

General Description

The AO4407A uses advanced trench technology to provide excellent $R_{DS(ON)}$, and ultra-low low gate charge with a 25V gate rating. This device is suitable for use as a load switch or in PWM applications.

* RoHS and Halogen-Free Complaint

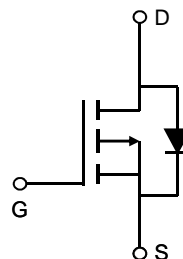
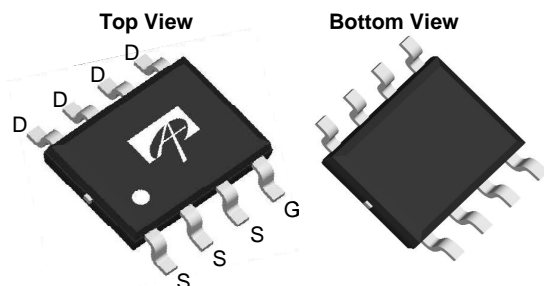
Product Summary

$V_{DS} = -30V$
 $I_D = -12A$ ($V_{GS} = -20V$)
 $R_{DS(ON)} < 11m\Omega$ ($V_{GS} = -20V$)
 $R_{DS(ON)} < 13m\Omega$ ($V_{GS} = -10V$)
 $R_{DS(ON)} < 17m\Omega$ ($V_{GS} = -6V$)

100% UIS Tested
 100% Rg Tested



SOIC-8



Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

| Parameter | Symbol | Maximum | Units |
|--|----------------|------------|------------|
| Drain-Source Voltage | V_{DS} | -30 | V |
| Gate-Source Voltage | V_{GS} | ± 25 | V |
| Continuous Drain Current ^A | I_D | -12 | A |
| $T_A=25^\circ C$ | | -10 | |
| $T_A=70^\circ C$ | | -60 | |
| Pulsed Drain Current ^B | I_{DM} | -26 | |
| Avalanche Current ^G | I_{AR} | 101 | mJ |
| Repetitive avalanche energy $L=0.3mH$ ^G | E_{AR} | 3.1 | W |
| Power Dissipation ^A | P_D | 2.0 | |
| $T_A=25^\circ C$ | | | |
| $T_A=70^\circ C$ | | | |
| 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 ^A | $R_{\theta JA}$ | 32 | 40 | $^\circ C/W$ |
| $t \leq 10s$ | | 60 | 75 | $^\circ C/W$ |
| Maximum Junction-to-Ambient ^A | $R_{\theta JL}$ | 17 | 24 | $^\circ C/W$ |
| Steady State | | | | |
| Maximum Junction-to-Lead ^C | | | | |

Electrical Characteristics (T_J=25°C unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|---------------------------------------|--|------|-------------|----------|-------|
| STATIC PARAMETERS | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | I _D = -250μA, V _{GS} = 0V | -30 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = -30V, V _{GS} = 0V T _J = 55°C | | | -1 -5 | μA |
| I _{GSS} | Gate-Body leakage current | V _{DS} = 0V, V _{GS} = ±25V | | | ±100 | nA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} = V _{GS} , I _D = -250μA | -1.7 | -2.3 | -3 | V |
| I _{D(ON)} | On state drain current | V _{GS} = -10V, V _{DS} = -5V | -60 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} = -20V, I _D = -12A T _J = 125°C | | 8.5 11.5 | 11 15 | mΩ |
| | | V _{GS} = -10V, I _D = -12A | | 10 | 13 | |
| | | V _{GS} = -6V, I _D = -10A | | 12.7 | 17 | |
| | | | | | | |
| g _{FS} | Forward Transconductance | V _{DS} = -5V, I _D = -10A | | 21 | | S |
| V _{SD} | Diode Forward Voltage | I _S = -1A, V _{GS} = 0V | | -0.7 | -1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | -3 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =-15V, f=1MHz | | 2060 | 2600 | pF |
| C _{oss} | Output Capacitance | | | 370 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 295 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | | 2.4 | 3.6 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _g | Total Gate Charge | V _{GS} =-10V, V _{DS} =-15V, I _D =-12A | | 30 | 39 | nC |
| Q _{gs} | Gate Source Charge | | | 4.6 | | nC |
| Q _{gd} | Gate Drain Charge | | | 10 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =-10V, V _{DS} =-15V, R _L =1.25Ω, R _{GEN} =3Ω | | 11 | | ns |
| t _r | Turn-On Rise Time | | | 9.4 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 24 | | ns |
| t _f | Turn-Off Fall Time | | | 12 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =-12A, dI/dt=100A/μs | | 30 | 40 | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =-12A, dI/dt=100A/μs | | 22 | | nC |

