



ALPHA & OMEGA
SEMICONDUCTOR

AOT2918L/AOB2918L/AOTF2918L

100V N-Channel MOSFET

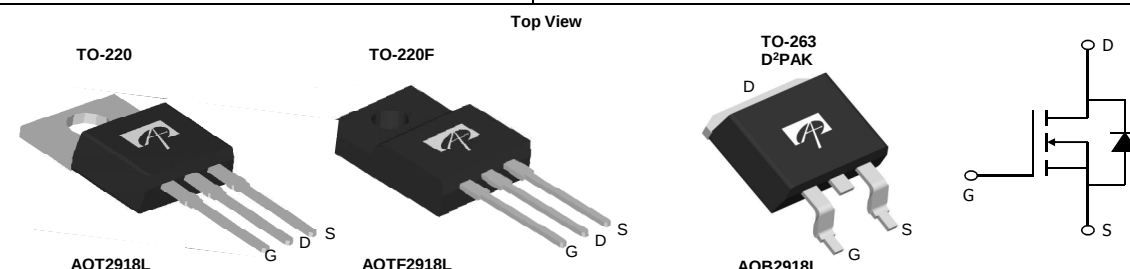
General Description

The AOT2918L & AOB2918L & AOTF2918L uses Trench MOSFET technology that is uniquely optimized to provide the most efficient high frequency switching performance. Power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and C_{RSS} . In addition, switching behavior is well controlled with a soft recovery body diode. This device is ideal for boost converters and synchronous rectifiers for consumer, telecom, industrial power supplies and LED backlighting.

Product Summary

V_{DS}	100V
I_D (at $V_{GS}=10V$)	90A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 7mΩ

100% UIS Tested
100% R_g Tested



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

Parameter	Symbol	AOT2918L/AOB2918L	AOTF2918L	Units
Drain-Source Voltage	V_{DS}	100		V
Gate-Source Voltage	V_{GS}	±20		V
Continuous Drain Current ^G	I_D	90	58	A
$T_C=25^\circ\text{C}$				
$T_C=100^\circ\text{C}$		70	45	
Pulsed Drain Current ^C	I_{DM}	260		A
Continuous Drain Current	I_{DSM}	13		A
$T_A=25^\circ\text{C}$				
$T_A=70^\circ\text{C}$		10		
Avalanche Current ^C	I_{AS}, I_{AR}	35		A
Avalanche energy $L=0.1\text{mH}$ ^C	E_{AS}, E_{AR}	61		mJ
Power Dissipation ^B	P_D	267	41	W
$T_C=25^\circ\text{C}$				
$T_C=100^\circ\text{C}$		133	20	
Power Dissipation ^A	P_{DSM}	2.1		W
$T_A=25^\circ\text{C}$				
$T_A=70^\circ\text{C}$		1.33		
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175		°C

Thermal Characteristics

Parameter	Symbol	AOT2918L/AOB2918L	AOTF2918L	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	15	15	°C/W
$t \leq 10\text{s}$				
Maximum Junction-to-Ambient ^{A, D}	$R_{\theta JC}$	60	60	°C/W
Steady-State				
Maximum Junction-to-Case	$R_{\theta JC}$	0.56	3.6	°C/W
Steady-State				

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 T _J =55°C			1 5	μA
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	2.7	3.3	3.9	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	260			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A T _J =125°C		5.6 9	7 12	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		34		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.7	1	V
I _S	Maximum Body-Diode Continuous Current ^G				90	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =50V, f=1MHz		2580	3430	pF
C _{oss}	Output Capacitance			1530	2035	pF
C _{rss}	Reverse Transfer Capacitance			37	63	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		1.5	2.3	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =50V, I _D =20A		38	53	nC
Q _{gs}	Gate Source Charge			12		nC
Q _{gd}	Gate Drain Charge			12		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =50V, R _L =2.5Ω, R _{GEN} =3Ω		17	38	ns
t _r	Turn-On Rise Time			24	53	ns
t _{D(off)}	Turn-Off DelayTime			30	66	ns
t _f	Turn-Off Fall Time			24	53	ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, di/dt=500A/μs		46	65	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, di/dt=500A/μs		230	320	nC

A. The value of R_{θJA} 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_{θJA} 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_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} 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 is 120A.

