

### General Description

- Trench Power AlphaSGT™ technology
- Low  $R_{DS(ON)}$
- Low Gate Charge
- Optimized for fast-switching applications

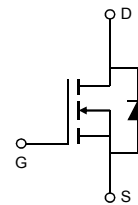
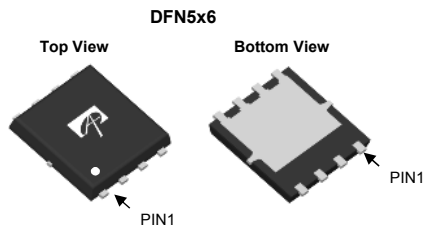
### Applications

- Synchronous Rectification in DC/DC and AC/DC Converters
- Industrial and Motor Drive applications

### Product Summary

$V_{DS}$	45V
$I_D$ (at $V_{GS}=10V$ )	100A
$R_{DS(ON)}$ (at $V_{GS}=10V$ )	< 1.15m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=4.5V$ )	< 1.85m $\Omega$

100% UIS Tested  
 100% Rg Tested



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AON6152	DFN 5x6	Tape & Reel	3000

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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	45	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>G</sup>	$I_D$	$T_C=25^\circ\text{C}$	100
		$T_C=100^\circ\text{C}$	100
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	400	A
Continuous Drain Current	$I_{DSM}$	$T_A=25^\circ\text{C}$	58
		$T_A=70^\circ\text{C}$	47
Avalanche Current <sup>C</sup>	$I_{AS}$	60	A
Avalanche energy $L=0.3\text{mH}$ <sup>C</sup>	$E_{AS}$	540	mJ
$V_{DS}$ Spike <sup>I</sup>	$V_{SPIKE}$	54	V
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ\text{C}$	208
		$T_C=100^\circ\text{C}$	83
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ\text{C}$	7.3
		$T_A=70^\circ\text{C}$	4.7
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	14	17	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A,D</sup>		Steady-State	40	50
Maximum Junction-to-Case	$R_{\theta JC}$	0.45	0.6	$^\circ\text{C/W}$

Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	45			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=45\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	1.3	1.8	2.3	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$ , $I_D=20\text{A}$ $T_J=125^\circ\text{C}$		0.9	1.15	m $\Omega$
		$V_{GS}=4.5\text{V}$ , $I_D=20\text{A}$		1.5	1.9	
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=20\text{A}$		100		S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}$ , $V_{GS}=0\text{V}$		0.66	1	V
$I_S$	Maximum Body-Diode Continuous Current <sup>G</sup>				100	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=22.5\text{V}$ , $f=1\text{MHz}$	6800	8500	10200	pF
$C_{oss}$	Output Capacitance		780	1120	1460	pF
$C_{riss}$	Reverse Transfer Capacitance		25	90	155	pF
$R_g$	Gate resistance	$f=1\text{MHz}$	0.6	1.2	1.8	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$ , $V_{DS}=22.5\text{V}$ , $I_D=20\text{A}$		110	155	nC
$Q_g(4.5\text{V})$	Total Gate Charge			48	70	nC
$Q_{gs}$	Gate Source Charge			24		nC
$Q_{gd}$	Gate Drain Charge			7.5		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}$ , $V_{DS}=22.5\text{V}$ , $R_L=1.125\Omega$ , $R_{GEN}=3\Omega$		16		ns
$t_r$	Turn-On Rise Time			6		ns
$t_{D(off)}$	Turn-Off Delay Time			75		ns
$t_f$	Turn-Off Fall Time			6.5		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=20\text{A}$ , $dI/dt=400\text{A}/\mu\text{s}$		25		ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=20\text{A}$ , $dI/dt=400\text{A}/\mu\text{s}$		74		nC

A. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The Power dissipation  $P_{DSM}$  is based on  $R_{\theta JA} \leq 10\text{s}$  and the maximum allowed junction temperature of  $150^\circ\text{C}$ . The value in any given application depends on the user's specific board design.

B. The power dissipation  $P_D$  is based on  $T_{J(MAX)}=150^\circ\text{C}$ , 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  $T_{J(MAX)}=150^\circ\text{C}$ .

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  $<300\mu\text{s}$  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  $T_{J(MAX)}=150^\circ\text{C}$ . 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 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ .

I. The spike duty cycle 5% max in every frequency period, limited by junction temperature  $T_{J(MAX)}=125^\circ\text{C}$ .

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

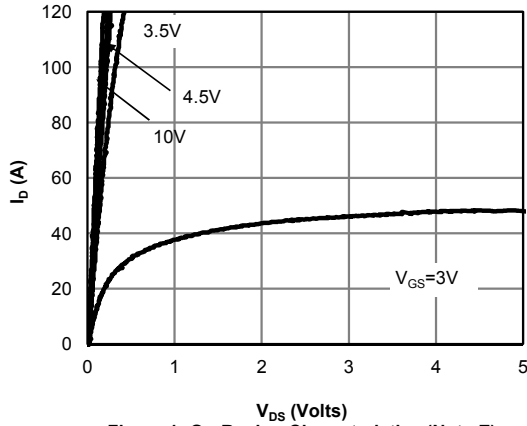


Figure 1: On-Region Characteristics (Note E)

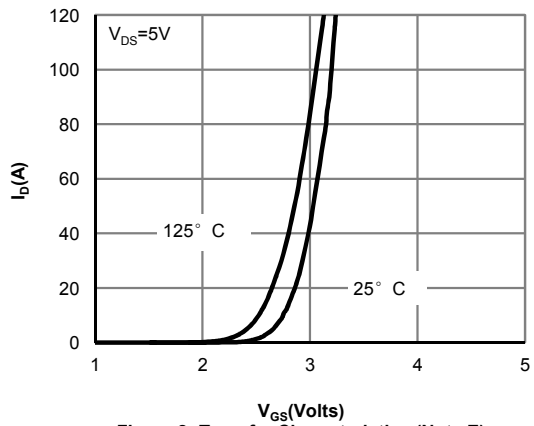


Figure 2: Transfer Characteristics (Note E)

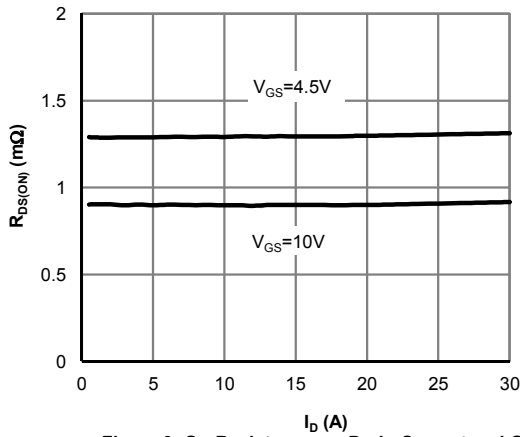


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

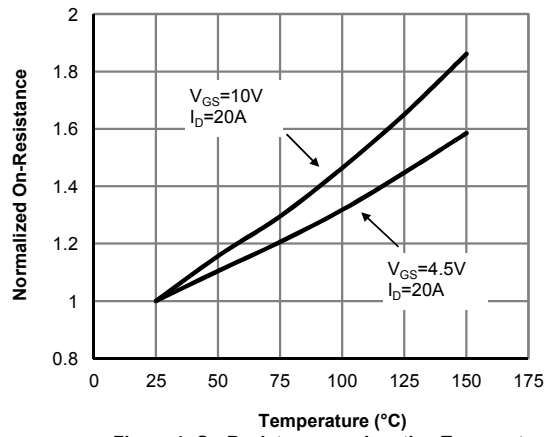


Figure 4: On-Resistance vs. Junction Temperature (Note E)

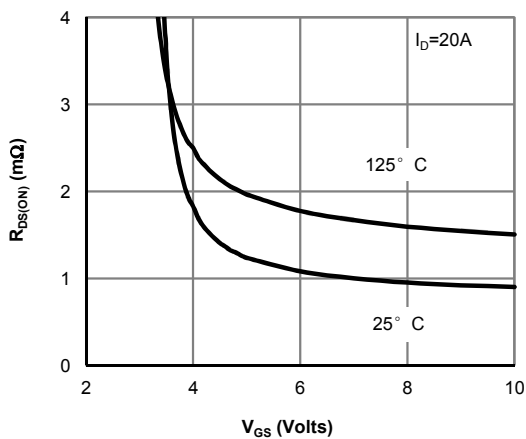


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

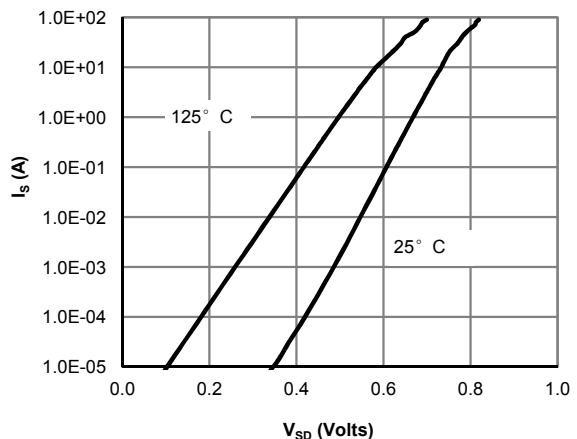


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

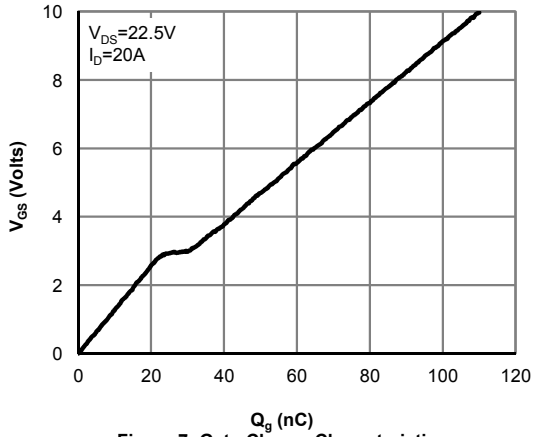


Figure 7: Gate-Charge Characteristics

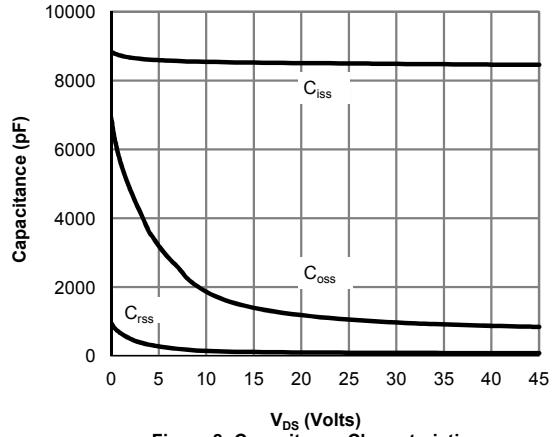


Figure 8: Capacitance Characteristics

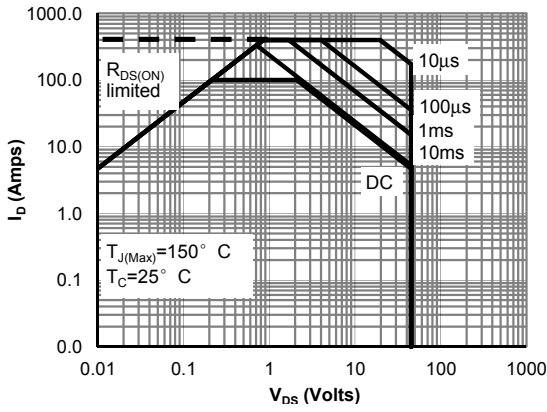


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

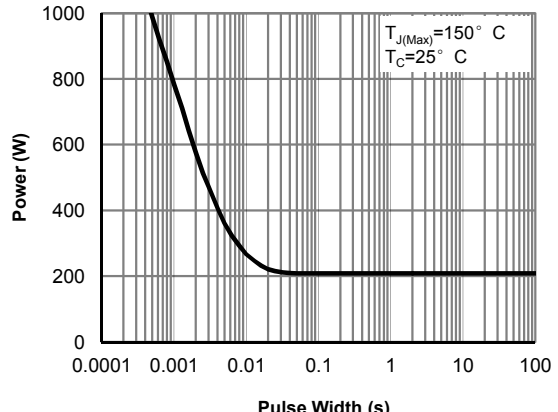


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

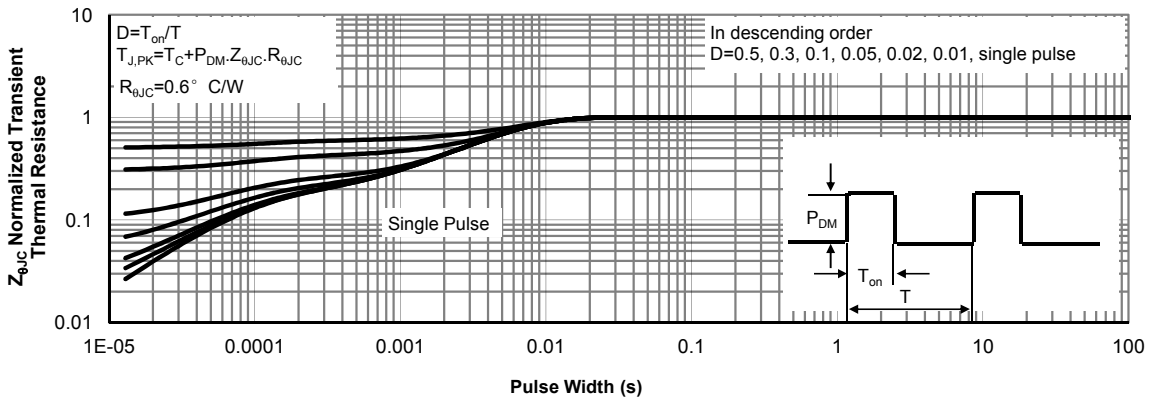


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

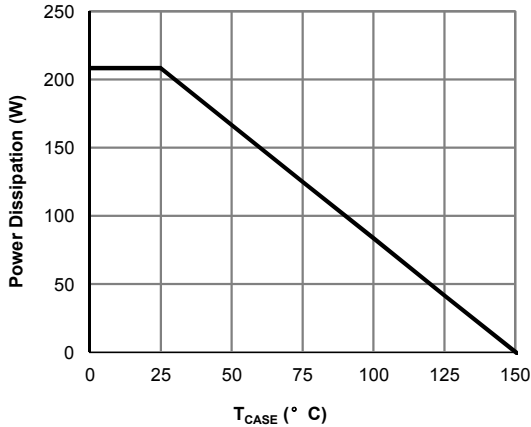


Figure 12: Power De-rating (Note F)

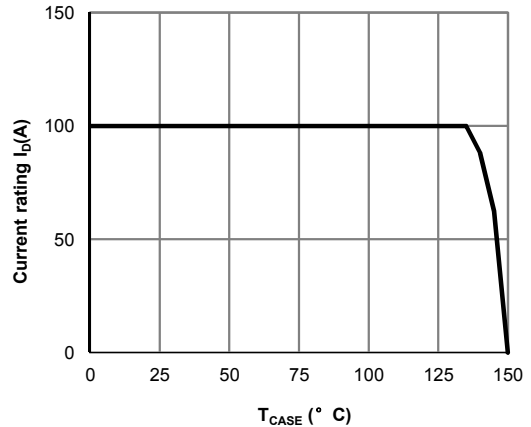


Figure 13: Current De-rating (Note F)

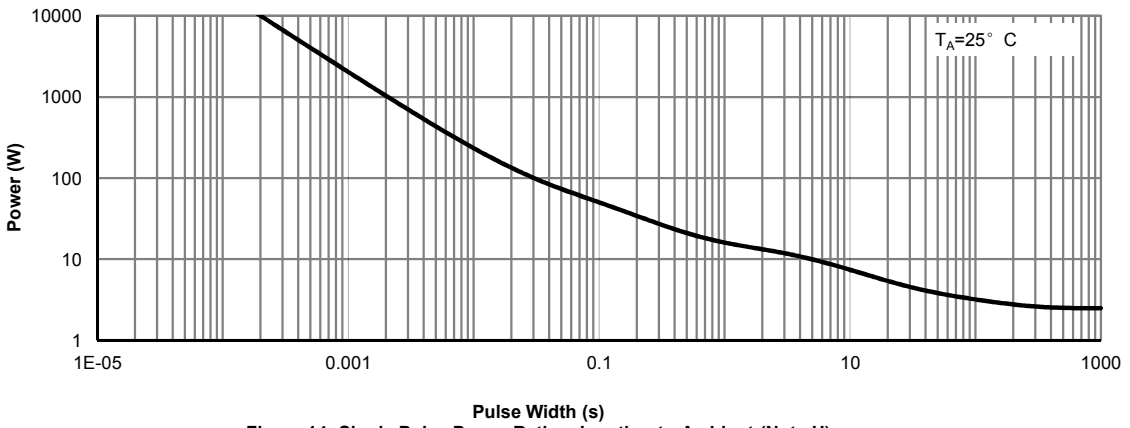


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

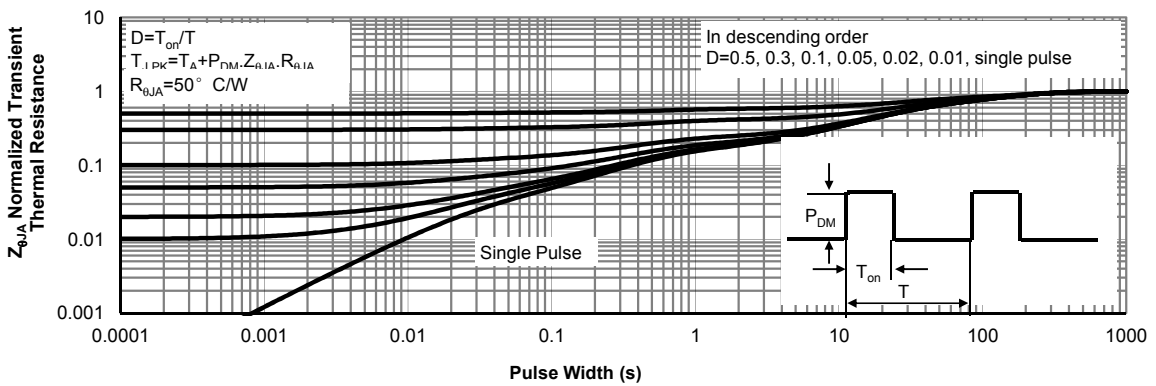
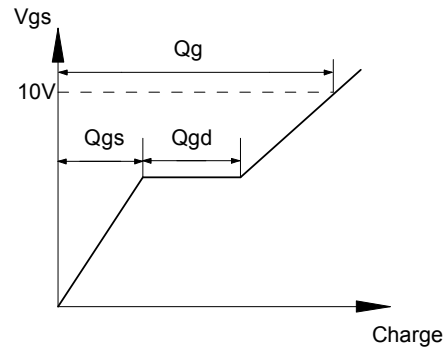
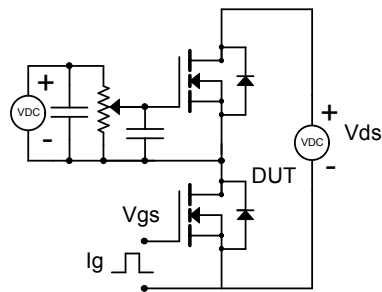
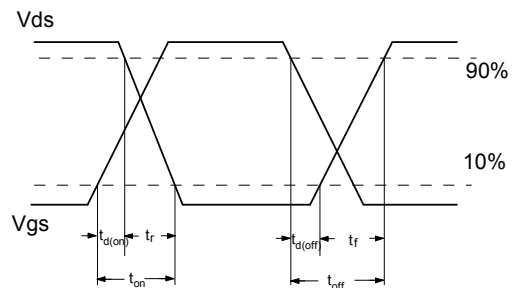
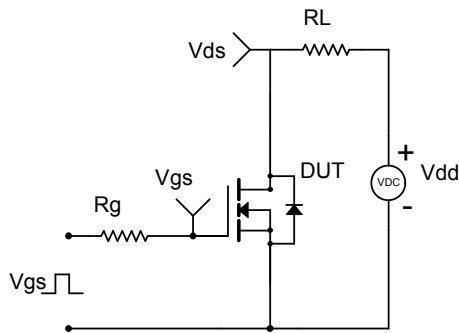


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

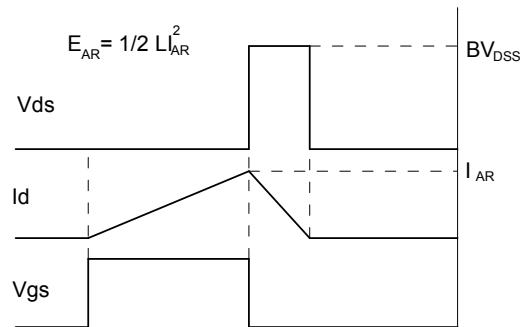
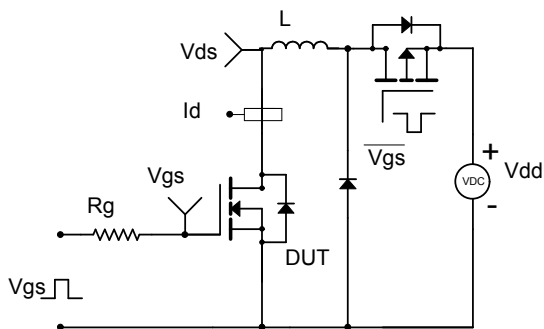
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

