

### General Description

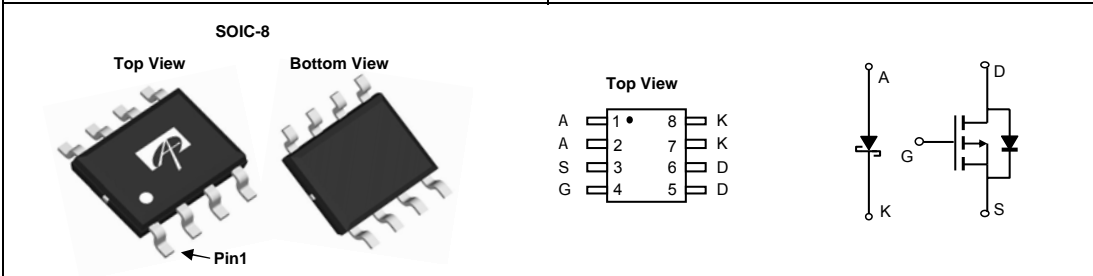
AO4771L uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. A Schottky diode is provided to facilitate the implementation of a bidirectional blocking switch, or for "standard buck" DC-DC conversion applications.

### Product Summary

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

### 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	$V_{GS}$	$\pm 20$		V
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	-4	A
		$T_A=70^\circ\text{C}$	-3	
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	-18		
Avalanche Current <sup>C</sup>	$I_{AS}, I_{AR}$	11		A
Avalanche energy $L=0.1\text{mH}$ <sup>C</sup>	$E_{AS}, E_{AR}$	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 <sup>B</sup>	$P_D$	$T_A=25^\circ\text{C}$	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 <sup>A</sup> $t \leq 10\text{s}$	$R_{\theta JA}$	48	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup> 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 <sup>A</sup> $t \leq 10\text{s}$	$R_{\theta JA}$	49	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup> 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<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V	-30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			-1 -5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =-250μA	-1.3	-1.8	-2.3	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	-18			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-4A T <sub>J</sub> =125°C		56 79	68 95	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3A		83	105	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-4A		8		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.8	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-2	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz	230	290	350	pF
C <sub>oss</sub>	Output Capacitance		40	60	80	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		25	40	55	pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	7.5	16	24	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-4A	4.6	5.8	7	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge		2.2	2.8	3	nC
Q <sub>gs</sub>	Gate Source Charge		0.9	1.1	1.3	nC
Q <sub>gd</sub>	Gate Drain Charge		0.8	1.3	1.8	nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, R <sub>L</sub> =3.75Ω, R <sub>GEN</sub> =3Ω		6		ns
t <sub>r</sub>	Turn-On Rise Time			5		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			21		ns
t <sub>f</sub>	Turn-Off Fall Time			9		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time		I <sub>F</sub> =-4A, di/dt=100A/μs	8	10	12
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-4A, di/dt=100A/μs	16	20	24	nC
<b>SCHOTTKY PARAMETERS</b>						
V <sub>F</sub>	Forward Voltage Drop	I <sub>F</sub> =1A		0.4	0.5	V
I <sub>rm</sub>	Maximum reverse leakage current	V <sub>R</sub> =24V			0.05	mA
		V <sub>R</sub> =24V, T <sub>J</sub> =125°C			10	
C <sub>T</sub>	Junction Capacitance	V <sub>R</sub> =15V		56		pF

A. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The value in any given application depends on the user's specific board design.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150°C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25°C.

D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> 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 1in<sup>2</sup> FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.

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**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

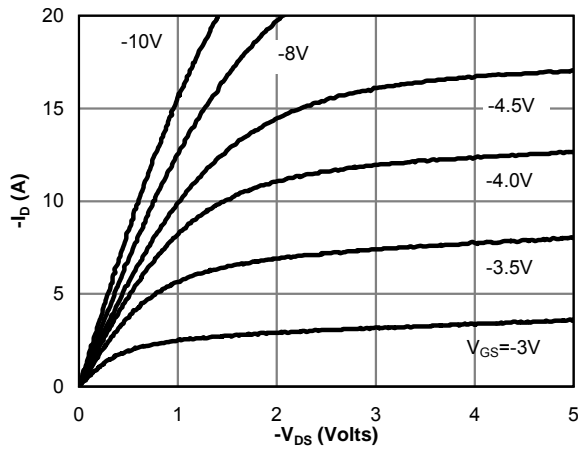


Fig 1: On-Region Characteristics(Note E)

