



ALPHA & OMEGA
SEMICONDUCTOR

AOD486A
40V N-Channel MOSFET

General Description

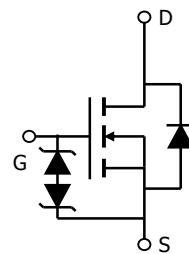
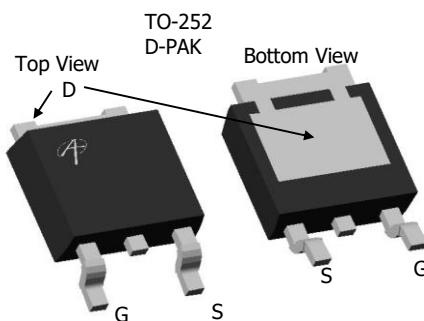
The AOD486A uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

- RoHS Compliant
- Halogen Free*

Features

V_{DS} (V) = 40V
 I_D = 50 A (V_{GS} = 10V)
 $R_{DS(ON)} < 9.8 \text{ m}\Omega$ (V_{GS} = 10V)
 $R_{DS(ON)} < 13 \text{ m}\Omega$ (V_{GS} = 4.5V)

ESD Protected
100% UIS Tested
100% Rg Tested



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^G	I_D	50	A
$T_C=100^\circ\text{C}$		36	
Pulsed Drain Current ^C	I_{DM}	100	
Avalanche Current ^C	I_{AR}	30	A
Repetitive avalanche energy $L=0.3\text{mH}$ ^C	E_{AR}	135	mJ
Power Dissipation ^B	P_D	50	W
$T_C=100^\circ\text{C}$		25	
Power Dissipation ^A	P_{DSM}	2	W
$T_A=70^\circ\text{C}$		1.3	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	°C

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	17.4	30	°C/W
Steady-State		45	60	°C/W
Maximum Junction-to-Case ^B	$R_{\theta JC}$	1.2	3	°C/W

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	40			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm20\text{V}$			±100	μA
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1.75	2	3	V
$I_{\text{D(ON)}}$	On state drain current	$V_{GS}=10\text{V}, V_{DS}=5\text{V}$	100			A
$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=20\text{A}$		8.1	9.8	$\text{m}\Omega$
		$T_J=125^\circ\text{C}$		12.15	16	
g_{FS}		$V_{GS}=4.5\text{V}, I_D=5\text{A}$		10.8	13	$\text{m}\Omega$
Forward Transconductance	$V_{DS}=5\text{V}, I_D=20\text{A}$		47		S	
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.76	1	V
I_S	Maximum Body-Diode Continuous Current				50	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=20\text{V}, f=1\text{MHz}$		1600	1920	pF
C_{oss}	Output Capacitance			320		pF
C_{rss}	Reverse Transfer Capacitance			100		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		3.4		Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=20\text{V}, I_D=20\text{A}$		22		nC
$Q_g(4.5\text{V})$	Total Gate Charge			10.5		nC
Q_{gs}	Gate Source Charge			4.2		nC
Q_{gd}	Gate Drain Charge			4.8		nC
$t_{\text{D(on)}}$	Turn-On DelayTime	$V_{GS}=10\text{V}, V_{DS}=20\text{V}, R_L=1\Omega, R_{\text{GEN}}=3\Omega$		6.5		ns
t_r	Turn-On Rise Time			12.5		ns
$t_{\text{D(off)}}$	Turn-Off DelayTime			33		ns
t_f	Turn-Off Fall Time			16		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=20\text{A}, dI/dt=100\text{A}/\mu\text{s}$		31		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=20\text{A}, dI/dt=100\text{A}/\mu\text{s}$		33		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 $T_A=25^\circ\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ 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 $T_{J(\text{MAX})}=175^\circ\text{C}$, 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 $T_{J(\text{MAX})}=175^\circ\text{C}$.

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 <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 $T_{J(\text{MAX})}=175^\circ\text{C}$.

G: The package is limited to a maximum of 25A continuous current.

H: These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

*This device is guaranteed green after data code 8X11 (Sep 1ST 2008).

