

AON4705L

P-Channel Enhancement Mode Field Effect Transistor with Schottky Diode

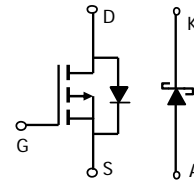
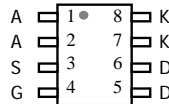
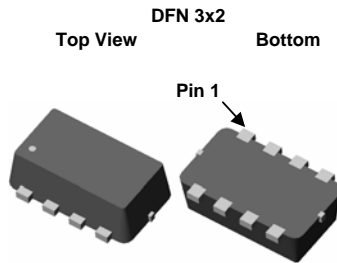
General Description

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

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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
V_{DSS}	Drain-Source Breakdown Voltage	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-20\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1 -5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 8\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-0.5	-0.66	-1	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-4.5\text{V}$, $V_{DS}=-5\text{V}$	-15			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5\text{V}$, $I_D=-4\text{A}$ $T_J=125^\circ\text{C}$		51 64	65	$\text{m}\Omega$
		$V_{GS}=-2.5\text{V}$, $I_D=-3.5\text{A}$		65	85	$\text{m}\Omega$
		$V_{GS}=-1.8\text{V}$, $I_D=-3\text{A}$		83	110	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}$, $I_D=-4\text{A}$		12		S
V_{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				-2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=-10\text{V}$, $f=1\text{MHz}$		560	745	pF
C_{oss}	Output Capacitance		80		pF	
C_{riss}	Reverse Transfer Capacitance		70		pF	
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		15	23	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=-4.5\text{V}$, $V_{DS}=-10\text{V}$, $I_D=-4\text{A}$		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	$V_{GS}=-4.5\text{V}$, $V_{DS}=-10\text{V}$, $R_L=2.5\Omega$, $R_{GEN}=3\Omega$		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	$I_F=-4\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		37	49	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-4\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		27		nC
SCHOTTKY PARAMETERS						
V_F	Forward Voltage Drop	$I_F=1\text{A}$		0.4	0.5	V
I_{rm}	Maximum reverse leakage current	$V_R=16\text{V}$			0.2	mA
		$V_R=16\text{V}$, $T_J=125^\circ\text{C}$			20	
C_T	Junction Capacitance	$V_R=10\text{V}$		44		pF
t_{rr}	Schottky Reverse Recovery Time	$I_F=1\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		11	14	ns
Q_{rr}	Schottky Reverse Recovery Charge	$I_F=1\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		2.5		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$. 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 $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using $t \leq 300\mu\text{s}$ 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 $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

F: The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.

