长运通半导体
CYT Semiconductor

CYT1000A Linear Constant Current IC

CYT1000A SPECIFICATION

Specialty

- Output current is adjustable 5mA-60mA , constant current precision can reach±3%;
- With over-temperature protection function;
- No EMC Question;
- IC driver and LEDs can share the same Aluminum plate(PCB);
- The circuit is simple, low cost;
- Packaging: ESOP-8;

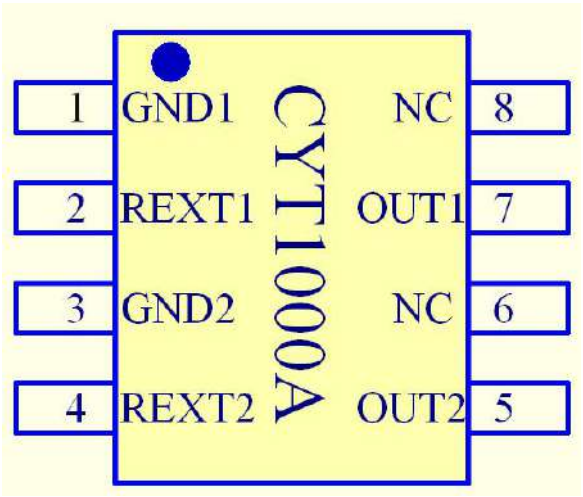
Application field

- Bulb light
- Tube light
- Down light
- Ceiling light

Summarize

CYT1000A 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.

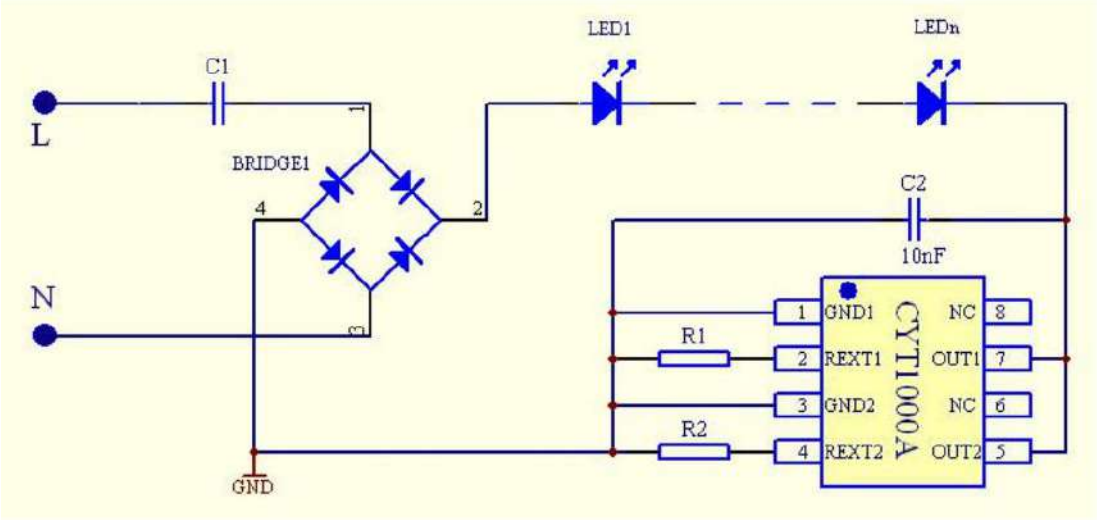
Pin figure



Pin Name	Pin NO.	Function
GND1	1	GND1
REXT1	2	Current regulation port chip1
GND2	3	GND2
REXT2	4	Current regulation port chip2
OUT1	7	Current output port chip1
OUT2	5	Current output port chip2
NC	6、8	Dangling feet

CYT1000A Linear Constant Current IC

Typical application solutions



Absolute rating

If no special instructions, the environment temperature is 25℃

Characteristic parameters	Symbol	Range
The OUT port voltage	VOUT	-0.5～250V
The OUT port current	IOUT	5mA～60mA
Working temperature	TOPT	-40℃～+120℃
Storage temperature	TSTG	-50℃～+150℃
ESD stress	VESD	2KV

