ALPHA & OMEGA SEMICONDUCTOR

# AO4842

## 30V Dual N-Channel MOSFET

## General Description

The AO4842 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 buck converters.

## Product Summary

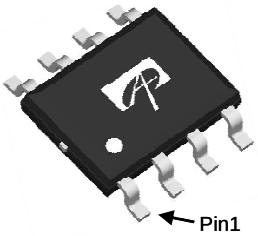
$V_{DS}$ (V) = 30V
$I_D$ = 7.7A ($V_{GS}$ = 10V)
$R_{DS(ON)}$ < 21mΩ ($V_{GS}$ = 10V)
$R_{DS(ON)}$ < 30mΩ ($V_{GS}$ = 4.5V)

100% UIS Tested
100% Rg Tested

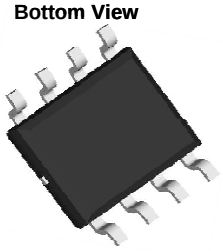
Green Product

SOIC-8

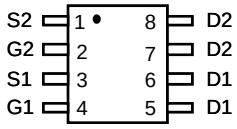
Top View

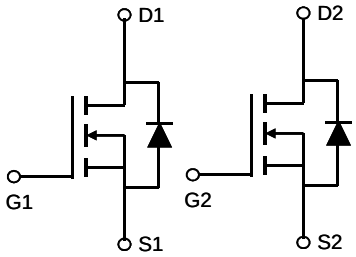



Bottom View



Top View




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

| Parameter | | Symbol | Maximum | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current [AF] | $T_A$=25°C | $I_D$ | 7.7 | A |
| | $T_A$=70°C | | 6.5 | |
| Pulsed Drain Current [B] | | $I_{DM}$ | 64 | |
| Power Dissipation | $T_A$=25°C | $P_D$ | 2 | W |
| | $T_A$=70°C | | 1.44 | |
| 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 | $R_{\theta JA}$ | 50 | 62.5 | °C/W |
| Maximum Junction-to-Ambient [A] | Steady-State | | 82 | 110 | °C/W |
| Maximum Junction-to-Lead [C] | Steady-State | $R_{\theta JL}$ | 41 | 50 | °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 | 30 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=30V, $V_{GS}$=0V | | 0.004 | 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 | 1.5 | 2.1 | 2.6 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}$=4.5V, $V_{DS}$=5V | 64 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V, $I_D$=7.7A | | 16.8 | 21 | mΩ |
| | | $T_J$=125°C | | 24 | 29 | |
| | | $V_{GS}$=4.5V, $I_D$=5A | | 23.4 | 30 | mΩ |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=5V, $I_D$=7.7A | | 20 | | S |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=1A,$V_{GS}$=0V | | 0.75 | 1 | V |
| $I_S$ | Maximum Body-Diode Continuous Current | | | | 2.4 | A |
| **DYNAMIC PARAMETERS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=15V, f=1MHz | | 373 | 448 | pF |
| $C_{oss}$ | Output Capacitance | | | 67 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 41 | | pF |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | | 1.8 | 2.8 | Ω |
| **SWITCHING PARAMETERS** | | | | | | |
| $Q_g$(10V) | Total Gate Charge | $V_{GS}$=10V, $V_{DS}$=15V, $I_D$=7.7A | | 7.2 | 11 | nC |
| $Q_g$(4.5V) | Total Gate Charge | | | 3.5 | | nC |
| $Q_{gs}$ | Gate Source Charge | | | 1.3 | | nC |
| $Q_{gd}$ | Gate Drain Charge | | | 1.7 | | nC |
| $t_{D(on)}$ | Turn-On DelayTime | $V_{GS}$=10V, $V_{DS}$=15V, $R_L$=1.95Ω, $R_{GEN}$=3Ω | | 4.5 | | ns |
| $t_r$ | Turn-On Rise Time | | | 2.7 | | ns |
| $t_{D(off)}$ | Turn-Off DelayTime | | | 14.9 | | ns |
| $t_f$ | Turn-Off Fall Time | | | 2.9 | | ns |
| $t_{rr}$ | Body Diode Reverse Recovery Time | $I_F$=7.7A, dI/dt=100A/µs | | 10.5 | 12.6 | ns |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge | $I_F$=7.7A, dI/dt=100A/µs | | 4.5 | | nC |

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 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 <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 $T_A$=25° C. The SOA curve provides a single pulse rating.
F. The current rating is based on the t ≤ 10s thermal resistance rating.

