

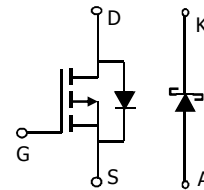
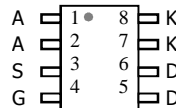
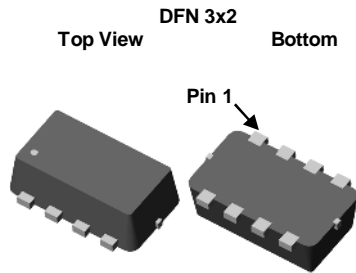
## 20V P-Channel MOSFET with Schottky Diode

### General Description

The AON4703 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.

### Features

$V_{DS}$  (V) = -20V  
 $I_D = -3.4A$  ( $V_{GS} = -4.5V$ )  
 $R_{DS(ON)} < 90m\Omega$  ( $V_{GS} = -4.5V$ )  
 $R_{DS(ON)} < 120m\Omega$  ( $V_{GS} = -2.5V$ )  
 $R_{DS(ON)} < 160m\Omega$  ( $V_{GS} = -1.8V$ )  
**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	$V_{GS}$	$\pm 8$		V
Continuous Drain Current <sup>A</sup>	$I_D$	$T_A=25^\circ\text{C}$	-3.4	A
		$T_A=70^\circ\text{C}$	-2.7	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	-15		
Schottky reverse voltage	$V_{KA}$		20	V
Continuous Forward Current <sup>A</sup>	$I_F$	$T_A=25^\circ\text{C}$	1.9	A
		$T_A=70^\circ\text{C}$	1.2	
Pulsed Forward Current <sup>B</sup>	$I_{FM}$		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 <sup>A</sup>	$t \leq 10s$	$R_{\theta JA}$	51	75	$^\circ\text{C/W}$
	Steady-State		88	110	
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	28	35	
Thermal Characteristics Schottky					
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10s$	$R_{\theta JA}$	66	80	$^\circ\text{C/W}$
	Steady-State		95	130	
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	40	50	

**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	-20			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-20V, 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> =±8V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.4	-0.65	-1	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-5V	-15			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3.4A T <sub>J</sub> =125°C		51 64	90 135	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2.5A		65	120	mΩ
		V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-1.5A		83	160	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-3.4A		12		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.7	-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> =-10V, f=1MHz		560	745	pF
C <sub>OSS</sub>	Output Capacitance		80		pF	
C <sub>RSS</sub>	Reverse Transfer Capacitance		70		pF	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		15	23	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-10V, I <sub>D</sub> =-3.4A		8.5	11	nC
Q <sub>gs</sub>	Gate Source Charge		1.2		nC	
Q <sub>gd</sub>	Gate Drain Charge		2.1		nC	
t <sub>D(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-10V, R <sub>L</sub> =2.9Ω, R <sub>GEN</sub> =3Ω		7.2		ns
t <sub>r</sub>	Turn-On Rise Time		36		ns	
t <sub>D(off)</sub>	Turn-Off Delay Time		53		ns	
t <sub>f</sub>	Turn-Off Fall Time		56		ns	
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-3.4A, di/dt=100A/μs		37	49	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-3.4A, di/dt=100A/μs		27		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> =16V			0.2	mA
		V <sub>R</sub> =16V, T <sub>J</sub> =125°C			20	
C <sub>T</sub>	Junction Capacitance	V <sub>R</sub> =10V		44		pF
t <sub>rr</sub>	Schottky Reverse Recovery Time	I <sub>F</sub> =1A, di/dt=100A/μs		11	14	ns
Q <sub>rr</sub>	Schottky Reverse Recovery Charge	I <sub>F</sub> =1A, di/dt=100A/μs		2.5		nC

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: Repetitive rating, pulse width limited by junction temperature.

