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[Alpha & Omega Semiconductor Inc.](#)
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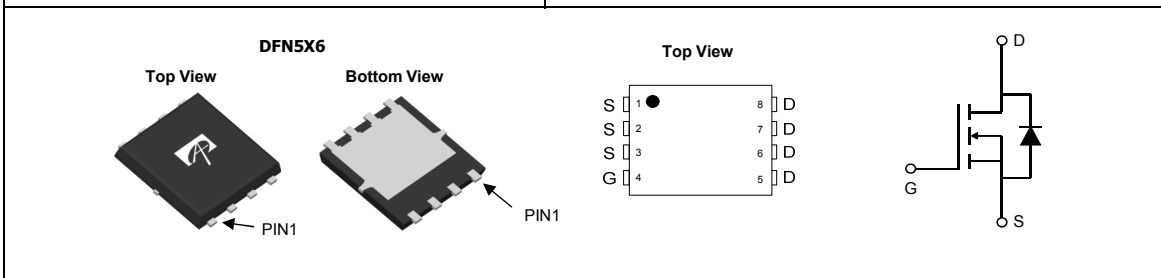
sales@integrated-circuit.com



AON6596

30V N-Channel AlphaMOS

General Description	Product Summary								
<ul style="list-style-type: none"> • Trench Power AlphaMOS technology • Low $R_{DS(ON)}$ • Low Gate Charge • High Current Capability • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • DC/DC Converters in Computing • Isolated DC/DC Converters in Telecom and Industrial 	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">V_{DS}</td> <td style="width: 40%;">30V</td> </tr> <tr> <td>I_D (at $V_{GS}=10V$)</td> <td>35A</td> </tr> <tr> <td>$R_{DS(ON)}$ (at $V_{GS}=10V$)</td> <td>< 7.5mΩ</td> </tr> <tr> <td>$R_{DS(ON)}$ (at $V_{GS}=4.5V$)</td> <td>< 10.5mΩ</td> </tr> </table> <p>100% UIS Tested 100% Rg Tested</p> <div style="text-align: right;">  </div>	V_{DS}	30V	I_D (at $V_{GS}=10V$)	35A	$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 7.5m Ω	$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 10.5m Ω
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$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 10.5m Ω								



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AON6596	DFN 5X6	Tape & Reel	3000

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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^G	$T_C=25^\circ\text{C}$	35	A
	$T_C=100^\circ\text{C}$	30	
Pulsed Drain Current ^C	I_{DM}	120	
Continuous Drain Current	$T_A=25^\circ\text{C}$	20	A
	$T_A=70^\circ\text{C}$	16	
Avalanche Current ^C	I_{AS}	32*	A
Avalanche energy	$L=0.05\text{mH}$ ^C E_{AS}	26*	mJ
V_{DS} Spike	100ns V_{SPIKE}	36	V
Power Dissipation ^B	$T_C=25^\circ\text{C}$	41	W
	$T_C=100^\circ\text{C}$	16	
Power Dissipation ^A	$T_A=25^\circ\text{C}$	5	W
	$T_A=70^\circ\text{C}$	3.2	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	20	25	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{A,D}		45	55	$^\circ\text{C/W}$
Maximum Junction-to-Case	$R_{\theta JC}$	2.4	3	$^\circ\text{C/W}$

* $L=0.1\text{mH}$, $I_{AS}=24\text{A}$, $E_{AS}=29\text{mJ}$, Starting $T_J=25^\circ\text{C}$.


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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	ID=250μA, VGS=0V	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, 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	1.5	1.95	2.5	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A T _J =125°C		6.2	7.5	mΩ
		V _{GS} =4.5V, I _D =20A		8.4	10.5	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		67		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.72	1	V
I _S	Maximum Body-Diode Continuous Current ^G				35	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		1150		pF
C _{oss}	Output Capacitance			180		pF
C _{rss}	Reverse Transfer Capacitance			105		pF
R _g	Gate resistance	f=1MHz	0.5	1.1	1.7	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =20A		20	30	nC
Q _g (4.5V)	Total Gate Charge			9.5	15	nC
Q _{gs}	Gate Source Charge			2.7		nC
Q _{gd}	Gate Drain Charge			5		nC
Q _{gs}	Gate Source Charge	V _{GS} =4.5V, V _{DS} =15V, I _D =20A		2.7		nC
Q _{gd}	Gate Drain Charge			5		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =0.75Ω, R _{GEN} =3Ω		6.5		ns
t _r	Turn-On Rise Time			2		ns
t _{D(off)}	Turn-Off DelayTime			17		ns
t _f	Turn-Off Fall Time			3.5		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, dI/dt=500A/μs		8.7		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, dI/dt=500A/μs		13.5		nC

