

## General Description

- Advanced High Voltage MOSFET technology
- Low  $R_{DS(ON)}$
- Low  $C_{iss}$  and  $C_{rss}$
- High Current Capability
- RoHS and Halogen Free Compliant

## Applications

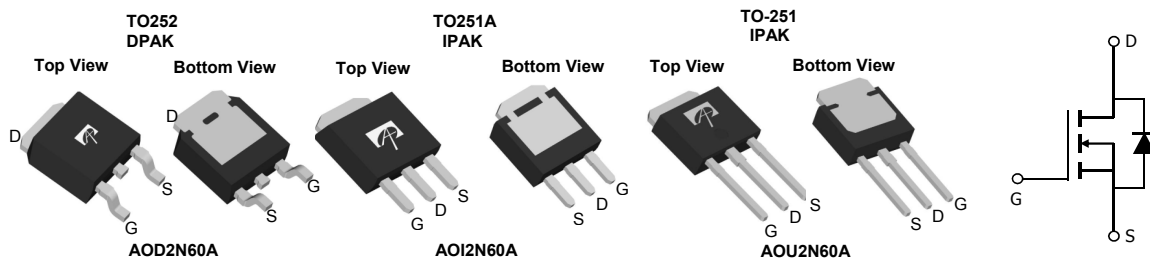
- General Lighting for LED and CCFL
- AC/DC Power supplies for Industrial, Consumer, and Telecom

## Product Summary

|                                 |                |
|---------------------------------|----------------|
| $V_{DS} @ T_{j,max}$            | 700V           |
| $I_D$ (at $V_{GS}=10V$ )        | 2A             |
| $R_{DS(ON)}$ (at $V_{GS}=10V$ ) | < 4.7 $\Omega$ |

100% UIS Tested

100%  $R_g$  Tested



| Orderable Part Number | Package Type | Form        | Minimum Order Quantity |
|-----------------------|--------------|-------------|------------------------|
| AOD2N60A              | TO-252       | Tape & Reel | 2500                   |
| AOI2N60A              | TO-251A      | Tube        | 4000                   |
| AOU2N60A              | TO-251       | Tube        | 4000                   |

## 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                                                          | $V_{GS}$       | $\pm 30$   | V                   |
| Continuous Drain Current <sup>B</sup>                                        | $I_D$          | 2          | A                   |
| $T_C=25^\circ\text{C}$                                                       |                | 1.4        |                     |
| $T_C=100^\circ\text{C}$                                                      |                |            |                     |
| Pulsed Drain Current <sup>C</sup>                                            | $I_{DM}$       | 6          |                     |
| Avalanche Current <sup>C,I</sup>                                             | $I_{AR}$       | 4.6        | A                   |
| Repetitive avalanche energy <sup>C,I</sup>                                   | $E_{AR}$       | 10.6       | mJ                  |
| Single pulsed avalanche energy <sup>H</sup>                                  | $E_{AS}$       | 97         | mJ                  |
| Peak diode recovery $dv/dt$                                                  | $dv/dt$        | 5          | V/ns                |
| Power Dissipation <sup>B</sup>                                               | $P_D$          | 57         | W                   |
|                                                                              |                | 0.45       | W/ $^\circ\text{C}$ |
| $T_C=25^\circ\text{C}$                                                       |                |            |                     |
| Derate above $25^\circ\text{C}$                                              |                |            |                     |
| Junction and Storage Temperature Range                                       | $T_J, T_{STG}$ | -50 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 <sup>A,G</sup> | $R_{\theta JA}$ | 40      | 50      | $^\circ\text{C/W}$ |
| Maximum Case-to-sink <sup>A</sup>          | $R_{\theta CS}$ | -       | 0.5     | $^\circ\text{C/W}$ |
| Maximum Junction-to-Case <sup>D,F</sup>    | $R_{\theta JC}$ | 1.8     | 2.2     | $^\circ\text{C/W}$ |

