英集芯科技
INJOINIC TECHNOLOGY

IP5306

2.1A Charging 2.4 A Highly integrated mobile power discharge SOC

1 characteristic

- **Charging and discharging the synchronous switch**
  - 2.4A Synchronous boost converter, 2.1A Charging synchronous switch
  - Maximum boost efficiency up 96%
  - Maximum charge efficiency up 97%
  - Built-in power path management, support charge while discharge
  - Support large load current line up features
- **Charging**
  - Adaptive charging current is adjusted to match all adapters
  - Charging voltage accuracy: ± 0.5%
  - stand by 4.20 / 4.30 / 4.35 / 4.40V battery
- **Power display**
  - stand by 4,3,2,1 Stars led Power display
- **Feature-rich**
  - Power button
  - Built-in lighting drive
  - Automatically detects the phone insertion and removal
- **Low power consumption**
  - Intelligent load identification, automatic standby
  - Standby power for 100 μA
- **BOM Minimalism**
  - power MOS Built-in, single-inductor charge-discharge
- **Multiple protection, high reliability**
  - Output over-current, over-voltage, short circuit protection
  - Input over voltage, over-charge, over-discharge, over-discharge protection stream
  - The whole over-temperature protection
  - ESD 4KV Instant pressure 12V

2 application

- **Mobile power / charging treasure**
- **Mobile phones, tablet computers and other portable devices**

3 Brief introduction

IP5306 A boost converter is an integrated, multi-functional lithium rechargeable power management manager, a battery level indicator SOC , Provides a complete power solution for mobile power.

IP5306 The high level of integration and feature-rich, so that when applied with minimal external components, and effectively reduce the size of the overall program, reducing BOM cost.

IP5306 Just realize an inductor buck and boost function. DC-DC Converter operates in 500KHz It can support low cost inductors and capacitors.

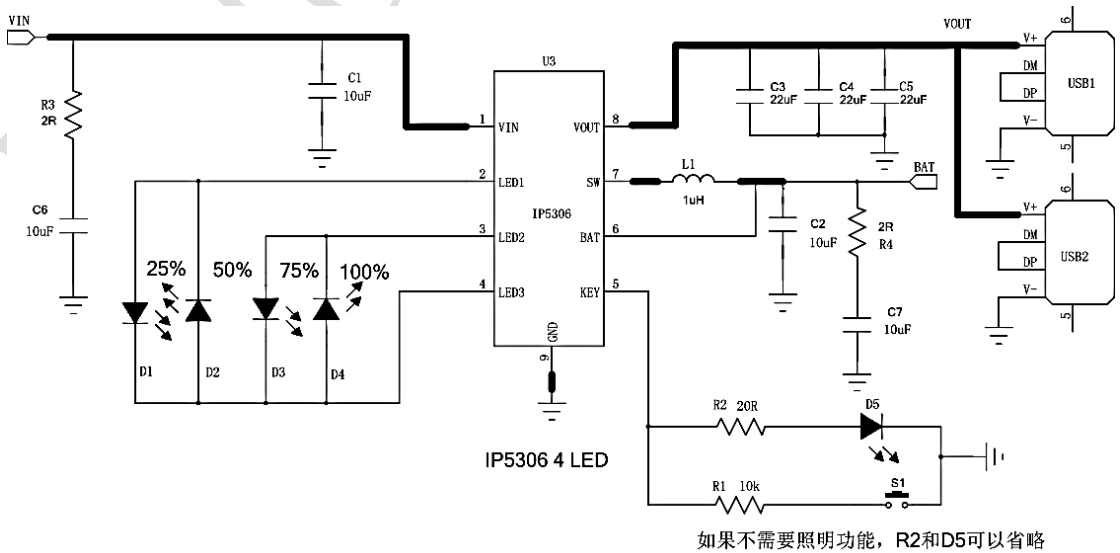
IP5306 The system provides maximum synchronous boost 2.4A Output current, the conversion efficiency is high 91% . No-load, automatically enter the sleep state, the quiescent current drops 50uA .