A. The value of R_{θJA} is measured with the device mounted on 1 in² 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} ≤ 10s 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_D is based on T_{J(MAX)}=150° 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)}=150° 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)}=150° 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

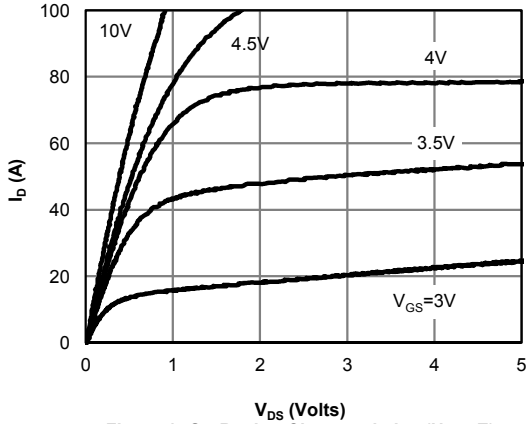


Figure 1: On-Region Characteristics (Note E)

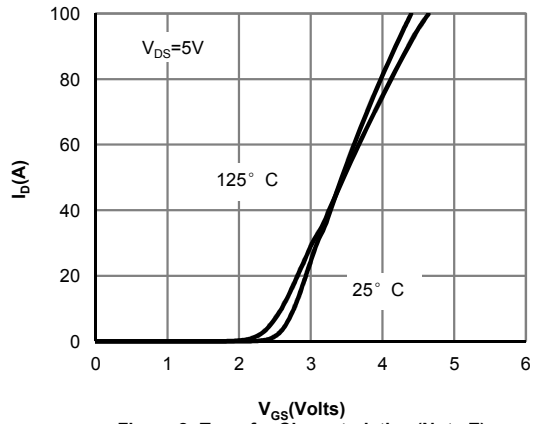


Figure 2: Transfer Characteristics (Note E)

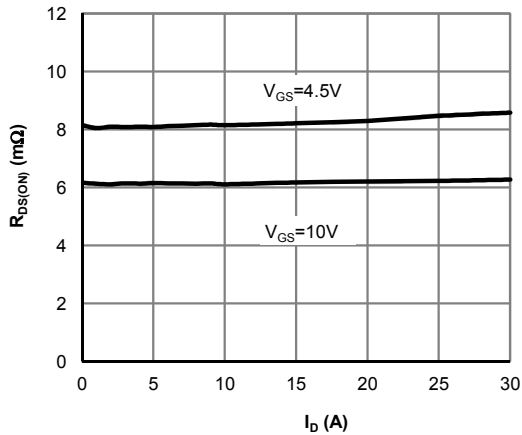


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

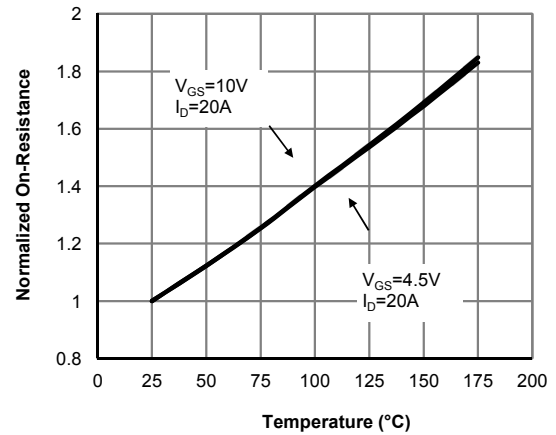


Figure 4: On-Resistance vs. Junction Temperature (Note E)

