

1.Description

The AO4441 uses advanced trench technology to provide excellent $R_{DS(ON)}$, and ultra-low low gate charge. This device is suitable for use as a load switch or in PWM applications.

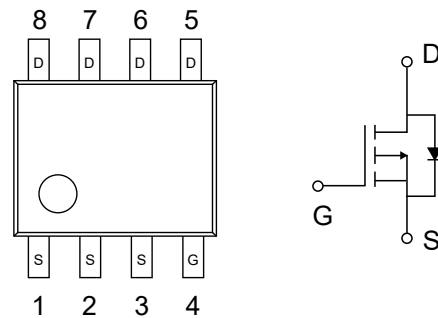
2.Features

- $V_{DS(V)} = -60V$
- $I_D = -4A (V_{GS} = -10V)$
- $R_{DS(ON)} < 100m\Omega (V_{GS} = -10V)$
- $R_{DS(ON)} < 130m\Omega (V_{GS} = -4.5V)$

3.Pinning information

Pin	Symbol	Description
4	G	GATE
1,2,3	S	SOURCE
5,6,7,8	D	DRAIN

SOP-8



4.Absolute Maximum Ratings $T_A = 25^\circ C$

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	-60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ^A	$T_A = 25^\circ C$	I_D	-4	A
	$T_A = 70^\circ C$		-3.1	
Pulsed Drain Current ^B		I_{DM}	-20	
Power Dissipation ^A	$T_A = 25^\circ C$	P_D	3.1	W
	$T_A = 70^\circ C$		2	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^\circ C$



5.Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	t ≤ 10s	R _{θJA}	24	40	°C/W
Maximum Junction-to-Ambient ^A	Steady-State		54	75	°C/W
Maximum Junction-to-Lead ^C	Steady-State	R _{θJL}	21	30	°C/W



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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$	-60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-48\text{V}$, $V_{GS}=0\text{V}$			-1	μA
		$T_J=55^{\circ}\text{C}$			-5	
Gate-Body leakage current	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-1	-2.1	-3	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-10\text{V}$, $I_D=-4\text{A}$		80	100	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}$, $I_D=-3\text{A}$		102	130	$\text{m}\Omega$
Forward Transconductance	g_{FS}	$V_{DS}=-5\text{V}$, $I_D=-4\text{A}$		10		S
Diode Forward Voltage	V_{SD}	$I_S=-1\text{A}$, $V_{GS}=0\text{V}$		-0.77	-1	V
Maximum Body-Diode Continuous Current	I_S				-4	A
DYNAMIC PARAMETERS						
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=-30\text{V}$, $f=1\text{MHz}$		930	1120	pF
Output Capacitance	C_{oss}			85		pF
Reverse Transfer Capacitance	C_{rss}			35		pF
Gate resistance	R_g	$f=1\text{MHz}$		7.2	9	Ω
SWITCHING PARAMETERS						
Total Gate Charge	$Q_g(10\text{V})$	$V_{GS}=-10\text{V}$, $V_{DS}=-30\text{V}$ $I_D=-4\text{A}$		16	20	nC
Total Gate Charge	$Q_g(4.5\text{V})$			8	10	nC
Gate Source Charge	Q_{gs}			2.5		nC
Gate Drain Charge	Q_{gd}			3.2		nC



Turn-On DelayTime		$V_{GS}=-10V, V_{DS}=-30V$ $R_L=7.5\Omega$		8		ns
Turn-On Rise Time				3.8		ns
Turn-Off DelayTime						
Turn-Off Fall Time				7.5		ns
Body Diode Reverse Recovery Time		$I_F=-4A, dI/dt=100A/\mu s$		27	35	ns
Body Diode Reverse Recovery Charge		$I_F=-4A, dI/dt=100A/\mu s$		32		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ C$. The value in any a given application depends on the user's specific board design. The current rating is based on the $t \leq 10s$ thermal resistance rating.

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 6,12,14 are obtained using 80 μs 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 $T_A=25^\circ C$. The SOA curve provides a single pulse rating.



7.1 Typical characteristic

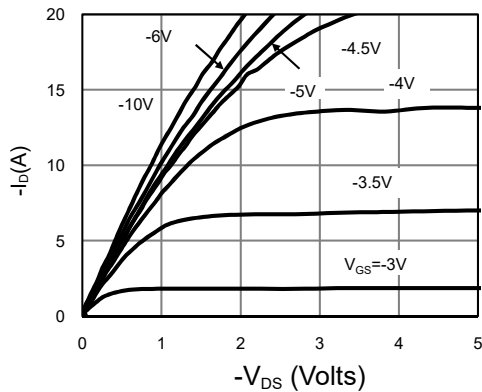


Fig 1: On-Region Characteristics

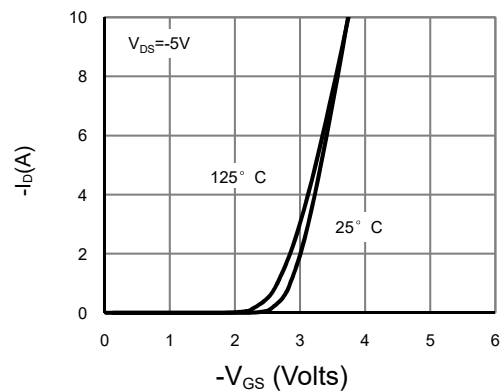


Figure 2: Transfer Characteristics

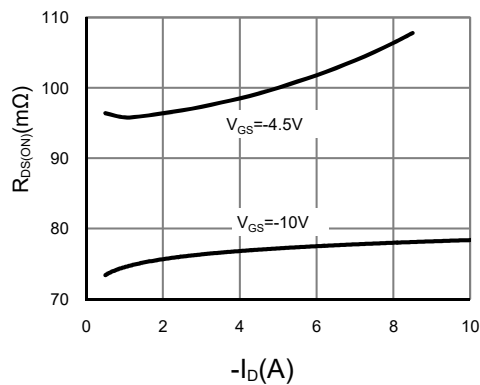


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

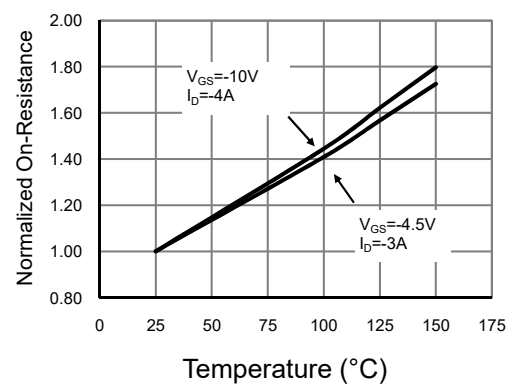


Figure 4: On-Resistance vs. Junction Temperature

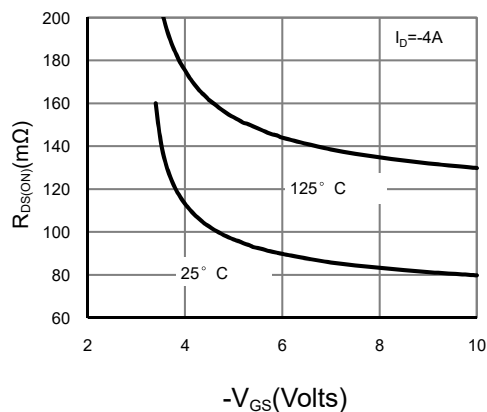


Figure 5: On-Resistance vs. Gate-Source Voltage

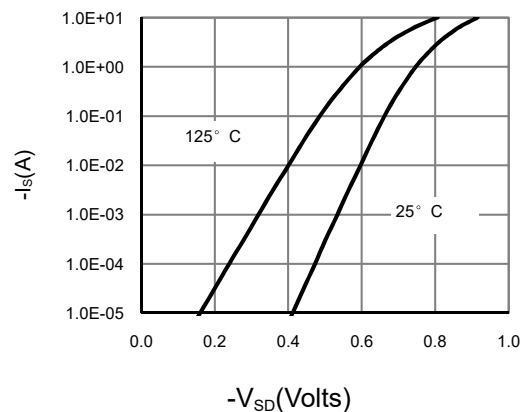


Figure 6: Body-Diode Characteristics



7.2 Typical characteristic

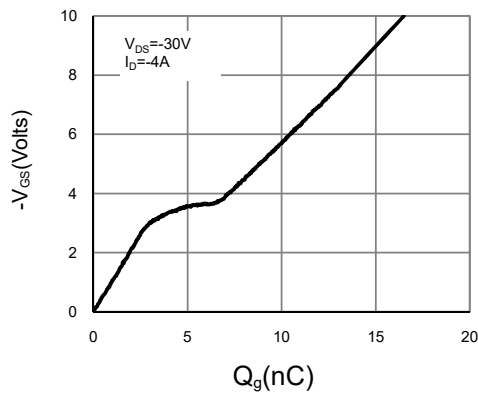


Figure 7: Gate-Charge Characteristics

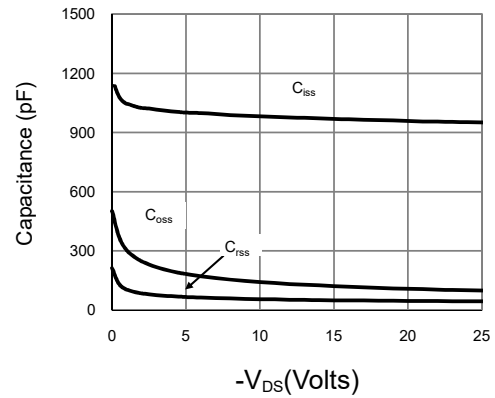


Figure 8: Capacitance Characteristics

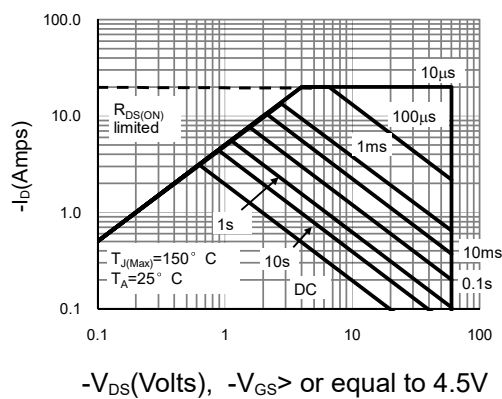


Figure 9: : Maximum Forward Biased Safe Operating Area (Note E)

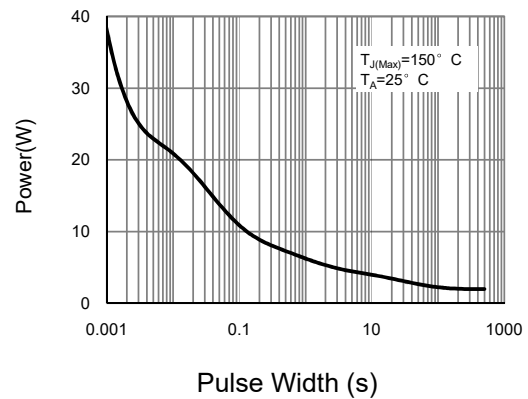


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

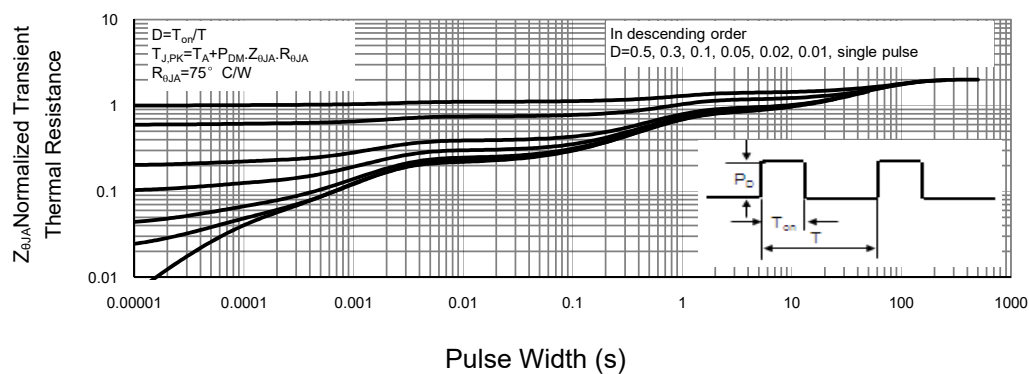
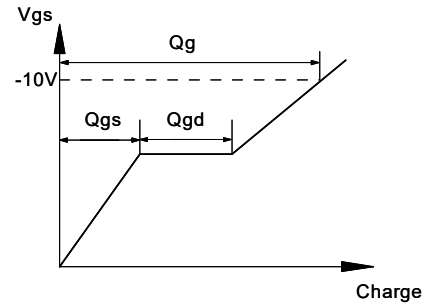
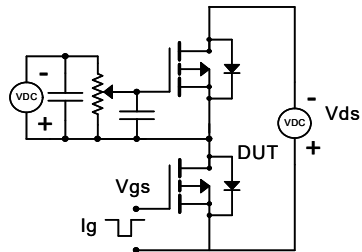


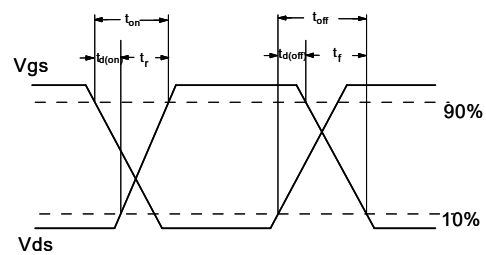
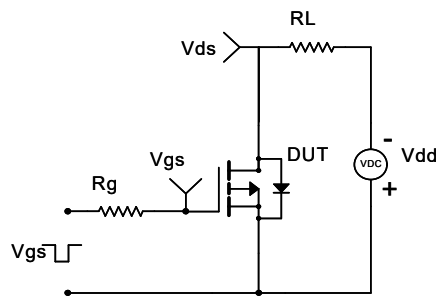
Figure 12: Normalized Maximum Transient Thermal Impedance



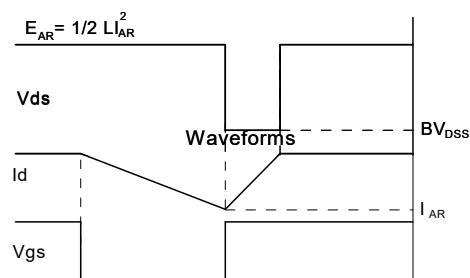
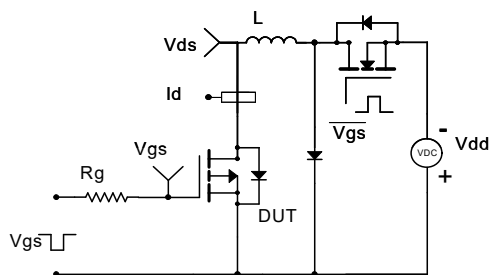
Gate Charge Test Circuit & Waveform



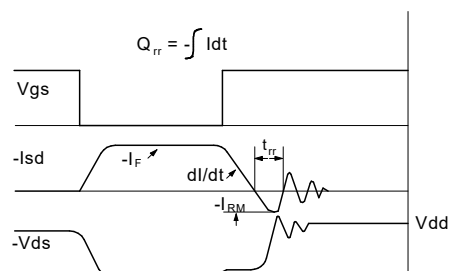
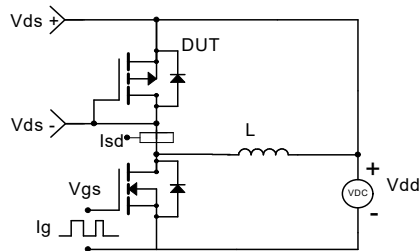
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

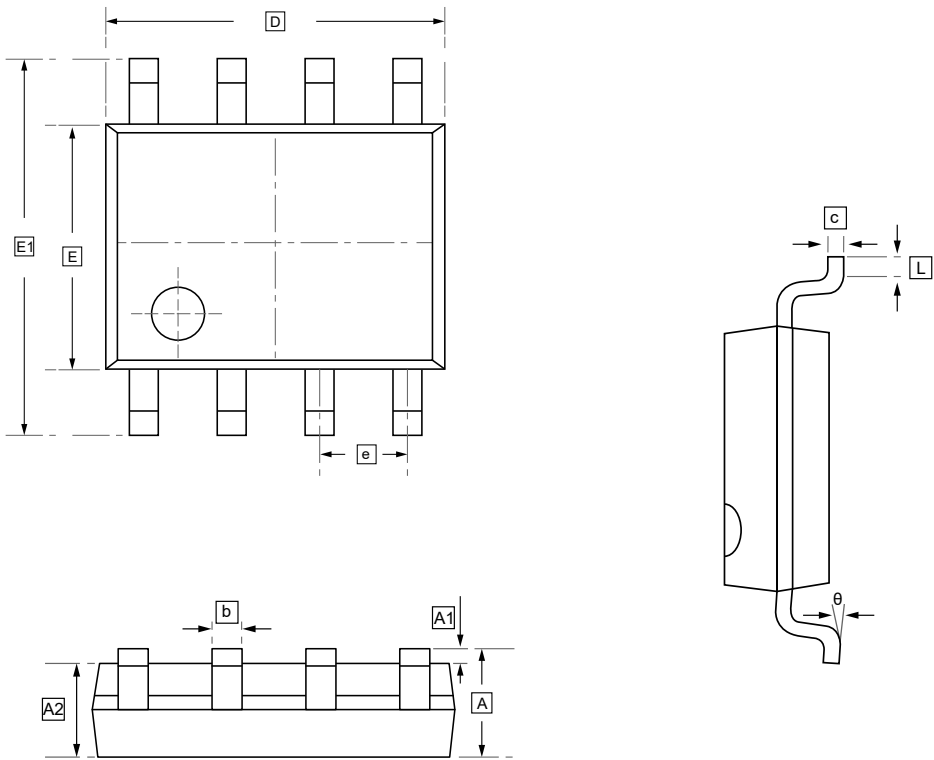


Diode Recovery Test Circuit & Waveforms





8.SOP-8 Package Outline Dimensions

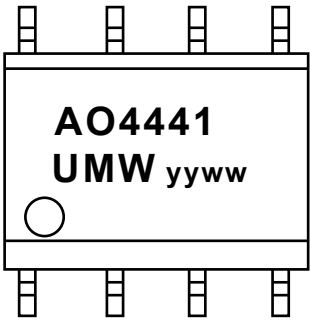


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E	E1	e	L	θ
Min	1.350	0.000	1.350	0.330	0.170	4.700	3.800	5.800	1.270	0.400	0°
Max	1.750	0.100	1.550	0.510	0.250	5.100	4.000	6.200	BSC	1.270	8°



9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW AO4441	SOP-8	3000	Tape and reel



10.Disclaimer

UMW reserves the right to make changes to all products, specifications. Customers should obtain the latest version of product documentation and verify the completeness and currency of the information before placing an order.

When applying our products, please do not exceed the maximum rated values, as this may affect the reliability of the entire system. Under certain conditions, any semiconductor product may experience faults or failures. Buyers are responsible for adhering to safety standards and implementing safety measures during system design, prototyping, and manufacturing when using our products to prevent potential failure risks that could lead to personal injury or property damage.

Unless explicitly stated in writing, UMW products are not intended for use in medical, life-saving, or life-sustaining applications, nor for any other applications where product failure could result in personal injury or death. If customers use or sell the product for such applications without explicit authorization, they assume all associated risks.

When reselling, applying, or exporting, please comply with export control laws and regulations of China, the United States, the United Kingdom, the European Union, and other relevant countries, regions, and international organizations.

This document and any actions by UMW do not grant any intellectual property rights, whether express or implied, by estoppel or otherwise. The product names and marks mentioned herein may be trademarks of their respective owners.