



**ALPHA & OMEGA**  
SEMICONDUCTOR



## AO4801A

### Dual P-Channel Enhancement Mode Field Effect Transistor

#### General Description

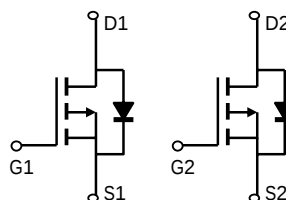
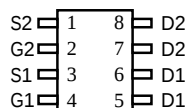
The AO4801A uses advanced trench technology to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use as a load switch or in PWM applications. Standard Product AO4801A is Pb-free (meets ROHS & Sony 259 specifications)

#### Features

$V_{DS}$  (V) = -30V  
 $I_D$  = -5.6A ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 42m\Omega$  ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 52m\Omega$  ( $V_{GS}$  = 4.5V)  
 $R_{DS(ON)} < 75m\Omega$  ( $V_{GS}$  = 2.5V)

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

SOIC-8  
Top View



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

| Parameter                                          | Symbol                 | 10 Sec     | Steady State | Units            |
|----------------------------------------------------|------------------------|------------|--------------|------------------|
| Drain-Source Voltage                               | $V_{DS}$               | -30        |              | V                |
| Gate-Source Voltage                                | $V_{GS}$               | $\pm 12$   |              |                  |
| Continuous Drain Current <sup>AF</sup>             | $T_A=25^\circ\text{C}$ | 5.6        | 4.2          | A                |
|                                                    | $T_A=70^\circ\text{C}$ | 4.5        | 3.4          |                  |
| Pulsed Drain Current <sup>B</sup>                  | $I_{DM}$               | -30        |              |                  |
| Avalanche Current <sup>B</sup>                     | $I_{AR}$               | 11         |              |                  |
| Repetitive avalanche energy $L=0.3mH$ <sup>B</sup> | $E_{AR}$               | 18         |              | mJ               |
| Power Dissipation                                  | $T_A=25^\circ\text{C}$ | 2.0        | 1.1          | W                |
|                                                    | $T_A=70^\circ\text{C}$ | 1.3        | 0.7          |                  |
| 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> | $R_{\theta JA}$ | 48  | 62.5 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient <sup>A</sup> |                 | 74  | 110  | $^\circ\text{C/W}$ |
| Maximum Junction-to-Lead <sup>C</sup>    | $R_{\theta JL}$ | 35  | 40   | $^\circ\text{C/W}$ |

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>-5 | μA    |
| I <sub>GSS</sub>            | Gate-Body leakage current             | V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V                                                  |      |          | ±100     | nA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                   | -0.6 | -0.95    | -1.3     | V     |
| I <sub>D(ON)</sub>          | On state drain current                | V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-5V                                                | -25  |          |          | A     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance     | V <sub>GS</sub> =-10V, I <sub>D</sub> =-5.6A<br>T <sub>J</sub> =125°C                       |      | 34<br>48 | 42<br>60 | mΩ    |
|                             |                                       | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3.5A                                               |      | 41       | 52       | mΩ    |
|                             |                                       | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2.5A                                               |      | 60       | 75       | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =-5V, I <sub>D</sub> =-5.6A                                                 |      | 14       |          | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                 | I <sub>S</sub> =-1A, V <sub>GS</sub> =0V                                                    |      | -0.74    | -1       | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current |                                                                                             |      |          | -2       | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                       |                                                                                             |      |          |          |       |
| C <sub>iss</sub>            | Input Capacitance                     | V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz                                          |      | 933      | 1200     | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |                                                                                             |      | 108      |          | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |                                                                                             |      | 81       |          | pF    |
| R <sub>g</sub>              | Gate resistance                       | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                            |      | 6        | 9        | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |                                                                                             |      |          |          |       |
| Q <sub>g</sub> (4.5V)       | Total Gate Charge                     | V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-5.6A                        |      | 9.3      | 12.2     | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |                                                                                             |      | 1.5      |          | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |                                                                                             |      | 3.7      |          | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, R <sub>L</sub> =2.7Ω,<br>R <sub>GEN</sub> =6Ω |      | 5.2      |          | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |                                                                                             |      | 6.8      |          | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |                                                                                             |      | 42       |          | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |                                                                                             |      | 15       |          | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =-5.6A, dI/dt=100A/μs                                                        |      | 21       | 28       | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =-5.6A, dI/dt=100A/μs                                                        |      | 14.3     |          | nC    |

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1 in 2 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 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<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

F: The current rating is based on the t ≤ 10s junction to ambient thermal resistance rating.