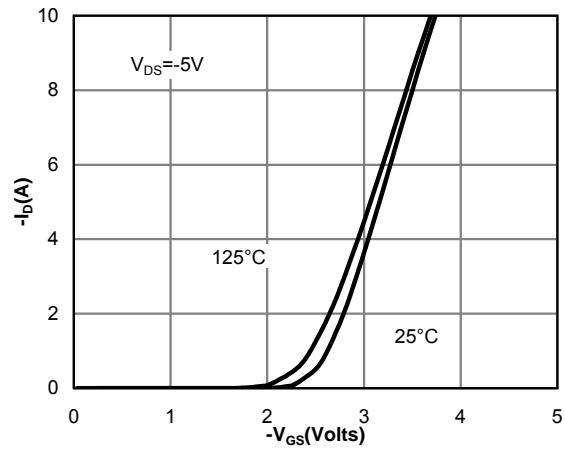


Figure 2: Transfer Characteristics(Note E)

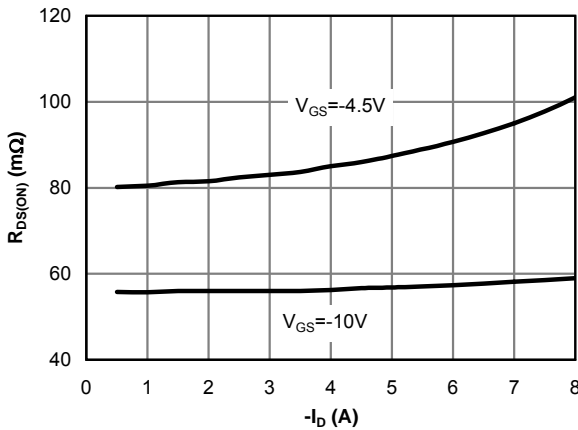


Figure 3: On-Resistance vs. Drain Current and Gate Voltage(Note E)

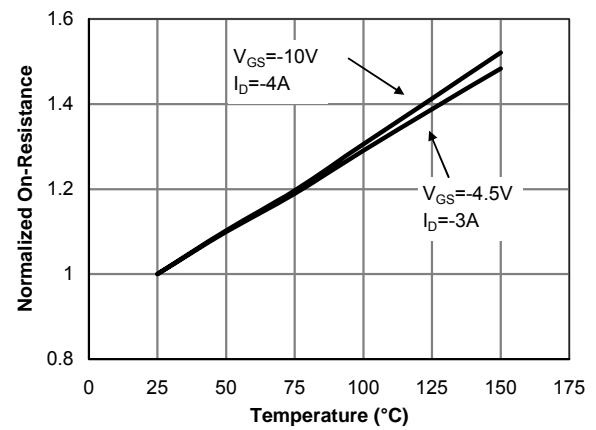


Figure 4: On-Resistance vs. Junction Temperature(Note E)

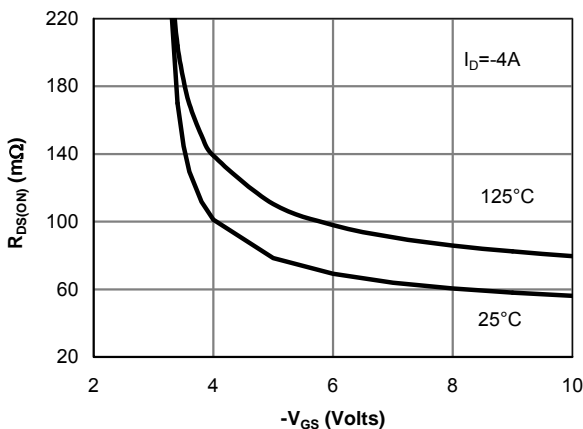


Figure 5: On-Resistance vs. Gate-Source Voltage(Note E)