C: The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> 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 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=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

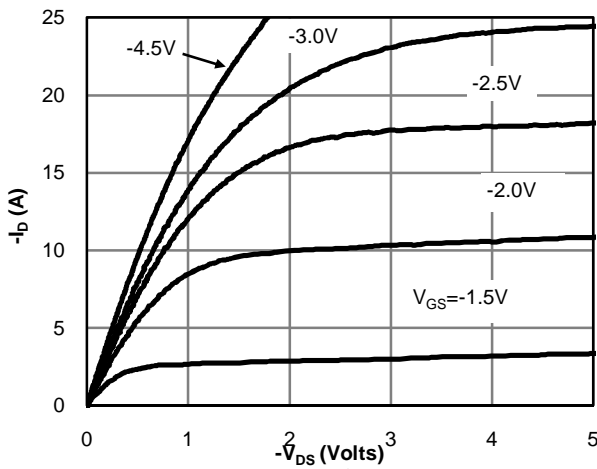


Fig 1: On-Region Characteristics

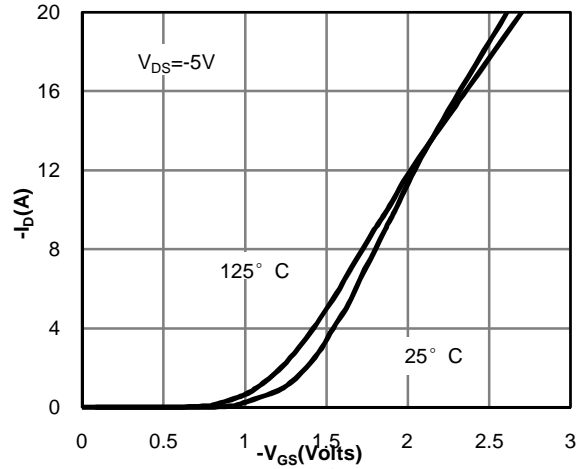


Figure 2: Transfer Characteristics

