**General Description**

The AO3162 is fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications. By providing low $R_{DS(on)}$, $C_{iss}$ and $C_{rss}$ along with guaranteed avalanche capability this device can be adopted quickly into new and existing offline power supply designs.

**Product Summary**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Maximum</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-Source Voltage</td>
<td>$V_{DS}$</td>
<td>600</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>$V_{GS}$</td>
<td>±30</td>
<td>V</td>
</tr>
<tr>
<td>Continuous Drain Current</td>
<td>$I_{D}$</td>
<td>0.034</td>
<td>A</td>
</tr>
<tr>
<td>Peak diode recovery $dv/dt$</td>
<td>$P_{D}$</td>
<td>1.39</td>
<td>W</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>$t_{JL}$</td>
<td>70</td>
<td>90</td>
</tr>
<tr>
<td>Thermal Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Junction-to-Ambient A</td>
<td>$R_{JA}$</td>
<td>70</td>
<td>90</td>
</tr>
<tr>
<td>Maximum Junction-to-Ambient A</td>
<td>$R_{KL}$</td>
<td>63</td>
<td>80</td>
</tr>
</tbody>
</table>

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**Absolute Maximum Ratings**  $T_{A}=25^\circ C$ unless otherwise noted

<table>
<thead>
<tr>
<th>Parameter</th>
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<tr>
<td>Power Dissipation</td>
<td>$t_{JL}$</td>
<td>70</td>
<td>90</td>
</tr>
<tr>
<td>Junction and Storage Temperature Range</td>
<td>$T_{JL, STG}$</td>
<td>-50 to 150</td>
<td>°C</td>
</tr>
</tbody>
</table>
## Electrical Characteristics \( (T_J=25\,^\circ C\) unless otherwise noted)\)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\text{BV}_{DSS})</td>
<td>Drain-Source Breakdown Voltage</td>
<td>(I_D=250\mu A, V_{GSS}=0V, T_J=25,^\circ C)</td>
<td>600</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>(\text{I}_{DSS})</td>
<td>Zero Gate Voltage Drain Current</td>
<td>(D=250\mu A, V_{GSS}=0V)</td>
<td>-</td>
<td>700</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>(\Delta V)</td>
<td>Zero Gate Voltage Drain Current</td>
<td>(V_{GSS}=600V, V_{GSS}=0V)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>(\mu A)</td>
</tr>
<tr>
<td>(\text{I}_{GSS})</td>
<td>Gate-Body leakage current</td>
<td>(V_{GSS}=0V, V_{GSS}=\pm30V)</td>
<td>-</td>
<td>-</td>
<td>±100</td>
<td>nA</td>
</tr>
<tr>
<td>(R_{DS(on)})</td>
<td>Gate Threshold Voltage</td>
<td>(V_{GSS}=5V, I_D=8\mu A)</td>
<td>2.8</td>
<td>3.2</td>
<td>4.1</td>
<td>V</td>
</tr>
<tr>
<td>(I_{BS})</td>
<td>Static Drain-Source On-Resistance</td>
<td>(V_{GSS}=10V, I_D=0.016A)</td>
<td>-</td>
<td>154</td>
<td>500</td>
<td>(\Omega)</td>
</tr>
<tr>
<td>(\text{g}_F)</td>
<td>Forward Transconductance</td>
<td>(V_{DS}=40V, I_D=0.016A)</td>
<td>-</td>
<td>0.045</td>
<td>-</td>
<td>S</td>
</tr>
<tr>
<td>(V_{DS})</td>
<td>Diode Forward Voltage</td>
<td>(I_D=0.016A, V_{GSS}=0V)</td>
<td>-</td>
<td>0.74</td>
<td>1</td>
<td>V</td>
</tr>
<tr>
<td>(I_{BS})</td>
<td>Maximum Body-Diode Continuous Current</td>
<td>-</td>
<td>-</td>
<td>0.034</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>(I_{BSM})</td>
<td>Maximum Body-Diode Pulsed Current</td>
<td>-</td>
<td>-</td>
<td>0.16</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

