

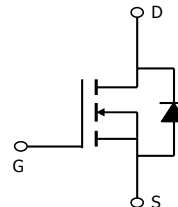
General Description

The AOT15S60 & AOB15S60 & AOTF15S60 have been fabricated using the advanced α MOS™ high voltage process that is designed to deliver high levels of performance and robustness in switching applications.

By providing low $R_{DS(on)}$, Q_g and E_{OSS} along with guaranteed avalanche capability these parts can be adopted quickly into new and existing offline power supply designs.

Features

$V_{DS} @ T_{j,max}$	700V
I_{DM}	63A
$R_{DS(on),max}$	0.29 Ω
$Q_{g,typ}$	16nC
$E_{OSS} @ 400V$	3.6 μ J



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

Parameter	Symbol	AOT15S60/AOB15S60	AOTF15S60L	Units
Drain-Source Voltage	V_{DS}	600		V
Gate-Source Voltage	V_{GS}	± 30		V
Continuous Drain Current	I_D	15	15*	A
		10	10*	
Pulsed Drain Current ^C	I_{DM}	63		
Avalanche Current ^C	I_{AR}	2.4		A
Repetitive avalanche energy ^C	E_{AR}	86		mJ
Single pulsed avalanche energy ^G	E_{AS}	173		mJ
Power Dissipation ^B	P_D	208	27.8	W
		1.67	0.22	W/°C
MOSFET dv/dt ruggedness	dv/dt	100		V/ns
Peak diode recovery dv/dt ^H		20		
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150		°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds ^J	T_L	300		°C

Thermal Characteristics

Parameter	Symbol	AOT15S60/AOB15S60	AOTF15S60L	Units
Maximum Junction-to-Ambient ^{A,D}	$R_{\theta JA}$	65	65	°C/W
Maximum Case-to-sink ^A	$R_{\theta CS}$	0.5	--	°C/W
Maximum Junction-to-Case	$R_{\theta JC}$	0.6	4.5	°C/W

* Drain current limited by maximum junction temperature.

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	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$, $T_J=25^\circ\text{C}$	600	-	-	V
		$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$, $T_J=150^\circ\text{C}$	650	700	-	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=600\text{V}$, $V_{GS}=0\text{V}$	-	-	1	μA
		$V_{DS}=480\text{V}$, $T_J=150^\circ\text{C}$	-	10	-	
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 30\text{V}$	-	-	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=5\text{V}$, $I_D=250\mu\text{A}$	2.5	3.2	3.8	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=7.5\text{A}$, $T_J=25^\circ\text{C}$	-	0.254	0.29	Ω
		$V_{GS}=10\text{V}$, $I_D=7.5\text{A}$, $T_J=150^\circ\text{C}$	-	0.68	0.78	Ω
V_{SD}	Diode Forward Voltage	$I_S=7.5\text{A}$, $V_{GS}=0\text{V}$, $T_J=25^\circ\text{C}$	-	0.83	-	V
I_S	Maximum Body-Diode Continuous Current		-	-	15	A
I_{SM}	Maximum Body-Diode Pulsed Current ^C		-	-	63	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=100\text{V}$, $f=1\text{MHz}$	-	717	-	pF
C_{oss}	Output Capacitance		-	58	-	pF
$C_{o(er)}$	Effective output capacitance, energy related ^H	$V_{GS}=0\text{V}$, $V_{DS}=0$ to 480V , $f=1\text{MHz}$	-	41.2	-	pF
$C_{o(tr)}$	Effective output capacitance, time related ^I		-	125.2	-	pF
C_{rss}	Reverse Transfer Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=100\text{V}$, $f=1\text{MHz}$	-	1.3	-	pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$	-	13.4	-	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=480\text{V}$, $I_D=7.5\text{A}$	-	15.6	-	nC
Q_{gs}	Gate Source Charge		-	3.5	-	nC
Q_{gd}	Gate Drain Charge		-	6.0	-	nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}$, $V_{DS}=400\text{V}$, $I_D=7.5\text{A}$, $R_G=25\Omega$	-	24.5	-	ns
t_r	Turn-On Rise Time		-	22	-	ns
$t_{D(off)}$	Turn-Off Delay Time		-	84	-	ns
t_f	Turn-Off Fall Time		-	24	-	ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=7.5\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$, $V_{DS}=400\text{V}$	-	282	-	ns
I_{rm}	Peak Reverse Recovery Current	$I_F=7.5\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$, $V_{DS}=400\text{V}$	-	26	-	A
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=7.5\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$, $V_{DS}=400\text{V}$	-	4.5	-	μC

