N-Channel 100 V (D-S) MOSFET

**PRODUCT SUMMARY**

<table>
<thead>
<tr>
<th>VDS (V)</th>
<th>RDS(on) (Ω) MAX.</th>
<th>ID (A)</th>
<th>QS (TYP.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0.0040 at VGS = 10 V</td>
<td>120</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>0.0046 at VGS = 7.5 V</td>
<td>120</td>
<td></td>
</tr>
</tbody>
</table>

**FEATURES**
- ThunderFET® power MOSFET
- Maximum 175 °C junction temperature
- 100 % Rg and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

**APPLICATIONS**
- Power supply
- Secondary synchronous rectification
- DC/DC converter
- Power tools
- Motor drive switch
- DC/AC inverter
- Battery management

**ABSOLUTE MAXIMUM RATINGS** (TC = 25 °C, unless otherwise noted)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>LIMIT</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-Source Voltage</td>
<td>VDS</td>
<td>100</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>VGS</td>
<td>± 20</td>
<td>V</td>
</tr>
<tr>
<td>Continuous Drain Current (TJ = 150 °C)</td>
<td>I0</td>
<td>120 d</td>
<td>A</td>
</tr>
<tr>
<td>TJ = 70 °C</td>
<td></td>
<td>120 d</td>
<td>A</td>
</tr>
<tr>
<td>Pulsed Drain Current (t = 100 μs)</td>
<td>IDM</td>
<td>480</td>
<td>A</td>
</tr>
<tr>
<td>Avalanche Current</td>
<td>IAS</td>
<td>73</td>
<td>A</td>
</tr>
<tr>
<td>Single Avalanche Energy a</td>
<td>EAS</td>
<td>266</td>
<td>mJ</td>
</tr>
<tr>
<td>Maximum Power Dissipation a</td>
<td>PD</td>
<td>375 b</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125 b</td>
<td>W</td>
</tr>
<tr>
<td>Operating Junction and Storage Temperature Range</td>
<td>TJ, Tstg</td>
<td>-55 to +175</td>
<td>°C</td>
</tr>
</tbody>
</table>

**THERMAL RESISTANCE RATINGS**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>LIMIT</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junction-to-Ambient (PCB Mount) c</td>
<td>RthJA</td>
<td>40</td>
<td>°C/W</td>
</tr>
<tr>
<td>Junction-to-Case (Drain)</td>
<td>RthJC</td>
<td>0.4</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).
- Package limited.
S13-0736-Rev. A, 13-Apr-15

For technical questions, contact: pmostechsupport@vishay.com

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Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
TYPICAL CHARACTERISTICS \( (T_A = 25 \, ^\circ C, \text{unless otherwise noted})\)

**Output Characteristics**

- \( V_{GS} = 10 \, V \text{ thru } 7 \, V \)
- \( V_{GS} = 6 \, V \)
- \( V_{GS} = 5 \, V \)

**Transfer Characteristics**

- \( T_C = 125 \, ^\circ C \)
- \( T_C = 25 \, ^\circ C \)
- \( T_C = -55 \, ^\circ C \)

**Transconductance**

- \( T_C = 25 \, ^\circ C \)
- \( T_C = -55 \, ^\circ C \)
- \( T_C = 125 \, ^\circ C \)

**On-Resistance vs. Drain Current**

- \( V_{GS} = 7.5 \, V \)
- \( V_{GS} = 10 \, V \)

**Capacitance**

- \( C_{RMS} \)
- \( C_{RSS} \)
- \( C_{SS} \)
- \( C_{MAX} \)

**Gate Charge**

- \( I_D = 20 \, A \)
- \( V_{DS} = 25 \, V \)
- \( V_{DS} = 50 \, V \)
- \( V_{DS} = 80 \, V \)
TYPICAL CHARACTERISTICS (TA = 25 °C, unless otherwise noted)

