

General Description

- AlphaSGT™ N-Channel Power MOSFET technology
- Source down package with center gate
- Low $R_{DS(ON)}$
- Logic level
- Low Gate Charge
- High Current Capability
- RoHS 2.0 and Halogen-Free Compliant

Applications

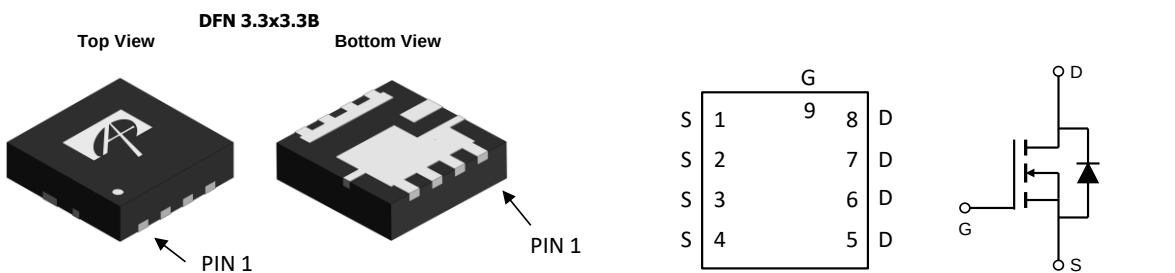
- Synchronous Rectification
- DC-DC low side FET

Product Summary

V_{DS}	25V
I_D (at $V_{GS}=10V$)	360A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 0.69mΩ
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 0.85mΩ

100% UIS Tested
100% Rg Tested

Max $T_J=175^{\circ}C$



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AONK40202	DFN3.3x3.3B	Tape & Reel	3000

Absolute Maximum Ratings $T_A=25^{\circ}C$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	25	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current	I_D	360	A
	$T_C=100^{\circ}C$	256	
Pulsed Drain Current ^C	I_{DM}	730	
Continuous Drain Current	I_{DSM}	75	A
	$T_A=70^{\circ}C$	63	
Avalanche Current ^C	I_{AS}	60	A
Avalanche energy $L=0.01mH$ ^C	E_{AS}	18	mJ
Power Dissipation ^B	P_D	136	W
	$T_C=100^{\circ}C$	68	
Power Dissipation ^A	P_{DSM}	6	W
	$T_A=70^{\circ}C$	4.2	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^{\circ}C$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	20	25	$^{\circ}C/W$
Maximum Junction-to-Ambient ^{A D}	Steady-State	35	45	$^{\circ}C/W$
Maximum Junction-to-Case	Steady-State		1.1	$^{\circ}C/W$

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	25			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =25V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±12V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1	1.4	1.8	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A T _J =125°C		0.57 0.75	0.69 0.92	mΩ
		V _{GS} =4.5V, I _D =20A		0.68	0.85	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		210		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.67	1	V
I _S	Maximum Body-Diode Continuous Current				130	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =12.5V, f=200KHz		5850		pF
C _{oss}	Output Capacitance			1680		pF
C _{rss}	Reverse Transfer Capacitance			200		pF
R _g	Gate resistance	f=1MHz	0.4	0.85	1.3	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =12.5V, I _D =20A		83	116	nC
Q _{g(4.5V)}	Total Gate Charge			37	55	nC
Q _{gs}	Gate Source Charge			13.3		nC
Q _{gd}	Gate Drain Charge			9.6		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =12.5V, R _L =0.625Ω, R _{GEN} =3Ω		11.7		ns
t _r	Turn-On Rise Time			16.7		ns
t _{D(off)}	Turn-Off DelayTime			67		ns
t _f	Turn-Off Fall Time			11.5		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, di/dt=100A/μs		36		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, di/dt=100A/μs		25		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} ≤ 10s and the maximum allowed junction temperature of 175° 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. Single pulse width limited by junction temperature T_{J(MAX)}=175° 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)}=175° C. The SOA curve provides a single pulse rating.
- G. 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