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

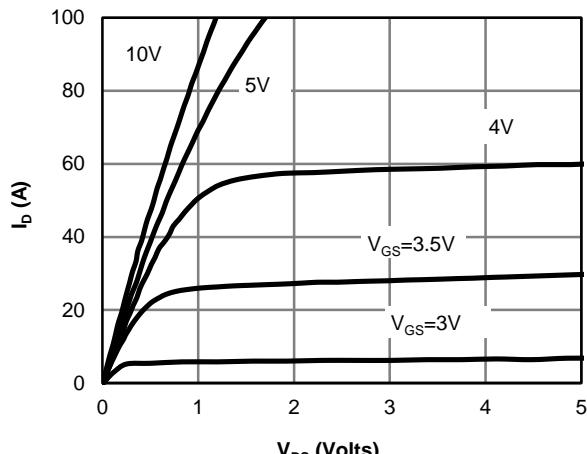


Fig 1: On-Region Characteristics

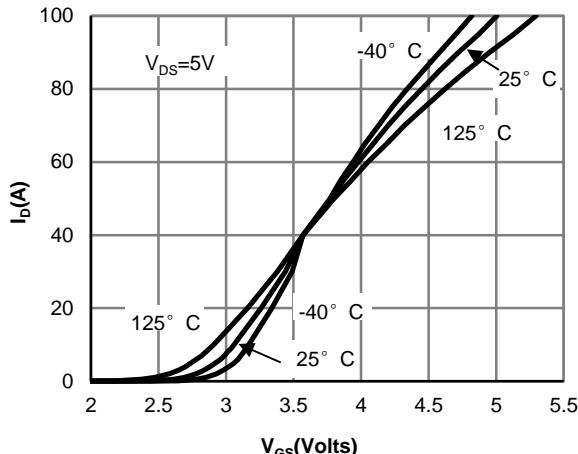


Figure 2: Transfer Characteristics

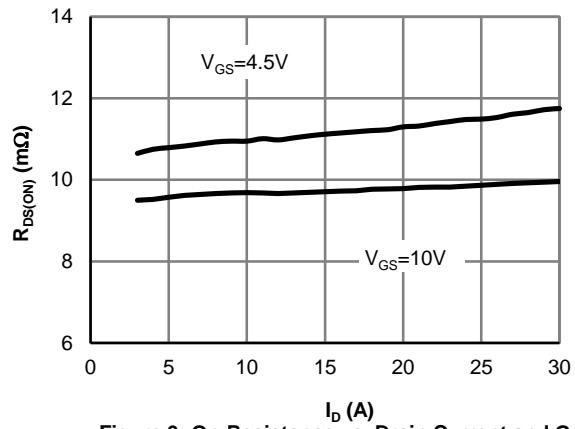


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

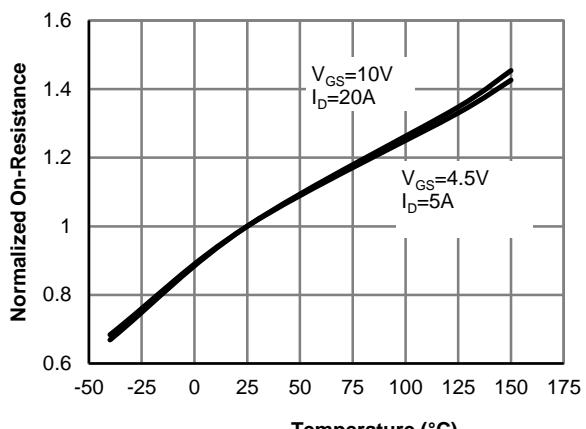


