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AON6407

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ALPHA & OMEGA SEMICONDUCTOR

AON6407

30V P-Channel MOSFET

General Description

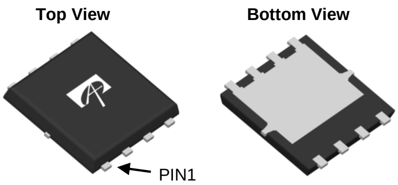
The AON6407 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Product Summary

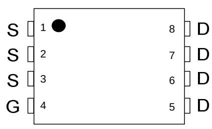
V_{DS}	-30
I_D (at V_{GS}= -10V)	-85A
$R_{DS(ON)}$ (at V_{GS}= -10V)	< 4.5mΩ
$R_{DS(ON)}$ (at V_{GS} = -6V)	< 6.0mΩ

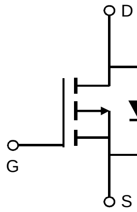
100% UIS Tested
100% R_g Tested

DFN5X6



Top View





Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±25	V
Continuous Drain Current [G]	T_C=25℃	I_D	-85	A
	T_C=100℃		-67	
Pulsed Drain Current [C]		I_{DM}	-200	
Continuous Drain Current	T_A=25℃	I_{DSM}	-32	A
	T_A=70℃		-25.5	
Avalanche Current [C]		I_{AS}	45	A
Avalanche energy L=0.1mH [C]		E_{AS}	101	mJ
Power Dissipation [B]	T_C=25℃	P_D	83	W
	T_C=100℃		33	
Power Dissipation [A]	T_A=25℃	P_{DSM}	7.3	W
	T_A=70℃		4.7	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	℃

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	14	17	℃/W
Maximum Junction-to-Ambient [A D]	Steady-State		40	55	℃/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1.1	1.5	℃/W

Electrical Characteristics (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=-250µA, V_{GS}=0V	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-30V, V_{GS}=0V			-1	µA
		T_J=55℃			-5	µA
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±25V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=$V_{GS,}$ I_D=-250µA	-1.6	-2.1	-2.6	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=-20A		3.3	4.5	mΩ
		T_J=125℃		4.9	6.5	mΩ
		V_{GS}=-6V, I_D=-20A		4.4	6	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-20A		65		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V		-0.69	-1	V
I_S	Maximum Body-Diode Continuous Current [G]				-85	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz		3505		pF
C_{oss}	Output Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz		900		pF
C_{rss}	Reverse Transfer Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz		650		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		4.6	9.2	Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=-10V, V_{DS}=-15V, I_D=-20A		75	105	nC
Q_{gs}	Gate Source Charge	V_{GS}=-10V, V_{DS}=-15V, I_D=-20A		13		nC
Q_{gd}	Gate Drain Charge	V_{GS}=-10V, V_{DS}=-15V, I_D=-20A		23		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=0.75Ω, R_{GEN}=3Ω		14		ns
t_r	Turn-On Rise Time	V_{GS}=-10V, V_{DS}=-15V, R_L=0.75Ω, R_{GEN}=3Ω		16		ns
$t_{D(off)}$	Turn-Off DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=0.75Ω, R_{GEN}=3Ω		94		ns
t_f	Turn-Off Fall Time	V_{GS}=-10V, V_{DS}=-15V, R_L=0.75Ω, R_{GEN}=3Ω		75		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-20A, dI/dt=500A/µs		35		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-20A, dI/dt=500A/µs		75		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 150° C may be used if the PCB allows it.
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. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150° C. Ratings are based on low frequency and duty cycles to keep initial T_J =25° C.Maximum UIS current limited by test equipment.
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 <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

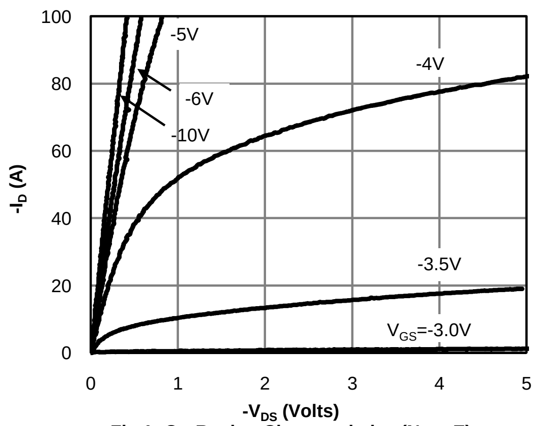


Fig 1: On-Region Characteristics (Note E)

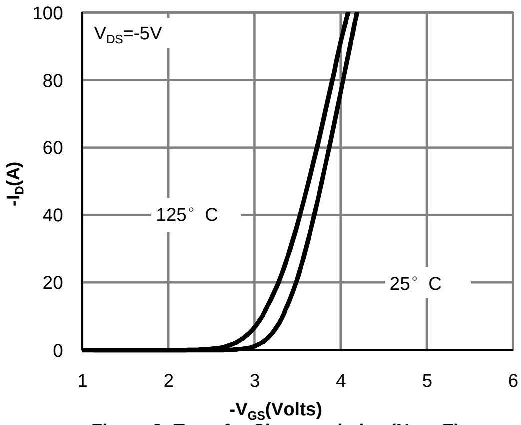


Figure 2: Transfer Characteristics (Note E)

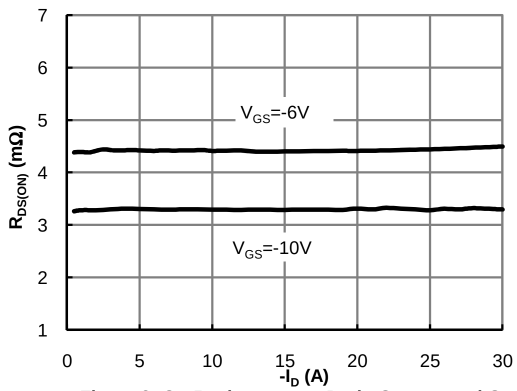


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

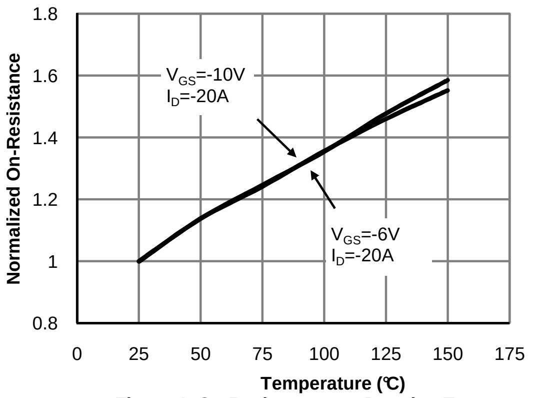


Figure 4: On-Resistance vs. Junction Temperature (Note E)

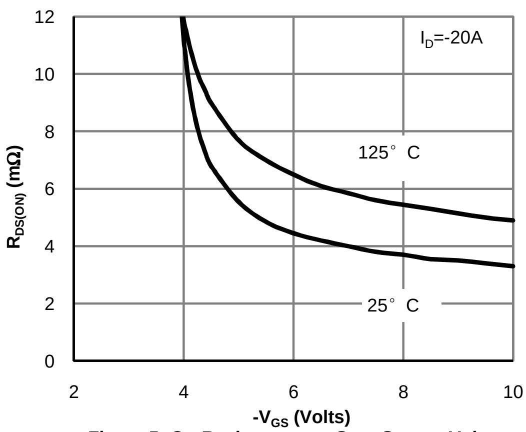


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

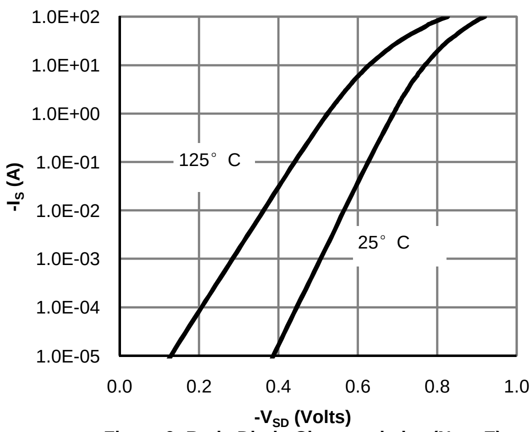


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

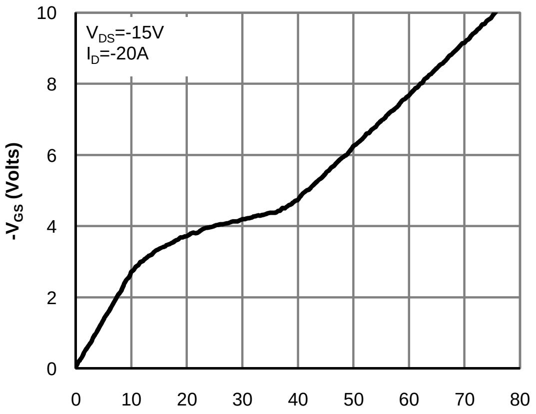


Figure 7: Gate-Charge Characteristics

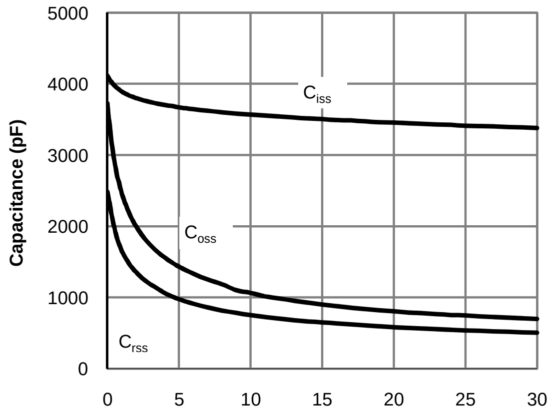


Figure 8: Capacitance Characteristics

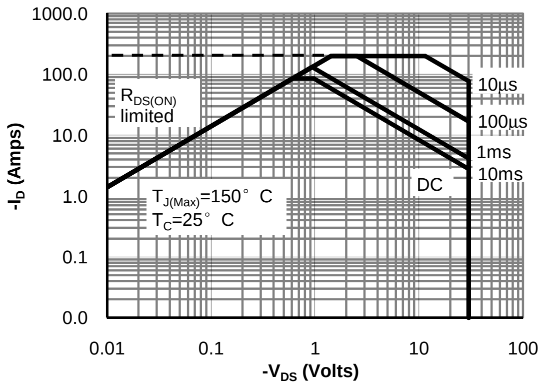


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

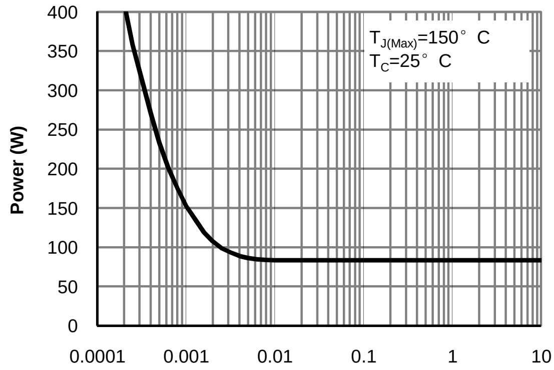


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

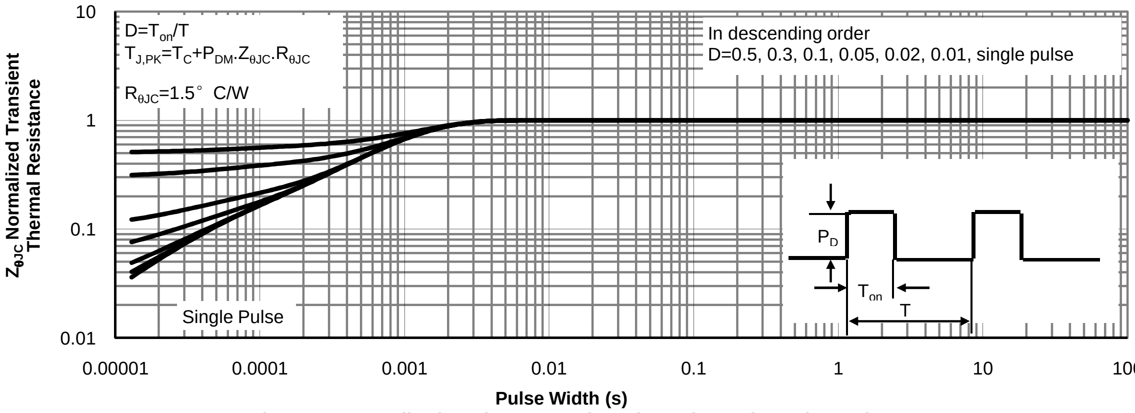


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

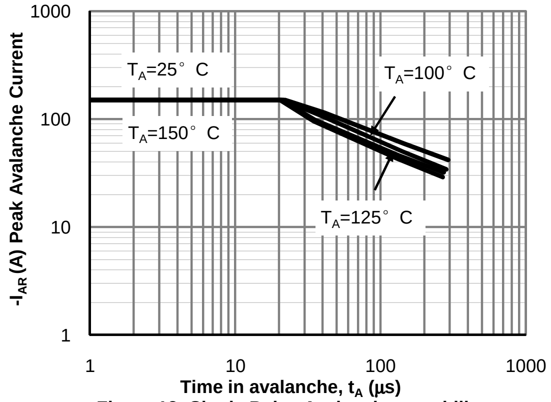


Figure 12: Single Pulse Avalanche capability (Note C)

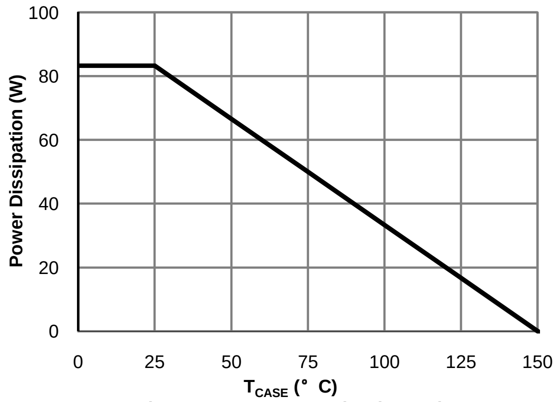


Figure 13: Power De-rating (Note F)

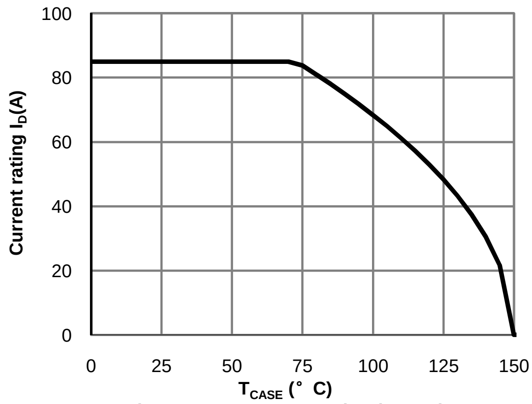


Figure 14: Current De-rating (Note F)