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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

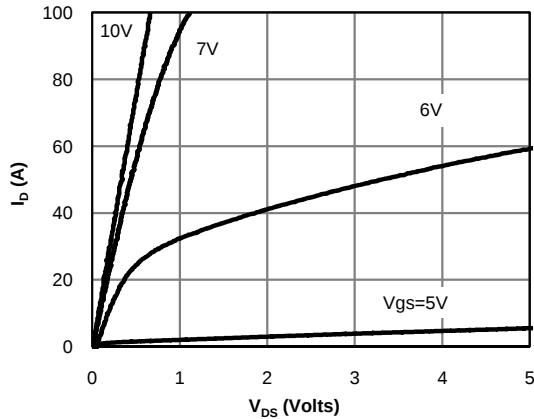


Fig 1: On-Region Characteristics (Note E)

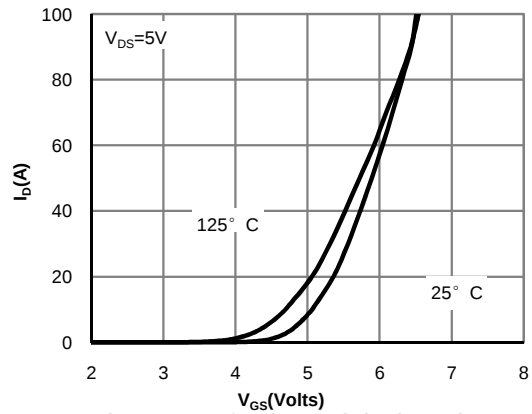


Figure 2: Transfer Characteristics (Note E)

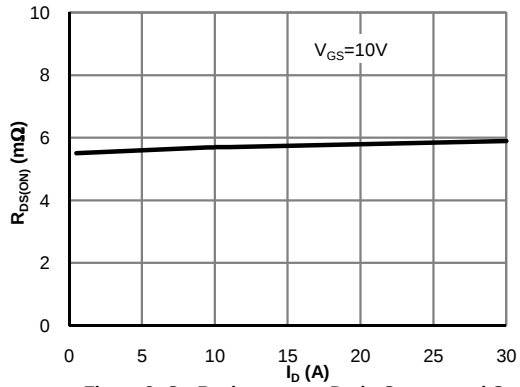


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

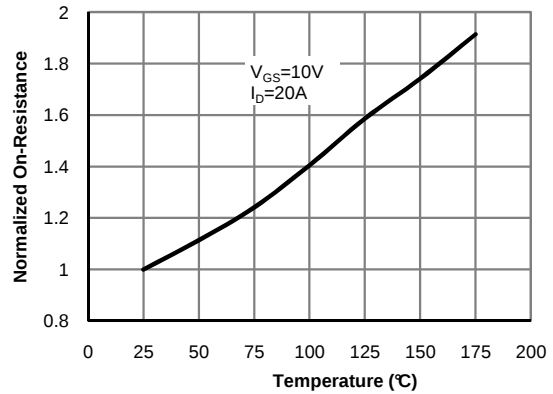


Figure 4: On-Resistance vs. Junction Temperature (Note E)

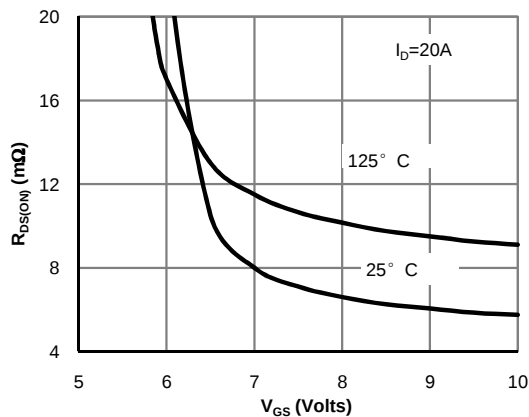


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

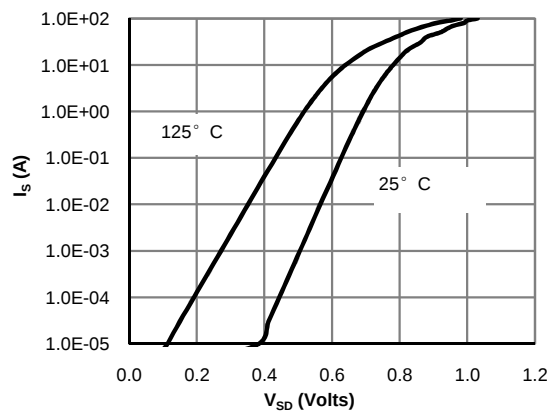


Figure 6: Body-Diode Characteristics (Note E)

