



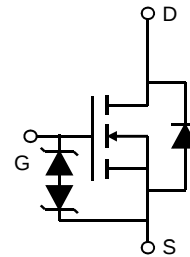
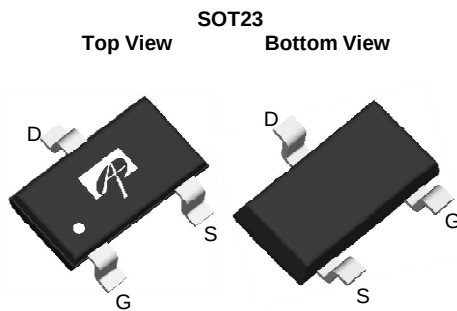
### General Description

The AO3460 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge, and operation with gate voltages as low as 4.5V, in the small SOT-23 footprint. It can be used for a wide variety of applications, including load switching, low current inverters and low current DC-DC converters. It is ESD protected.

### Product Summary

$V_{DS}$  (V) = 60V  
 $I_D$  = 0.65A ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 1.7\Omega$  ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 2\Omega$  ( $V_{GS}$  = 4.5V)

ESD protected



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

| Parameter                                | Symbol         | Maximum    | Units            |
|------------------------------------------|----------------|------------|------------------|
| Drain-Source Voltage                     | $V_{DS}$       | 60         | V                |
| Gate-Source Voltage                      | $V_{GS}$       | $\pm 20$   | V                |
| Continuous Drain Current <sup>A, F</sup> | $I_D$          | 0.65       | A                |
| $T_A=25^\circ\text{C}$                   |                |            |                  |
| $T_A=70^\circ\text{C}$                   | $I_D$          | 0.5        | A                |
| Pulsed Drain Current <sup>B</sup>        | $I_{DM}$       | 1.6        |                  |
| Power Dissipation <sup>A</sup>           | $P_D$          | 1.4        | W                |
| $T_A=25^\circ\text{C}$                   |                |            |                  |
| $T_A=70^\circ\text{C}$                   | $P_D$          | 0.9        | 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> | $R_{\theta JA}$ | 70  | 90  | $^\circ\text{C/W}$ |
| $t \leq 10\text{s}$                      |                 |     |     |                    |
| Maximum Junction-to-Ambient <sup>A</sup> | $R_{\theta JA}$ | 100 | 125 | $^\circ\text{C/W}$ |
| Steady-State                             |                 |     |     |                    |
| Maximum Junction-to-Lead <sup>C</sup>    | $R_{\theta JL}$ | 63  | 80  | $^\circ\text{C/W}$ |
| Steady-State                             |                 |     |     |                    |

Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise noted)

