



### AO4900A

## Dual N-Channel Enhancement Mode Field Effect Transistor with Schottky Diode

#### General Description

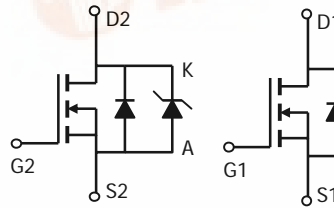
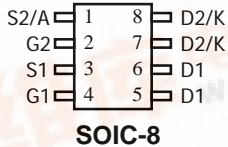
The AO4900A uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. The two MOSFETs make a compact and efficient switch and synchronous rectifier combination for use in DC-DC converters. A Schottky diode is co-packaged in parallel with the synchronous MOSFET to boost efficiency further. *Standard Product AO4900A is Pb-free (meets ROHS & Sony 259 specifications). AO4900AL is a Green Product ordering option. AO4900A and AO4900AL are electrically identical.*

#### Features

- $V_{DS} (V) = 30V$
- $I_D = 6.9A (V_{GS} = 10V)$
- $R_{DS(ON)} < 27m\Omega (V_{GS} = 10V)$
- $R_{DS(ON)} < 32m\Omega (V_{GS} = 4.5V)$
- $R_{DS(ON)} < 50m\Omega (V_{GS} = 2.5V)$

#### 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	$V_{GS}$	$\pm 12$		V
Continuous Drain Current <sup>A</sup>	$I_D$	$T_A=25^\circ C$	6.9	A
		$T_A=70^\circ C$	5.8	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	40		
Schottky reverse voltage	$V_{KA}$		30	V
Continuous Forward Current <sup>A</sup>	$I_F$	$T_A=25^\circ C$	3	A
		$T_A=70^\circ C$	2	
Pulsed Forward Current <sup>B</sup>	$I_{FM}$		40	
Power Dissipation	$P_D$	$T_A=25^\circ C$	2	W
		$T_A=70^\circ C$	1.44	
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 <sup>A</sup>	$R_{\theta JA}$	55	62.5	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>				
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	40	48	
Thermal Characteristics Schottky				
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	47.5	62.5	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>				
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	32	40	



Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=24\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$		0.002	1	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 12\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	0.7	1	1.5	V
$I_{D(ON)}$	On state drain current	$V_{GS}=4.5\text{V}$ , $V_{DS}=5\text{V}$	40			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$ , $I_D=6.9\text{A}$ $T_J=125^\circ\text{C}$		20	27	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$ , $I_D=6\text{A}$		23	32	$\text{m}\Omega$
		$V_{GS}=2.5\text{V}$ , $I_D=5\text{A}$		34	50	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=5\text{A}$	10	26		S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}$ , $V_{GS}=0\text{V}$		0.71	1	V
$I_S$	Maximum Body-Diode Continuous Current				4.5	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=15\text{V}$ , $f=1\text{MHz}$		900	1100	pF
$C_{oss}$	Output Capacitance			88		pF
$C_{rss}$	Reverse Transfer Capacitance			65		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		0.95	1.5	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g$	Total Gate Charge	$V_{GS}=4.5\text{V}$ , $V_{DS}=15\text{V}$ , $I_D=8.5\text{A}$		10	12	nC
$Q_{gs}$	Gate Source Charge			1.8		nC
$Q_{gd}$	Gate Drain Charge			3.75		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $R_L=1.8\Omega$ , $R_{GEN}=6\Omega$		3.2		ns
$t_r$	Turn-On Rise Time			3.5		ns
$t_{D(off)}$	Turn-Off DelayTime			21.5		ns
$t_f$	Turn-Off Fall Time			2.7		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=5\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		16.8	20	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=5\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		8	12	nC
<b>SCHOTTKY PARAMETERS</b>						
$V_F$	Forward Voltage Drop	$I_F=1.0\text{A}$		0.45	0.5	V
$I_{rm}$	Maximum reverse leakage current	$V_R=30\text{V}$		0.007	0.05	mA
		$V_R=30\text{V}$ , $T_J=125^\circ\text{C}$		3.2	10	
		$V_R=30\text{V}$ , $T_J=150^\circ\text{C}$		12	20	
$C_T$	Junction Capacitance	$V_R=15\text{V}$		37		pF

