UMW AO4441

-60V P-Channel MOSFET

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.

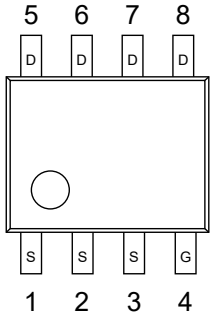
2.Features

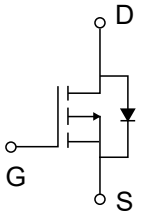
- $V_{DS\ (V)}$=-60V
- I_D=-4A(V_{GS}=-10V)
- $R_{DS(ON)}$<100mΩ(V_{GS}=-10V)
- $R_{DS(ON)}$<130mΩ(V_{GS}=-4.5V)

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°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°C	I_D	-4	A
	T_A=70°C		-3.1	
Pulsed Drain Current [B]		I_{DM}	-20	
Power Dissipation [A]	T_A=25°C	P_D	3.1	W
	T_A=70°C		2	
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	$R_{\theta JA}$	24	40	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		54	75	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	21	30	°C/W

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

Turn-On DelayTime	$t_{D(on)}$	V_{GS}=-10V, V_{DS}=-30V R_L=7.5Ω		8		ns
Turn-On Rise Time	t_r			3.8		ns
Turn-Off DelayTime	$t_{D(off)}$					
Turn-Off Fall Time	t_f			7.5		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F=-4A, dI/dt=100A/μs		27	35	ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F=-4A, dI/dt=100A/μs		32		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 a 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 $R_{\theta JA}$ is the sum of the thermal impedence 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 80μs pulses, duty cycle 0.5% max.

E. These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

7.1Typical characteristic

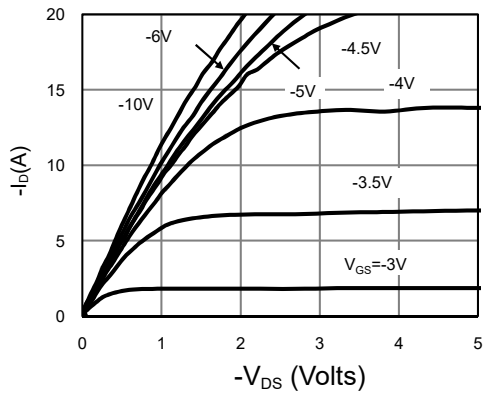


Fig 1: On-Region Characteristics

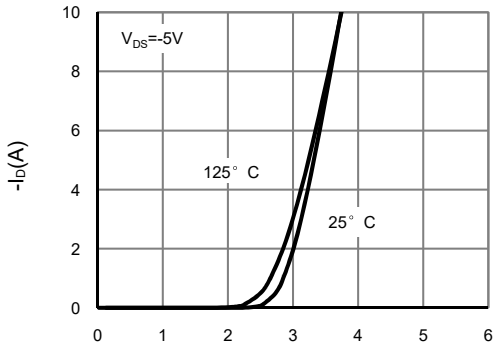


Figure 2: Transfer Characteristics

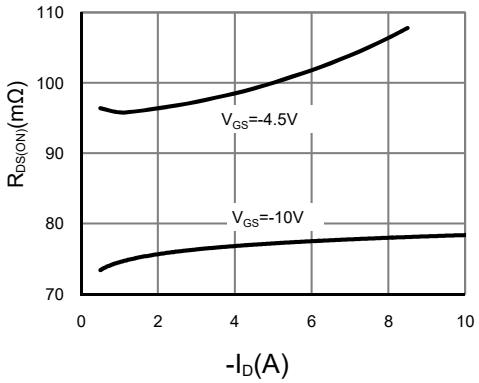


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

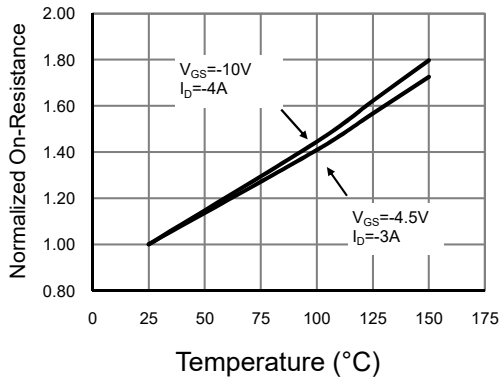


Figure 4: On-Resistance vs. Junction Temperature

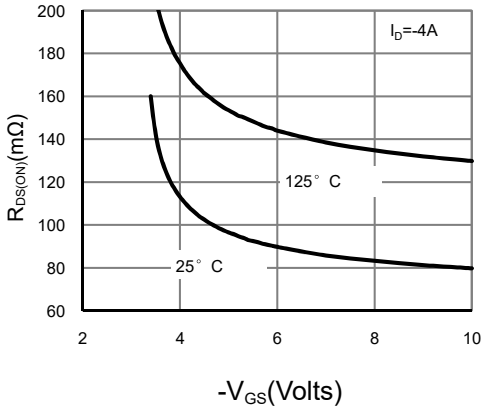


Figure 5: On-Resistance vs. Gate-Source Voltage

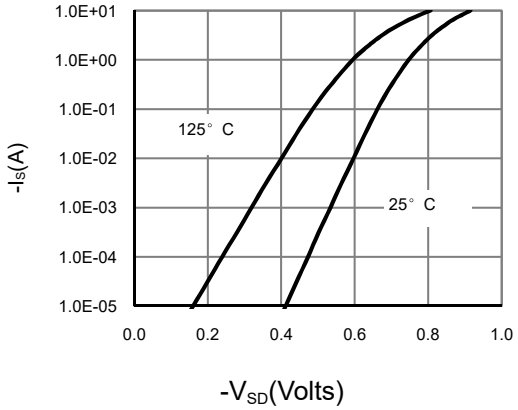


Figure 6: Body-Diode Characteristics

7.2Typical characteristic

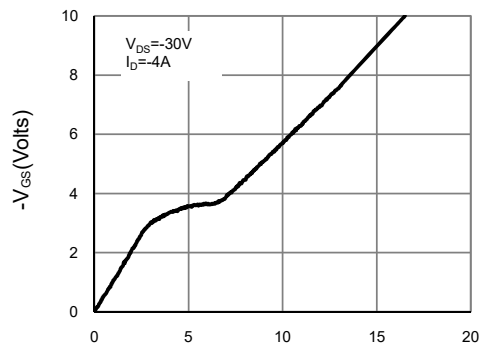


Figure 7: Gate-Charge Characteristics

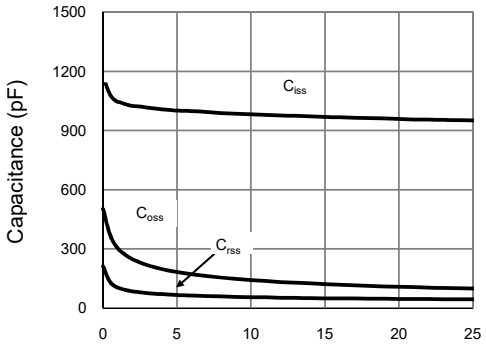


Figure 8: Capacitance Characteristics

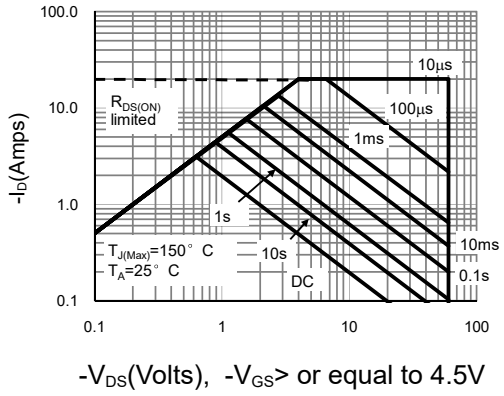


Figure 9: : Maximum Forward Biased Safe Operating Area (Note E)

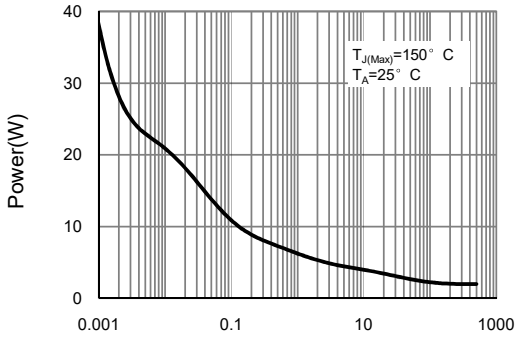


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

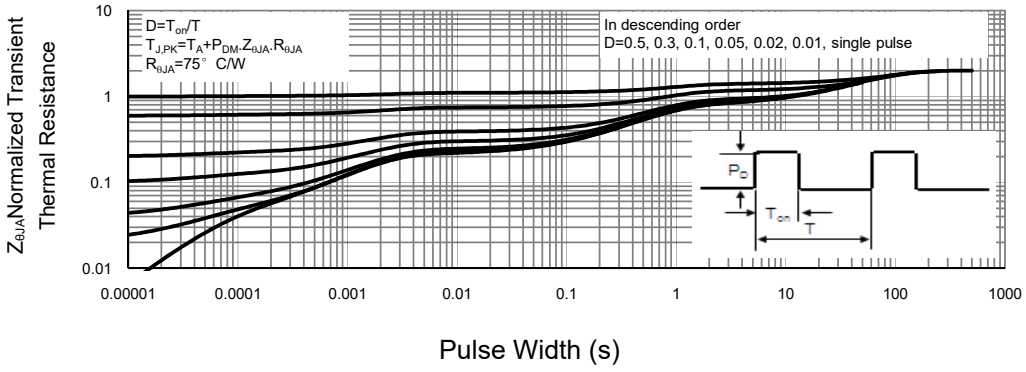
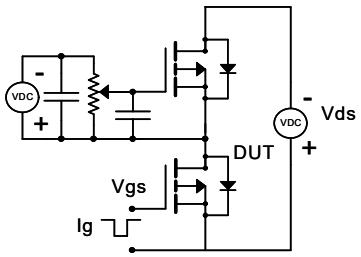
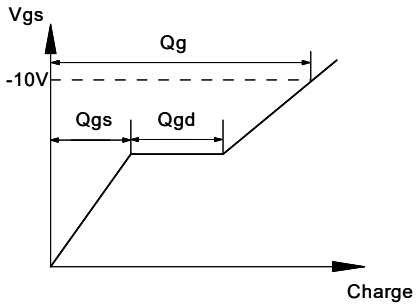


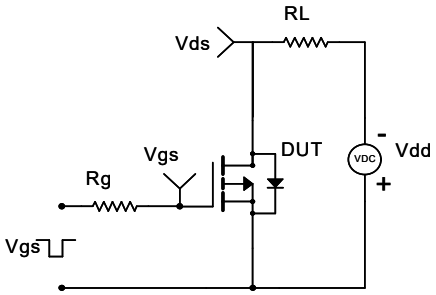
Figure 12: Normalized Maximum Transient Thermal Impedance

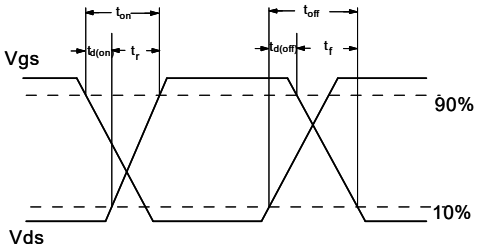
Gate Charge Test Circuit & Waveform



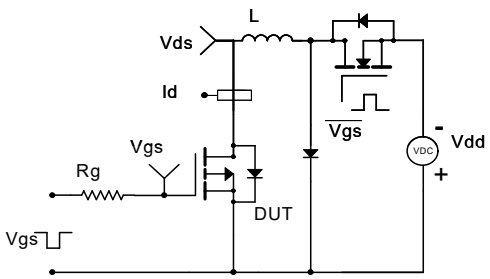


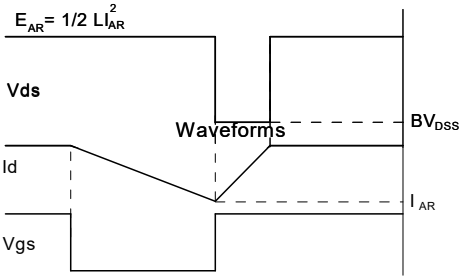
Resistive Switching Test Circuit & Waveforms



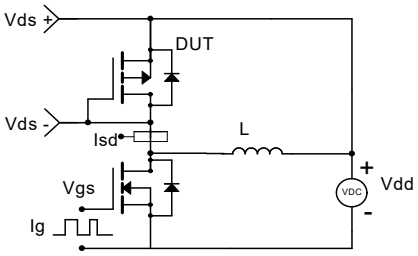


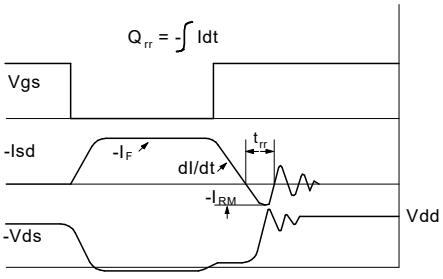
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



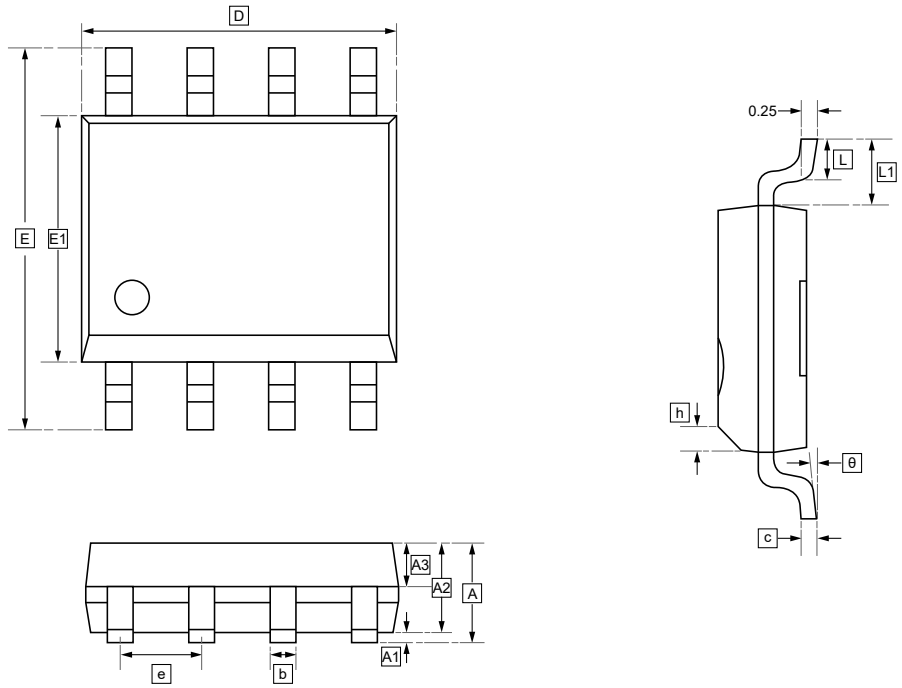


Diode Recovery Test Circuit & Waveforms





8.SOP-8 Package Outline Dimensions

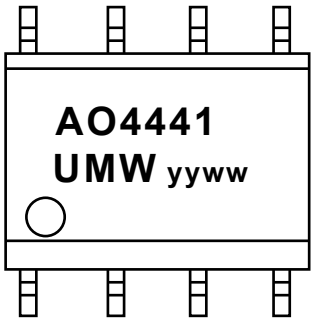


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.70	5.80	3.80	1.24	0.30	0.50
Max	1.75	0.20	1.50	0.70	0.47	0.24	5.10	6.20	4.00	1.30	0.50	0.80

Symbol	L1	θ
Min	1.00	0°
Max	1.10	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

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