



## GaN 50V, 750W, 2.45GHz RF Power Transistor

**STCV25750D4**

### Description

The STCV25750D4 is a 750W capable, push pull, internally matched GaN HEMT, ideal for ISM or RF energy applications at 2450MHz narrow band

**In typical CW operation, it can deliver >700W CW when air cooling.**

There is no guarantee of performance when this part is used outside of stated frequencies.

- Typical RF performance at 2450MHz applications

Vds=50V, Vgs=-4.8V, CW, Tc=25 degree C, Air cooling, **heatsink size: 95\*130\*18mm**

| Freq(MHz) | Pin(dBm) | Psat(dBm) | Psat(W) | IDS(A) | Gain(dB) | Eff(%) |
|-----------|----------|-----------|---------|--------|----------|--------|
| 2445      | 44.14    | 59.08     | 809.10  | 22.7   | 14.94    | 71.29  |
| 2450      | 44       | 58.99     | 792.50  | 22.26  | 14.99    | 71.20  |
| 2455      | 43.8     | 58.87     | 770.90  | 21.57  | 15.07    | 71.48  |

### Note:

**Performance might be varied under different load conditions due to loadpull effect, application report with isolator included upon request**

Recommended driver: STAV25050G2

### Applications

- 2.45GHz RF Energy
- S band 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

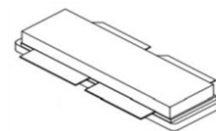
1. Turn RF power off
2. Reduce VGS down to VP, typically -5 V
3. Reduce VDS down to 0 V
4. Turn off VGS

**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>  | 102         | 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 <sub>c</sub> = 25°C, at Pd=250W | R <sub>θJC</sub> | 0.4   | °C /W |





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

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

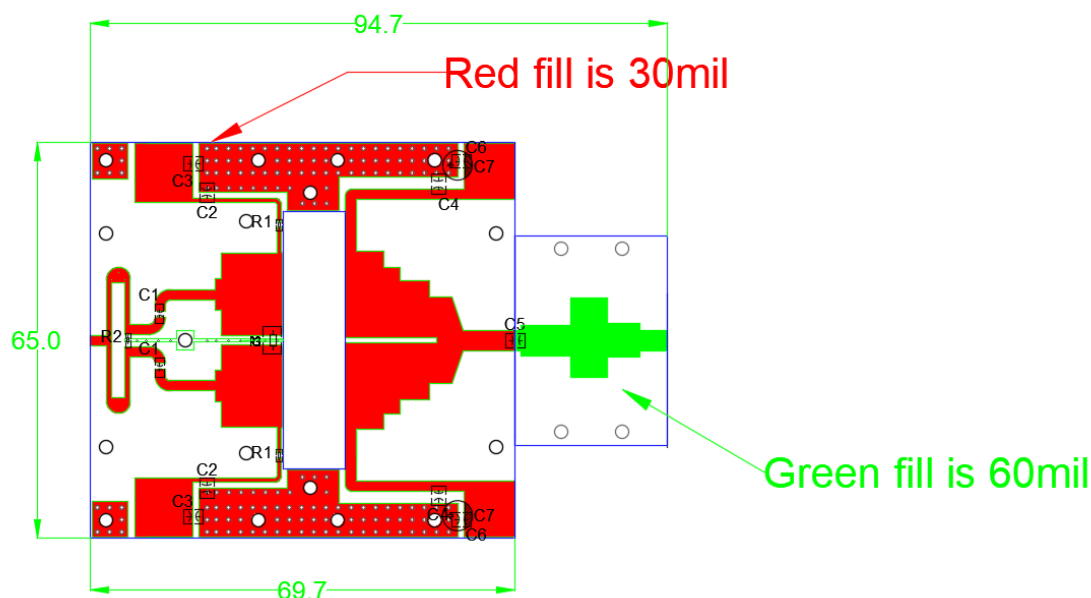
| Characteristic                 | Conditions                                          | Symbol              | Min | Typ   | Max | Unit |
|--------------------------------|-----------------------------------------------------|---------------------|-----|-------|-----|------|
| Drain-Source Breakdown Voltage | VGS=-8V; IDS=102mA                                  | V <sub>DSS</sub>    |     | 200   |     | V    |
| Gate Threshold Voltage         | VDS =10V, ID = 102mA                                | V <sub>GS(th)</sub> | -4  | -     | -2  | V    |
| Gate Quiescent Voltage         | VDS =50V, IDS=120mA,<br>Measured in Functional Test | V <sub>GS(Q)</sub>  |     | -3.48 |     | V    |

**Ruggedness Characteristics**

| Characteristic           | Conditions                                                             | Symbol | Min | Typ | Max | Unit |
|--------------------------|------------------------------------------------------------------------|--------|-----|-----|-----|------|
| Load mismatch capability | 2.45GHz, Pout=750W pulse CW<br><br>All phase,<br><br>No device damages | VSWR   |     | 5:1 |     |      |

## Reference Circuit of Test Fixture Assembly Diagram

DXF file upon request

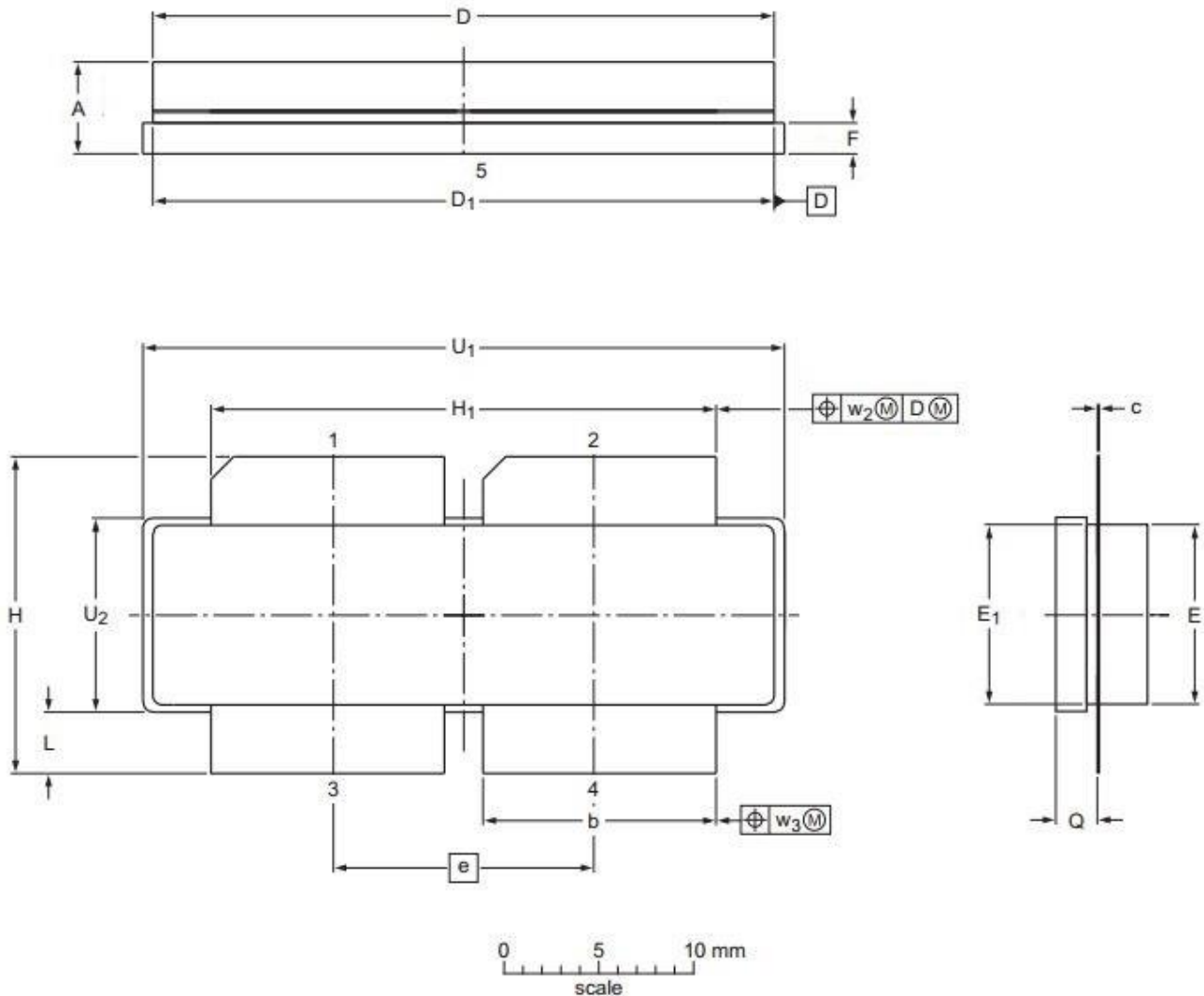


| Component | Description                                                                                                                                    | Suggestion |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| C1        | 18pF                                                                                                                                           | MQ200805   |
| C2        | 24pF                                                                                                                                           | MQ301111   |
| C4        | 15 pF                                                                                                                                          | MQ301111   |
| C5        | MCM-1-300V-D-100-J                                                                                                                             |            |
| C3,       | 10uF, 100V                                                                                                                                     | 1210       |
| C6,       | 10uF, 100V                                                                                                                                     | 5750       |
| C7        | 4700uF/63V                                                                                                                                     |            |
| R1        | Chip Resistor, 10 $\Omega$                                                                                                                     | 0805       |
| R2        | Chip Resistor, 100 $\Omega$                                                                                                                    | 1206       |
| R3        | Chip Resistor, 10 $\Omega$                                                                                                                     | 1812       |
| PCB       | Rogers tc350-plus, r= 3.5, thickness 30 mils, 1oz copper ( red fill ) ;<br>//Taconic RF-35TC-0600-A, thickness 60 mils, 1oz copper(green fill) |            |



## 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>3</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                                     |
|-----------|----------|------------------------------------------------------|
| 2023/6/7  | Rev 1.0  | Preliminary datasheet creation                       |
| 2024/7/25 | Rev 1.1  | Update application result based on enlarged heatsink |
|           |          |                                                      |

Application data based on: YHG-23-11/24-10

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