



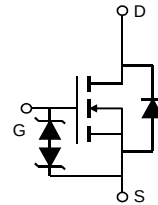
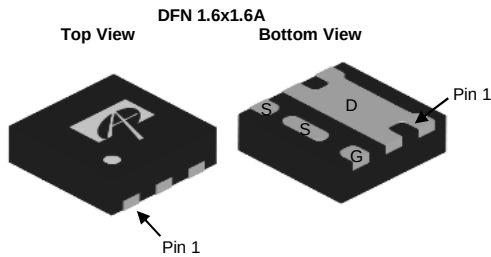
### General Description

The AON1620 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.

### Product Summary

|                                  |                |
|----------------------------------|----------------|
| $V_{DS}$                         | 12V            |
| $I_D$ (at $V_{GS}=4.5V$ )        | 4A             |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$ ) | < 22m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=2.5V$ ) | < 27m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=1.8V$ ) | < 36m $\Omega$ |

Typical ESD protection HBM Class 2



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

| Parameter                              | Symbol         | Maximum    | Units            |
|----------------------------------------|----------------|------------|------------------|
| Drain-Source Voltage                   | $V_{DS}$       | 12         | V                |
| Gate-Source Voltage                    | $V_{GS}$       | $\pm 8$    | V                |
| Continuous Drain Current <sup>G</sup>  | $I_D$          | 4          | A                |
| $T_A=25^\circ\text{C}$                 |                |            |                  |
| $T_A=70^\circ\text{C}$                 |                | 3          |                  |
| Pulsed Drain Current <sup>C</sup>      | $I_{DM}$       | 16         |                  |
| Power Dissipation <sup>A</sup>         | $P_D$          | 1.8        | W                |
| $T_A=25^\circ\text{C}$                 |                |            |                  |
| $T_A=70^\circ\text{C}$                 |                | 1.15       |                  |
| 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>   | $R_{\theta JA}$ | 56  | 70  | $^\circ\text{C/W}$ |
| $t \leq 10s$                               |                 |     |     |                    |
| Maximum Junction-to-Ambient <sup>A,D</sup> |                 | 88  | 110 | $^\circ\text{C/W}$ |
| 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                                                 | 12  |            |          | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current       | V <sub>DS</sub> =12V, 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> =±8V                                                  |     |            | ±10      | μA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                   | 0.4 | 0.7        | 1.0      | V     |
| I <sub>D(ON)</sub>          | On state drain current                | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =5V                                                 | 16  |            |          | A     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A<br>T <sub>J</sub> =125°C                         |     | 18<br>23.5 | 22<br>29 | mΩ    |
|                             |                                       | V <sub>GS</sub> =2.5V, I <sub>D</sub> =3A                                                  |     | 21         | 27       | mΩ    |
|                             |                                       | V <sub>GS</sub> =1.8V, I <sub>D</sub> =2A                                                  |     | 27         | 36       | mΩ    |
|                             |                                       | V <sub>GS</sub> =1.5V, I <sub>D</sub> =1A                                                  |     | 35         |          | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =5V, I <sub>D</sub> =4A                                                    |     | 25         |          | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                 | I <sub>S</sub> =1A, V <sub>GS</sub> =0V                                                    |     | 0.65       | 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> =6V, f=1MHz                                           |     | 770        |          | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |                                                                                            |     | 180        |          | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |                                                                                            |     | 130        |          | pF    |
| R <sub>g</sub>              | Gate resistance                       | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                           |     | 1.2        |          | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |                                                                                            |     |            |          |       |
| Q <sub>g(4.5V)</sub>        | Total Gate Charge                     | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =6V, I <sub>D</sub> =4A                             |     | 8          | 12       | 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> =4.5V, V <sub>DS</sub> =6V, R <sub>L</sub> =3.75Ω,<br>R <sub>GEN</sub> =3Ω |     | 2.5        |          | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |                                                                                            |     | 3.5        |          | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |                                                                                            |     | 25         |          | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |                                                                                            |     | 4          |          | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =4A, dI/dt=100A/μs                                                          |     | 10         |          | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =4A, dI/dt=100A/μs                                                          |     | 3          |          | 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 resistance, 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.

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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

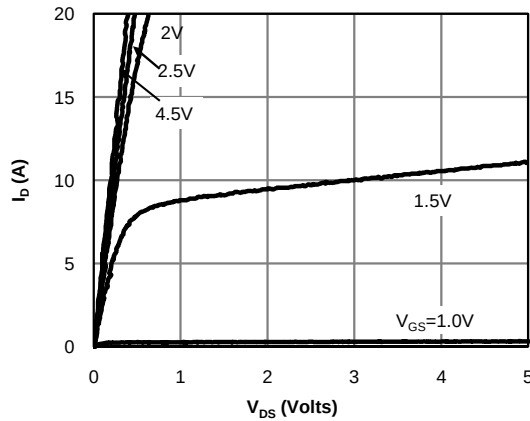


Fig 1: On-Region Characteristics (Note E)

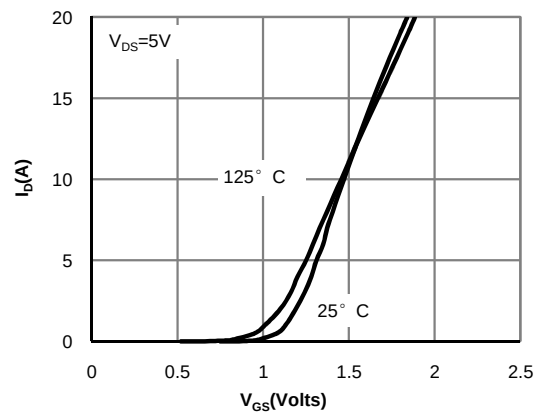


Figure 2: Transfer Characteristics (Note E)

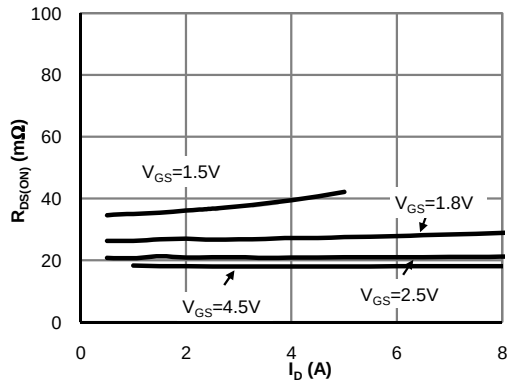


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

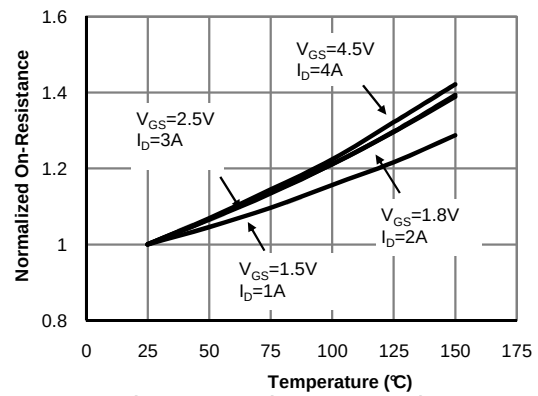


Figure 4: On-Resistance vs. Junction Temperature (Note E)

