

SU6012V GaN TRANSISTOR

Document Number: SU6012V
Preliminary Datasheet V1.1

Gallium Nitride 50V 115W, RF Power Transistor

Description

The SU6012V is a 115W single ended, input matched GaN HEMT, designed for multiple applications with frequencies up to 3.7GHz.

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

- Typical performance (on Innogration 2-3.7GHz class AB fixture with device soldered)

$V_{DD}=50V$ $I_{DQ}=100mA$, $V_{gs}=-3.04V$

Pulse CW, pulse width: 20us, duty cycle: 10%

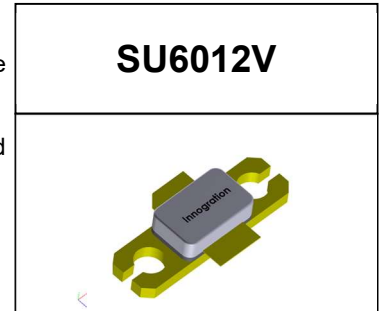
Freq(MHz)	P1dB(dBm)	Gain(P1dB)	P3dB(W)	P3dB Eff(%)
2000	49.89	12.06	137.02	57.55
2300	49.41	12.78	127.24	66.11
2600	50.68	12.21	154.12	64.85
2900	48.81	12.87	100.1	46.73
3200	49.65	13.09	119.38	44.72
3500	49.4	12.76	112.59	45.89

CW:

Freq(MHz)	Pin(dBm)	Pout(W)	IDS(A)	Power Gain(dB)	Eff(%)
2000	40.3	112.20	4.23	10.2	53.05
2100	40.1	120.23	4.14	10.7	58.08
2200	39.7	111.43	3.68	10.77	60.56
2300	39.5	104.71	3.6	10.7	58.17
2400	41.6	123.03	4.41	9.3	55.79
2500	40.47	112.20	4.38	10.03	51.23
2600	41	132.43	4.44	10.22	59.66
2700	40.6	117.49	4.09	10.1	57.45
2800	40.46	100.00	4.06	9.54	49.26
2900	40.1	87.70	4.21	9.33	41.66
3000	40	84.33	4.5	9.26	37.48
3100	40.26	87.10	4.7	9.14	37.06
3200	39.6	93.33	4.8	10.1	38.89
3300	40	100.00	4.74	10	42.19
3400	38.79	100.00	4.61	11.21	43.38
3500	40.2	91.20	4.6	9.4	39.65
3600	40.84	84.72	4.63	8.44	36.60
3700	41	81.85	4.75	8.13	34.46

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



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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	I_{gf}	16	mA
Storage Temperature Range	T_{stg}	-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 $T_C = 85^\circ\text{C}$, $T_J = 200^\circ\text{C}$, DC Power Dissipation, FEA	$R_{\theta JC}$	2	C/W

Table 3. Electrical Characteristics ($T_C = 25^\circ\text{C}$ unless otherwise noted)

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = -8\text{V}$; $I_{DS} = 16\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS} = 50\text{V}$, $I_D = 16\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 50\text{V}$, $I_{DS} = 100\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-3.04		V

Reference Circuit of Test Fixture Assembly Diagram

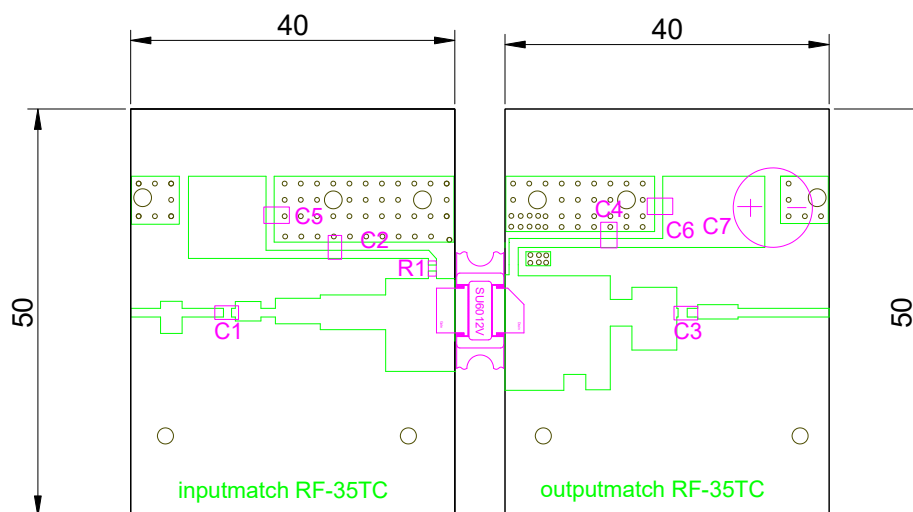


Figure 1. Test Circuit Component Layout (2000-3700MHz)

