General Description

The AOW10N65/AOWF10N65 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 $C_{iss}$, along with guaranteed avalanche capability, this device can be adopted quickly into new and existing offline power supply designs.

Product Summary

- $V_{DS}$: 750V at 150°C
- $I_D$ (at $V_{GS}$=10V): 10A
- $R_{DS(on)}$ (at $V_{GS}$=10V): < 1Ω

100% UIS Tested
100% $R_g$ Tested

Absolute Maximum Ratings $T_A$=25°C unless otherwise noted

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>AOW10N65</th>
<th>AOWF10N65</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-Source Voltage</td>
<td>$V_{DS}$</td>
<td>650</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>$V_{GS}$</td>
<td>±30</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Continuous Drain Current</td>
<td>$I_D$, $T_J$=25°C</td>
<td>10</td>
<td>10*</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>$I_D$, $T_J$=100°C</td>
<td>6.2</td>
<td>6.2*</td>
<td>A</td>
</tr>
<tr>
<td>Pulsed Drain Current C</td>
<td>$I_{DM}$</td>
<td>36</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Avalanche Current C</td>
<td>$I_{AR}$</td>
<td>3.4</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Repetitive avalanche energy C</td>
<td>$E_{AR}$</td>
<td>173</td>
<td></td>
<td>mJ</td>
</tr>
<tr>
<td>Single pulsed avalanche energy D</td>
<td>$E_{AS}$</td>
<td>347</td>
<td></td>
<td>mJ</td>
</tr>
<tr>
<td>Power Dissipation B</td>
<td>$P_D$, $T_J$=25°C</td>
<td>250</td>
<td>28</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>W/°C</td>
</tr>
<tr>
<td>Junction and Storage Temperature Range</td>
<td>$T_J$, $T_{STG}$</td>
<td>-55 to 150</td>
<td></td>
<td>°C</td>
</tr>
<tr>
<td>Maximum lead temperature for soldering purpose, 1/8&quot; from case for 5 seconds</td>
<td>$T_L$</td>
<td>300</td>
<td></td>
<td>°C</td>
</tr>
</tbody>
</table>

Thermal Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>AOW10N65</th>
<th>AOWF10N65</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Junction-to-Ambient A/W</td>
<td>$R_{JA}$</td>
<td>65</td>
<td>65</td>
<td>°C/W</td>
</tr>
<tr>
<td>Maximum Case-to-sink A/W</td>
<td>$R_{JC}$</td>
<td>0.5</td>
<td>--</td>
<td>°C/W</td>
</tr>
<tr>
<td>Maximum Junction-to-Case A/W</td>
<td>$R_{JC}$</td>
<td>0.5</td>
<td>4.5</td>
<td>°C/W</td>
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</tbody>
</table>

