General Description

- Trench Power MOSFET technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- RoHS and Halogen-Free Compliant

Applications

- Ideal for Load Switching

Product Summary

$V_{DS}$ 30V
$I_D$ (at $V_{GS}=10V$) 3.8A
$R_{DS(ON)}$ (at $V_{GS}=10V$) < 50mΩ
$R_{DS(ON)}$ (at $V_{GS}=4.5V$) < 57mΩ
$R_{DS(ON)}$ (at $V_{GS}=2.5V$) < 72mΩ

ESD protection

Orderable Part Number

<table>
<thead>
<tr>
<th>AOTS32338C</th>
<th>Package Type</th>
<th>Form</th>
<th>Minimum Order Quantity</th>
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<tbody>
<tr>
<td></td>
<td>TSOP-6</td>
<td>Tape &amp; Reel</td>
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Absolute Maximum Ratings $T_A=25°C$ unless otherwise noted

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Maximum</th>
<th>Units</th>
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<tbody>
<tr>
<td>Drain-Source Voltage</td>
<td>$V_{DS}$</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>$V_{GS}$</td>
<td>±12</td>
<td>V</td>
</tr>
<tr>
<td>Continuous Drain Current</td>
<td>$I_D$</td>
<td>3.8</td>
<td>A</td>
</tr>
<tr>
<td>$T_A=25°C$</td>
<td></td>
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<tr>
<td>$T_A=70°C$</td>
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<tr>
<td>Pulsed Drain Current C</td>
<td>$I_{OM}$</td>
<td>22</td>
<td>A</td>
</tr>
<tr>
<td>$T_H=25°C$</td>
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<td>$T_H=70°C$</td>
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<tr>
<td>Power Dissipation B</td>
<td>$P_D$</td>
<td>1.2</td>
<td>W</td>
</tr>
<tr>
<td>$T_A=25°C$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$T_A=70°C$</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Junction and Storage Temperature Range</td>
<td>$T_J$, $T_{STG}$</td>
<td>-55 to 150</td>
<td>°C</td>
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</table>

Thermal Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
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<tr>
<td>Maximum Junction-to-Ambient A</td>
<td>$R_{JUA}$</td>
<td>82</td>
<td>100</td>
<td>°C/W</td>
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<tr>
<td>Maximum Junction-to-Ambient A, U</td>
<td>Steady-State</td>
<td>111</td>
<td>140</td>
<td>°C/W</td>
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<tr>
<td>Maximum Junction-to-Lead</td>
<td>Steady-State</td>
<td>56</td>
<td>70</td>
<td>°C/W</td>
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## Electrical Characteristics (T<sub>J</sub>=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>
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<tbody>
<tr>
<td><strong>STATIC PARAMETERS</strong></td>
<td></td>
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<td></td>
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<tr>
<td>BV&lt;sub&gt;DS&lt;/sub&gt;</td>
<td>Drain-Source Breakdown Voltage</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt;=30V, V&lt;sub&gt;GS&lt;/sub&gt;=0V</td>
<td>30</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>I&lt;sub&gt;GS&lt;/sub&gt;</td>
<td>Zero Gate Voltage Drain Current</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt;=30V, V&lt;sub&gt;GS&lt;/sub&gt;=0V</td>
<td></td>
<td>1</td>
<td></td>
<td>μA</td>
</tr>
<tr>
<td>I&lt;sub&gt;GSS&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;=±12V</td>
<td></td>
<td>±10</td>
<td></td>
<td>μA</td>
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<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;G&lt;/sub&gt;=250μA</td>
<td>0.5</td>
<td>1</td>
<td>1.5</td>
<td>V</td>
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<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;G&lt;/sub&gt;=3.8A</td>
<td>40</td>
<td>50</td>
<td></td>
<td>mΩ</td>
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<tr>
<td></td>
<td></td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=4.5V, I&lt;sub&gt;G&lt;/sub&gt;=3.6A</td>
<td>42</td>
<td>57</td>
<td></td>
<td>mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=2.5V, I&lt;sub&gt;G&lt;/sub&gt;=3.2A</td>
<td>50</td>
<td>72</td>
<td></td>
<td>mΩ</td>
</tr>
<tr>
<td>g&lt;sub&gt;fs&lt;/sub&gt;</td>
<td>Forward Transconductance</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt;=5V, I&lt;sub&gt;D&lt;/sub&gt;=3.8A</td>
<td>20</td>
<td></td>
<td></td>
<td>S</td>
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<tr>
<td>V&lt;sub&gt;SD&lt;/sub&gt;</td>
<td>Diode Forward Voltage</td>
<td>I&lt;sub&gt;B&lt;/sub&gt;=1A, V&lt;sub&gt;GS&lt;/sub&gt;=0V</td>
<td>0.7</td>
<td>1</td>
<td></td>
<td>V</td>
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<tr>
<td>I&lt;sub&gt;s&lt;/sub&gt;</td>
<td>Maximum Body-Diode Continuous Current</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>A</td>
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<td><strong>DYNAMIC PARAMETERS</strong></td>
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<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;=15V, f=1MHz</td>
<td>340</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;=15V, f=1MHz</td>
<td>30</td>
<td></td>
<td></td>
<td>pF</td>
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<tr>
<td>C&lt;sub&gt;rss&lt;/sub&gt;</td>
<td>Reverse Transfer Capacitance</td>
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<td>25</td>
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<td></td>
<td>pF</td>
</tr>
<tr>
<td>R&lt;sub&gt;g&lt;/sub&gt;</td>
<td>Gate resistance</td>
<td>f=1MHz</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>Ω</td>
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<tr>
<td><strong>SWITCHING PARAMETERS</strong></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Q&lt;sub&gt;g&lt;/sub&gt;(10V)</td>
<td>Total Gate Charge</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=10V, V&lt;sub&gt;DS&lt;/sub&gt;=15V, I&lt;sub&gt;G&lt;/sub&gt;=3.8A</td>
<td>8</td>
<td>16</td>
<td></td>
<td>nC</td>
</tr>
<tr>
<td>Q&lt;sub&gt;g&lt;/sub&gt;(4.5V)</td>
<td>Total Gate Charge</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=4.5V, V&lt;sub&gt;DS&lt;/sub&gt;=15V, I&lt;sub&gt;G&lt;/sub&gt;=3.8A</td>
<td>4</td>
<td>8</td>
<td></td>
<td>nC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=2.5V, V&lt;sub&gt;DS&lt;/sub&gt;=15V, I&lt;sub&gt;G&lt;/sub&gt;=3.8A</td>
<td>4</td>
<td>8</td>
<td></td>
<td>nC</td>
</tr>
<tr>
<td>Q&lt;sub&gt;gd&lt;/sub&gt;</td>
<td>Gate Drain Charge</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=10V, V&lt;sub&gt;DS&lt;/sub&gt;=15V, I&lt;sub&gt;G&lt;/sub&gt;=3.8A</td>
<td>1.2</td>
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<td></td>
<td>nC</td>
</tr>
<tr>
<td>t&lt;sub&gt;on&lt;/sub&gt;</td>
<td>Turn-On DelayTime</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=10V, V&lt;sub&gt;DS&lt;/sub&gt;=15V, R&lt;sub&gt;L&lt;/sub&gt;=3.95Ω</td>
<td>2.5</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>t&lt;sub&gt;rr&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;=15V, R&lt;sub&gt;GEN&lt;/sub&gt;=3Ω</td>
<td>3</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>30</td>
<td></td>
<td></td>
<td>ns</td>
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<tr>
<td>t&lt;sub&gt;f&lt;/sub&gt;</td>
<td>Turn-Off Fall Time</td>
<td></td>
<td>5</td>
<td></td>
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<tr>
<td>t&lt;sub&gt;RDR&lt;/sub&gt;</td>
<td>Body Diode Reverse Recovery Time</td>
<td>I&lt;sub&gt;B&lt;/sub&gt;=3.8A, di/dt=500A/μs</td>
<td>5.5</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Q&lt;sub&gt;rr&lt;/sub&gt;</td>
<td>Body Diode Reverse Recovery Charge</td>
<td>I&lt;sub&gt;B&lt;/sub&gt;=3.8A, di/dt=500A/μs</td>
<td>4</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>A</sub>=25°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 ≤10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25°C.

D. The R<sub>qJA</sub> is the sum of the thermal impedance from junction to lead R<sub>qJL</sub> and lead 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-ambient thermal impedance which is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.

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Rev.1.0: January 2019
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

- Qg (nC)
- VGS (Volts)

#### Figure 8: Capacitance Characteristics

- Ciss (pF)
- VDS (Volts)

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

- VDS (Volts)
- ID (Amps)
- VGS > or equal to 4.5V

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

- Power (W)
- Pulse Width (s)

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

- Zth(Normalized Transient Thermal Resistance)
- Pulse Width (s)
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