ALPHA & OMEGA SEMICONDUCTOR

AO4772

30V N-Channel MOSFET

General Description

AO4772 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 "standard buck" DC-DC conversion applications.

Product Summary

V_{DS}	30V
I_D (at V_{GS}=10V)	6A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 30mΩ
$R_{DS(ON)}$ (at V_{GS} = 4.5V)	< 42mΩ

Schottky

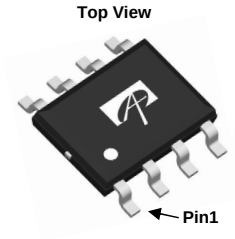
V_{KA}	30V
I_F	4A
V_F (at I_F=1A)	<0.45V

100% UIS Tested
100% R_g Tested

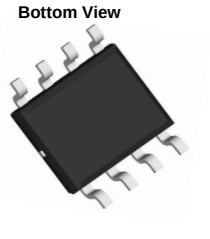
Green Product

SOIC-8

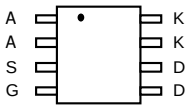
Top View

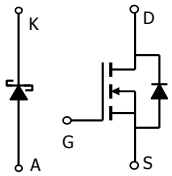


Bottom View



Top View





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}	±20		V
Continuous Drain Current	T_A=25°C	I_D	6		A
	T_A=70°C		5		
Pulsed Drain Current [C]		I_{DM}	30		
Avalanche Current [C]		I_{AS}, I_{AR}	10		A
Avalanche energy L=0.1mH [C]		E_{AS}, E_{AR}	5		mJ
Schottky reverse voltage		V_{KA}		30	V
Continuous Forward Current	T_A=25°C	I_F		4	A
	T_A=70°C			3	
Power Dissipation [B]	T_A=25°C	P_D	2	2	W
	T_A=70°C		1.3	1.3	
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	$R_{\theta JA}$	48	62.5	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		74	90	°C/W
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	32	40	°C/W
Parameter: Schottky					
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	48	62.5	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		74	90	°C/W
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	31	40	°C/W

Electrical Characteristics (T_J=25℃ 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℃			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±20V			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250µA	1.2	1.8	2.4	V
$I_{D(ON)}$	On state drain current	V_{GS}=10V, V_{DS}=5V	25			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=6A		25	30	mΩ
		T_J=125℃		40	48	
		V_{GS}=4.5V, I_D=5A		33	42	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=6A		15		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.8	1	V
I_S	Maximum Body-Diode Continuous Current				2.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz		255	310	pF
C_{oss}	Output Capacitance			45		pF
C_{rss}	Reverse Transfer Capacitance			35	50	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	1.6	3.25	4.9	Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=15V, I_D=6A	4	5.2	6.3	nC
Q_g(4.5V)	Total Gate Charge		2	2.55	3.2	nC
Q_{gs}	Gate Source Charge			0.85		nC
Q_{gd}	Gate Drain Charge			1.3		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=15V, R_L=2.5Ω, R_{GEN}=3Ω		4.5		ns
t_r	Turn-On Rise Time			2.5		ns
$t_{D(off)}$	Turn-Off DelayTime			14.5		ns
t_f	Turn-Off Fall Time			3.5		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=6A, dI/dt=100A/µs		8.5	12	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=6A, dI/dt=100A/µs		2.2	3	nC
SCHOTTKY PARAMETERS						
V_F	Forward Voltage Drop	I_F=1A		0.34	0.45	V
I_{rm}	Maximum reverse leakage current	V_R=24V			0.1	mA
		V_R=24V, T_J=125℃			80	
C_T	Junction Capacitance	V_R=15V		110		pF

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25℃. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on $T_{J(MAX)}$=150℃, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150℃. Ratings are based on low frequency and duty cycles to keep initialT_J=25℃.

D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300µs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedence which is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(MAX)}$=150℃. The SOA curve provides a single pulse ratin g.