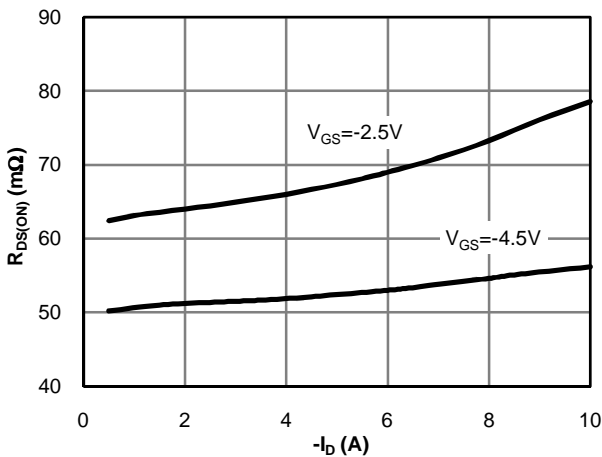


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

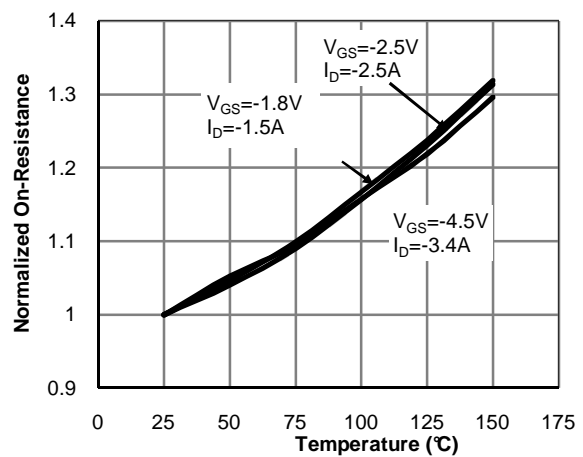


Figure 4: On-Resistance vs. Junction Temperature

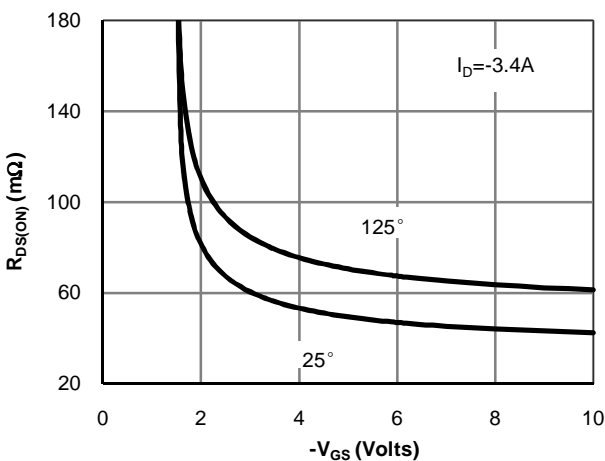


Figure 5: On-Resistance vs. Gate-Source Voltage

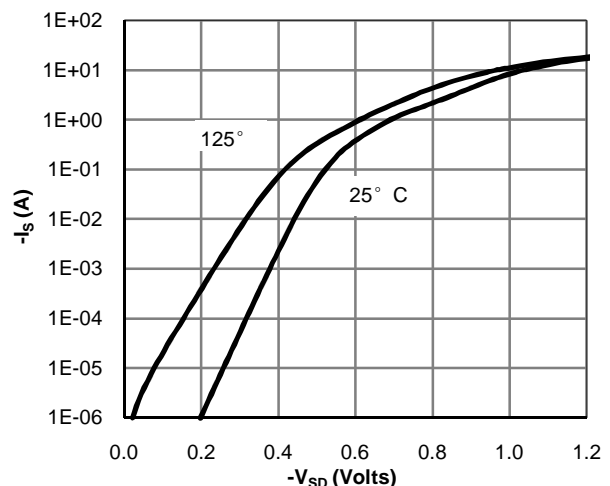
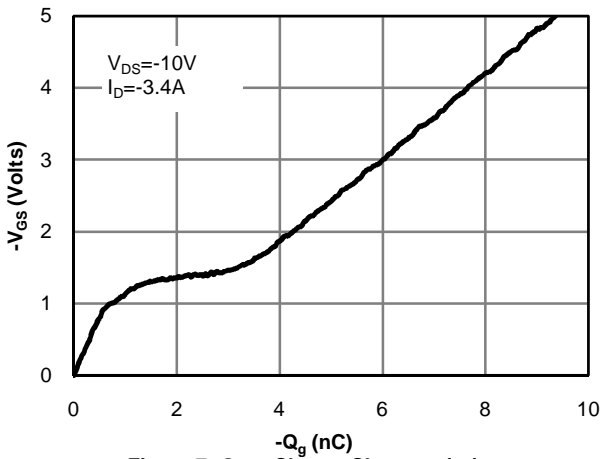
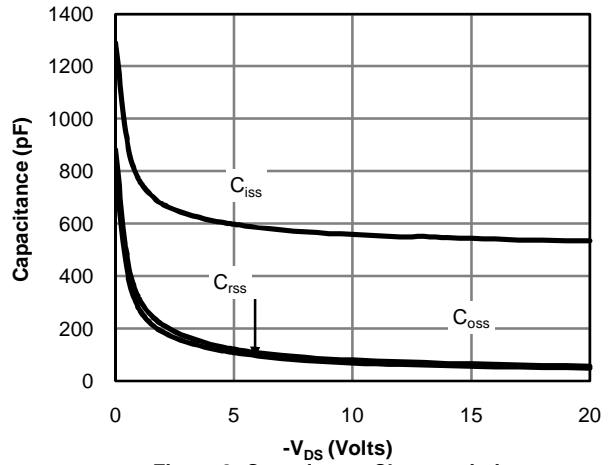


