GaN HEMT 50V, 330W,3GHz RF Power Transistor

SC3033RVS

Description

The SC3033RVS is a 330W, single ended GaN HEMT, designed for multiple applications with Frequencies up to 3GHz. It is optimized thermally to better support wideband CW or wider pulse or higher duty cycle application.

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

It is the thermal enhancement of SL2033VS and SU1532V.

- Typical RF performance on 0.7-1.3GHz wideband application board with device soldered under higher duty cycle

SC3033RVS^{V2} Vgs=-3.24V Vds=50V Idq=120mA Pulse 300us 50%						
Freq (MHz)	Psat (dBm)	Psat (W)	IDS (A)	Pin (dBm)	Gain (dB)	Eff (%)
700	54.93	311.2	5.96	37.65	17.28	52.21
750	54.93	311.2	5.74	37.70	17.23	54.21
800	55.48	353.2	5.82	38.08	17.40	60.68
850	55.69	370.7	5.69	39.04	16.65	65.15
900	54.95	312.6	4.75	39.06	15.89	65.81
950	54.81	302.7	6.05	39.37	15.44	50.03
1000	55.77	377.6	6.61	40.47	15.30	57.12
1050	55.79	379.3	6.16	38.42	17.37	61.58
1100	55.91	389.9	5.62	38.61	17.30	69.38
1150	55.67	369.0	5.00	38.40	17.27	73.80
1200	55.27	336.5	4.39	39.33	15.94	76.65
1224	55.02	317.7	4.21	40.84	14.18	75.46

Note: 1-2G 200W CW data 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

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	43.2	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= 85°C, at Pd=150W,	$R_{\theta JC}$	0.55	°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=43.2mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 43.2mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=100mA, Measured in Functional Test	$V_{GS(Q)}$		-3.2		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	50V 2GHz, Pout=330W pulsed CW, All phase, No device damages	VSWR		10:1		