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

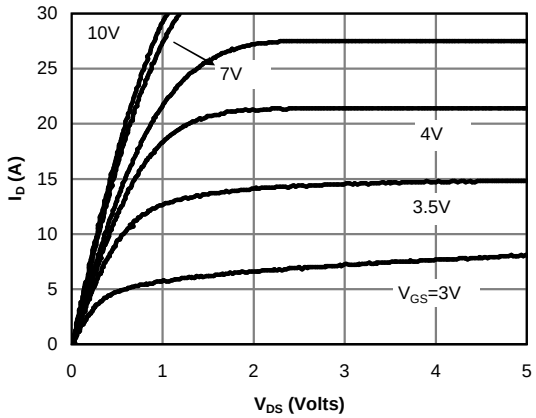


Fig 1: On-Region Characteristics (Note E)

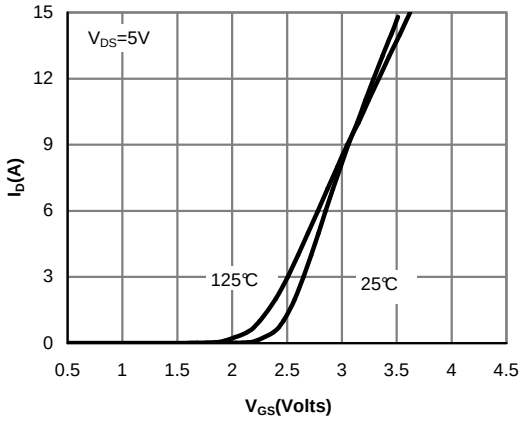


Figure 2: Transfer Characteristics (Note E)

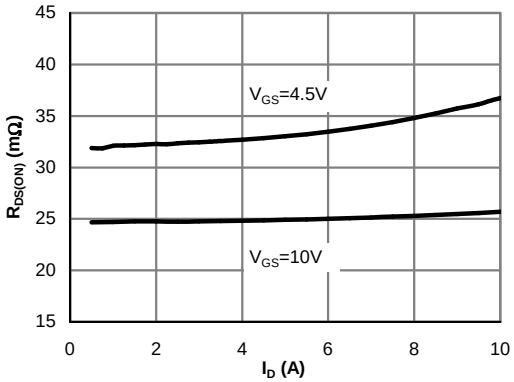


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

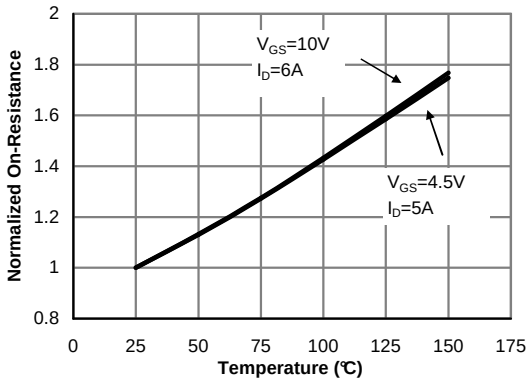


Figure 4: On-Resistance vs. Junction Temperature (Note E)

