

Color Temperature Tuning Controller

FEATURES

- Few peripheral components, no need to detect AC input
- Non logic disorder problem with multiple
- LED drivers work at the same time
- Built-in voltage limiting circuit ensures KP14501LG can work under a wide power range
- Integrates 400V thyristor
- Suitable for isolated and non-isolated application
- Patent technology, stable performance
- SOT23-6

GENERAL DESCRIPTION

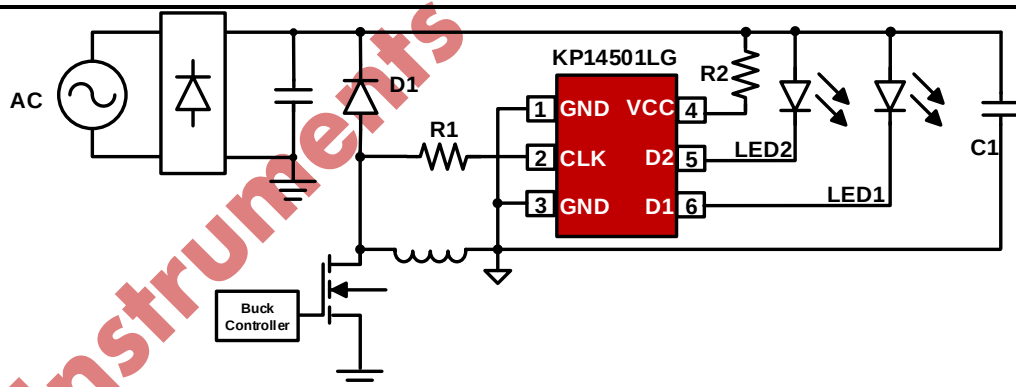
The KP14501LG is specialized for on/off color temperature tuning application (constant output power), uses patent technology, can simplify the peripheral components and ensures the logic consistency of multiple LED drivers at the same time.

The KP14501LG integrates 400V thyristor, can be utilized in applications with output current within 300mA.

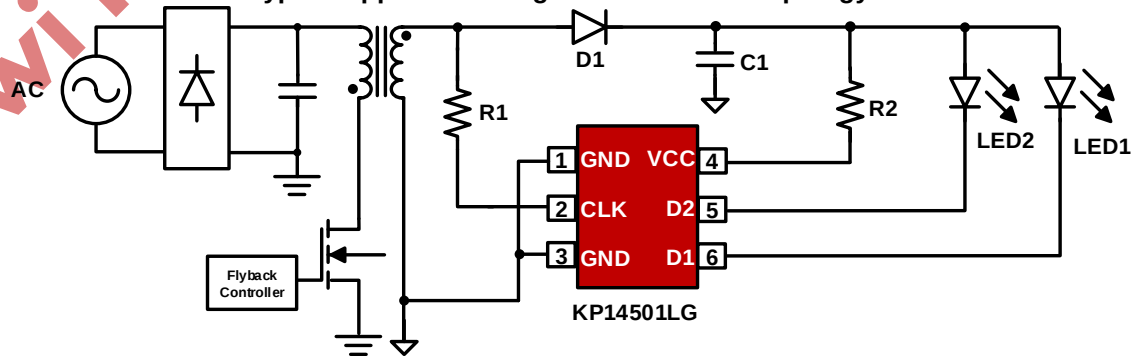
APPLICATIONS

- On/off Color temperature tuning LED driver

TYPICAL APPLICATION CIRCUIT

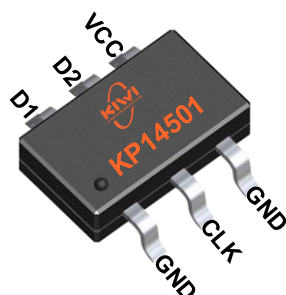


Typical application diagram of the Buck topology



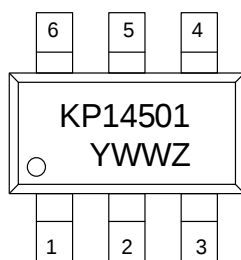
Typical application diagram of Flyback topology

Pin Configuration



SOT23-6

Marking Information



Y: Year Code
WW: Week Code,01-52
Z: Serial Number,1-9 or A-Z

SOT23-6

Pin Description

Pin Number	Pin Name	I/O	Description
1,3	GND	P	Signal and power ground, pin 1 and pin 3 must be connected through the PCB
2	CLK	I	Signal Detect
4	VCC	P	Power Supply
5	D2	I	LED2-
6	D1	I	LED1-

Ordering Information

Part Number	Description
KP14501LGA	SOT23-6, Halogen free, in T&R, 3000 Pcs/Reel

Absolute Maximum Ratings (Note 1)

Parameter	Value	Unit
VCC	-0.3 to 6.5	V
CLK	-0.3 to 6.5	V
D1, D2	-0.3 to 400	V
Storage Temperature Range	-55 to 150	°C
ESD Capability, HBM (Human Body Model) (Note 2)	2	kV
Package Thermal Resistance----Junction to Ambient (SOT23-6)	250	°C/W
Power dissipation(Note 3)	0.45	W

Recommended Operation Conditions

Parameter	Value	Unit
Operating Junction Temperature	-40 to 125	°C

Electrical Characteristics (T_A = 25°C, VCC=5.5V, if not otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Unit
Supply Voltage Section(VCC Pin)						
V _{CC}	Power supply pin clamping voltage	I _{VCC} =1mA	4.46	5.7	6.83	V
I _{VCC_Op}	Operation current			300	496	μA
V _{DD}	Internal supply voltage		3.91	5.1	6.39	V
I _{CLK_th}	Current detection threshold		16	22	47	μA
V _{CLK_lcl}	Detect pin clamp voltage	I _{CLK} =0.5mA	3.5	4.7	6.2	V
V _{DS_max}	Internal switching saturate voltage	I _{Dx} =0.3A		1.4		V
T _{on}	Power on detection delay			85		ms
T _{off}	Power down detection delay			25		ms
T _{off_rst}	Maximum timing time			8		s

Note 1. Stresses listed as the above "Maximum Ratings" may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to maximum rating conditions for extended periods may remain possibility to affect device reliability.

Note 2. Human Body mode, 100pF capacitor discharge on 1.5kΩ resistor.

Note 3. The maximum power consumption will also change when temperature changes, which is determined by thermal resistance, junction operating temperature and ambient temperature. The maximum allowable power consumption is $P=(\text{junction operating temperature} - \text{ambient temperature})/\text{thermal resistance}$.

Operation Description

● Power Supply

KP14501LG gets power supply from VCC pin. It needs to put a current limit resistor between VCC pin and positive node of output. The operation current of KP14501LG is about 0.3mA. Margin is needed in system design, Considering the influence of temperature and other factors. The maximum value of the limiting resistor is $R2(\max) = (V_o - 5.7) / 0.5$ (k Ω), which ensures that the supply current is greater than 0.5mA. Internal power supply circuit is following.

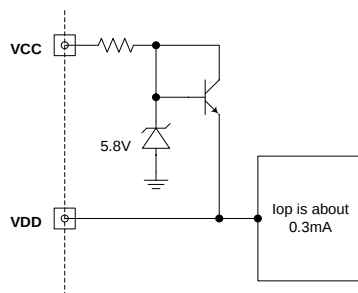


Fig.1 Internal Power Supply Circuit

The VCC pin of KP14501LG integrates current clamping circuit; the max clamping current is 3mA. The min value of current limit resistor R2 is $R2(\min) = (V_o - 5.7) / 3$ (k Ω).

● Signal Detecting

The signal detecting pin CLK need to use a detecting resistor R1 connected to the inductor of the constant current controller, following the typical application schematic. The built-in detection module of KP14501LG detects the square wave of the current on the CLK pin, and the detection threshold is 22 μ A; When the power switch is on, the CLK pin detects a square current wave, and when the power switch is off, the square current wave on the CLK pin disappears. To ensure sufficient margin, the selection of square wave sampling resistance R1 should be satisfied : $R1(\max) = (V_o - 4.7) / 0.05$ (k Ω). When a negative voltage occurs on R1 in the selected

system, it is necessary to ensure that the current flowing through R1 is less than the tolerance value of R1.

The delay time of the switch on and off is set inside the chip, which are Ton and Toff. Normal it requires that the on time is greater than Ton and the off time is greater than Toff, otherwise the chip remains in its current state.

Logic state order

The logic state of KP14501 is D1->D2->D1+D2, where D1 and D2 represent the first and second LED strings, respectively.

● Drive

KP14501LG integrates two 400V thyristor. The peripheral circuit is very simple.

● State Reset

When the lights are turned off, the system switches to the next state after Toff time. The maintain time can be realized by adjusting VCC capacitor. The bigger of the VCC capacitor, the longer of the maintain time. When the power-down time reaches the internal reset timing time (8s) or the VCC voltage below the reset value, the system resets to the initial state.

● KP14501LG Application Techniques

When designs KP14501LG PCB, following rules will help to acquire better performance:

1. VDD capacitor should be as close as possible to VDD and GND pin;
2. layout should consider dissipating heat, pour copper around the chip as much as possible.

When do testing of KP14501LG LED drive

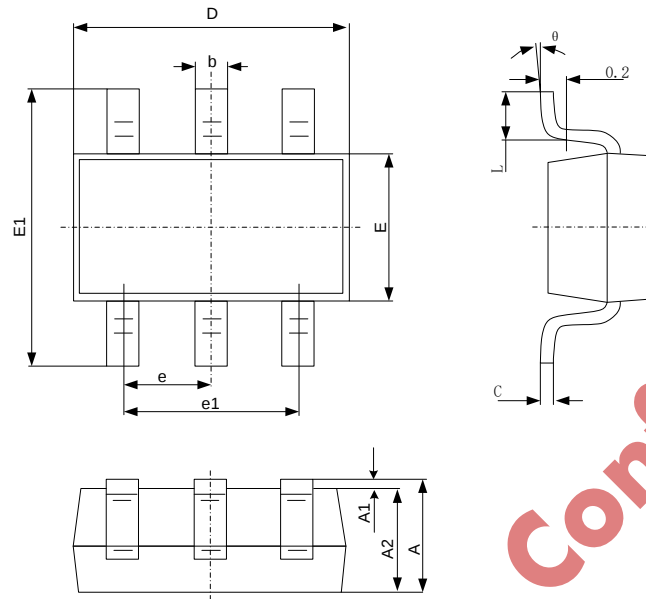


KP14501LGA

Color Temperature Tuning Controller

modules, operators should ensure the loading is connected well before power on.

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Package Dimension
SOT23-6


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.200	0.035	0.047
A1	0.000	0.150	0.000	0.006
A2	0.900	1.100	0.035	0.043
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.800	3.020	0.110	0.119
E	1.500	1.700	0.059	0.067
E1	2.600	3.000	0.102	0.118
e	0.950 (BSC)		0.037 (BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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