

**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> =250μA, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C                       | 650 | 700   | -     |       |
| 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> =150°C                                            | -   | 10    | -     |       |
| I <sub>GSS</sub>            | Gate-Body leakage current                                 | V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V                                              | -   | -     | ±100  | nA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                                    | V <sub>DS</sub> =5V, I <sub>D</sub> =250μA                                              | 2.5 | 3.2   | 3.8   | V     |
| R <sub>DS(on)</sub>         | Static Drain-Source On-Resistance                         | V <sub>GS</sub> =10V, I <sub>D</sub> =26.5A, T <sub>J</sub> =25°C                       | -   | 0.058 | 0.07  | Ω     |
|                             |                                                           | V <sub>GS</sub> =10V, I <sub>D</sub> =26.5A, T <sub>J</sub> =150°C                      | -   | 0.155 | 0.185 | Ω     |
| V <sub>SD</sub>             | Diode Forward Voltage                                     | I <sub>S</sub> =26.5A, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                        | -   | 0.84  | -     | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current                     |                                                                                         | -   | -     | 53    | A     |
| I <sub>SM</sub>             | Maximum Body-Diode Pulsed Current                         |                                                                                         | -   | -     | 215   | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                                           |                                                                                         |     |       |       |       |
| C <sub>iss</sub>            | Input Capacitance                                         | V <sub>GS</sub> =0V, V <sub>DS</sub> =100V, f=1MHz                                      | -   | 3034  | -     | pF    |
| C <sub>oss</sub>            | Output Capacitance                                        |                                                                                         | -   | 222   | -     | 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                                 | -   | 170   | -     | pF    |
| C <sub>o(tr)</sub>          | Effective output capacitance, time related <sup>I</sup>   |                                                                                         | -   | 524   | -     | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance                              | V <sub>GS</sub> =0V, V <sub>DS</sub> =100V, f=1MHz                                      | -   | 3     | -     | pF    |
| R <sub>g</sub>              | Gate resistance                                           | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                        | -   | 1.8   | -     | 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> =26.5A                      | -   | 59    | -     | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                                        |                                                                                         | -   | 17    | -     | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                                         |                                                                                         | -   | 19    | -     | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                                         | V <sub>GS</sub> =10V, V <sub>DS</sub> =400V, I <sub>D</sub> =26.5A, R <sub>G</sub> =25Ω | -   | 48    | -     | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                                         |                                                                                         | -   | 102   | -     | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                                        |                                                                                         | -   | 215   | -     | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                                        |                                                                                         | -   | 122   | -     | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time                          | I <sub>F</sub> =26.5A, dI/dt=100A/μs, V <sub>DS</sub> =400V                             | -   | 664   | -     | ns    |
| I <sub>rm</sub>             | Peak Reverse Recovery Current                             | I <sub>F</sub> =26.5A, dI/dt=100A/μs, V <sub>DS</sub> =400V                             | -   | 36    | -     | A     |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge                        | I <sub>F</sub> =26.5A, dI/dt=100A/μs, V <sub>DS</sub> =400V                             | -   | 14    | -     | 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 <300 μs 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<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.

G. L=60mH, I<sub>AS</sub>=7.5A, V<sub>DD</sub>=150V, Starting T<sub>J</sub>=25°C

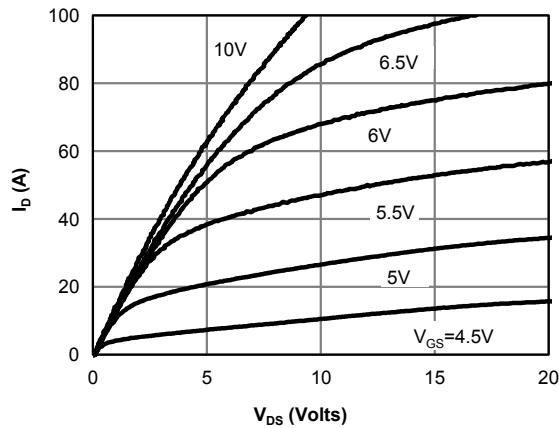
H. C<sub>o(er)</sub> is a fixed capacitance that gives the same stored energy as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 to 80% V<sub>(BR)DSS</sub>.

