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ALPHA & OMEGA SEMICONDUCTOR

# AON4420L
## N-Channel Enhancement Mode Field Effect Transistor

### General Description

The AON4420L combines advanced trench MOSFET technology with a small footprint package to provide low $R_{DS(ON)}$ per unit area. This device is ideal for load switch and high speed switching applications.

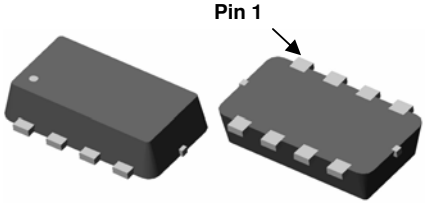
- RoHS Compliant
- Halogen Free

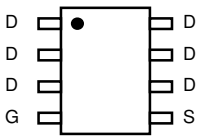
### Features

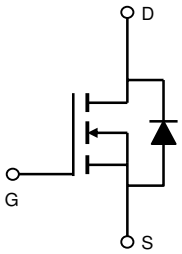
$V_{DS}$ (V) = 30V
$I_D$ = 10A ($V_{GS}$ = 10V)
$R_{DS(ON)}$ < 19mΩ ($V_{GS}$ = 10V)
$R_{DS(ON)}$ < 25mΩ ($V_{GS}$ = 4.5V)

**DFN 3x2**

**Top View** **Bottom 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 |
| Pulsed Drain Current [C] | | $I_{DM}$ | 50 | |
| Continuous Drain Current [A] | $T_A$=25°C | $I_D$ | 10 | A |
| | $T_A$=70°C | | 8 | |
| Power Dissipation [A] | $T_A$=25°C | $P_D$ | 1.6 | W |
| | $T_A$=70°C | | 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 | $R_{\theta JA}$ | 34 | 40 | °C/W |
| Maximum Junction-to-Ambient [A] | Steady-State | | 66 | 80 | °C/W |
| Maximum Junction-to-Lead [B] | Steady-State | $R_{\theta JL}$ | 20 | 25 | °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 | | | 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 | 1.4 | 1.9 | 2.5 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}$ = 10V, $V_{DS}$ = 5V | 50 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$ = 10V, $I_D$ = 10A | | 16 | 20 | mΩ |
| | | $T_J$=125°C | | 27 | | |
| | | $V_{GS}$ = 4.5V, $I_D$ = 8A | | 21 | 26 | |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 5V, $I_D$ = 10A | | 30 | | S |
| $V_{SD}$ | Diode Forward Voltage | $I_S$ = 1A,$V_{GS}$ = 0V | | 0.75 | 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 | 440 | 550 | 660 | pF |
| $C_{oss}$ | Output Capacitance | | 80 | 110 | 140 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | 35 | 55 | 80 | pF |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | 2 | 4 | 6 | Ω |
| **SWITCHING PARAMETERS** | | | | | | |
| $Q_g$ (10V) | Total Gate Charge (10V) | $V_{GS}$=10V, $V_{DS}$=15V, $I_D$=10A | 8 | 9.8 | 12 | nC |
| $Q_g$ (4.5V) | Total Gate Charge (4.5V) | | 4 | 4.6 | 5.5 | nC |
| $Q_{gs}$ | Gate Source Charge | | 1.5 | 1.8 | 2.2 | nC |
| $Q_{gd}$ | Gate Drain Charge | | 1.3 | 2.2 | 3 | nC |
| $t_{D(on)}$ | Turn-On DelayTime | $V_{GS}$=10V, $V_{DS}$=15V, $R_L$=1.5Ω, $R_{GEN}$=3Ω | | 5 | | ns |
| $t_r$ | Turn-On Rise Time | | | 3.2 | | ns |
| $t_{D(off)}$ | Turn-Off DelayTime | | | 24 | | ns |
| $t_f$ | Turn-Off Fall Time | | | 6 | | ns |
| $t_{rr}$ | Body Diode Reverse Recovery Time | $I_F$=10A, dI/dt=300A/µs | 8 | 11 | 14 | ns |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge | $I_F$=10A, dI/dt=300A/µs | 11 | 13 | 16 | 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 t ≤ 300µs 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.

Rev0: July 2008

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

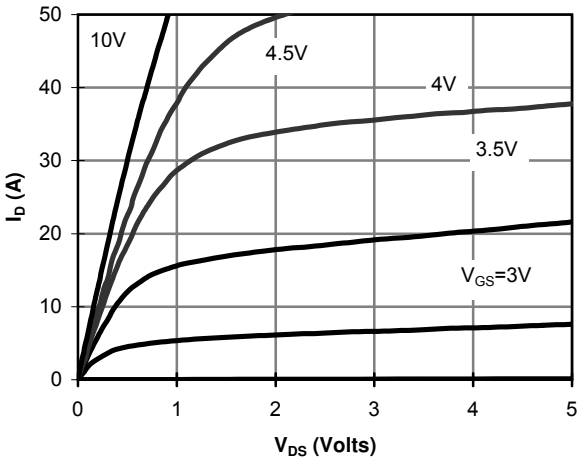



**Figure 1: On-Region Characteristics**

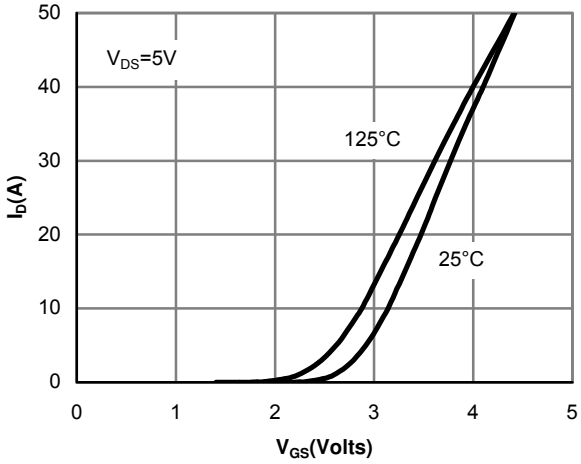



**Figure 2: Transfer Characteristics**

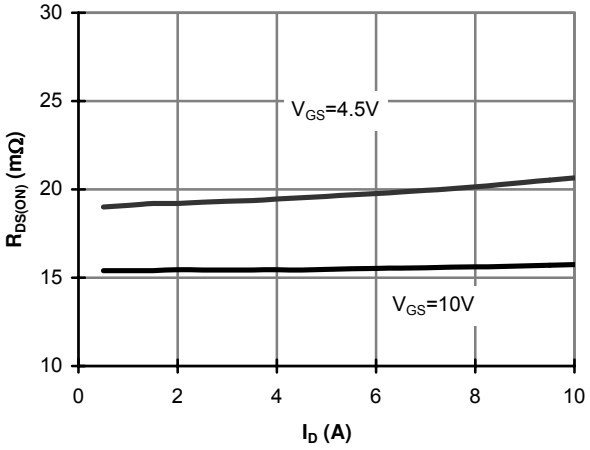



**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**

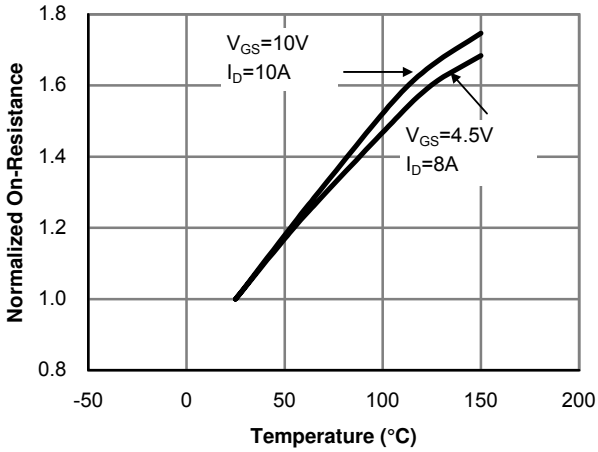



**Figure 4: On-Resistance vs. Junction Temperature**

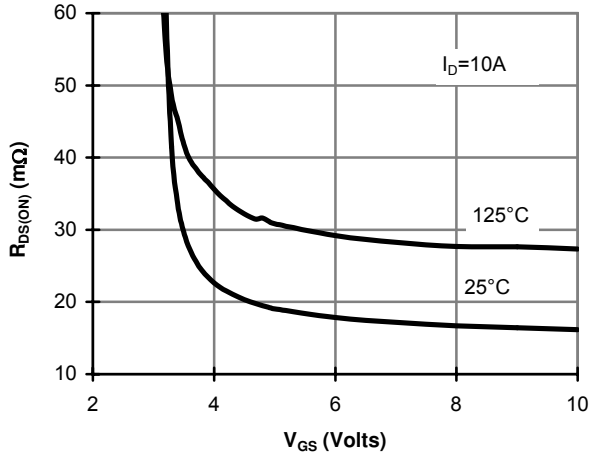



**Figure 5: On-Resistance vs. Gate-Source Voltage**

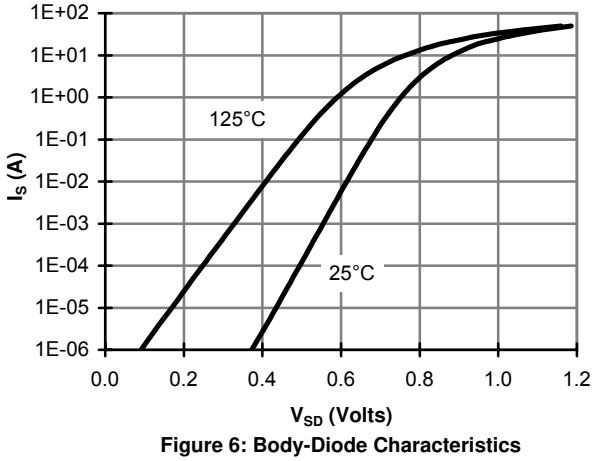



**Figure 6: Body-Diode Characteristics**

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

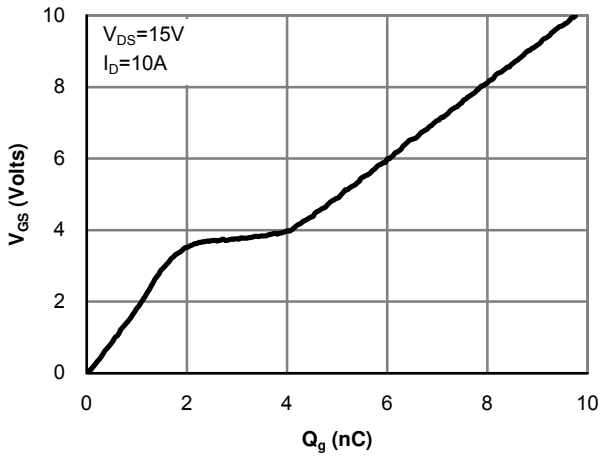



**Figure 7: Gate-Charge Characteristics**

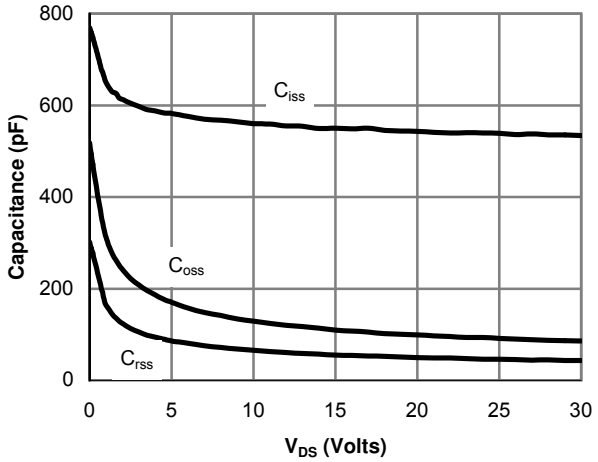



**Figure 8: Capacitance Characteristics**

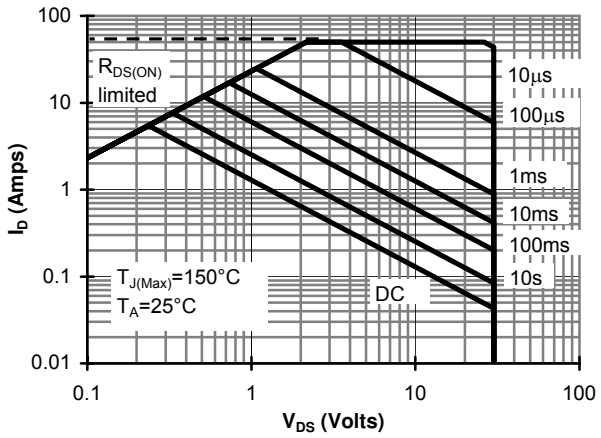



**Figure 9: Maximum Forward Biased Safe Operating Area (Note E)**

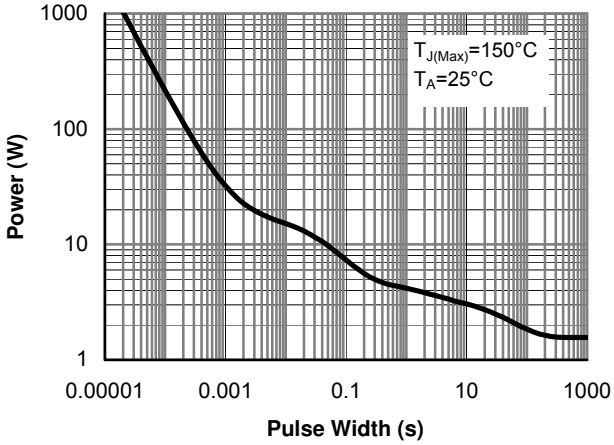



**Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)**

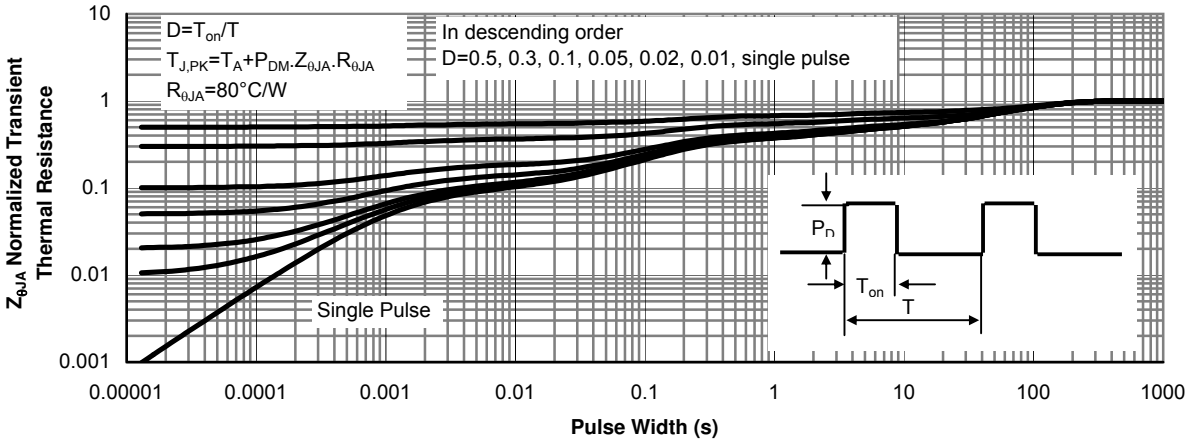
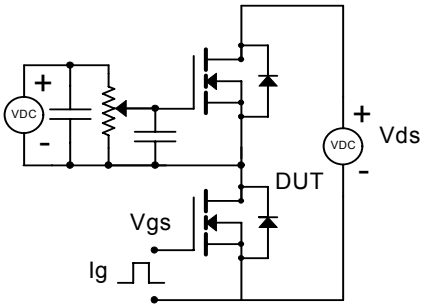
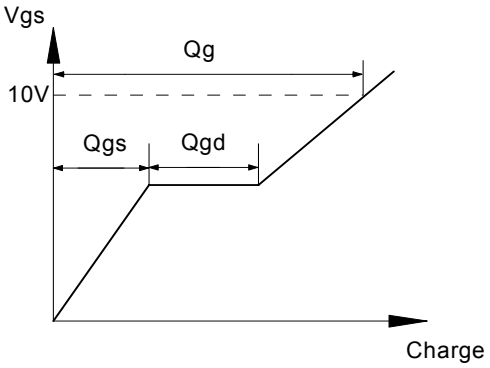


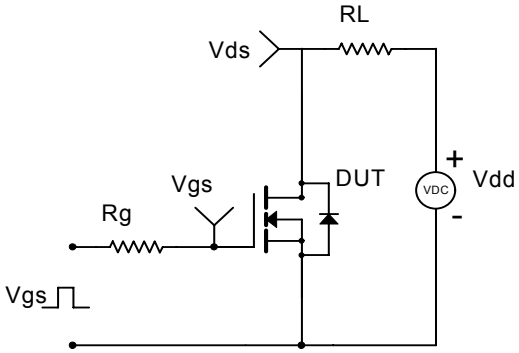

**Figure 11: Normalized Maximum Transient Thermal Impedance(Note E)**

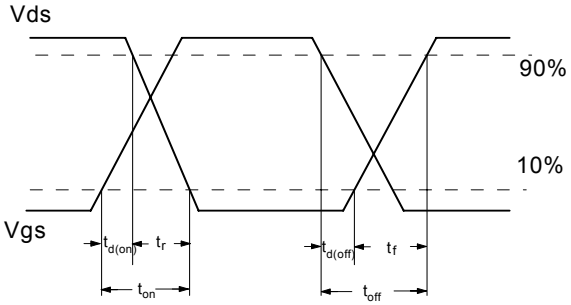
## Gate Charge Test Circuit & Waveform




## Resistive Switching Test Circuit & Waveforms




## Diode Recovery Test Circuit & Waveforms