ALPHA & OMEGA SEMICONDUCTOR

AON6268
60V N-Channel AlphaSGT ™

General Description

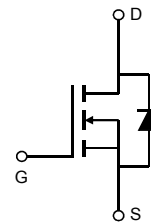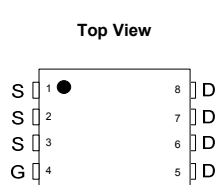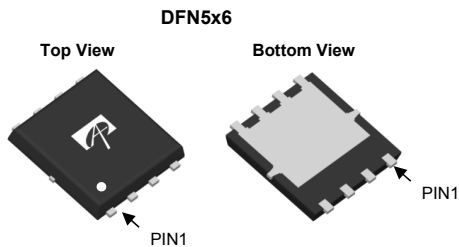- Trench Power AlphaSGT™ technology
- Low $R_{DS(ON)}$
- Low Gate Charge

Product Summary

V_{DS}	60V
I_D (at V_{GS}=10V)	44A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 4.7mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 6.3mΩ

Applications

- Synchronous Rectification for AC-DC Quick Charger

100% UIS Tested
100% Rg Tested

Green Product

DFN5x6

Top View   Bottom View   Top View

PIN1   PIN1

S	1	8	D
S	2	7	D
S	3	6	D
G	4	5	D

Orderable Part Number	Package Type	Form	Minimum Order Quantity
AON6268	DFN 5x6	Tape & Reel	3000