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>.

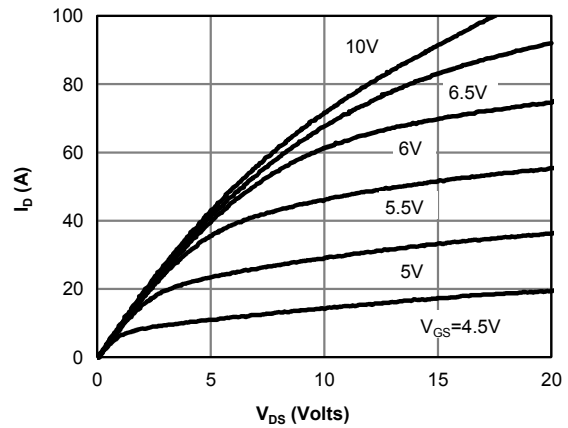
J. Wavesoldering only allowed at leads.

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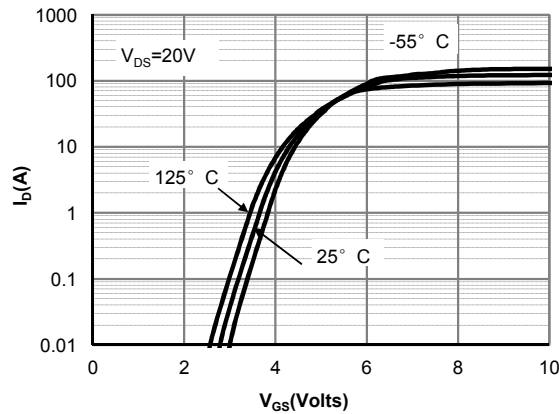
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



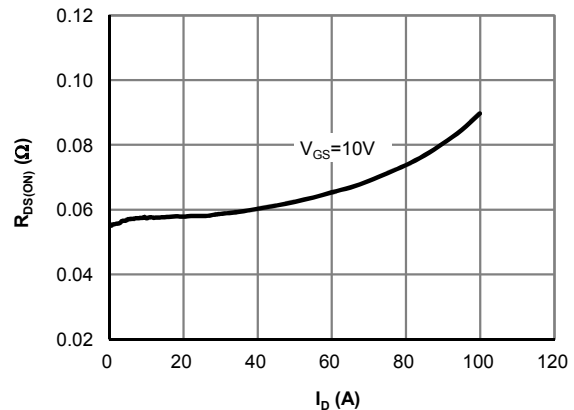
**Figure 1: On-Region Characteristics@25°C**



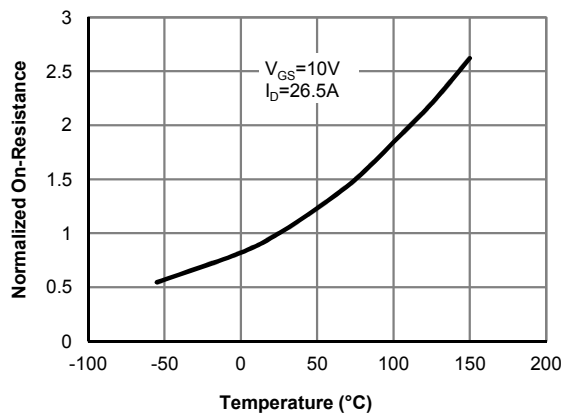
**Figure 2: On-Region Characteristics@125°C**



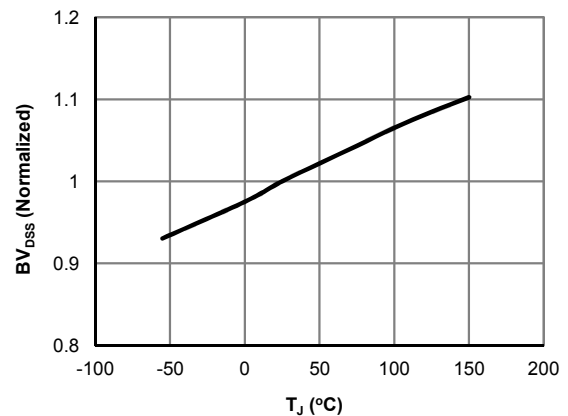
**Figure 3: Transfer Characteristics**



**Figure 4: On-Resistance vs. Drain Current and Gate Voltage**

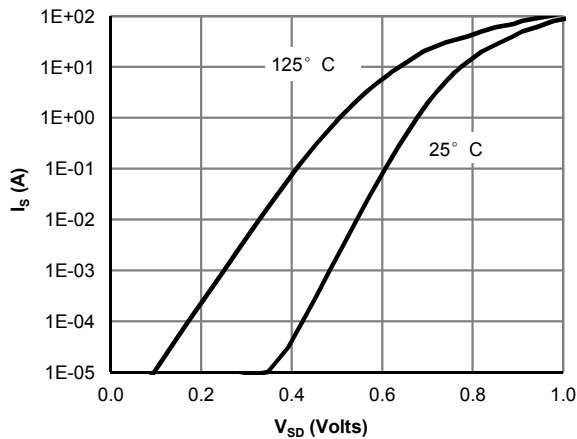


**Figure 5: On-Resistance vs. Junction Temperature**

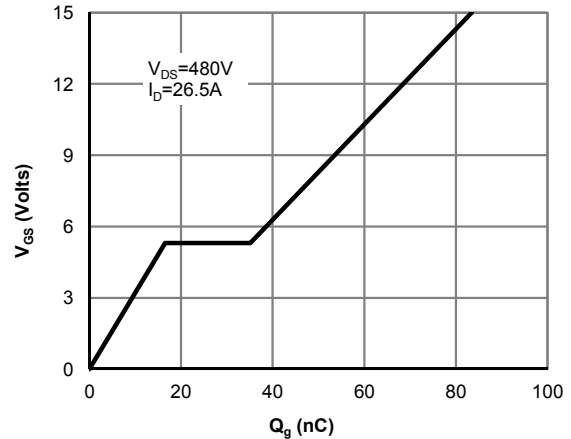


**Figure 6: Break Down vs. Junction Temperature**

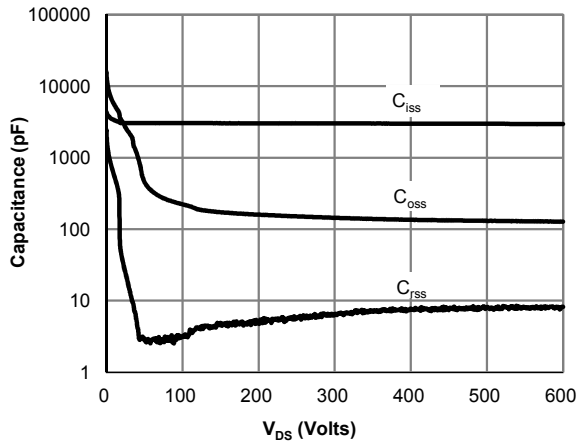
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



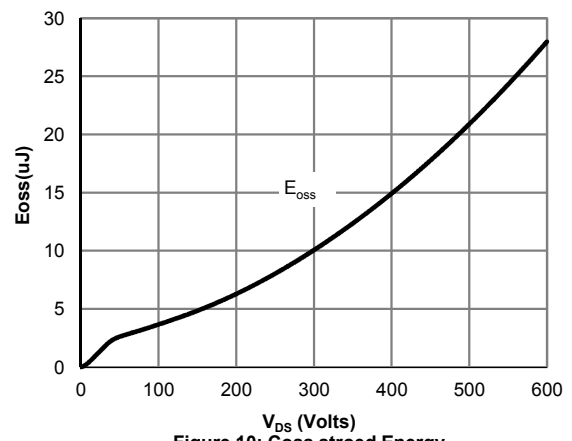
**Figure 7: Body-Diode Characteristics (Note E)**



