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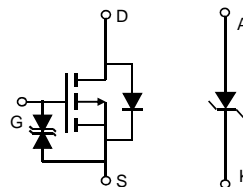
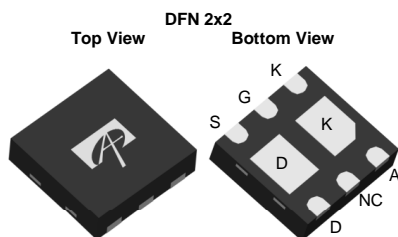
30V P-Channel MOSFET with Schottky Diode

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 $T_A=25^\circ C$ 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	I_D	$T_A=25^\circ C$	-4	A
		$T_A=70^\circ C$	-3	
Pulsed Drain Current ^B	I_{DM}	-15		
Schottky reverse voltage	V_{KA}		20	V
Continuous Forward Current ^A	I_F	$T_A=25^\circ C$	2.5	A
		$T_A=70^\circ C$	1.5	
Pulsed Forward Current ^B	I_{FM}		15	
Power Dissipation ^A	P_D	$T_A=25^\circ C$	2.8	W
		$T_A=70^\circ C$	1.8	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter: MOSFET	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A $t \leq 10s$	$R_{\theta JA}$	35	45	$^\circ C/W$
Maximum Junction-to-Ambient ^A Steady-State		65	85	$^\circ C/W$
Parameter: Schottky				
Maximum Junction-to-Ambient ^A $t \leq 10s$	$R_{\theta JA}$	36	47	$^\circ C/W$
Maximum Junction-to-Ambient ^A Steady-State		67	87	$^\circ C/W$

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 T _J =55°C			-1 -5	μA
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 T _J =125°C		97 138	117 165	mΩ
		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 Delay Time	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 Delay Time			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_{θJA} is measured with the device mounted on 1 in² 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 <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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

