



General Description

- Proprietary α MOS5™ technology
- Low $R_{DS(ON)}$
- Optimized switching parameters for better EMI performance
- Enhanced body diode for robustness and fast reverse recovery

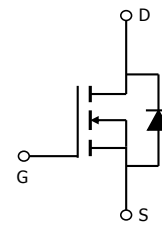
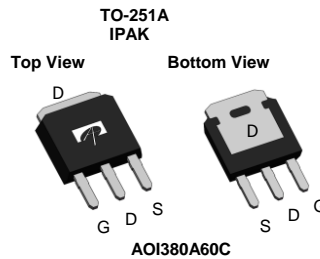
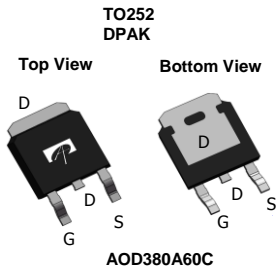
Applications

- SMPS with PFC, Flyback and LLC topologies
- Silver ATX ,adapter, TV, lighting, Server power

Product Summary

| | |
|----------------------|-----------------|
| $V_{DS} @ T_{j,max}$ | 700V |
| I_{DM} | 44A |
| $R_{DS(ON),max}$ | < 0.38 Ω |
| $Q_{g,typ}$ | 20nC |
| $E_{oss} @ 400V$ | 2.6 μ J |

100% UIS Tested
100% R_g Tested



| Orderable Part Number | Package Type | Form | Minimum Order Quantity |
|-----------------------|--------------|-----------|------------------------|
| AOD380A60C | TO252 | Tape&Reel | 2500 |
| AOI380A60C | TO251A | Tube | 3500 |

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

| Parameter | Symbol | Maximum | Units |
|---|----------------|---------------------------------|------------------|
| Drain-Source Voltage | V_{DS} | 600 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current | I_D | $T_C=25^\circ\text{C}$ | 11 |
| | | $T_C=100^\circ\text{C}$ | 7.2 |
| Pulsed Drain Current ^C | I_{DM} | 44 | A |
| Avalanche Current ^C | I_{AR} | 2.5 | A |
| Repetitive avalanche energy ^C | E_{AR} | 3.1 | mJ |
| Single pulsed avalanche energy ^G ($T_J=25^\circ\text{C}$, $V_{GS}=10\text{V}$, $I_L=2\text{Apk}$, $L=105\text{mH}$, $R_{GS}=25\Omega$) | E_{AS} | 210 | mJ |
| MOSFET dv/dt ruggedness | dv/dt | 100 | V/ns |
| Peak diode recovery dv/dt | | 20 | V/ns |
| Power Dissipation ^B | P_D | $T_C=25^\circ\text{C}$ | 125 |
| | | Derate above 25°C | 1.0 |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |
| Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds | T_L | 300 | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Typical | Maximum | Units |
|--|-----------------|---------|---------|--------------------|
| Maximum Junction-to-Ambient ^{A,D} | $R_{\theta JA}$ | 45 | 55 | $^\circ\text{C/W}$ |
| Maximum Case-to-sink ^A | $R_{\theta CS}$ | -- | 0.5 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Case | $R_{\theta JC}$ | 0.8 | 1 | $^\circ\text{C/W}$ |

