**ALPHA & OMEGA**
**SEMICONDUCTOR, INC.**

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# AO4902
# Dual N-Channel Enhancement Mode Field Effect Transistor with Schottky Diode

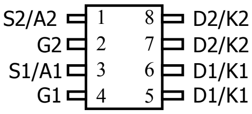
## General Description

The AO4902 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The two identical MOSFETs are co-packaged in parallel with a Schottky diode, making them ideal for many bridge and totem pole applications, for e.g. DDR memory.

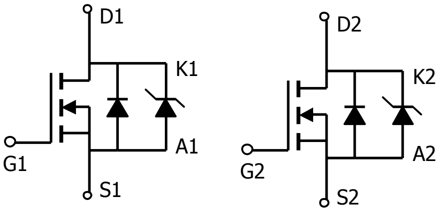
## Features

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

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



**SOIC-8**



| **Absolute Maximum Ratings $T_A$=25°C unless otherwise noted** | | | | | |
|---|---|---|---|---|---|
| **Parameter** | | **Symbol** | **MOSFET** | **Schottky** | **Units** |
| Drain-Source Voltage | | $V_{DS}$ | 30 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ±12 | | V |
| Continuous Drain Current$^{A}$ | $T_A$=25°C | $I_D$ | 6.9 | | A |
| | $T_A$=70°C | | 5.8 | | |
| Pulsed Drain Current$^{B}$ | | $I_{DM}$ | 40 | | |
| Schottky reverse voltage | | $V_{KA}$ | | 30 | V |
| Continuous Forward Current$^{A}$ | $T_A$=25°C | $I_F$ | | 3 | A |
| | $T_A$=70°C | | | 2 | |
| Pulsed Forward Current$^{B}$ | | $I_{FM}$ | | 40 | |
| Power Dissipation | $T_A$=25°C | $P_D$ | 2 | 2 | W |
| | $T_A$=70°C | | 1.44 | 1.44 | |
| Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 150 | -55 to 150 | °C |

| **Parameter: Thermal Characteristics MOSFET** | | **Symbol** | **Typ** | **Max** | **Units** |
|---|---|---|---|---|---|
| Maximum Junction-to-Ambient$^{A}$ | t ≤ 10s | $R_{\theta JA}$ | 48 | 62.5 | °C/W |
| Maximum Junction-to-Ambient$^{A}$ | Steady-State | | 74 | 110 | |
| Maximum Junction-to-Lead$^{C}$ | Steady-State | $R_{\theta JL}$ | 35 | 40 | |
| **Thermal Characteristics Schottky** | | | | | |
| Maximum Junction-to-Ambient$^{A}$ | t ≤ 10s | $R_{\theta JA}$ | 47.5 | 62.5 | °C/W |
| Maximum Junction-to-Ambient$^{A}$ | Steady-State | | 71 | 110 | |
| Maximum Junction-to-Lead$^{C}$ | Steady-State | $R_{\theta JL}$ | 32 | 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 | | | 1 | µA |
| | | $T_J$=55°C | | | 5 | |
| $I_{GSS}$ | Gate-Body leakage current | $V_{DS}$=0V, $V_{GS}$= ±12V | | | 100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$ $I_D$=250µA | 0.7 | 1 | 1.4 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}$=4.5V, $V_{DS}$=5V | 25 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V, $I_D$=6.9A | | 22.6 | 27 | mΩ |
| | | $T_J$=125°C | | 33 | 40 | |
| | | $V_{GS}$=4.5V, $I_D$=6.0A | | 27 | 32 | mΩ |
| | | $V_{GS}$=2.5V, $I_D$=5A | | 42 | 50 | mΩ |
| | | | | | | |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=5V, $I_D$=5A | 12 | 16 | | S |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=1A | | 0.71 | 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 | | 846 | | pF |
| $C_{oss}$ | Output Capacitance | | | 96 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 67 | | pF |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | | 1.24 | | Ω |
| **SWITCHING PARAMETERS** | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{GS}$=4.5V, $V_{DS}$=15V, $I_D$=6.9A | | 9.6 | | nC |
| $Q_{gs}$ | Gate Source Charge | | | 1.65 | | nC |
| $Q_{gd}$ | Gate Drain Charge | | | 3 | | nC |
| $t_{D(on)}$ | Turn-On DelayTime | $V_{GS}$=10V, $V_{DS}$=15V, $R_L$=2.2Ω, $R_{GEN}$=6Ω | | 5.7 | | ns |
| $t_r$ | Turn-On Rise Time | | | 13 | | ns |
| $t_{D(off)}$ | Turn-Off DelayTime | | | 37 | | ns |
| $t_f$ | Turn-Off Fall Time | | | 4.2 | | ns |
| $t_{rr}$ | Body Diode Reverse Recovery time | $I_F$=5A, dI/dt=100A/µs | | 15.5 | | ns |
| $Q_{rr}$ | Body Diode Reverse Recovery charge | $I_F$=5A, dI/dt=100A/µs | | 7.9 | | 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 $R_{\theta JA}$ is measured with the device mounted on 1in$^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A$ =25°C. The value in any a 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 $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.

D. The static characteristics in Figures 1 to 6,12,14 are obtained using 80µs 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 $T_A$=25°C. The SOA curve provides a single pulse rating.

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTIC

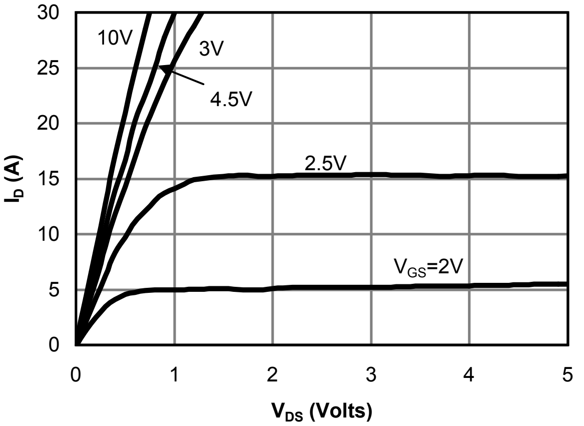


Fig 1: On-Region Characteristics

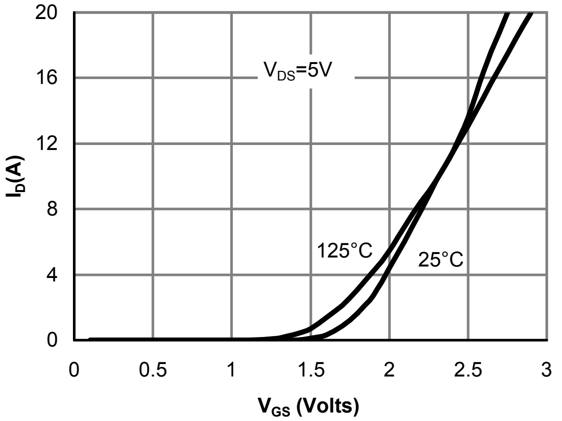


Figure 2: Transfer Characteristics

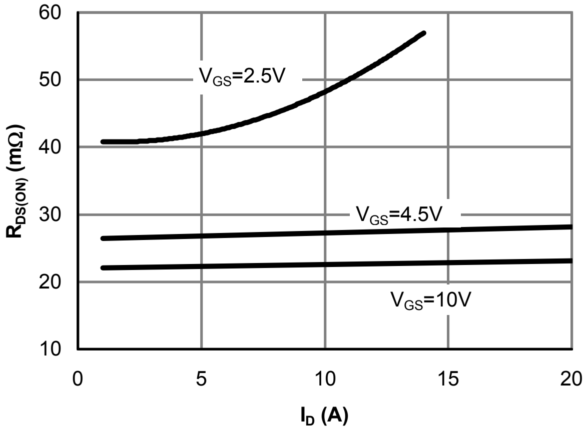


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

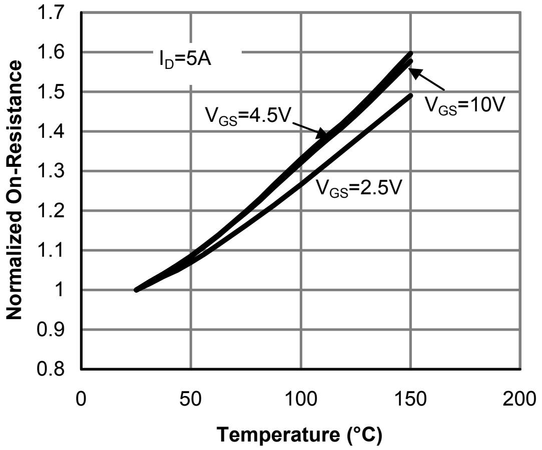


Figure 4: On resistance vs. Junction Temperature

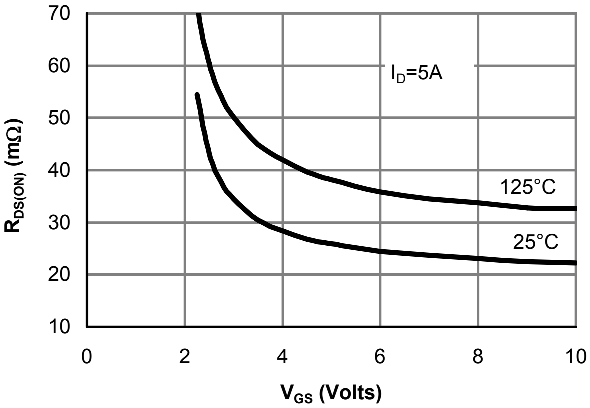


Figure 5: On resistance vs. Gate-Source Voltage

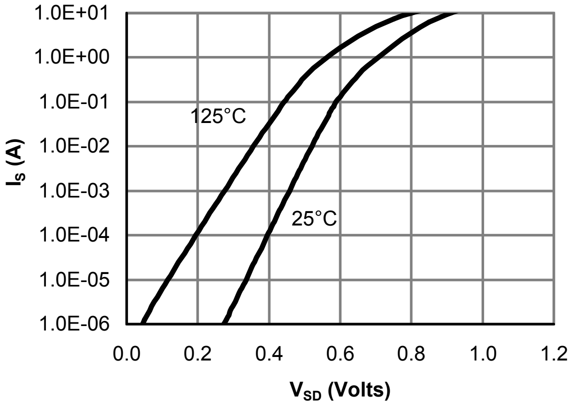


Figure 6: Body-Diode Characteristics

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

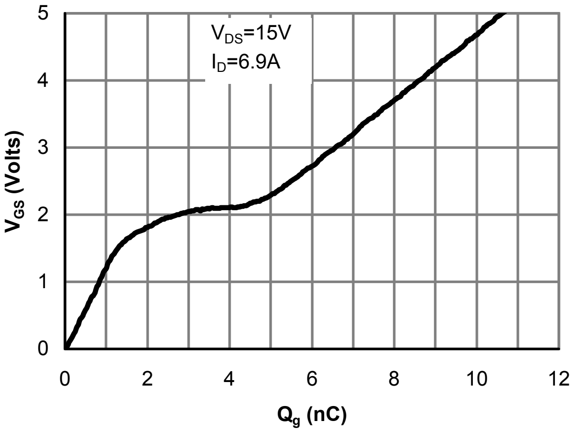


Figure 7: Gate-Charge Characteristics