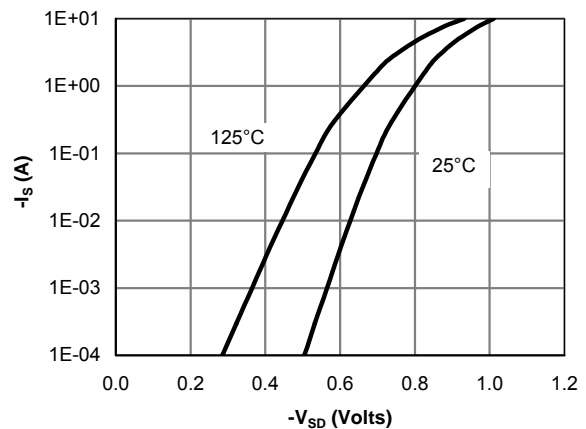


Figure 6: Body-Diode Characteristics(Note E)

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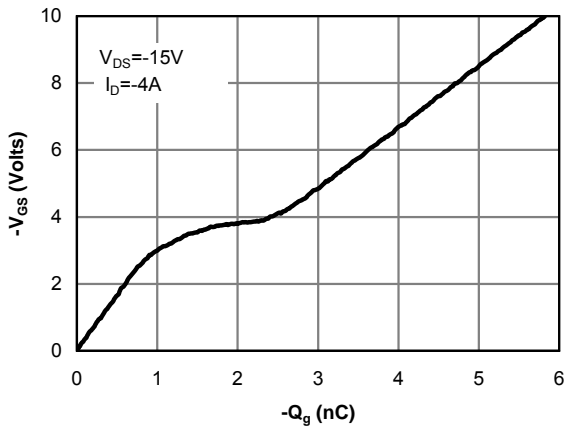


