



### General Description

- Proprietary  $\alpha$ MOS5™ technology
- Low  $R_{DS(ON)}$
- Optimized switching parameters for better EMI performance
- Enhanced body diode for robustness and fast reverse
- RoHS 2.0 and Halogen-Free Compliant

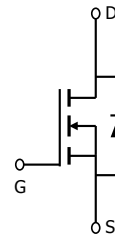
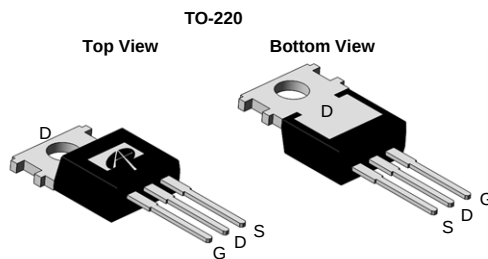
### Applications

- PFC and PWM stages (LLC, PSFB, TTF) of Server, Telecom, Industrial, UPS, and Solar Inverters

### Product Summary

|                      |                 |
|----------------------|-----------------|
| $V_{DS} @ T_{j,max}$ | 700V            |
| $I_{DM}$             | 140A            |
| $R_{DS(ON),max}$     | < 0.08 $\Omega$ |
| $Q_{g,typ}$          | 70nC            |
| $E_{oss} @ 400V$     | 9.1 $\mu$ J     |

100% UIS Tested  
100%  $R_g$  Tested



| Orderable Part Number | Package Type | Form | Minimum Order Quantity |
|-----------------------|--------------|------|------------------------|
| AOT080A60L            | TO-220 Green | Tube | 1000                   |

### 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                                                          | $V_{GS}$       | $\pm 20$   | V     |
| Continuous Drain Current                                                     | $I_D$          | 35         | A     |
|                                                                              |                | 22         |       |
| Pulsed Drain Current <sup>C</sup>                                            | $I_{DM}$       | 140        |       |
| Avalanche Current <sup>C</sup>                                               | $I_{AR}$       | 11         | A     |
| Repetitive avalanche energy <sup>C</sup>                                     | $E_{AR}$       | 60         | mJ    |
| Single pulsed avalanche energy <sup>G</sup>                                  | $E_{AS}$       | 690        | mJ    |
| MOSFET dv/dt ruggedness                                                      | dv/dt          | 100        | V/ns  |
| Peak diode recovery dv/dt                                                    |                | 20         |       |
| Power Dissipation <sup>B</sup>                                               | $P_D$          | 260        | W     |
|                                                                              |                | 2.1        | 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          | Maximum | Units |
|--------------------------------------------|-----------------|---------|-------|
| Maximum Junction-to-Ambient <sup>A,D</sup> | $R_{\theta JA}$ | 65      | °C/W  |
| Maximum Case-to-sink <sup>A</sup>          | $R_{\theta CS}$ | 0.5     | °C/W  |
| Maximum Junction-to-Case                   | $R_{\theta JC}$ | 0.48    | °C/W  |