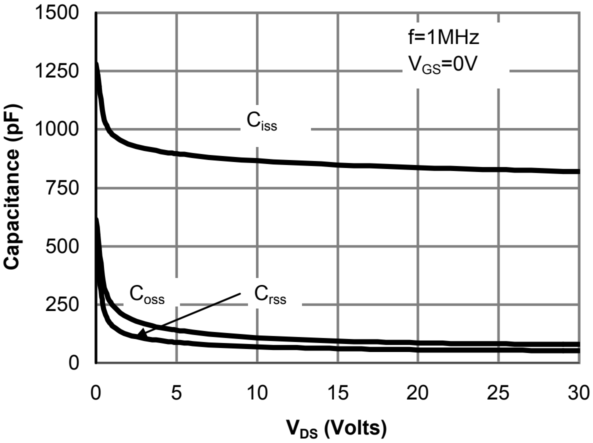


Figure 8: Capacitance Characteristics

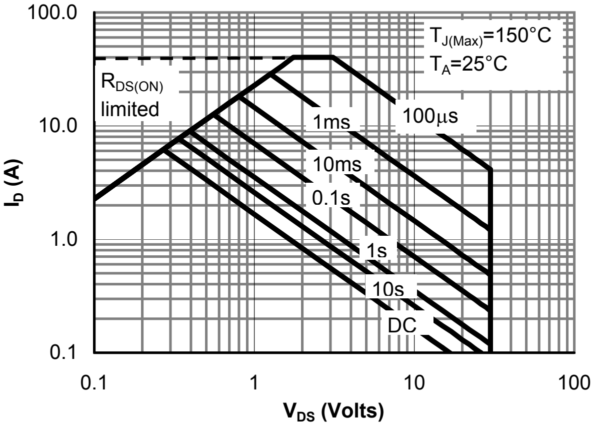


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

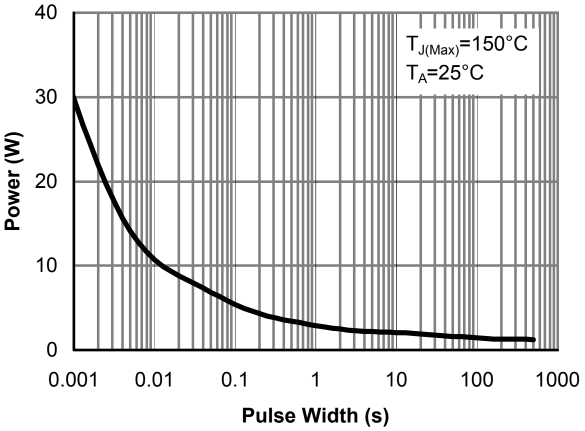


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

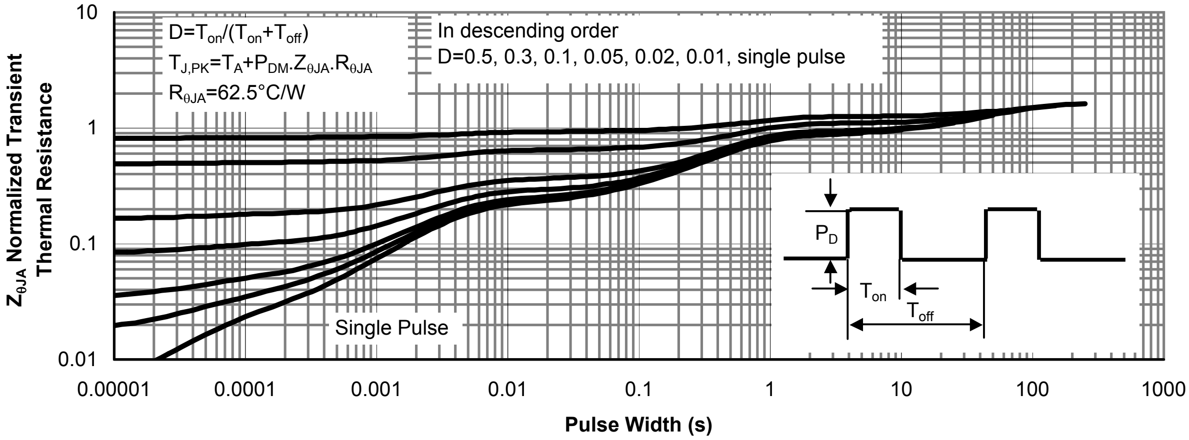


Figure 11: Normalized Maximum Transient Thermal Impedance

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: SCHOTTK

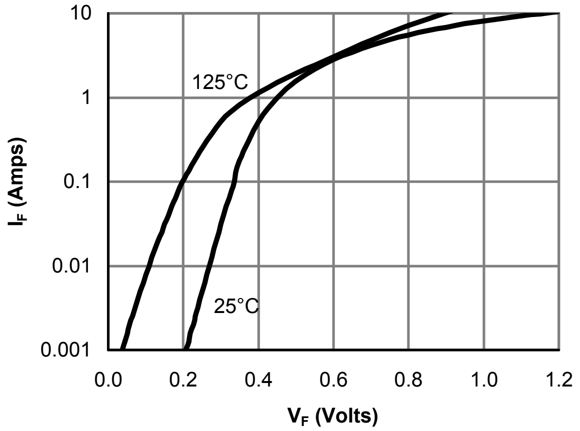