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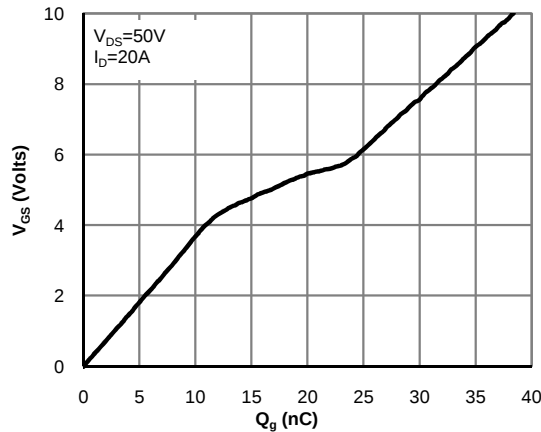


Figure 7: Gate-Charge Characteristics

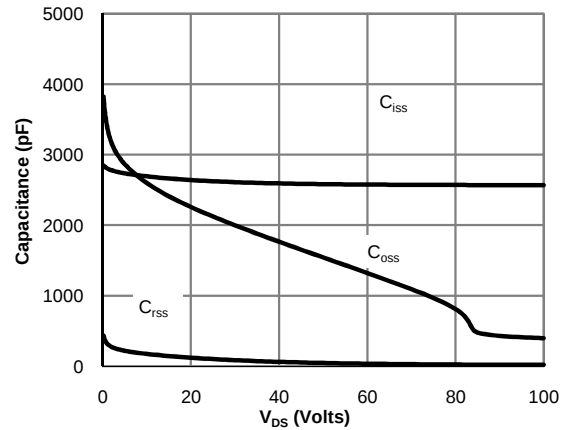


Figure 8: Capacitance Characteristics

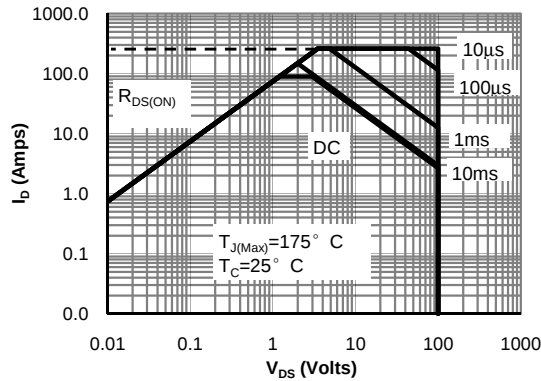


Figure 9: Maximum Forward Biased Safe Operating Area for AOT2918L and AOB2918L (Note F)

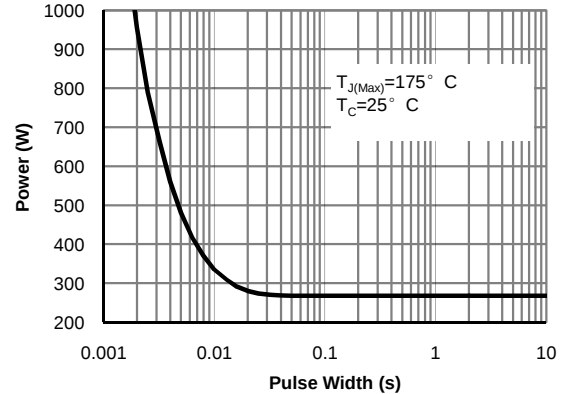


Figure 10: Single Pulse Power Rating Junction-to-Case for AOT2918L and AOB2918L (Note F)

