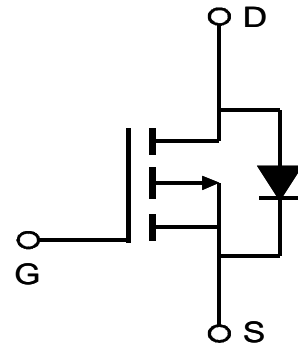


**General Description**

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.



**Product Summary**

$V_{DS} = -30V$   $I_D = -6.5 A$

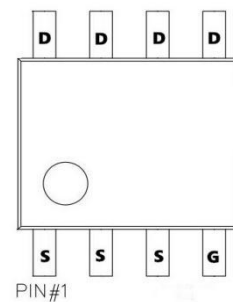
$R_{DS(ON)} < 42m\Omega @ V_{GS}=10V$

**Application**

Battery protection

Load switch

Uninterruptible power supply



**Absolute Maximum Ratings  $T_A=25^\circ C$  unless otherwise noted**

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

**Thermal Characteristics**

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10s$	$R_{\theta JA}$	31	40	$^\circ C/W$
	Steady-State		59	75	$^\circ C/W$
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	16	24	$^\circ C/W$

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V	-30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			-1 -5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =-250μA	-1	-1.5	-2.5	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	-30			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-6.5A		33	42	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-5A		56	60	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-6.5A		14		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.8	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-3.5	A
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz		520		pF
C <sub>oss</sub>	Output Capacitance			100		pF
C <sub>riss</sub>	Reverse Transfer Capacitance			65		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	3.5	7.5	11.5	Ω
Q <sub>g(10V)</sub>	Total Gate Charge	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-6.5A		9.2	11	nC
Q <sub>g(4.5V)</sub>	Total Gate Charge			4.6	6	nC
Q <sub>gs</sub>	Gate Source Charge			1.6		nC
Q <sub>gd</sub>	Gate Drain Charge			2.2		nC
t <sub>D(on)</sub>	Turn-On DelayTime				7.5	
t <sub>r</sub>	Turn-On Rise Time	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, R <sub>L</sub> =2.5Ω, R <sub>GEN</sub> =3Ω		5.5		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			19		ns
t <sub>f</sub>	Turn-Off Fall Time			7		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-6.5A, dI/dt=100A/μs		11		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-6.5A, dI/dt=100A/μs		5.3		nC

A. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150° C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150° C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25° C.

D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs 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 1in<sup>2</sup> FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150° C. The SOA curve provides a single pulse rating.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

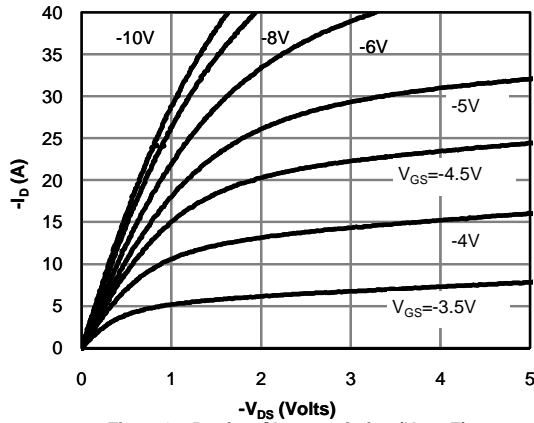


Fig 1: On-Region Characteristics (Note E)

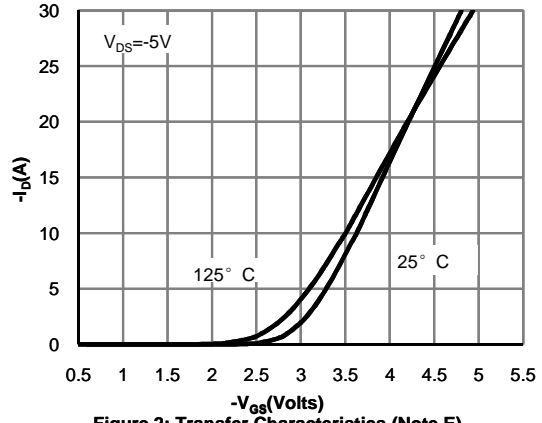


Figure 2: Transfer Characteristics (Note E)

