General Description
The AO4435 uses advanced trench technology to provide excellent $R_{DS(ON)}$, and ultra-low low gate charge with a 25V gate rating. This device is suitable for use as a load switch or in PWM applications.

-RoHS Compliant
-AO4435 is Halogen Free

Product Summary
$V_{DS} = -30V$
$I_D = -10.5A$  ($V_{GS} = -20V$)
$R_{DS(ON)} < 14\,\text{m\Omega}$  ($V_{GS} = -20V$)
$R_{DS(ON)} < 18\,\text{m\Omega}$  ($V_{GS} = -10V$)
$R_{DS(ON)} < 36\,\text{m\Omega}$  ($V_{GS} = -5V$)

100% UIS Tested
100% Rg Tested

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>-30</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>$V_{GS}$</td>
<td>±25</td>
<td>V</td>
</tr>
<tr>
<td>Continuous Drain Current</td>
<td>$I_D$</td>
<td>-10.5</td>
<td>A</td>
</tr>
<tr>
<td>($T_A = 25^\circ\text{C}$)</td>
<td>($T_A = 70^\circ\text{C}$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulsed Drain Current</td>
<td>$I_{DM}$</td>
<td>-80</td>
<td>A</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>$P_D$</td>
<td>3.1</td>
<td>W</td>
</tr>
<tr>
<td>($T_A = 25^\circ\text{C}$)</td>
<td>($T_A = 70^\circ\text{C}$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avalanche Current</td>
<td>$I_{AR}$</td>
<td>-20</td>
<td>A</td>
</tr>
<tr>
<td>Repetitive avalanche energy 0.3mH</td>
<td>$E_{AR}$</td>
<td>60</td>
<td>mJ</td>
</tr>
<tr>
<td>Junction and Storage Temperature Range</td>
<td>$T_J$, $T_{STG}$</td>
<td>-55 to 150</td>
<td>$^\circ\text{C}$</td>
</tr>
</tbody>
</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</td>
<td>$R_{JUA}$</td>
<td>t ≤ 10s</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>Maximum Junction-to-Ambient</td>
<td>$R_{JUL}$</td>
<td>Steady State</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>Maximum Junction-to-Lead</td>
<td>$R_{JUL}$</td>
<td>Steady State</td>
<td>60</td>
<td>75</td>
</tr>
</tbody>
</table>

Alpha & Omega Semiconductor, Ltd. www.aosmd.com
### 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>$BV_{DSS}$</td>
<td>Drain-Source Breakdown Voltage</td>
<td>$I_{D} = -250\mu A, V_{GS} = 0V$</td>
<td>-30</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$I_{DSS}$</td>
<td>Zero Gate Voltage Drain Current</td>
<td>$V_{DS} = -30V, V_{GS} = 0V$</td>
<td></td>
<td></td>
<td>-1</td>
<td>$\mu A$</td>
</tr>
<tr>
<td>$I_{GSS}$</td>
<td>Gate-Body leakage current</td>
<td>$V_{DS} = 0V, V_{GS} = \pm 25V$</td>
<td>$\pm 100$</td>
<td></td>
<td></td>
<td>$nA$</td>
</tr>
<tr>
<td>$V_{GS(th)}$</td>
<td>Gate Threshold Voltage</td>
<td>$V_{DS} = V_{GS}, I_{D} = -250\mu A$</td>
<td>-1.7</td>
<td>-2.3</td>
<td>-3</td>
<td>V</td>
</tr>
<tr>
<td>$I_{D(ON)}$</td>
<td>On state drain current</td>
<td>$V_{GS} = -10V, V_{DS} = -5V$</td>
<td>-80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R_{DS(on)}$</td>
<td>Static Drain-Source On-Resistance</td>
<td>$V_{GS} = -20V, I_{D} = -1A$</td>
<td></td>
<td></td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>$g_{FS}$</td>
<td>Forward Transconductance</td>
<td>$V_{DS} = -5V, I_{D} = -1A$</td>
<td>22</td>
<td></td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>$V_{SD}$</td>
<td>Diode Forward Voltage</td>
<td>$I_{F} = -1A, V_{GS} = 0V$</td>
<td>-0.74</td>
<td>-1</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$I_{S}$</td>
<td>Maximum Body-Diode Continuous Current</td>
<td></td>
<td></td>
<td></td>
<td>-3.5</td>
<td></td>
</tr>
</tbody>
</table>

