

1.Description

The AO4459 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

2.Features

- $V_{DS(V)} = -30V$
- $I_D = -6.5A$
- $R_{DS(ON)} < 42m\Omega (V_{GS} = 10V)$

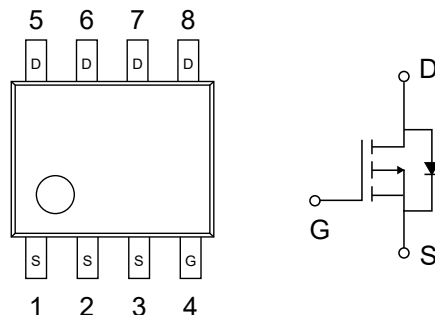
3.Application

- Battery protection
- Load switch
- Uninterruptible power supply

4.Pinning information

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

SOP-8



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

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	$T_A = 25^\circ C$	I_D	-6.5	A
	$T_A = 70^\circ C$		-5.3	
Pulsed Drain Current ^c		I_{DM}	-30	
Avalanche Current ^c		I_{AS}, I_{AR}	17	
Avalanche energy $L=0.1mH$ ^c		E_{AS}, E_{AR}	14	mJ
Power Dissipation ^B	$T_A = 25^\circ C$	P_D	3.1	W
	$T_A = 70^\circ C$		2	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^\circ C$



6.Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	t ≤ 10s	R _{θJA}	31	40	°C/W
Maximum Junction-to-Ambient ^{AD}	Steady-State		59	75	°C/W
Maximum Junction-to-Lead	Steady-State	R _{θJL}	16	24	°C/W



7. Electrical Characteristic (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
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	μA
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	-1.5	-2.5	V
On state drain current	I _{D(ON)}	V _{GS} =-10V, V _{DS} =-5V	-30			A
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-6.5A		33	42	mΩ
		V _{GS} =-4.5V, I _D =-5A		56	60	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-6.5A		14	-1	S
Diode Forward Voltage	V _{SD}	I _S =-1A, V _{GS} =0V		-0.8	-3.5	V
Maximum Body-Diode Continuous Current	I _S				-3.5	A
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =-15V, f=1MHz		520		pF
Output Capacitance	C _{oss}			100		pF
Reverse Transfer Capacitance	C _{rss}			65		pF
Gate resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1MHz	3.5	7.5	11.5	Ω
Total Gate Charge	Q _g (10V)	V _{GS} =-10V, V _{DS} =-15V I _D =-6.5A		9.2	11	nC
Total Gate Charge	Q _g (4.5V)			4.6	6	nC
Gate Source Charge	Q _{gs}			1.6		nC
Gate Drain Charge	Q _{gd}			2.2		nC
Turn-On DelayTime	t _{D(on)}	V _{GS} =-10V, V _{DS} =-15V R _L =2.5Ω, R _{GEN} =3Ω		7.5		ns
Turn-On Rise Time	t _r			5.5		ns
Turn-Off DelayTime	t _{D(off)}			19		ns
Turn-Off Fall Time	t _f			7		ns
Body Diode Reverse Recovery Time	t _{rr}	I _F =-6.5A, dI/dt=100A/μs		11		ns
Body Diode Reverse Recovery Charge	Q _{rr}	I _F =-6.5A, dI/dt=100A/μs		5.3		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 $T_{J(MAX)} = 150^\circ\text{C}$, using $\leq 10\text{s}$ junction-to-ambient thermal resistance.
- C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$. 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 $< 300\mu\text{s}$ 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 $T_{J(MAX)} = 150^\circ\text{C}$. The SOA curve provides a single pulse rating.