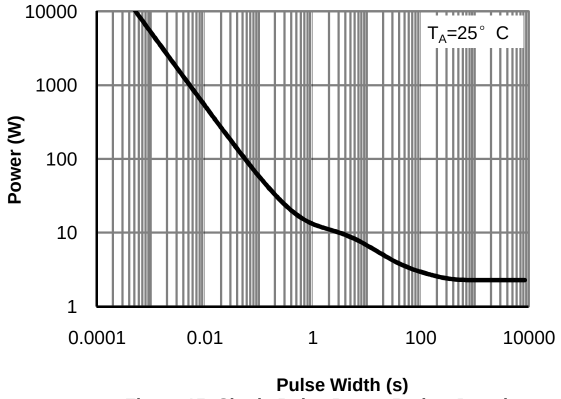


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

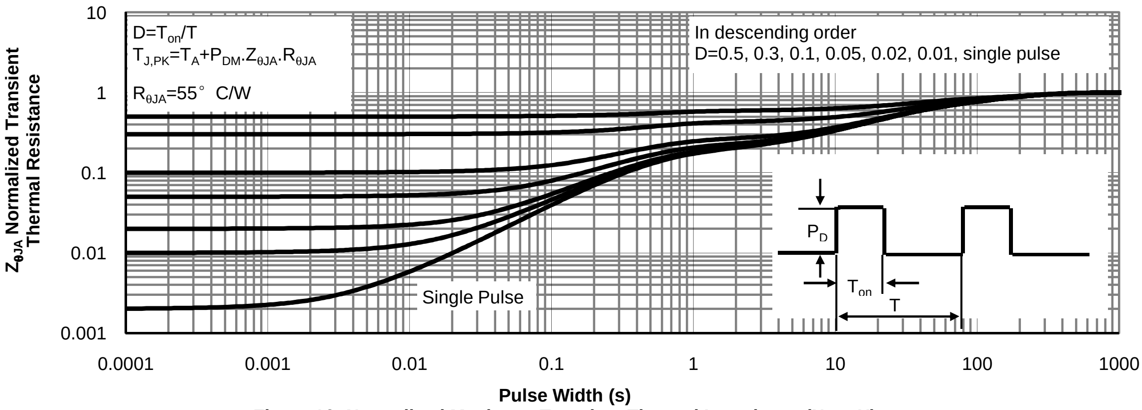
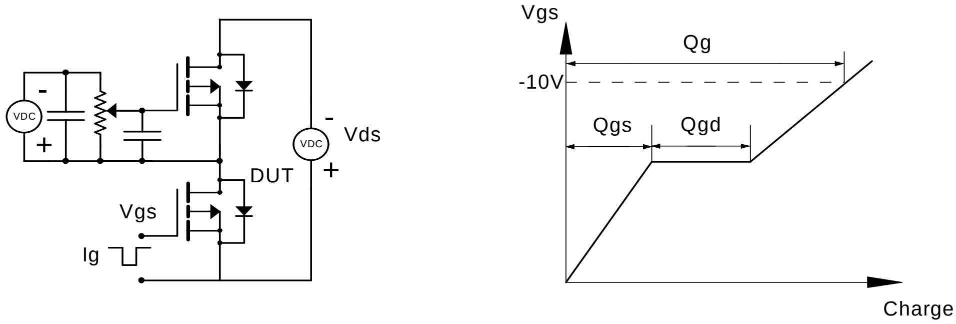
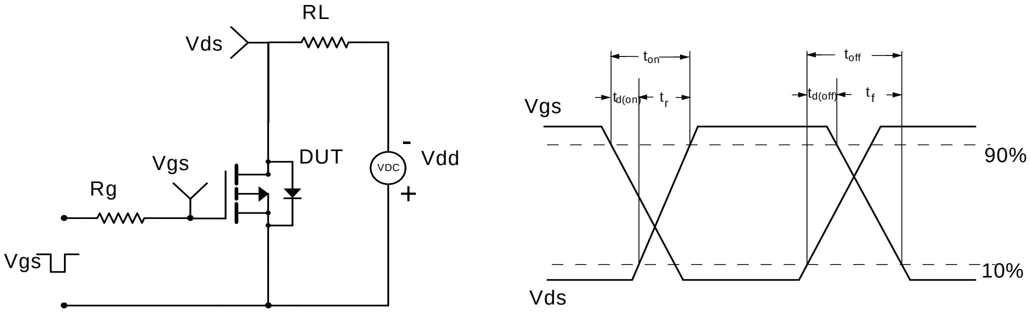


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

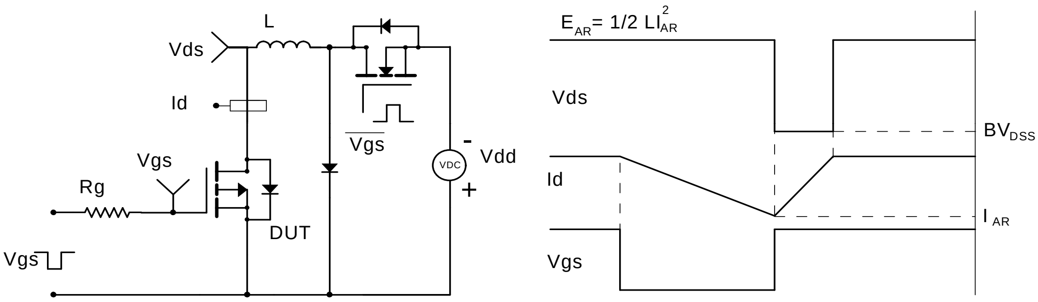
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms