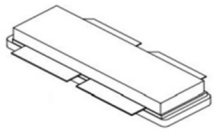
GaN 50V, 1000W, RF Power Transistor

STCV131K0RD4



Description

The STCV131K0RD4 is a push pull 1000W saturated power capable, internally matched GaN HEMT, ideal for ISM or RF energy applications at fixed frequency point or very narrow band within 1.2 to 1.5GHz There is no guarantee of performance when this part is used outside of stated frequencies.

- Typical CW performance at 1300MHz applications with transistor soldered on heatsink

STCV131K0RD4 Vds=50V Vgs=3.6V CW						
Freq(MHz)	Pout(dBm)	Pout(W)	Ids(A)	Pin(dBm)	Gain(dB)	Eff(%)
1300	60.3	1071.52	28.3	42.9	17.4	75.73
	60	1000.00	27.1	42.05	17.95	73.80
	59.5	891.25	25.5	41.12	18.38	69.90
	58.8	758.58	23.3	40.12	18.68	65.11
	57.9	616.60	21	39.09	18.81	58.72
	57	501.19	18.7	38.08	18.92	53.60
	56	398.11	16.6	37.05	18.95	47.96
	54.9	309.03	14.8	36	18.9	41.76
	53.88	244.34	12.9	34.97	18.91	37.88
	52.86	193.20	11.3	33.93	18.93	34.19
	51.73	148.94	9.9	32.9	18.83	30.09

Applications

- 1.3/1.5GHz particle linear accelerator
- L band power amplifier
- GPS ground station

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}	55	Vdc
Maximum gate current	Igs	141	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=340W	$R_{\theta JC}$	0.4	°C /W

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

DC Characteristics (Each path, measured on wafer prior to packaging)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=70.5mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 70.5mA	$V_{GS(th)}$	-4	-	-2	V
Gate Quiescent Voltage	VDS =50V, IDS=120mA, Measured in Functional Test	$V_{GS(Q)}$		--3.48		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	1.3GHz, Pout=1000W pulse CW All phase, No device damages	VSWR		5:1		

TYPICAL CHARACTERISTICS

Figure 1: S11/S21 output from Network analyser (VDS= 50V, IDQ=500 mA Vgs =-3.45V)

