ALPHA & OMEGA SEMICONDUCTOR

AOT470/AOB470L

75V N-Channel MOSFET

General Description

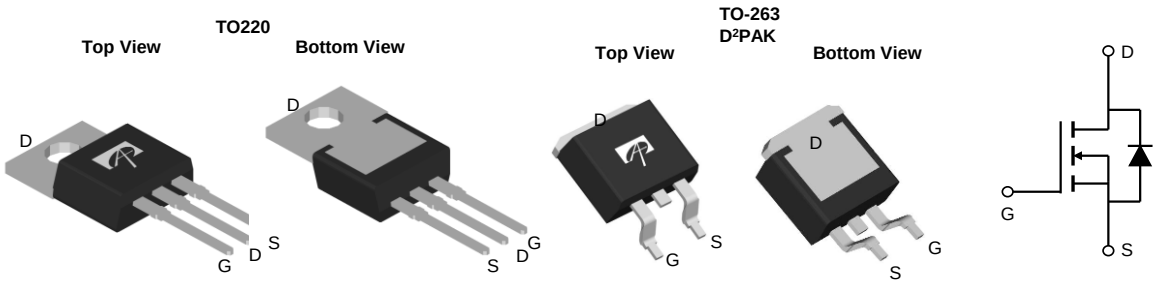
The AOT470/AOB470L uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

Product Summary

V_{DS}	75V
I_D (at V_{GS}=10V)	100A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 10.5mΩ

100% UIS Tested
100% R_g Tested

RoHS Compliant



Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	75	V
Gate-Source Voltage		V_{GS}	±25	V
Continuous Drain Current [G]	T_C=25°C	I_D	100	A
	T_C=100°C		78	
Pulsed Drain Current [C]		I_{DM}	200	
Continuous Drain Current	T_A=25°C	I_{DSM}	10	A
	T_A=70°C		8	
Avalanche Current [C]		I_{AS}, I_{AR}	45	A
Avalanche energy L=0.3mH [C]		E_{AS}, E_{AR}	300	mJ
Power Dissipation [B]	T_C=25°C	P_D	268	W
	T_C=100°C		134	
Power Dissipation [A]	T_A=25°C	P_{DSM}	2.1	W
	T_A=70°C		1.3	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	10	12	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		45	60	°C/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	0.45	0.56	°C/W

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		75			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=75V, V_{GS}=0V				1	µA
			T_J=55°C			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±25V				1	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250µA		2	2.7	4	V
$I_{D(ON)}$	On state drain current	V_{GS}=10V, V_{DS}=5V		200			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=30A			8.3	10.5	mΩ
		TO220	T_J=125°C		13.7	17	
		V_{GS}=10V, I_D=30A TO263			8	10.2	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=30A			90		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V			0.7	1	V
I_S	Maximum Body-Diode Continuous Current					100	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=30V, f=1MHz		3760	4700	5640	pF
C_{oss}	Output Capacitance			280	400	520	pF
C_{rss}	Reverse Transfer Capacitance			110	180	250	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		1.5	3	4.5	Ω
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=30V, I_D=30A			114	136	nC
Q_{gs}	Gate Source Charge				33	40	nC
Q_{gd}	Gate Drain Charge				18	25	nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=30V, R_L=1Ω, R_{GEN}=3Ω			21		ns
t_r	Turn-On Rise Time				39		ns
$t_{D(off)}$	Turn-Off DelayTime				70		ns
t_f	Turn-Off Fall Time				24		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=30A, dI/dt=100A/µs		37	53	70	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=30A, dI/dt=100A/µs		100	143	185	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° C. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ 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 $R_{\theta JA}$ 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 µs 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 rating is limited by bond-wires.
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

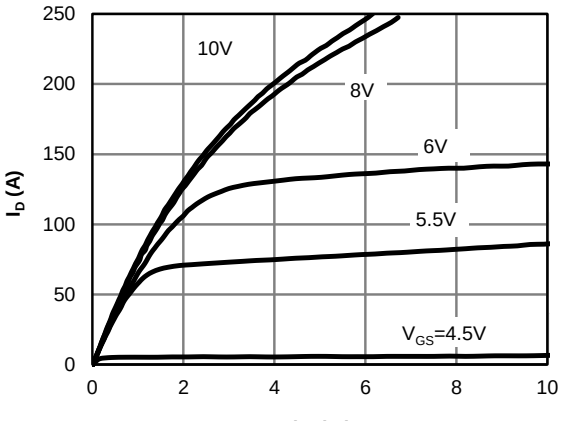


Fig 1: On-Region Characteristics (Note E)

