# UMW AO3403A

30V P-Channel MOSFET

## 1.Description

The AO3403A uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device issuitable for use as a load switch or in PWM applications.

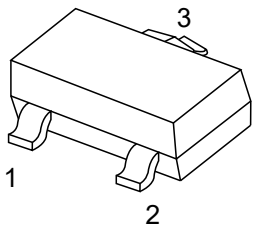
## 2.Features

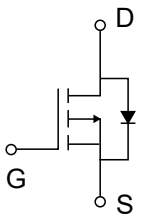
- $V_{DS\ (V)}$= -30V
- $I_D$=-2.6A
- $R_{DS(ON)}$<88mΩ($V_{GS}$=-10V)
- $R_{DS(ON)}$<103mΩ($V_{GS}$=-4.5V)

## 3.Pinning information

| Pin | Symbol | Description |
|---|---|---|
| 1 | G | GATE |
| 2 | S | SOURCE |
| 3 | D | DRAIN |

SOT-23




## 4.Absolute Maximum Ratings $T_A$=25°C unless otherwise noted

| Parameter | | Symbol | Maximum | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±12 | V |
| Continuous Drain Current | $T_A$=25°C | $I_D$ | -2.6 | A |
| | $T_A$=70°C | | -2.2 | |
| Pulsed Drain Current [C] | | $I_{DM}$ | -13 | |
| Power Dissipation [B] | $T_A$=25°C | $P_D$ | 1.4 | W |
| | $T_A$=70°C | | 0.9 | |
| Junction and Storage Temperature Range | | $T_J$,$T_{STG}$ | -55 to 150 | °C |

## 5.Thermal Characteristics

| Parameter | | Symbol | Typ | Max | Units |
|---|---|---|---|---|---|
| Maximum Junction-to-Ambient [A] | t ≤ 10s | $R_{\theta JA}$ | 70 | 90 | °C/W |
| Maximum Junction-to-Ambient [A D] | Steady-State | | 100 | 125 | °C/W |
| Maximum Junction-to-Lead | Steady-State | $R_{\theta JL}$ | 63 | 80 | °C/W |

## 6.Electrical Characteristics ($T_J$=25°C unless otherwise noted)

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **STATIC PARAMETERS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $I_D$=-250μA, $V_{GS}$=0V | -30 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-30V, $V_{GS}$=0V | | | -1 | μA |
| | | $T_J$=55°C | | | -5 | |
| Gate-Body leakage current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$=±12V | | | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -0.6 | -1 | -1.4 | V |
| On state drain current | $I_{D(ON)}$ | $V_{GS}$=-10V, $V_{DS}$=-5V | -13 | | | A |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=-10V, $I_D$=-2.6A | | 88 | 115 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-2A | | 103 | 150 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=-5V, $I_D$=-2.6A | | 8 | | S |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=-1A, $V_{GS}$=0V | | -0.78 | -1 | V |
| Maximum Body-Diode Continuous Current | $I_S$ | | | | -1.5 | A |
| **DYNAMIC PARAMETERS** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=-15V, f=1MHz | | 260 | 315 | pF |
| Output Capacitance | $C_{oss}$ | | | 37 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 20 | | pF |
| Gate resistance | $R_g$ | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | 4 | 8 | 12 | Ω |
| **SWITCHING PARAMETERS** | | | | | | |
| Total Gate Charge | $Q_g$(10V) | $V_{GS}$=-10V, $V_{DS}$=-15V, $I_D$=-2.6A | | 5.9 | 7.2 | nC |
| Total Gate Charge | $Q_g$(4.5V) | | | 2.8 | 3.5 | nC |
| Gate Source Charge | $Q_{gs}$ | | | 0.7 | | nC |
| Gate Drain Charge | $Q_{gd}$ | | | 1 | | nC |
| Turn-On DelayTime | $t_{D(on)}$ | $V_{GS}$=-10V, $V_{DS}$=-15V, $R_L$=5.76Ω,$R_{GEN}$=3Ω | | 6 | | ns |
| Turn-On Rise Time | $t_r$ | | | 3.5 | | ns |
| Turn-Off DelayTime | $t_{D(off)}$ | | | 20 | | ns |
| Turn-Off Fall Time | $t_f$ | | | 5 | | ns |
| Body Diode Reverse Recovery Time | $t_{rr}$ | $I_F$=-2.6A, dI/dt=100A/μs | | 11.5 | 15 | ns |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | $I_F$=-2.6A, dI/dt=100A/μs | | 4.5 | | nC |

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in $^2$ 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.

