

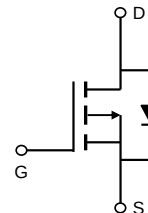
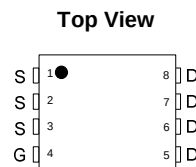
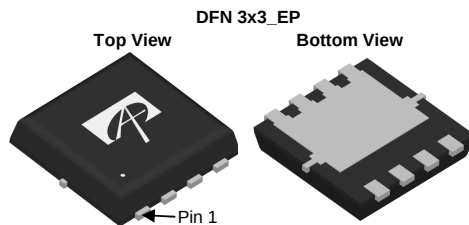
General Description

The AON7407 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Product Summary

V_{DS}	-20V
I_D (at $V_{GS} = -4.5V$)	-40A
$R_{DS(ON)}$ (at $V_{GS} = -4.5V$)	< 9.5m Ω
$R_{DS(ON)}$ (at $V_{GS} = -2.5V$)	< 12.5m Ω
$R_{DS(ON)}$ (at $V_{GS} = -1.8V$)	< 18m Ω

100% UIS Tested
 100% R_g Tested



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 8	V
Continuous Drain Current ^G	I_D	$T_C = 25^\circ\text{C}$ -40	A
		$T_C = 100^\circ\text{C}$ -29	
Pulsed Drain Current ^C	I_{DM}	-100	A
Continuous Drain Current	I_{DSM}	$T_A = 25^\circ\text{C}$ -14.5	A
		$T_A = 70^\circ\text{C}$ -11.5	
Avalanche Current ^C	I_{AS}, I_{AR}	-40	A
Avalanche energy $L = 0.1\text{mH}$ ^C	E_{AS}, E_{AR}	80	mJ
Power Dissipation ^B	P_D	$T_C = 25^\circ\text{C}$ 29	W
		$T_C = 100^\circ\text{C}$ 12	
Power Dissipation ^A	P_{DSM}	$T_A = 25^\circ\text{C}$ 3.1	W
		$T_A = 70^\circ\text{C}$ 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	$R_{\theta JA}$	$t \leq 10\text{s}$ 30	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{A D}		Steady-State 60	75	$^\circ\text{C/W}$
Maximum Junction-to-Case	$R_{\theta JC}$	Steady-State 3.5	4.2	$^\circ\text{C/W}$

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	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-20\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1 -5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 8\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-0.3	-0.55	-0.9	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-4.5\text{V}$, $V_{DS}=-5\text{V}$	-100			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5\text{V}$, $I_D=-14\text{A}$ $T_J=125^\circ\text{C}$		7.6 10.5	9.5 13.5	$\text{m}\Omega$
		$V_{GS}=-2.5\text{V}$, $I_D=-13\text{A}$		9.3	12.5	$\text{m}\Omega$
		$V_{GS}=-1.8\text{V}$, $I_D=-11\text{A}$		11.4	18	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}$, $I_D=-14\text{A}$		72		S
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}$, $V_{GS}=0\text{V}$		-0.52	-1	V
I_S	Maximum Body-Diode Continuous Current				-35	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=-10\text{V}$, $f=1\text{MHz}$	2795	3495	4195	pF
C_{oss}	Output Capacitance		365	528	690	pF
C_{rss}	Reverse Transfer Capacitance		255	425	595	pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		2.8	5.6	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=-4.5\text{V}$, $V_{DS}=-10\text{V}$, $I_D=-14\text{A}$	35	44	53	nC
Q_{gs}	Gate Source Charge			9		nC
Q_{gd}	Gate Drain Charge			11		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-4.5\text{V}$, $V_{DS}=-10\text{V}$, $R_L=0.75\Omega$, $R_{GEN}=3\Omega$		18		ns
t_r	Turn-On Rise Time			32		ns
$t_{D(off)}$	Turn-Off DelayTime			136		ns
t_f	Turn-Off Fall Time			59		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-14\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$	26	33	40	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-14\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$	80	100	120	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 $R_{\theta JA}$ $t \leq 10\text{s}$ value 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 $T_{J(MAX)}=150^\circ\text{C}$, 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 $T_{J(MAX)}=150^\circ\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^\circ\text{C}$.
- 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 $<300\mu\text{s}$ 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 $T_{J(MAX)}=150^\circ\text{C}$. 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 $T_A=25^\circ\text{C}$.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