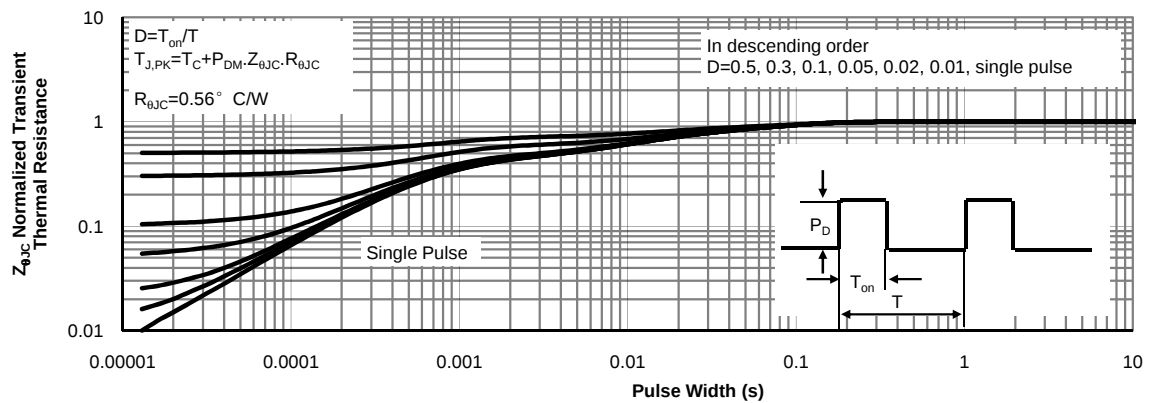


Figure 11: Normalized Maximum Transient Thermal Impedance for AOT2918L and AOB2918L (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

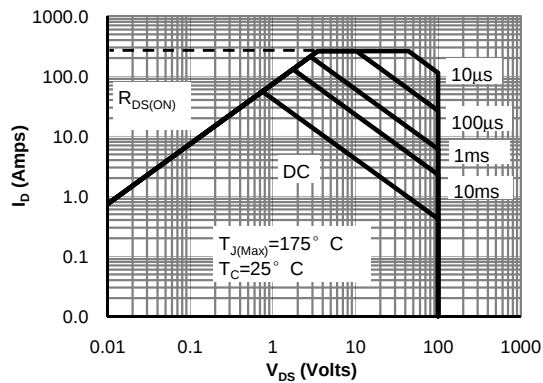


Figure 9: Maximum Forward Biased Safe Operating Area for AOTF2918L

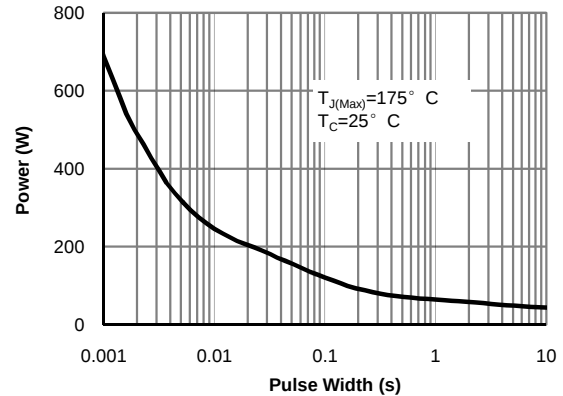


Figure 10: Single Pulse Power Rating Junction-to-Case for AOTF2918L (Note F)

