

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).

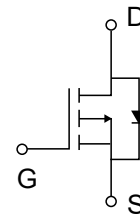
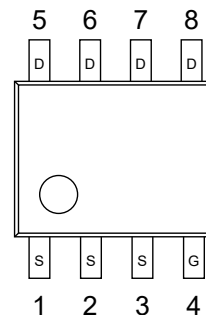
2.Features

- $V_{DS} = -30V$
- $I_D = -14A$
- $R_{DS(ON)} < 9.5m\Omega$ ($V_{GS} = -10V$)
- $R_{DS(ON)} < 14.7m\Omega$ ($V_{GS} = -4.5V$)

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	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=\pm 25\text{V}$			± 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

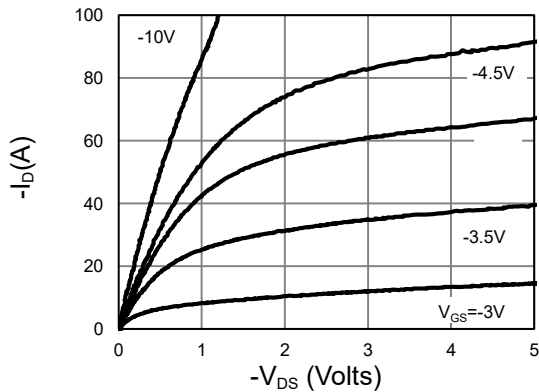


Fig 1: On-Region Characteristics (Note E)

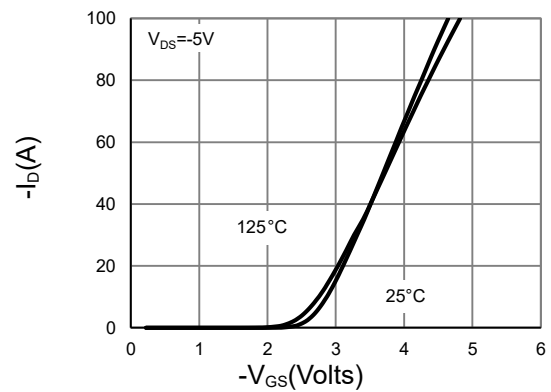


Figure 2: Transfer Characteristics (Note E)

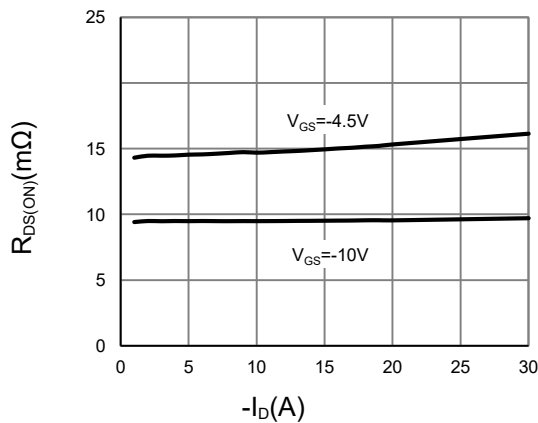


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

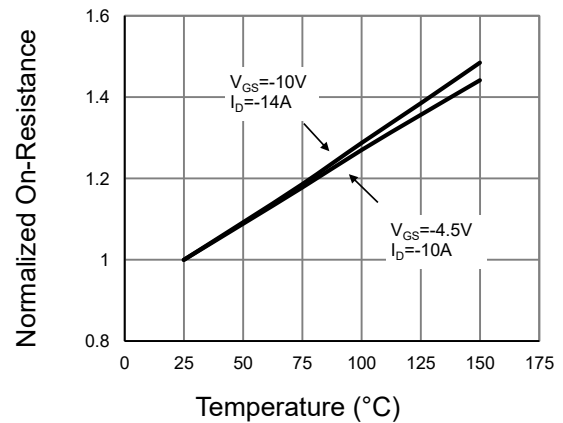


Figure 4: On-Resistance vs. Junction Temperature (Note E)

