# 2731GN-220V

220 Watts - 50 Volts, 200 $\mu$s, 10%
S-Band Radar 2700 - 3100 MHz

## GENERAL DESCRIPTION

The 2731GN-220V is an internally matched, COMMON SOURCE, class AB, GaN on SiC HEMT transistor capable of providing over 10 dB gain, 220 Watts of pulsed RF output power at 200uS pulse width, 10% duty factor across the 2700 to 3100 MHz band. This hermetically sealed transistor is designed for S-Band Radar applications. It utilizes gold metallization and eutectic attach to provide highest reliability and superior ruggedness.

Market Application – 2731GN-220V is designed for S-Band Pulsed Radar

## ABSOLUTE MAXIMUM RATINGS

**Maximum Power Dissipation**

Device Dissipation @ 25°C 650 W

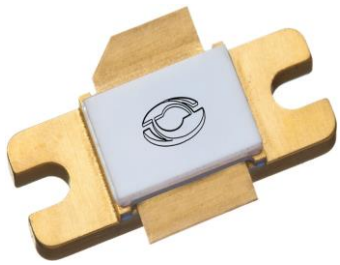
**Maximum Voltage and Current**

Drain-Source Voltage ($V_{DSS}$) 150 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

## CASE OUTLINE
## 55-QP
## Common Source



## ELECTRICAL CHARACTERISTICS @ 25°C

| Symbol | Characteristics | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Pout | Output Power | Pin=22.5W Freq=2700,2900,3100MHz | 220 | 245 | | W |
| Gp | Power Gain | Pin=22.5W Freq=2700,2900,3100MHz | 9.8 | 10.4 | | dB |
| ηd | Drain Efficiency | Pin=22.5W Freq=2700,2900,3100MHz | 40 | 50 | | % |
| Dr | Droop | Pin=22.5W Freq=2700,2900,3100MHz | | | 0.8 | dB |
| VSWR-T | Load Mismatch Tolerance | Pout=220W, Freq= 2900MHz | | | 3:1 | |
| Θjc | Thermal Resistance | Pulse Width=200uS, Duty=10% | | | 0.33 | °C/W |

- **Bias Condition: Vdd=+50V, Idq=150mA constant current (Vgs= -2.0 ~ -4.5V typical)**

## FUNCTIONAL CHARACTERISTICS @ 25°C

| | | | | | | |
|---|---|---|---|---|---|---|
| $I_{D(Off)}$ | Drain leakage current | $V_{gS}$ = -8V, $V_D$ = 150V | | | 30 | mA |
| $I_{G(Off)}$ | Gate leakage current | $V_{gS}$ = -8V, $V_D$ = 0V | | | 8 | mA |

