

AON2701

P-Channel Enhancement Mode Field Effect Transistor with Schottky Diode

General Description

The AON2701/L 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 DC-DC conversion applications.

AON2701 and AON2701L are electrically identical.

-RoHS Compliant

-Halogen Free*

Features

V_{DS} (V) = -20V

I_D = -3A (V_{GS} = -4.5V)

$R_{DS(ON)}$ < 120m Ω (V_{GS} = -4.5V)

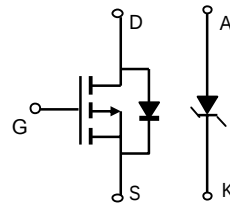
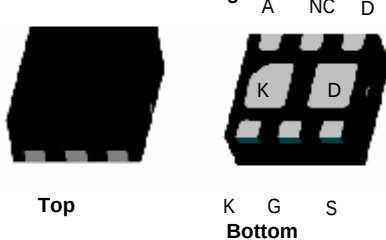
$R_{DS(ON)}$ < 160m Ω (V_{GS} = -2.5V)

$R_{DS(ON)}$ < 200m Ω (V_{GS} = -1.8V)

SCHOTTKY

V_{KA} (V) = 20V, I_F = 2A, V_F < 0.45V@1A

DFN 2x2 Package



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	$T_A=25^\circ\text{C}$	-3		A
	$T_A=70^\circ\text{C}$	-2.3		
Pulsed Drain Current ^B	I_{DM}	-15		
Schottky reverse voltage	V_{KA}		20	V
Continuous Forward Current ^A	$T_A=25^\circ\text{C}$		2.5	A
	$T_A=70^\circ\text{C}$		1.5	
Pulsed Forward Current ^B	I_{FM}		15	
Power Dissipation	$T_A=25^\circ\text{C}$	1.5	1.45	W
	$T_A=70^\circ\text{C}$	0.95	0.92	
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 ≤ 10s	R _{θJA}	35	45	°C/W
Maximum Junction-to-Ambient ^A	Steady-State		65	85	
Thermal Characteristics Schottky					
Maximum Junction-to-Ambient ^A	t ≤ 10s	R _{θJA}	36	47	°C/W
Maximum Junction-to-Ambient ^A	Steady-State		67	87	

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	-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	-0.3	-0.5	-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 =-3A T _J =125°C		100 135	120 170	mΩ
		V _{GS} =-2.5V, I _D =-2.6A		128	160	mΩ
		V _{GS} =-1.8V, I _D =-1.5A		160	200	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-3A		6		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.76	-1	V
I _S	Maximum Body-Diode Continuous Current				-1.1	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-10V, f=1MHz		540	700	pF
C _{oss}	Output Capacitance			90		pF
C _{rss}	Reverse Transfer Capacitance			63		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		9.5	13	Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-10V, I _D =-3A		5	6.5	nC
Q _{gs}	Gate Source Charge			1.2		nC
Q _{gd}	Gate Drain Charge			1		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-4.5V, V _{DS} =-10V, R _L =1.5Ω, R _{GEN} =3Ω		5		ns
t _r	Turn-On Rise Time			40		ns
t _{D(off)}	Turn-Off DelayTime			28.5		ns
t _f	Turn-Off Fall Time			46		ns
t _{rr}	Body Diode Reverse Recovery Time			21	28	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-3A, dI/dt=100A/μs		9.1		nC
SCHOTTKY PARAMETERS						
V _F	Forward Voltage Drop	I _F =1A		0.4	0.45	V
I _{rm}	Maximum reverse leakage current	V _R =5V			0.05	mA
		V _R =5V, T _J =125°C			10	
I _{rm}	Maximum reverse leakage current	V _R =16V			0.1	mA
		V _R =16V, T _J =125°C			20	
C _T	Junction Capacitance	V _R =10V		34		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		0.8		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. The current rating is based on the t ≤ 10s thermal resistance rating.

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 <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.

*This device is guaranteed green after data code 7111 (Oct 15 2007).