| Symbol                      | Parameter                             | Conditions                                                                        | Min | Typ        | Max      | Units         |
|-----------------------------|---------------------------------------|-----------------------------------------------------------------------------------|-----|------------|----------|---------------|
| <b>STATIC PARAMETERS</b>    |                                       |                                                                                   |     |            |          |               |
| $BV_{DSS}$                  | Drain-Source Breakdown Voltage        | $I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$                                         | 60  |            |          | V             |
| $I_{DSS}$                   | Zero Gate Voltage Drain Current       | $V_{DS}=60\text{V}$ , $V_{GS}=0\text{V}$<br>$T_J=55^\circ\text{C}$                |     |            | 1<br>5   | $\mu\text{A}$ |
| $I_{GSS}$                   | Gate-Body leakage current             | $V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$                                      |     |            | $\pm 10$ | $\mu\text{A}$ |
| $V_{GS(th)}$                | Gate Threshold Voltage                | $V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$                                            | 1   | 2.2        | 2.5      | V             |
| $I_{D(ON)}$                 | On state drain current                | $V_{GS}=10\text{V}$ , $V_{DS}=5\text{V}$                                          | 1.6 |            |          | A             |
| $R_{DS(ON)}$                | Static Drain-Source On-Resistance     | $V_{GS}=10\text{V}$ , $I_D=0.65\text{A}$<br>$T_J=125^\circ\text{C}$               |     | 1.4<br>2.5 | 1.7<br>3 | $\Omega$      |
|                             |                                       | $V_{GS}=4.5\text{V}$ , $I_D=0.5\text{A}$                                          |     | 1.6        | 2        | $\Omega$      |
| $g_{FS}$                    | Forward Transconductance              | $V_{DS}=5\text{V}$ , $I_D=0.65\text{A}$                                           |     | 0.8        |          | S             |
| $V_{SD}$                    | Diode Forward Voltage                 | $I_S=0.1\text{A}$ , $V_{GS}=0\text{V}$                                            |     | 0.8        | 1        | V             |
| $I_S$                       | Maximum Body-Diode Continuous Current |                                                                                   |     |            | 1.2      | A             |
| <b>DYNAMIC PARAMETERS</b>   |                                       |                                                                                   |     |            |          |               |
| $C_{iss}$                   | Input Capacitance                     | $V_{GS}=0\text{V}$ , $V_{DS}=30\text{V}$ , $f=1\text{MHz}$                        |     | 22         | 27       | pF            |
| $C_{oss}$                   | Output Capacitance                    |                                                                                   |     | 6          | 10       | pF            |
| $C_{rss}$                   | Reverse Transfer Capacitance          |                                                                                   |     | 2          | 6        | pF            |
| $R_g$                       | Gate resistance                       | $V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$                         |     | 250        | 400      | $\Omega$      |
| <b>SWITCHING PARAMETERS</b> |                                       |                                                                                   |     |            |          |               |
| $Q_g(10\text{V})$           | Total Gate Charge                     | $V_{GS}=10\text{V}$ , $V_{DS}=30\text{V}$ , $I_D=0.65\text{A}$                    |     | 0.8        | 2        | nC            |
| $Q_g(4.5\text{V})$          | Total Gate Charge                     |                                                                                   |     | 0.4        | 1.5      | nC            |
| $Q_{gs}$                    | Gate Source Charge                    |                                                                                   |     | 0.17       | 1        | nC            |
| $Q_{gd}$                    | Gate Drain Charge                     |                                                                                   |     | 0.2        | 1        | nC            |
| $t_{D(on)}$                 | Turn-On DelayTime                     | $V_{GS}=10\text{V}$ , $V_{DS}=30\text{V}$ , $R_L=75\Omega$ ,<br>$R_{GEN}=3\Omega$ |     | 5.3        | 12       | ns            |
| $t_r$                       | Turn-On Rise Time                     |                                                                                   |     | 2.8        | 6        | ns            |
| $t_{D(off)}$                | Turn-Off DelayTime                    |                                                                                   |     | 19.7       | 30       | ns            |
| $t_f$                       | Turn-Off Fall Time                    |                                                                                   |     | 5.5        | 11       | ns            |
| $t_{rr}$                    | Body Diode Reverse Recovery Time      | $I_F=0.65\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$ , $V_{GS}=-9\text{V}$        |     | 11.3       | 14       | ns            |
| $Q_{rr}$                    | Body Diode Reverse Recovery Charge    | $I_F=0.65\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$ , $V_{GS}=-9\text{V}$        |     | 7.5        |          | nC            |

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature.

C: The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to lead  $R_{\theta JL}$  and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using  $<300\mu\text{s}$  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  $T_A=25^\circ\text{C}$ . The SOA curve provides a single pulse rating.

F: The current rating is based on the  $t \leq 10\text{s}$  thermal resistance rating.

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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

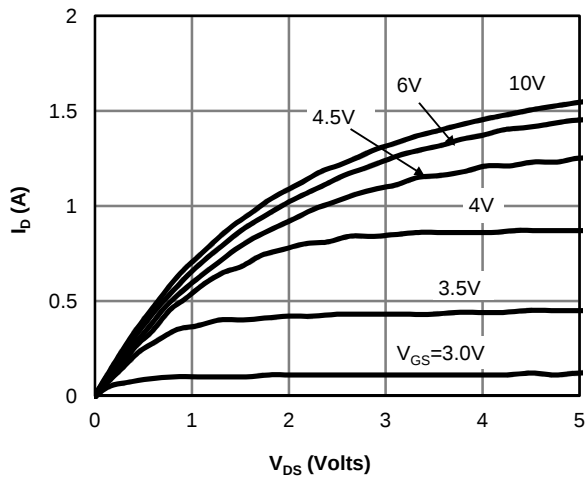


Figure 1: On-Region Characteristics

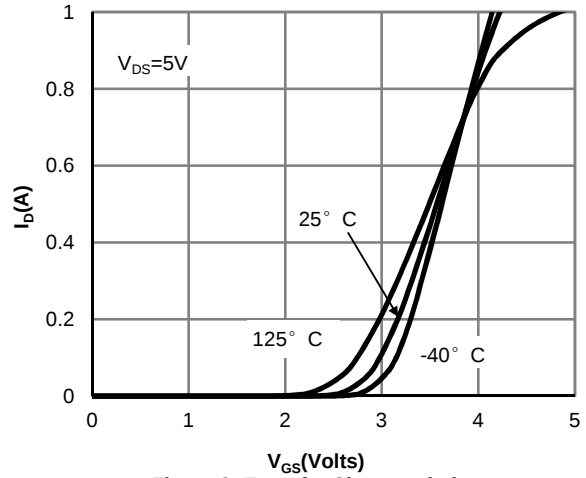


Figure 2: Transfer Characteristics

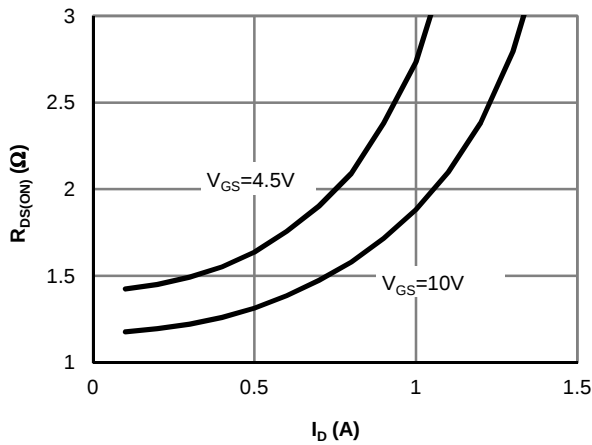


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

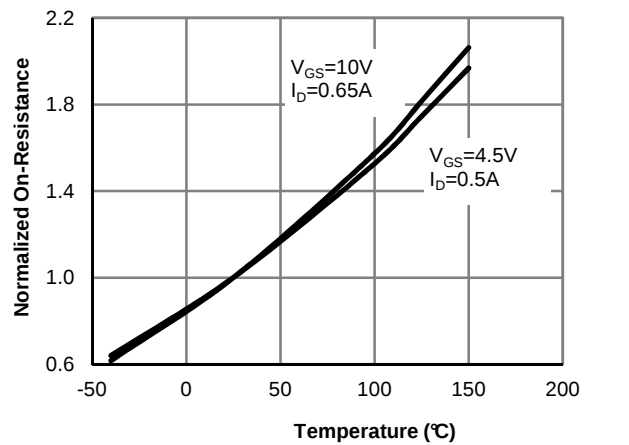


Figure 4: On-Resistance vs. Junction Temperature

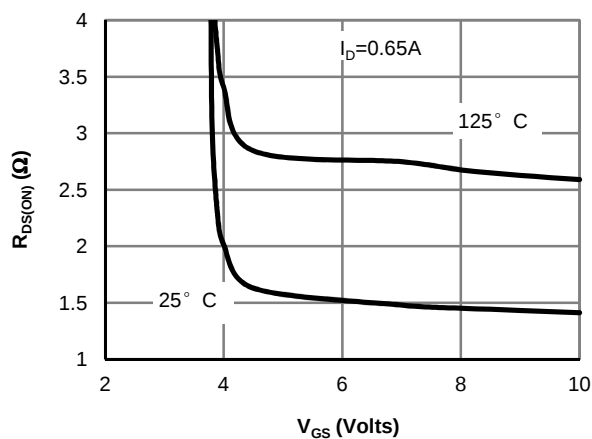


Figure 5: On-Resistance vs. Gate-Source Voltage

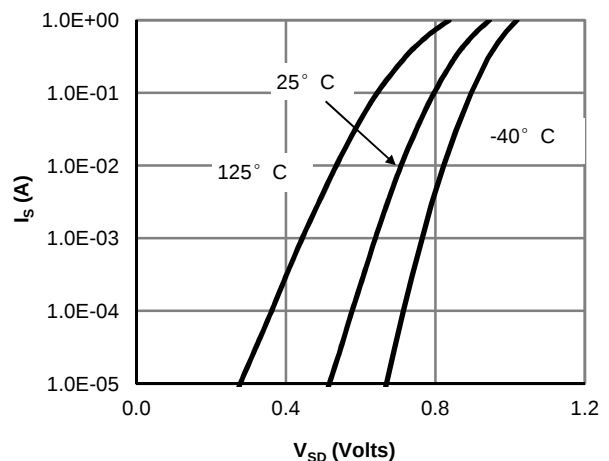


Figure 6: Body-Diode Characteristics

