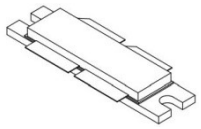
SQ121K5RVP GaN TRANSISTOR

Document Number: SQ121K5RVP
Preliminary Datasheet V1.0

1030-1090MHz, 1500W, GaN RF Power Transistor

SQ121K5RVP



Description

The SQ121K5RVP is a 1500-watt, high performance, internally matched GaN RF Power transistor, designed for multiple applications with frequencies from1030-1090MHz.

It is featured for high power and high ruggedness, suitable for Industrial, Scientific and Medical application, as well as Avionics application, L band pulse amplifier.

Supported by high breakdown voltage, it is also usable at higher voltage up to 55V, with higher output power.

•Typical **Pulsed CW** Performance (On Innogration fixture with device soldered):

V_{DD} = 50 Volts, I_{DQ} = 40 mA, Pulse CW, Pulse width=20us, Duty cycle=5%.

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P2dB (dBm)	P2dB (W)	P2dB Eff(%)
1030	62.17	1647.1	62.0	15.77	62.6	**1821.0**	**62**
1060	61.92	1554.8	64.9	15.77	62.42	**1746.6**	**65**
1090	61.38	1373.7	65.9	15.57	61.97	**1575.8**	**66**

Applications and Features

- Suitable for L band pulse amplifier, wideband amplifier, EMC testing, ISM etc.
- High Efficiency and Linear Gain Operations
- 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 (50V)
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	Igf	216	mA
Storage Temperature Range	Tstg	-65 to +150	C
Case Operating Temperature	T_C	-55 to +150	C
Operating Junction Temperature	T_J	+225	C

Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case 85 °C Case backside Temperature Pout = 1500 W, Pulse: 20 us PW, 10% DC	$R_{\theta JC}$	0.1	C/W

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

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=-8V; I_{DS}=216mA	V_{DSS}		200		V
Gate Threshold Voltage	V_{DS} = 50V, I_D = 216mA	V_{GS}(th)	-4		-2	V
Gate Quiescent Voltage	V_{DS} =50V, I_{DS}=40mA, Measured in Functional Test	$V_{GS(Q)}$		-3.4		V

Functional Tests (In Innogration broadband Test Fixture, 50 ohm system) : V_{DD} = 50 Vdc, I_{DQ} = 100 mA, f = 1100 MHz, Pulse CW

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain @ P3dB	Gp		13		dB
Drain Efficiency@P3dB$_t$	Eff		60		%
3dB Compressed point	P3dB		1500		W
Input Return Loss	IRL		-7		dB
Mismatch stress at all phases(No device damage)	VSWR		10:1		Ψ

