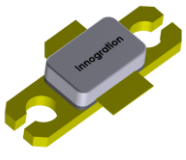
S3U6005V GaN TRANSISTOR

Document Number: S3U6005V
Preliminary Datasheet V1.1

Gallium Nitride 50V 50W, RF Power Transistor

S3U6005V



Description

The S3U6005V is a 50W single ended, input matched GaN HEMT, designed for multiple applications with frequencies up to 6GHz.

In typical 1-6G broadband application, it can deliver 45W pulsed CW power and 35W CW and typical 200-3000MHz broadband application, it can deliver 35W CW

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

- Typical Pulsed CW performance ： 100us，10% (on Innogration 1-6GHz class AB fixture with device soldered)

Freq(MHz)	Pin(dBm)	Pout(dBm)	Pout(W)	Ids(A)	Gain(dB)	Eff(%)
1000	39.15	46.75	47.3	0.243	7.6	38.9
1500	39.40	47.00	50.1	0.315	7.6	31.8
2000	39.45	47.35	54.3	0.323	7.9	33.6
2500	39.00	48.00	63.1	0.322	9.0	39.2
3000	39.10	47.98	62.8	0.260	8.9	48.3
3500	39.15	48.65	73.3	0.338	9.5	43.4
4000	39.15	47.50	56.2	0.311	8.4	36.2
4500	39.15	47.95	62.4	0.324	8.8	38.5
5000	39.15	47.30	53.7	0.329	8.2	32.6
5500	39.15	47.45	55.6	0.336	8.3	33.1
6000	39.25	47.05	50.7	0.28	7.8	36.3

- Typical Pulsed CW performance ： CW (on Innogration 200-3000MHz class AB fixture with device soldered)

Freq(MHz)	Pin(dBm)	Pout(dBm)	Pout(W)	Ids(A)	Gain(dB)	Eff (%)	2nd (dBc)	3rd (dBc)
150	36.90	45.49	35.4	1.05	8.6	67.4	-4.7	-13.0
200	37.10	45.50	35.7	0.81	8.3	85.6	-11.9	-13.5
400	35.76	46.35	43.2	1.28	10.6	67.4	-16.7	-11.8
600	36.35	46.38	43.5	1.62	10.0	53.6	-13.2	-14.0
800	36.95	45.97	39.5	1.91	9.0	41.4	-14.3	-18.6
1000	36.24	46.70	46.8	2.27	10.5	41.2	-12.3	-17.6
1500	36.10	46.67	46.5	2.48	10.6	37.5	-12.4	-26.2
2000	36.20	47.31	53.8	2.68	11.1	40.2	-26.6	-24.1
2500	36.60	47.68	58.6	2.42	11.1	48.4	-20.0	-26.0
3000	35.40	46.00	39.8	2.30	10.6	34.6	-17.0	-34.7

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Applications and Features

- Suitable for wireless communication infrastructure, 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	6.6	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 T_C= 25°C, T_J=200°C, DC Power Dissipation, FEA	$R_{\theta JC}$	TBD	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}=6.6mA	V_{DSS}		200		V
Gate Threshold Voltage	V_{DS} = 50V, I_D = 6.6mA	V_{GS}(th)	-4		-2	V
Gate Quiescent Voltage	V_{DS} =50V, I_{DS}=100mA, Measured in Functional Test	$V_{GS(Q)}$		-3.2		V

1-6GHz broadband

Reference Circuit of Test Fixture Assembly Diagram

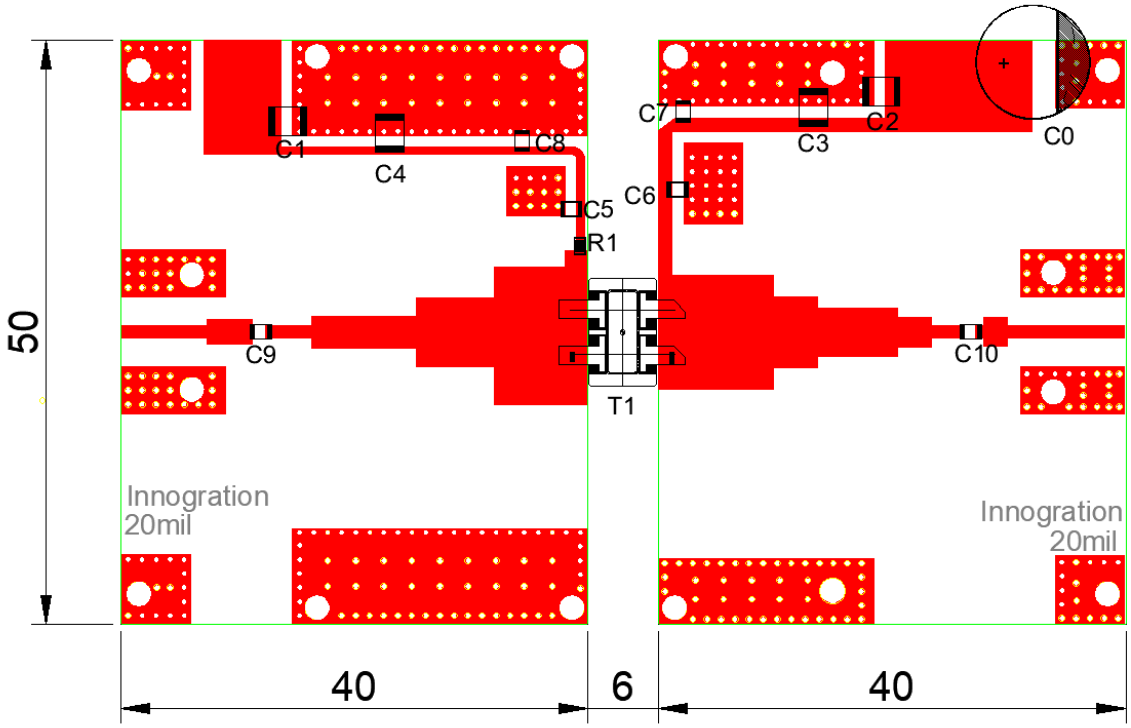
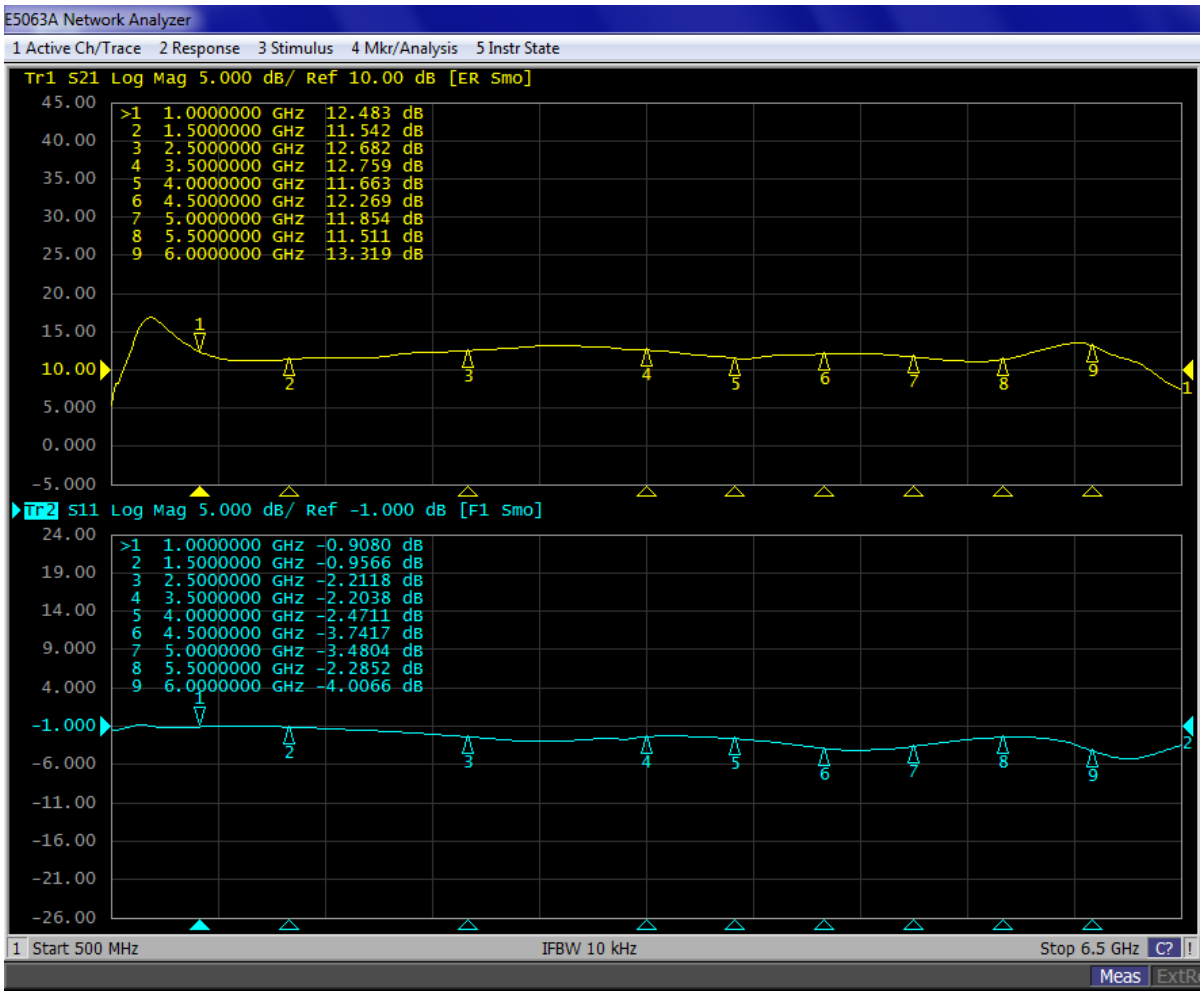