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: MOSFET

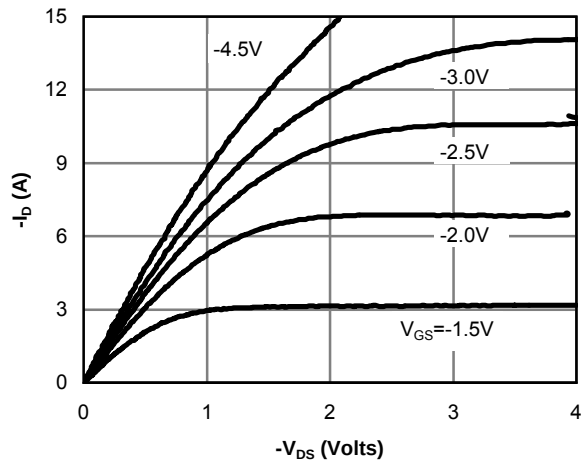


Figure 1: On-Region Characteristics

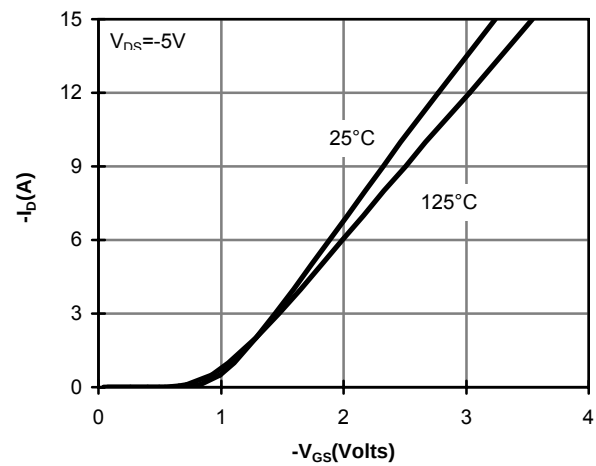


Figure 2: Transfer Characteristics

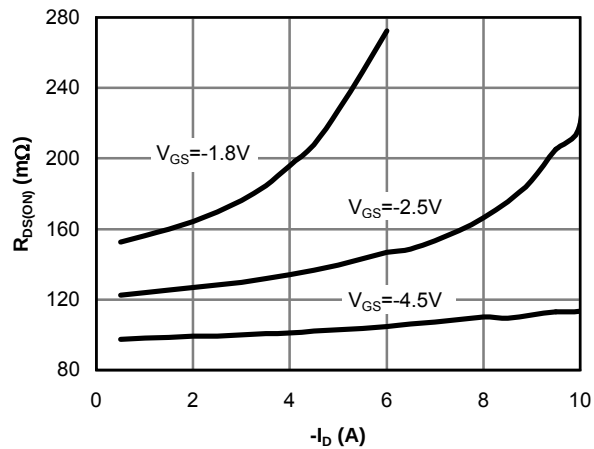


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

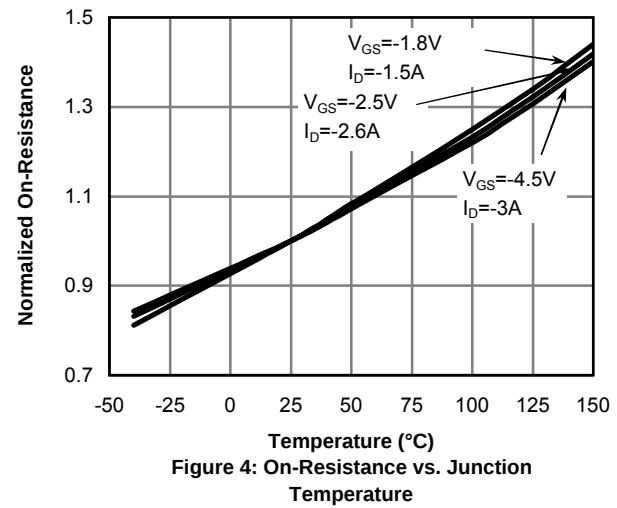


Figure 4: On-Resistance vs. Junction Temperature

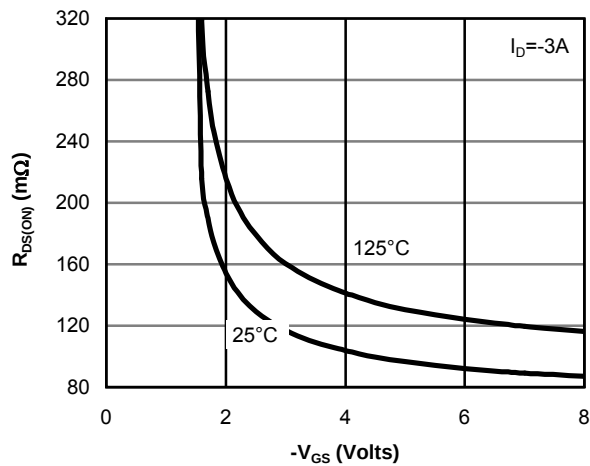


Figure 5: On-Resistance vs. Gate-Source Voltage

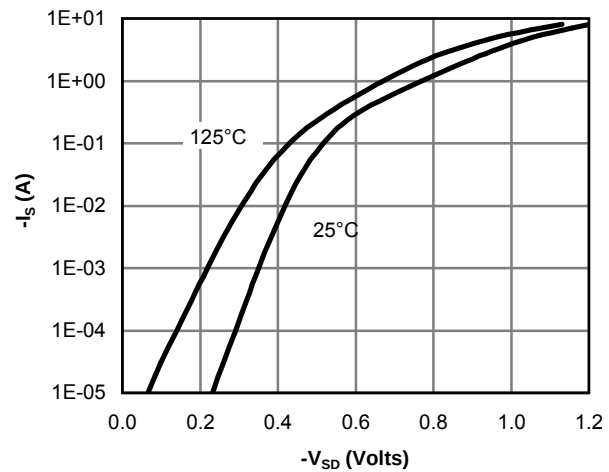


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: MOSFET

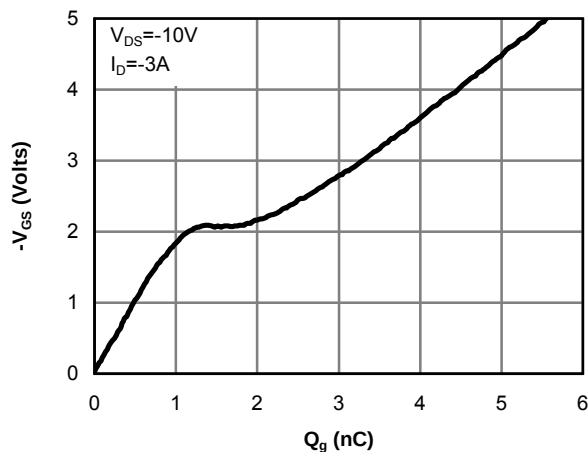


Figure 7: Gate-Charge Characteristics

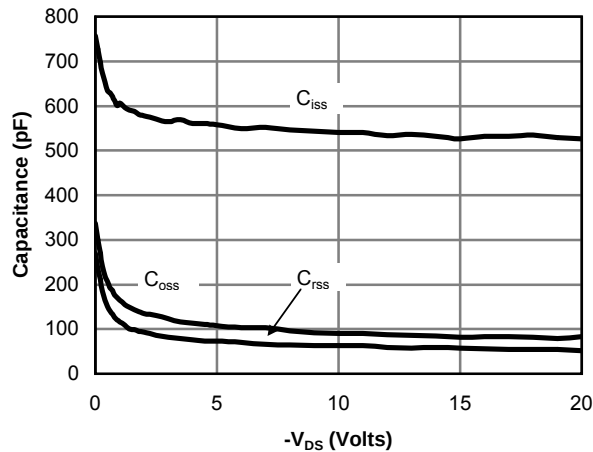