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

| Symbol                             | Parameter                                                 | Conditions                                                                           | Min | Typ   | Max  | Units |
|------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|-----|-------|------|-------|
| <b>STATIC PARAMETERS</b>           |                                                           |                                                                                      |     |       |      |       |
| BV <sub>DSS</sub>                  | Drain-Source Breakdown Voltage                            | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                     | 600 |       |      | V     |
|                                    |                                                           | I <sub>D</sub> =1mA, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C                      |     | 700   |      |       |
| BV <sub>DSS</sub> /ΔT <sub>J</sub> | Breakdown Voltage Temperature Coefficient                 | I <sub>D</sub> =1mA, V <sub>GS</sub> =0V                                             |     | 0.51  |      | V/°C  |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =600V, V <sub>GS</sub> =0V                                           |     |       | 1    | μA    |
|                                    |                                                           | V <sub>DS</sub> =480V, T <sub>J</sub> =125°C                                         |     | 3.2   |      |       |
| I <sub>GSS</sub>                   | Gate-Body leakage current                                 | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                           |     |       | ±100 | nA    |
| V <sub>GS(th)</sub>                | Gate Threshold Voltage                                    | V <sub>DS</sub> =5V, I <sub>D</sub> =250μA                                           | 3   | 3.6   | 4.2  | V     |
| R <sub>DS(on)</sub>                | Static Drain-Source On-Resistance                         | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                                            |     | 0.071 | 0.08 | Ω     |
| g <sub>FS</sub>                    | Forward Transconductance                                  | V <sub>DS</sub> =10V, I <sub>D</sub> =20A                                            |     | 39    |      | S     |
| V <sub>SD</sub>                    | Diode Forward Voltage                                     | I <sub>S</sub> =20A, V <sub>GS</sub> =0V                                             |     | 0.85  | 1.2  | V     |
| I <sub>S</sub>                     | Maximum Body-Diode Continuous Current                     |                                                                                      |     |       | 35   | A     |
| I <sub>SM</sub>                    | Maximum Body-Diode Pulsed Current <sup>C</sup>            |                                                                                      |     |       | 140  | A     |
| <b>DYNAMIC PARAMETERS</b>          |                                                           |                                                                                      |     |       |      |       |
| C <sub>iss</sub>                   | Input Capacitance                                         | V <sub>GS</sub> =0V, V <sub>DS</sub> =100V, f=1MHz                                   |     | 3960  |      | pF    |
| C <sub>oss</sub>                   | Output Capacitance                                        |                                                                                      |     | 116   |      | pF    |
| C <sub>o(er)</sub>                 | Effective output capacitance, energy related <sup>H</sup> | V <sub>GS</sub> =0V, V <sub>DS</sub> =0 to 480V, f=1MHz                              |     | 104   |      | pF    |
| C <sub>o(tr)</sub>                 | Effective output capacitance, time related <sup>I</sup>   |                                                                                      |     | 470   |      | pF    |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance                              | V <sub>GS</sub> =0V, V <sub>DS</sub> =100V, f=1MHz                                   |     | 0.9   |      | pF    |
| R <sub>g</sub>                     | Gate resistance                                           | f=1MHz                                                                               |     | 2.1   |      | Ω     |
| <b>SWITCHING PARAMETERS</b>        |                                                           |                                                                                      |     |       |      |       |
| Q <sub>g</sub>                     | Total Gate Charge                                         | V <sub>GS</sub> =10V, V <sub>DS</sub> =480V, I <sub>D</sub> =20A                     |     | 70    |      | nC    |
| Q <sub>gs</sub>                    | Gate Source Charge                                        |                                                                                      |     | 18    |      | nC    |
| Q <sub>gd</sub>                    | Gate Drain Charge                                         |                                                                                      |     | 20    |      | nC    |
| t <sub>D(on)</sub>                 | Turn-On DelayTime                                         | V <sub>GS</sub> =10V, V <sub>DS</sub> =400V, I <sub>D</sub> =20A, R <sub>G</sub> =5Ω |     | 32    |      | ns    |
| t <sub>r</sub>                     | Turn-On Rise Time                                         |                                                                                      |     | 34    |      | ns    |
| t <sub>D(off)</sub>                | Turn-Off DelayTime                                        |                                                                                      |     | 88    |      | ns    |
| t <sub>f</sub>                     | Turn-Off Fall Time                                        |                                                                                      |     | 25    |      | ns    |
| t <sub>rr</sub>                    | Body Diode Reverse Recovery Time                          | I <sub>F</sub> =20A, dI/dt=100A/μs, V <sub>DS</sub> =400V                            |     | 450   |      | ns    |
| I <sub>rm</sub>                    | Peak Reverse Recovery Current                             |                                                                                      |     | 35    |      | A     |
| Q <sub>rr</sub>                    | Body Diode Reverse Recovery Charge                        |                                                                                      |     | 10.6  |      | μC    |

A. The value of R<sub>θJA</sub> is measured with the device in a still air environment with T<sub>A</sub>=25° C.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=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<sub>J(MAX)</sub>=150° C, Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25° C.

D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> 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 heatsin k, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150° C. The SOA curve provides a single pulse rating.

G. L=60mH, I<sub>AS</sub>=4.8 A, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25° C.

H. C<sub>o(er)</sub> is a fixed capacitance that gives the same stored energy as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 to 80% V<sub>(BR)DSS</sub>.