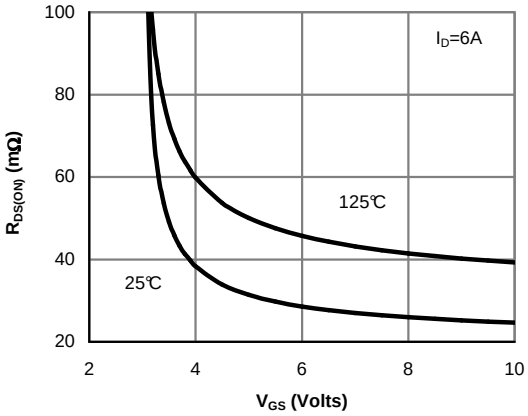


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

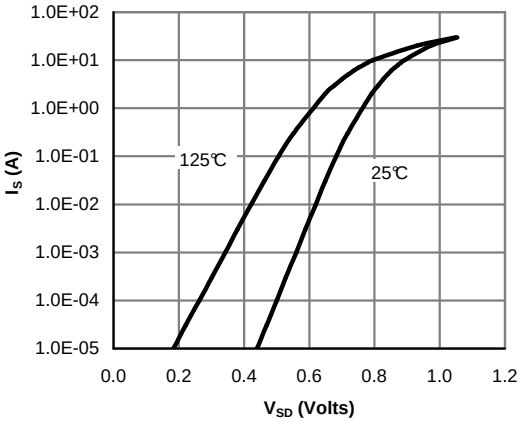


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

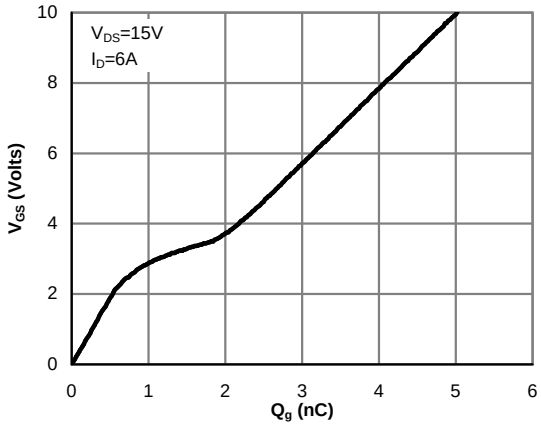


Figure 7: Gate-Charge Characteristics

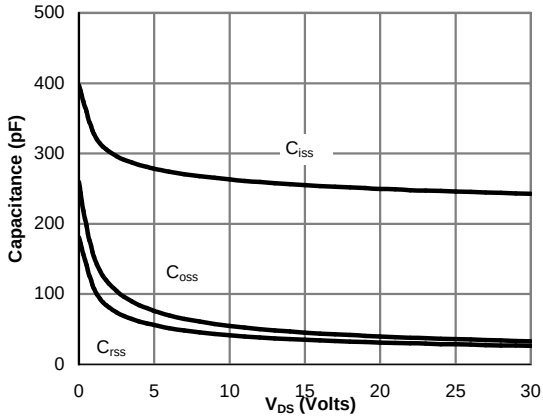


Figure 8: Capacitance Characteristics

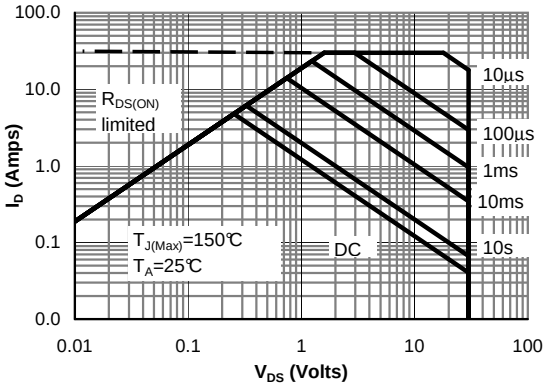


