

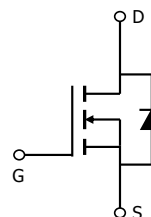
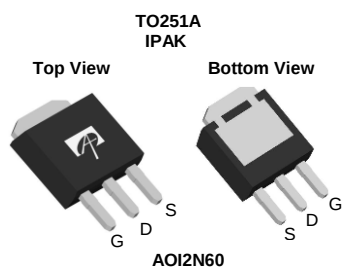
### General Description

The AOI2N60 has been fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications. By providing low  $R_{DS(on)}$ ,  $C_{iss}$  and  $C_{rss}$  along with guaranteed avalanche capability this part can be adopted quickly into new and existing offline power supply designs.

### Product Summary

|                                 |            |
|---------------------------------|------------|
| $V_{DS}$                        | 700V@150°C |
| $I_D$ (at $V_{GS}=10V$ )        | 2A         |
| $R_{DS(ON)}$ (at $V_{GS}=10V$ ) | < 4.4Ω     |

100% UIS Tested!  
 100%  $R_g$  Tested!



### 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                                                          | $V_{GS}$       | ±30        | V     |
| Continuous Drain Current <sup>B</sup>                                        | $I_D$          | 2          | A     |
| $T_C=25^\circ\text{C}$                                                       |                |            |       |
| $T_C=100^\circ\text{C}$                                                      |                | 1.4        |       |
| Pulsed Drain Current <sup>C</sup>                                            | $I_{DM}$       | 8          |       |
| Avalanche Current <sup>C</sup>                                               | $I_{AR}$       | 2          | A     |
| Repetitive avalanche energy <sup>C</sup>                                     | $E_{AR}$       | 60         | mJ    |
| Single plused avalanche energy <sup>H</sup>                                  | $E_{AS}$       | 120        | mJ    |
| Peak diode recovery dv/dt                                                    | dv/dt          | 5          | V/ns  |
| Power Dissipation <sup>B</sup>                                               | $P_D$          | 56.8       | W     |
|                                                                              |                | 0.45       | W/°C  |
| $T_C=25^\circ\text{C}$                                                       |                |            |       |
| Derate above 25°C                                                            |                |            |       |
| Junction and Storage Temperature Range                                       | $T_J, T_{STG}$ | -50 to 150 | °C    |
| Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds | $T_L$          | 300        | °C    |

