ALPHA & OMEGA SEMICONDUCTOR

AON6404

30V N-Channel MOSFET

General Description

The AON6404 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.

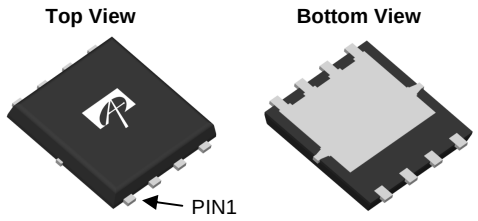
Product Summary

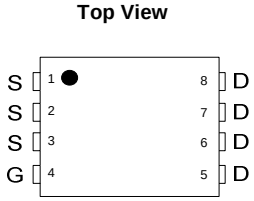
V_{DS} (V) = 30V
I_D = 85A (V_{GS} = 10V)
$R_{DS(ON)}$ < 2.2mΩ (V_{GS} = 10V)
$R_{DS(ON)}$ < 3.8mΩ (V_{GS} = 4.5V)

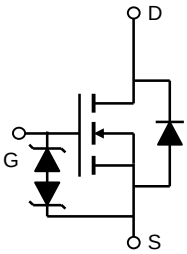
ESD protected
100% UIS Tested
100% Rg Tested

Green Product

DFN5X6







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}	±20	V
Continuous Drain Current [B,G]	T_C=25℃	I_D	85	A
	T_C=100℃		67	
Pulsed Drain Current		I_{DM}	160	
Continuous Drain Current [A]	T_A=25℃	I_{DSM}	25	
	T_A=70℃		20	
Avalanche Current		I_{AS}	85	
Single avalanche energy L=0.1mH		E_{AS}	361	mJ
Power Dissipation [B]	T_C=25℃	P_D	83	W
	T_C=100℃		33	
Power Dissipation [A]	T_A=25℃	P_{DSM}	2.1	W
	T_A=70℃		1.3	
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	$R_{\theta JA}$	15	20	℃/W
Maximum Junction-to-Ambient [A]	Steady-State		45	60	℃/W
Maximum Junction-to-Case [C]	Steady-State	$R_{\theta JC}$	1.1	1.5	℃/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	30	34		V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V			1	uA
		T_J=55°C			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±16V			10	uA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250µA	1.4	1.7	2	V
$I_{D(ON)}$	On state drain current	V_{GS}=10V, V_{DS}=5V	160			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=20A		1.8	2.2	mΩ
		T_J=125°C		2.5	3.1	
		V_{GS}=4.5V, I_D=20A		3	3.8	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=20A		75		S
V_{SD}	Diode Forward Voltage	I_S=85A,V_{GS}=0V		0.87	1.3	V
I_S	Maximum Body-Diode Continuous Current				85	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz		7420	9000	pF
C_{oss}	Output Capacitance			1045		pF
C_{rss}	Reverse Transfer Capacitance			720		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		1.2	1.8	Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=15V, I_D=20A		118	155	nC
Q_g(4.5V)	Total Gate Charge			54		nC
Q_{gs}	Gate Source Charge			29		nC
Q_{gd}	Gate Drain Charge			22		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=15V, R_L=0.75Ω, R_{GEN}=3Ω		17		ns
t_r	Turn-On Rise Time			18		ns
$t_{D(off)}$	Turn-Off DelayTime			67		ns
t_f	Turn-Off Fall Time			25		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A, dI/dt=100A/µs		60	80	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A, dI/dt=100A/µs		66		nC

A: The value of $R_{\theta JA}$ is measured with the device in a still air environment with T $_A$ =25°C, with the device mounted on 1 in2 FR-4 board with 2oz. Copper, in a still air environment with T A=25°

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 heatsink is used.

C: Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.

D. The $R_{\theta JA}$ is the sum of the thermal impedence 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 impedence 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 ratin g.