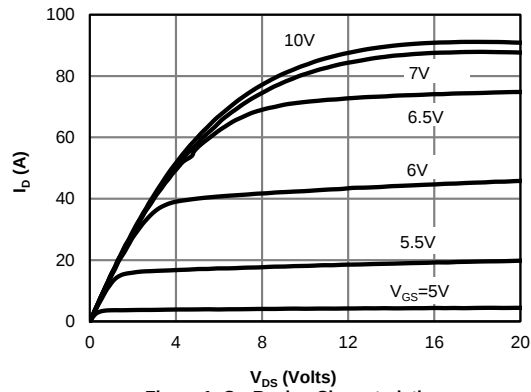
I. C<sub>o(tr)</sub> is a fixed capacitance that gives the same charging time as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 to 80% V<sub>(BR)DSS</sub>.

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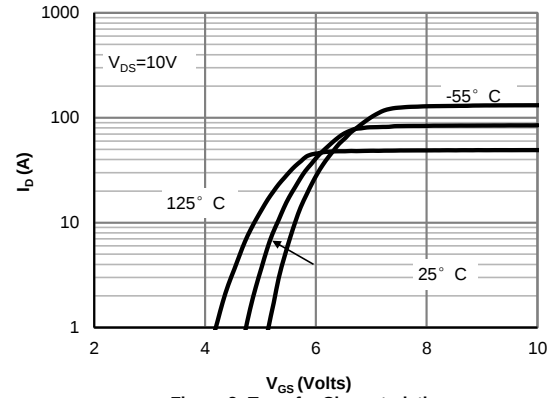
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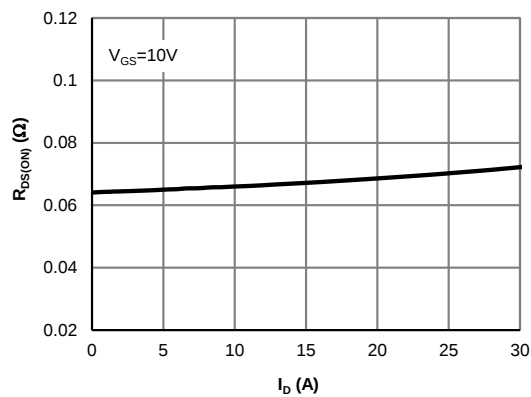
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



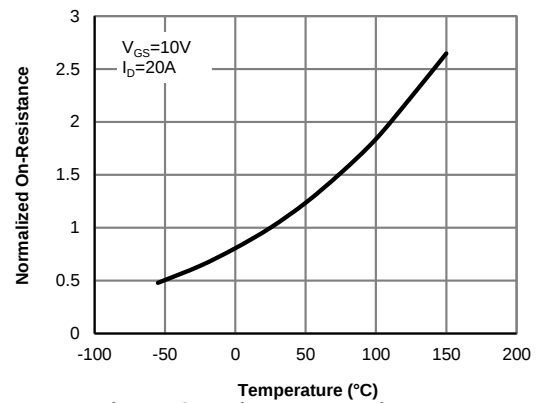
**Figure 1: On-Region Characteristics**



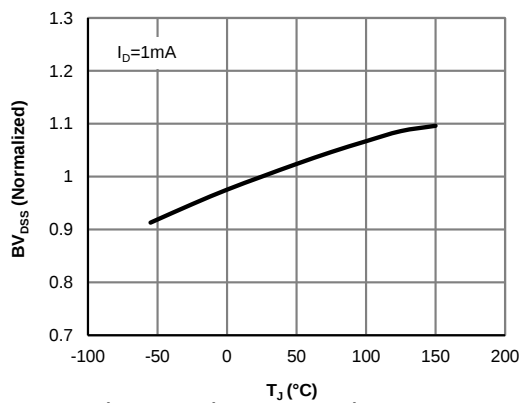
**Figure 2: Transfer Characteristics**



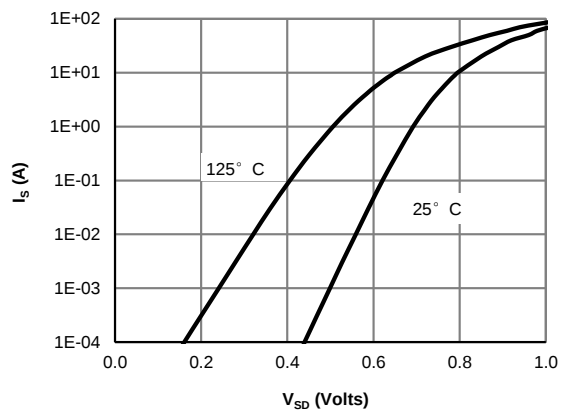
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



**Figure 4: On-Resistance vs. Junction Temperature**

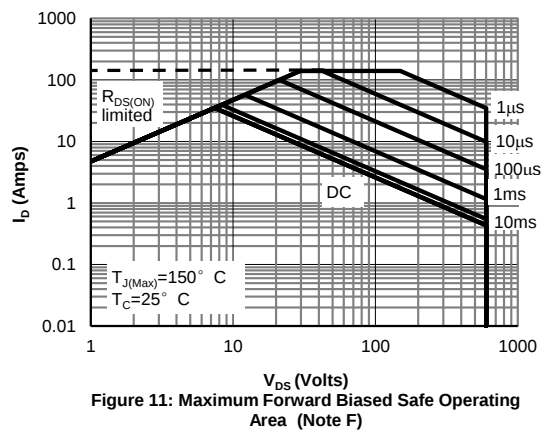
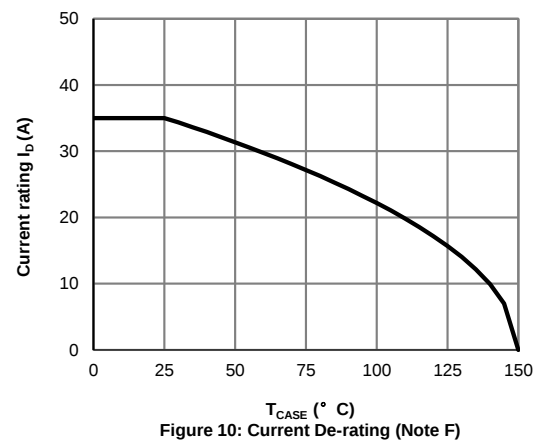
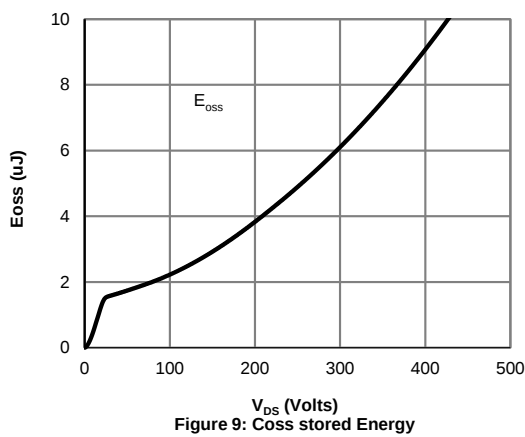
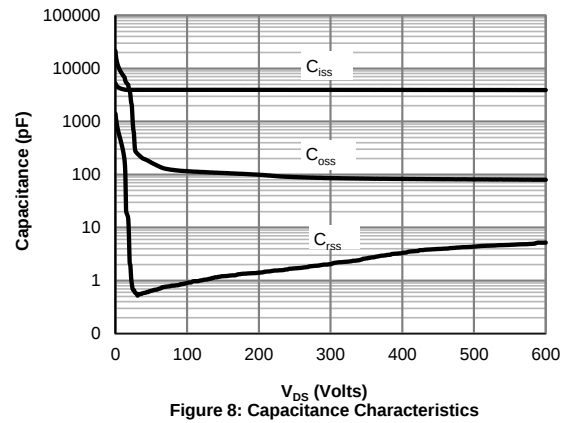
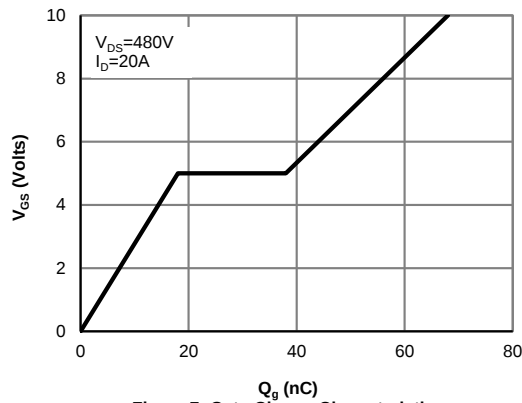


**Figure 5: Break Down vs. Junction Temperature**

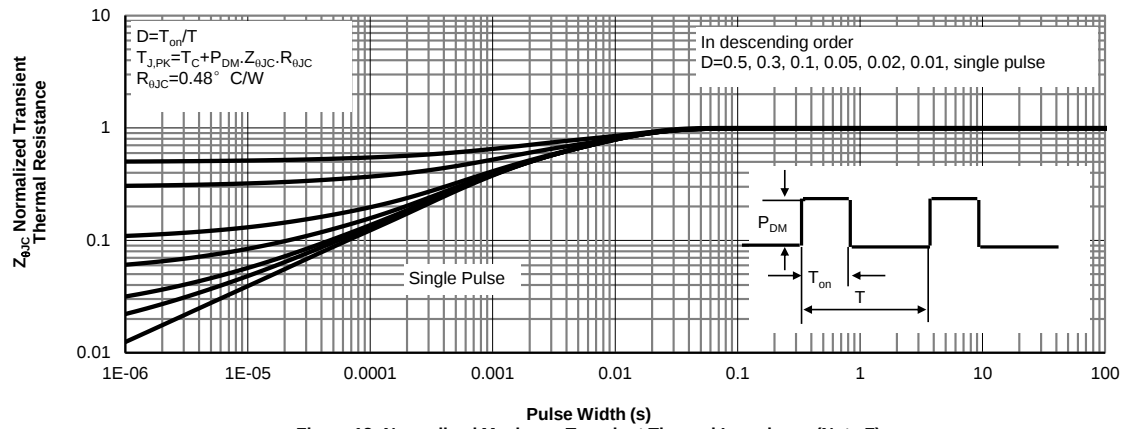


**Figure 6: Body-Diode Characteristics**

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

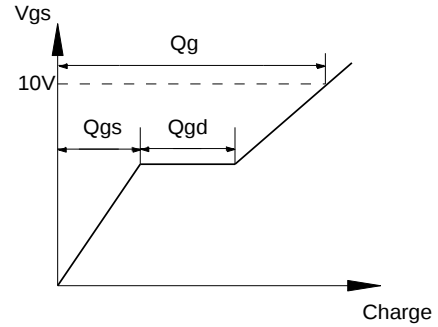
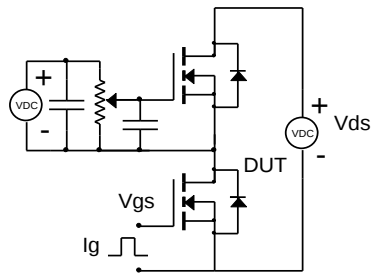


**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

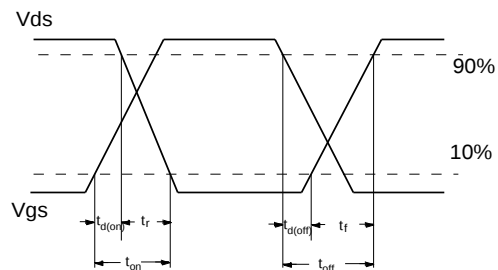
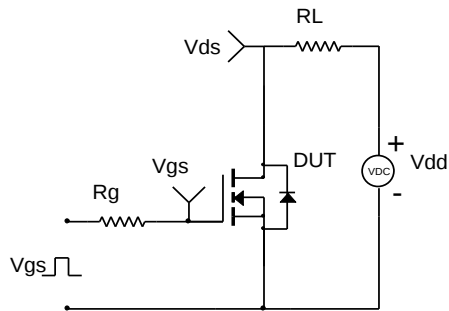


**Figure 12: Normalized Maximum Transient Thermal Impedance (Note F)**

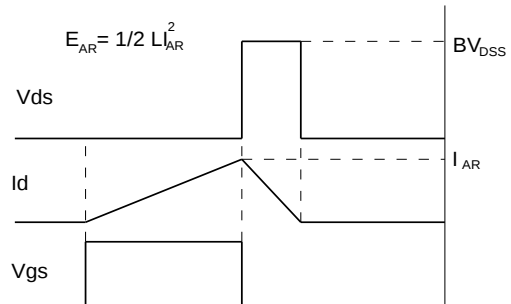
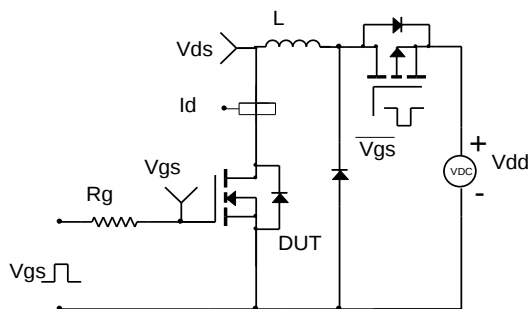
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