Figure 1. Network Analyzer result S11 and S21 VDS= 50V, IDQ = 500mA

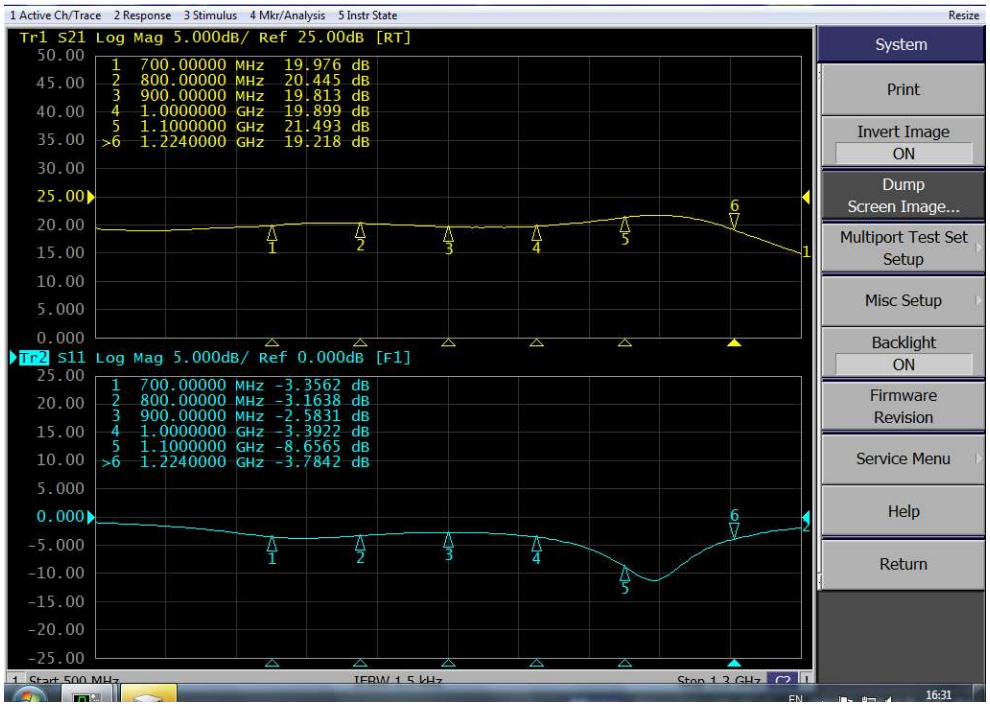


Figure 2: Picture of application board for 700-1224MHz Class AB

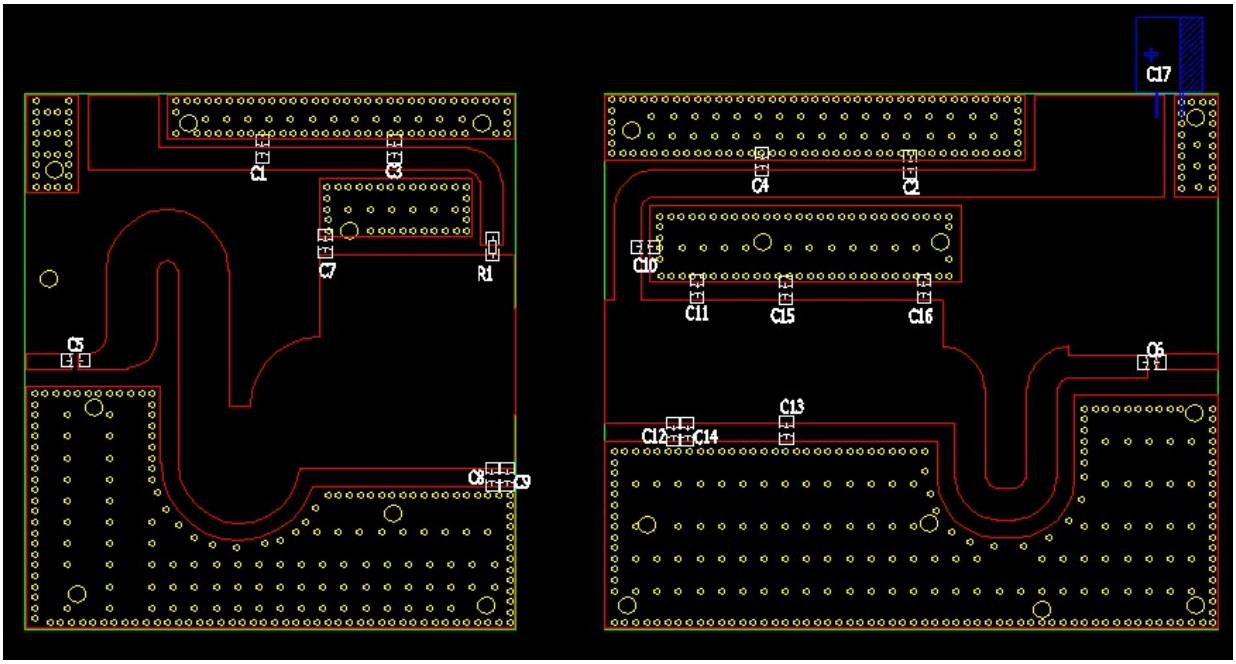
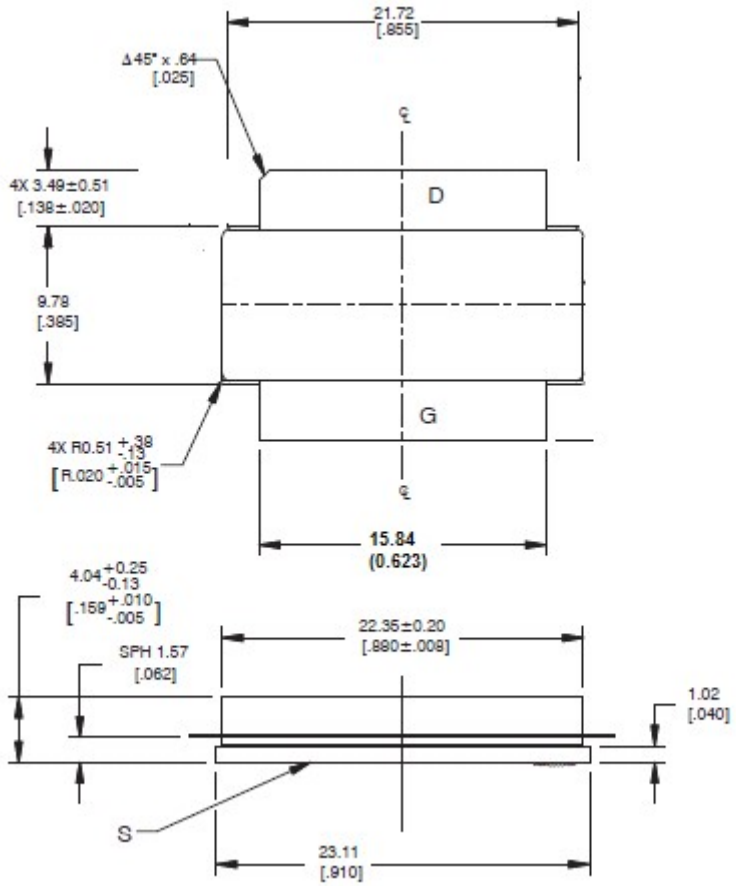


Table 4. Bill of materials of application board (PCB layout upon request

Component	Description	Suggestion
C1,C2	10uF	10uF/100V
C3,C4	100pF	MQ101111
C5,C6	47pF	MQ101111
C17	1000uF/63V	Electrolyic Capacitor
R1	18 Ω	Chip Resistor
C7	4.7pF	MQ101111
C8	2pF	MQ101111
C9	5.1pF	MQ101111
C10	3.6pF	MQ101111
C11	3.0pF	MQ101111
C12,C13	1.8pF	MQ101111
C14	2.2pF	MQ101111
C15	2.7pF	MQ101111
C16	1pF	MQ101111
PCB	30mil Rogers 4350B	

Package Outline

Flangeless ceramic package;



OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-C2					09/27/2018

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2023/5/14	V1.0	Production Datasheet Creation
2023/9/12	V1.1	Change carrier application to 0.7-1.3GHz data and indicate 1-2G data

Application data based on HL-23-21/HL-23-36/TC-23-58

Notice