

SuperMOS – SOP8 ±40V Complementary MOSFET

1. Description

The AO4614-ES uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

2. Features

- N-channel
40V $R_{DS(ON)}$ =20mΩ(Typ.) @ V_{GS} =10V
 $R_{DS(ON)}$ =28mΩ(Typ.) @ V_{GS} =4.5V
 - P-channel
-40V $R_{DS(ON)}$ =38mΩ(Typ.) @ V_{GS} =-10V
 $R_{DS(ON)}$ =48mΩ(Typ.) @ V_{GS} =-4.5V
- Fast Switching
 - High density cell design for low $R_{DS(on)}$
 - Material: Halogen free
 - Reliable and rugged
 - Avalanche Rated
 - Low leakage current

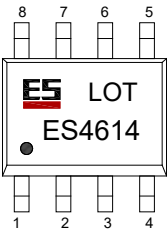
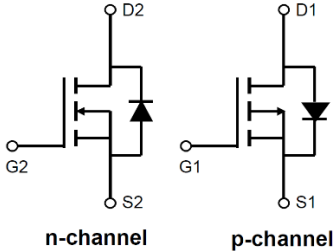
3. Applications

- PWM applications
 - Load switch
 - Power management in portable/desktop PCs
 - DC/DC conversion
- 100% UIS TESTED

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
AO4614-ES	SOP8	ES4614 /LOT	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	13 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
2	Gate2	Note c 	
1	Source2		
7/8	Drain2		
4	Gate1		
3	Source1		
5/6	Drain1		

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter		Symbol	Limit N-channel	Limit P-channel	Unit
Drain-Source Voltage		BV_{DSS}	40	-40	V
Gate-Source Voltage		V_{GS}	± 20	± 20	V
Continuous Drain Current	$T_A=25^{\circ}\text{C}$	I_D	6.8	-5.0	A
	$T_A=75^{\circ}\text{C}$		5.2	-3.9	
Maximum Power Dissipation	$T_A=25^{\circ}\text{C}$	P_D	2	2	W
	$T_A=75^{\circ}\text{C}$		1.2	1.2	
Pulsed Drain Current		I_{DM}	27.2	-20	A
Avalanche Current, Single Pulsed		I_{AS}	11 ^a	-16.5 ^b	A
Avalanche Energy, Single Pulsed		E_{AS}	18 ^a	40 ^b	mJ
Operating Junction Temperature		T_J	150		°C
Storage Temperature Range		T_{stg}	-55 to +150		°C

Thermal resistance ratings

Single Operation					
Parameter	Symbol	Device	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance ($t \leq 10\text{s}$)	$R_{\theta JA}$	n-ch	48	62.5	°C/W
Junction-to-Lead Thermal Resistance	$R_{\theta JL}$	n-ch	35	50	
Junction-to-Ambient Thermal Resistance ($t \leq 10\text{s}$)	$R_{\theta JA}$	p-ch	48	62.5	°C/W
Junction-to-Lead Thermal Resistance	$R_{\theta JL}$	p-ch	35	50	

Note:

a: $T_J=25^{\circ}\text{C}$, $V_{DD}=40\text{V}$, $V_G=10\text{V}$, $L=0.3\text{mH}$, $R_g=25\Omega$

b: $T_J=25^{\circ}\text{C}$, $V_{DD}=-40\text{V}$, $V_G=-10\text{V}$, $L=0.3\text{mH}$, $R_g=25\Omega$

c: This diagram is only an electrical schematic, and the actual pin size is based on POD.

7. N-channel Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	40			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V			1.0	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	1.0	1.5	2.2	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =10V, I _D =6A		20	25	mΩ
		V _{GS} =4.5V, I _D =5A		28	38	
Forward Trans conductance	g _{FS}	V _{DS} =5.0V, I _D =6A			40	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =20V		410		pF
Output Capacitance	C _{OSS}			100		
Reverse Transfer Capacitance	C _{RSS}			35		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =10V, V _{DS} =20V, I _D =6A		8.5		nC
Gate-to-Source Charge	Q _{GS}			1.2		
Gate-to-Drain Charge	Q _{GD}			2.4		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =10V, V _{DS} =20V, R _L =3.3Ω, R _{GEN} =3Ω		4.4		ns
Rise Time	t _r			3.3		
Turn-Off Delay Time	t _{d(OFF)}			15.8		
Fall Time	t _f			3.2		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =1.0A	0.45		1.5	V

8. N-channel Typical Characteristic

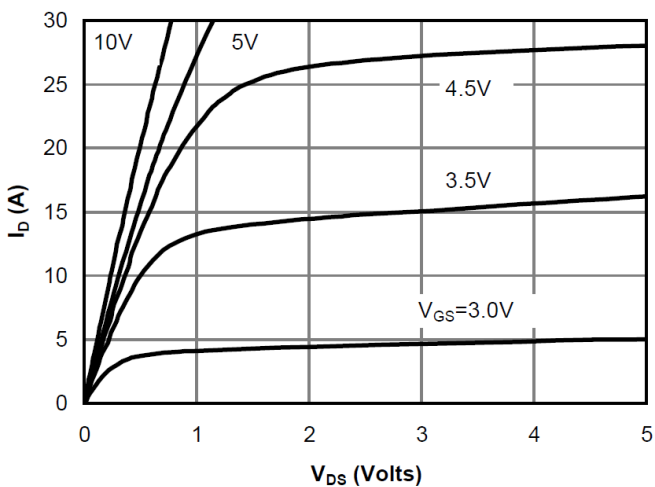


Fig 1: On-Region Characteristics

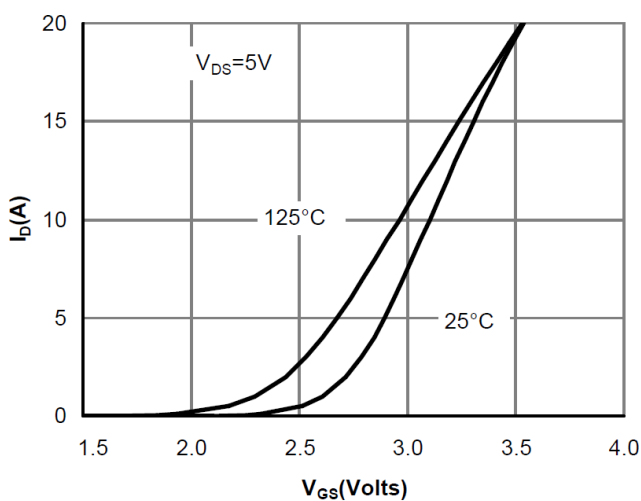


Figure 2: Transfer Characteristics

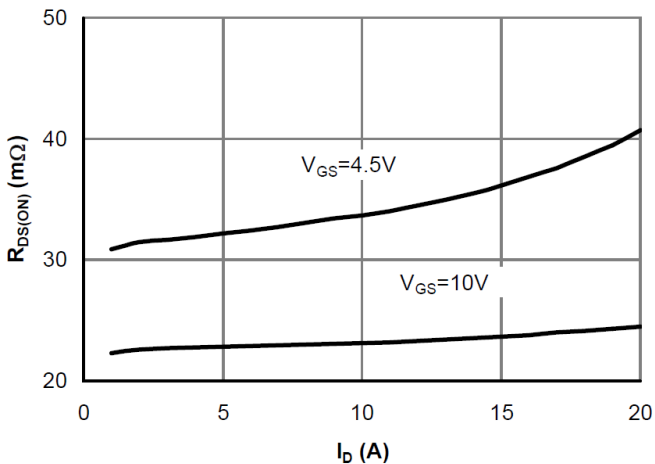


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

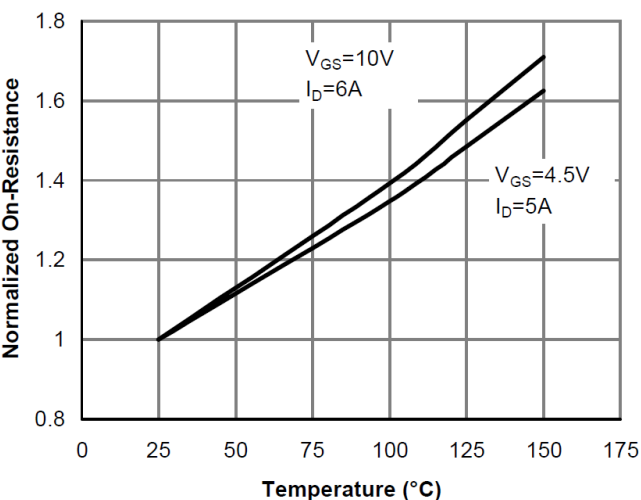


Figure 4: On-Resistance vs. Junction Temperature

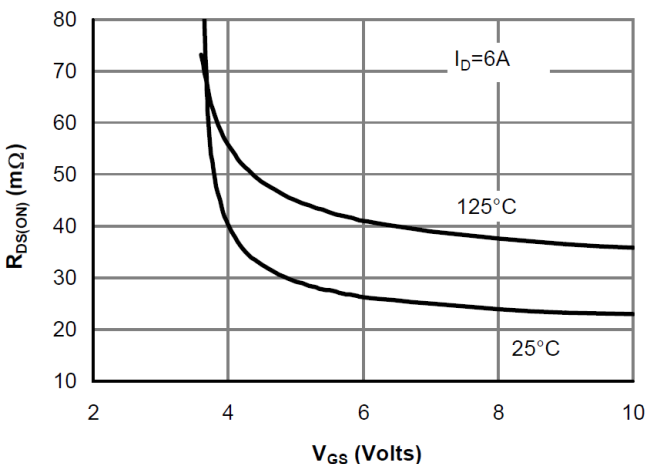


Figure 5: On-Resistance vs. Gate-Source Voltage

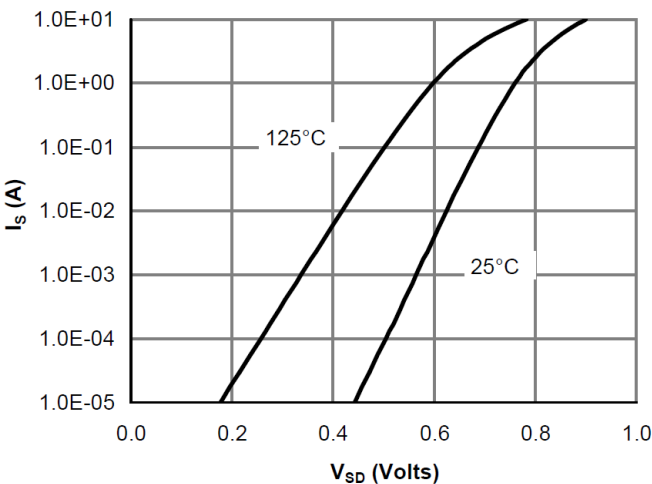
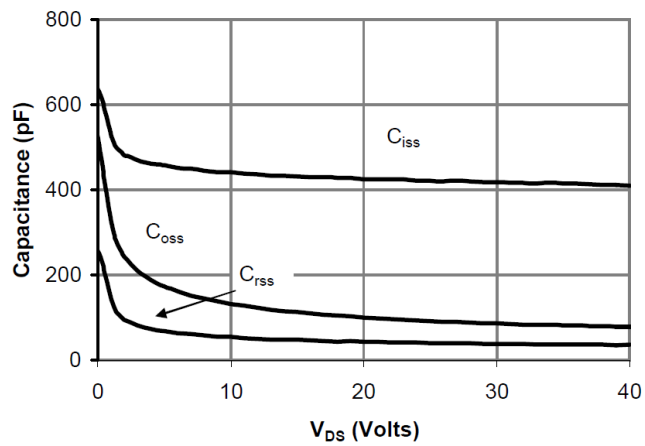


Figure 6: Body-Diode Characteristics

**Figure 7. Capacitance Characteristics**

9. P-channel Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250uA	-40			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} =0V, V _{DS} =-40V			-1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±1	uA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =-250uA	-1.0	-1.55	-2.5	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =10V, I _D =-5A		38	52	mΩ
		V _{GS} =-4.5V, I _D =-4A		48	64	
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-5A			40	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-20V f=1MHz		660		pF
Output Capacitance	C _{OSS}			140		
Reverse Transfer Capacitance	C _{RSS}			65		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =-10V, V _{DS} =-20V I _D =-5A		13.5		nC
Gate-to-Source Charge	Q _{GS}			2		
Gate-to-Drain Charge	Q _{GD}			4		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =-10V, V _{DS} =-20V R _L =4Ω, R _G =3Ω		7.5		ns
Rise Time	t _r			6.6		
Turn-Off Delay Time	t _{d(OFF)}			26		
Fall Time	t _f			11.5		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _{SD} =-1.0A	-4.5		-1.5	V

10. Typical Characteristic

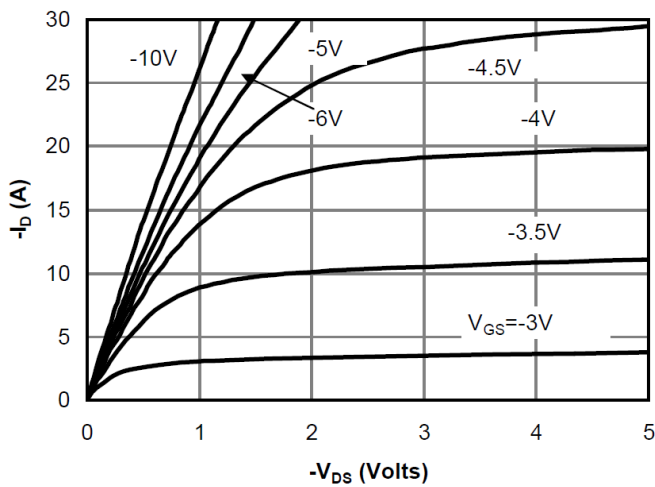


Fig 1: On-Region Characteristics

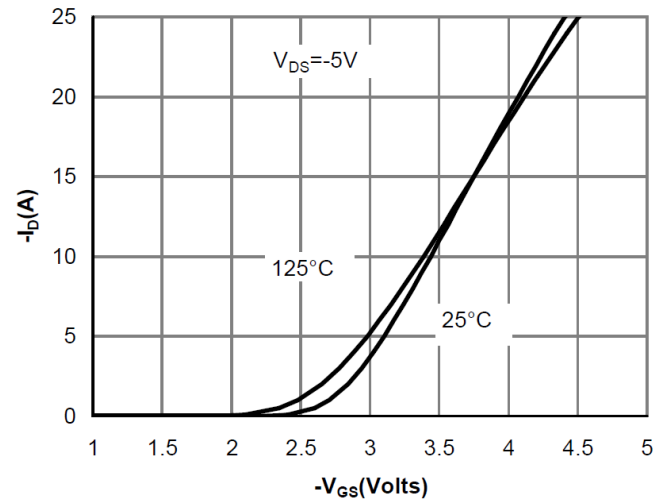


Figure 2: Transfer Characteristics

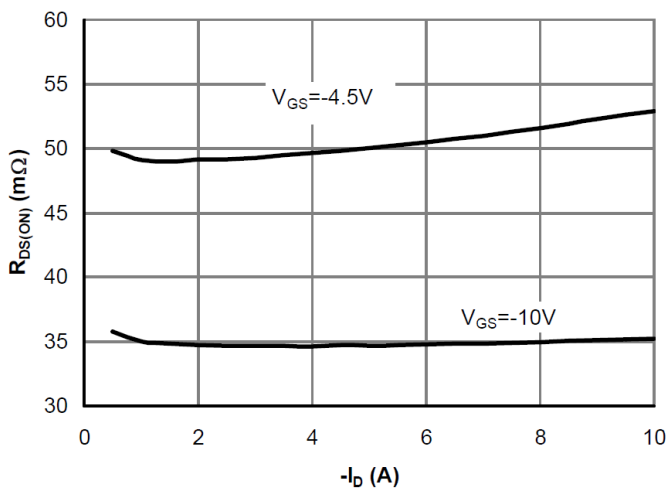


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