Electrical Characteristics (T_J=25°C unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|------------------------------------|---|--|-----|------|------|-------|
| STATIC PARAMETERS | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | I _D =250μA, V _{GS} =0V, T _J =25°C | 600 | | | V |
| | | I _D =250μA, V _{GS} =0V, T _J =150°C | | 700 | | |
| BV _{DSS} /ΔT _J | Breakdown Voltage Temperature Coefficient | I _D =250μA, V _{GS} =0V | | 0.44 | | V/°C |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =600V, V _{GS} =0V | | | 1 | μA |
| | | V _{DS} =480V, T _J =125°C | | | 10 | |
| I _{GSS} | Gate-Body leakage current | V _{DS} =0V, V _{GS} =±20V | | | ±100 | nA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =5V, I _D =250μA | 2.6 | 3.2 | 3.8 | V |
| R _{DS(on)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =5.5A | | 0.33 | 0.38 | Ω |
| g _{FS} | Forward Transconductance | V _{DS} =10V, I _D =5.5A | | 10 | | S |
| V _{SD} | Diode Forward Voltage | I _S =5.5A, V _{GS} =0V | | 0.85 | 1.2 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | 11 | A |
| I _{SM} | Maximum Body-Diode Pulsed Current ^C | | | | 44 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =100V, f=1MHz | | 955 | | pF |
| C _{oss} | Output Capacitance | | | 29 | | pF |
| C _{o(er)} | Effective output capacitance, energy related ^H | V _{GS} =0V, V _{DS} =0 to 480V, f=1MHz | | 30 | | pF |
| C _{o(tr)} | Effective output capacitance, time related ^I | | | 122 | | pF |
| C _{rss} | Reverse Transfer Capacitance | V _{GS} =0V, V _{DS} =100V, f=1MHz | | 2.4 | | pF |
| R _g | Gate resistance | f=1MHz | | 4.8 | | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _g | Total Gate Charge | V _{GS} =10V, V _{DS} =480V, I _D =5.5A | | 20 | | nC |
| Q _{gs} | Gate Source Charge | | | 4.6 | | nC |
| Q _{gd} | Gate Drain Charge | | | 6.6 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =10V, V _{DS} =400V, I _D =5.5A, R _G =5Ω | | 20 | | ns |
| t _r | Turn-On Rise Time | | | 13 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 43 | | ns |
| t _f | Turn-Off Fall Time | | | 16 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | | | 251 | | ns |
| I _{rm} | Peak Reverse Recovery Current | I _F =5.5A, dl/dt=100A/μs, V _{DS} =400V | | 19 | | A |
| Q _{rr} | Body Diode Reverse Recovery Charge | | | 3.1 | | μC |

A. The value of R_{θJA} 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, 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. Ratings are based on low frequency and duty cycles to keep initial T_J=25° C.

D. The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} 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. This is the absolute maximum rating. Parts are 100% tested at T_J=25° C, L=60mH, I_{AS}=1A, V_{DD}=150V, R_G=25Ω.

H. C_{o(er)} 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_{o(tr)} is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{(BR)DSS}.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