- A: The value of R_{θJA} is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A = 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_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.
- D: The static characteristics in Figures 1 to 6 are obtained using < 300μs pulses, duty cycle 0.5% max.
- E: These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C. The SOA curve provides a single pulse rating.
- F: The current rating is based on the t ≤ 10s thermal resistance rating.
- G: E_{AR} and I_{AR} ratings are based on low frequency and duty cycles to keep T_J=25C.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

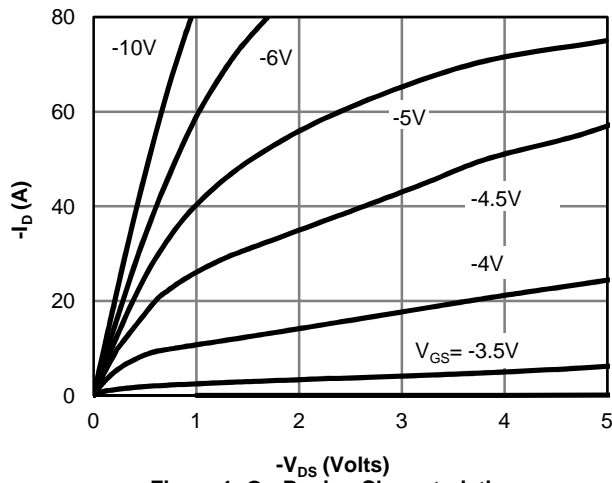


Figure 1: On-Region Characteristics

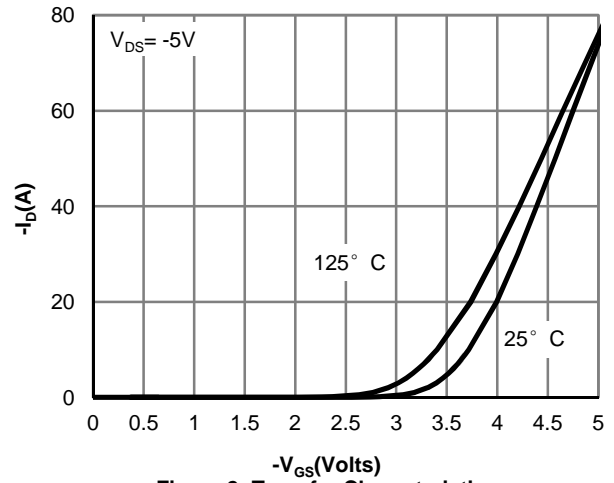


Figure 2: Transfer Characteristics

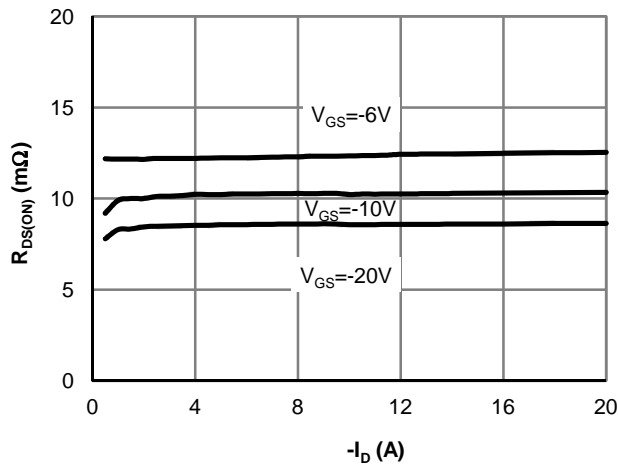


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

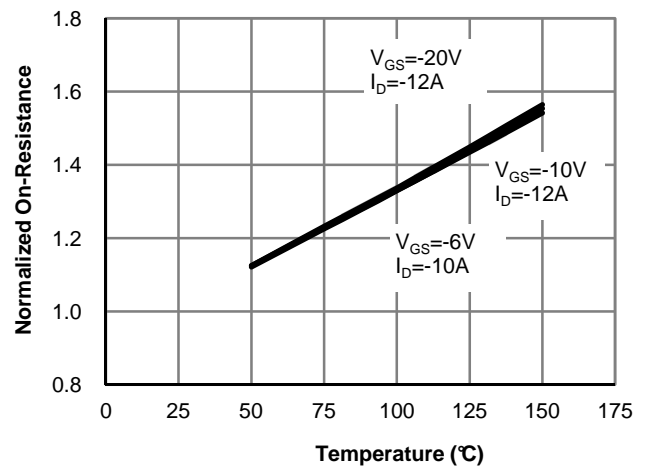