B. The power dissipation $P_D$ is based on $T_{J(MAX)}$=150°C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature TJ(MAX)=150°C. Ratings are based on low frequency and duty cycles to keep initial $T_J$=25°C.

D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ 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 impedence which is measured with the device mounted on 1in$^2$ FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(MAX)}$=150°C. The SOA curve provides a single pulse rating.

## 7.1Typical Electrical And Thermal Characteristics

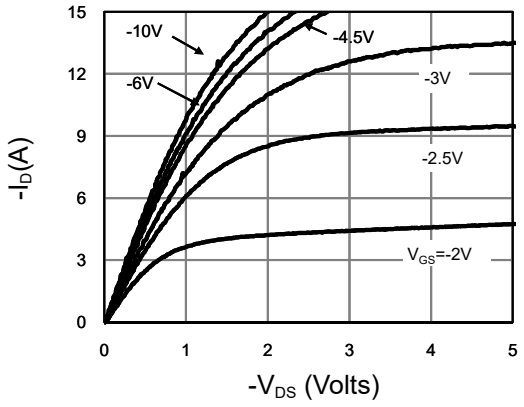



Fig 1: On-Region Characteristics (Note E)

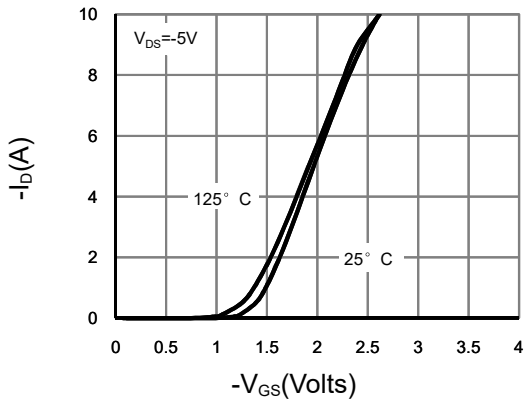



Figure 2: Transfer Characteristics (Note E)

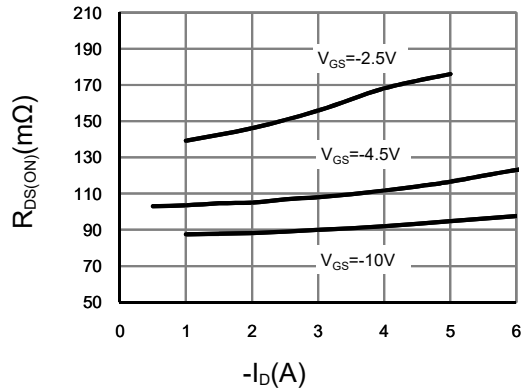



Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

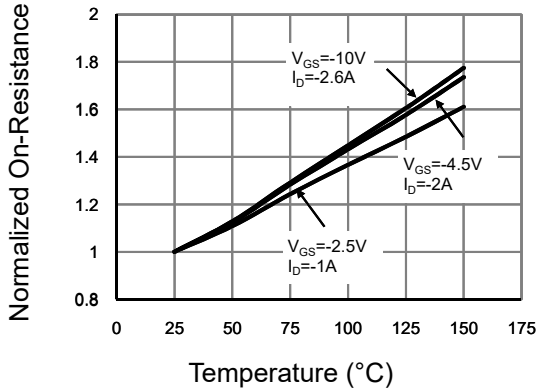



Figure 4: On-Resistance vs. Junction Temperature (Note E)

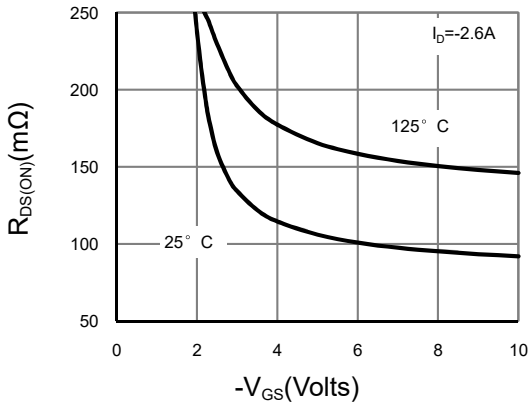



Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

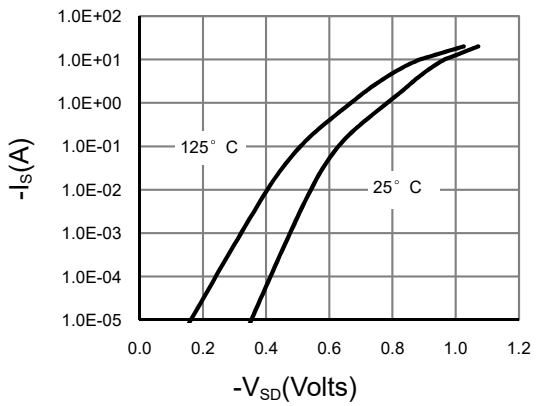



Figure 6: Body-Diode Characteristics(Note E)

## 7.2Typical Electrical And Thermal Characteristics

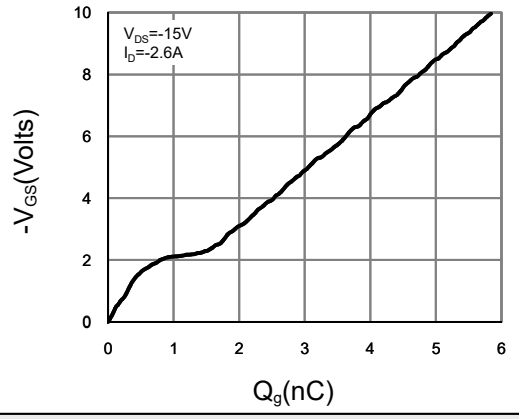



Figure 7: Gate-Charge Characteristics

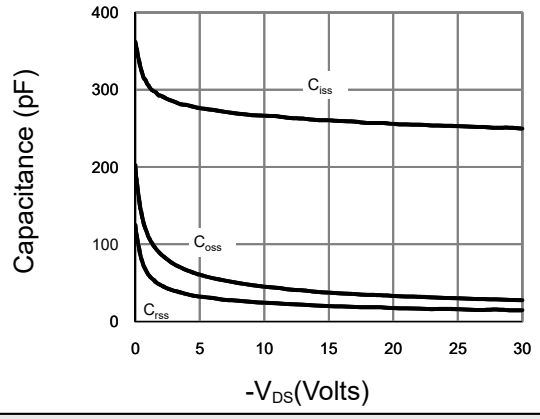



Figure 8: Capacitance Characteristics

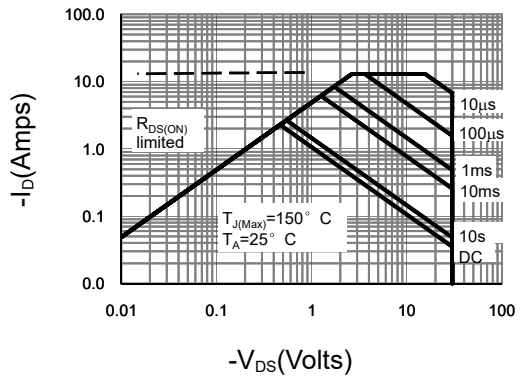



Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

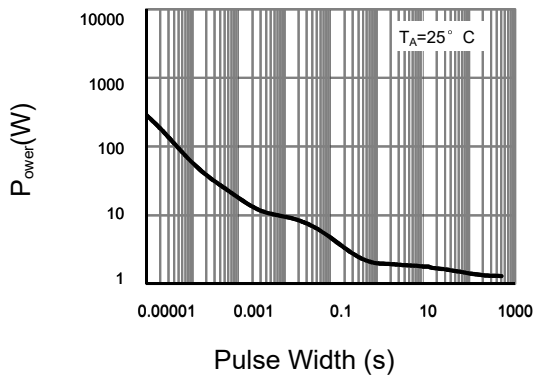



Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

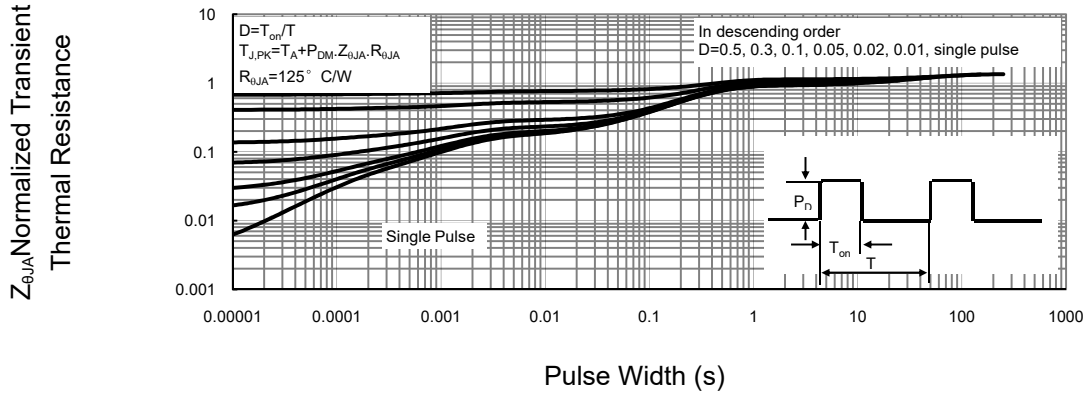
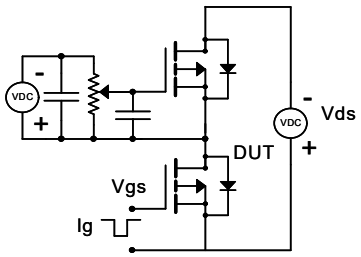
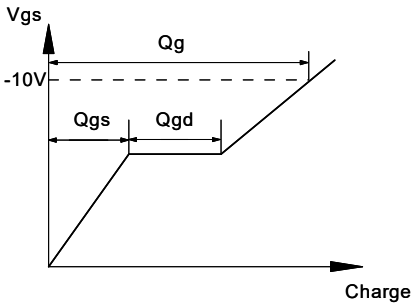


