



AO4703

P-Channel Enhancement Mode Field Effect Transistor with Schottky Diode

General Description

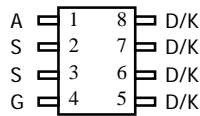
The AO4703 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. A Schottky diode is provided to facilitate the implementation of non-synchronous DC-DC converters. *Standard Product AO4703 is Pb-free (meets ROHS & Sony 259 specifications). AO4703L is a Green Product ordering option. AO4703 and AO4703L are electrically identical.*

Features

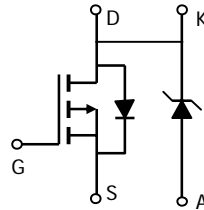
- $V_{DS} (V) = -30V$
- $I_D = -12A (V_{GS} = -20V)$
- $R_{DS(ON)} < 14m\Omega (V_{GS} = -20V)$
- $R_{DS(ON)} < 15m\Omega (V_{GS} = -10V)$

SCHOTTKY

- $V_{DS} (V) = 30V, I_F = 3A, V_F = 0.5V @ 1A$



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}	± 25		V
Continuous Drain Current ^A	I_D	$T_A=25^\circ C$	-12	A
		$T_A=70^\circ C$	-10	
Pulsed Drain Current ^B	I_{DM}	-60		
Schottky reverse voltage	V_{KA}		30	V
Continuous Forward Current ^A	I_F	$T_A=25^\circ C$	4.4	A
		$T_A=70^\circ C$	3.2	
Pulsed Forward Current ^B	I_{FM}		30	
Power Dissipation	P_D	$T_A=25^\circ C$	3	W
		$T_A=70^\circ C$	2.1	
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	$t \leq 10s$	$R_{\theta JA}$	28	40	$^\circ C/W$
Maximum Junction-to-Ambient ^A	Steady-State		54	75	
Maximum Junction-to-Lead ^C	Steady-State	$R_{\theta JL}$	21	30	
Thermal Characteristics Schottky					
Maximum Junction-to-Ambient ^A	$t \leq 10s$	$R_{\theta JA}$		40	$^\circ C/W$
Maximum Junction-to-Ambient ^A	Steady-State			75	
Maximum Junction-to-Lead ^C	Steady-State	$R_{\theta JL}$			

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} =±25V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1.7	-2.5	-3	V
I _{D(ON)}	On state drain current	V _{GS} =-10V, V _{DS} =-5V	60			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-10A T _J =125°C		12 16	15 20	mΩ
		V _{GS} =-20V, I _D =-10A		11	14	mΩ
		V _{GS} =-4.5V, I _D =-10A		25		mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-10A		26		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.72	-1	V
I _S	Maximum Body-Diode Continuous Current				-4.2	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance			2076		pF
C _{oss}	Output Capacitance	V _{GS} =0V, V _{DS} =-15V, f=1MHz		503		pF
C _{rss}	Reverse Transfer Capacitance			302		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		2		Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge			37.2		nC
Q _{gs}	Gate Source Charge	V _{GS} =-10V, V _{DS} =-15V, I _D =-12A		7		nC
Q _{gd}	Gate Drain Charge			10.4		nC
t _{D(on)}	Turn-On DelayTime			12.4		ns
t _r	Turn-On Rise Time	V _{GS} =-10V, V _{DS} =-15V, R _L =1.25Ω,		8.2		ns
t _{D(off)}	Turn-Off DelayTime	R _{GEN} =3Ω		25.6		ns
t _f	Turn-Off Fall Time			12		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-12A, dI/dt=100A/μs		33		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-12A, dI/dt=100A/μs		23		nC
SCHOTTKY PARAMETERS						
V _F	Forward Voltage Drop	I _F =1.0A		0.45	0.5	V
I _{rm}	Maximum reverse leakage current	V _R =30V		0.007	0.05	mA
		V _R =30V, T _J =125°C		3.2	10	
		V _R =30V, T _J =150°C		12	20	
C _T	Junction Capacitance	V _R =15V		37		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 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 6,12,14 are obtained using 80 μs 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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P-CHANNEL: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

