

AON4705L

P-Channel Enhancement Mode Field Effect Transistor with Schottky Diode

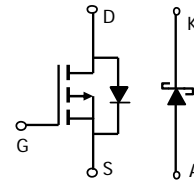
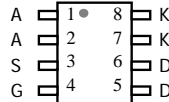
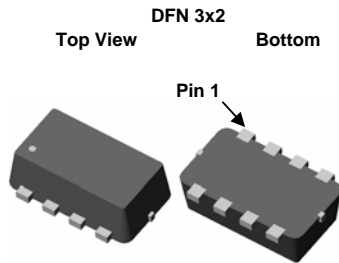
General Description

The AON4705L 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 buck converter applications.

- RoHS Compliant
- Halogen Free

Features

- $V_{DS} (V) = -20V$
- $I_D = -4A$ ($V_{GS} = -4.5V$)
- $R_{DS(ON)} < 65m\Omega$ ($V_{GS} = -4.5V$)
- $R_{DS(ON)} < 85m\Omega$ ($V_{GS} = -2.5V$)
- $R_{DS(ON)} < 110m\Omega$ ($V_{GS} = -1.8V$)
- SCHOTTKY**
- $V_{KA} (V) = 20V$, $I_F = 1A$, $V_F < 0.5V @ 1A$



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

Parameter	Symbol	MOSFET	Schottky	Units
Drain-Source Voltage	V_{DS}	-20		V
Gate-Source Voltage	V_{GS}	± 8		V
Continuous Drain Current ^A	I_D	$T_A=25^\circ C$	-4	A
		$T_A=70^\circ C$	-3.2	
Pulsed Drain Current ^B	I_{DM}	-15		
Schottky reverse voltage	V_{KA}		20	V
Continuous Forward Current ^A	I_F	$T_A=25^\circ C$	1.9	A
		$T_A=70^\circ C$	1.2	
Pulsed Forward Current ^B	I_{FM}		7	
Power Dissipation	P_D	$T_A=25^\circ C$	1.7	W
		$T_A=70^\circ C$	1.1	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	-55 to 150	$^\circ C$

Parameter: Thermal Characteristics MOSFET		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$t \leq 10s$	$R_{\theta JA}$	51	75	$^\circ C/W$
Maximum Junction-to-Ambient ^A	Steady-State		88	110	
Maximum Junction-to-Lead ^C	Steady-State	$R_{\theta JL}$	28	35	
Thermal Characteristics Schottky					
Maximum Junction-to-Ambient ^A	$t \leq 10s$	$R_{\theta JA}$	66	80	$^\circ C/W$
Maximum Junction-to-Ambient ^A	Steady-State		95	130	
Maximum Junction-to-Lead ^C	Steady-State	$R_{\theta JL}$	40	50	

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
V _{DSS}	Drain-Source Breakdown Voltage	I _D =-250μA, V _{GS} =0V	-20			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-20V, V _{GS} =0V T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±8V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-0.5	-0.66	-1	V
I _{D(ON)}	On state drain current	V _{GS} =-4.5V, V _{DS} =-5V	-15			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-4.5V, I _D =-4A T _J =125°C		51 64	65	mΩ
		V _{GS} =-2.5V, I _D =-3.5A		65	85	mΩ
		V _{GS} =-1.8V, I _D =-3A		83	110	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-4A		12		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.7	-1	V
I _S	Maximum Body-Diode Continuous Current				-2	A
DYNAMIC PARAMETERS						
C _{ISS}	Input Capacitance	V _{GS} =0V, V _{DS} =-10V, f=1MHz		560	745	pF
C _{OSS}	Output Capacitance			80		pF
C _{ISS}	Reverse Transfer Capacitance			70		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		15	23	Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-10V, I _D =-4A		8.5	11	nC
Q _{gs}	Gate Source Charge			1.2		nC
Q _{gd}	Gate Drain Charge			2.1		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-4.5V, V _{DS} =-10V, R _L =2.5Ω, R _{GEN} =3Ω		7.2		ns
t _r	Turn-On Rise Time			36		ns
t _{D(off)}	Turn-Off DelayTime			53		ns
t _f	Turn-Off Fall Time			56		ns
t _{rr}	Body Diode Reverse Recovery Time		I _F =-4A, dI/dt=100A/μs		37	49
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-4A, dI/dt=100A/μs		27		nC
SCHOTTKY PARAMETERS						
V _F	Forward Voltage Drop	I _F =1A		0.4	0.5	V
I _{rm}	Maximum reverse leakage current	V _R =16V			0.2	mA
		V _R =16V, T _J =125°C			20	
C _T	Junction Capacitance	V _R =10V		44		pF
t _{rr}	Schottky Reverse Recovery Time	I _F =1A, dI/dt=100A/μs		11	14	ns
Q _{rr}	Schottky Reverse Recovery Charge	I _F =1A, dI/dt=100A/μs		2.5		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 value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature.

