晶丰明源半导体

BP5912B

Color Temperature Switch LED Driver

Description

The BP5912B is a special color temperature switch LED driver，the BP5912B integrates two 0.5A/400V silicon controlled rectifier，realize color temperature switch function by detecting the LED driver switching waveform directly， the BP5912B maximally simplify the periphery components number，ensure the logical consistency when the multiple power supply applications. BP5912B can work conveniently in Flyback，Buck and Buck-Boost topology structure.

The BP5912B can realize the conversion between warm and cool color by the DET pin switching state detection.

The BP5912B uses SOP-8 package.

Features

- Integrates switching state detection circuits
- Built-in two 0.5A/400V silicon controlled rectifier
- Fixed two kinds of color temperature switch
- VDD short protection
- Available in SOP-8 package

Applications

- LED ceiling lamp
- LED Panel light
- LED Bulb
- Other LED lighting

Typical Application

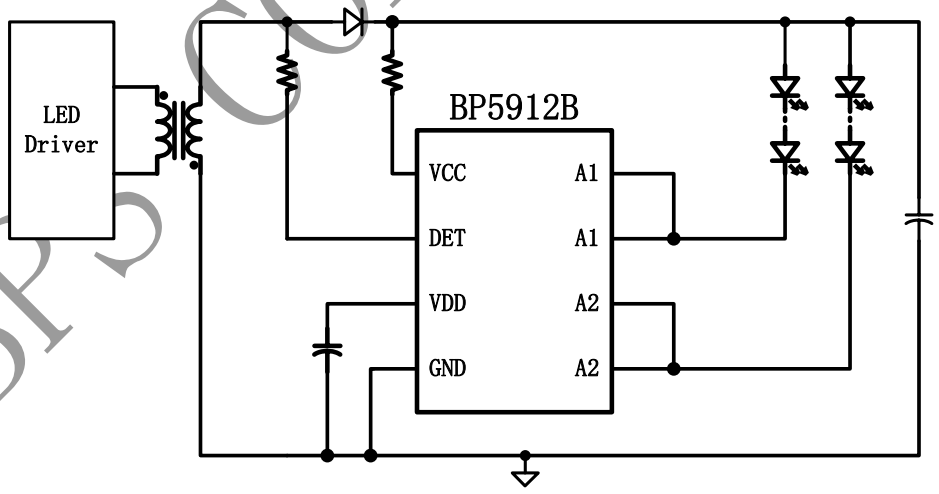
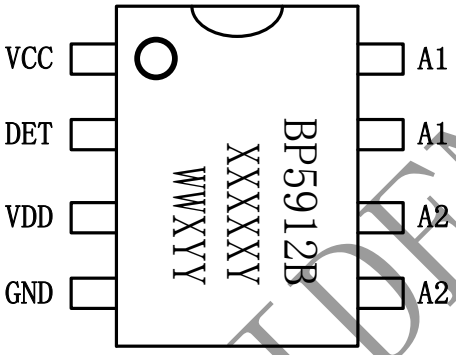


Figure 1. Typical application circuit for BP5912B

Ordering Information

Part Number	Package	Operating Temperature	Package Method	Marking
BP5912B	SOP-8	-40 ℃ to 105 ℃	Tape 4,000 pcs/Reel	BP5912B XXXXXY WWXYY

Pin Configuration and Marking Information



XXXXXY: lot code
WW: sign
X: Year
YY: Week

Figure 2. Pin configuration

Pin Definition

Pin No.	Name	Description
1	VCC	Power Supply Pin.
2	DET	Switching detect pin.
3	VDD	Internal power supply pin，Connect a bypass capacitor from this pin to GND.
4	GND	Ground.
5,6	A2	Built-in SCR for second via，connected to LED cathode
7,8	A1	Built-in SCR for first via，connected to LED cathode

Absolute Maximum Ratings (note1)

Symbol	Parameters	Range	Units
A1，A2	Anode of built-in SCR	-0.3~400	V
VCC	Power Supply Pin	-0.3~20	V
VDD	Internal power supply pin	-0.3~6	V
DET	Switching detect side	-0.3~6	V
P_{DMAX}	Power dissipation (note2)	0.45	W
θ_{JA}	Thermal resistance (Junction to Ambient)	145	℃/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 decrease 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.*

Note 3: *Human Body mode, 100pF capacitor discharge on 1.5kΩ resistor*

Electrical Characteristics (Notes 4, 5) (Unless otherwise specified, V_{CC}=12V and T_A=25℃)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
VCC	VCC Clamp Voltage			15		V
Icc	VCC Operating Current			300		uA
VDD	Internal Supply Voltage			5.3		V
VDDON	VDD Turn On Threshold Voltage			3		V
VDETH	VDETH Detecting Threshold			2		V
VDETL	VDETL Voltage Clamp Threshold			0		V
VDRM	Breakdown Voltage for Built-in SCR		400			V
IT(AV)	Average Current For Built-in SCR During Turn On Station			0.5		A
VTM	On-state Voltage Drop			1.45		A
ISH	Internal operating current at state keeping			1		uA
VSH	State Keeping Voltage Threshold			1.8		V
TOND	Delay Time For Judge Of Switching On	Fsw=50kHz		15		ms
TOFFD	Delay Time For Judge Of Switching Off			15		ms
TLOW_MAX	Low Level Time Holding By CLK Signal			125		us
ISEL	Operating Current For Sel Pin			10		uA
TSEL	Mode Selecting Time			35		ms

Note 4: *production testing of the chip is performed at 25°C.*

Note 5: *the maximum and minimum parameters specified are guaranteed by test, the typical value are guaranteed by design, characterization and statistical analysis*

。

Internal Block Diagram

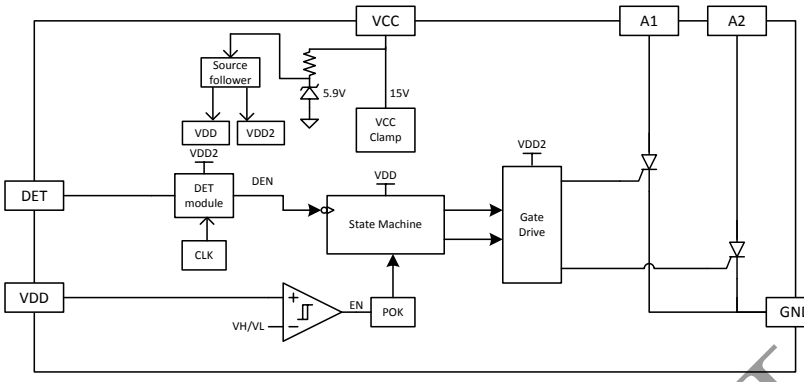


Figure 3. BP5912B Internal Block Diagram

Application Information

BP5912B can realize the conversion between warm color and cool color by using DET pin to detect the switching state.

Startup And Power Supply

VDD power is supplied from VCC pin through internal circuits of BP5912B, when VDD capacitor is charged up to 3V, BP5912B begins to work.

Switching Detecting

As shown in typical application circuit, Det pin is connected to the inductor switching node by a resistor, BP5912B can judge the switching station by detecting switching waveform from the node, therefore, when AC switch is powered on, Det pin can detect the switching waveform, AC switch is turned off, Det pin can not detect the switching waveform.

Color Temperature Switch Mode

BP5912B have two fixed color temperature switch mode : A1->A2。When VDD voltage drops to lower than 1.8V，BP5912B will be reset，color temperature switch mode will be the first mode when system power on again.

Protection Function

BP5912B built in VDD short protection function, when VDD cap is shorted，BP5912B logic state machine will not work, BP5912B only keep the current channel on state, can not switchover the color temperature, the system will work normally when short state is removed.

PCB Design

The following guidelines should be followed in BP5912B PCB layout：

Bypass Capacitor

VDD capacitor is suggested to be closed to VDD pin and GND pin.

Ground path

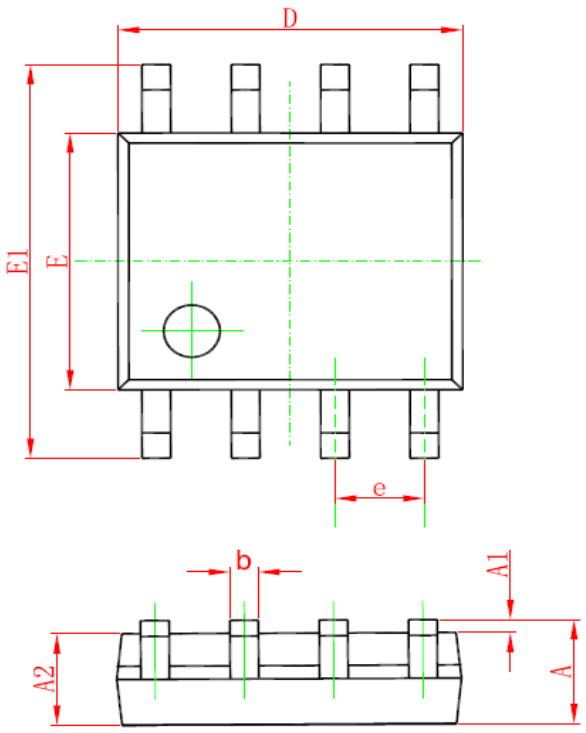
For the any topology structure, VDD capacitor negative pin and BP5912B GND pin and output capacitor negative pin should be connected together.

Heat Dissipation

To increase the copper area of A1、A2 and GND pin, to decrease the thermal impedance.

Physical Dimensions

SOP8 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	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
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°