

1.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. Standard Product AO4407A is Pb-free (meets ROHS & Sony 259 specifications).

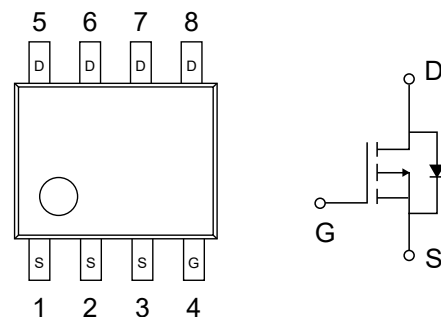
2.Features

- $V_{DS} = -30V$
- $I_D = -14A (V_{GS} = -10V)$
- $R_{DS(ON)} < 11.5m\Omega (V_{GS} = -10V)$
- $R_{DS(ON)} < 18.5m\Omega (V_{GS} = -4.5V)$

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 $T_A = 25^\circ C$ unless otherwise noted

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	± 25	V
Continuous Drain Current	$T_A = 25^\circ C$	I_D	-14	A
	$T_A = 70^\circ C$		-11	
Pulsed Drain Current ^C		I_{DM}	-56	
Avalanche Current ^C		I_{AS}	-33	A
Avalanche energy $L = 0.1mH$ ^C		E_{AS}	54	mJ
Power Dissipation ^B	$T_A = 25^\circ C$	P_D	3.1	W
	$T_A = 70^\circ C$		2.0	
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}	31	40	°C/W
Maximum Junction-to-Ambient ^{A D}	Steady-State		59	75	°C/W
Maximum Junction-to-Lead	Steady-State	R _{θJL}	16	24	°C/W



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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-30\text{V}$, $V_{GS}=0\text{V}$			-1	μA
		$T_J=55^\circ\text{C}$			-5	
Gate-Body leakage current	advanced	$V_{DS}=0\text{V}$, $V_{GS}=\pm 25\text{V}$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-1.3	-1.8	-2.3	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-10\text{V}$, $I_D=-14\text{A}$		9.5	11.5	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}$, $I_D=-10\text{A}$		14.7	18.5	$\text{m}\Omega$
Forward Transconductance	g_{FS}	$V_{DS}=-5\text{V}$, $I_D=-14\text{A}$		42		S
Diode Forward Voltage	V_{SD}	$I_S=-1\text{A}$, $V_{GS}=0\text{V}$		-0.7	-1	V
Maximum Body-Diode Continuous Current	I_S				-4	A
DYNAMIC PARAMETERS						
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=-15\text{V}$, $f=1\text{MHz}$		2050		pF
Output Capacitance	C_{oss}			330		pF
Reverse Transfer Capacitance	C_{rss}			300		pF
Gate resistance	R_g	$f=1\text{MHz}$		3.2	6.4	Ω
SWITCHING PARAMETERS						
Total Gate Charge	$Q_g(10\text{V})$	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$ $I_D=-14\text{A}$		40	60	nC
Total Gate Charge	$Q_g(4.5\text{V})$			20	30	nC
Gate Source Charge	Q_{gs}			6		nC
Gate Drain Charge	Q_{gd}			10		nC
Turn-On DelayTime	$t_{D(on)}$	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$ $R_L=1.05\Omega$, $R_{GEN}=3\Omega$		11		ns
Turn-On Rise Time	t_r			10		ns
Turn-Off DelayTime	$t_{D(off)}$			40		ns
Turn-Off Fall Time	t_f			18		ns
Body Diode Reverse Recovery Time	t_{rr}	$I_F=-14\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$		14		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F=-14\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$		25		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 $T_A = 25^\circ\text{C}$. The value in any given application depends on the user's specific board design.
- B. The power dissipation P_D is based on $T_{J(\text{MAX})} = 150^\circ\text{C}$, using $\leq 10\text{s}$ junction-to-ambient thermal resistance.
- C. Repetitive rating, pulse width limited by junction temperature $T_{J(\text{MAX})} = 150^\circ\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J = 25^\circ\text{C}$.
- D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.
- E. The static characteristics in Figures 1 to 6 are obtained using $< 300\text{ms}$ 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 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(\text{MAX})} = 150^\circ\text{C}$. The SOA curve provides a single pulse rating.



