General Description
The AON7422E combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Product Summary
- $V_{DS}$: 30V
- $I_D$ (at $V_{DS}$=10V): 40A
- $R_{DS(ON)}$ (at $V_{DS}$=10V): < 4.3mΩ
- $R_{DS(ON)}$ (at $V_{GS}$=4.5V): < 6.0mΩ

ESD protected
100% UIS Tested
100% $R_V$ Tested

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>
</tr>
</thead>
<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>±20</td>
<td>V</td>
</tr>
<tr>
<td>Continuous Drain Current</td>
<td>$I_D$</td>
<td>40</td>
<td>A</td>
</tr>
<tr>
<td>$T_C$=25°C</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>$T_C$=100°C</td>
<td></td>
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<tr>
<td>Pulsed Drain Current $I_{SM}$</td>
<td>$I_{SM}$</td>
<td>200</td>
<td>A</td>
</tr>
<tr>
<td>Continuous Drain Current</td>
<td>$I_{DQ}$</td>
<td>20</td>
<td>A</td>
</tr>
<tr>
<td>$T_A$=25°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$T_A$=70°C</td>
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<td></td>
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<tr>
<td>Avalanche Current $I_{ABS}$, $I_{AR}$</td>
<td></td>
<td>45</td>
<td>A</td>
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<tr>
<td>Avalanche energy $L$=0.1mH $E_{ABS}$, $E_{AR}$</td>
<td>101</td>
<td>mJ</td>
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<tr>
<td>Power Dissipation $P_D$</td>
<td>$P_D$</td>
<td>36</td>
<td>W</td>
</tr>
<tr>
<td>$T_C$=25°C</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>$T_C$=100°C</td>
<td></td>
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<tr>
<td>Power Dissipation $P_{DQ}$</td>
<td>$P_{DQ}$</td>
<td>14</td>
<td>W</td>
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<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>
<td></td>
</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>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Junction-to-Ambient $R_{JA}$</td>
<td></td>
<td>l ≤ 10s</td>
<td>30</td>
<td>40</td>
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<tr>
<td>Maximum Junction-to-Ambient $R_{JC}$</td>
<td></td>
<td>Steady-State</td>
<td>60</td>
<td>75</td>
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<tr>
<td>Maximum Junction-to-Case $R_{JC}$</td>
<td></td>
<td>Steady-State</td>
<td>2.8</td>
<td>3.4</td>
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</tbody>
</table>

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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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</thead>
<tbody>
<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>30</td>
<td>36</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>I&lt;sub&gt;DS&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>1</td>
<td>5</td>
<td>μA</td>
<td>T&lt;sub&gt;j&lt;/sub&gt;=55°C</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;=±16V</td>
<td>5</td>
<td></td>
<td>uA</td>
<td></td>
</tr>
<tr>
<td>R&lt;sub&gt;DS&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>10</td>
<td></td>
<td>uA</td>
<td></td>
</tr>
<tr>
<td>V&lt;sub&gt;DS(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>1.3</td>
<td>1.85</td>
<td>2.4</td>
<td>V</td>
</tr>
<tr>
<td>I&lt;sub&gt;DS(on)&lt;/sub&gt;</td>
<td>On state drain current</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt;=10V, V&lt;sub&gt;GS&lt;/sub&gt;=5V</td>
<td>200</td>
<td></td>
<td>A</td>
<td></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;DS&lt;/sub&gt;=10V, I&lt;sub&gt;d&lt;/sub&gt;=20A</td>
<td>3.5</td>
<td>4.3</td>
<td>mΩ</td>
<td>T&lt;sub&gt;j&lt;/sub&gt;=125°C</td>
</tr>
<tr>
<td>g&lt;sub&gt;B&lt;/sub&gt;</td>
<td>Forward Transconductance</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=5V, I&lt;sub&gt;d&lt;/sub&gt;=20A</td>
<td>85</td>
<td></td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>V&lt;sub&gt;SD&lt;/sub&gt;</td>
<td>Diode Forward Voltage</td>
<td>I&lt;sub&gt;d&lt;/sub&gt;=1A, V&lt;sub&gt;GS&lt;/sub&gt;=0V</td>
<td>0.7</td>
<td>1</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>C&lt;sub&gt;iss&lt;/sub&gt;</td>
<td>Maximum Body-Diode Continuous Current&lt;sup&gt;+&lt;/sup&gt;</td>
<td></td>
<td>40</td>
<td></td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

#### STATIC PARAMETERS

- **Gate-Body leakage current**
  - Conditions: V<sub>DS</sub>=0V, V<sub>GS</sub>=±20V
  - I<sub>G</sub>: 5 µA

