AON2707

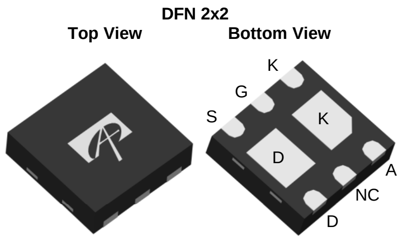
30V P-Channel MOSFET with Schottky Diode

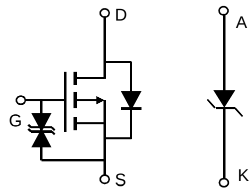
General Description

The AON2707 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.

Product Summary

V_{DS}	-30V
I_D (at V_{GS}=-10V)	-4A
$R_{DS(ON)}$ (at V_{GS}=-10V)	< 117mΩ
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	< 138mΩ
$R_{DS(ON)}$ (at V_{GS}=-2.5V)	< 193mΩ
Typical ESD protection	**HBM Class 2**
V_{KA}	20V
I_F	2A
V_F (at I_F=1A)	<0.45V





Absolute Maximum Ratings T_A=25°C unless otherwise noted					
Parameter		**Symbol**	**MOSFET**	**Schottky**	**Units**
Drain-Source Voltage		V_{DS}	-30		V
Gate-Source Voltage		V_{GS}	±12		V
Continuous Drain Current [A]	T_A=25°C	I_D	-4		A
	T_A=70°C		-3		
Pulsed Drain Current [B]		I_{DM}	-15		
Schottky reverse voltage		V_{KA}		20	V
Continuous Forward Current [A]	T_A=25°C	I_F		2.5	A
	T_A=70°C			1.5	
Pulsed Forward Current [B]		I_{FM}		15	
Power Dissipation [A]	T_A=25°C	P_D	2.8	2.7	W
	T_A=70°C		1.8	1.7	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	-55 to 150	°C

Thermal Characteristics					
Parameter: MOSFET		**Symbol**	**Typ**	**Max**	**Units**
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	35	45	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		65	85	°C/W
Parameter: Schottky					
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	36	47	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		67	87	°C/W

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		-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-30V, V_{GS}=0V				-1	µA
			T_J=55°C			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±12V				±10	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250µA		-0.7	-1.05	-1.5	V
$I_{D(ON)}$	On state drain current	V_{GS}=-10V, V_{DS}=-5V		-15			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-4A			97	117	mΩ
			T_J=125°C		138	165	
		V_{GS}=-4.5V, I_D=-2A			110	138	mΩ
		V_{GS}=-2.5V, I_D=-1A			148	193	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-4A			9		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V			-0.8	-1	V
I_S	Maximum Body-Diode Continuous Current					-3.2	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz			305		pF
C_{oss}	Output Capacitance				42		pF
C_{rss}	Reverse Transfer Capacitance				26		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz			8.5	17	Ω
SWITCHING PARAMETERS							
$Q_{g(10V)}$	Total Gate Charge	V_{GS}=-10V, V_{DS}=-15V, I_D=-4A			6.8	12	nC
$Q_{g(4.5V)}$	Total Gate Charge				3.2	6	nC
Q_{gs}	Gate Source Charge				0.75		nC
Q_{gd}	Gate Drain Charge				1.2		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=3.75Ω, R_{GEN}=3Ω			6.0		ns
t_r	Turn-On Rise Time				5		ns
$t_{D(off)}$	Turn-Off DelayTime				21		ns
t_f	Turn-Off Fall Time				6.5		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-4A, dI/dt=100A/µs			15		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-4A, dI/dt=100A/µs			6		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 $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°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 $R_{\theta JA}$ 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 <300 ms 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.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