IP5306 Charging using switching technology, providing maximum 2.1A Current, high charging efficiency 97% . Internal IC Input voltage and temperature regulation intelligent charging current.

IP5306 stand by 1 , 2 , 3 , 4 Stars led Power display.

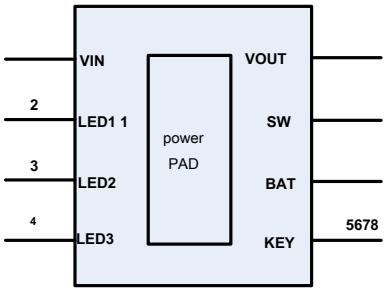
IP5306 stand by I2C Communication can be flexibly customized needs.

IP5306 use eSOP8L Package.



Map 1 Simplified Application Schematic (4 LED Indicates that the battery)

4 Pin definitions



eSOP8

Map 2 IP5306 Pin Figure

Pin Name Pin	Number Pin	Description
VIN	1	DC5V Charge input pin
LED1	2	led Drive Pins
LED2	3	led Drive Pins
LED3	4	led Drive Pins
KEY	5	Key input, Multiplexing driving lights
BAT	6	Boost input pins, connected to a positive electrode of lithium batteries.
SW	7	DC-DC Switch pin
VOUT	8	5V Boost output pin
PowerPAD		Connect to GND

5 IP Power Charger IC Model selection table

IC model	Charge and discharge Electricity		the Lord want special point						Package	
	Discharge	charging	ed Number of lights	Lighting button	I2C	DCP	Type-C	QC 2.0 / 3.0	specification and		Allow
IP5303	1.0A	1.2A	1	2		√	√	-	-	-	-	eSOP8	
IP5305	1.0A	1.2A	1	2,3,4	√	√	-		-	-	-	eSOP8	P2P
IP5306	2.4A	2.1A	1	2,3,4	√	√	√	-			-	-	eSOP8	
IP5108E	2.0A	1.0A	3	4,5		√	√	-			-	-	-	eSOP16	
IP5108	2.0A	2.0A	3	4,5		√	√	√	-			-	-	eSOP16	P2P
IP5207	1.2A	1.2A	3	4,5		√	√	-	√			-	-	QFN24	
IP5109	2.1A	2.1A	3	4,5		√	√	√	-			-	-	QFN24	
IP5209	2.4A	2.1A	3	4,5		√	√	√	√			-	-	QFN24	P2P
IP5219	2.4A	2.1A	3	4,5		√	√	√	√	√			-	QFN24	
IP5318Q	18W	4.8A	2,3,4,5	√	√	√				-	√		QFN40	P2P
IP5318	18W	4.8A	2,3,4,5	√	√	√	√					√	QFN40	

IP5306 Order Type Order No. Model Type

batteries	
IP5306	4.20V
IP5306_4.30V	4.30V
IP5306_4.35V	4.35V
IP5306_4.40V	4.40V

6 Limit parameters

parameter	symbol	value	unit
Port input voltage range	V_{IN}	-0.3 to 5.5	V
Operating temperature range	T_A	0 ~ 70	℃
Junction Temperature Range	T_J	- 40 to 150	℃
Storage Temperature Range	Tstg	- 60 to 150	℃
Thermal resistance (junction to ambient)	θ_{JA}	50	℃ / W
Human Body Model (HBM)	ESD	4	KV

* Numerical ratings listed above absolute maximum stress portion may cause permanent damage to the device, either in absolute maximum rating conditions

The exposure time is too long may affect the reliability and service life of the device

7 Recommended operating conditions

parameter	symbol	Minimum	Typical values	Maximum	unit
Input voltage	V_{IN}	4.5	5	5.5	V
Load current	I	0	2.4	3	A
Working temperature	T_A	0	--	70	℃

* Beyond these working conditions, characteristics of the device can not be guaranteed.

