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# AON3402

## 20V N-Channel MOSFET

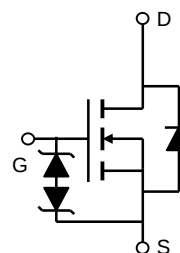
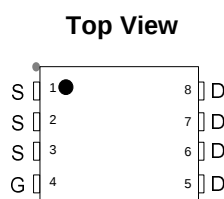
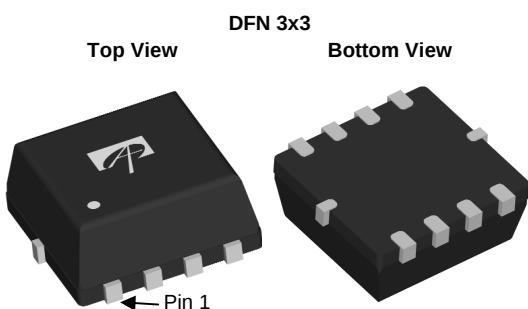
### General Description

The AON3402 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 load switch and general purpose FET application.

### Product Summary

$V_{DS}$  (V) = 20V  
 $I_D$  = 12.6A ( $V_{GS}$  = 4.5V)  
 $R_{DS(ON)}$  < 13m $\Omega$  ( $V_{GS}$  = 4.5V)  
 $R_{DS(ON)}$  < 17m $\Omega$  ( $V_{GS}$  = 2.5V)  
 $R_{DS(ON)}$  < 26m $\Omega$  ( $V_{GS}$  = 1.8V)

ESD Rating: 2000V HBM  
 100% Rg Tested



### 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 <sup>A</sup>  | $T_A=25^\circ\text{C}$ | 12.6       | A                |
|                                        | $T_A=70^\circ\text{C}$ | 10         |                  |
| Pulsed Drain Current <sup>B</sup>      | $I_{DM}$               | 40         |                  |
| Power Dissipation <sup>A</sup>         | $T_A=25^\circ\text{C}$ | 3.1        | W                |
|                                        | $T_A=70^\circ\text{C}$ | 2          |                  |
| 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> | $R_{\theta JA}$ | 30  | 40  | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient <sup>A</sup> |                 | 65  | 80  | $^\circ\text{C/W}$ |
| Maximum Junction-to-Lead <sup>C</sup>    | $R_{\theta JL}$ | 20  | 25  | $^\circ\text{C/W}$ |

## AON3402

### 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> =16V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =55°C                         |     |              | 10<br>25 | 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                                    | 0.5 | 0.78         | 1        | V     |
| I <sub>D(ON)</sub>          | On state drain current                | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =5V                                                | 40  |              |          | A     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =12A<br>T <sub>J</sub> =125°C                       |     | 10.3<br>14.4 | 13<br>18 | mΩ    |
|                             |                                       | V <sub>GS</sub> =2.5V, I <sub>D</sub> =10.5A                                              |     | 14.3         | 17       | mΩ    |
|                             |                                       | V <sub>GS</sub> =1.8V, I <sub>D</sub> =8.5A                                               |     | 21.7         | 26       | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =5V, I <sub>D</sub> =12A                                                  |     | 37           |          | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                 | I <sub>S</sub> =1A, V <sub>GS</sub> =0V                                                   |     | 0.73         | 1        | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current |                                                                                           |     |              | 4.8      | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                       |                                                                                           |     |              |          |       |
| C <sub>ISS</sub>            | Input Capacitance                     | V <sub>GS</sub> =0V, V <sub>DS</sub> =10V, f=1MHz                                         |     | 1810         |          | pF    |
| C <sub>OSS</sub>            | Output Capacitance                    |                                                                                           |     | 232          |          | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |                                                                                           |     | 200          |          | pF    |
| R <sub>g</sub>              | Gate resistance                       | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                          |     | 1.6          |          | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |                                                                                           |     |              |          |       |
| Q <sub>g</sub>              | Total Gate Charge                     | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =12A                          |     | 17.9         |          | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |                                                                                           |     | 1.5          |          | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |                                                                                           |     | 4.7          |          | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =10V, R <sub>L</sub> =1.0Ω,<br>R <sub>GEN</sub> =3Ω |     | 2.5          |          | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |                                                                                           |     | 7.2          |          | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |                                                                                           |     | 49           |          | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |                                                                                           |     | 10.8         |          | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =12A, dI/dt=100A/μs                                                        |     | 20.2         |          | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =12A, dI/dt=100A/μs                                                        |     | 8            |          | 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 are obtained using 300 μs 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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## AON3402

### TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

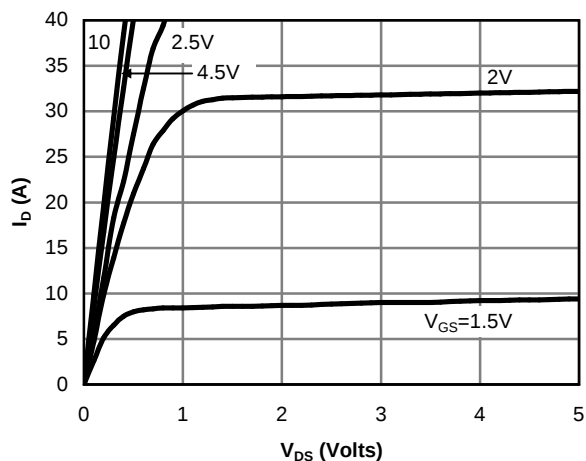


Fig 1: On-Region Characteristics

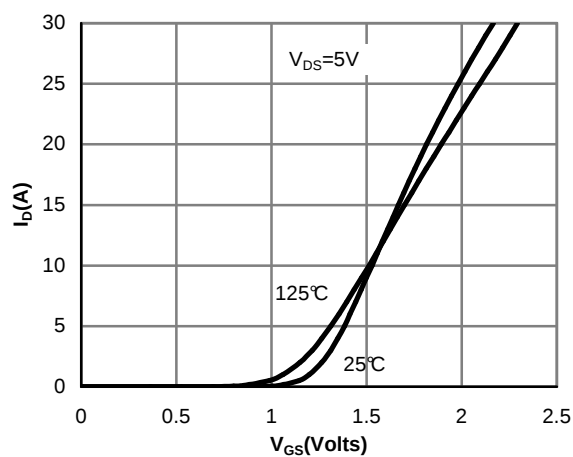


Figure 2: Transfer Characteristics

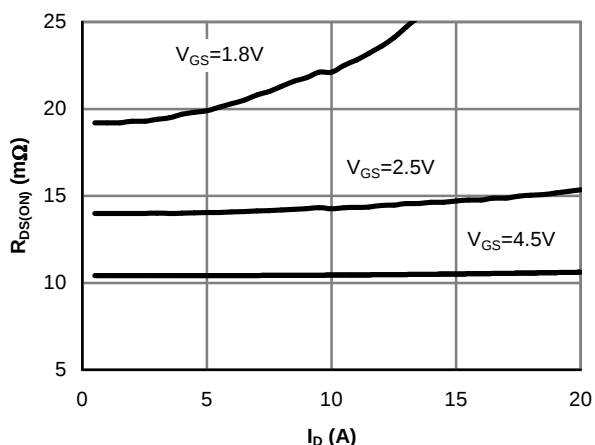


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

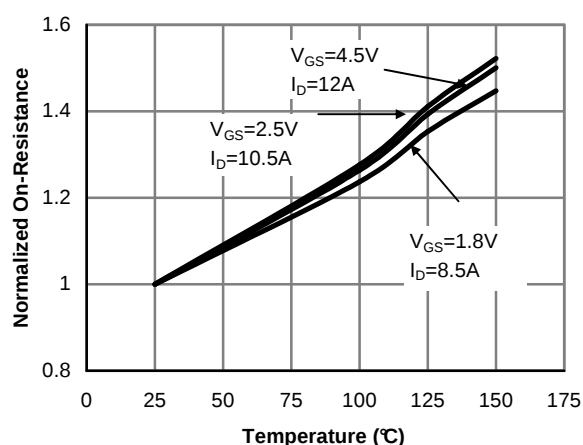


