AOCA32301
30V Common-Drain Dual N-Channel MOSFET

General Description
- Trench Power MOSFET technology
- Low R<sub>DS(ON)</sub>
- ESD protection
- Common drain configuration for design simplicity
- RoHS and Halogen-Free Compliant

Product Summary
- V<sub>SS</sub> 30V
- R<sub>DS(ON)</sub> (at V<sub>GS</sub>=10V) < 18mΩ
- R<sub>DS(ON)</sub> (at V<sub>GS</sub>=8V) < 19mΩ
- R<sub>DS(ON)</sub> (at V<sub>GS</sub>=4.5V) < 24mΩ

Applications
- Battery protection switch
- Type C - PD load switch

Applications
Typical ESD protection
HBM Class 2

Symbol
V<sub>SS</sub>
V<sub>GS</sub>
T<sub>A</sub> = 25°C
I<sub>S</sub>
I<sub>SM</sub>
T<sub>A</sub> = 25°C
P<sub>B</sub>

Parameter
Source-Source Voltage
Gate-Source Voltage
Source Current(DC) <br> T<sub>A</sub> = 25°C
Source Current(Pulse) <br> T<sub>A</sub> = 25°C
Power Dissipation <br> T<sub>A</sub> = 25°C
Junction and Storage Temperature Range

Symbol
V<sub>SS</sub>
V<sub>GS</sub>
I<sub>S</sub>
I<sub>SM</sub>
P<sub>B</sub>

Rating
30
±16
9
50
1.9
-55 to 150

Units
V
V
A
W
°C

Absolute Maximum Ratings
T<sub>A</sub>< 25°C unless otherwise noted

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Source-Source Voltage</td>
<td>V&lt;sub&gt;SS&lt;/sub&gt;</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;</td>
<td>±16</td>
<td>V</td>
</tr>
<tr>
<td>Source Current(DC) T&lt;sub&gt;A&lt;/sub&gt; = 25°C</td>
<td>I&lt;sub&gt;S&lt;/sub&gt;</td>
<td>9</td>
<td>A</td>
</tr>
<tr>
<td>Source Current(Pulse) T&lt;sub&gt;A&lt;/sub&gt; = 25°C</td>
<td>I&lt;sub&gt;SM&lt;/sub&gt;</td>
<td>50</td>
<td></td>
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<tr>
<td>Power Dissipation T&lt;sub&gt;A&lt;/sub&gt; = 25°C</td>
<td>P&lt;sub&gt;B&lt;/sub&gt;</td>
<td>1.9</td>
<td>W</td>
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<tr>
<td>Junction and Storage Temperature Range</td>
<td>T&lt;sub&gt;JA&lt;/sub&gt;, T&lt;sub&gt;STG&lt;/sub&gt;</td>
<td>-55 to 150</td>
<td>°C</td>
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Thermal Characteristics

<table>
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<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Typical</th>
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<tbody>
<tr>
<td>Maximum Junction-to-Ambient ≤ 10s</td>
<td>R&lt;sub&gt;JA&lt;/sub&gt;</td>
<td>55</td>
</tr>
<tr>
<td>Maximum Junction-to-Ambient Steady-State</td>
<td></td>
<td>65</td>
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Note 1. I<sub>S</sub> rated value is based on bare silicon. Mounted on 70mm x 70mm FR-4 board.

