

General Description

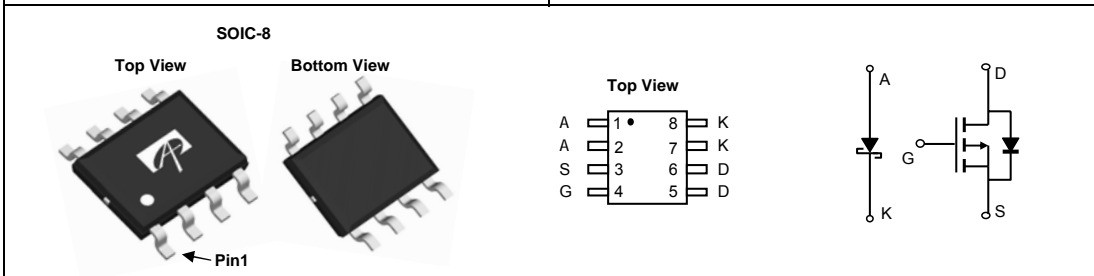
AO4771L uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. A Schottky diode is provided to facilitate the implementation of a bidirectional blocking switch, or for "standard buck" DC-DC conversion applications.

Product Summary

V_{DS}	-30V
I_D (at $V_{GS}=-10V$)	-4A
$R_{DS(ON)}$ (at $V_{GS}=-10V$)	< 68m Ω
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$)	< 105m Ω

Schottky

V_{KA}	30V
I_F	4A
V_F (at $I_F=1A$)	<0.5V



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

Parameter	Symbol	MOSFET	Schottky	Units
Drain-Source Voltage	V_{DS}	-30		V
Gate-Source Voltage	V_{GS}	± 20		V
Continuous Drain Current	I_D	$T_A=25^\circ\text{C}$	-4	A
		$T_A=70^\circ\text{C}$	-3	
Pulsed Drain Current ^C	I_{DM}	-18		
Avalanche Current ^C	I_{AS}, I_{AR}	11		A
Avalanche energy $L=0.1\text{mH}$ ^C	E_{AS}, E_{AR}	6		mJ
Schottky reverse voltage	V_{KA}		30	
Continuous Forward Current	I_F	$T_A=25^\circ\text{C}$	4	
		$T_A=70^\circ\text{C}$	2.5	
Power Dissipation ^B	P_D	$T_A=25^\circ\text{C}$	2	W
		$T_A=70^\circ\text{C}$	1.3	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter: MOSFET	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A $t \leq 10\text{s}$	$R_{\theta JA}$	48	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A Steady-State		74	90	$^\circ\text{C/W}$
Maximum Junction-to-Lead Steady-State	$R_{\theta JL}$	32	40	$^\circ\text{C/W}$
Parameter: Schottky	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A $t \leq 10\text{s}$	$R_{\theta JA}$	49	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A Steady-State		72	90	$^\circ\text{C/W}$
Maximum Junction-to-Lead Steady-State	$R_{\theta JL}$	31	40	$^\circ\text{C/W}$

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	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-30V, V _{GS} =0V T _J =55°C			-1 -5	μA
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
I _{D(ON)}	On state drain current	V _{GS} =-10V, V _{DS} =-5V	-18			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-4A T _J =125°C		56 79	68 95	mΩ
		V _{GS} =-4.5V, I _D =-3A		83	105	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-4A		8		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.8	-1	V
I _S	Maximum Body-Diode Continuous Current				-2	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-15V, f=1MHz	230	290	350	pF
C _{oss}	Output Capacitance		40	60	80	pF
C _{rss}	Reverse Transfer Capacitance		25	40	55	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	7.5	16	24	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =-10V, V _{DS} =-15V, I _D =-4A	4.6	5.8	7	nC
Q _g (4.5V)	Total Gate Charge		2.2	2.8	3	nC
Q _{gs}	Gate Source Charge		0.9	1.1	1.3	nC
Q _{gd}	Gate Drain Charge		0.8	1.3	1.8	nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-10V, V _{DS} =-15V, R _L =3.75Ω, R _{GEN} =3Ω		6		ns
t _r	Turn-On Rise Time			5		ns
t _{D(off)}	Turn-Off DelayTime			21		ns
t _f	Turn-Off Fall Time			9		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-4A, di/dt=100A/μs	8	10	12	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-4A, di/dt=100A/μs	16	20	24	nC
SCHOTTKY PARAMETERS						
V _F	Forward Voltage Drop	I _F =1A		0.4	0.5	V
I _{rm}	Maximum reverse leakage current	V _R =24V			0.05	mA
		V _R =24V, T _J =125°C			10	
C _T	Junction Capacitance	V _R =15V		56		pF

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 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 ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J=25°C.