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [G]	T_C=25°C	I_D	44	A
	T_C=100°C		44	
Pulsed Drain Current [C]		I_{DM}	176	
Continuous Drain Current	T_A=25°C	I_{DSM}	24	A
	T_A=70°C		20	
Avalanche Current [C]		I_{AS}	30	A
Avalanche energy L=0.3mH [C]		E_{AS}	135	mJ
V_{DS} Spike 10µs		V_{SPIKE}	72	V
Power Dissipation [B]	T_C=25°C	P_D	56	W
	T_C=100°C		22	
Power Dissipation [A]	T_A=25°C	P_{DSM}	5	W
	T_A=70°C		3.2	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{θJA}$	20	25	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		45	55	°C/W
Maximum Junction-to-Case	Steady-State	$R_{θJC}$	1.8	2.2	°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	ID=250µA, V$_{GS}$=0V		60			V
I$_{DSS}$	Zero Gate Voltage Drain Current	V$_{DS}$=60V, V$_{GS}$=0V				1	µA
			T$_J$=55°C			5	
I$_{GSS}$	Gate-Body leakage current	V$_{DS}$=0V, V$_{GS}$=±20V				±100	nA
V$_{GS(th)}$	Gate Threshold Voltage	V$_{DS}$=V$_{GS,}$ I$_D$=250µA		1.3	1.8	2.3	V
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=20A			3.8	4.7	mΩ
			T$_J$=125°C		5.8	7.2	
		V$_{GS}$=4.5V, I$_D$=20A			4.9	6.3	mΩ
g$_{FS}$	Forward Transconductance	V$_{DS}$=5V, I$_D$=20A			91		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A, V$_{GS}$=0V			0.7	1	V
I$_S$	Maximum Body-Diode Continuous Current ^{G}					44	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=30V, f=1MHz			2520		pF
C$_{oss}$	Output Capacitance				670		pF
C$_{rss}$	Reverse Transfer Capacitance				65		pF
R$_g$	Gate resistance	f=1MHz		0.5	1.2	2	Ω
SWITCHING PARAMETERS							
Q$_g$(10V)	Total Gate Charge	V$_{GS}$=10V, V$_{DS}$=30V, I$_D$=20A			44	65	nC
Q$_g$(4.5V)	Total Gate Charge				21	30	nC
Q$_{gs}$	Gate Source Charge				6.5		nC
Q$_{gd}$	Gate Drain Charge				8.5		nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=10V, V$_{DS}$=30V, R$_L$=1.5Ω, R$_{GEN}$=3Ω			7.5		ns
t$_r$	Turn-On Rise Time				6.5		ns
t$_{D(off)}$	Turn-Off DelayTime				38		ns
t$_f$	Turn-Off Fall Time				8		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=20A, di/dt=500A/µs			22		ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=20A, di/dt=500A/µs			80		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 $_{θJA}$ t≤ 10s and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.
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. Single pulse width limited by junction temperature T$_{J(MAX)}$=150° 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.
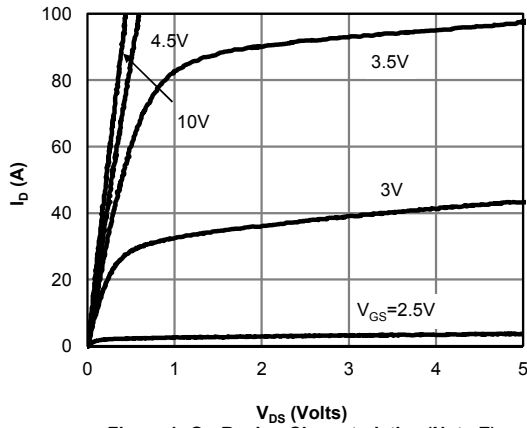F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T$_{J(MAX)}$=150° C. The SOA curve provides a single pulse rating.
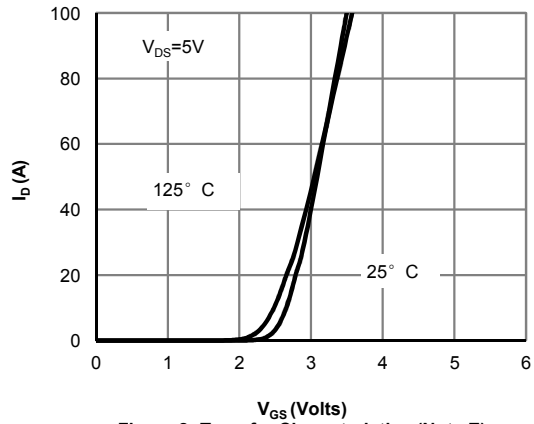G. The maximum current rating is package limited.
H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T$_A$=25° C.
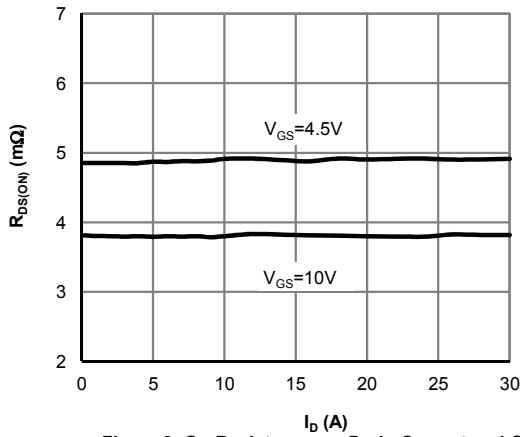
ALPHA & OMEGA SEMICONDUCTOR
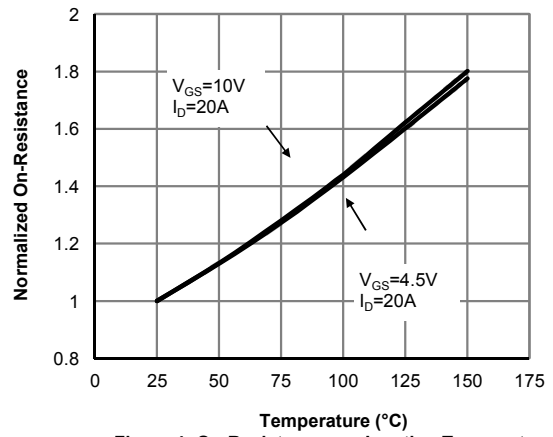
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
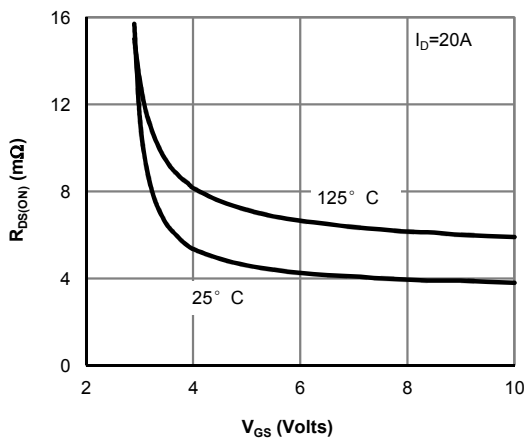

