

# AO4900

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

### General Description

The AO4900 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 AO4900 is Pb-free (meets ROHS & Sony 259 specifications).*

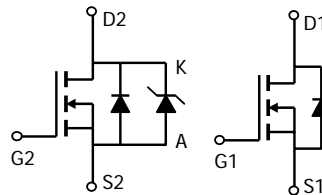
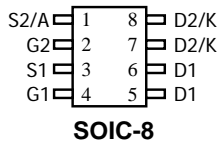
### Features

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

**UIS TESTED!**  
 **$R_g, C_{iss}, C_{oss}, C_{rss}$  Tested**



### 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>AF</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>AF</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	
Avalanche Current <sup>B</sup>	$I_{AR}$	15		A
Repetitive avalanche energy 0.3mH <sup>B</sup>	$E_{AR}$	34		mJ
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>	$R_{\theta JA}$	48	62.5	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>				
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	35	
<b>Thermal Characteristics Schottky</b>				
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>	Steady-State	$R_{\theta JL}$	32	

**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	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±12V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =250μA	0.7	1	1.4	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =5V	25			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =6.9A T <sub>J</sub> =125°C		22.6 33	27 40	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6.0A		27	32	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =5A		42	50	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =5A	12	16		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A		0.71	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				3	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance			846	1050	pF
C <sub>oss</sub>	Output Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		96		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			67	94	pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	0.7	1.4	2	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge			9.6	12	nC
Q <sub>gs</sub>	Gate Source Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, I <sub>D</sub> =6.9A		1.65		nC
Q <sub>gd</sub>	Gate Drain Charge			3		nC
t <sub>D(on)</sub>	Turn-On DelayTime			3.2	4.8	ns
t <sub>r</sub>	Turn-On Rise Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =2.2Ω, R <sub>GEN</sub> =3Ω		4.1	6.2	ns
t <sub>D(off)</sub>	Turn-Off DelayTime			26.3	40	ns
t <sub>f</sub>	Turn-Off Fall Time			3.7	5.5	ns
t <sub>rr</sub>	Body Diode Reverse Recovery time	I <sub>F</sub> =5A, dI/dt=100A/μs		15.5	20	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery charge	I <sub>F</sub> =5A, dI/dt=100A/μs		7.9		nC
<b>SCHOTTKY PARAMETERS</b>						
V <sub>F</sub>	Forward Voltage Drop	I <sub>F</sub> =1.0A		0.45	0.5	V
I <sub>rm</sub>	Maximum reverse leakage current	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	
C <sub>T</sub>	Junction Capacitance	V <sub>R</sub> =15V		37		pF

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in 2 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.

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 <300 μs pulses, duty cycle 0.5% max.

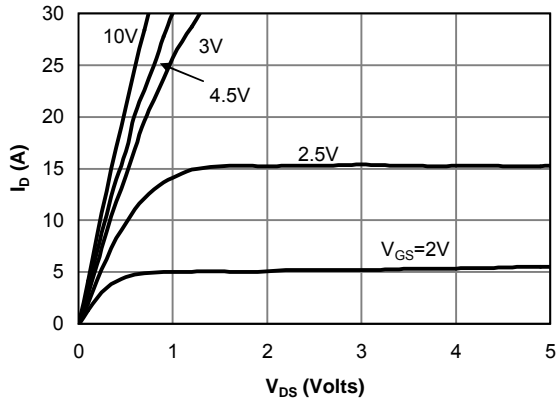
E. These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

F. The current rating is based on the t≤ 10s junction to ambient thermal resistance rating.

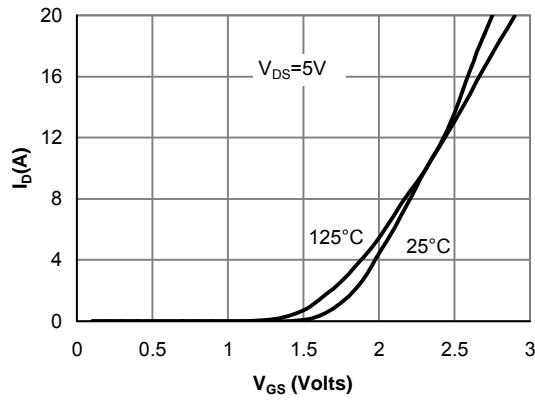
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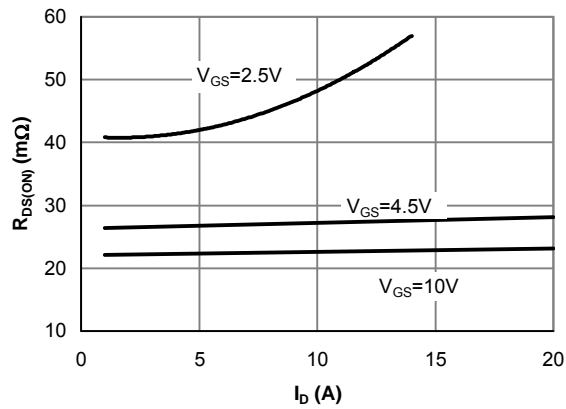
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