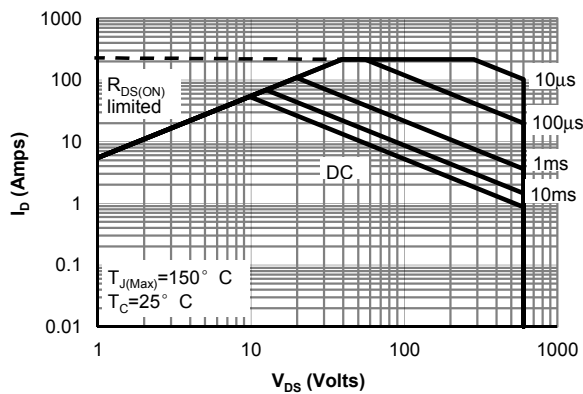
**Figure 8: Gate-Charge Characteristics**



**Figure 9: Capacitance Characteristics**



**Figure 10: Coss stored Energy**



**Figure 11: Maximum Forward Biased Safe Operating Area for AOK53S60 (Note F)**

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

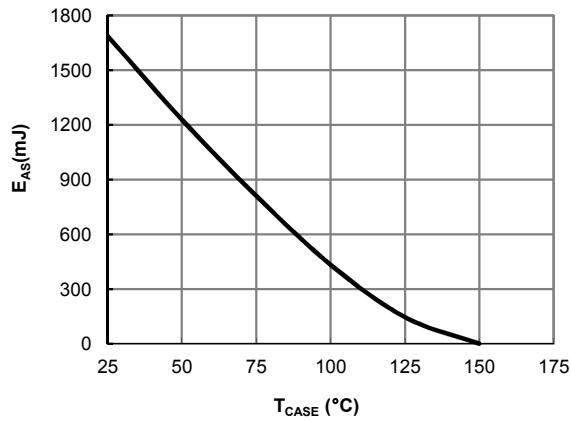


Figure 12: Avalanche energy

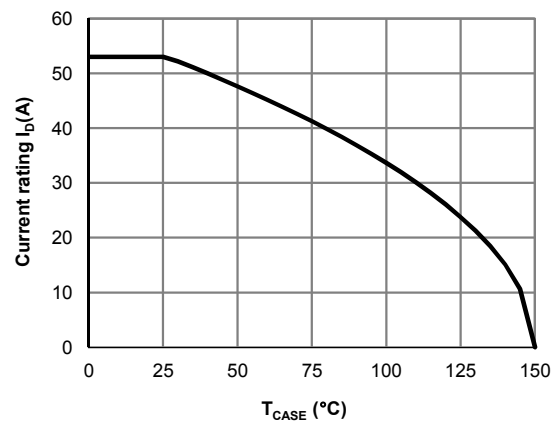


Figure 13: Current De-rating (Note B)

