

### General Description

The AOC2421 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 1.2V while retaining a 5V  $V_{GS(MAX)}$  rating.

### Product Summary

|                                   |                 |
|-----------------------------------|-----------------|
| $V_{DS}$                          | -8V             |
| $I_D$ (at $V_{GS}=-2.5V$ )        | -2.5A           |
| $R_{DS(ON)}$ (at $V_{GS}=-2.5V$ ) | < 60m $\Omega$  |
| $R_{DS(ON)}$ (at $V_{GS}=-1.8V$ ) | < 72m $\Omega$  |
| $R_{DS(ON)}$ (at $V_{GS}=-1.5V$ ) | < 85m $\Omega$  |
| $R_{DS(ON)}$ (at $V_{GS}=-1.2V$ ) | < 115m $\Omega$ |

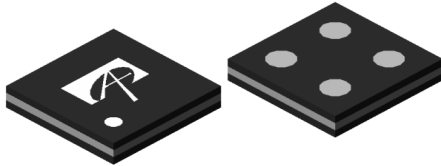
Typical ESD protection **HBM Class 2**



**MCSP 0.97x0.97A\_4**

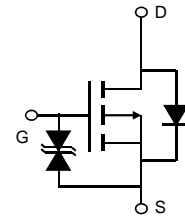
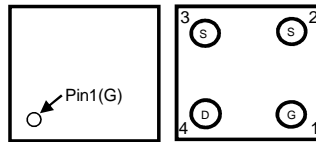
Top View

Bottom View



Top View

Bottom View



### 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                |
| Source Current (DC) <sup>Note1</sup>    | $I_D$          | -2.5       | A                |
| Source Current (Pulse) <sup>Note2</sup> |                |            |                  |
| Power Dissipation <sup>Note1</sup>      | $P_D$          | 0.6        | W                |
| 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>   | $R_{\theta JA}$ | 110 | 140 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient <sup>A D</sup> |                 | 160 | 200 | $^\circ\text{C/W}$ |

**Note 1.** Mounted on minimum pad PCB

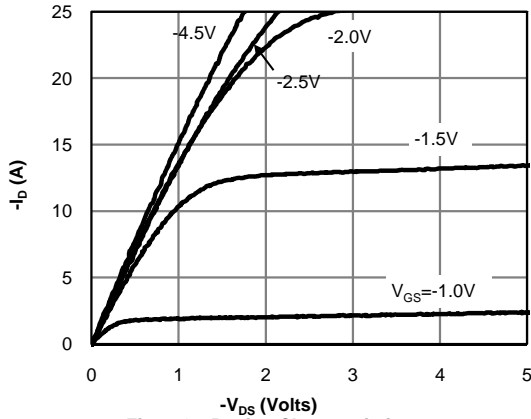
**Note 2.** PW < 300  $\mu\text{s}$  pulses, duty cycle 0.5% max

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

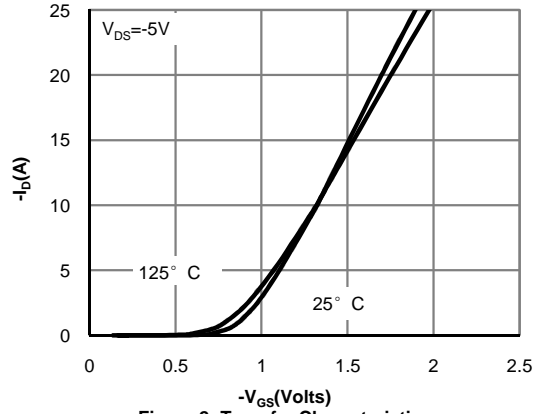
| Symbol                      | Parameter                          | Conditions   | Min  | Typ   | Max      | Units |
|-----------------------------|------------------------------------|--|------|-------|----------|-------|
| <b>STATIC PARAMETERS</b>    |                                    |  |      |       |          |       |
| 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  |      |       | ±10      | μA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage             | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                    | -0.2 | -0.45 | -0.7     | V     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance  | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-1.5A<br>T <sub>J</sub> =125°C                       |      | 50    | 62       | mΩ    |
|                             |                                    |  |      | 63.5  | 79       |       |
|                             |                                    | V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-1A  |      | 57    | 72       | mΩ    |
|                             |                                    | V <sub>GS</sub> =-1.5V, I <sub>D</sub> =-1A  |      | 65    | 85       | mΩ    |
|                             |                                    | V <sub>GS</sub> =-1.2V, I <sub>D</sub> =-1A  |      | 83    | 115      | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance           | V <sub>DS</sub> =-5V, I <sub>D</sub> =-1.5A  |      | 12    |          | S     |
| V <sub>SD</sub>             | Diode Forward Voltage              | I <sub>S</sub> =-1A, V <sub>GS</sub> =0V   |      | -0.6  | -1       | V     |
| <b>DYNAMIC PARAMETERS</b>   |                                    |  |      |       |          |       |
| C <sub>iss</sub>            | Input Capacitance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =-4V, f=1MHz  |      | 752   |          | pF    |
| C <sub>oss</sub>            | Output Capacitance                 |  |      | 178   |          | pF    |
| C <sub>riss</sub>           | Reverse Transfer Capacitance       |  |      | 104   |          | 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> =-4V, I <sub>D</sub> =-1.5A                          |      | 7.5   | 13       | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                 |  |      | 1.5   |          | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                  |  |      | 1.0   |          | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                  | V <sub>GS</sub> =-2.5V, V <sub>DS</sub> =-4V, R <sub>L</sub> =2.67Ω,<br>R <sub>GEN</sub> =3Ω |      | 285   |          | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                  |  |      | 465   |          | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                 |  |      | 1870  |          | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                 |  |      | 1900  |          | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time   | I <sub>F</sub> =-1.5A, di/dt=100A/μs   |      | 12    |          | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge | I <sub>F</sub> =-1.5A, di/dt=100A/μs   |      | 4     |          | nC    |