Rev 0. Aug 2008

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

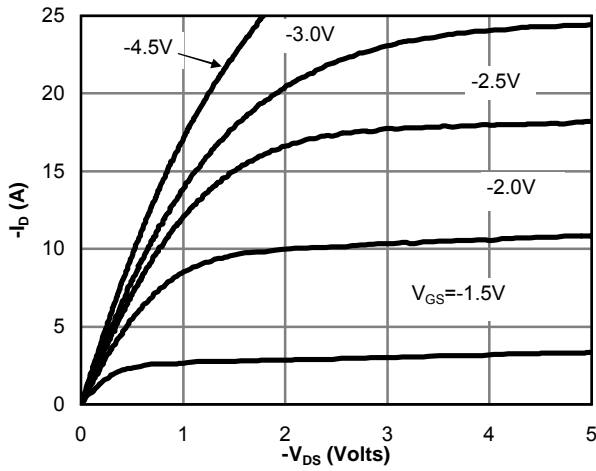


Fig 1: On-Region Characteristics

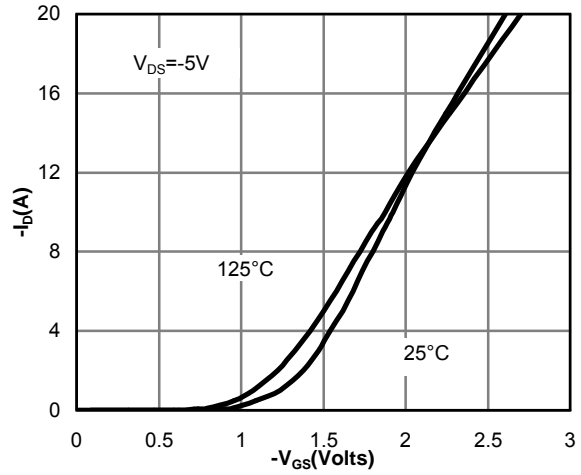


Figure 2: Transfer Characteristics

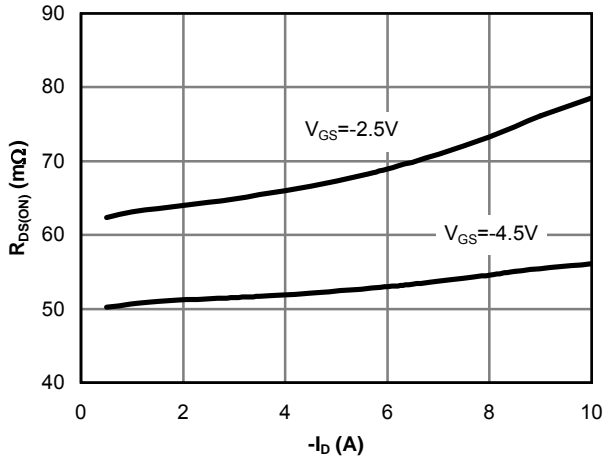


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

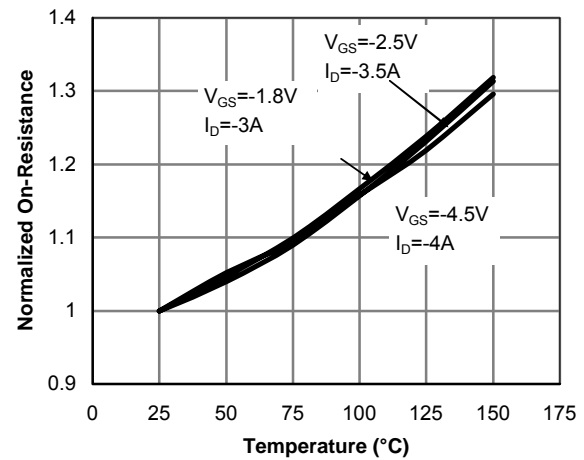


Figure 4: On-Resistance vs. Junction Temperature

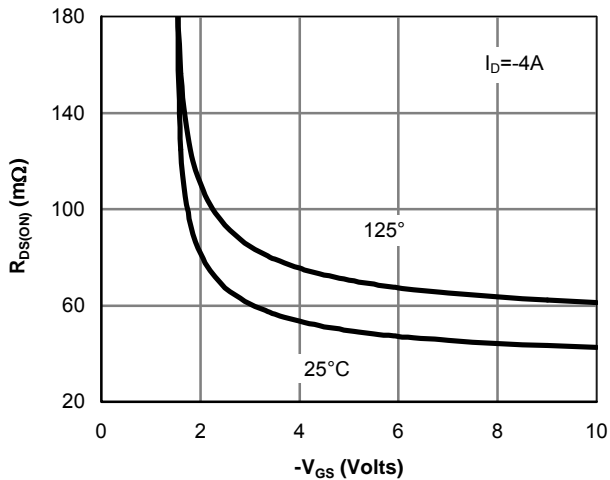