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

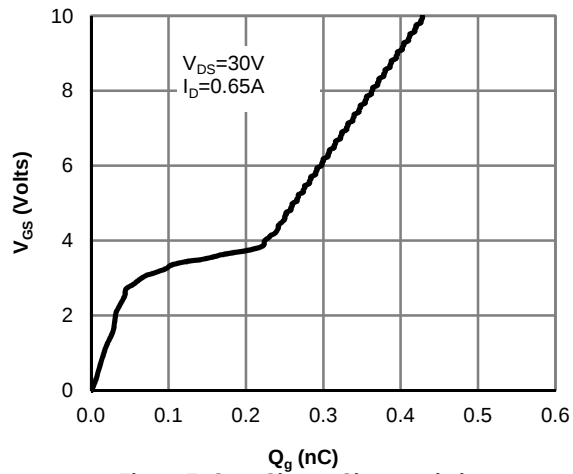


Figure 7: Gate-Charge Characteristics

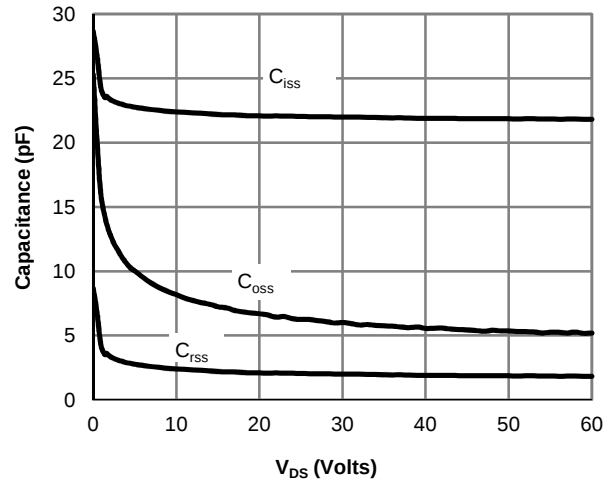


Figure 8: Capacitance Characteristics

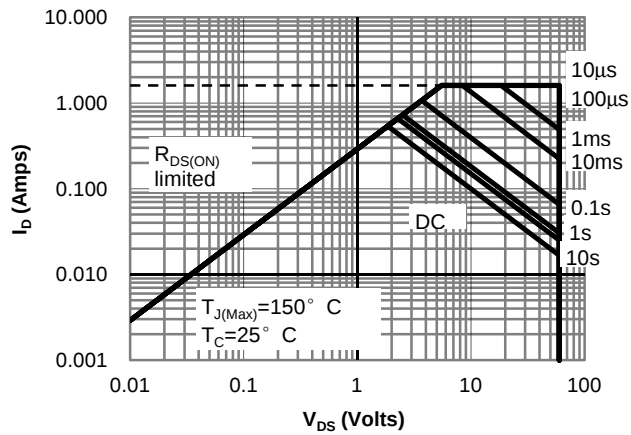


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

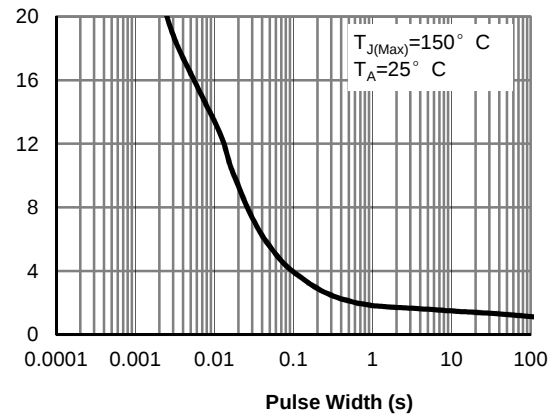


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

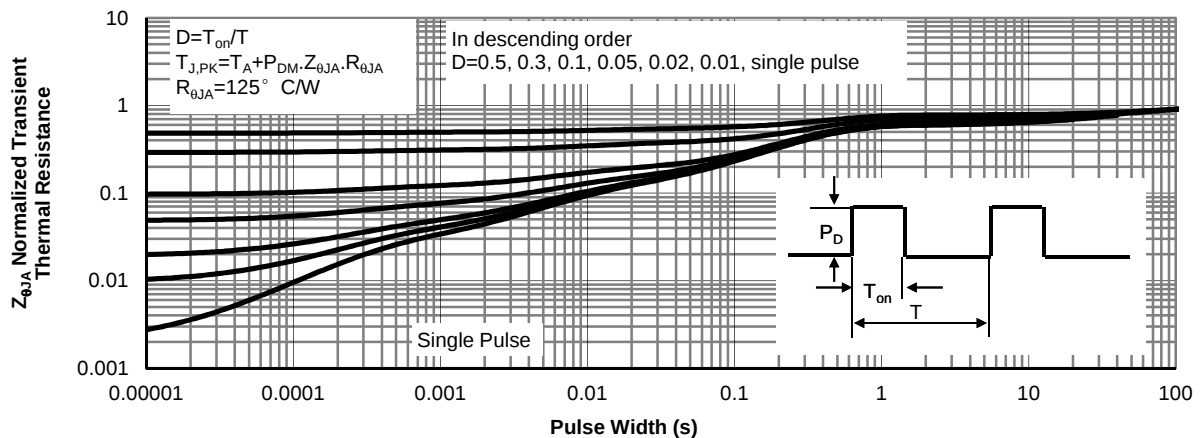


Figure 11: Normalized Maximum Transient Thermal Impedance