8.1 Typical characteristic

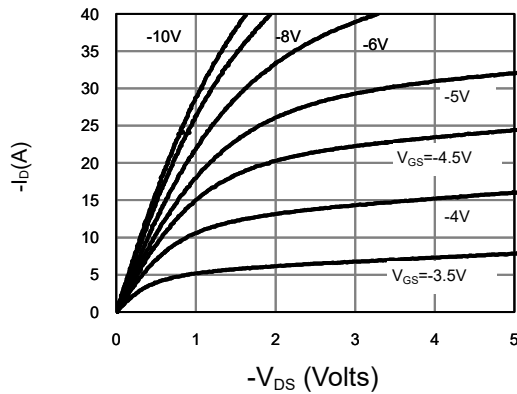


Fig 1: On-Region Characteristics (Note E)

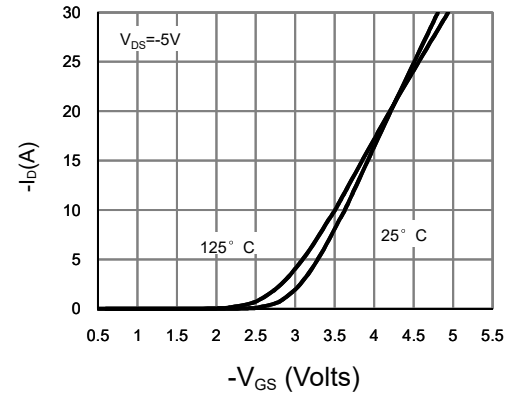


Figure 2: Transfer Characteristics (Note E)

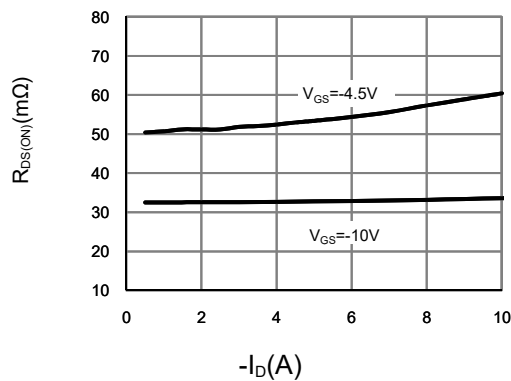


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

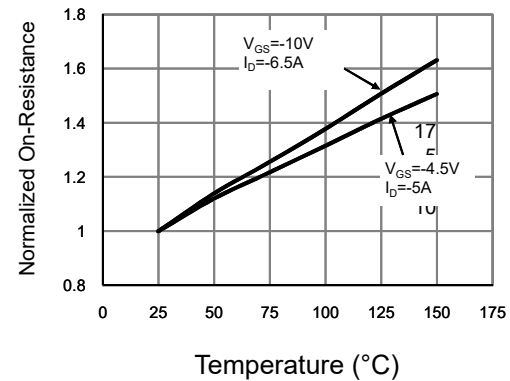


Figure 4: On-Resistance vs. Junction Temperature (Note E)

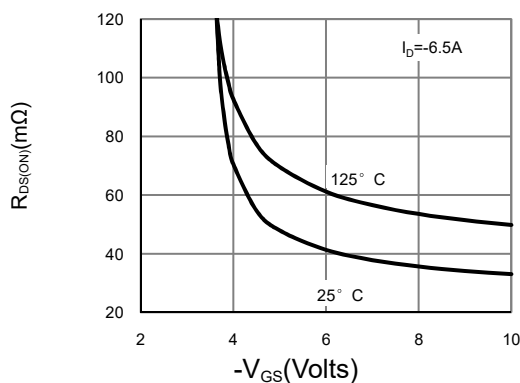


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

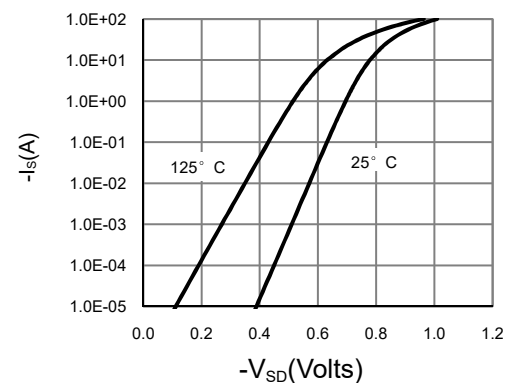


Figure 6: Body-Diode Characteristics (Note E)



