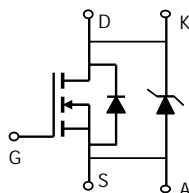
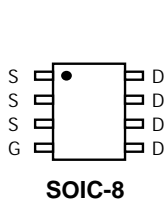


**AO4702**
**N-Channel Enhancement Mode Field Effect Transistor with Schottky Diode**
**General Description**

The AO4702 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. A Schottky Diode is packaged in parallel to improve device performance in synchronous rectification applications, or H-bridge configurations. *Standard Product AO4702 is Pb-free (meets ROHS & Sony 259 specifications). AO4702L is a Green Product ordering option. AO4702 and AO4702L are electrically identical.*

**Features**
 $V_{DS} (V) = 30V$ 
 $I_D = 11A (V_{GS} = 10V)$ 
 $R_{DS(ON)} < 16m\Omega (V_{GS} = 10V)$ 
 $R_{DS(ON)} < 25m\Omega (V_{GS} = 4.5V)$ 
**SCHOTTKY**
 $V_{DS} (V) = 30V, I_F = 3A, V_F < 0.5V @ 1A$ 

**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	$V_{GS}$	$\pm 20$		V
Continuous Drain Current <sup>A</sup>	$T_A=25^\circ C$	11		A
	$T_A=70^\circ C$	9.3		
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	50		
Schottky reverse voltage	$V_{KA}$		30	V
Continuous Forward Current <sup>A</sup>	$T_A=25^\circ C$		4.4	A
	$T_A=70^\circ C$		3.2	
Pulsed Diode Forward Current <sup>B</sup>	$I_{FM}$		30	
Power Dissipation	$T_A=25^\circ C$	3	3	W
	$T_A=70^\circ C$	2	2	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	-55 to 150	$^\circ C$

Thermal Characteristics: MOSFET					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10s$	$R_{\theta JA}$	31	40	°C/W
Maximum Junction-to-Ambient <sup>A</sup>	Steady-State		59	75	°C/W
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	16	24	°C/W

Thermal Characteristics: Schottky					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10s$	$R_{\theta JA}$	36	40	°C/W
Maximum Junction-to-Ambient <sup>A</sup>	Steady-State		67	75	°C/W
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	25	30	°C/W

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^{\circ}C$ . The value in any given application depends on the user's specific board design. The current rating is based on the  $t \leq 10s$  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 80  $\mu s$  pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^{\circ}C$ . The SOA curve provides a single pulse rating.

F: The Schottky appears in parallel with the MOSFET body diode, even though it is a separate chip. Therefore, we provide the net forward drop, capacitance and recovery characteristics of the MOSFET and Schottky. However, the thermal resistance is specified for each chip separately.

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Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current (Set by Schottky leakage)	V <sub>R</sub> =30V		0.007	0.05	mA
		V <sub>R</sub> =30V, T <sub>J</sub> =125°C		3.2	10	
		V <sub>R</sub> =30V, T <sub>J</sub> =150°C		12	20	
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.8	3	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =5V	40			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =11A		13.4	16	mΩ
		T <sub>J</sub> =125°C		16.8	21	
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A		20	25	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =11A		25		S
V <sub>SD</sub>	Diode + Schottky Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.45	0.5	V
I <sub>S</sub>	Maximum Body-Diode + Schottky Continuous Current				5	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		1040	1250	pF
C <sub>oss</sub>	Output Capacitance (FET+Schottky)			212		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			121		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		0.7	0.85	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =11A		19.8	24	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge			9.8	12	nC
Q <sub>gs</sub>	Gate Source Charge			2.5		nC
Q <sub>gd</sub>	Gate Drain Charge			3.5		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =1.35Ω, R <sub>GEN</sub> =3Ω		4.5	7	ns
t <sub>r</sub>	Turn-On Rise Time			3.9	7	ns
t <sub>D(off)</sub>	Turn-Off DelayTime			17.4	30	ns
t <sub>f</sub>	Turn-Off Fall Time			3.2	5.7	ns
t <sub>rr</sub>	Body Diode + Schottky Reverse Recovery Time	I <sub>F</sub> =11A, dI/dt=100A/μs		19	23	ns
Q <sub>rr</sub>	Body Diode + Schottky Reverse Recovery Charge	I <sub>F</sub> =11A, dI/dt=100A/μs		9	11	nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The value in any given application depends on the user's specific board design. The current rating is based on the t<sub>θJA</sub> ≤ 10s thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C: The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using 80 μs pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

F: The Schottky appears in parallel with the MOSFET body diode, even though it is a separate chip. Therefore, we provide the net forward drop, capacitance and recovery characteristics of the MOSFET and Schottky. However, the thermal resistance is specified for each chip separately.