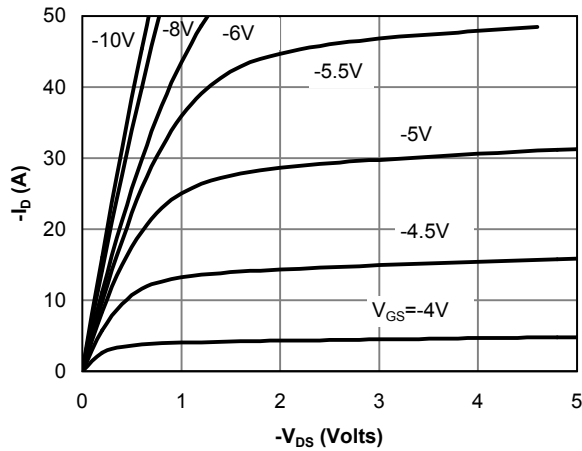


Fig 1: On-Region Characteristics

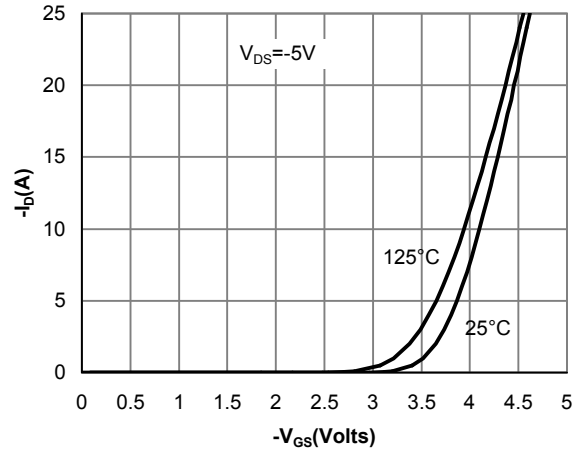


Figure 2: Transfer Characteristics

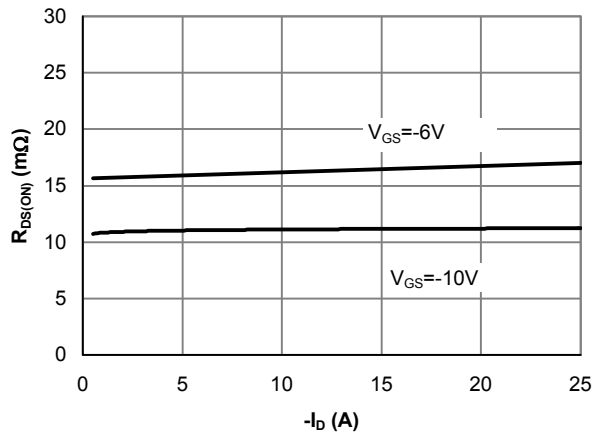


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

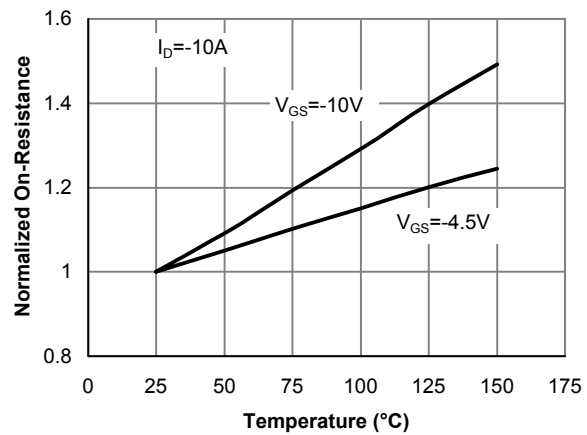


Figure 4: On-Resistance vs. Junction Temperature

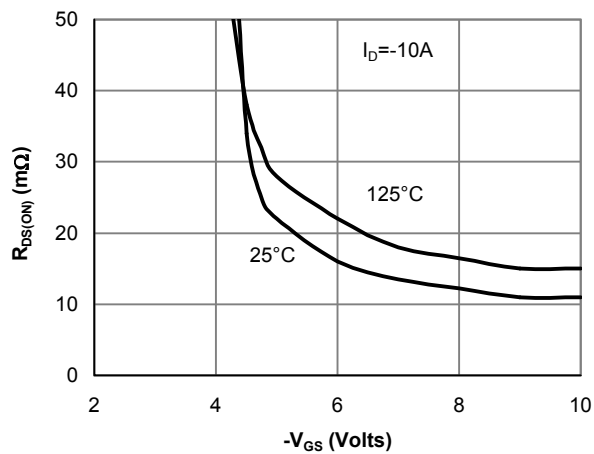