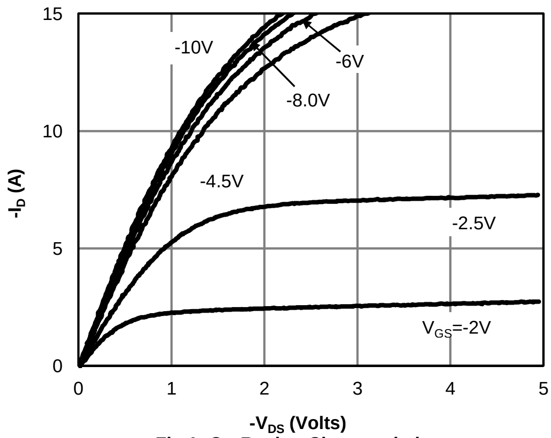


Fig 1: On-Region Characteristics

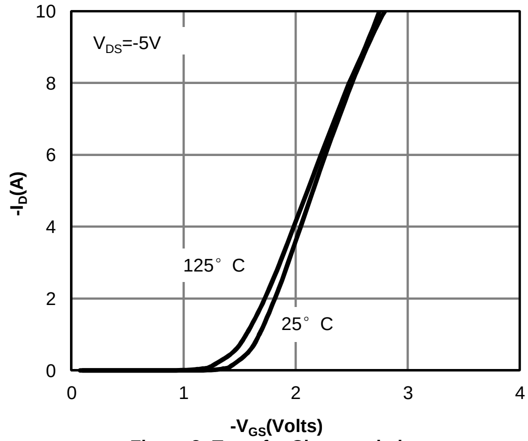


Figure 2: Transfer Characteristics

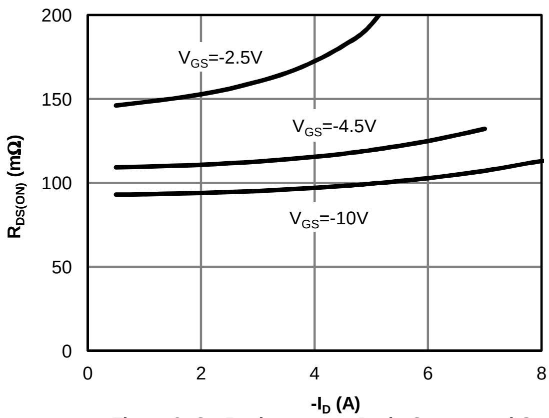


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

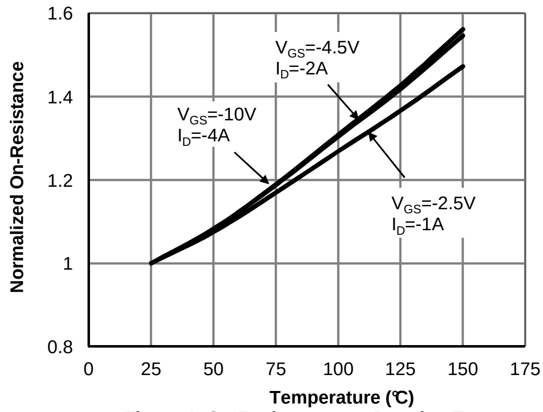


Figure 4: On-Resistance vs. Junction Temperature

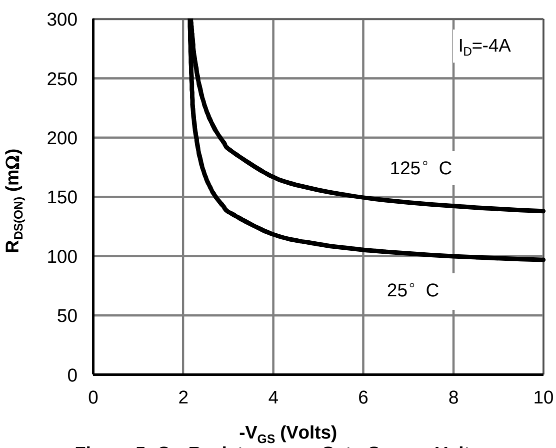


Figure 5: On-Resistance vs. Gate-Source Voltage