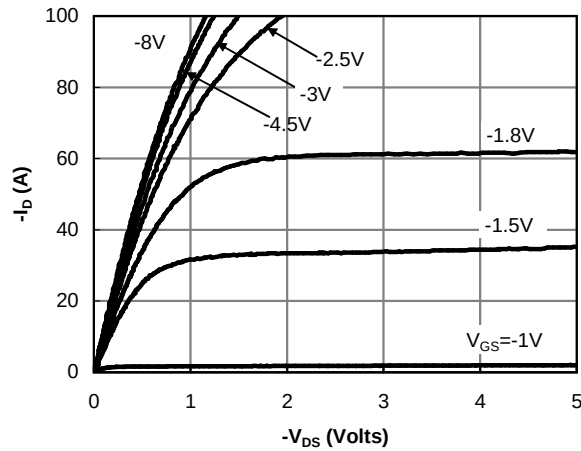


Fig 1: On-Region Characteristics (Note E)

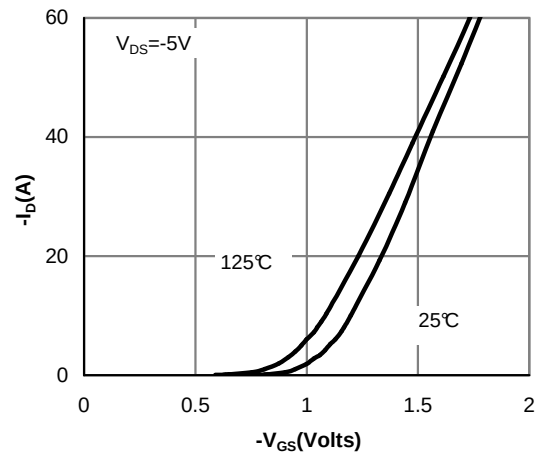


Figure 2: Transfer Characteristics (Note E)

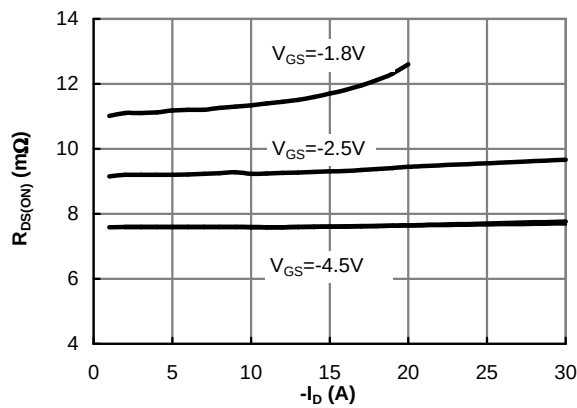


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

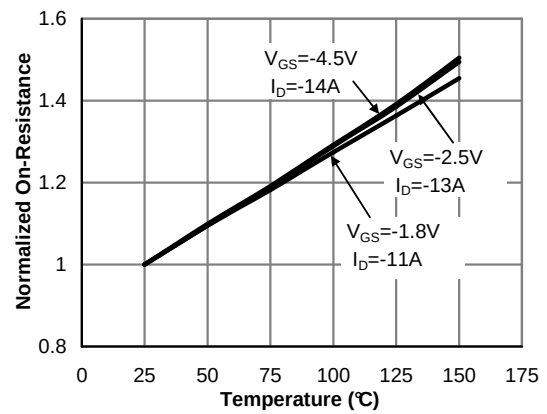


Figure 4: On-Resistance vs. Junction Temperature (Note E)

