AOT2610L/AOTF2610L

60V N-Channel MOSFET

General Description

The AOT2610L & AOTF2610L uses trench MOSFET technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$, Ciss and Coss. This device is ideal for boost converters and synchronous rectifiers for consumer, telecom, industrial power supplies and LED backlighting.

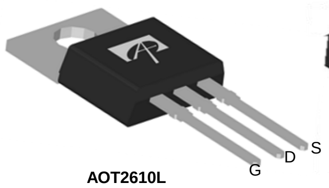
Product Summary

V_{DS}	60V
I_D (at V_{GS}=10V)	55A / 35A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 10.7mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 13.5mΩ

100% UIS Tested
100% R_g Tested

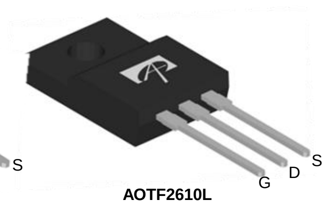
Top View

TO-220

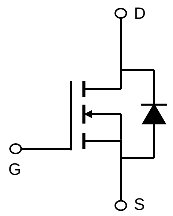


AOT2610L

TO-220F



AOTF2610L



Absolute Maximum Ratings T_A=25°C unless otherwise noted					
Parameter		**Symbol**	**AOT2610L**	**AOTF2610L**	**Units**
Drain-Source Voltage		V_{DS}	60		V
Gate-Source Voltage		V_{GS}	±20		V
Continuous Drain Current	T_C=25°C	I_D	55	35	A
	T_C=100°C		39	25	
Pulsed Drain Current [C]		I_{DM}	140		
Continuous Drain Current	T_A=25°C	I_{DSM}	9		A
	T_A=70°C		7		
Avalanche Current [C]		I_{AS}	36		A
Avalanche energy L=0.1mH [C]		E_{AS}	65		mJ
Power Dissipation [B]	T_C=25°C	P_D	75	31	W
	T_C=100°C		37.5	15.5	
Power Dissipation [A]	T_A=25°C	P_{DSM}	2.1		W
	T_A=70°C		1.3		
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175		°C

Thermal Characteristics					
Parameter		**Symbol**	**AOT2610L**	**AOTF2610L**	**Units**
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	15	15	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		60	60	°C/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	2.0	4.8	°C/W

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	60			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=60V, 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	1.4	2	2.5	V
$I_{D(ON)}$	On state drain current	V_{GS}=10V, V_{DS}=5V	140			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=20A		8.7	10.7	mΩ
		T_J=125°C		15.7	18.9	
		V_{GS}=4.5V, I_D=20A		10.7	13.5	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=20A		85		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.72	1	V
I_S	Maximum Body-Diode Continuous Current				35	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=30V, f=1MHz		2007		pF
C_{oss}	Output Capacitance			177		pF
C_{rss}	Reverse Transfer Capacitance			12.5		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	0.6	1.2	1.8	Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=30V, I_D=20A		20.6	30	nC
Q_g(4.5V)	Total Gate Charge			8.5	13	nC
Q_{gs}	Gate Source Charge			5		nC
Q_{gd}	Gate Drain Charge			2.2		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=30V, R_L=1.5Ω, R_{GEN}=3Ω		8.5		ns
t_r	Turn-On Rise Time			3.5		ns
$t_{D(off)}$	Turn-Off DelayTime			27		ns
t_f	Turn-Off Fall Time			3		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A, dI/dt=500A/µs		19		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A, dI/dt=500A/µs		69.5		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 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 $_{\theta JA}$ 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. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=175°C. Ratings are based on low frequency and duty cycles to keep initial T_J =25°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 limited by package.
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°C.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

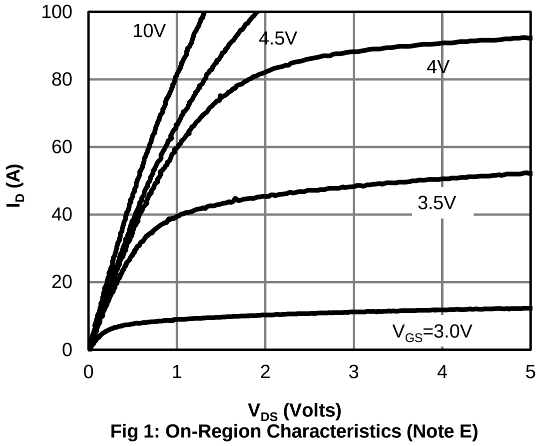


Fig 1: On-Region Characteristics (Note E)