Reference Circuit of Test Fixture Assembly Diagram

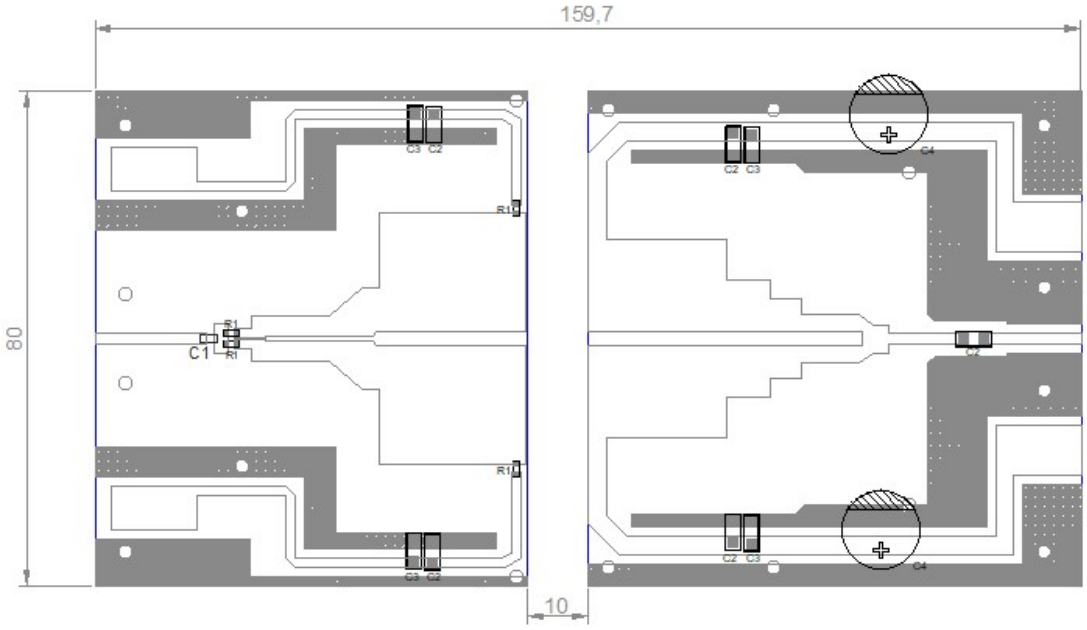


Figure 1. Test Circuit Component Layout

Table 5. Test Circuit Component Designations and Values

Component	**Description**	**Suggested Manufacturer**
C1,	47pF	ATC600F
C2*5	47pF	ATC800B
C3*4	Ceramic multilayer capacitor, 10uF, 100V	10uF/100V
C4*2	4700uF	63V/1000uF
R1*4	Chip Resistor,9.1 Ω	
PCB	30mil thick, εr=3.48, Rogers RO4350B, 1 oz. copper	

TYPICAL CHARACTERISTICS

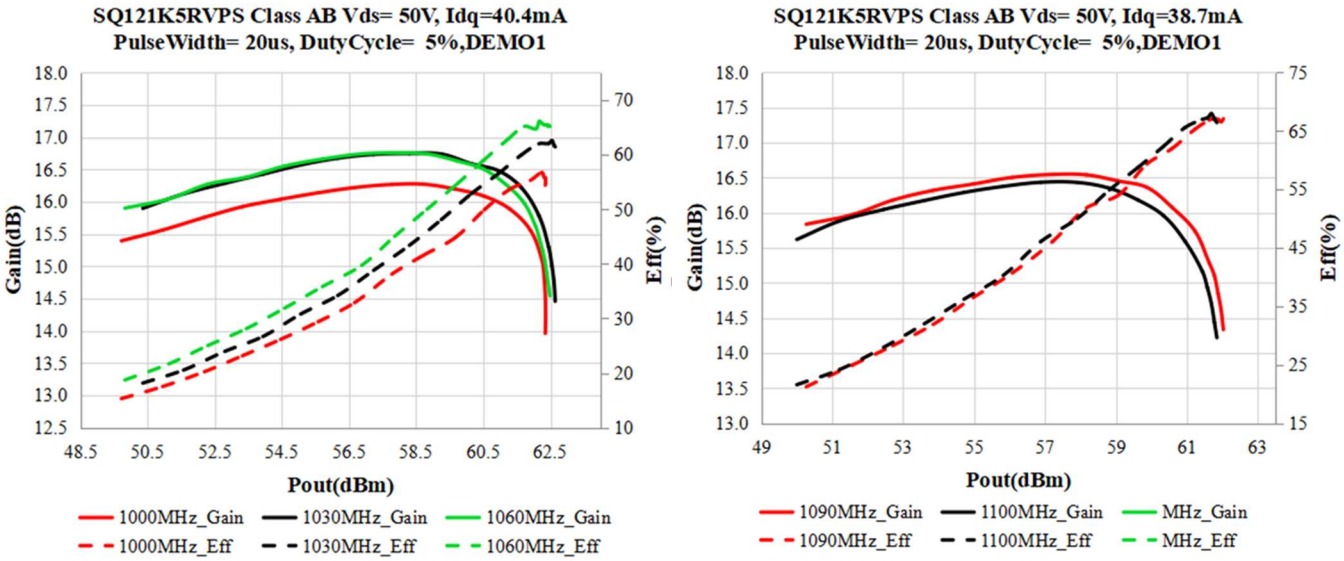


Figure 2. Power Gain and Drain Efficiency as Function of Pulse Output Power（1030-1090MHz）