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

D: The static characteristics in Figures 1 to 6 are obtained using t ≤ 300μs pulses, duty cycle 0.5% max.

E: 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. The SOA curve provides a single pulse rating.

F: The current rating is based on the t ≤ 10s thermal resistance rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

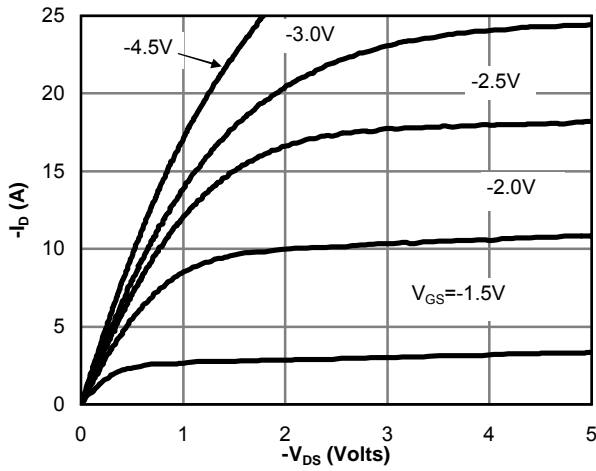


Fig 1: On-Region Characteristics

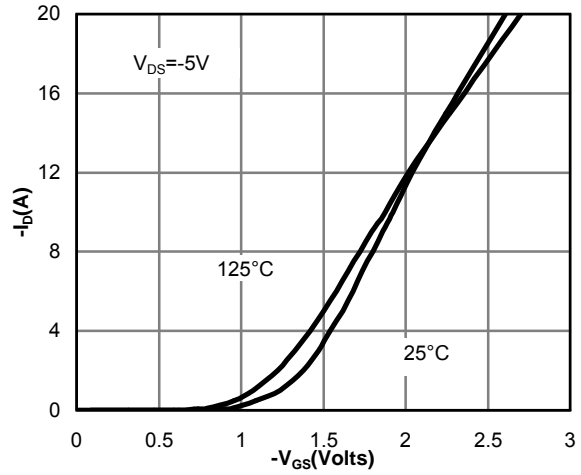


Figure 2: Transfer Characteristics

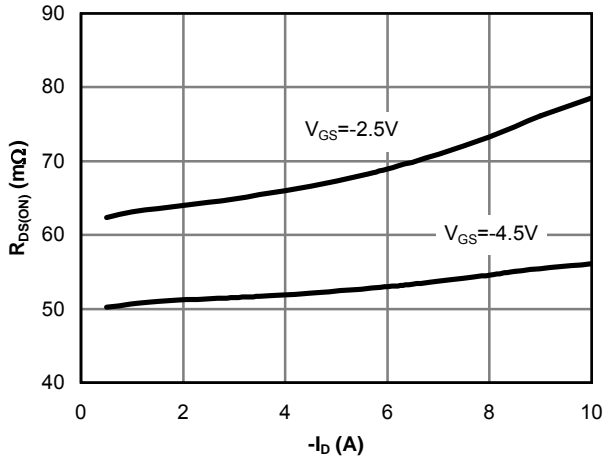


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

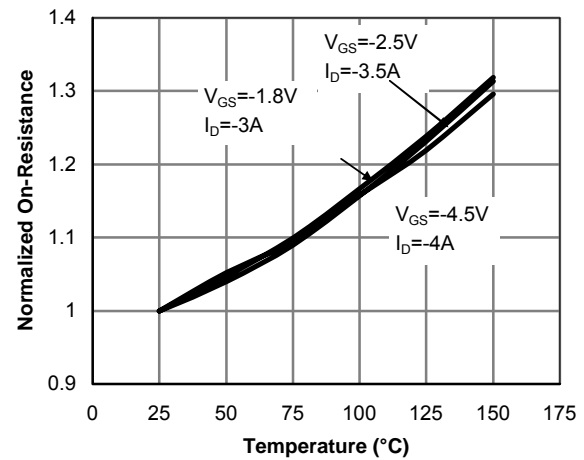


Figure 4: On-Resistance vs. Junction Temperature

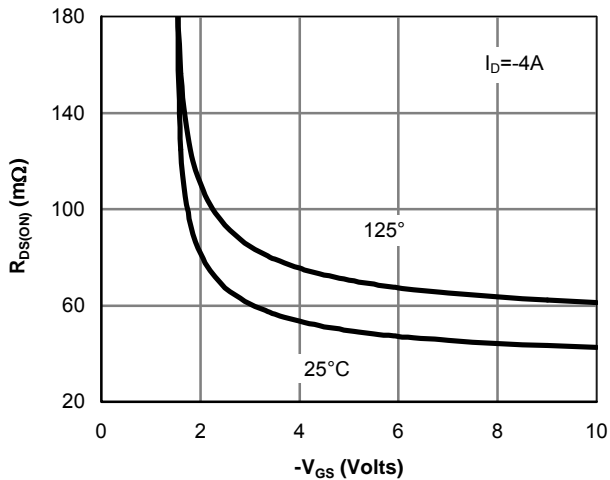


Figure 5: On-Resistance vs. Gate-Source Voltage

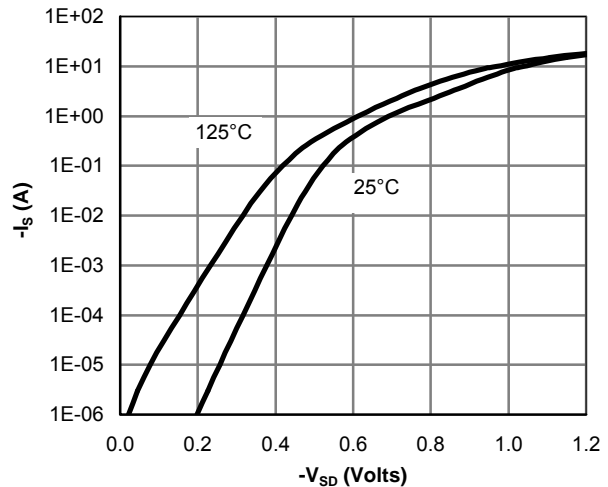


