AOW360A70/AOWF360A70
700V, αMOS™ N-Channel Power Transistor

General Description

- Proprietary αMOS™ technology
- Low R_{D(S,ON)}
- Optimized switching parameters for better EMI performance
- Enhanced body diode for robustness and fast reverse recovery

Applications

- Flyback for SMPS
- Charger, PD Adapter, TV, lighting.

Product Summary

- V_{DS} @ T_{J,max} 800V
- I_{DM} 48A
- R_{D(S,ON),max} < 0.36Ω
- Q_{g,typ} 22.5nC
- E_{oss} @ 400V 2.8μJ

100% UIS Tested
100% H_{B} Tested

Orderable Part Number | Package Type | Form  | Minimum Order Quantity
----------------------|--------------|-------|------------------------
AOW360A70            | TO262        | Tube  | 1000
AOWF360A70           | TO262F       | Tube  | 1000

Parameter                  | Symbol | AOW360A70 | AOWF360A70 | Units |
---------------------------|--------|-----------|------------|-------|
Drain-Source Voltage      | V_{DS} | 700       |            | V     |
Gate-Source Voltage       | V_{GS} | ±20       |            | V     |
Continuous Drain Current  | T_{C=25°C} | 12       | 12*        | A     |
                          | T_{C=100°C} | 7.6      | 7.6*       |       |
Pulsed Drain Current      | I_{RM}  | 48        |            | A     |
Avalanche Current         | I_{AR}  | 3.4       |            |       |
Repetitive avalanche energy | E_{AR} | 5.8       |            | mJ    |
Single pulsed avalanche energy | E_{AS} | 50        |            | mJ    |
MOSFET dv/dt ruggedness   | dv/dt  | 100       |            | V/ns  |
Peak diode recovery dv/dt |        | 20        |            |       |
Power Dissipation          | T_{J=25°C} | 156      | 29.5       | W     |
                          |         | 1.25      | 0.23       | W/°C  |
Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 |            | °C    |
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds | T_{L}  | 300       |            | °C    |

Thermal Characteristics

Parameter                  | Symbol | AOW360A70 | AOWF360A70 | Units |
---------------------------|--------|-----------|------------|-------|
Maximum Junction-to-Ambient | R_{th JA} | 65        | 65         | °C/W |
Maximum Case-to-sink       | R_{th CS} | 0.5       | 0.5        | °C/W |
Maximum Junction-to-Case   | R_{th JC} | 0.8       | 4.2        | °C/W |

* Drain current limited by maximum junction temperature.
## Electrical Characteristics (T_J=25°C unless otherwise noted)

### STATIC PARAMETERS

<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=250μA, V_{GS}=0V, T_J=25°C</td>
<td>700</td>
<td></td>
<td></td>
<td>V</td>
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<tr>
<td></td>
<td></td>
<td>I_D=25μA, V_{GS}=0V, T_J=150°C</td>
<td>800</td>
<td></td>
<td></td>
<td>V</td>
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<tr>
<td>BV_DSS/△T_J</td>
<td>Breakdown Voltage Temperature Coefficient</td>
<td>I_D=250μA, V_{GS}=0V</td>
<td>0.6</td>
<td></td>
<td></td>
<td>V/°C</td>
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<tr>
<td>IS</td>
<td>Zero Gate Voltage Drain Current</td>
<td>V_{GS}=700V, V_{DS}=0V</td>
<td>1</td>
<td></td>
<td></td>
<td>μA</td>
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<td>IS</td>
<td>Gate-Body leakage current</td>
<td>V_{DS}=0V, V_{GS}=20V</td>
<td>±100</td>
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<td></td>
<td>nA</td>
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<td>V_DSSDV</td>
<td>Gate Threshold Voltage</td>
<td>V_{DS}=5V, I_D=250μA</td>
<td>4</td>
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<td></td>
<td>V</td>
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<tr>
<td>R_DS(DON)</td>
<td>Static Drain-Source On-Resistance</td>
<td>V_{GS}=10V, I_D=6A</td>
<td>0.316</td>
<td>0.36</td>
<td></td>
<td>Ω</td>
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<tr>
<td>g_I</td>
<td>Forward Transconductance</td>
<td>V_{DS}=10V, I_D=6A</td>
<td>10</td>
<td></td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>V_FD</td>
<td>Diode Forward Voltage</td>
<td>I_F=6A, V_{DS}=0V</td>
<td>0.86</td>
<td>1.2</td>
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<td>V</td>
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<tr>
<td>I_S</td>
<td>Maximum Body-Diode Continuous Current</td>
<td>V_{GS}=0V, V_{DS}=100V, f=1MHz</td>
<td>12</td>
<td>A</td>
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<tr>
<td>I_FM</td>
<td>Maximum Body-Diode Pulsed Current</td>
<td>V_{GS}=0V, V_{DS}=100V, f=1MHz</td>
<td>48</td>
<td>A</td>
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### DYNAMIC PARAMETERS

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<th>Symbol</th>
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<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Ciss</td>
<td>Input Capacitance</td>
<td>V_{DS}=0V, V_{GS}=100V, f=1MHz</td>
<td>1360</td>
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<td></td>
<td>pF</td>
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<tr>
<td>Coss</td>
<td>Output Capacitance</td>
<td>V_{DS}=0V, V_{GS}=480V, f=1MHz</td>
<td>34</td>
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<td></td>
<td>pF</td>
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<tr>
<td>Ciss(V)</td>
<td>Effective output capacitance, energy related²</td>
<td>V_{GS}=0V, V_{DS}=0 to 480V, f=1MHz</td>
<td>32</td>
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<td>pF</td>
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<tr>
<td>Coss(V)</td>
<td>Effective output capacitance, time related¹</td>
<td>V_{GS}=0V, V_{DS}=100V, f=1MHz</td>
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<td>pF</td>
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<td>CGS</td>
<td>Reverse Transfer Capacitance</td>
<td>V_{GS}=0V, V_{DS}=100V, f=1MHz</td>
<td>1.7</td>
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<td>pF</td>
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<tr>
<td>R_g</td>
<td>Gate resistance</td>
<td>f=1MHz</td>
<td>2</td>
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<td>Ω</td>
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### SWITCHING PARAMETERS

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<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q_G</td>
<td>Total Gate Charge</td>
<td>V_{GS}=10V, V_{DS}=480V, I_D=6A</td>
<td>22.5</td>
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<td>nC</td>
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<td>Q_GS</td>
<td>Gate Source Charge</td>
<td>V_{GS}=10V, V_{DS}=480V, I_D=6A</td>
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<td>nC</td>
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<td>Q_Gd</td>
<td>Gate Drain Charge</td>
<td>V_{GS}=0V, V_{DS}=250μA</td>
<td>6.3</td>
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<td></td>
<td>nC</td>
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<tr>
<td>T_D(on)</td>
<td>Turn-On DelayTime</td>
<td>V_{GS}=10V, V_{DS}=400V, I_D=6A, R_D=5Ω</td>
<td>24.5</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>T_D(Off)</td>
<td>Turn-Off DelayTime</td>
<td>R_D=5Ω</td>
<td>34.5</td>
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<td>ns</td>
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<td>T_R</td>
<td>Turn-Off Fall Time</td>
<td>V_{GS}=0V, V_{DS}=250μA</td>
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<td>ns</td>
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<td>T_BR</td>
<td>Body Diode Reverse Recovery Time</td>
<td>I_D=6A, dI/dt=100A/μs, V_{DS}=400V</td>
<td>310</td>
<td></td>
<td></td>
<td>ns</td>
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<tr>
<td>Q_B</td>
<td>Body Diode Reverse Recovery Charge</td>
<td>I_D=6A, dI/dt=100A/μs, V_{DS}=400V</td>
<td>24.5</td>
<td>A</td>
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</tbody>
</table>

A. The value of R_{JJA} is measured with the device in a still air environment with T_A=25°C.
B. The power dissipation P_D is based on T_{J(MAX)}=150°C in a TO225 package, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C.
D. The R_{JJA} is the sum of the thermal impedance from junction to case R_{JC} and case 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-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=150°C. The SOA curve provides a single pulse rating.
G. L=60mH, I_{AS}=1.3A, R_g=25Ω, Starting T_J=25°C.
H. C_{iss} is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{(BR)DSS}.
I. C_{oss} is a fixed capacitance that gives the same charging time as C_{iss} while V_{DS} is rising from 0 to 80% V_{(BR)DSS}.

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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: Break Down vs. Junction Temperature

Figure 6: Body-Diode Characteristics
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7: Gate-Charge Characteristics

Figure 8: Capacitance Characteristics

Figure 9: Coss stored Energy

Figure 10: Current De-rating (Note F)

Figure 11: Maximum Forward Biased Safe Operating Area for AOW360A70 (Note F)

Figure 12: Maximum Forward Biased Safe Operating Area for AOWF360A70 (Note F)
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 13: Normalized Maximum Transient Thermal Impedance for AOW360A70(Note F)

Figure 14: Normalized Maximum Transient Thermal Impedance for AOWF360A70 (Note F)

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

\[ Z_{q JC} = \frac{T_{PK}}{P_{DM} Z_{JC}} \]

\[ R_{JC} = 0.8 \degree C/W \]

In descending order

\[ D = 0.5, 0.3, 0.1, 0.05, 0.02, 0.01, \text{ single pulse} \]