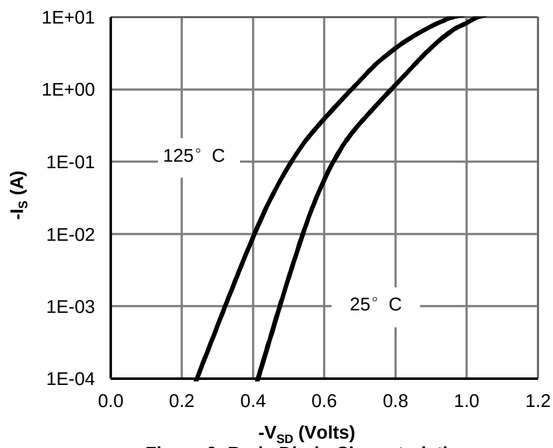


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

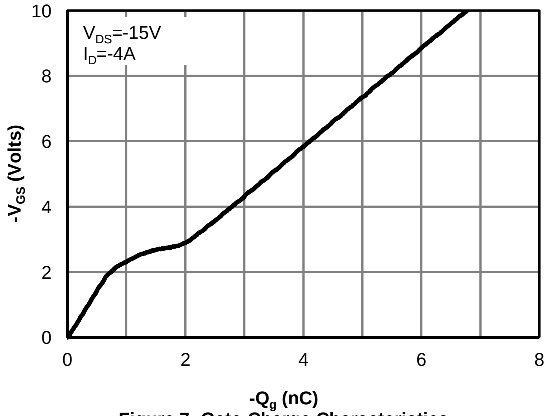


Figure 7: Gate-Charge Characteristics

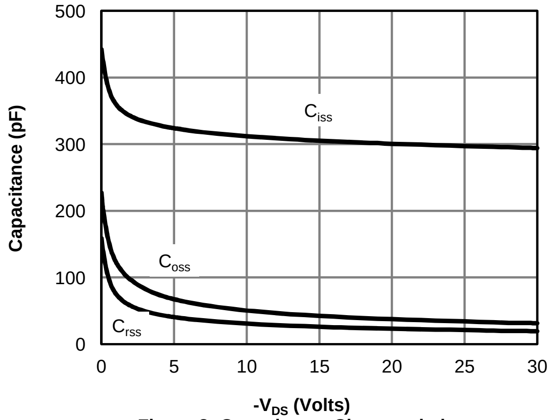


Figure 8: Capacitance Characteristics

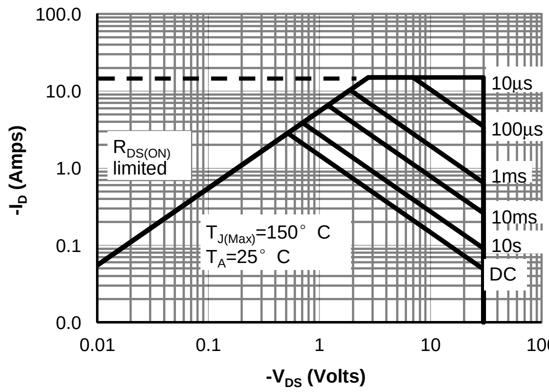


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

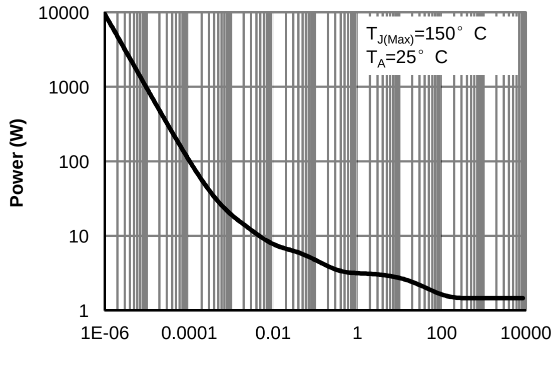


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

