



**AO4447**

**P-Channel Enhancement Mode Field Effect Transistor**

**General Description**

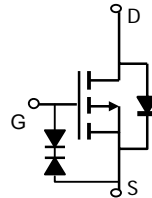
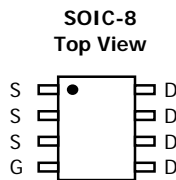
The AO4447/L uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , and ultra-low low gate charge. This device is suitable for use as a load switch. The device is ESD protected. AO4447 and AO4447L are electrically identical.

- RoHS Compliant
- AO4447L is Halogen Free

**Features**

- $V_{DS}$  (V) = -30V
- $I_D$  = -15 A ( $V_{GS}$  = -10V)
- Max  $R_{DS(ON)}$  < 7.5m $\Omega$  ( $V_{GS}$  = -10V)
- Max  $R_{DS(ON)}$  < 12m $\Omega$  ( $V_{GS}$  = -4V)
- ESD Rating: 4KV HBM

**UIS Tested!**  
**Rg, Ciss, Coss, Crss Tested**



**Absolute Maximum Ratings  $T_A=25^\circ\text{C}$  unless otherwise noted**

| Parameter   | Symbol         | Maximum                | Units            |
|---|----------------|------------------------|------------------|
| Drain-Source Voltage                                      | $V_{DS}$       | -30                    | V                |
| Gate-Source Voltage                                       | $V_{GS}$       | $\pm 20$               | V                |
| Continuous Drain Current <sup>AF</sup>                    | $I_D$          | $T_A=25^\circ\text{C}$ | -15              |
|   |                | $T_A=70^\circ\text{C}$ | -13.6            |
| Pulsed Drain Current <sup>B</sup>                         | $I_{DM}$       | -60                    | A                |
| Avalanche Current <sup>G</sup>                            | $I_{AR}$       | 40                     | A                |
| Repetitive avalanche energy $L=0.3\text{mH}$ <sup>G</sup> | $E_{AR}$       | 240                    | mJ               |
| Power Dissipation <sup>A</sup>                            | $P_D$          | $T_A=25^\circ\text{C}$ | 3.1              |
|   |                | $T_A=70^\circ\text{C}$ | 2                |
| Junction and Storage Temperature Range                    | $T_J, T_{STG}$ | -55 to 150             | $^\circ\text{C}$ |

**Thermal Characteristics**

| Parameter                                | Symbol          | Typ                 | Max | Units              |
|--|-----------------|---------------------|-----|--------------------|
| Maximum Junction-to-Ambient <sup>A</sup> | $R_{\theta JA}$ | $t \leq 10\text{s}$ | 26  | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient <sup>A</sup> |                 | Steady-State        | 50  | $^\circ\text{C/W}$ |
| Maximum Junction-to-Lead <sup>C</sup>    | $R_{\theta JL}$ | 14                  | 24  | $^\circ\text{C/W}$ |

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<br>T <sub>J</sub> =55°C                          |      |            | -1<br>-10 | μA    |
| I <sub>GSS</sub>            | Gate-Body leakage current             | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V  |      |            | ±10       | μA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =-250μA                                     | -0.9 | -1.25      | -1.6      | V     |
| I <sub>D(ON)</sub>          | On state drain current                | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V   | -60  |            |           | A     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance     | V <sub>GS</sub> =-10V, I <sub>D</sub> =-15A<br>T <sub>J</sub> =125°C                        |      | 6.7<br>9.4 | 7.5<br>12 | mΩ    |
|                             |                                       | V <sub>GS</sub> =-4V, I <sub>D</sub> =-13A  |      | 9.2        | 12        | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =-5V, I <sub>D</sub> =-15A  |      | 60         |           | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                 | I <sub>S</sub> =-1A, V <sub>GS</sub> =0V  |      | -0.69      | -1        | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current |   |      |            | 5.5       | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                       |   |      |            |           |       |
| C <sub>iss</sub>            | Input Capacitance                     | V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz  |      | 5500       | 6600      | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |   |      | 745        |           | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |   |      | 473        |           | pF    |
| R <sub>g</sub>              | Gate resistance                       | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz  |      | 3.1        | 4         | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |   |      |            |           |       |
| Q <sub>g</sub>              | Total Gate Charge                     | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-15A                          |      | 88.8       | 120       | nC    |
| Q <sub>g(4.5V)</sub>        | Gate Charge                           |   |      | 45.2       | 60        | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |   |      | 10.1       |           | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |   |      | 19.4       |           | nC    |
| t <sub>D(on)</sub>          | Turn-On Delay Time                    | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, R <sub>L</sub> =1.7Ω,<br>R <sub>GEN</sub> =3Ω |      | 12         |           | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |   |      | 11.5       |           | ns    |
| t <sub>D(off)</sub>         | Turn-Off Delay Time                   |   |      | 100        |           | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |   |      | 40         |           | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =-15A, di/dt=100A/μs   |      | 46.6       | 60        | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =-15A, di/dt=100A/μs   |      | 67.7       |           | nC    |

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> 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 6,12,14 are obtained using <300μs pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in<sup>2</sup> 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 thermal resistance rating.

G: EAR and IAR ratings are based on low frequency and duty cycles such that T<sub>J(start)</sub>=25C for each pulse.

Rev6: Jan 2008

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

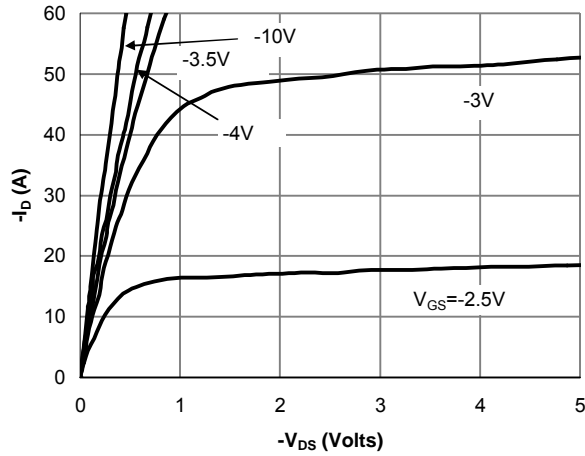


Fig 1: On-Region Characteristics

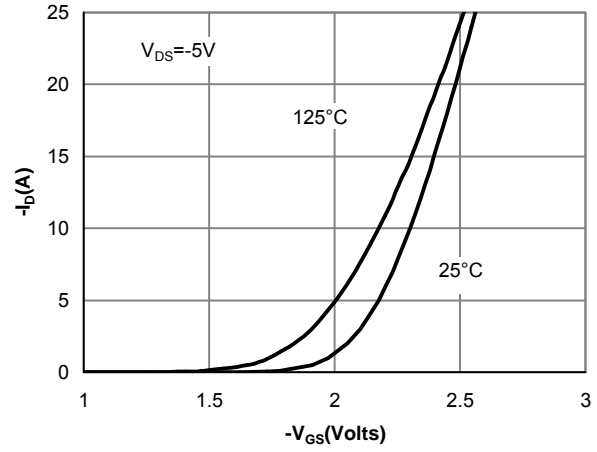


Figure 2: Transfer Characteristics

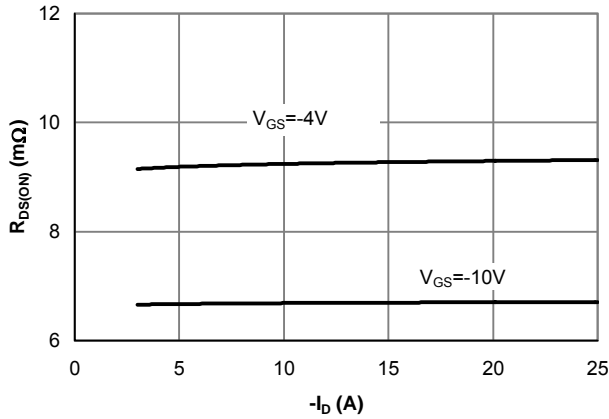


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

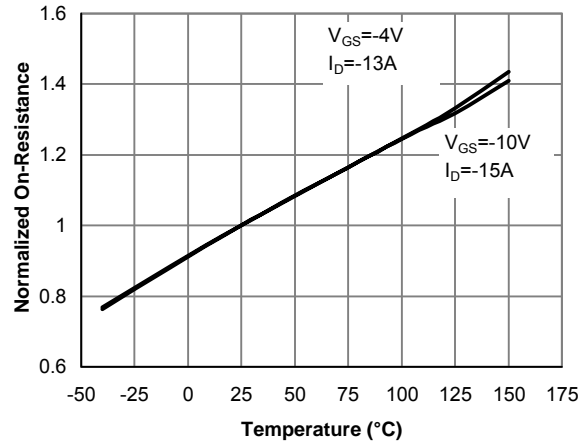


Figure 4: On-Resistance vs. Junction Temperature

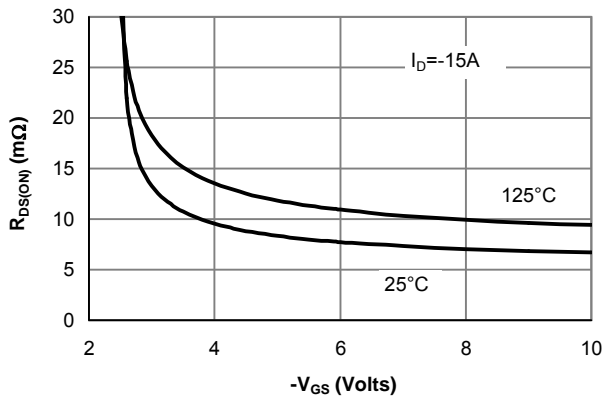


Figure 5: On-Resistance vs. Gate-Source Voltage

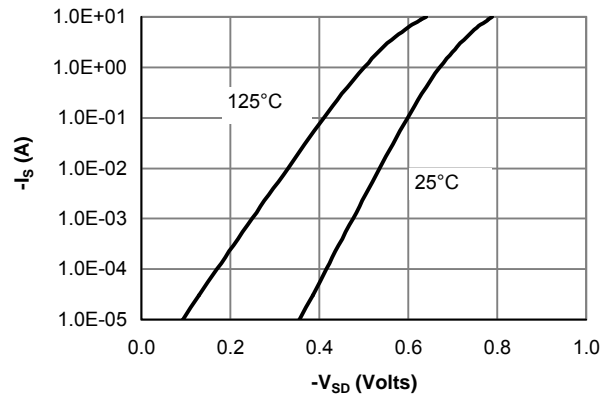


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

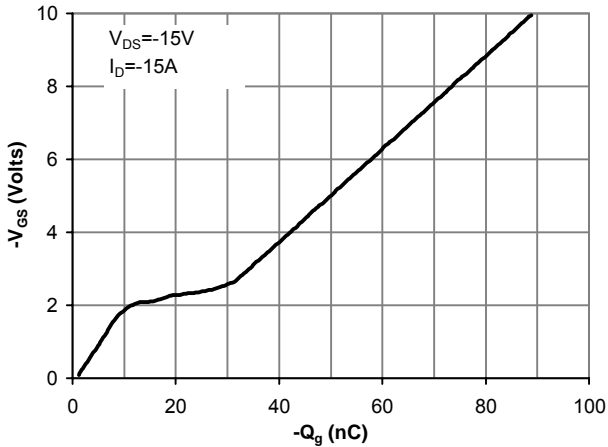


Figure 7: Gate-Charge Characteristics

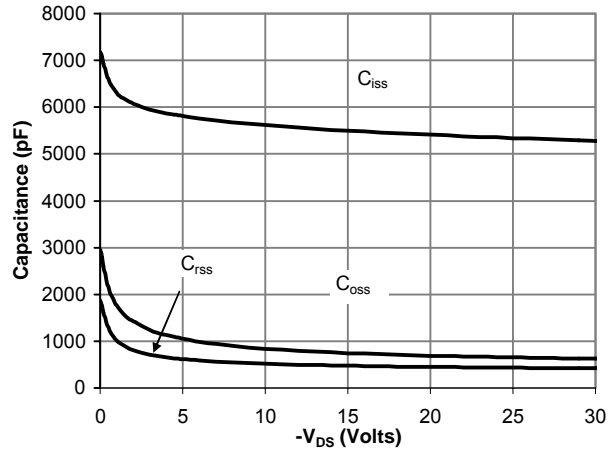


Figure 8: Capacitance Characteristics

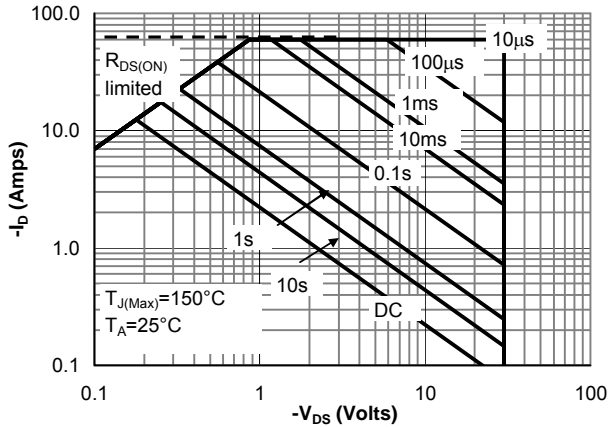


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

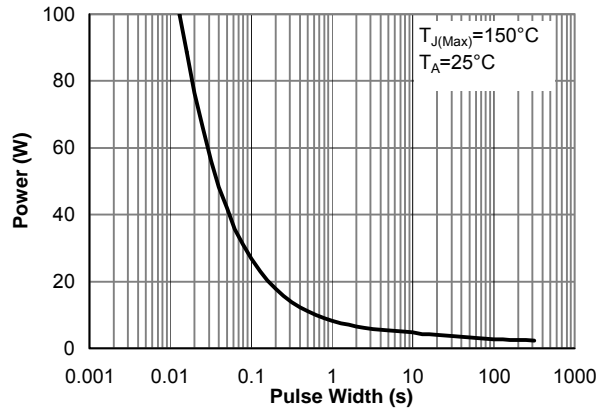


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

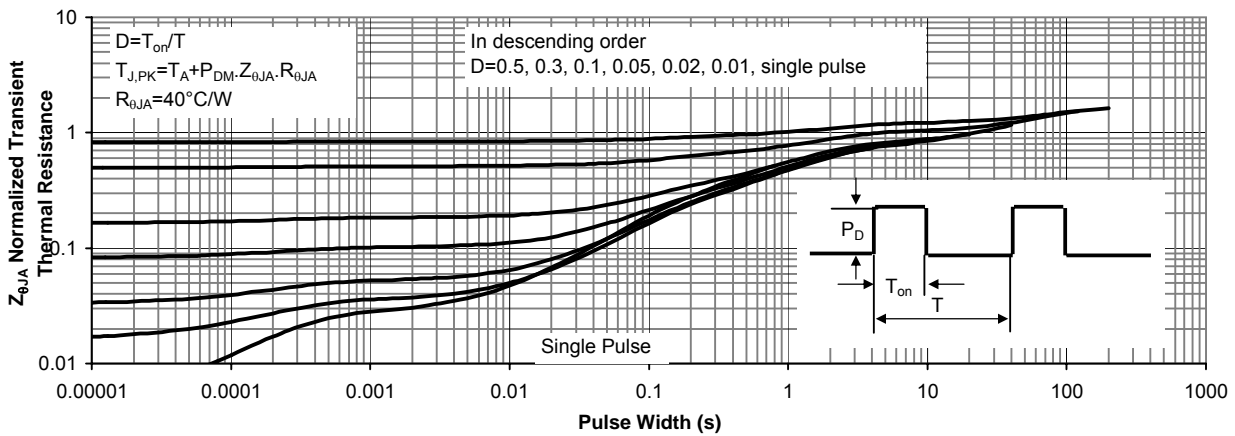


Figure 11: Normalized Maximum Transient Thermal Impedance