**Product Summary**

<table>
<thead>
<tr>
<th>$V_{BR} (DSS)$</th>
<th>$R_{DS(on)}$</th>
<th>$I_D$</th>
<th>$T_C = +25°C$</th>
</tr>
</thead>
<tbody>
<tr>
<td>30V</td>
<td>12mΩ @ $V_{GS} = 10V$</td>
<td>37.8A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16mΩ @ $V_{GS} = 4.5V$</td>
<td>32.8A</td>
<td></td>
</tr>
</tbody>
</table>

**Features**
- 100% Unclamped Inductive Switch (UIS) Test in Production
- Low On-Resistance
- Fast Switching Speed
- Totally Lead-Free & Fully RoHS Compliant (Note 1 & 2)
- Halogen and Antimony Free. “Green” Device (Note 3)

**Description**
This MOSFET is designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

**Applications**
- Backlighting
- DC-DC Converters
- Power Management Functions

**Mechanical Data**
- Case: TO252
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.33 grams (Approximate)

**Ordering Information** (Notes 4)

<table>
<thead>
<tr>
<th>Product</th>
<th>Case</th>
<th>Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMN3016LK3-13</td>
<td>TO252</td>
<td>2,500/Tape &amp; Reel</td>
</tr>
</tbody>
</table>

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated’s definitions of Halogen- and Antimony-free, “Green” and Lead-free.
3. Halogen- and Antimony-free “Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

**Marking Information**
- $N3016L$ = Product Type Marking Code
- $YYWW$ = Date Code Marking
- $YY$ = Year (ex: 14 = 2014)
- $WW$ = Week (01 - 53)
### Maximum Ratings (@TA = +25°C, unless otherwise specified.)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-Source Voltage</td>
<td>VDSS</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>VGSS</td>
<td>±20</td>
<td>V</td>
</tr>
<tr>
<td>Continuous Drain Current (Note 6) VGS = 10V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steady State</td>
<td>TA = +25°C</td>
<td>ID</td>
<td>12.4</td>
</tr>
<tr>
<td></td>
<td>TA = +70°C</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Steady State</td>
<td>TC = +25°C</td>
<td>ID</td>
<td>37.8</td>
</tr>
<tr>
<td></td>
<td>TC = +70°C</td>
<td></td>
<td>30.3</td>
</tr>
<tr>
<td>t&lt;10s</td>
<td>TA = +25°C</td>
<td>ID</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>TA = +70°C</td>
<td></td>
<td>13.6</td>
</tr>
<tr>
<td>Maximum Body Diode Continuous Current</td>
<td>IS</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>Pulsed Drain Current (10µs pulse, duty cycle = 1%)</td>
<td>IDM</td>
<td>90</td>
<td>A</td>
</tr>
<tr>
<td>Avalanche Current (Note 7) L = 0.1mH</td>
<td>IAS</td>
<td>22</td>
<td>A</td>
</tr>
<tr>
<td>Avalanche Energy (Note 7) L = 0.1mH</td>
<td>EAS</td>
<td>24</td>
<td>mJ</td>
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</table>