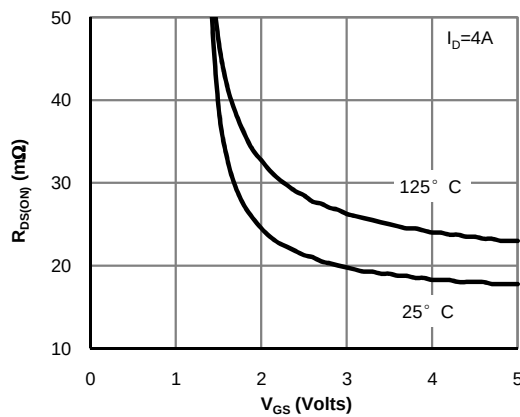


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

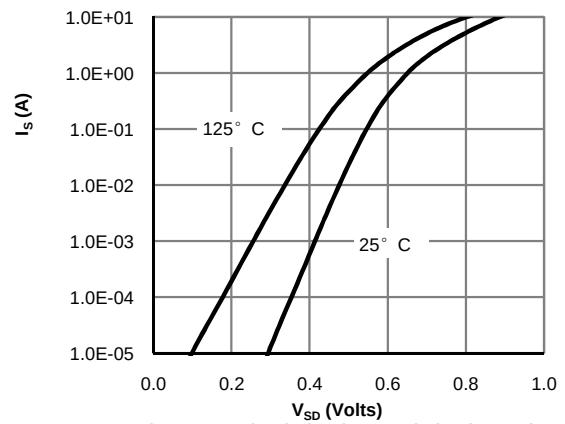
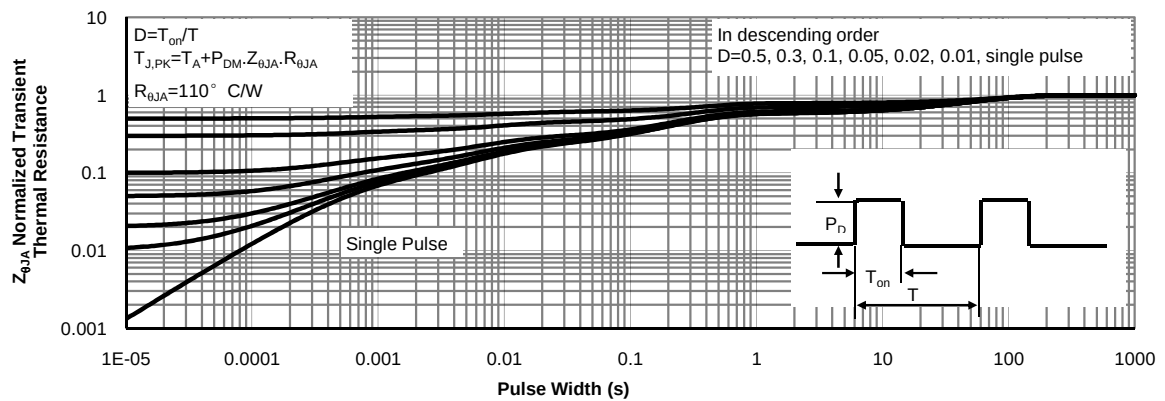
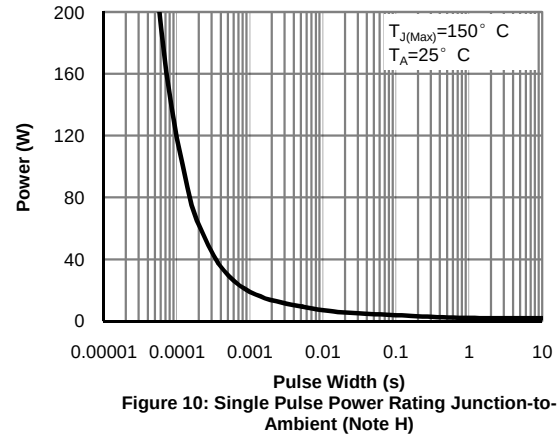
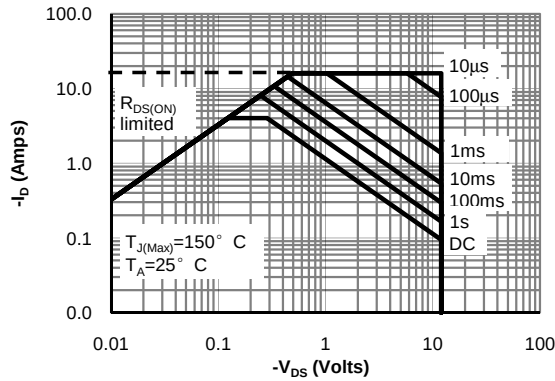
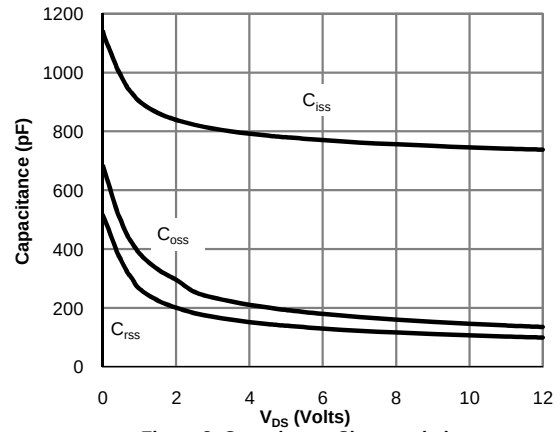
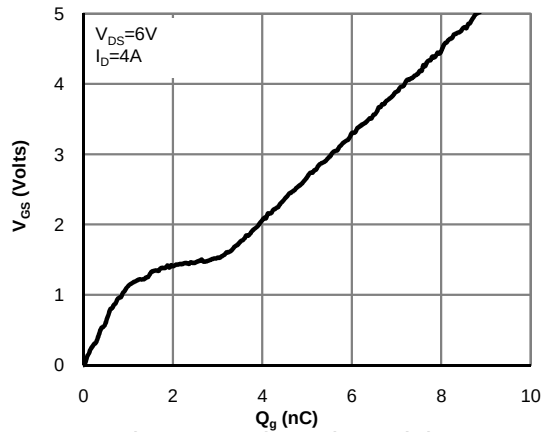
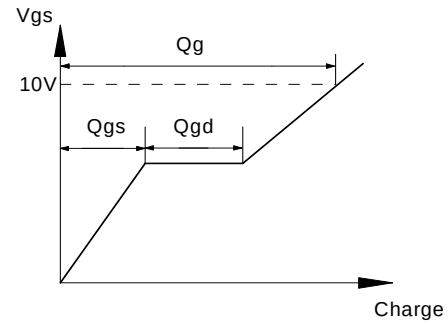
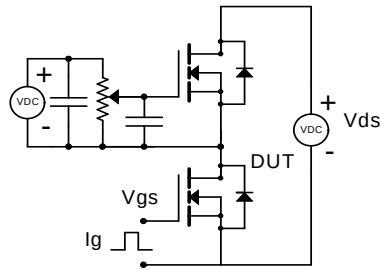


Figure 6: Body-Diode Characteristics (Note E)

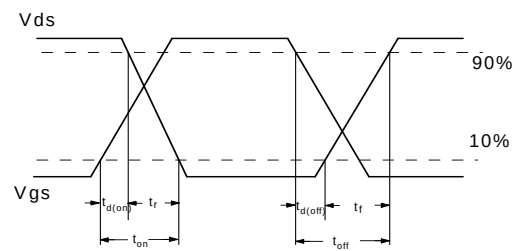
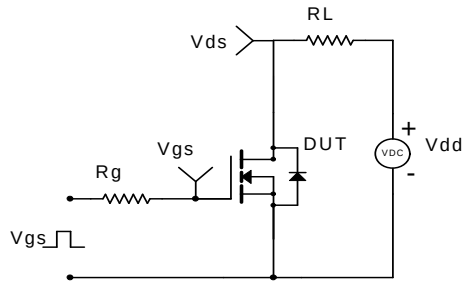
## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveforms



### Diode Recovery Test Circuit & Waveforms