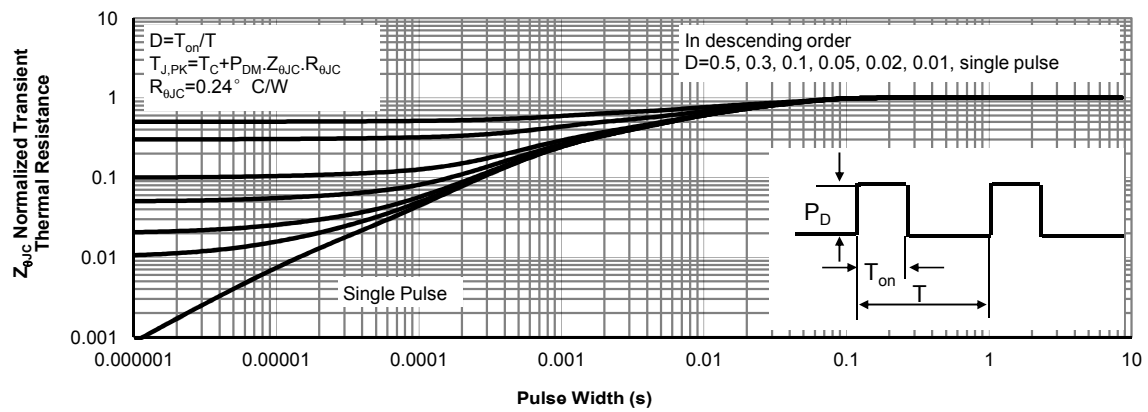
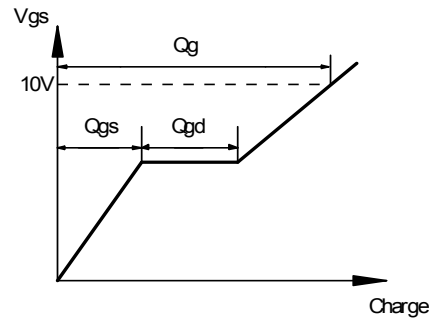
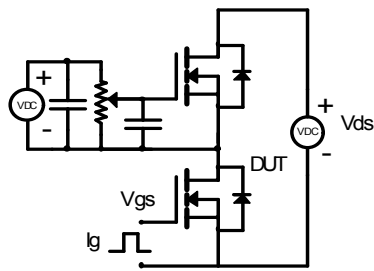
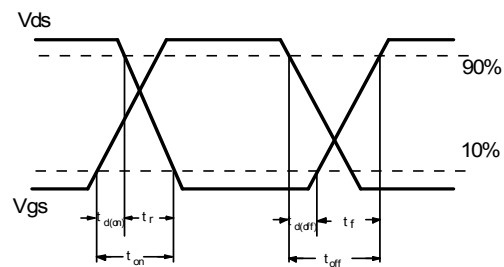
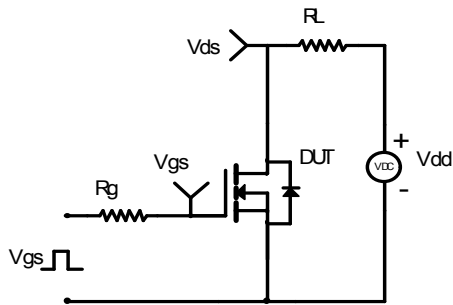


Figure 14: Normalized Maximum Transient Thermal Impedance for AOK53S60 (Note F)

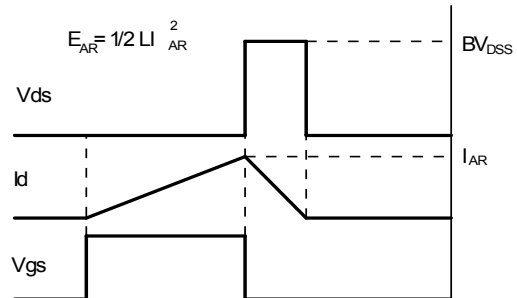
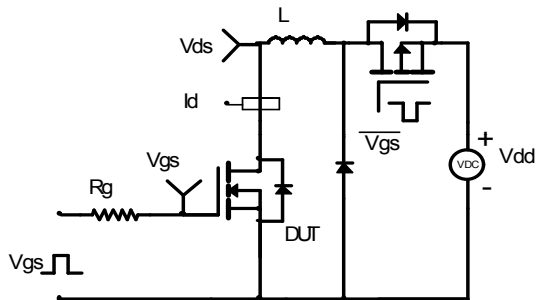
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