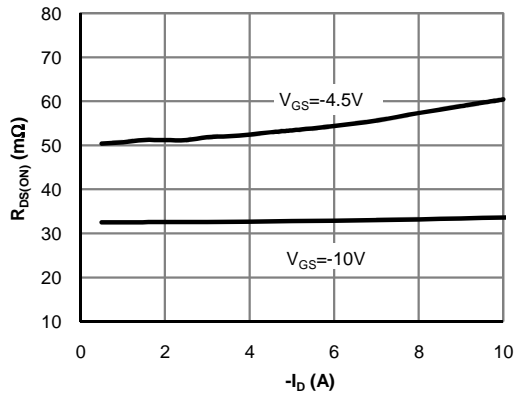


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

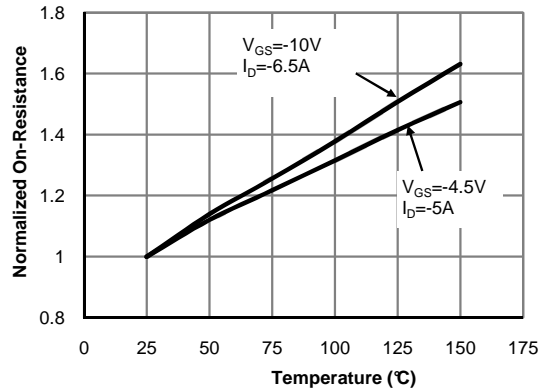


Figure 4: On-Resistance vs. Junction Temperature (Note E)

