

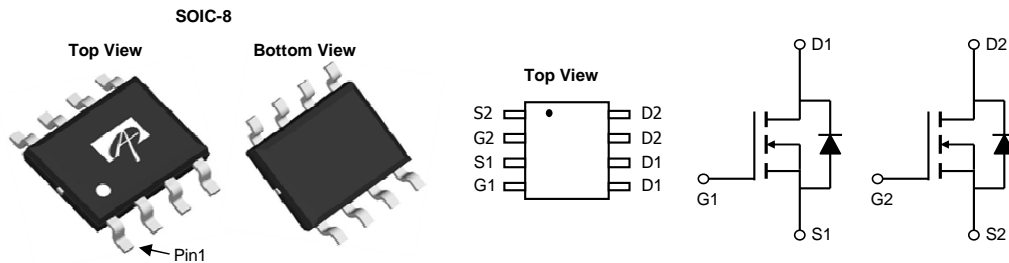
**General Description**

The AO4812 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**

|                                  |                |
|----------------------------------|----------------|
| $V_{DS}$                         | 30V            |
| $I_D$ (at $V_{GS}=10V$ )         | 6A             |
| $R_{DS(ON)}$ (at $V_{GS}=10V$ )  | < 30m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$ ) | < 42m $\Omega$ |

100% UIS Tested  
 100%  $R_g$  Tested


**Absolute Maximum Ratings  $T_A=25^\circ C$  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                | $I_D$            | $T_A=25^\circ C$ | 6          |
|   |                  | $T_A=70^\circ C$ | 5          |
| Pulsed Drain Current <sup>C</sup>       | $I_{DM}$         | 30               | A          |
| Avalanche Current <sup>C</sup>          | $I_{AS}, I_{AR}$ | 10               | A          |
| Avalanche energy $L=0.1mH$ <sup>C</sup> | $E_{AS}, E_{AR}$ | 5                | mJ         |
| Power Dissipation <sup>B</sup>          | $P_D$            | $T_A=25^\circ C$ | 2          |
|   |                  | $T_A=70^\circ C$ | 1.3        |
| Junction and Storage Temperature Range  | $T_J, T_{STG}$   | -55 to 150       | $^\circ C$ |

**Thermal Characteristics**

| Parameter                                  | Symbol          | Typ          | Max  | Units        |
|--|-----------------|--------------|------|--------------|
| Maximum Junction-to-Ambient <sup>A</sup>   | $R_{\theta JA}$ | 48           | 62.5 | $^\circ C/W$ |
| Maximum Junction-to-Ambient <sup>A D</sup> |                 | Steady-State | 74   | 90           |
| Maximum Junction-to-Lead                   | $R_{\theta JL}$ | 32           | 40   | $^\circ C/W$ |

**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> =±20V  |     |          | ±100     | nA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                  | 1.2 | 1.8      | 2.4      | V     |
| I <sub>D(ON)</sub>          | On state drain current                | V <sub>GS</sub> =10V, V <sub>DS</sub> =5V   | 30  |          |          | A     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance     | V <sub>GS</sub> =10V, I <sub>D</sub> =6A<br>T <sub>J</sub> =125°C                         |     | 25<br>40 | 30<br>48 | mΩ    |
|                             |                                       | V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A   |     | 33       | 42       |       |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =5V, I <sub>D</sub> =6A   |     | 15       |          | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                 | I <sub>S</sub> =1A, V <sub>GS</sub> =0V   |     | 0.76     | 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> =15V, f=1MHz   |     | 255      | 310      | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |   |     | 45       |          | pF    |
| C <sub>riss</sub>           | Reverse Transfer Capacitance          |   |     | 35       | 50       | pF    |
| R <sub>g</sub>              | Gate resistance                       | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz  | 1.6 | 3.25     | 4.9      | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |   |     |          |          |       |
| Q <sub>g(10V)</sub>         | Total Gate Charge                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =6A                            |     | 5.2      | 6.3      | nC    |
| Q <sub>g(4.5V)</sub>        |                                       |   |     | 2.55     | 3.2      | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |   |     | 0.85     |          | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |   |     | 1.3      |          | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =2.5Ω,<br>R <sub>GEN</sub> =3Ω |     | 4.5      |          | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |   |     | 2.5      |          | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |   |     | 14.5     |          | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |   |     | 3.5      |          | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =6A, dI/dt=100A/μs   |     | 8.5      |          | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =6A, dI/dt=100A/μs   |     | 2.2      |          | 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.

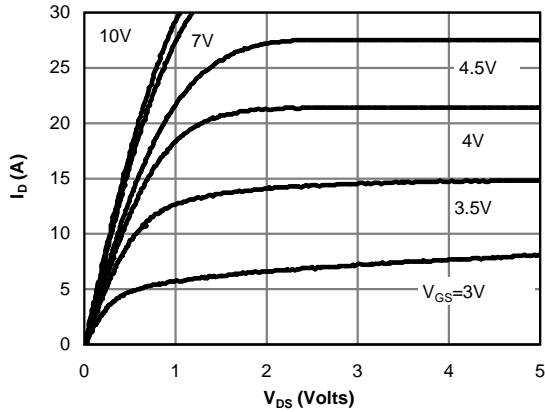
D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead to ambient.

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

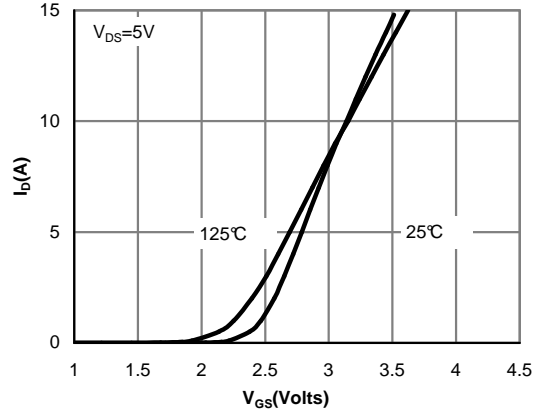
F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.

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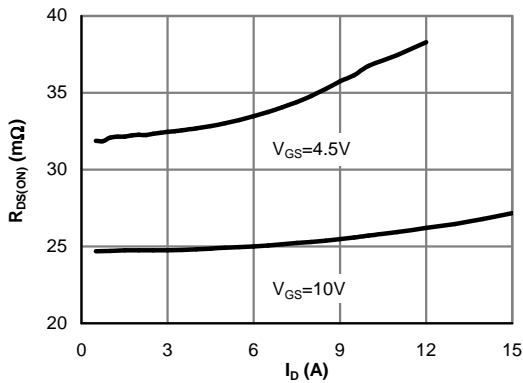
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



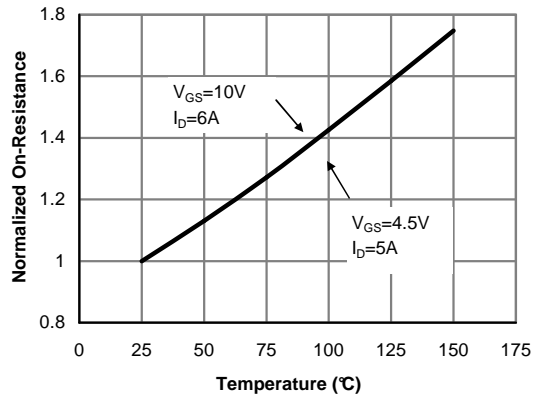
**Fig 1: On-Region Characteristics (Note E)**



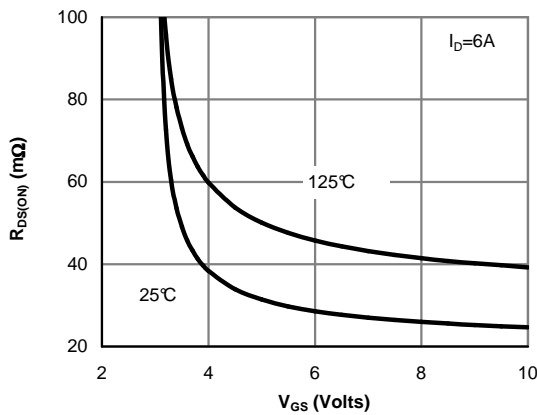
**Figure 2: Transfer Characteristics (Note E)**



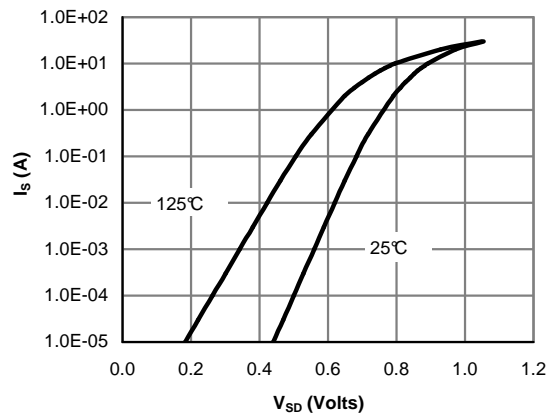
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**



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

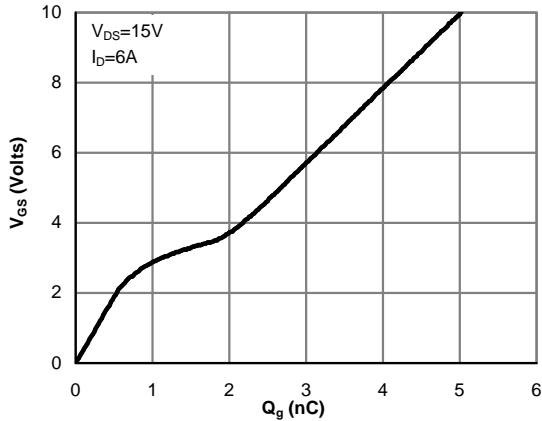


**Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)**

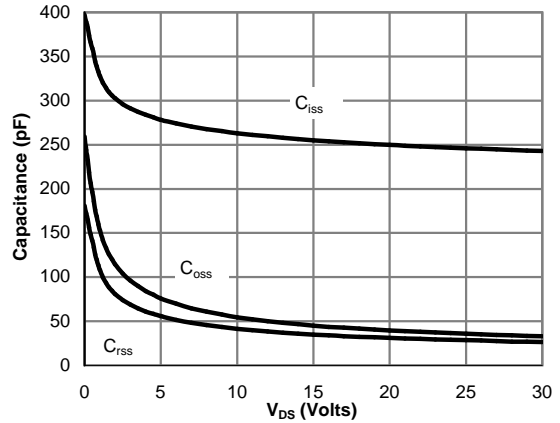


**Figure 6: Body-Diode Characteristics (Note E)**

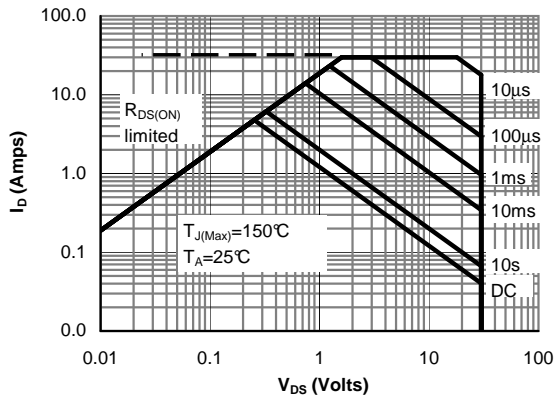
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



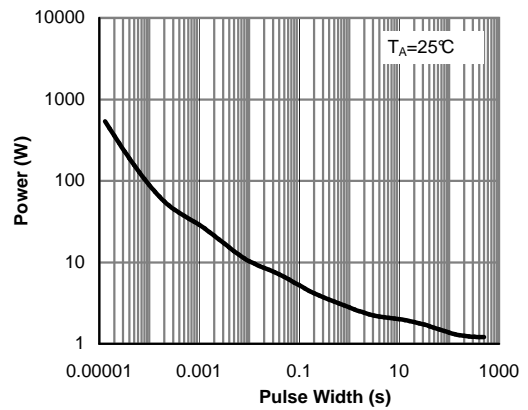
**Figure 7: Gate-Charge Characteristics**



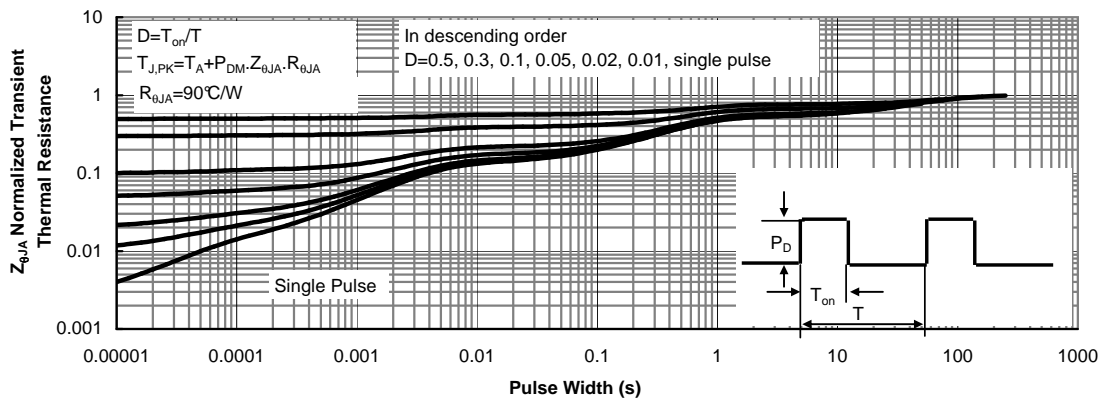
**Figure 8: Capacitance Characteristics**



**Figure 10: Maximum Forward Biased Safe Operating Area (Note F)**

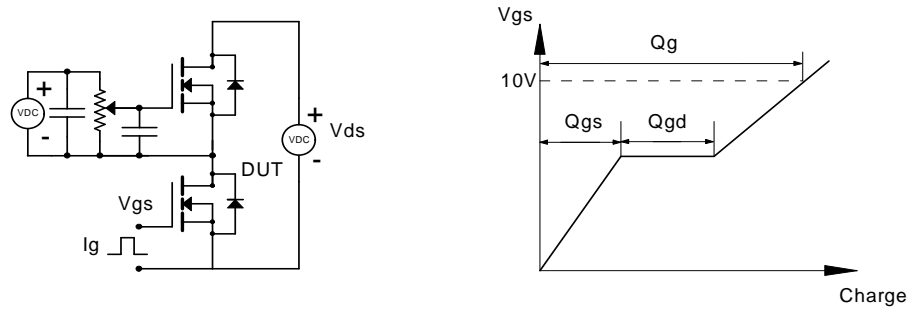


**Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note F)**

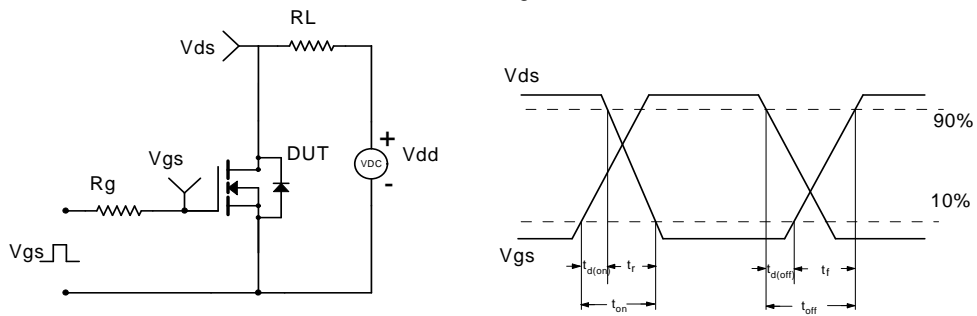


**Figure 12: Normalized Maximum Transient Thermal Impedance (Note F)**

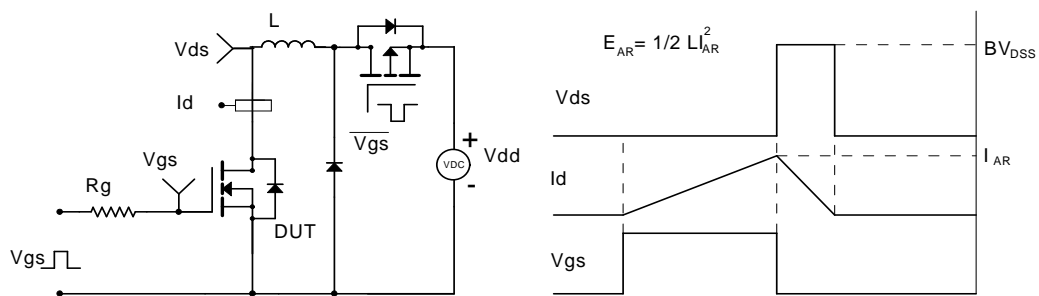
**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**

