

**AO8832**

## Common-Drain Dual N-Channel Enhancement Mode Field Effect Transistor

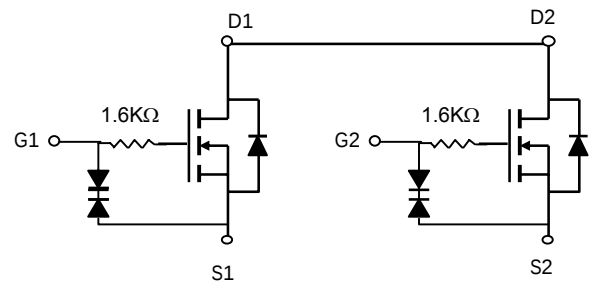
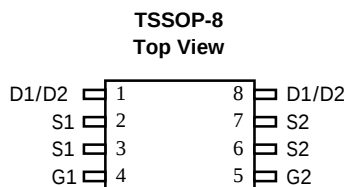


### General Description

The AO8832 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V while retaining a 12V  $V_{GS(MAX)}$  rating. It is ESD protected. This device is suitable for use as a uni-directional or bi-directional load switch, facilitated by its common-drain configuration. *Standard Product AO8832 is Pb-free (meets ROHS & Sony 259 specifications).*

### Features

$V_{DS} (V) = 30V$   
 $I_D = 7A$  ( $V_{GS} = 10V$ )  
 $R_{DS(ON)} < 24m\Omega$  ( $V_{GS} = 10V$ )  
 $R_{DS(ON)} < 28m\Omega$  ( $V_{GS} = 4.5V$ )  
 $R_{DS(ON)} < 31m\Omega$  ( $V_{GS} = 3.6V$ )  
 $R_{DS(ON)} < 39m\Omega$  ( $V_{GS} = 2.5V$ )



### 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                    | $V_{GS}$       | $\pm 12$   | V          |
| Continuous Drain Current <sup>A</sup>  | $I_D$          | 7          | A          |
| $T_A=25^\circ C$                       |                |            |            |
| $T_A=70^\circ C$                       |                | 5.5        |            |
| Pulsed Drain Current <sup>B</sup>      | $I_{DM}$       | 30         |            |
| Power Dissipation <sup>A</sup>         | $P_D$          | 1.5        | W          |
| $T_A=25^\circ C$                       |                |            |            |
| $T_A=70^\circ C$                       |                | 0.96       |            |
| 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> | $R_{\theta JA}$ | 67  | 85  | $^\circ C/W$ |
| $t \leq 10s$                             |                 |     |     |              |
| Maximum Junction-to-Ambient <sup>A</sup> |                 | 110 | 130 | $^\circ C/W$ |
| Steady-State                             |                 |     |     |              |
| Maximum Junction-to-Lead <sup>C</sup>    | $R_{\theta JL}$ | 62  | 75  | $^\circ C/W$ |
| 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                                                 | 30  |          |        | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current       | V <sub>DS</sub> =24V, 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> =±10V                                                 |     |          | 10     | μA    |
| BV <sub>GSO</sub>           | Gate-Source Breakdown Voltage         | V <sub>DS</sub> =0V, I <sub>G</sub> =±250μA                                                | ±12 |          |        | V     |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                   | 0.6 | 0.78     | 1.5    | V     |
| I <sub>D(ON)</sub>          | On state drain current                | V <sub>GS</sub> =4.5V, 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> =7A<br>T <sub>J</sub> =125°C                          |     | 20<br>28 | 24     | mΩ    |
|                             |                                       | V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A                                                  |     | 23       | 28     |       |
|                             |                                       | V <sub>GS</sub> =3.6V, I <sub>D</sub> =5A                                                  |     | 24.7     | 31     |       |
|                             |                                       | V <sub>GS</sub> =2.5V, I <sub>D</sub> =4A                                                  |     | 31       | 39     |       |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =5V, I <sub>D</sub> =7A                                                    |     | 25       |        | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                 | I <sub>S</sub> =1A, V <sub>GS</sub> =0V                                                    |     | 0.67     | 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                                          |     | 330      |        | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |                                                                                            |     | 80       |        | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |                                                                                            |     | 10       |        | pF    |
| R <sub>g</sub>              | Gate resistance                       | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                           |     | 1.6      |        | kΩ    |
| <b>SWITCHING PARAMETERS</b> |                                       |                                                                                            |     |          |        |       |
| Q <sub>g</sub>              | Total Gate Charge                     | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, I <sub>D</sub> =7A                            |     | 6.4      |        | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |                                                                                            |     | 3.1      |        | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |                                                                                            |     | 2.5      |        | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, R <sub>L</sub> =2.2Ω,<br>R <sub>GEN</sub> =3Ω |     | 388      |        | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |                                                                                            |     | 992      |        | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |                                                                                            |     | 2.7      |        | μs    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |                                                                                            |     | 1.9      |        | μs    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =7A, dI/dt=100A/μs, V <sub>GS</sub> =-9V                                    |     | 16.6     |        | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =7A, dI/dt=100A/μs, V <sub>GS</sub> =-9V                                    |     | 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. The current rating is based on the t ≤ 10s thermal resistance rating.

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.

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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

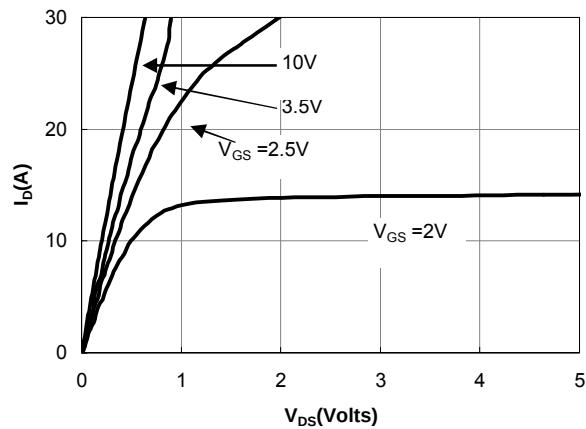


Figure 1: On-Regions Characteristics

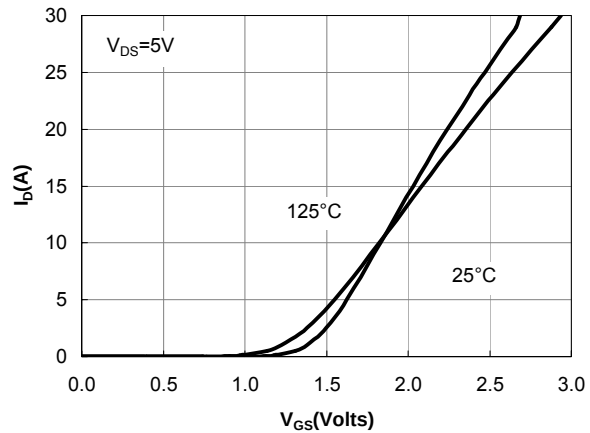


Figure 2: Transfer Characteristics

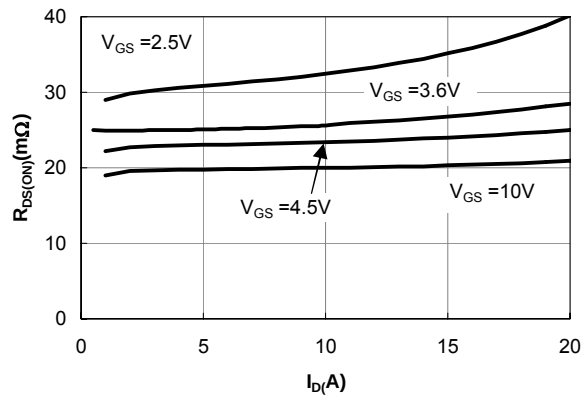


