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ALPHA & OMEGA
SEMICONDUCTOR

AOT410L/AOB410L

100V N-Channel MOSFET
SDMOS™

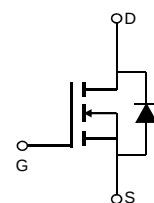
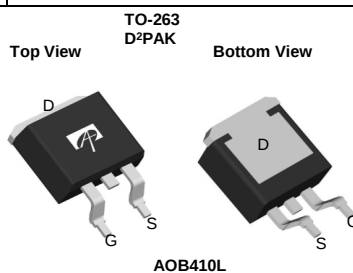
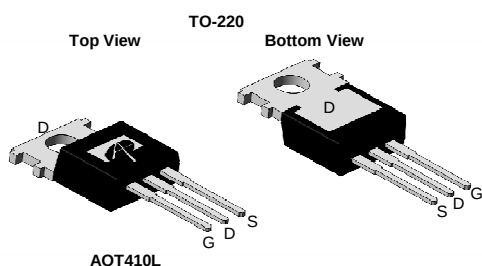
General Description

The AOT410L/AOB410L is fabricated with SDMOS™ trench technology that combines excellent $R_{DS(ON)}$ with low gate charge & low Q_{rr} . The result is outstanding efficiency with controlled switching behavior. This universal technology is well suited for PWM, load switching and general purpose applications.

Product Summary

V_{DS}	100V
I_D (at $V_{GS}=10V$)	150A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 6.5mΩ (< 6.2mΩ*)
$R_{DS(ON)}$ (at $V_{GS}=7V$)	< 7.5mΩ (< 7.2mΩ*)

100% UIS Tested
100% R_g Tested



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOT410L	TO-220	Tube	1000
AOB410L	TO-263	Tape & Reel	800

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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 25	V
Continuous Drain Current ^G	I_D	150	A
$T_C=25^\circ\text{C}$		108	
$T_C=100^\circ\text{C}$			
Pulsed Drain Current ^C	I_{DM}	405	
Continuous Drain Current	I_{DSM}	12	A
$T_A=25^\circ\text{C}$		10	
$T_A=70^\circ\text{C}$			
Avalanche Current ^C	I_{AS}, I_{AR}	50	A
Avalanche energy $L=0.1\text{mH}$ ^C	E_{AS}, E_{AR}	125	mJ
Power Dissipation ^B	P_D	333	W
$T_C=25^\circ\text{C}$		167	
$T_C=100^\circ\text{C}$			
Power Dissipation ^A	P_{DSM}	1.9	W
$T_A=25^\circ\text{C}$		1.2	
$T_A=70^\circ\text{C}$			
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	12	15	$^\circ\text{C/W}$
$t \leq 10\text{s}$				
Maximum Junction-to-Ambient ^{A D}	$R_{\theta JA}$	54	65	$^\circ\text{C/W}$
Steady-State				
Maximum Junction-to-Case	$R_{\theta JC}$	0.35	0.45	$^\circ\text{C/W}$
Steady-State				

* Surface mount package TO263

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			10 50	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±25V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =5V, I _D =250μA	2	3	4	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V		405		A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A T0220 T _J =125°C		5.1 8.8	6.5 11	mΩ
		V _{GS} =7V, I _D =20A T0220		5.8	7.5	mΩ
		V _{GS} =10V, I _D =20A TO263		4.8	6.2	mΩ
		V _{GS} =7V, I _D =20A TO263		5.5	7.2	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		70		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.63	1	V
I _S	Maximum Body-Diode Continuous Current				150	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =50V, f=1MHz	5290	6622	7950	pF
C _{oss}	Output Capacitance		415	594	770	pF
C _{rss}	Reverse Transfer Capacitance		130	215	300	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	0.3	0.64	1	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =50V, I _D =20A	85	107	129	nC
Q _{gs}	Gate Source Charge		23	28.5	34	nC
Q _{gd}	Gate Drain Charge		24	40	56	nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =50V, R _L =2.5Ω, R _{GEN} =3Ω		28		ns
t _r	Turn-On Rise Time			22		ns
t _{D(off)}	Turn-Off DelayTime			43.5		ns
t _f	Turn-Off Fall Time			14.5		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, dI/dt=500A/μs	19	27	35	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, dI/dt=500A/μs	124	177	230	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.