8 Electrical Characteristics

Unless otherwise specified, TA = 25 ℃ , L = 1.0uH

parameter	symbol	Test Conditions	Minimum	Typical values	Max Unit	
Charging system						
Input voltage	V_{IN}		4.5 5		5.5 V	
Input operating current	I_{VIN}	VIN = 5V , fs = 500KHz			2	mA
Input Quiescent Current		VIN = 5V , Device not switching		100		uA
Charging target voltage	V_{TRGT}			4.2		V
recharging current	I_{CHRG}			2.1	2.4 A	
Trickle charge current	I_{TRKL}	VIN = 5V , BAT = 2.7V		100		mA
Trickle-off voltage	V_{TRKL}			2.9		V
Recharge threshold	V_{RCH}			4.1		V

Charging cut-off time	T_{END}			twenty four		Hour
Input undervoltage protection	V_{UVLO} Voltage rise			4.5		V
Hysteresis undervoltage protection	V_{UVLOH}			200		mV
Boost system						
Battery voltage	V_{BAT}		3.0		4.4 V	
Switching operation of the battery the input current	I_{BAT}	VBAT = 3.7V , VOUT = 5.0V , fs = 500KHz		3		mA
		VIN = 5V , Device not switching		100		uA
DC The output voltage	V_{OUT}	VBAT = 3.7V		5.0		V
Complement output line voltage	V_{OUT}	VBAT = 3.7V		5.15		V
Complement output line current point	Iout	VBAT = 3.7V		1		A
Output voltage ripple	ΔV_{OUT}	VBAT = 3.7V , VOUT = 5.0V , fs = 500KHz		50		mV
Boost system power supply current	I_{vout}			2.4		A
Load overcurrent detection time	T_{UVD}	The output voltage is continuously below 4.2V		30		ms
Load short-circuit detection time	T_{OCD}	Output current for greater than 3.5A	150		200	us
Control System						
On-off level	f_s			500		KHz
PMOS ON resistance	r_{DSON}			35		mΩ
NMOS ON resistance				30		mΩ
Standby current battery input	I_{STB}	VIN = 0V , VBAT = 3.7V		50		uA
led Lighting drive current	Key			25		mA
led Display drive current	I_{L1} I_{L2} I_{L3}			4		mA
Automatic load detection time	T_{loadD} Continuous load current of less than 45mA			32		s
Key short wake-up time $T_{OnDebounce}$				50		ms
turn on light time	$T_{Keylight}$			2		s
Thermal Shutdown Temperature	T_{OTP}	Temperature rise		125		℃
Thermal Shutdown Temperature Hysteresis	ΔT_{OTP}			40		℃

9 Light display mode

- 4 Mode

discharge lamp

Power C (%)	D1	D2	D3	D4
C≥75%	bright	bright	bright	bright
50% ≤C < 75%	bright	bright	bright	Destroy
25% ≤C < 50%	bright	bright	Destroy	Destroy
3% ≤C < 25%	bright	Destroy	Destroy	Destroy
0% < C < 3%	1.5Hz Flicker	Destroy	Destroy	Destroy

Charging

Power C (%)	D1	D2	D3	D4
full	bright	bright	bright	bright
75% ≤C	bright	bright	bright	1.5Hz Flicker
50% ≤C < 75%	bright	bright	1.5Hz Flicker	Destroy
25% ≤C < 50%	bright	1.5Hz Flicker	Destroy	Destroy
C < 25%	1.5Hz Flicker	Destroy	Destroy	Destroy

- 3 Light Mode

Three lights and four display lamps like , Every single light Correct The battery should be in the following table