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

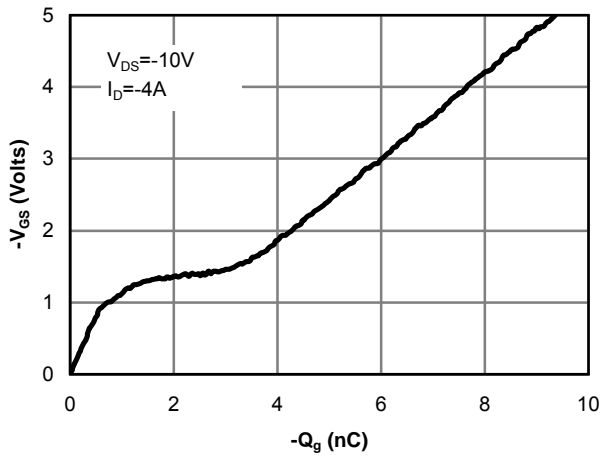


Figure 7: Gate-Charge Characteristics

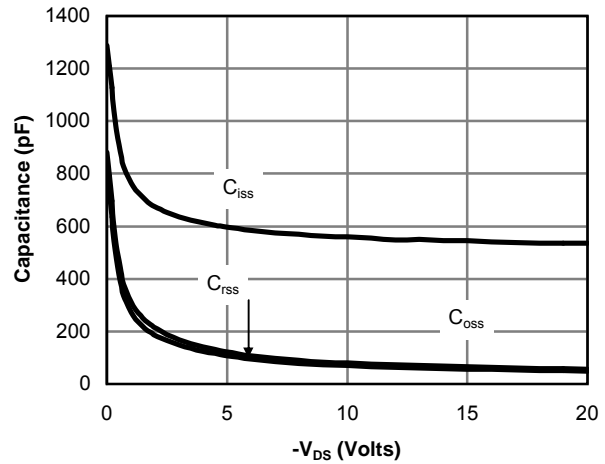


Figure 8: Capacitance Characteristics

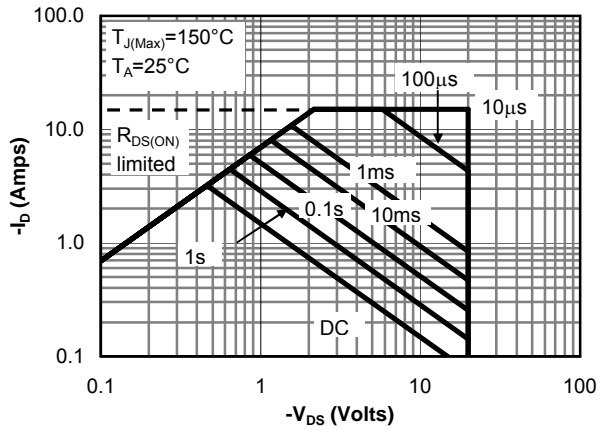


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

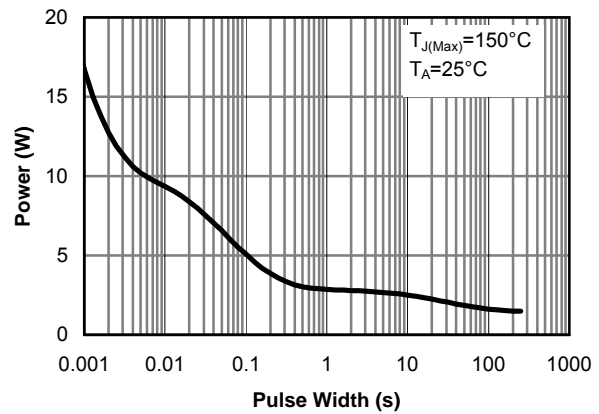


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