**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><br>/ΔT <sub>J</sub> | Zero Gate Voltage Drain Current                | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V                                              |     | 0.7  |      | 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    | 4.5  | V     |
| R <sub>DS(ON)</sub>                   | Static Drain-Source On-Resistance              | V <sub>GS</sub> =10V, I <sub>D</sub> =1A                                                |     | 3.9  | 4.7  | Ω     |
| g <sub>FS</sub>                       | Forward Transconductance                       | V <sub>DS</sub> =40V, I <sub>D</sub> =1A                                                |     | 2.8  |      | 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 <sup>C</sup> |                                                                                         |     |      | 6    | A     |
| <b>DYNAMIC PARAMETERS</b>             |                                                |                                                                                         |     |      |      |       |
| C <sub>iss</sub>                      | Input Capacitance                              | V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz                                       |     | 295  |      | pF    |
| C <sub>oss</sub>                      | Output Capacitance                             |                                                                                         |     | 30   |      | pF    |
| C <sub>rss</sub>                      | Reverse Transfer Capacitance                   |                                                                                         |     | 2.3  |      | pF    |
| R <sub>g</sub>                        | Gate resistance                                | f=1MHz                                                                                  |     | 3.2  |      | 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                         |     | 6.5  | 11   | nC    |
| Q <sub>gs</sub>                       | Gate Source Charge                             |                                                                                         |     | 1.5  |      | nC    |
| Q <sub>gd</sub>                       | Gate Drain Charge                              |                                                                                         |     | 1.8  |      | 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 |     | 16   |      | ns    |
| t <sub>r</sub>                        | Turn-On Rise Time                              |                                                                                         |     | 11   |      | ns    |
| t <sub>D(off)</sub>                   | Turn-Off DelayTime                             |                                                                                         |     | 28   |      | ns    |
| t <sub>f</sub>                        | Turn-Off Fall Time                             |                                                                                         |     | 14   |      | ns    |
| t <sub>rr</sub>                       | Body Diode Reverse Recovery Time               | I <sub>F</sub> =2A, dI/dt=100A/μs, V <sub>DS</sub> =100V                                |     | 268  |      | ns    |
| Q <sub>rr</sub>                       | Body Diode Reverse Recovery Charge             | I <sub>F</sub> =2A, dI/dt=100A/μs, V <sub>DS</sub> =100V                                |     | 1.6  |      | 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 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>=1.8A, V<sub>DD</sub>=150V, R<sub>G</sub>=10Ω, Starting T<sub>J</sub>=25° C.
- I. L=1.0mH, V<sub>DD</sub>=150V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25° C.

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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