***Export Classification: ECCN 3A001.b.3.a.3***

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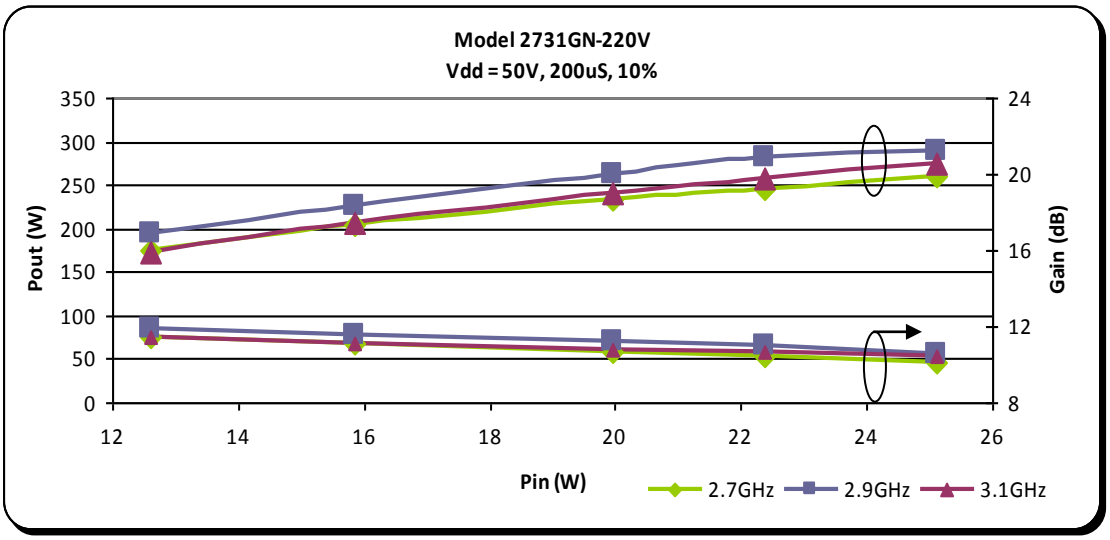
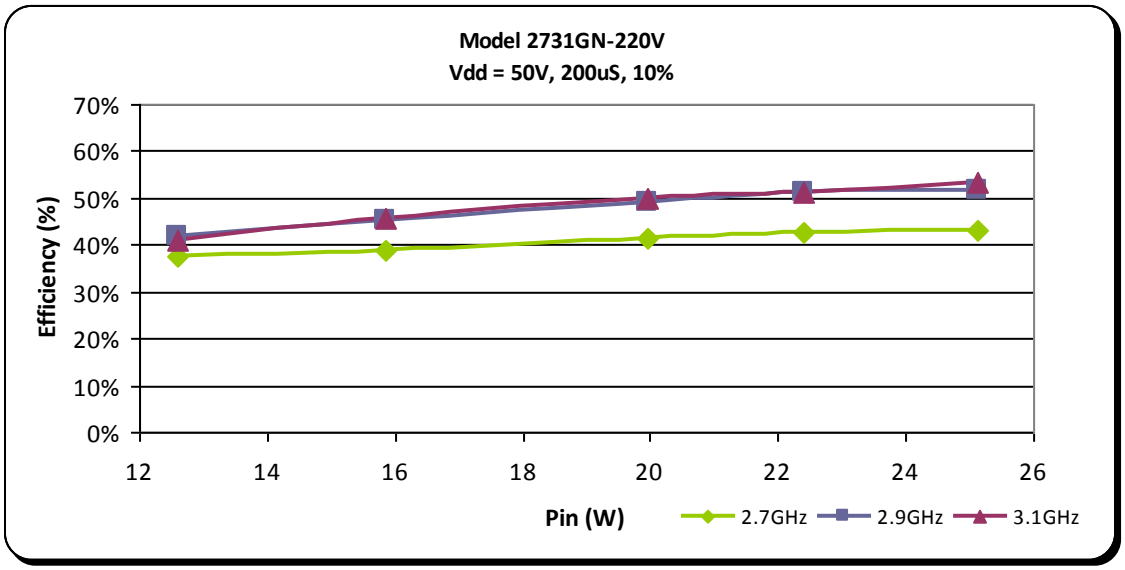
## TYPICAL BROAD BAND PERFORMACE DATA

| Frequency | Pin (W) | Pout (W) | Id (A) | RL (dB) | Nd (%) | G (dB) | Droop (dB) |
|---|---|---|---|---|---|---|---|
| 2700 MHz | 22.5 | 246 | 1.24 | -8 | 43 | 10.4 | 0.6 |
| 2900 MHz | 22.5 | 280 | 1.17 | -14 | 51 | 11.0 | 0.5 |
| 3100 MHz | 22.5 | 258 | 1.08 | -7 | 51 | 10.6 | 0.4 |



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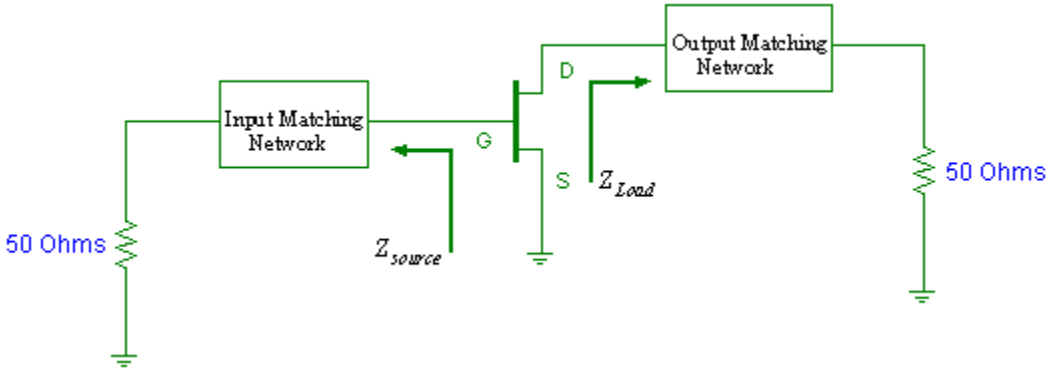
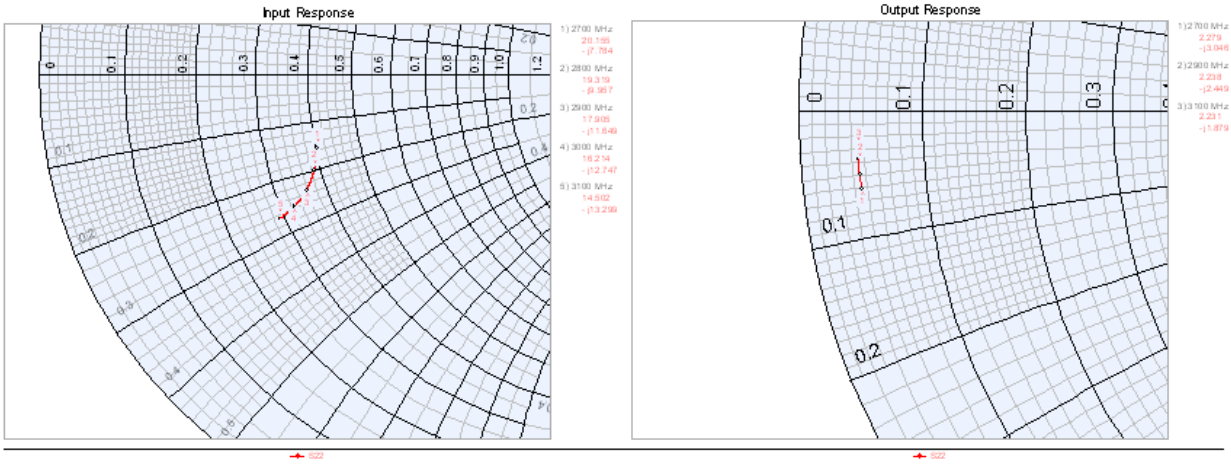
## TRANSISTOR IMPEDANCE INFORMATION




