General Description

• Trench Power MOSFET technology
• Low $R_{DS(ON)}$
• Low Gate Charge
• RoHS and Halogen-Free Compliant

Applications

• Ideal for Load Switching

Product Summary

$V_{DS}$  30V

$I_D$ (at $V_{GS}$=10V)  3.7A

$R_{DS(ON)}$ (at $V_{GS}$=10V)  < 51mΩ

$R_{DS(ON)}$ (at $V_{GS}$=4.5V)  < 56mΩ

$R_{DS(ON)}$ (at $V_{GS}$=2.5V)  < 72mΩ

ESD protection

Applications

Symbol

$V_{DS}$

$V_{GS}$

$I_D$

$T_{J}$, $T_{STG}$

Parameter

Drain-Source Voltage

Gate-Source Voltage

Continuous Drain Current

Pulsed Drain Current

Power Dissipation

Junction and Storage Temperature Range

Symbol

$V_{DS}$

$V_{GS}$

$I_D$

$I_{OM}$

$P_D$

$T_{J}$, $T_{STG}$

Maximum

30

±12

3.7

2.9

1.1

-55 to 150

Unit

V

V

A

°C

°C/W

°C/W

°C/W

Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Orderable Part Number

AOSN32338C

Package Type

SC70-3

Form

Tape & Reel

Minimum Order Quantity

3000

Thermal Characteristics

Parameter

Maximum Junction-to-Ambient

Maximum Junction-to-Ambient

Maximum Junction-to-Lead

Symbol

$t \leq 10s$

Steady-State

Steady-State

$t_{JUA}$

$R_{JUA}$

$R_{JUL}$

Typ

110

110

60

Max

90

135

72

Units

°C/W

°C/W

°C/W
### 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>BVDSS</td>
<td>Drain-Source Breakdown Voltage</td>
<td>ID=250μA, VGS=0V</td>
<td>30</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>IDSS</td>
<td>Zero Gate Voltage Drain Current</td>
<td>VDS=30V, VGS=0V</td>
<td>1</td>
<td>5</td>
<td></td>
<td>μA</td>
</tr>
<tr>
<td>IVGSS</td>
<td>Gate-Body leakage current</td>
<td>VDS=0V, VGS=±12V</td>
<td>±10</td>
<td></td>
<td></td>
<td>μA</td>
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<tr>
<td>VGS(ON)</td>
<td>Gate Threshold Voltage</td>
<td>VDS=VGS, ID=250μA</td>
<td>0.5</td>
<td>1</td>
<td>1.5</td>
<td>V</td>
</tr>
<tr>
<td>RDS(ON)</td>
<td>Static Drain-Source On-Resistance</td>
<td>VGS=10V, IG=3.7A</td>
<td>42</td>
<td>51</td>
<td></td>
<td>mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VGS=4.5V, IG=3.5A</td>
<td>58</td>
<td>70</td>
<td></td>
<td>mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VGS=2.5V, IG=3.1A</td>
<td>54</td>
<td>72</td>
<td></td>
<td>mΩ</td>
</tr>
<tr>
<td>gFS</td>
<td>Forward Transconductance</td>
<td>VDS=5V, IG=3.7A</td>
<td>20</td>
<td></td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>VSD</td>
<td>Diode Forward Voltage</td>
<td>IG=1A, VGS=0V</td>
<td>0.7</td>
<td>1</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>IS</td>
<td>Maximum Body-Diode Continuous Current</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>A</td>
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</tbody>
</table>

### DYNAMIC PARAMETERS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ciss</td>
<td>Input Capacitance</td>
<td>VGS=0V, VDS=15V, f=1MHz</td>
<td>340 pF</td>
</tr>
<tr>
<td>Coss</td>
<td>Output Capacitance</td>
<td></td>
<td>30 pF</td>
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<tr>
<td>Cgss</td>
<td>Reverse Transfer Capacitance</td>
<td></td>
<td>25 pF</td>
</tr>
<tr>
<td>Rg</td>
<td>Gate resistance</td>
<td>f=1MHz</td>
<td>4 8 12 Ω</td>
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</tbody>
</table>

### SWITCHING PARAMETERS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qg(10V)</td>
<td>Total Gate Charge</td>
<td>VGS=10V, VDS=15V, IG=3.7A</td>
<td>8 16 nC</td>
</tr>
<tr>
<td>Qg(4.5V)</td>
<td>Total Gate Charge</td>
<td></td>
<td>4 8 nC</td>
</tr>
<tr>
<td>Qgs</td>
<td>Gate Source Charge</td>
<td></td>
<td>1 nC</td>
</tr>
<tr>
<td>Qgd</td>
<td>Gate Drain Charge</td>
<td></td>
<td>1.2 nC</td>
</tr>
<tr>
<td>tON</td>
<td>Turn-On Delay Time</td>
<td></td>
<td>2.5 ns</td>
</tr>
<tr>
<td>tr</td>
<td>Turn-On Rise Time</td>
<td>VGS=10V, VDS=15V, RL=4.05Ω</td>
<td>3 ns</td>
</tr>
<tr>
<td>tOFF</td>
<td>Turn-Off Delay Time</td>
<td>RGEN=3Ω</td>
<td>30 ns</td>
</tr>
<tr>
<td>tf</td>
<td>Turn-Off Fall Time</td>
<td></td>
<td>5 ns</td>
</tr>
<tr>
<td>trr</td>
<td>Body Diode Reverse Recovery Time</td>
<td>IG=3.7A, di/dt=500A/μs</td>
<td>5.5 μs</td>
</tr>
<tr>
<td>Qrr</td>
<td>Body Diode Reverse Recovery Charge</td>
<td>IG=3.7A, di/dt=500A/μs</td>
<td>4 nC</td>
</tr>
</tbody>
</table>

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A. The value of RqJA is measured with the device mounted on 1in² 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 RqJA is the sum of the thermal impedance from junction to lead RqJL 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-air thermal impedance which is measured with the device mounted on 1in² 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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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-Ambient (Note F)

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