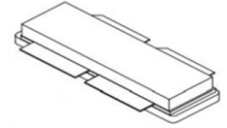




## GaN 50V,800W, RF Power Transistor

### SQ1081RVPS



### Description

The SQ1081RVPS is a push pull 800W capable, internally matched GaN HEMT, ideal for multiple applications up to 1GHz. It is optimized thermally to support higher duty cycle or longer pulse up to CW application.

In typical wideband application from 700 to 910MHz, it can deliver >600W across the full band. There is no guarantee of performance when this part is used outside of stated frequencies.

- Typical Pulsed CW performance at 700-910MHz applications

| SQ1081RVPS <sup>V0</sup> Vgs=-3.4V Vds=48V Idq=300mA Pulse 12us 50% |           |            |         |       |          |        |
|---|-----------|------------|---------|-------|----------|--------|
| Freq (MHz)  | Pin (dBm) | Pout (dBm) | Pout(W) | I(A)  | Gain(dB) | Eff(%) |
| 700   | 43.5      | 58.32      | 679     | 10.10 | 14.8     | 70.0   |
| 750   | 43.7      | 57.90      | 617     | 9.72  | 14.2     | 66.1   |
| 800   | 42.9      | 58.21      | 662     | 10.60 | 15.3     | 65.1   |
| 850   | 42.8      | 58.72      | 745     | 11.50 | 15.9     | 67.5   |
| 910   | 42.5      | 57.90      | 617     | 9.10  | 15.4     | 70.6   |

### Applications

- P band power amplifier
- UHF TV
- Public Safety Radio
- Data link power amplifier

### 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
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 <sub>DSS</sub> | +200        | Vdc  |
| Gate--Source Voltage           | V <sub>GS</sub>  | -8 to +0.5  | Vdc  |
| Operating Voltage              | V <sub>DD</sub>  | 55          | Vdc  |
| Maximum gate current           | I <sub>gs</sub>  | 100         | mA   |
| Storage Temperature Range      | T <sub>stg</sub> | -65 to +150 | °C   |
| Case Operating Temperature     | T <sub>c</sub>   | +150        | °C   |
| Operating Junction Temperature | T <sub>j</sub>   | +225        | °C   |



**Table 2. Thermal Characteristics**

| Characteristic   | Symbol          | Value | Unit                      |
|--|-----------------|-------|---------------------------|
| Thermal Resistance, Junction to Case by FEA<br>$T_c = 25^\circ\text{C}$ , at $P_{out} = 800\text{W}$ @ $900\text{MHz}$ | $R_{\theta JC}$ | 0.22  | $^\circ\text{C}/\text{W}$ |

**Table 3. Electrical Characteristics (TA = 25°C unless otherwise noted)**

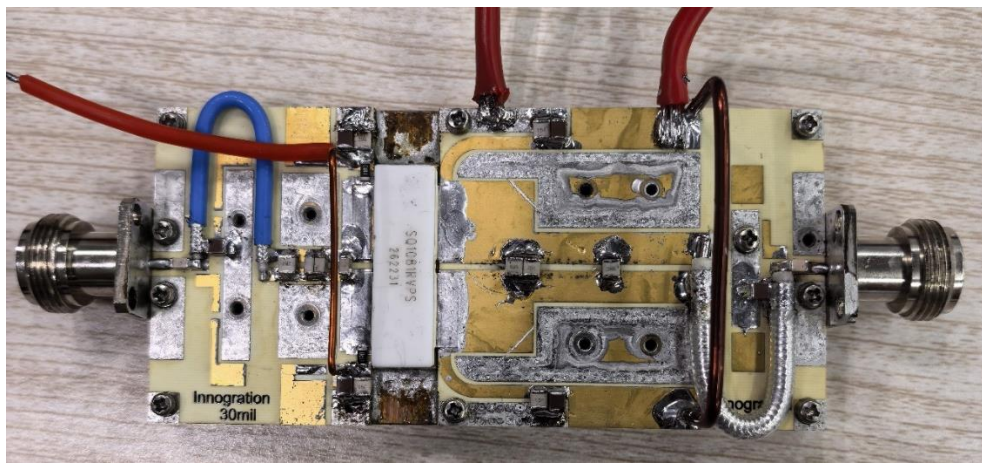
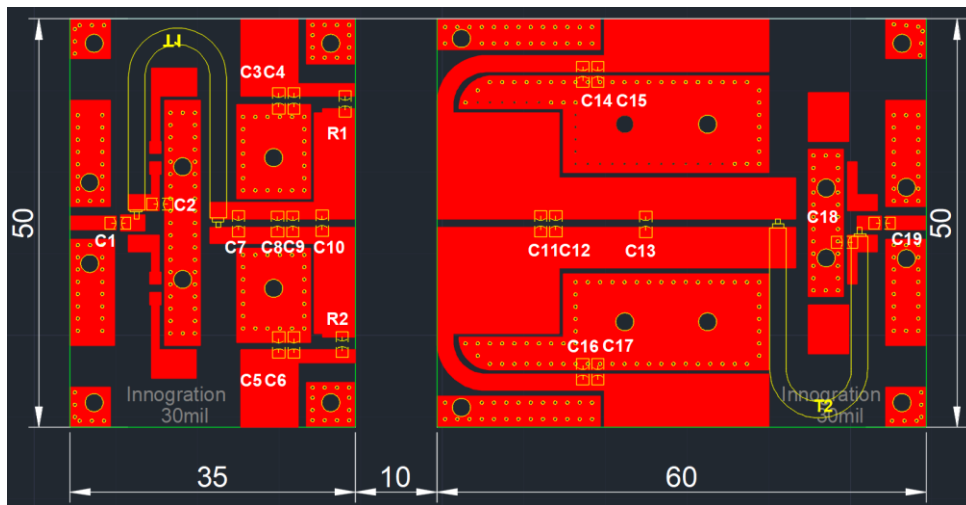
**DC Characteristics (Each path, measured on wafer prior to packaging)**