Note: $Z_{Source}$ is looking into the input circuit
$Z_{Load}$ is looking into the output circuit

| Impedance Data | | |
|---|---|---|
| **Freq (GHz)** | **$Z_{Source}$** | **$Z_{Load}$** |
| 2.7 | 20.15 – j07.78 | 2.27 – j3.04 |
| 2.9 | 17.90 – j11.64 | 2.23 – j2.44 |
| 3.1 | 14.50 – j13.29 | 2.23 – j1.87 |



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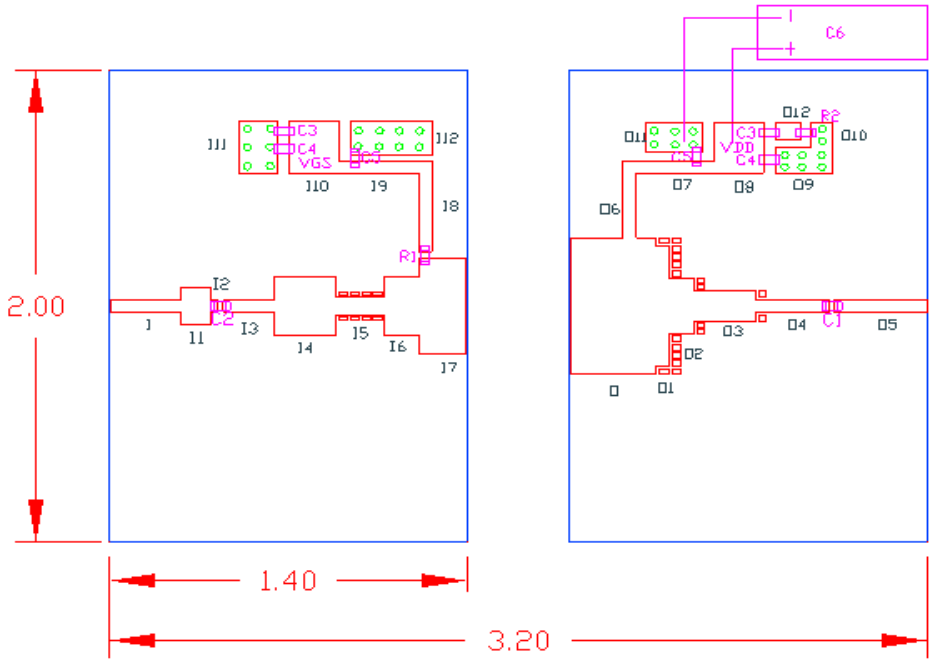
## TEST CIRCUIT DIAGRAM




## Board Material: Roger Duriod 6002 @ 20 Mil Thickness, Er=2.9

| Component List | | |
|---|---|---|
| Item | Description | Value |
| C1 | Chip Cap A size | 9.1pF |
| C2 | Chip Cap A size | 9.1pF |
| C3 | Chip Cap B size | 10,000pF |
| C4 | Chip Cap B size | 1000pF |
| C5 | Chip Cap B size | 100pF |
| C10 | Electrolytic Cap (63V) | 2200uF |
| R1 | Chip Resistor size 0805 | 11.5 ohms |
| R2 | Chip Resistor size 0805 | 2 Ohms |
| | | |
| Board: Duroid 6002 - 20 Mil Thick - Er = 2.9 | | |

