EVVOSEMI®

THINK CHANGE DO

ESD TVS MOS LDO Diode Sensor DC-DC

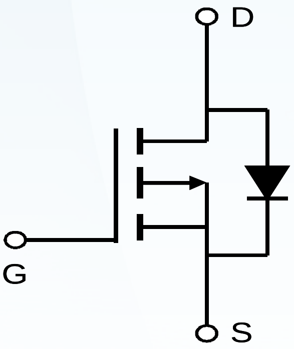
Product Specification

Domestic Part Number	AO4459
Overseas Part Number	AO4459
Equivalent Part Number	AO4459

P-Channel MOSFET

General Description

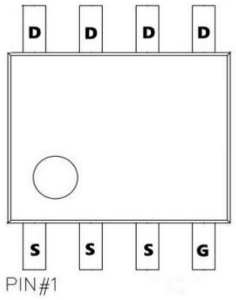
The AO4459 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.



Product Summary

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

$R_{DS(ON)}$ < 42mΩ @ V_{GS}=10V



Application

Battery protection

Load switch

Uninterruptible power supply

Absolute Maximum Ratings T_A=25℃ unless otherwise noted

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

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	31	40	℃/W
Maximum Junction-to-Ambient [A D]	Steady-State		59	75	℃/W
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	16	24	℃/W

Electrical Characteristics (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=-250μA, V_{GS}=0V		-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-30V, V_{GS}=0V				-1	μA
			T_J=55℃			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±20V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=-250μA		-1	-1.5	-2.5	V
$I_{D(ON)}$	On state drain current	V_{GS}=-10V, V_{DS}=-5V		-30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-6.5A			33	42	mΩ
		V_{GS}=-4.5V, I_D=-5A			56	60	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-6.5A			14		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V			-0.8	-1	V
I_S	Maximum Body-Diode Continuous Current					-3.5	A
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz			520		pF
C_{oss}	Output Capacitance				100		pF
C_{rss}	Reverse Transfer Capacitance				65		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		3.5	7.5	11.5	Ω
Q_g(10V)	Total Gate Charge	V_{GS}=-10V, V_{DS}=-15V, I_D=-6.5A			9.2	11	nC
Q_g(4.5V)	Total Gate Charge				4.6	6	nC
Q_{gs}	Gate Source Charge				1.6		nC
Q_{gd}	Gate Drain Charge				2.2		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=2.5Ω, R_{GEN}=3Ω			7.5		ns
t_r	Turn-On Rise Time				5.5		ns
$t_{D(off)}$	Turn-Off DelayTime				19		ns
t_f	Turn-Off Fall Time				7		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-6.5A, dI/dt=100A/μs			11		ns
Q_{rr}	Body Diode Reverse Recovery Charge	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 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25° 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° C, using ≤ 10s junction-to-ambient thermal resistance.
C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150° C. Ratings are based on low frequency and duty cycles to keep initialT_J=25° C.
D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ 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 impedence which is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(MAX)}$=150° C. The SOA curve provides a single pulse rating.

P-Channel MOSFET

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

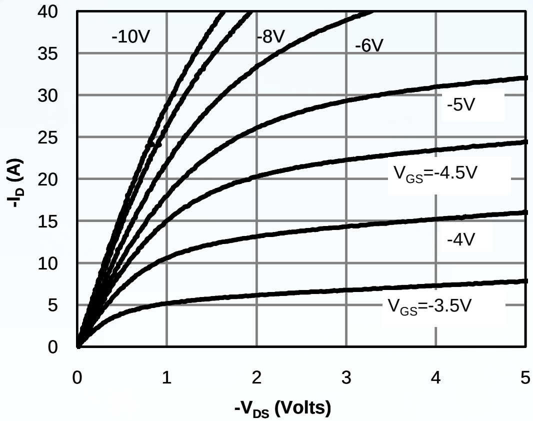


Fig 1: On-Region Characteristics (Note E)

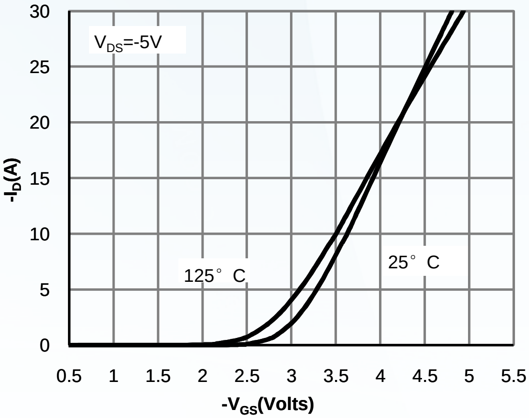


Figure 2: Transfer Characteristics (Note E)