A. The value of $R_{\theta JA}$ is measured with the device in a still air environment with $T_A=25^\circ\text{C}$.

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. $L=60\text{mH}$, $I_{AS}=2.4\text{A}$, $V_{DD}=150\text{V}$, Starting $T_J=25^\circ\text{C}$

H. $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 80% $V_{(BR)DSS}$.

I. $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% $V_{(BR)DSS}$.

J. Wavesoldering only allowed at leads.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

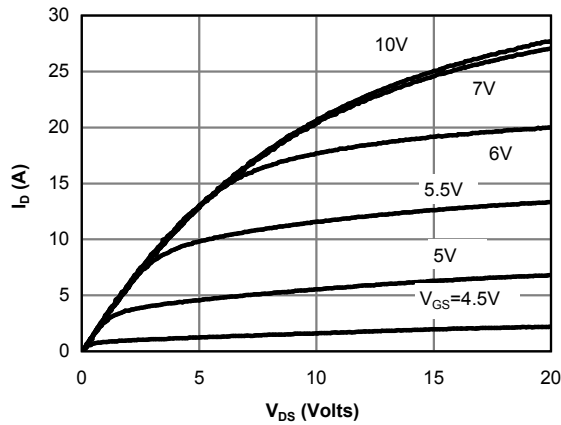


Figure 1: On-Region Characteristics@25°C