8.2 Typical characteristic

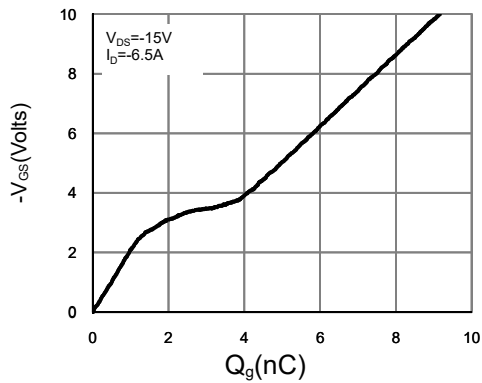


Figure 7: Gate-Charge Characteristics

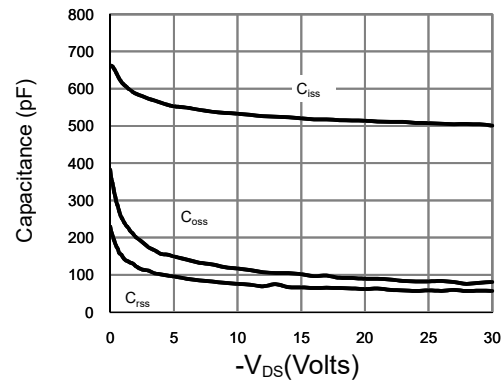


Figure 8: Capacitance Characteristics

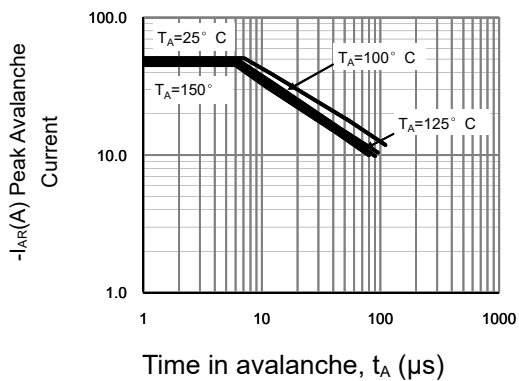


Figure 9: Single Pulse Avalanche capability (Note C)

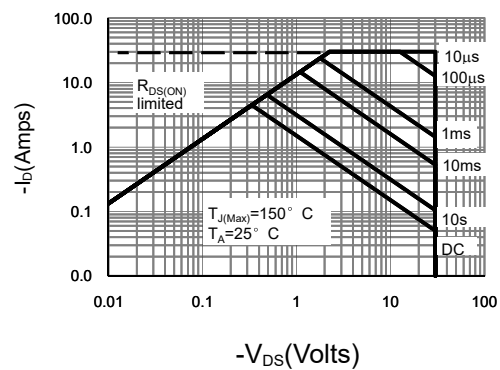


Figure 10: Maximum Forward Biased Safe Operating Area (Note F)