Figure 8: Capacitance Characteristics

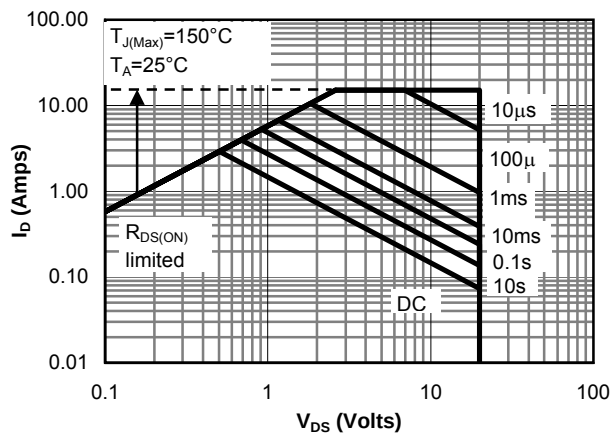


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

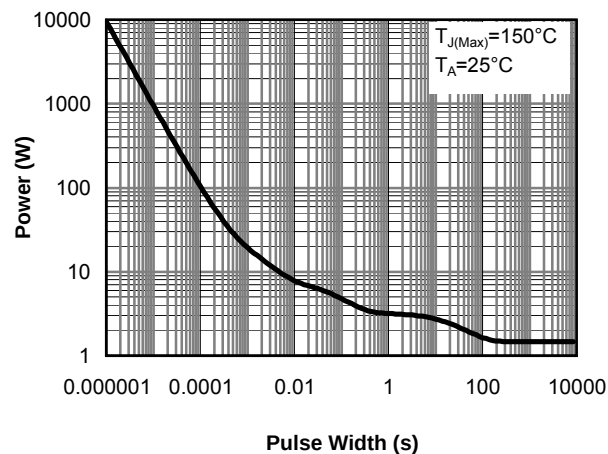


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

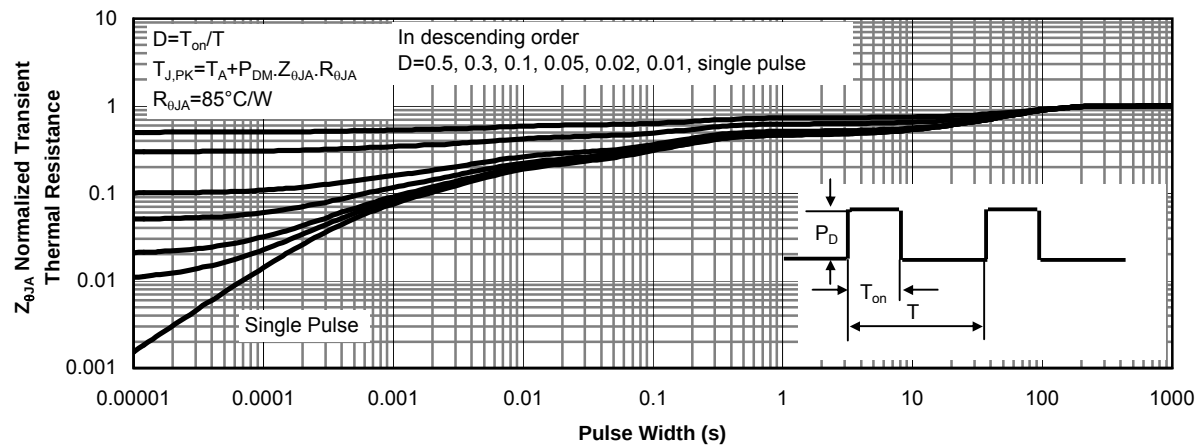


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: SCHOTTKY

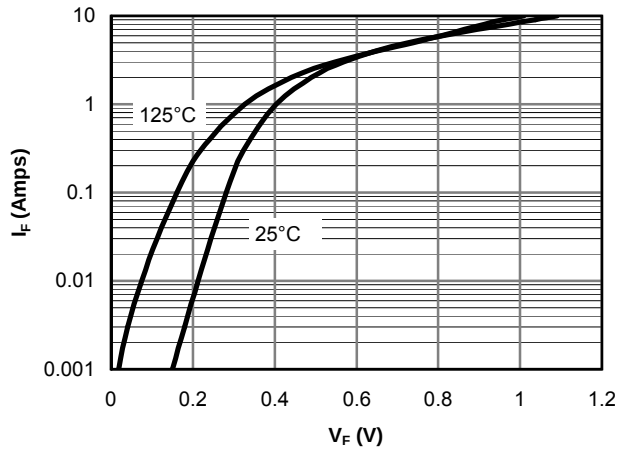


Figure 12: Schottky Forward Characteristics

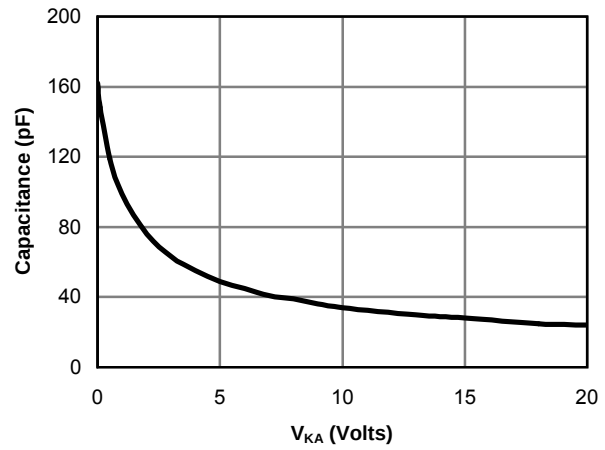


Figure 13: Schottky Capacitance Characteristics

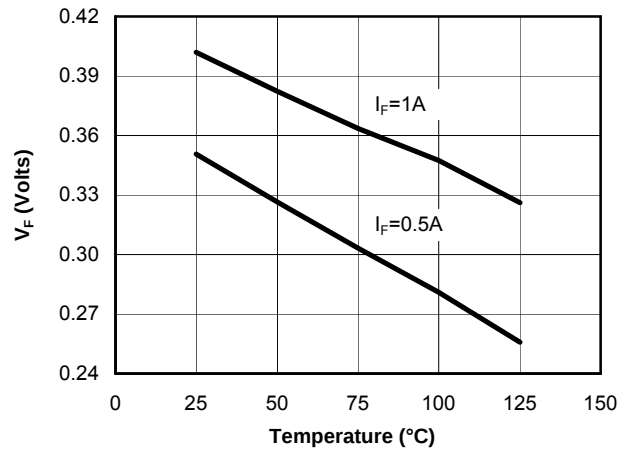


Figure 14: Schottky Forward Drop vs. Junction Temperature

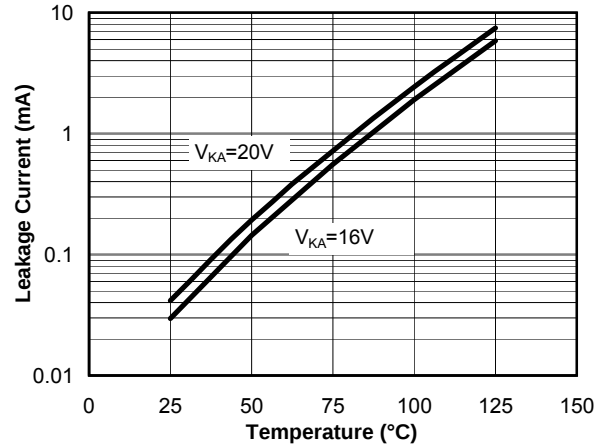


Figure 15: Schottky Leakage Current vs. Junction Temperature