Figure 5: On-Resistance vs. Gate-Source Voltage

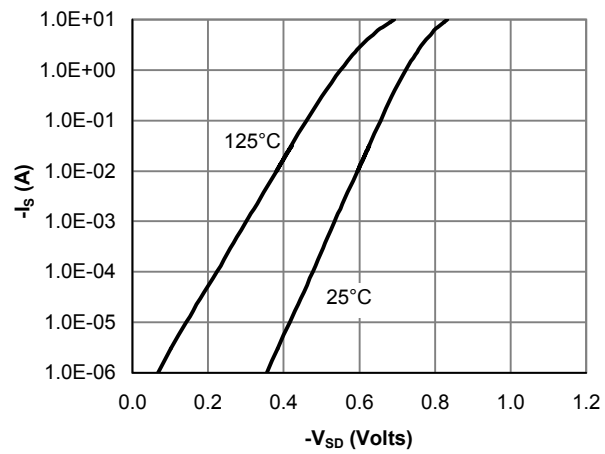


Figure 6: Body-Diode Characteristics

P-CHANNEL: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

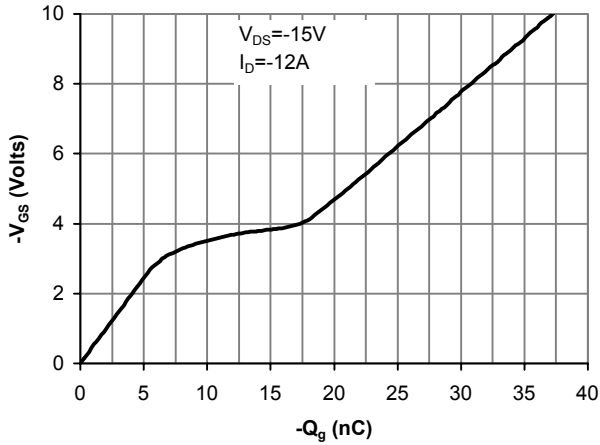


Figure 7: Gate-Charge Characteristics

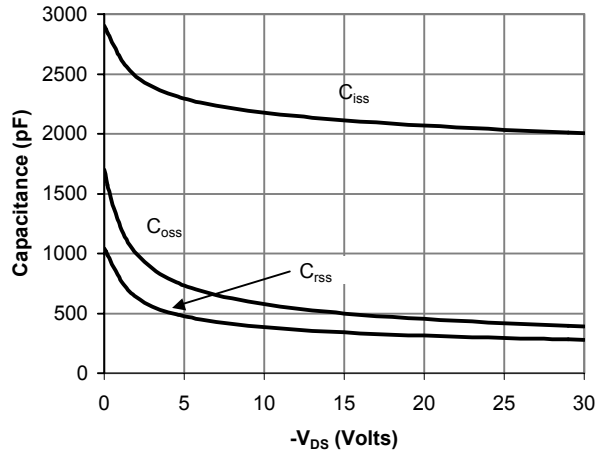


Figure 8: Capacitance Characteristics

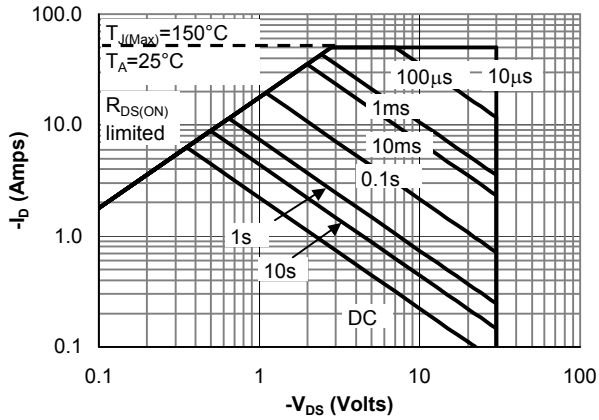