| Input Physical Circuit Layout | | |
|---|---|---|
| Item | W (mil) | L (mil) |
| I | 52 | 278 |
| I1 | 160 | 112 |
| I2 | 52 | 30 |
| I3 | 52 | 200 |
| I4 | 250 | 240 |
| I5 | 80 | 190 |
| I6 | 250 | 130 |
| I7 | 400 | 187 |
| I8 | 52 | 340 |
| I9 | 52 | 330 |
| I10 | 220 | 190 |
| I11 | 220 | 150 |
| I12 | 140 | 320 |

| Output Physical Circuit Layout | | |
|---|---|---|
| Item | W (mil) | L (mil) |
| O | 580 | 334 |
| O1 | 508 | 50 |
| O2 | 230 | 100 |
| O3 | 130 | 241 |
| O4 | 52 | 286 |
| O5 | 52 | 360 |
| O6 | 52 | 270 |
| O7 | 52 | 390 |
| O8 | 216 | 190 |
| O9 | 110 | 140 |
| O10 | 216 | 80 |
| O11 | 126 | 220 |
| O12 | 73 | 110 |

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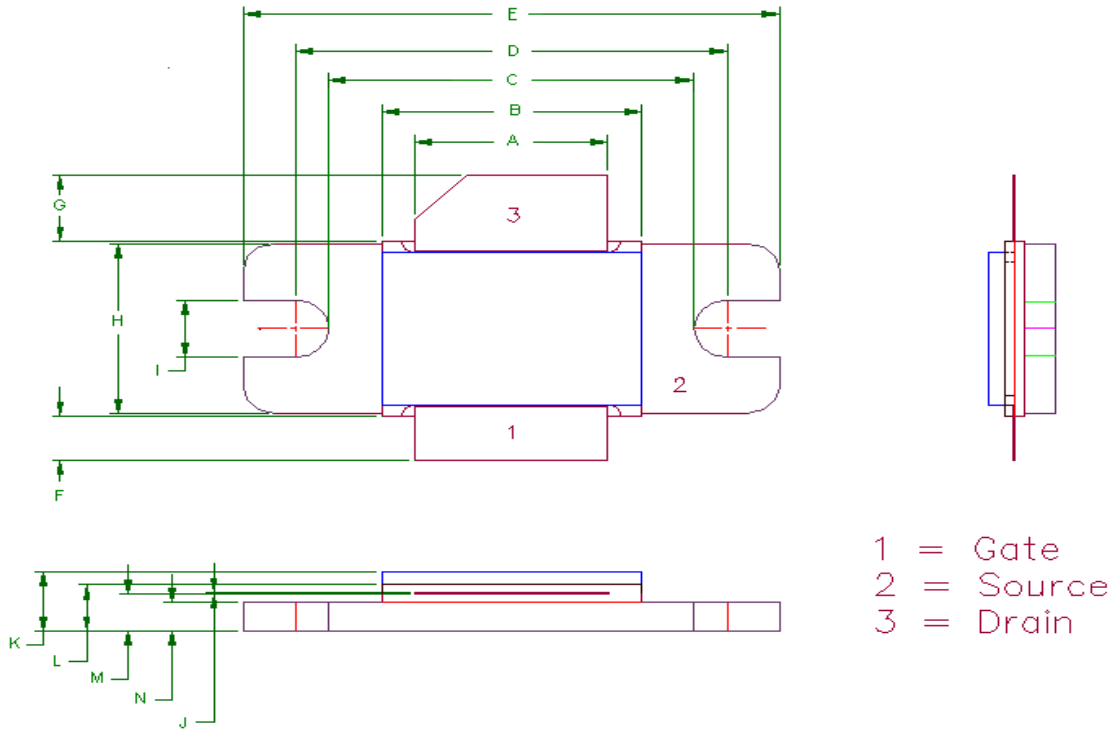
## 55-QP PACKAGE DIMENSION




| Dimension | Min (mil) | Min (mm) | Max (mil) | Max (mm) |
|---|---|---|---|---|
| A | 370 | 9.40 | 372 | 9.44 |
| B | 498 | 12.65 | 500 | 12.7 |
| C | 700 | 17.78 | 702 | 17.83 |
| D | 830 | 21.08 | 832 | 21.13 |
| E | 1030 | 26.16 | 1032 | 26.21 |
| F | 101 | 2.56 | 102 | 2.59 |
| G | 151 | 3.84 | 152 | 3.86 |
| H | 385 | 9.78 | 387 | 9.83 |
| I | 130 | 3.30 | 132 | 3.35 |
| J | 003 | .076 | 004 | 0.10 |
| K | 135 | 3.43 | 137 | 3.48 |
| L | 105 | 2.67 | 107 | 2.72 |
| M | 085 | 2.16 | 86 | 2.18 |
| N | 065 | 1.65 | 66 | 1.68 |

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***Revision History***

| Revision Level / Date | Para. Affected | Description |
|---|---|---|
| 0.1 / June 2013 | - | Initial Preliminary Release |
| 1 / 9 Feb 2016 | - | Formatted, updated export classification |