* Drain current limited by maximum junction temperature.
## Electrical Characteristics (T_J=25°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><strong>STATIC PARAMETERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BV_DSS</td>
<td>Drain-Source Breakdown Voltage</td>
<td>I_D=250μA, V_GS=0V, T_J=25°C</td>
<td>650</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I_D=250μA, V_GS=0V, T_J=150°C</td>
<td>750</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>BV_DSS/ΔT,J</td>
<td>Zero Gate Voltage Drain Current</td>
<td>I_D=250μA, V_GS=0V</td>
<td>0.75</td>
<td></td>
<td></td>
<td>V/°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_GS=520V, T_J=125°C</td>
<td>10</td>
<td></td>
<td></td>
<td>µA</td>
</tr>
<tr>
<td>I_DS(min)</td>
<td>Gate-Body leakage current</td>
<td>V_GS=0V, V_DS≤30V</td>
<td>±100</td>
<td>nA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_GS=5V, I_D=250µA</td>
<td>3</td>
<td>4</td>
<td>4.5</td>
<td>V</td>
</tr>
<tr>
<td>R_D(ON)</td>
<td>Static Drain-Source On-Resistance</td>
<td>I_D=10V, I_P=5A</td>
<td>0.77</td>
<td>1</td>
<td></td>
<td>Ω</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_GS=40V, I_P=5A</td>
<td>13</td>
<td></td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>V_DS</td>
<td>Forward Transconductance</td>
<td>V_GS=10V, I_D=250µA</td>
<td>0.73</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I_P=1A, V_GS=0V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum Body-Diode Continuous Current</td>
<td>I_S=1A, V_RS=0V</td>
<td>10</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum Body-Diode Pulsed Current</td>
<td>I_S=1A, V_RS=0V</td>
<td>36</td>
<td>A</td>
<td></td>
<td></td>
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<tr>
<td><strong>DYNAMIC PARAMETERS</strong></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Ciss</td>
<td>Input Capacitance</td>
<td>V_GS=0V, V_DS=25V, f=1MHz</td>
<td>1095</td>
<td>1369</td>
<td>1645</td>
<td>pF</td>
</tr>
<tr>
<td>Coss</td>
<td>Output Capacitance</td>
<td>V_GS=0V, V_DS=25V, f=1MHz</td>
<td>80</td>
<td>118</td>
<td>154</td>
<td>pF</td>
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<tr>
<td>Crss</td>
<td>Reverse Transfer Capacitance</td>
<td>V_GS=0V, V_DS=25V, f=1MHz</td>
<td>6</td>
<td>10</td>
<td>14</td>
<td>pF</td>
</tr>
<tr>
<td>Rg</td>
<td>Gate resistance</td>
<td>V_GS=0V, V_DS=0V, f=1MHz</td>
<td>1.7</td>
<td>3.5</td>
<td>5.5</td>
<td>Ω</td>
</tr>
<tr>
<td><strong>SWITCHING PARAMETERS</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qg</td>
<td>Total Gate Charge</td>
<td>V_GS=10V, V_DS=520V, I_D=10A</td>
<td>22</td>
<td>27.7</td>
<td>33</td>
<td>nC</td>
</tr>
<tr>
<td>Qgs</td>
<td>Gate Source Charge</td>
<td>V_GS=10V, V_DS=520V, I_D=10A</td>
<td>6</td>
<td>7.4</td>
<td>9</td>
<td>nC</td>
</tr>
<tr>
<td>Qgd</td>
<td>Gate Drain Charge</td>
<td>V_GS=10V, V_DS=520V, I_D=10A</td>
<td>5.5</td>
<td>11.3</td>
<td>17</td>
<td>nC</td>
</tr>
<tr>
<td>t_D(μs)</td>
<td>Turn-On DelayTime</td>
<td>V_GS=10V, V_DS=325V, I_D=10A,</td>
<td>30</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I_D=25Ω</td>
<td>61</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>t_D(μs)</td>
<td>Turn-Off DelayTime</td>
<td>V_GS=10V, V_DS=325V, I_D=10A,</td>
<td>74</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I_D=25Ω</td>
<td>53</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>t_D</td>
<td>Turn-Off Fall Time</td>
<td>I_D=10A, dI/dt=100A/µs, V_GS=100V</td>
<td>255</td>
<td>320</td>
<td>385</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L=60mH, I_D=3.4A, V_DD=150V, R_G=25Ω, Starting T_J=25°C</td>
<td>4.8</td>
<td>6</td>
<td>7.2</td>
<td>µC</td>
</tr>
<tr>
<td>Qv</td>
<td>Body Diode Reverse Recovery Time</td>
<td>I_D=10A, dI/dt=100A/µs, V_GS=100V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A. The value of R_{θ JA} is measured with the device in a still air environment with T_J=25°C.
B. The power dissipation P_D is based on T_{J(MAX)}=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J=25°C.
D. The R_{θ JA} is the sum of the thermal impedence from junction to case R_{θ JC} and case to ambient.
E. The static characteristics in Figures 1 to 6 are obtained using <300 µs pulses, duty cycle 0.5% max.
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=150°C. The SOA curve provides a single pulse rating.
G. L=60mH, I_D=3.4A, V_DD=150V, R_G=25Ω, Starting T_J=25°C

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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 (Note E)
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7: Gate-Charge Characteristics

Figure 8: Capacitance Characteristics

Figure 9: Maximum Forward Biased Safe Operating Area for AOW10N65 (Note F)

Figure 10: Maximum Forward Biased Safe Operating Area for AOWF10N65 (Note F)

Figure 11: Current De-rating (Note B)
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 12: Normalized Maximum Transient Thermal Impedance for AOW10N65 (Note F)

Figure 13: Normalized Maximum Transient Thermal Impedance for AOWF10N65 (Note F)