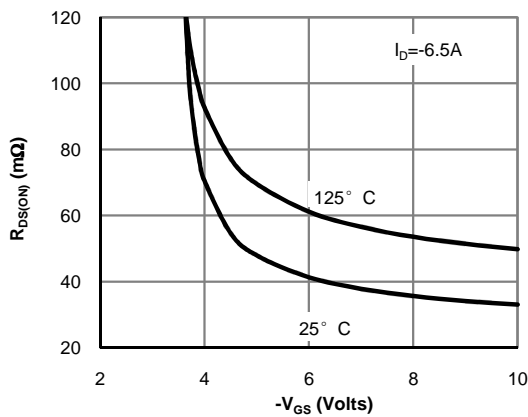


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

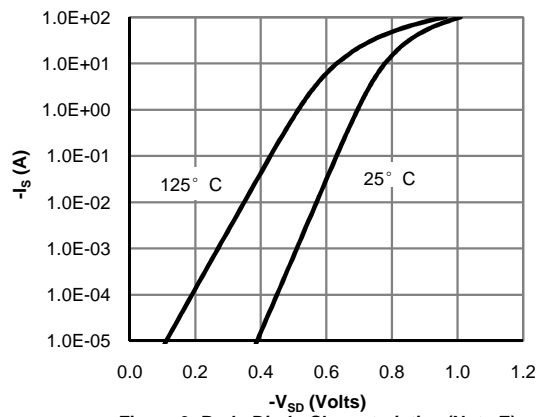


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

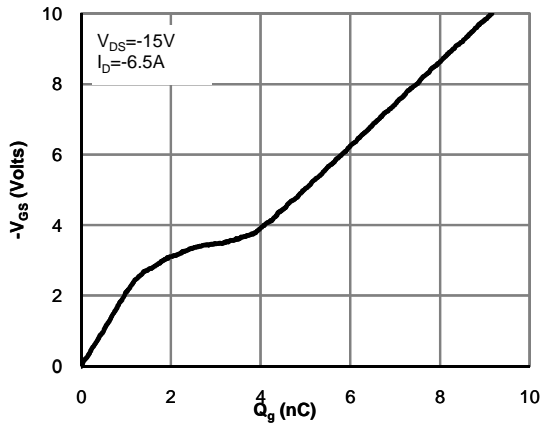


Figure 7: Gate-Charge Characteristics

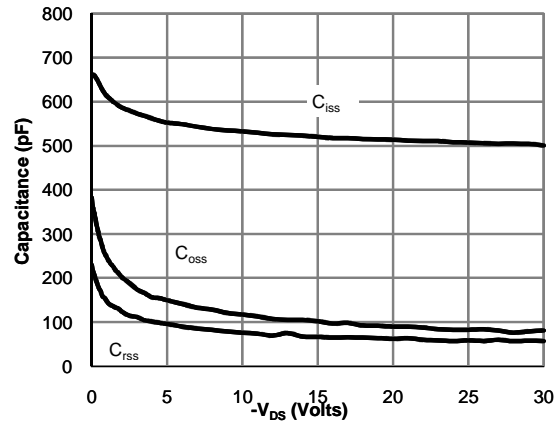


Figure 8: Capacitance Characteristics

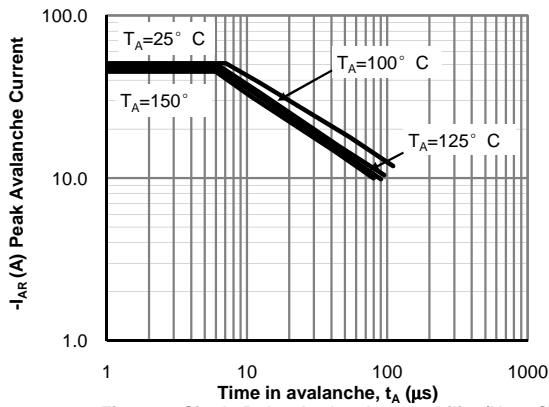


Figure 9: Single Pulse Avalanche capability (Note C)

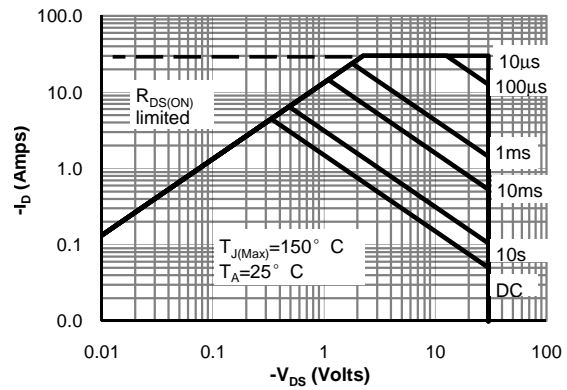


Figure 10: Maximum Forward Biased Safe Operating Area (Note F)

