**General Description**

AO4629 uses advanced trench technology to provide excellent $R_{DS(on)}$ and low gate charge. This complementary N and P channel MOSFET configuration is ideal for low input Voltage inverter applications.

**Product Summary**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Max n-channel</th>
<th>Max p-channel</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Channel $V_{DS}=30V$</td>
<td>$I_D$</td>
<td>6A ($V_{GS}=10V$)</td>
<td>-5.5A ($V_{GS}=-10V$)</td>
<td></td>
</tr>
<tr>
<td>$V_{GS}$</td>
<td>$R_{DS(on)}$</td>
<td>&lt; 30mΩ ($V_{GS}=10V$)</td>
<td>&lt; 41mΩ ($V_{GS}=-10V$)</td>
<td></td>
</tr>
<tr>
<td>$T_A=70°C$</td>
<td>$R_{DS(on)}$</td>
<td>&lt; 42mΩ ($V_{GS}=4.5V$)</td>
<td>&lt; 74mΩ ($V_{GS}=-4.5V$)</td>
<td></td>
</tr>
<tr>
<td>100% UIS Tested</td>
<td></td>
<td></td>
<td>100% UIS Tested</td>
<td></td>
</tr>
<tr>
<td>100% $R_g$ Tested</td>
<td></td>
<td></td>
<td>100% $R_g$ Tested</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Max n-channel</th>
<th>Max p-channel</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-Source Voltage</td>
<td>$V_{DS}$</td>
<td>30</td>
<td>-30</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>$V_{GS}$</td>
<td>±20</td>
<td>±20</td>
<td>V</td>
</tr>
<tr>
<td>Continuous Drain Current</td>
<td>$I_D$</td>
<td>6</td>
<td>-5.5</td>
<td>A</td>
</tr>
<tr>
<td>$T_A=25°C$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$T_A=70°C$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulsed Drain Current $^C$</td>
<td>$I_{DM}$</td>
<td>30</td>
<td>-25</td>
<td>A</td>
</tr>
<tr>
<td>Avalanche Current $^C$</td>
<td>$I_{AS}$, $I_{AR}$</td>
<td>10</td>
<td>17</td>
<td>A</td>
</tr>
<tr>
<td>Avalanche energy $L=0.1mH$ $^C$</td>
<td>$E_{AS}$, $E_{AR}$</td>
<td>5</td>
<td>14</td>
<td>mJ</td>
</tr>
<tr>
<td>Power Dissipation $^B$</td>
<td>$P_D$</td>
<td>2</td>
<td>2</td>
<td>W</td>
</tr>
<tr>
<td>$T_A=25°C$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$T_A=70°C$</td>
<td></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></td>
<td>°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 $^A$</td>
<td>$R_{JJA}$</td>
<td>48</td>
<td>62.5</td>
<td>°C/W</td>
</tr>
<tr>
<td>Maximum Junction-to-Ambient $^A$ Steady-State</td>
<td>$R_{JJA}$</td>
<td>74</td>
<td>90</td>
<td>°C/W</td>
</tr>
<tr>
<td>Maximum Junction-to-Lead Steady-State</td>
<td>$R_{JJA}$</td>
<td>32</td>
<td>40</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

**Notes:**
- $^A$ Steady-State
- $^B$ $t < 10s$
- $^C$ $I_C=25mA$ for $C=0.1mF$

**Diagram:**
- SOIC-8 package diagram
- Circuit symbol for n-channel and p-channel MOSFETs
### N-Channel 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>BV(_{DSS})</td>
<td>Drain-Source Breakdown Voltage</td>
<td>I(<em>D)=250(\mu)A, V(</em>{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(<em>{DS})=30V, V(</em>{GS})=0V</td>
<td>1</td>
<td></td>
<td></td>
<td>(\mu)A</td>
</tr>
<tr>
<td>Uses</td>
<td>Gate-Body leakage current</td>
<td>V(<em>{DS})=0V, V(</em>{GS})=±20V</td>
<td>100</td>
<td></td>
<td></td>
<td>nA</td>
</tr>
<tr>
<td>V(_{GS(th)})</td>
<td>Gate Threshold Voltage</td>
<td>V(<em>{DS})=V(</em>{GS}), I(_D)=250(\mu)A</td>
<td>1.2</td>
<td>1.8</td>
<td>2.4</td>
<td>V</td>
</tr>
<tr>
<td>I(_{D(on)})</td>
<td>On state drain current</td>
<td>V(<em>{GS})=10V, V(</em>{DS})=5V</td>
<td>30</td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>R(_{DS(on)})</td>
<td>Static Drain-Source On-Resistance</td>
<td>V(_{GS})=10V, I(_D)=6A</td>
<td>25</td>
<td>30</td>
<td>40</td>
<td>48 m(\Omega)</td>
</tr>
<tr>
<td>g(_F)</td>
<td>Forward Transconductance</td>
<td>V(_{DS})=5V, I(_D)=6A</td>
<td>15</td>
<td></td>
<td></td>
<td>(\Omega)</td>
</tr>
<tr>
<td>V(_{SD})</td>
<td>Diode Forward Voltage</td>
<td>I(<em>S)=1A, V(</em>{GS})=0V</td>
<td>0.76</td>
<td></td>
<td>1</td>
<td>V</td>
</tr>
<tr>
<td>I(_{b})</td>
<td>Maximum Body-Diode Continuous Current</td>
<td>V(<em>{GS})=0V, V(</em>{DS})=0V, f=1MHz</td>
<td>1.6</td>
<td>3.25</td>
<td>4.9</td>
<td>(\Omega)</td>
</tr>
</tbody>
</table>

#### STATIC PARAMETERS

- **C\(_{iss}\)**: Input Capacitance
- **C\(_{oss}\)**: Output Capacitance
- **C\(_{rss}\)**: Reverse Transfer Capacitance
- **R\(_{g}\)**: Gate resistance
- **R\(_{DS(ON)}\)**: Static Drain-Source On-Resistance

#### DYNAMIC PARAMETERS

- **Q\(_{i}\)**: Total Gate Charge
- **Q\(_{g}\)**: Gate Source Charge
- **Q\(_{gd}\)**: Gate Drain Charge
- **t\(_{D(on)}\)**: Turn-On Delay Time
- **t\(_{D(off)}\)**: Turn-Off Delay Time
- **t\(_{rr}\)**: Turn-Off Fall Time
- **I\(_{br}\)**: Body Diode Reverse Recovery Time
- **Q\(_{fr}\)**: Body Diode Reverse Recovery Charge

#### SWITCHING PARAMETERS

- **Q\(_{i}\)**: Total Gate Charge
- **Q\(_{g}\)**: Gate Source Charge
- **Q\(_{gd}\)**: Gate Drain Charge
- **t\(_{D(on)}\)**: Turn-On Delay Time
- **t\(_{D(off)}\)**: Turn-Off Delay Time
- **t\(_{rr}\)**: Turn-Off Fall Time
- **I\(_{br}\)**: Body Diode Reverse Recovery Time
- **Q\(_{fr}\)**: Body Diode Reverse Recovery Charge

A. The value of R\(_{LX}\) is measured with the device mounted on 1in\(^2\) FR-4 board with 2oz. Copper, in a still air environment with T\(_{A}\) =-25°C. The value in any given application depends on the user’s specific board design.

B. The power dissipation P\(_D\) is based on T\(_{J(MAX)}\)=150°C, using ≤ 10s junction-to-ambient thermal resistance.

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\(_{LX}\) is the sum of the thermal impedence from junction to lead R\(_{JL}\) and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300\(\mu\)s pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedence which is measured with the device mounted on 1in\(^2\) FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T\(_{J(MAX)}\)=150°C. The SOA curve provides a single pulse rating.

---

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N-Channel: 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)
N-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7: Gate-Charge Characteristics

![Gate-Charge Characteristics](image)

Figure 8: Capacitance Characteristics

![Capacitance Characteristics](image)

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

![Maximum Forward Biased Safe Operating Area](image)

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

![Single Pulse Power Rating](image)

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

![Normalized Maximum Transient Thermal Impedance](image)
Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

Diode Recovery Test Circuit & Waveforms
### P-Channel Electrical Characteristics (T<sub> Tamb </sub>= 25°C unless otherwise noted)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BV&lt;sub&gt;DS&lt;/sub&gt;</td>
<td>Drain-Source Breakdown Voltage</td>
<td>-30</td>
<td>-1</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>ID&lt;sub&gt;DS&lt;/sub&gt;</td>
<td>Zero Gate Voltage Drain Current</td>
<td>-30 V, V&lt;sub&gt;GS&lt;/sub&gt; = 0V</td>
<td>-5</td>
<td>-</td>
<td>µA</td>
</tr>
<tr>
<td>I&lt;sub&gt;ON&lt;/sub&gt;</td>
<td>Gate-Body leakage current</td>
<td>100</td>
<td>-2</td>
<td>-2.5</td>
<td>nA</td>
</tr>
<tr>
<td>V&lt;sub&gt;GS(th)&lt;/sub&gt;</td>
<td>Gate Threshold Voltage</td>
<td>-1.5</td>
<td>-1</td>
<td>-2</td>
<td>V</td>
</tr>
<tr>
<td>ID&lt;sub&gt;ON&lt;/sub&gt;</td>
<td>On state drain current</td>
<td>-25</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R&lt;sub&gt;DS(ON)&lt;/sub&gt;</td>
<td>Static Drain-Source On-Resistance</td>
<td>-10 V, I&lt;sub&gt;B&lt;/sub&gt;=-5.5A</td>
<td>32</td>
<td>41</td>
<td>mΩ</td>
</tr>
<tr>
<td>g&lt;sub&gt;F&lt;/sub&gt;</td>
<td>Forward Transconductance</td>
<td>-5.5V, I&lt;sub&gt;B&lt;/sub&gt;=-5.5A</td>
<td>13</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>V&lt;sub&gt;SD&lt;/sub&gt;</td>
<td>Diode Forward Voltage</td>
<td>-0.76</td>
<td>-0.76</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>r&lt;sub&gt;B&lt;/sub&gt;</td>
<td>Maximum Body-Diode Continuous Current</td>
<td>-2.5</td>
<td>A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### STATIC PARAMETERS

- **Input Capacitance**
  - V<sub>DS</sub>=0V, V<sub>GS</sub>=15V, f=1MHz
  - 520 pF

- **Output Capacitance**
  - V<sub>DS</sub>=0V, V<sub>GS</sub>=15V, f=1MHz
  - 100 pF

- **Reverse Transfer Capacitance**
  - 65 pF

- **Gate resistance**
  - V<sub>DS</sub>=0V, V<sub>GS</sub>=±20V
  - 3.5 7.5 11.5 Ω

#### DYNAMIC PARAMETERS

- **Total Gate Charge**
  - V<sub>GS</sub>=-10V, V<sub>DS</sub>=15V, I<sub>B</sub>=-5.5A
  - 9.2 11 nC

- **Gate Source Charge**
  - 4.6 6 nC

- **Gate Drain Charge**
  - 1.6 nC

- **Turn-On Delay Time**
  - 2.2 nC

- **Turn-On Rise Time**
  - 7.5 ns

- **Turn-Off Delay Time**
  - 5.5 ns

- **Turn-Off Fall Time**
  - 19 ns

- **Body Diode Reverse Recovery Time**
  - 7 ns

- **Body Diode Reverse Recovery Charge**
  - 11 ns

#### SWITCHING PARAMETERS

- **Q<sub>G(10V)</sub>** Total Gate Charge
  - V<sub>GS</sub>=-10V, V<sub>DS</sub>=15V, I<sub>B</sub>=-5.5A
  - 9.2 11 nC

- **Q<sub>G(4.5V)</sub>** Total Gate Charge
  - V<sub>GS</sub>=-10V, V<sub>DS</sub>=15V, I<sub>B</sub>=-5.5A
  - 4.6 6 nC

- **Q<sub>gs</sub>** Gate Source Charge
  - 1.6 nC

- **Q<sub>gd</sub>** Gate Drain Charge
  - 2.2 nC

- **Q<sub>on</sub>** Turn-On Delay Time
  - 7.5 ns

- **Q<sub>off</sub>** Turn-Off Delay Time
  - 5.5 ns

- **Q<sub.getRuntime</sub>** Turn-Off Fall Time
  - 19 ns

- **Q<sub>body</sub>** Body Diode Reverse Recovery Charge
  - 11 ns

- **Q<sub>leak</sub>** Body Diode Reverse Recovery Charge
  - 5.5 10 nC

---

A. The value of R<sub>θJA</sub> is measured with the device mounted on 1in x 2in FR-4 board with 2oz. Copper, in a still air environment with T<sub> Tamb </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> JMAX </sub>= 150°C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T<sub> JMAX </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 lead R<sub>θJL</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 impedence which is measured with the device mounted on 1in x 2in FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub> JMAX </sub>= 150°C. The SOA curve provides a single pulse rating.

---

**Important Note:**

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P-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

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P-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

**Figure 7: Gate-Charge Characteristics**

- $V_{DS}=15\text{V}$, $I_D=5.5\text{A}$
- $Q_g$ vs $V_{GS}$

**Figure 8: Capacitance Characteristics**

- $C_{iss}$, $C_{oss}$, $C_{rss}$
- $V_{DS}=-15\text{V}$, $I_D=-5.5\text{A}$
- Capacitance vs $V_{DS}$

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

- $R_{DS(on)}$
- $T_J=150\degree\text{C}$, $T_J=25\degree\text{C}$
- $I_D$ vs $V_{DS}$

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

- $Z_{\theta JA}$, Normalized Transient Thermal Impedance
- $D=T_{on}/T_{PK}$, $T_{on}=P_{DM}Z_{\theta JA}R_{th JA}$
- $R_{th JA}=90\degree\text{C/W}$
- $T_{on}=10\mu\text{s}$, $1\text{ms}$, $10\text{ms}$, $10\text{s}$
- $P_{D}$ vs $V_{DS}$, $T_{on}$

In descending order

- $D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01$, single pulse

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

- $Z_{\theta JA}$ vs $P_{D}$, $T_{on}$

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