Figure 6: Body-Diode Characteristics

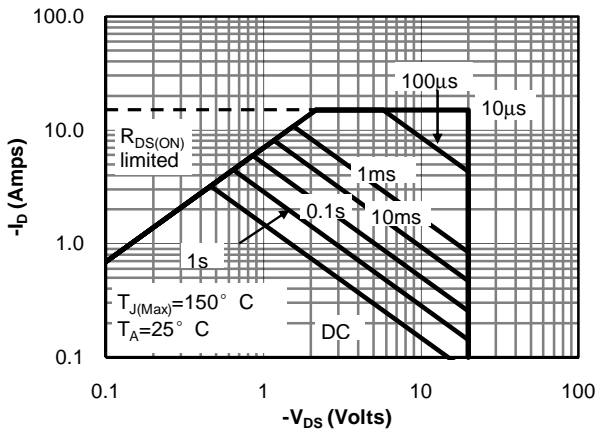
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



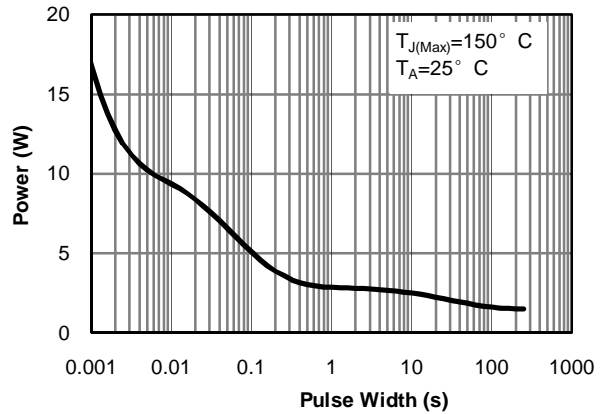
**Figure 7: Gate-Charge Characteristics**



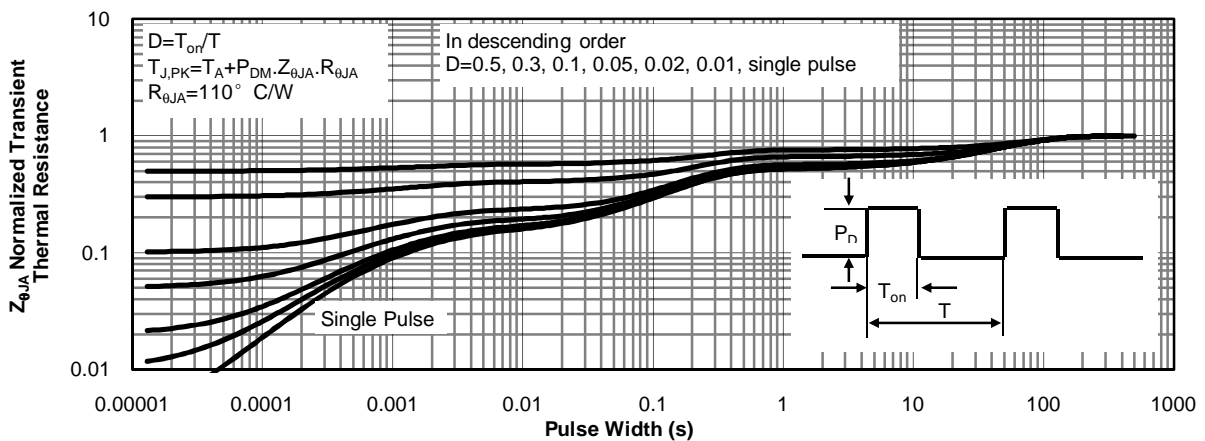
**Figure 8: Capacitance Characteristics**



**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**

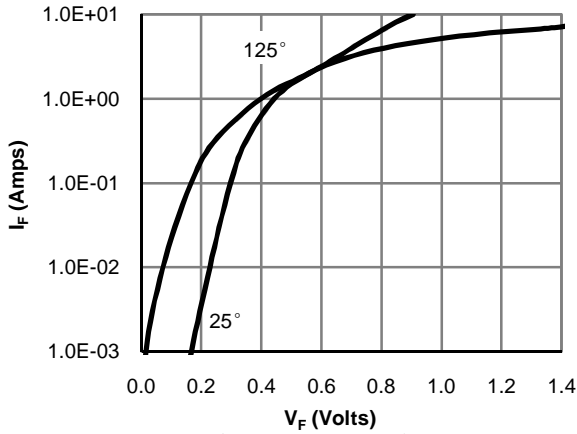


Figure 12: Schottky Forward Characteristics

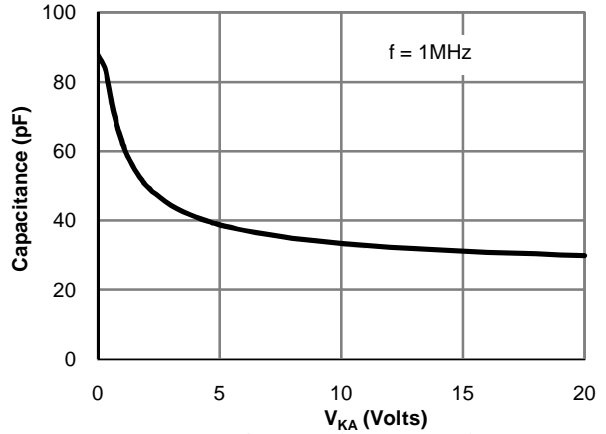


Figure 13: Schottky Capacitance Characteristics

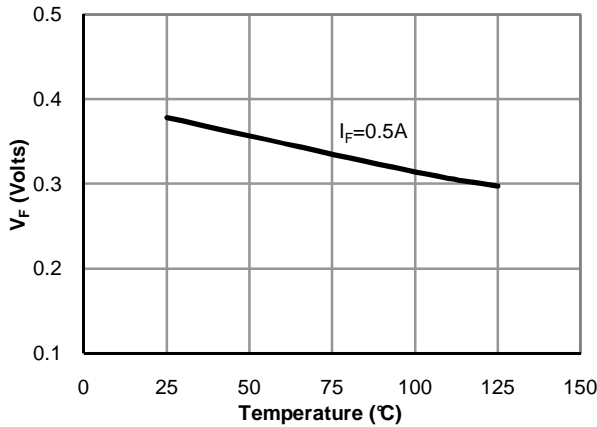


Figure 14: Schottky Forward Drop vs. Junction Temperature