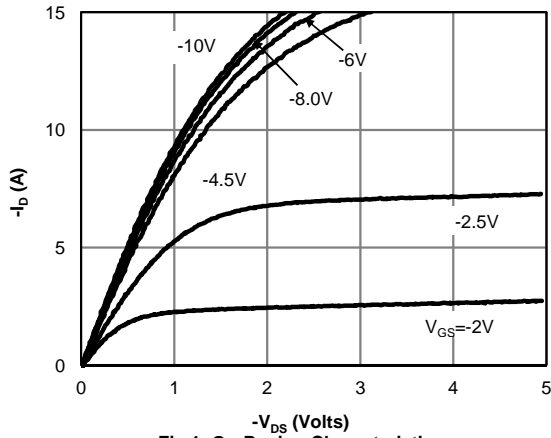


Fig 1: On-Region Characteristics

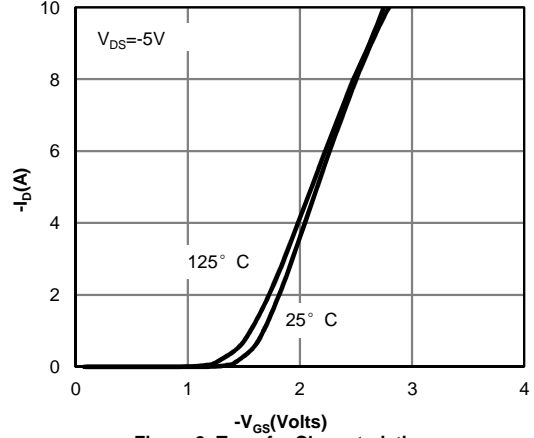


Figure 2: Transfer Characteristics

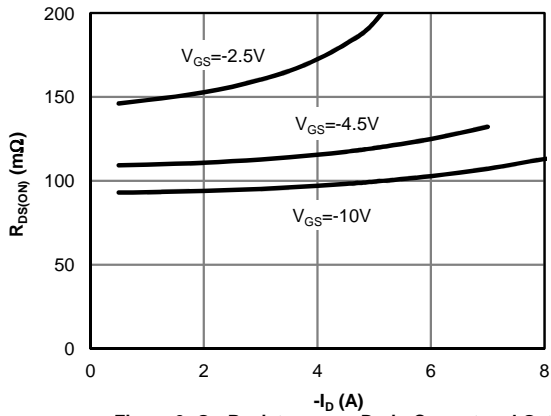


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

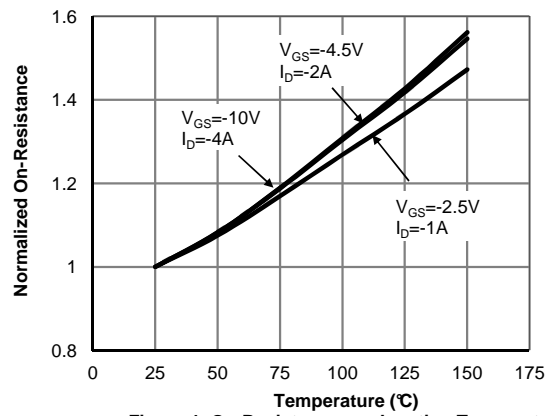


Figure 4: On-Resistance vs. Junction Temperature

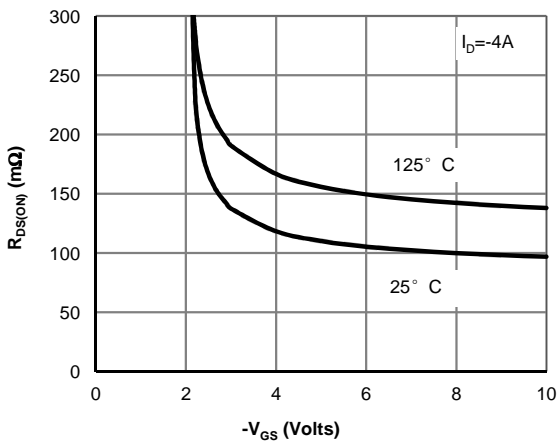


Figure 5: On-Resistance vs. Gate-Source Voltage

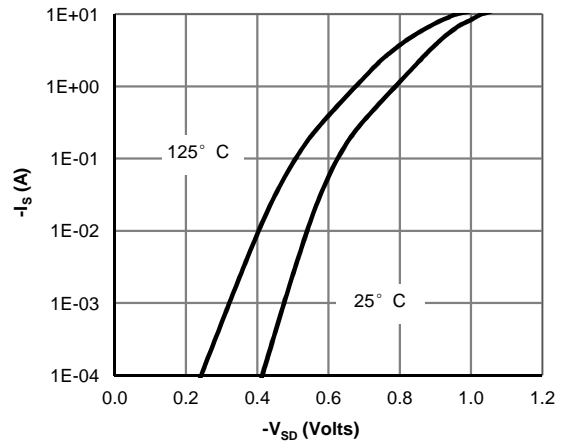


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

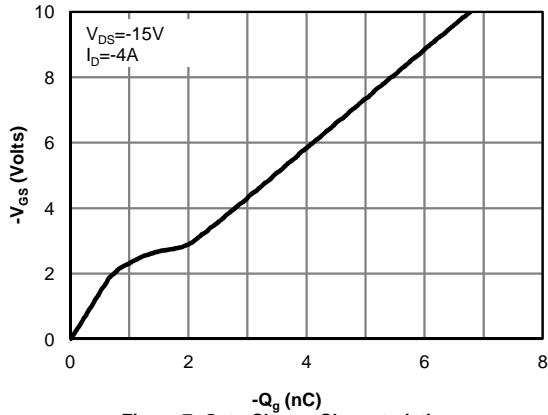