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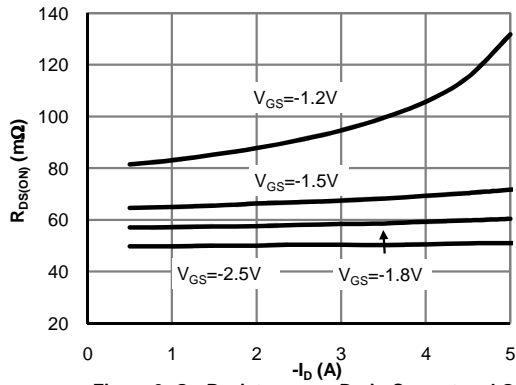
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



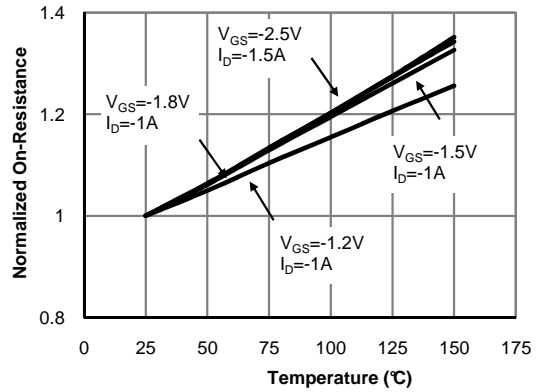
**Fig 1: On-Region Characteristics**



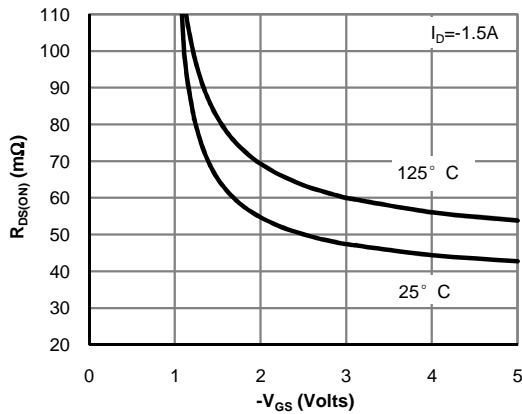
**Figure 2: Transfer Characteristics**



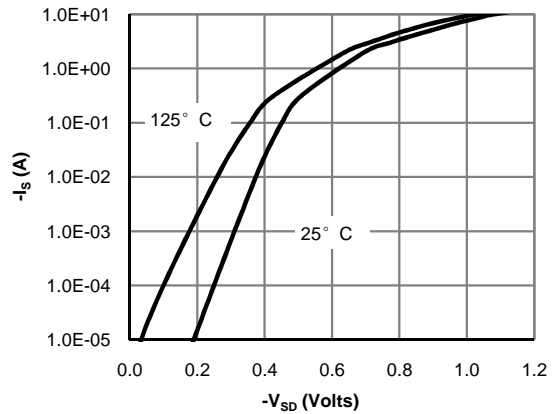
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**



**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**

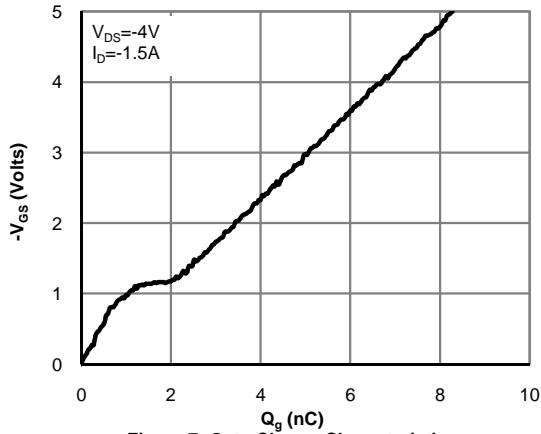


Figure 7: Gate-Charge Characteristics

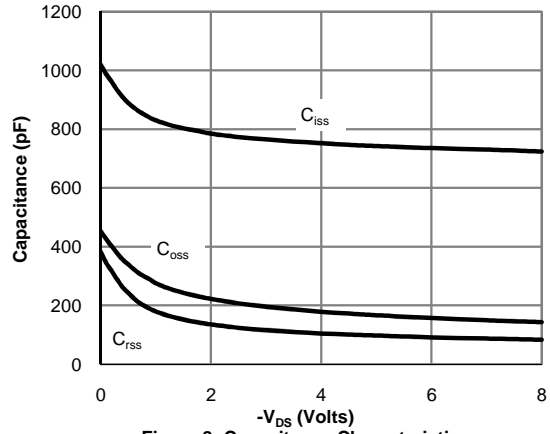


Figure 8: Capacitance Characteristics

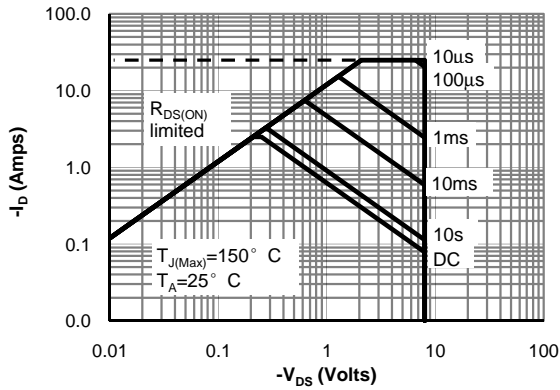


Figure 9: Maximum Forward Biased Safe Operating Area

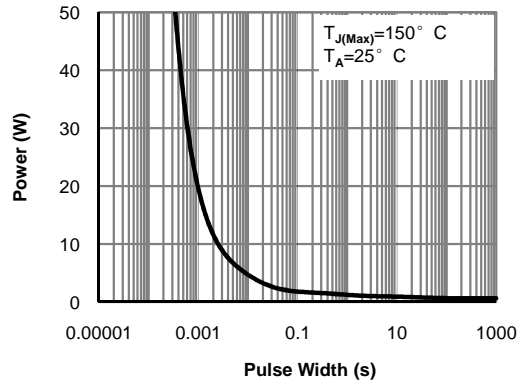


Figure 10: Single Pulse Power Rating Junction-to-Ambient

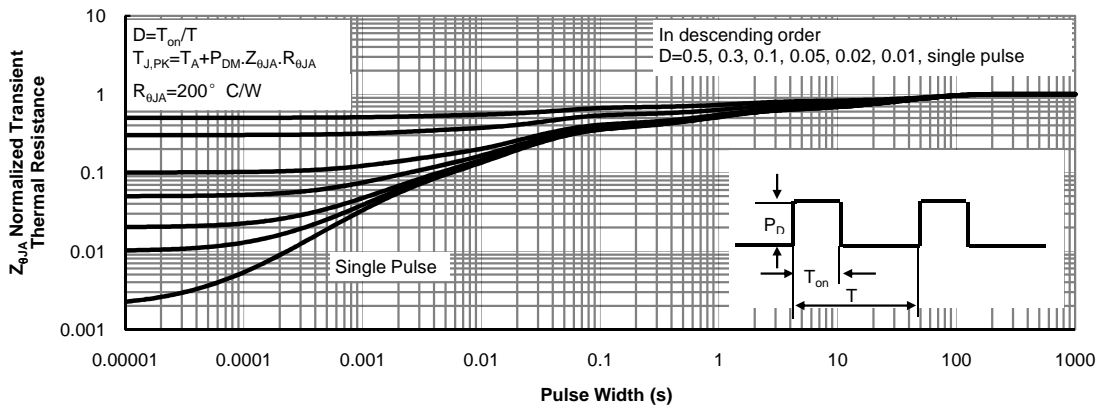


Figure 11: Normalized Maximum Transient Thermal Impedance

**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**