- **On-Resistance vs. Junction Temperature**: 
  - $R_{DS(on)}$ vs $T_J$ (°C)
  - $I_D = 20$ A
  - $V_{GS} = 10$ V

- **Source Drain Diode Forward Voltage**: 
  - $V_{DS} = V_{DS(on)}$ (Normalized)
  - $T_J = 25$ °C

- **On-Resistance vs. Gate-to-Source Voltage**: 
  - $R_{DS(on)}$ vs $V_{GS}$ (V)
  - $T_J = 25$ °C
  - $T_J = 150$ °C

- **Threshold Voltage**: 
  - $V_{GS(th)}$ vs $T_J$ (°C)
  - $I_D = 250$ μA

- **Drain Source Breakdown vs. Junction Temperature**: 
  - $V_{DS}$ (Source-to-Drain Voltage) vs $T_J$ (°C)
  - $I_D = 10$ mA
**THERMAL RATINGS** *(TA = 25 °C, unless otherwise noted)*

![Graph showing Safe Operating Area and Normalized Thermal Transient Impedance](image-url)

**Safe Operating Area**

- **Normalized Thermal Transient Impedance, Junction-to-Ambient**

**Limited by R_DSS**

**Single Pulse**

**BVDSS Limited**

- **T_C = 25 °C**

**Normalized Effective Transient Thermal Impedance**

- **Square Wave Pulse Duration (s)**

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THERMAL RATINGS \((T_A = 25 \, ^{\circ}C, \text{ unless otherwise noted})\)

Note

- The characteristics shown in the two graphs
- Normalized Transient Thermal Impedance Junction to Ambient \((25 \, ^{\circ}C)\)
- Normalized Transient Thermal Impedance Junction to Case \((25 \, ^{\circ}C)\)

are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1” x 1” x 0.062”, double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.
TO-220AB

<table>
<thead>
<tr>
<th>DIM.</th>
<th>MILLIMETERS</th>
<th>INCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.25 to 4.65</td>
<td>0.167 to 0.183</td>
</tr>
<tr>
<td>b</td>
<td>0.69 to 1.01</td>
<td>0.027 to 0.040</td>
</tr>
<tr>
<td>b(1)</td>
<td>1.20 to 1.73</td>
<td>0.047 to 0.068</td>
</tr>
<tr>
<td>c</td>
<td>0.36 to 0.61</td>
<td>0.014 to 0.024</td>
</tr>
<tr>
<td>D</td>
<td>14.85 to 15.49</td>
<td>0.585 to 0.610</td>
</tr>
<tr>
<td>D2</td>
<td>12.19 to 12.70</td>
<td>0.480 to 0.500</td>
</tr>
<tr>
<td>E</td>
<td>10.04 to 10.51</td>
<td>0.395 to 0.414</td>
</tr>
<tr>
<td>e</td>
<td>2.41 to 2.67</td>
<td>0.095 to 0.105</td>
</tr>
<tr>
<td>e(1)</td>
<td>4.88 to 5.28</td>
<td>0.192 to 0.208</td>
</tr>
<tr>
<td>F</td>
<td>1.14 to 1.40</td>
<td>0.045 to 0.055</td>
</tr>
<tr>
<td>H(1)</td>
<td>6.09 to 6.48</td>
<td>0.240 to 0.255</td>
</tr>
<tr>
<td>J(1)</td>
<td>2.41 to 2.92</td>
<td>0.095 to 0.115</td>
</tr>
<tr>
<td>L</td>
<td>13.35 to 14.02</td>
<td>0.526 to 0.552</td>
</tr>
<tr>
<td>L(1)</td>
<td>3.32 to 3.82</td>
<td>0.131 to 0.150</td>
</tr>
<tr>
<td>Ø P</td>
<td>3.54 to 3.94</td>
<td>0.139 to 0.155</td>
</tr>
<tr>
<td>Q</td>
<td>2.60 to 3.00</td>
<td>0.102 to 0.118</td>
</tr>
</tbody>
</table>

Note
* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM
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