Note 2. PW < 10 μs pulses, duty cycle 1% max.
### 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>BV&lt;sub&gt;SSS&lt;/sub&gt;</td>
<td>Source-Source Breakdown Voltage</td>
<td>I&lt;sub&gt;S&lt;/sub&gt;=250μA, V&lt;sub&gt;GS&lt;/sub&gt;=0V Test Circuit 6</td>
<td>30</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>I&lt;sub&gt;SSS&lt;/sub&gt;</td>
<td>Zero Gate Voltage Source Current</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=30V, V&lt;sub&gt;GS&lt;/sub&gt;=0V Test Circuit 1</td>
<td>1</td>
<td></td>
<td></td>
<td>μA</td>
</tr>
<tr>
<td>I&lt;sub&gt;GSS&lt;/sub&gt;</td>
<td>Gate leakage current</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=0V, V&lt;sub&gt;GS&lt;/sub&gt;=±16V Test Circuit 2</td>
<td>±10</td>
<td></td>
<td></td>
<td>μA</td>
</tr>
<tr>
<td>V&lt;sub&gt;GS(th)&lt;/sub&gt;</td>
<td>Gate Threshold Voltage</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=V&lt;sub&gt;GS&lt;/sub&gt;, I&lt;sub&gt;G&lt;/sub&gt;=250μA Test Circuit 3</td>
<td>1.1</td>
<td>1.5</td>
<td>1.9</td>
<td>V</td>
</tr>
<tr>
<td>R&lt;sub&gt;SS(ON)&lt;/sub&gt;</td>
<td>Static Source to Source On-Resistance</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=10V, I&lt;sub&gt;G&lt;/sub&gt;=4A Test Circuit 4</td>
<td>10</td>
<td>14.5</td>
<td>18</td>
<td>mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td>21</td>
<td>26</td>
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<td></td>
<td></td>
<td></td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=8V, I&lt;sub&gt;G&lt;/sub&gt;=4A Test Circuit 4</td>
<td>11</td>
<td>15.2</td>
<td>19</td>
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<td></td>
<td></td>
<td></td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=4.5V, I&lt;sub&gt;G&lt;/sub&gt;=4A Test Circuit 4</td>
<td>13</td>
<td>18.6</td>
<td>24</td>
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<tr>
<td>g&lt;sub&gt;fS&lt;/sub&gt;</td>
<td>Forward Transconductance</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;=5V, I&lt;sub&gt;G&lt;/sub&gt;=4A Test Circuit 3</td>
<td>22</td>
<td></td>
<td></td>
<td>S</td>
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<tr>
<td>V&lt;sub&gt;FSS&lt;/sub&gt;</td>
<td>Forward Source to Source Voltage</td>
<td>I&lt;sub&gt;S&lt;/sub&gt;=1A, V&lt;sub&gt;GS&lt;/sub&gt;=0V Test Circuit 5</td>
<td>0.7</td>
<td>1</td>
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<td>V</td>
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#### STATIC PARAMETERS

#### DYNAMIC PARAMETERS

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<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Value</th>
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<tbody>
<tr>
<td>R&lt;sub&gt;f&lt;/sub&gt;</td>
<td>Gate resistance</td>
<td>f=1MHz</td>
<td>1.5 Ω</td>
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#### SWITCHING PARAMETERS

<table>
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<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Value</th>
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<tbody>
<tr>
<td>Q&lt;sub&gt;g&lt;/sub&gt;</td>
<td>Total Gate Charge</td>
<td>V&lt;sub&gt;G1S1&lt;/sub&gt;=10V, V&lt;sub&gt;GS&lt;/sub&gt;=15V, I&lt;sub&gt;G&lt;/sub&gt;=4A</td>
<td>24.5 nC</td>
</tr>
<tr>
<td>t&lt;sub&gt;on&lt;/sub&gt;</td>
<td>Turn-On DelayTime</td>
<td>V&lt;sub&gt;G1S1&lt;/sub&gt;=10V, V&lt;sub&gt;GS&lt;/sub&gt;=15V, R&lt;sub&gt;L&lt;/sub&gt;=3.75Ω, Test Circuit8</td>
<td>9 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;G1S1&lt;/sub&gt;=10V, V&lt;sub&gt;GS&lt;/sub&gt;=15V, R&lt;sub&gt;L&lt;/sub&gt;=3.75Ω, Test Circuit8</td>
<td>23 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>30.5 ns</td>
</tr>
<tr>
<td>t&lt;sub&gt;f&lt;/sub&gt;</td>
<td>Turn-Off Fall Time</td>
<td></td>
<td>13 ns</td>
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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1: On-Region Characteristics

Figure 2: Transfer Characteristics

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

Figure 4: On-Resistance vs. Junction Temperature

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

Figure 6: Forward Source to Source Characteristics
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7: Gate-Charge Characteristics

Figure 8: Maximum Forward Biased Safe Operating Area (Note1)

Figure 9: Single Pulse Power Rating Junction-to-Ambient (Note1)

Figure 10: Normalized Maximum Transient Thermal Impedance (Note1)
When FET1 is measured between GATE and SOURCE of FET2 are shorted

TEST CIRCUIT 1 Iss
POSITIVE VSS FOR ISSS+
NEGATIVE VSS FOR ISSS-

TEST CIRCUIT 2 Igss1,2
POSITIVE VGS FOR IGSS1+
NEGATIVE VGS FOR IGSS1-
When FET1 is measured between GATE and SOURCE of FET2 are shorted

TEST CIRCUIT 3 Vgs(off)
When FET1 is measured between GATE and SOURCE of FET2 are shorted

TEST CIRCUIT 4 Rss(on)

TEST CIRCUIT 5 Vf(1,2)
4.5V
When FET1 measured FET2 VGS<4.5V
VGS=0

TEST CIRCUIT 6 BVoss
POSITIVE VSS FOR ISSS+
NEGATIVE VSS FOR ISSS-

TEST CIRCUIT 7 BVgs1,2
POSITIVE VSS FOR ISSS+
NEGATIVE VSS FOR ISSS-
When FET1 is measured between GATE and SOURCE of FET2 are shorted

TEST CIRCUIT 8 Switching time