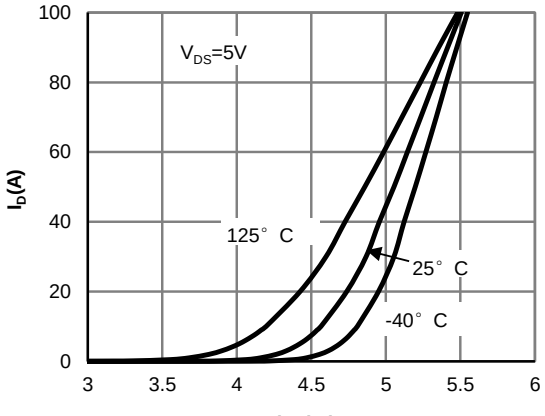


Figure 2: Transfer Characteristics (Note E)

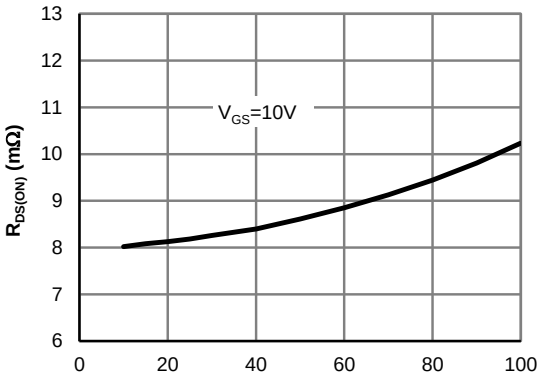


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

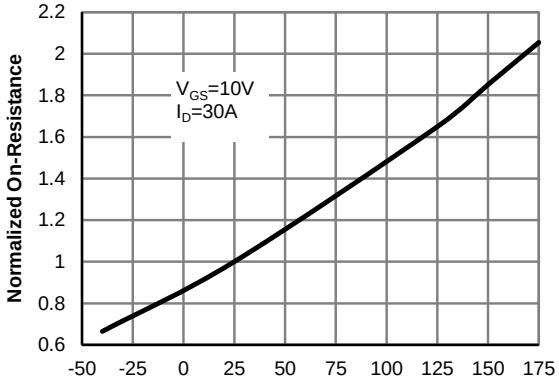


Figure 4: On-Resistance vs. Junction Temperature (Note E)

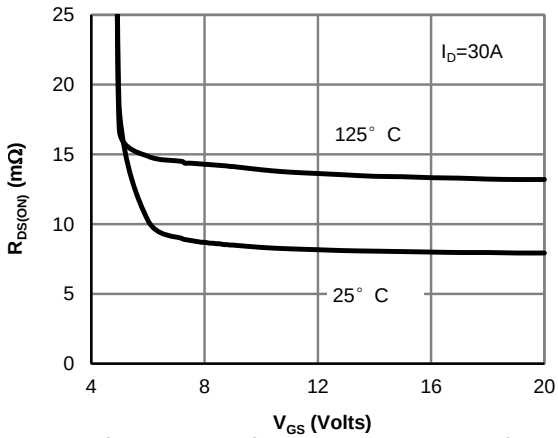


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

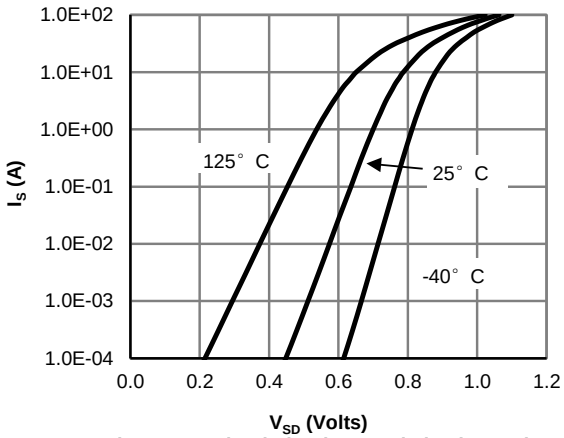


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

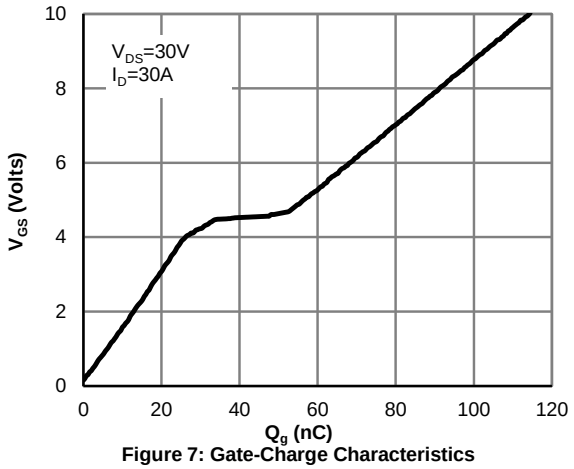


Figure 7: Gate-Charge Characteristics

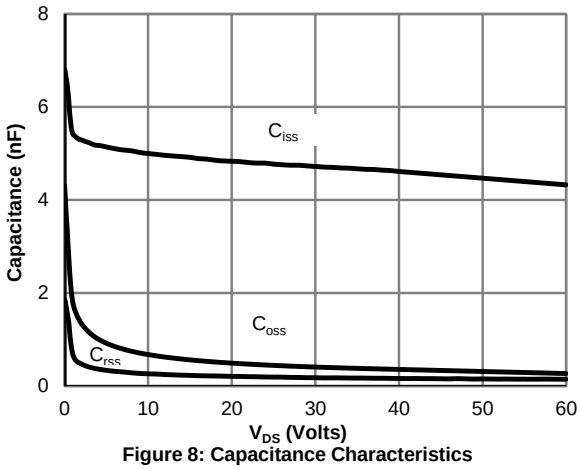


Figure 8: Capacitance Characteristics

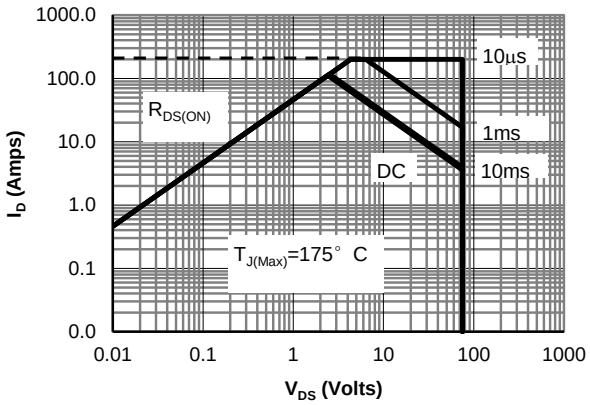


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

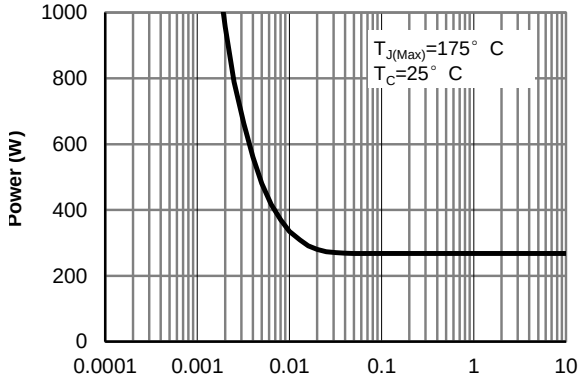


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

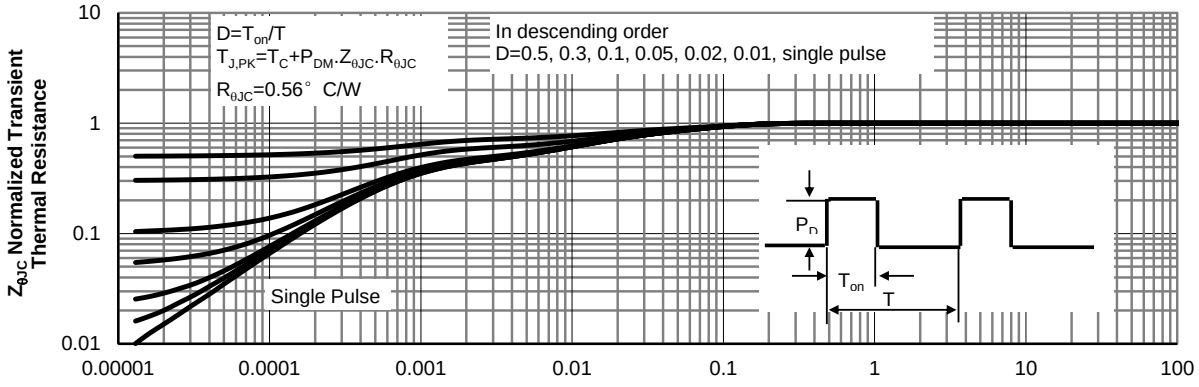


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

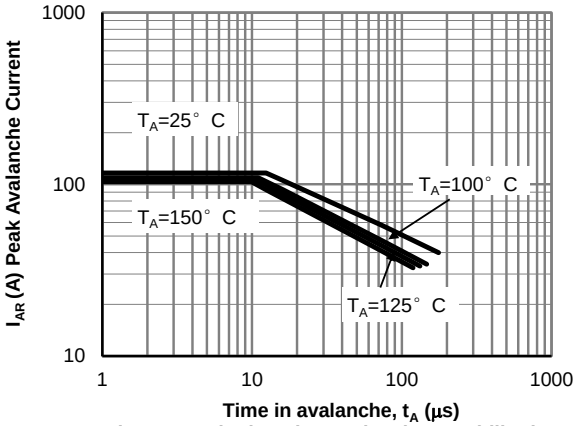


Figure 12: Single Pulse Avalanche capability (Note C)

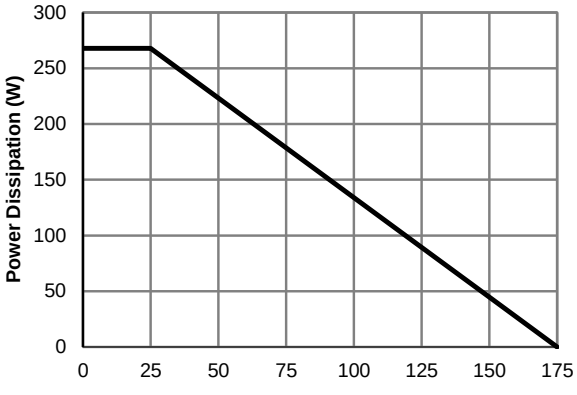


Figure 13: Power De-rating (Note F)

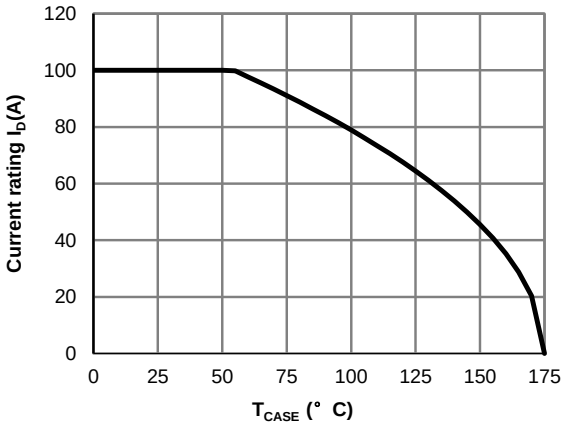


Figure 14: Current De-rating (Note F)

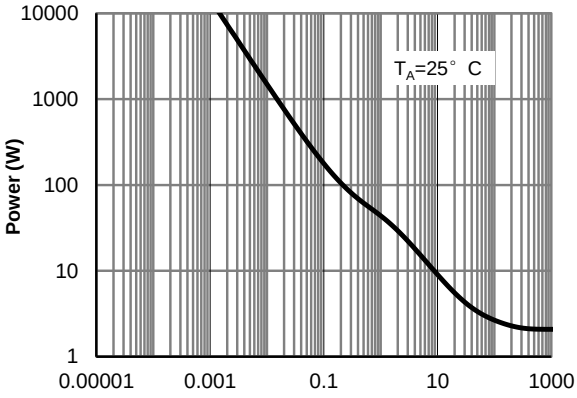


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

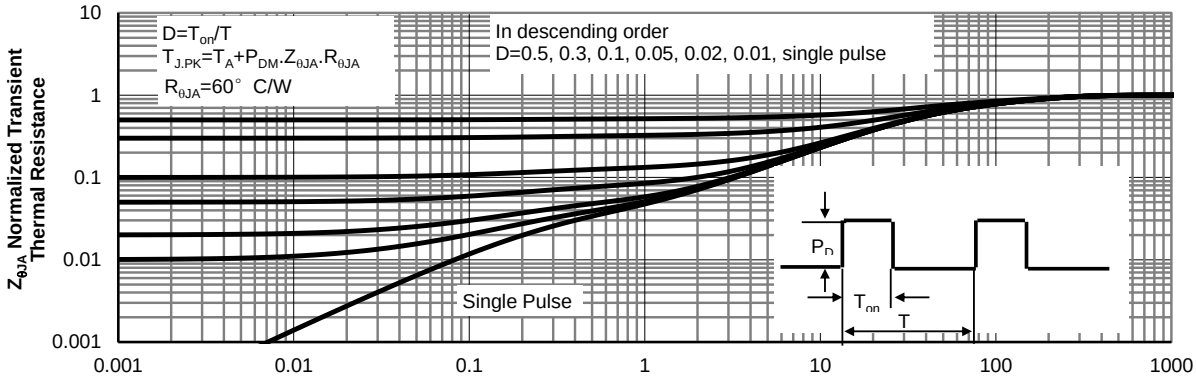
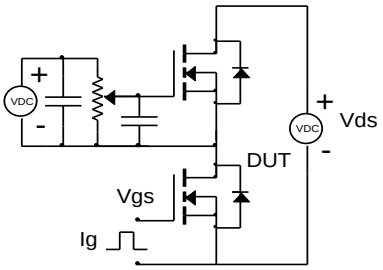
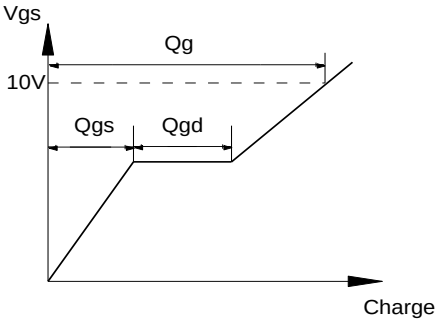


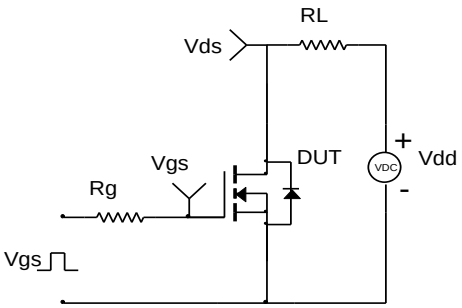
Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

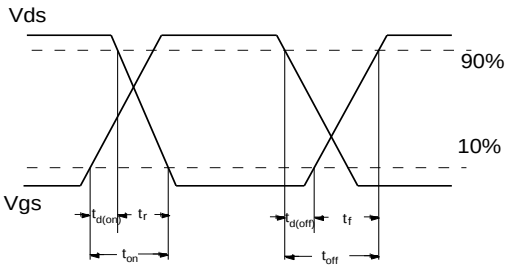
Gate Charge Test Circuit & Waveform



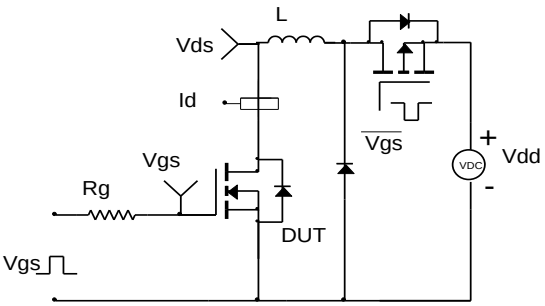


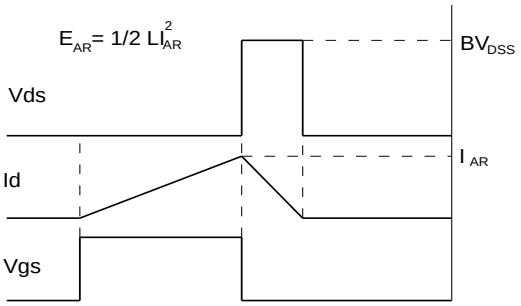
Resistive Switching Test Circuit & Waveforms



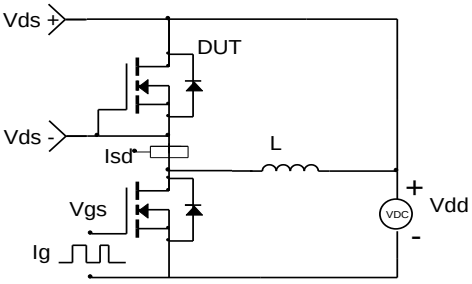


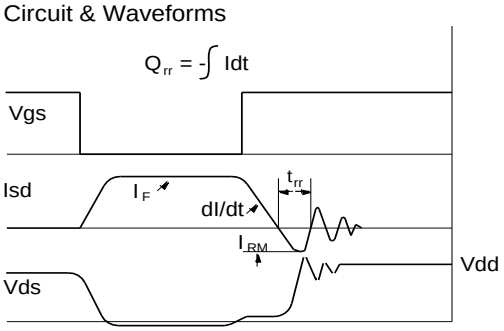
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms





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