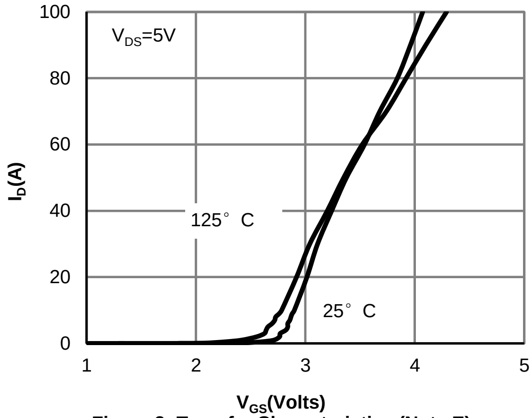


Figure 2: Transfer Characteristics (Note E)

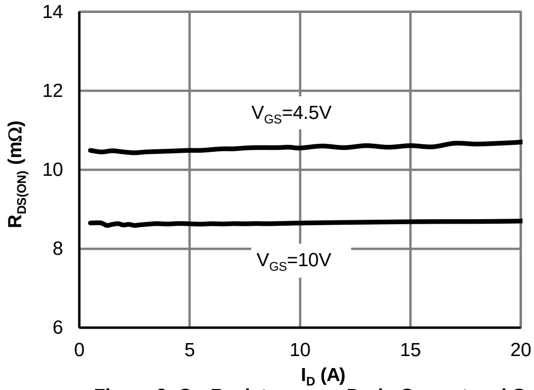


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

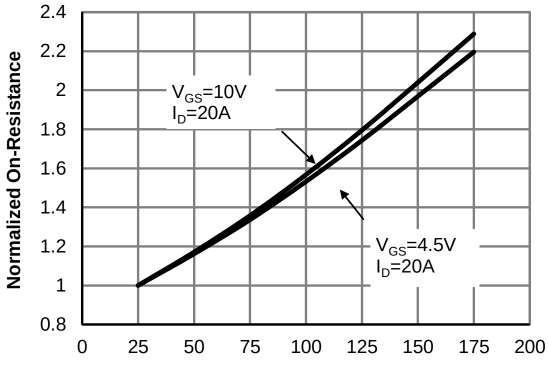


Figure 4: On-Resistance vs. Junction Temperature (Note E)