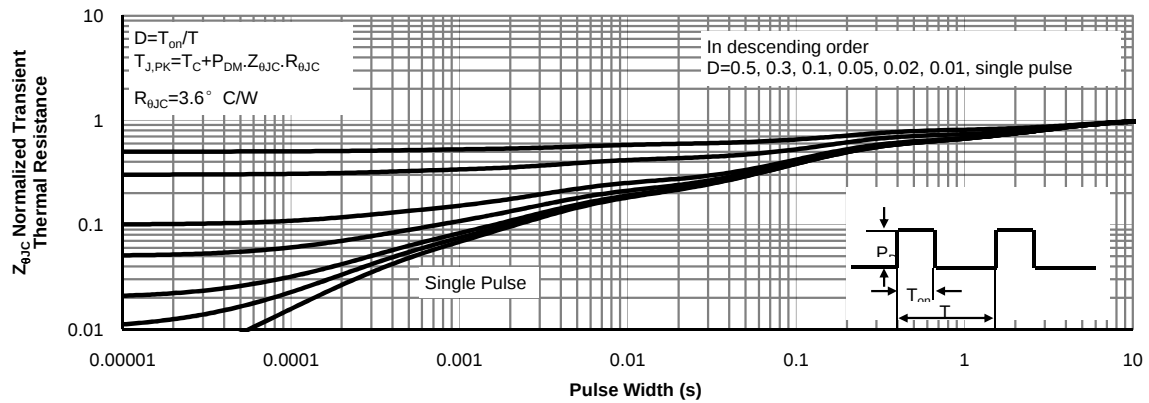


Figure 11: Normalized Maximum Transient Thermal Impedance for AOTF2918L (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

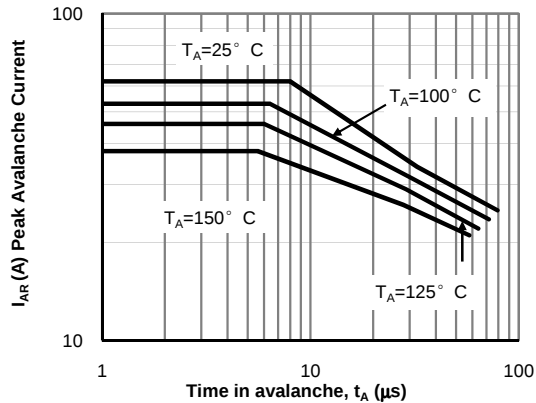


Figure 12: Single Pulse Avalanche capability (Note C)

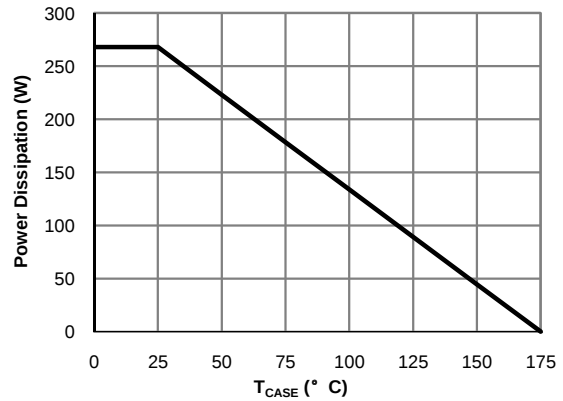


Figure 13: Power De-rating (Note F)

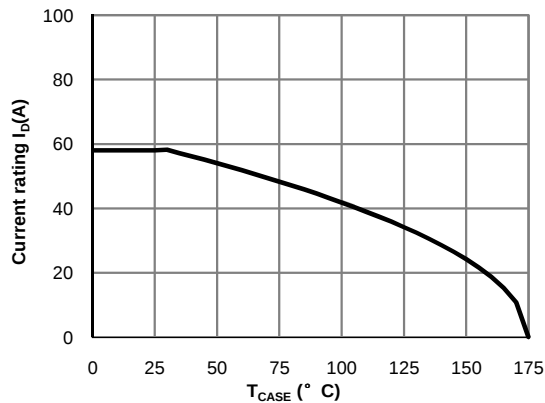


Figure 14: Current De-rating (Note F)

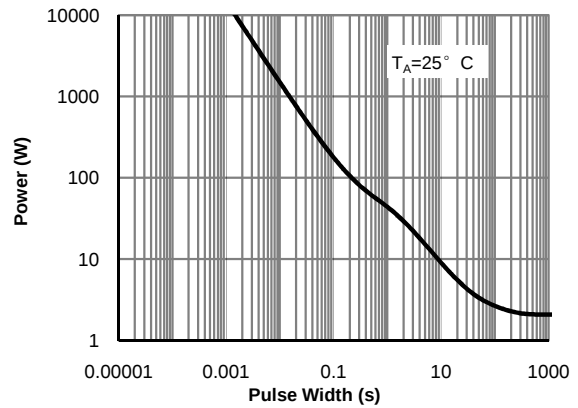


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

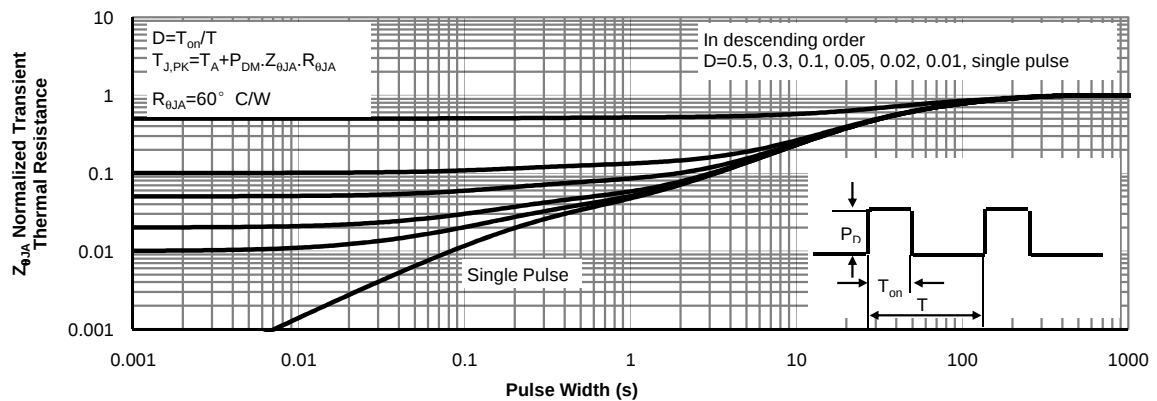
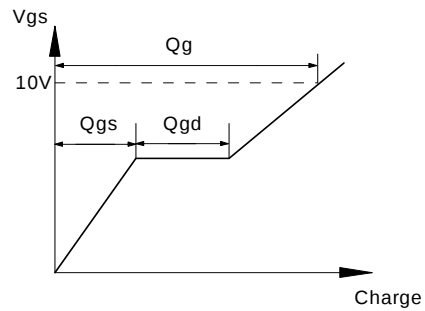
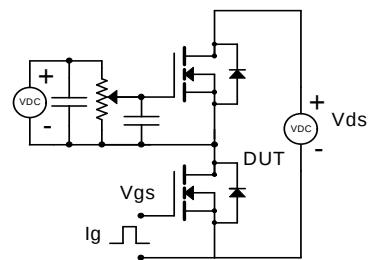
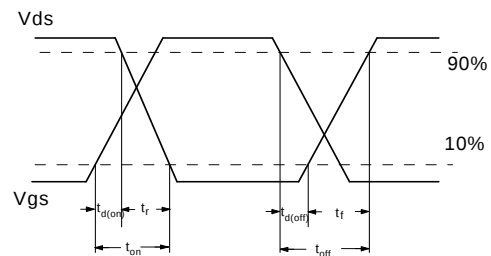
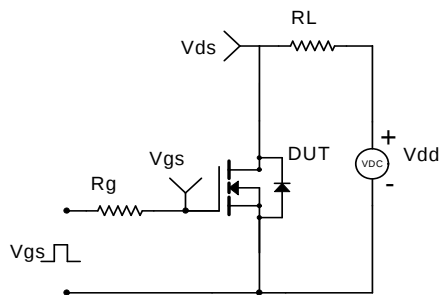


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

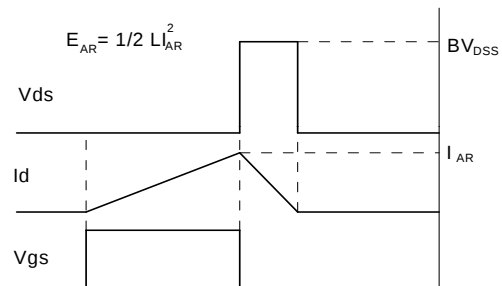
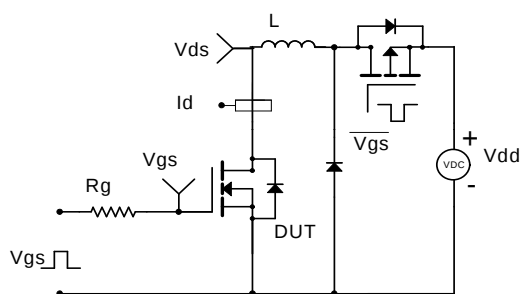
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