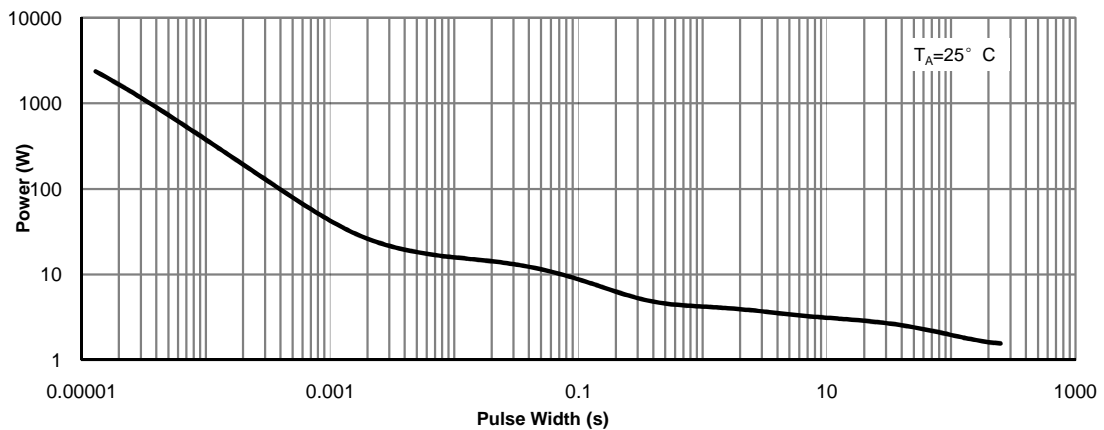


Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

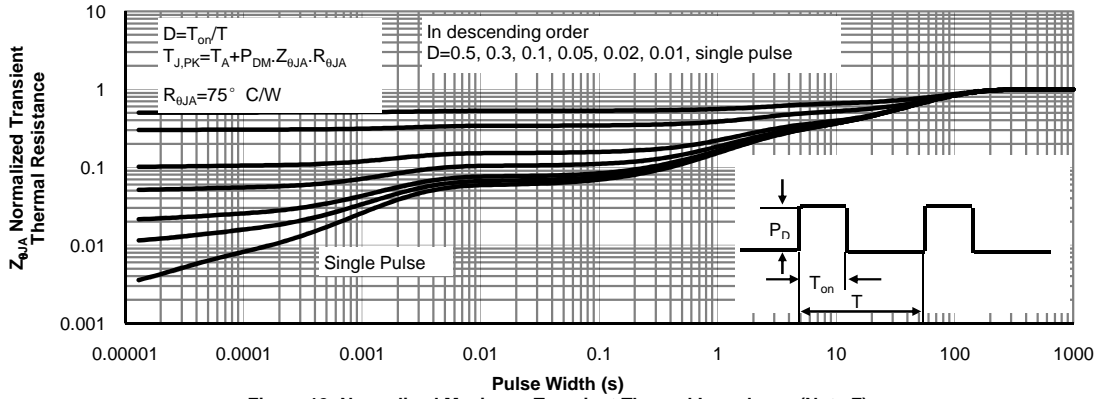
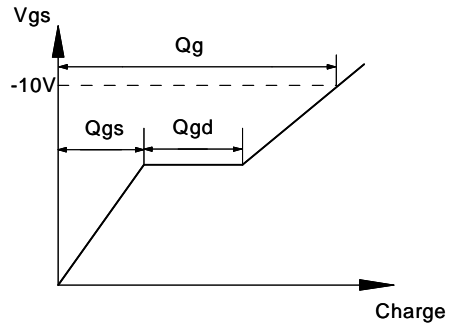
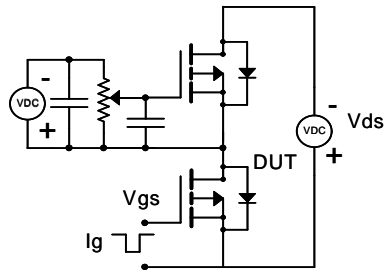
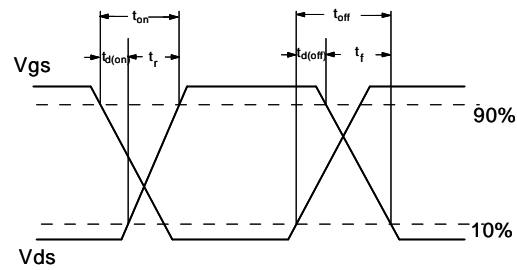
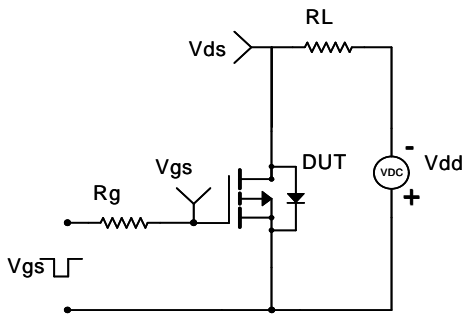


Figure 12: Normalized Maximum Transient Thermal Impedance (Note F)

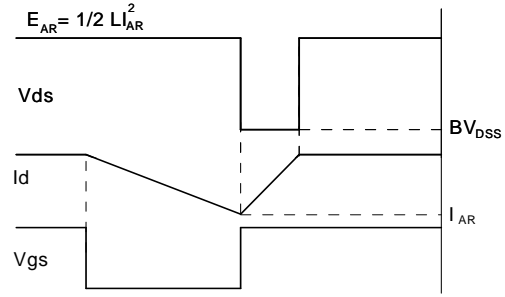
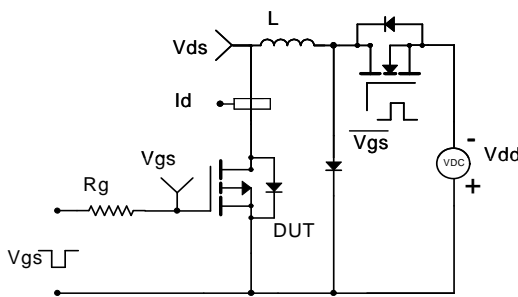
Gate Charge Test Circuit & Waveform



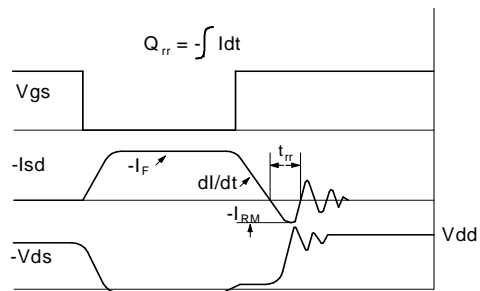
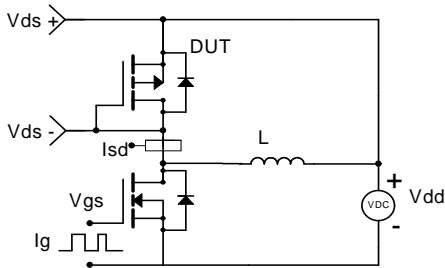
Resistive Switching Test Circuit & Waveforms



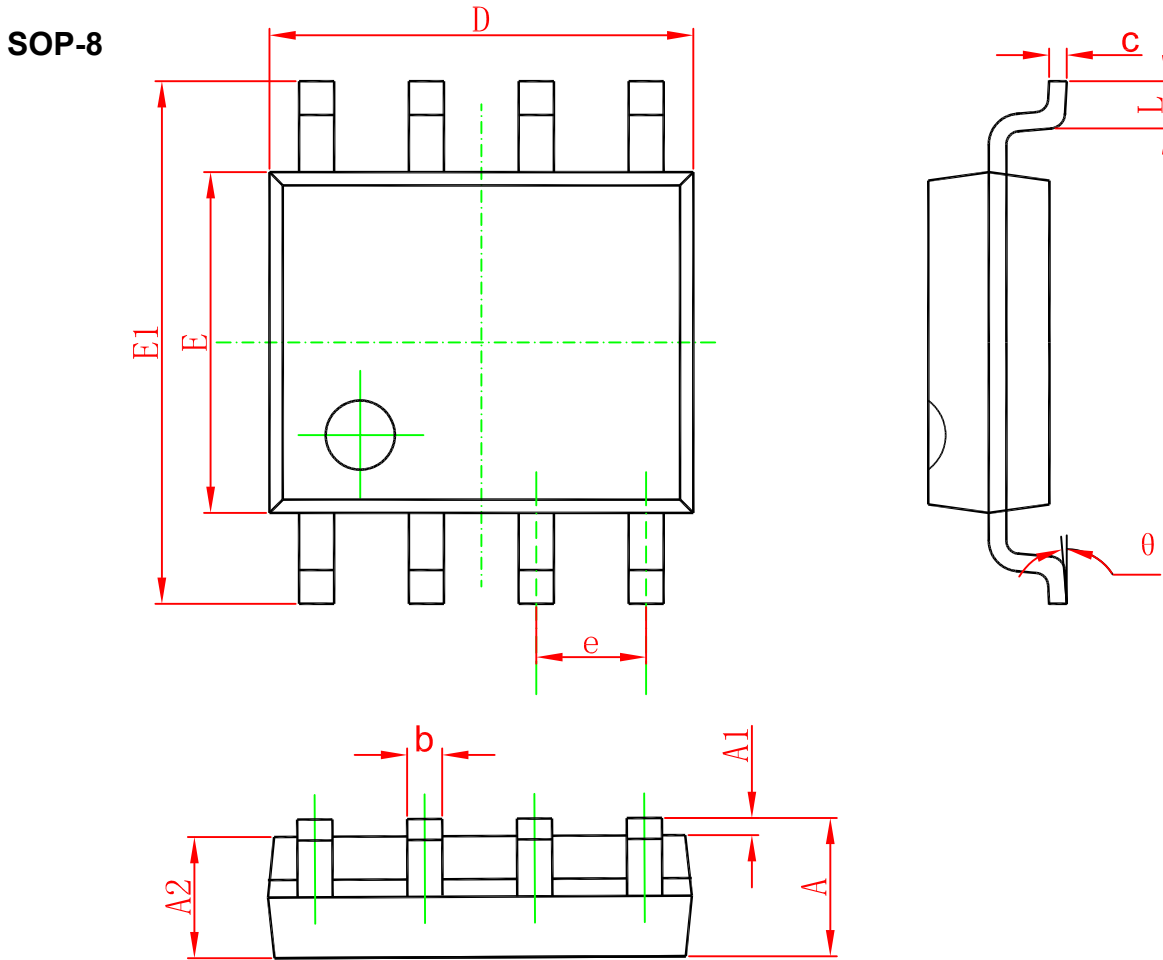
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

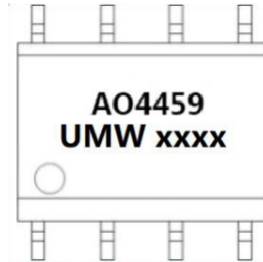


PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

**Marking**



("xxxx"代表年份周期)

**Ordering information**

Order code	Package	Baseqty	Deliverymode
UMW AO4459	SOP-8	3000	Tape and reel