G. Maximum current is limited by the package.

Rev4: May 2011

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

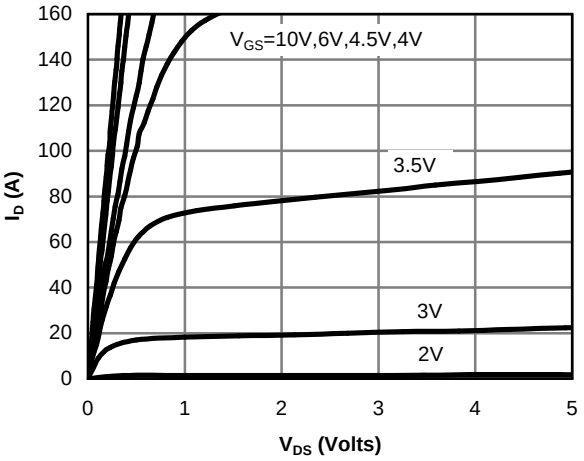


Fig 1: On-Region Characteristics

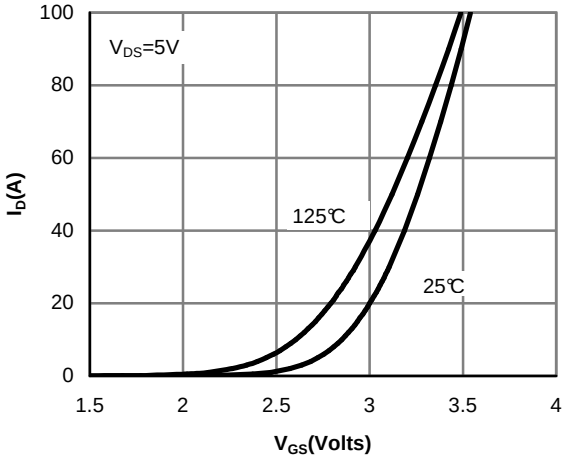


Figure 2: Transfer Characteristics

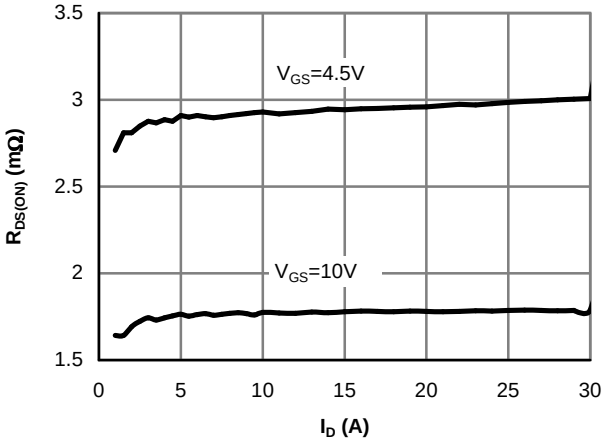


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