Figure 5: On-Resistance vs. Gate-Source Voltage

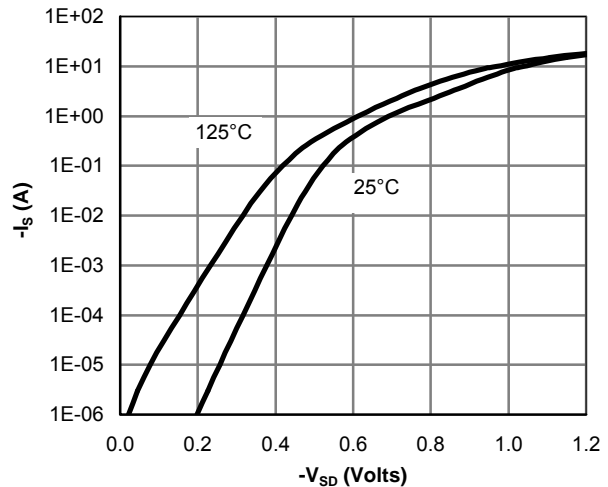


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

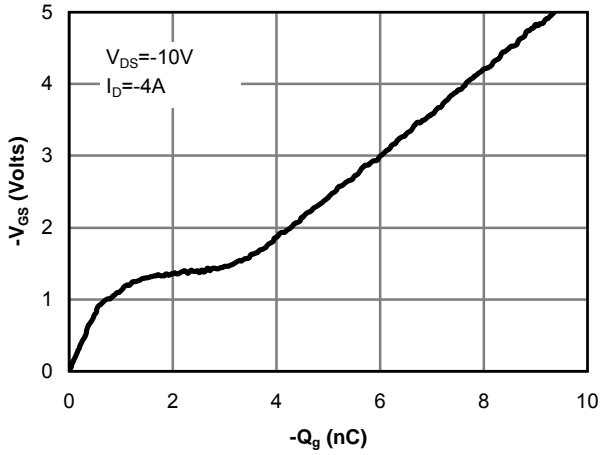


Figure 7: Gate-Charge Characteristics

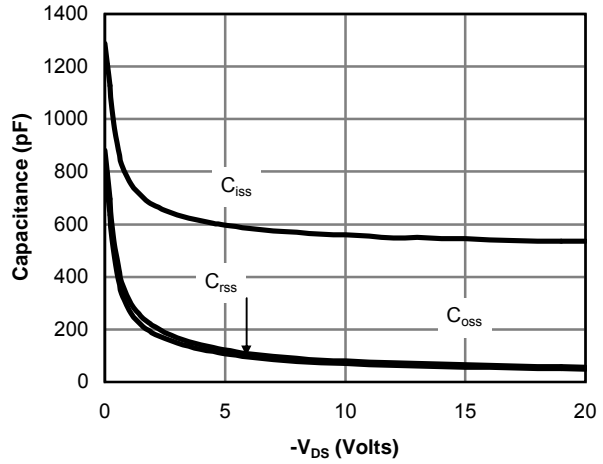


Figure 8: Capacitance Characteristics

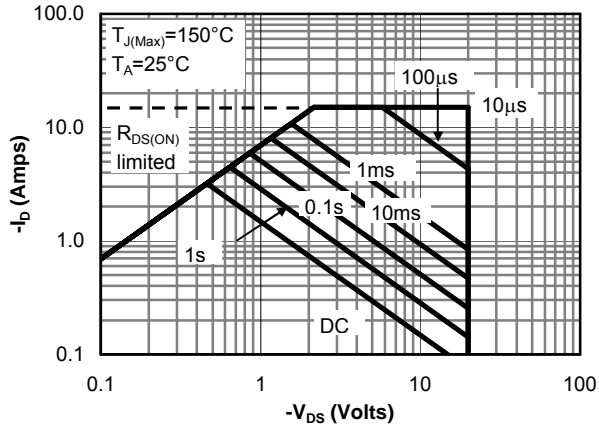


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

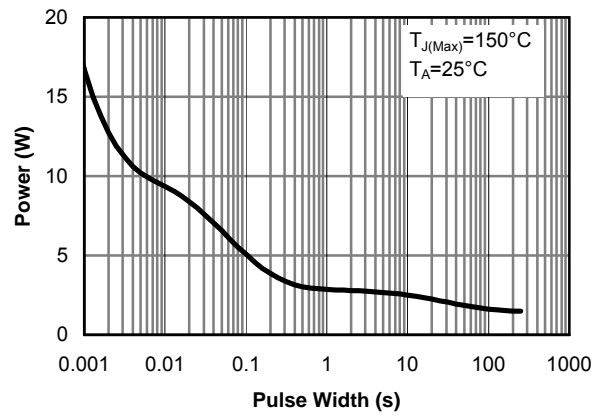