7.1 TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

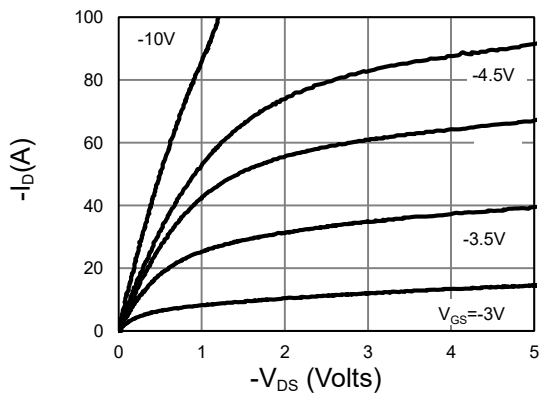


Fig 1: On-Region Characteristics (Note E)

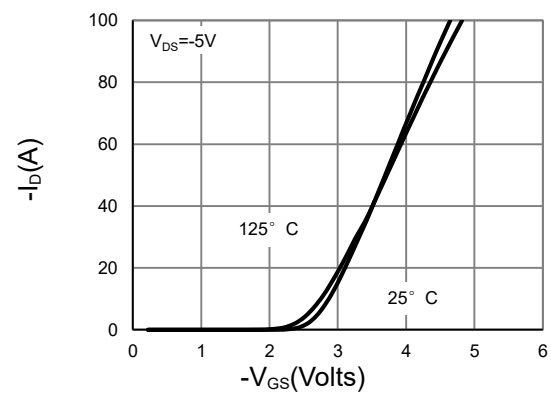


Figure 2: Transfer Characteristics (Note E)

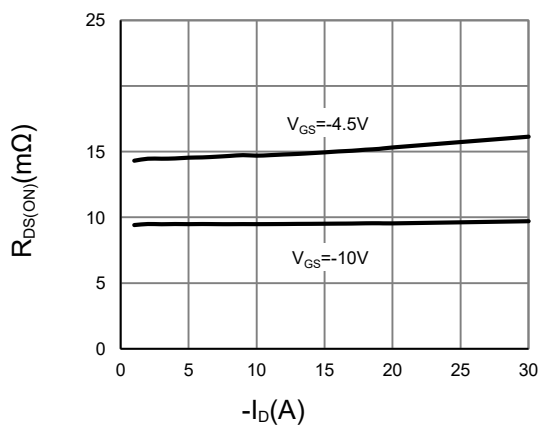


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

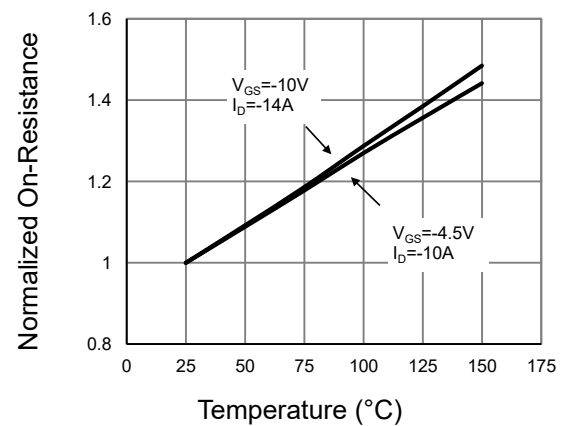


Figure 4: On-Resistance vs. Junction Temperature (Note E)