### Dynamic Parameters

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C_{iss})</td>
<td>Input Capacitance</td>
<td>(V_{GSS}=0V, V_{DB}=25V, f=1MHz)</td>
<td>-</td>
<td>4.2</td>
<td>6</td>
<td>pF</td>
</tr>
<tr>
<td>(C_{oss})</td>
<td>Output Capacitance</td>
<td>(V_{GSS}=0V, V_{DB}=25V, f=1MHz)</td>
<td>-</td>
<td>0.45</td>
<td>0.6</td>
<td>pF</td>
</tr>
<tr>
<td>(C_{rss})</td>
<td>Reverse Transfer Capacitance</td>
<td>(V_{GSS}=0V, V_{DB}=25V, f=1MHz)</td>
<td>-</td>
<td>0.05</td>
<td>0.07</td>
<td>pF</td>
</tr>
<tr>
<td>(R_g)</td>
<td>Gate resistance</td>
<td>(V_{GSS}=0V, V_{DB}=0V, f=1MHz)</td>
<td>14</td>
<td>28</td>
<td>42</td>
<td>(\Omega)</td>
</tr>
</tbody>
</table>

### Switching Parameters

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Q_g)</td>
<td>Total Gate Charge</td>
<td>(V_{GSS}=10V, V_{DB}=400V, I_D=0.01A)</td>
<td>-</td>
<td>0.1</td>
<td>0.15</td>
<td>nC</td>
</tr>
<tr>
<td>(Q_{gs})</td>
<td>Gate Source Charge</td>
<td>(V_{GSS}=10V, V_{DB}=400V, I_D=0.01A)</td>
<td>-</td>
<td>0.03</td>
<td>0.05</td>
<td>nC</td>
</tr>
<tr>
<td>(Q_{gd})</td>
<td>Gate Drain Charge</td>
<td>(V_{GSS}=10V, V_{DB}=400V, I_D=0.01A)</td>
<td>-</td>
<td>0.05</td>
<td>0.08</td>
<td>nC</td>
</tr>
<tr>
<td>(I_{d(on)})</td>
<td>Turn-On Delay Time</td>
<td>(V_{GSS}=10V, V_{DB}=300V, I_D=0.01A, R_g=6\Omega)</td>
<td>-</td>
<td>13.8</td>
<td>20</td>
<td>ns</td>
</tr>
<tr>
<td>(I_{d})</td>
<td>Turn-On Rise Time</td>
<td>(V_{GSS}=10V, V_{DB}=300V, I_D=0.01A, R_g=6\Omega)</td>
<td>-</td>
<td>10</td>
<td>15</td>
<td>ns</td>
</tr>
<tr>
<td>(I_{d(off)})</td>
<td>Turn-Off Delay Time</td>
<td>(V_{GSS}=10V, V_{DB}=300V, I_D=0.01A, R_g=6\Omega)</td>
<td>-</td>
<td>39.2</td>
<td>57</td>
<td>ns</td>
</tr>
<tr>
<td>(I_{tr})</td>
<td>Turn-Off Fall Time</td>
<td>(V_{GSS}=10V, V_{DB}=300V, I_D=0.01A, R_g=6\Omega)</td>
<td>-</td>
<td>13</td>
<td>19</td>
<td>ns</td>
</tr>
<tr>
<td>(I_{br})</td>
<td>Body Diode Reverse Recovery Time</td>
<td>(I_F=0.016A, dI/dt=100A/\mu s, V_{DS}=300V)</td>
<td>-</td>
<td>105</td>
<td>160</td>
<td>ns</td>
</tr>
<tr>
<td>(Q_{br})</td>
<td>Body Diode Reverse Recovery Charge</td>
<td>(I_F=0.016A, dI/dt=100A/\mu s, V_{DS}=300V)</td>
<td>-</td>
<td>9.5</td>
<td>14.3</td>
<td>nC</td>
</tr>
</tbody>
</table>

A: The value of \(R_{\theta JA}\) is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with \(T_J=25\,^\circ C\). The value in any given application depends on the user’s specific board design.

B: Repetitive rating, pulse width limited by junction temperature.

C: The \(R_{\theta JA}\) is the sum of the thermal impedance from junction to lead \(R_{\theta JL}\) and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using <300 \(\mu s\) pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with \(T_J=25\,^\circ C\). The SOA curve provides a single pulse rating.

F: The current rating is based on the \(I\leq10s\) thermal resistance rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Fig 1: On-Region Characteristics

Fig 2: Transfer Characteristics

Fig 3: On-Resistance vs. Drain Current and Gate Voltage

Fig 4: On-Resistance vs. Junction Temperature

Fig 5: Break Down vs. Junction Temperature

Fig 6: Body-Diode Characteristics
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7: Gate-Charge Characteristics

Figure 8: Capacitance Characteristics

Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)
Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

Diode Recovery Test Circuit & Waveforms

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Page 5 of 5