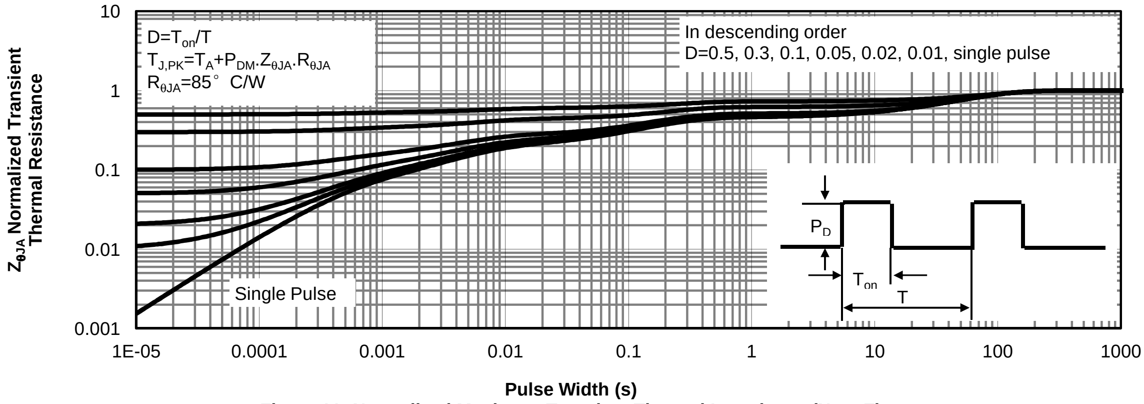


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

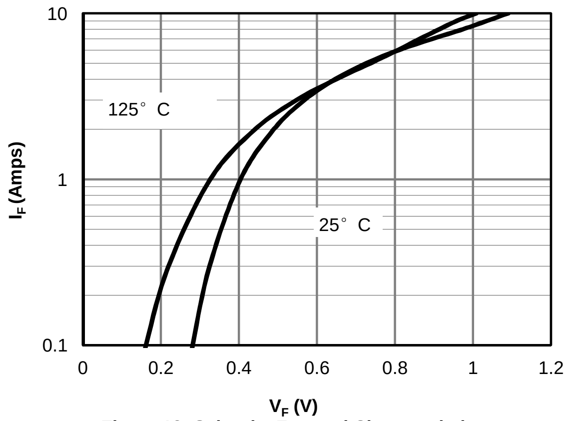


Figure 12: Schottky Forward Characteristics

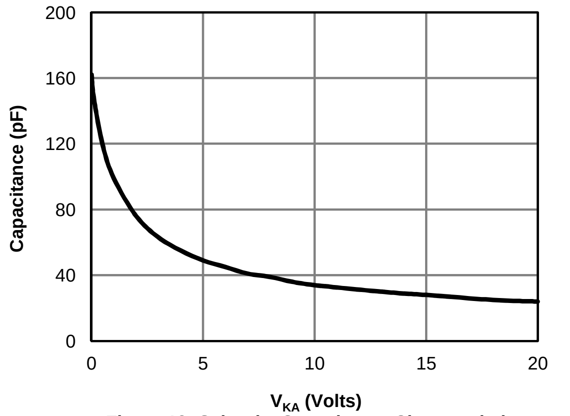


Figure 13: Schottky Capacitance Characteristics

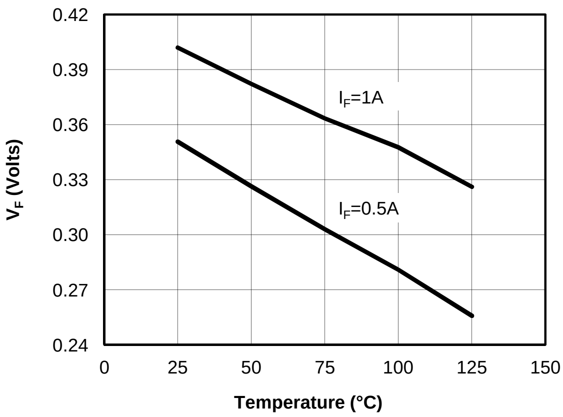


Figure 14: Schottky Forward Drop vs. Junction Temperature

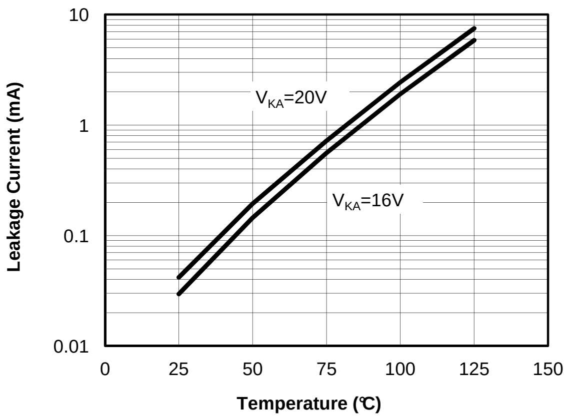


