ALPHA & OMEGA SEMICONDUCTOR

# AO4484

## 40V N-Channel MOSFET

## General Description

The AO4484 uses advanced trench technology to provide excellent $R_{DS(ON)}$ with low gate charge. This is an all purpose device that is suitable for use in a wide range of power conversion applications.

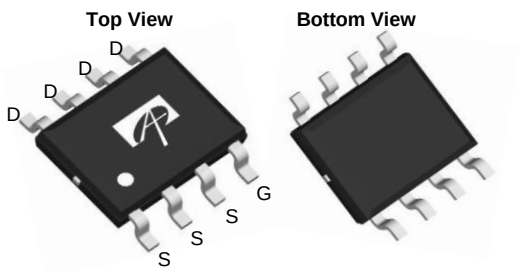
## Product Summary

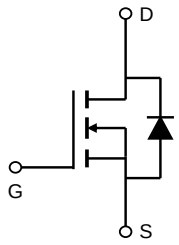
$V_{DS}$ (V) = 40V
$I_D$ = 10A ($V_{GS}$ = 10V)
$R_{DS(ON)}$ < 10mΩ ($V_{GS}$ = 10V)
$R_{DS(ON)}$ < 12mΩ ($V_{GS}$ = 4.5V)

100% UIS Tested
100% Rg Tested

Green Product

**SOIC-8**




**Absolute Maximum Ratings $T_J$=25°C unless otherwise noted**

| Parameter | | Symbol | 10 Sec | Steady State | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 40 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | | V |
| Continuous Drain Current [A] | $T_A$=25°C | $I_D$ | 13.5 | 10 | A |
| | $T_A$=70°C | | 10.8 | 8 | |
| Pulsed Drain Current [B] | | $I_{DM}$ | 120 | | |
| Avalanche Current [G] | | $I_{AR}$ | 23 | | |
| Repetitive avalanche energy L=0.3mH [G] | | $E_{AR}$ | 79 | | mJ |
| Power Dissipation [A] | $T_A$=25°C | $P_D$ | 3.1 | 1.7 | W |
| | $T_A$=70°C | | 2.0 | 1.1 | |
| Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 150 | | °C |

**Thermal Characteristics**

| Parameter | | Symbol | Typ | Max | Units |
|---|---|---|---|---|---|
| Maximum Junction-to-Ambient [A] | t ≤ 10s | $R_{\theta JA}$ | 31 | 40 | °C/W |
| Maximum Junction-to-Ambient [A] | Steady State | | 59 | 75 | °C/W |
| Maximum Junction-to-Lead [C] | Steady State | $R_{\theta JL}$ | 16 | 24 | °C/W |

## 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 | 40 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 40V, $V_{GS}$ = 0V | | | 1 | µA |
| | | $T_J$ = 55°C | | | 5 | |
| $I_{GSS}$ | Gate-Body leakage current | $V_{DS}$ = 0V, $V_{GS}$ = ±20V | | | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$ $I_D$ = 250µA | 1.7 | 2.2 | 3 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}$ = 10V, $V_{DS}$ = 5V | 120 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$ = 10V, $I_D$ = 10A | | 8.2 | 10 | mΩ |
| | | $T_J$=125°C | | 12.5 | 16 | |
| | | $V_{GS}$ = 4.5V, $I_D$ = 8A | | 10 | 12.5 | |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 5V, $I_D$ = 10A | | 75 | | S |
| $V_{SD}$ | Diode Forward Voltage | $I_S$ = 1A,$V_{GS}$ = 0V | | 0.72 | 1 | V |
| $I_S$ | Maximum Body-Diode Continuous Current | | | | 2.5 | A |
| **DYNAMIC PARAMETERS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=20V, f=1MHz | | 1500 | 1950 | pF |
| $C_{oss}$ | Output Capacitance | | | 215 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 135 | | pF |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | 2 | 3.5 | 5 | Ω |
| **SWITCHING PARAMETERS** | | | | | | |
| $Q_g$ (10V) | Total Gate Charge | $V_{GS}$=10V, $V_{DS}$=20V, $I_D$=10A | | 27.2 | 37 | nC |
| $Q_g$ (4.5V) | Total Gate Charge | | | 13.6 | 18 | nC |
| $Q_{gs}$ | Gate Source Charge | | | 4.5 | | nC |
| $Q_{gd}$ | Gate Drain Charge | | | 6.4 | | nC |
| $t_{D(on)}$ | Turn-On DelayTime | $V_{GS}$=10V, $V_{DS}$=20V, $R_L$= 2Ω, $R_{GEN}$=3Ω | | 6.4 | | ns |
| $t_r$ | Turn-On Rise Time | | | 17.2 | | ns |
| $t_{D(off)}$ | Turn-Off DelayTime | | | 29.6 | | ns |
| $t_f$ | Turn-Off Fall Time | | | 16.8 | | ns |
| $t_{rr}$ | Body Diode Reverse Recovery Time | $I_F$=10A, dI/dt=100A/µs | | 30 | 40 | ns |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge | $I_F$=10A, dI/dt=100A/µs | | 19 | | nC |

A: The value of $R_{\theta JA}$ 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.
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 are obtained using t ≤ 300µs 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.
F. The current rating is based on the t ≤ 10s thermal resistance rating.
G. $E_{AR}$ and $I_{AR}$ ratings are based on low frequency and duty cycles to keep $T_j$=25C.

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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

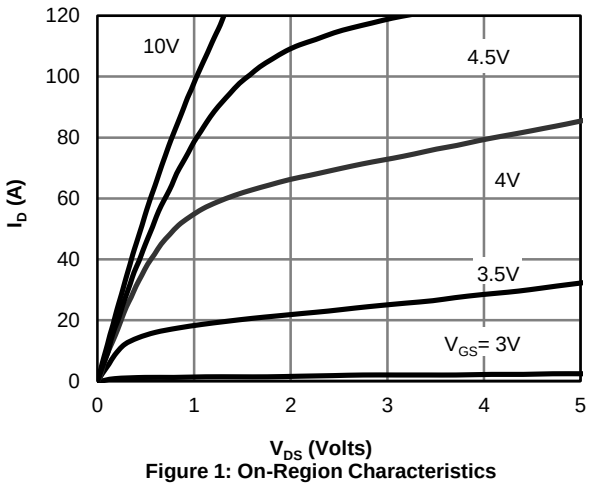



