DU28120T

RF Power MOSFET Transistor
120 W, 2 - 175 MHz, 28 V

Features
- N-Channel enhancement mode device
- DMOS structure
- Lower capacitances for broadband operation
- High saturated output power
- Lower noise figure than bipolar devices
- RoHS Compliant

ABSOLUTE MAXIMUM RATINGS AT 25°C

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-Source Voltage</td>
<td>V_{DS}</td>
<td>65</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>V_{GS}</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>Drain-Source Current</td>
<td>I_{DS}</td>
<td>24</td>
<td>A</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>P_{D}</td>
<td>269</td>
<td>W</td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>T_{J}</td>
<td>200</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>T_{STG}</td>
<td>-55 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>Thermal Resistance</td>
<td>θ_{JC}</td>
<td>0.65</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

TYPICAL DEVICE IMPEDANCE

<table>
<thead>
<tr>
<th>F (MHz)</th>
<th>Z_{IN} (Ω)</th>
<th>Z_{LOAD} (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>4.0 - j8.0</td>
<td>3.4 + j2.4</td>
</tr>
<tr>
<td>50</td>
<td>1.0 - j2.5</td>
<td>2.2 + j1.3</td>
</tr>
<tr>
<td>100</td>
<td>1.0 + j0.5</td>
<td>2.2 + j0.0</td>
</tr>
</tbody>
</table>

Z_{IN} is the series equivalent input impedance of the device from gate to source.

Z_{LOAD} is the optimum series equivalent load impedance as measured from drain to ground.

ELECTRICAL CHARACTERISTICS AT 25°C

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Max</th>
<th>Units</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-Source Breakdown Voltage</td>
<td>BV_{DSS}</td>
<td>65</td>
<td>-</td>
<td>V</td>
<td>V_{DS} = 0.0 V , I_{DS} = 3.0 mA</td>
</tr>
<tr>
<td>Drain-Source Leakage Current</td>
<td>I_{DSS}</td>
<td>-</td>
<td>6.0</td>
<td>mA</td>
<td>V_{DS} = 28.0 V , V_{GS} = 0.0 V</td>
</tr>
<tr>
<td>Gate-Source Leakage Current</td>
<td>I_{GSS}</td>
<td>-</td>
<td>6.0</td>
<td>μA</td>
<td>V_{GS} = 20.0 V , V_{DS} = 0.0 V</td>
</tr>
<tr>
<td>Gate Threshold Voltage</td>
<td>V_{GS(TH)}</td>
<td>2.0</td>
<td>6.0</td>
<td>V</td>
<td>V_{DS} = 10.0 V , I_{DS} = 600.0 mA</td>
</tr>
<tr>
<td>Forward Transconductance</td>
<td>G_{m}</td>
<td>3.0</td>
<td>-</td>
<td>S</td>
<td>V_{DS} = 10.0 V , I_{DS} = 6000.0 mA , ΔV_{GS} = 1.0V, 80 μs Pulse</td>
</tr>
<tr>
<td>Input Capacitance</td>
<td>C_{GS}</td>
<td>-</td>
<td>270</td>
<td>pF</td>
<td>V_{DS} = 28.0 V , F = 1.0 MHz</td>
</tr>
<tr>
<td>Output Capacitance</td>
<td>C_{DS}</td>
<td>-</td>
<td>240</td>
<td>pF</td>
<td>V_{DS} = 28.0 V , F = 1.0 MHz</td>
</tr>
<tr>
<td>Reverse Capacitance</td>
<td>C_{RSS}</td>
<td>-</td>
<td>48</td>
<td>pF</td>
<td>V_{DS} = 28.0 V , F = 1.0 MHz</td>
</tr>
<tr>
<td>Power Gain</td>
<td>G_{p}</td>
<td>13</td>
<td>-</td>
<td>dB</td>
<td>V_{DS} = 28.0 V , I_{DS} = 600 mA, P_{OUT} = 120.0 W F =175 MHz</td>
</tr>
<tr>
<td>Drain Efficiency</td>
<td>η_{d}</td>
<td>60</td>
<td>-</td>
<td>%</td>
<td>V_{DS} = 28.0 V , I_{DS} = 600 mA, P_{OUT} = 120.0 W F =175 MHz</td>
</tr>
<tr>
<td>Load Mismatch Tolerance</td>
<td>VSWR-T</td>
<td>30:1</td>
<td>-</td>
<td>%</td>
<td>V_{DS} = 28.0 V , I_{DS} = 600 mA, P_{OUT} = 120.0 W F =175 MHz</td>
</tr>
</tbody>
</table>

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120 W, 2 - 175 MHz, 28 V

Typical Broadband Performance Curves

**GAIN vs FREQUENCY**
$V_{dd}=28$ V $I_{dq}=600$ mA $P_{out}=120$ W

**EFFICIENCY vs FREQUENCY**
$V_{dd}=28$ V $I_{dq}=600$ mA $P_{out}=120$ W

**POWER OUTPUT vs POWER INPUT**
$V_{dd}=28$ V $I_{dq}=50$ mA

**POWER OUTPUT vs SUPPLY VOLTAGE**
$F=175$ MHz $I_{dq}=600$ mA $P_{in}=3.0$ W
TEST FIXTURE SCHEMATIC

VGS J3
C10
C11
C12

VDS J4
R2
C1

C4
C8

R1
L1

C2
C1

C3
L2

C7
L3

C9

C5
C6

C10

PARTS LIST

C1, C6: TRIMMER CAPACITOR 5-80pF
C2, C5: CAPACITOR 50pF
C3: TRIMMER CAPACITOR 4-40pF
C4, C11: MONOLITHIC CIRCUIT CAPACITOR 0.01µF
C7: TRIMMER CAPACITOR 9-100pF
C8, C9: CAPACITOR 100pF
C10: CAPACITOR 1000pF
C12: ELECTROLYTIC CAPACITOR 50µF 50 VOLT
L1, L2: NO. 12 AWG COPPER WIRE X 0.87" (LOOP 0.4")
L3, L4: 8 TURNS OF NO. 16 AWG ENAMEL WIRE ON 0.25", CLOSE WOUND
R1, R2: RESISTOR 2.7K OHMS 0.25 WATT
Q1: DU28120T
BOARD: FR4 0.062"