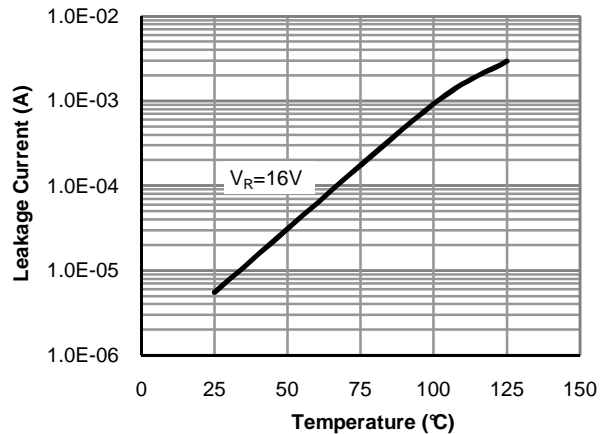


Figure 15: Schottky Leakage current vs. Junction Temperature

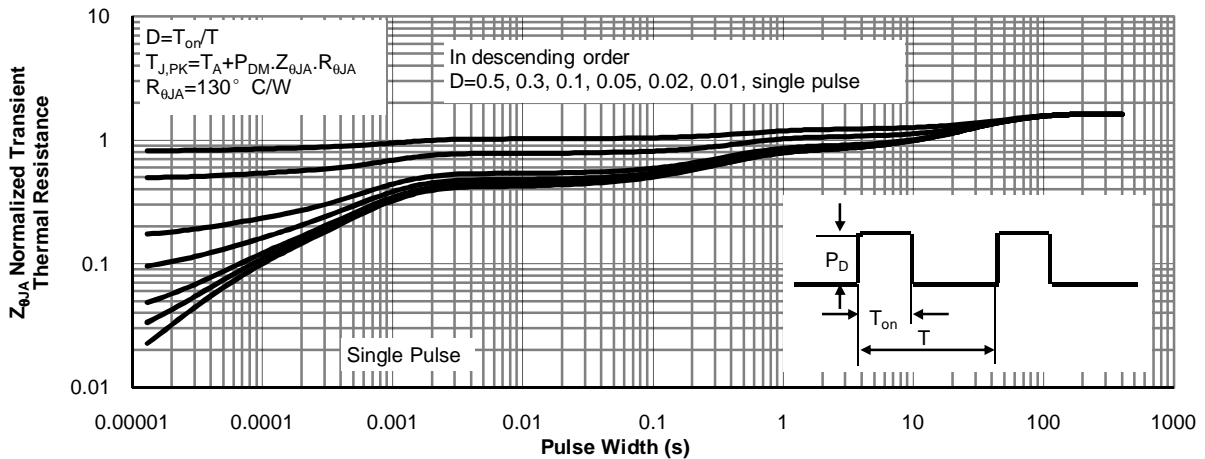
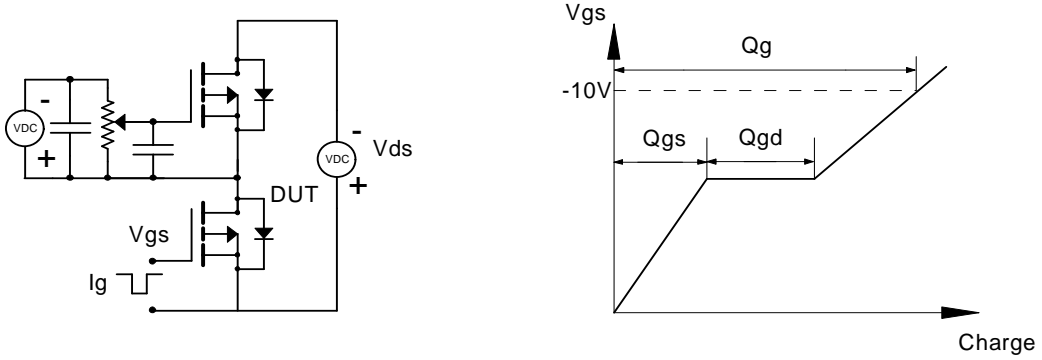
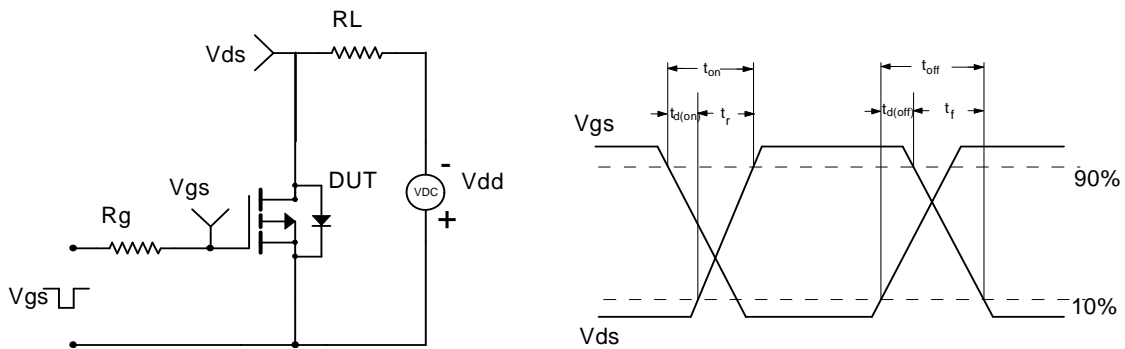


Figure 16: Schottky Normalized Maximum Transient Thermal Impedance

**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**