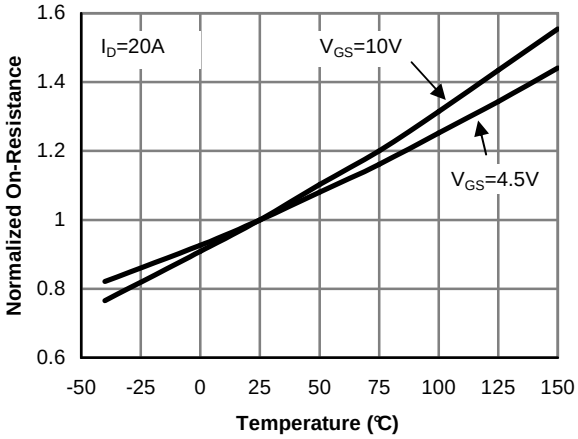


Figure 4: On-Resistance vs. Junction Temperature

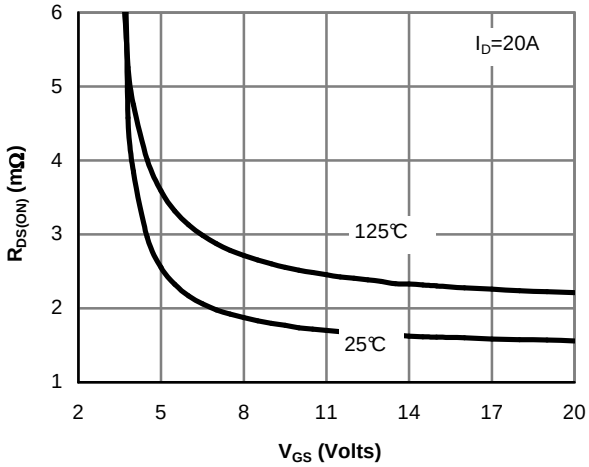


Figure 5: On-Resistance vs. Gate-Source Voltage

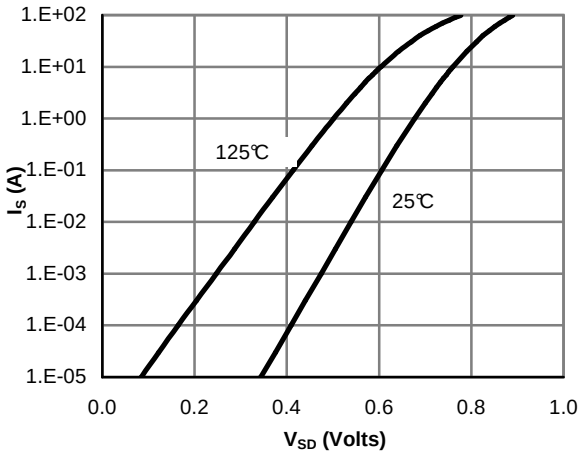


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

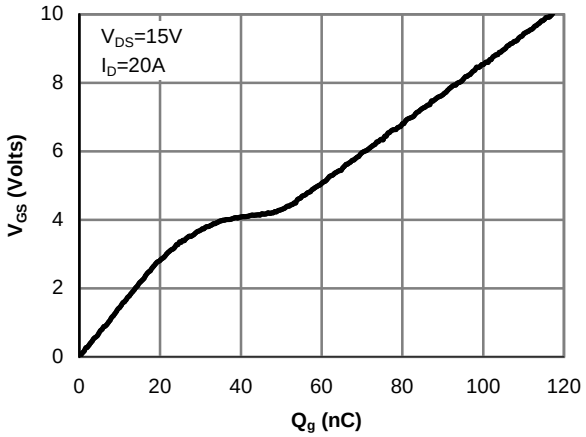


Figure 7: Gate-Charge Characteristics