Figure 1: On-Region Characteristics (Note E)
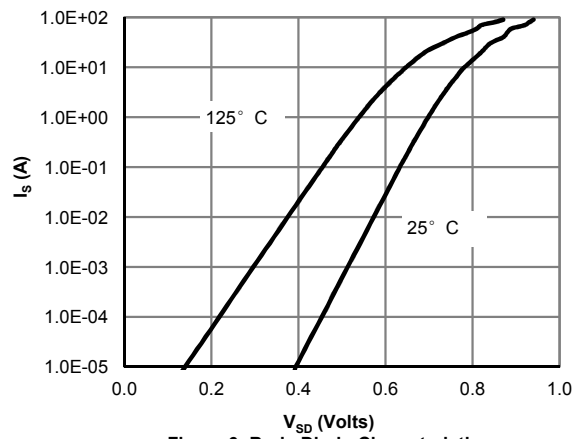

Figure 2: Transfer Characteristics (Note E)

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

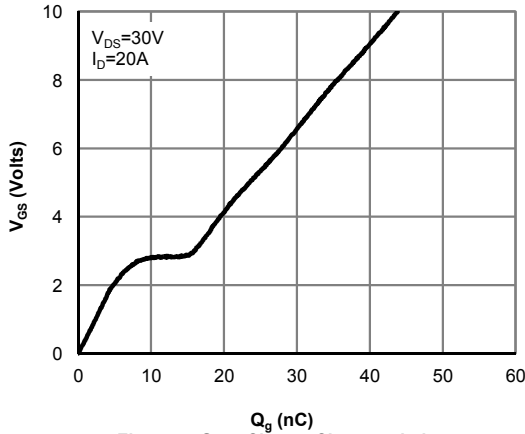
Figure 4: On-Resistance vs. Junction Temperature (Note E)

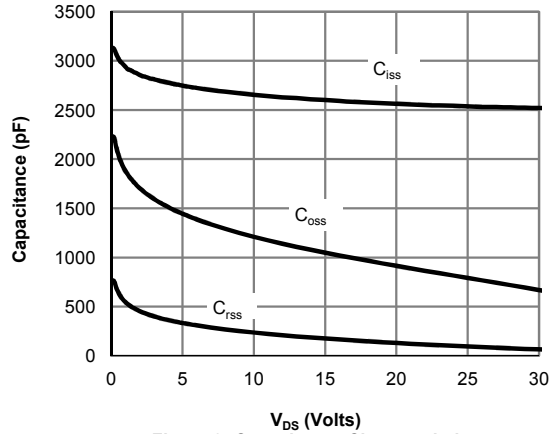

Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)
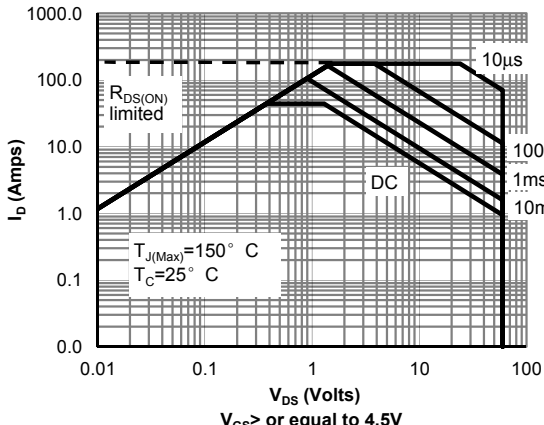

