



### General Description

The AO9926B uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 1.8V while retaining a 12V  $V_{GS(MAX)}$  rating. This device is suitable for use as a uni-directional or bi-directional load switch.

### Product Summary

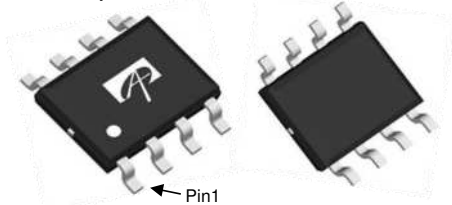
|                                  |                |
|----------------------------------|----------------|
| $V_{DS}$                         | 20V            |
| $I_D$ (at $V_{GS}=10V$ )         | 7.6A           |
| $R_{DS(ON)}$ (at $V_{GS}=10V$ )  | < 23m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$ ) | < 26m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=2.5V$ ) | < 34m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=1.8V$ ) | < 52m $\Omega$ |



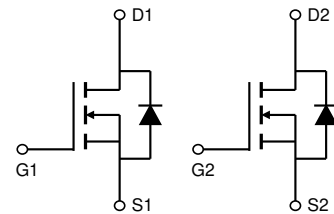
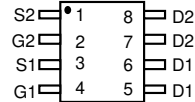
SOIC-8

Top View

Bottom View



Top View



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

| Parameter                              | Symbol         | Maximum    | Units            |
|----------------------------------------|----------------|------------|------------------|
| Drain-Source Voltage                   | $V_{DS}$       | 20         | V                |
| Gate-Source Voltage                    | $V_{GS}$       | $\pm 12$   | V                |
| Continuous Drain Current               | $I_D$          | 7.6        | A                |
| $T_A=25^\circ\text{C}$                 |                | 6.1        |                  |
| Pulsed Drain Current <sup>C</sup>      | $I_{DM}$       | 38         |                  |
| Power Dissipation <sup>B</sup>         | $P_D$          | 2          | W                |
| $T_A=25^\circ\text{C}$                 |                | 1.28       |                  |
| 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 | $^\circ\text{C/W}$ |
| $t \leq 10s$                               |                 |     |      |                    |
| Maximum Junction-to-Ambient <sup>A D</sup> | $R_{\theta JL}$ | 74  | 90   | $^\circ\text{C/W}$ |
| Steady-State                               |                 |     |      |                    |
| Maximum Junction-to-Lead                   | $R_{\theta JL}$ | 32  | 40   | $^\circ\text{C/W}$ |
| Steady-State                               |                 |     |      |                    |

**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                                                | 20  |            |          | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current       | V <sub>DS</sub> =20V, 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                                  | 0.4 | 0.75       | 1.1      | V     |
| I <sub>D(ON)</sub>          | On state drain current                | V <sub>GS</sub> =10V, V <sub>DS</sub> =5V                                                 | 38  |            |          | A     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance     | V <sub>GS</sub> =10V, I <sub>D</sub> =7.6A<br>T <sub>J</sub> =125°C                       |     | 16.5<br>25 | 23<br>30 | mΩ    |
|                             |                                       | V <sub>GS</sub> =4.5V, I <sub>D</sub> =7A                                                 |     | 18.5       | 26       | mΩ    |
|                             |                                       | V <sub>GS</sub> =2.5V, I <sub>D</sub> =6A                                                 |     | 24         | 34       | mΩ    |
|                             |                                       | V <sub>GS</sub> =1.8V, I <sub>D</sub> =2A                                                 |     | 32         | 52       | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =5V, I <sub>D</sub> =7.6A                                                 |     | 25         |          | 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> =15V, f=1MHz                                         | 420 | 525        | 630      | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |                                                                                           | 65  | 95         | 125      | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |                                                                                           | 45  | 75         | 105      | pF    |
| R <sub>g</sub>              | Gate resistance                       | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                          | 0.8 | 1.7        | 2.6      | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |                                                                                           |     |            |          |       |
| Q <sub>g</sub> (10V)        | Total Gate Charge                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =7.6A                          |     | 12.5       |          | nC    |
| Q <sub>g</sub> (4.5V)       | Total Gate Charge                     |                                                                                           |     | 6          |          | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |                                                                                           |     | 1          |          | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |                                                                                           |     | 2          |          | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =1.3Ω,<br>R <sub>GEN</sub> =3Ω |     | 3          |          | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |                                                                                           |     | 7.5        |          | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |                                                                                           |     | 20         |          | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |                                                                                           |     | 6          |          | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =7.6A, di/dt=100A/μs                                                       |     | 14         |          | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =7.6A, di/dt=100A/μs                                                       |     | 6          |          | 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

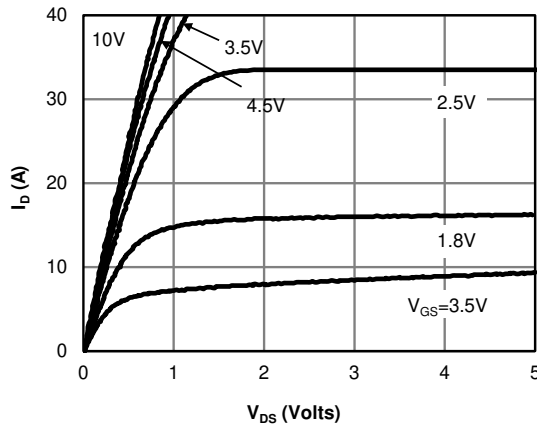


Fig 1: On-Region Characteristics (Note E)

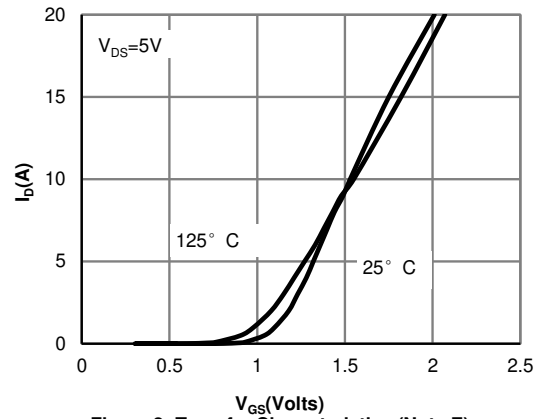


Figure 2: Transfer Characteristics (Note E)

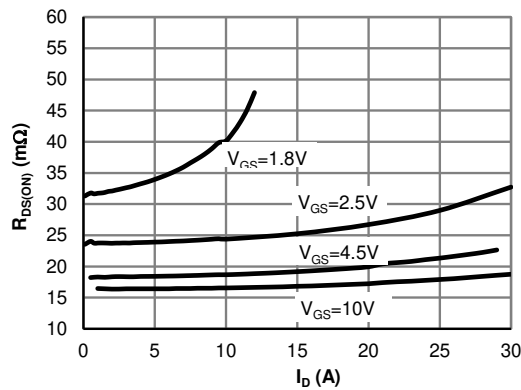


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

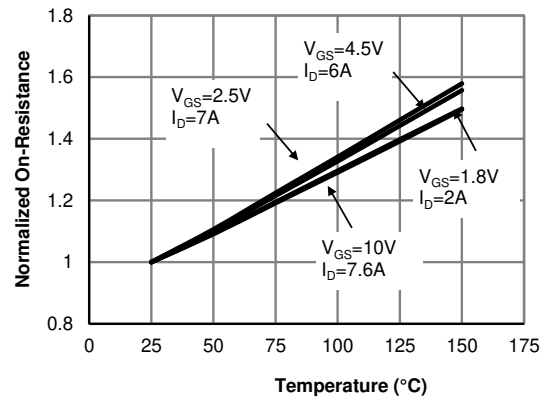


Figure 4: On-Resistance vs. Junction Temperature (Note E)

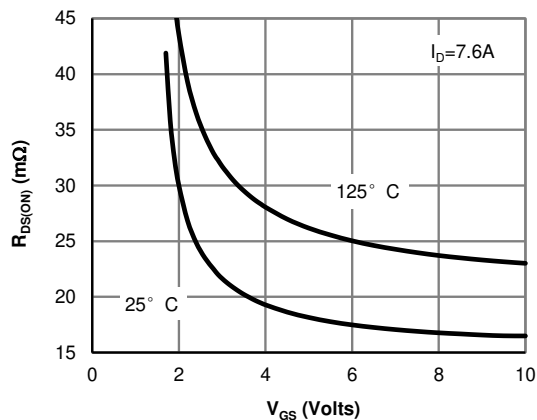


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

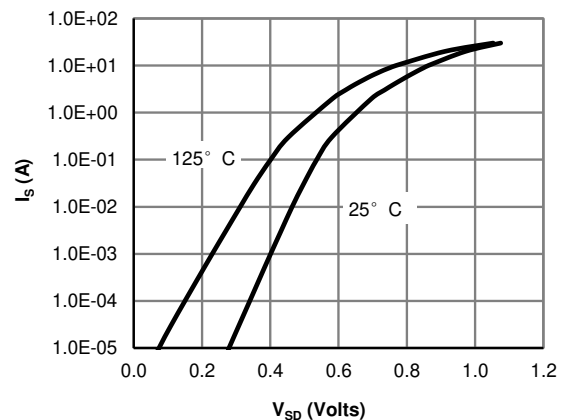
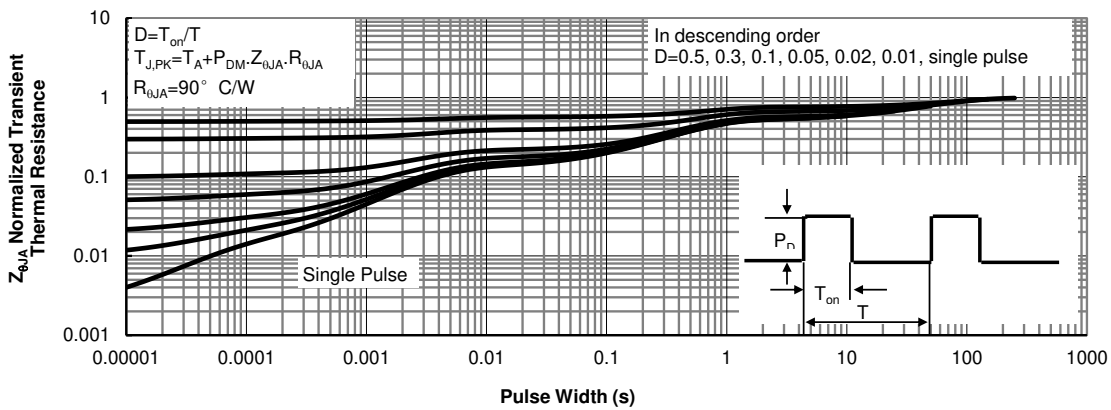
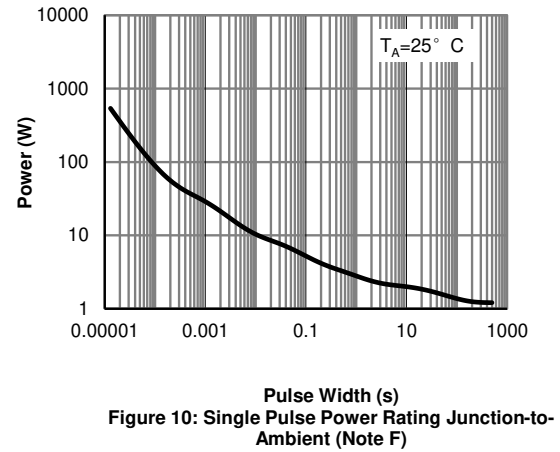
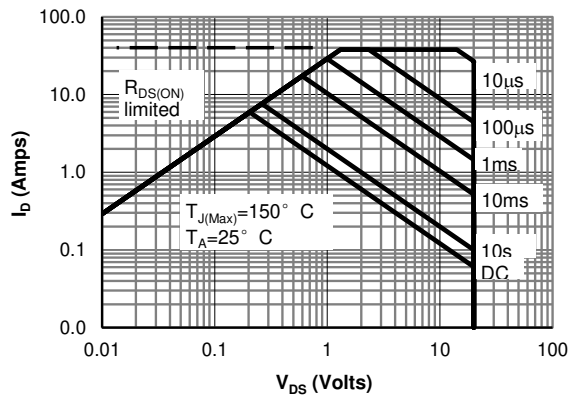
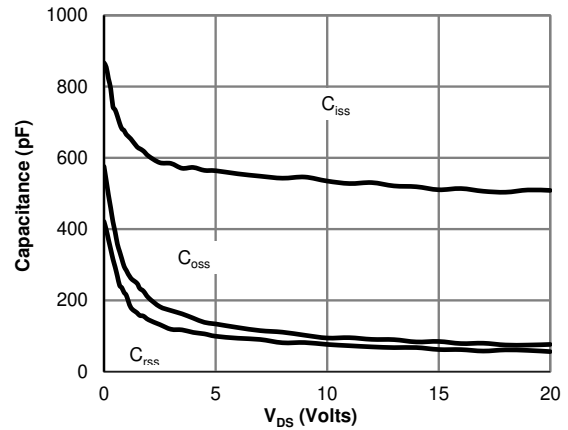
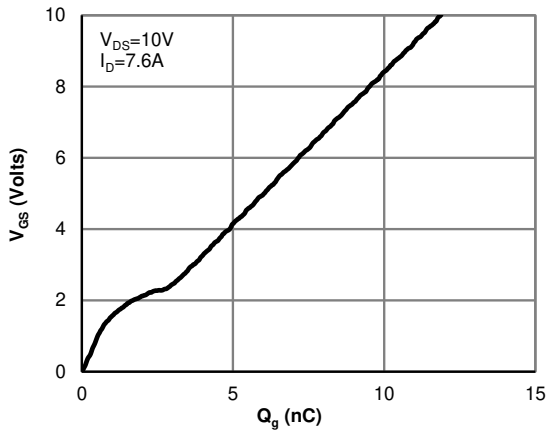
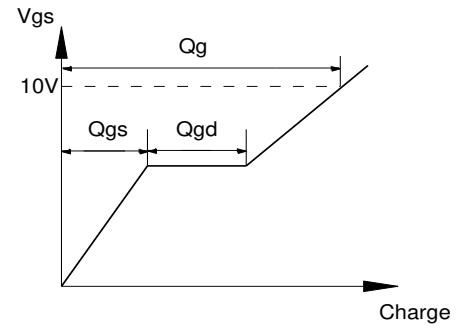
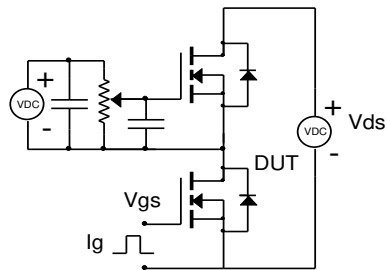


Figure 6: Body-Diode Characteristics (Note E)

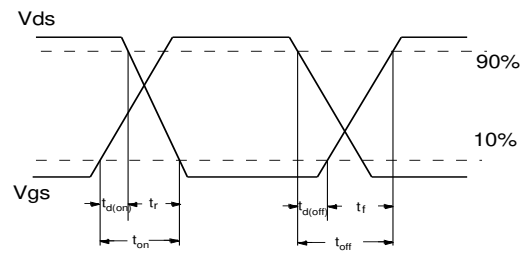
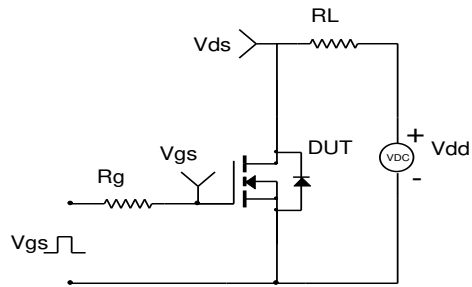
## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveforms



### Diode Recovery Test Circuit & Waveforms