Figure 1. Test Circuit Component Layout (1000-6000MHz)

Table 4. Test Circuit Component Designations and Values

Component	Description	Suggested Manufacturer
C0	470uF/63V	Electrolytic Capacitor
C1, C2, C3, C4	10uF	1210
C5, C6	100pF	Beijing YuanLu HongYuan Electronic Technology CO., LTD MQ400805
C7	51pF	
C8, C9	6.8pF	
C10	4.3pF	
R1	Chip Resistor,10Ω	0805
T1	S3U6005VS V0	Innogration
PCB	Rogers 4350b, thickness 20 mils, 1oz copper	

Figure 2. Network Analyzer result S11 and S21



200-3000MHz broadband

Reference Circuit of Test Fixture Assembly Diagram

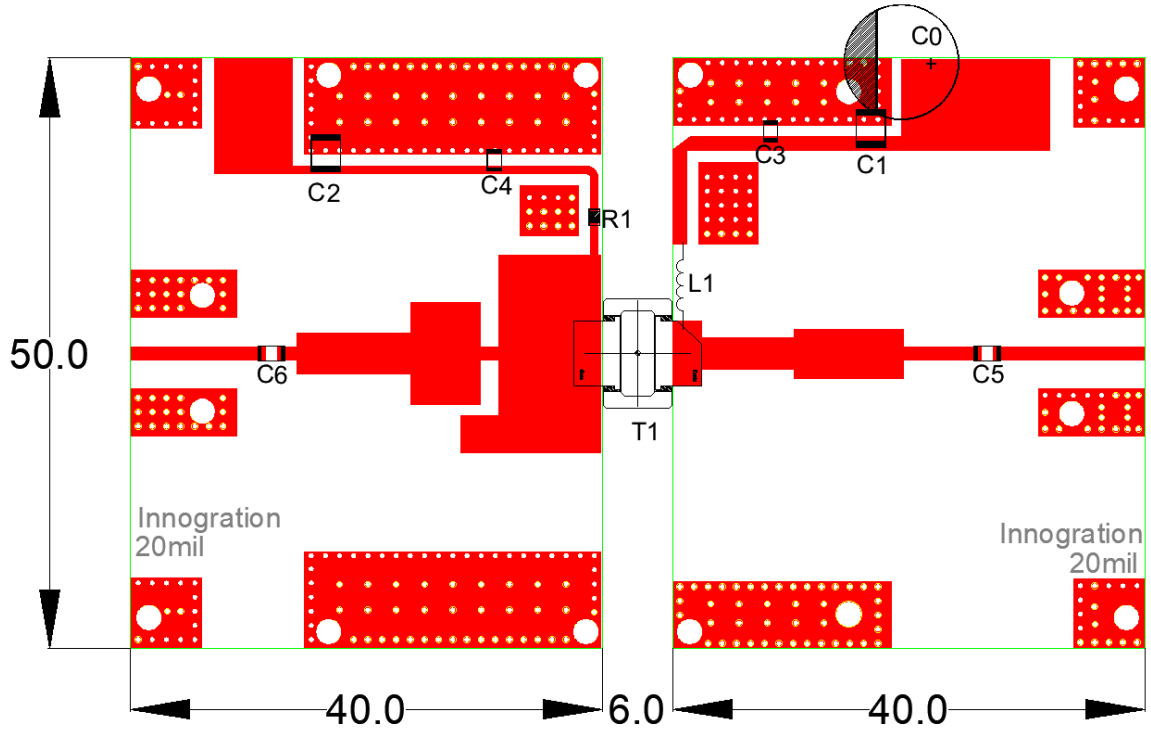
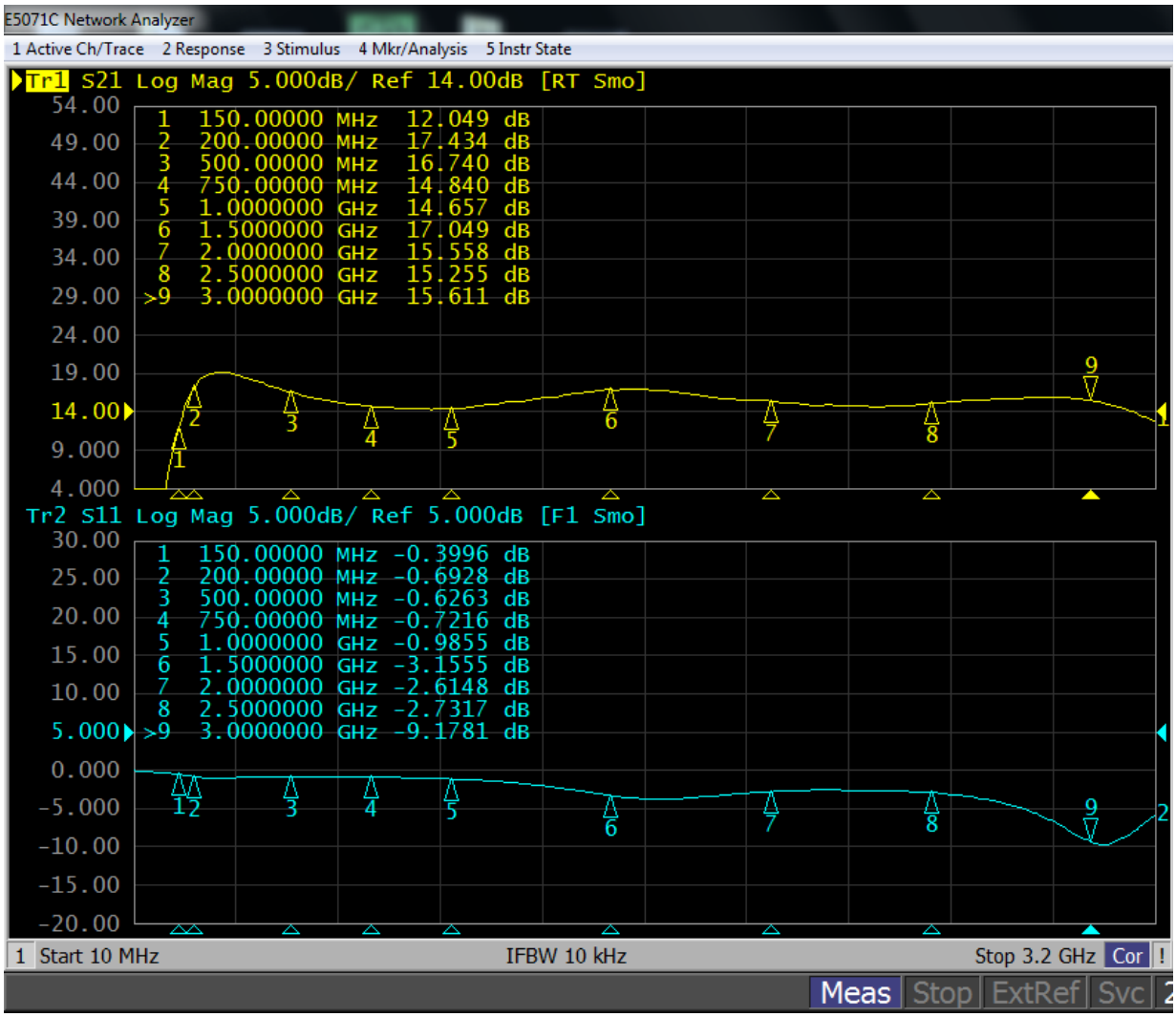


Figure 2. Test Circuit Component Layout (200-3000MHz)

Table 5. Test Circuit Component Designations and Values

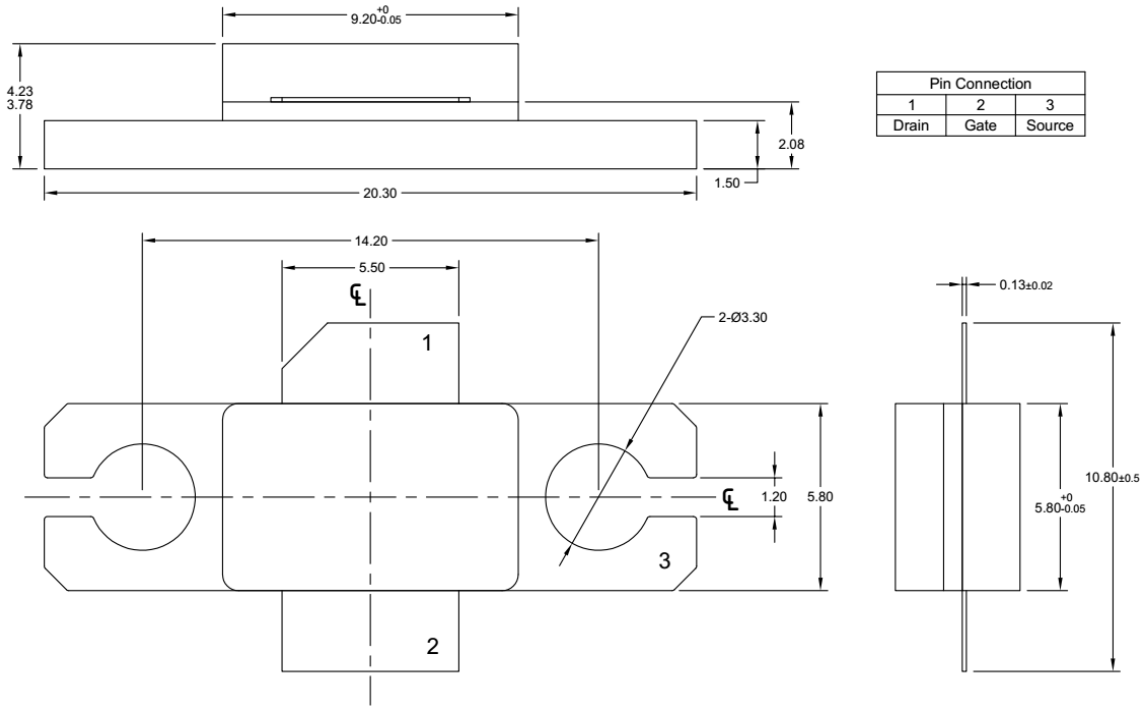
Reference Designator	Description	Quantity	Suggestion
C0	470uF/100V	1	Electrolytic Capacitor
C1, C2	10uF/100V, 1210	2	-
C3, C4	1uF, 0805	2	-
C5	22 pF, 1111	1	Beijing YuanLu HongYuan Electronic Technology CO., LTD
C6	6.2 pF, 1111	1	
L1	Wire diameter 1mm; Insider diameter 3mm;3 turns	1	DIY
T1	S3U6005VS	1	Innogration
R1	10 Ω, 0603/0805	1	Murata
PCB	Rogers 4350b, 20mil		-

Figure 3. Network Analyzer result S11 and S21



Package Outline

Flanged ceramic package; 2 leads



OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-GXB					10/10/2017

Figure 1. Package Outline PKG-G2E

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2025/6/4	V1.0	Preliminary Datasheet creation
2025/8/14	V1.1	Add 200-3000MHz application data

Application data based on RXT-25-18/RXT-25-28

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