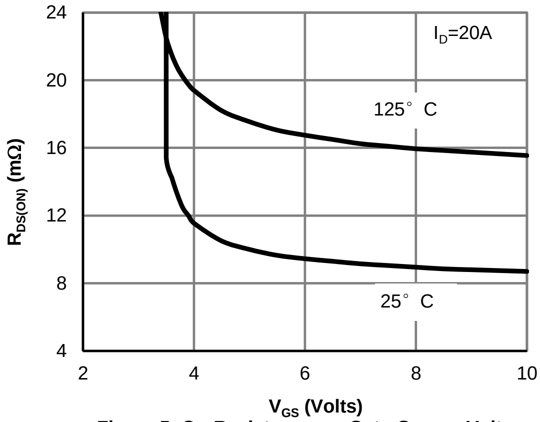


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

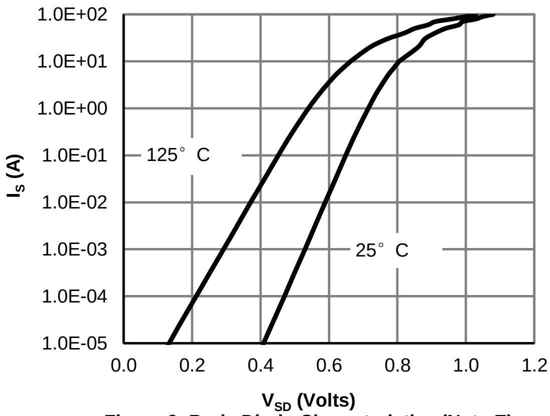


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

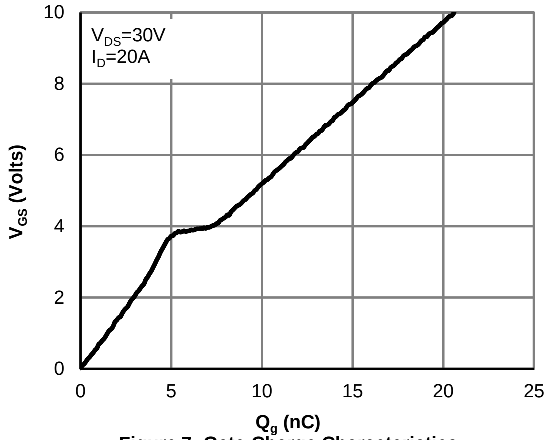


Figure 7: Gate-Charge Characteristics

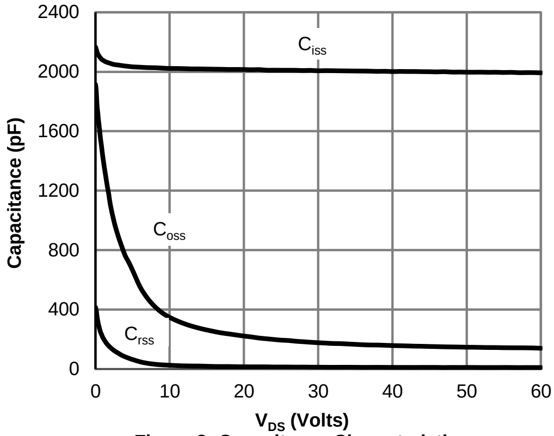


Figure 8: Capacitance Characteristics

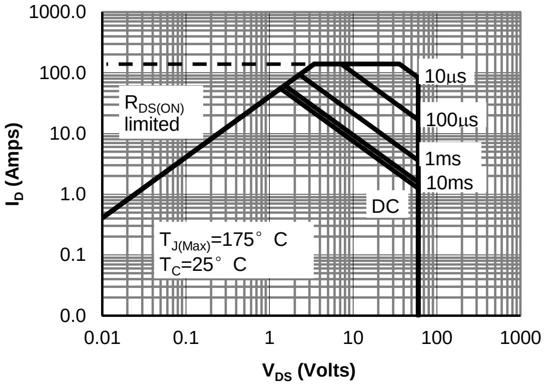


Figure 9: Maximum Forward Biased Safe Operating Area for AOT2610L (Note F)

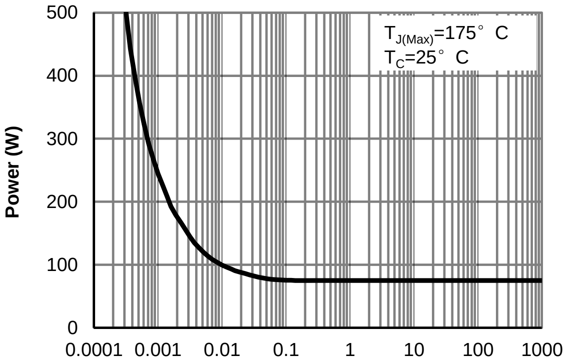


Figure 10: Single Pulse Power Rating Junction-to-Case for AOT2610L (Note F)