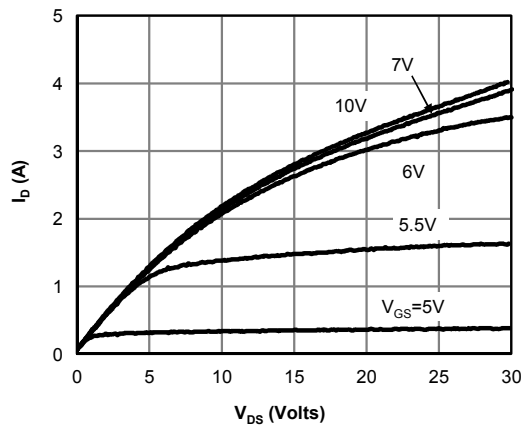


Fig 1: On-Region Characteristics

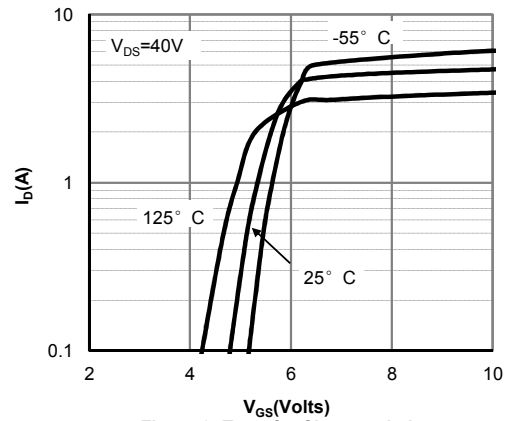


Figure 2: Transfer Characteristics

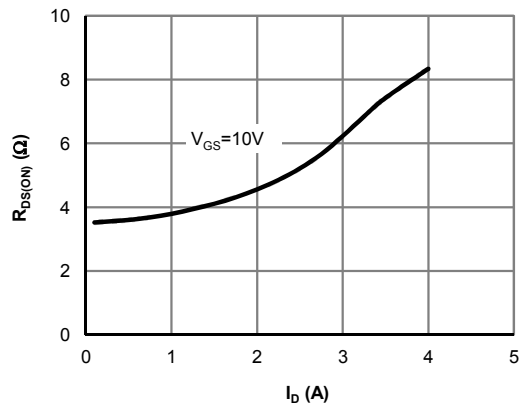


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

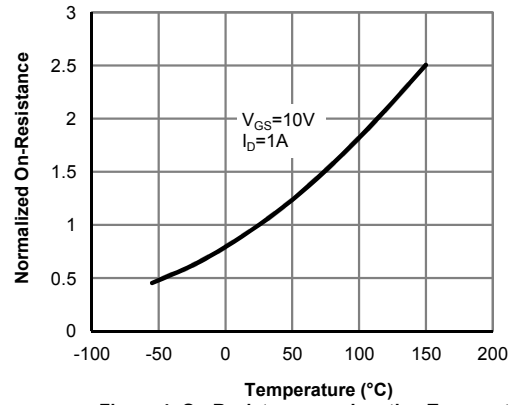


Figure 4: On-Resistance vs. Junction Temperature

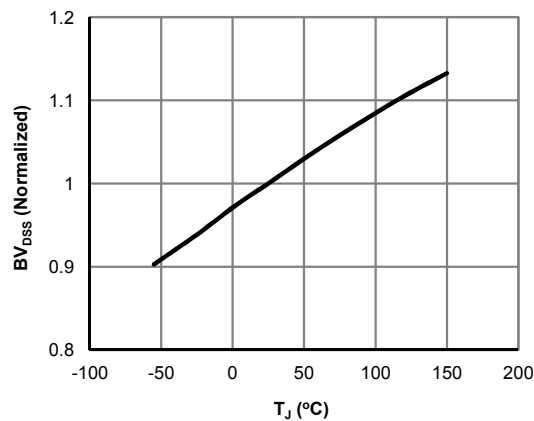


Figure 5: Break Down vs. Junction Temperature

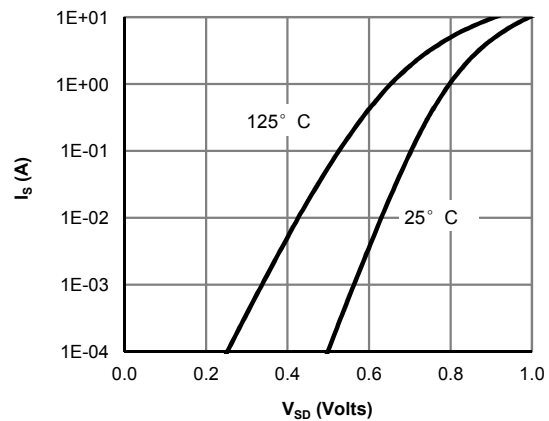


Figure 6: Body-Diode Characteristics

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

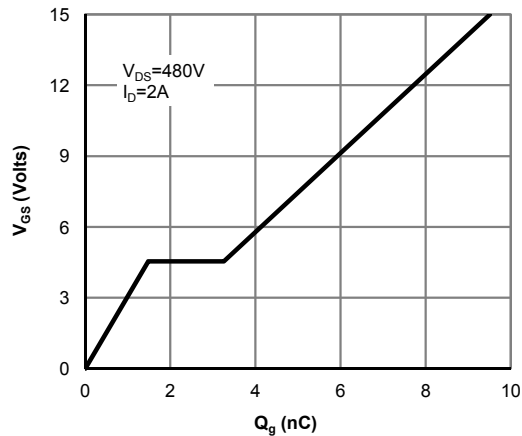


Figure 7: Gate-Charge Characteristics

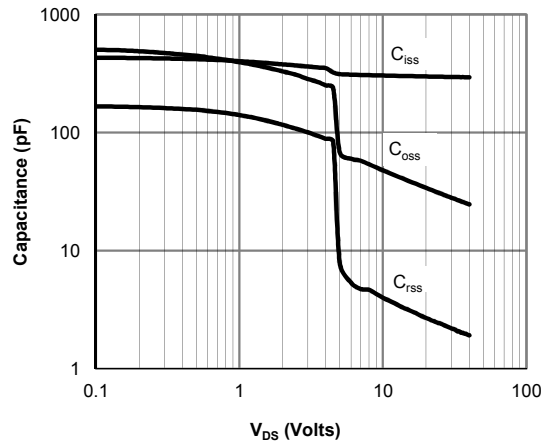


Figure 8: Capacitance Characteristics

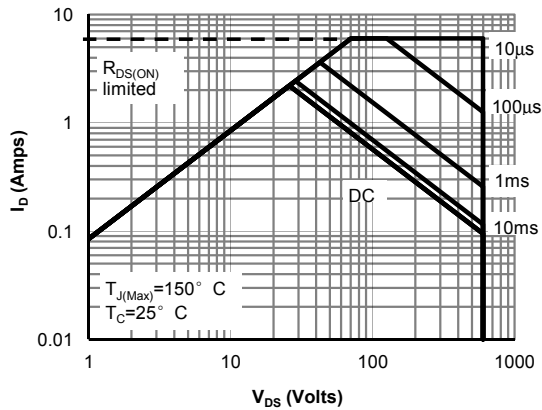


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

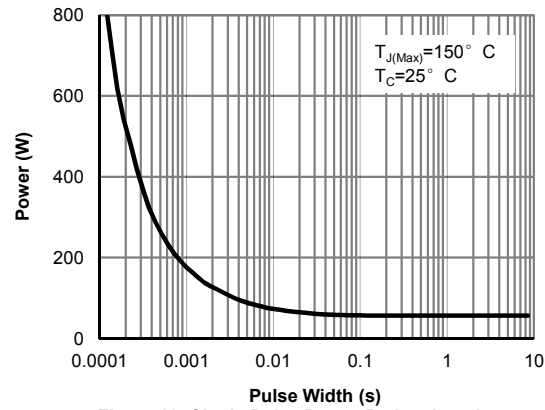


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

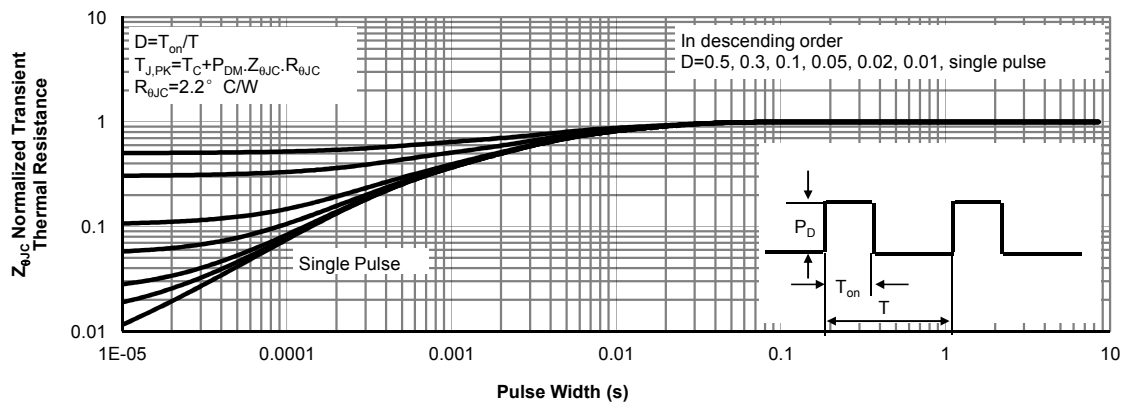


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

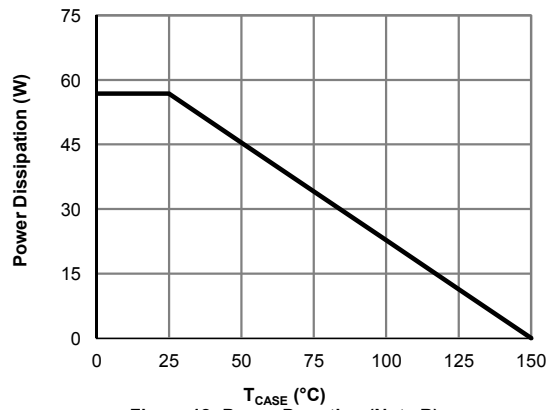


Figure 12: Power De-rating (Note B)

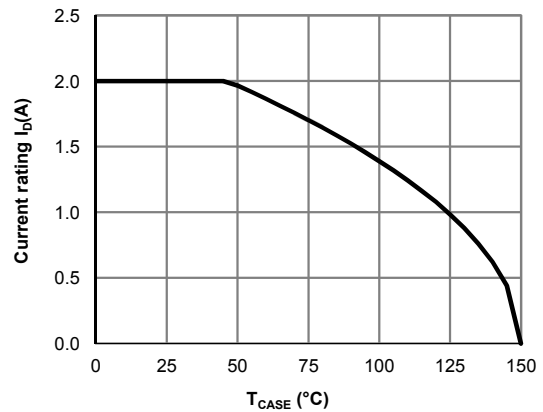


Figure 13: Current De-rating (Note B)