### Thermal Characteristics (@TA = +25°C, unless otherwise specified.)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Power Dissipation (Note 5)</td>
<td>PD</td>
<td>1.6</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TA = +25°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TA = +70°C</td>
<td>1.0</td>
</tr>
<tr>
<td>Thermal Resistance, Junction to Ambient (Note 5)</td>
<td>RθJA</td>
<td>75</td>
<td>°C/W</td>
</tr>
<tr>
<td>Steady State</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t&lt;10s</td>
<td>34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Power Dissipation (Note 6)</td>
<td>PD</td>
<td>2.8</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TA = +25°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TA = +70°C</td>
<td>1.8</td>
</tr>
<tr>
<td>Thermal Resistance, Junction to Ambient (Note 6)</td>
<td>RθJA</td>
<td>46</td>
<td>°C/W</td>
</tr>
<tr>
<td>Steady State</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t&lt;10s</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal Resistance, Junction to Case (Note 6)</td>
<td>RθJC</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>Operating and Storage Temperature Range</td>
<td>TJ, TSTG</td>
<td>-55 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>
### Electrical Characteristics (@\(T_a = +25^\circ C\), unless otherwise specified.)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Test Condition</th>
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<tbody>
<tr>
<td><strong>OFF CHARACTERISTICS</strong> (Note 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drain-Source Breakdown Voltage</td>
<td>(BVDSS)</td>
<td>30</td>
<td></td>
<td></td>
<td>V</td>
<td>(V_{GS} = 0V, I_D = 250\mu A)</td>
</tr>
<tr>
<td>Zero Gate Voltage Drain Current (T_J = +25^\circ C)</td>
<td>(I_{DS}SS)</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>(\mu A)</td>
<td>(V_{DS} = 30V, V_{GS} = 0V)</td>
</tr>
<tr>
<td>Gate-Source Leakage</td>
<td>(I_{GSS})</td>
<td>—</td>
<td>—</td>
<td>±100</td>
<td>nA</td>
<td>(V_{GS} = \pm 20V, V_{DS} = 0V)</td>
</tr>
<tr>
<td><strong>ON CHARACTERISTICS</strong> (Note 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate Threshold Voltage</td>
<td>(V_{GS(th)})</td>
<td>1.3</td>
<td>—</td>
<td>2.3</td>
<td>V</td>
<td>(V_{DS} = V_{GS}, I_D = 250\mu A)</td>
</tr>
<tr>
<td>Static Drain-Source On-Resistance</td>
<td>(R_{DS(ON)})</td>
<td>—</td>
<td>8</td>
<td>12</td>
<td>m(\Omega)</td>
<td>(V_{GS} = 10V, I_D = 11A)</td>
</tr>
<tr>
<td>Diode Forward Voltage</td>
<td>(V_{SD})</td>
<td>—</td>
<td>0.70</td>
<td>1.0</td>
<td>V</td>
<td>(V_{GS} = 0V, I_S = 1A)</td>
</tr>
<tr>
<td><strong>DYNAMIC CHARACTERISTICS</strong> (Note 9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Capacitance</td>
<td>(C_{iss})</td>
<td>—</td>
<td>1415</td>
<td></td>
<td>p(F)</td>
<td>(V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz)</td>
</tr>
<tr>
<td>Output Capacitance</td>
<td>(C_{oss})</td>
<td>—</td>
<td>119</td>
<td></td>
<td>p(F)</td>
<td>(V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz)</td>
</tr>
<tr>
<td>Reverse Transfer Capacitance</td>
<td>(C_{rss})</td>
<td>—</td>
<td>82</td>
<td></td>
<td>p(F)</td>
<td></td>
</tr>
<tr>
<td>Gate Resistance</td>
<td>(R_G)</td>
<td>—</td>
<td>2.2</td>
<td>—</td>
<td>(\Omega)</td>
<td>(V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz)</td>
</tr>
<tr>
<td>Total Gate Charge ((V_{GS} = -10V))</td>
<td>(Q_G)</td>
<td>—</td>
<td>25.1</td>
<td>—</td>
<td>n(C)</td>
<td></td>
</tr>
<tr>
<td>Total Gate Charge ((V_{GS} = -4.5V))</td>
<td>(Q_G)</td>
<td>—</td>
<td>11.3</td>
<td>—</td>
<td>n(C)</td>
<td></td>
</tr>
<tr>
<td>Gate-Source Charge</td>
<td>(Q_{Gss})</td>
<td>—</td>
<td>3.5</td>
<td>—</td>
<td>n(C)</td>
<td></td>
</tr>
<tr>
<td>Gate-Drain Charge</td>
<td>(Q_{Gpd})</td>
<td>—</td>
<td>3.6</td>
<td>—</td>
<td>n(C)</td>
<td></td>
</tr>
<tr>
<td>Turn-On Delay Time</td>
<td>(t_{D(on)})</td>
<td>—</td>
<td>4.8</td>
<td>—</td>
<td>ns</td>
<td>(V_{DD} = 15V, I_D = 12A, R_L = 1.25\Omega, R_G = 3\Omega, f = 1.0MHz)</td>
</tr>
<tr>
<td>Turn-On Rise Time</td>
<td>(t_r)</td>
<td>—</td>
<td>16.5</td>
<td>—</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Turn-Off Delay Time</td>
<td>(t_{D(off)})</td>
<td>—</td>
<td>26.1</td>
<td>—</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Turn-Off Fall Time</td>
<td>(t_f)</td>
<td>—</td>
<td>5.6</td>
<td>—</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Body Diode Reverse Recovery Time</td>
<td>(t_{rr})</td>
<td>—</td>
<td>12.3</td>
<td>—</td>
<td>ns</td>
<td>(I_F = 12A, di/dt = 500A/\mu s)</td>
</tr>
<tr>
<td>Body Diode Reverse Recovery Charge</td>
<td>(Q_{rr})</td>
<td>—</td>
<td>10.4</td>
<td>—</td>
<td>n(C)</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. UIS in production with \(L = 0.1mH\), starting \(T_a = +25^\circ C\).
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

![Figure 1 Typical Output Characteristic](image1)

![Figure 2 Typical Transfer Characteristics](image2)
Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

Figure 4 Typical On-Resistance vs. Drain Current and Temperature

Figure 5 On-Resistance Variation with Temperature

Figure 6 On-Resistance Variation with Temperature

Figure 7 Gate Threshold Variation vs. Ambient Temperature

Figure 8 Diode Forward Voltage vs. Current
Figure 9 Typical Drain-Source Leakage Current vs. Voltage

Figure 10 Typical Junction Capacitance

Figure 11 Gate Charge

Figure 12 Transient Thermal Resistance
Package Outline Dimensions

Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Value (in mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>4.572</td>
</tr>
<tr>
<td>X</td>
<td>1.060</td>
</tr>
<tr>
<td>X1</td>
<td>5.632</td>
</tr>
<tr>
<td>Y</td>
<td>2.600</td>
</tr>
<tr>
<td>Y1</td>
<td>5.700</td>
</tr>
<tr>
<td>Y2</td>
<td>10.700</td>
</tr>
</tbody>
</table>

Suggested Pad Layout

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   2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

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