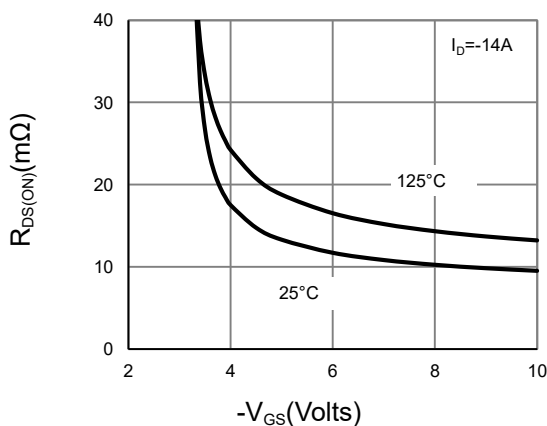


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

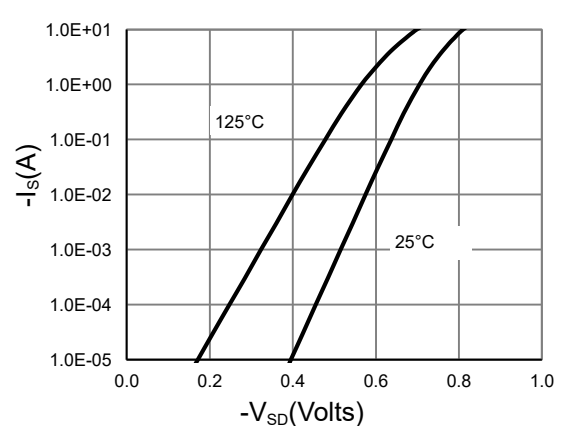


Figure 6: Body-Diode Characteristics (Note E)