### Thermal Characteristics

| Parameter                                  | Symbol          | Typical | Maximum | Units |
|--------------------------------------------|-----------------|---------|---------|-------|
| Maximum Junction-to-Ambient <sup>A,G</sup> | $R_{\theta JA}$ | 45      | 55      | °C/W  |
| Maximum Case-to-sink <sup>A</sup>          | $R_{\theta CS}$ | -       | 0.5     | °C/W  |
| Maximum Junction-to-Case <sup>D,F</sup>    | $R_{\theta JC}$ | 1.8     | 2.2     | °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> =250μA, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C                       |     | 700  |      |       |
| BV <sub>DSS</sub> /ΔT <sub>J</sub> | Zero Gate Voltage Drain Current       | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V                                              |     | 0.56 |      | 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                                            |     |      | 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                                              | 3   | 4    | 4.5  | V     |
| R <sub>DS(ON)</sub>                | Static Drain-Source On-Resistance     | V <sub>GS</sub> =10V, I <sub>D</sub> =1A                                                |     | 3.6  | 4.4  | Ω     |
| g <sub>FS</sub>                    | Forward Transconductance              | V <sub>DS</sub> =40V, I <sub>D</sub> =1A                                                |     | 3.5  |      | S     |
| V <sub>SD</sub>                    | Diode Forward Voltage                 | I <sub>S</sub> =1A, V <sub>GS</sub> =0V                                                 |     | 0.79 | 1    | V     |
| I <sub>S</sub>                     | Maximum Body-Diode Continuous Current |                                                                                         |     |      | 2    | A     |
| I <sub>SM</sub>                    | Maximum Body-Diode Pulsed Current     |                                                                                         |     |      | 8    | A     |
| <b>DYNAMIC PARAMETERS</b>          |                                       |                                                                                         |     |      |      |       |
| C <sub>iss</sub>                   | Input Capacitance                     | V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz                                       | 215 | 270  | 325  | pF    |
| C <sub>oss</sub>                   | Output Capacitance                    |                                                                                         | 23  | 29   | 35   | pF    |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance          |                                                                                         | 2.2 | 2.8  | 3.4  | pF    |
| R <sub>g</sub>                     | Gate resistance                       | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                        | 3.5 | 4.4  | 6.6  | 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> =2A                         |     | 9.5  | 11   | nC    |
| Q <sub>gs</sub>                    | Gate Source Charge                    |                                                                                         |     | 1.9  | 2    | nC    |
| Q <sub>gd</sub>                    | Gate Drain Charge                     |                                                                                         |     | 4.7  | 6    | nC    |
| t <sub>D(on)</sub>                 | Turn-On DelayTime                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =300V, I <sub>D</sub> =2A,<br>R <sub>G</sub> =25Ω |     | 17.2 | 21   | ns    |
| t <sub>r</sub>                     | Turn-On Rise Time                     |                                                                                         |     | 14.3 | 17   | ns    |
| t <sub>D(off)</sub>                | Turn-Off DelayTime                    |                                                                                         |     | 27   | 32   | ns    |
| t <sub>f</sub>                     | Turn-Off Fall Time                    |                                                                                         |     | 17   | 20   | ns    |
| t <sub>rr</sub>                    | Body Diode Reverse Recovery Time      | I <sub>F</sub> =2A, dI/dt=100A/μs, V <sub>DS</sub> =100V                                |     | 154  | 185  | ns    |
| Q <sub>rr</sub>                    | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =2A, dI/dt=100A/μs, V <sub>DS</sub> =100V                                |     | 0.8  | 0.96 | 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 in a TO252 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<sub>J(MAX)</sub>=150° 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.

G. These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C.

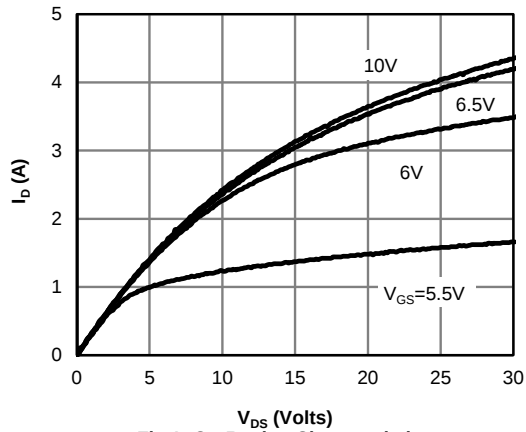
H. L=60mH, I<sub>AS</sub>=2A, V<sub>DS</sub>=150V, R<sub>G</sub>=10Ω, Starting T<sub>J</sub>=25° C

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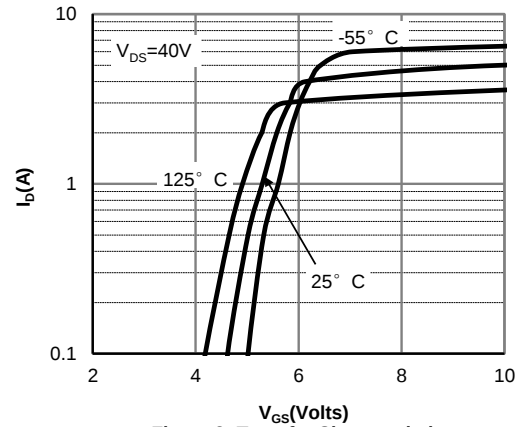
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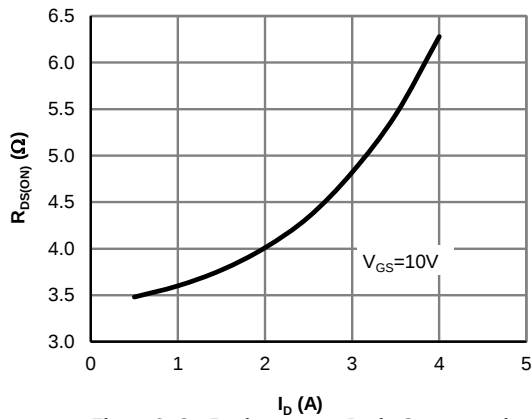
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