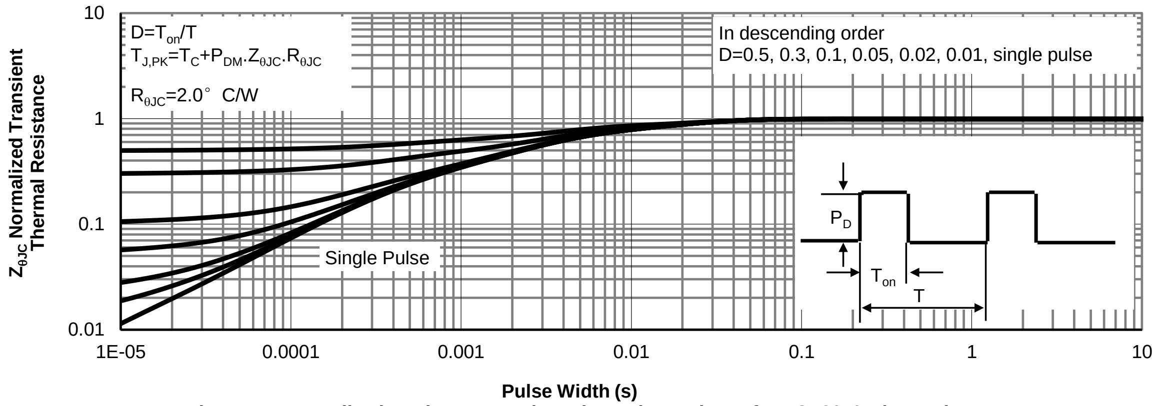
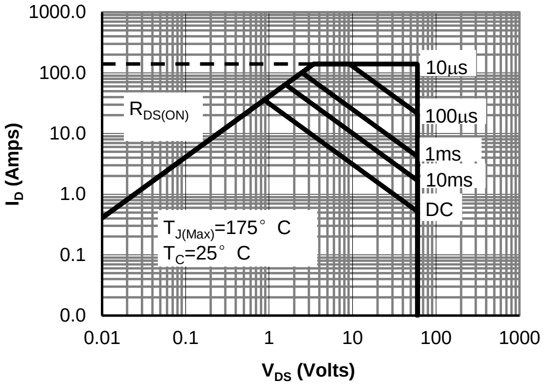


Figure 11: Normalized Maximum Transient Thermal Impedance for AOT2610L (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



V_{GS}> or equal to 4.5V

Figure 9: Maximum Forward Biased Safe Operating Area for AOTF2610L (Note F)

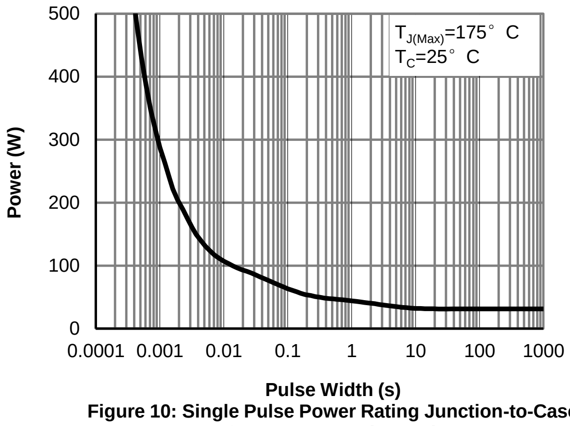


Figure 10: Single Pulse Power Rating Junction-to-Case for AOTF2610L (Note F)

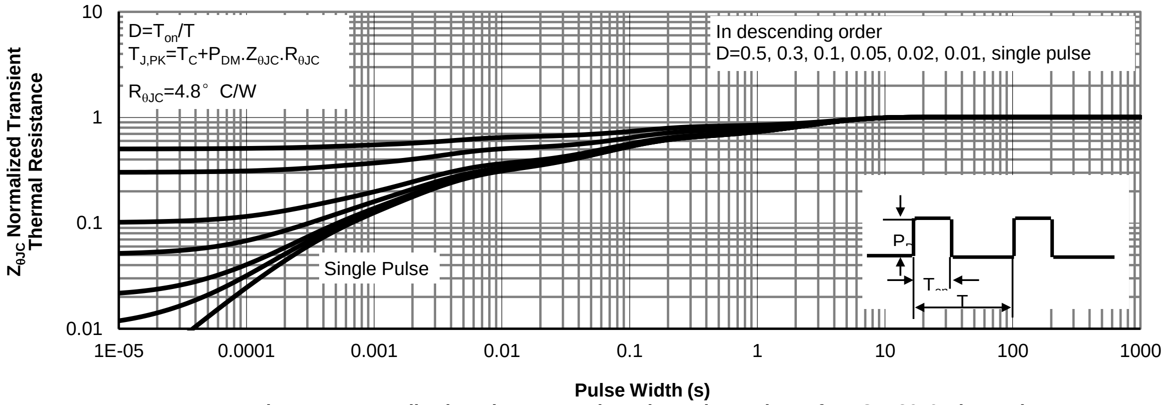


Figure 11: Normalized Maximum Transient Thermal Impedance for AOTF2610L (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

