



**General Description**

- Trench Power MOSFET technology
- Low  $R_{DS(ON)}$
- Low Gate Charge
- RoHS and Halogen-Free Compliant

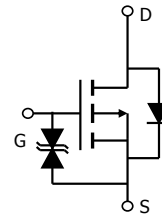
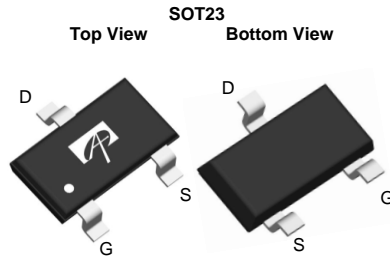
**Applications**

- This device is ideal for Load Switch

**Product Summary**

|                                   |                |
|-----------------------------------|----------------|
| $V_{DS}$                          | -30V           |
| $I_D$ (at $V_{GS}=-10V$ )         | -4.3A          |
| $R_{DS(ON)}$ (at $V_{GS}=-10V$ )  | < 45m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=-4.5V$ ) | < 65m $\Omega$ |

**Typical ESD protection**      **HBM Class 1C**



| Orderable Part Number | Package Type | Form        | Minimum Order Quantity |
|-----------------------|--------------|-------------|------------------------|
| AO3481C               | SOT23-3      | Tape & Reel | 3000                   |

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

| Parameter                              | Symbol         | Maximum                | Units            |
|--|----------------|------------------------|------------------|
| Drain-Source Voltage                   | $V_{DS}$       | -30                    | V                |
| Gate-Source Voltage                    | $V_{GS}$       | $\pm 20$               | V                |
| Continuous Drain Current               | $I_D$          | $T_A=25^\circ\text{C}$ | -4.3             |
|  |                | $T_A=70^\circ\text{C}$ | -3.3             |
| Pulsed Drain Current <sup>C</sup>      | $I_{DM}$       | -17                    | A                |
| Power Dissipation <sup>B</sup>         | $P_D$          | $T_A=25^\circ\text{C}$ | 1.3              |
|  |                | $T_A=70^\circ\text{C}$ | 0.8              |
| 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  | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient <sup>A,D</sup> |                 | Steady-State | 100 | 125                |
| Maximum Junction-to-Lead                   | $R_{\theta JL}$ | 63           | 80  | $^\circ\text{C/W}$ |

**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   | -30  |          |          | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current       | V <sub>DS</sub> =-30V, 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> =±20V  |      |          | ±10      | μA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                     | -1.2 | -1.7     | -2.2     | V     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance     | V <sub>GS</sub> =-10V, I <sub>D</sub> =-4.3A<br>T <sub>J</sub> =125°C                         |      | 37<br>52 | 45<br>64 | mΩ    |
|                             |                                       | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3.5A   |      | 52       | 65       |       |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =-5V, I <sub>D</sub> =-4.3A   |      | 13       |          | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                 | I <sub>S</sub> =-1A, V <sub>GS</sub> =0V  |      | 0.8      | 1        | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current |   |      |          | 2        | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                       |   |      |          |          |       |
| C <sub>iss</sub>            | Input Capacitance                     | V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz  |      | 720      |          | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |   |      | 80       |          | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |   |      | 70       |          | pF    |
| R <sub>g</sub>              | Gate resistance                       | f=1MHz  |      | 15       | 25       | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |   |      |          |          |       |
| Q <sub>g(10V)</sub>         | Total Gate Charge                     | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-4.3A                           |      | 12.5     | 23       | nC    |
| Q <sub>g(4.5V)</sub>        | Total Gate Charge                     |   |      | 6        | 12       | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |   |      | 1.6      |          | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |   |      | 3        |          | nC    |
| t <sub>D(on)</sub>          | Turn-On Delay Time                    | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V,<br>R <sub>L</sub> =3.488Ω, R <sub>GEN</sub> =3Ω |      | 8.5      |          | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |   |      | 5        |          | ns    |
| t <sub>D(off)</sub>         | Turn-Off Delay Time                   |   |      | 39       |          | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |   |      | 14.5     |          | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =-4.3A, di/dt=500A/μs  |      | 10       |          | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =-4.3A, di/dt=500A/μs  |      | 13       |          | 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.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150° C, using ≤ 10s junction-to-ambient thermal resistance.