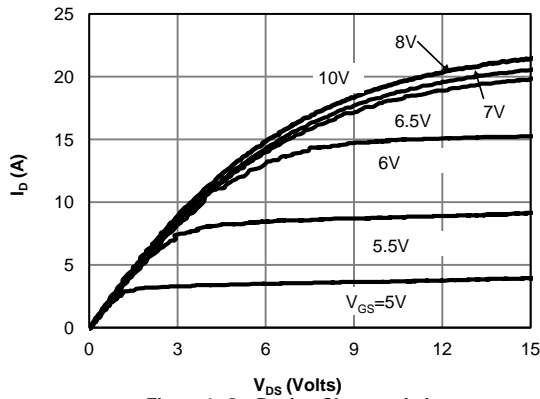


Figure 1: On-Region Characteristics

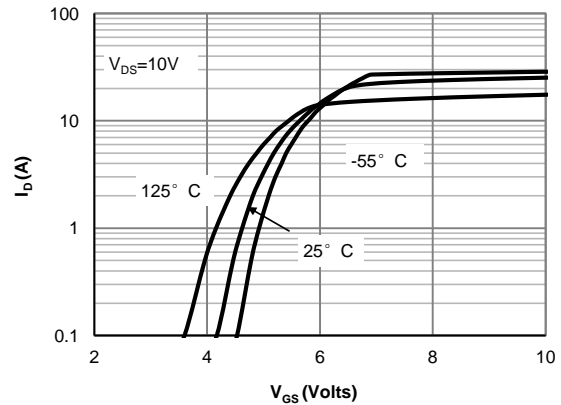


Figure 2: Transfer Characteristics

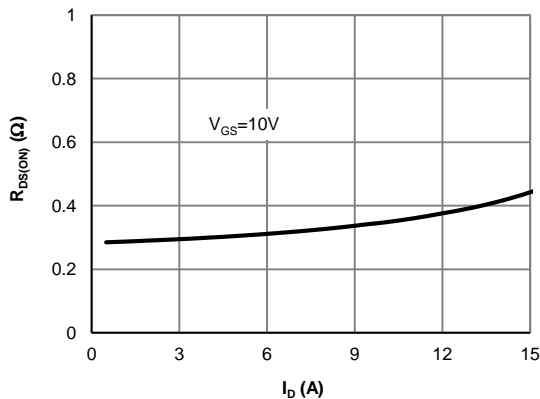


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

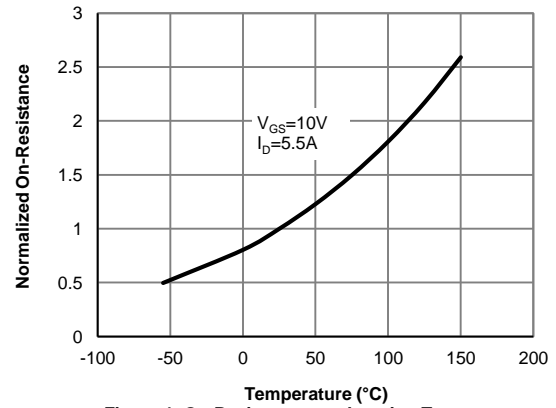


Figure 4: On-Resistance vs. Junction Temperature

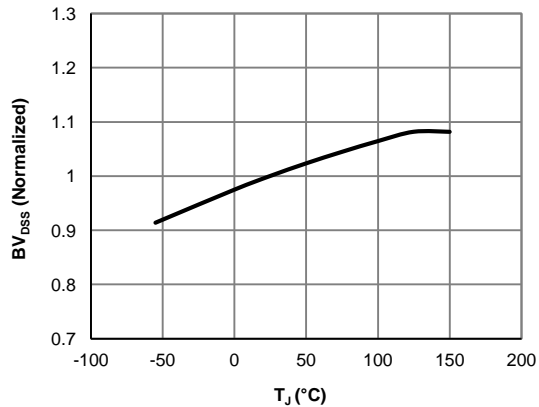


Figure 5: Break Down vs. Junction Temperature

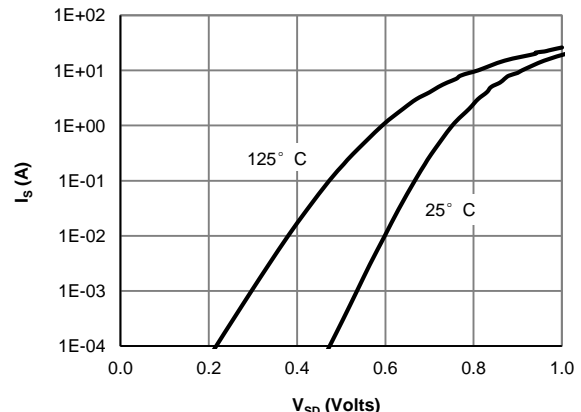


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