7.2 TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

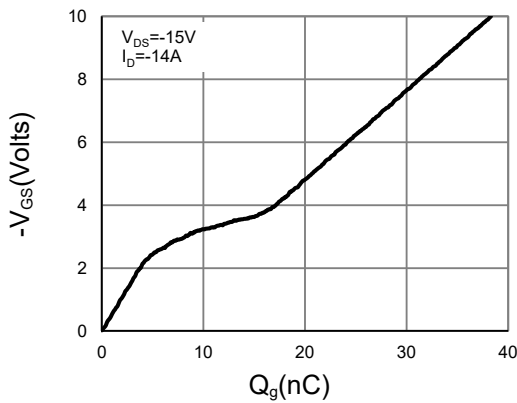


Figure 7: Gate-Charge Characteristics

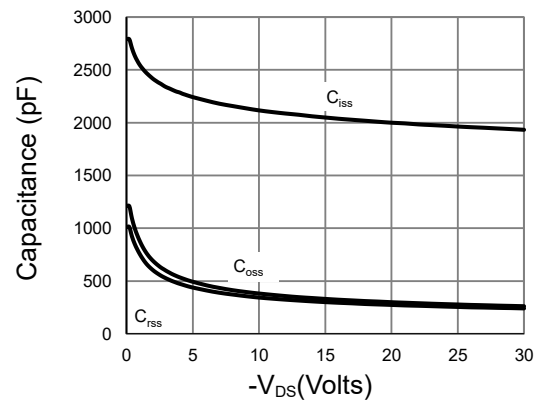


Figure 8: Capacitance Characteristics

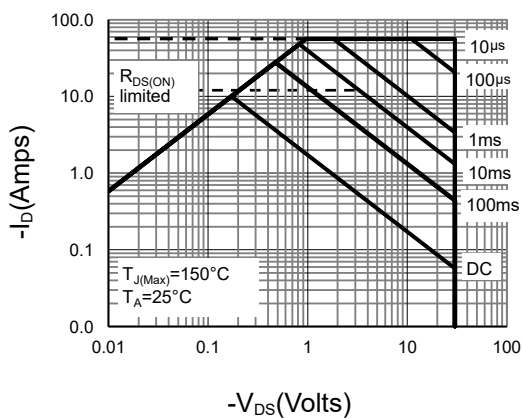


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

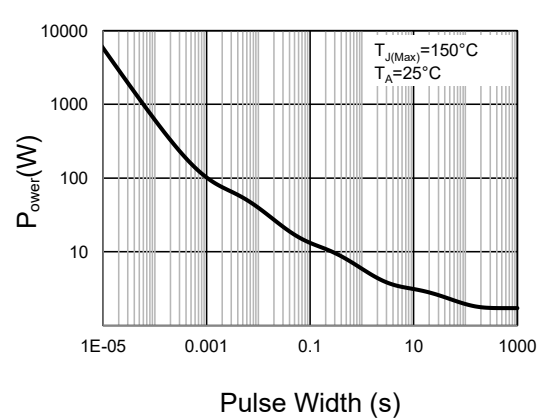


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

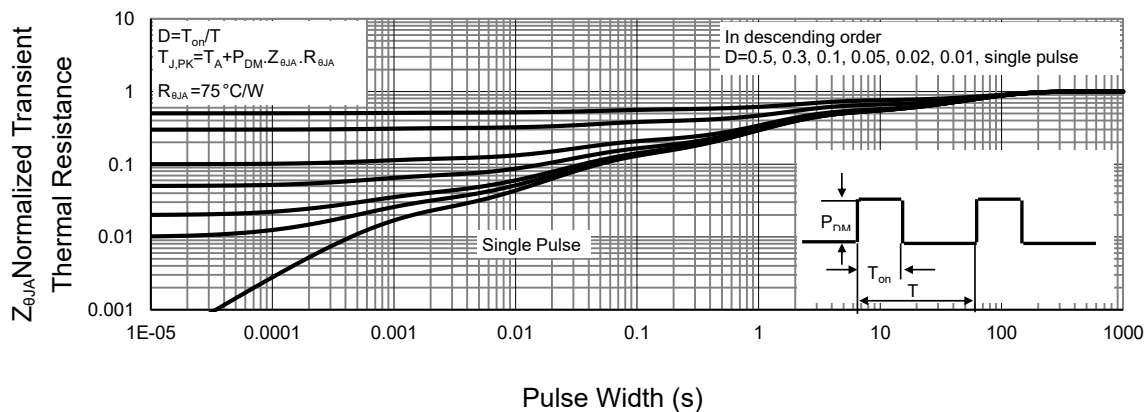
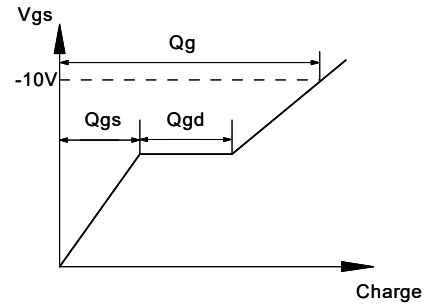
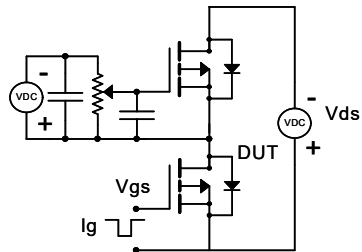


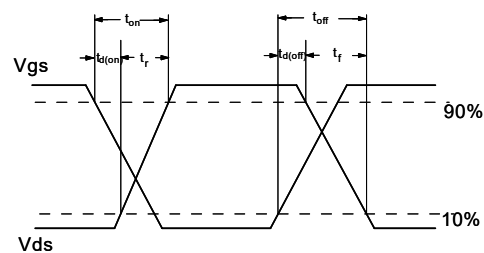
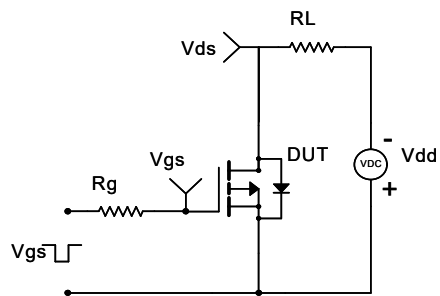
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