Figure 4: On-Resistance vs. Junction Temperature

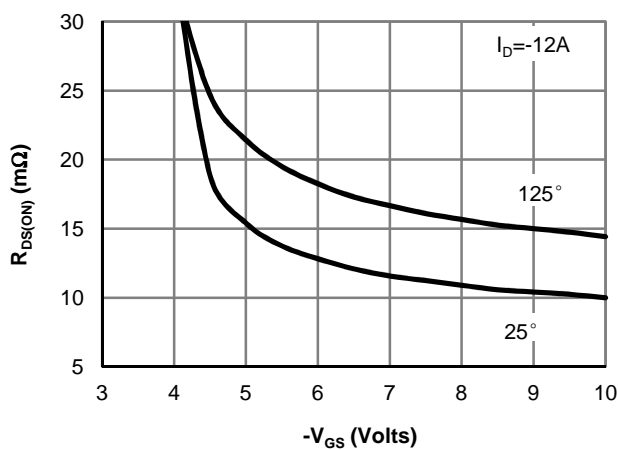


Figure 5: On-Resistance vs. Gate-Source Voltage

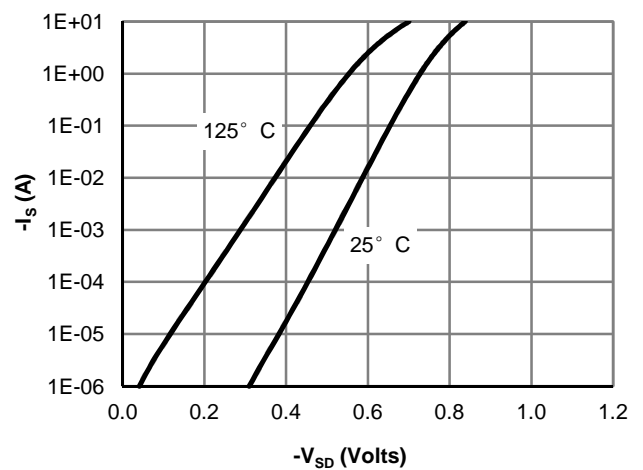
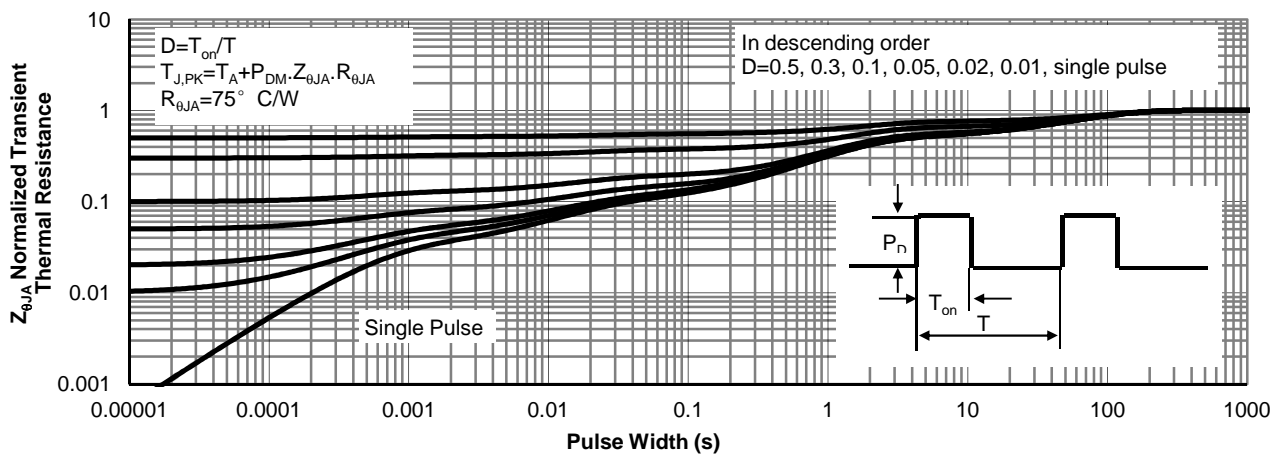
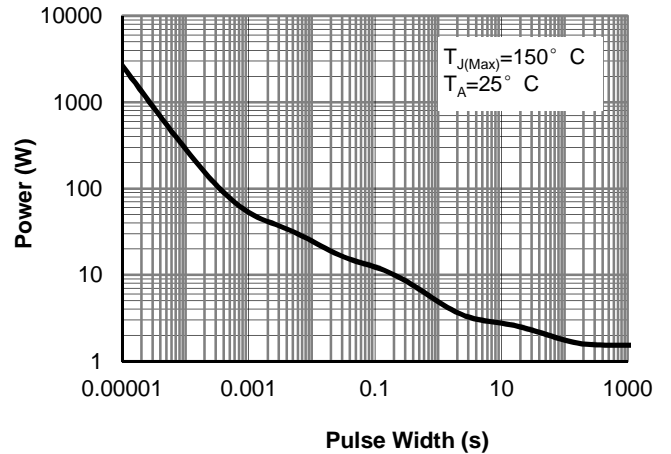
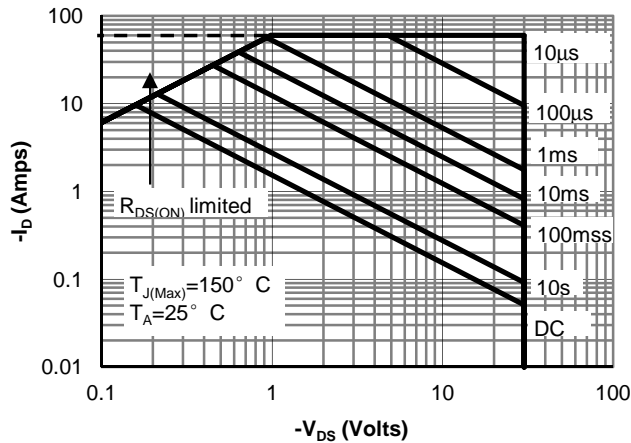
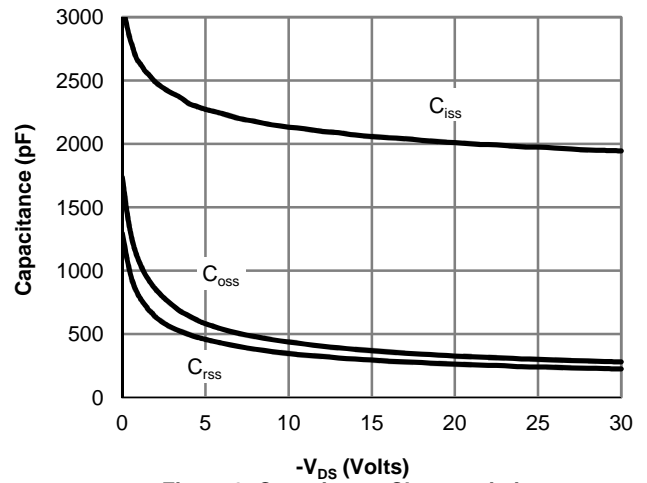
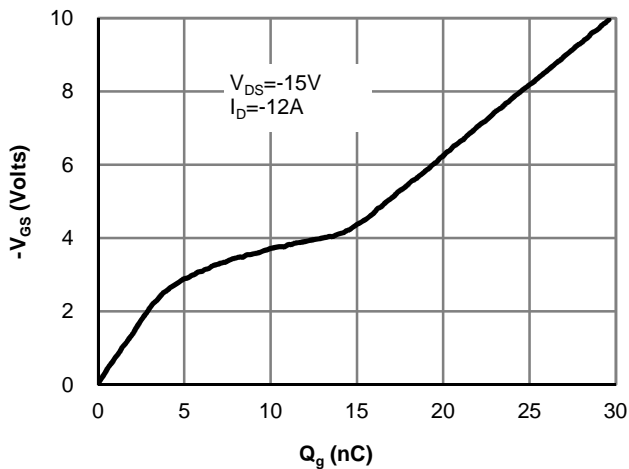
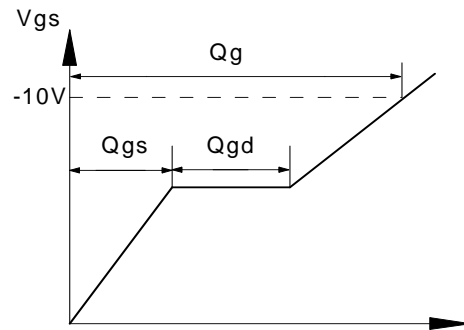
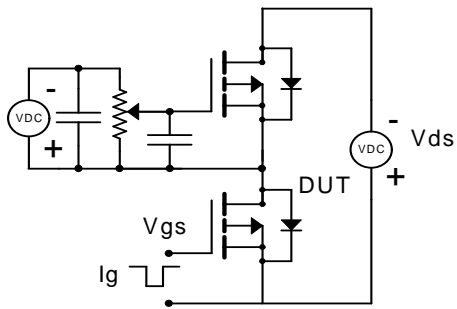


Figure 6: Body-Diode Characteristics

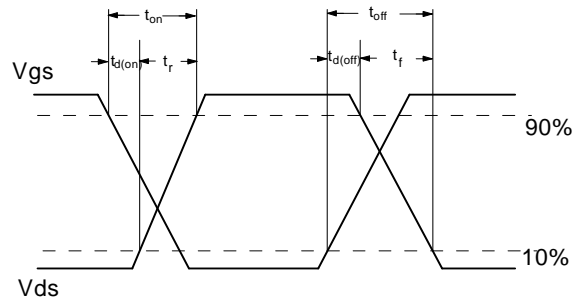
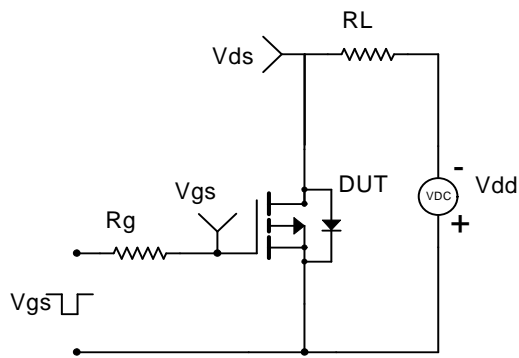
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



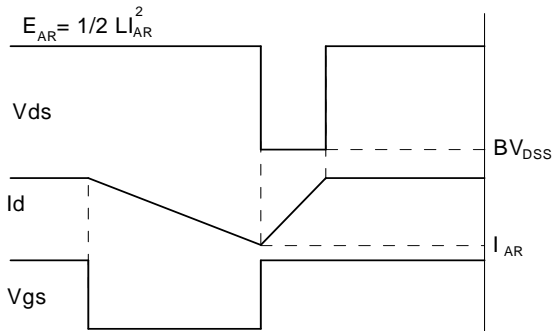
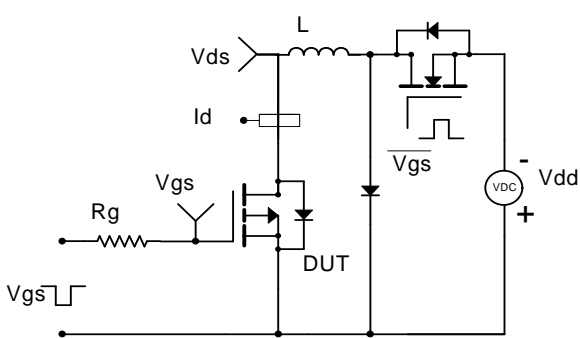
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