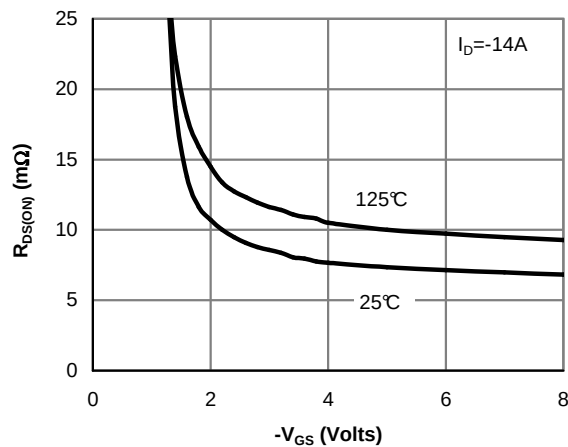


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

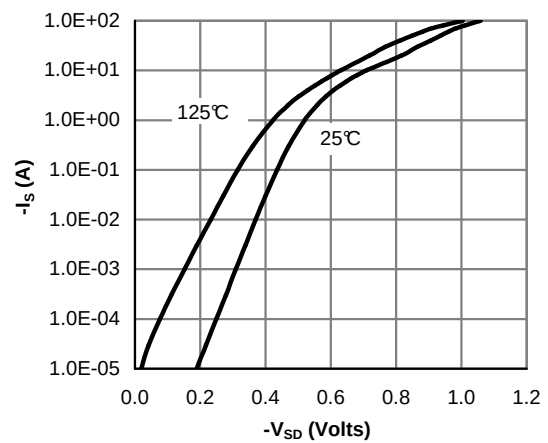


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

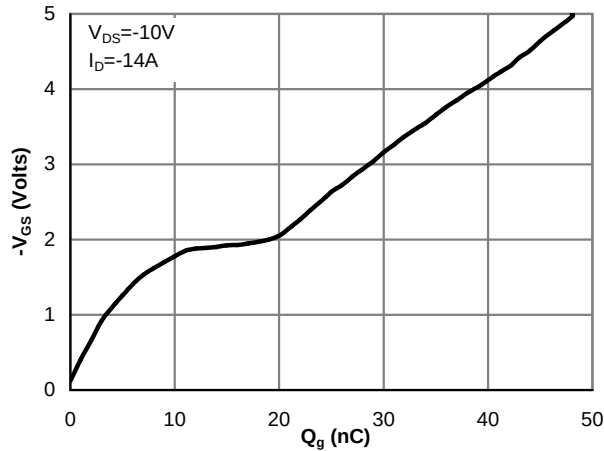


Figure 7: Gate-Charge Characteristics

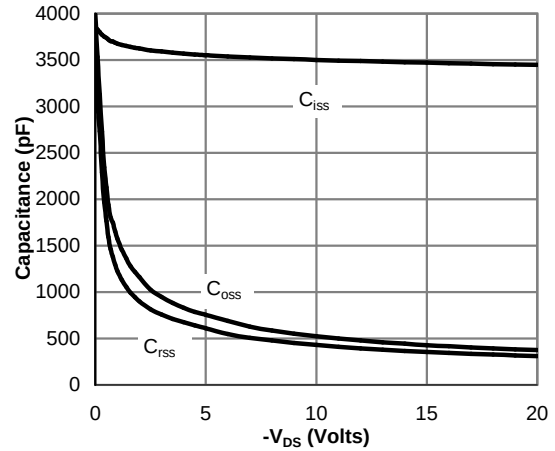


Figure 8: Capacitance Characteristics

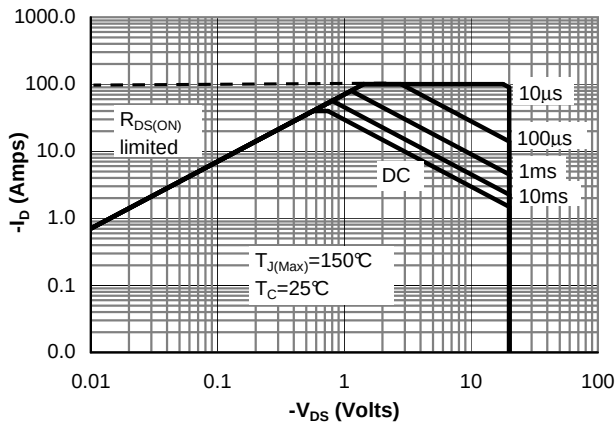


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