Figure 15: Schottky Leakage Current vs. Junction Temperature

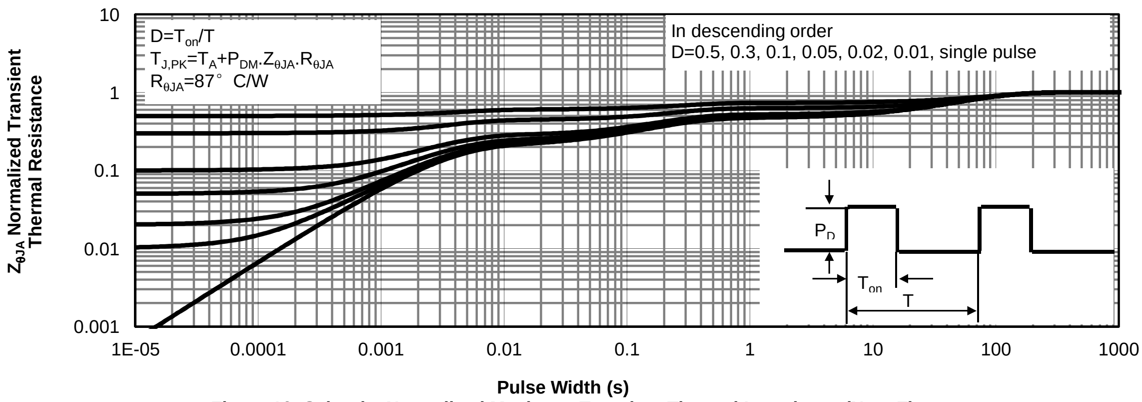
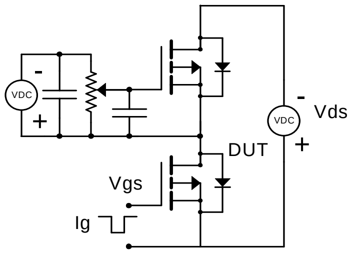
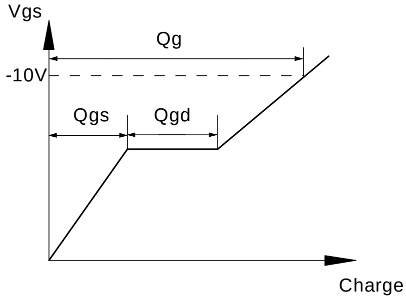


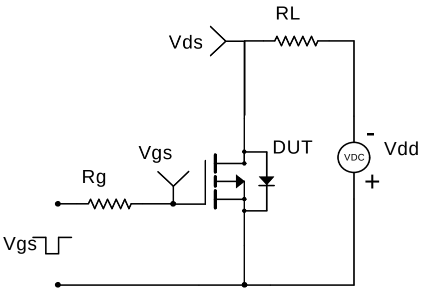
Figure 16: Schottky Normalized Maximum Transient Thermal Impedance (Note E)

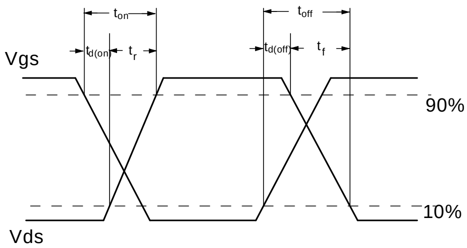
Gate Charge Test Circuit & Waveform





Resistive Switching Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms