Gallium Nitride 50V, 240W,DC-3GHz RF Power Transistor

SL3024VS

Description

The SL3024VS is a 240W, **single ended** GaN HEMT, designed for multiple applications with frequencies up to 3GHz. It is optimized thermally to support CW application.

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

- VDS=50V Vgs=-3.2V Idq=240mA on wideband application board with device soldered

Signal mode: Pulsed CW, 20us width, 10% duty cycle.

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
1100	53.77	238.5	61.2	17.55	55.15	327.5	69.2
1150	53.22	209.8	60.6	16.8	54.59	288.0	67.6
1200	52.68	185.2	57.8	17.25	54.22	264.5	65.0
1250	53.11	204.5	61.2	17.52	54.77	299.6	71.1
1300	51.79	151.2	52.0	16.45	53.9	245.4	63.1
1350	52.47	176.4	60.0	17.48	53.59	228.8	63.7
1400	52.61	182.2	59.5	17.13	53.69	233.7	62.5
1450	52.59	181.7	57.2	16.54	53.97	249.6	63.4
1500	52.69	185.8	57.5	17.05	54.07	255.2	63.3
1550	52.78	189.6	57.6	16.73	54.12	258.2	62.8
1600	52.71	186.5	57.0	16.76	54.16	260.6	62.6
1650	52.67	185.0	57.2	17.33	53.99	250.9	61.4
1700	52.39	173.5	57.2	16.9	53.79	239.4	61.7

Signal mode: CW, Pin=40dBm

Freq (MHz)	Pout (W)	Power Gain (dB)	Eff (%)
1100-1700	>200	>13	>60%

Applications

- L band power amplifier application
- P band power amplifier application
- Typical wideband PA: 1.1-1.7GHz, 0.5-1GHz

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

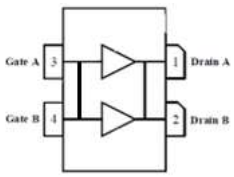
1. Set VGS to the pinch--off (VP) voltage, typically –5 V
2. Turn on VDS to nominal supply voltage
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

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	30	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=150W,	$R_{\theta JC}$	0.65	°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=30mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 30mA	$V_{GS(th)}$	-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=240W pulsed CW, All phase, No device damages	VSWR		10:1		

Figure 2: Network analyzer output, S11 and S21

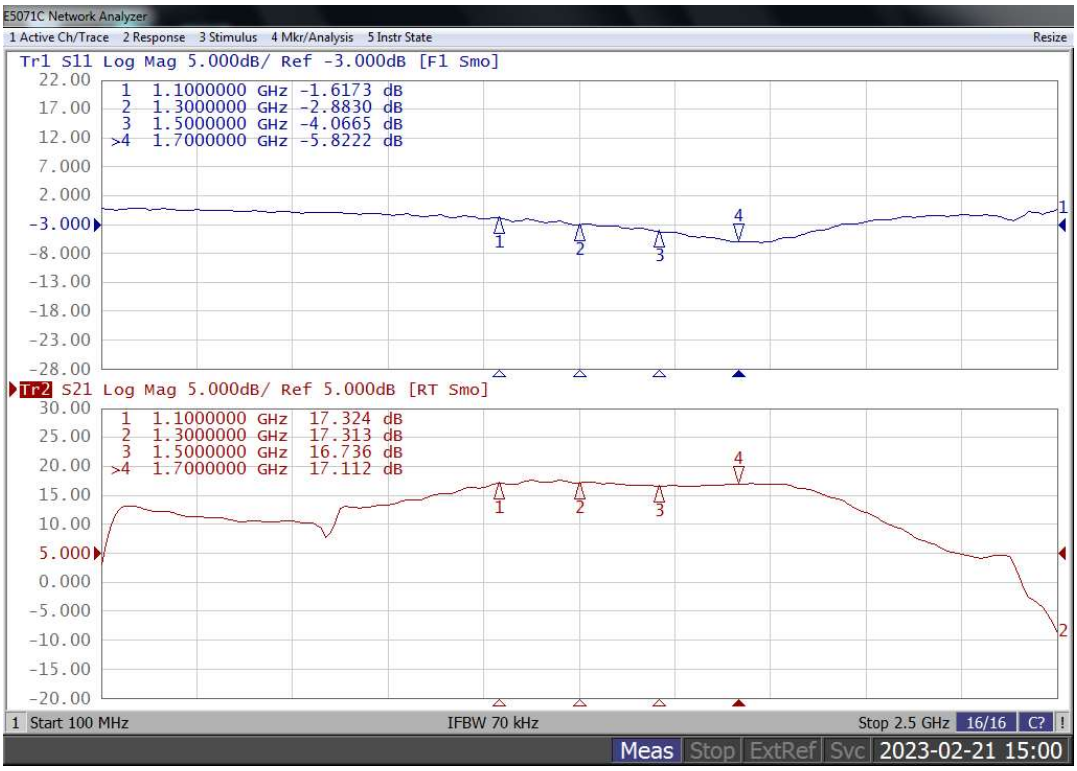


Figure 4: Picture of application board for 1.1-1.7GHz Class AB

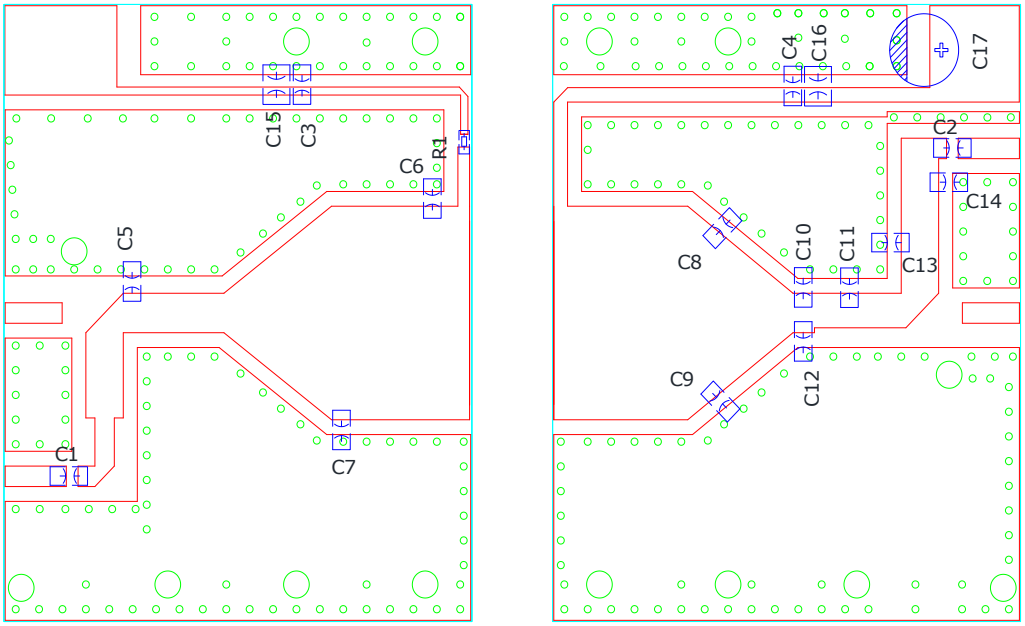


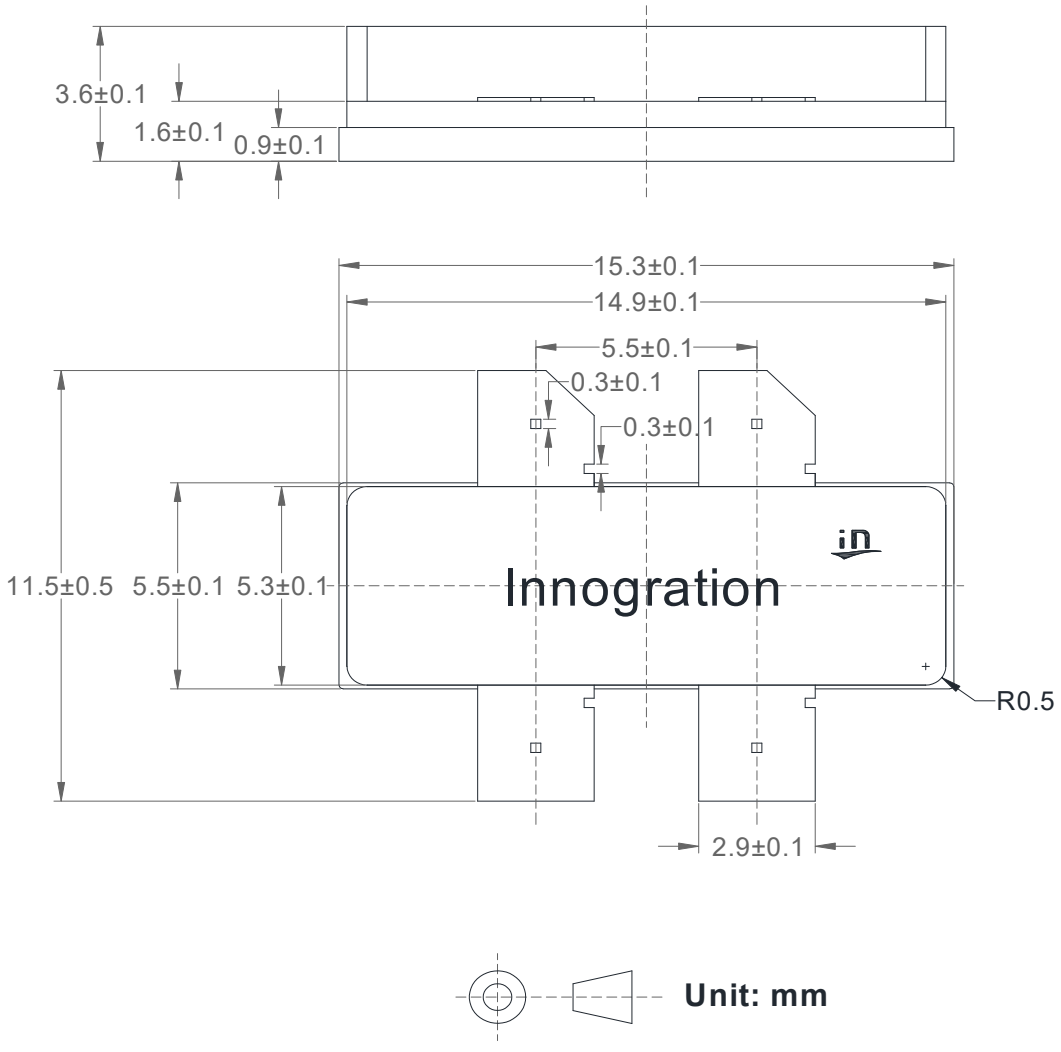
Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 30Mils)

Designator	Footprint	Comment	Quantity
C1	0805	4.7 pF	1
C2, C3, C4	0805	20 pF	3
C5, C11, C14	0805	0.5 pF	3
C6, C7, C8, C9, C10, C12	0805	2.4 pF	6
C13	0805	1.0pF	1
C15, C16	1210	10uF/100V	2
C17		100uF/63V	1
R1	0603	10R	1

(pF capacitors are ATC 600F/600S series)

*For CW application, C2 replaced by 3 pcs of 20pF

Earless Flanged Ceramic Package; 4 leads



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2023/2/21	V1.0	Production Datasheet Creation

Application data based on LSM-23-08

Notice