	D1	D2	D3	D4
The three lights	3%	66%	100%	no
Four lights	25%	50%	75%	100%

- 2 Light Mode

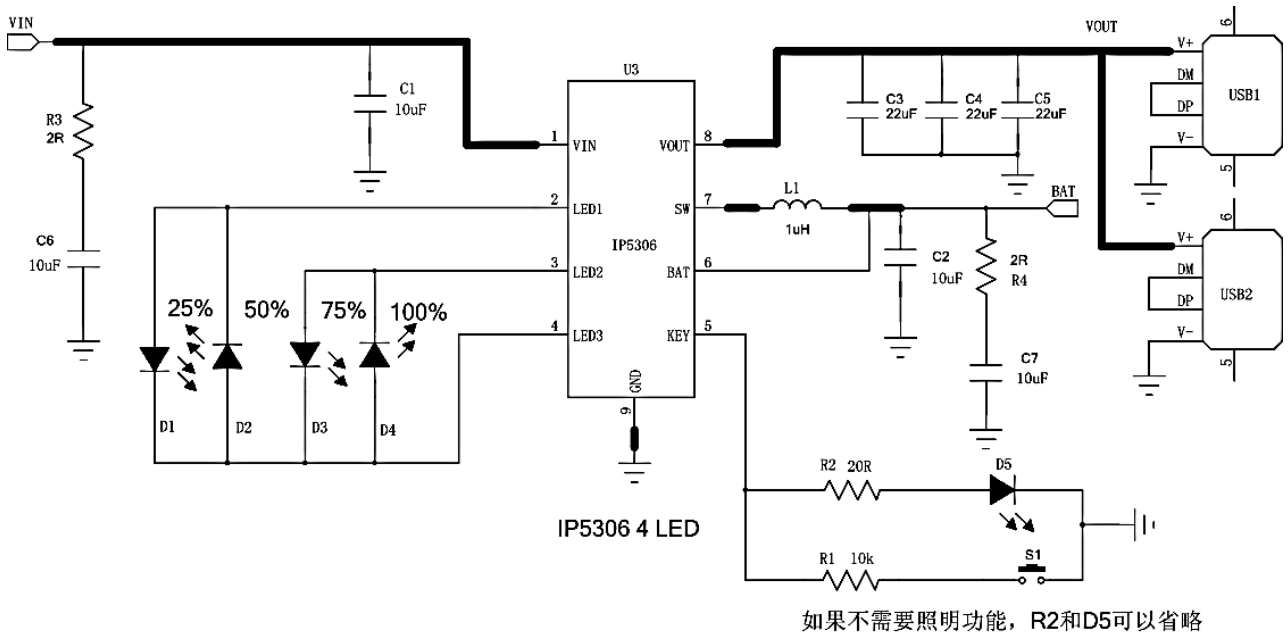
	status	D1	D2
Charging	The charging process	Flicker	Destroy
	full	bright	Destroy
Discharge		Destroy	bright
	Low	Destroy	Flicker

- 1 Light Mode

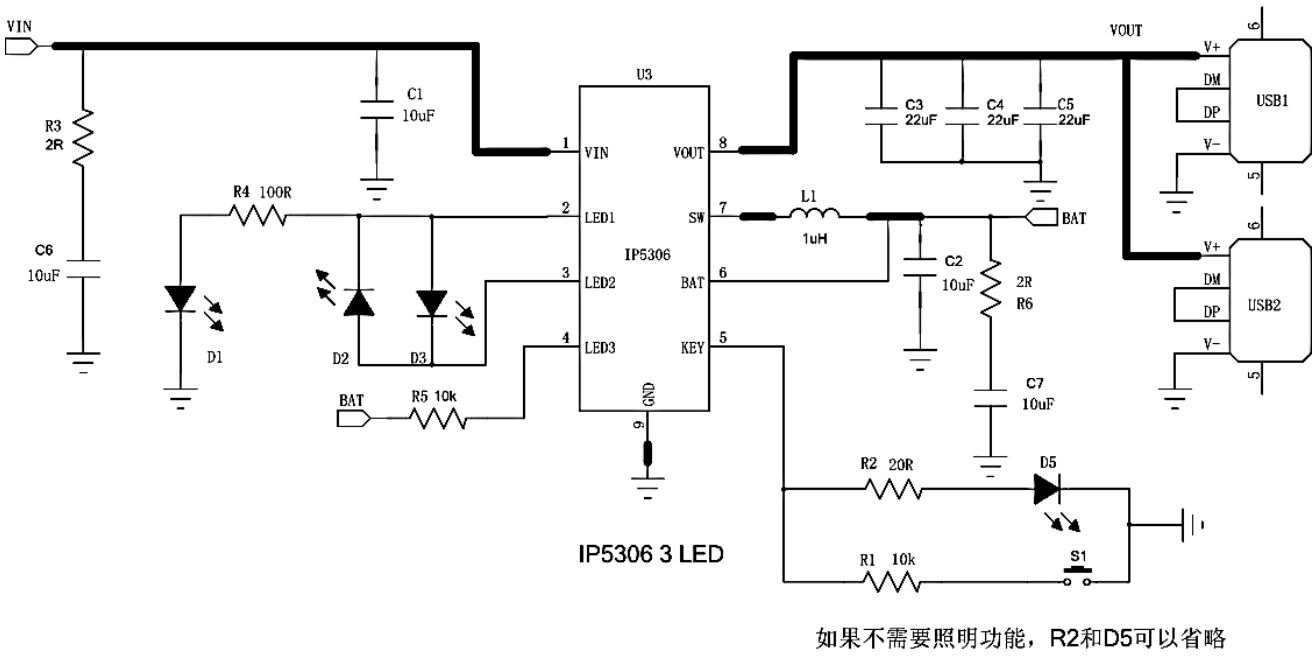
	status	D1
Charging	The charging process	Flicker
	Fully charged	bright
Discharge	Normal discharge	bright
	Low	Flicker