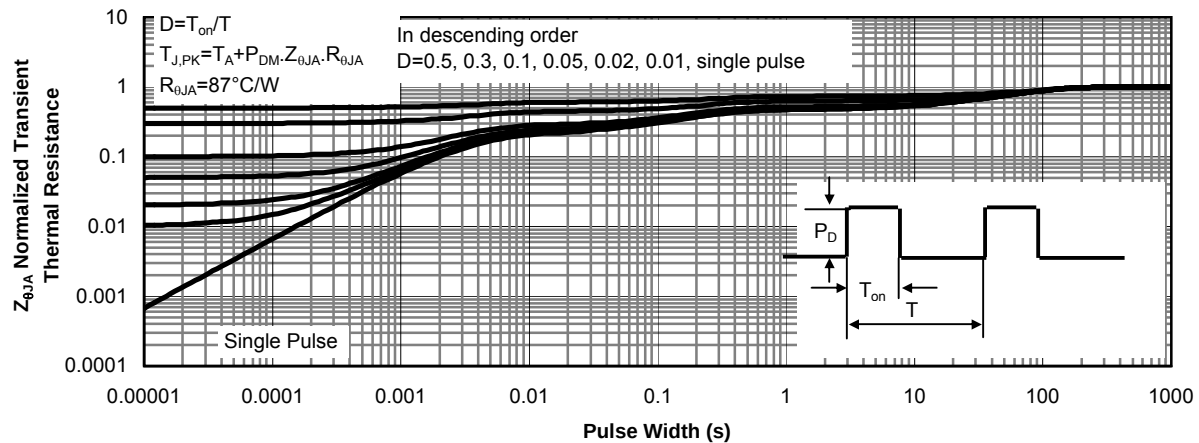
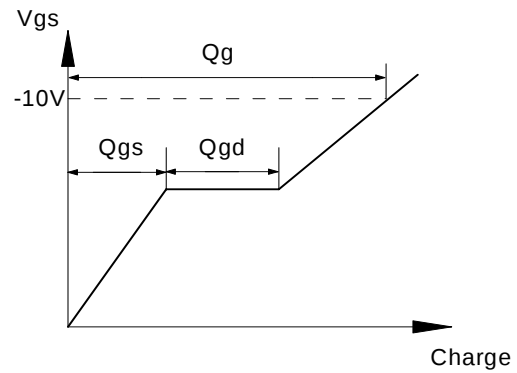
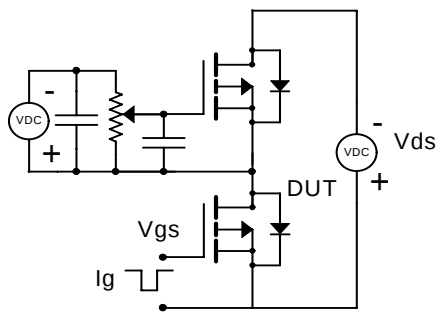
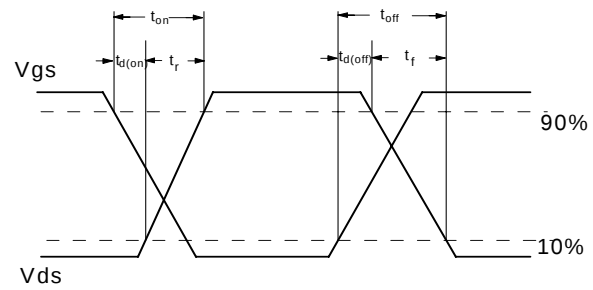
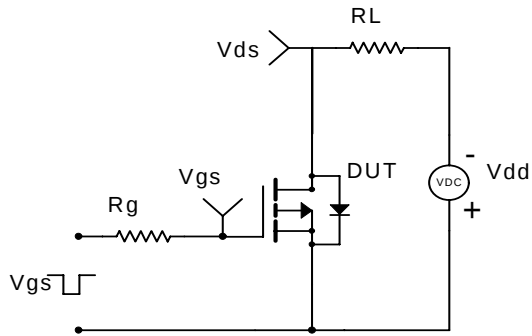


Figure 16: Schottky Normalized Maximum Transient Thermal Impedance (Note E)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