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

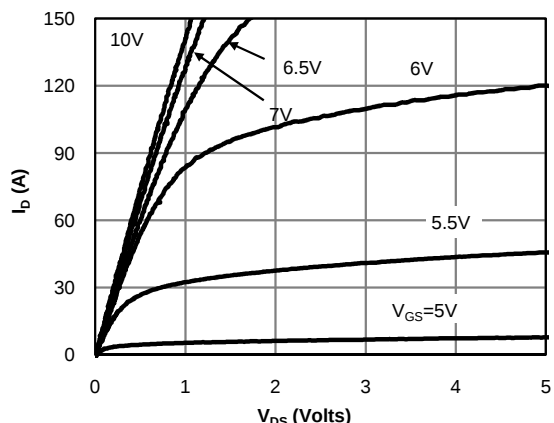


Fig 1: On-Region Characteristics (Note E)

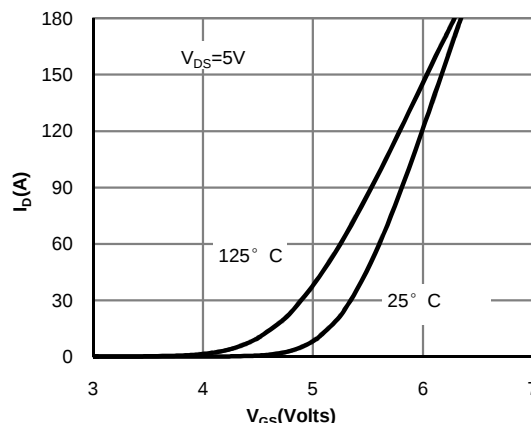


Figure 2: Transfer Characteristics (Note E)

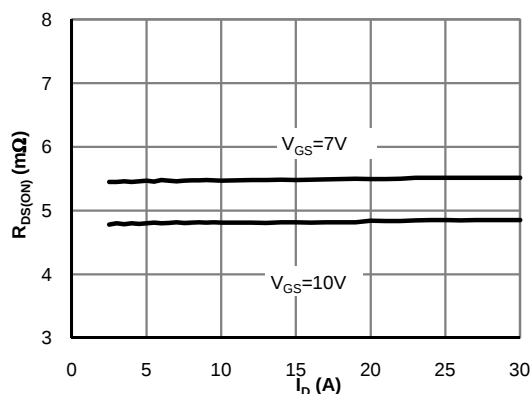


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

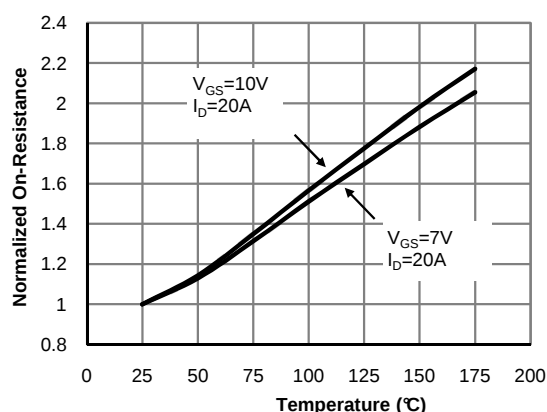


Figure 4: On-Resistance vs. Junction Temperature (Note E)

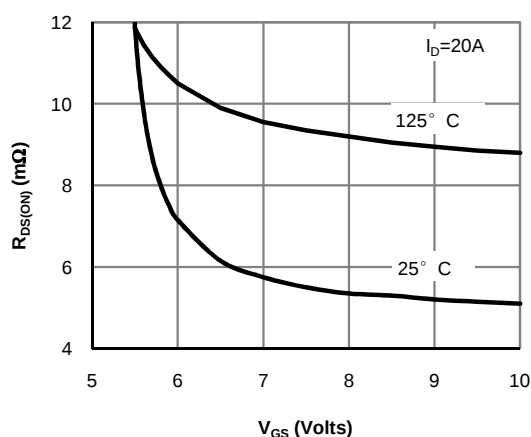


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

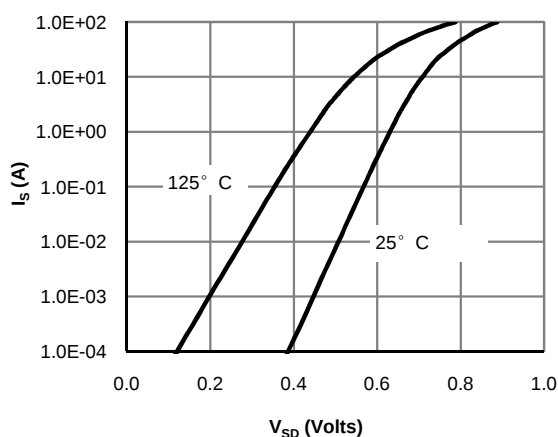
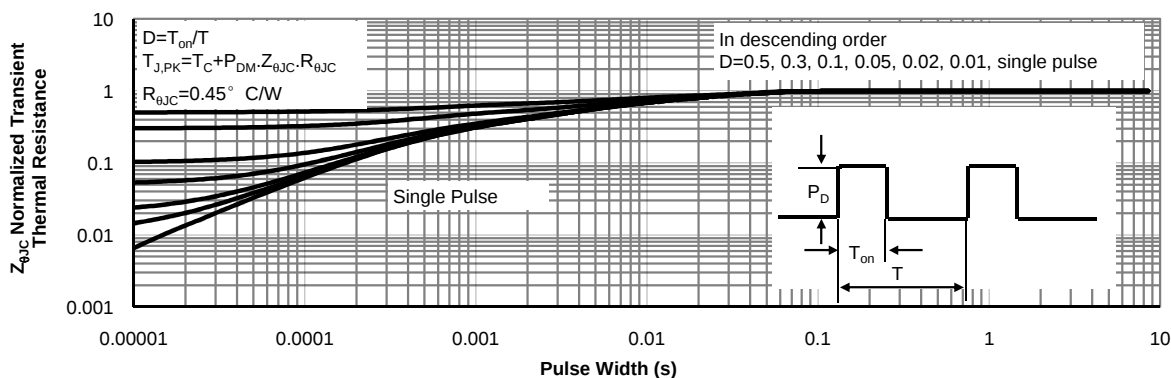
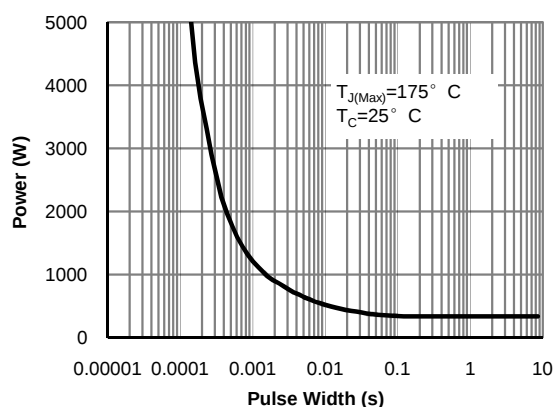
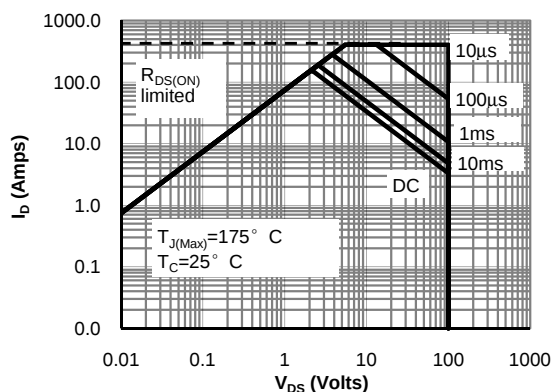
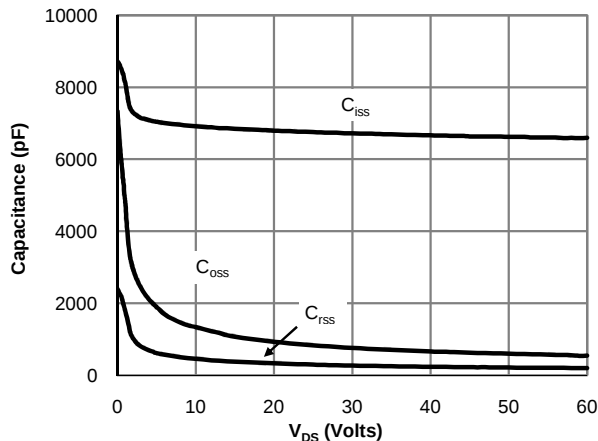
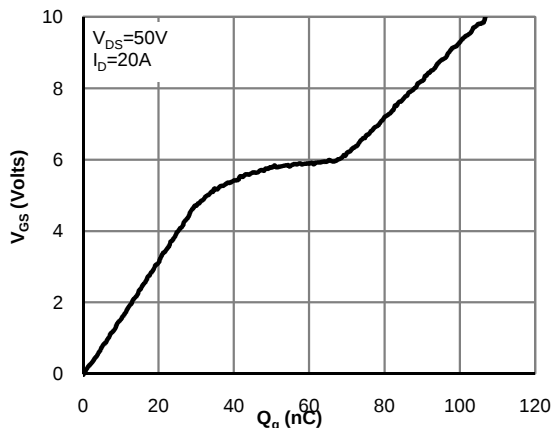


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



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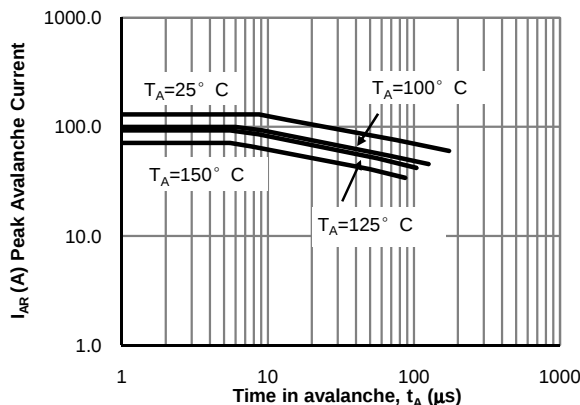


Figure 12: Single Pulse Avalanche capability (Note C)

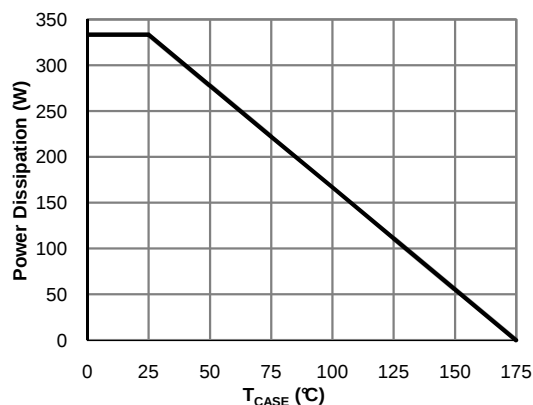


Figure 13: Power De-rating (Note F)

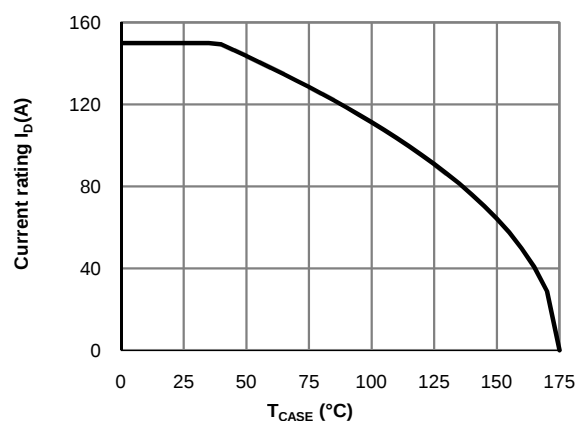


Figure 14: Current De-rating (Note F)

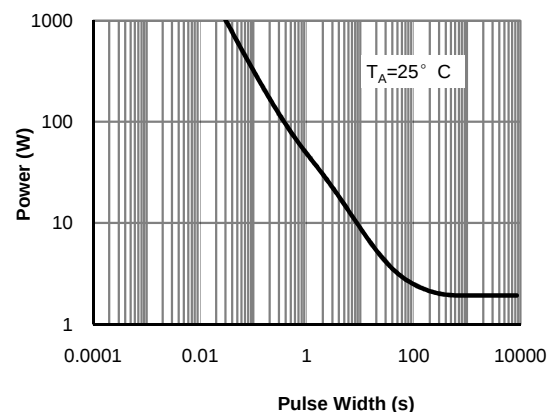


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

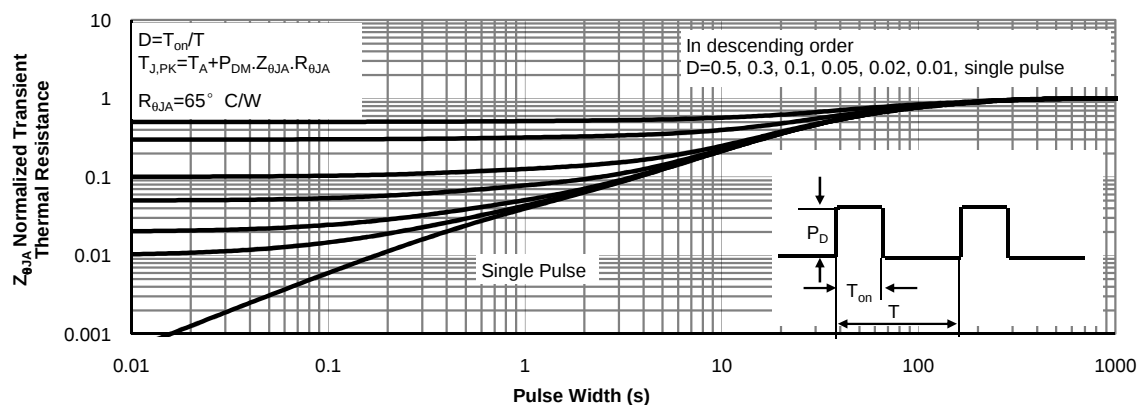


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

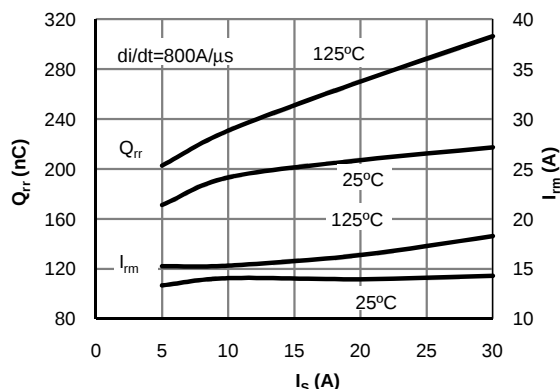


Figure 17: Diode Reverse Recovery Charge and Peak Current vs. Conduction Current

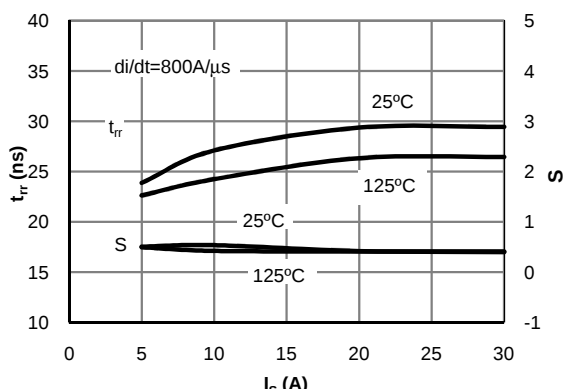


Figure 18: Diode Reverse Recovery Time and Softness Factor vs. Conduction Current

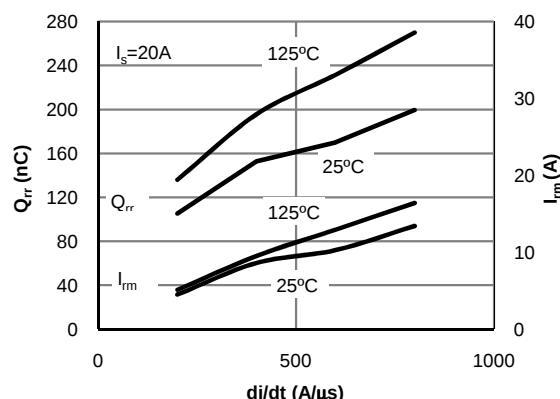


Figure 19: Diode Reverse Recovery Charge and Peak Current vs. di/dt

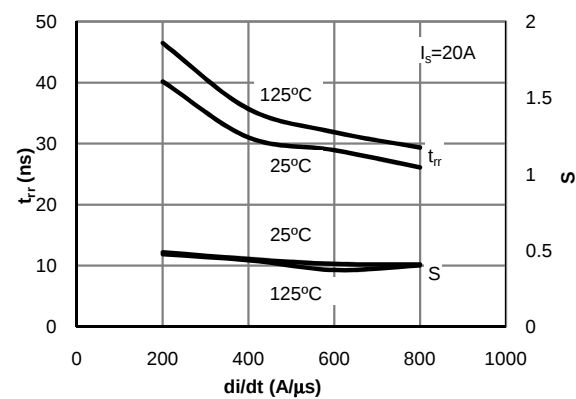
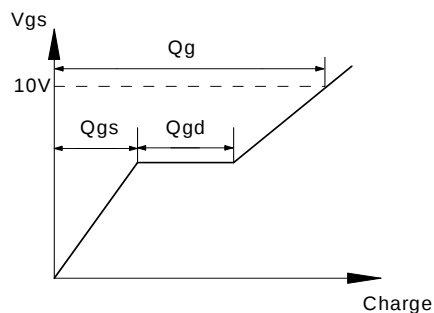
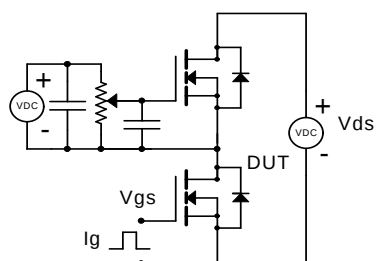
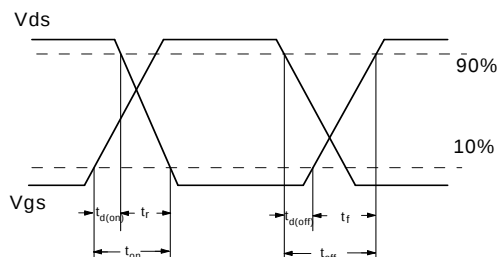
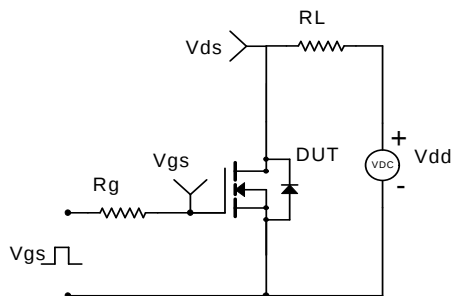


Figure 20: Diode Reverse Recovery Time and Softness Factor vs. di/dt

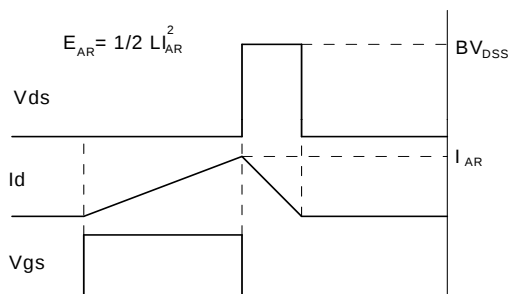
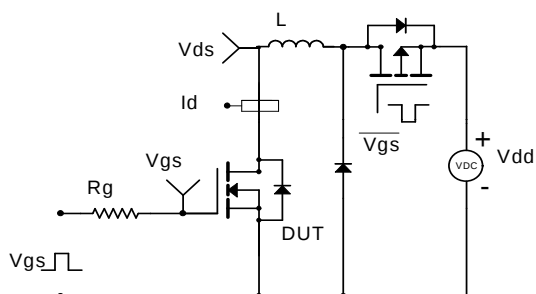
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

