General Description

- Trench Power AlphaSGT™ technology
- Low $R_{DS(ON)}$
- Logic Level Gate Drive
- Excellent Gate Charge x $R_{DS(ON)}$ Product (FOM)
- RoHS and Halogen-Free Compliant

Applications

- High Frequency Switching and Synchronous Rectification
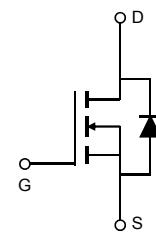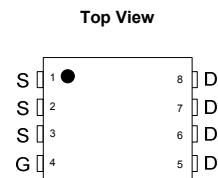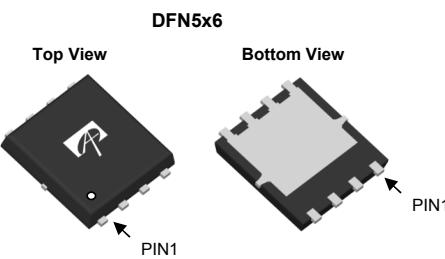
Product Summary

V_{DS}	60V
I_D (at V_{GS}=10V)	100A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 2.5mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 3.4mΩ

100% UIS Tested
100% Rg Tested

DFN5x6

Top View Bottom View

PIN1 PIN1

Top View

```
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
AONS62604	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	100	A
	T_C=100°C		100	
Pulsed Drain Current [C]		I_{DM}	320	
Continuous Drain Current	T_A=25°C	I_{DSM}	37	A
	T_A=70°C		30	
Avalanche Current [C]		I_{AS}	42	A
Avalanche energy L=0.3mH [C]		E_{AS}	265	mJ
V_{DS} Spike [I] 10μs		V_{SPIKE}	72	V
Power Dissipation [B]	T_C=25°C	P_D	119	W
	T_C=100°C		47.5	
Power Dissipation [A]	T_A=25°C	P_{DSM}	6.2	W
	T_A=70°C		4.0	
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	$R_{\theta JA}$	15	20	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		40	50	°C/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	0.85	1.05	°C/W

ALPHA & OMEGA
SEMICONDUCTOR

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		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		1.2	1.6	2.2	V
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=20A			2.1	2.5	mΩ
			T$_J$=125°C		3.4	4.1	
		V$_{GS}$=4.5V, I$_D$=20A			2.7	3.4	mΩ
g$_{FS}$	Forward Transconductance	V$_{DS}$=5V, I$_D$=20A			110		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A, V$_{GS}$=0V			0.67	1	V
I$_S$	Maximum Body-Diode Continuous Current [G]					100	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=30V, f=1MHz			3660		pF
C$_{oss}$	Output Capacitance				1160		pF
C$_{rss}$	Reverse Transfer Capacitance				108		pF
R$_g$	Gate resistance	f=1MHz		0.3	0.75	1.2	Ω
SWITCHING PARAMETERS							
Q$_g$(10V)	Total Gate Charge	V$_{GS}$=10V, V$_{DS}$=30V, I$_D$=20A			64	90	nC
Q$_g$(4.5V)	Total Gate Charge				32	50	nC
Q$_{gs}$	Gate Source Charge				8.5		nC
Q$_{gd}$	Gate Drain Charge				11.5		nC
Q$_{oss}$	Output Charge	V$_{GS}$=0V, V$_{DS}$=30V			57		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				7		ns
t$_{D(off)}$	Turn-Off DelayTime				44		ns
t$_f$	Turn-Off Fall Time				12.5		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=20A, di/dt=500A/µs			26		ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=20A, di/dt=500A/µs			92		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.
I. The spike duty cycle 5% max, limited by junction temperature T$_{J(MAX)}$=125° C**.**
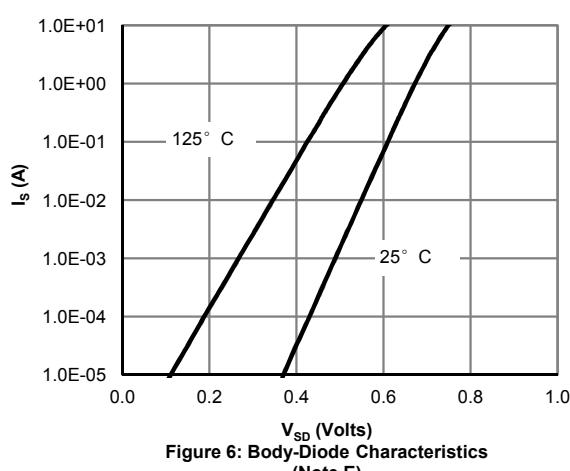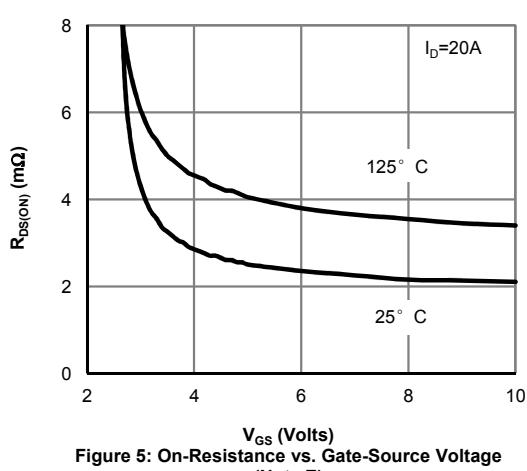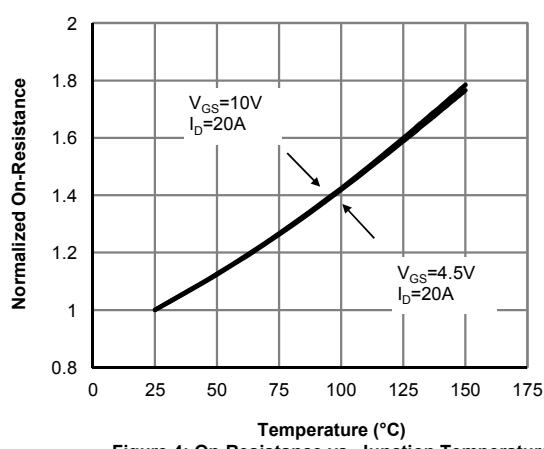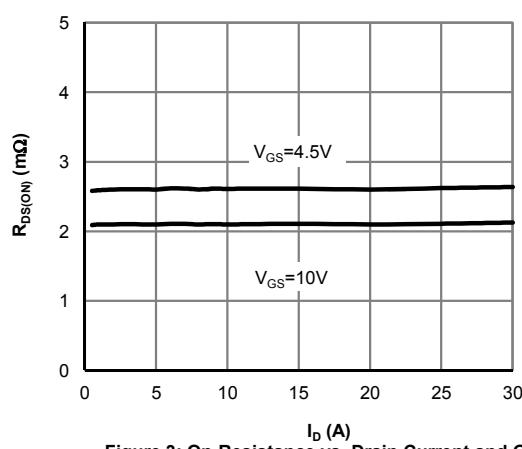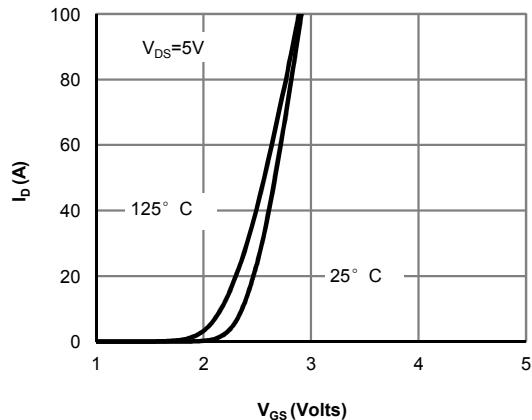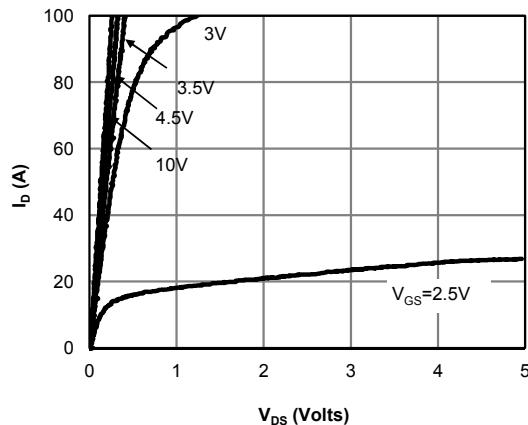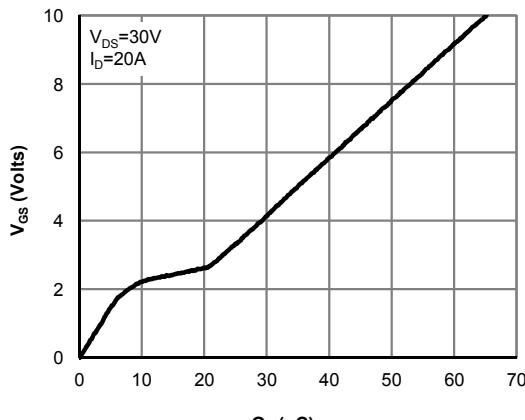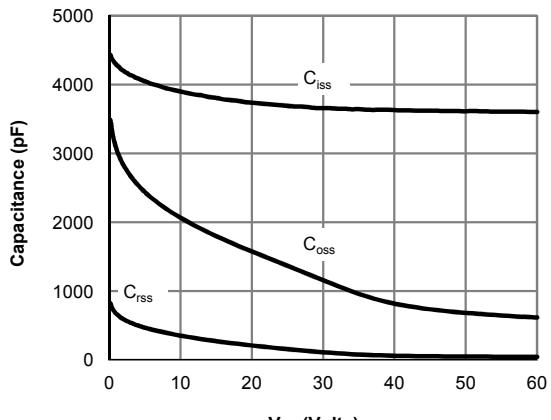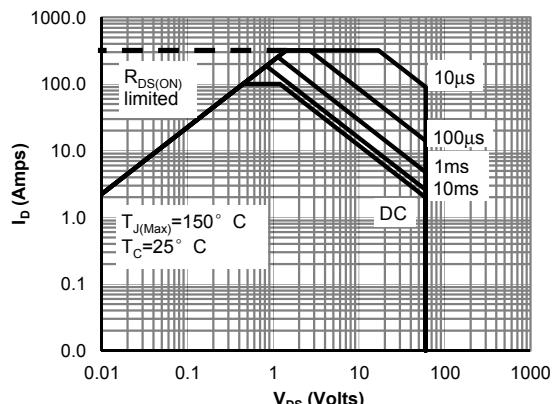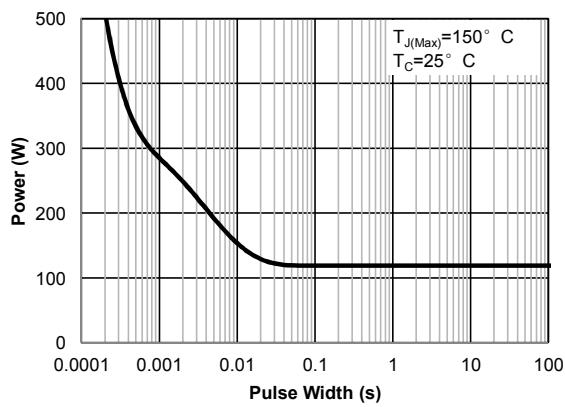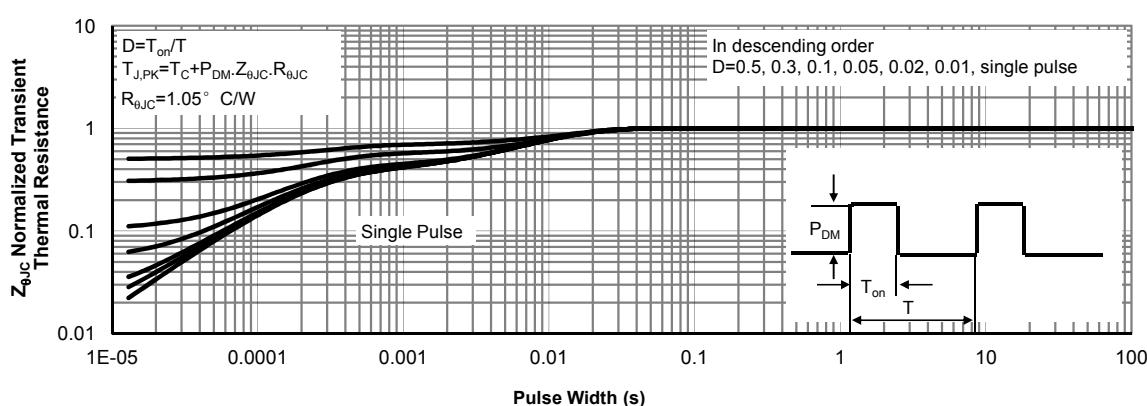
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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

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

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)

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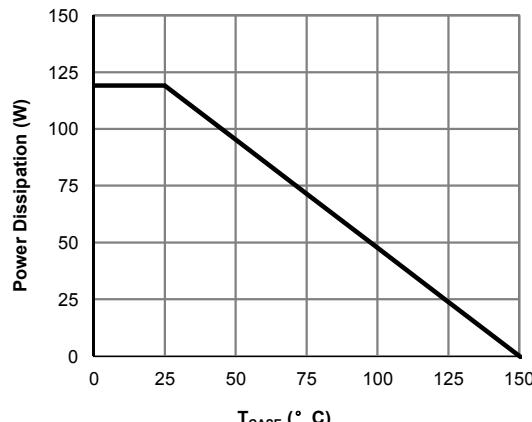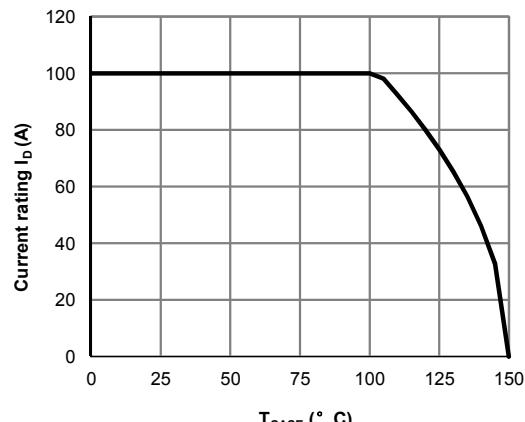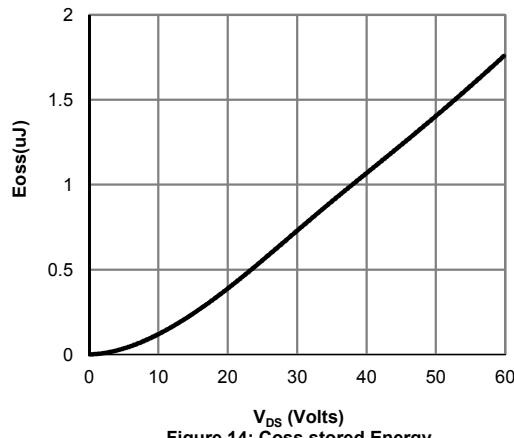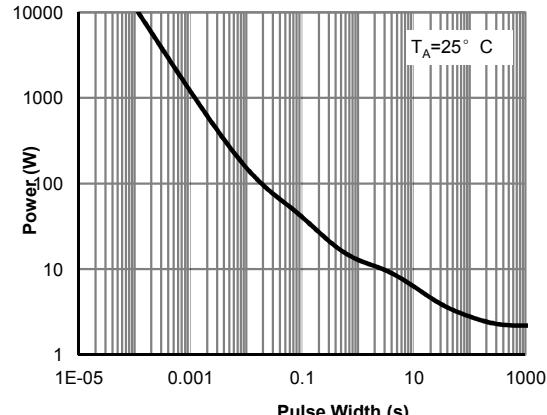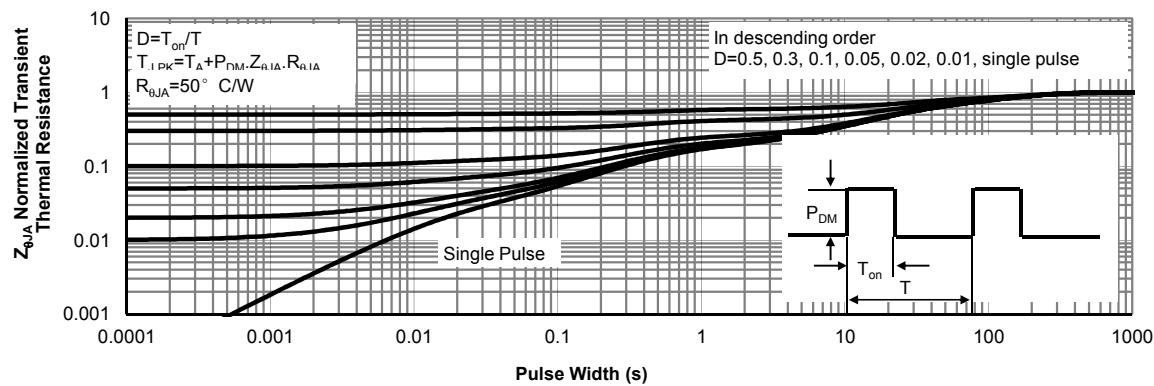
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 12: Power De-rating (Note F)

Figure 13: Current De-rating (Note F)

Figure 14: Coss stored Energy

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

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

$D=T_{on}/T$
$T_{J\,PK}=T_A+P_{DM}.Z_{\theta JA}.R_{\theta JA}$
$R_{\theta JA}=50^{\circ}$ C/W

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

Single Pulse

Figure A: Gate Charge Test Circuit & Waveforms
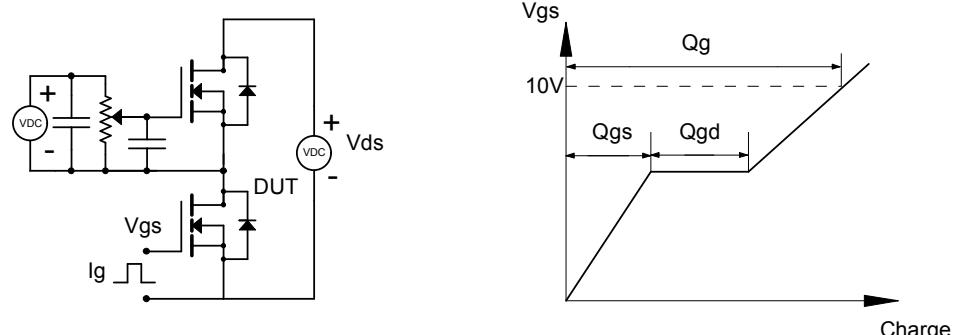
Figure B: Resistive Switching Test Circuit & Waveforms
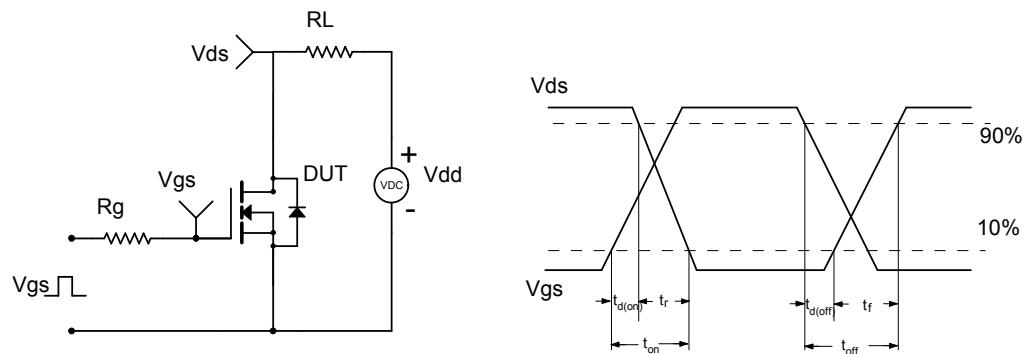
Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2 \, LI_{AR}^2$$
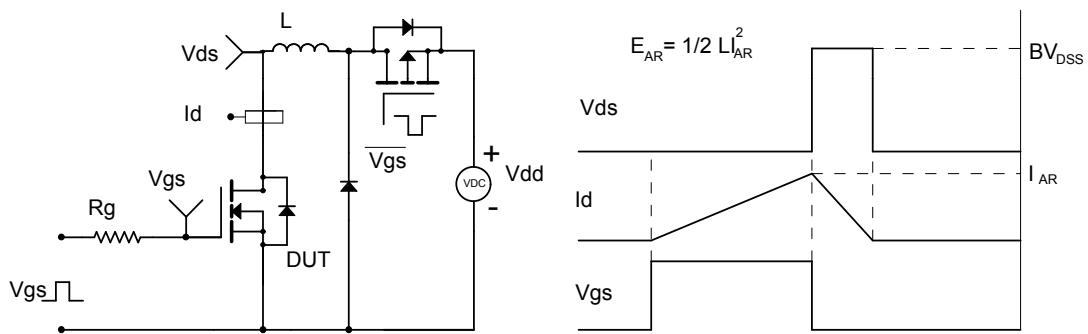
Figure D: Diode Recovery Test Circuit & Waveforms

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