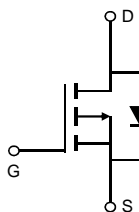


## General Description

The AON2401 combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ . This device is ideal for load switch and battery protection applications.

## Features

|                                   |                |
|-----------------------------------|----------------|
| $V_{DS}$                          | -8V            |
| $I_D$ (at $V_{GS}=-2.5V$ )        | -8A            |
| $R_{DS(ON)}$ (at $V_{GS}=-2.5V$ ) | < 22m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=-1.8V$ ) | < 28m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=-1.5V$ ) | < 36m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=-1.2V$ ) | < 53m $\Omega$ |



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

| Parameter                              | Symbol         | Maximum                | Units            |
|--|----------------|------------------------|------------------|
| Drain-Source Voltage                   | $V_{DS}$       | -8                     | V                |
| Gate-Source Voltage                    | $V_{GS}$       | $\pm 5$                | V                |
| Continuous Drain Current <sup>G</sup>  | $I_D$          | $T_A=25^\circ\text{C}$ | -8               |
|  |                | $T_A=70^\circ\text{C}$ | -6               |
| Pulsed Drain Current <sup>C</sup>      | $I_{DM}$       | -32                    | A                |
| Power Dissipation <sup>A</sup>         | $P_D$          | $T_A=25^\circ\text{C}$ | 2.8              |
|  |                | $T_A=70^\circ\text{C}$ | 1.8              |
| 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>   | $R_{\theta JA}$ | 37           | 45  | $^\circ\text{C}/\text{W}$ |
| Maximum Junction-to-Ambient <sup>A,D</sup> |                 | Steady-State | 66  | 80                        |

**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   | -8    |       |          | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current       | V <sub>DS</sub> =-8V, 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> =±5V   |       |       | ±100     | nA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                   | -0.15 | -0.4  | -0.65    | V     |
| I <sub>D(ON)</sub>          | On state drain current                | V <sub>GS</sub> =-2.5V, V <sub>DS</sub> =-5V  | -32   |       |          | A     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance     | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-8A<br>T <sub>J</sub> =125°C                        |       | 18    | 22       | mΩ    |
|                             |                                       |   |       | 24.5  | 32       |       |
|                             |                                       | V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-6A   |       | 22.6  | 28       | mΩ    |
|                             |                                       | V <sub>GS</sub> =-1.5V, I <sub>D</sub> =-4A   |       | 27.7  | 36       | mΩ    |
|                             |                                       | V <sub>GS</sub> =-1.2V, I <sub>D</sub> =-2A   |       | 39    | 53       | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =-5V, I <sub>D</sub> =-8A   |       | 33    |          | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                 | I <sub>S</sub> =-1A, V <sub>GS</sub> =0V  |       | -0.55 | -1       | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current |   |       |       | -4       | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                       |   |       |       |          |       |
| C <sub>iss</sub>            | Input Capacitance                     | V <sub>GS</sub> =0V, V <sub>DS</sub> =-4V, f=1MHz   |       | 1465  |          | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |   |       | 345   |          | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |   |       | 235   |          | pF    |
| R <sub>g</sub>              | Gate resistance                       | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz  |       | 10    |          | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |   |       |       |          |       |
| Q <sub>g</sub>              | Total Gate Charge                     | V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-4V, I <sub>D</sub> =-8A                           |       | 12.5  | 18       | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |   |       | 1.5   |          | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |   |       | 3     |          | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-4V, R <sub>L</sub> =0.5Ω,<br>R <sub>GEN</sub> =3Ω |       | 4     |          | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |   |       | 28    |          | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |   |       | 99    |          | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |   |       | 43    |          | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =-8A, di/dt=100A/μs  |       | 23    |          | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =-8A, di/dt=100A/μs  |       | 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 Power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> t ≤ 10s value and the maximum allowed junction temperature of 150° 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 junction-to-case thermal impedance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

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 case R<sub>θJC</sub> and case to ambient.