D. The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T_{J(MAX)}=150°C. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

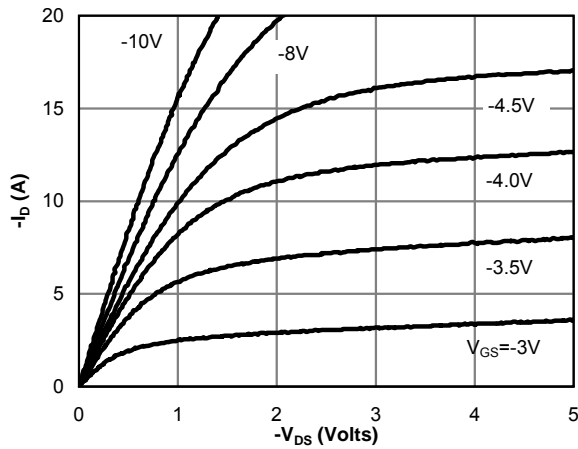


Fig 1: On-Region Characteristics(Note E)

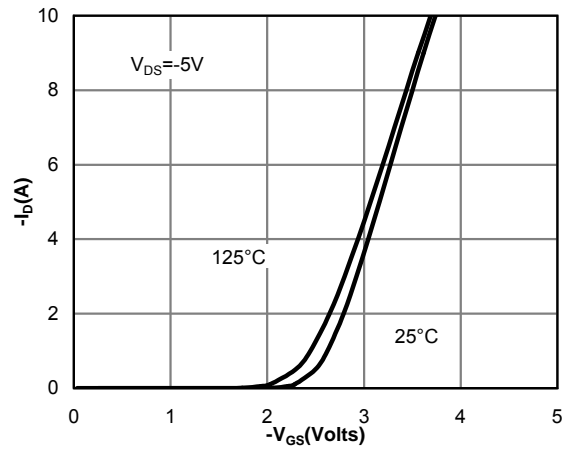


Figure 2: Transfer Characteristics(Note E)

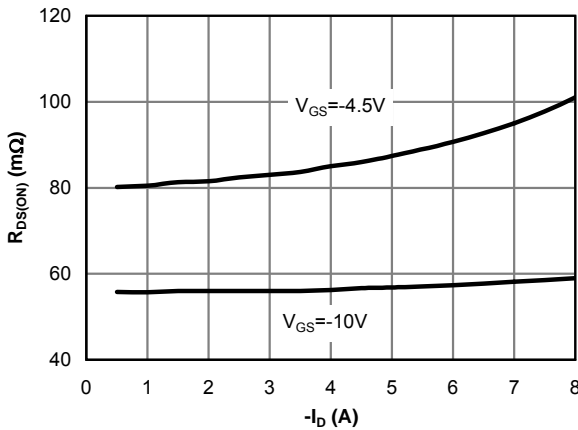


Figure 3: On-Resistance vs. Drain Current and Gate Voltage(Note E)

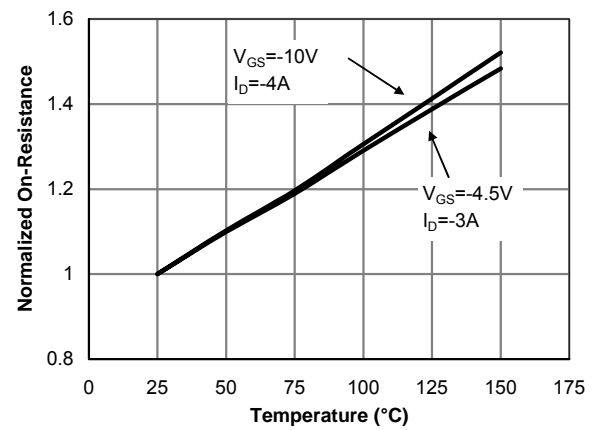


Figure 4: On-Resistance vs. Junction Temperature(Note E)

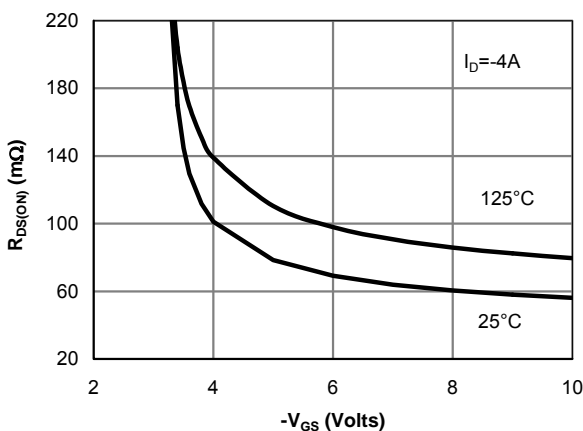


Figure 5: On-Resistance vs. Gate-Source Voltage(Note E)

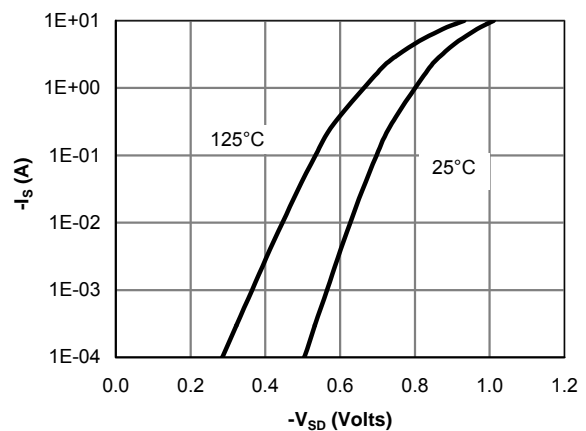


Figure 6: Body-Diode Characteristics(Note E)

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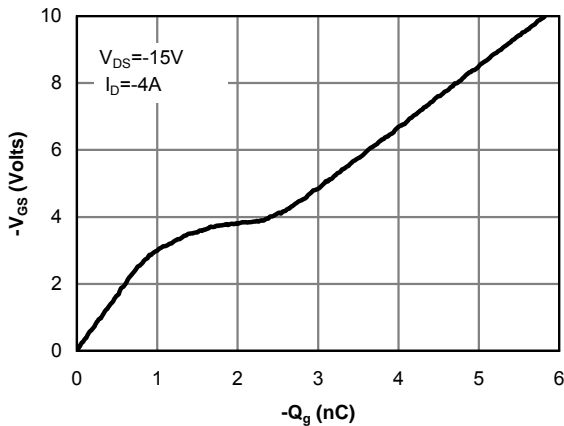


Figure 7: Gate-Charge Characteristics

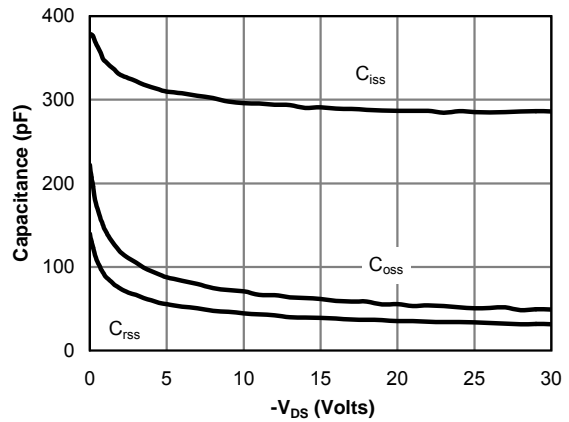


Figure 8: Capacitance Characteristics

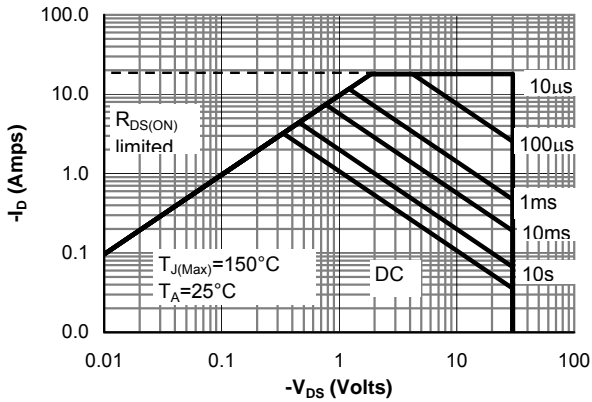


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

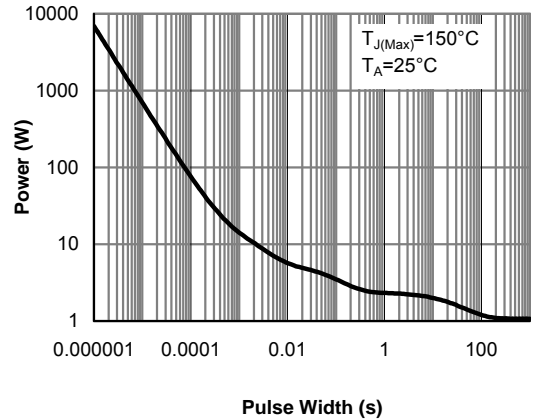


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

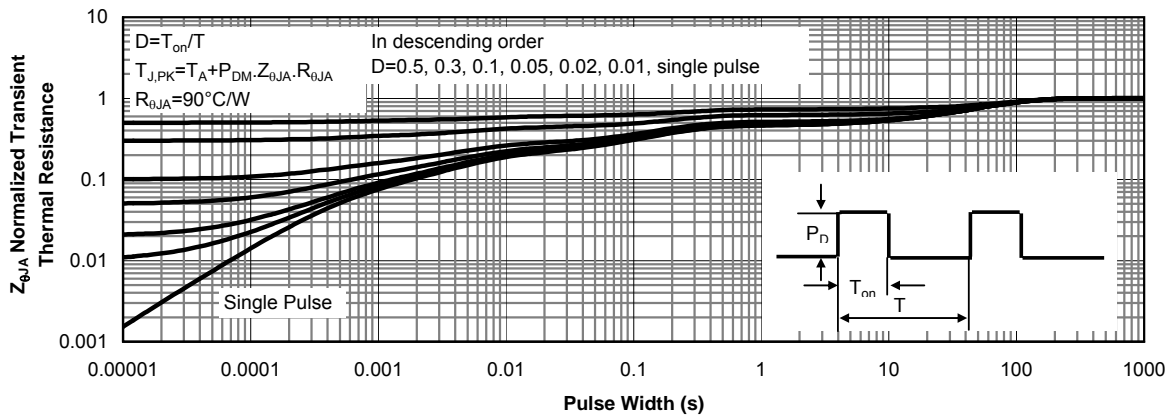


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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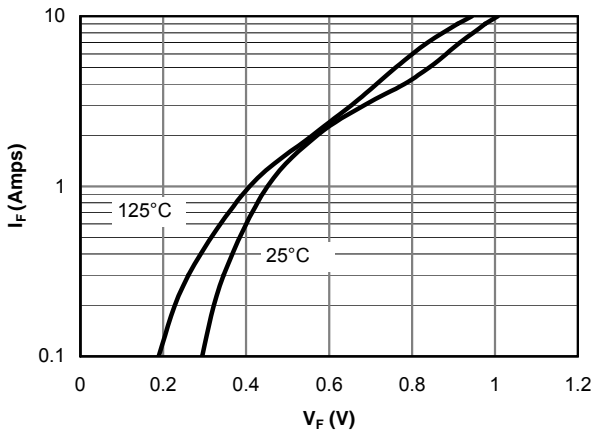