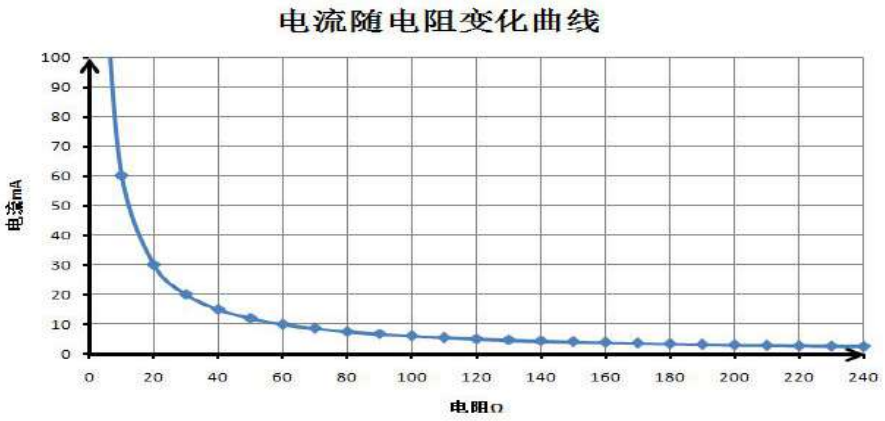
Electrical Working Parameters

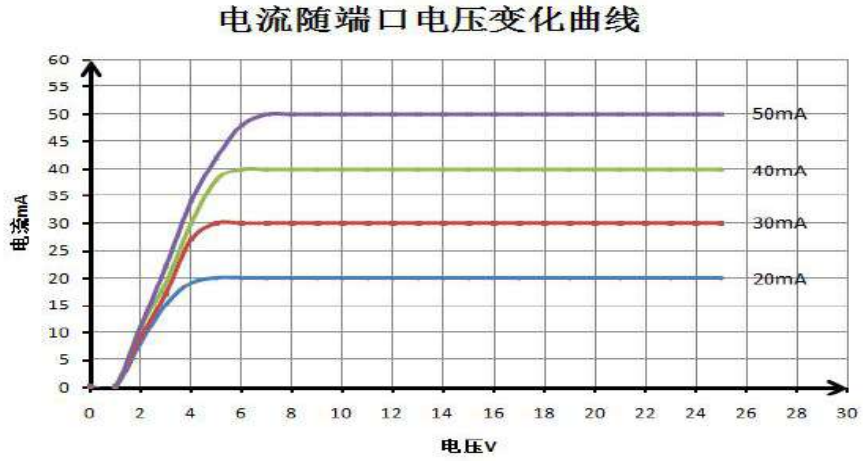
If no special instructions, the environment temperature is 25℃

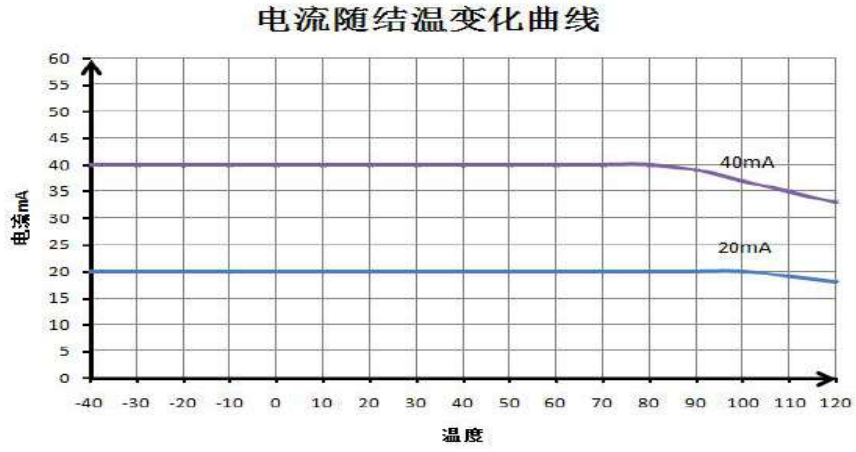
Parameters	Condition	Min	Typical value	Max	Unit
The OUT input voltage	Iout=30mA	6.5	-	-	V
The OUT port withstand voltage	Iout=0	250	-	-	V
Current output	-	5	-	60	mA
Quiescent current	Vout=10V REXT Dangling	-	0.16	0.25	mA
REXT Port voltage	Vout=10V	-	0.6	-	V
Iout error	I out=5～60mA		±3%		%