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

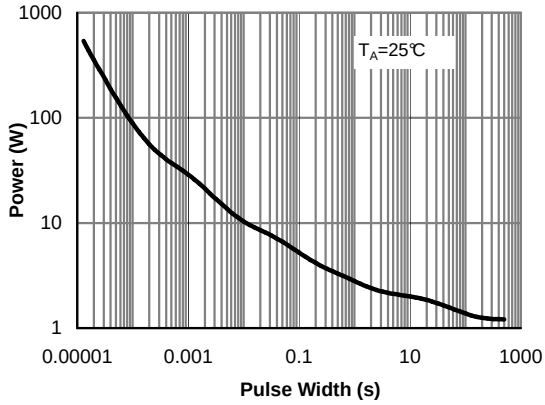


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

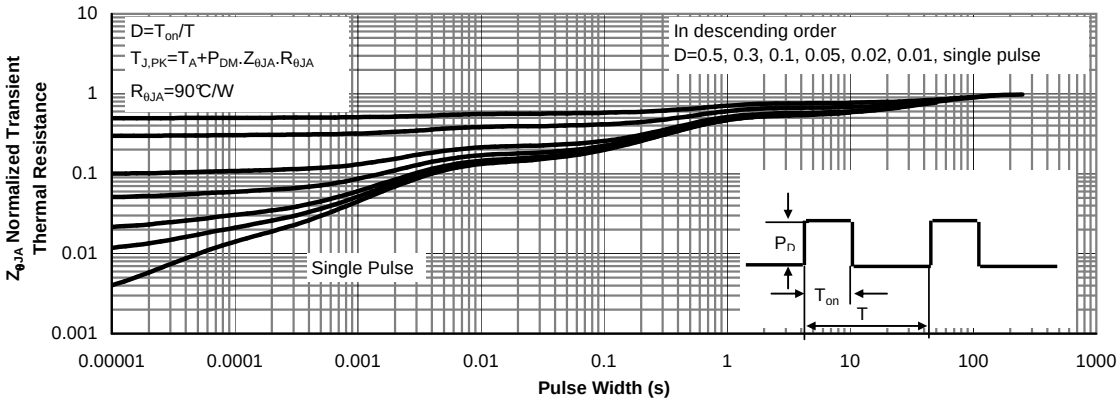


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

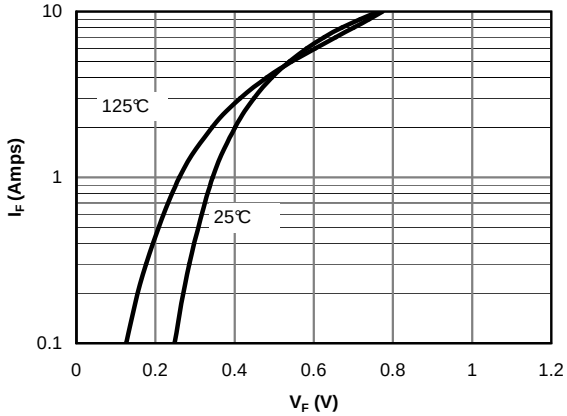


Figure 12: Schottky Forward Characteristics

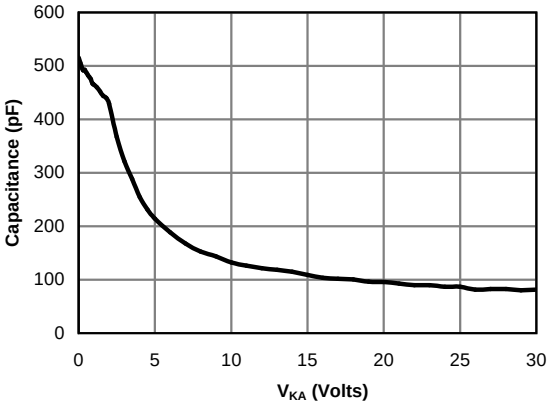


Figure 13: Schottky Capacitance Characteristics