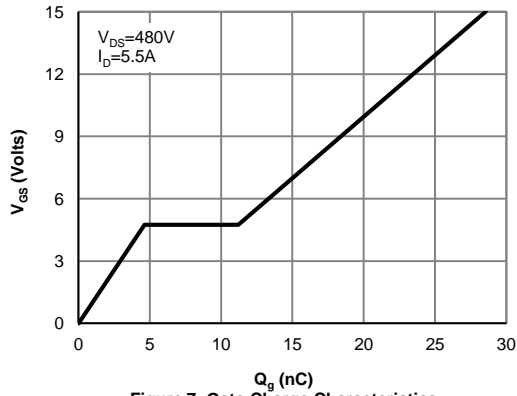


Figure 7: Gate-Charge Characteristics

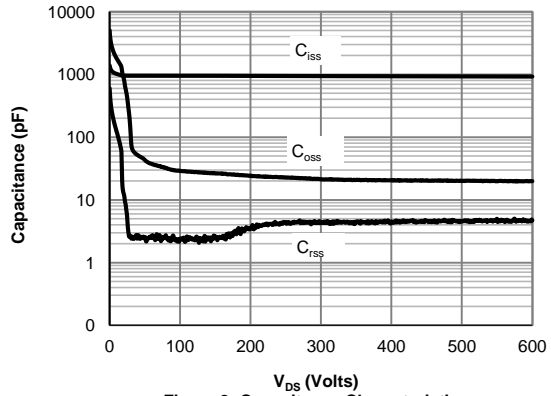


Figure 8: Capacitance Characteristics

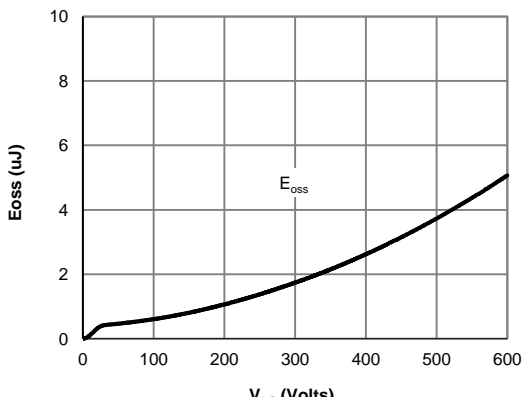


Figure 9: Coss stored Energy

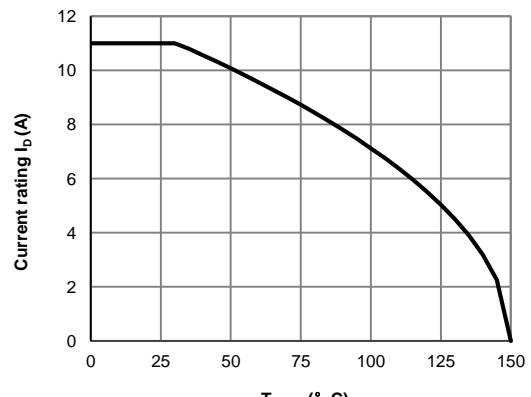


Figure 10: Current De-rating (Note F)

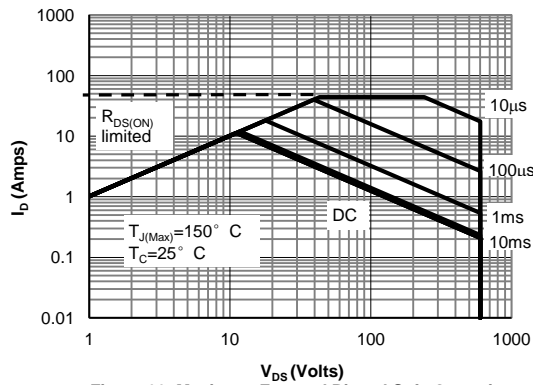


Figure 11: Maximum Forward Biased Safe Operating Area for AOD380A60C (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

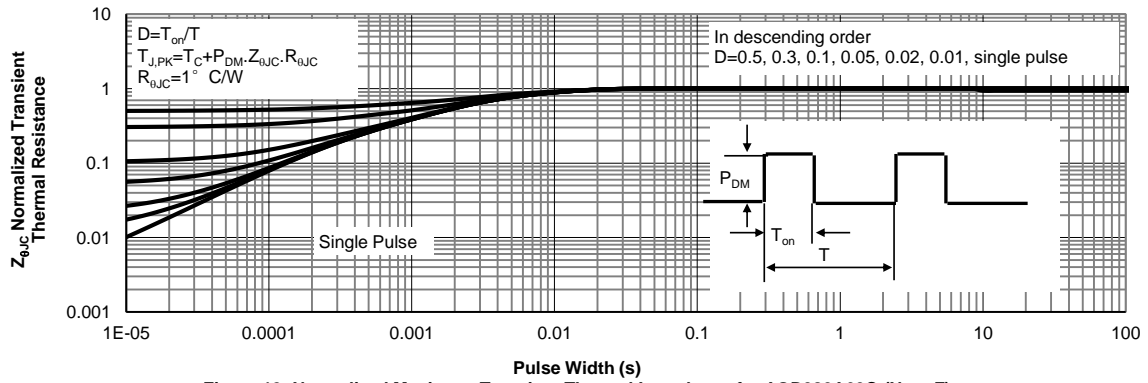
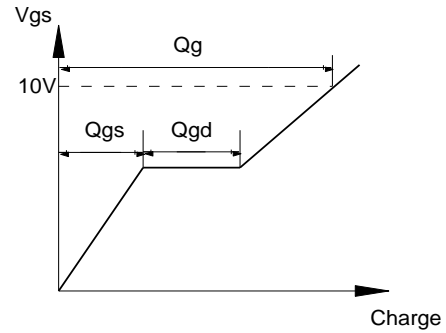
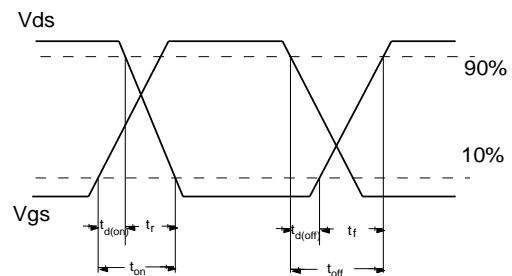
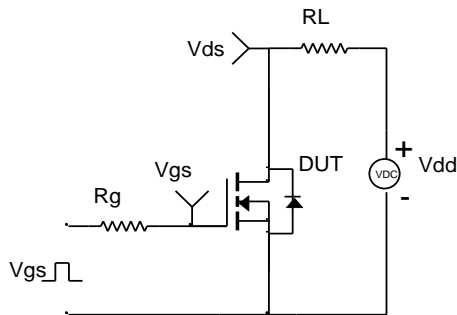


Figure 12: Normalized Maximum Transient Thermal Impedance for AOD380A60C (Note F)

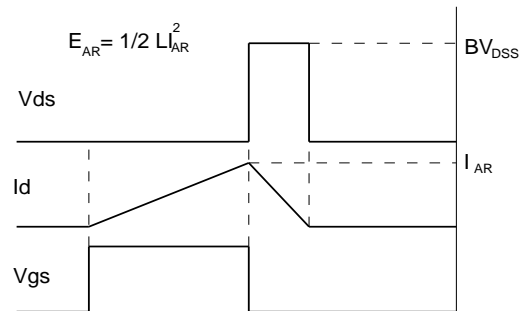
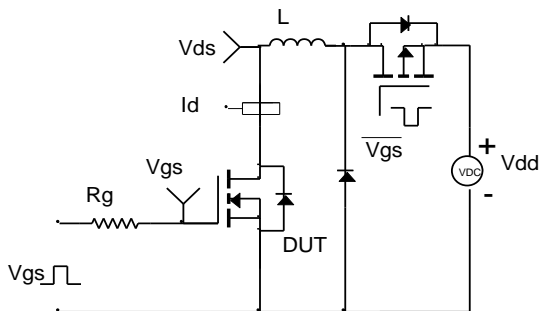
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