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.

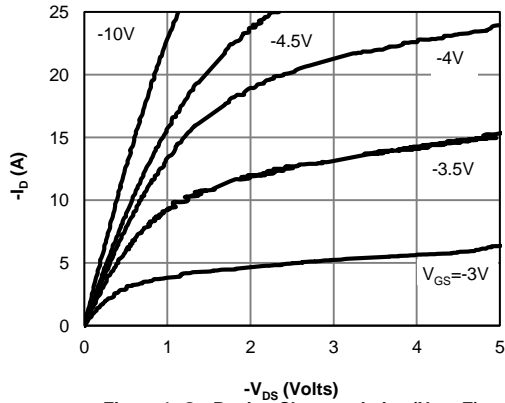
D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

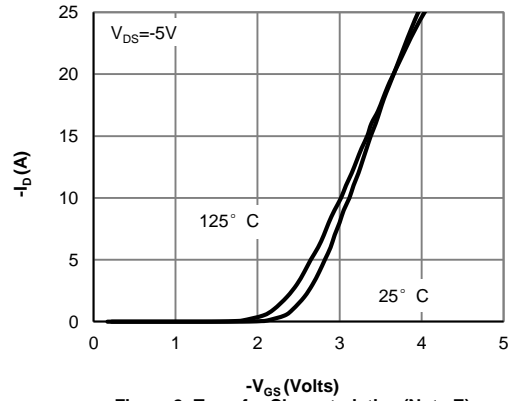
F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150° C. The SOA curve provides a single pulse rating.

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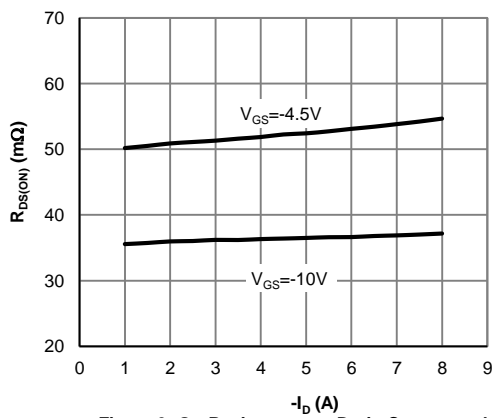
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



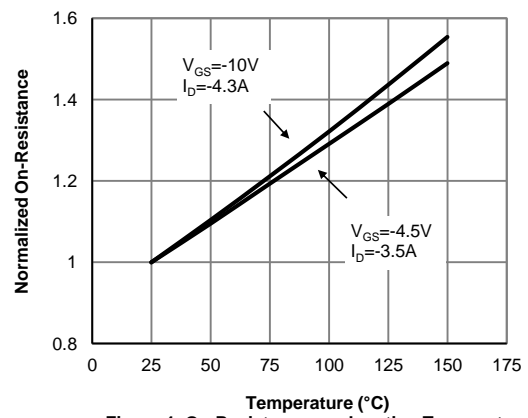
**Figure 1: On-Region Characteristics (Note E)**



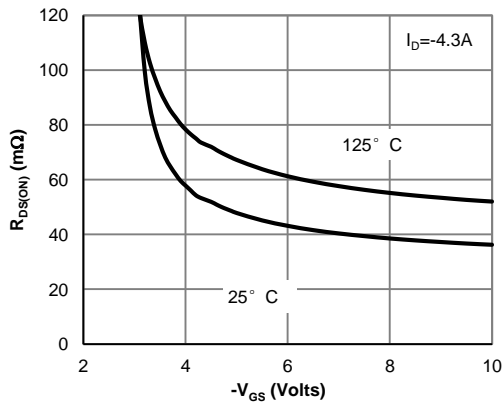
**Figure 2: Transfer Characteristics (Note E)**



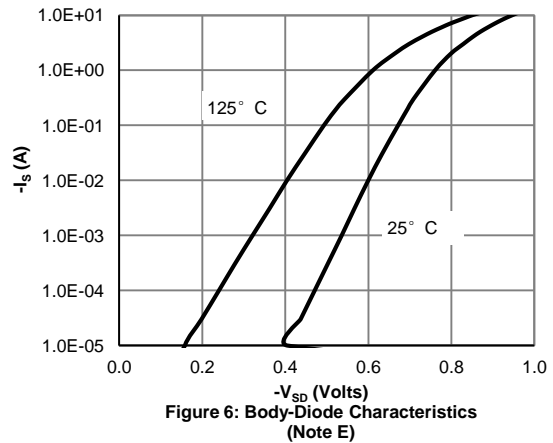
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**



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

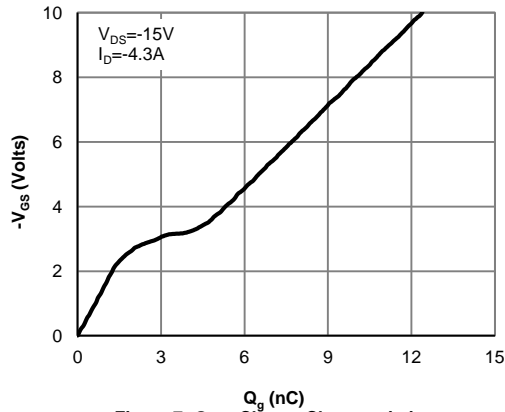


**Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)**

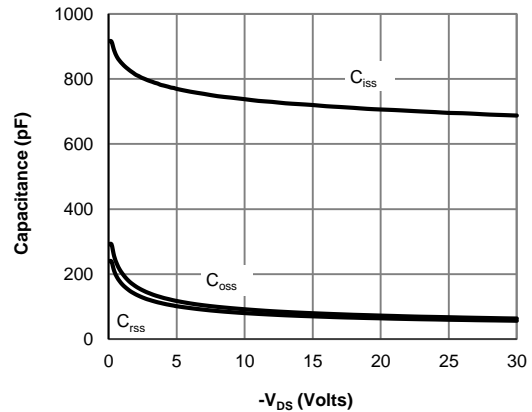


**Figure 6: Body-Diode Characteristics (Note E)**

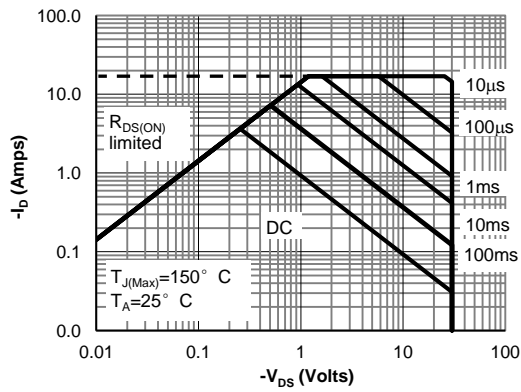
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



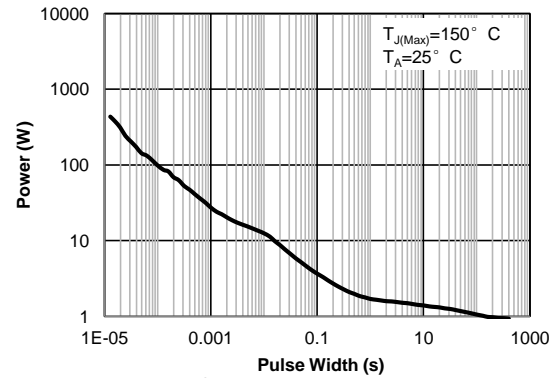
**Figure 7: Gate-Charge Characteristics**



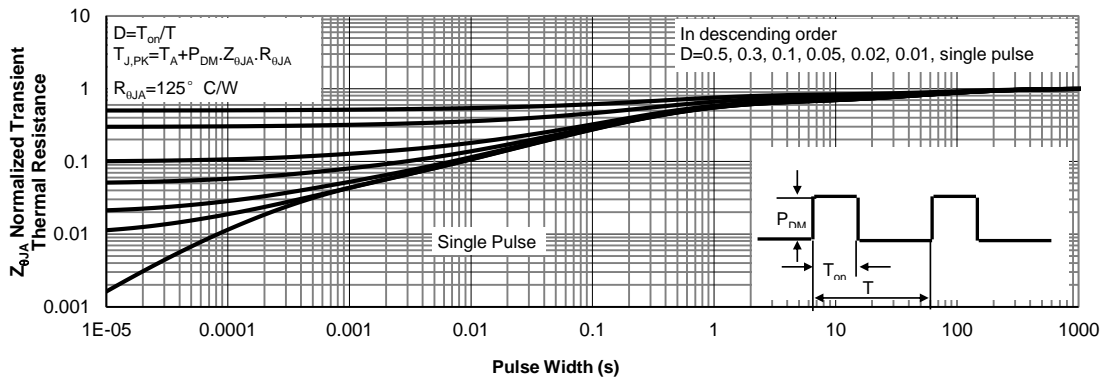
**Figure 8: Capacitance Characteristics**



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

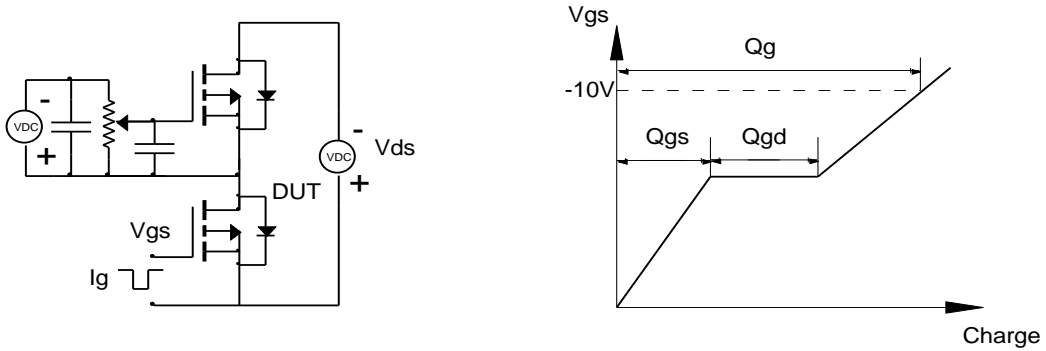


**Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)**

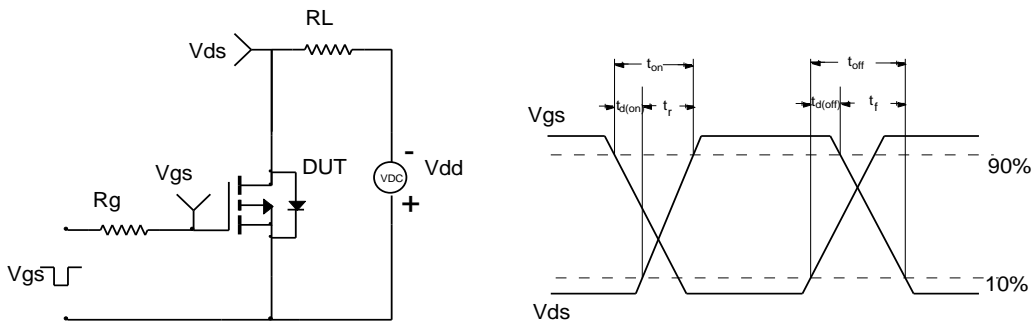


**Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)**

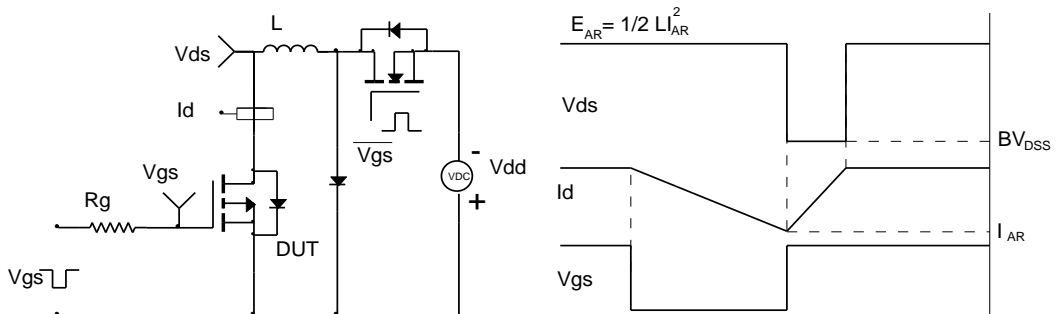
**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**