The out port output current characteristics

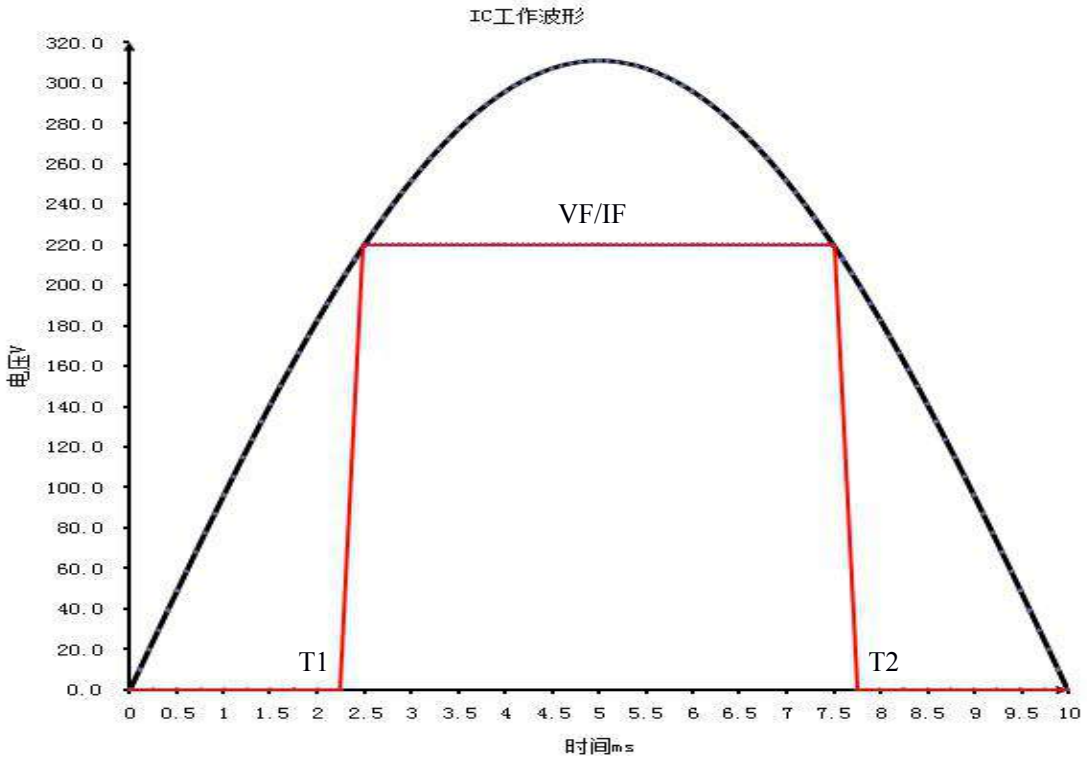
CYT1000A current output computational formula: $I_{out} = \frac{V_{rext}}{Rs} = \frac{600mV}{Rs}(mA)$







CYT1000A 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:

$$T1 = \arcsin(V_F / \sqrt{2}U) / 2\pi f$$
$$T2 = 1/2f - \arcsin(V_F / \sqrt{2}U) / 2\pi f \quad (2)$$

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

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

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:

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

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

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

5、Power efficiency calculation

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

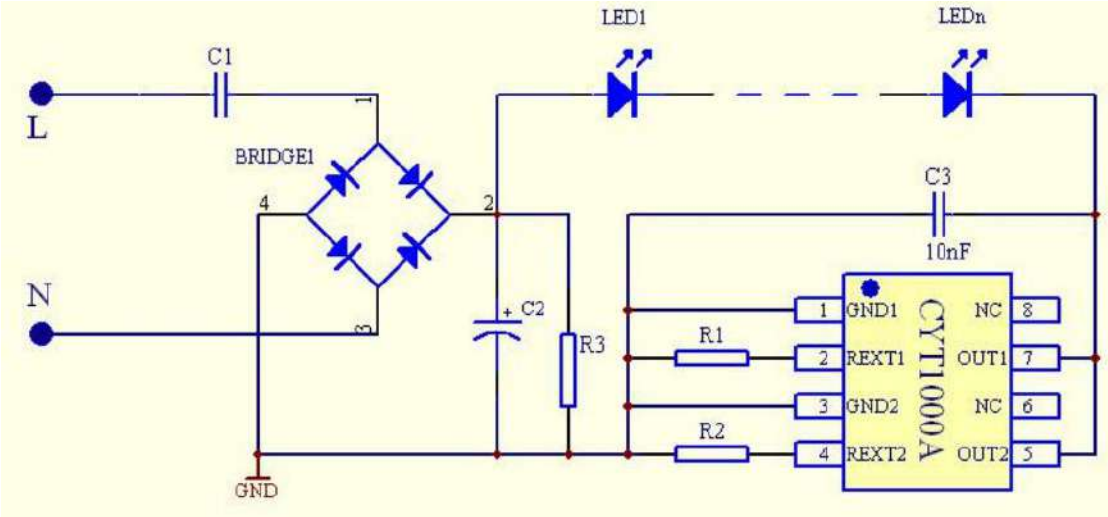
Lines of the inherent loss refers to the switching loss of IC, line loss, the wastage of the rectifier bridge and other related loss these values cannot be calculated, but by contrast experiment we can conclude that the depletion approximation is a fixed value.

At this point, all the theoretical calculation about 1000A 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 < 1000A application

design form>

Application solutions

1、The PF 0.5, 90% efficiency flicker free solution:



In the scheme:

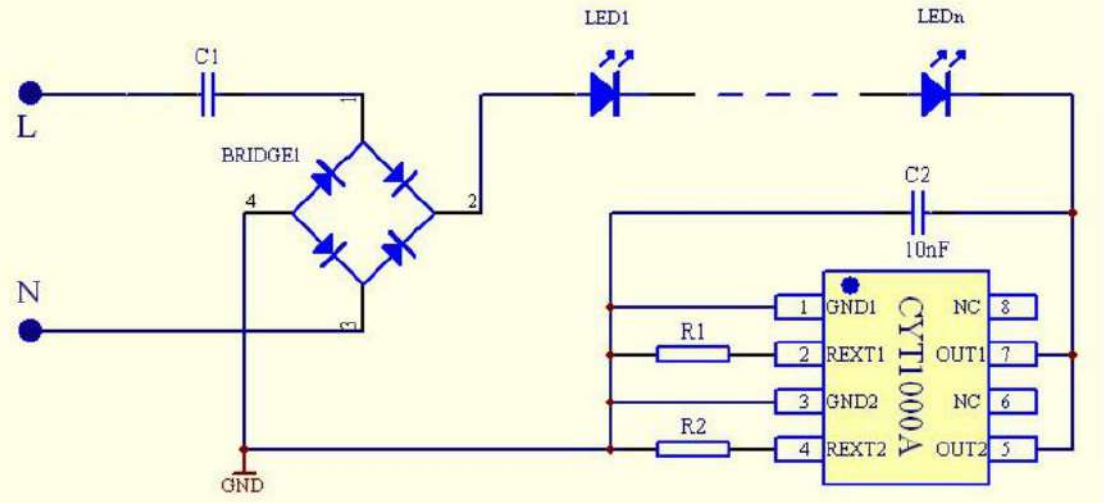
When LED series voltage of 270-285v, can do not need to buck capacitor C1, when the LED lamp bead amount is small, by choosing appropriate capacitance and regulate the flow of constant value, can achieve the best power efficiency, suitable for 3 to 5 w light source module;

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

Capacitor C3 main anti surge buffer effect, avoid IC moment is punctured, improve product reliability;

Resistance RS can be used to adjust the LED constant current value, specific see IC output current were calculated.

2, The PF 0.9, 80% efficiency low cost solution



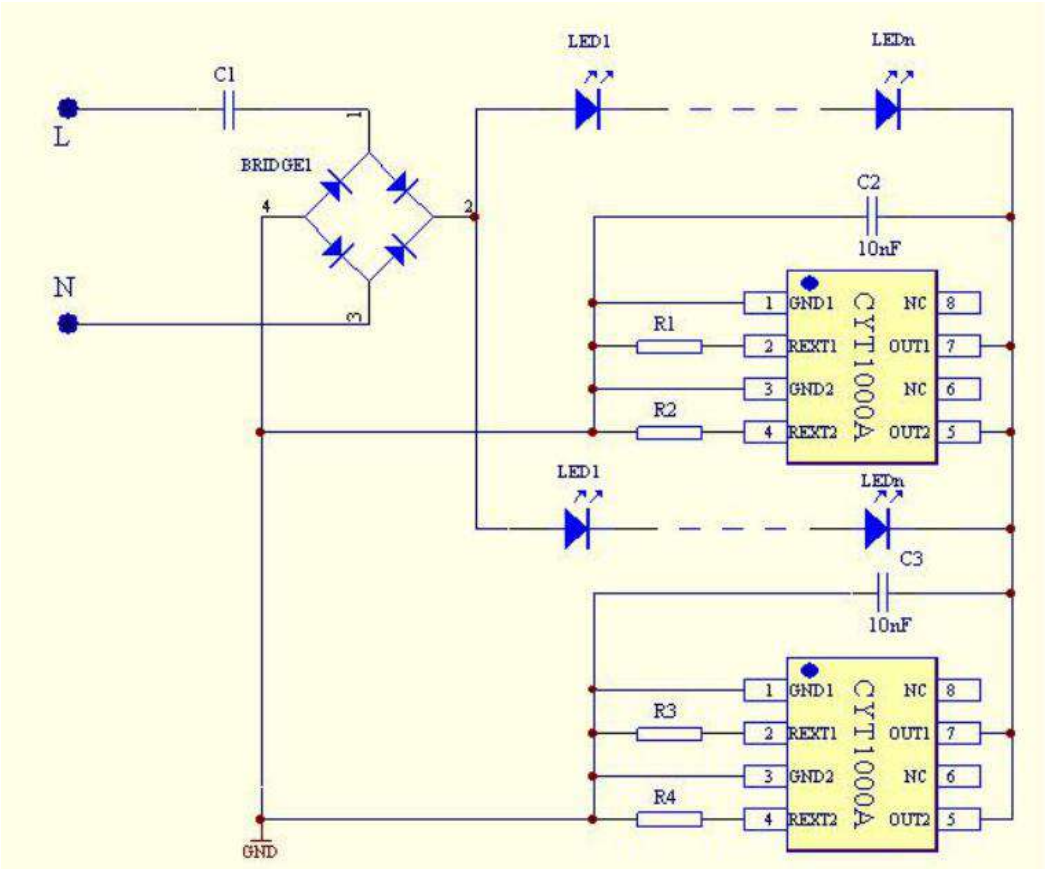
In the scenario above:

Input voltage is AC220V LED series voltage control between 220-240 v, low voltage LED lamp string increases IC loss, reduce the power conversion efficiency. This plan line PF value around 0.9;When the LED lamp bead amount is small, by choosing appropriate buck capacitor C1 and regulating constant current value, can achieve the best power efficiency and PF value, suitable for 3-5 w light source module;

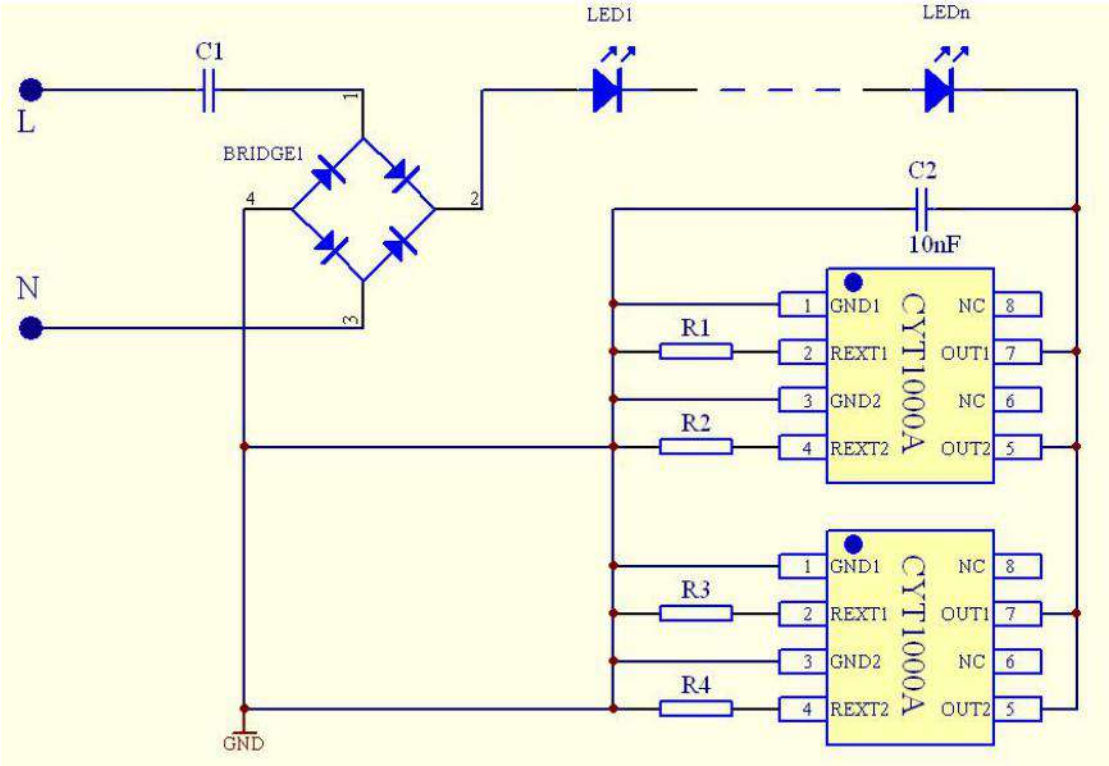
Capacitance C2 main anti surge buffer effect, avoid IC moment is punctured, improve product reliability;

Resistance RS can be used to adjust the LED constant current value, specific see IC output current were calculated.

3, IC extension application solutions



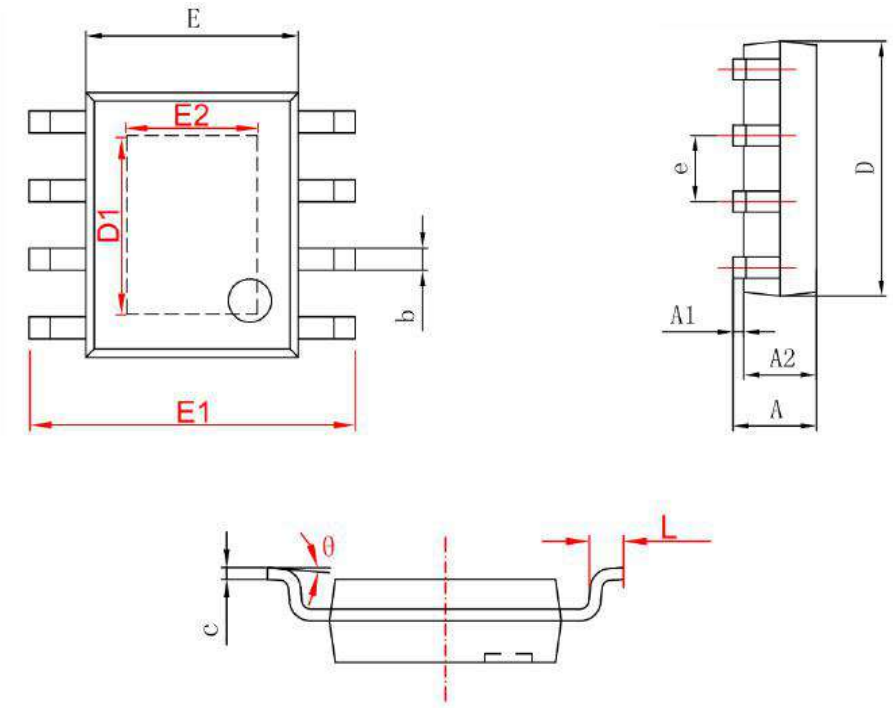
IC control LEDs in Parallel respectively



IC parallel control LED in series

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°