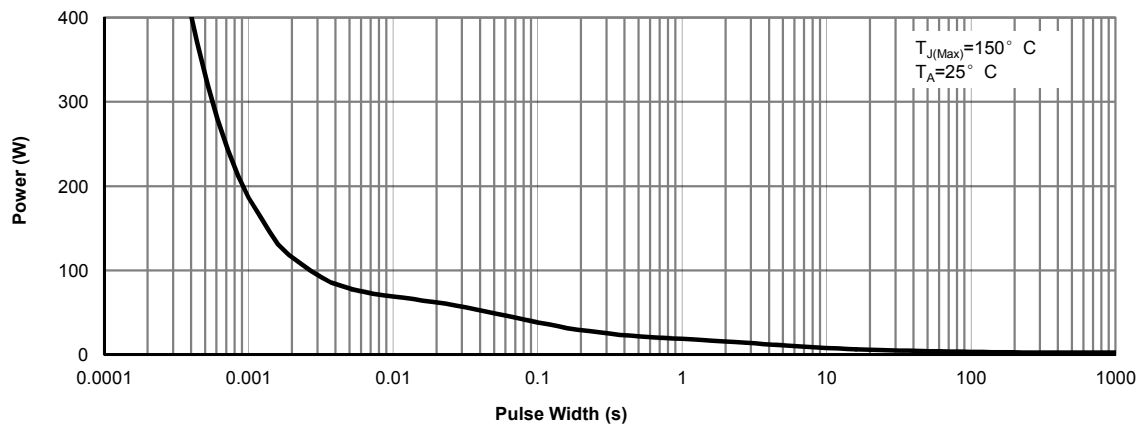


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

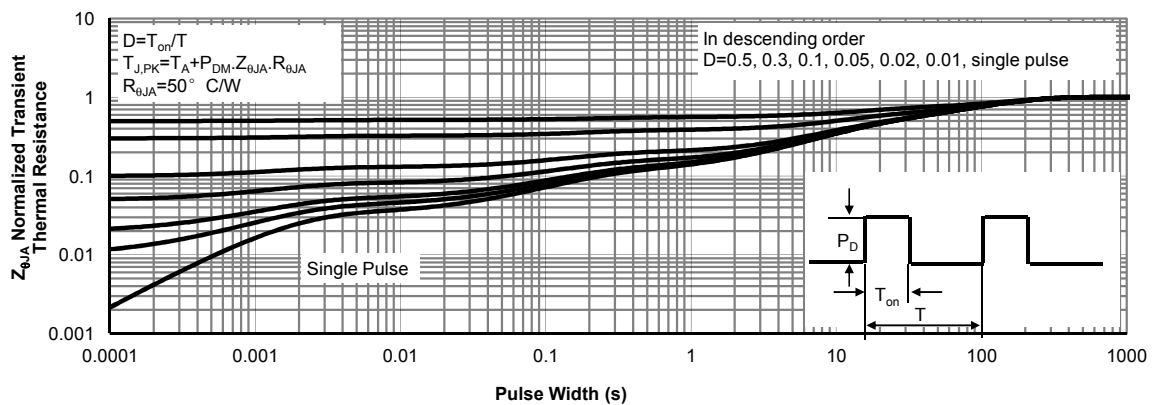
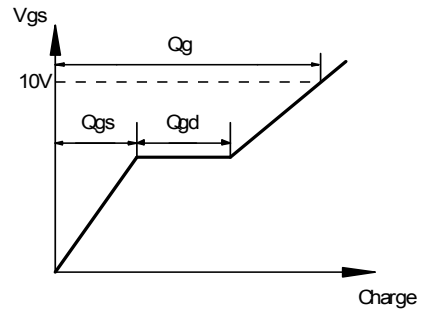
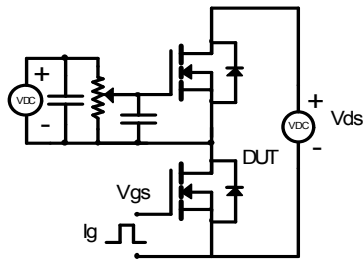
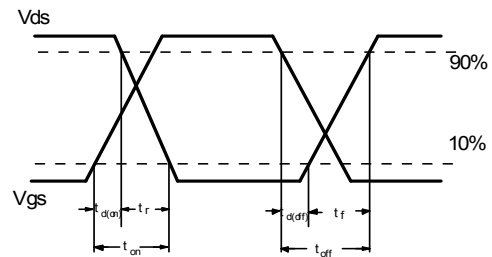
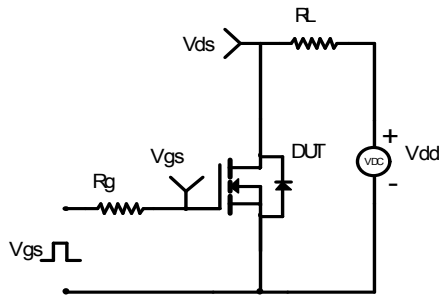


Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)

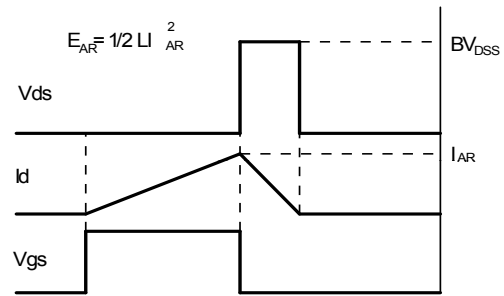
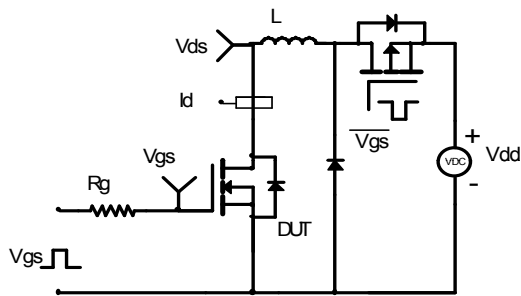
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