### STATIC PARAMETERS

**Input Capacitance**

- $C_{iss} = 1130 \text{ pF}$
- $C_{oss} = 240 \text{ pF}$
- $C_{rss} = 155 \text{ pF}$

**Gate resistance**

- $R_{G}(10V) = 18 \text{ nC}$
- $R_{G}(4.5V) = 9.5 \text{ nC}$
- $Q_{gs} = 5.5 \text{ nC}$
- $Q_{gd} = 3.3 \text{ nC}$

**Gate-Body leakage current**

- $I_{GAR} = 8.7 \text{ ns}$
- $I_{AR} = 7 \text{ ns}$
- $I_{D(ON)} = 18 \text{ ns}$

**Reverse Transfer Capacitance**

- $R_{rr} = 12 \text{ nC}$
- $Q_{rr} = 25 \text{ nC}$
- $Q_{DAR} = 30 \text{ nC}$

**Body Diode Reverse Recovery Charge**

- $I_{F(10A)} = 25 \text{ nC}$
- $dI/dt=100A/\mu s$
- $I_{F(10A)} = 30 \text{ nC}$
- $dI/dt=100A/\mu s$

**SOA curve**

- $I_{F(10A)} = 25 \text{ nC}$
- $dI/dt=100A/\mu s$

**Reverse transfer capacitance**

- $C_{rss} = 240 \text{ pF}$
- $C_{rss} = 155 \text{ pF}$

**Gate resistance**

- $R_{G}(10V) = 18 \text{ nC}$
- $R_{G}(4.5V) = 9.5 \text{ nC}$
- $Q_{gs} = 5.5 \text{ nC}$
- $Q_{gd} = 3.3 \text{ nC}$

**Gate-Body leakage current**

- $I_{GAR} = 8.7 \text{ ns}$
- $I_{AR} = 7 \text{ ns}$
- $I_{D(ON)} = 18 \text{ ns}$

**Reverse Transfer Capacitance**

- $R_{rr} = 12 \text{ nC}$
- $Q_{rr} = 25 \text{ nC}$
- $Q_{DAR} = 30 \text{ nC}$

**Body Diode Reverse Recovery Charge**

- $I_{F(10A)} = 25 \text{ nC}$
- $dI/dt=100A/\mu s$
- $I_{F(10A)} = 30 \text{ nC}$
- $dI/dt=100A/\mu s$

A: The value of $R_{thJ}$ is measured with the device mounted on 1 in $^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_a = 25^\circ C$.

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

C: The $R_{thJ}$ is the sum of the thermal impedance from junction to lead $R_{thJ}$ 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 in $^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_a=25^\circ C$. The SOA curve provides a single pulse rating.

F: The current rating is based on the $t \leq 10s$ thermal resistance rating.

G: $E_{mu}$ and $I_{mu}$ ratings are based on low frequency and duty cycles to keep $T_J=25^\circ C$.

Rev7: Nov. 2010

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES 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.

Alpha & Omega Semiconductor, Ltd. www.aosmd.com
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1: On-Region Characteristics

Figure 2: Transfer Characteristics

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

Figure 4: On-Resistance vs. Junction Temperature

Figure 5: On-Resistance vs. Gate-Source Voltage

Figure 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)

Alpha & Omega Semiconductor, Ltd. www.aosmd.com
Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

Diode Recovery Test Circuit & Waveforms