Figure 12: Schottky Forward Characteristics

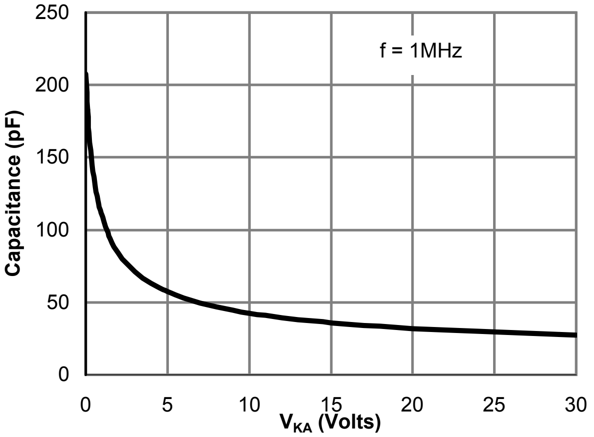


Figure 13: Schottky Capacitance Characteristics

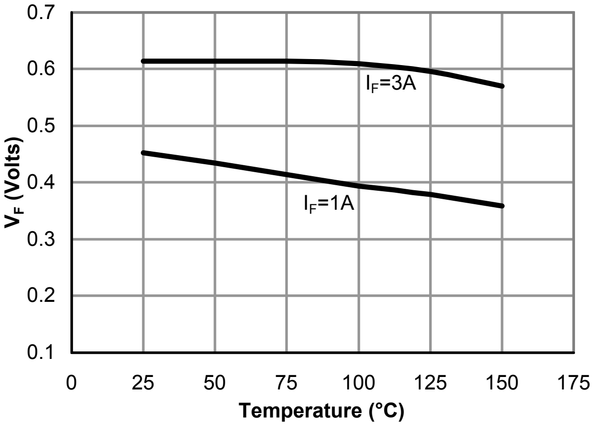


Figure 14: Schottky Forward Drop vs. Junction Temperature

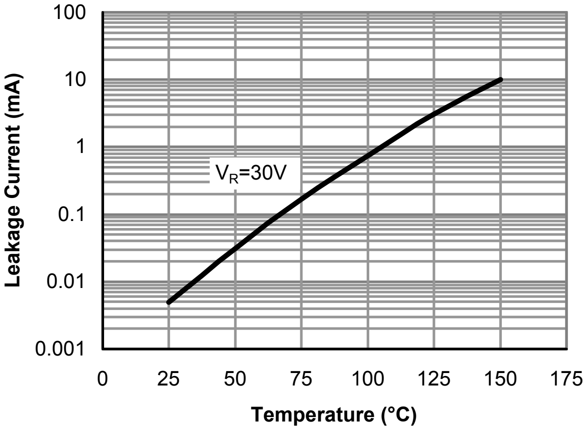


Figure 15: Schottky Leakage current vs. Junction Temperature

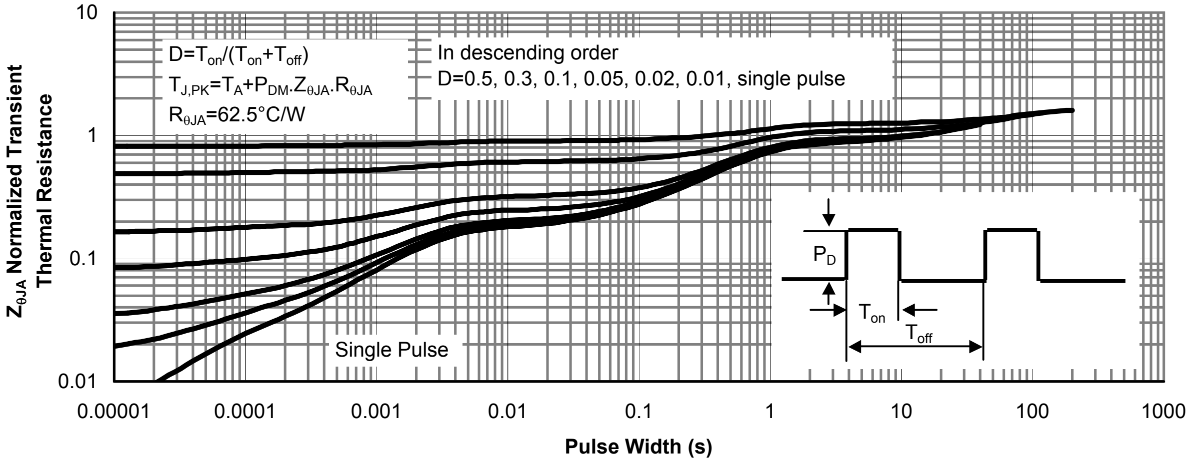


Figure 15: Schottky Normalized Maximum Transient Thermal Impedance