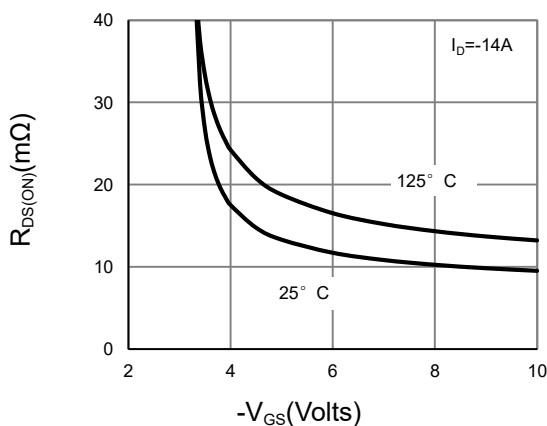


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

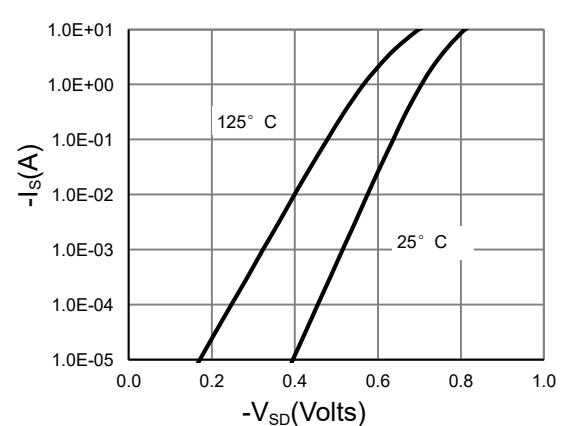


Figure 6: Body-Diode Characteristics (Note E)



7.2 TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

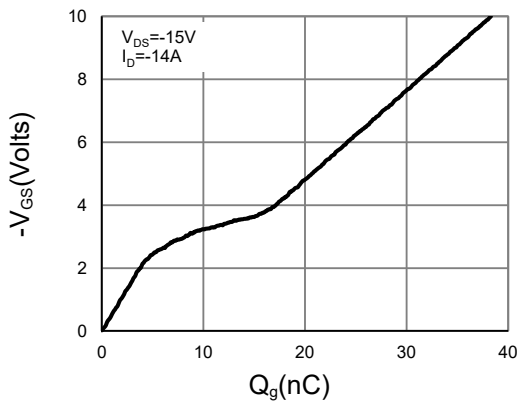


Figure 7: Gate-Charge Characteristics

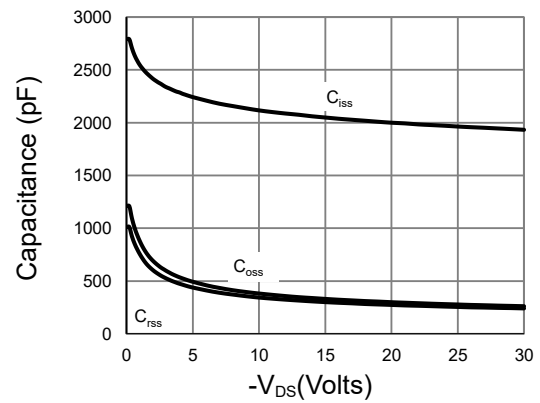


Figure 8: Capacitance Characteristics

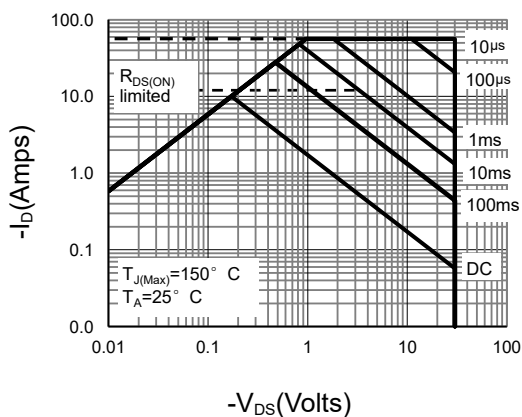


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

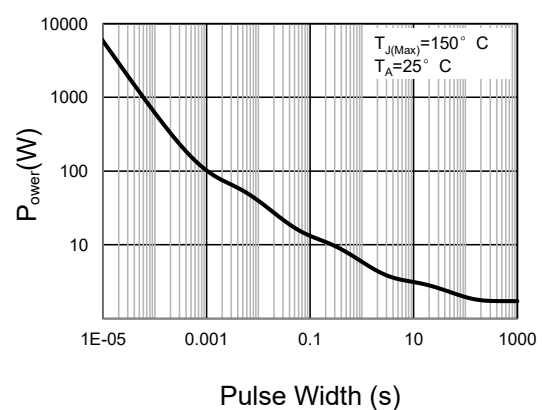


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

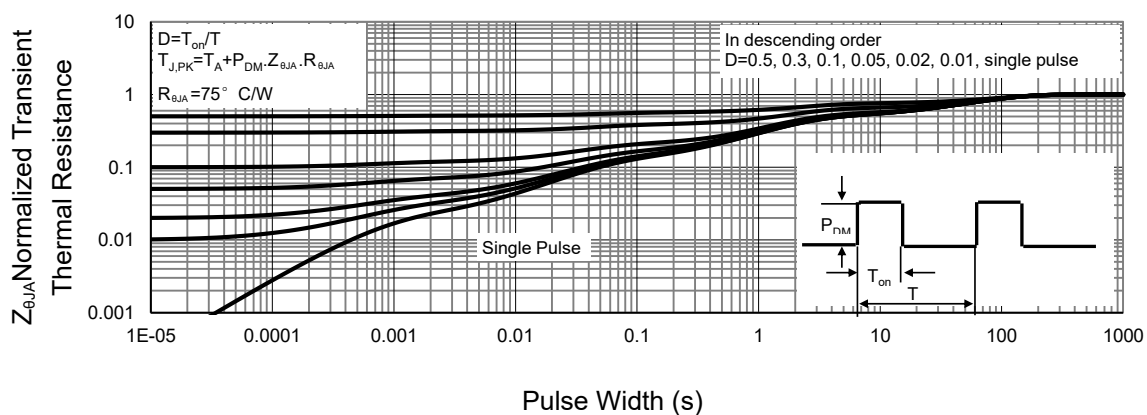
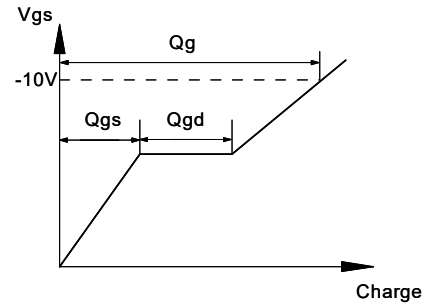
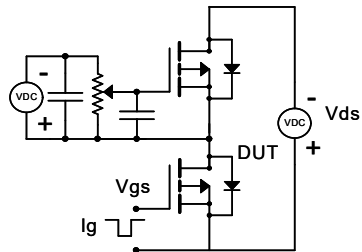


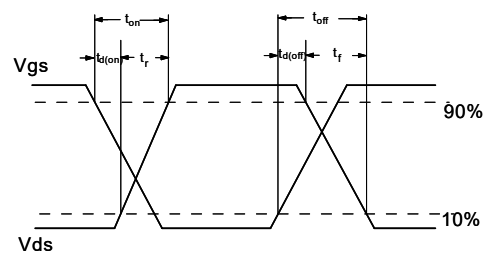
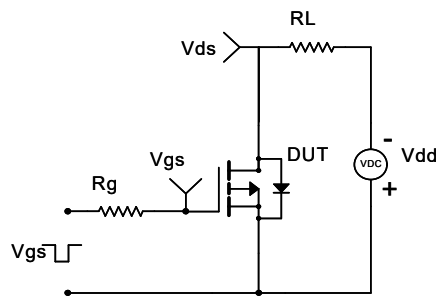
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



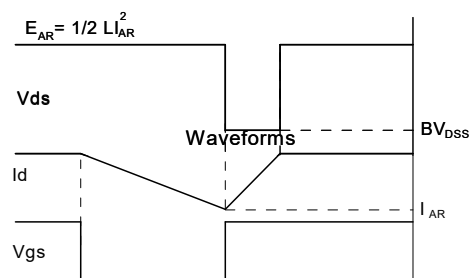
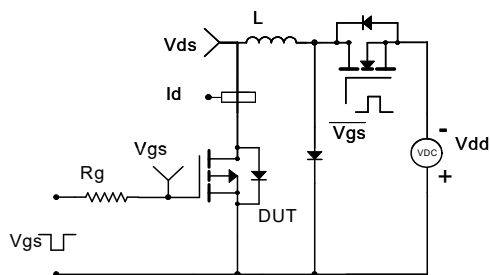
Gate Charge Test Circuit & Waveform



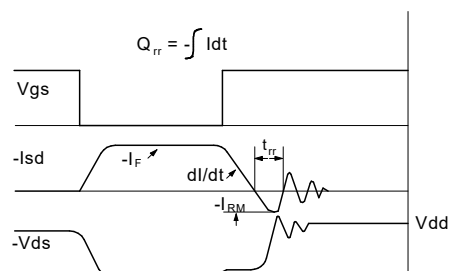
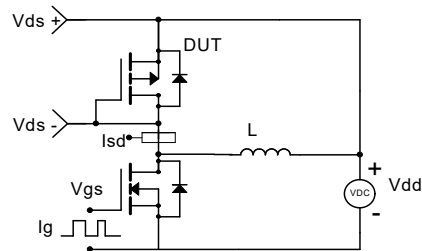
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

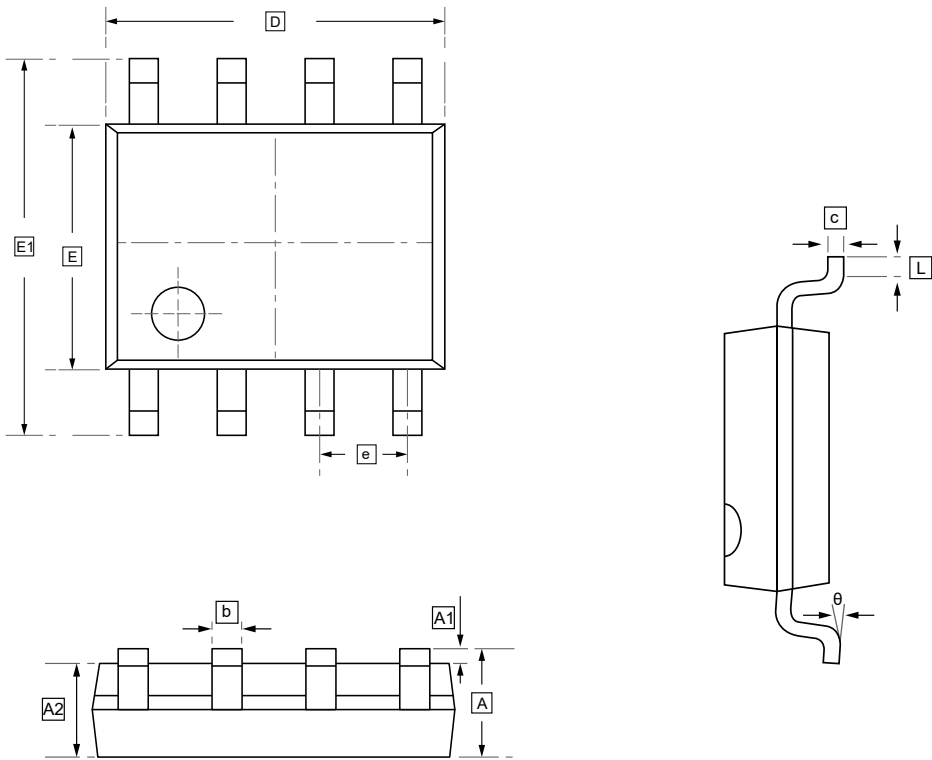


Diode Recovery Test Circuit & Waveforms





8.SOP-8 Package Outline Dimensions

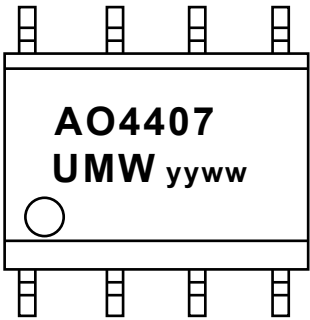


DIMENSIONS (mm are the original dimensions)

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 AO4407A	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.