

S3U1036V GaN TRANSISTOR

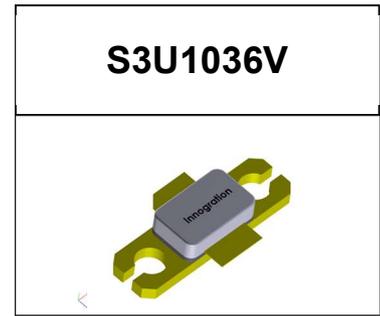
Document Number: S3U1036V
Preliminary Datasheet V1.0

GaN HEMT 28V 180W, RF Power Transistor

Description

The S3U1036V is a 180W single ended, unmatched GaN HEMT, designed for multiple applications with frequencies up to 1GHz.

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



- Typical performance (on fixture with device soldered): $V_{DD}=28V$ $I_{DQ}=280mA$, Pulse CW, Pulse Width=20 us, Duty cycle=10%

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
700	52.58	181.1	61.8	17.48	53.38	217.8	67.0
750	51.99	158.2	62.1	18.8	53.18	208.2	70.2
800	51.86	153.6	65.6	18.72	52.93	196.2	72.8
850	51.02	126.6	62.1	17.97	52.44	175.4	70.5
900	50.69	117.2	58.2	17.34	52.25	167.8	66.0
950	51.14	129.9	56.7	16.36	52.52	178.7	62.5
1000	52.41	174.2	60.1	15.3	53.81	240.3	69.5

CW

Freq (MHz)	Psat (dBm)	Psat (W)	Psat Eff (%)
700	52.96	197.7	63.84%
750	52.96	197.7	67.96%
800	52.88	194.1	71.98%
850	52.55	179.9	70.83%
900	52.28	169.0	64.78%
950	52.37	172.6	60.79%
1000	53.32	214.8	64.84%

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

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Preliminary Datasheet V1.0

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DS}	+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}	46.8	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 $T_c = 25^\circ\text{C}$, DC Power Dissipation, FEA	$R_{\theta JC}$	0.9	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	$V_{GS} = -8\text{V}$; $I_{DS} = 46.8\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS} = 28\text{V}$, $I_D = 46.8\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 28\text{V}$, $I_{DS} = 280\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-3.28		V

Functional Tests (In Innogration broadband Test Fixture, 50 ohm system) : $V_{DD} = 28\text{Vdc}$, $I_{DQ} = 280\text{mA}$, $f = 1000\text{MHz}$, Pulsed CW

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain @ P3dB	G_p		13		dB
Drain Efficiency@P3dB _t	Eff		65		%
3dB Compressed point	P_{3dB}	180	200		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

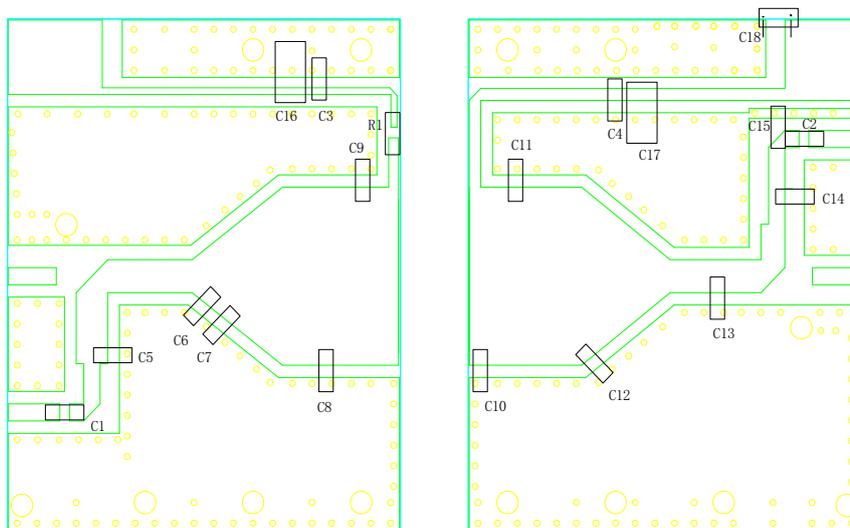


Figure 1. Test Circuit Component Layout (700MHz~1000MHz)

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Document Number: S3U1036V
Preliminary Datasheet V1.0

Table 4. Test Circuit Component Designations and Values

Designator	Footprint	Comment	Quantity
C1	0805	6.8 pF	1
C2, C3, C4	0805	82 pF	3
C5, C7, C10, C13	0805	3.3 pF	4
C6, C8	0805	8.2 pF	2
C9	0805	10 pF	1
C11, C12	0805	8.2 pF	2
C14	0805	3.9 pF	1
C15	0805	1.5 pF	1
C16, C17	1210	10uF/100V	2
C18		100uF/63V	1

Figure 2. Network Analyzer result S11 and S21 $V_{gs} = -3.0V$, $V_{DS} = 50V$, $I_{DQ} = 200mA$



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Package Outline

Flanged ceramic package; 2 leads

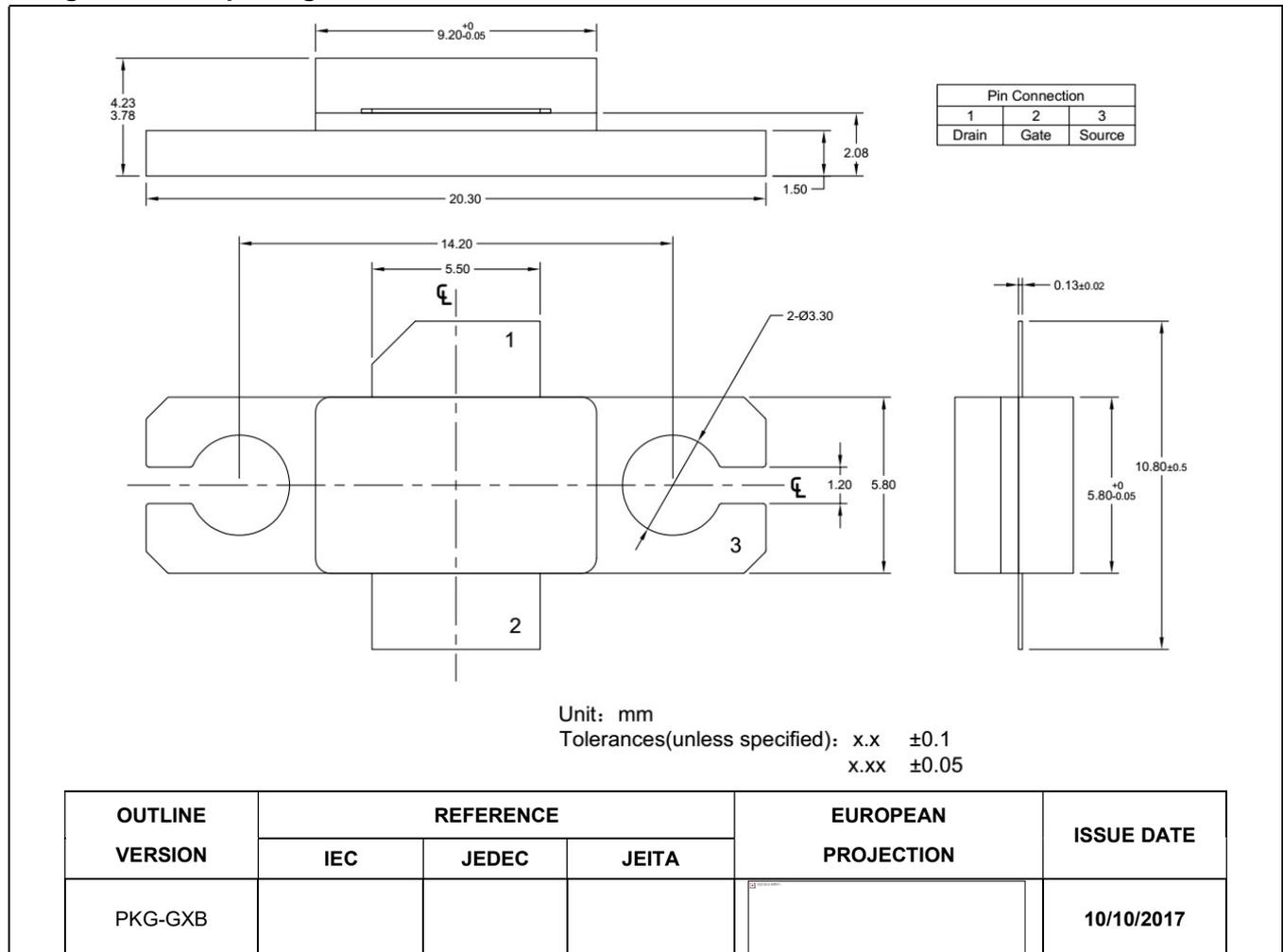


Figure 1. Package Outline PKG-G2E

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Preliminary Datasheet V1.0

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2022/11/22	V1.0	Preliminary datasheet

Application data based LSM-22-18

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