Figure 4: On-Resistance vs. Junction Temperature

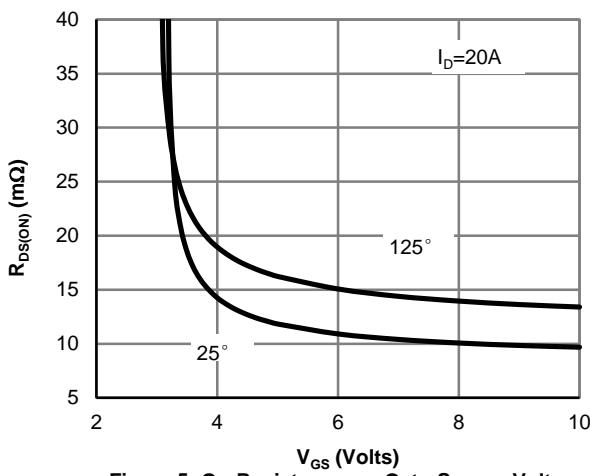


Figure 5: On-Resistance vs. Gate-Source Voltage

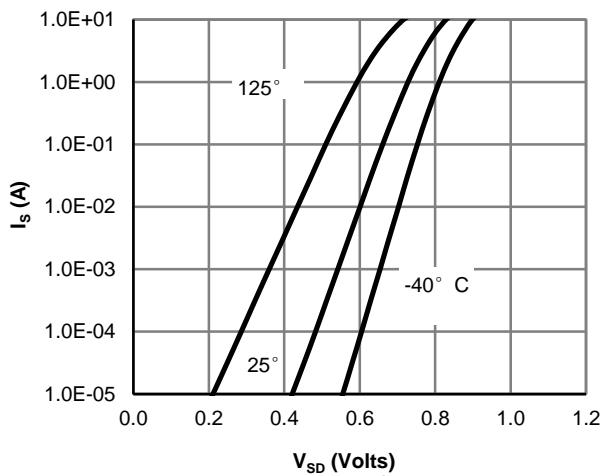


Figure 6: Body-Diode Characteristics



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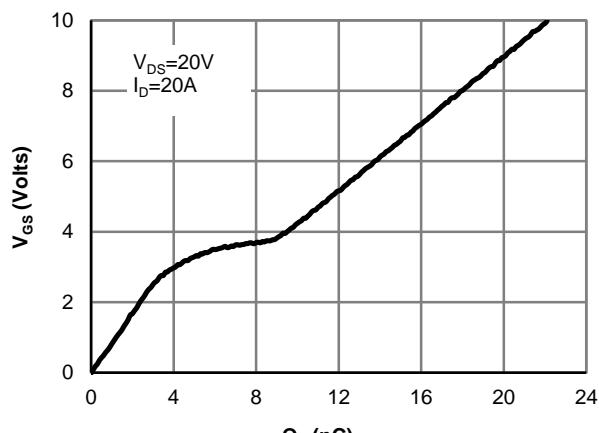


