

2731GN-120V

Datasheet

Class-AB GaN-on-SiC HEMT Transistor



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Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1 Revision 1.0

Revision 1.0 was published in March 2017. It was the first publication of this document.

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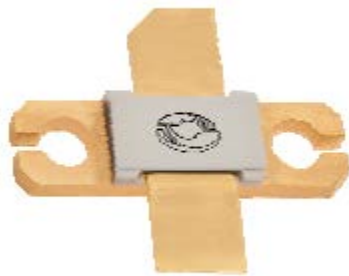
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2 Product Overview

The 2731GN-120V is an internally matched, common-source, class-AB, GaN-on-SiC HEMT transistor capable of providing over 15.7 dB gain, 120 W of pulsed RF output power at 200 μ s pulse width, 10% duty factor across the 2700 MHz to 3100 MHz band. This hermetically sealed transistor is designed for S-Band radar applications. It utilizes gold metallization and eutectic attach to provide the highest reliability and superior ruggedness.

The 2731GN-120V is designed for S-Band pulsed radar. The export classification is EAR-99.

Figure 1 55-QP Case Outline



3 Electrical Specifications

This section details the electrical specifications of the 2731GN-120V device.

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the 2731GN-120V device.

Table 1 Absolute Maximum Ratings

Rating	Parameter	Value	Units
Maximum power dissipation	Device dissipation at 25 °C	240	W
Maximum voltage and current	Drain-source voltage (V_{DSS})	125	V
	Gate-source voltage (V_{GS})	-8 to 0	V
Maximum temperatures	Storage temperature (T_{STG})	-55 to 125	°C
	Operating junction temperature	250	°C

3.2 Electrical Characteristics

The following table shows the typical electrical characteristics of the 2731GN-120V device at 25 °C.

Table 2 Electrical Characteristics

Symbol	Characteristics	Test Conditions	Min	Typ	Max	Units
P_{OUT}	Output power	$P_{IN} = 3.2$ W, Freq = 2700 MHz, 2900 MHz, 3200 MHz	120	145		W
G_P	Power gain	$P_{IN} = 3.2$ W, Freq = 2700 MHz, 2900 MHz, 3200 MHz	15.7	16.5		dB
η_D	Drain efficiency	$P_{IN} = 3.2$ W, Freq = 2700 MHz, 2900 MHz, 3200 MHz	55	64		%
Dr	Droop	$P_{IN} = 3.2$ W, Freq = 2700 MHz, 2900 MHz, 3200 MHz		0.1	0.5	dB
VSWR-T	Load mismatch tolerance	$P_{IN} = 3.2$ W, Freq = 2900 MHz			5:1	
θ_{JC}	Thermal resistance	Pulse width = 200 μ s, Duty = 10%			1.13	°C/W

Bias Condition: $V_{DD} = 50$ V, $I_{DQ} = 30$ mA constant current ($V_{GS} = -2.0$ V to -4.5 V typical)

3.3 Functional Characteristics

The following table shows the typical functional characteristics of the 2731GN-120V device at 25 °C.

Table 3 Functional Characteristics

Symbol	Characteristics	Test Conditions	Min	Typ	Max	Units
$I_{D(off)}$	Drain leakage current	$V_{GS} = -8$ V, $V_D = 50$ V			12	mA
$I_{G(off)}$	Gate leakage current	$V_{GS} = -8$ V, $V_D = 0$ V			4	mA
BV_{DSS}	Drain-source breakdown voltage	$V_{GS} = -8$ V, $I_D = 12$ mA	125			V

3.4 Typical Broadband Performance Data

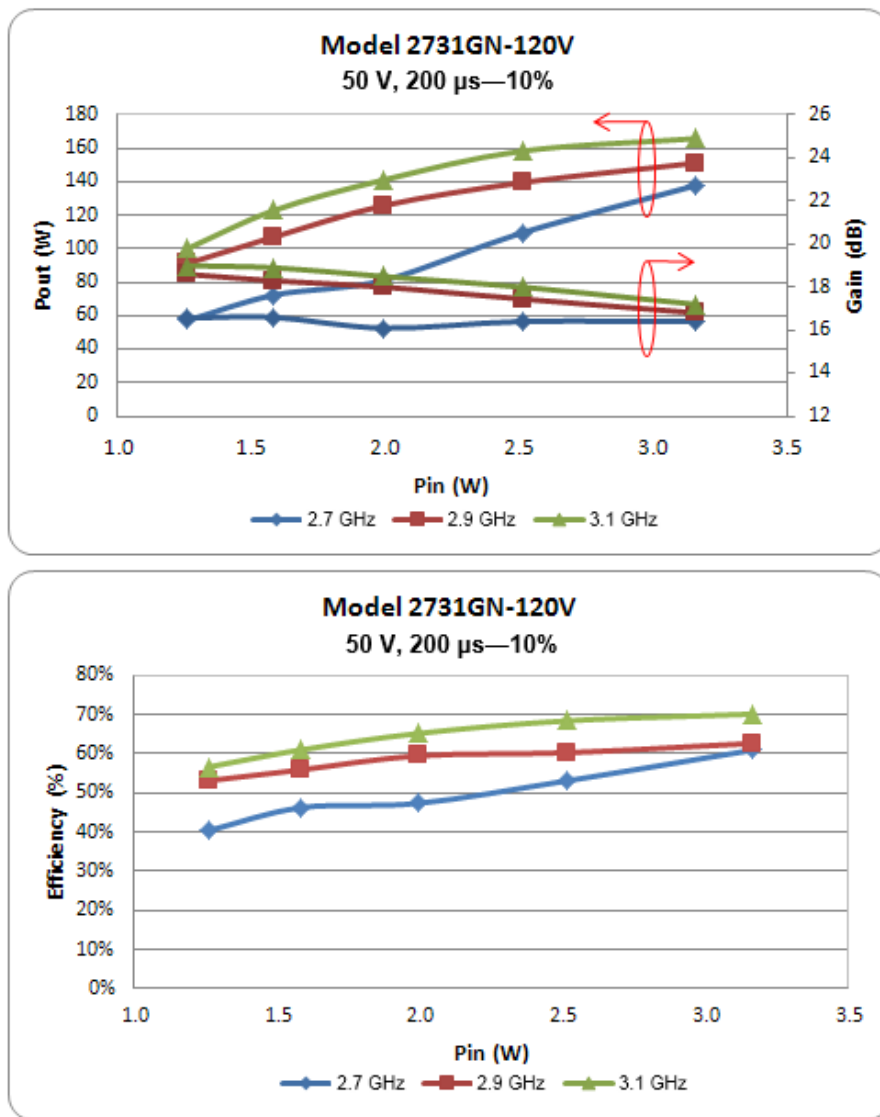
The following table shows the typical broadband performance data of the 2731GN-120V device.

Table 4 Typical Broadband Performance Data

Freq (MHz)	P _{IN} (W)	P _{OUT} (W)	I _D (A)	RL (dB)	η _D (%)	G _P (dB)	Droop (dB)
2700	3.2	138	0.48	-7.5	61	16.4	0.1
2900	3.2	152	0.51	-10.0	63	16.8	0.1
3100	3.2	162	0.50	-8.5	68	17.2	0.1

The following graphs show the typical broadband performance of the 2731GN-120V device.

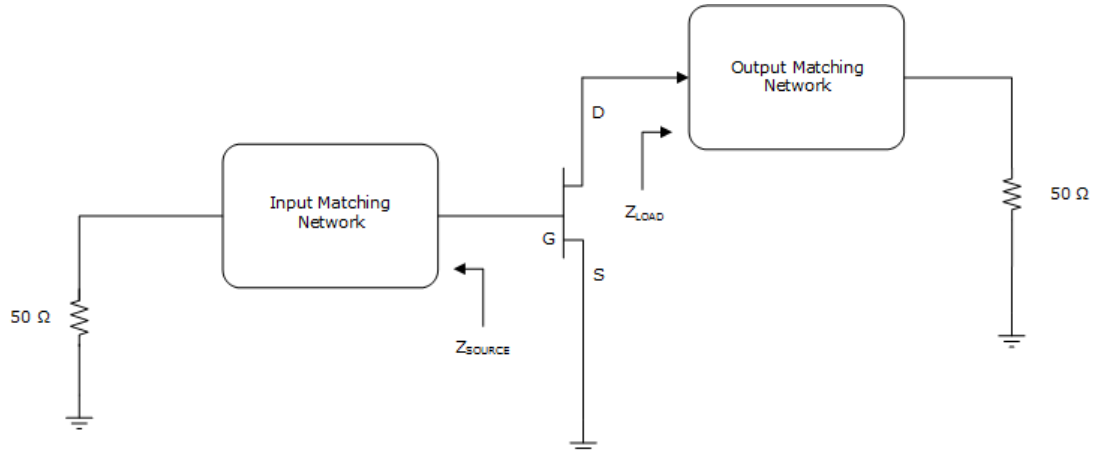
Figure 2 Typical Broadband Performance Data Graphs



4 Transistor Impedance Information

The following illustration shows the transistor impedance information for the 2731GN-120V device. The Z_{SOURCE} is looking into the input circuit; Z_{LOAD} is looking into the output circuit.

Figure 3 Transistor Impedance Diagram



The following table shows the impedance data for the 2731GN-120V device.

Table 5 Impedance Data

Freq (GHz)	Z_{SOURCE}	Z_{LOAD}
2.7	$5.66 - j11.94$	$7.57 - j4.09$
2.9	$4.94 - j11.12$	$8.08 - j3.93$
3.1	$4.33 - j10.32$	$8.55 - j4.08$

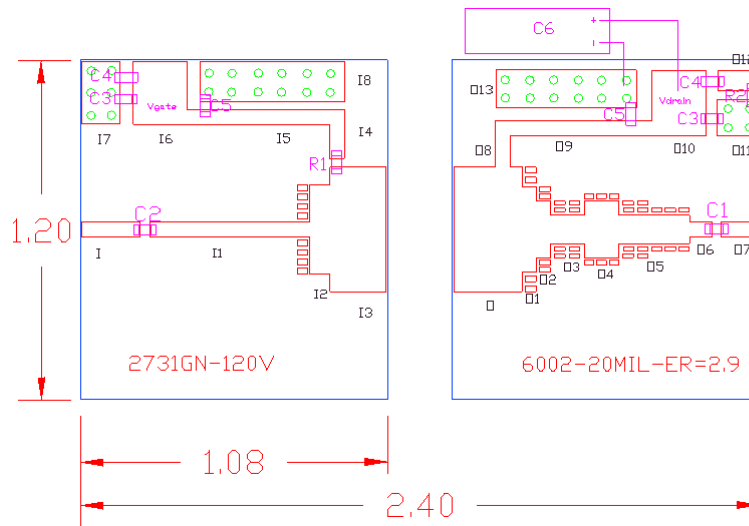
5 Transistor Test Information

This section details the transistor test information of the 2731GN-120V device.

5.1 Transistor Test Circuit Diagram

The following illustration shows the transistor test circuit diagram for the 2731GN-120V device. The dimensions are in inches.

Figure 4 Transistor Test Circuit



The board material is Roger Duroid 6002, 20 mil thickness, and $\epsilon_r = 2.9$.

The following table lists the components for the 2731GN-120V device.

Table 6 Component List 2731GN-120V

Item	Description	Value
C1	Chip cap A size	9.1 pF
C2	Chip cap A size	9.1 pF
C3	Chip cap B size	1000 pF
C4	Chip cap B size	10000 pF
C5	Chip cap B size	100 μ F
C10	Electrolytic cap (63 V)	2200 μ F
R1	Chip resistor size 0805	11.5 Ω
R2	Chip resistor size 0805	2 Ω

Table 7 Input Component List 2731GN-120V

Item	W (mil)	L (mil)
I	52	206

Item	W (mil)	L (mil)
I1	52	565
I2	318	70
I3	440	200
I4	52	174
I5	52	502
I6	220	190
I7	220	134
I8	140	510

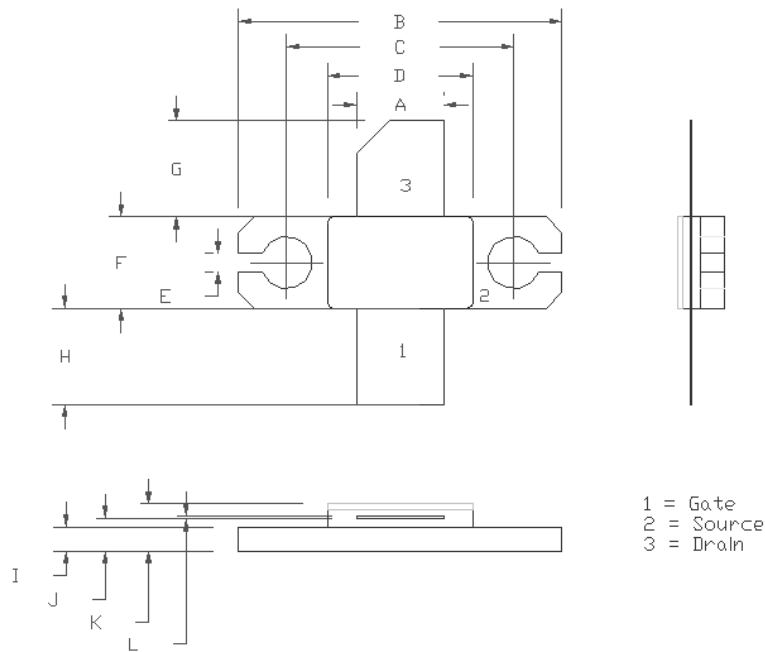
Table 8 Output Component List 2731GN-120V

Item	W (mil)	L (mil)
O	440	242
O1	300	50
O2	200	50
O3	100	120
O4	200	122
O5	100	250
O6	52	80
O7	52	130
O8	52	165
O9	52	500
O10	230	190
O11	126	140
O12	70	142
O13	130	500

6 Package Information

The following illustration shows the package outline of the 2731GN-120V.

Figure 5 55-QP Package Outline



The following table shows the dimensions of the 2731GN-120V device, and it corresponds to [Figure 5](#) above.

Table 9 55-QP Package Dimensions

Dimension	Min (mil)	Min (mm)	Max (mil)	Max (mm)
A	213	5.41	217	5.51
B	798	20.26	802	20.37
C	560	14.22	564	14.32
D	258	6.55	362	9.19
E	43	1.09	47	1.19
F	226	5.74	230	5.84
G	235	5.96	239	6.07
H	235	5.96	239	6.07
I	60	1.52	62	1.57
J	81	2.06	82	2.08
K	116	2.94	118	2.99
L	4	0.102	6	0.152