Figure 4: On-Resistance vs. Junction Temperature

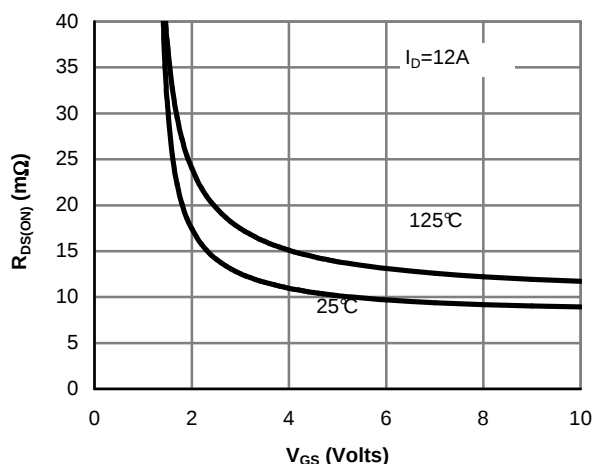


Figure 5: On-Resistance vs. Gate-Source Voltage

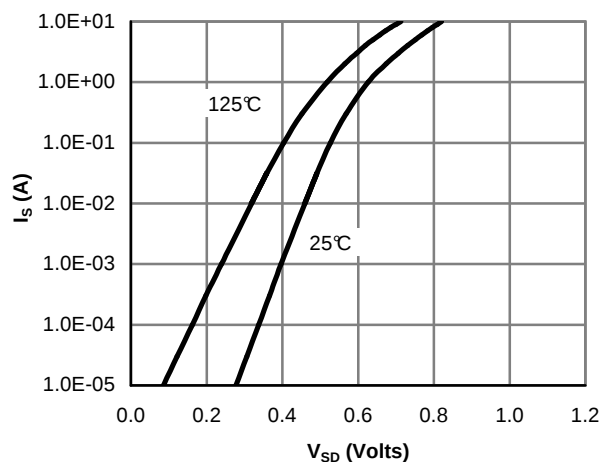


Figure 6: Body-Diode Characteristics

## AON3402

### TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

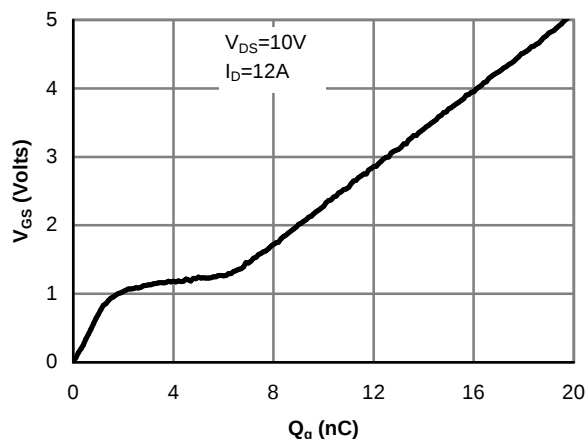


Figure 7: Gate-Charge Characteristics

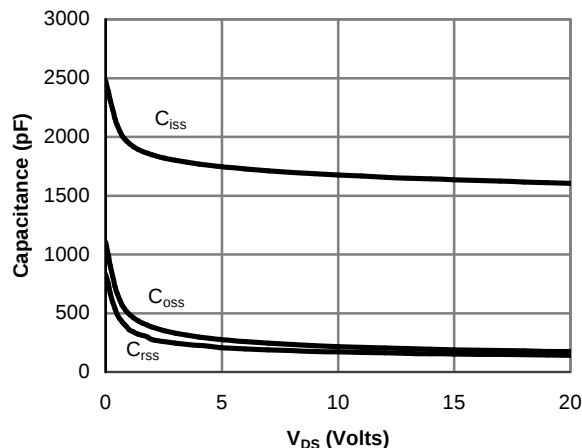


Figure 8: Capacitance Characteristics

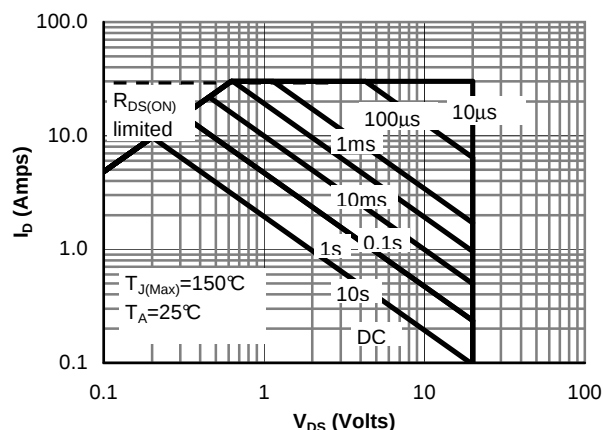


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

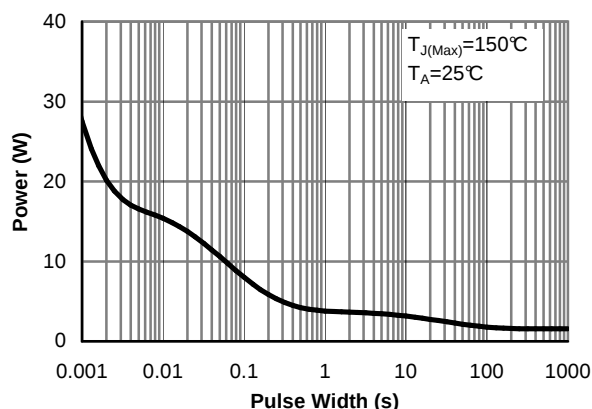


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

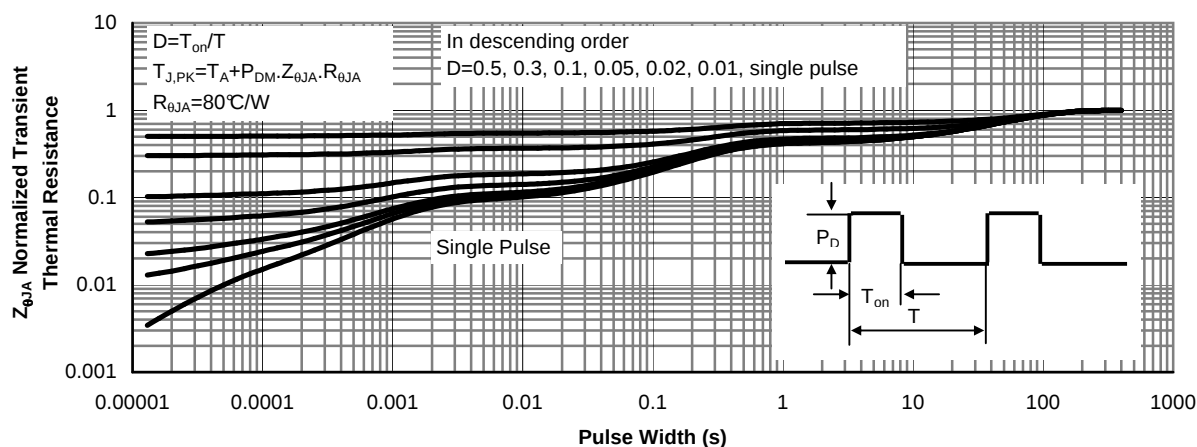


Figure 11: Normalized Maximum Transient Thermal Impedance