Figure 7: Gate-Charge Characteristics

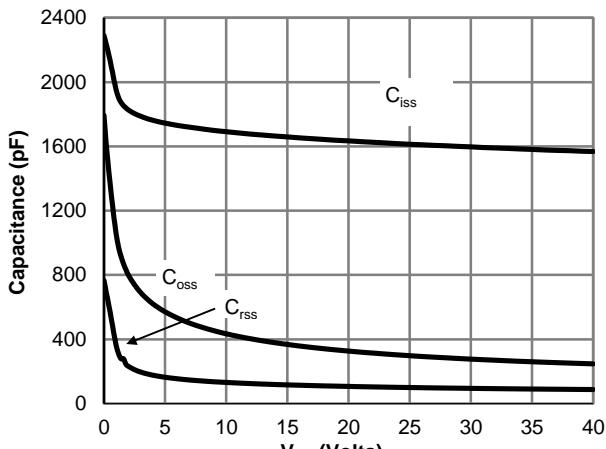


Figure 8: Capacitance Characteristics

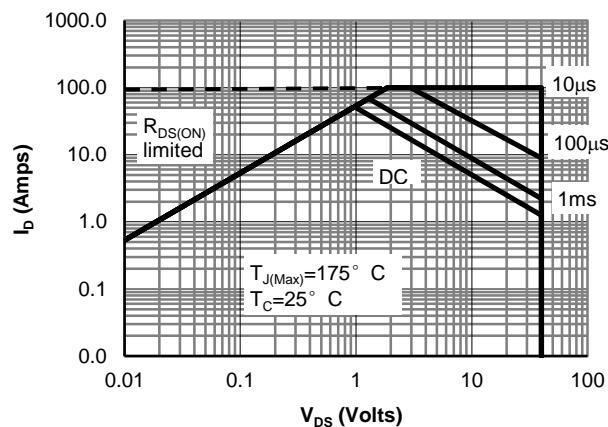


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

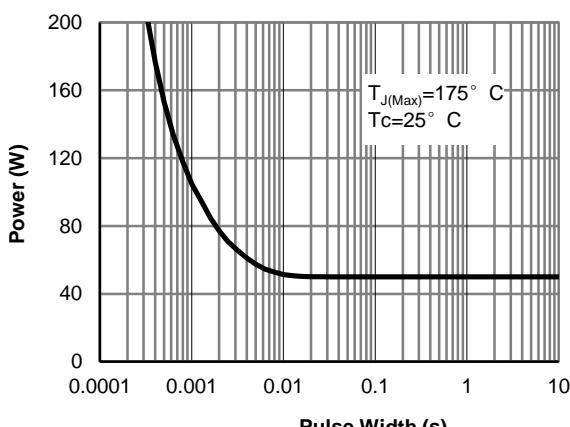


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

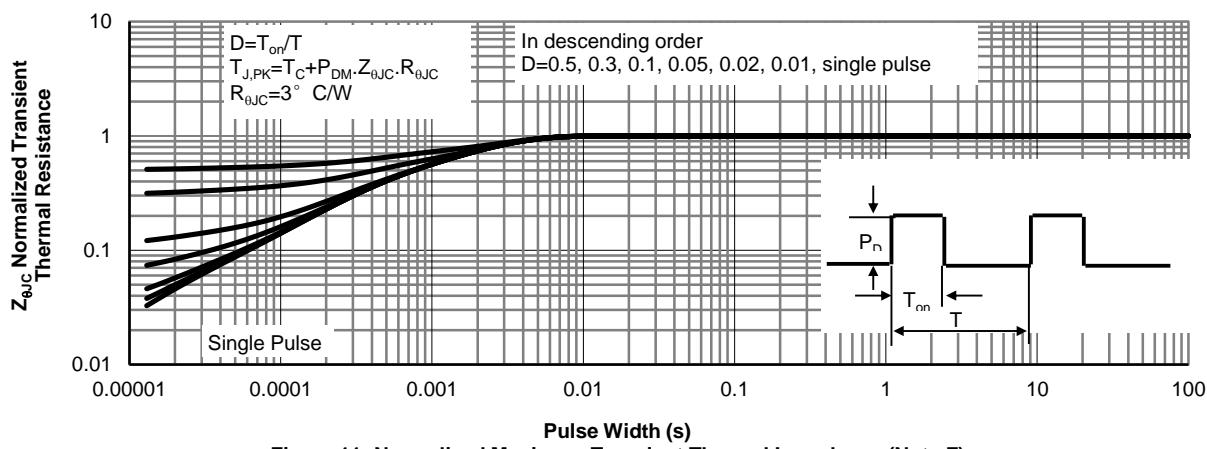


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

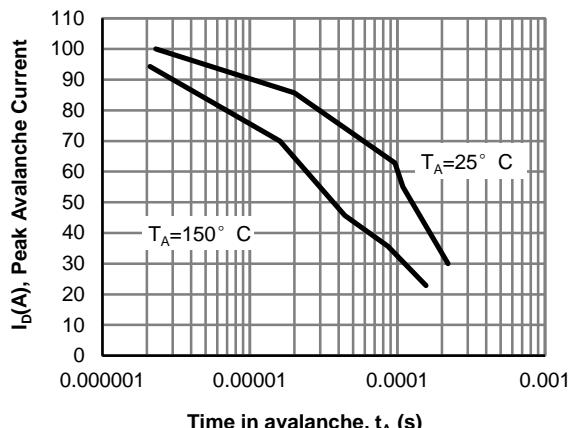


Figure 12: Single Pulse Avalanche capability

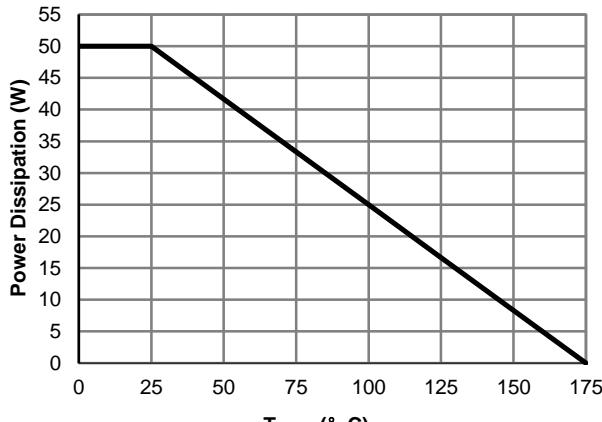


Figure 13: Power De-rating (Note B)

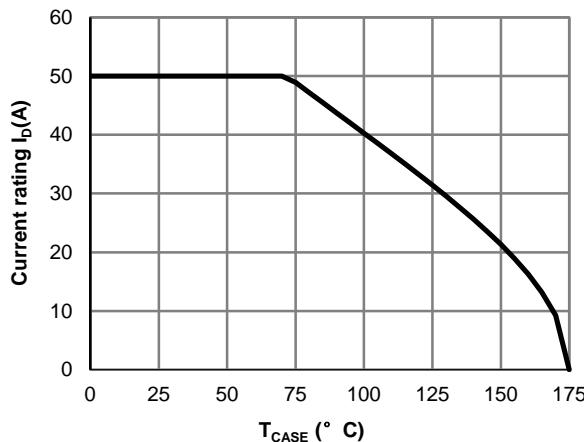


Figure 14: Current De-rating (Note B)

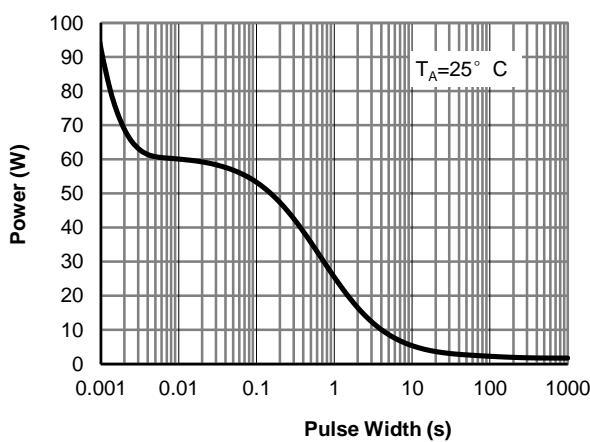


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

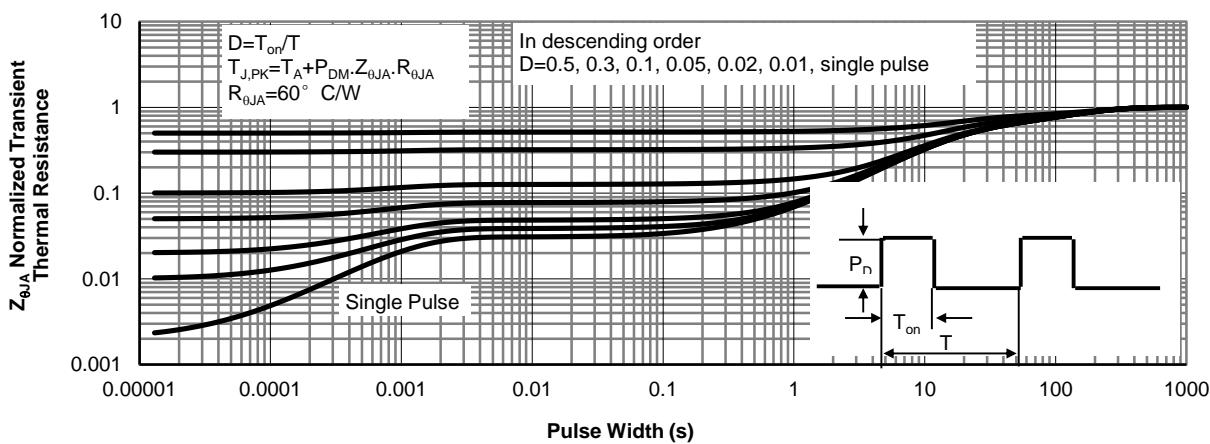
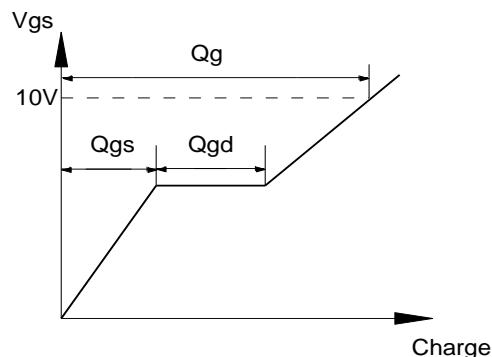
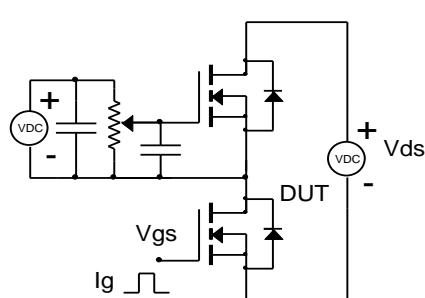
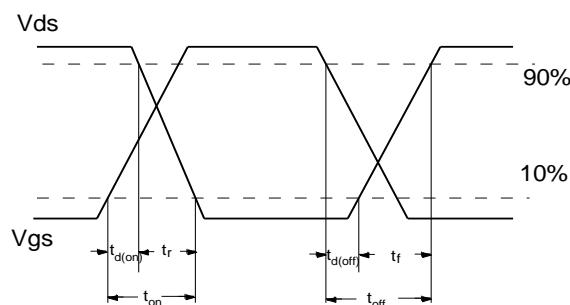
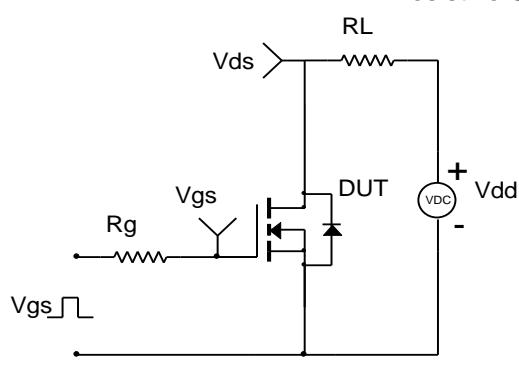


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

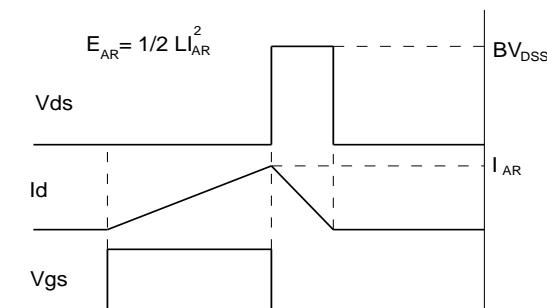
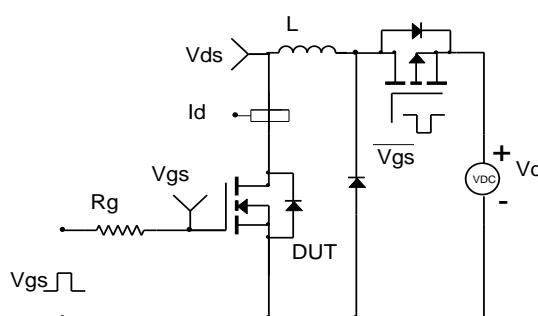
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