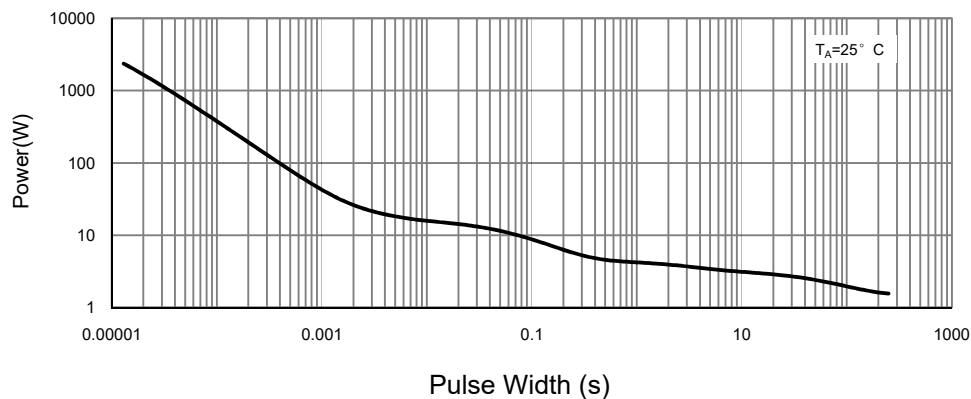
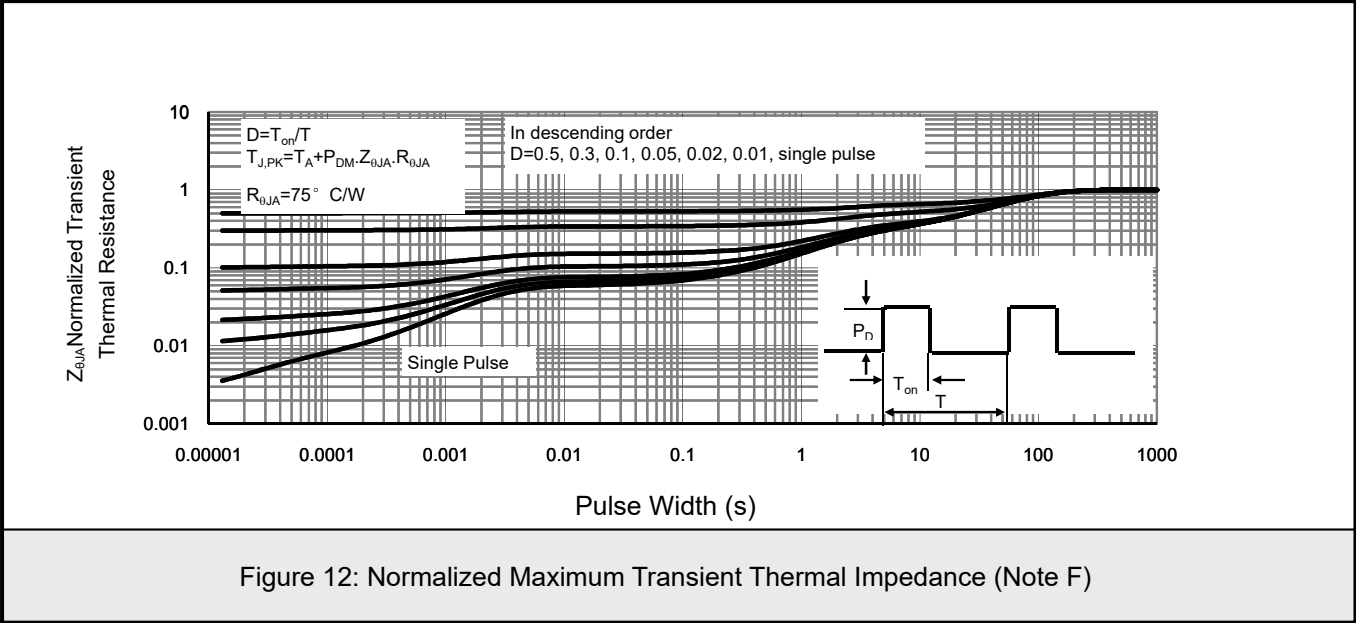


Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note F)

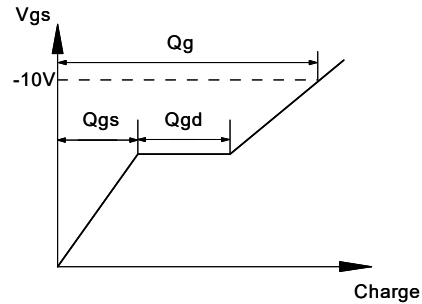
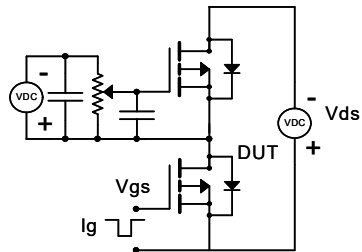


8.3Typical characteristic

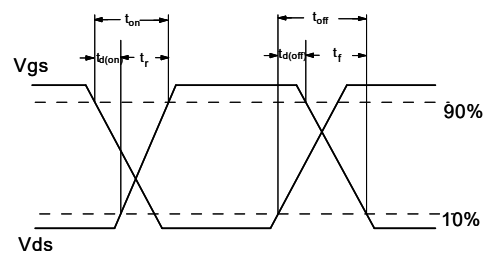
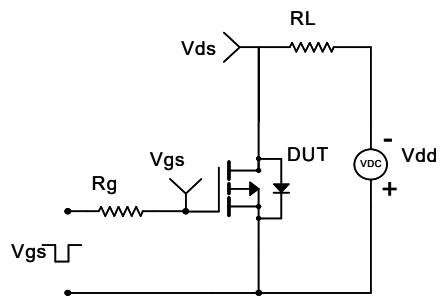




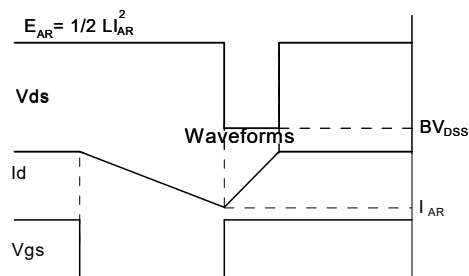
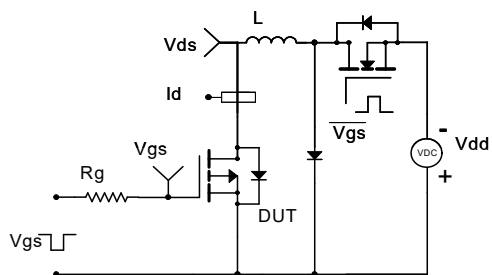
Gate Charge Test Circuit & Waveform



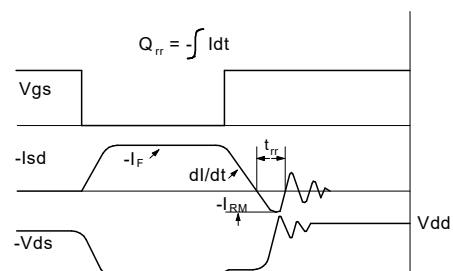
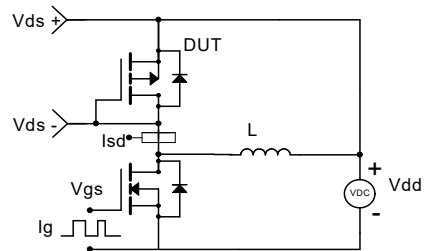
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

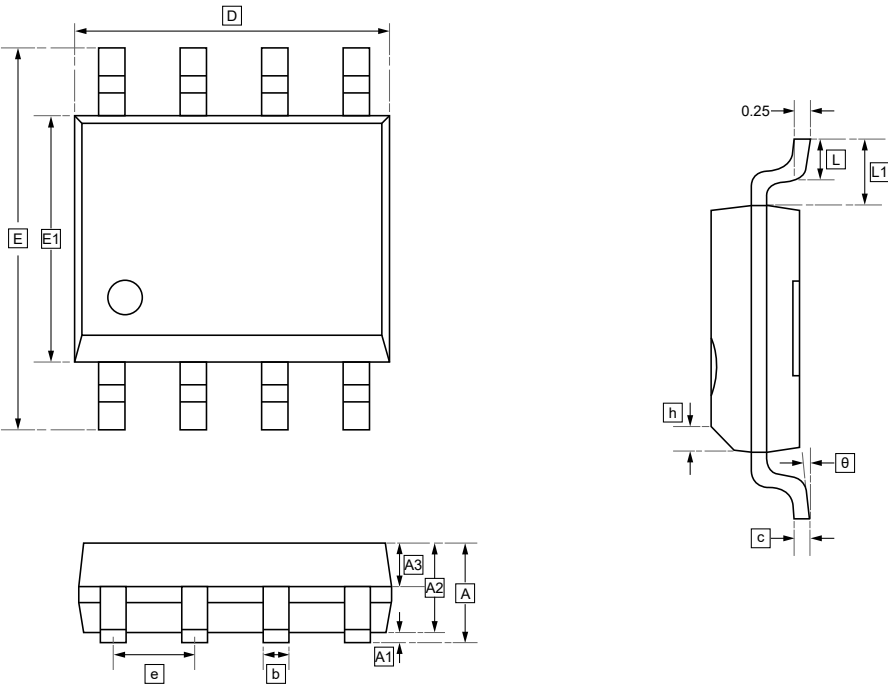


Diode Recovery Test Circuit & Waveforms





9.SOP-8 Package Outline Dimensions



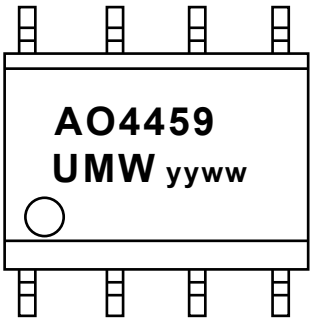
DIMENSIONS (mm are the original dimensions)

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°



10.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW AO4459	SOP-8	3000	Tape and reel



11.Disclaimer

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