HA220XXPB
High Voltage LED Constant Source IC

General Description

Constant current source IC is a kind of power supply converter with a constant current output. This constant current source IC is mainly applied to supply power of LEDS in series. When the input voltage is 220VAC, with red LED, the number of LEDs in series can up to 110. The input voltage is 85-240VAC,output a constant current that the value can be preset by peripheral resistance.

The peripheral circuits is concise, the whole circuits structure is very small in volume wi th no inductance and transformer, which can be set in LED lamps and lanterns with a small volume.

Features

► Wide input range 85 to 240VAC
► >95% efficiency(Test conditon: With resistance load, between IC two ends)
► Range of output constant current: 10mA to 80mA(Preset by peripheral circuit)
► The number of LEDs series: $n \leqslant 0.9VinDC/VF$. n is the number of LEDs in series single circuit ;VinDC is the voltage of commutate input; VF is forward voltage dr of each LED
► Precision: $\pm 2.5\%$ $\pm 5\%$; $\pm 10\%$
► Good property of EMC
► Range of Temperature -40℃～ 85℃
► Good stability, high performance cost ratio, and the usage perfomance parameter won't change in large range working voltage and temperature
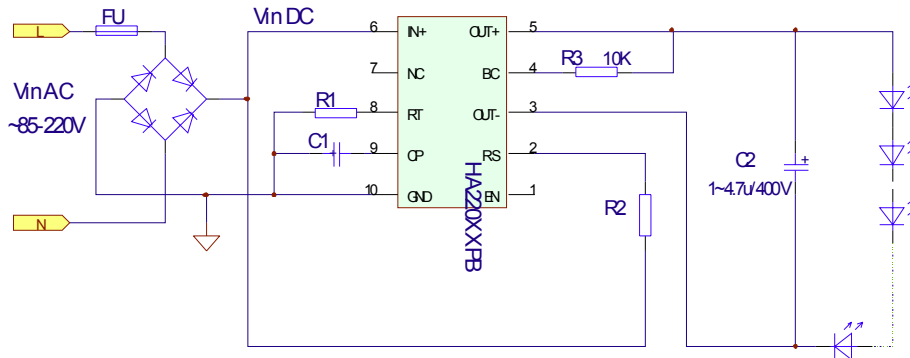► Package: DIP-10

Applications

► LED lighting device
► Electronic display
► Industry lighting facility
► Decorative lighting facility and bulb
► LCD Plane display backlight
► Other LED driver that needn't isolated from power supply

Block Diagram

HA220XXPB
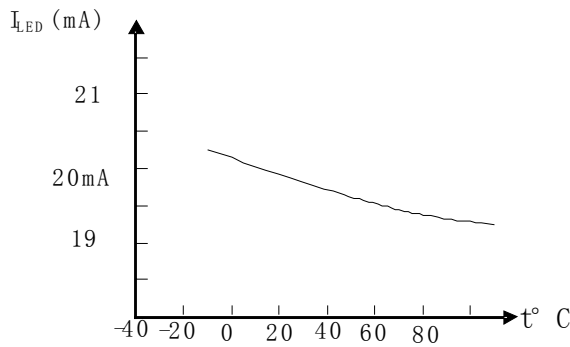# High Voltage LED Constant Source IC
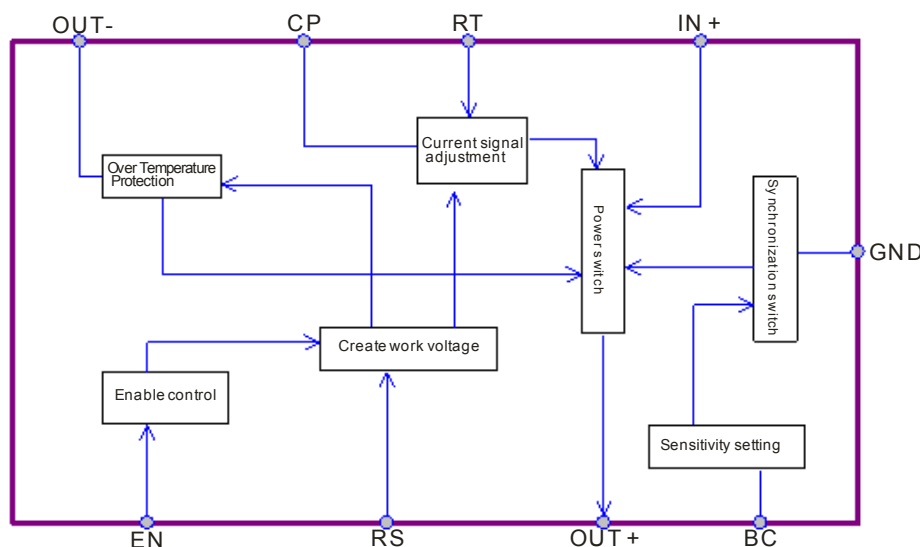
Typical Applications

Remark: This type High power constant current source of HA220XXPB IC comes from the old type HA220XXP IC .
Besides current preset resistance R1 and operating resistance R2 number revision, other parameters are invariable.

Typical Temperature Diagram

Type temperature curve (set current=20mA)

PIN Descroptions

Pin	Symbol	Definition	Pin	Symbol	Definition
1	EN	Enable port	2	RS	Start-up resistance
3	OUT-	Negative output	4	BC	compensatory resistance
5	OUT+	Positive output	6	IN+	Positive input
7	NC	No use	8	RT	Regulate current
9	CP	Smoothing	10	GND	Ground

Explain

1. $\sum VF \leqslant 0.9Vin$, VF is forward voltage drop of each LED.
2. For the type HA22002PB(20mA)IC the total voltage drop of a LED string more than 30V is better. That means the number of LEDs in series need more than 16pcs in a loop (the red LED work voltage is 1.8V).For the type HA22004PB(40mA

HA22006PB(60mA) IC the total voltage drop of a LED string more than 90V is better.If there are two or several LED string merging, each string should with the same number of LEDs.

3. The best range of output constant current source: 150V-180V.

4. Current regulating resistance R1

20mA **(HA22002PB)**	47 Ω /0. 5W	The current range : 20mA±20% Current increase 1mA,Resistance decrease 2Ω Current decrease 1mA,Resistance increase 2Ω
40mA **(HA22004PB)**	24 Ω /1W	The current range: 40mA±20% Current increase 2mA, Resistance decrease1 Ω Current decrease 2mA, Resistance increase1 Ω
60mA **(HA22006PB)**	15 Ω /1–2 W	The current range: 60mA±20% Current increase 3mA, Resistance decrease 0.6 Ω Current decrease 3mA, Resistance increase 0.6 Ω

The Relationship of Current and Resistance

5. Resistance R2:resistance value=0.8*input voltage*1K Ω(range of resistance ±5%）, power value: 1W.example:when Vin=220V ,R2=220*0.8=180 KΩ.   (It's better for the IC away from the resistances R1 and R2 when design.)

6. R3 is the current compensatory resistance, recommend use 10 KΩ 1/16W ～ 1/8W resistance .

7. C2: Filter capacitance(the recommendation is 1～4. 7uF/400V ）

8. C1:Smoothing capacitance(For the types of HA22002P and HA22004P, peripheral capacitance C1 is 100uF/16V,and HA22006P, peripheral capacitance C1 is 100uF/25V)

9. Warning note: don't use Filter Capacitance follow the bridge circuit.

10. The method of how to count out the most number of LED it can bring with example: Suppose input voltage VinAC=220V,then VinDC = 220 V×0.9 = 198 V. For example drive white LED light, suppose each white light Vr=3.3V, thus, it can bring 198V/3.3V=60.If the electrical network voltage is low when voltage supply, in order to ensure IC has enough adjustment scope to drive the LED to be able the normal work , This time above mathematical formula While coefficient 0.9. ∑VF = 198V × 0.9 =178V. Now the most number of white LED light it can drive can achieve 178V/3.3V=54. This computational method has considered ViAC±15% range of variation. If the AC input is under the stabilzed voltage, the quantity of LEDs can be added more.

11. The first pin is Enable port, effectual when vacant and turn off when on high level. This pin can not connect with low level. The following circuit diagrams are two modes to enable the IC. Fig (a) is for segregated mode enabling, Fig (b) is for un-segregated mode enabling.

Remark: When using EN pin to control the circuit on or off, add an inductance to limit the current ascender (di/dt). Red LED obvious in particular under this protect effect. Its value can be 1 to 2.2mH, and the max permissible current should be more 1.3 times actual current across the LED load.
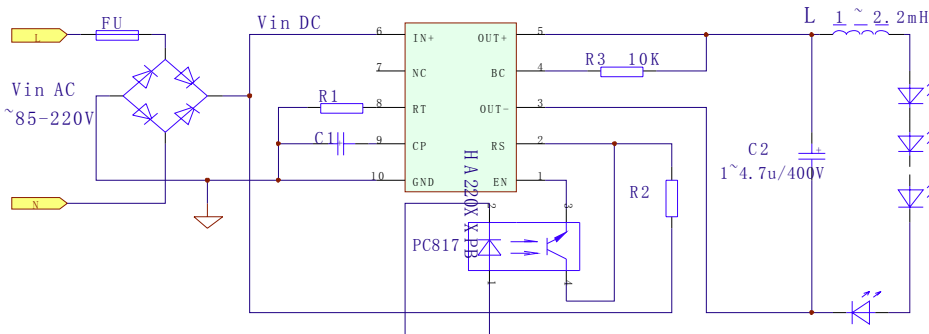
Fig (a) Segregated mode enabling

Optical coupler closed, IC is on work; while open it the IC inner circuit will disconnect and won't work.
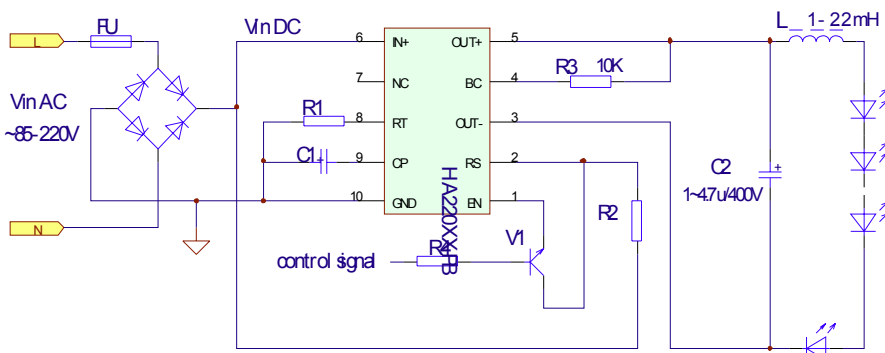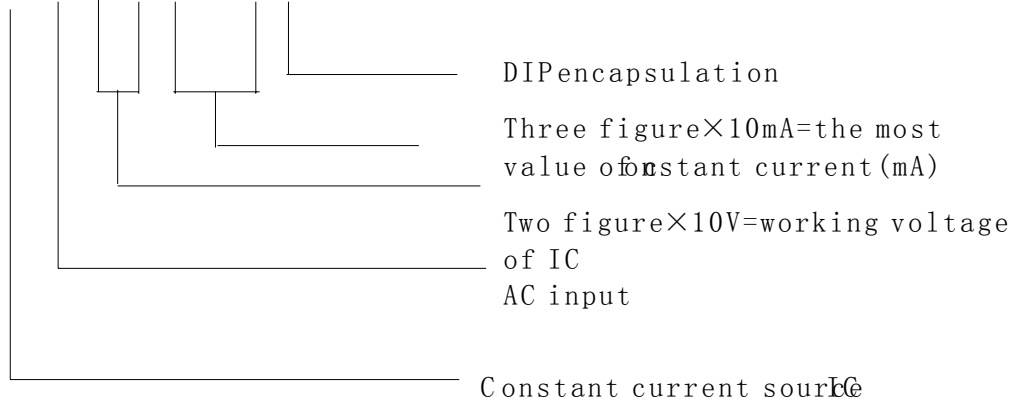

Fig (b) Un-segregated mode enabling

EN: Enable port, vacant is effectual; high level is off. This pin forbid to connect low level. The transistor V1 recommend type 9301 or 8050, and R4 recommend value 4.7K or 5.1K when R4 input voltage is 5V. Note: this un-segregated mode enabling can only be used when control signal and constant source IC can share the same ground pole.
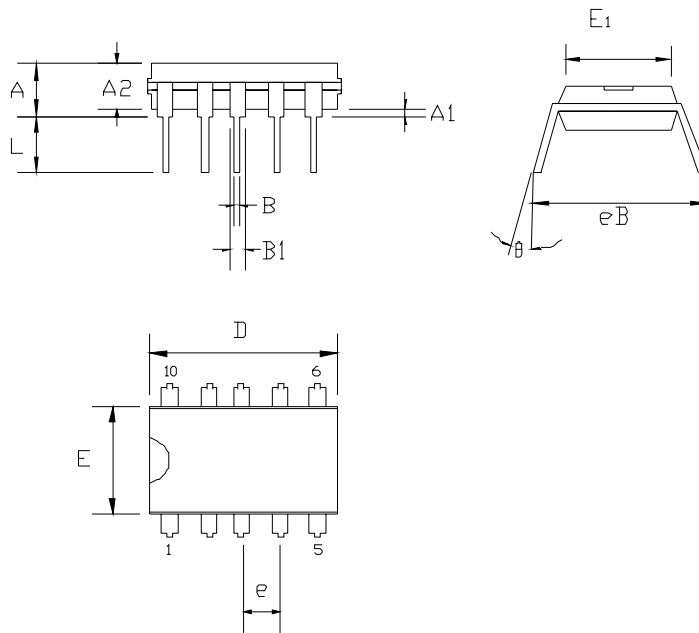
Type informations

H A 2 2 X X X P B

DIP encapsulation

Three figure×10mA=the most value of constant current (mA)

Two figure×10V=working voltage of IC

AC input

Constant current source IC

Package informations

Symbol	A	A1	A2	D	E	E1
Dimensions(mm)	4.20-4.30	0.05-0.15	4.00-4.10	11.65-11.80	7.25-7.30	6.55-6.75
Symbol	eB	B	L	e	θ	
Dimensions(mm)	8.50-9.50	050-0.60	3.50-4.55	2.50-2.60	15°-20°	