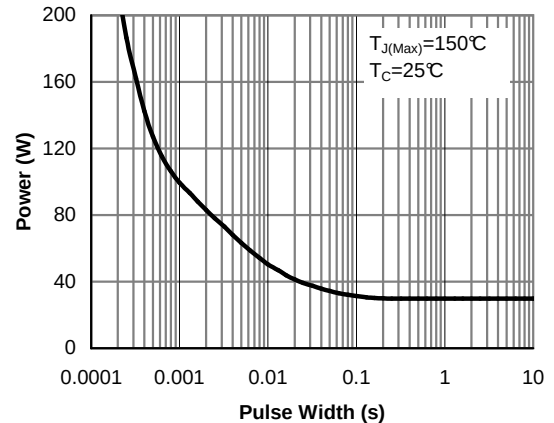


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

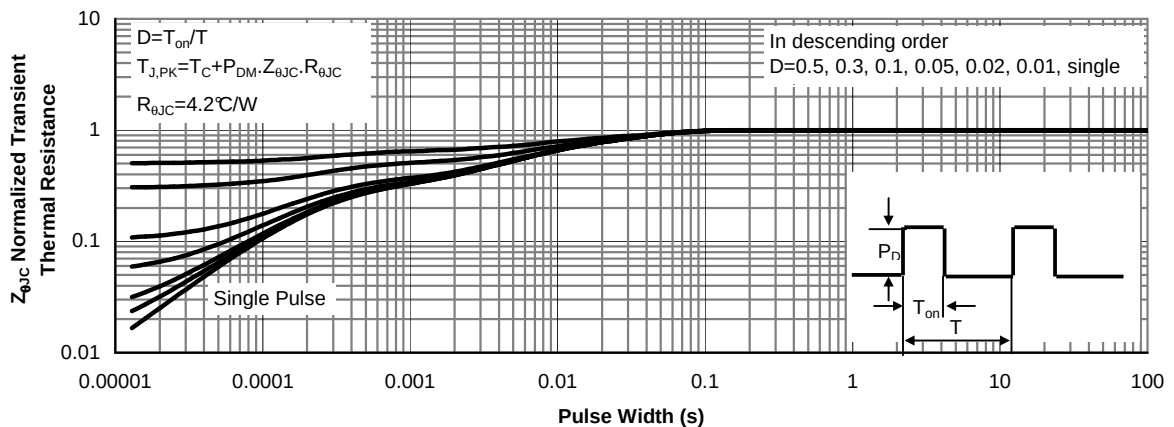


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

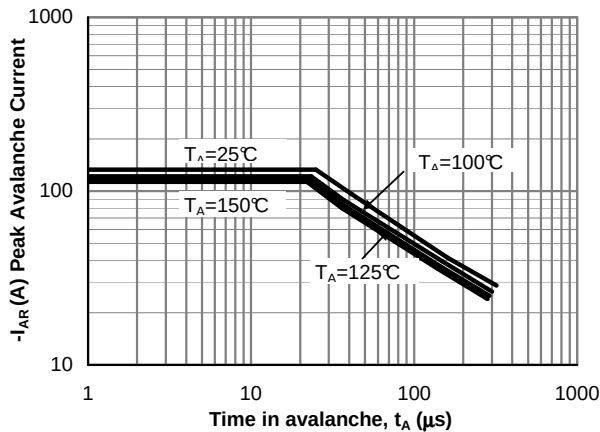


Figure 12: Single Pulse Avalanche capability (Note C)

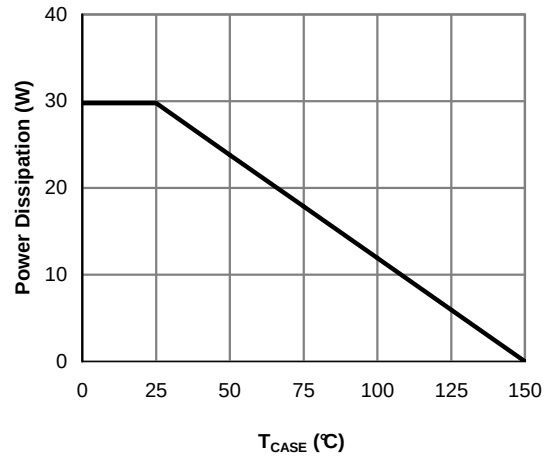


Figure 13: Power De-rating (Note F)

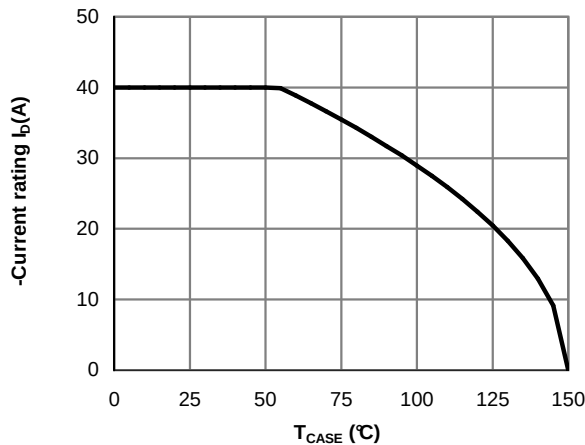


Figure 14: Current De-rating (Note F)