Figure 6: Body-Diode Characteristics (Note E)
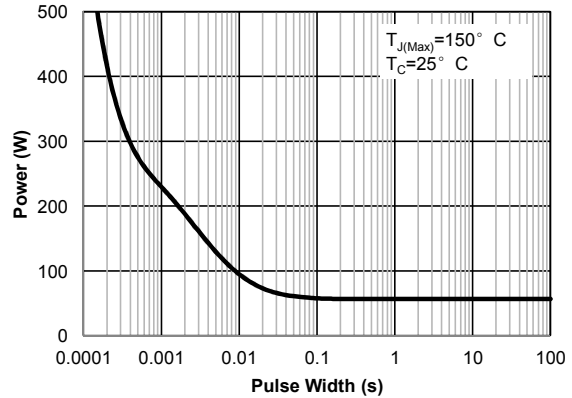
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
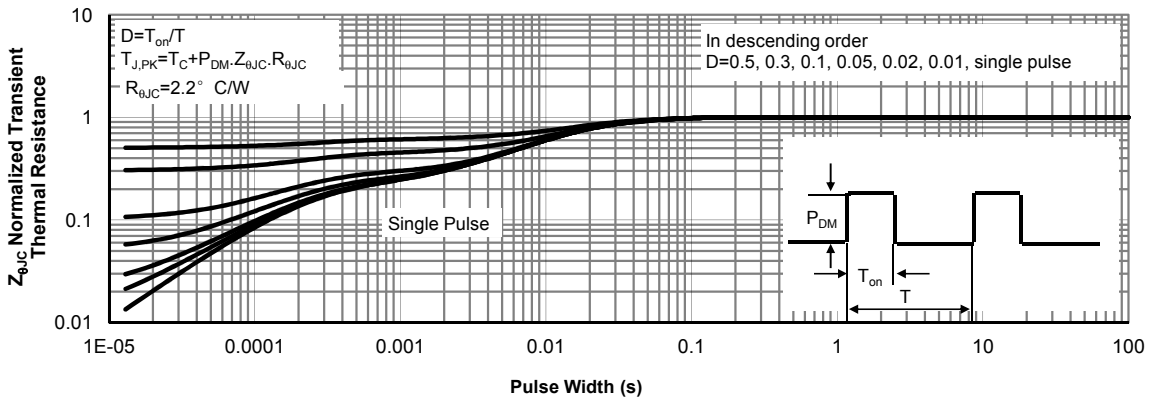

Figure 7: Gate-Charge Characteristics

$V_{DS}=30V$
$I_D=20A$

Figure 8: Capacitance Characteristics

C_{iss}
C_{oss}
C_{rss}

$R_{DS(ON)}$ limited

10μs
100μs
1ms
10ms
DC

$T_{J(Max)}=150°C$
$T_C=25°C$

$V_{GS}>$ or equal to 4.5V
Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

$T_{J(Max)}=150°C$
$T_C=25°C$

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

$D=T_{on}/T$
$T_{J,PK}=T_C+P_{DM} \cdot Z_{\theta JC} \cdot R_{\theta JC}$
$R_{\theta JC}=2.2°C/W$