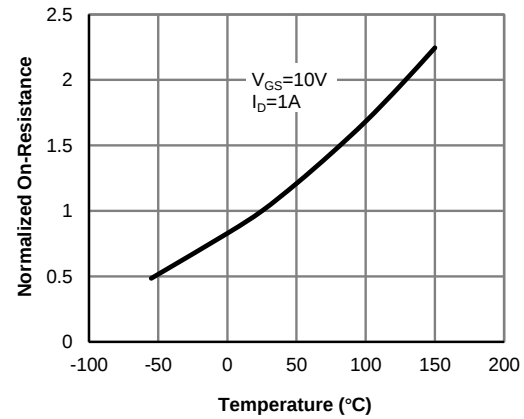
**Fig 1: On-Region Characteristics**



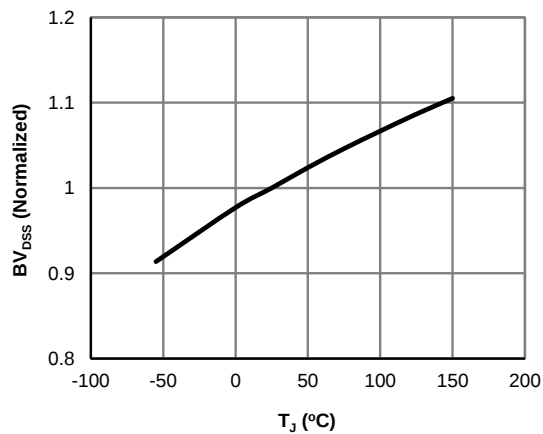
**Figure 2: Transfer Characteristics**



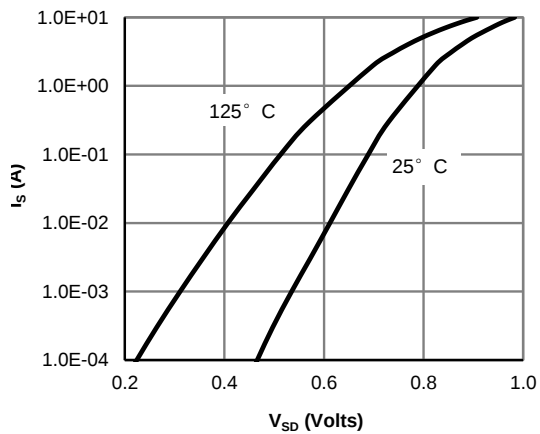
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



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



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



**Figure 6: Body-Diode Characteristics**

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

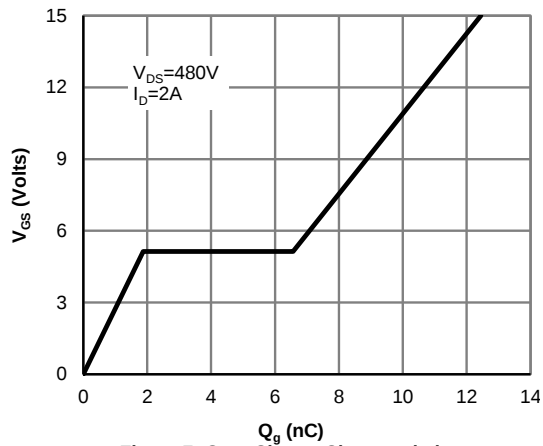


Figure 7: Gate-Charge Characteristics

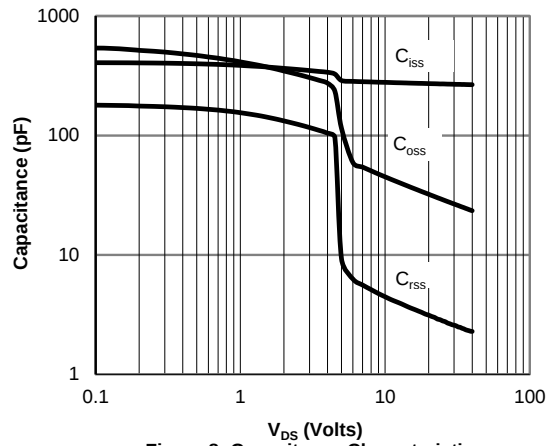


Figure 8: Capacitance Characteristics

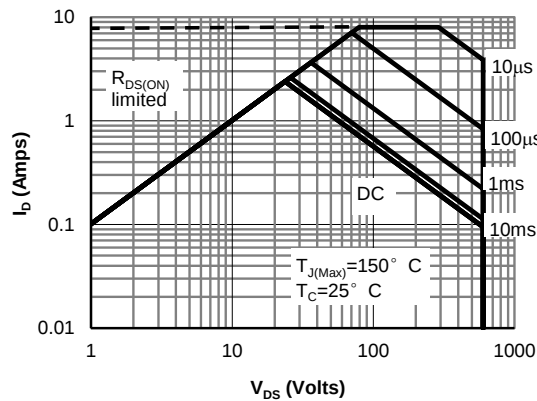


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

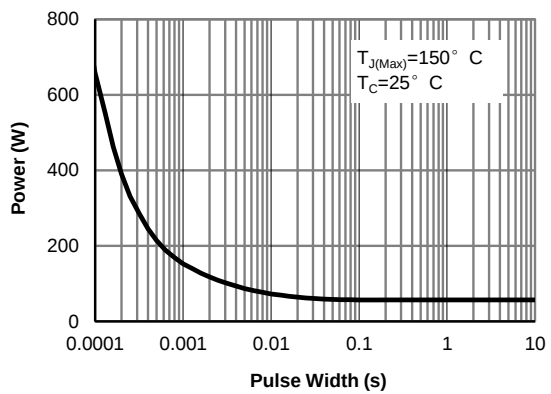


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

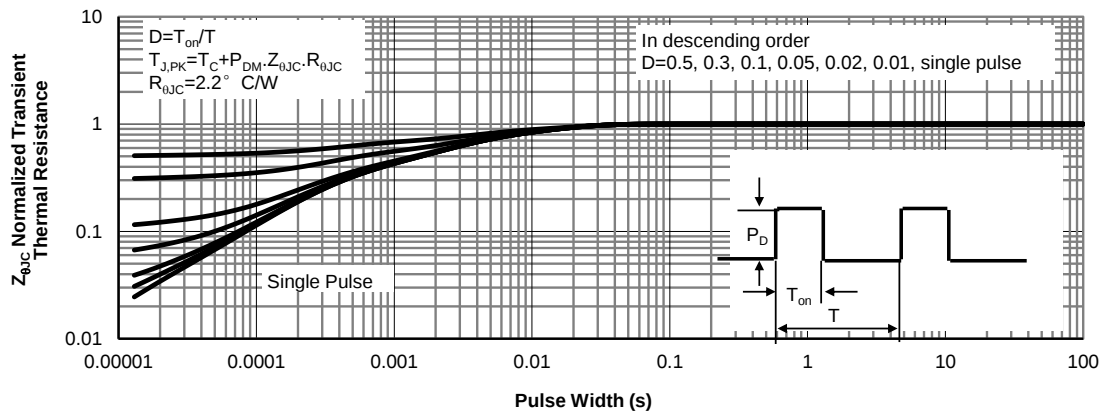


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

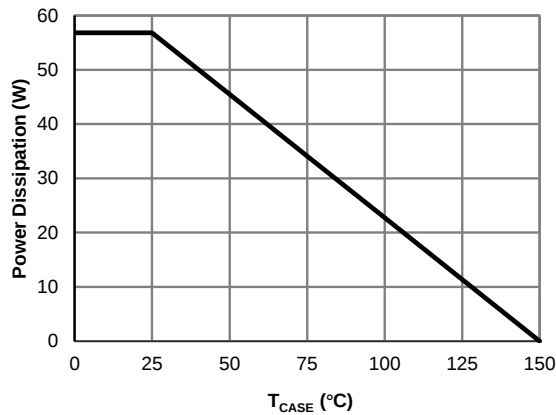


Figure 12: Power De-rating (Note B)

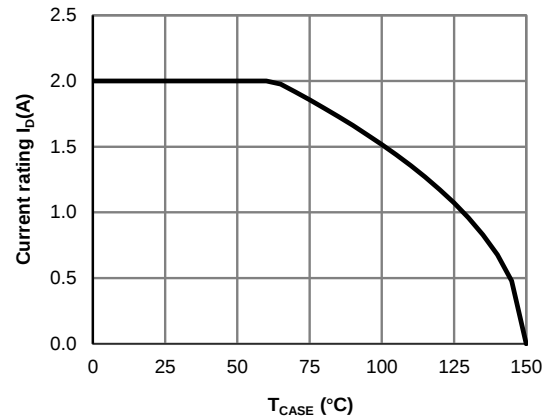


Figure 13: Current De-rating (Note B)

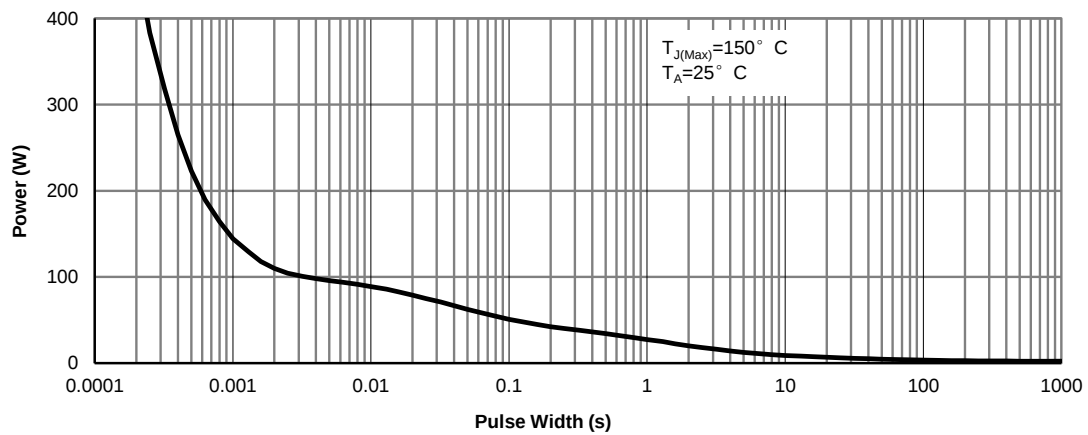


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

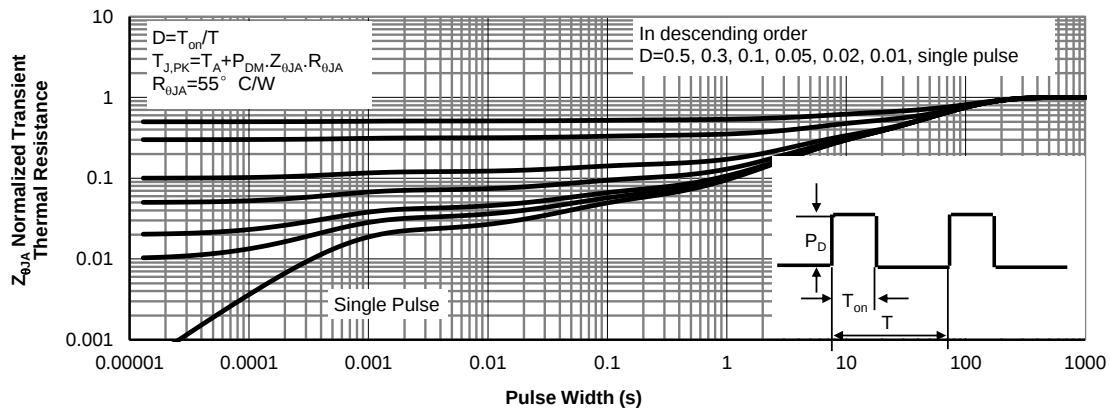
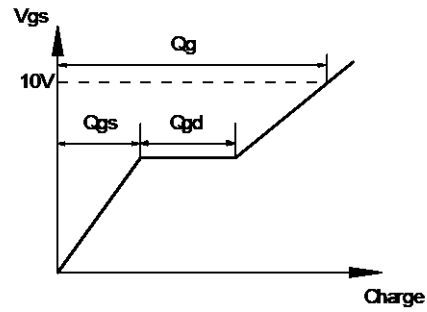
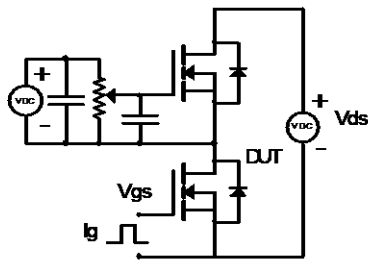
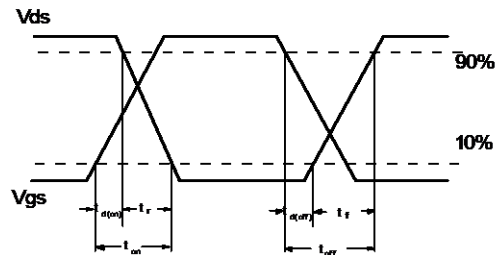
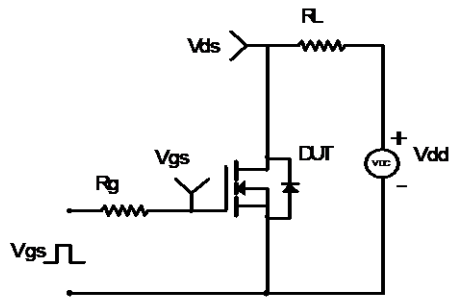


Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)

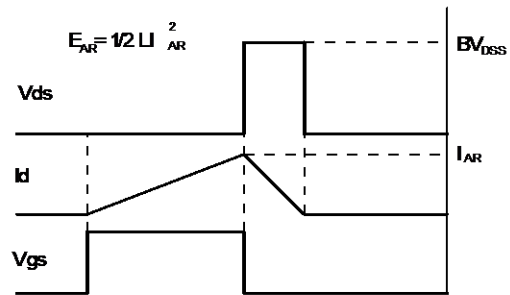
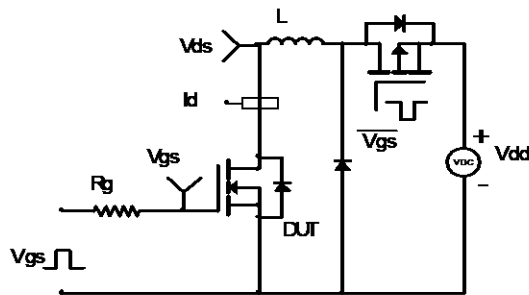
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