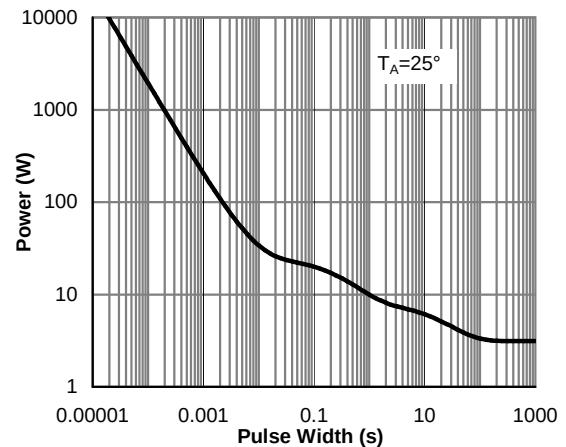


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

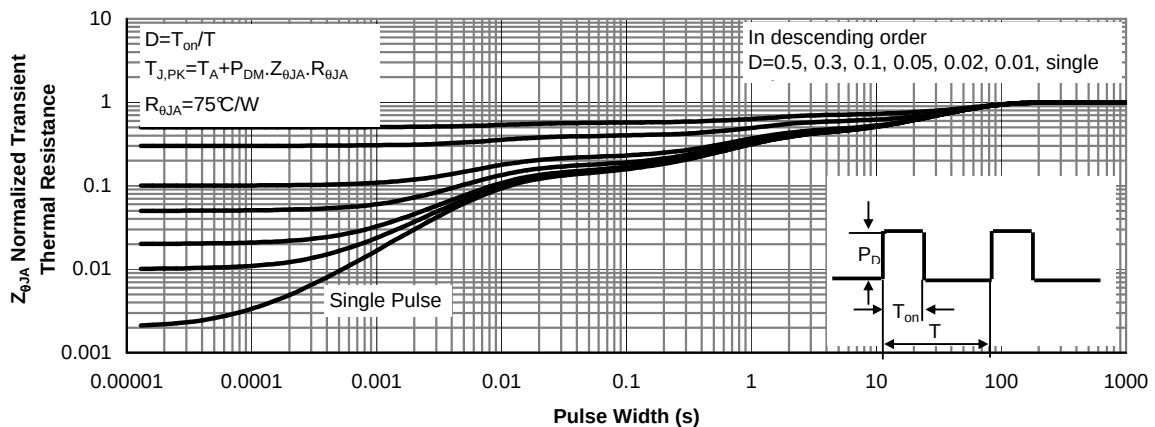
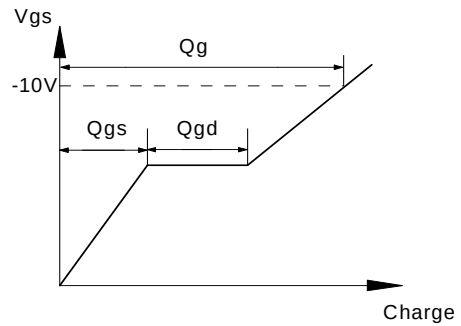
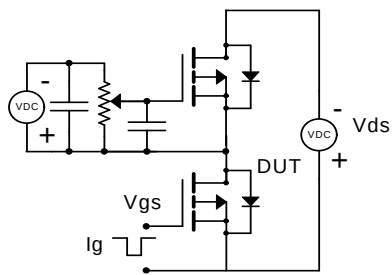
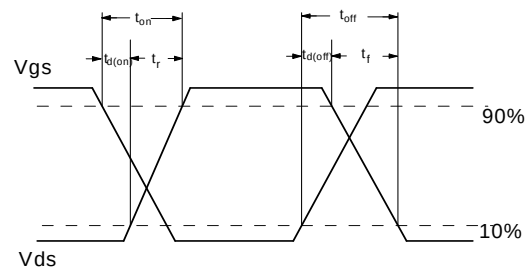
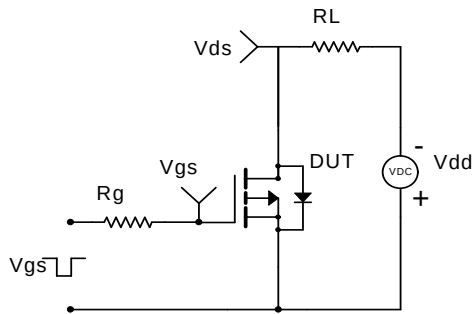


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

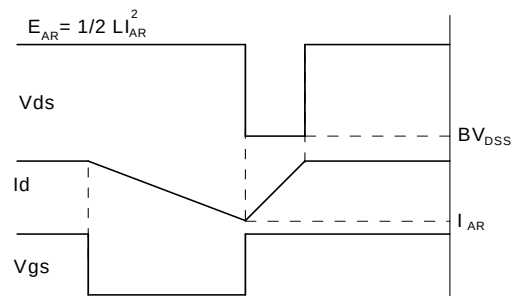
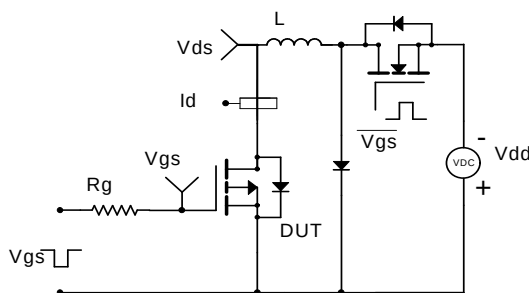
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