- **Gate-Body leakage current**
  - Conditions: V<sub>DS</sub>=0V, V<sub>GS</sub>=±16V
  - I<sub>G</sub>: 5 uA

- **Gate-Body leakage current**
  - Conditions: V<sub>DS</sub>=0V, V<sub>GS</sub>=±20V
  - I<sub>G</sub>: 10 uA

- **Gate Threshold Voltage**
  - Conditions: V<sub>DS</sub>=V<sub>GS</sub>, I<sub>d</sub>=250µA
  - V<sub>DS(th)</sub>: 1.3 V, 1.85 V, 2.4 V

- **On state drain current**
  - Conditions: V<sub>DS</sub>=5V, I<sub>d</sub>=20A
  - I<sub>DS(on)</sub>: 200 A

- **Static Drain-Source On-Resistance**
  - Conditions: V<sub>DS</sub>=10V, I<sub>d</sub>=20A
  - R<sub>DS(on)</sub>: 3.5 mΩ, 4.3 mΩ

#### DYNAMIC PARAMETERS

- **Input Capacitance**
  - Conditions: V<sub>GS</sub>=0V, V<sub>DS</sub>=15V, f=1MHz
  - C<sub>iss</sub>: 1950 pF, 2445 pF, 2940 pF

- **Output Capacitance**
  - Conditions: V<sub>GS</sub>=0V, V<sub>DS</sub>=15V, f=1MHz
  - C<sub>oss</sub>: 270 pF, 390 pF, 510 pF

- **Reverse Transfer Capacitance**
  - Conditions: V<sub>GS</sub>=0V, V<sub>DS</sub>=15V, f=1MHz
  - C<sub>rss</sub>: 130 pF, 220 pF, 310 pF

- **Gate resistance**
  - Conditions: V<sub>GS</sub>=0V, V<sub>DS</sub>=0V, f=1MHz
  - R<sub>g</sub>: 1.2 Ω, 2.4 Ω, 3.6 Ω

#### SWITCHING PARAMETERS

- **Total Gate Charge**
  - Conditions: V<sub>GS</sub>=10V, V<sub>DS</sub>=15V, I<sub>d</sub>=20A
  - Q<sub>g</sub>: 32 nC, 41 nC, 50 nC

- **Gate Source Charge**
  - Conditions: V<sub>GS</sub>=10V, V<sub>DS</sub>=15V, I<sub>d</sub>=20A
  - Q<sub>gs</sub>: 7.2 nC

- **Gate Drain Charge**
  - Conditions: V<sub>GS</sub>=10V, V<sub>DS</sub>=15V, I<sub>d</sub>=20A
  - Q<sub>gd</sub>: 6.6 nC

- **Turn-On Delay Time**
  - Conditions: V<sub>GS</sub>=10V, V<sub>DS</sub>=15V, R<sub>L</sub>=0.75 Ω
  - t<sub>D(on)</sub>: 7 ns

- **Turn-On Rise Time**
  - Conditions: V<sub>GS</sub>=10V, V<sub>DS</sub>=15V, R<sub>L</sub>=0.75 Ω, R<sub>GEN</sub>=3 Ω
  - t<sub>r</sub>: 5 ns

- **Turn-Off Fall Time**
  - Conditions: V<sub>GS</sub>=10V, V<sub>DS</sub>=15V, R<sub>L</sub>=0.75 Ω, R<sub>GEN</sub>=3 Ω
  - t<sub>f</sub>: 41.5 ns

- **Turn-Off Delay Time**
  - Conditions: V<sub>GS</sub>=10V, V<sub>DS</sub>=15V, R<sub>L</sub>=0.75 Ω, R<sub>GEN</sub>=3 Ω
  - t<sub>rr</sub>: 10.5 ns

- **Body Diode Reverse Recovery Time**
  - Conditions: I<sub>d</sub>=20A, dI/dt=500A/µs
  - t<sub>rr</sub>: 17.5 ns, 22 ns

- **Body Diode Reverse Recovery Charge**
  - Conditions: I<sub>d</sub>=20A, dI/dt=500A/µs
  - Q<sub>rr</sub>: 31 nC, 40 nC

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**Notes:**

- A. The value of R<sub>θJA</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 Power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> t ≤ 10s value and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.

- 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. 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>θJA</sub> is the sum of the thermal impedence from junction to case R<sub>θJC</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 impedence 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<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C.
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)
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 12: Single Pulse Avalanche capability (Note C)

Figure 13: Power De-rating (Note F)

Figure 14: Current De-rating (Note F)

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

Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)