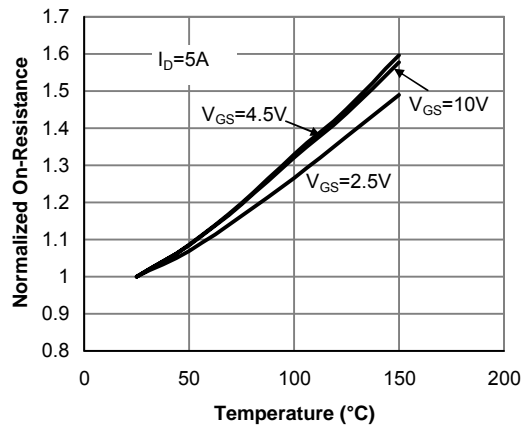
**Fig 1: On-Region Characteristics**



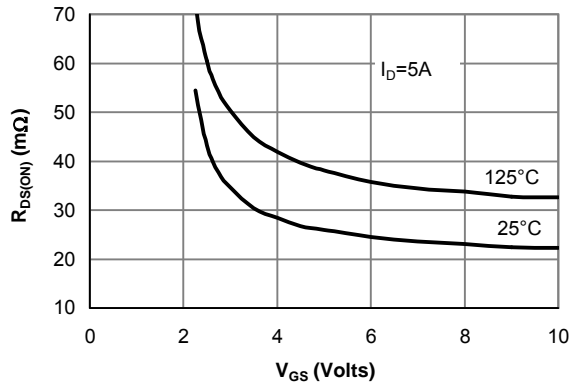
**Figure 2: Transfer Characteristics**



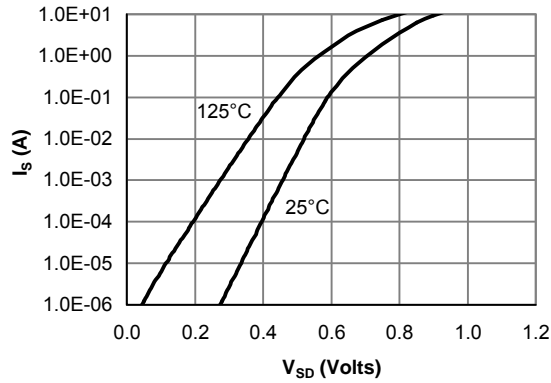
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



**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**

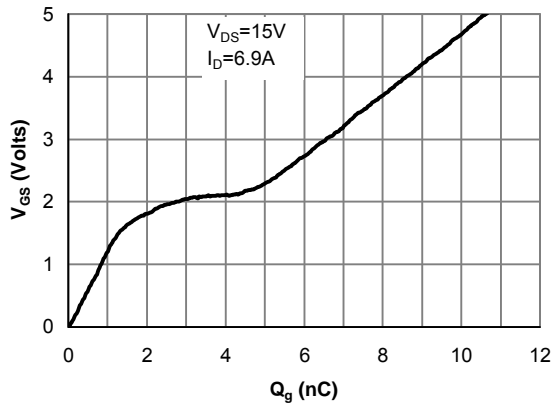


Figure 7: Gate-Charge Characteristics

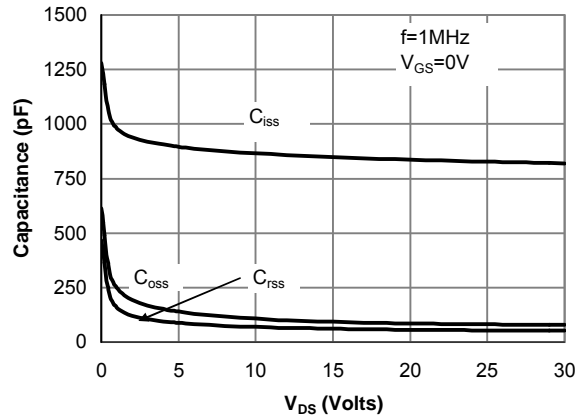


Figure 8: Capacitance Characteristics

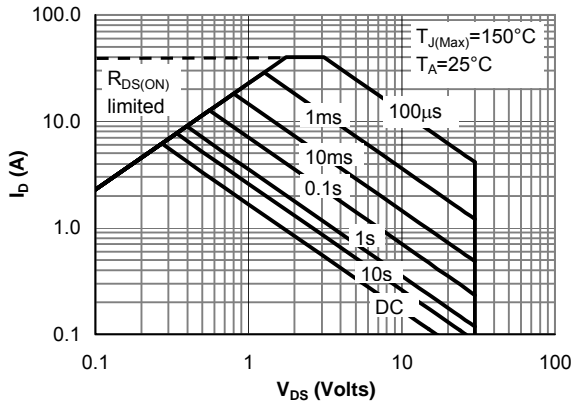


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

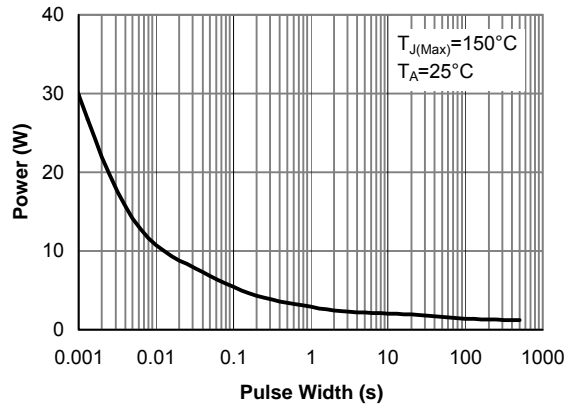


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

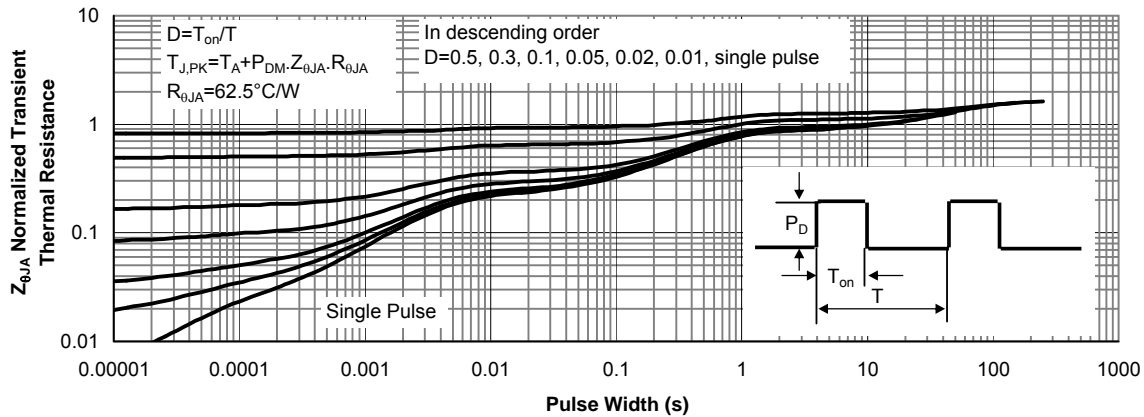


Figure 11: Normalized Maximum Transient Thermal Impedance

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: SCHOTTKY**

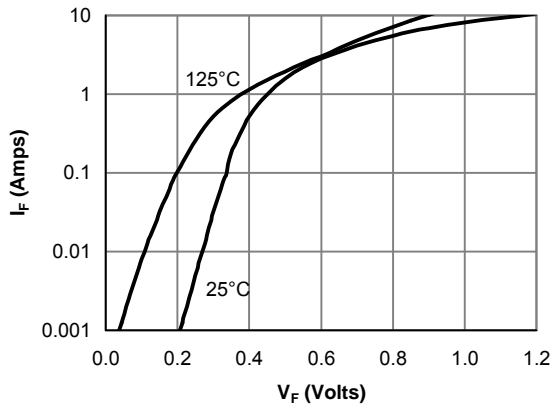


Figure 12: Schottky Forward Characteristics

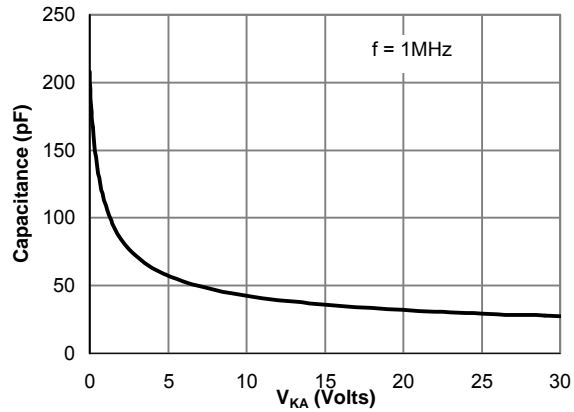


Figure 13: Schottky Capacitance Characteristics

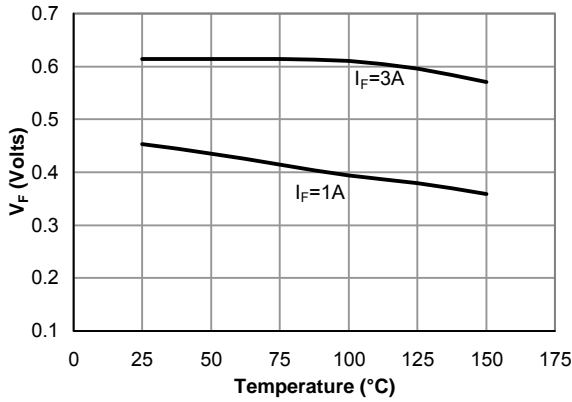


Figure 14: Schottky Forward Drop vs. Junction Temperature

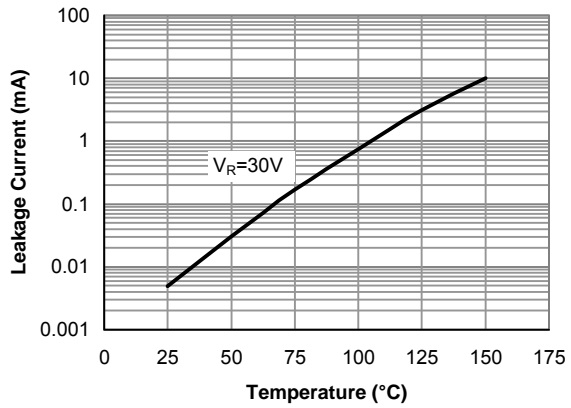


Figure 15: Schottky Leakage current vs. Junction Temperature

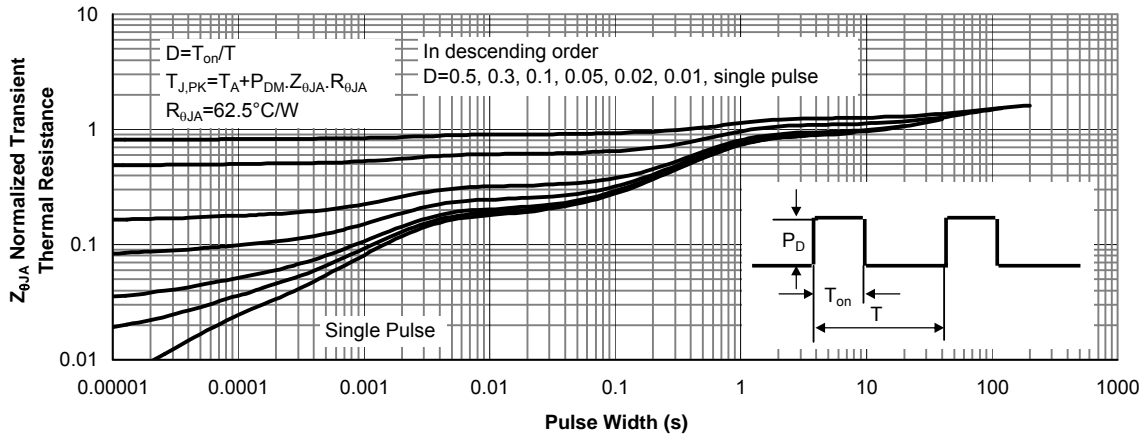


Figure 15: Schottky Normalized Maximum Transient Thermal Impedance