Rev0: Mar. 2007

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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

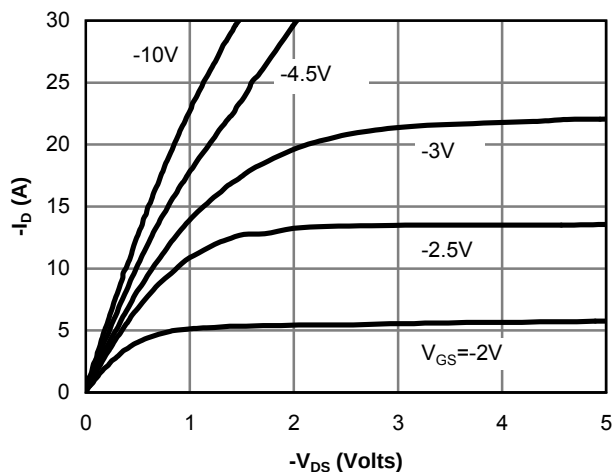


Figure 1: On-Region Characteristics

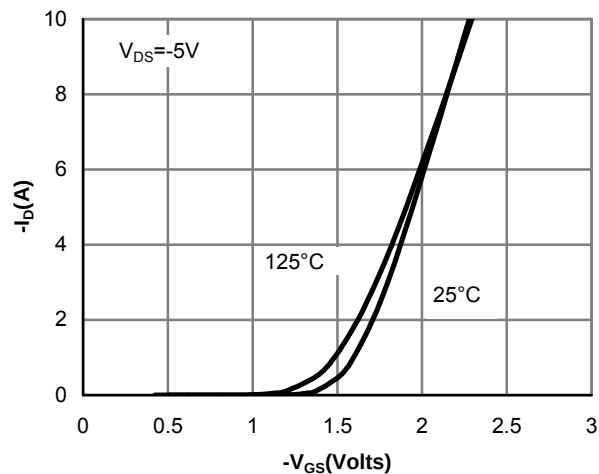


Figure 2: Transfer Characteristics

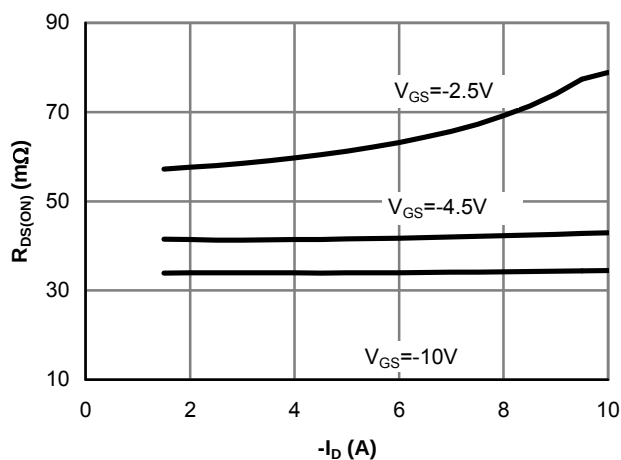


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

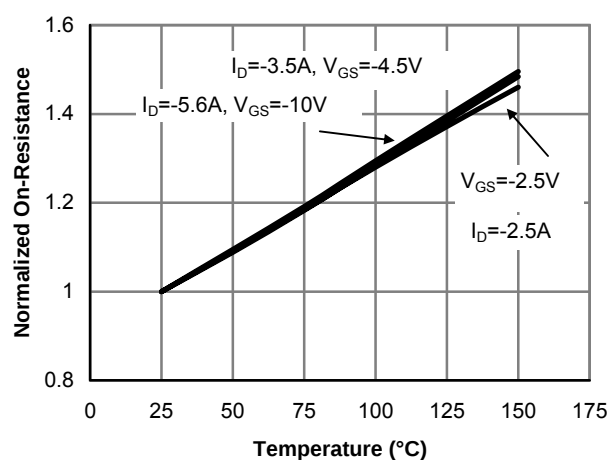


Figure 4: On-Resistance vs. Junction Temperature

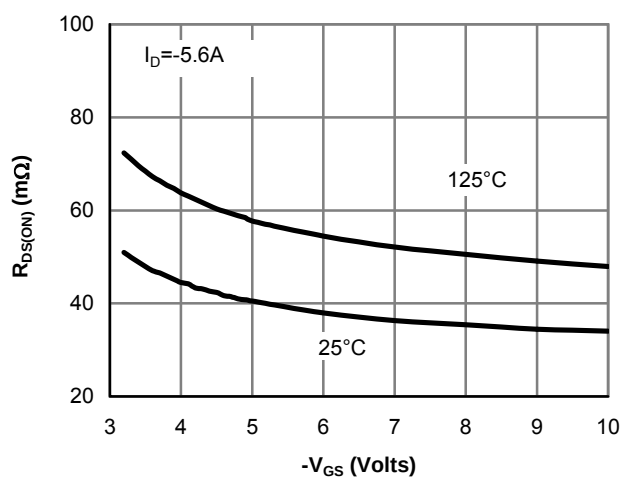


Figure 5: On-Resistance vs. Gate-Source Voltage

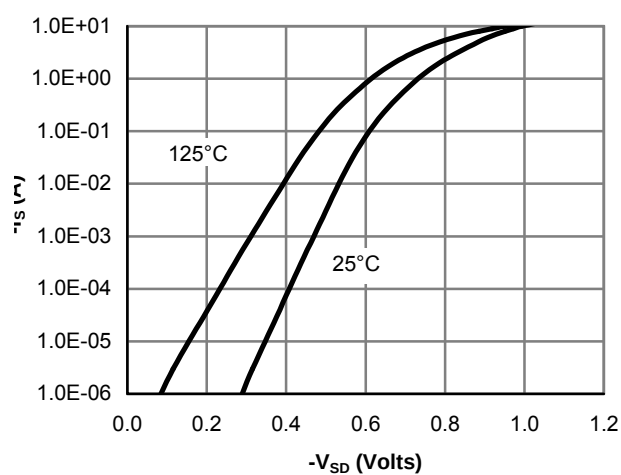


Figure 6: Body-Diode Characteristics

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

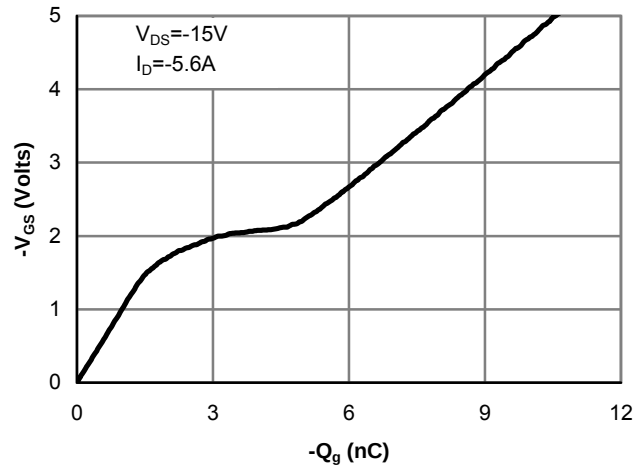


Figure 7: Gate-Charge Characteristics

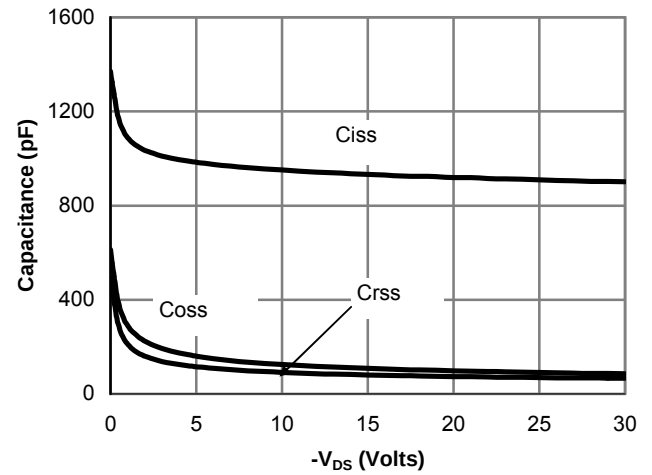


Figure 8: Capacitance Characteristics

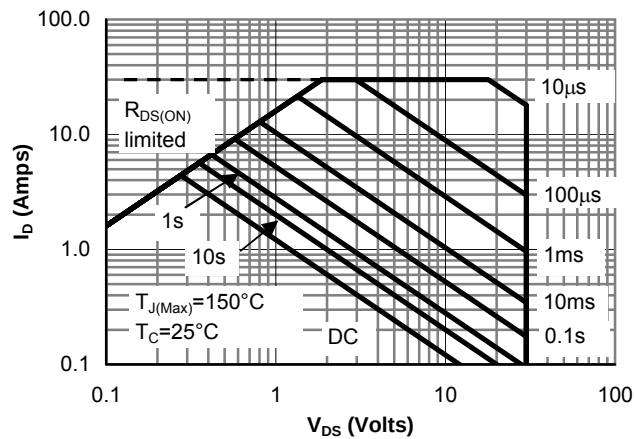


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

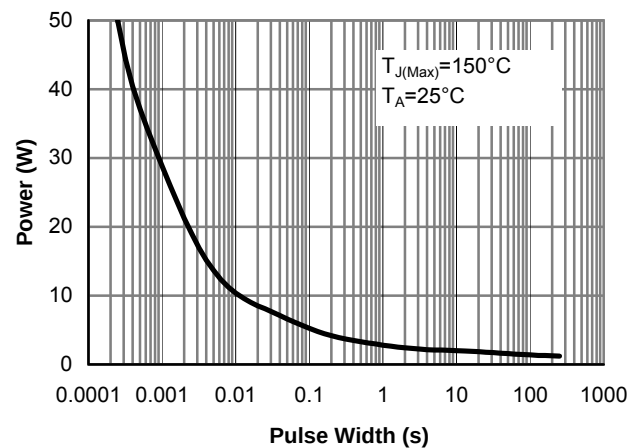


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

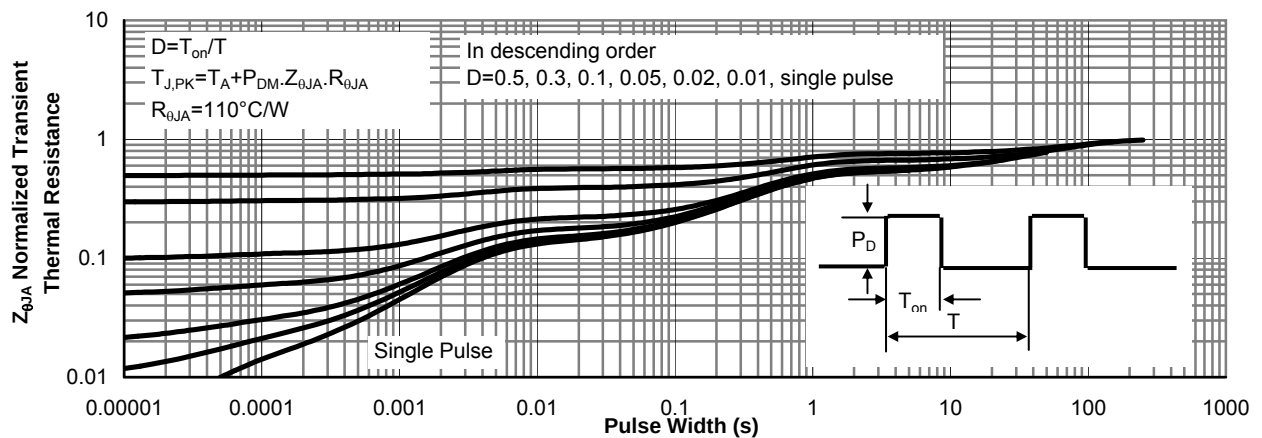


Figure 11: Normalized Maximum Transient Thermal Impedance