10 Typical Application Schematic

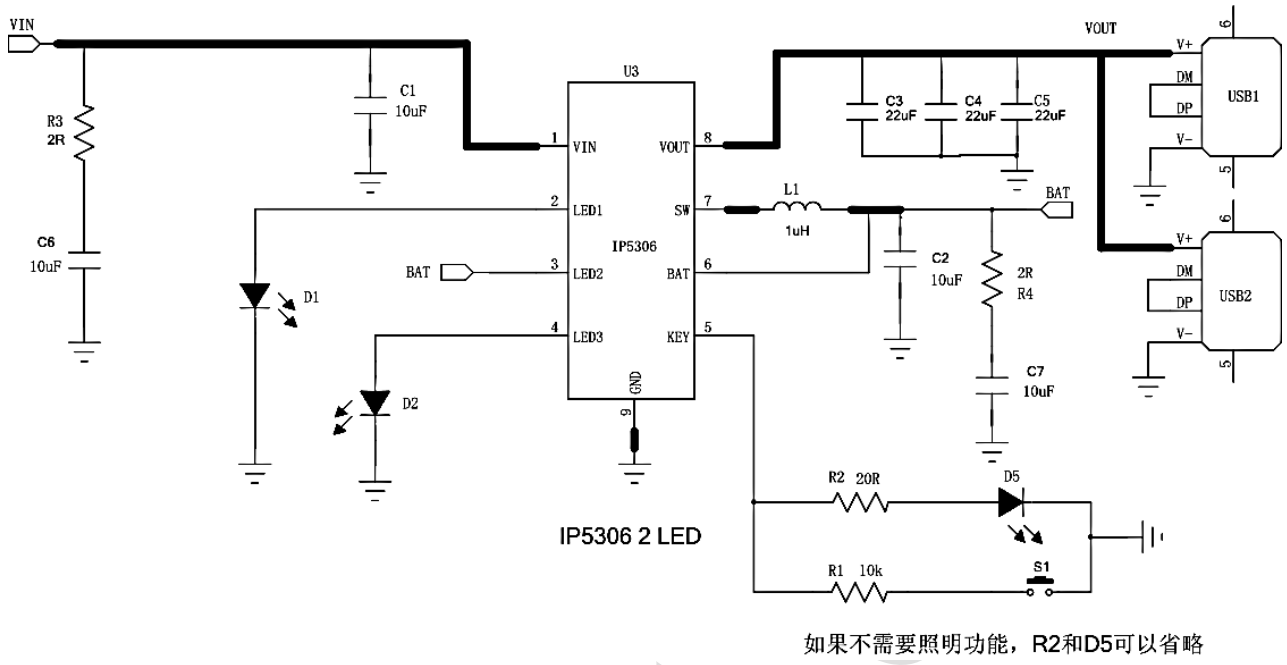
IP5306 Requires only inductors, capacitors, resistors, To implement a full function mobile power solutions.



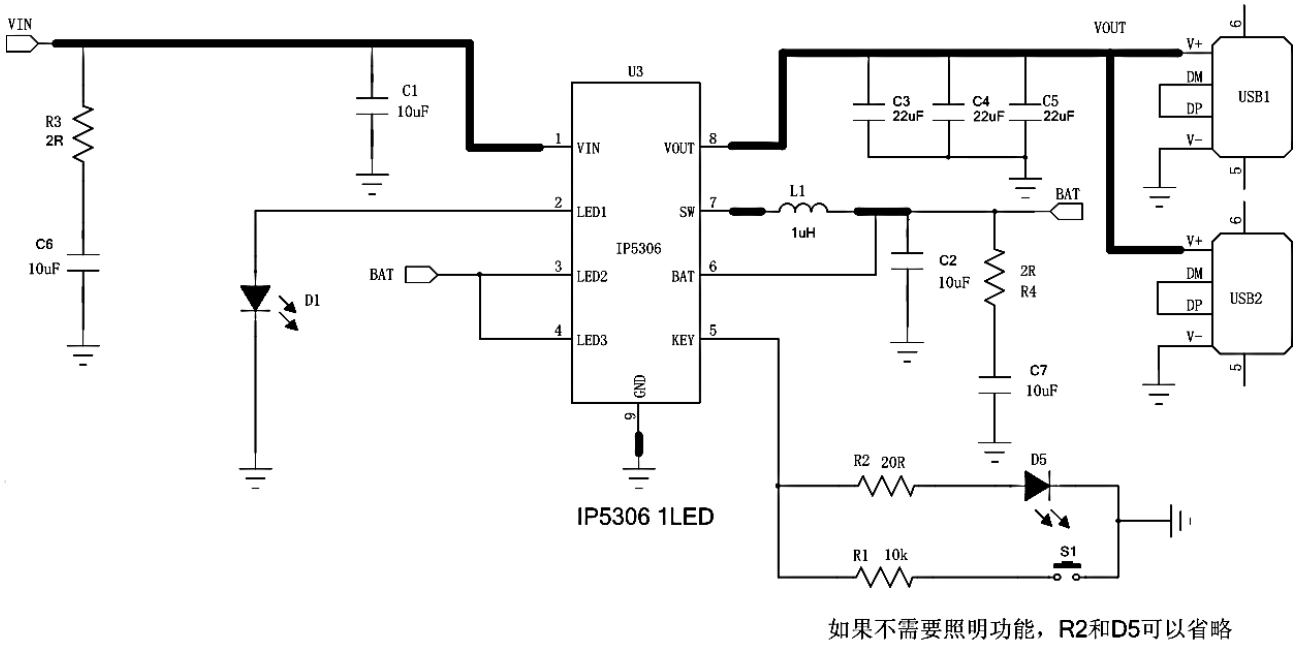
Map 7 4LED Power display typical application schematic



Map 8 3LED Power display typical application schematic



Map 9 2LED Power display typical application schematic



Map 10 1LED Power display typical application schematic

11 BOM table

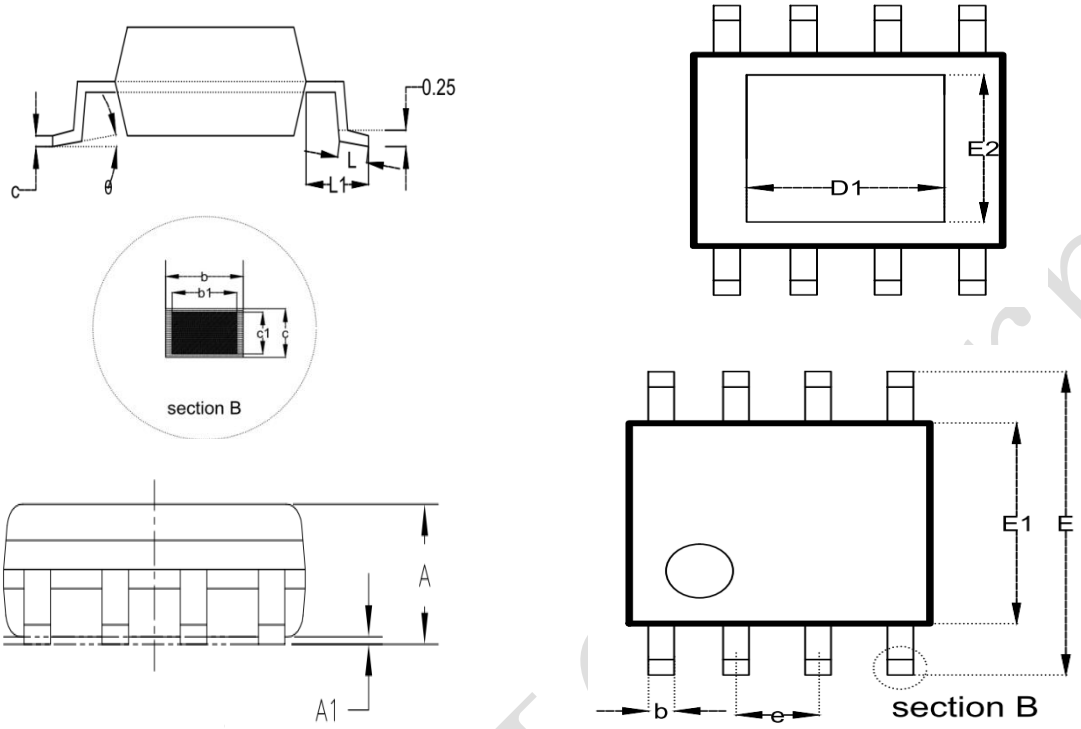
No.	Component Name	Model & Specifications	Unit	dosage	position	Remark
1	IC	IP5306	PCS	1	U1	
2	Chip Resistor	0603 2R 5%	PCS	1	R3 , R4	
3	Chip Resistor	0603 20R 5%	PCS	1	R2	The brightness of lights, other resistance values may be connected or shorted
4	Chip Resistor	0603 10K 5%	PCS	1	R1	
5	Chip capacitors	0805 10uF 10%	PCS	3	C1 , C2 , C6 , C7 Pressure is greater than 16V , Recommended that	With chip ceramic capacitors
6	Chip capacitors	0805 22uF 10%	PCS	3	C3 , C4 , C5	Pressure is greater than 16V Recommended chip ceramic capacitors
7	Patch led	0603	PCS	4	D1 , D2 , D3 , D4	
8	led 5mm		PCS	1	D5	
9	inductance	SPM70701R0	PCS	1	L1	saturation Isat , The current temperature rise Idc more than the 4.5A, DCR Less than 0.01 A sense of value 1uH @ 500KHz
10	USB Female 10mm Pratylenchus mouth roll		PCS	2	USB1 , USB2	
11	Mini USB	Micro USB Female 5 Foot sticking to PCS		1	J1	
12	button	6.5mm * 5.1mm	PCS	1	S1	
13	AC Electronic wire 2 * 100mm	Red and black	PCS	2	B + B-	

Recommended model inductance

SPM70701R0

DARFON PIN	Inductance (UH)	Tolerance	DC Resistance (MΩ)		Heat Rating Current DC Amp.	Saturation Current DC Amps.	Measuring Condition
			Typ.	Max.	Idc (A) Max.	Isat (A) Max.	
SPM70701R0	1.0	± 20%	8.5	8	12	15	

12 Package Information



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	--	--	1.65
A1	0.05	--	0.15
A	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	--	0.48
b1	0.38	0.41	0.43
c	0.21	--	0.25
c1	0.19	0.20	0.21
D	4.70	4.90	5.10
E	5.80	6.00	6.20
E1	3.70	3.90	4.10
e	1.27BSC		
h	0.25	--	0.50
L	0.50	0.60	0.80
L1	1.05BSC		
θ	0	--	8°
D1	--	2.09	--
E2	--	2.09	--