| Characteristic                 | Conditions   | Symbol       | Min | Typ  | Max | Unit |
|--------------------------------|--|--------------|-----|------|-----|------|
| Drain-Source Breakdown Voltage | $V_{GS} = -8\text{V}$ ; $I_{DS} = 100\text{mA}$                                  | $V_{DSS}$    |     | 200  |     | V    |
| Gate Threshold Voltage         | $V_{DS} = 10\text{V}$ , $I_D = 100\text{mA}$                                     | $V_{GS(th)}$ | -4  | -    | -2  | V    |
| Gate Quiescent Voltage         | $V_{DS} = 50\text{V}$ , $I_{DS} = 180\text{mA}$ ,<br>Measured in Functional Test | $V_{GS(Q)}$  |     | -3.2 |     | V    |

**Ruggedness Characteristics**

| Characteristic           | Conditions  | Symbol | Min | Typ | Max | Unit |
|--------------------------|---|--------|-----|-----|-----|------|
| Load mismatch capability | 900MHz, $P_{out} = 600\text{W}$ pulse CW<br>All phase,<br>No device damages | VSWR   |     | 5:1 |     |      |

**Figure 1: Reference design circuit (PCB DWG file upon request,)**





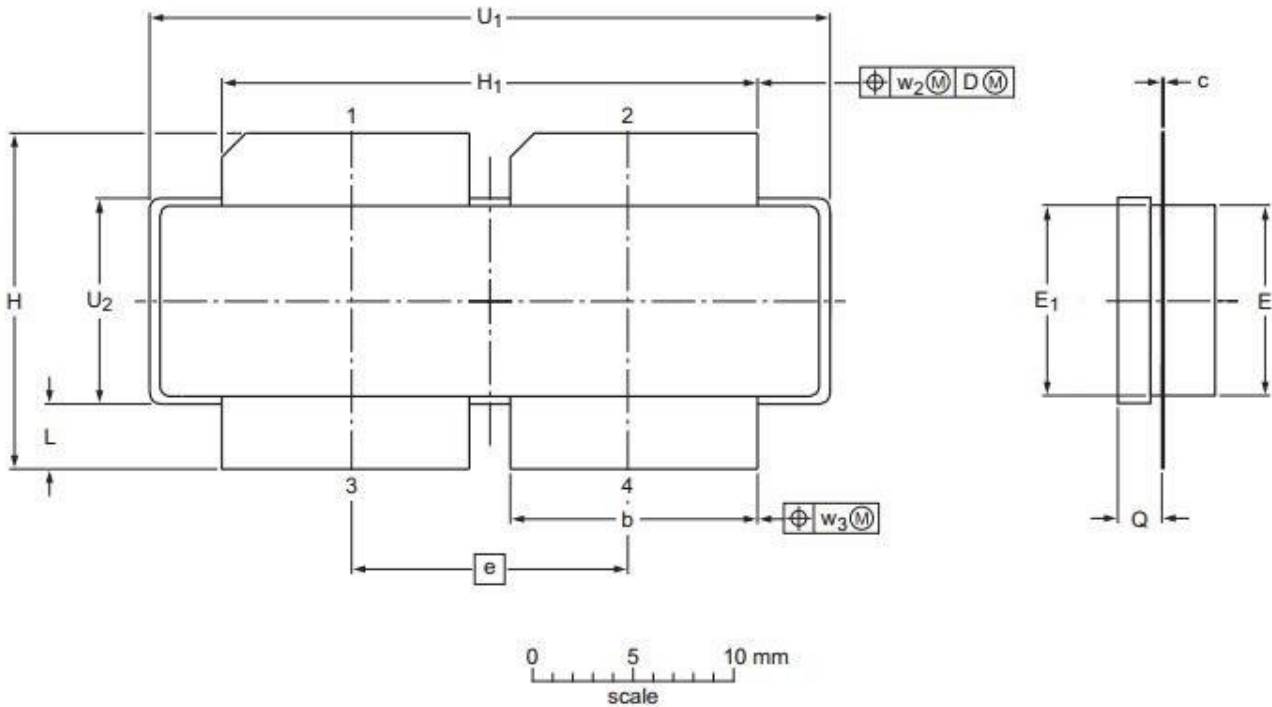
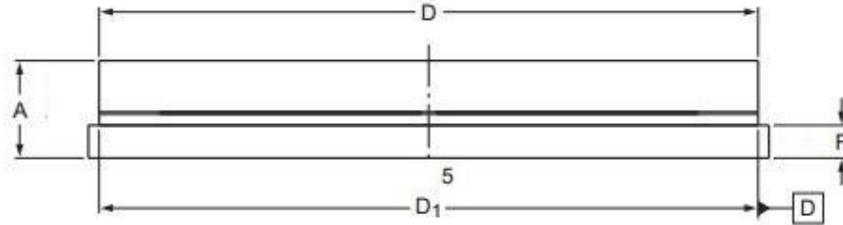
| Component            | Description     | Suggested Manufacturer |
|----------------------|-----------------|------------------------|
| C2,C3,C5,C15,C17,C18 | 10uF/1210       | 10uF/100V              |
| C1                   | 20pF/ MQ101111  |                        |
| C19                  | 56pF/ MQ101111  |                        |
| C4,C6                | 39pF/ MQ101111  |                        |
| C14,C16              | 150pF/ MQ101111 |                        |
| C7                   | 2.7pF/ MQ101111 |                        |
| C8                   | 2.2pF/ MQ101111 |                        |
| C9                   | 8.2pF/ MQ101111 |                        |
| C10                  | 12pF/ MQ101111  |                        |
| C11,C13              | 5.6pF/ MQ101111 |                        |
| C12                  | 2.4pF/ MQ101111 |                        |
| R1,R2                | 11 Ω / MQ101111 | Chip Resistor          |
| T1                   | 25 ohm,55mm     | RFSFBU-086-25          |
| T2                   | 35 ohm ,55mm    | SFF-35-3               |
| PCB                  | 30Mil           | Rogers4350             |





### Package Outline

Earless flanged ceramic package; 4 leads (1、2—DRAIN、3、4—GATE、5—SOURCE)



| UNIT   | A     | b     | c     | D     | D <sub>1</sub> | e     | E     | E <sub>1</sub> | F     | H     | H <sub>1</sub> | L     | Q     | U <sub>1</sub> | U <sub>2</sub> | W <sub>2</sub> | W <sub>2</sub> |
|--------|-------|-------|-------|-------|----------------|-------|-------|----------------|-------|-------|----------------|-------|-------|----------------|----------------|----------------|----------------|
| mm     | 4.7   | 11.81 | 0.18  | 31.55 | 31.52          | 13.72 | 9.50  | 9.53           | 1.75  | 17.12 | 25.53          | 3.48  | 2.26  | 32.39          | 10.29          | 0.25           | 0.25           |
|        | 4.2   | 11.56 | 0.10  | 30.94 | 30.96          |       | 9.30  | 9.27           | 1.50  | 16.10 | 25.27          | 2.97  | 2.01  | 32.13          | 10.03          |                |                |
| inches | 0.185 | 0.465 | 0.007 | 1.242 | 1.241          | 0.540 | 0.374 | 0.375          | 0.069 | 0.674 | 1.005          | 0.137 | 0.089 | 1.275          | 0.405          | 0.01           | 0.01           |
|        | 0.165 | 0.455 | 0.004 | 1.218 | 1.219          |       | 0.366 | 0.365          | 0.059 | 0.634 | 0.995          | 0.117 | 0.079 | 1.265          | 0.395          |                |                |

| OUTLINE<br>VERSION | REFERENCE |       |       | EUROPEAN<br>PROJECTION | ISSUE DATE |
|--------------------|-----------|-------|-------|------------------------|------------|
|                    | IEC       | JEDEC | JEITA |                        |            |
| PKG-D4             |           |       |       |                        | 03/12/2013 |



## Revision history

Table 4. Document revision history

| Date     | Revision | Datasheet Status   |
|----------|----------|--|
| 2026/6/5 | V1.0     | Preliminary Datasheet Creation to replace SQ1080RVPS with improved stability |
|          |          |  |
|          |          |  |

Application data based on:SYX-26-29

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