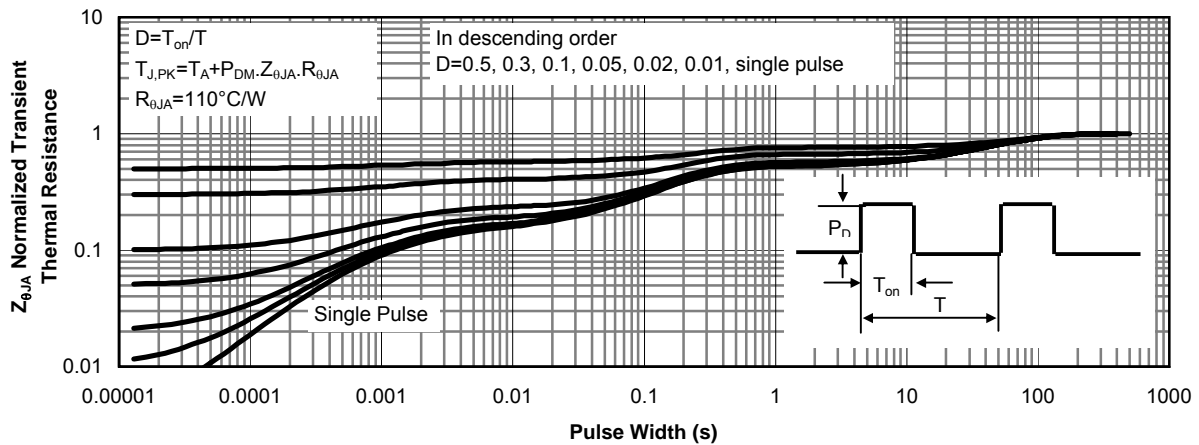


Figure 11: Normalized Maximum Transient Thermal Impedance

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: SCHOTTKY

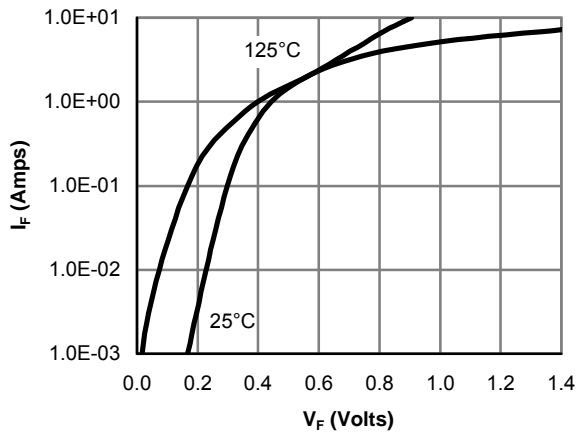


Figure 12: Schottky Forward Characteristics

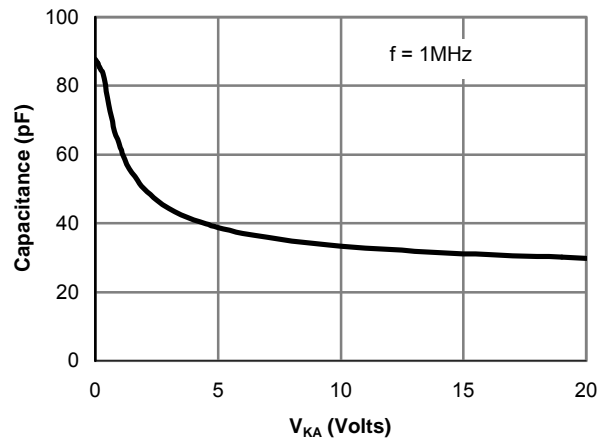


Figure 13: Schottky Capacitance Characteristics

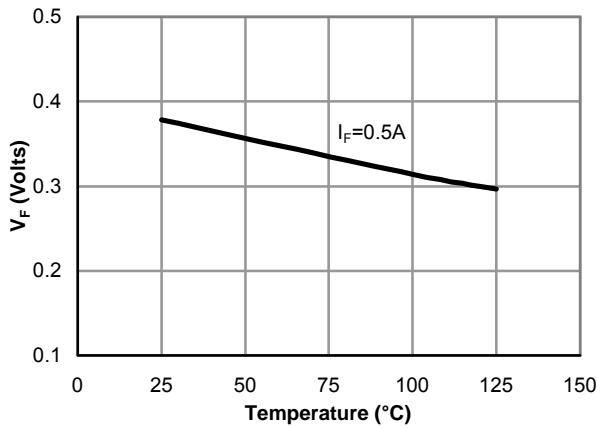


Figure 14: Schottky Forward Drop vs. Junction Temperature

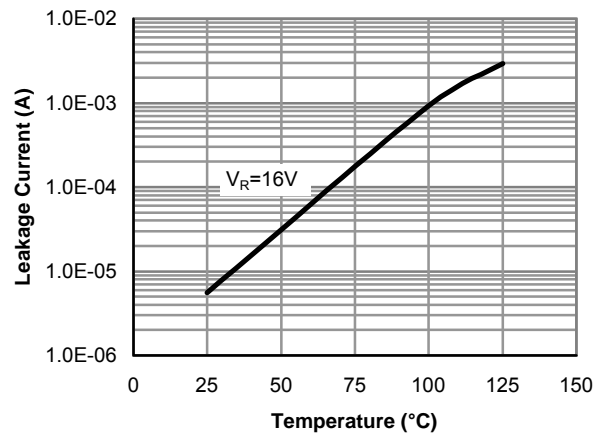


Figure 15: Schottky Leakage current vs. Junction Temperature

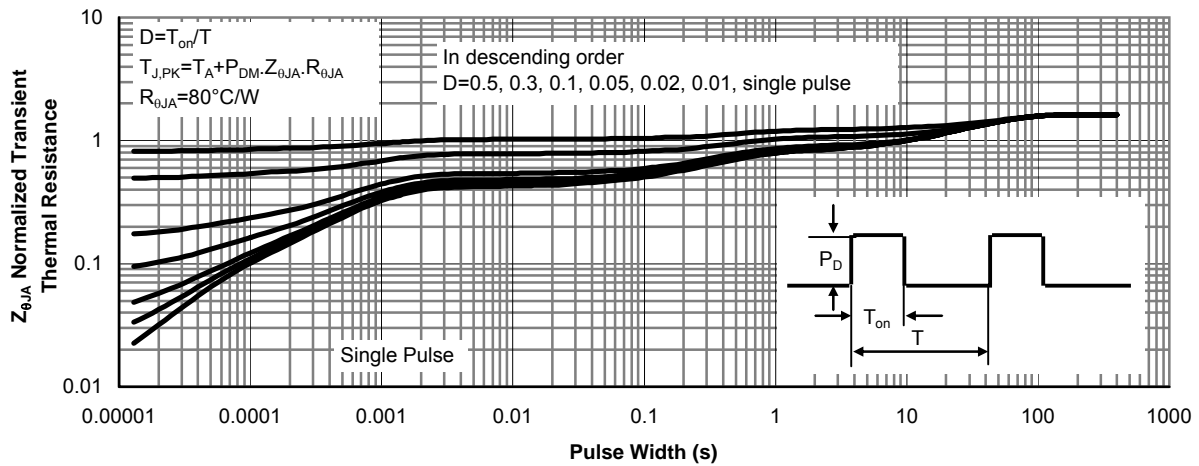
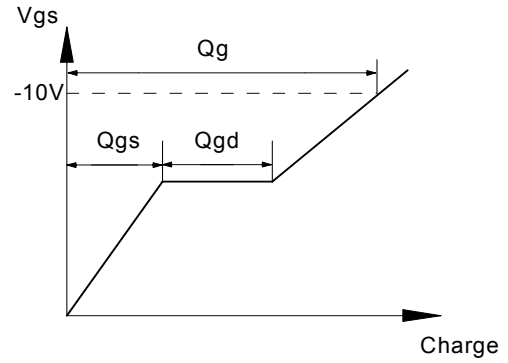
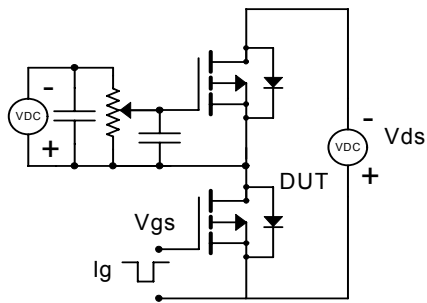
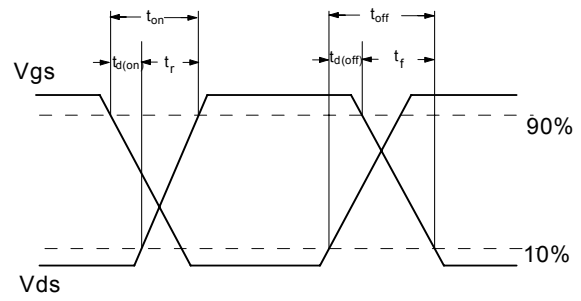
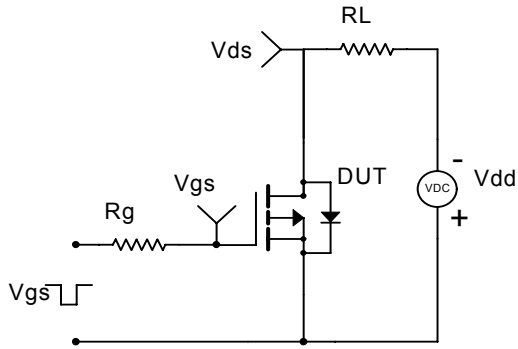


Figure 16: Schottky Normalized Maximum Transient Thermal Impedance

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