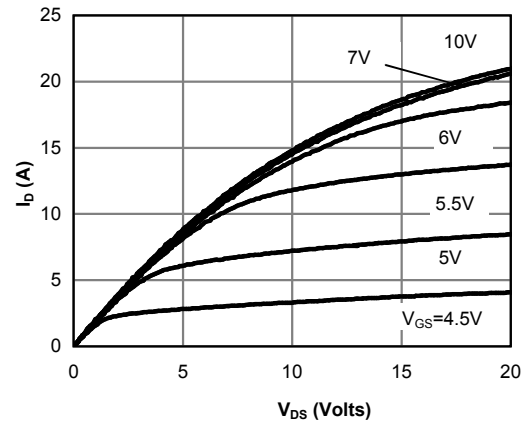


Figure 2: On-Region Characteristics@125°C

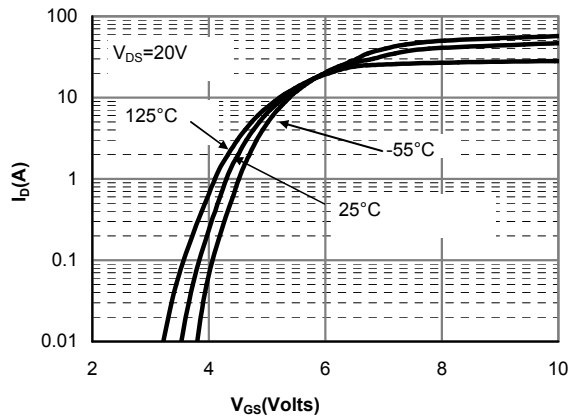


Figure 3: Transfer Characteristics

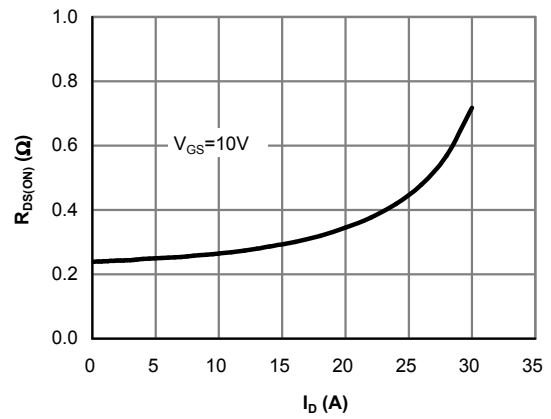


Figure 4: On-Resistance vs. Drain Current and Gate Voltage

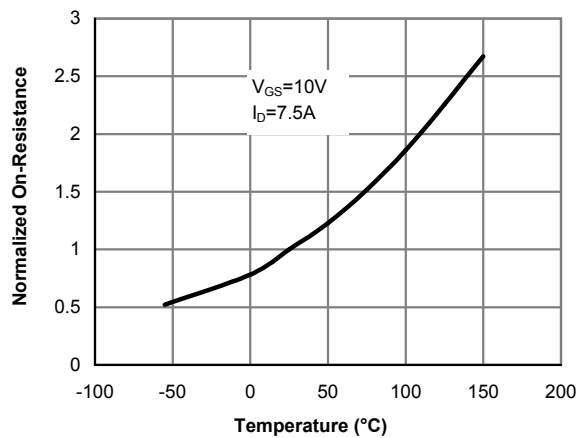


Figure 5: On-Resistance vs. Junction Temperature

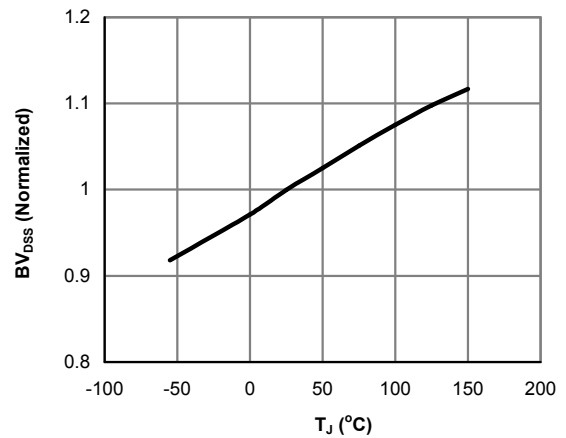


Figure 6: Break Down vs. Junction Temperature

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

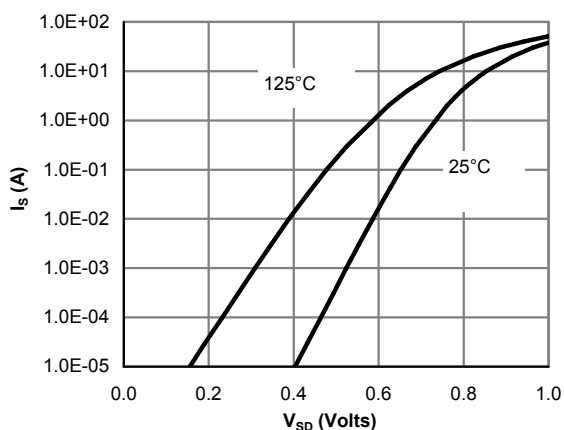


Figure 7: Body-Diode Characteristics (Note E)

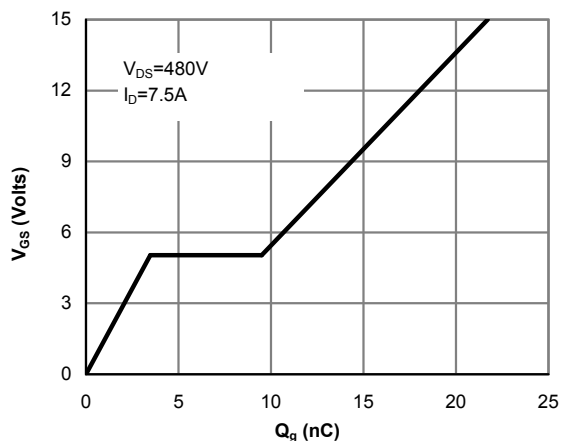


Figure 8: Gate-Charge Characteristics

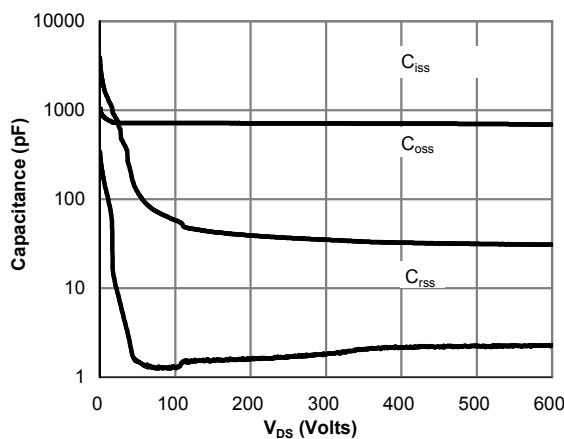


Figure 9: Capacitance Characteristics

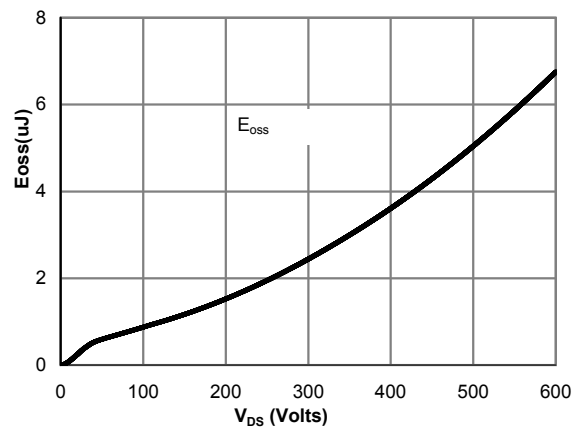


Figure 10: Coss stored Energy

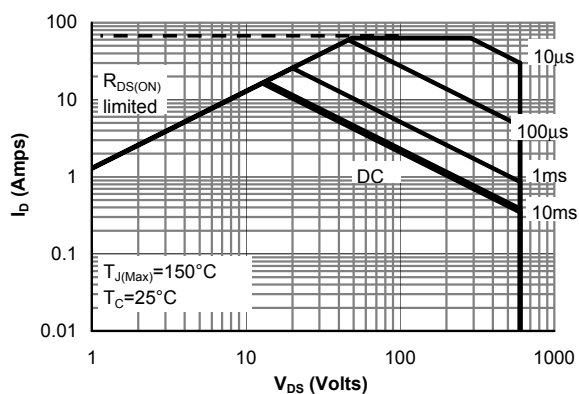


Figure 11: Maximum Forward Biased Safe Operating Area for AOT(B)15S60 (Note F)

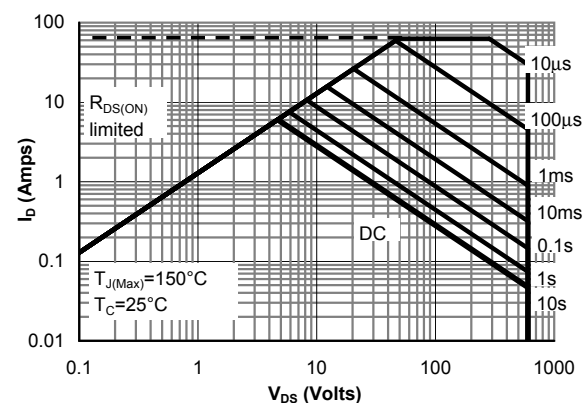


Figure 12: Maximum Forward Biased Safe Operating Area for AOTF15S60L (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