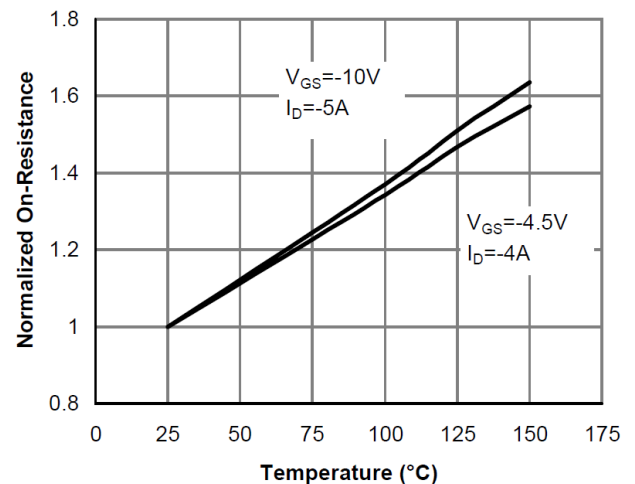


Figure 4: On-Resistance vs. Junction Temperature

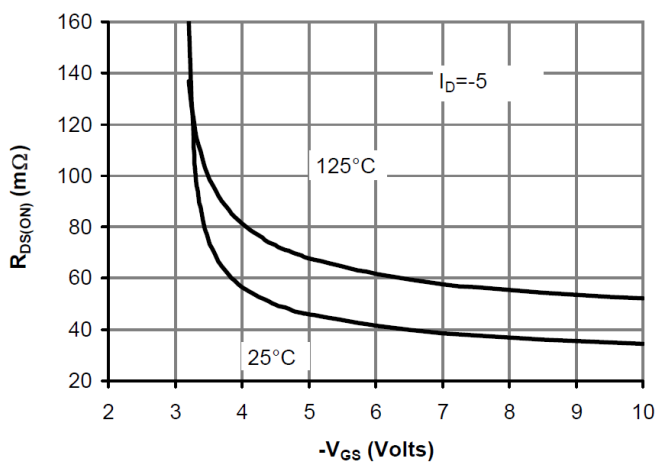


Figure 5: On-Resistance vs. Gate-Source Voltage

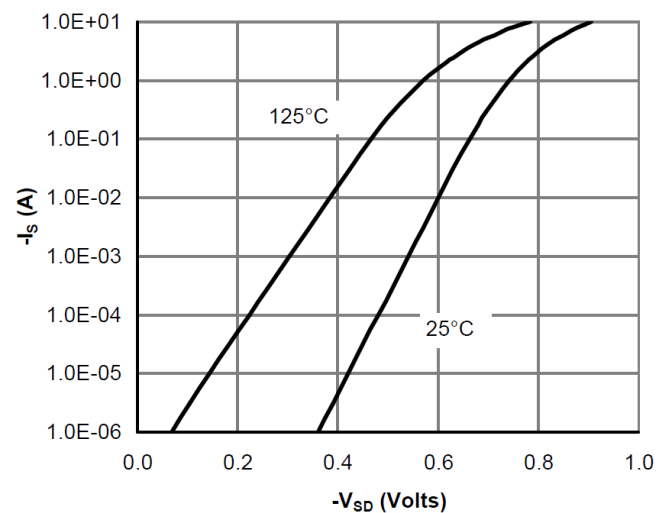
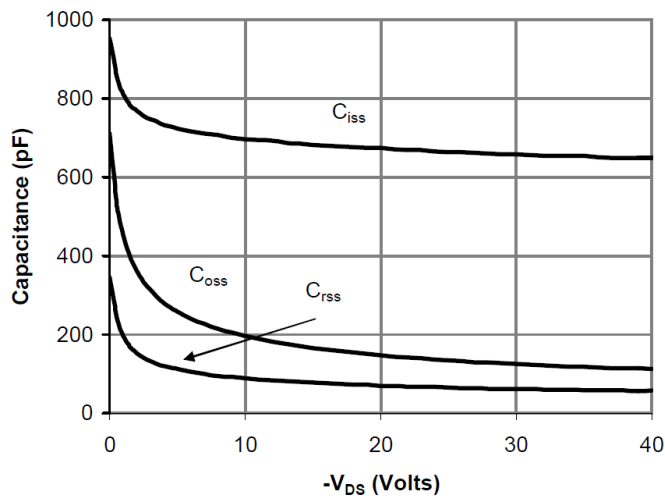
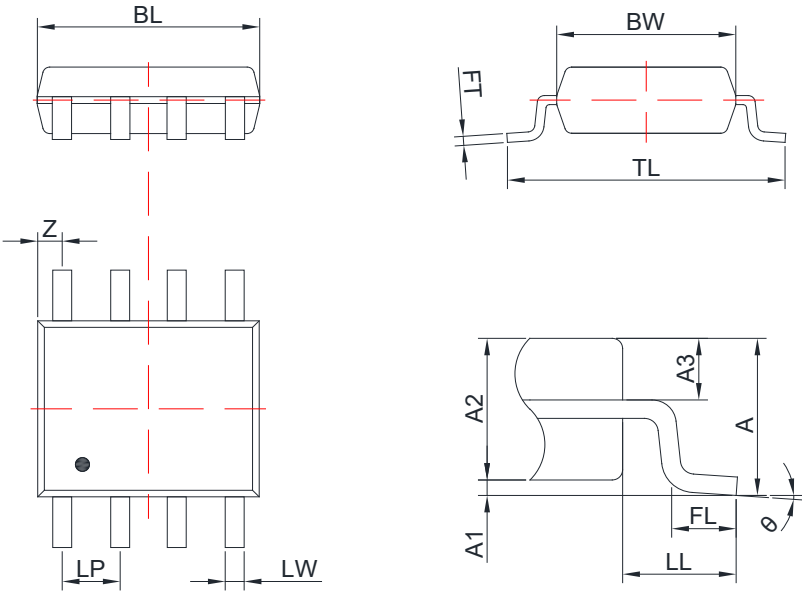


Figure 6: Body-Diode Characteristics

**Figure 7. Capacitance Characteristics**

11. Dimension (SOP8)

POD A(Y)



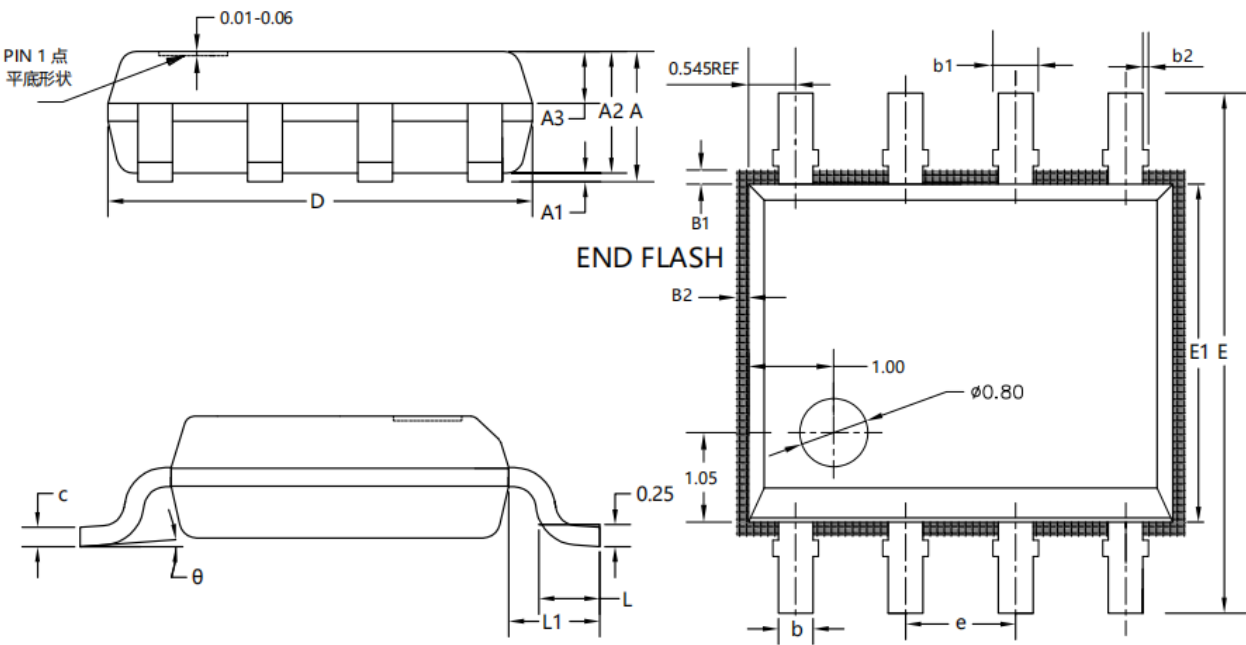
COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

Symbol	Dimensions		Symbol	Dimensions	
	Min.	Max.		Min.	Max.
A	1.75		FL	0.50	0.80
A1	0.05	0.15	LP	1.25	1.30
A2	1.40	1.50	LL	1.1 BSC	
A3	0.623 BSC		LW	0.38	0.43
BL	4.92	5.08	TL	5.90	6.10
BW	3.70	4.10	Z	0.54	
FT	0.20	0.21	θ	0°	8°

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POD B(C)



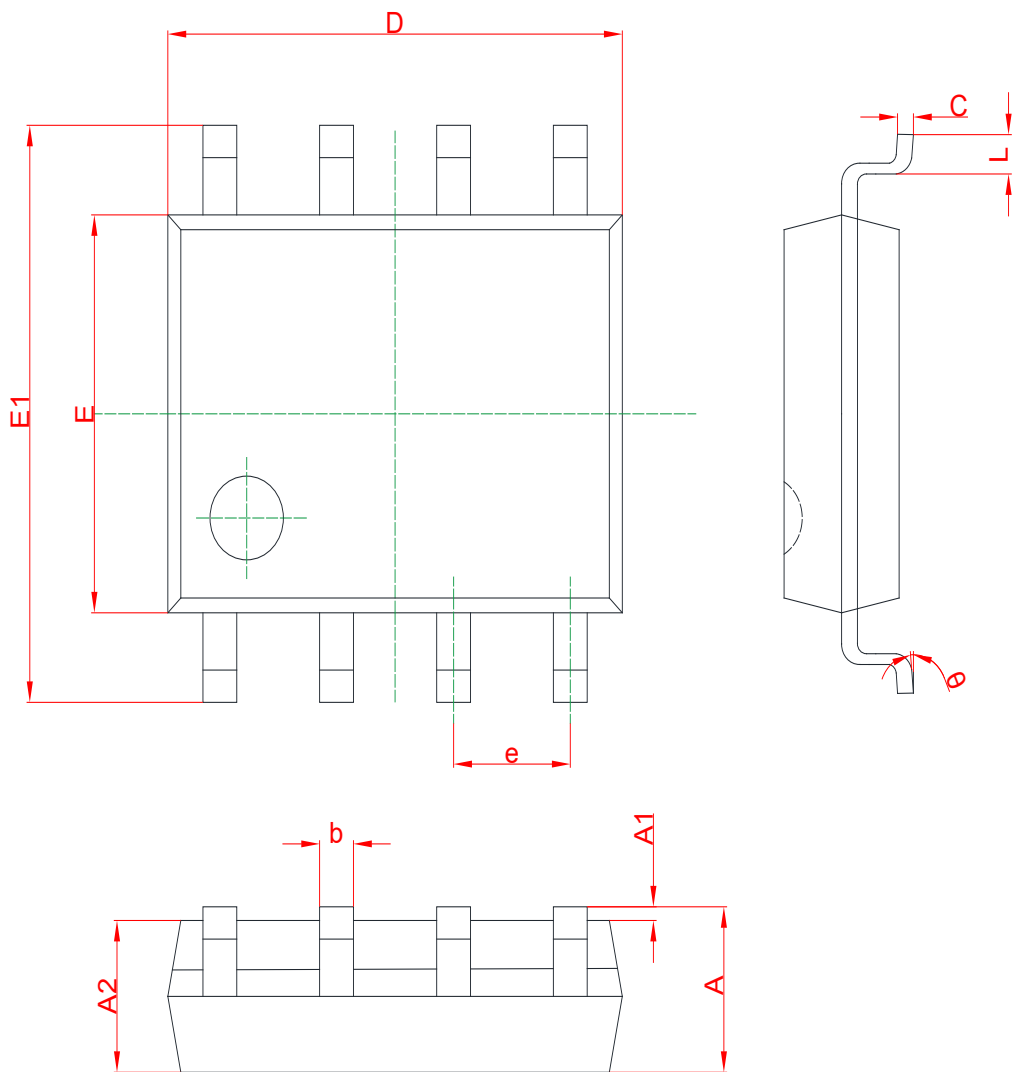
COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

Symbol	Dimensions			Symbol	Dimensions		
	Min.	NOM.	Max.		Min.	NOM.	Max.
A	1.55	1.65	1.75	L	0.50	0.60	0.70
A1	0.06	0.11	0.16	L1	0.90	1.05	1.20
A2	1.35	1.45	1.55	θ	0°	4°	8°
A3	0.60	0.70	0.80	B1	0.14MAX		
b	0.30	0.40	0.50	B2	0.12MAX		
c	0.17	0.20	0.25	b1	0.66MAX		
D	4.80	4.90	5.00	b2	0	0.04	0.08
E	5.80	6.00	6.20	e	1.27BSC		
E1	3.80	3.90	4.00				

AO4614-ES

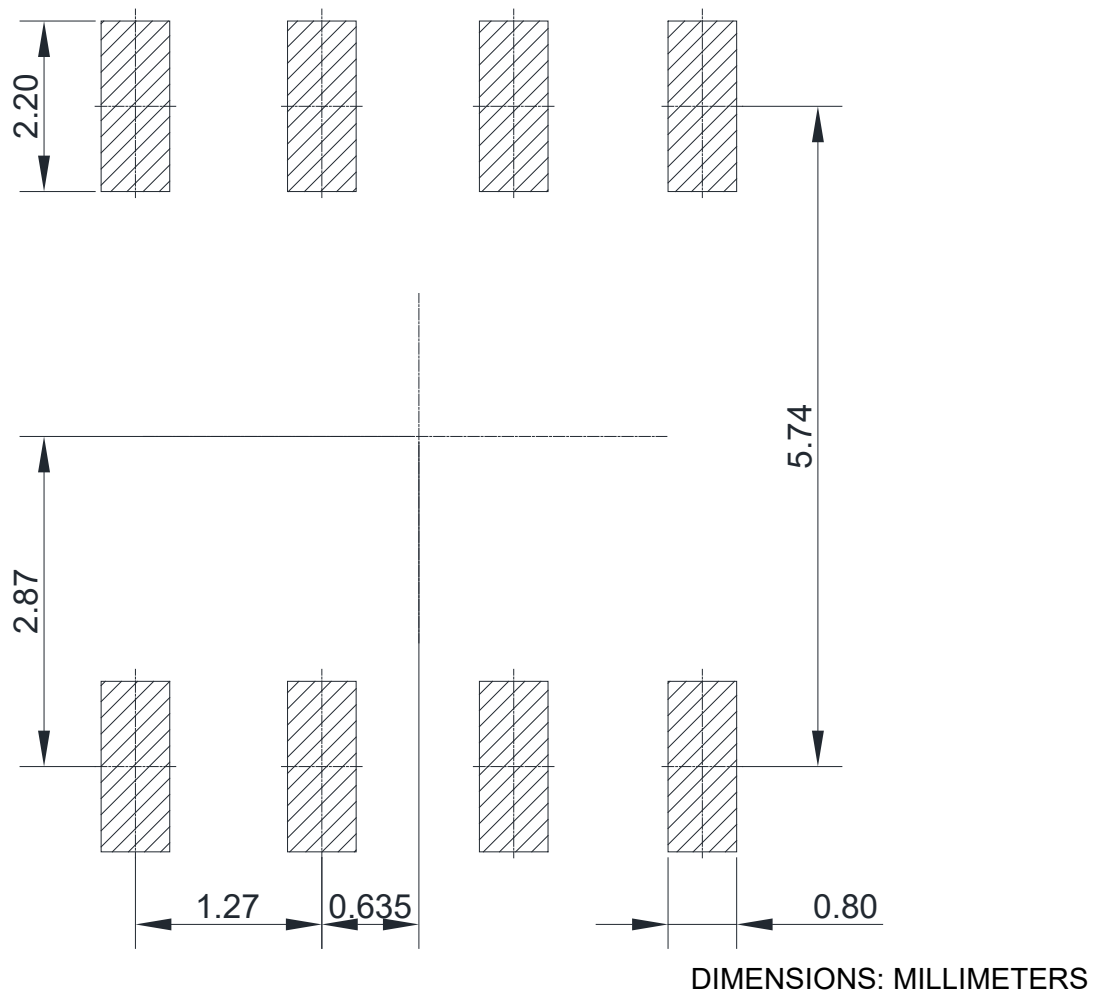
Rev-1.4

POD C(X)



Symbol	Dimensions		Symbol	Dimensions	
	Min.	Max.		Min.	Max.
L	0.40	0.60	e	1.27 TYP	
D	4.95	5.05	c	0.15	0.25
E	3.8	4.0	A2	1.33	1.50
E1	5.80	6.20	A1	0.04	0.20
b	0.4 TYP		θ	0°	8°

12. Recommended Soldering Footprint



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