

AO4700
**N-Channel Enhancement Mode Field Effect Transistor
with Schottky Diode**
General Description

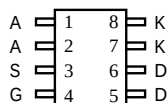
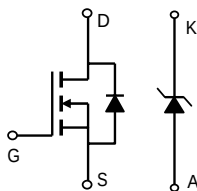
The AO4700 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. A Schottky diode is provided to facilitate the implementation of a bidirectional blocking switch, or for non-synchronous DC-DC conversion applications. *Standard Product AO4700 is Pb-free (meets ROHS & Sony 259 specifications). AO4700L is a Green Product ordering option. AO4700 and AO4700L are electrically identical.*

Features

$V_{DS} (V) = 30V$
 $I_D = 6.9A$ ($V_{GS} = 10V$)
 $R_{DS(ON)} < 28m\Omega$ ($V_{GS} = 10V$)
 $R_{DS(ON)} < 42m\Omega$ ($V_{GS} = 4.5V$)

SCHOTTKY

$V_{DS} (V) = 30V$, $I_F = 4A$, $V_F < 0.5V@3A$


SOIC-8

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}	± 20		V
Continuous Drain Current ^A	$T_A=25^\circ C$	I_D	6.9	A
	$T_A=70^\circ C$		5.8	
Pulsed Drain Current ^B	I_{DM}	30		
Schottky reverse voltage	V_{KA}		30	V
Continuous Forward Current ^A	$T_A=25^\circ C$	I_F	4	A
	$T_A=70^\circ C$		2.6	
Pulsed Forward Current ^B	I_{FM}		40	
Power Dissipation	$T_A=25^\circ C$	P_D	2	W
	$T_A=70^\circ C$		1.28	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	-55 to 150	$^\circ C$

Parameter: Thermal Characteristics MOSFET		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	t ≤ 10s	R _{θJA}	48	62.5	°C/W
Maximum Junction-to-Ambient ^A	Steady-State		74	110	
Maximum Junction-to-Lead ^C	Steady-State	R _{θJL}	35	40	
Thermal Characteristics Schottky					
Maximum Junction-to-Ambient ^A	t ≤ 10s	R _{θJA}	44	62.5	°C/W
Maximum Junction-to-Ambient ^A	Steady-State		73	110	
Maximum Junction-to-Lead ^C	Steady-State	R _{θJL}	31	40	

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} =24V, V _{GS} =0V T _J =55°C			1 5	μA
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	1.9	3	V
I _{D(ON)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	20			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =6.9A T _J =125°C		22.5 31.3	28 38	mΩ
		V _{GS} =4.5V, I _D =5.0A		34.5	42	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =6.9A	10	15.4		S
V _{SD}	Diode Forward Voltage	I _S =1A		0.76	1	V
I _S	Maximum Body-Diode Continuous Current				3	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		680		pF
C _{oss}	Output Capacitance			102		pF
C _{rss}	Reverse Transfer Capacitance			77		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		3		Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =6.9A		13.84		nC
Q _g (4.5V)	Total Gate Charge			6.74		nC
Q _{gs}	Gate Source Charge			1.82		nC
Q _{gd}	Gate Drain Charge			3.2		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =2.2Ω, R _{GEN} =3Ω		4.6		ns
t _r	Turn-On Rise Time			4.1		ns
t _{D(off)}	Turn-Off DelayTime			20.6		ns
t _f	Turn-Off Fall Time			5.2		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =6.9A, dI/dt=100A/μs		16.5		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =6.9A, dI/dt=100A/μs		7.8		nC
SCHOTTKY PARAMETERS						
V _F	Forward Voltage Drop	I _F =3.0A		0.45	0.5	V
I _{rm}	Maximum reverse leakage current	V _R =24V		0.07	0.15	mA
		V _R =24V, T _J =125°C		4.2	20	
		V _R =24V, T _J =150°C		15	60	
C _T	Junction Capacitance	V _R =15V		120		pF

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 ≤ 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 80μs 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.

Rev 3 : Sept 2005

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

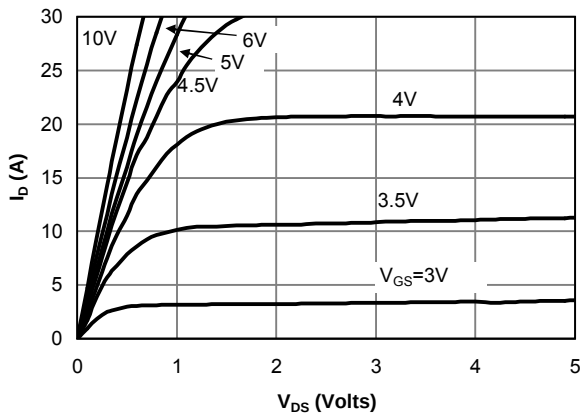


Fig 1: On-Region Characteristics

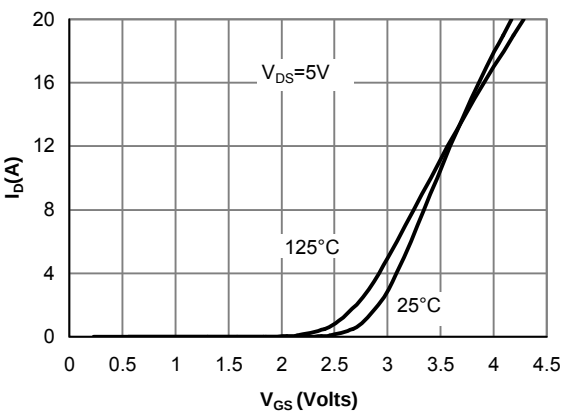


Figure 2: Transfer Characteristics

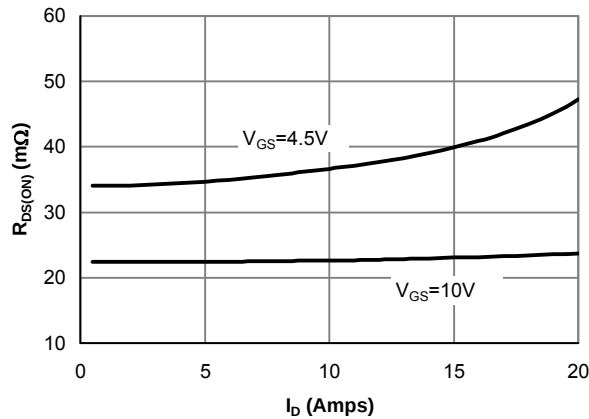


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

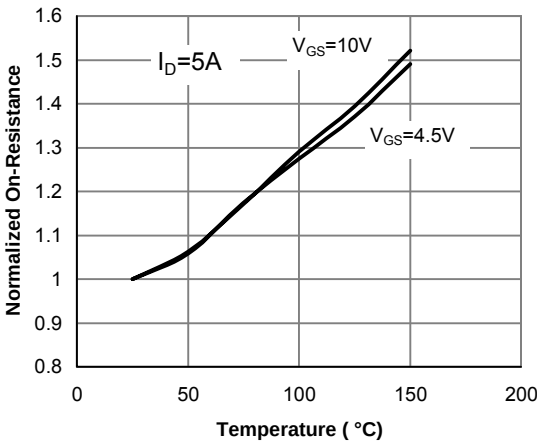


Figure 4: On-Resistance vs. Junction Temperature

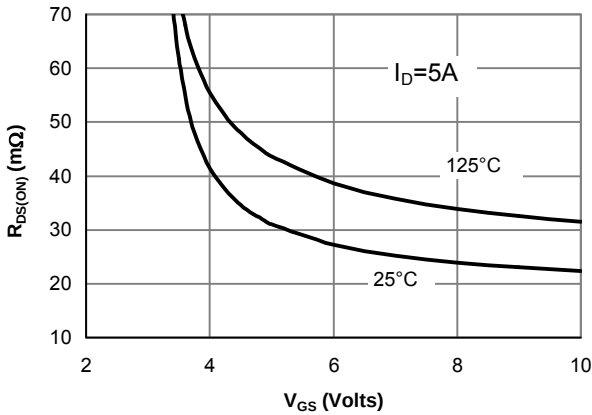


Figure 5: On-Resistance vs. Gate-Source Voltage

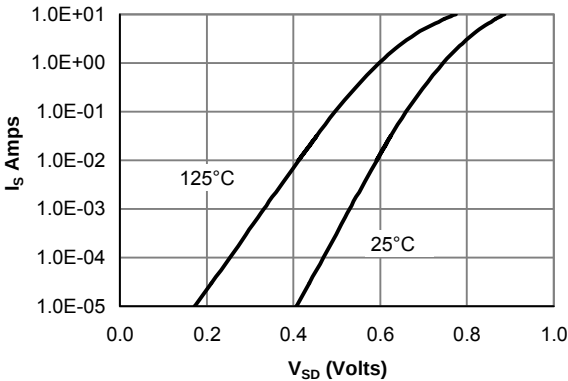


Figure 6: Body diode characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

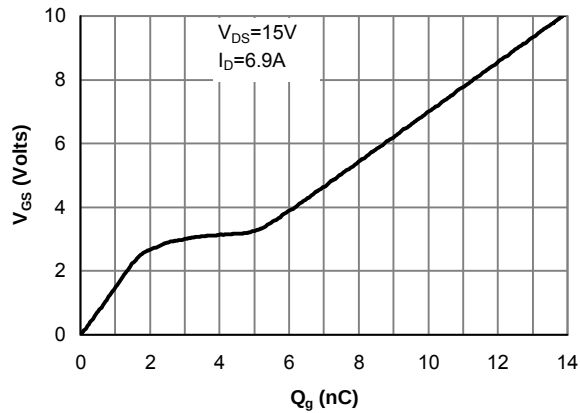


Figure 7: Gate-Charge characteristics

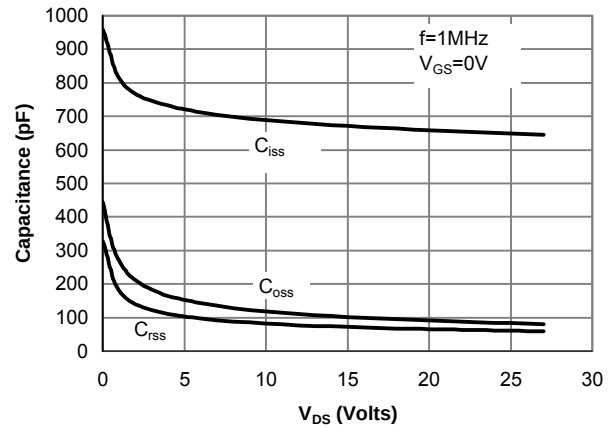


Figure 8: Capacitance Characteristics

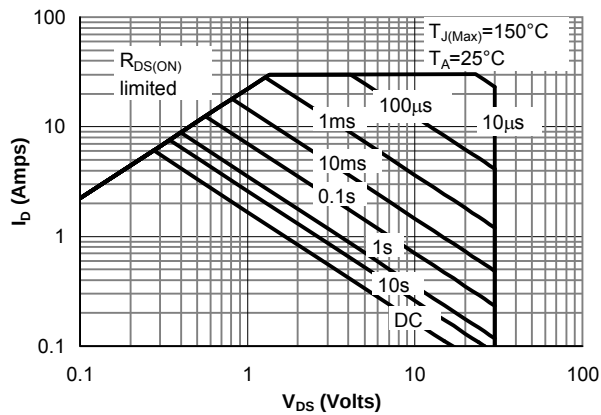


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

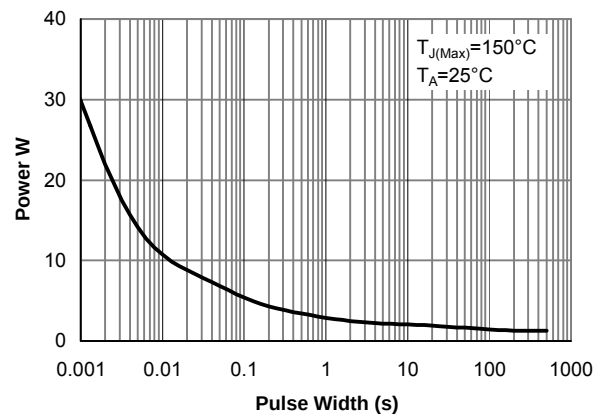


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

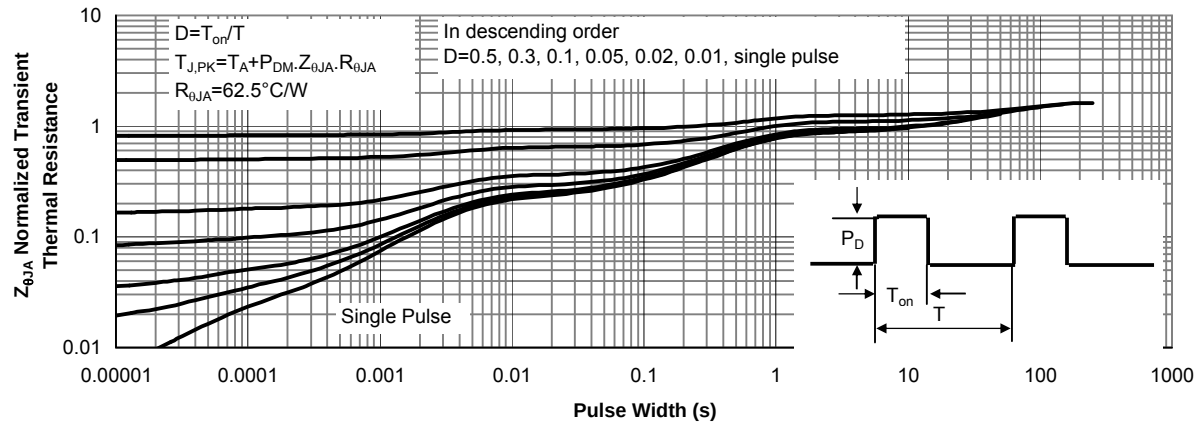


Figure 11: Normalized Maximum Transient Thermal Impedance

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: SCHOTTKY