Figure 12: Schottky Forward Characteristics

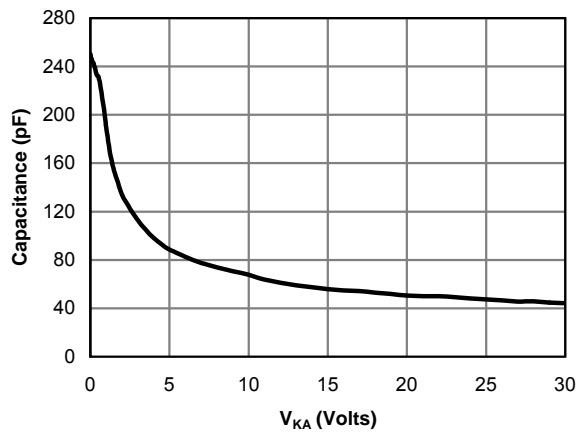


Figure 13: Schottky Capacitance Characteristics

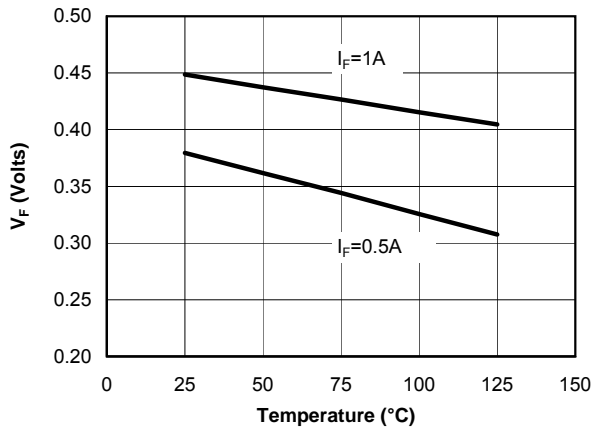


Figure 14: Schottky Forward Drop vs. Junction Temperature

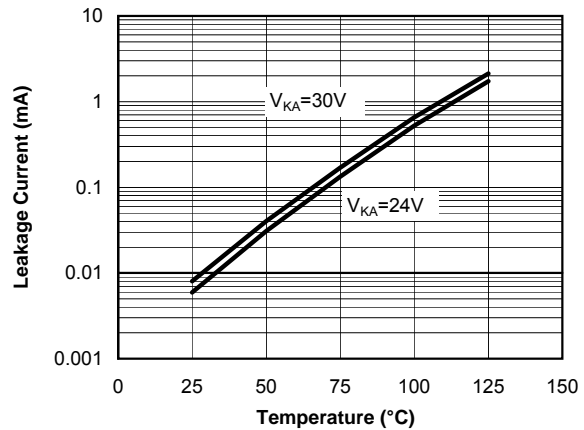
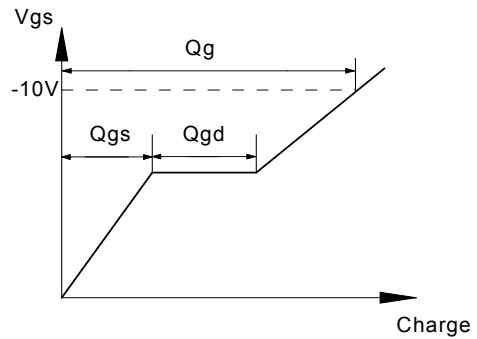
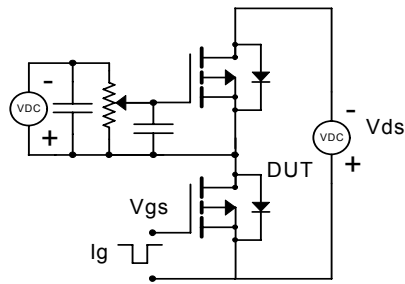
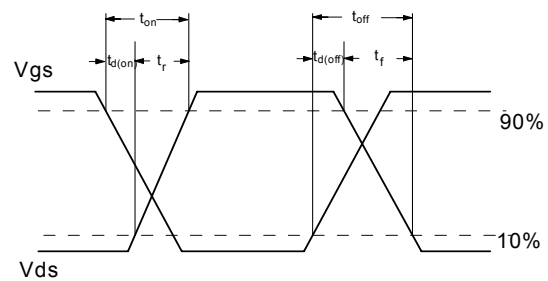
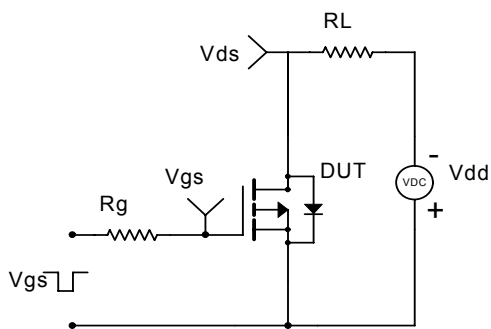


Figure 15: Schottky Leakage Current vs. Junction Temperature

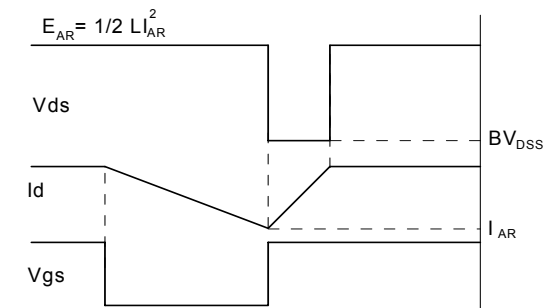
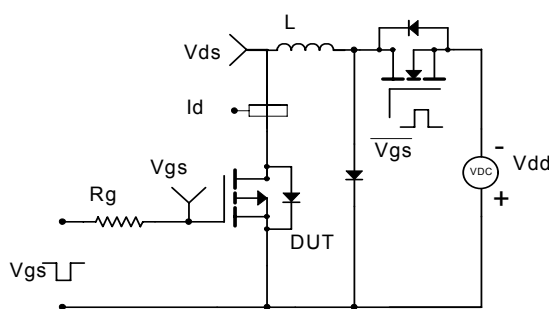
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