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

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

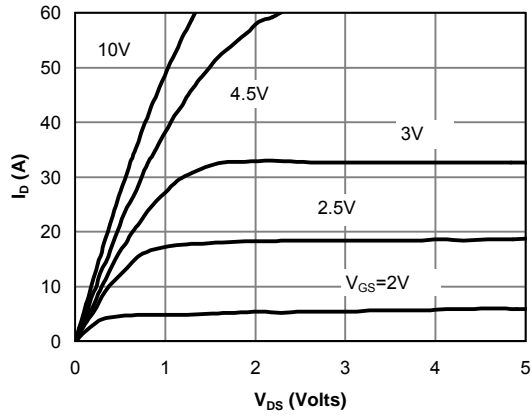


Fig 1: On-Region Characteristics

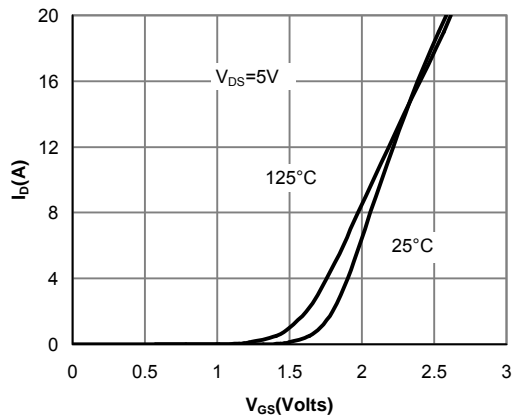


Figure 2: Transfer Characteristics

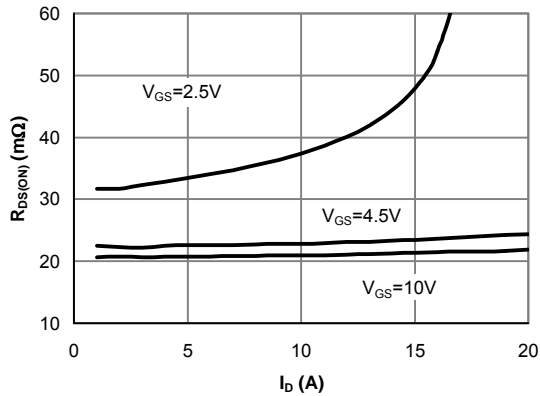


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

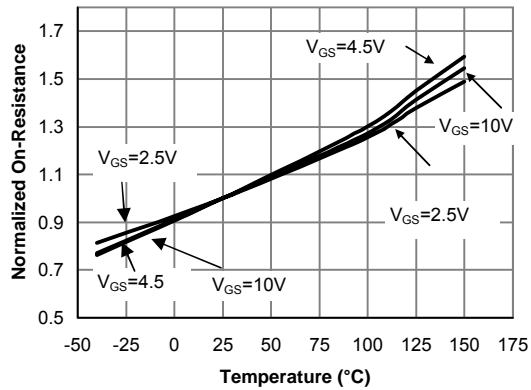


Figure 4: On-Resistance vs. Junction Temperature

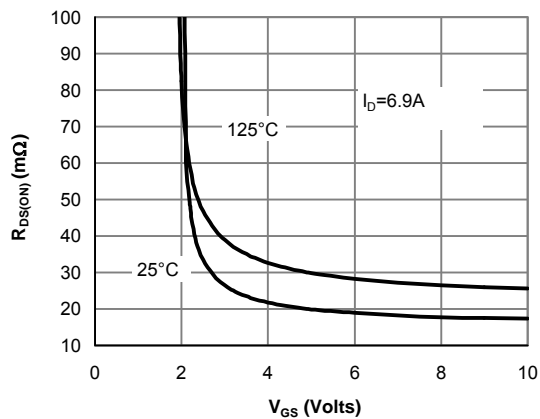


Figure 5: On-Resistance vs. Gate-Source Voltage

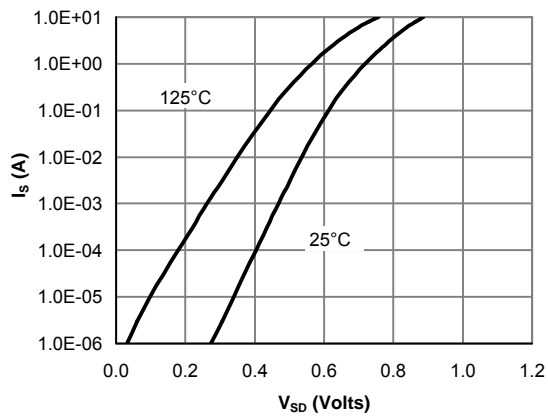


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

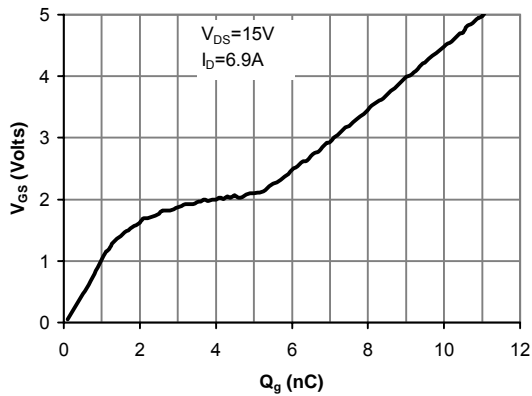


Figure 7: Gate-Charge Characteristics

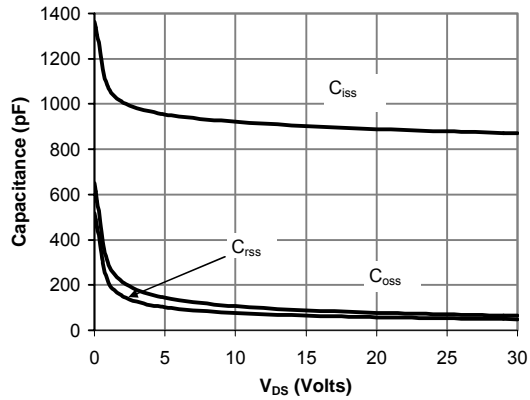


Figure 8: Capacitance Characteristics

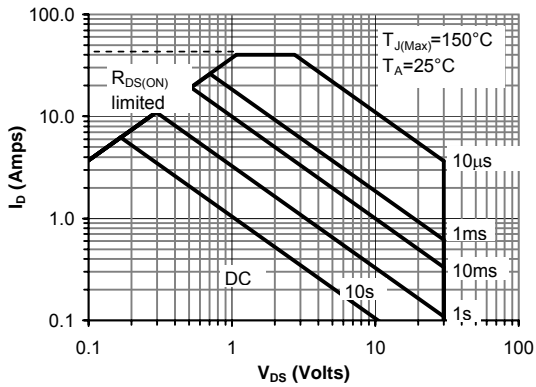


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

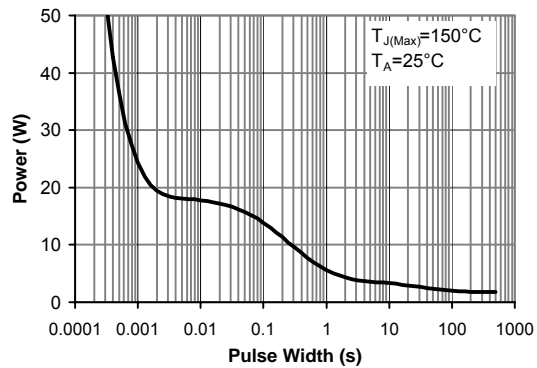


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

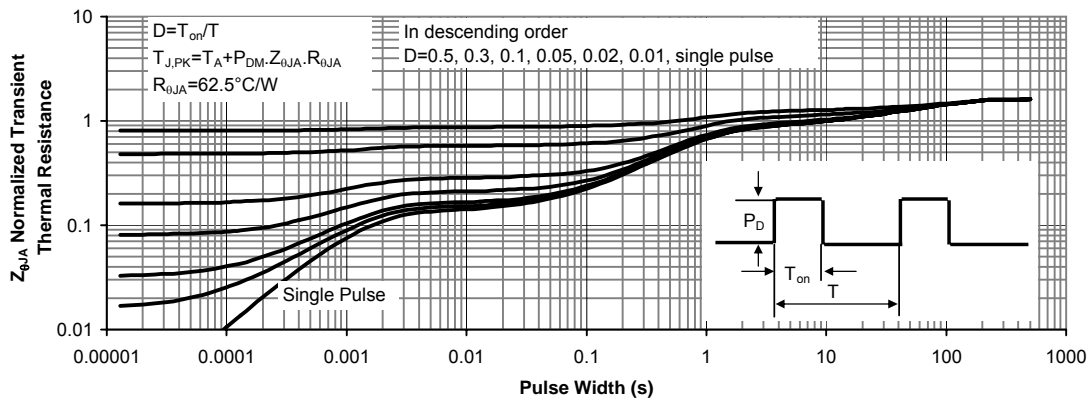


Figure 11: Normalized Maximum Transient Thermal Impedance

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: SCHOTTKY

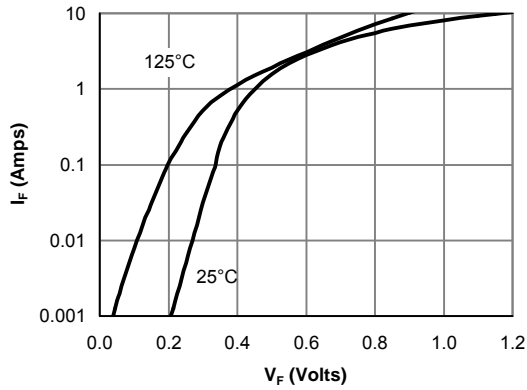


Figure 12: Schottky Forward Characteristics

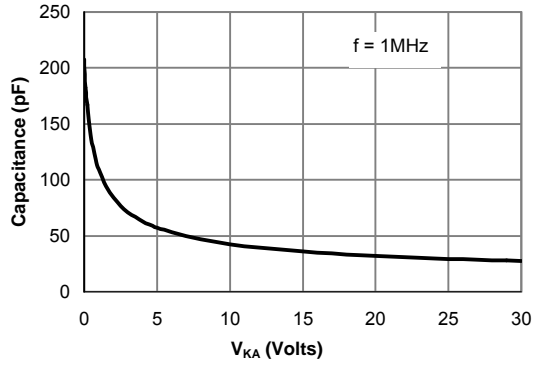


Figure 13: Schottky Capacitance Characteristics

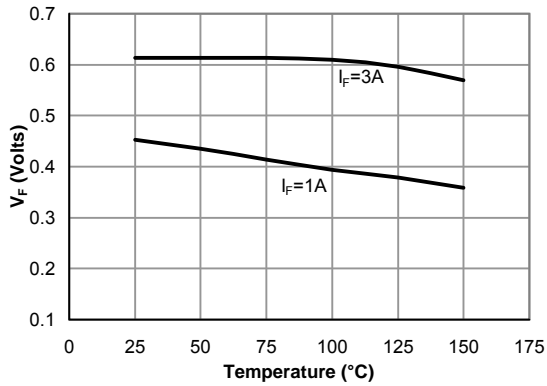


Figure 14: Schottky Forward Drop vs. Junction Temperature

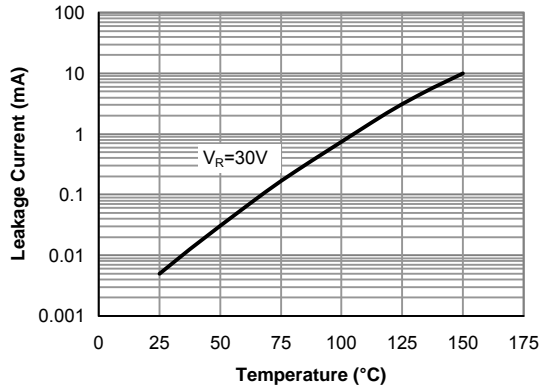


Figure 15: Schottky Leakage current vs. Junction Temperature

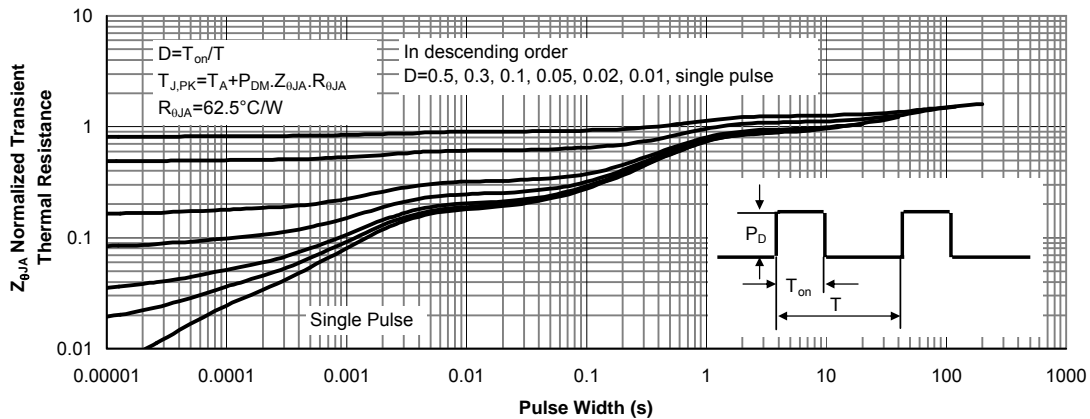


Figure 15: Schottky Normalized Maximum Transient Thermal Impedance



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