In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse

Single Pulse

P_{DM}
T_{on}
T

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

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 12: Power De-rating (Note F)
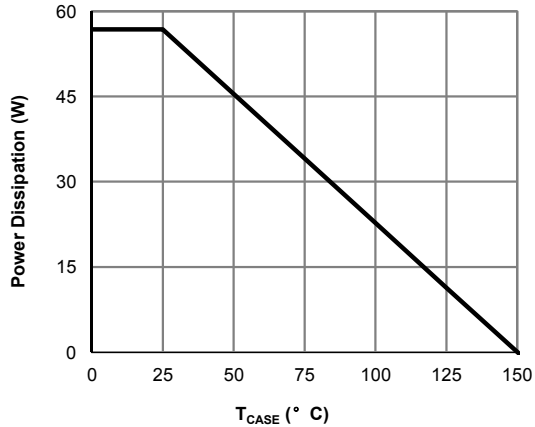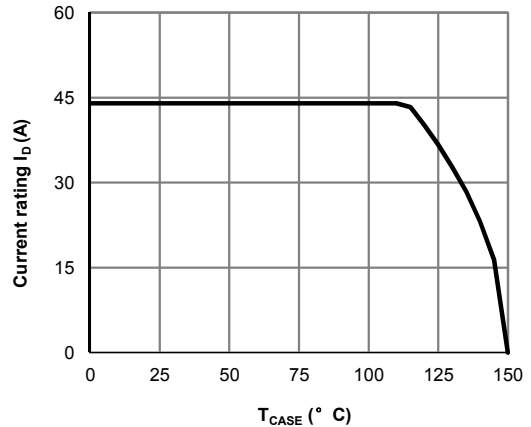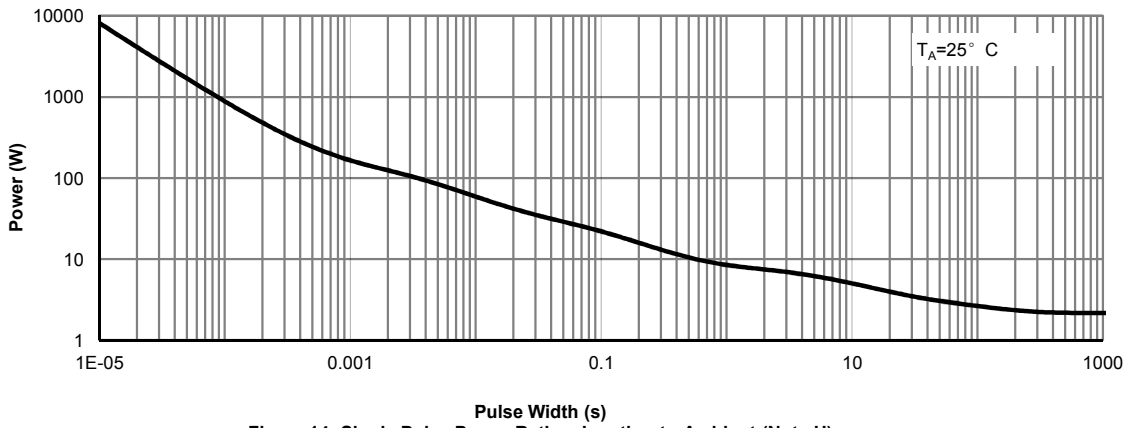
Figure 13: Current De-rating (Note F)

$T_A=25°C$

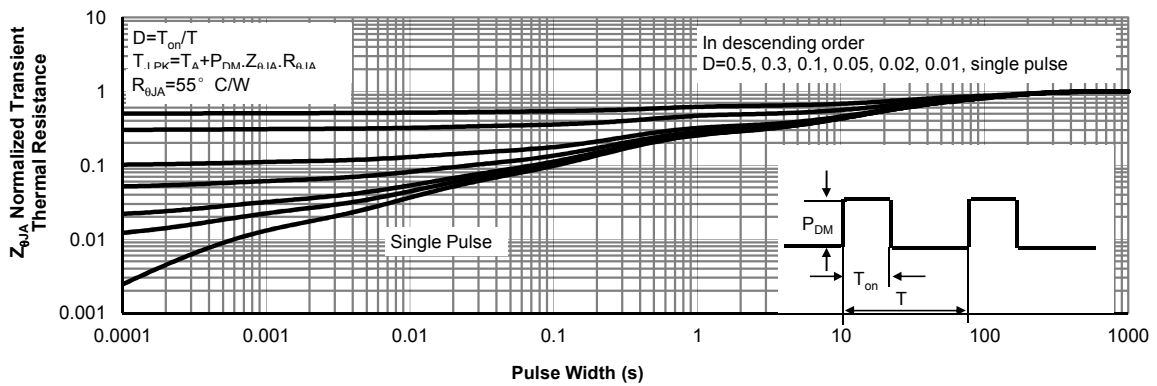**Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)**

$D=T_{on}/T$
$T_{J PK}=T_A+P_{DM}.Z_{\theta JA}.R_{\theta JA}$
$R_{\theta JA}=55°C/W$

In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse

Single Pulse

P_{DM}

T_{on}

T

Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

ALPHA & OMEGA
SEMICONDUCTOR

Figure A: Gate Charge Test Circuit & Waveforms
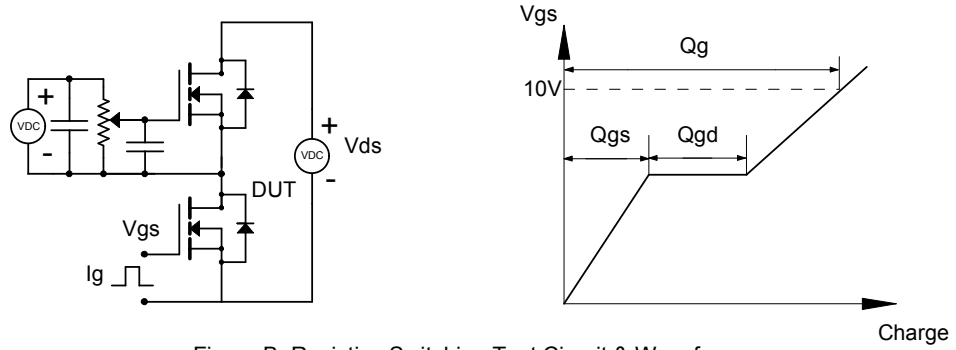
Figure B: Resistive Switching Test Circuit & Waveforms
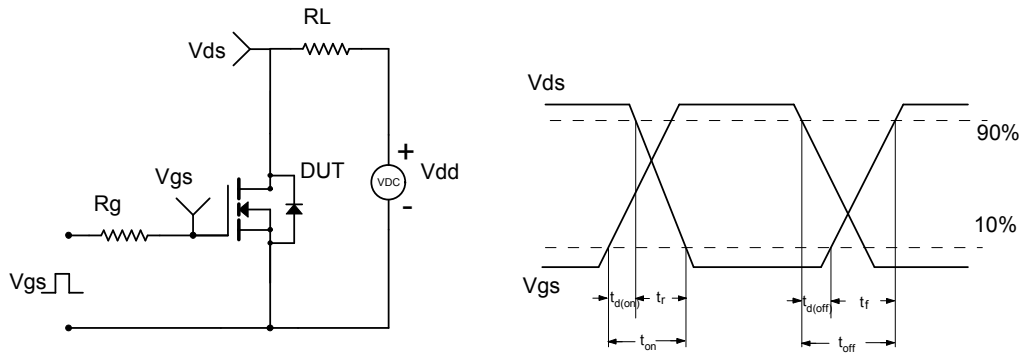
Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms
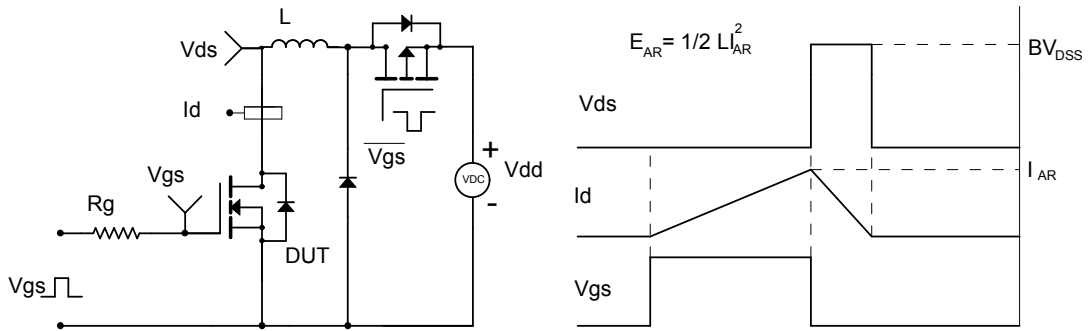
$$E_{AR} = 1/2 \ LI_{AR}^2$$

Figure D: Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int Idt$$