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_DSS</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_DSS</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>V_DSS</td>
<td>65</td>
<td>-</td>
<td>V</td>
<td>V_DSS = 0.0 V , I_DSS = 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_GS = 28.0 V , V_DSS = 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_DSS = 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_DSS = 10.0 V , I_DSS = 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_DSS = 10.0 V , I_DSS = 6000.0 mA , Δ V_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_DSS = 28.0 V, F = 1.0 MHz</td>
</tr>
<tr>
<td>Output Capacitance</td>
<td>C_DSS</td>
<td>-</td>
<td>240</td>
<td>pF</td>
<td>V_DSS = 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_DSS = 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_DSS = 28.0 V, I_DSS = 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_DSS = 28.0 V, I_DSS = 600 mA , P_OUT = 120.0 W F =175 MHz</td>
</tr>
<tr>
<td>Load Mismatch Tolerance</td>
<td>VSWR-T</td>
<td>-</td>
<td>30:1</td>
<td>-</td>
<td>V_DSS = 28.0 V, I_DSS = 600 mA , P_OUT = 120.0 W F =175 MHz</td>
</tr>
</tbody>
</table>

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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

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TEST FIXTURE SCHEMATIC

VGS J3
VDS J4
R2
C10
C11
C12
C9
L4
L3
C7
C6
C5
Q1
Q2
R1
L2
L1
C4
C8
R2
RF IN J1
C1
C3
C2
RF OUT J2

PARTS LIST
C1,C6 TRIMMER CAPACITOR 5-80pF
C2,C5 CAPACITOR 50pF
C3 TRIMMER CAPACITOR 4-40pF
C4,C11 MONOLITHIC CIRCUIT CAPACITOR 0.01uF
C7 TRIMMER CAPACITOR 9-180pF
C8,C9 CAPACITOR 300pF
C10 CAPACITOR 1000pF
C12 ELECTROLYTIC CAPACITOR 50uF 50 VOLT
L1,L2 NO. 12 AWG COPPER WIRE X 0.87" (LOOPE D 0.4")
L3,L4 8 TURNS OF NO. 16 AWG ENAMEL WIRE ON
Ø0.25", CLOSE WOUND
R1,R2 RESISTOR 2.7K OHMS 0.25 WATT
Q1 DU28120T
BOARD FR4 0.062"
RF Power MOSFET Transistor
120 W, 2 - 175 MHz, 28 V

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