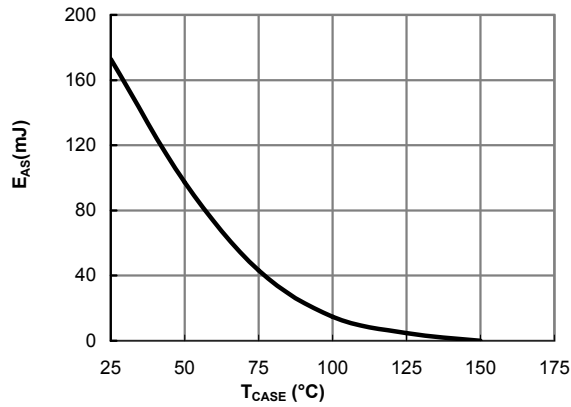


Figure 13: Avalanche energy

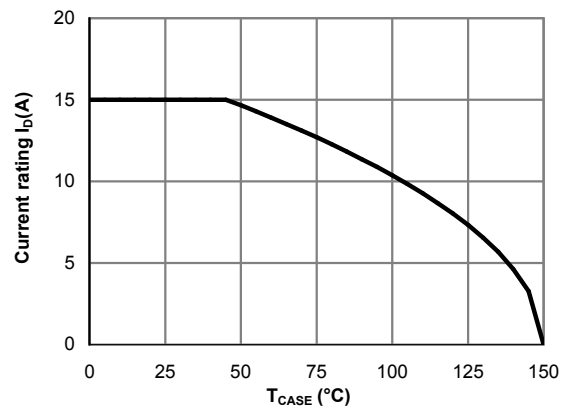


Figure 14: Current De-rating (Note B)

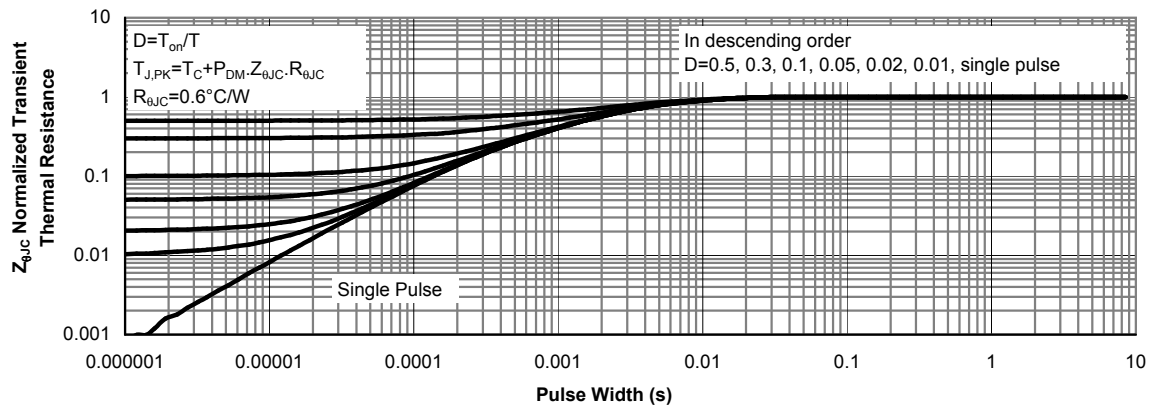


Figure 15: Normalized Maximum Transient Thermal Impedance for AOT(B)15S60 (Note F)