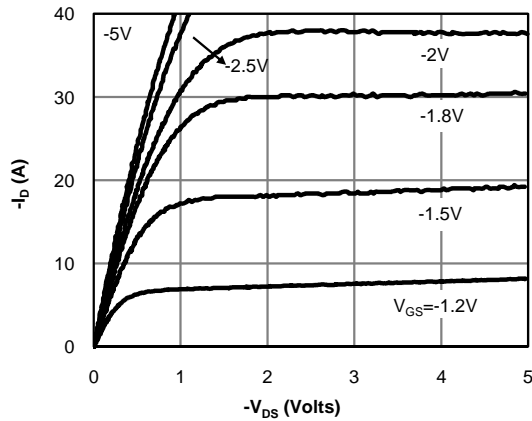
E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150° C. The SOA curve provides a single pulse rating.

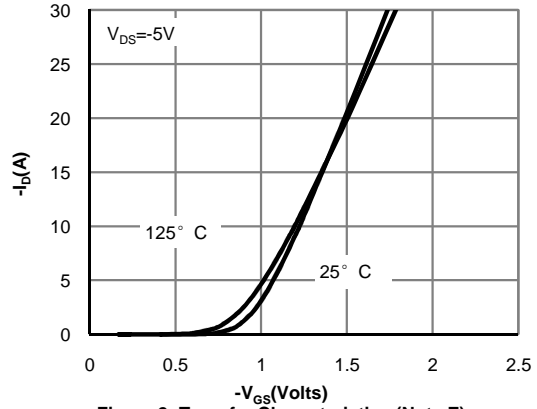
G. The maximum current rating is package limited.

H. 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.

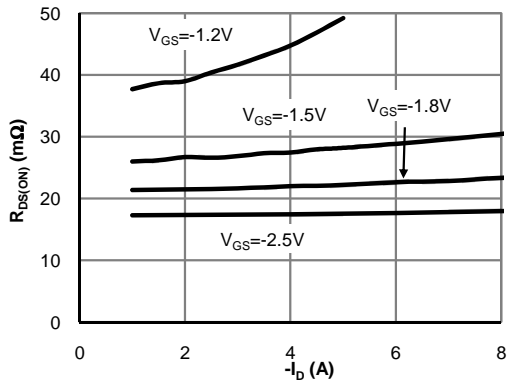
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



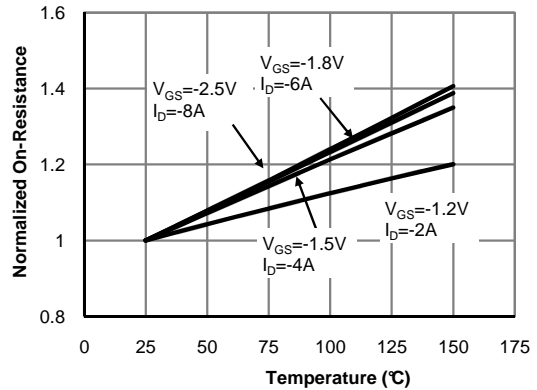
**Fig 1: On-Region Characteristics (Note E)**



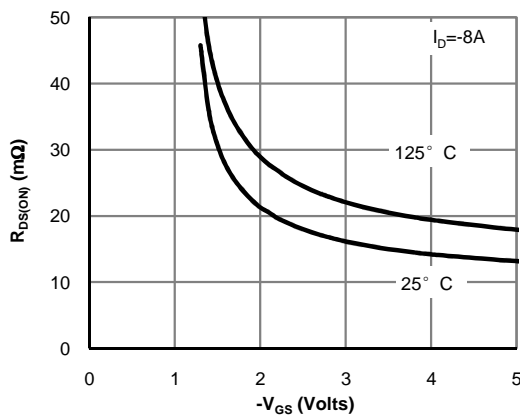
**Figure 2: Transfer Characteristics (Note E)**



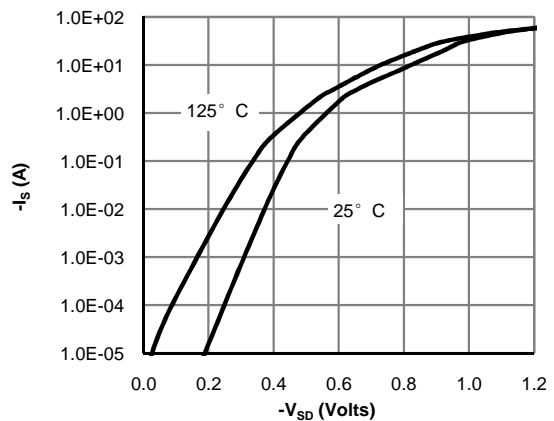
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**



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

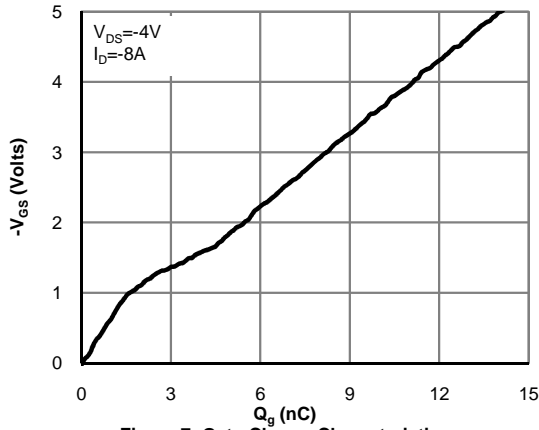


**Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)**

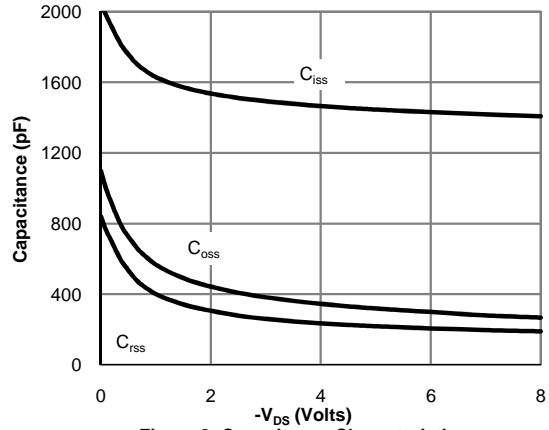


**Figure 6: Body-Diode Characteristics (Note E)**

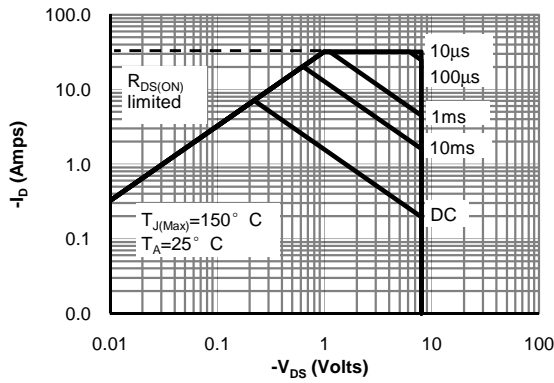
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



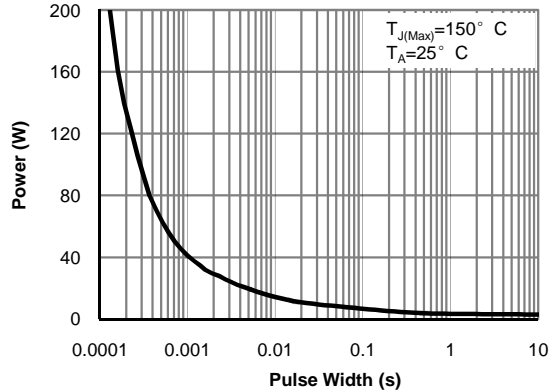
**Figure 7: Gate-Charge Characteristics**



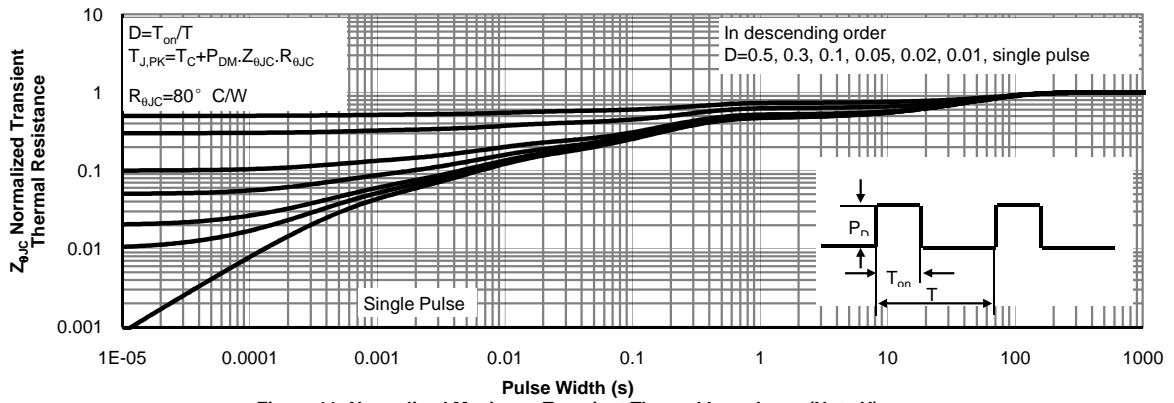
**Figure 8: Capacitance Characteristics**



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

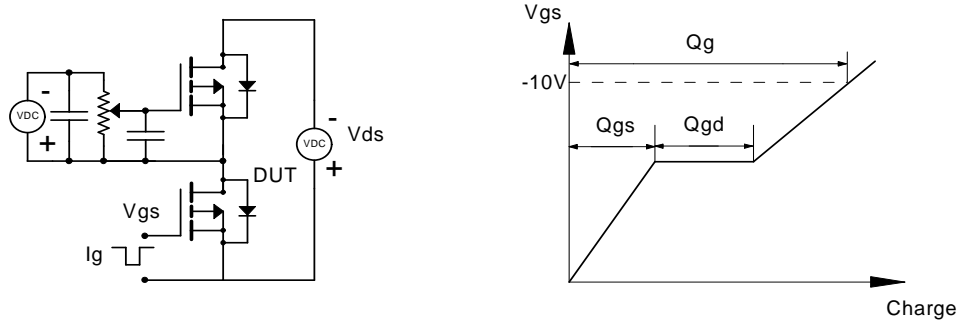


**Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note H)**

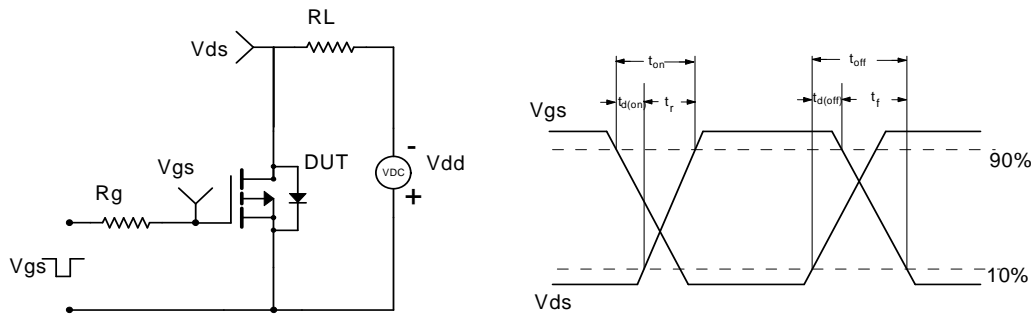


**Figure 11: Normalized Maximum Transient Thermal Impedance (Note H)**

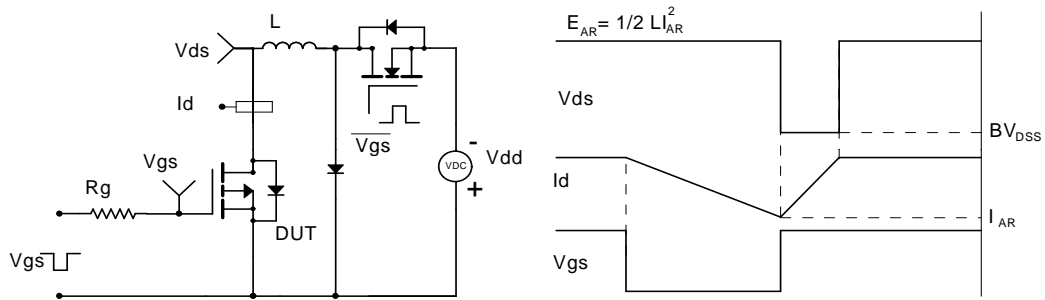
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