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

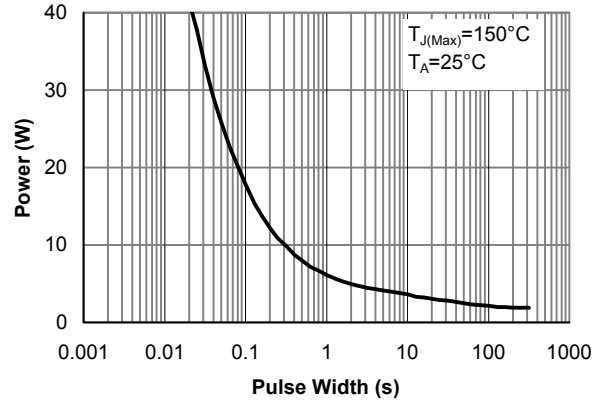


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

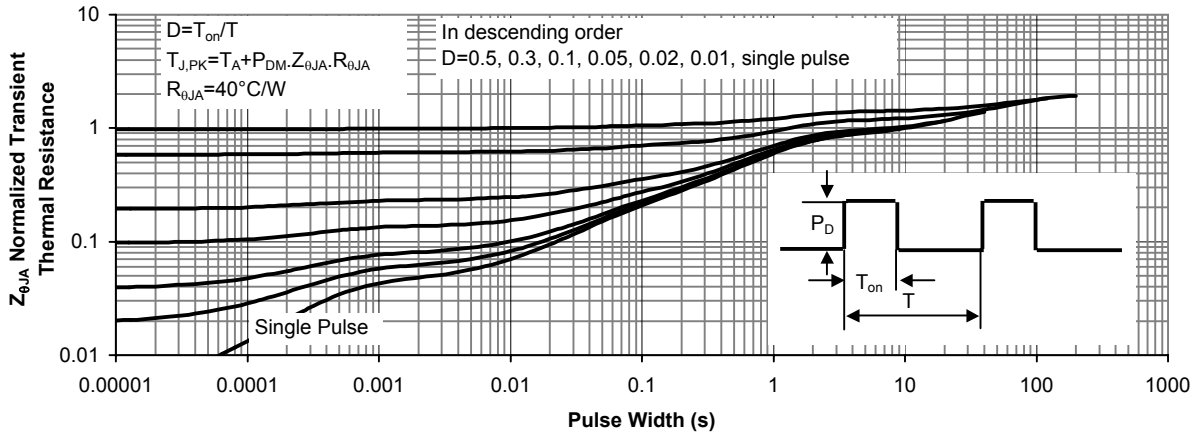


Figure 11: Normalized Maximum Transient Thermal Impedance

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: SCHOTTKY

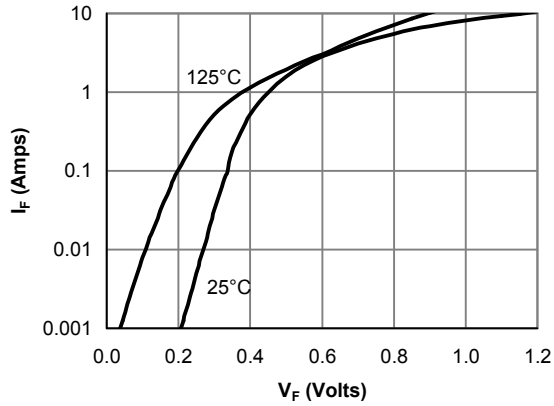


Figure 12: Schottky Forward Characteristics

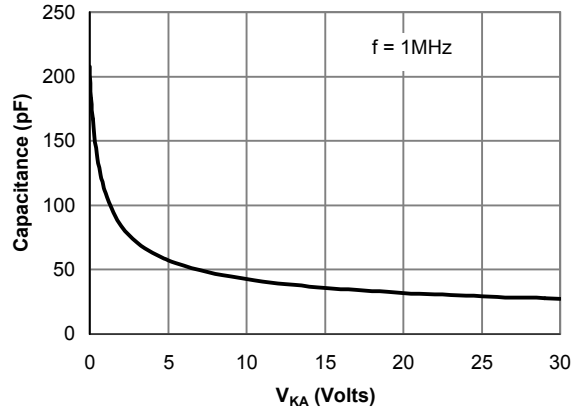


Figure 13: Schottky Capacitance Characteristics

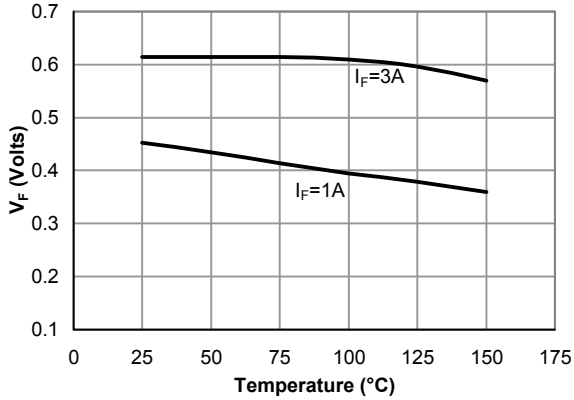


Figure 14: Schottky Forward Drop vs. Junction Temperature

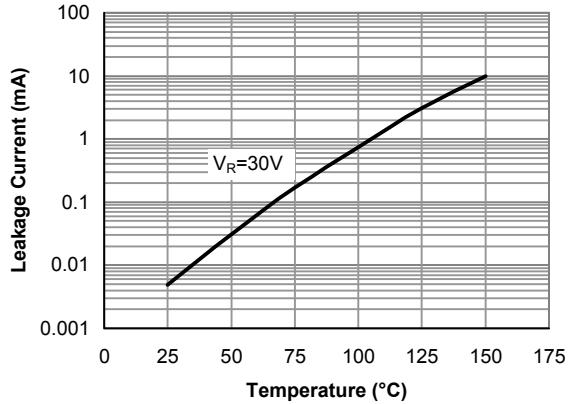


Figure 15: Schottky Leakage current vs. Junction Temperature

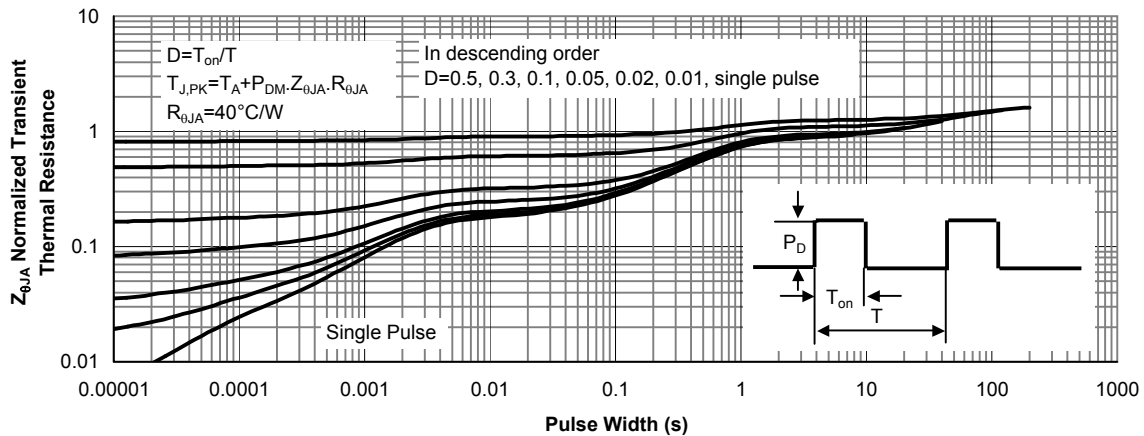


Figure 15: Schottky Normalized Maximum Transient Thermal Impedance