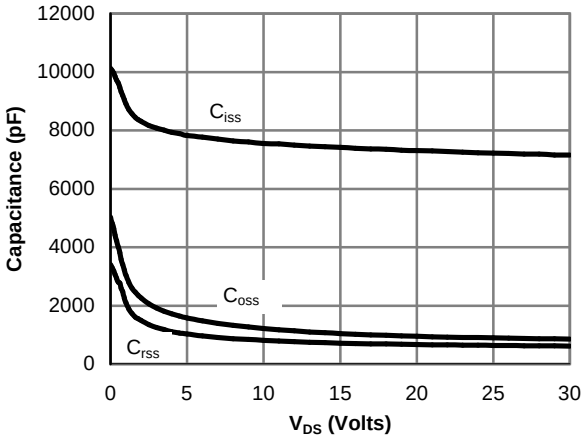


Figure 8: Capacitance Characteristics

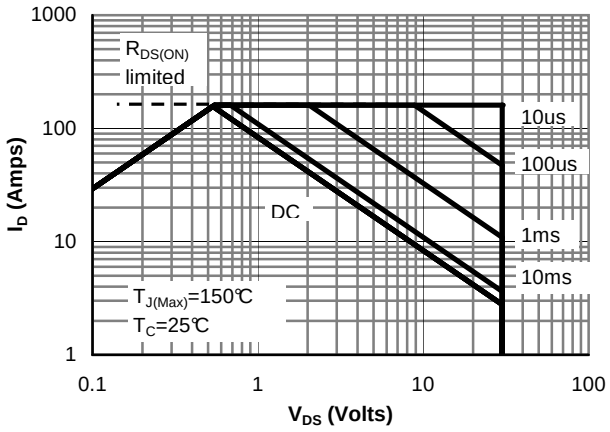


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

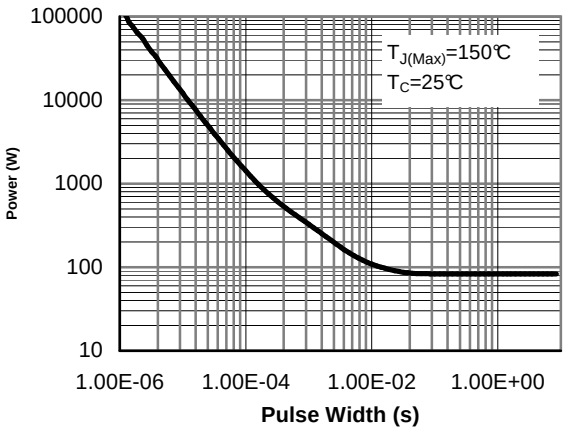


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

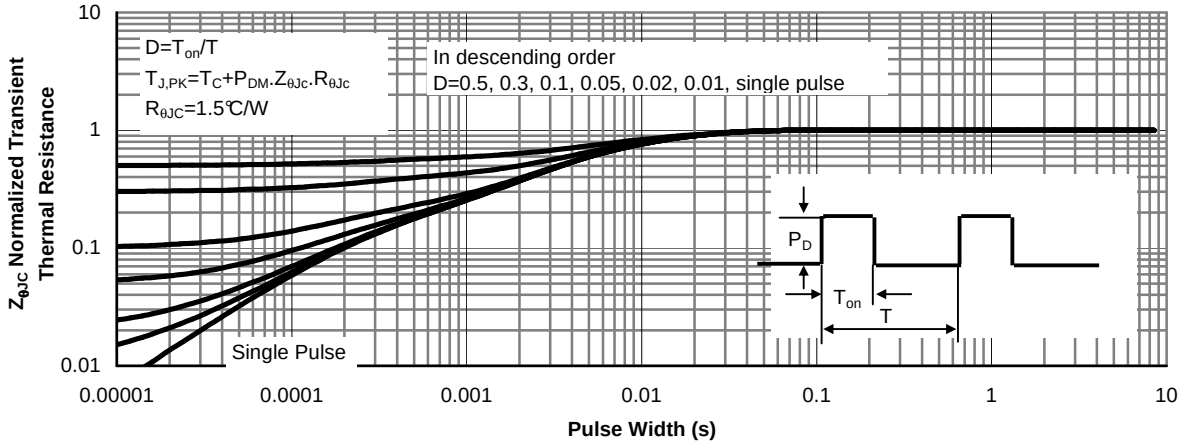


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

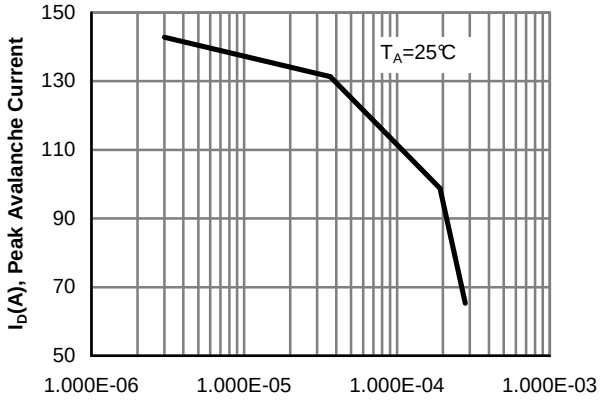


Figure 12: Single Pulse Avalanche capability

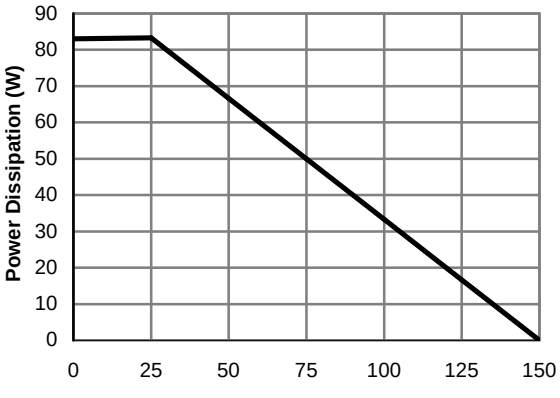


Figure 13: Power De-rating (Note B)

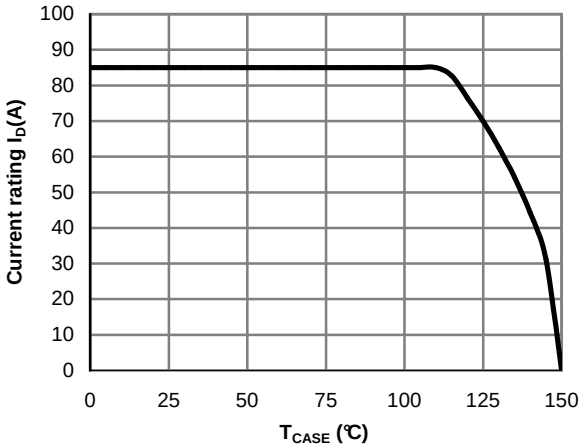


Figure 14: Current De-rating (Note B,G)

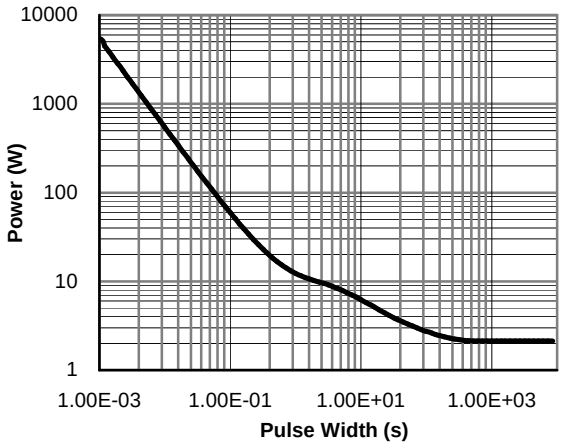


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note A)

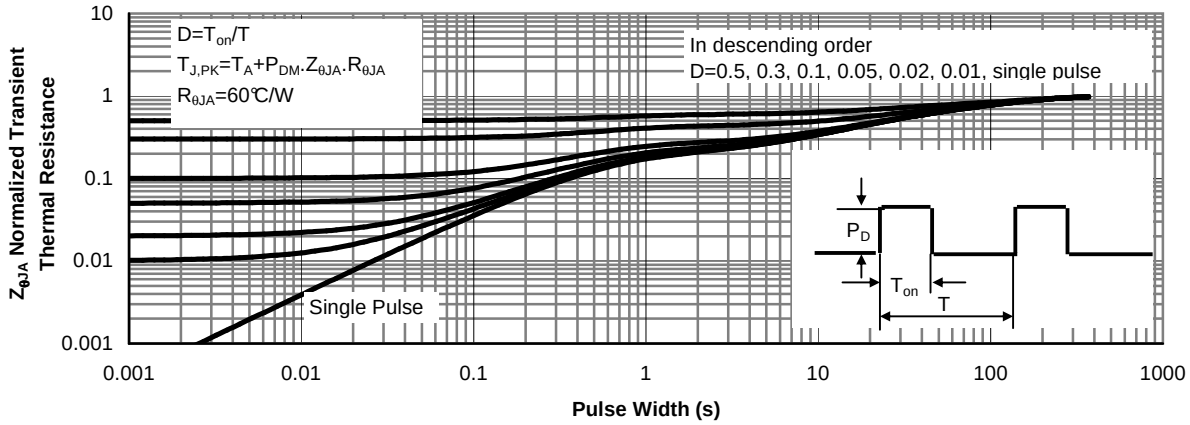
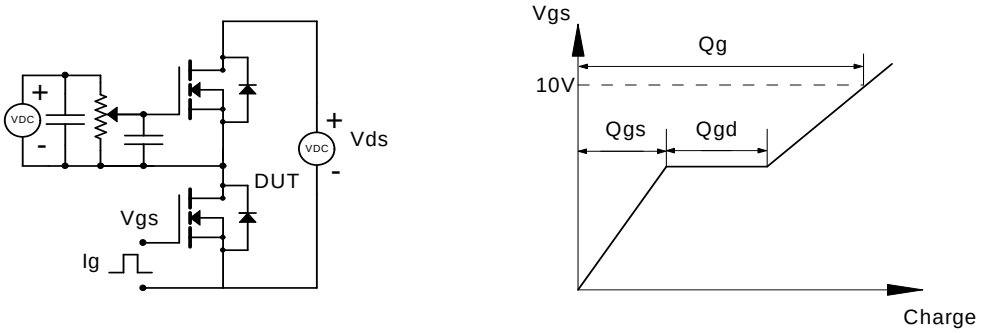
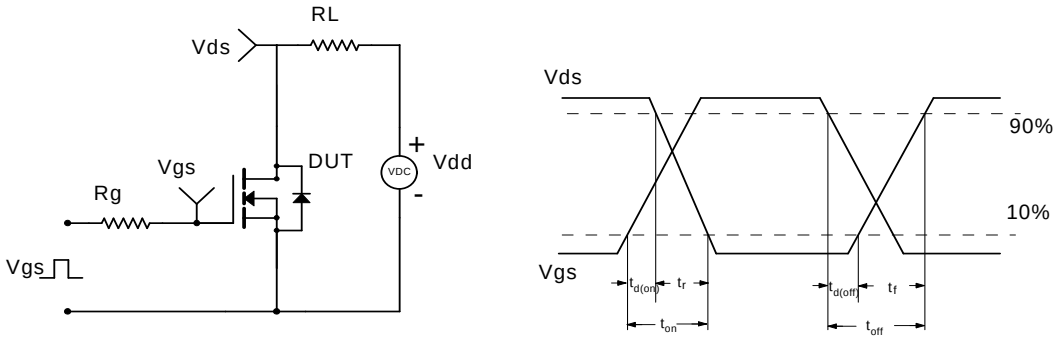


Figure 16: Normalized Maximum Transient Thermal Impedance (Note A)

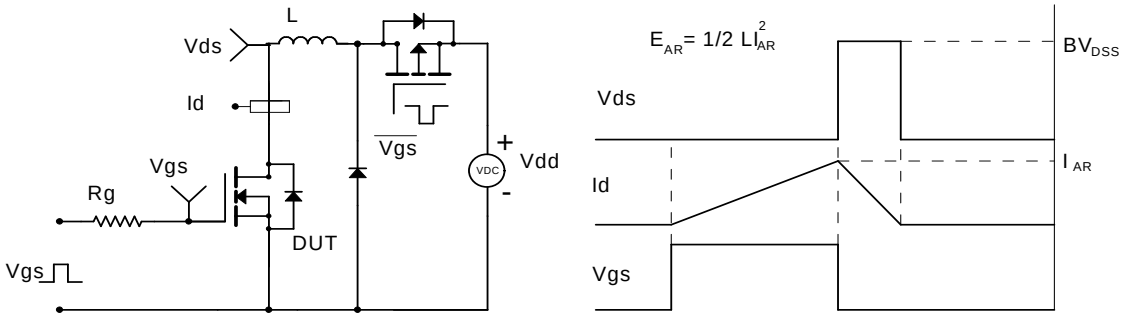
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms