# AOD2922

***100V N-Channel AlphaMOS***

ALPHA & OMEGA SEMICONDUCTOR

## General Description

- Latest Trench Power AlphaMOS (αMOS MV) technology
- Very Low $R_{DS(ON)}$
- Low Gate Charge
- Optimized for fast-switching applications
- RoHS and Halogen-Free Compliant

## Product Summary

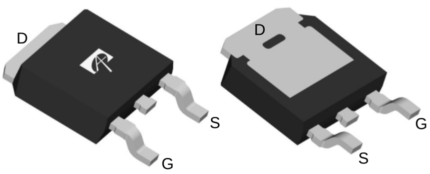
| | |
|---|---|
| $V_{DS}$ | 100V |
| $I_D$ (at $V_{GS}$=10V) | 7A |
| $R_{DS(ON)}$ (at $V_{GS}$=10V) | < 140mΩ |
| $R_{DS(ON)}$ (at $V_{GS}$=4.5V) | < 176mΩ |

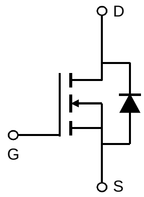
100% UIS Tested
100% Rg Tested

## Application

- Synchronus Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

TO-252
DPAK




| Orderable Part Number | Package Type | Form | Minimum Order Quantity |
|---|---|---|---|
| AOD2922 | TO-252 | Tape & Reel | 2500 |

**Absolute Maximum Ratings $T_A$=25℃ unless otherwise noted**

| Parameter | | Symbol | Maximum | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | $T_C$=25℃ | $I_D$ | 7 | A |
| | $T_C$=100℃ | | 5 | |
| Pulsed Drain Current [C] | | $I_{DM}$ | 10 | |
| Continuous Drain Current | $T_A$=25℃ | $I_{DSM}$ | 3.5 | A |
| | $T_A$=70℃ | | 3 | |
| Avalanche Current [C] | | $I_{AS}$ | 3 | A |
| Avalanche energy L=0.1mH [C] | | $E_{AS}$ | 0.5 | mJ |
| $V_{DS}$ Spike | 10us | $V_{SPIKE}$ | 120 | V |
| Power Dissipation [B] | $T_C$=25℃ | $P_D$ | 17 | W |
| | $T_C$=100℃ | | 8.5 | |
| Power Dissipation [A] | $T_A$=25℃ | $P_{DSM}$ | 5.0 | W |
| | $T_A$=70℃ | | 3.2 | |
| Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 175 | ℃ |

**Thermal Characteristics**

| Parameter | | Symbol | Typ | Max | Units |
|---|---|---|---|---|---|
| Maximum Junction-to-Ambient [A] | t ≤ 10s | $R_{\theta JA}$ | 20 | 25 | ℃/W |
| Maximum Junction-to-Ambient [A D] | Steady-State | | 40 | 50 | ℃/W |
| Maximum Junction-to-Case | Steady-State | $R_{\theta JC}$ | 7.3 | 8.8 | ℃/W |

ALPHA & OMEGA SEMICONDUCTOR

## Electrical Characteristics ($T_J$=25°C unless otherwise noted)

| Symbol | Parameter | Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| **STATIC PARAMETERS** | | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $I_D$=250µA, $V_{GS}$=0V | | 100 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=100V, $V_{GS}$=0V | | | | 1 | µA |
| | | | $T_J$=55°C | | | 5 | |
| $I_{GSS}$ | Gate-Body leakage current | $V_{DS}$=0V, $V_{GS}$=±20V | | | | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250µA | | 1.7 | 2.2 | 2.7 | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V, $I_D$=5A | | | 117 | 140 | mΩ |
| | | | $T_J$=125°C | | 224 | 270 | |
| | | $V_{GS}$=4.5V, $I_D$=3A | | | 140 | 176 | mΩ |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=5V, $I_D$=5A | | | 8.5 | | S |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=1A,$V_{GS}$=0V | | | 0.8 | 1.1 | V |
| $I_S$ | Maximum Body-Diode Continuous Current | | | | | 7 | A |
| **DYNAMIC PARAMETERS** | | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=50V, f=1MHz | | | 250 | 310 | pF |
| $C_{oss}$ | Output Capacitance | | | | 19 | 30 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | | 2.5 | 8 | pF |
| $R_g$ | Gate resistance | f=1MHz | | 5 | 10.5 | 16 | Ω |
| **SWITCHING PARAMETERS** | | | | | | | |
| $Q_g$(10V) | Total Gate Charge | $V_{GS}$=10V, $V_{DS}$=50V, $I_D$=5A | | | 3.8 | 10 | nC |
| $Q_g$(4.5V) | Total Gate Charge | | | | 1.8 | 6 | nC |
| $Q_{gs}$ | Gate Source Charge | | | | 0.8 | | nC |
| $Q_{gd}$ | Gate Drain Charge | | | | 0.8 | | nC |
| $t_{D(on)}$ | Turn-On DelayTime | $V_{GS}$=10V, $V_{DS}$=50V, $R_L$=10Ω, $R_{GEN}$=3Ω | | | 5 | | ns |
| $t_r$ | Turn-On Rise Time | | | | 3 | | ns |
| $t_{D(off)}$ | Turn-Off DelayTime | | | | 19 | | ns |
| $t_f$ | Turn-Off Fall Time | | | | 5 | | ns |
| $t_{rr}$ | Body Diode Reverse Recovery Time | $I_F$=5A, dI/dt=500A/µs | | | 16 | | ns |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge | $I_F$=5A, dI/dt=500A/µs | | | 52 | | nC |

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A$ =25°C. The Power dissipation $P_{DSM}$ is based on R $_{\theta JA}$ t≤ 10s and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.
B. The power dissipation $P_D$ is based on $T_{J(MAX)}$=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 $T_{J(MAX)}$=175°C.
D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ 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 $T_{J(MAX)}$=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 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A$=25°C.

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

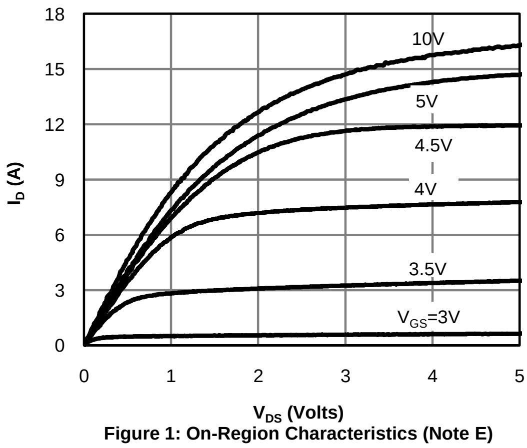



Figure 1: On-Region Characteristics (Note E)

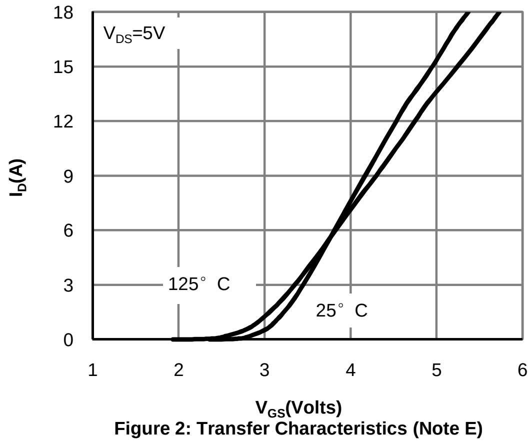



Figure 2: Transfer Characteristics (Note E)

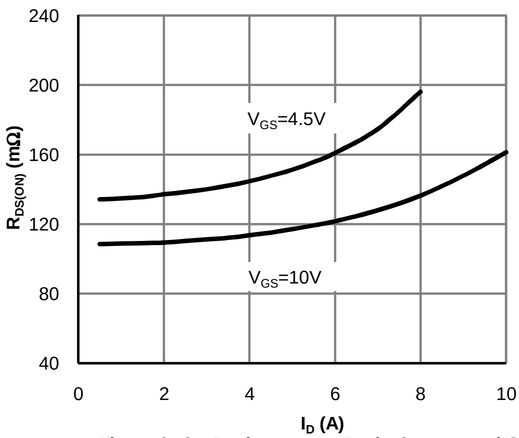



Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

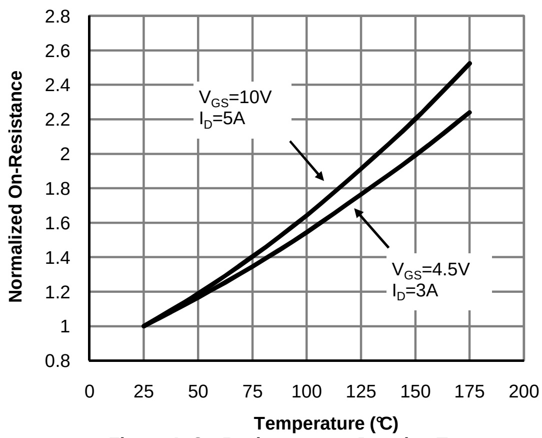



Figure 4: On-Resistance vs. Junction Temperature (Note E)

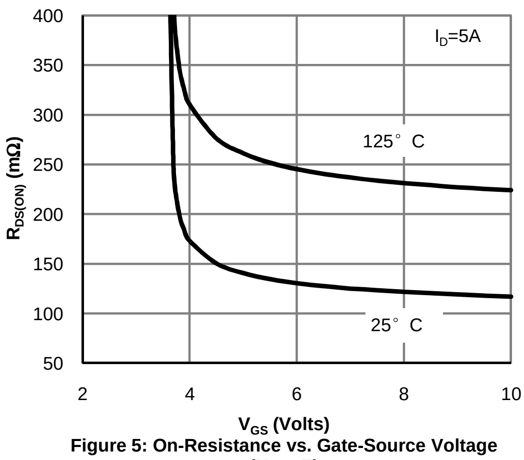



Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

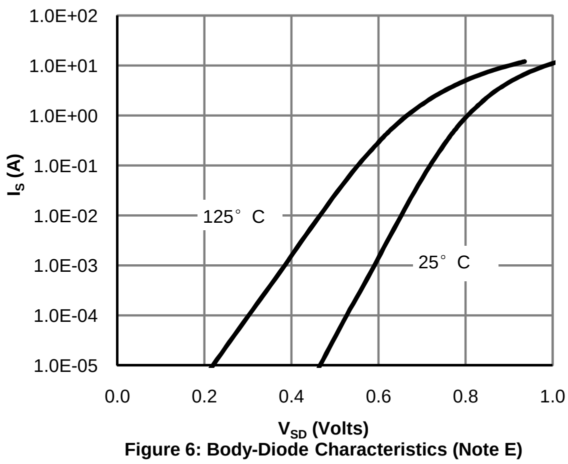



Figure 6: Body-Diode Characteristics (Note E)

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

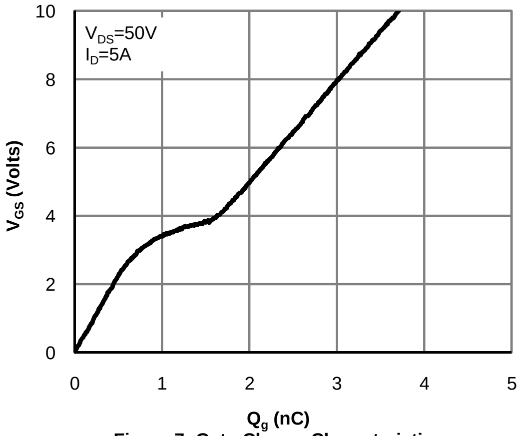



**Figure 7: Gate-Charge Characteristics**

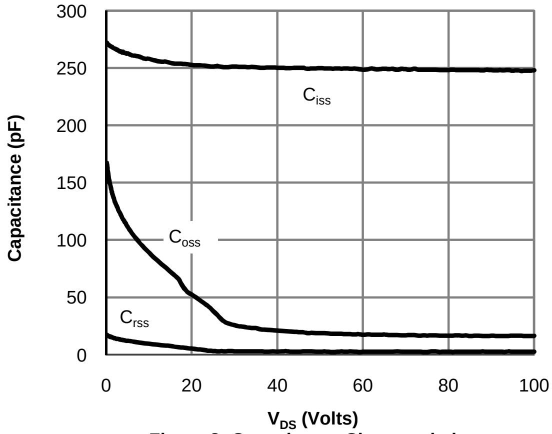
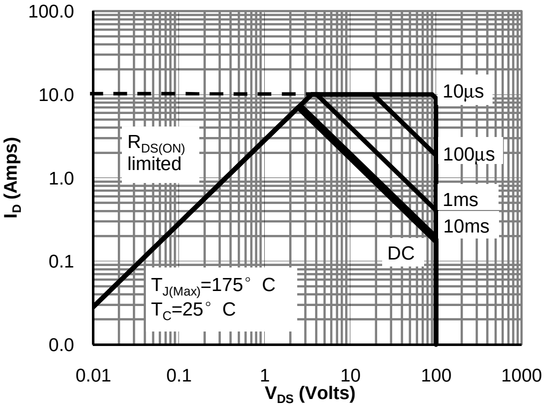



**Figure 8: Capacitance Characteristics**




$V_{GS}$> or equal to 4.5V

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

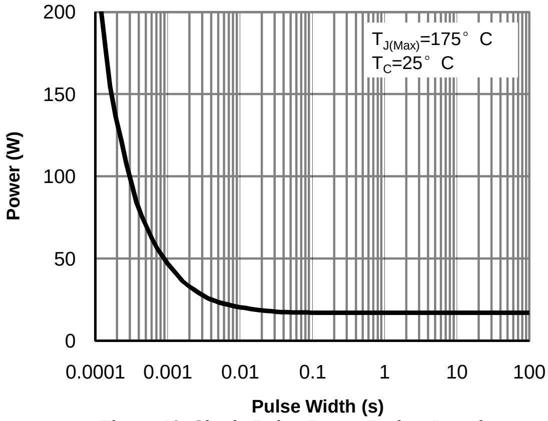



**Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)**

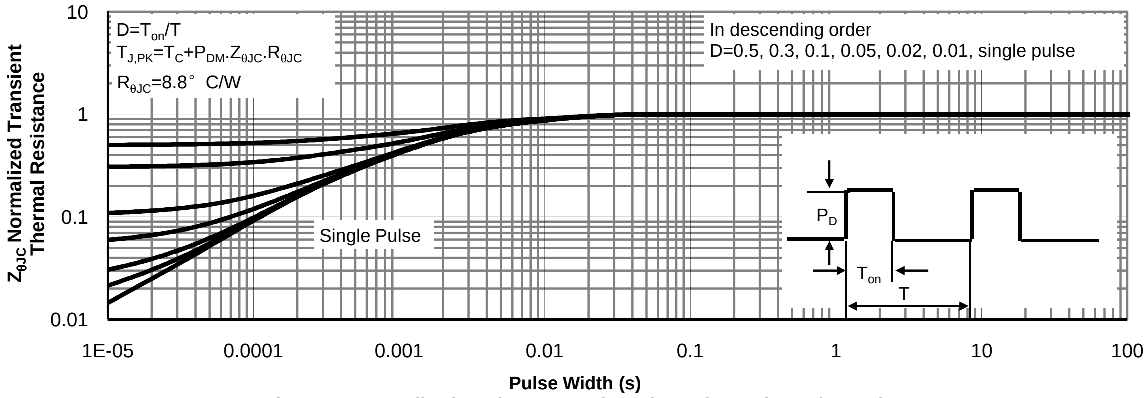



**Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)**

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

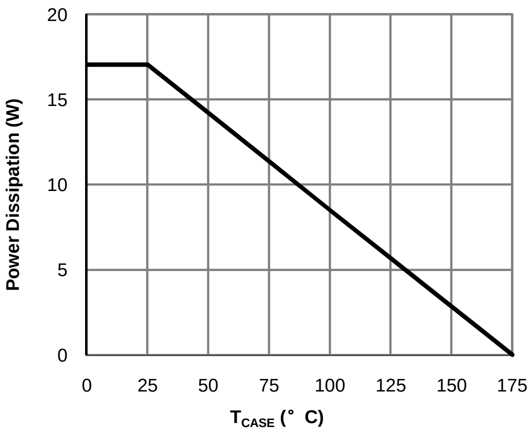


Figure 12: Power De-rating (Note F)

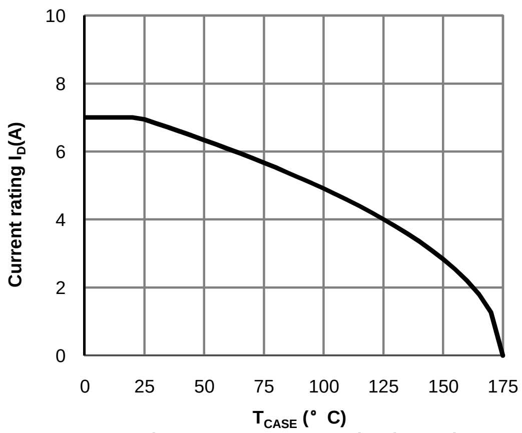


Figure 13: Current De-rating (Note F)

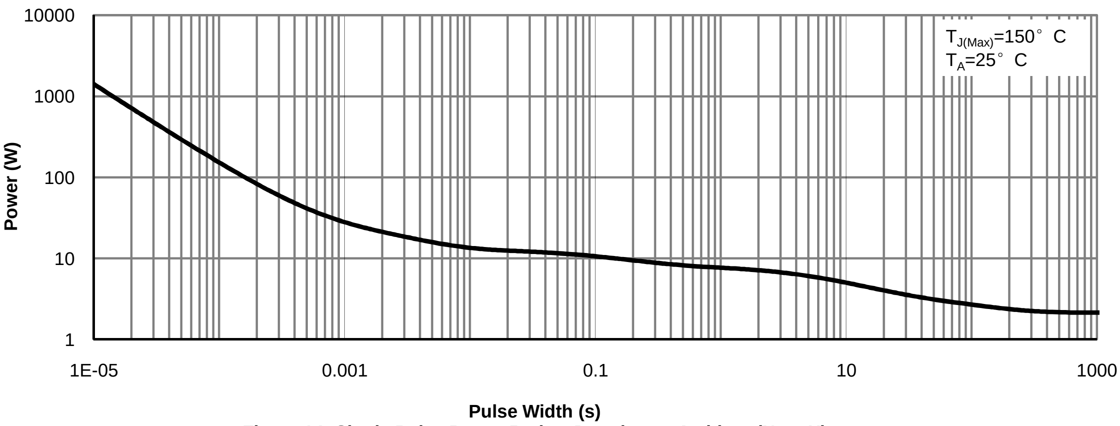


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

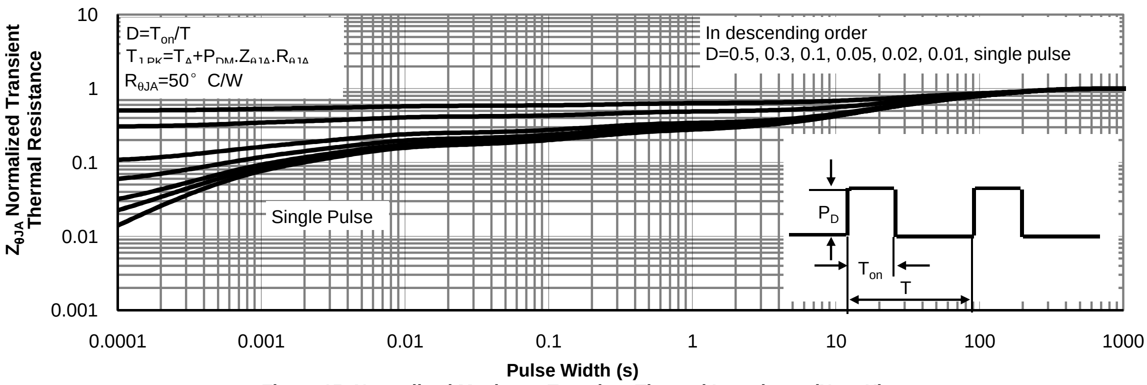
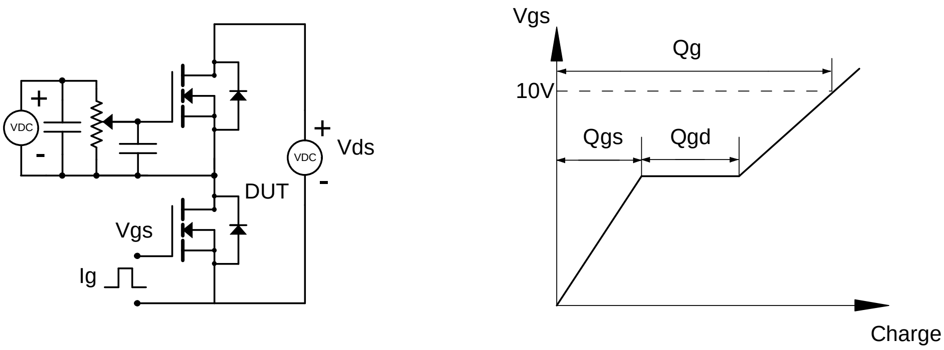
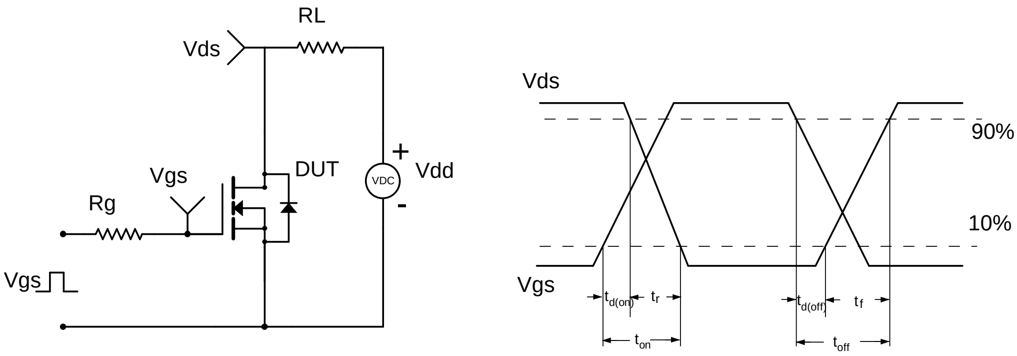


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

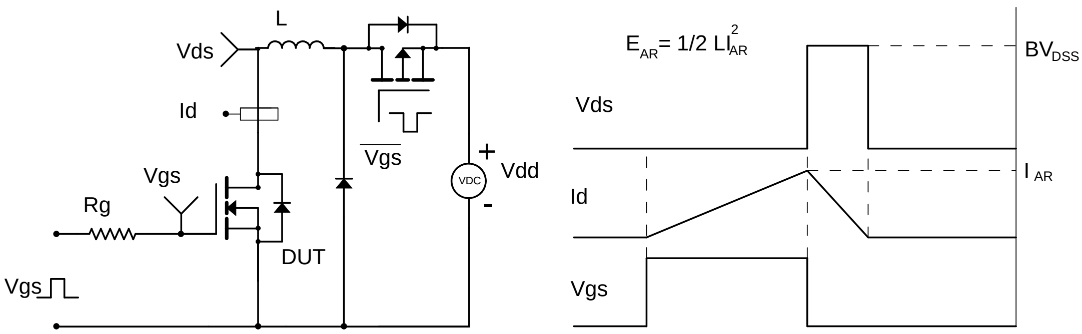
## Gate Charge Test Circuit & Waveform




## Resistive Switching Test Circuit & Waveforms




## Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




## Diode Recovery Test Circuit & Waveforms