Rev5: May. 2012

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

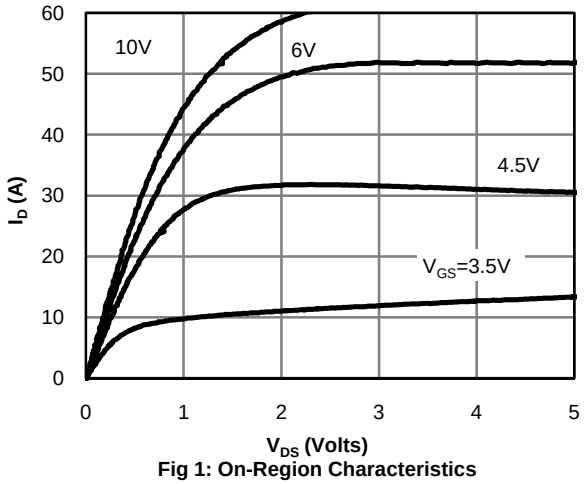


Fig 1: On-Region Characteristics

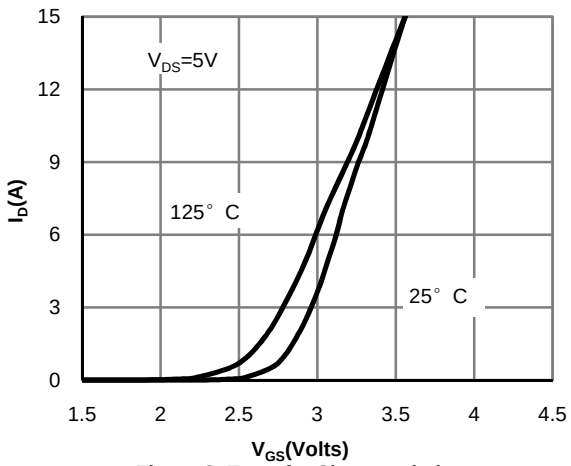


Figure 2: Transfer Characteristics

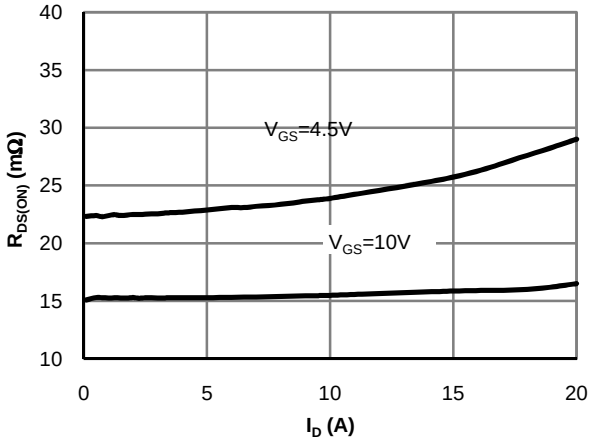


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

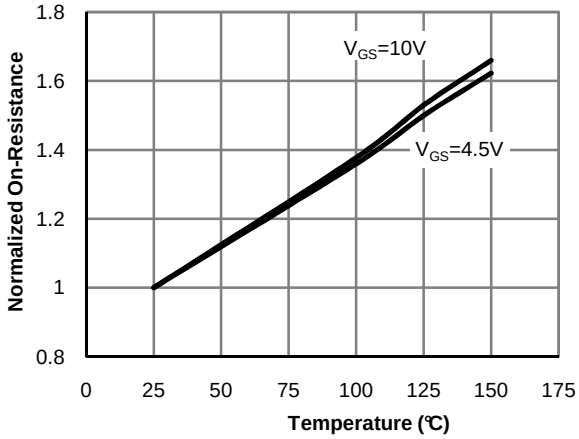


Figure 4: On-Resistance vs. Junction Temperature

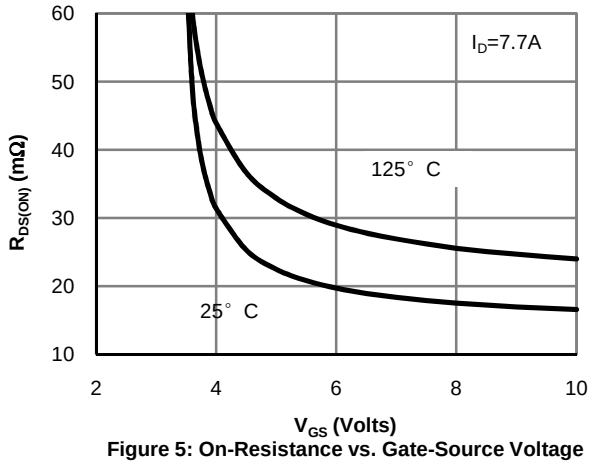


Figure 5: On-Resistance vs. Gate-Source Voltage

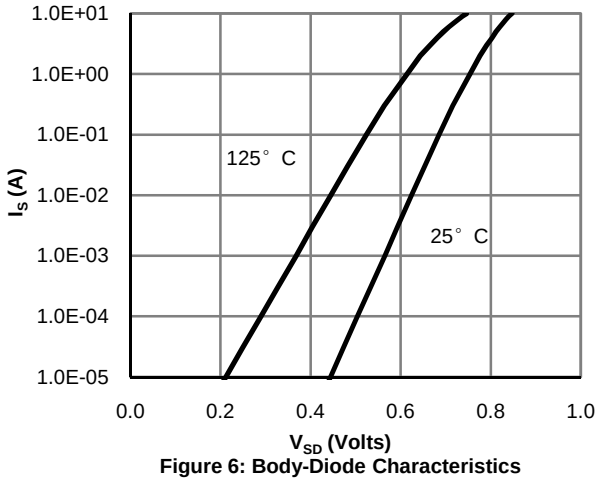


Figure 6: Body-Diode Characteristics

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

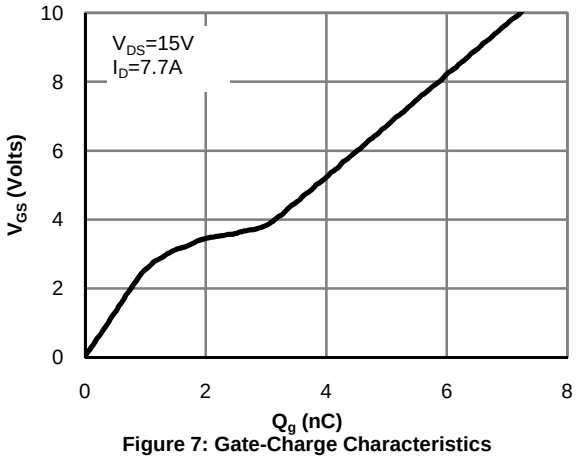



Figure 7: Gate-Charge Characteristics

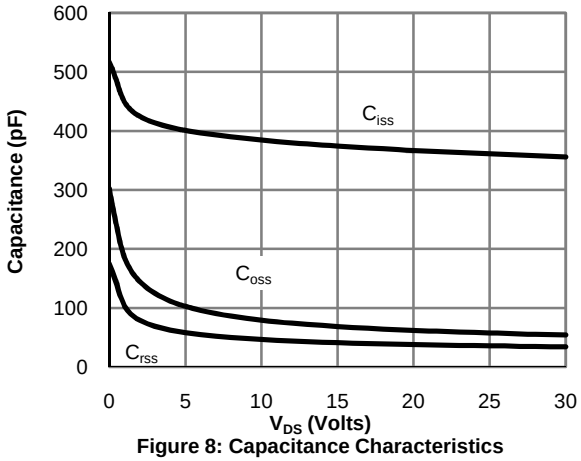



Figure 8: Capacitance Characteristics

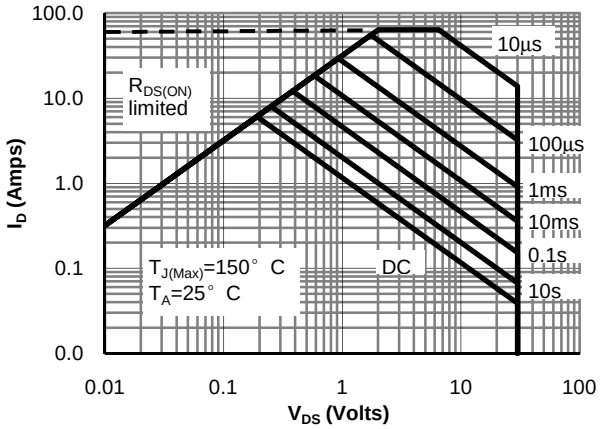



Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

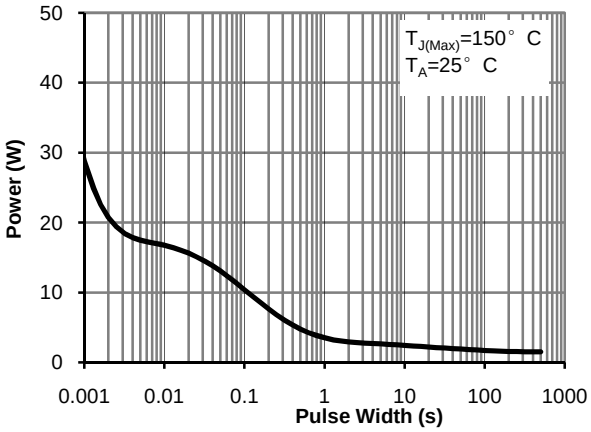



Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

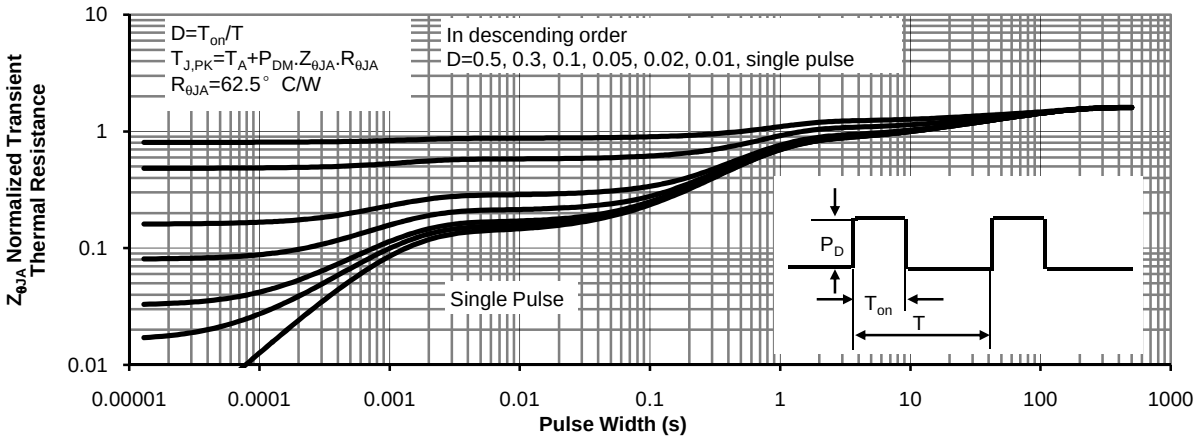



Figure 11: Normalized Maximum Transient Thermal Impedance