General Description

- Trench Power AlphaMOS (αMOS LV) technology
- Low $R_{DS(ON)}$
- Optimized for load switch
- High Current Capability
- ESD protected
- RoHS and Halogen-Free Compliant

Applications

- NB Battery Pack

Product Summary

- $V_{DS}$: 30V
- $I_{D}$ (at $V_{GS}$=10V): 34A
- $R_{DS(ON)}$ (at $V_{GS}$=10V): $< 3.7 \text{mΩ}$
- $R_{DS(ON)}$ (at $V_{GS}$=4.5V): $< 5.2 \text{mΩ}$

- Typical ESD protection: HBM Class 2
- 100% UIS Tested
- 100% $R_g$ Tested

Orderable Part Number: AON7566

Package Type: DFN 3x3 EP

Form: Tape & Reel

Minimum Order Quantity: 5000

Absolute Maximum Ratings $T_A=25\degree C$ 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 $^A$</td>
<td>$I_D$, $I_{D(SM)}$</td>
<td>34</td>
<td>A</td>
</tr>
<tr>
<td>Pulsed Drain Current $^C$</td>
<td>$I_{DSM}$</td>
<td>135</td>
<td></td>
</tr>
<tr>
<td>Avalanche Current $^C$</td>
<td>$I_{AS}$</td>
<td>30</td>
<td>A</td>
</tr>
<tr>
<td>Avalanche energy $^C$</td>
<td>$E_{AS}$</td>
<td>45</td>
<td>mJ</td>
</tr>
<tr>
<td>$V_{DS}$ Spike</td>
<td>10µs</td>
<td>$V_{SPIKE}$</td>
<td>36</td>
</tr>
<tr>
<td>Power Dissipation $^B$</td>
<td>$P_D$, $P_{D(SM)}$</td>
<td>30, 5</td>
<td>W</td>
</tr>
<tr>
<td>Junction and Storage Temperature Range</td>
<td>$T_J$, $T_{STG}$</td>
<td>-55 to 150</td>
<td>$\degree C$</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>$R_{JUA}$</td>
<td>20</td>
<td>25</td>
<td>°C/W</td>
</tr>
<tr>
<td>Maximum Junction-to-Ambient $^B$ Steady-State</td>
<td>$R_{JUC}$</td>
<td>3.5</td>
<td>4.2</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

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### Electrical Characteristics ($T_J=25\degree\text{C}$ 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>$V_{DSS}$</td>
<td>Drain-Source Breakdown Voltage</td>
<td>$I_D=250\mu\text{A}, V_{GS}=0\text{V}$</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>$V_{GS}=30\text{V}, V_{DS}=0\text{V}$</td>
<td></td>
<td>1</td>
<td></td>
<td>$\mu\text{A}$</td>
</tr>
<tr>
<td>$I_{ES}$</td>
<td>Gate-Body leakage current</td>
<td>$V_{GS}=0\text{V}, V_{DS}=\pm20\text{V}$</td>
<td></td>
<td>$\pm10$</td>
<td></td>
<td>$\mu\text{A}$</td>
</tr>
<tr>
<td>$V_{GS(th)}$</td>
<td>Gate Threshold Voltage</td>
<td>$V_{GS}=V_{DS}, I_D=250\mu\text{A}$</td>
<td>1.4</td>
<td>1.9</td>
<td>2.4</td>
<td>V</td>
</tr>
<tr>
<td>$R_{DS(on)}$</td>
<td>Static Drain-Source On-Resistance</td>
<td>$V_{GS}=10\text{V}, I_D=20\text{A}$</td>
<td>3.0</td>
<td>3.7</td>
<td>5.5</td>
<td>m$\Omega$</td>
</tr>
<tr>
<td>$R_F$</td>
<td>Forward Transconductance</td>
<td>$V_{DS}=5\text{V}, I_D=20\text{A}$</td>
<td>90</td>
<td></td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>$V_{SD}$</td>
<td>Diode Forward Voltage</td>
<td>$I_F=1\text{A}, V_{GS}=0\text{V}$</td>
<td>0.68</td>
<td>1</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$C_{iss}$</td>
<td>Maximum Body-Diode Continuous Current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>34 A</td>
</tr>
</tbody>
</table>

### STATIC PARAMETERS

- **$C_{iss}$**: Input Capacitance
  - $V_{GS}=0\text{V}, V_{DS}=15\text{V}, f=1\text{MHz}$
  - Min: 3000 pF
  - Typ: 330 pF
  - Max: 600 pF
- **$C_{oss}$**: Output Capacitance
  - $V_{GS}=0\text{V}, V_{DS}=15\text{V}$, $f=1\text{MHz}$
  - Min: 280 pF
- **$C_{rss}$**: Reverse Transfer Capacitance
  - Min: 1 pF
- **$R_g$**: Gate resistance
  - $f=1\text{MHz}$
  - Min: 1 Ω
  - Typ: 2 Ω
  - Max: 3 Ω

### SWITCHING PARAMETERS

- **$Q_{on}(10\text{V})$**: Total Gate Charge
  - $V_{GS}=10\text{V}, V_{DS}=15\text{V}, I_D=20\text{A}$
  - Min: 57 nC
  - Typ: 80 nC
- **$Q_{on}(4.5\text{V})$**: Total Gate Charge
  - $V_{GS}=10\text{V}, V_{DS}=15\text{V}$, $R_L=0.75\Omega$
  - Min: 28 nC
  - Typ: 40 nC
- **$Q_{gs}$**: Gate Source Charge
  - Min: 9.5 nC
- **$Q_{gd}$**: Gate Drain Charge
  - Min: 10 nC
- **$t_{on}$**: Turn-On Rise Time
  - $V_{GS}=10\text{V}, V_{DS}=15\text{V}, R_L=0.75\Omega$
  - Min: 7.5 ns
- **$t_{off}$**: Turn-Off Delay Time
  - $R_{GEN}=3\Omega$
  - Min: 49 ns
- **$t_f$**: Turn-Off Fall Time
  - Min: 13 ns
- **$t_r$**: Body Diode Reverse Recovery Time
  - $I_F=20\text{A}, \frac{dI_F}{dt}=500\text{A/μs}$
  - Min: 12 ns
- **$Q_{rr}$**: Body Diode Reverse Recovery Charge
  - $I_F=20\text{A}, \frac{dI_F}{dt}=500\text{A/μs}$
  - Min: 20 nC

### DYNAMIC PARAMETERS

- **$C_{gs}$**: Input Capacitance
  - $V_{GS}=0\text{V}, V_{DS}=15\text{V}$, $f=1\text{MHz}$
  - Min: 3020 pF
- **$C_{oss}$**: Output Capacitance
  - Min: 330 pF
- **$C_{rss}$**: Reverse Transfer Capacitance
  - Min: 350 pF
- **$R_g$**: Gate resistance
  - $f=1\text{MHz}$
  - Min: 1 Ω
  - Typ: 2 Ω
  - Max: 3 Ω

A. The value of $R_{thA}$ is measured with the device mounted on 1in$^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A=25\degree\text{C}$. The Power dissipation $P_{SM}$ is based on $R_{thA}$ ts 10s and the maximum allowed junction temperature of 150$\degree\text{C}$. The value in any given application depends on the user’s specific board design.

B. The power dissipation $P_{D}$ is based on $T_{J(MAX)}=150\degree\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Single pulse width limited by junction temperature $T_{J(MAX)}=150\degree\text{C}$. The SOA curve provides a single pulse rating.

D. The $R_{thJA}$ is the sum of the thermal impedance from junction to case $R_{thJC}$ and case to ambient.

E. The $R_{thJA}$ is the sum of the thermal impedance from junction to case $R_{thJC}$ and case to ambient.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}=150\degree\text{C}$. 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$^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A=25\degree\text{C}$.
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

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: Power De-rating (Note F)

Figure 13: Current De-rating (Note F)

Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

\[ D = \frac{T_{on}}{T_{PK}} \]

\[ T_{JPK} = T_A + P_{DM} \cdot \theta_{JA} \cdot R_{\theta JA} \]
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