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

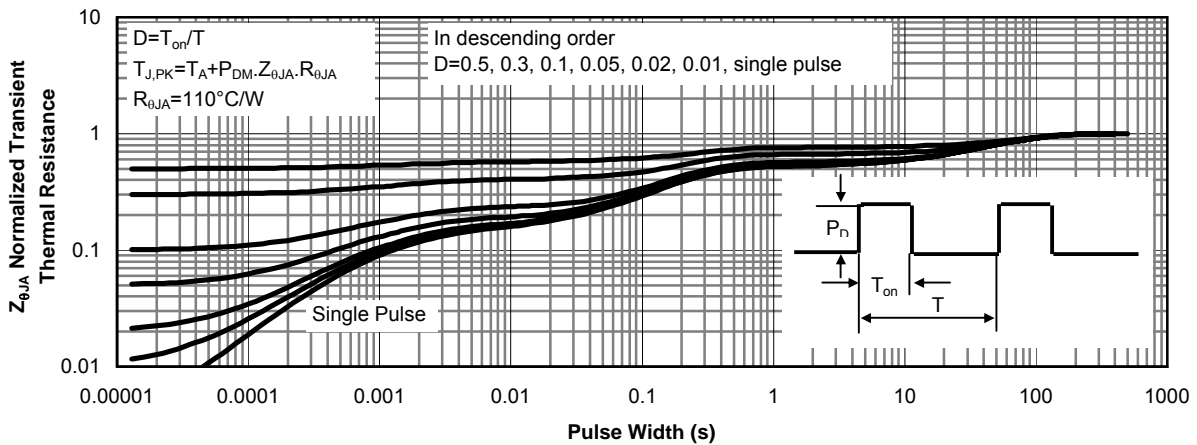


Figure 11: Normalized Maximum Transient Thermal Impedance

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: SCHOTTKY

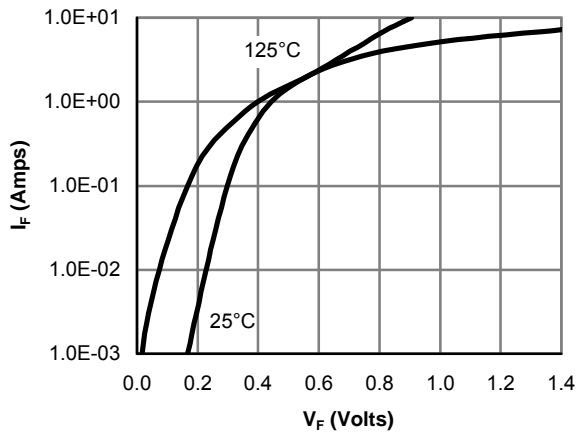


Figure 12: Schottky Forward Characteristics

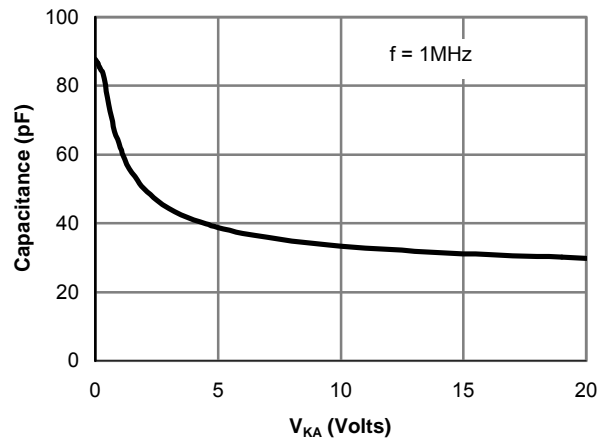


Figure 13: Schottky Capacitance Characteristics

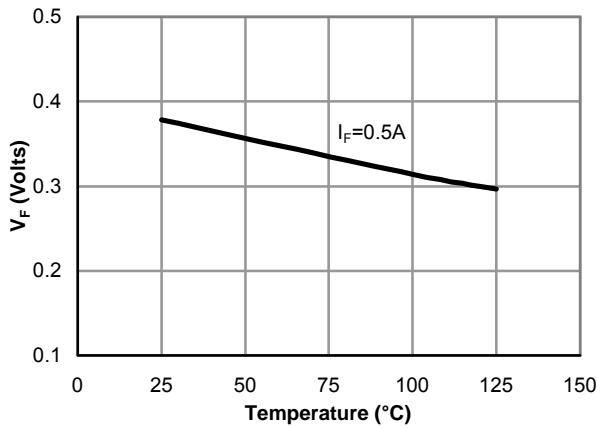


Figure 14: Schottky Forward Drop vs. Junction Temperature

