FDD18N20LZ
N-Channel UniFET™ MOSFET
200 V, 16 A, 125 mΩ

Features
• $R_{DS(on)} = 125$ mΩ (Typ.) @ $V_{GS} = 10$ V, $I_D = 8$ A
• Low Gate Charge (Typ. 30 nC)
• Low $C_{rss}$ (Typ. 25 pF)
• 100% Avalanche Tested
• Improved dv/dt Capability
• ESD Improved Capability
• RoHS Compliant

Applications
• LED TV
• Consumer Appliances
• Uninterruptible Power Supply

Description
UniFET™ MOSFET is Fairchild Semiconductor’s high voltage MOSFET family based on planar stripe and DMOS technology. This MOSFET is tailored to reduce on-state resistance, and to provide better switching performance and higher avalanche energy strength. This device family is suitable for switching power converter applications such as power factor correction (PFC), flat panel display (FPD) TV power, ATX and electronic lamp ballasts.

MOSFET Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted.

<table>
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<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>FDD18N20LZ</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{DSS}$</td>
<td>Drain to Source Voltage</td>
<td>200</td>
<td>V</td>
</tr>
<tr>
<td>$V_{GSS}$</td>
<td>Gate to Source Voltage</td>
<td>±20</td>
<td>V</td>
</tr>
<tr>
<td>$I_D$</td>
<td>Drain Current</td>
<td>16</td>
<td>A</td>
</tr>
<tr>
<td>$I_{DRM}$</td>
<td>Drain Current, -Pulsed (Note 1)</td>
<td>64</td>
<td>A</td>
</tr>
<tr>
<td>$E_{AS}$</td>
<td>Single Pulsed Avalanche Energy (Note 2)</td>
<td>320</td>
<td>mJ</td>
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<tr>
<td>$I_{AR}$</td>
<td>Avalanche Current (Note 1)</td>
<td>16</td>
<td>A</td>
</tr>
<tr>
<td>$E_{AR}$</td>
<td>Repetitive Avalanche Energy (Note 1)</td>
<td>8.9</td>
<td>mJ</td>
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<tr>
<td>$dv/dt$</td>
<td>Peak Diode Recovery dv/dt (Note 3)</td>
<td>10</td>
<td>V/ns</td>
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<tr>
<td>$P_D$</td>
<td>Power Dissipation</td>
<td>89</td>
<td>W</td>
</tr>
<tr>
<td>$T_{j,STG}$</td>
<td>Operating and Storage Temperature Range</td>
<td>-55 to +150</td>
<td>°C</td>
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<tr>
<td>$T_L$</td>
<td>Maximum Lead Temperature for Soldering, 1/8” from Case for 5 Seconds.</td>
<td>300</td>
<td>°C</td>
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Thermal Characteristics

<table>
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<th>Unit</th>
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<tr>
<td>$R_{JUC}$</td>
<td>Thermal Resistance, Junction to Case, Max.</td>
<td>1.4</td>
<td>°C/W</td>
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<tr>
<td>$R_{JA}$</td>
<td>Thermal Resistance, Junction to Ambient, Max.</td>
<td>83</td>
<td>°C/W</td>
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## Package Marking and Ordering Information

<table>
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<tr>
<th>Part Number</th>
<th>Top Mark</th>
<th>Package</th>
<th>Packing Method</th>
<th>Reel Size</th>
<th>Tape Width</th>
<th>Quantity</th>
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<tr>
<td>FDD18N20LZ</td>
<td>FDD18N20LZ</td>
<td>DPAK</td>
<td>Tape and Reel</td>
<td>330 mm</td>
<td>16 mm</td>
<td>2500 units</td>
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### Electrical Characteristics

$T_C = 25^\circ C$ unless otherwise noted.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
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<tbody>
<tr>
<td>$BVDSS$</td>
<td>Drain to Source Breakdown Voltage</td>
<td>$I_D = 250 \mu A$, $V_{GS} = 0 V$, $T_J = 25^\circ C$</td>
<td>200</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$\Delta BV_{DSS}$ / $\Delta$</td>
<td>Breakdown Voltage Temperature Coefficient</td>
<td>$I_D = 250 \mu A$, Referenced to $25^\circ C$</td>
<td>-</td>
<td>0.2</td>
<td>-</td>
<td>$V/\circ C$</td>
</tr>
<tr>
<td>$I_D$</td>
<td>Zero Gate Voltage Drain Current</td>
<td>$V_{DS} = 200 V$, $V_{GS} = 0 V$</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>$\mu A$</td>
</tr>
<tr>
<td>$I_GS$</td>
<td>Gate to Body Leakage Current</td>
<td>$V_{GS} = \pm 16 V$, $V_{DS} = 0 V$</td>
<td>-</td>
<td>-</td>
<td>$\pm 10$</td>
<td>$\mu A$</td>
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### Off Characteristics

<table>
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<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
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<tr>
<td>$V_{GS(th)}$</td>
<td>Gate Threshold Voltage</td>
<td>$V_{GS} = V_{DS}$, $I_D = 250 \mu A$</td>
<td>1.0</td>
<td>-</td>
<td>2.5</td>
<td>V</td>
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<tr>
<td>$R_{DS(on)}$</td>
<td>Static Drain to Source On Resistance</td>
<td>$V_{GS} = 10 V$, $I_D = 8 A$</td>
<td>-</td>
<td>0.10</td>
<td>0.125</td>
<td>$\Omega$</td>
</tr>
<tr>
<td>$g_{FS}$</td>
<td>Forward Transconductance</td>
<td>$V_{DS} = 20 V$, $I_D = 2 A$</td>
<td>-</td>
<td>11</td>
<td>-</td>
<td>S</td>
</tr>
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### Dynamic Characteristics