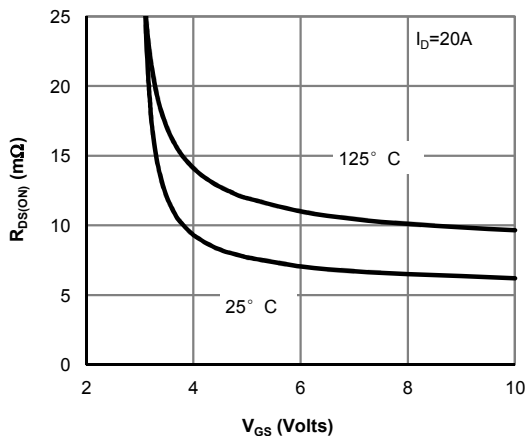


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

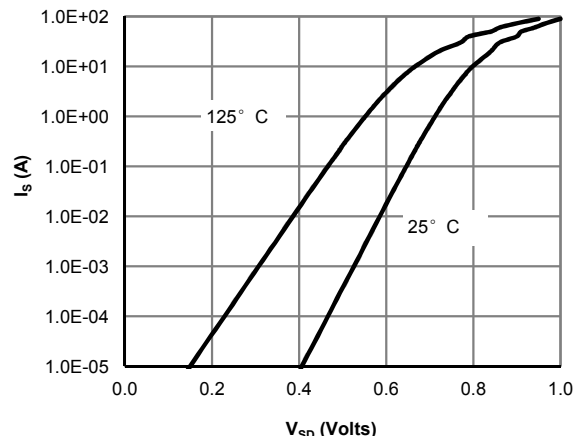


Figure 6: Body-Diode Characteristics (Note E)



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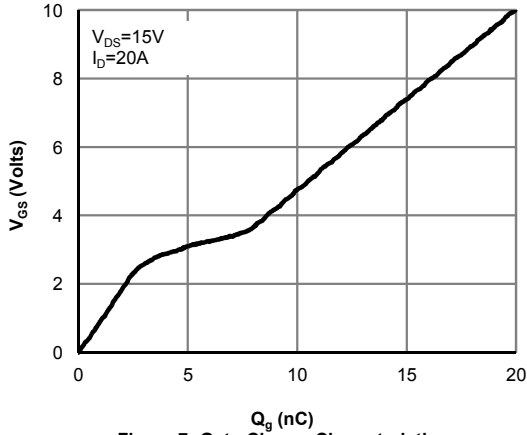