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Table 4. Test Circuit Component Designations and Values

Component	Description	Suggested Manufacturer
C1,C2,C3	9.1pF	DLC75D
C4	9.1PF	DLC70B
C5,C6	Ceramic multilayer capacitor, 10uF, 100V	10uF/100V
C7	470UF	63V/470UF
R1	Chip Resistor, 15 Ω , 0805	
PCB	0.508mm [0.020"] thick, $\epsilon_r=3.5$, RF-35TC, 1 oz. copper from Taconic	

Figure 2. Power Gain and Efficiency Vs frequency

$V_{gs} = -3.04V$, $V_{DS} = 50V$, $I_{DQ} = 100mA$, Pulsed CW, 20uS width, 10% dule cycle.

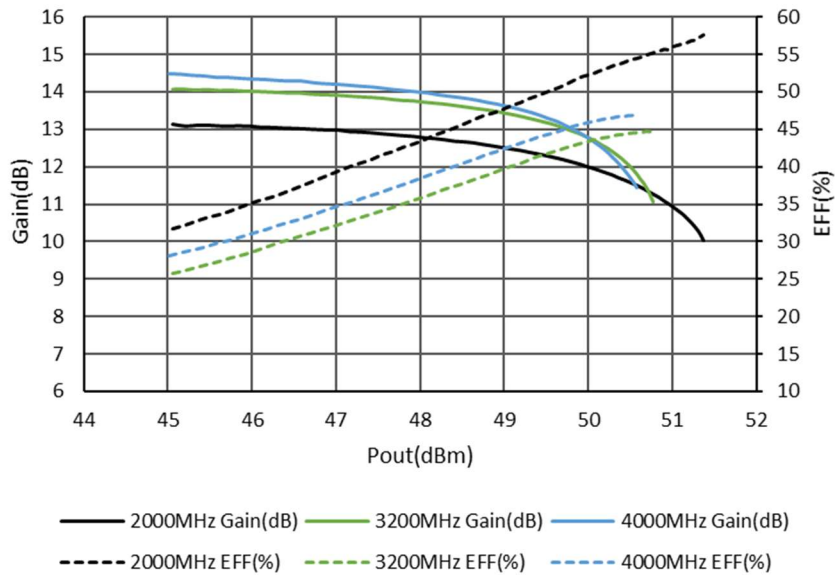
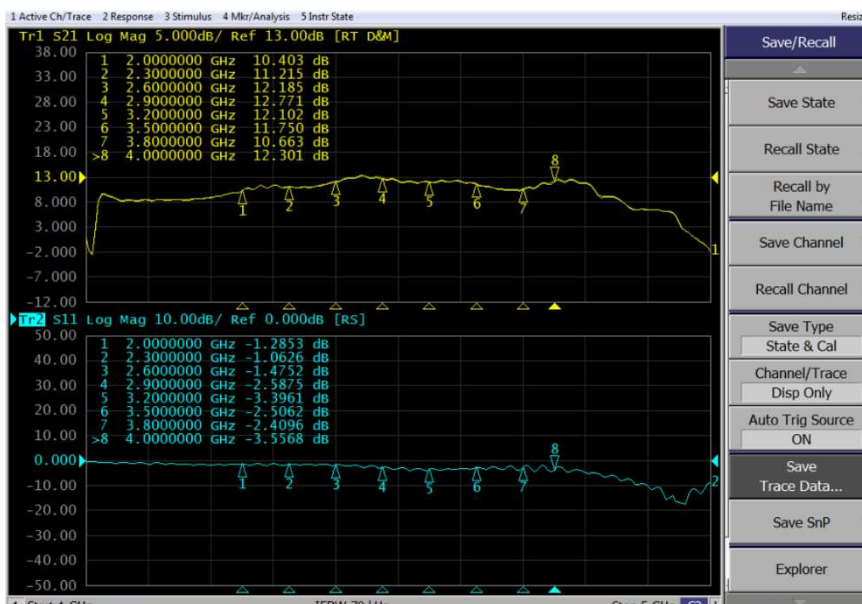


Figure 3. Network Analyzer result S11 and S21 $V_{gs} = -3.04V$, $V_{DS} = 50V$, $I_{DQ} = 100mA$



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Package Outline

Flanged ceramic package; 2 leads

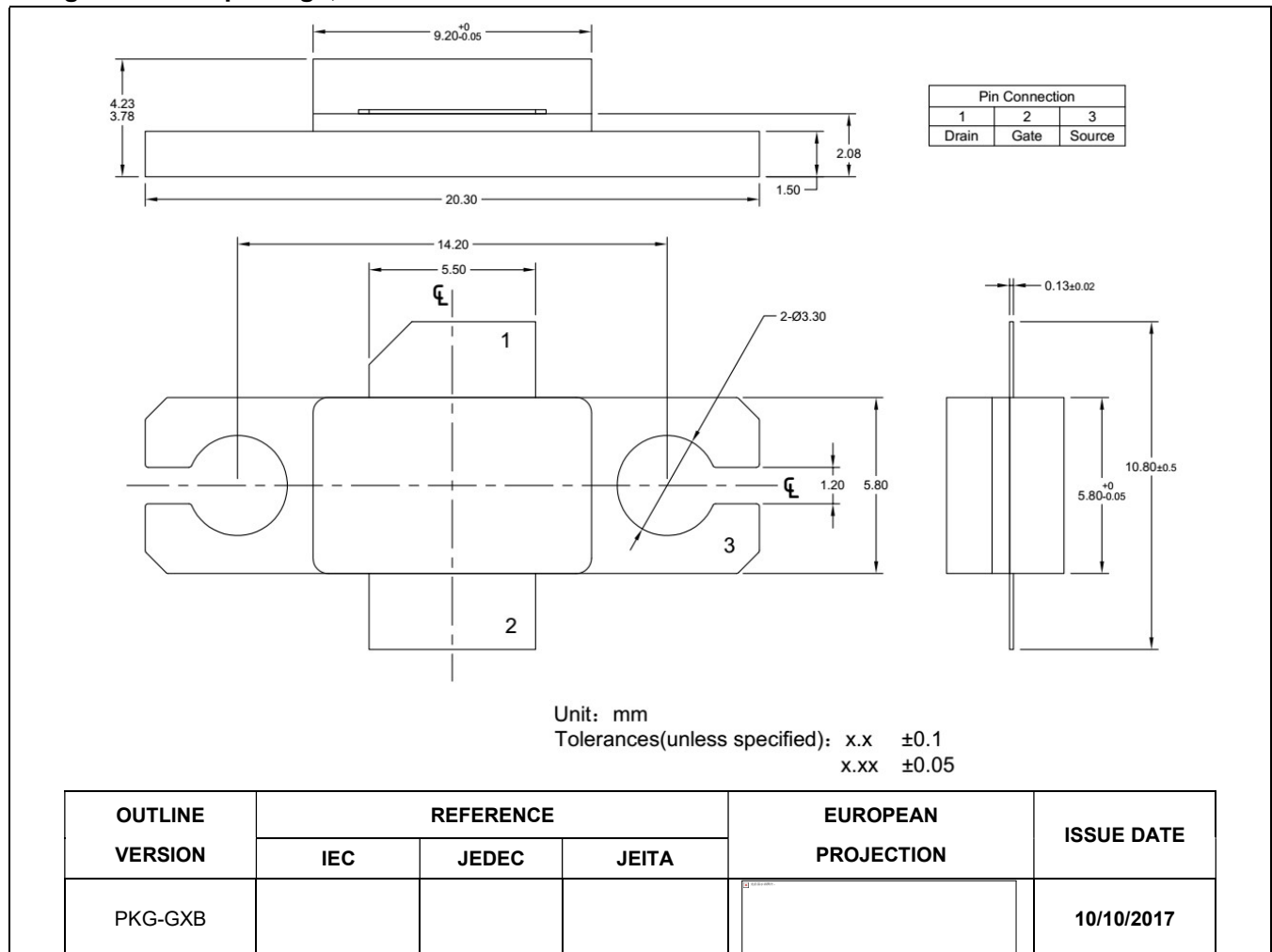


Figure 1. Package Outline PKG-G2E

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Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2020/5/13	V1.0	Preliminary Datasheet creation
2020/7/7	V1.1	Correct typo on 1 st page

Application data based on YHG-20-11

Notice

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