BP5336H

Multi-segments AC/DC Linear LED Driver

Description

BP5336H is a high precision multiple segments linear constant current LED driver, which integrates 700V MOSFET and HV power supply circuit. It is mainly used to drive high voltage LED chips supplied by mains. Without electrolytic capacitors and magnetic components, the LED driver can achieve small size, long life and meet EMI requirements.

BP5336H can precisely set the current of LED through external resistor, and THD can be optimized by adjusting the forward voltage ratio of each segment.

BP5336H has thermal fold back function. When the IC's temperature is too high, the LED current will be reduced.

BP5336H integrates input voltage compensation function. When the input voltage is too high, BP5336H will reduce the output current according to the external compensation resistance to ensure that the input power does not change a lot.

BP5336H optimizes pin definition, facilitates layout and saves jumper resistor in multi-chip parallel connection.

Features

- Simple BOM and compact size
- No E-cap and magnetic components
- Integrate 700V MOSFET for each segment
- Save jumper resistor in multi-chip parallel connection
- Can work under ±20% line voltage variation
- Fast start up
- ±5% output current accuracy
- LED current set by external resistor
- Input voltage compensation
- Integrate thermal fold back
- SOP8-EP package

Application

- LED retrofit
- LED downlight
- Others

Typical Application

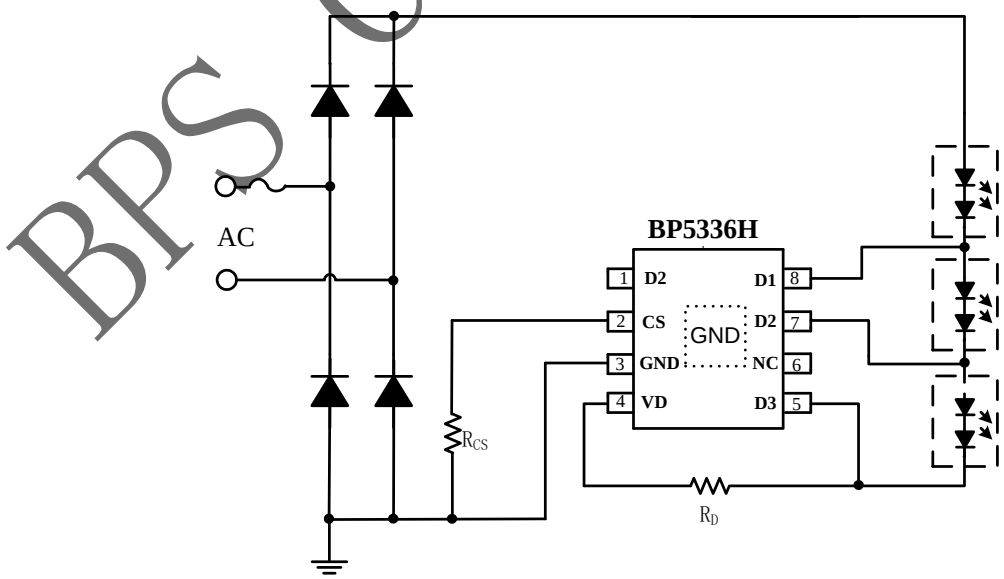
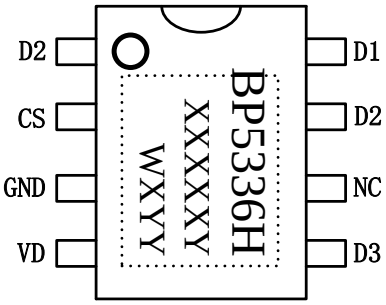


Fig.1 BP5336H Typical Application

Ordering Information

Part Number	Package	Temperature Range	Tape & Reel	Marking
BP5336H	SOP8-EP	-40 ℃ to 105 ℃	Tape 4,000 pcs/reel	BP5336H XXXXXY WXYY

Pin Configuration



XXXXXY: Lot Code
WX: Reserved code
YY：Week

Fig.2 Pin Configuration

Pin Definition

Pin Number	Pin Name	Description
1	D2	Drain of LED string 2
2	CS	Current sense, need to connect resistor to GND
3	GND	IC ground
4	VD	Voltage compensation, connect resistor to D3
5	D3	Drain of LED string 3
6, E-pad	NC	Floating
7	D2	Drain of LED string 2
8	D1	Drain of LED string 1

Absolute Maximum Ratings (note1)

Symbol	Parameters	Range	Units
D1，D2，D3	Internal MOSFET drain voltage	700	V
CS,VD	Low voltage interface	-0.3~6	V
P_{DMAX}	Power dissipation (note 2)	1	W
θ_{JA}	Thermal resistance	60	℃/W
T_J	Operating junction temperature	-40 to 150	℃
T_{STG}	Storage temperature range	-55 to 150	℃

Note 1: *Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. Under "recommended operating conditions" the device operation is assured, but some particular parameter may not be achieved. The electrical characteristics table defines the operation range of the device, the electrical characteristics is assured on DC and AC voltage by test program. For the parameters without minimum and maximum value in the EC table, the typical value defines the operation range, the accuracy is not guaranteed by spec.*

Note 2: *The maximum power dissipation decreases if temperature rise, it is decided by T_{JMAX}, θ_{JA}, and environment temperature (T_A). The maximum power dissipation is the lower one between $P_{DMAX} = (T_{JMAX} - T_A)/ \theta_{JA}$ and the number listed in the maximum table.*

Recommendation for Operation Condition

Symbol	Parameters	Range	Units
I_{LED}	LED output current @ Vout=250V Input voltage：176~265Vac	<40	mA
I_{LED}	LED output current @ Vout=132V Input voltage：108~132Vac	<80	mA

Electrical Characteristics (note 3,4)(unless specified, otherwise T_A=25℃)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
Operation Current						
I_{CC}	Operation current	D1=30V		200		uA
Current Sense						
V_{REF1}	Ref. for string 1	D1=30V，Rcs=120Ω		360		mV
V_{REF2}	Ref. for string 2	D1，D2=30V，Rcs=120Ω		425		mV
V_{REF3}	Ref. for string 3	D1，D3=30V，Rcs=120Ω	475	500	525	mV
Thermal Regulation						
T_{REG}	Thermal regulation			140		℃

Note 3: *production of the chip is performed at 25℃.*

Note 4: *the maximum and minimum specified are guaranteed by test, the typical value are guaranteed by design, characterization and statistical analysis.*

Internal Block Diagram

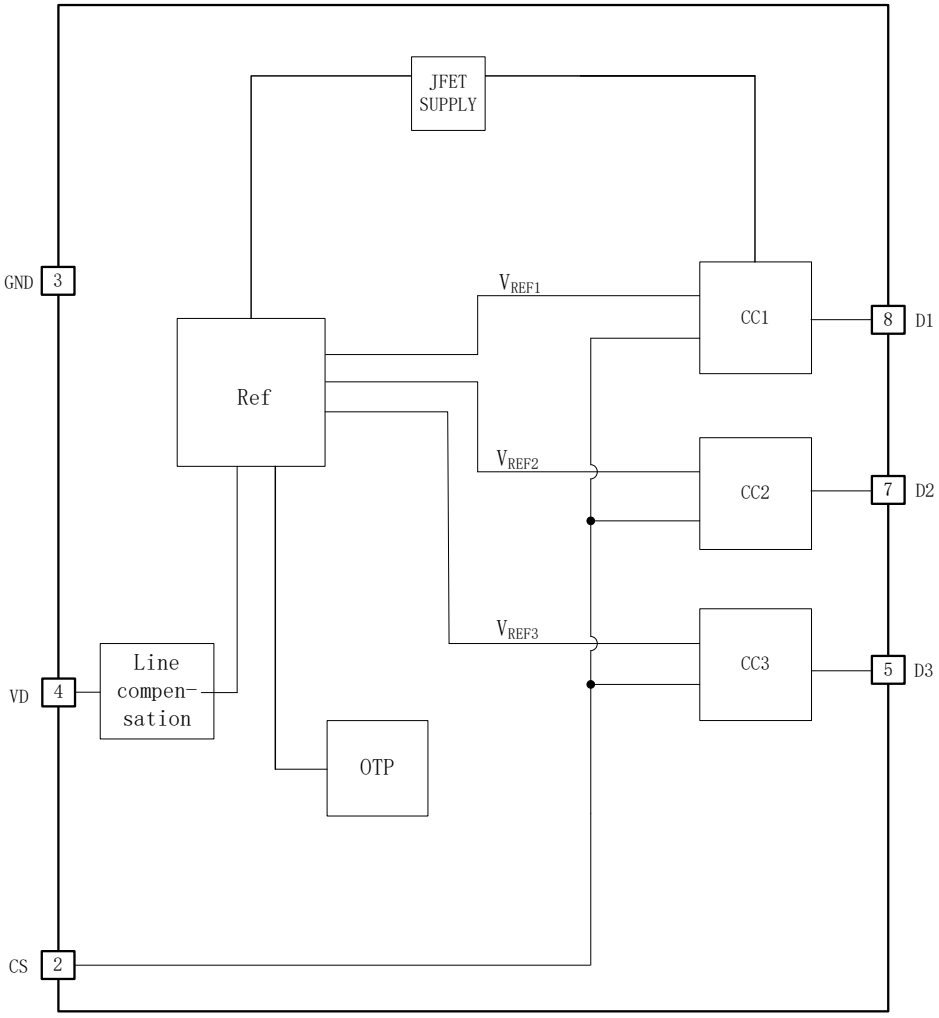


Fig.3 Internal Block Diagram

Application Information

BP5336H is a high precision multiple segments linear constant current LED driver, which integrates 700V MOSFET and HV power supply circuit. It is mainly used to drive high voltage LED chips supplied by mains. Without electrolytic capacitors and magnetic components, the LED driver can achieve small size, long life and meet EMI requirements.

1 Supply

After power on, the chip is supplied by JEFT through D1, starting work once voltage on D1 above 10V.

2 Operation principle

BP5336H automatedly lights the LED strings one by one according to line voltage and extends the LED working strings in every main cycles with purpose of output lumen maintenance and LED utilization improvement. BP5336H can automatedly work under different LED string's voltage, no need to set switch point outside. For different application, the forward voltage of all strings should match the input voltage, like 110V and 220V respectively.

3 Current Configuration

BP5336H supports high precision LED current set by

external resistors.

Current for each string defined as：

$$I_{LEDn} = \frac{Vref_n}{Rcs}$$

where， n=1,2,3 refers to the different Reference Voltage for each string.

4 Thermal Regulation

BP5336H has thermal regulation available to balance the power delivering and temperature increasing. To improve the system reliability, the output current to be regulated lower down refer to the junction temperature.

The temperature threshold of thermal regulation is 140℃.

5 Input Voltage Compensation

When LED string 3 on, in order to save the power loss, the system will decrease the LED current following voltage on D3 pin. The decreased value is defined as:

$$V_{REF3} = 0.5 - \frac{1.26K\Omega}{R_D} * (V_{D3} - 1)$$

Where R_D is the compensation resistor between D3 and VD pin.

PCB Layout Suggestion

Suggestion for BP5336H PCB layout：

GND

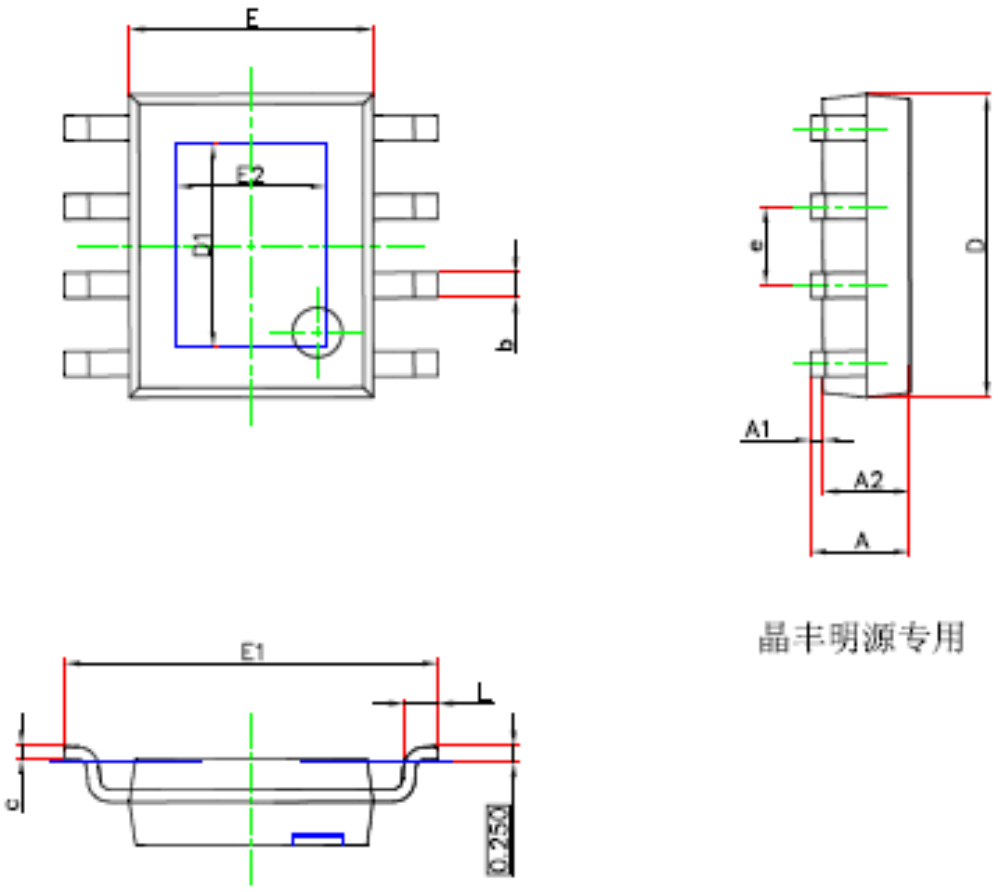
Use the trace for current sense resistor as short as possible. Extend the copper area for each Drain Pin to improve good thermal condition.

Heat sinking

BP5336H adopts SOP8-EP package to strengthen the thermal dissipation, so that connect E-pad to GND to decrease thermal resistance.

Package Information

SOP8-EP (EXP PAD) PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.700	0.053	0.067
A1	0.000	0.100	0.000	0.004
A2	1.350	1.550	0.053	0.061
c	0.170	0.250	0.007	0.010
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
L	0.400	1.270	0.016	0.050
b	0.330	0.510	0.013	0.020
D	4.700	5.100	0.185	0.201
D1	3.202	3.402	0.126	0.134
e	1.270 BASIC		0.050 BASIC	
θ	0°	8°	0°	8°