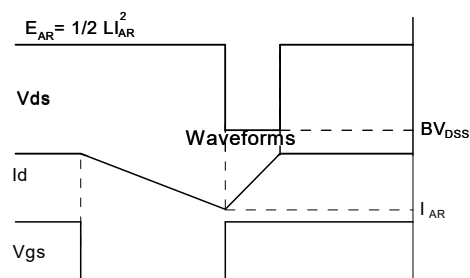
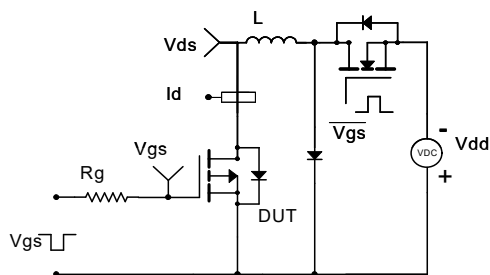
Gate Charge Test Circuit & Waveform



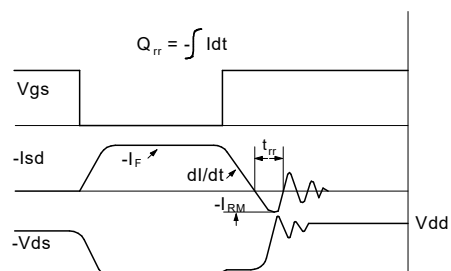
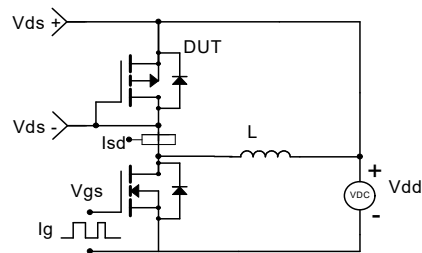
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

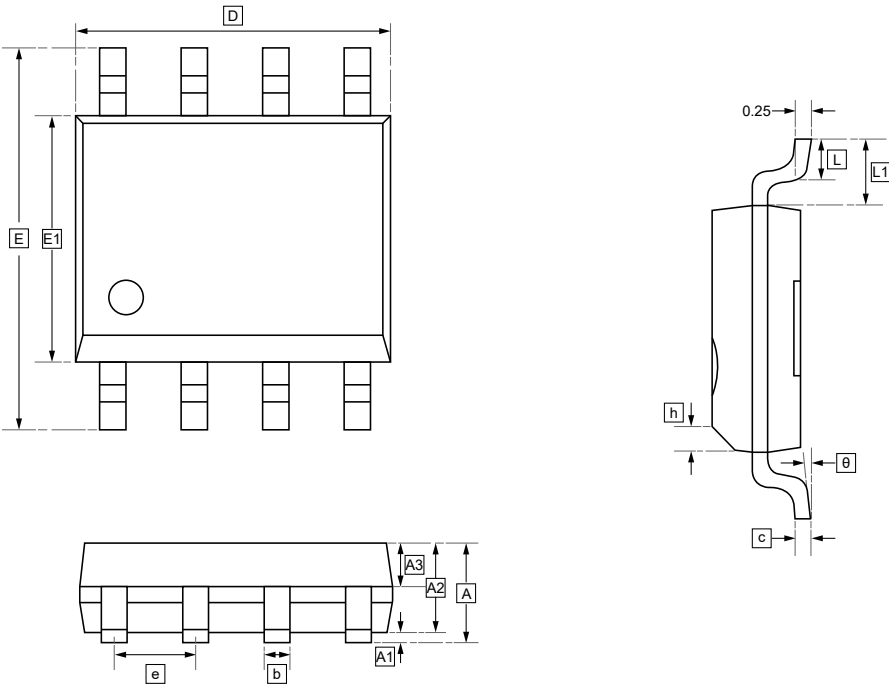


Diode Recovery Test Circuit & Waveforms





8.SOP-8 Package Outline Dimensions



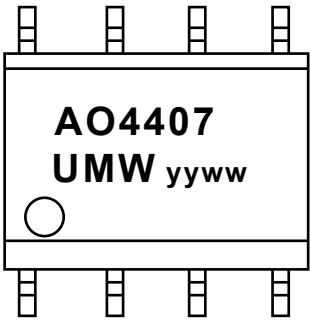
DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.80	5.80	3.80	1.24	0.30	0.50
Max	1.75	0.20	1.50	0.70	0.47	0.24	5.00	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 AO4407A	SOP-8	3000	Tape and reel



10.Disclaimer

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