Figure 7: Gate-Charge Characteristics

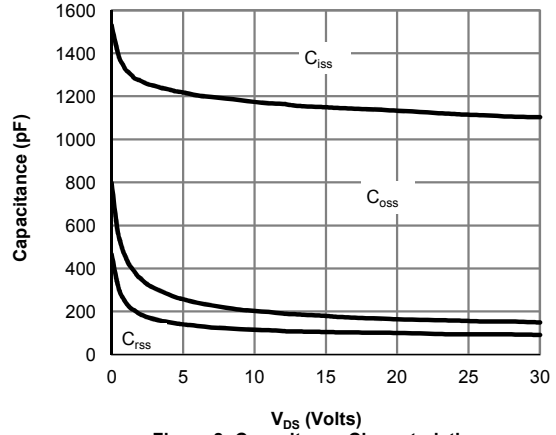


Figure 8: Capacitance Characteristics

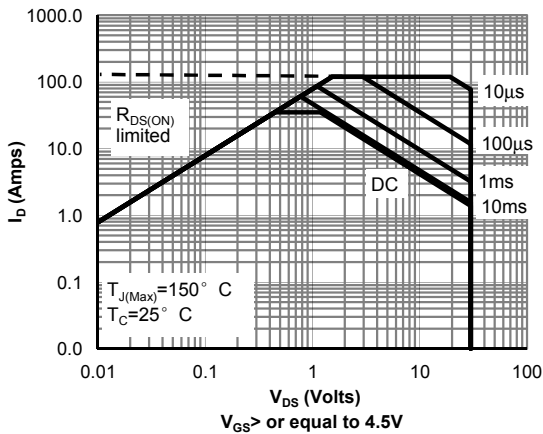


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

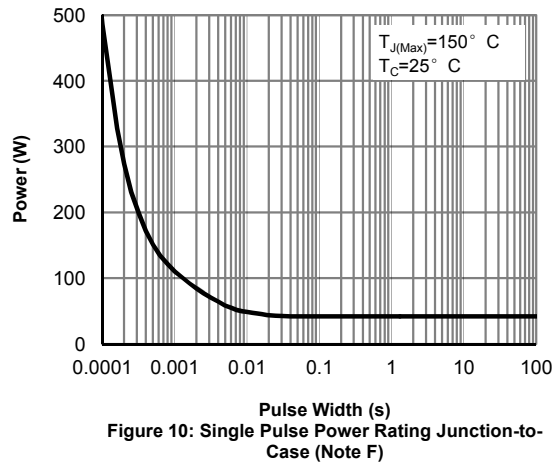


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

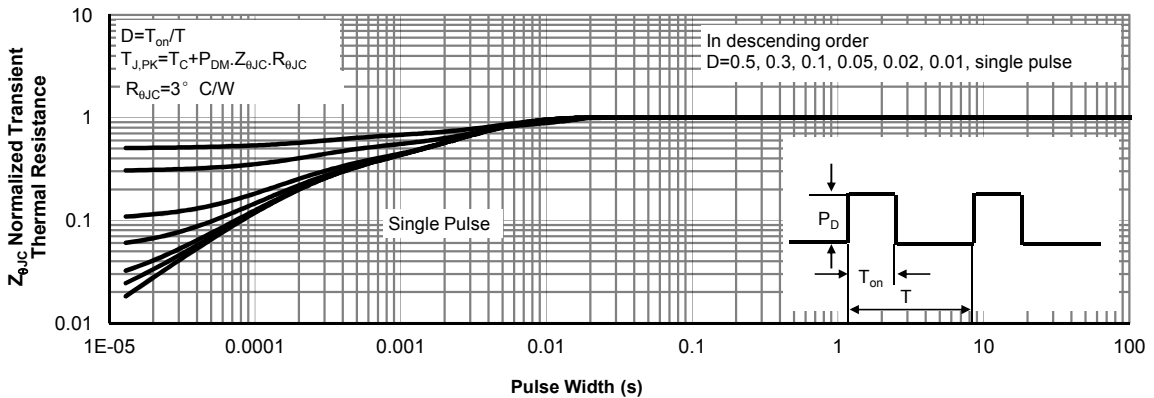


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

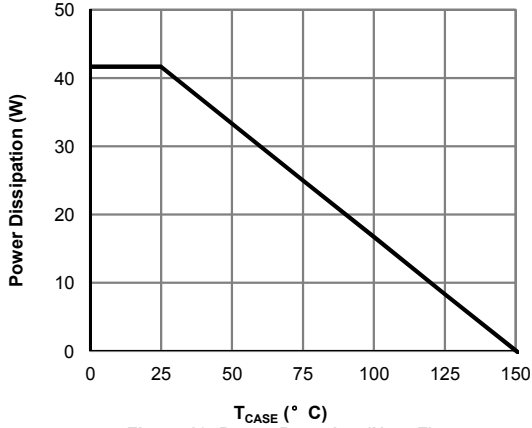


Figure 12: Power De-rating (Note F)

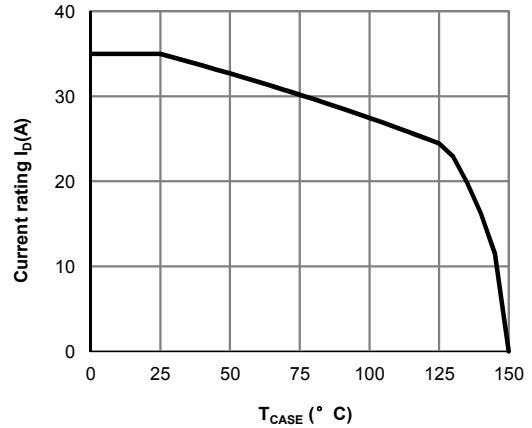


Figure 13: Current De-rating (Note F)

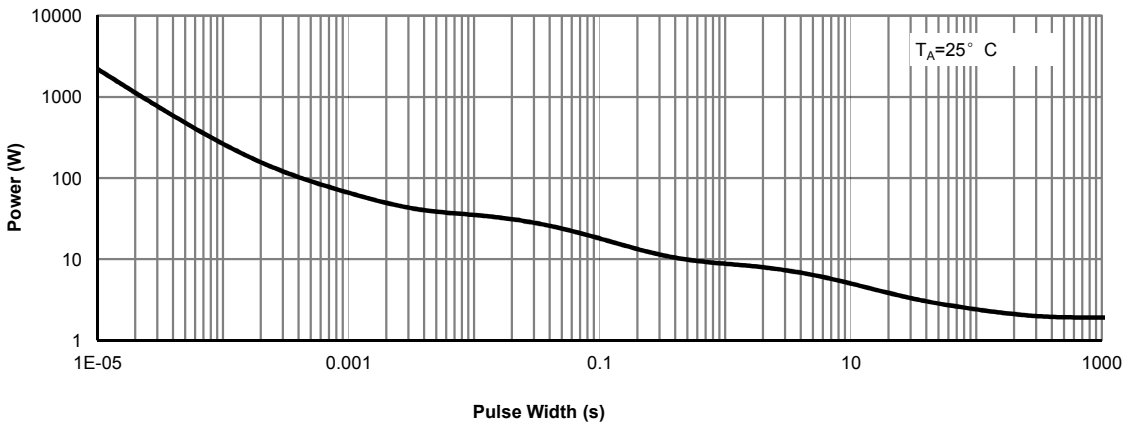


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

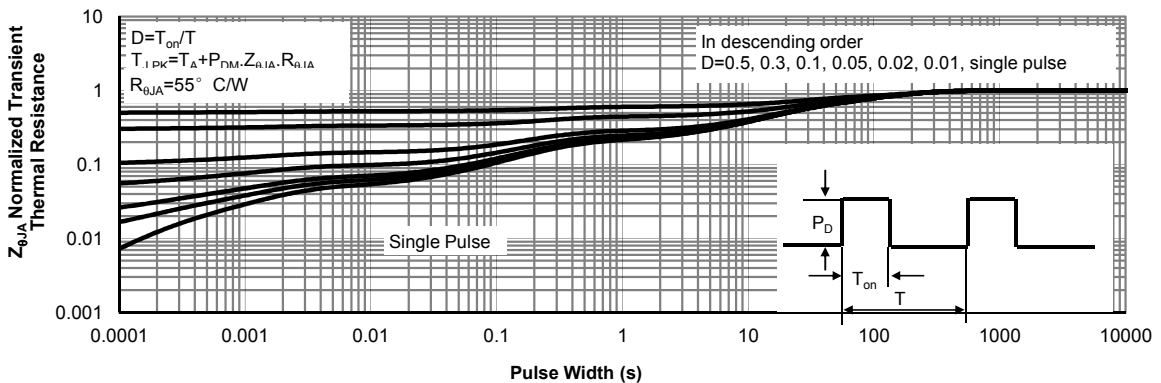
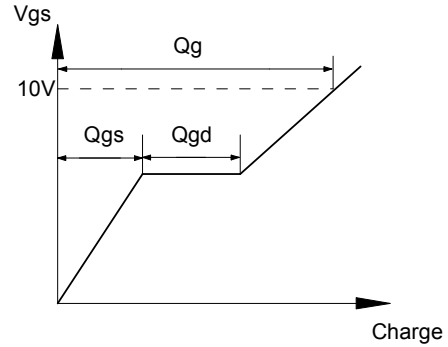
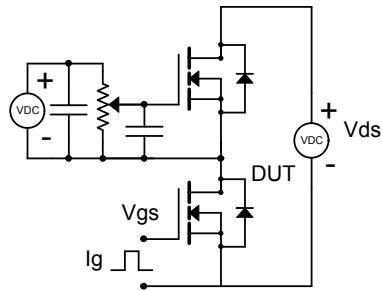
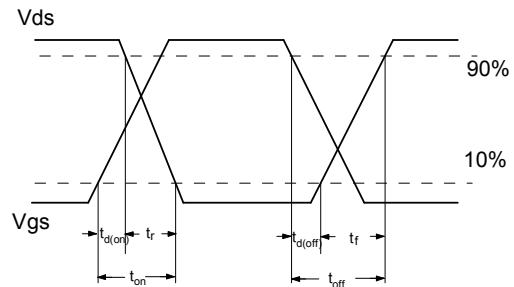
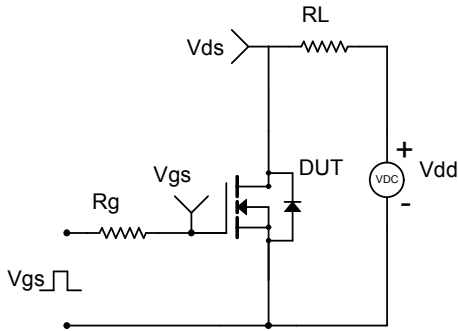


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

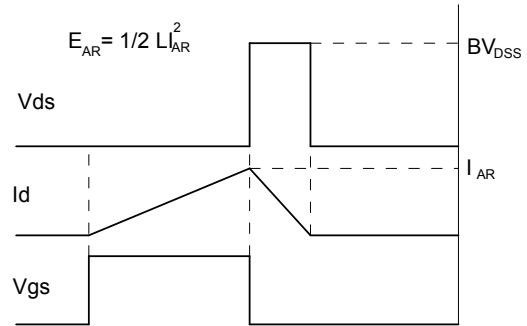
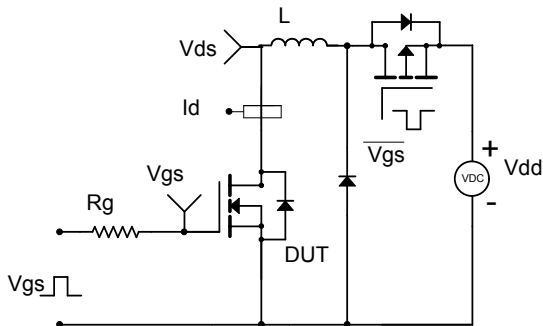
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