Figure 7: Gate-Charge Characteristics

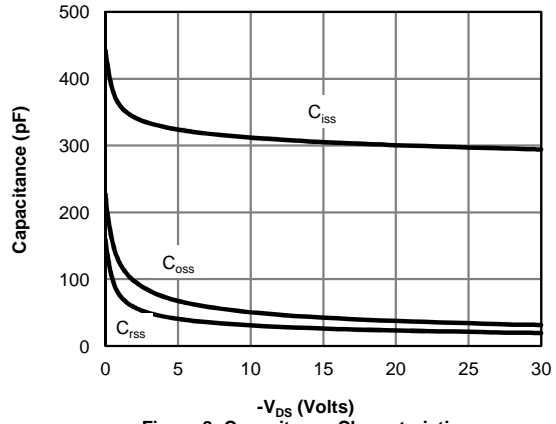


Figure 8: Capacitance Characteristics

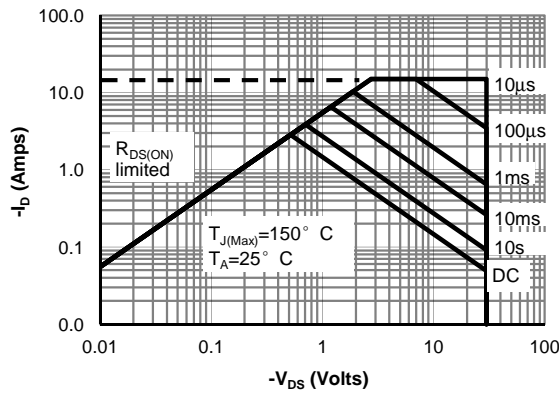


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

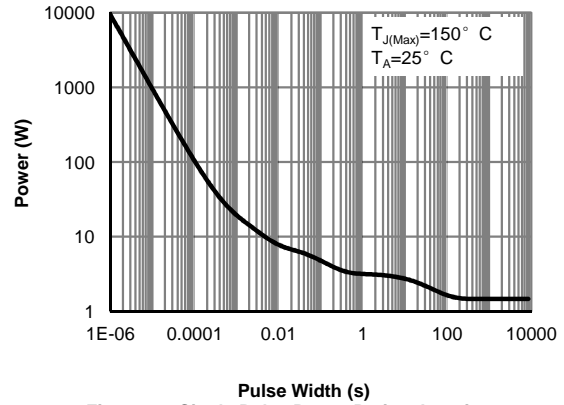


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

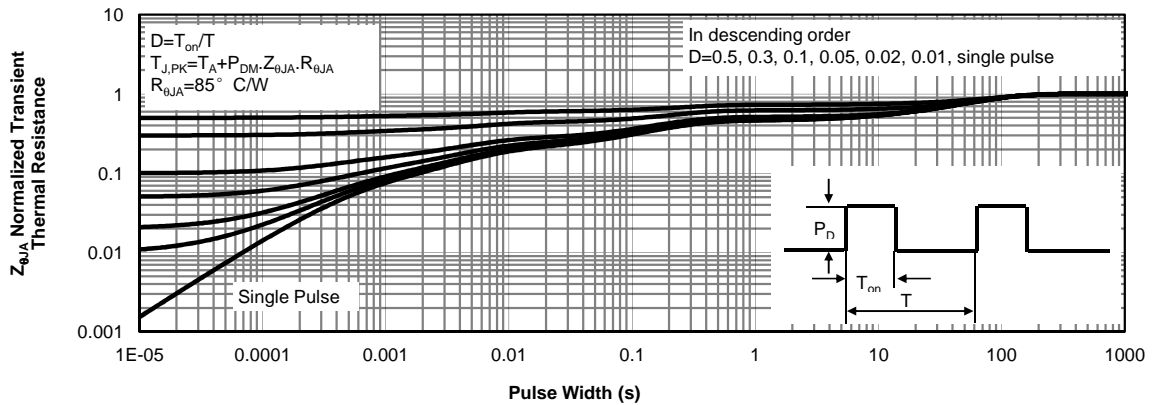


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

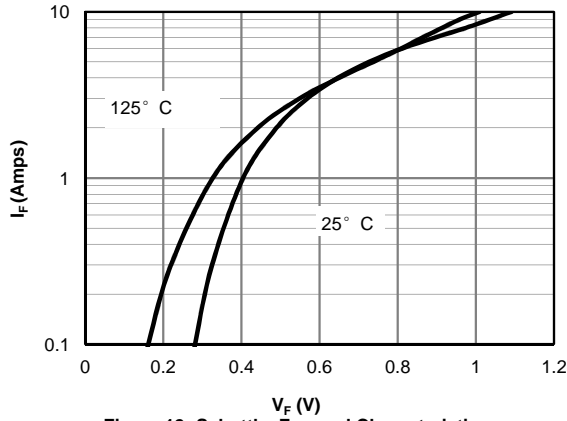


Figure 12: Schottky Forward Characteristics

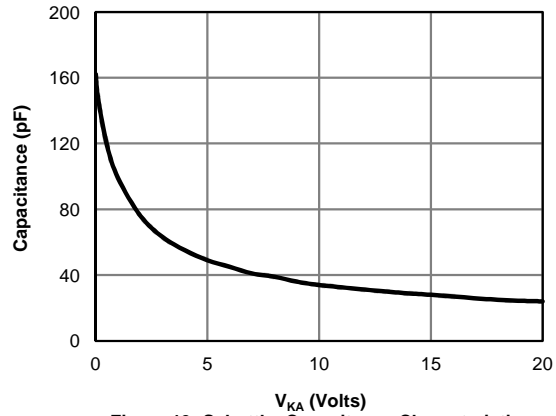