**Figure 1: On-Region Characteristics**

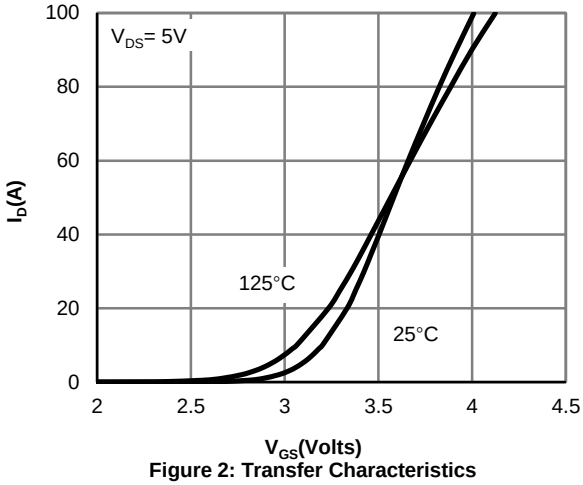



**Figure 2: Transfer Characteristics**

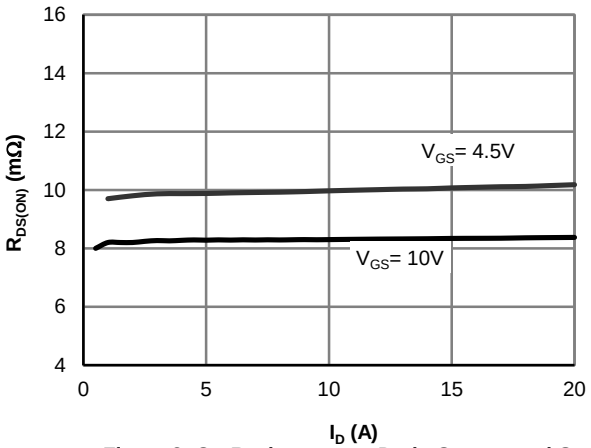



**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**

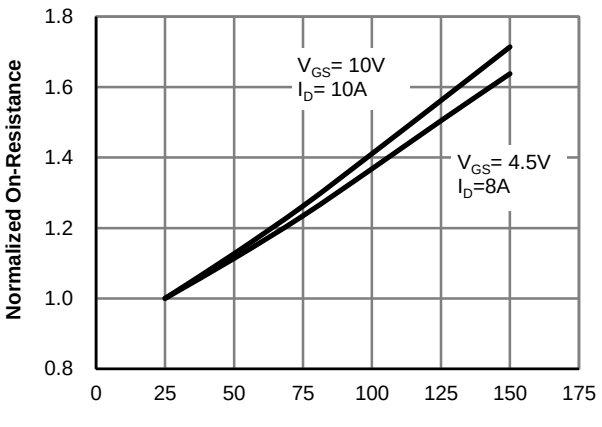



**Figure 4: On-Resistance vs. Junction Temperature**

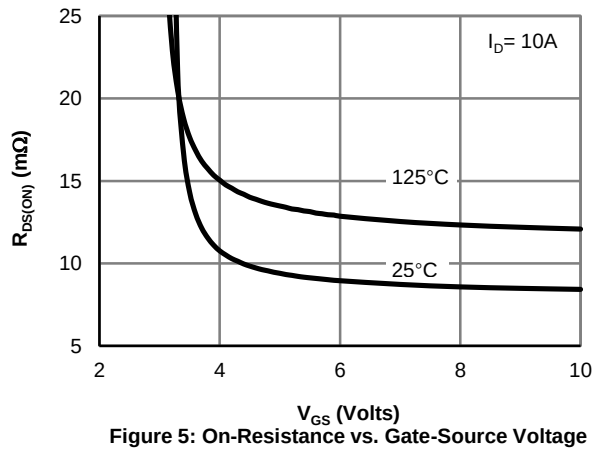



**Figure 5: On-Resistance vs. Gate-Source Voltage**

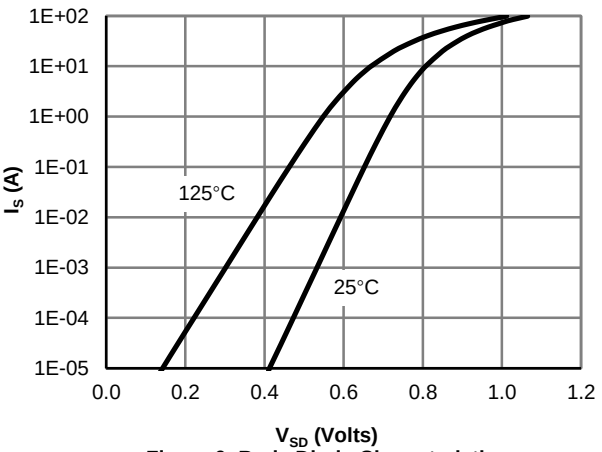



**Figure 6: Body-Diode Characteristics**

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

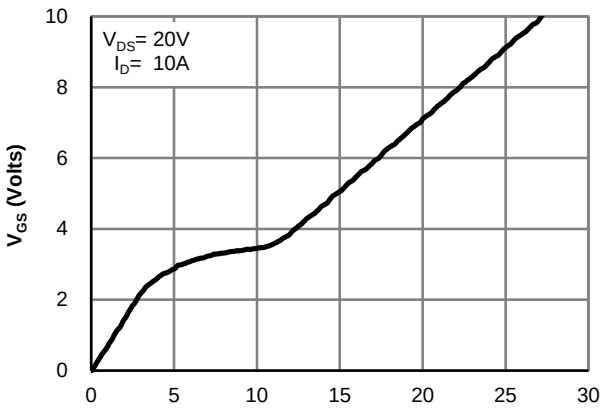



**Figure 7: Gate-Charge Characteristics**

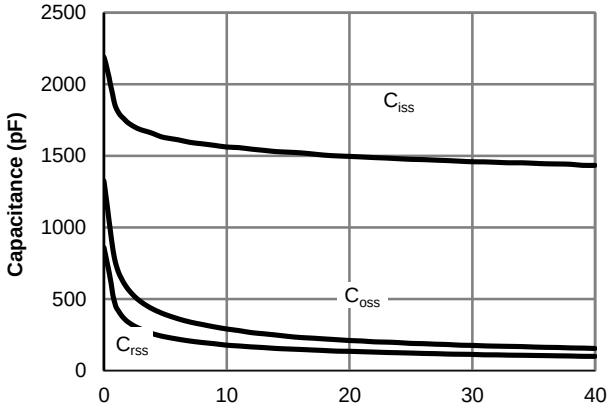



**Figure 8: Capacitance Characteristics**

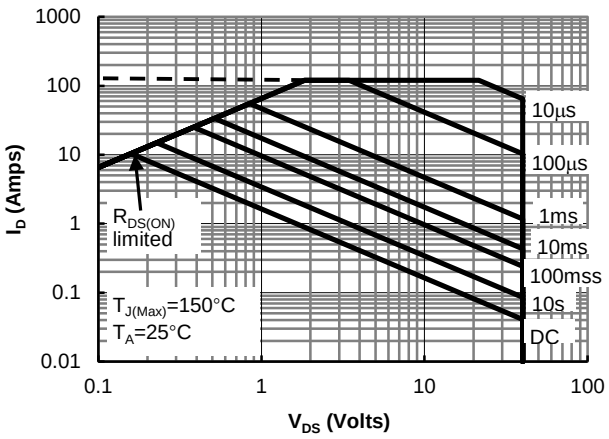



**Figure 9: Maximum Forward Biased Safe Operating Area (Note E)**

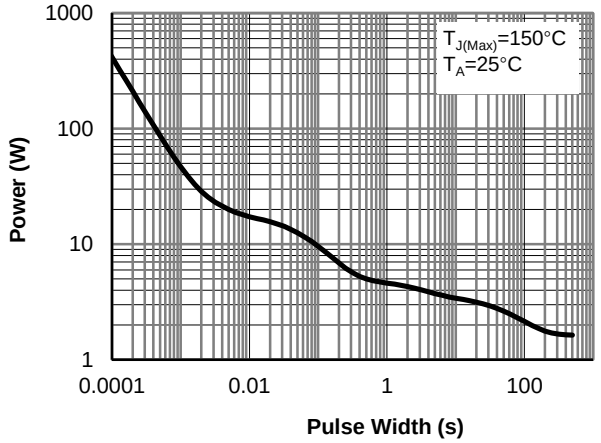



**Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)**

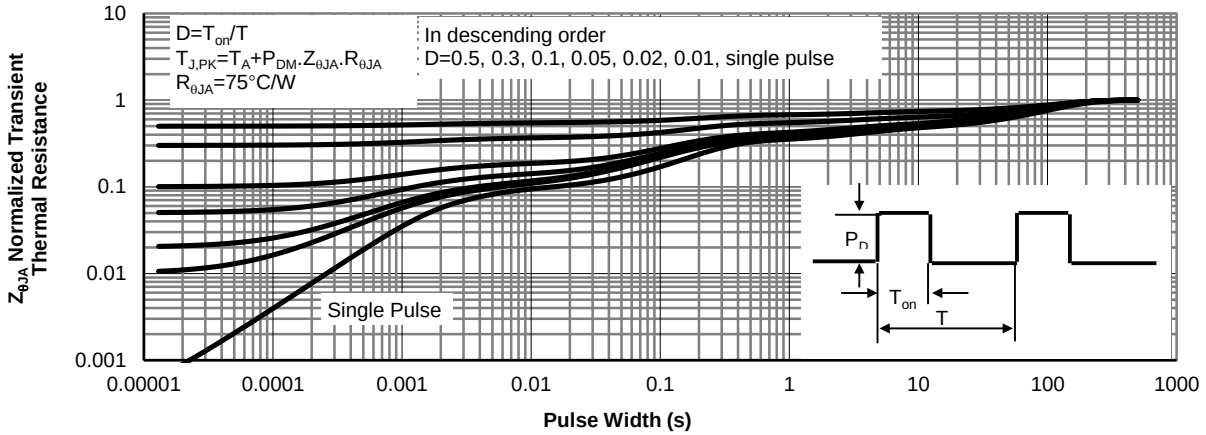



**Figure 11: Normalized Maximum Transient Thermal Impedance(Note E)**

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