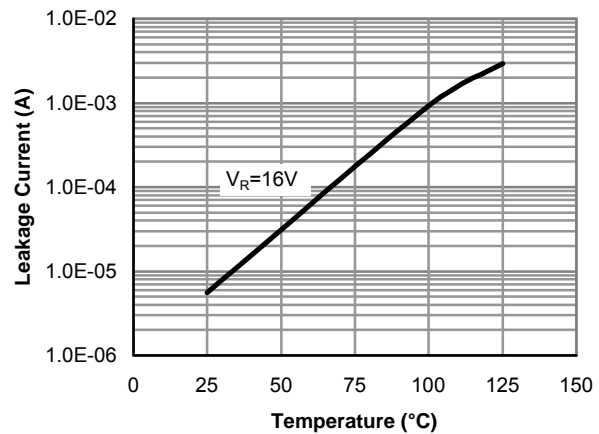


Figure 15: Schottky Leakage current vs. Junction Temperature

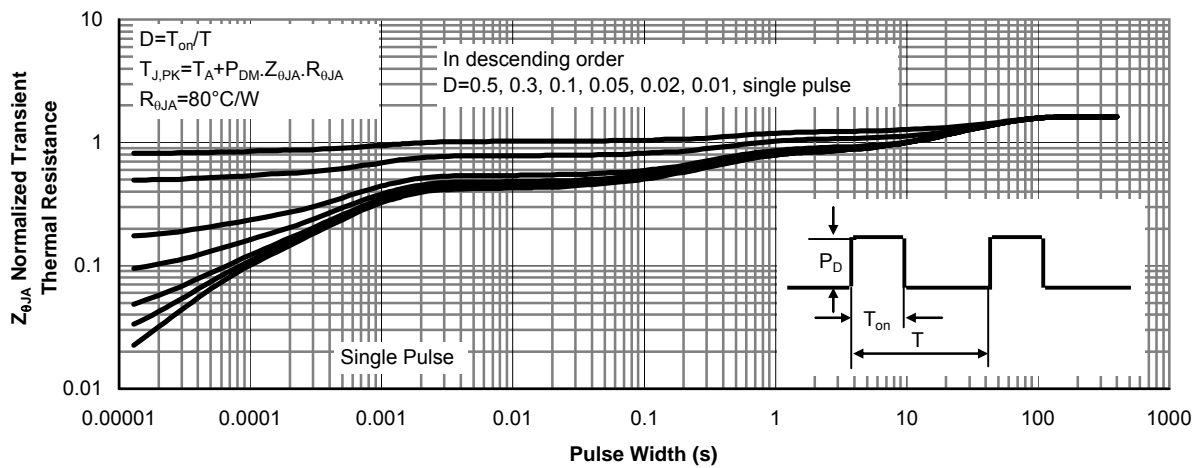
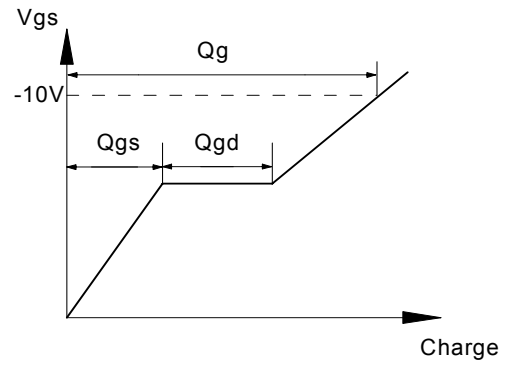
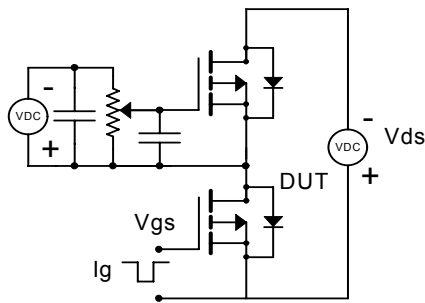
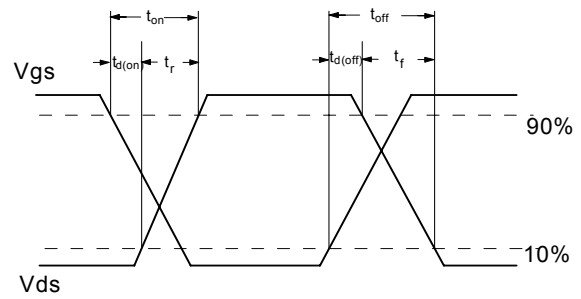
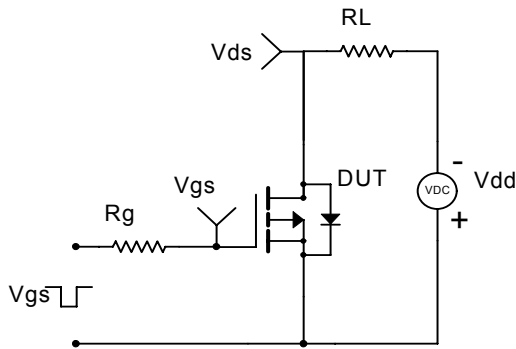


Figure 16: Schottky Normalized Maximum Transient Thermal Impedance

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