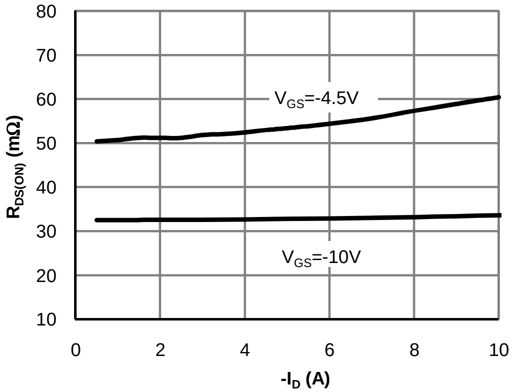


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

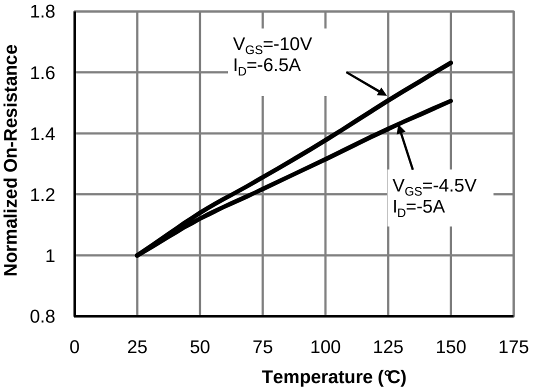


Figure 4: On-Resistance vs. Junction Temperature (Note E)