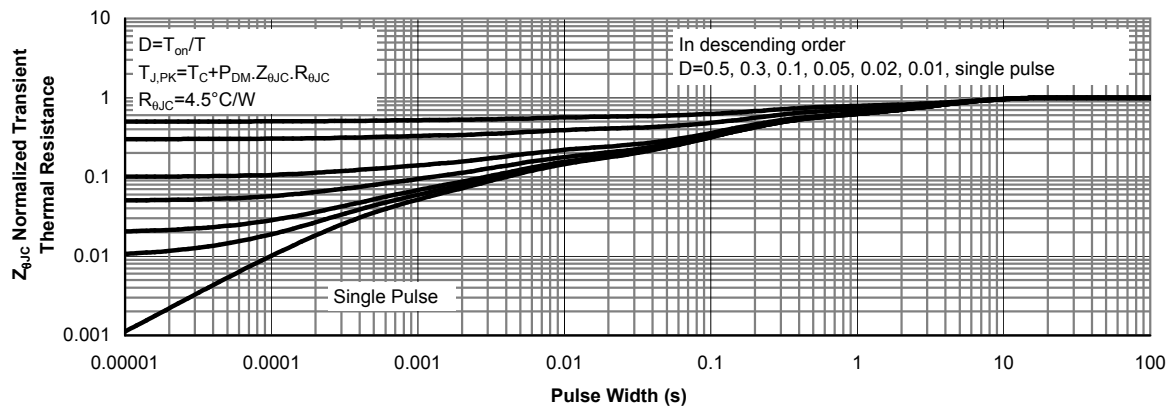
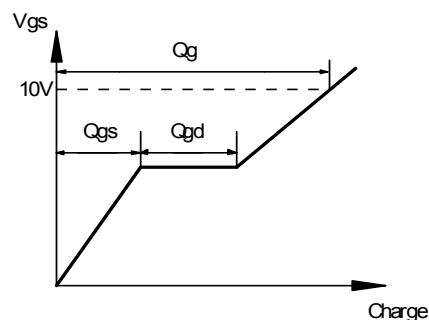
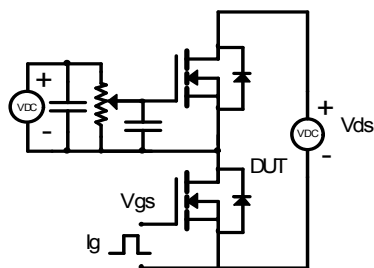
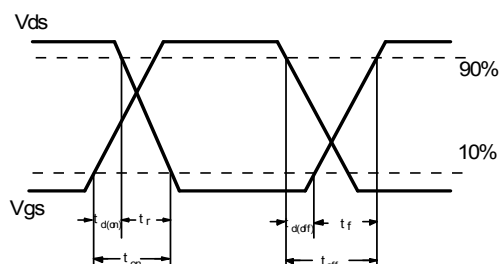
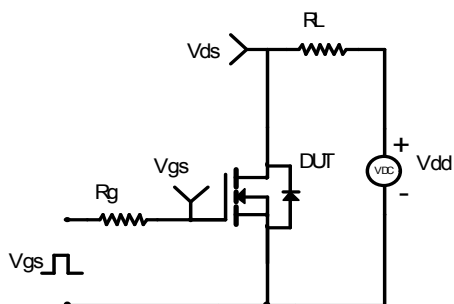


Figure 16: Normalized Maximum Transient Thermal Impedance for AOTF15S60L (Note F)

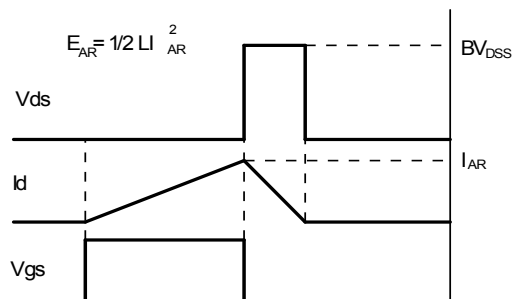
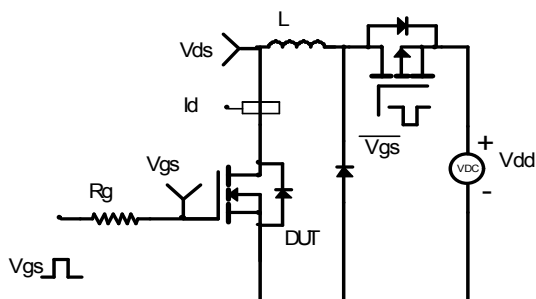
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