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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

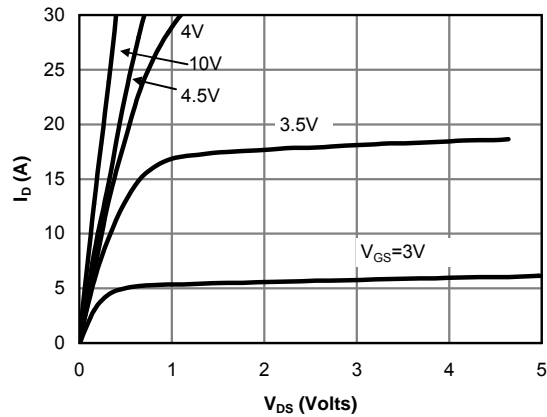


Fig 1: On-Region Characteristics

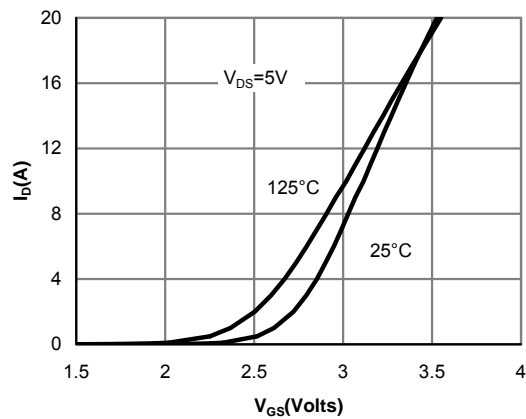


Figure 2: Transfer Characteristics

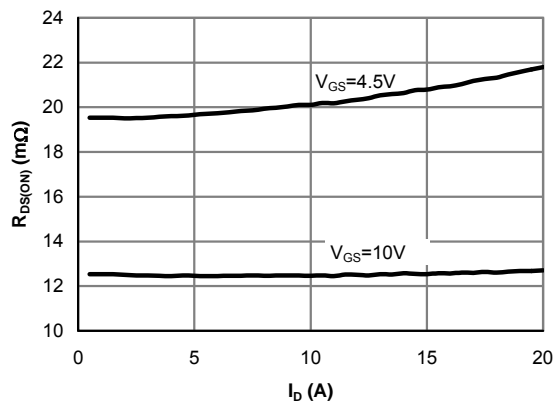


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

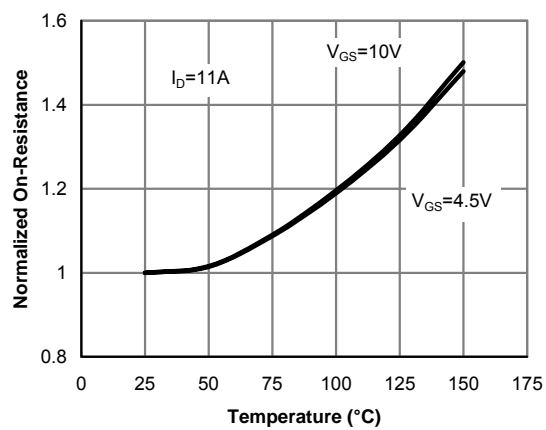


Figure 4: On-Resistance vs. Junction Temperature

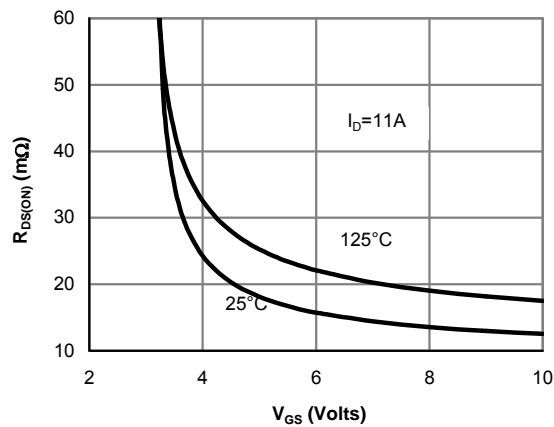


Figure 5: On-Resistance vs. Gate-Source Voltage

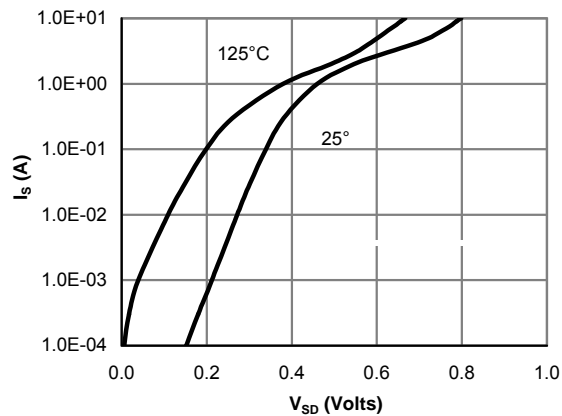


Figure 6: Body-Diode Characteristics

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

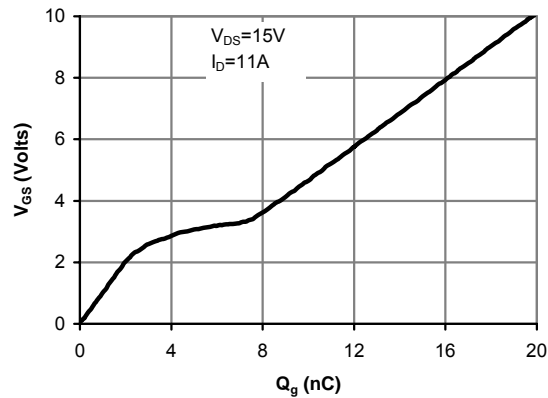


Figure 7: Gate-Charge Characteristics

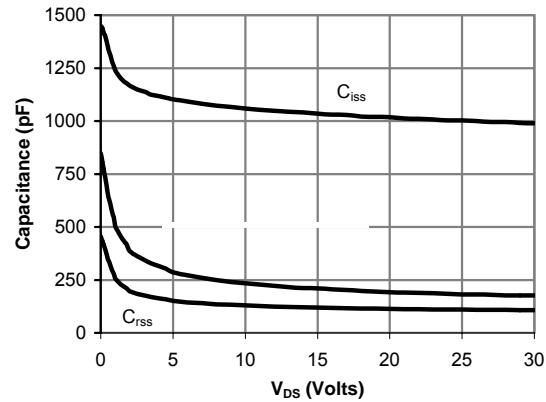


Figure 8: Capacitance Characteristics

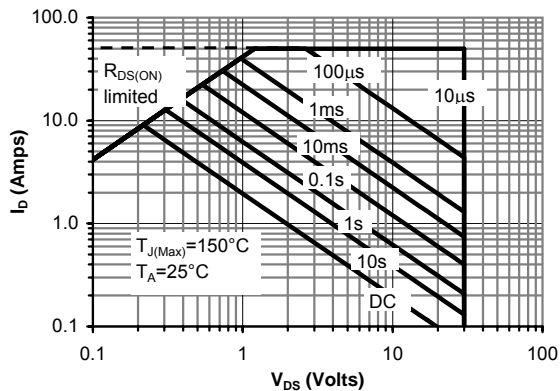


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

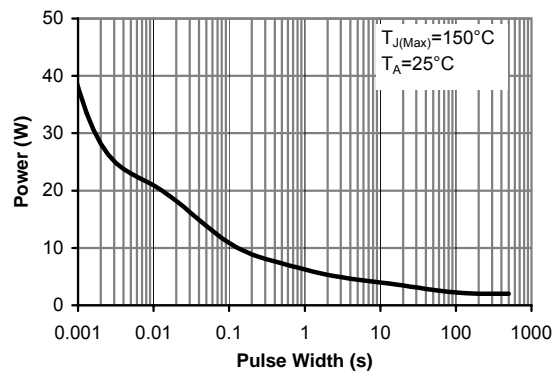


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

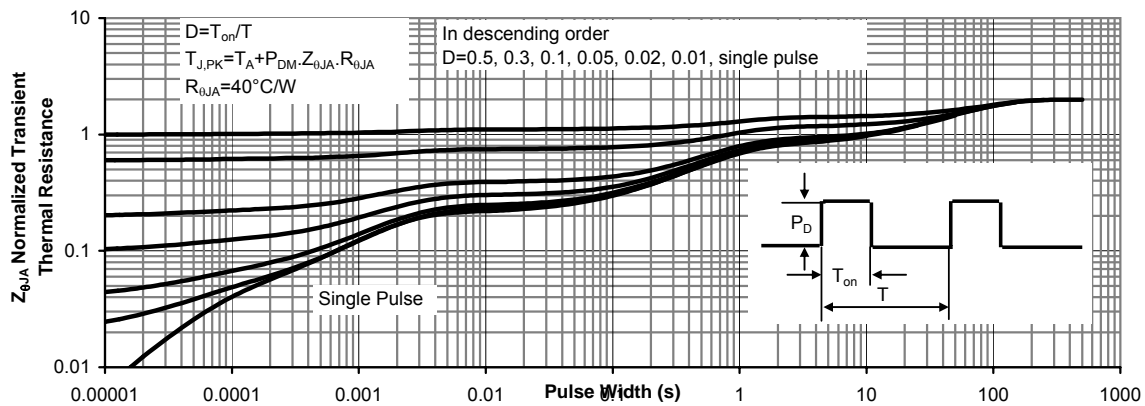


Figure 11: Normalized Maximum Transient Thermal Impedance