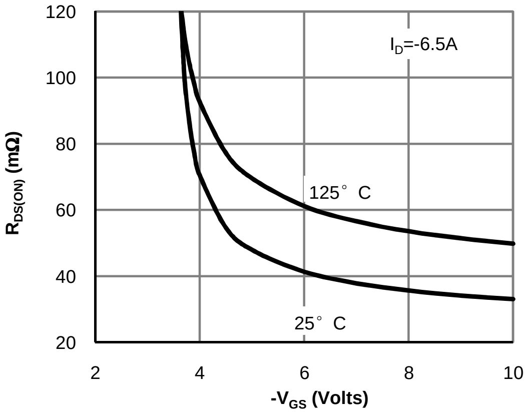


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

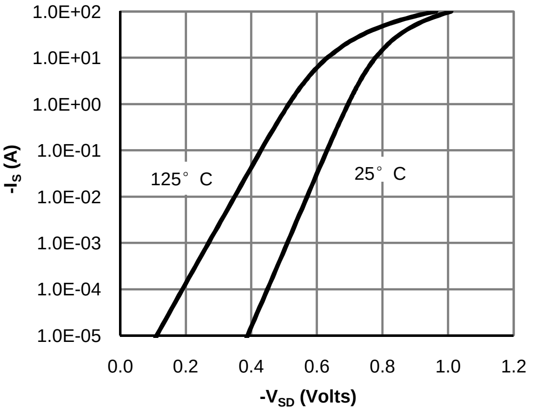


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

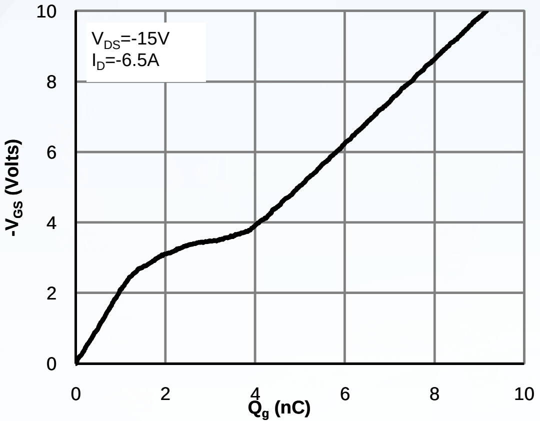


Figure 7: Gate-Charge Characteristics

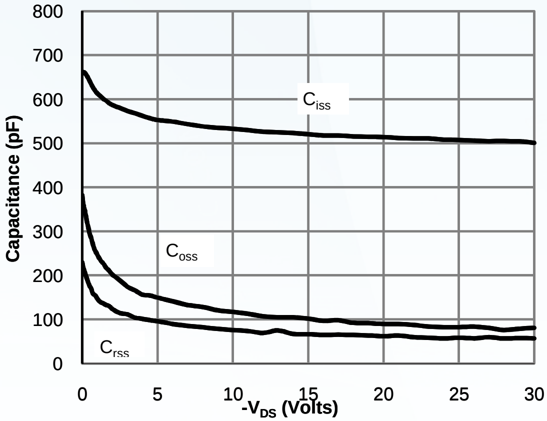


Figure 8: Capacitance Characteristics

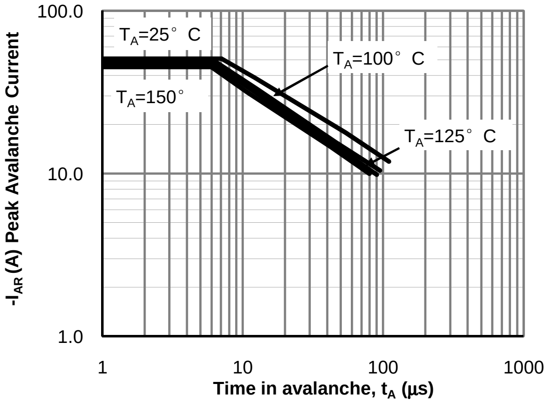


Figure 9: Single Pulse Avalanche capability (Note C)

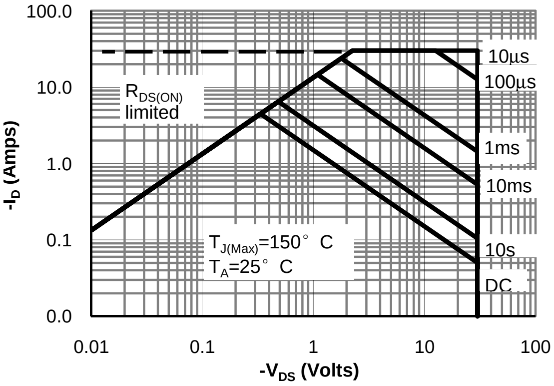


Figure 10: Maximum Forward Biased Safe Operating Area (Note F)

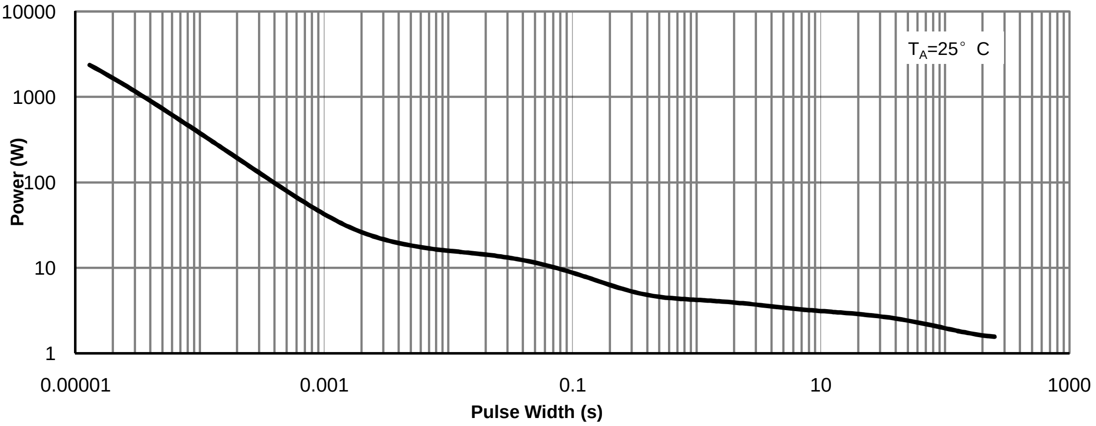


Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

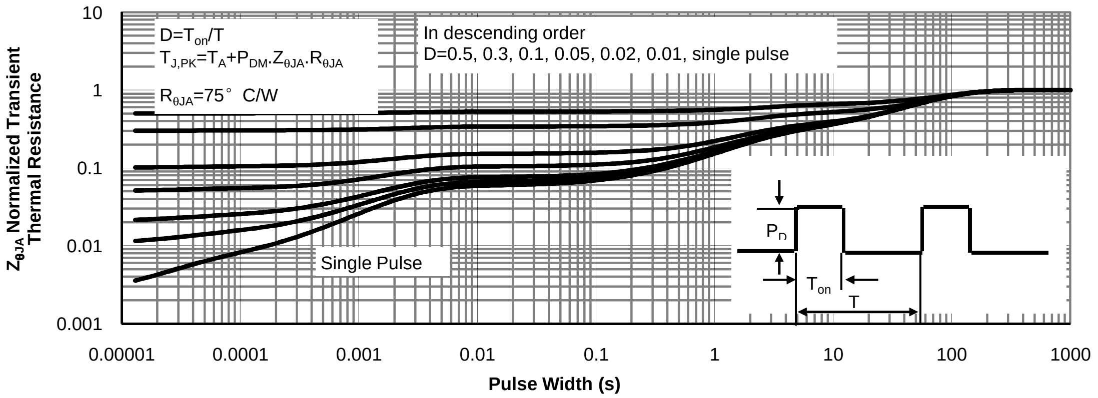
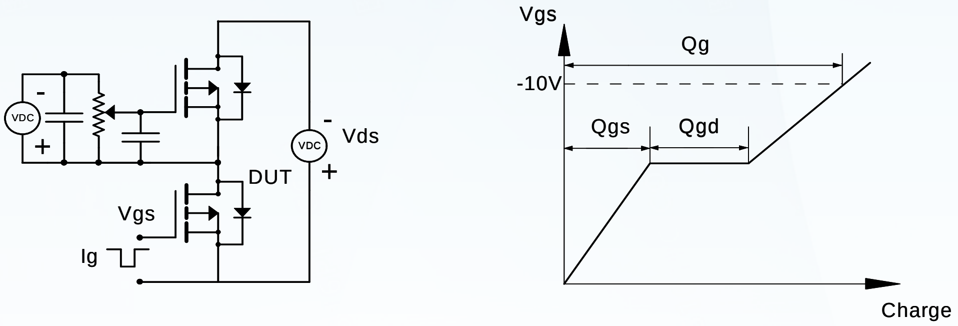
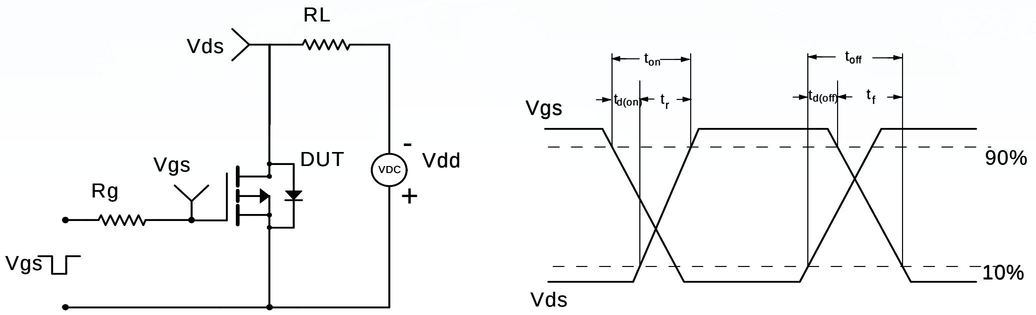


Figure 12: Normalized Maximum Transient Thermal Impedance (Note F)

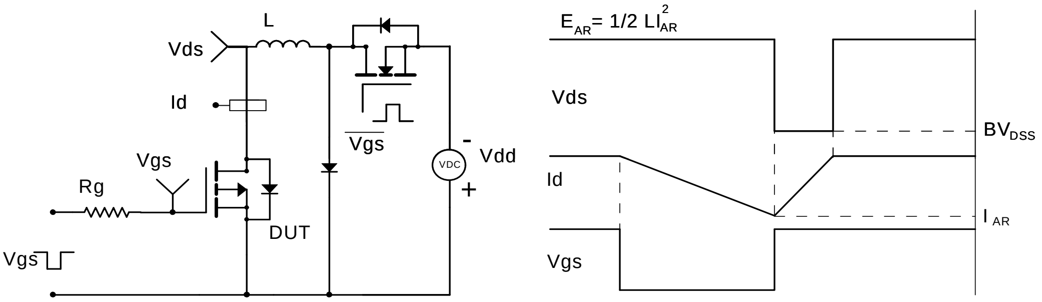
Gate Charge Test Circuit & Waveform



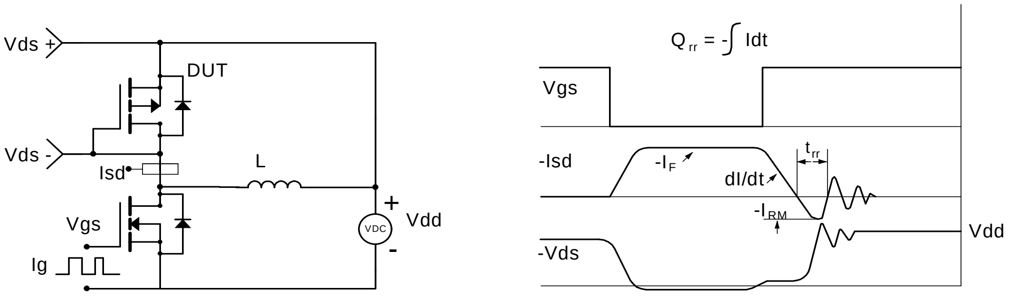
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



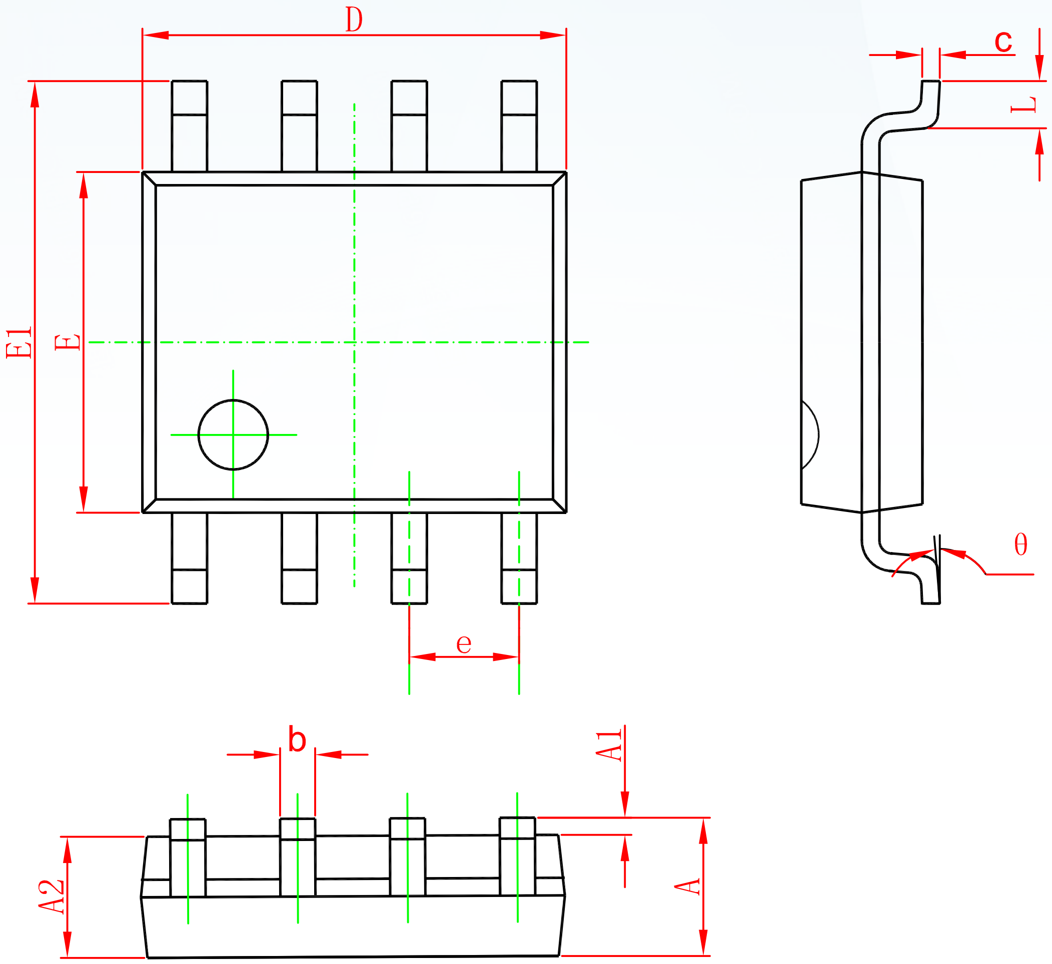
Diode Recovery Test Circuit & Waveforms



P-Channel MOSFET

PACKAGE OUTLINE DIMENSIONS

SOP-8



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
AO4459	SOP-8	3000	Tape and reel

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