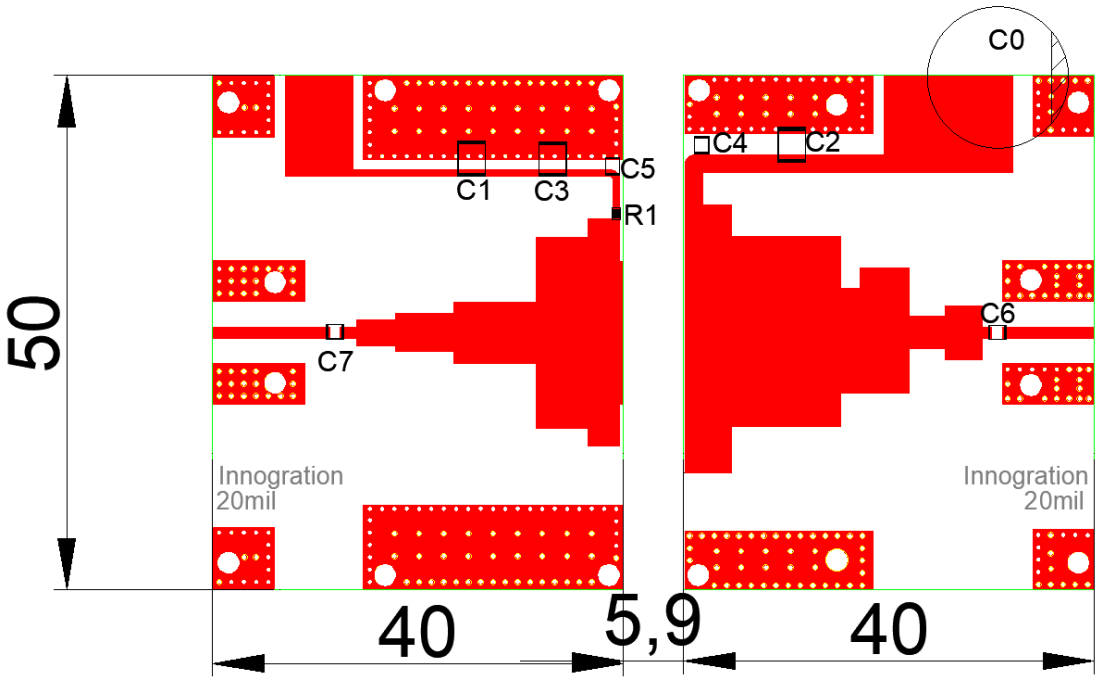
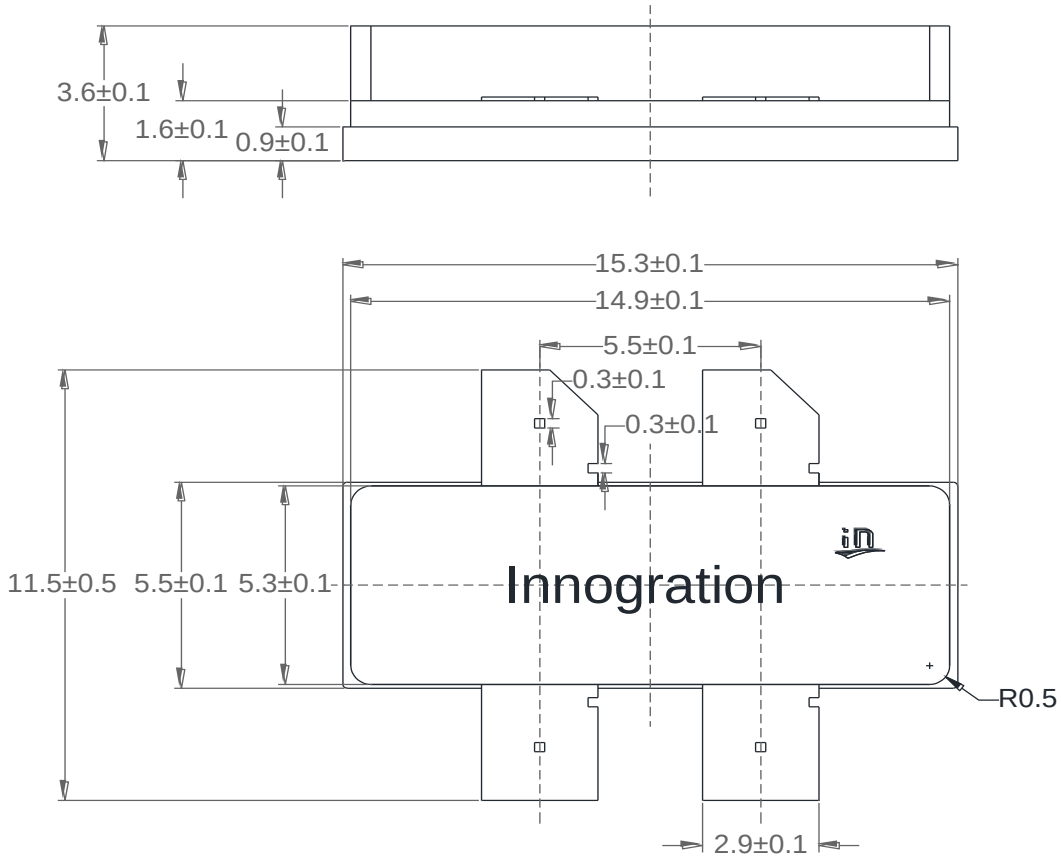


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20Mils)

Component	Description	Suggested Manufacturer
C0	1000uF/63V	
C1, C2, C3	10uF	1210
C3, C4, C7	6.8pF	Beijing YuanLu HongYuan Electronic Technology CO.,LTD MQ200805
C6	6.8pF	Beijing YuanLu HongYuan Electronic Technology CO.,LTD MQ301111
R1	Chip Resistor,10Ω	0805
PCB	Rogers 4350b, thickness 20 mils, 1oz copper	

Earless Flanged Ceramic Package; 4 leads



Unit: mm

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2024/9/14	V1.0	Production Datasheet Creation

Application data based on RXT-24-43

Notice