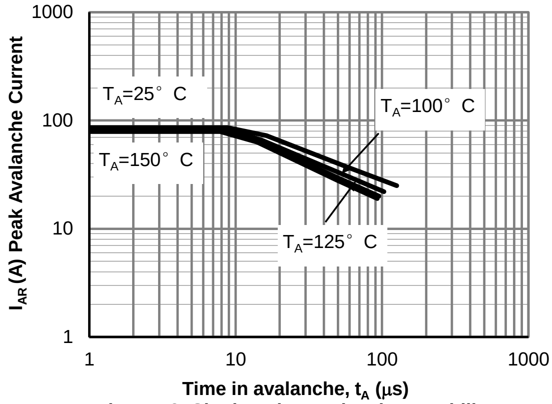


Figure 12: Single Pulse Avalanche capability (Note C)

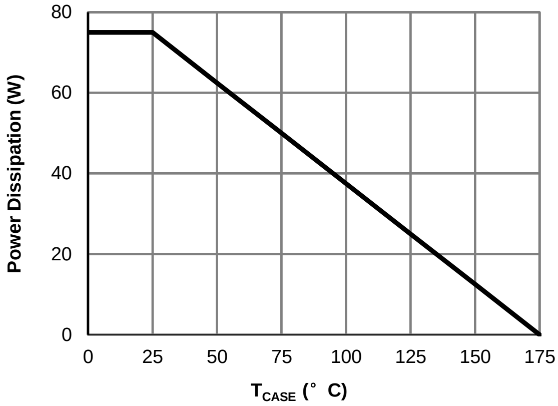


Figure 13: Power De-rating (Note F)

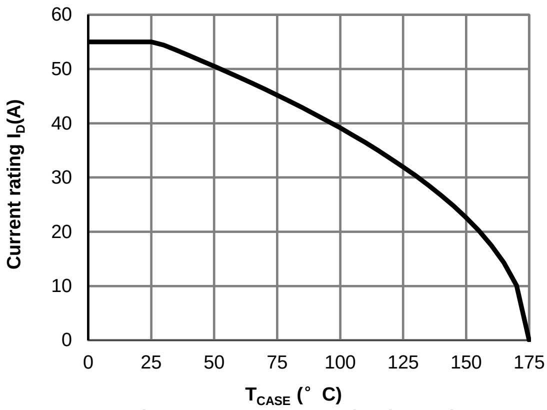


Figure 14: Current De-rating (Note F)

