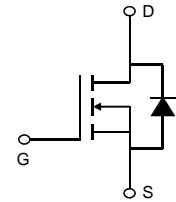


## General Description

- Latest Trench Power AlphaMOS (αMOS LV) technology
- Very Low RDS(on) at 4.5V<sub>GS</sub>
- Low Gate Charge
- High Current Capability
- RoHS and Halogen-Free Compliant

## Features

|  |         |
|--|---------|
| V <sub>DS</sub>                                | 30V     |
| I <sub>D</sub> (at V <sub>GS</sub> =10V)       | 70A     |
| R <sub>DS(ON)</sub> (at V <sub>GS</sub> =10V)  | < 2.6mΩ |
| R <sub>DS(ON)</sub> (at V <sub>GS</sub> =4.5V) | < 4mΩ   |



### Absolute Maximum Ratings T<sub>A</sub>=25°C unless otherwise noted

| Parameter                              | Symbol                            | Maximum               | Units |
|--|-----------------------------------|-----------------------|-------|
| Drain-Source Voltage                   | V <sub>DS</sub>                   | 30                    | V     |
| Gate-Source Voltage                    | V <sub>GS</sub>                   | ±20                   | V     |
| Continuous Drain Current <sup>G</sup>  | I <sub>D</sub>                    | T <sub>C</sub> =25°C  | 70    |
|  |                                   | T <sub>C</sub> =100°C | 54    |
| Pulsed Drain Current <sup>C</sup>      | I <sub>DM</sub>                   | 280                   | A     |
| Continuous Drain Current               | I <sub>DSM</sub>                  | T <sub>A</sub> =25°C  | 45    |
|  |                                   | T <sub>A</sub> =70°C  | 37    |
| Avalanche Current <sup>C</sup>         | I <sub>AS</sub>                   | 45                    | A     |
| Avalanche energy L=0.1mH <sup>C</sup>  | E <sub>AS</sub>                   | 101                   | mJ    |
| V <sub>DS</sub> Spike                  | V <sub>SPIKE</sub>                | 36                    | V     |
| Power Dissipation <sup>B</sup>         | P <sub>D</sub>                    | T <sub>C</sub> =25°C  | 60    |
|  |                                   | T <sub>C</sub> =100°C | 30    |
| Power Dissipation <sup>A</sup>         | P <sub>DSM</sub>                  | T <sub>A</sub> =25°C  | 7.5   |
|  |                                   | T <sub>A</sub> =70°C  | 5.2   |
| Junction and Storage Temperature Range | T <sub>J</sub> , T <sub>STG</sub> | -55 to 175            | °C    |

### Thermal Characteristics

| Parameter                                  | Symbol           | Typ          | Max | Units |
|--|------------------|--------------|-----|-------|
| Maximum Junction-to-Ambient <sup>A</sup>   | R <sub>θJA</sub> | 16           | 20  | °C/W  |
| Maximum Junction-to-Ambient <sup>A,D</sup> |                  | Steady-State | 41  | 50    |
| Maximum Junction-to-Case                   | R <sub>θJC</sub> | 1.9          | 2.5 | °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   | 30  |      |        | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current                    | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =55°C                          |     |      | 1<br>5 | μA    |
| 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> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                   | 1.2 | 1.7  | 2.2    | V     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance                  | V <sub>GS</sub> =10V, I <sub>D</sub> =20A<br>T <sub>J</sub> =125°C                         |     | 2.1  | 2.6    | mΩ    |
|                             |  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A   |     | 3.2  | 4      |       |
| g <sub>FS</sub>             | Forward Transconductance                           | V <sub>DS</sub> =5V, I <sub>D</sub> =20A   |     | 85   |        | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                              | I <sub>S</sub> =1A, V <sub>GS</sub> =0V  |     | 0.7  | 1      | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current <sup>G</sup> |  |     |      | 70     | A     |
| <b>DYNAMIC PARAMETERS</b>   |  |  |     |      |        |       |
| C <sub>iss</sub>            | Input Capacitance                                  |  |     | 2719 |        | pF    |
| C <sub>oss</sub>            | Output Capacitance                                 | V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz  |     | 1204 |        | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance                       |  |     | 169  |        | pF    |
| R <sub>g</sub>              | Gate resistance                                    | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz   | 0.9 | 2    | 3      | Ω     |
| <b>SWITCHING PARAMETERS</b> |  |  |     |      |        |       |
| Q <sub>g(10V)</sub>         | Total Gate Charge                                  | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A                            |     | 44   | 60     | nC    |
| Q <sub>g(4.5V)</sub>        | Total Gate Charge                                  |  |     | 21   | 28     | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                                 |  |     | 9    |        | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                                  |  |     | 7    |        | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                                  | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =0.75Ω,<br>R <sub>GEN</sub> =3Ω |     | 9.7  |        | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                                  |  |     | 5.2  |        | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                                 |  |     | 32.5 |        | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                                 |  |     | 10.3 |        | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time                   | I <sub>F</sub> =20A, dI/dt=500A/μs   |     | 19.6 |        | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge                 | I <sub>F</sub> =20A, dI/dt=500A/μs   |     | 42.7 |        | nC    |

A. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C. The Power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=175° 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. Single pulse width limited by junction temperature T<sub>J(MAX)</sub>=175° 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.

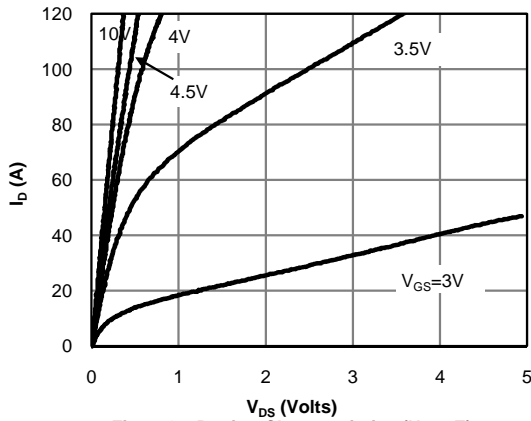
E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=175° C. The SOA curve provides a single pulse rating.

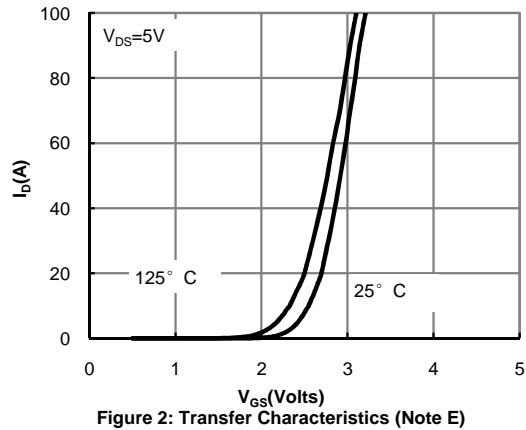
G. The maximum current rating is package limited.

H. 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.

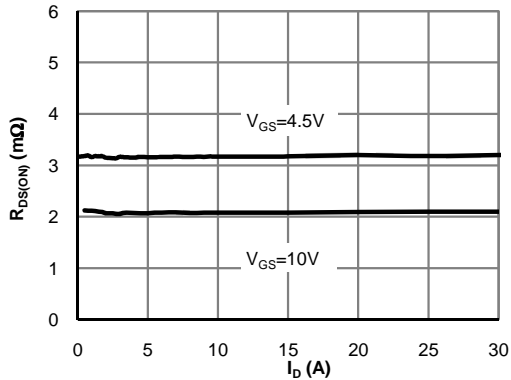
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



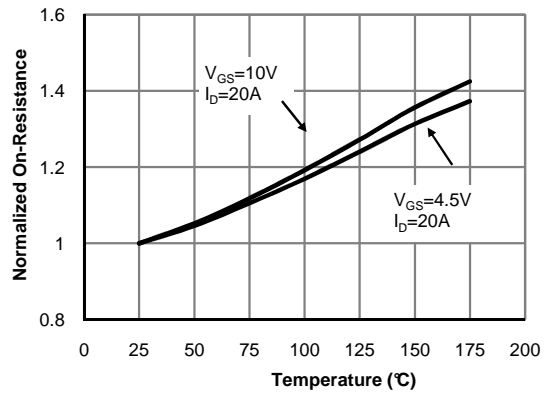
**Fig 1: On-Region Characteristics (Note E)**



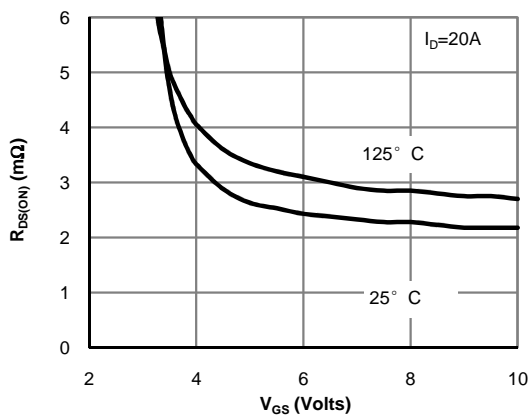
**Figure 2: Transfer Characteristics (Note E)**



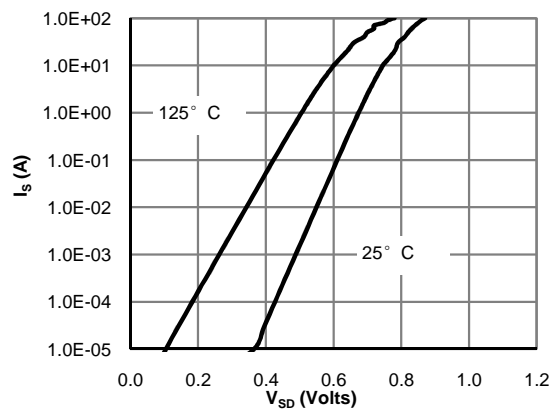
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**



**Figure 4: On-Resistance vs. Junction Temperature (Note E)**



**Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)**



**Figure 6: Body-Diode Characteristics (Note E)**

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

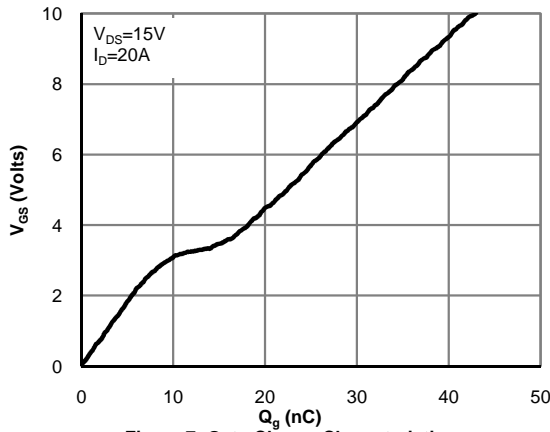


Figure 7: Gate-Charge Characteristics

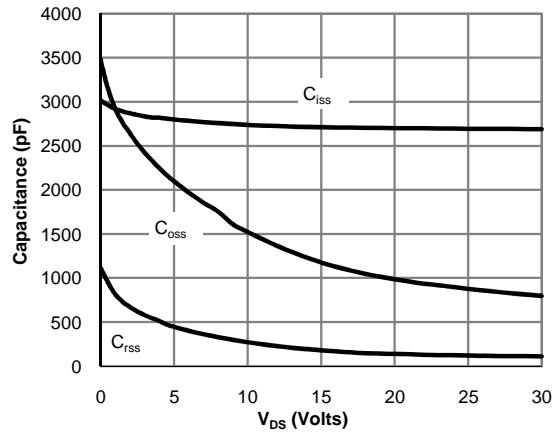


Figure 8: Capacitance Characteristics

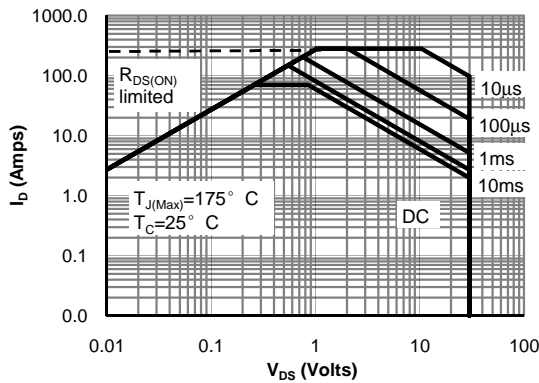


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

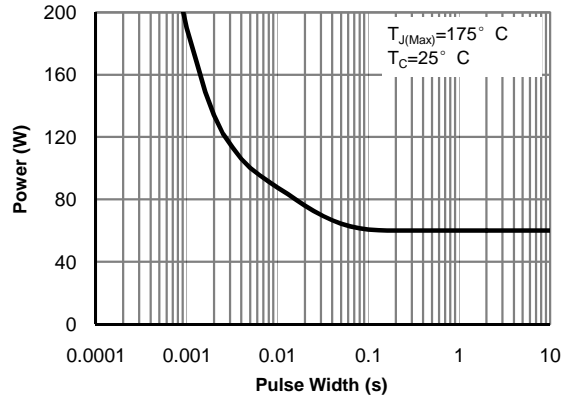


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

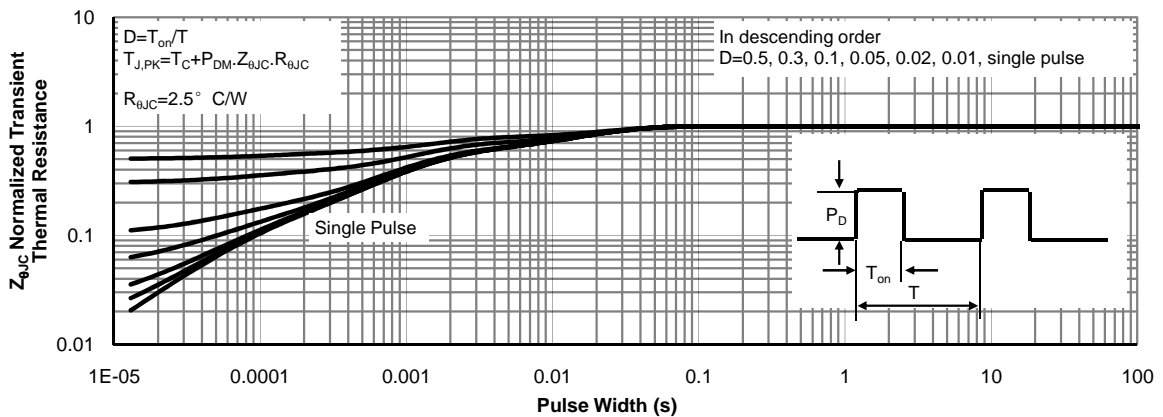


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

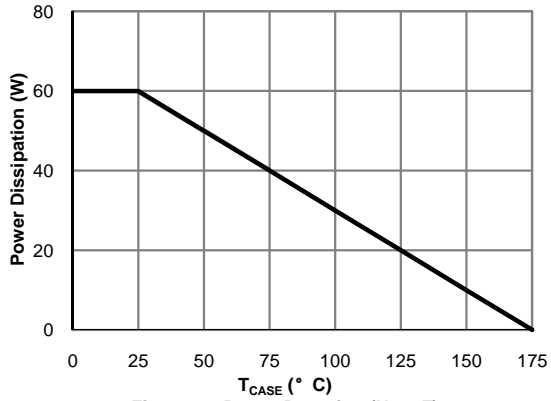


Figure 12: Power De-rating (Note F)

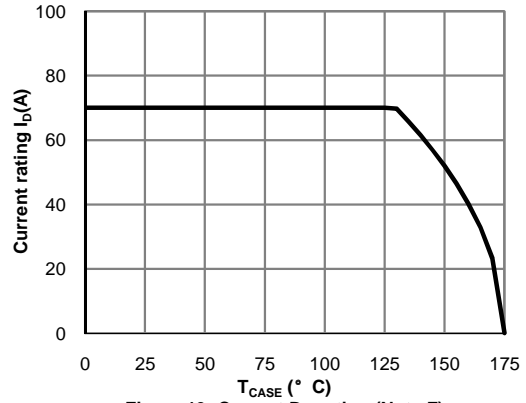


Figure 13: Current De-rating (Note F)

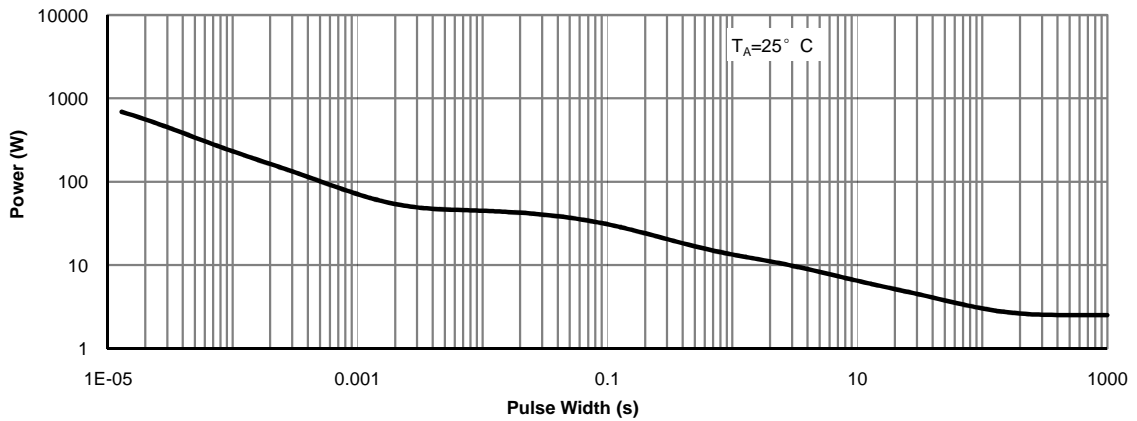


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

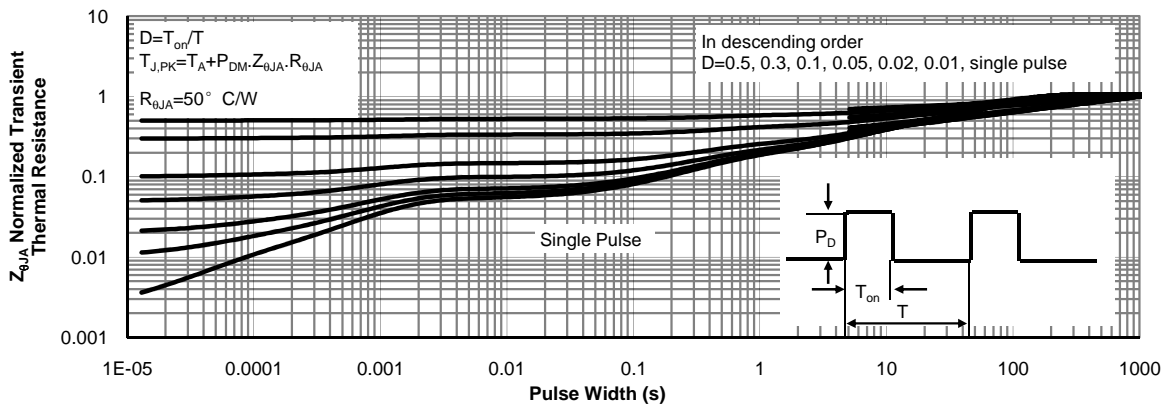
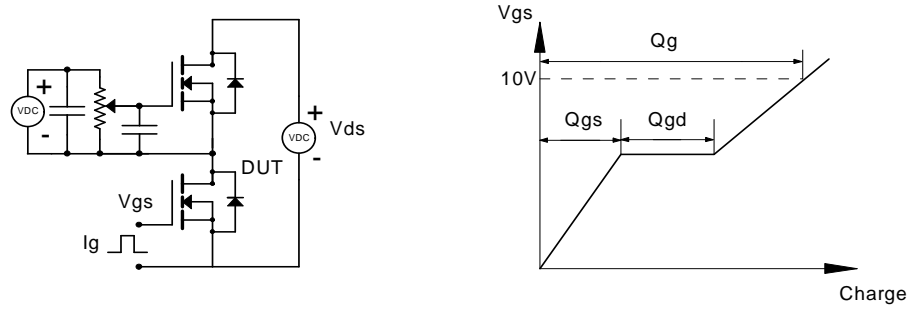
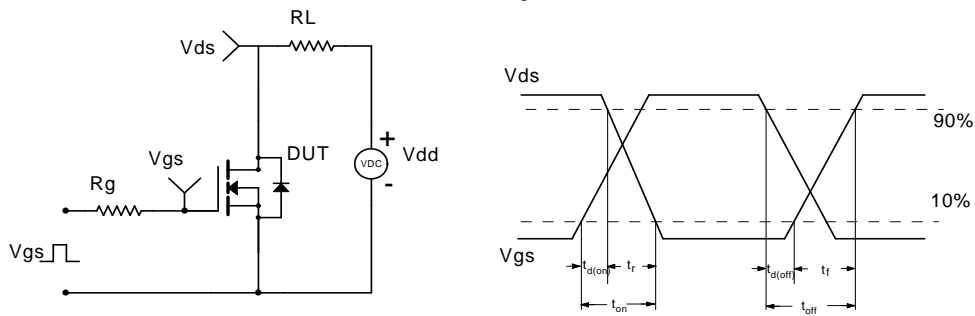


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

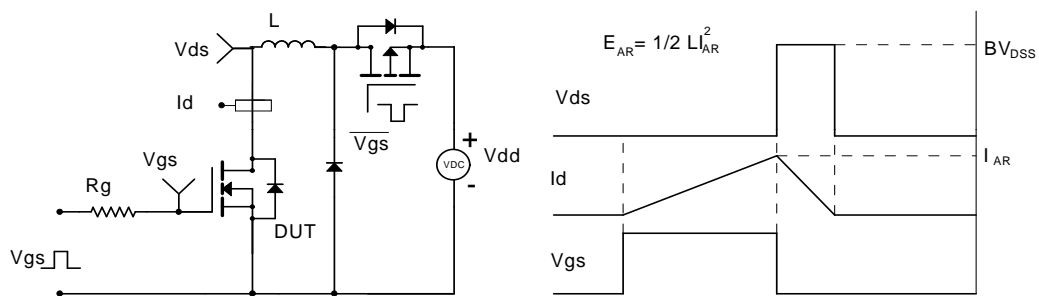
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