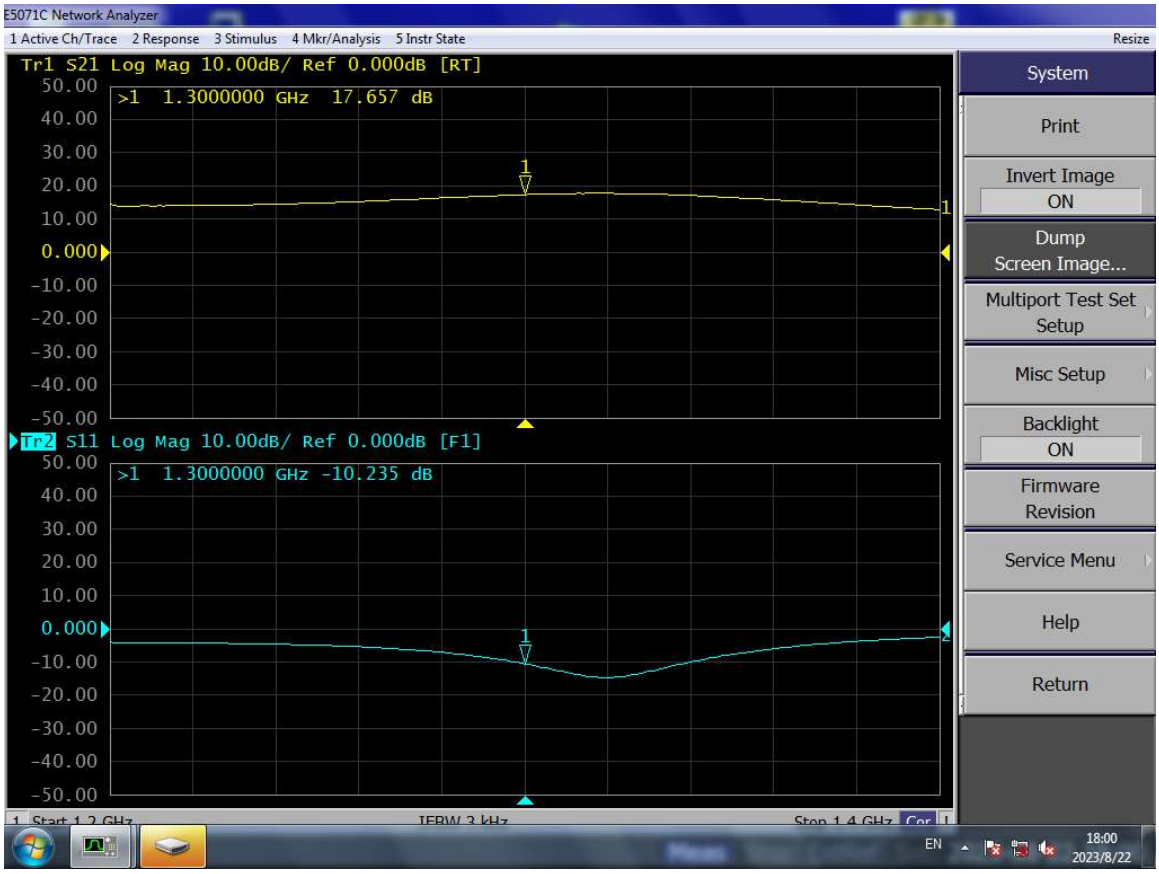
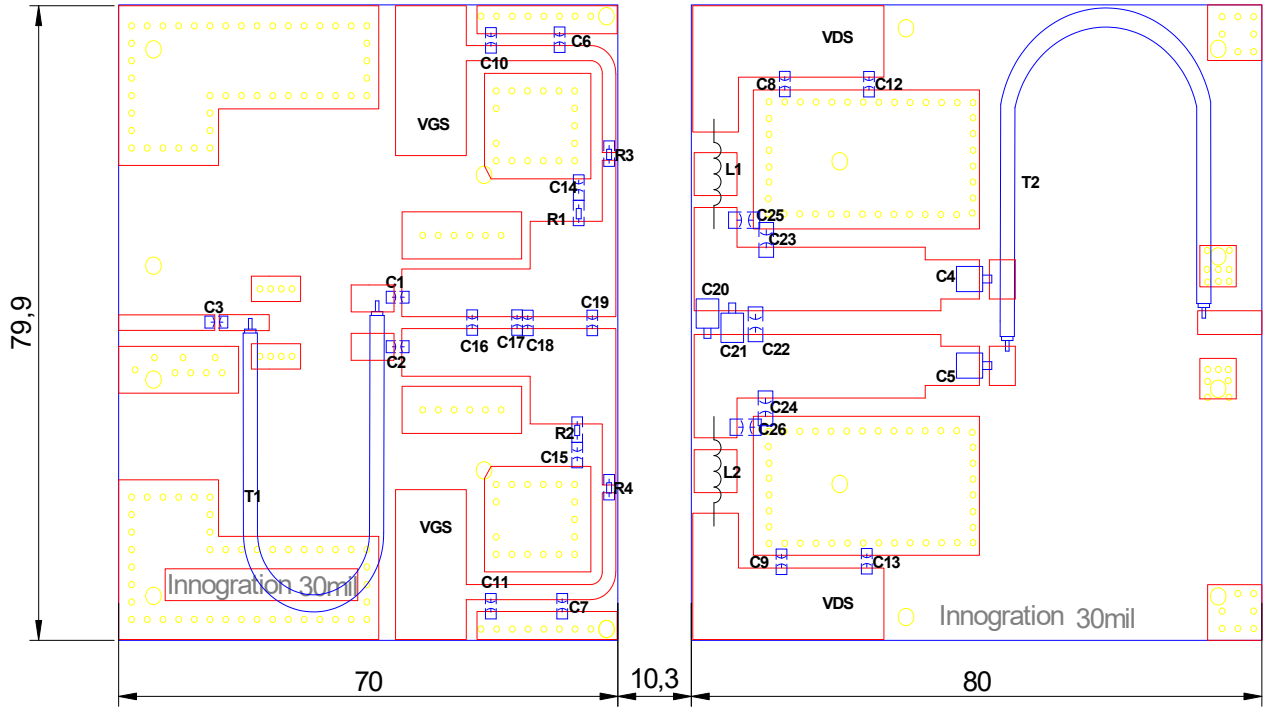


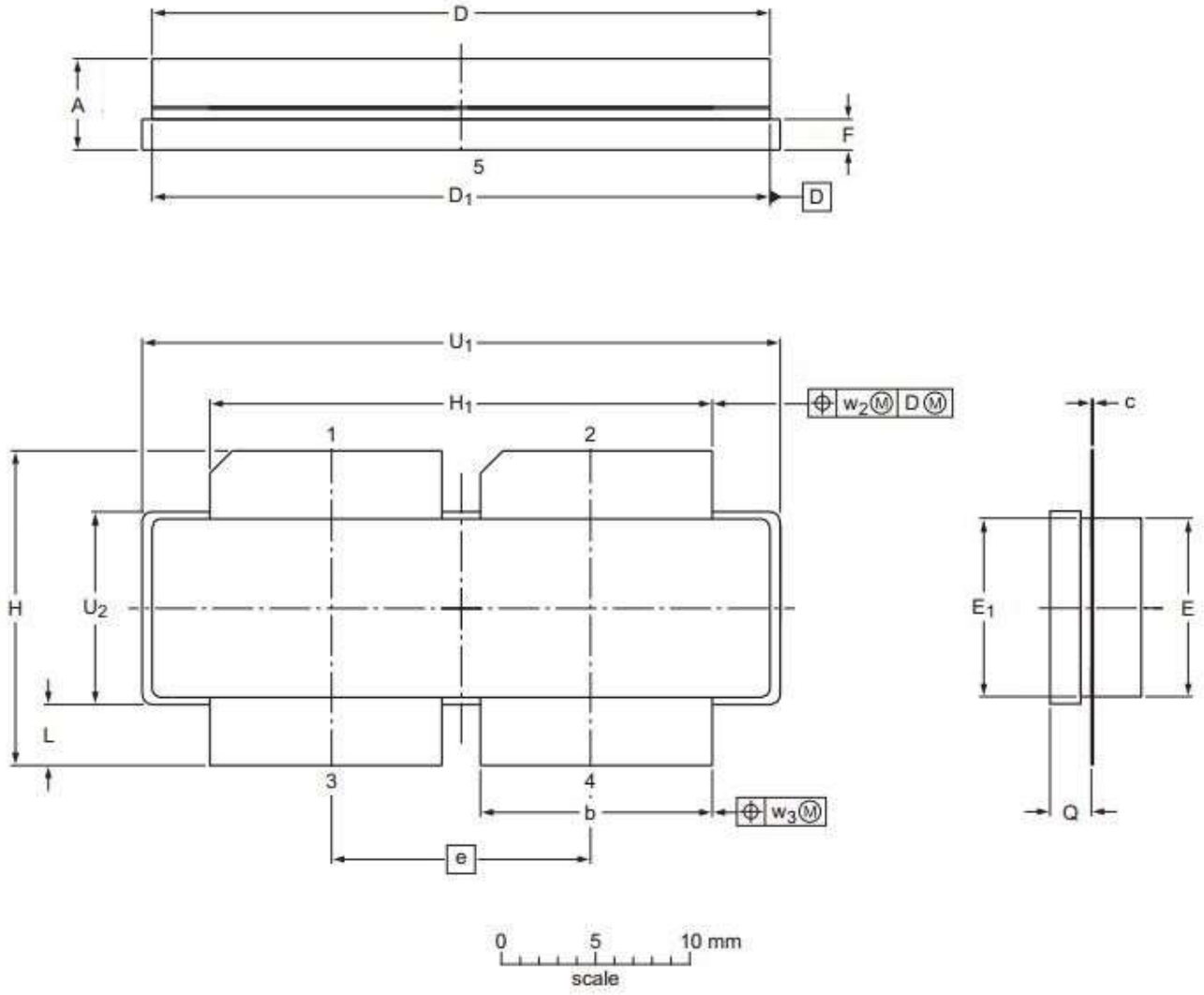
Figure 2: Reference design circuit (PCB DWG file upon request,)



Component	Description	Suggestion
C1,C2,C3	56pF	MQ301111
C4,C5	47pF	Mica capacitance
C6,C7,C8,C9	300pF	10uF/100V
C10,C11,C12,C13,C14,C15	10uF	Ceramic Multilayer Capacitor
C16	2.2pF	MQ301111
C17	3.0pF	MQ301111
C18	1.2pF	MQ301111
C19	4.7pF	MQ301111
C20	4.7pF	Mica capacitance
C21	3.3pF	Mica capacitance
C22	1.8pF	MQ102525
C23,C24	3.6pF	MQ102525
C25,C26	5.1pF	MQ102525
L1,L2	3 Turns，φ1.5mm，D=3mm	DIY
R1,R2,R3,R4	10Ω	Chip Resistor 1026
T1	25ohm,5cm	SFT-25-3
T2	50ohm,6cm	SFT-50-3
PCB	30mil RF-35TC-A	

Package Outline

Earless flanged ceramic package; 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	Q	U_1	U_2	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	2.26 2.01	32.39 32.13	10.29 10.03	0.25	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	0.089 0.079	1.275 1.265	0.405 0.395	0.01	0.01

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-D4					03/12/2013

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2022/11/28	V1.0	Preliminary Datasheet Creation
2023/1/7	V1.1	Add 1.3GHz tuned for higher P1dB
2023/3/16	V1.2	Correct T2 info
2023/8/23	V1.3	Update according to the latest application data, only 1.3GHz present

Application data based on: RXT-22-10/HL-23-01

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