

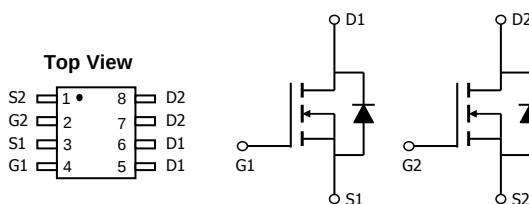
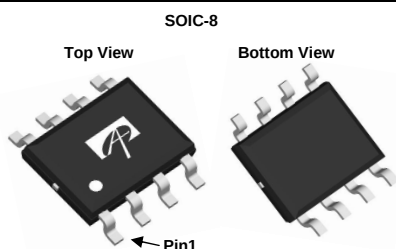
### General Description

The AO4884 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

|                                    |                |
|------------------------------------|----------------|
| $V_{DS}$                           | 40V            |
| $I_D$ (at $V_{GS}=10V$ )           | 10A            |
| $R_{DS(ON)}$ (at $V_{GS}=10V$ )    | < 13m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS} = 4.5V$ ) | < 16m $\Omega$ |

100% UIS Tested  
100%  $R_g$  Tested



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

| Parameter                                      | Symbol           | Maximum    | Units            |
|------------------------------------------------|------------------|------------|------------------|
| Drain-Source Voltage                           | $V_{DS}$         | 40         | V                |
| Gate-Source Voltage                            | $V_{GS}$         | $\pm 20$   | V                |
| Continuous Drain Current                       | $I_D$            | 10         | A                |
| $T_A=25^\circ\text{C}$                         |                  | 8          |                  |
| Pulsed Drain Current <sup>C</sup>              | $I_{DM}$         | 50         | A                |
| Avalanche Current <sup>C</sup>                 | $I_{AS}, I_{AR}$ | 35         | A                |
| Avalanche energy $L=0.1\text{mH}$ <sup>C</sup> | $E_{AS}, E_{AR}$ | 61         | mJ               |
| Power Dissipation <sup>B</sup>                 | $P_D$            | 2          | W                |
| $T_A=25^\circ\text{C}$                         |                  | 1.3        |                  |
| 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 D</sup> |                 | 74  | 90   | $^\circ\text{C/W}$ |
| Maximum Junction-to-Lead                   | $R_{\theta JL}$ | 32  | 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                                              | 40   |            |          | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current       | V <sub>DS</sub> =40V, 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> = ±20V                                             |      |            | ±100     | nA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 1.55 | 2.2        | 2.7      | V     |
| I <sub>D(ON)</sub>          | On state drain current                | V <sub>GS</sub> =10V, V <sub>DS</sub> =5V                                               | 50   |            |          | A     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance     | V <sub>GS</sub> =10V, I <sub>D</sub> =10A<br>T <sub>j</sub> =125°C                      |      | 11<br>16.5 | 13<br>20 | mΩ    |
|                             |                                       | V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A                                              |      | 12.7       | 16       | mΩ    |
|                             |                                       |                                                                                         |      |            |          |       |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =5V, I <sub>D</sub> =10A                                                |      | 50         |          | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                 | I <sub>S</sub> =1A, V <sub>GS</sub> =0V                                                 |      | 0.7        | 1        | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current |                                                                                         |      |            | 2.5      | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                       |                                                                                         |      |            |          |       |
| C <sub>iss</sub>            | Input Capacitance                     | V <sub>GS</sub> =0V, V <sub>DS</sub> =20V, f=1MHz                                       | 1200 | 1500       | 1950     | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |                                                                                         | 150  | 215        | 280      | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |                                                                                         | 80   | 135        | 190      | pF    |
| R <sub>g</sub>              | Gate resistance                       | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                        | 1.7  | 3.5        | 5.3      | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |                                                                                         |      |            |          |       |
| Q <sub>g</sub> (10V)        | Total Gate Charge                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =20V, I <sub>D</sub> =10A                         | 22   | 27.2       | 33       | nC    |
| Q <sub>g</sub> (4.5V)       | Total Gate Charge                     |                                                                                         | 10   | 13.6       | 16       | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |                                                                                         | 3.6  | 4.5        | 5.4      | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |                                                                                         | 3.8  | 6.4        | 9        | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =20V, R <sub>L</sub> =2Ω,<br>R <sub>GEN</sub> =3Ω |      | 6.4        |          | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |                                                                                         |      | 17.2       |          | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |                                                                                         |      | 29.6       |          | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |                                                                                         |      | 16.8       |          | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =10A, dI/dt=500A/μs                                                      | 9    | 13         | 17       | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =10A, dI/dt=500A/μs                                                      | 25   | 35         | 45       | 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. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150°C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C. Ratings are based on low frequency and duty cycles to keep initial T<sub>j</sub>=25°C.

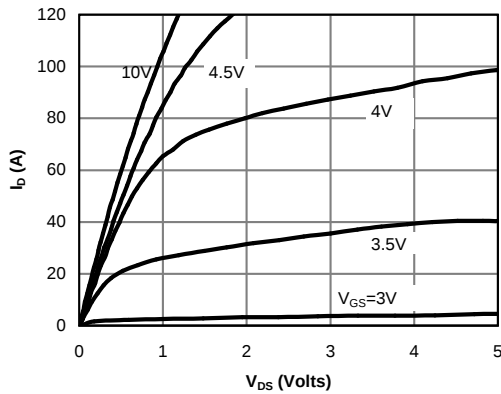
D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

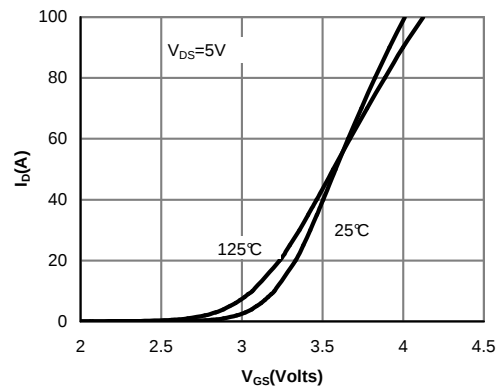
F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.

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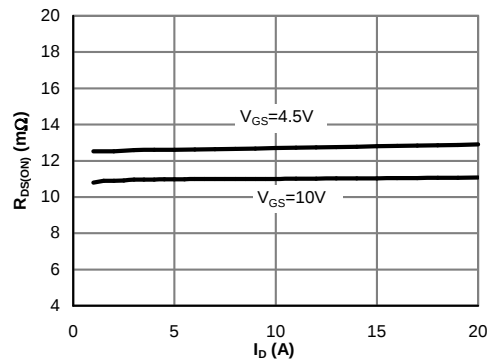
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



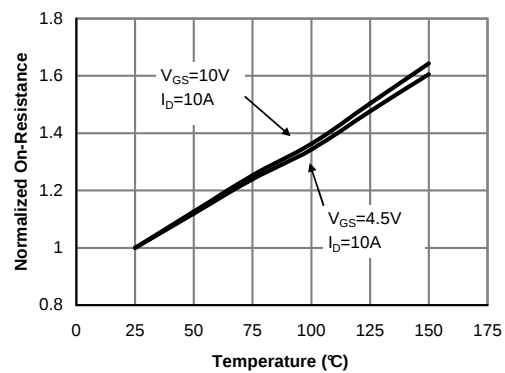
**Fig 1: On-Region Characteristics (Note E)**



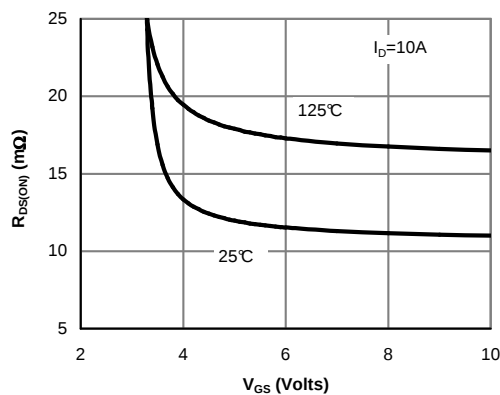
**Figure 2: Transfer Characteristics (Note E)**



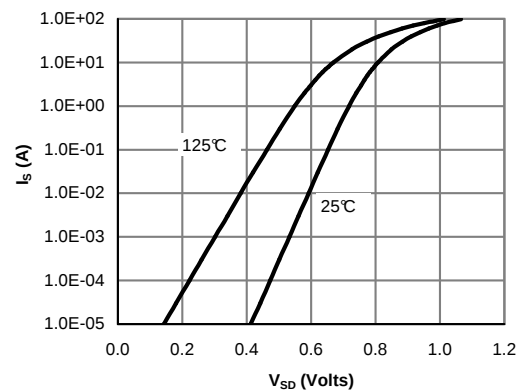
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**



**Figure 4: On-Resistance vs. Junction Temperature (Note E)**

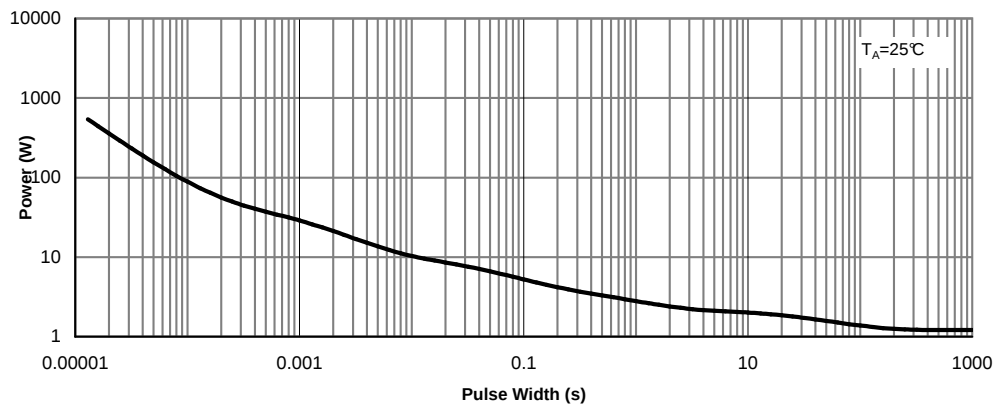
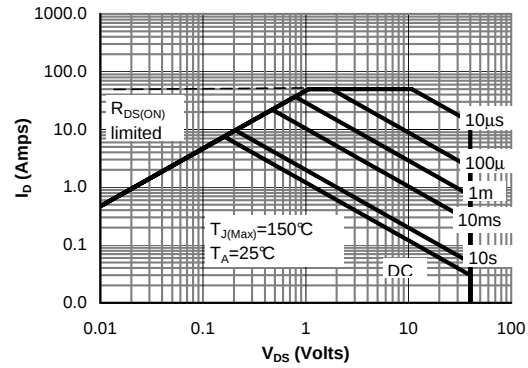
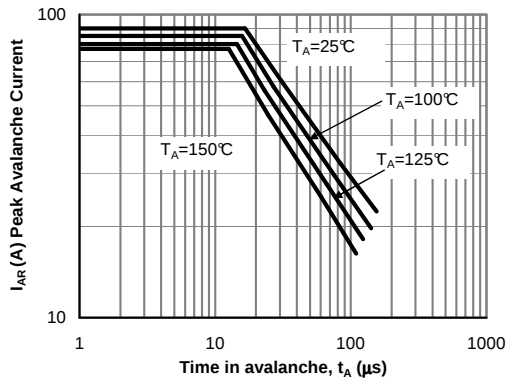
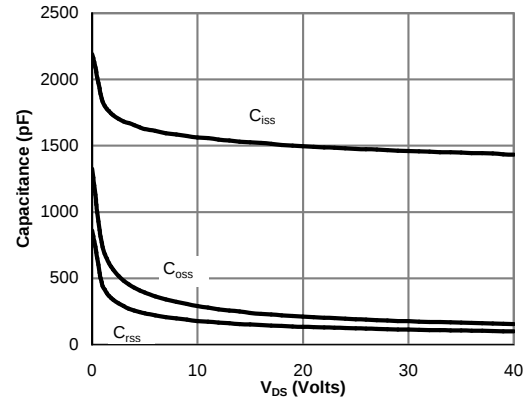
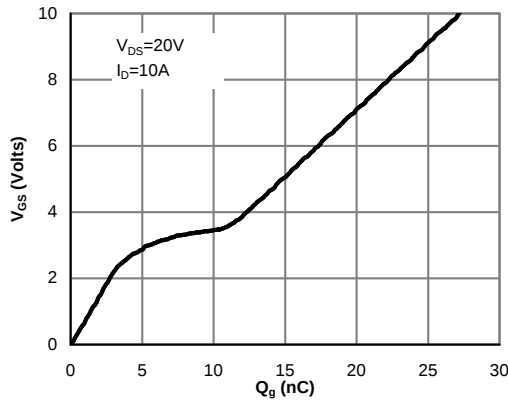


**Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)**

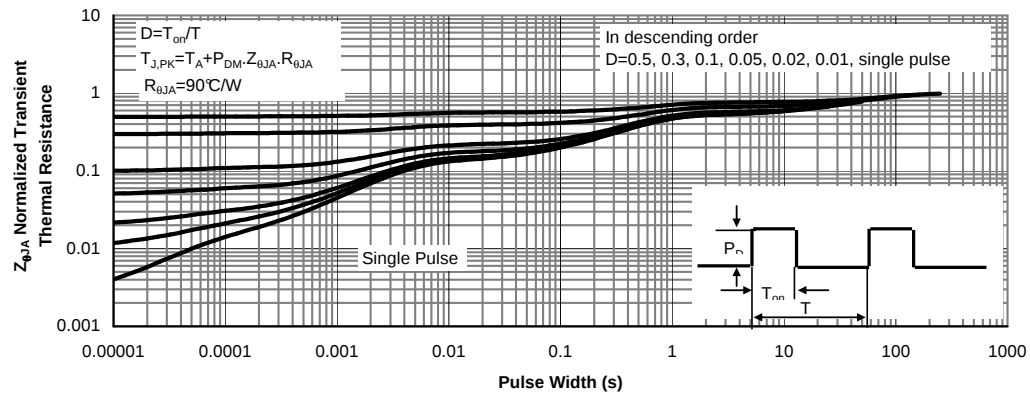


**Figure 6: Body-Diode Characteristics (Note E)**

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

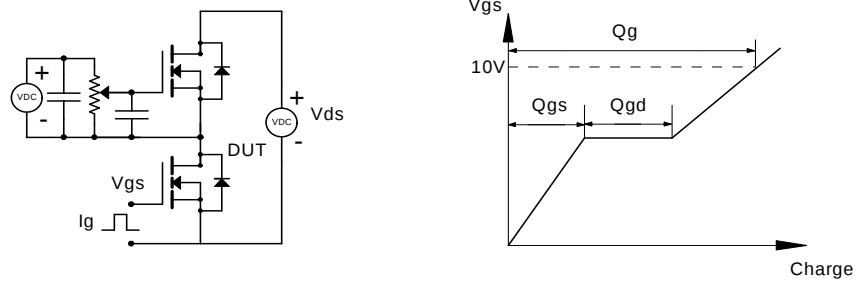


**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

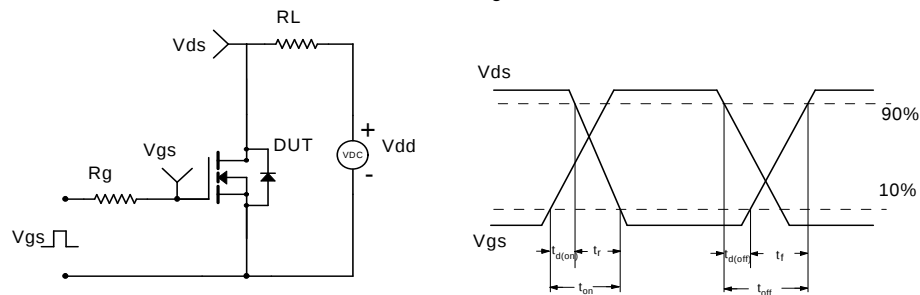


**Figure 12: Normalized Maximum Transient Thermal Impedance (Note F)**

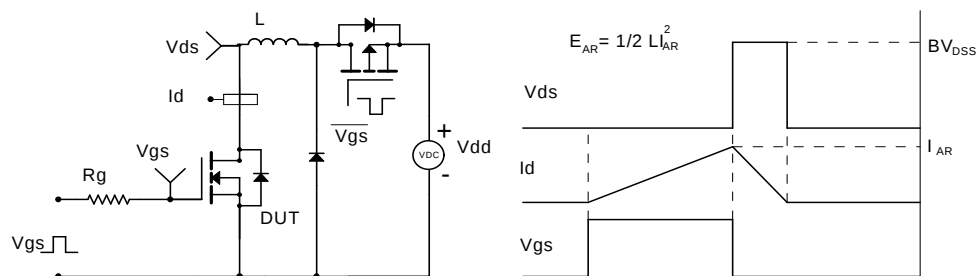
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