Figure 7: Gate-Charge Characteristics

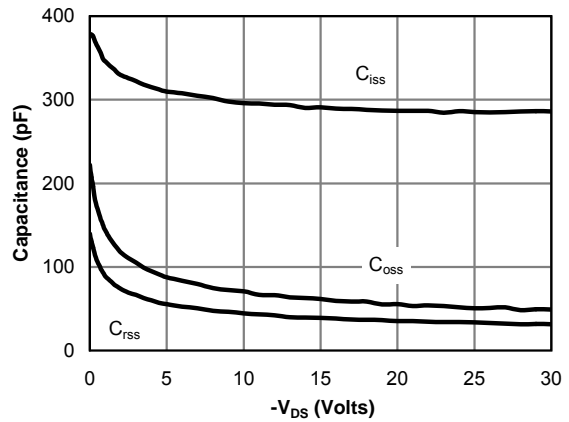


Figure 8: Capacitance Characteristics

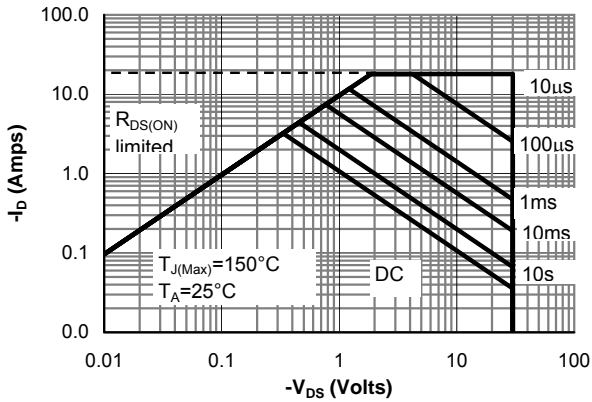


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

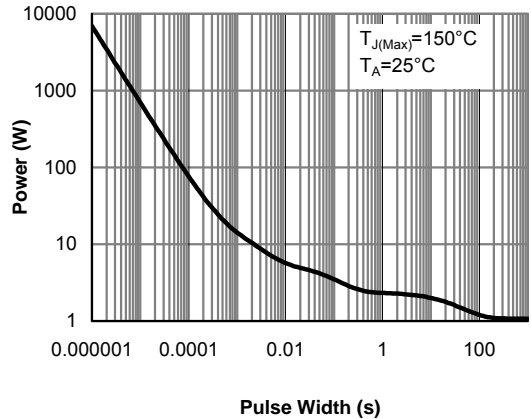


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

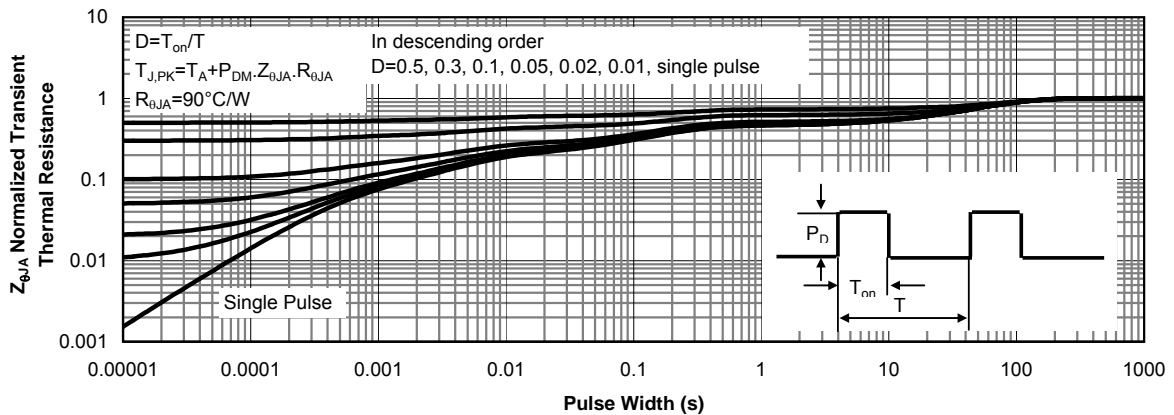


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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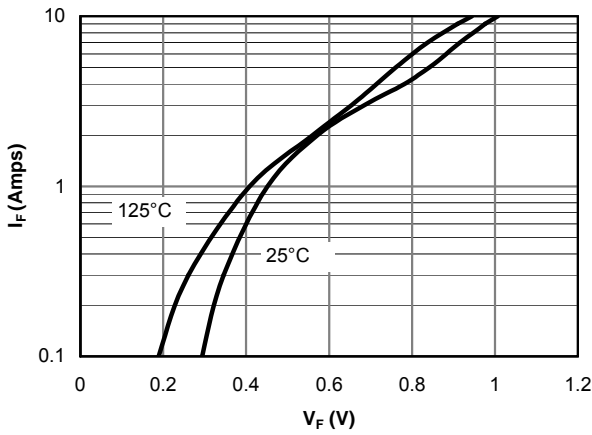