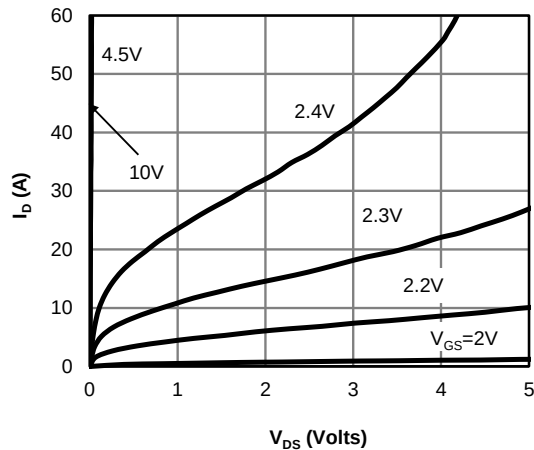


Figure 1: On-Region Characteristics (Note E)

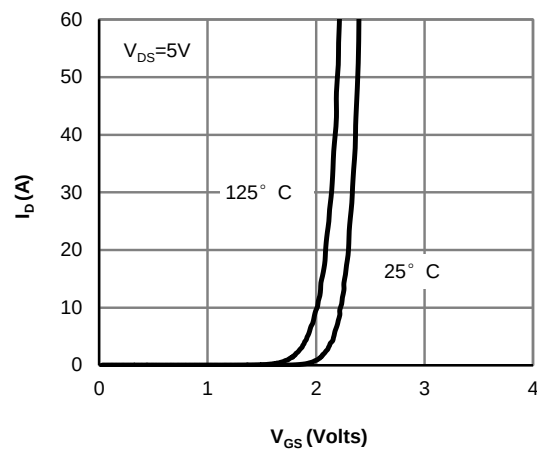


Figure 2: Transfer Characteristics (Note E)

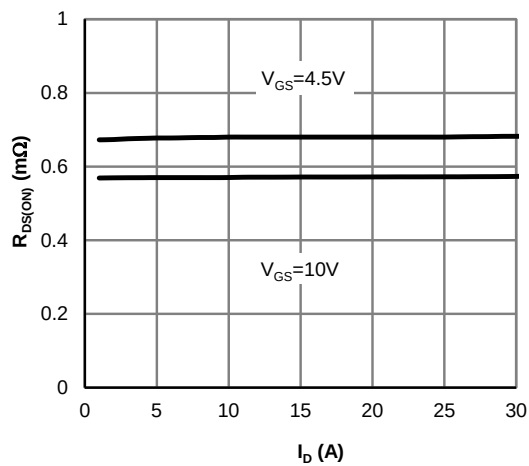


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

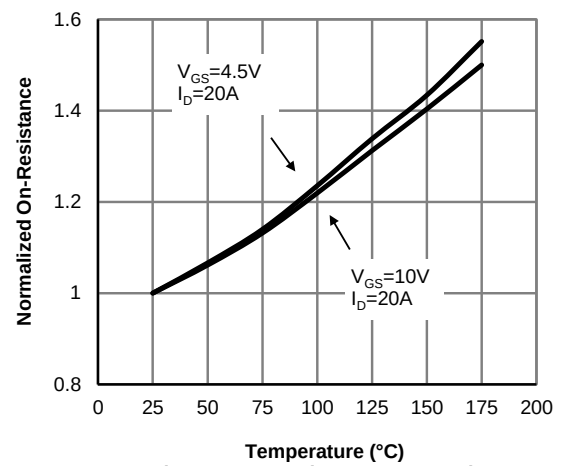


Figure 4: On-Resistance vs. Junction Temperature (Note E)

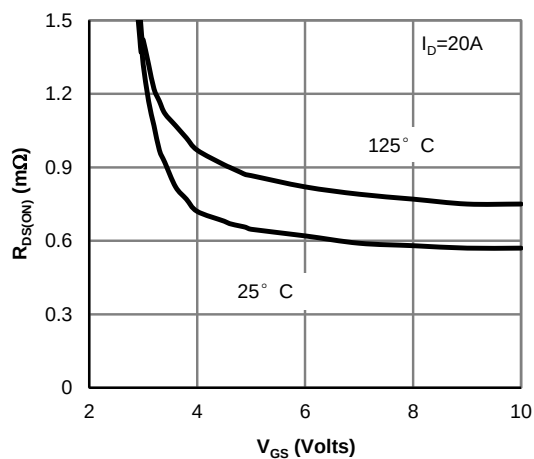


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

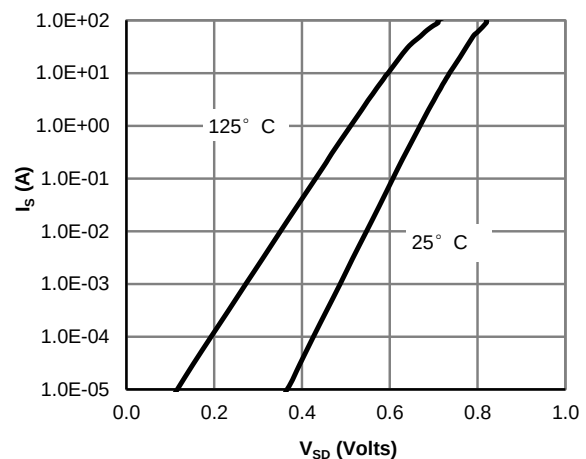
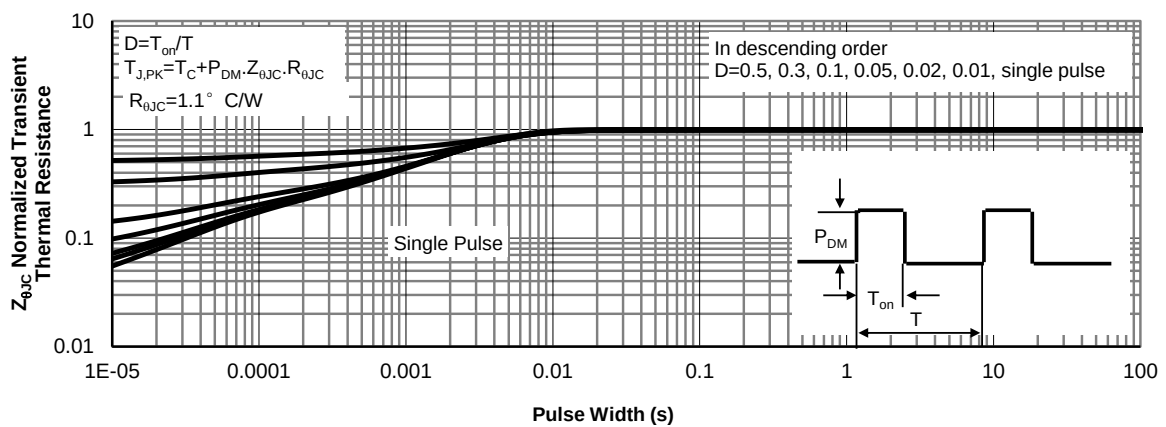
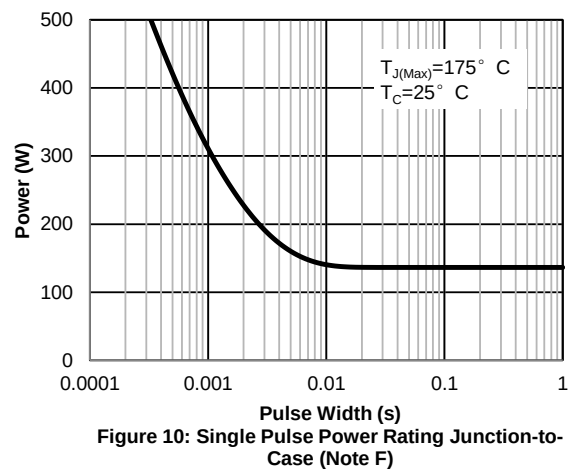
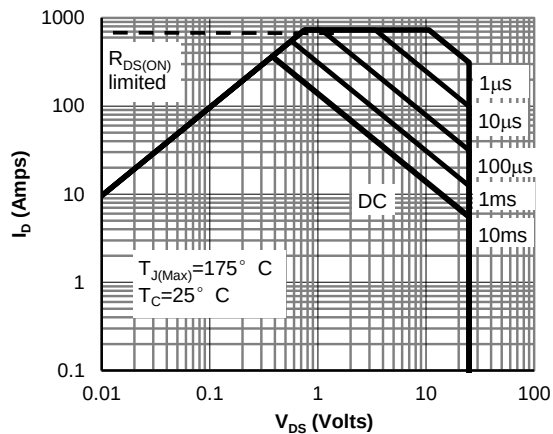
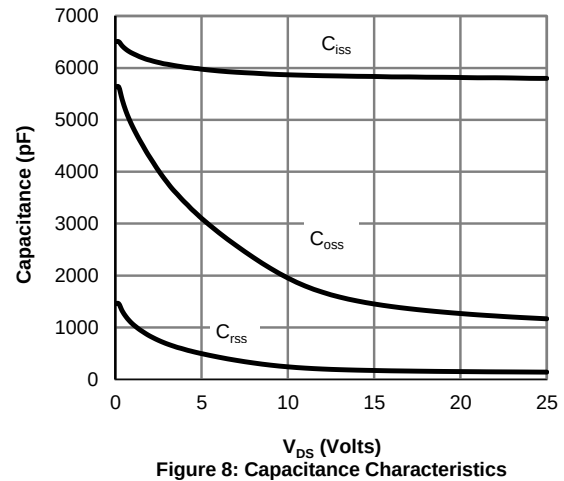
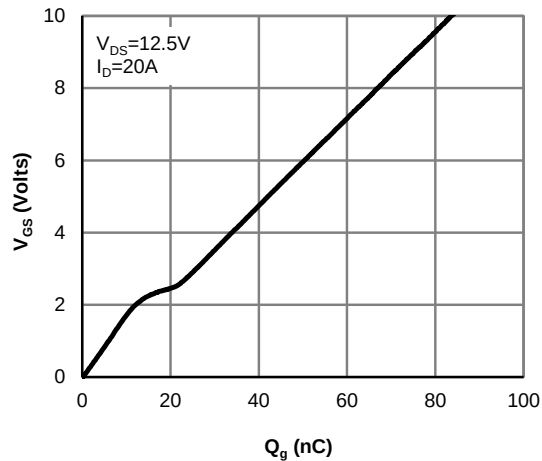


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



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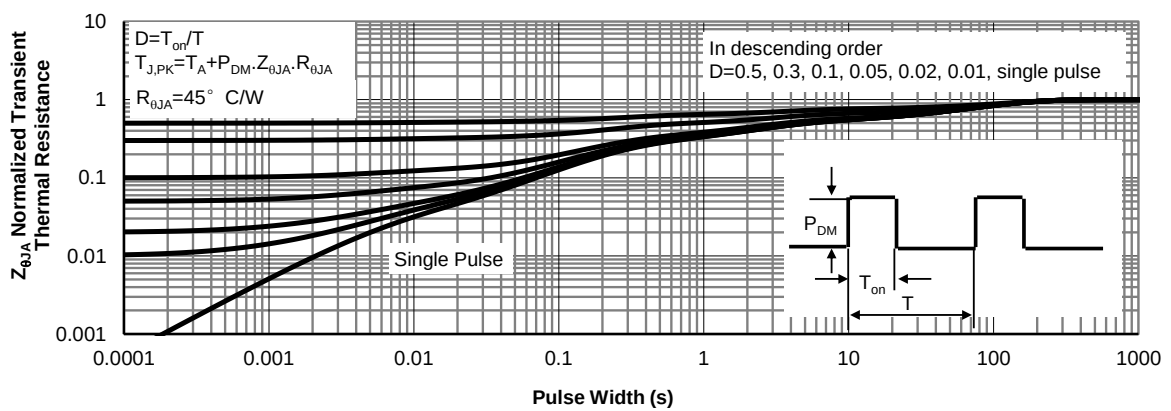
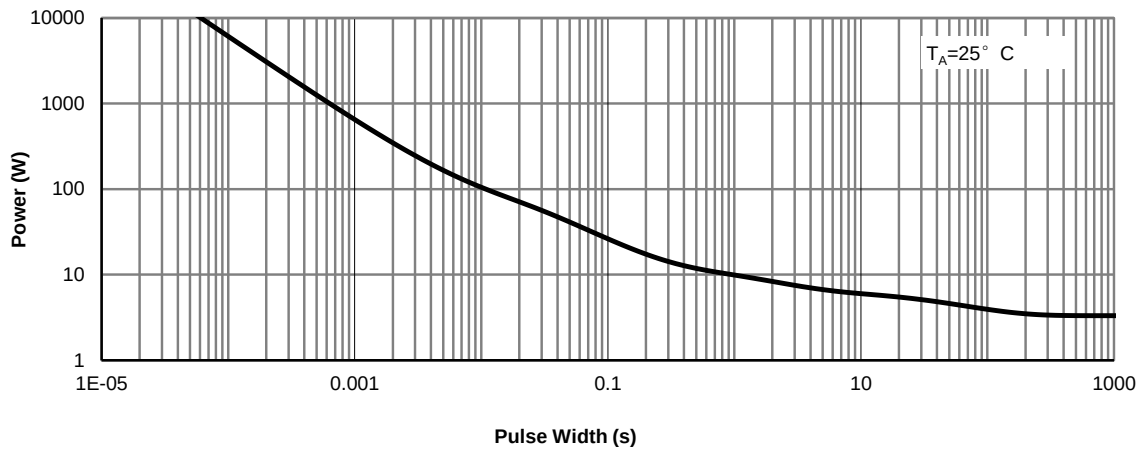
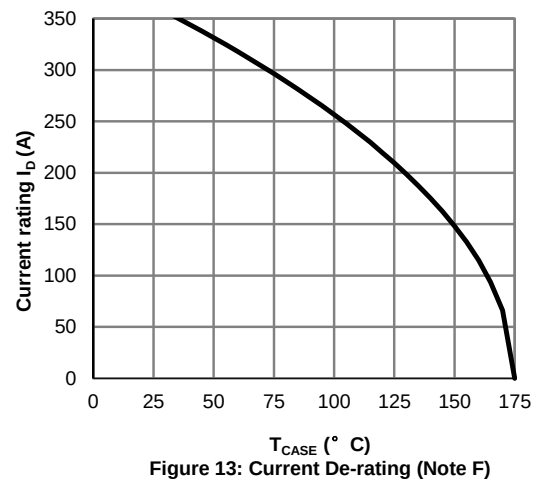
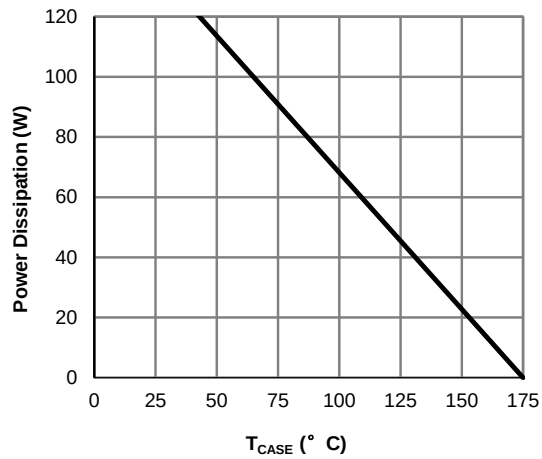


Figure A: Gate Charge Test Circuit & Waveforms

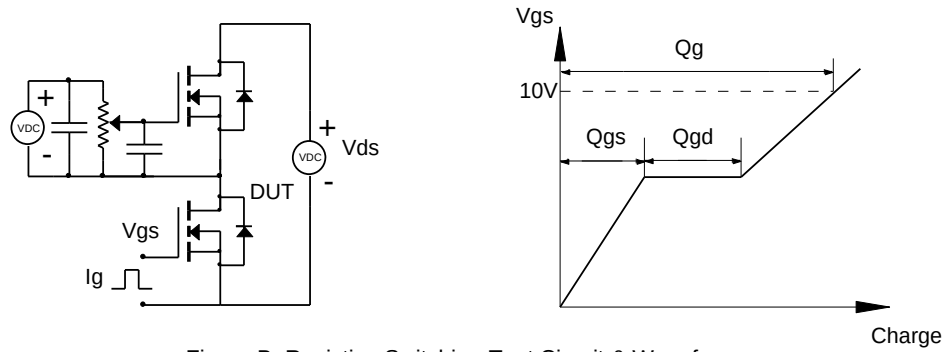


Figure B: Resistive Switching Test Circuit & Waveforms

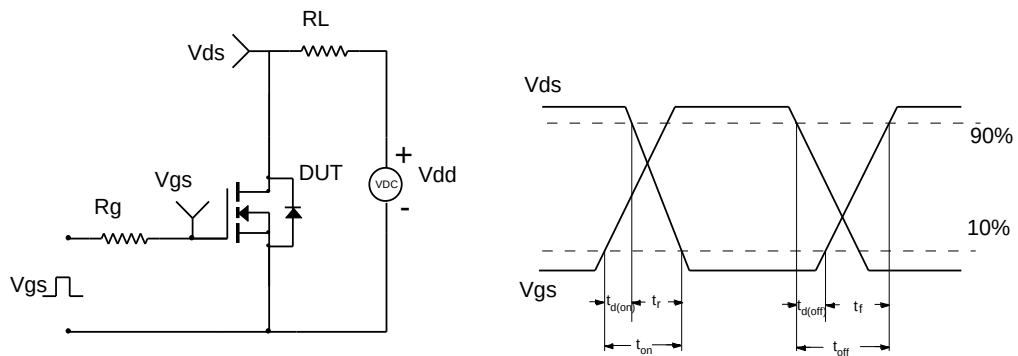


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

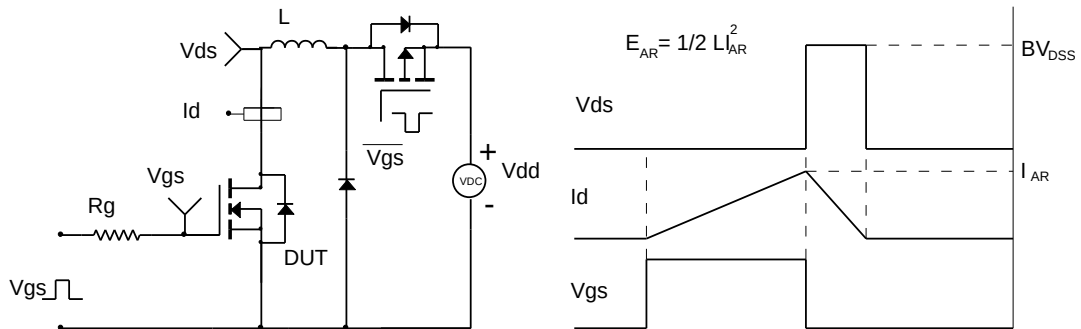


Figure D: Diode Recovery Test Circuit & Waveforms