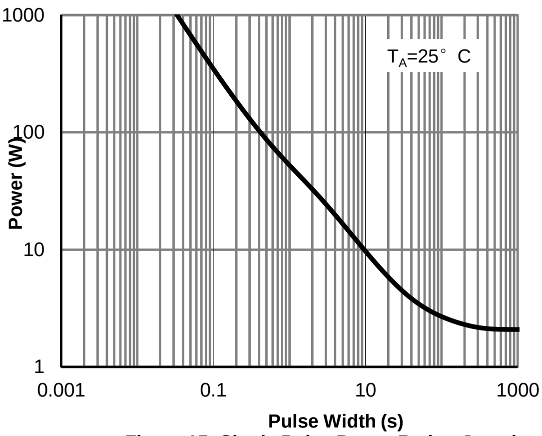


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

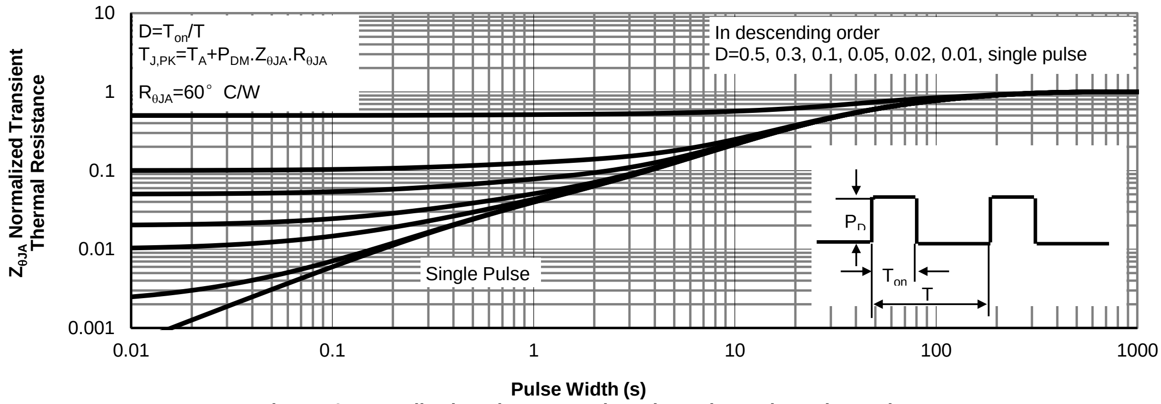
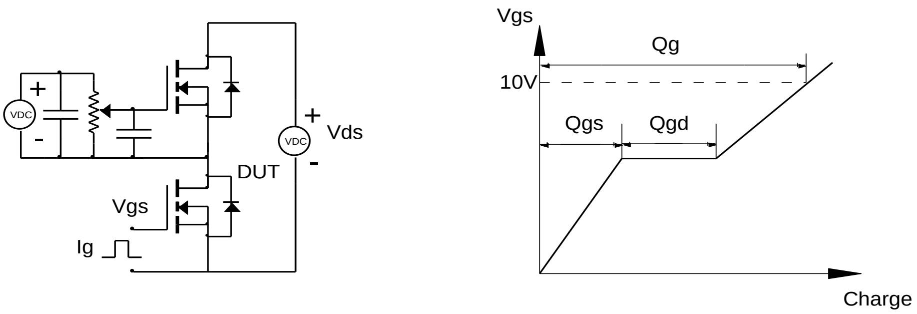
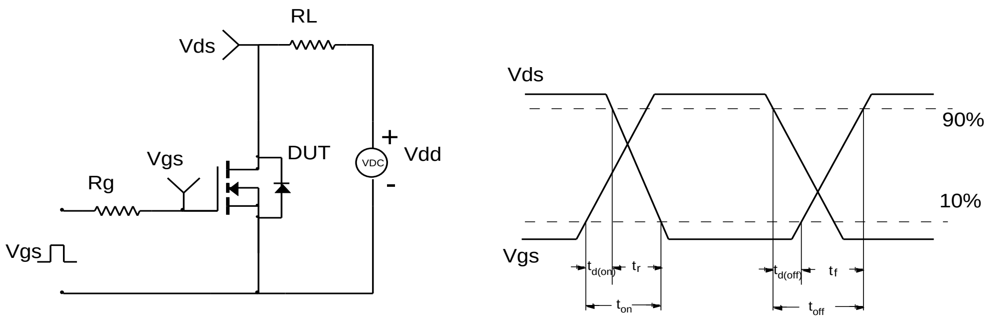


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

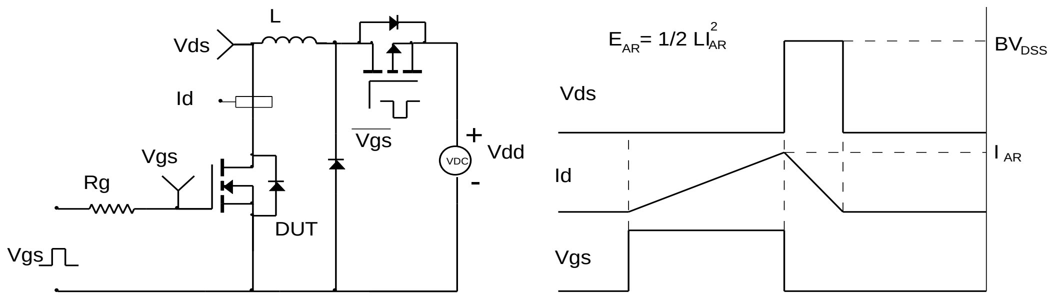
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms