



# AON6403L

## P-Channel Power Transistor

### General Description

The AON6403L 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.

- RoHS Compliant
- Halogen Free

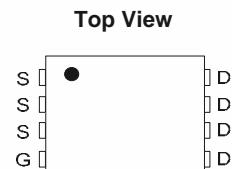
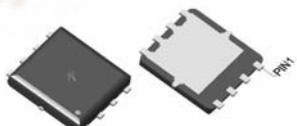
### Product Summary

$V_{DS}$	-30V
$I_D$ (at $V_{GS} = -10V$ )	-85A
$R_{DS(ON)}$ (at $V_{GS} = -10V$ )	< 3.1mΩ
$R_{DS(ON)}$ (at $V_{GS} = -4.5V$ )	< 4.3mΩ

100% UIS Tested  
100%  $R_g$  Tested



Fits SOIC8  
footprint !



Top View

DFN5X6

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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>G</sup>	$I_D$	-85	A
$T_C=100^\circ C$	$I_D$	-67	
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	-280	A
Continuous Drain Current <sup>C</sup>	$I_{DSM}$	-21	A
$T_A=70^\circ C$	$I_{DSM}$	-17	
Avalanche Current <sup>C</sup>	$I_{AR}$	-72	A
Repetitive avalanche energy $L=0.1mH$ <sup>C</sup>	$E_{AR}$	259	mJ
Power Dissipation <sup>B</sup>	$P_D$	83	W
$T_C=100^\circ C$	$P_D$	33	
Power Dissipation <sup>A</sup>	$P_{DSM}$	2.3	W
$T_A=70^\circ C$	$P_{DSM}$	1.4	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C

### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	14	17	°C/W
Maximum Junction-to-Ambient <sup>A D</sup> Steady-State		40	55	°C/W
Maximum Junction-to-Case	$R_{\theta JC}$	1	1.5	°C/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$\text{BV}_{\text{DSS}}$	Drain-Source Breakdown Voltage	$I_D=-250\mu\text{A}, V_{GS}=0\text{V}$	-30			V
$I_{\text{DSS}}$	Zero Gate Voltage Drain Current	$V_{DS}=-30\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1	$\mu\text{A}$
$I_{\text{GSS}}$	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm20\text{V}$			$\pm100$	nA
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-1.2	-1.7	-2.2	V
$I_{\text{D(ON)}}$	On state drain current	$V_{GS}=-10\text{V}, V_{DS}=-5\text{V}$	-280			A
$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}, I_D=-20\text{A}$ $T_J=125^\circ\text{C}$		2.6	3.1	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}, I_D=-20\text{A}$		3.6	4.4	$\text{m}\Omega$
$g_{\text{FS}}$	Forward Transconductance	$V_{DS}=-5\text{V}, I_D=-20\text{A}$		82		S
$V_{\text{SD}}$	Diode Forward Voltage	$I_S=-1\text{A}, V_{GS}=0\text{V}$		-0.7	-1	V
$I_S$	Maximum Body-Diode Continuous Current				-85	A
<b>DYNAMIC PARAMETERS</b>						
$C_{\text{iss}}$	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=-15\text{V}, f=1\text{MHz}$	6100	7600	9120	pF
$C_{\text{oss}}$	Output Capacitance		930	1320	1720	pF
$C_{\text{rss}}$	Reverse Transfer Capacitance		630	1050	1470	pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	1	2	4	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=-10\text{V}, V_{DS}=-15\text{V}, I_D=-20\text{A}$	130	163	196	nC
$Q_g(4.5\text{V})$	Total Gate Charge		63	79	95	nC
$Q_{\text{gs}}$	Gate Source Charge		18	22	26	nC
$Q_{\text{gd}}$	Gate Drain Charge		20	33	46	nC
$t_{\text{D(on)}}$	Turn-On DelayTime	$V_{GS}=-10\text{V}, V_{DS}=-15\text{V}, R_L=0.75\Omega, R_{\text{GEN}}=3\Omega$		13		ns
$t_r$	Turn-On Rise Time			18		ns
$t_{\text{D(off)}}$	Turn-Off DelayTime			135		ns
$t_f$	Turn-Off Fall Time			52		ns
$t_{\text{rr}}$	Body Diode Reverse Recovery Time	$I_F=-20\text{A}, dI/dt=500\text{A}/\mu\text{s}$	21	26	32	ns
$Q_{\text{rr}}$	Body Diode Reverse Recovery Charge	$I_F=-20\text{A}, dI/dt=500\text{A}/\mu\text{s}$	63	78	94	nC

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

B. The power dissipation  $P_D$  is based on  $T_{J(\text{MAX})}=150^\circ\text{C}$ , using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature  $T_{J(\text{MAX})}=150^\circ\text{C}$ . Ratings are based on low frequency and duty cycles to keep initial  $T_J=25^\circ\text{C}$ . Maximum UIS current limited by test equipment.

D. The  $R_{\text{thJA}}$  is the sum of the thermal impedance from junction to case  $R_{\text{thJC}}$  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.

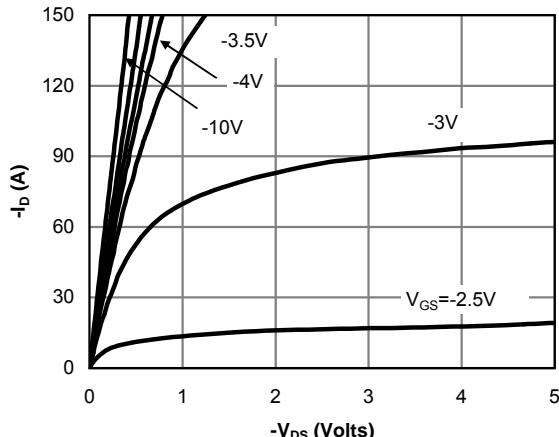
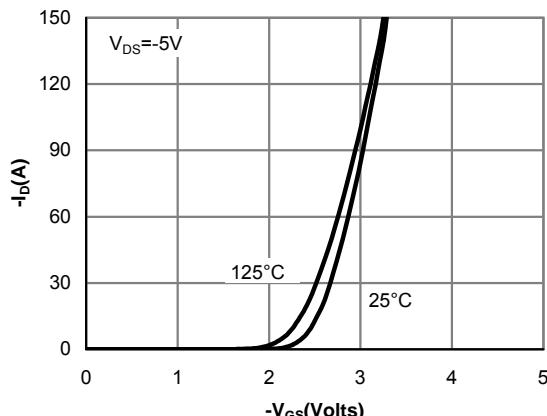
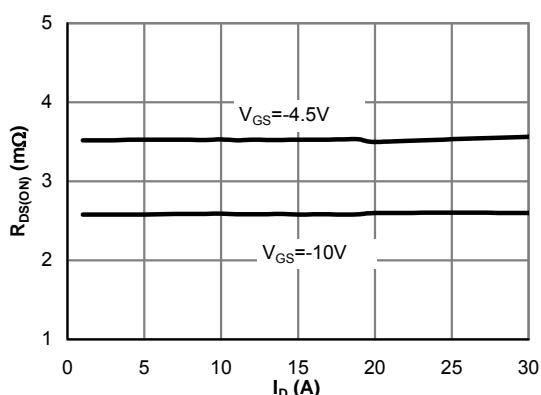
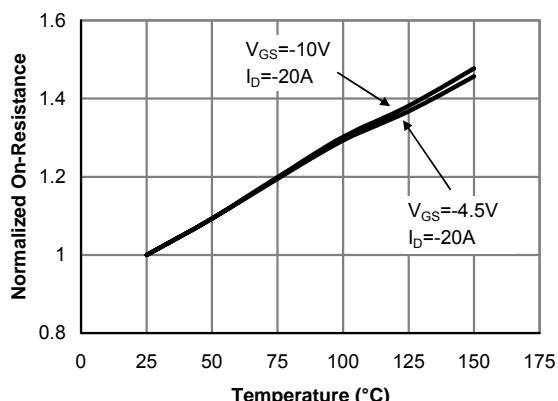
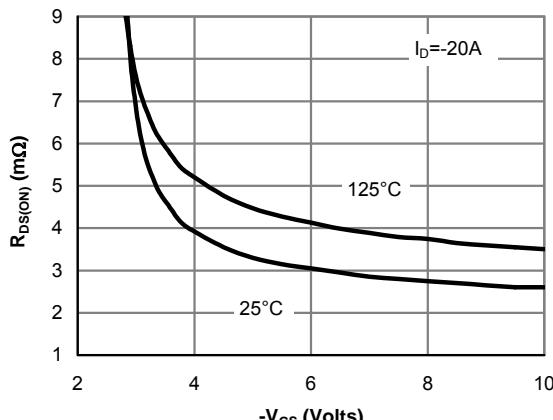
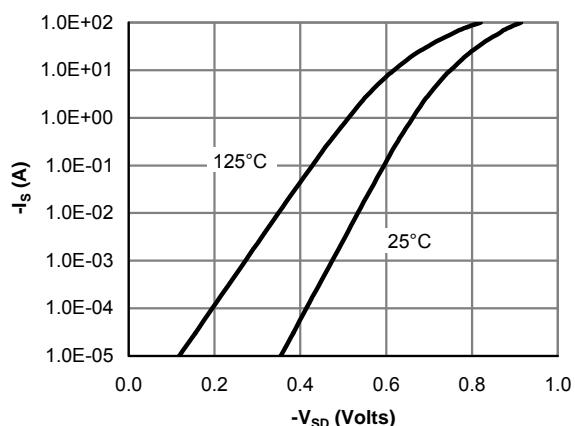
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of  $T_{J(\text{MAX})}=150^\circ\text{C}$ . The SOA curve provides a single pulse rating.

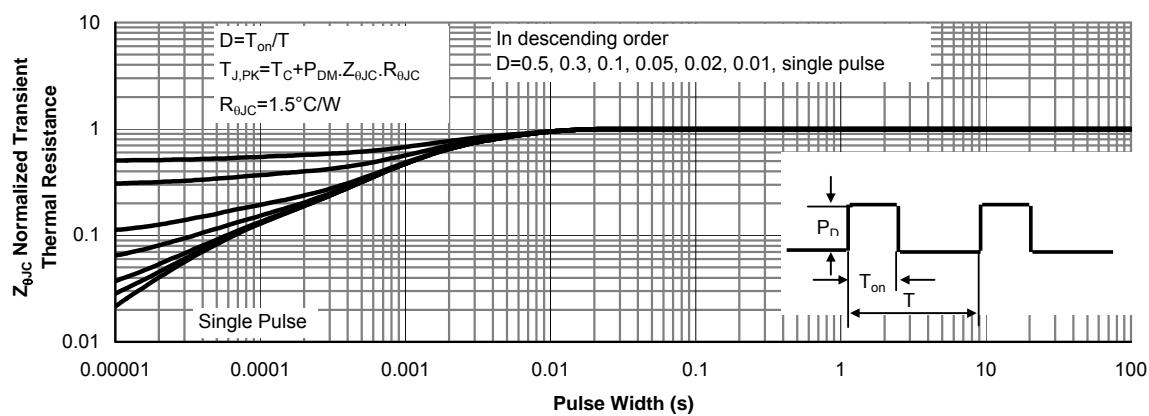
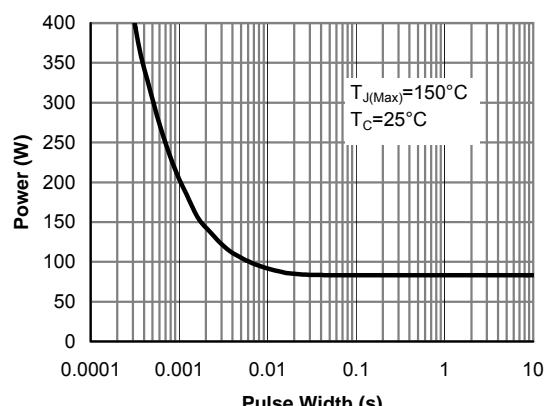
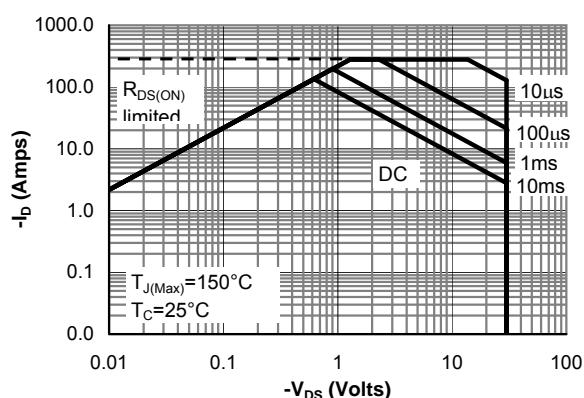
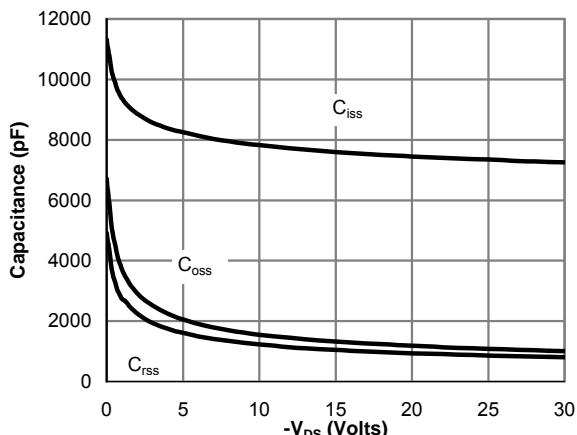
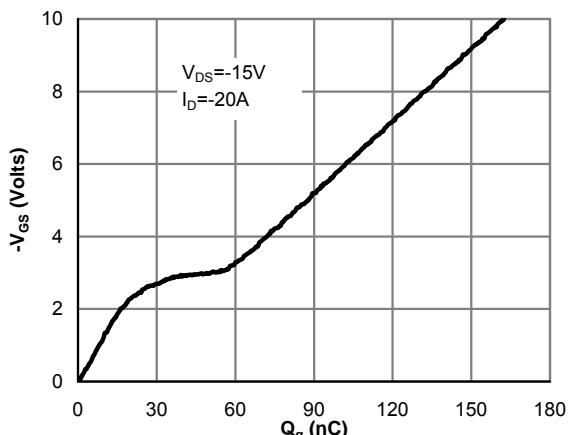
G. The maximum current rating is limited by package.

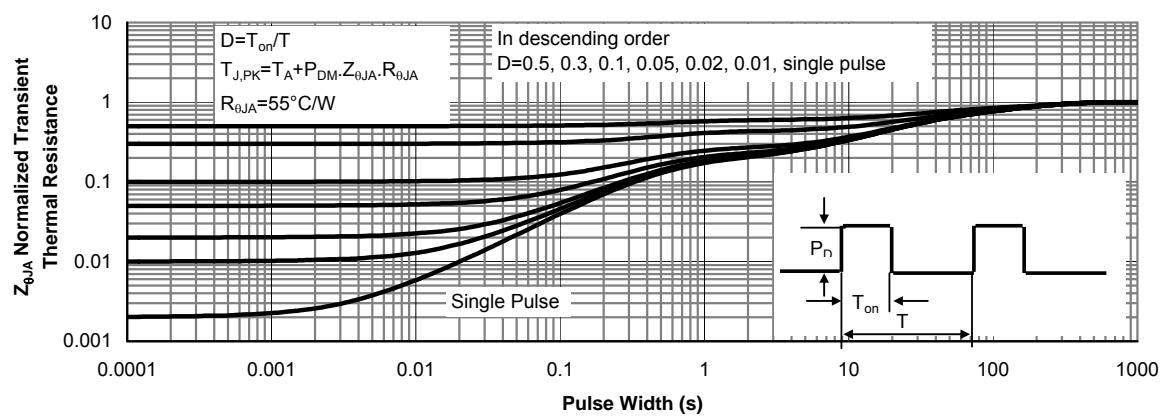
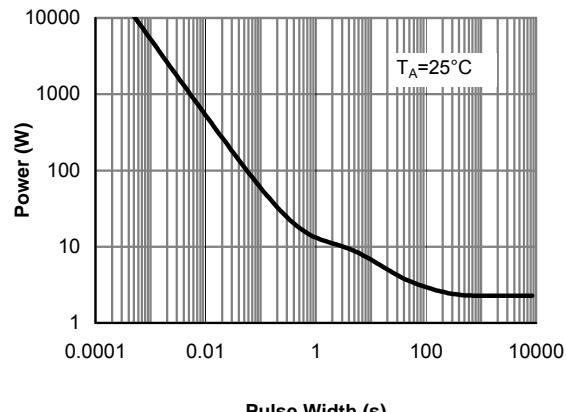
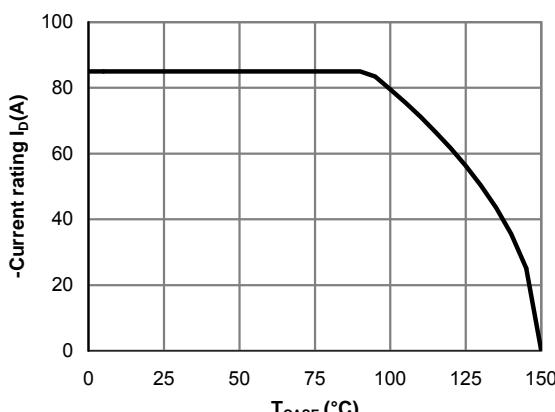
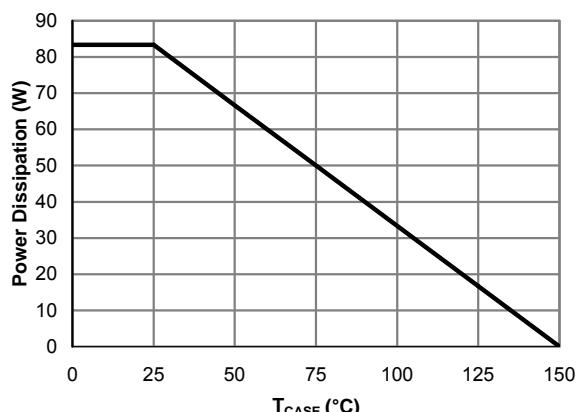
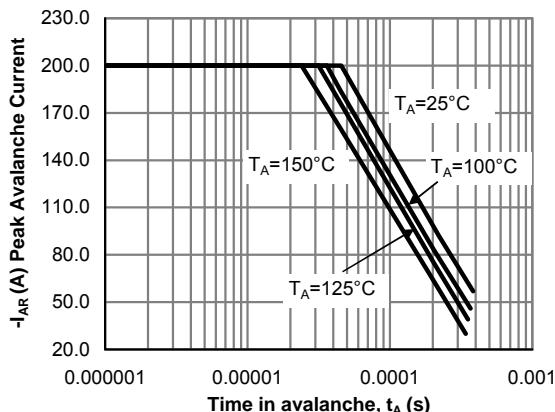
H. These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ .

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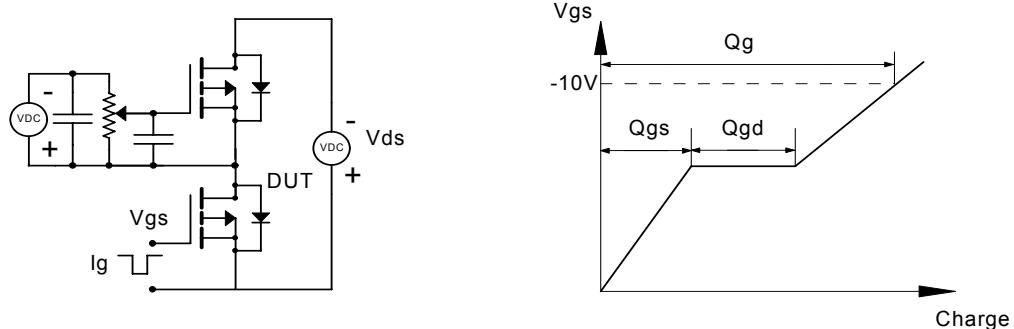
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**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

**Fig 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)**

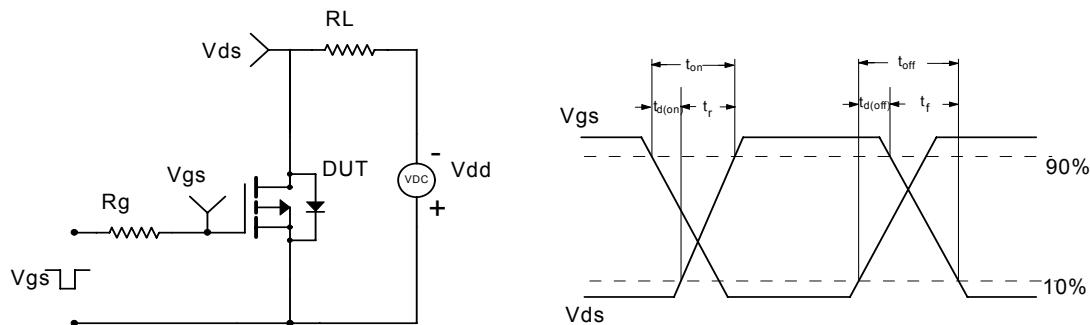
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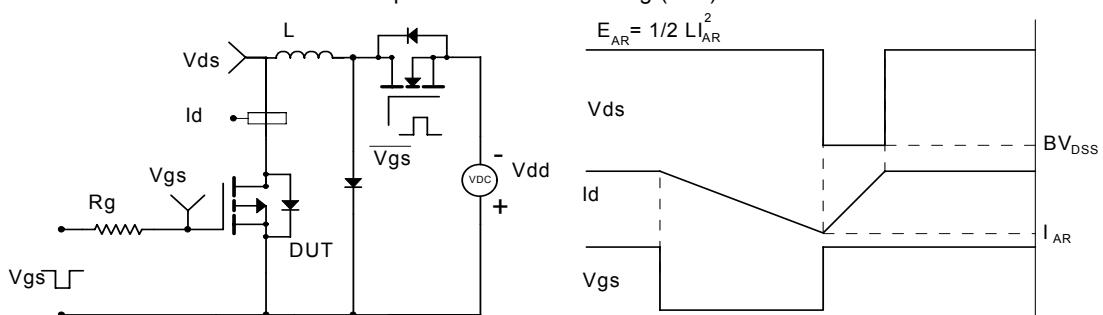
### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveforms



### Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



### Diode Recovery Test Circuit & Waveforms