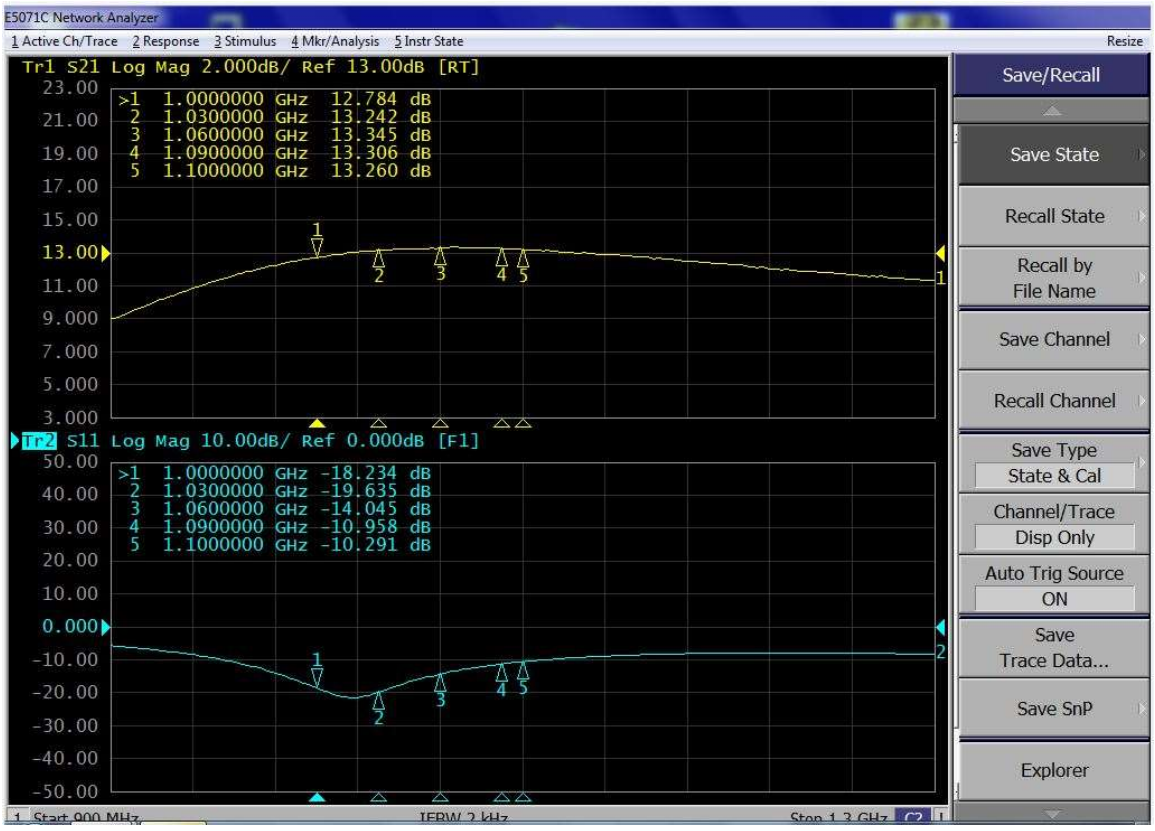
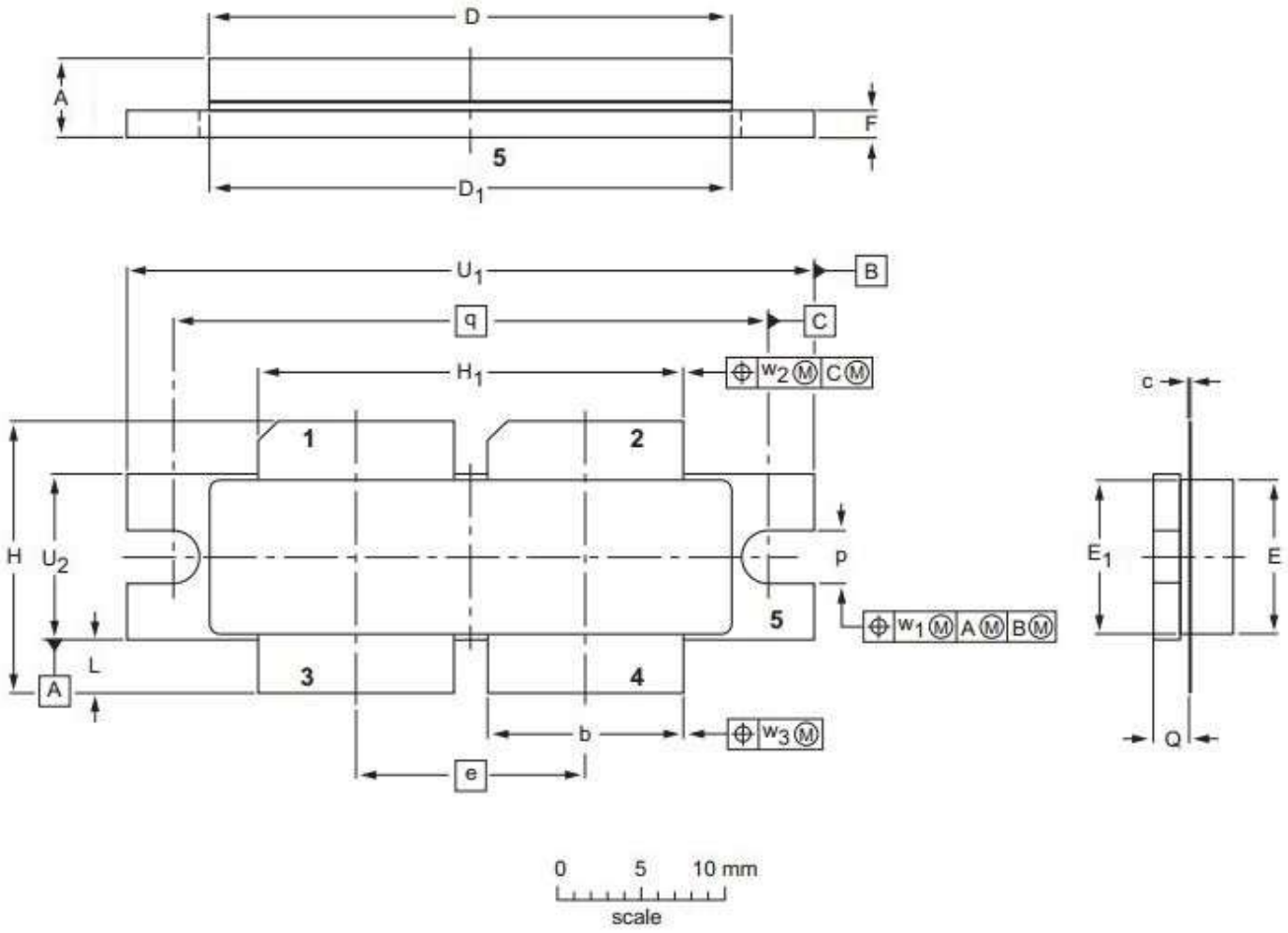


Figure 3. Network analyzer output S11/S21

Package Outline

Flanged ceramic package; 2 mounting holes; 4 leads（1、2—DRAIN、3、4—GATE、5—SOURCE）



UNIT	A	b	c	D	D_1	e	E	E_1	F	H	H_1	L	p	Q	q	U_1	U_2	W_1	W_2	W_2
Mm	4.7 4.2	11.81 11.56	0.18 0.10	31.55 30.94	31.52 30.96	13.72	9.50 9.30	9.53 9.27	1.75 1.50	17.12 16.10	25.53 25.27	3.48 2.97	3.30 3.05	2.26 2.01	35.56	41.28 41.02	10.29 10.03	0.25	0.51	0.25
Inches	0.185 0.165	0.465 0.455	0.007 0.004	1.242 1.218	1.241 1.219	0.540	0.374 0.366	0.375 0.365	0.069 0.059	0.674 0.634	1.005 0.995	0.137 0.117	0.130 0.120	0.089 0.079	1.400	1.625 1.615	0.405 0.395	0.01	0.02	0.01

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-D4E					03/12/2013

Revision history

Table 6. Document revision history

Date	Revision	Datasheet Status
2022/4/1	Rev 1.0	Prliminary Datasheet

Application data based on YHG-22-08

Disclaimers