<table>
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<tr>
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<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
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<tr>
<td>$C_{iss}$</td>
<td>Input Capacitance</td>
<td>$V_{DS} = 25 V$, $V_{GS} = 0 V$, $f = 1 MHz$</td>
<td>-</td>
<td>1185</td>
<td>1575</td>
<td>pF</td>
</tr>
<tr>
<td>$C_{oss}$</td>
<td>Output Capacitance</td>
<td></td>
<td>-</td>
<td>190</td>
<td>255</td>
<td>pF</td>
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<tr>
<td>$C_{rss}$</td>
<td>Reverse Transfer Capacitance</td>
<td></td>
<td>-</td>
<td>25</td>
<td>40</td>
<td>pF</td>
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<tr>
<td>$Q_{t(0)}$</td>
<td>Total Gate Charge at $10 V$</td>
<td></td>
<td>-</td>
<td>30</td>
<td>40</td>
<td>nC</td>
</tr>
<tr>
<td>$Q_{gs}$</td>
<td>Gate to Source Gate Charge</td>
<td>$V_{DS} = 200 V$, $I_D = 16 A$</td>
<td>-</td>
<td>3.5</td>
<td>-</td>
<td>nC</td>
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<tr>
<td>$Q_{gd}$</td>
<td>Gate to Drain “Miller” Charge</td>
<td>$V_{GS} = 10 V$</td>
<td>-</td>
<td>8.5</td>
<td>-</td>
<td>nC</td>
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### Switching Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
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<tr>
<td>$t_{on}$</td>
<td>Turn-On Delay Time</td>
<td>$V_{DD} = 100 V$, $I_D = 16 A$</td>
<td>-</td>
<td>15</td>
<td>40</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>Turn-On Rise Time</td>
<td>$V_{GS} = 10 V$, $R_G = 25 \Omega$</td>
<td>-</td>
<td>20</td>
<td>50</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{off}$</td>
<td>Turn-Off Delay Time</td>
<td></td>
<td>-</td>
<td>135</td>
<td>280</td>
<td>ns</td>
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<tr>
<td>$t_f$</td>
<td>Turn-Off Fall Time</td>
<td></td>
<td>-</td>
<td>50</td>
<td>110</td>
<td>ns</td>
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### Drain-Source Diode Characteristics

<table>
<thead>
<tr>
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<th>Max.</th>
<th>Unit</th>
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<tbody>
<tr>
<td>$I_D$</td>
<td>Maximum Continuous Drain to Source Diode Forward Current</td>
<td>-</td>
<td>-</td>
<td>16</td>
<td>A</td>
</tr>
<tr>
<td>$I_{SM}$</td>
<td>Maximum Pulsed Drain to Source Diode Forward Current</td>
<td>-</td>
<td>-</td>
<td>64</td>
<td>A</td>
</tr>
<tr>
<td>$V_{SD}$</td>
<td>Drain to Source Diode Forward Voltage</td>
<td></td>
<td>-</td>
<td>1.4</td>
<td>V</td>
</tr>
<tr>
<td>$I_{rr}$</td>
<td>Reverse Recovery Time</td>
<td></td>
<td>-</td>
<td>105</td>
<td>-</td>
</tr>
<tr>
<td>$Q_{rr}$</td>
<td>Reverse Recovery Charge</td>
<td></td>
<td>0.4</td>
<td>-</td>
<td>$\mu C$</td>
</tr>
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</table>

### Notes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. $L = 2.5 \text{ mH}$, $I_{SD} = 16 \text{ A}$, $V_{DD} = 50 \text{ V}$, $R_G = 25 \Omega$, starting $T_J = 25^\circ C$.
3. $I_{SD} = 16 \text{ A}$, $dI/dt = 200 \text{ A/\mu s}$, $V_{DD} = BVDSS$, starting $T_J = 25^\circ C$.
4. Essentially independent of operating temperature typical characteristics.
Typical Performance Characteristics

Figure 1. On-Region Characteristics

Figure 2. Transfer Characteristics

Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

Figure 5. Capacitance Characteristics

Figure 6. Gate Charge Characteristics

Notes:
1. 250µs Pulse Test
2. TC = 25°C

Notes:
1. VGS = 0V
2. f = 1MHz
Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

Figure 8. On-Resistance Variation vs. Temperature

Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs. Case Temperature

Figure 11. Transient Thermal Response Curve
Figure 12. Gate Charge Test Circuit & Waveform

Figure 13. Resistive Switching Test Circuit & Waveforms

Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms
Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

- Driver
- DUT
- VGS (Driver)
- VDS (DUT)
- ISD (DUT)
- I_{FM}, Body Diode Forward Current
- I_{RM}, Body Diode Reverse Current
- di/dt
- Body Diode Recovery dv/dt
- Body Diode

V_{GS} (Driver)

D = \frac{\text{Gate Pulse Width}}{\text{Gate Pulse Period}}

10V

\text{DUT}

\text{Driver}

\text{RG}

\text{Same Type as DUT}

\text{L}

\text{VDD}

\text{IFM, Body Diode Forward Current}

\text{IRM, Body Diode Reverse Current}

\text{Body Diode Recovery dv/dt}

\text{Body Diode}

\text{V_{DS} (DUT)}

\text{V_{DD}}
Figure 16. TO252 (D-PAK), Molded, 3-Lead, Option AA&AB

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<th>Product Status</th>
<th>Definition</th>
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<td>Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.</td>
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- SuperFET®
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- SuperSOT™-8
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