



Shenzhen Jizhi Micro-Electronic Technology Co.,Ltd.

JZ1009AE linear constant current LED IC chip

JZ1009AE

Specification

Presented to: _____ ;

Model No. : _____ JZ1009AE _____ ;

DATE: _____ ;

Customer Part No. : _____ ;

Specification Approved	Prepared By	
	Checked By	
	Approved By	
Customer Approved	Checked By	
	Approved By	
	Please sign and return one copy to us.	Seal the

CE RoHS

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Features

- Output current is adjustable 5mA-60mA, constant current precision can reach $\pm 3\%$;
- With over temperature protection function;
- No EMC Question;
- Chip and PCB can share Aluminum plate;
- The circuit is simple, low cost;
- Packaging: ESOP-8;

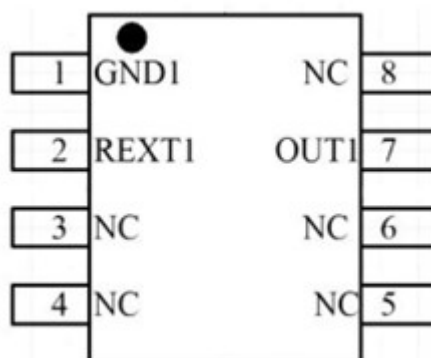
Application field

- Bulb light
- Tube light
- Downlight
- Ceiling light

Summarize

JZ1009AE is a linear constant current IC, the output current is adjustable, high precision of constant current, simple application solutions, cost and resistance capacity of step-down, over temperature protection function, safer and more reliable.

Pin figure



Pin Name	Pin NO.	Function
GND1	1	GND1
REXT1	2	Chip current regulation port
NC	3	Dangling feet
NC	4	Dangling feet
OUT	7	Chip current output port
NC	5	Dangling feet
NC	6、8	Dangling feet

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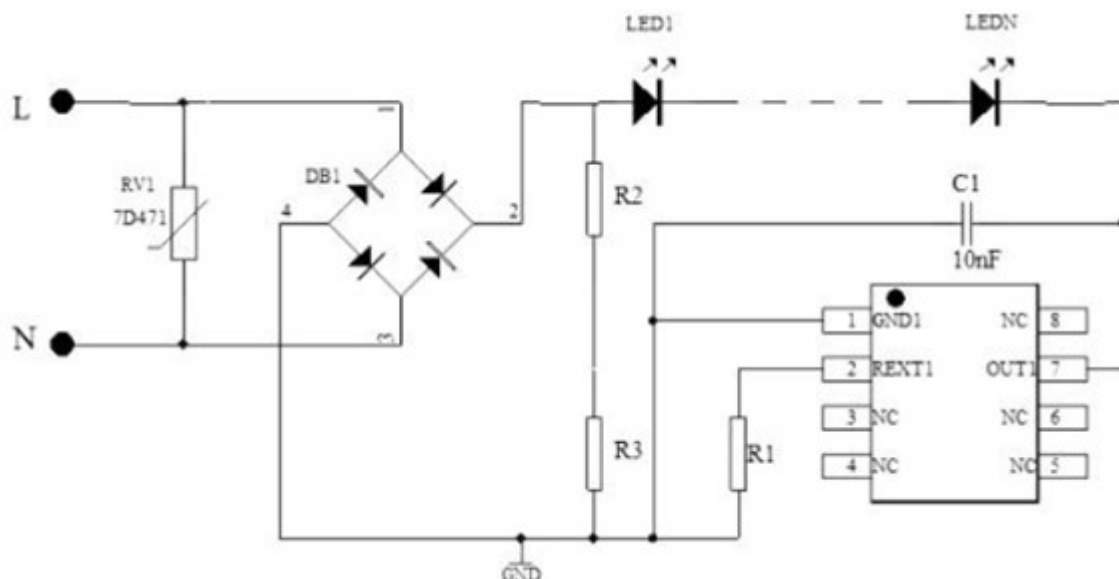
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Typical application solutions



Absolute rating

If no special instructions, the environment temperature is 25℃

Characteristic parameters	Symbol	Range
The OUT port voltage	VOUT	-0.5~450V
The OUT port current	IOUT	5mA~60mA
Working temperature	TOPT	-40℃~+140℃
Storage temperature	TSTG	-50℃~+150℃
ESD stress	VESD	2KV

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Electrical Working Parameters

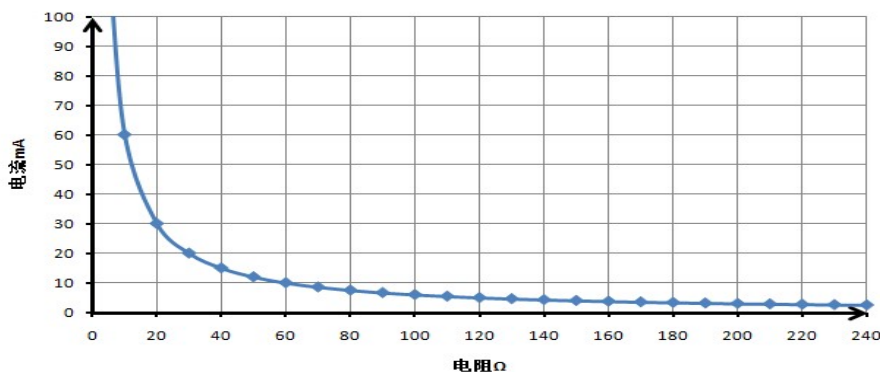
If no special instructions, the environment temperature is 25℃

Parameters	Condition	Min	Typical value	Max	Unit
The OUT input voltage	I _{out} =30mA	6.5	-	-	V
The OUT port withstand voltage	I _{out} =0	450	-	-	V
Current output	-	5	-	60	mA
Quiescent current	V _{out} =10V REXT Dangling	-	0.16	0.25	mA
REXT Port voltage	V _{out} =10V	-	0.6	-	V
I _{out} error	I _{out} =5~60mA		±3%		%
Temperature compensation point	-		135		℃

The out port output current characteristics

JZ1009AE current output computational formula: $I_{out} = \frac{V_{ext}}{R_s} = \frac{600mV}{R_s} (mA)$

电流随电阻变化曲线



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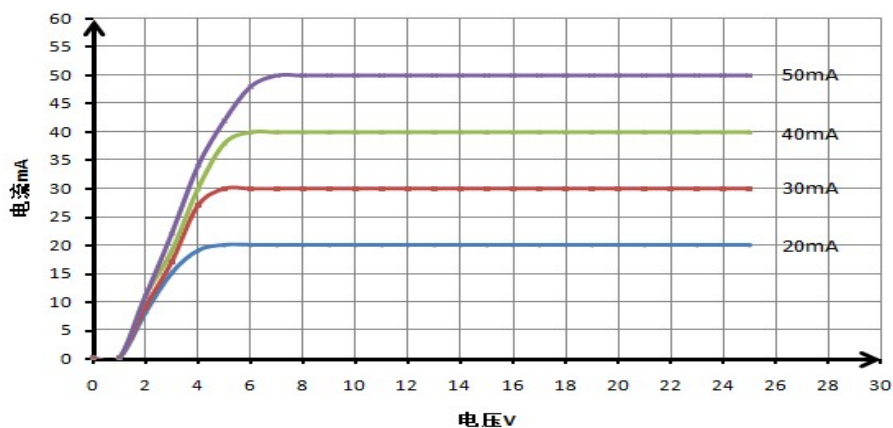
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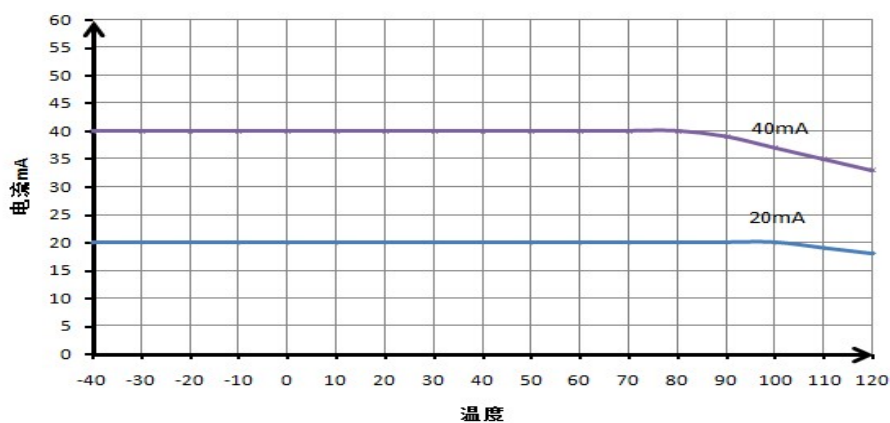
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电流随端口电压变化曲线



电流随结温变化曲线



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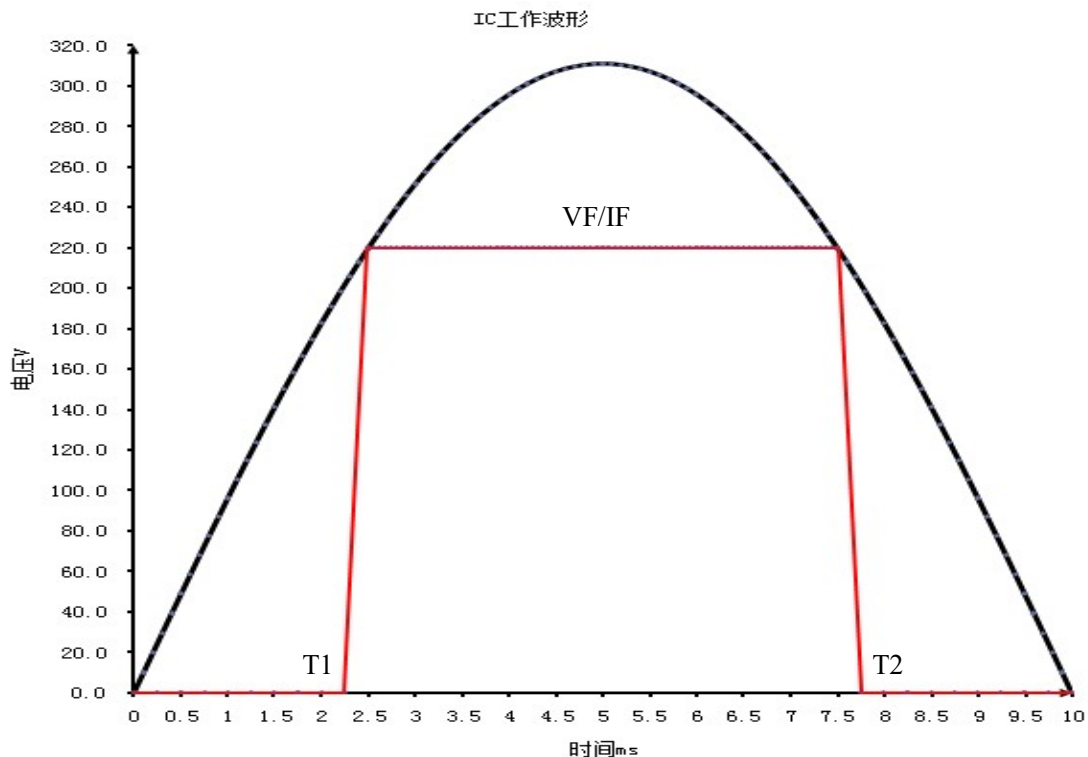
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JZ1009AE theoretical calculation



1、Mains of the wave function is a sine curve(picture 2)describe as follows:

$$u = \sqrt{2}U \sin(2\pi ft + \varphi) \quad (1)$$

Among: U: mains effective value, f: power frequency, Φ : initial phase

The inverse operation of type 1 can be calculated:

$$T1 = \arcsin(V_F / \sqrt{2}U) / 2\pi f \quad (2)$$

$$T2 = 1/2f - \arcsin(V_F / \sqrt{2}U) / 2\pi f$$

This can work out the LED current conduction time:

$$\Delta T = T2 - T1 \quad (3)$$

2、V-I characteristic curve of lamp bead:

By type (2) it can be seen that a LED lamp bead voltage VF influence

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conduction time, affecting the effective current of the LED, as follows:

$$V_F = n * V_{LED} (I_{LED} = 600mA / R) \quad (4)$$

LED resistance R is different, the current is different, the rendered VF is different, will affect the whole of the LED voltage VF

3、LED Power consumption calculation

The effective value of LED current calculation is as follows:

$$I_{LED} = I_F * \sqrt{\Delta T / T} \quad (5)$$

The effective value of LED voltage:

$$V_{LED} = V_F * \sqrt{\Delta T / T} \quad (6)$$

LED power consumption calculation is as follows:

$$P_{LED} = V_{LED} * I_{LED} = I_F * V_F * (\Delta T / T) \quad (7)$$

4、IC Power consumption calculation

Mains voltage and lamp bead voltage difference is the working voltage of IC, the expression is as follows:

$$u_{IC}(t) = u(t) - V(t) = \sqrt{2}U \sin(2\pi ft) - V(t) \quad (8)$$

IC power consumption is on the integral calculation, as follows:

$$P_{IC} = \int_{T1}^{T2} (\sqrt{2}U \sin(2\pi ft) - V_F) * I_F dt / T \quad (9)$$

5、Power efficiency calculation

$$\eta = P_{LED} / (P_{LED} + P_{IC} + P_{固有损耗}) \% \quad (10)$$

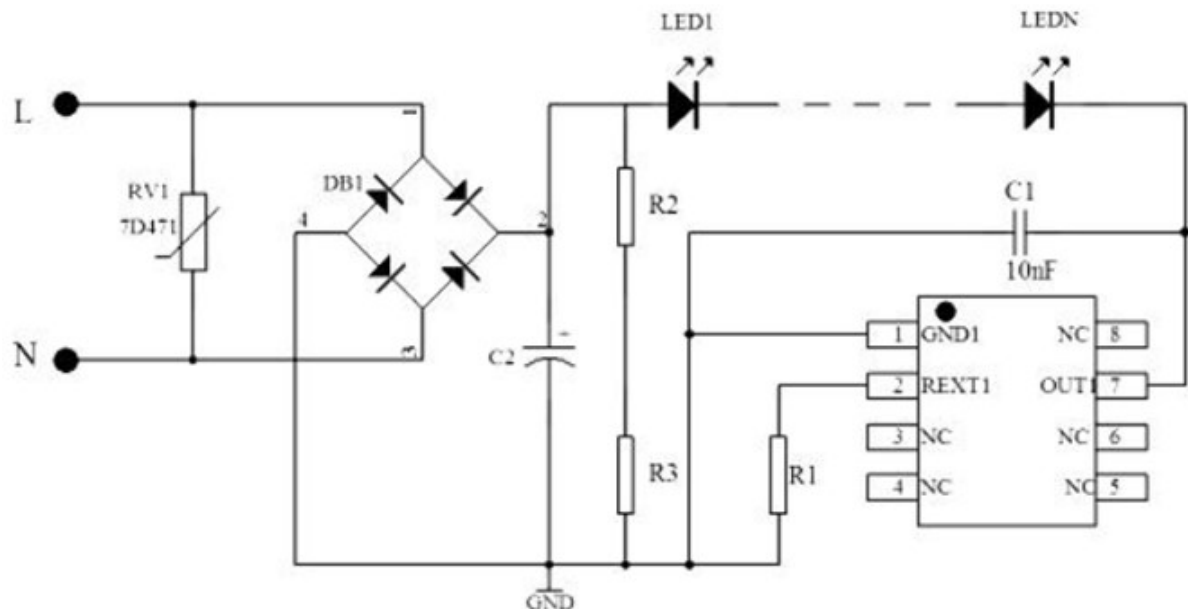
Lines of the inherent loss refers to the switching loss of IC, line

loss, the wastage of the rectifier bridge and other related loss these values cannot be calculated, but by contrast experiment we can conclude that the depletion approximation is a fixed value.

At this point, all the theoretical calculation about JZ1009AE IC has been completed, can make the graphical user interface to the above formula, which can simulate the photovoltaic module in different lamp bead amount different feedback resistance, under the condition of different types of lamp bead the change of the power and power efficiency, reference < JZ1009AE application design form>

Application solutions instance

1、The PF value of 0.5 90% efficiency without stroboscopic scheme



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In the scheme:

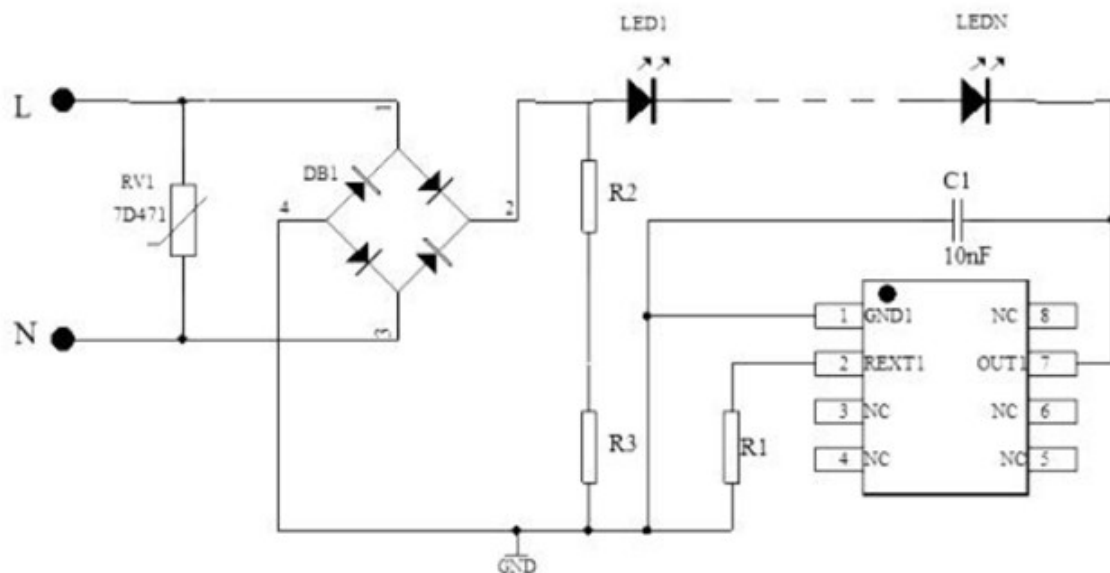
When input voltage is AC220V, design LED lamp bead series voltage control between 270-290V;

Capacitance C2 can smoothing to power supply, improve the average of the power supply voltage, so as to improve the efficiency of power supply, but PF only about 0.5 of the whole machine;

Varistor RV1, capacitor C1 main anti surge buffer effect, to avoid IC is punctured immediately, improve the product reliability;

Resistance R2 and R3 is discharge resistance, resistance R1, can be used to adjust the LED constant current value, specific see IC output current were calculated.

2、 PF value of 0.9 80% efficiency low cost solution



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In the scenario above:

Input voltage is AC220V LED series voltage control between 220-240V, low voltage LED lamp string increases IC loss, reduce the power conversion efficiency. This plan line PF value around 0.9;

MOV RV1, capacitor C1 main anti surge buffer effect, to avoid IC is punctured immediately, improve the product reliability;

Resistance R2 and R3 is discharge resistance, resistance R1, can be used to adjust the LED constant current value, specific see IC output current were calculated.

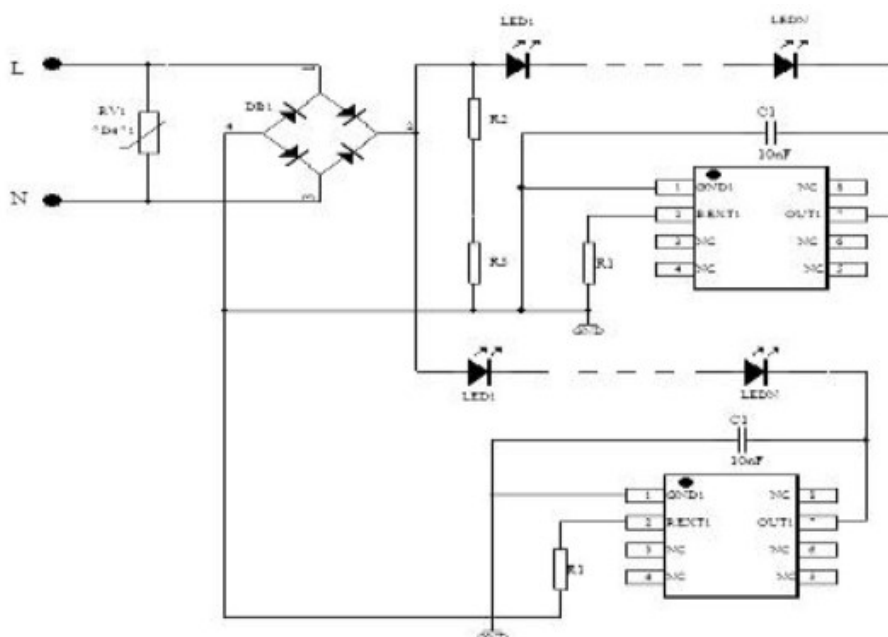
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3、IC extension application solutions



IC 分别控制灯串

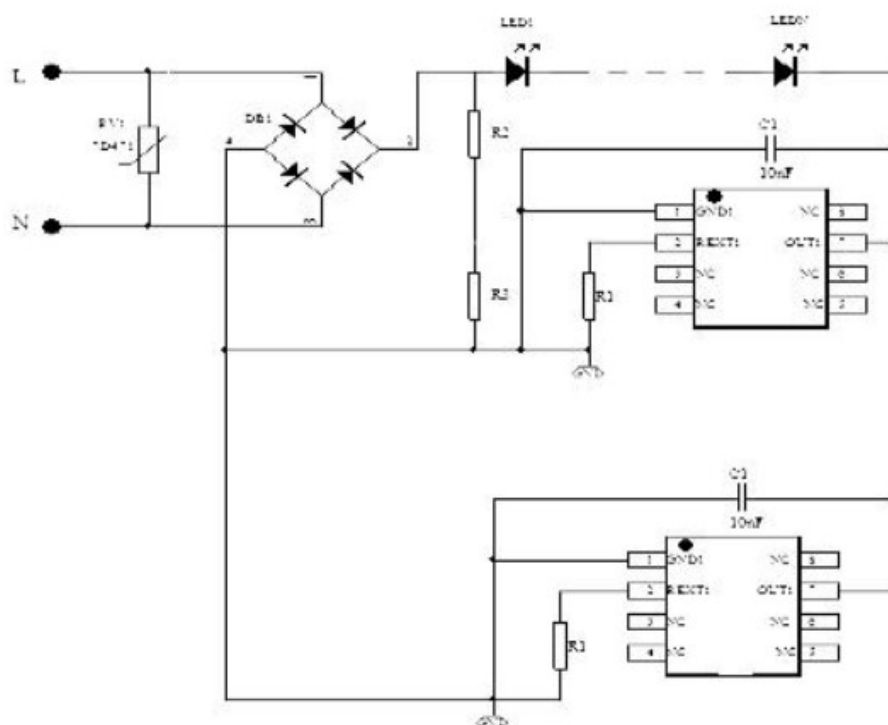
IC controlled twinkle light, respectively

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IC 并联控制灯串

IC parallel controlled twinkle light

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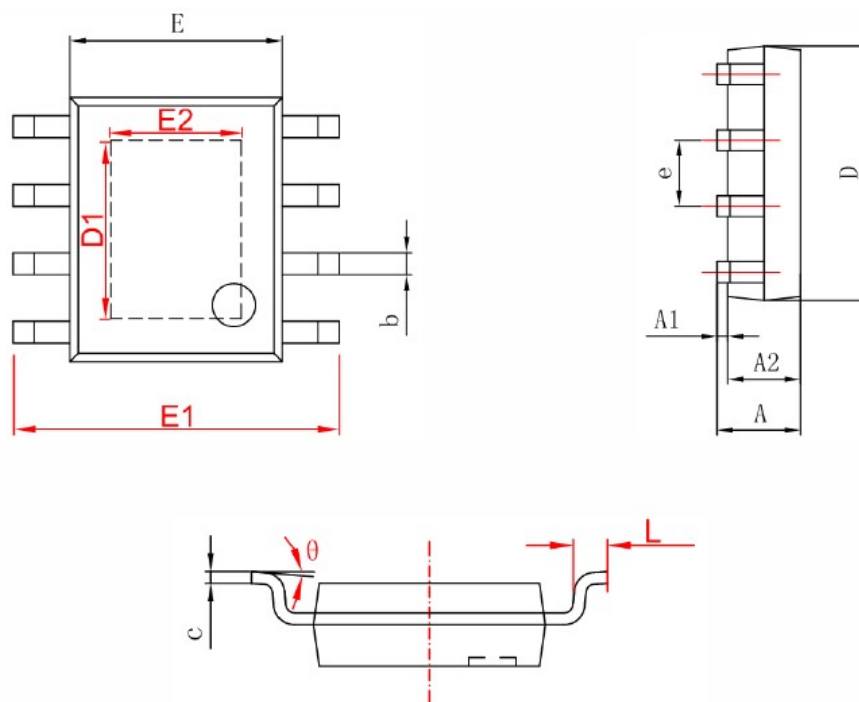
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Packaging form

ESOP-8



	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.050	0.150	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
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.313	2.513	0.091	0.099
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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