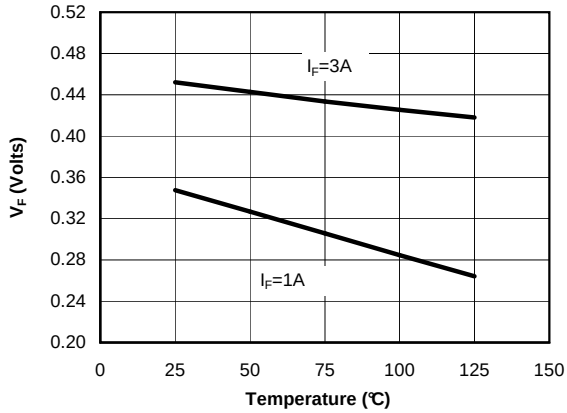


Figure 14: Schottky Forward Drop vs. Junction Temperature

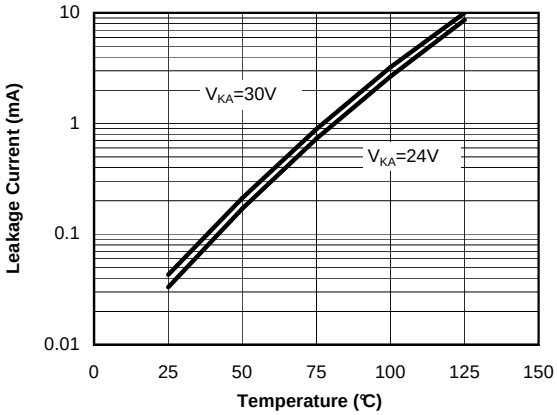
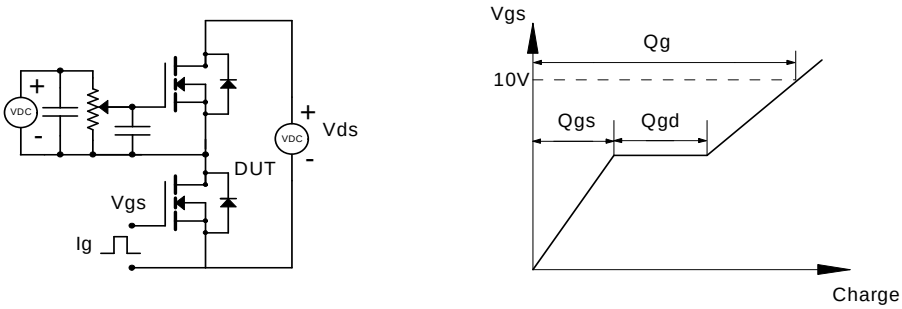
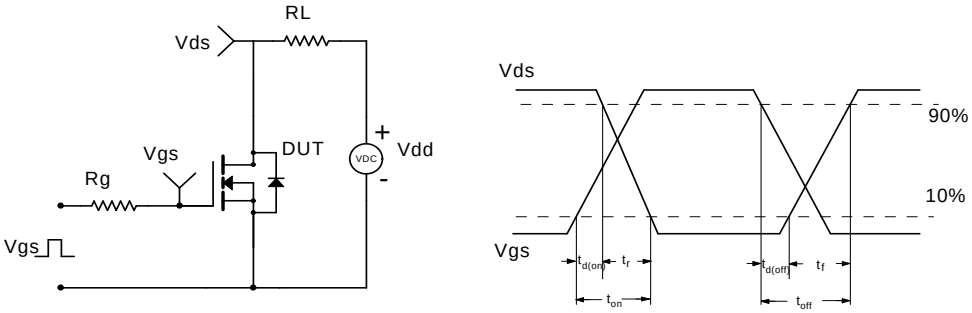


Figure 15: Schottky Leakage Current vs. Junction Temperature

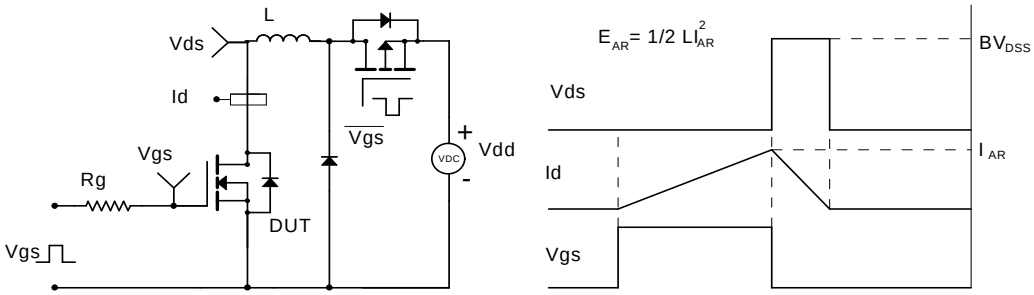
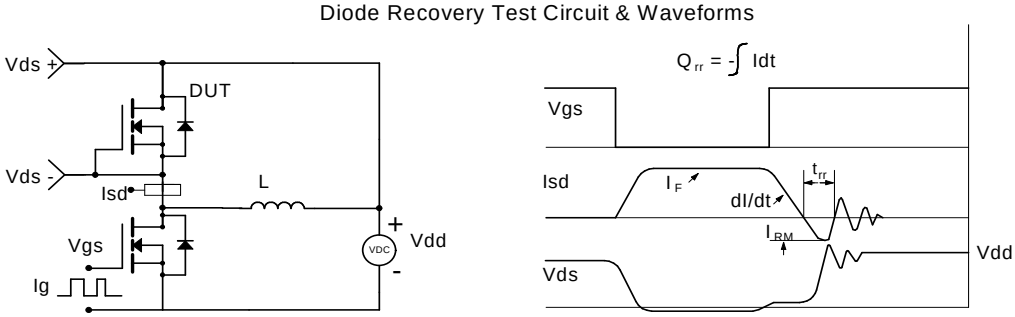
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms