

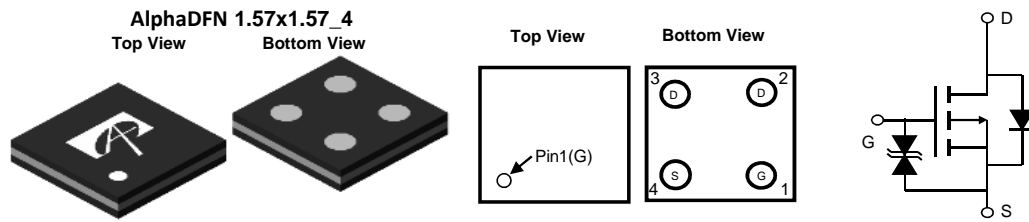
### General Description

The AOC2413 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 $V_{GS}=-2.5V$ )        | -3.5A          |
| $R_{DS(ON)}$ (at $V_{GS}=-2.5V$ ) | < 28m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=-1.8V$ ) | < 32m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=-1.5V$ ) | < 37m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=-1.2V$ ) | < 47m $\Omega$ |

Typical ESD protection **HBM Class 3A**



### Absolute Maximum Ratings $T_A=25^\circ C$ 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>    | $I_D$          | -3.5       | A          |
| Source Current (Pulse) <sup>Note2</sup> | $I_{DM}$       | -50        |            |
| Power Dissipation <sup>Note1</sup>      | $P_D$          | 0.55       | W          |
| 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>   | $R_{\theta JA}$ | 140 | 170 | $^\circ C/W$ |
| Maximum Junction-to-Ambient <sup>A D</sup> |                 | 190 | 230 |              |

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

**Note 2.** PW <300  $\mu s$  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                                    | -0.15 | -0.42 | -0.65    | 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                       |       | 22.5  | 28       | mΩ    |
|                             |                                    |  |       | 29.5  | 37       |       |
|                             |                                    | V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-1A  |       | 25    | 32       | mΩ    |
|                             |                                    | V <sub>GS</sub> =-1.5V, I <sub>D</sub> =-1A  |       | 28    | 37       | mΩ    |
|                             |                                    | V <sub>GS</sub> =-1.2V, I <sub>D</sub> =-1A  |       | 34    | 47       | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance           | V <sub>DS</sub> =-5V, I <sub>D</sub> =-1.5A  |       | 14    |          | S     |
| V <sub>SD</sub>             | Diode Forward Voltage              | I <sub>S</sub> =-1A, V <sub>GS</sub> =0V   |       | -0.52 | -1       | V     |
| <b>DYNAMIC PARAMETERS</b>   |                                    |  |       |       |          |       |
| C <sub>iss</sub>            | Input Capacitance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =-4V, f=1MHz  |       | 1935  |          | pF    |
| C <sub>oss</sub>            | Output Capacitance                 |  |       | 475   |          | pF    |
| C <sub>riss</sub>           | Reverse Transfer Capacitance       |  |       | 240   |          | pF    |
| R <sub>g</sub>              | Gate resistance                    | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz   |       | 1.7   |          | 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                          |       | 19    | 27       | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                 |  |       | 7.5   |          | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                  |  |       | 3.5   |          | 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 |       | 1.6   |          | μs    |
| t <sub>r</sub>              | Turn-On Rise Time                  |  |       | 2.8   |          | μs    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                 |  |       | 2.7   |          | μs    |
| t <sub>f</sub>              | Turn-Off Fall Time                 |  |       | 6.2   |          | μs    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time   | I <sub>F</sub> =-1.5A, di/dt=100A/μs   |       | 17    |          | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge | I <sub>F</sub> =-1.5A, di/dt=100A/μs   |       | 9     |          | nC    |

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**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

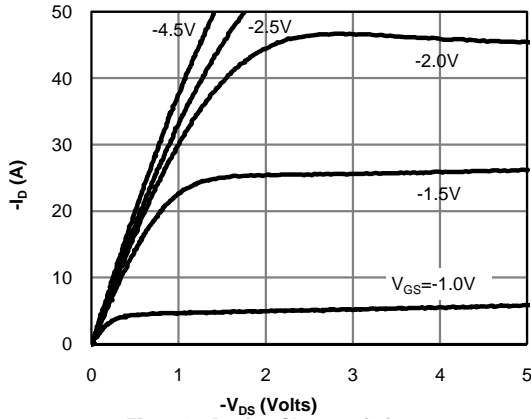


Fig 1: On-Region Characteristics

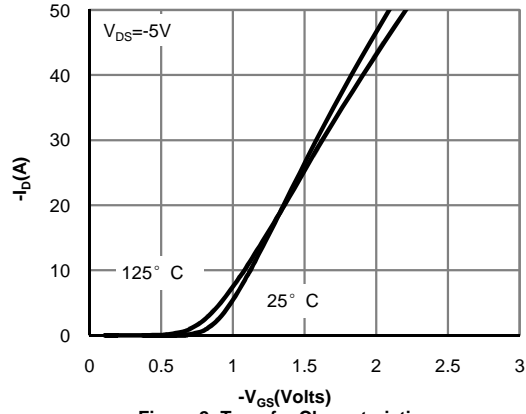


Figure 2: Transfer Characteristics

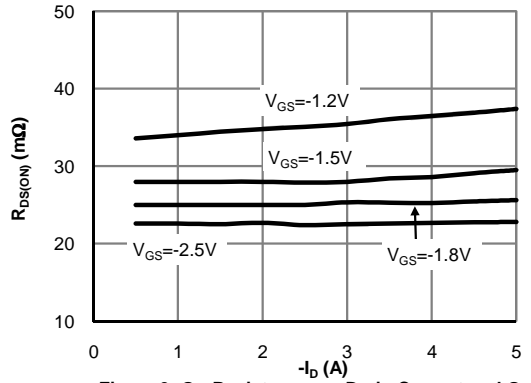


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

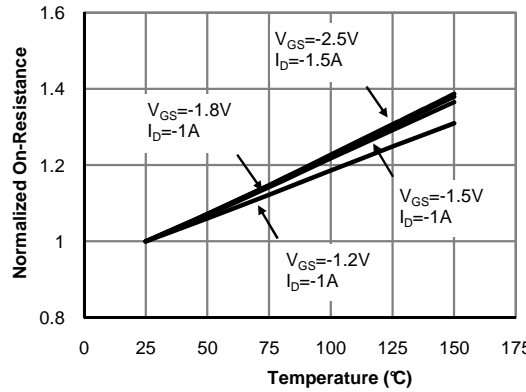


Figure 4: On-Resistance vs. Junction Temperature (Note E)

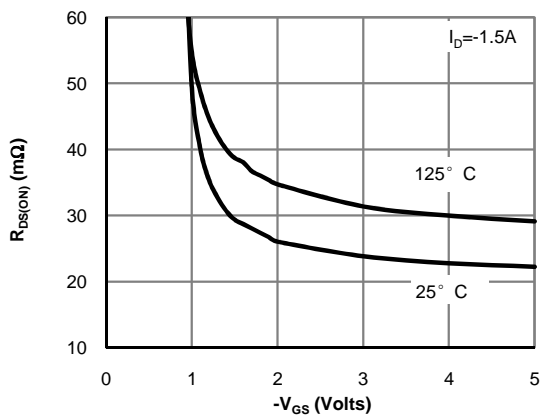


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

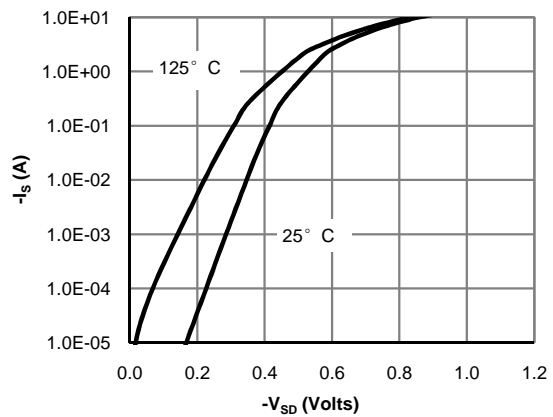


Figure 6: Body-Diode Characteristics (Note E)

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

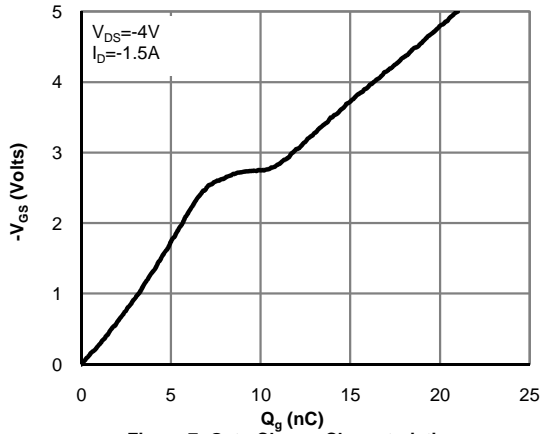


Figure 7: Gate-Charge Characteristics

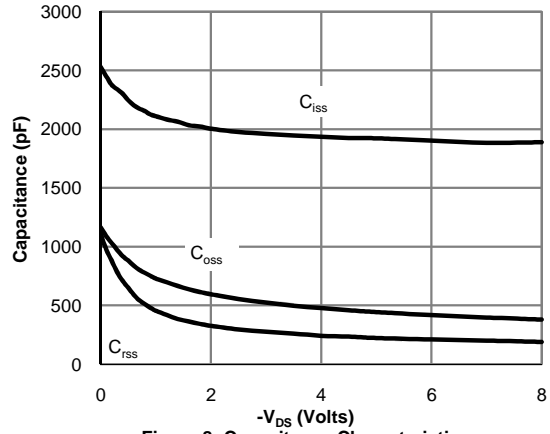


Figure 8: Capacitance Characteristics

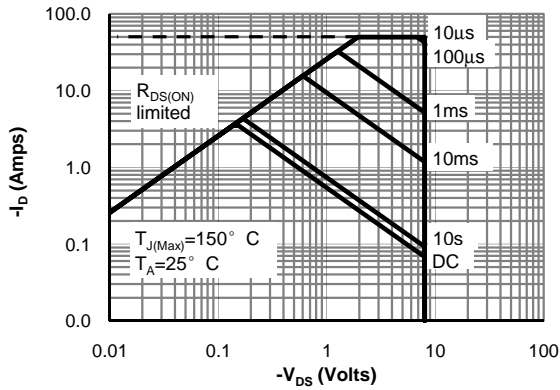


Figure 9: Maximum Forward Biased Safe Operating Area

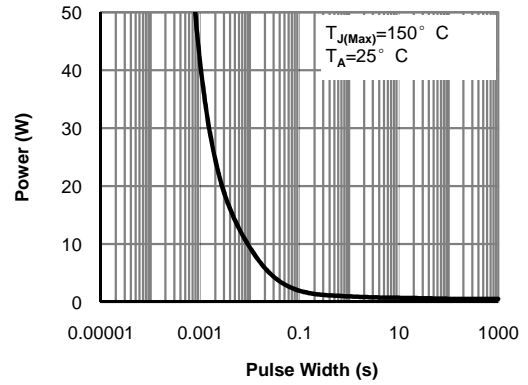


Figure 10: Single Pulse Power Rating Junction-to-Ambient

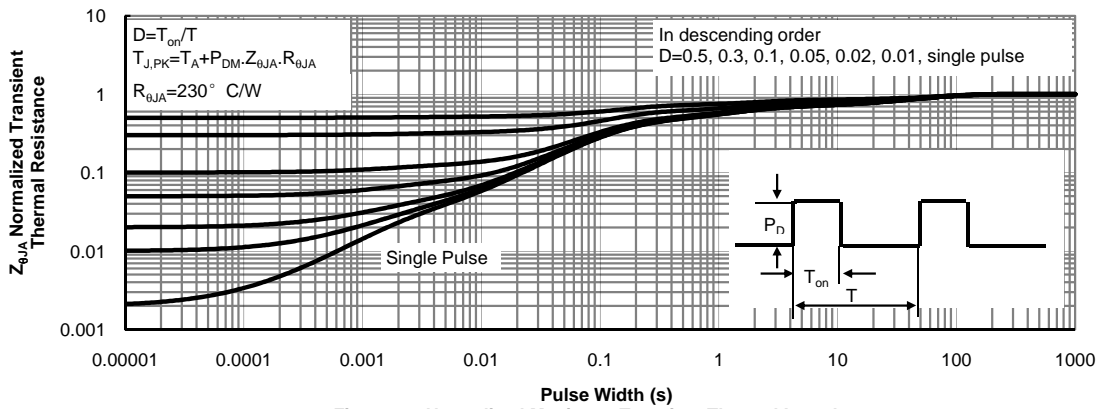
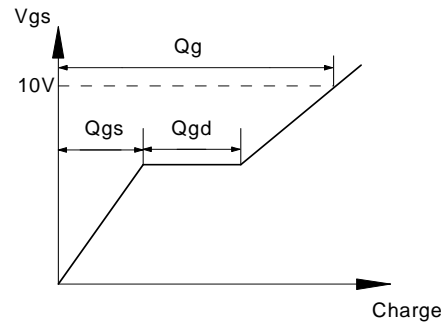
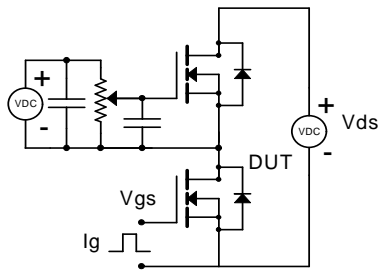
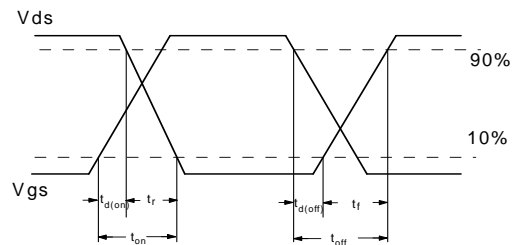
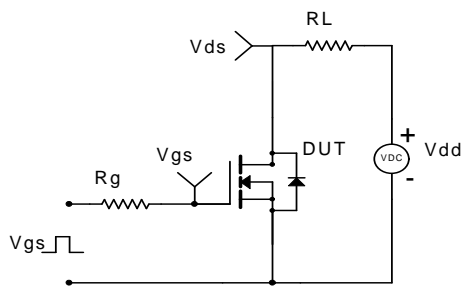


Figure 11: Normalized Maximum Transient Thermal Impedance

**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**