Figure 12: Schottky Forward Characteristics

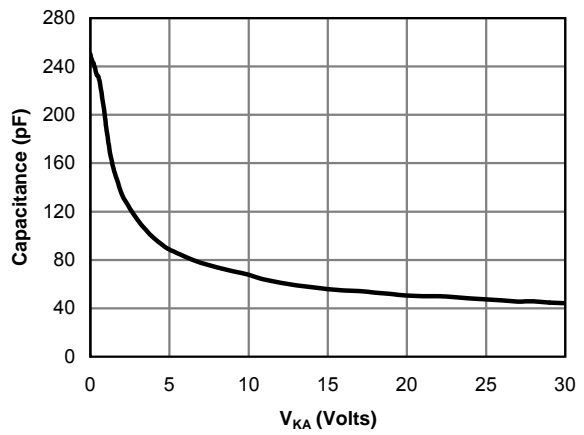


Figure 13: Schottky Capacitance Characteristics

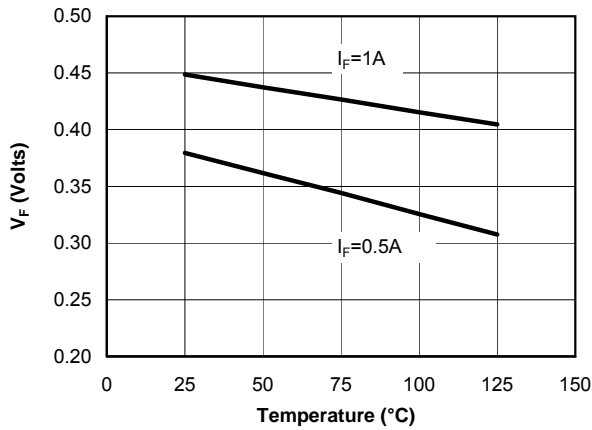


Figure 14: Schottky Forward Drop vs. Junction Temperature

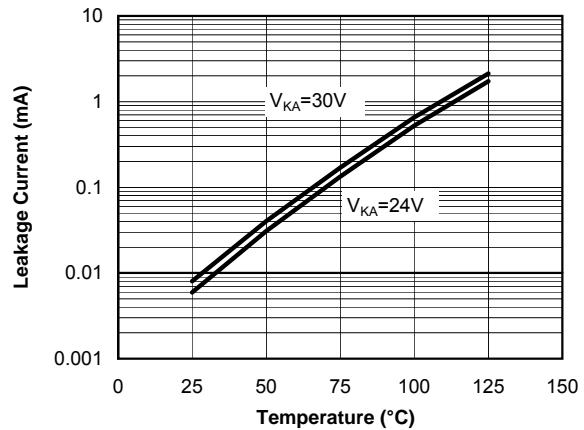
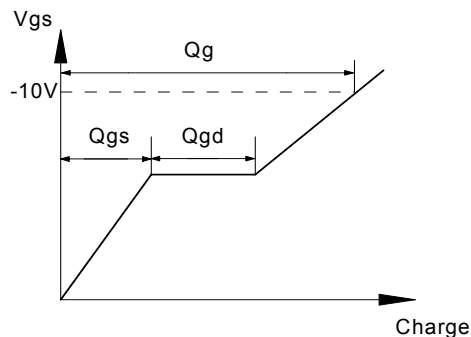
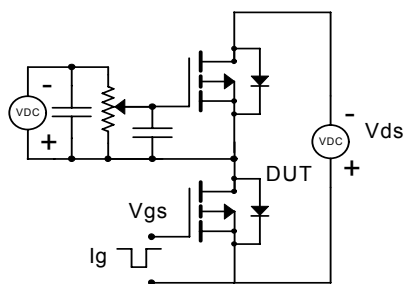
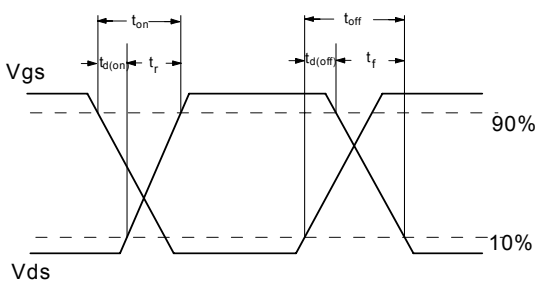
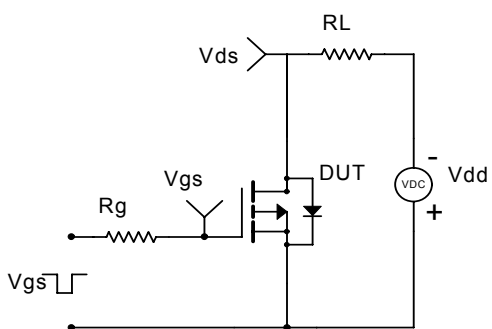


Figure 15: Schottky Leakage Current vs. Junction Temperature

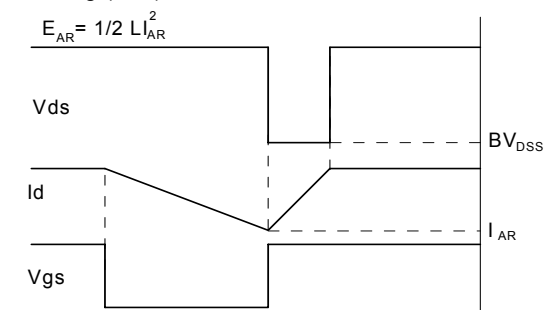
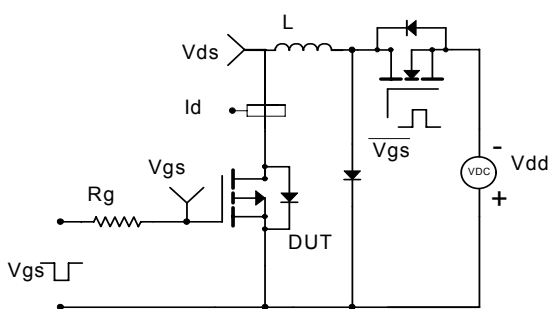
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