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

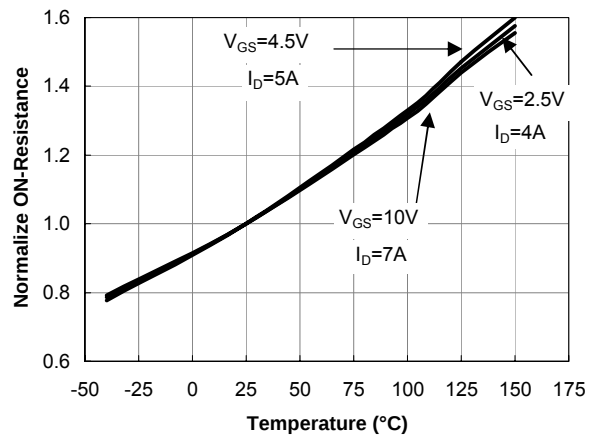


Figure 4: On-Resistance vs. Junction Temperature

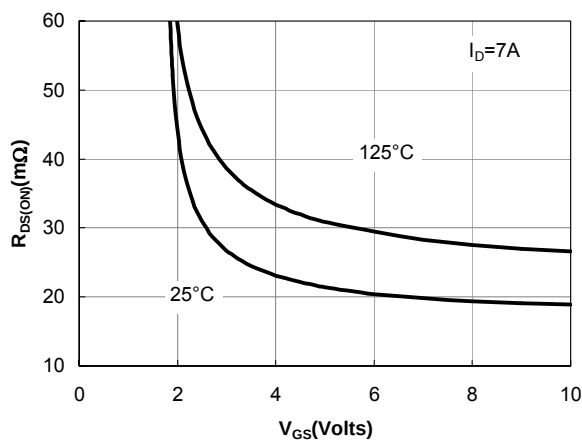


Figure 5: On-Resistance vs. Gate-Source Voltage

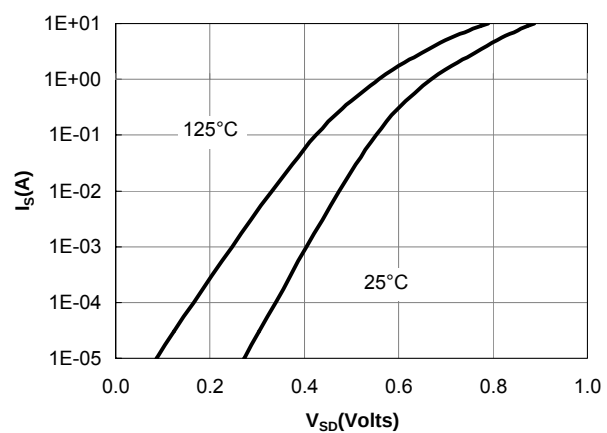


Figure 6: Body-Diode Characteristics

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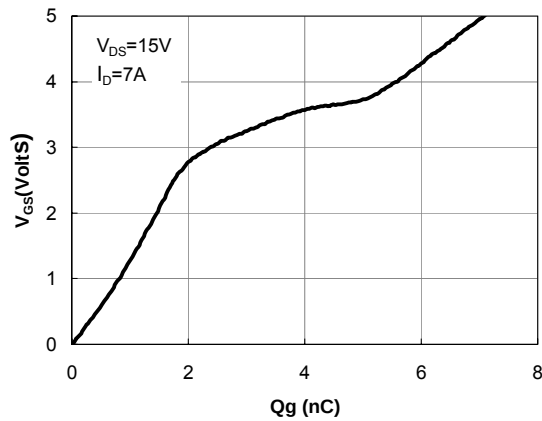


Figure 7: Gate-Charge Characteristics

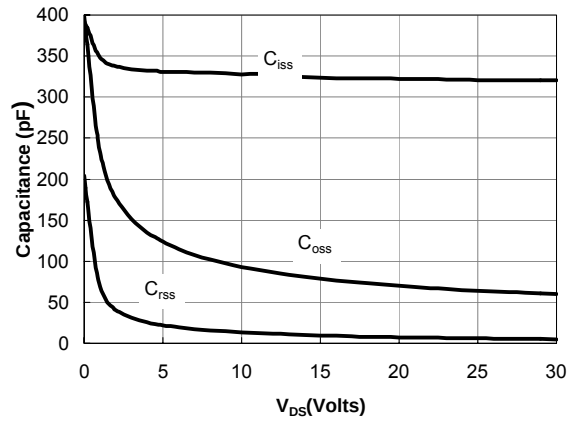


Figure 8: Capacitance Characteristics

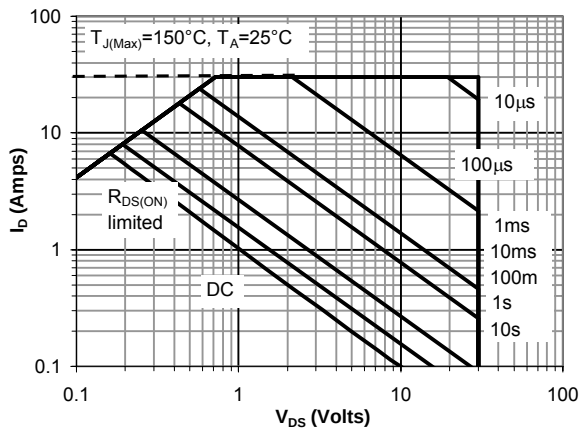


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

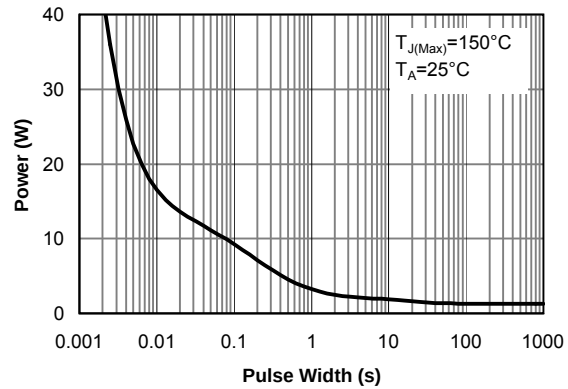


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

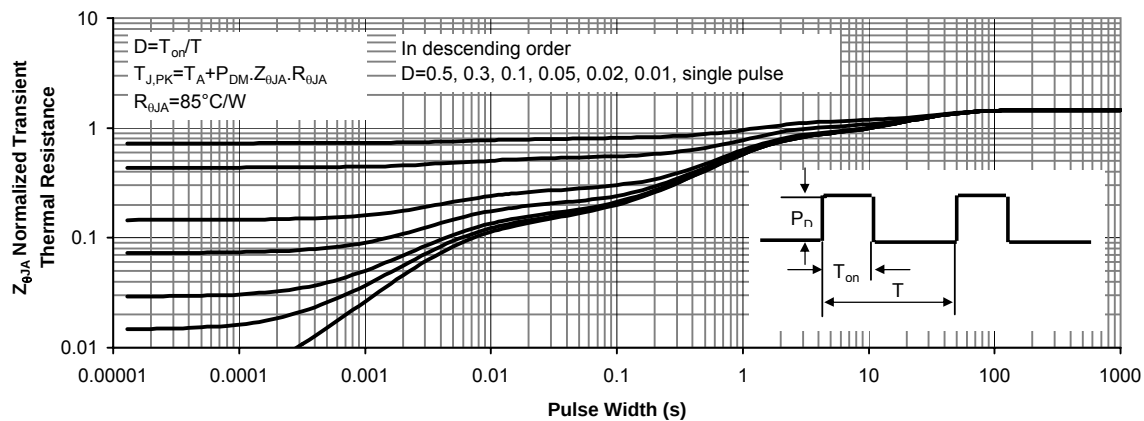


Figure 11: Normalized Maximum Transient Thermal Impedance