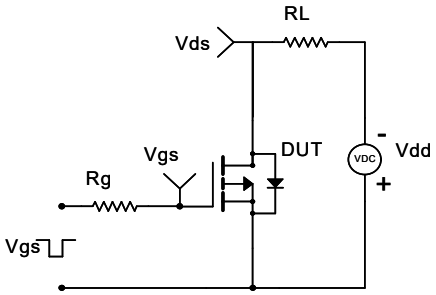

Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

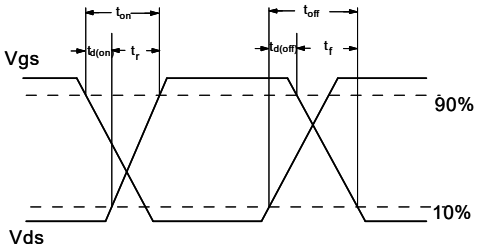
## Gate Charge Test Circuit & Waveform



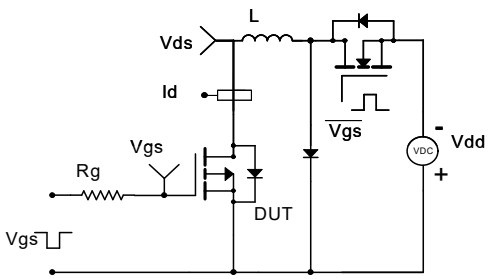



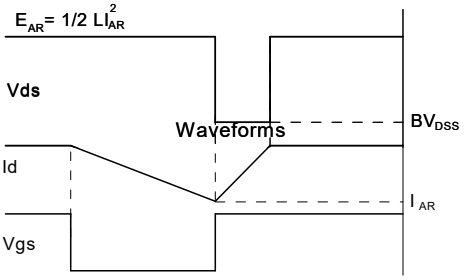

## Resistive Switching Test Circuit & Waveforms



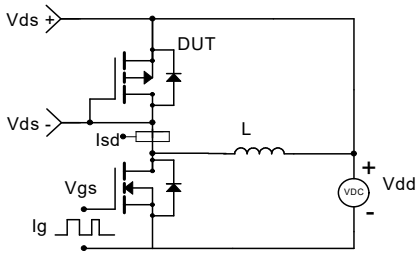



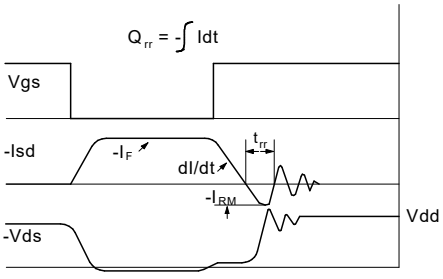

## Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



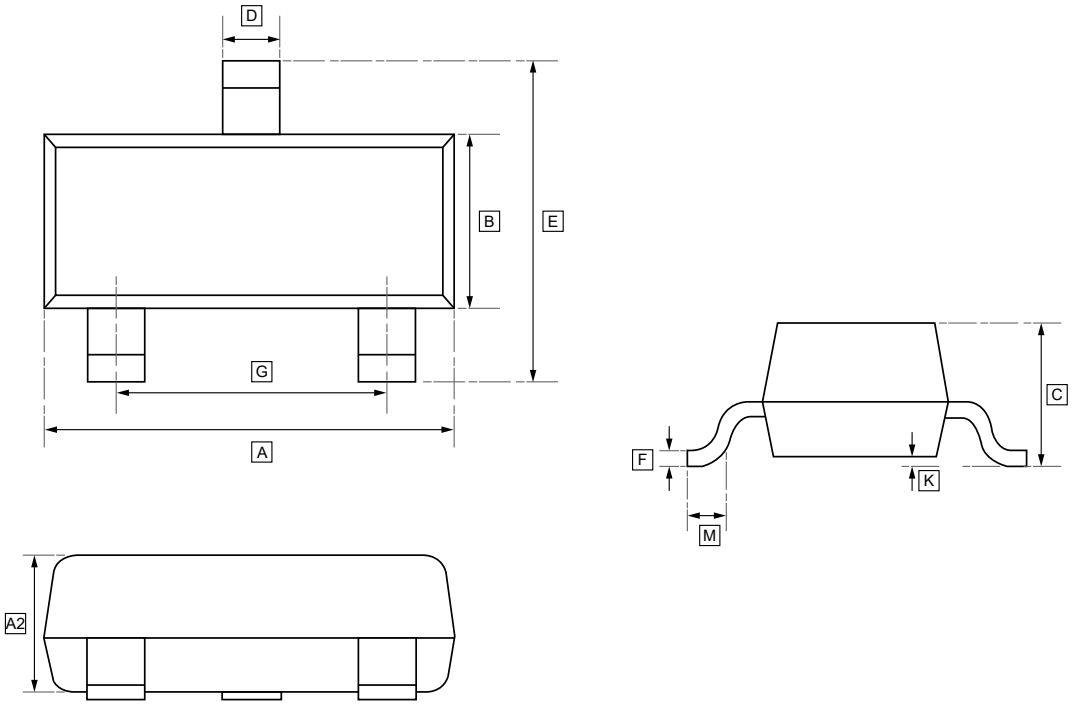




## Diode Recovery Test Circuit & Waveforms



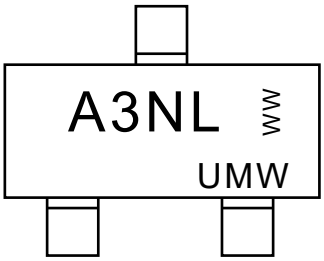
## 8.SOT-23 Package Outline Dimensions




**DIMENSIONS (mm are the original dimensions)**

| Symbol | A | B | C | D | E | G | K | M | A2 | F |
|---|---|---|---|---|---|---|---|---|---|---|
| **Min** | 2.80 | 1.20 | 0.90 | 0.32 | 2.25 | 1.80 | 0.00 | 0.30 | 0.95 | 0.095 |
| **Max** | 3.04 | 1.40 | 1.10 | 0.55 | 2.55 | 2.00 | 0.10 | - | 1.05 | 0.115 |

## 9.Ordering Information




WW: Batch Code

| Order Code | Package | Base QTY | Delivery Mode |
|---|---|---|---|
| UMW AO3403A | SOT-23 | 3000 | Tape and reel |

## 10.Disclaimer

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