Figure 13: Schottky Capacitance Characteristics

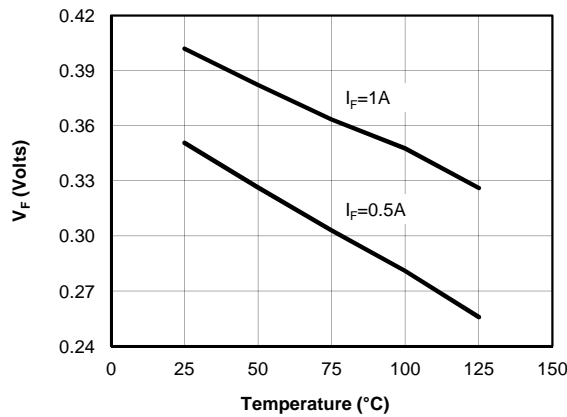


Figure 14: Schottky Forward Drop vs. Junction Temperature

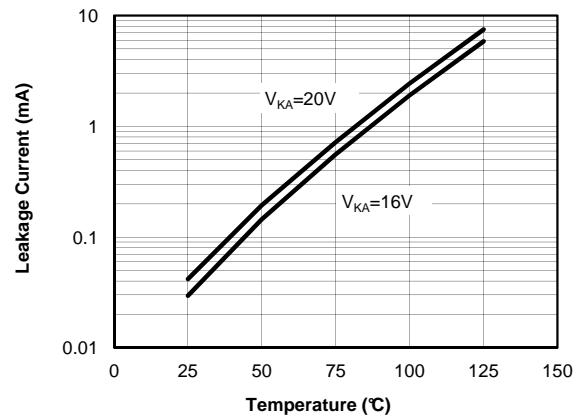


Figure 15: Schottky Leakage Current vs. Junction Temperature

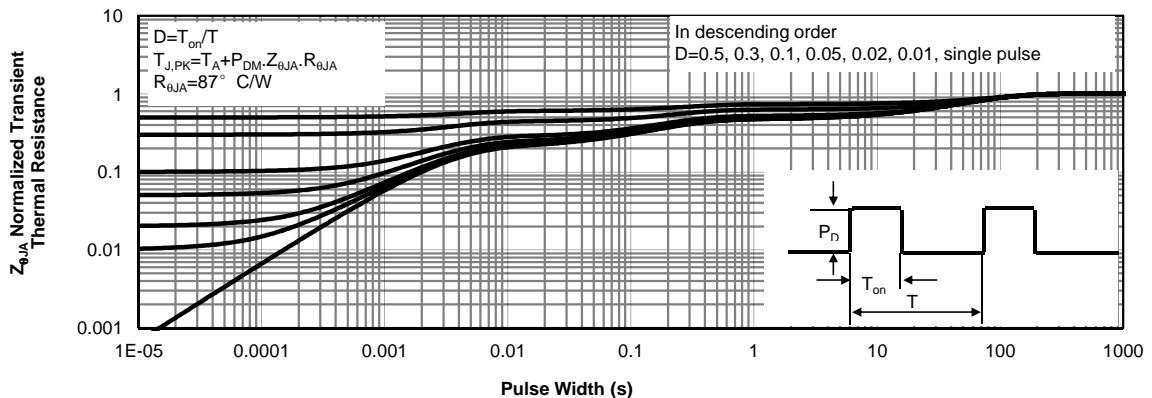
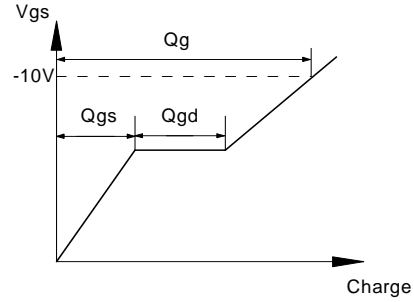
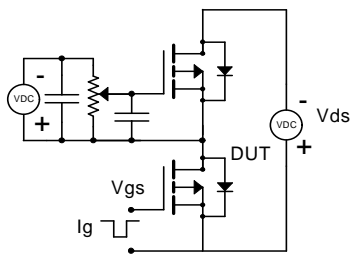
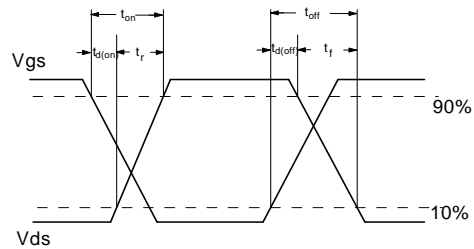
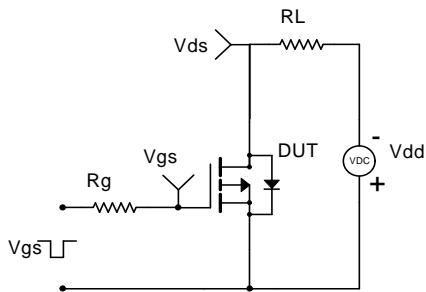


Figure 16: Schottky Normalized Maximum Transient Thermal Impedance (Note E)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

