**General Description**

- Trench Power AlphaSGT™ technology
- Best in class on-resistance $R_{DS(ON)}$
- Lowers switching loss by lower Qrr than other MOSFET suppliers
- Optimized voltage spike at SSR application
- RoHS and Halogen-Free Compliant

**Applications**

- High frequency switching and synchronous rectification
- BMS
- Motor

**Product Summary**

- $V_{DS}$: 100V
- $I_D$ (at $V_{GS}$=10V): 120A
- $R_{DS(ON)}$ (at $V_{GS}$=10V): $< 3.6\, \text{mΩ}$
- $R_{DS(ON)}$ (at $V_{GS}$=6V): $< 4.8\, \text{mΩ}$

100% UIS Tested
100% $R_g$ Tested

**Orderable Part Number**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package Type</th>
<th>Form</th>
<th>Minimum Order Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOT66916L</td>
<td>TO-220</td>
<td>Tube</td>
<td>1000</td>
</tr>
<tr>
<td>AOB66916L</td>
<td>TO-263</td>
<td>Tape &amp; Reel</td>
<td>800</td>
</tr>
</tbody>
</table>

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

<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>100</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>$V_{GS}$</td>
<td>$\pm 20$</td>
<td>V</td>
</tr>
<tr>
<td>Continuous Drain Current $^a$</td>
<td>$T_c=25^\circ\text{C}$</td>
<td>$I_D$</td>
<td>120 A</td>
</tr>
<tr>
<td></td>
<td>$T_c=100^\circ\text{C}$</td>
<td>$I_D$</td>
<td>120 A</td>
</tr>
<tr>
<td>Pulsed Drain Current $^c$</td>
<td>$I_{DM}$</td>
<td>450</td>
<td>A</td>
</tr>
<tr>
<td>Continuous Drain Current $^c$</td>
<td>$T_a=25^\circ\text{C}$</td>
<td>$I_{DSM}$</td>
<td>35.5 A</td>
</tr>
<tr>
<td></td>
<td>$T_a=70^\circ\text{C}$</td>
<td>$I_{DSM}$</td>
<td>28.5 A</td>
</tr>
<tr>
<td>Avalanche Current $^c$</td>
<td>$I_{AS}$</td>
<td>80</td>
<td>A</td>
</tr>
<tr>
<td>Avalanche energy $^c$</td>
<td>$E_{AS}$</td>
<td>320</td>
<td>mJ</td>
</tr>
<tr>
<td>Power Dissipation $^b$</td>
<td>$T_c=25^\circ\text{C}$</td>
<td>$P_D$</td>
<td>277 W</td>
</tr>
<tr>
<td></td>
<td>$T_c=100^\circ\text{C}$</td>
<td>$P_D$</td>
<td>111 W</td>
</tr>
<tr>
<td>Power Dissipation $^a$</td>
<td>$T_a=25^\circ\text{C}$</td>
<td>$P_{DSM}$</td>
<td>8.3 W</td>
</tr>
<tr>
<td></td>
<td>$T_a=70^\circ\text{C}$</td>
<td>$P_{DSM}$</td>
<td>5.3 W</td>
</tr>
</tbody>
</table>

Junction and Storage Temperature Range

| $T_J$, $T_{STG}$ | -55 to 150 °C |

**Thermal Characteristics**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Junction-to-Ambient $^a$</td>
<td>$R_{JJA}$</td>
<td>12</td>
<td>15</td>
<td>°C/W</td>
</tr>
<tr>
<td>Maximum Junction-to-Ambient $^a$</td>
<td>Steady-State</td>
<td>50</td>
<td>60</td>
<td>°C/W</td>
</tr>
<tr>
<td>Maximum Junction-to-Case</td>
<td>$R_{JUC}$</td>
<td>0.35</td>
<td>0.45</td>
<td>°C/W</td>
</tr>
</tbody>
</table>
### Electrical Characteristics (T<sub>j=25°C</sub> 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&lt;sub&gt;DS&lt;/sub&gt;</td>
<td>Drain-Source Breakdown Voltage</td>
<td>I&lt;sub&gt;D&lt;/sub&gt;=250μA, V&lt;sub&gt;GS&lt;/sub&gt;=0V</td>
<td>100</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>I&lt;sub&gt;DS(th)&lt;/sub&gt;</td>
<td>Zero Gate Voltage Drain Current</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt;=100V, V&lt;sub&gt;GS&lt;/sub&gt;=0V</td>
<td></td>
<td></td>
<td>1</td>
<td>μA</td>
</tr>
<tr>
<td>I&lt;sub&gt;G&lt;/sub&gt;</td>
<td>Gate-Body leakage current</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt;=0V, V&lt;sub&gt;GS&lt;/sub&gt;=±20V</td>
<td></td>
<td></td>
<td>±100</td>
<td>nA</td>
</tr>
<tr>
<td>V&lt;sub&gt;GS(th)&lt;/sub&gt;</td>
<td>Gate Threshold Voltage</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt;=V&lt;sub&gt;GS&lt;/sub&gt;, I&lt;sub&gt;D&lt;/sub&gt;=250μA</td>
<td>2.5</td>
<td>2.95</td>
<td>3.5</td>
<td>V</td>
</tr>
<tr>
<td>R&lt;sub&gt;DS(on)&lt;/sub&gt;</td>
<td>Static Drain-Source On-Resistance</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=10V, I&lt;sub&gt;D&lt;/sub&gt;=20A</td>
<td>3.0</td>
<td>3.6</td>
<td></td>
<td>mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DYNAMIC PARAMETERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C&lt;sub&gt;iss&lt;/sub&gt;</td>
<td>Input Capacitance</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=0V, V&lt;sub&gt;DS&lt;/sub&gt;=50V, f=1MHz</td>
<td>6180</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>C&lt;sub&gt;oss&lt;/sub&gt;</td>
<td>Output Capacitance</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=0V, V&lt;sub&gt;DS&lt;/sub&gt;=50V</td>
<td>1660</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>C&lt;sub&gt;gs&lt;/sub&gt;</td>
<td>Reverse Transfer Capacitance</td>
<td></td>
<td>29</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>R&lt;sub&gt;gs&lt;/sub&gt;</td>
<td>Gate resistance</td>
<td>f=1MHz</td>
<td>0.7</td>
<td>1.5</td>
<td>2.3</td>
<td>Ω</td>
</tr>
<tr>
<td><strong>SWITCHING PARAMETERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q&lt;sub&gt;q(10V)&lt;/sub&gt;</td>
<td>Total Gate Charge</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=10V, V&lt;sub&gt;DS&lt;/sub&gt;=50V, I&lt;sub&gt;D&lt;/sub&gt;=20A</td>
<td>78</td>
<td></td>
<td></td>
<td>nC</td>
</tr>
<tr>
<td>Q&lt;sub&gt;gs&lt;/sub&gt;</td>
<td>Gate Source Charge</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=0V, V&lt;sub&gt;DS&lt;/sub&gt;=50V</td>
<td>22</td>
<td></td>
<td></td>
<td>nC</td>
</tr>
<tr>
<td>Q&lt;sub&gt;gd&lt;/sub&gt;</td>
<td>Gate Drain Charge</td>
<td></td>
<td>15</td>
<td></td>
<td></td>
<td>nC</td>
</tr>
<tr>
<td>Q&lt;sub&gt;oss&lt;/sub&gt;</td>
<td>Output Charge</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=0V, V&lt;sub&gt;DS&lt;/sub&gt;=50V</td>
<td>134</td>
<td></td>
<td></td>
<td>nC</td>
</tr>
<tr>
<td>t&lt;sub&gt;on&lt;/sub&gt;</td>
<td>Turn-On DelayTime</td>
<td></td>
<td>24</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>t&lt;sub&gt;r&lt;/sub&gt;</td>
<td>Turn-On Rise Time</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=10V, V&lt;sub&gt;DS&lt;/sub&gt;=50V, R&lt;sub&gt;L&lt;/sub&gt;=2.5Ω</td>
<td>18</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>t&lt;sub&gt;off&lt;/sub&gt;</td>
<td>Turn-Off DelayTime</td>
<td>R&lt;sub&gt;GEN&lt;/sub&gt;=3Ω</td>
<td>52</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>t&lt;sub&gt;f&lt;/sub&gt;</td>
<td>Turn-Off Fall Time</td>
<td></td>
<td>22</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>t&lt;sub&gt;b&lt;/sub&gt;</td>
<td>Body Diode Reverse Recovery Time</td>
<td>I&lt;sub&gt;B&lt;/sub&gt;=20A, di/dt=500A/μs</td>
<td>45</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Q&lt;sub&gt;b&lt;/sub&gt;</td>
<td>Body Diode Reverse Recovery Charge</td>
<td>I&lt;sub&gt;B&lt;/sub&gt;=20A, di/dt=500A/μs</td>
<td>287</td>
<td></td>
<td></td>
<td>nC</td>
</tr>
</tbody>
</table>

A. The value of R<sub>qJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>j</sub>=25°C. The Power dissipation P<sub>DSM</sub> is based on R<sub>qJA</sub> t≤ 10s and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=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. Single pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.

D. The body diode reverse recovery charge Q<sub>b</sub> is the sum of the thermal impedance from junction to case R<sub>qJC</sub> and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs 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<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in FR-4 board with 2oz. Copper, in a still air environment with T<sub>j</sub>=25°C.

> APPLICATIONS OR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1: On-Region Characteristics (Note E)

Figure 2: Transfer Characteristics (Note E)

Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

Figure 4: On-Resistance vs. Junction Temperature (Note E)

Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

Figure 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 (Note F)

**Figure 10:** Single Pulse Power Rating Junction-to-Case (Note F)

**Figure 11:** Normalized Maximum Transient Thermal Impedance (Note F)

In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

![Graphs showing power dissipation, current rating, transient thermal resistance, and pulse width for typical electrical and thermal characteristics.](image)

Figure 12: Power Derating (Note F)

Figure 13: Current Derating (Note F)

Figure 14: Coss stored Energy

Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)
Figure A: Gate Charge Test Circuit & Waveforms

Figure B: Resistive Switching Test Circuit & Waveforms

Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

Figure D: Diode Recovery Test Circuit & Waveforms