南京拓品微电子有限公司

Nanjing Top Power ASIC Corp

DATASHEET

TP8305B High Efficiency WLED/ Boost Driver

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Product Introduction

TP8305B is an input voltage range (0.8 ~ 5.5V), adjustable constant current and the current limit of two modes to drive white LED designed to boost DC / DC converter. Variable frequency mode, by-cycle current limit, output current with the input power supply voltage is reduced even change. The device can use a single or dual battery drive single power white LED, can also use a lithium battery-powered two, three or multiple WLED. Driving method WLED connected in series to provide equal WLED current, resulting in uniform brightness.
Low 46mV feedback voltage minimizes power dissipation in the current setting resistor, thereby improving efficiency. 50mV current limit feedback voltage, current limit can be set according to different needs.

Features

- External NMOS, Output voltage is adjustable, It can drive high voltage, high power load, such as 10V1A.
- Drive 0.3W-7W of single white LED
- Drive multiple pieces WLED lamp
- Efficiency up to 90%
- 0.8V low operating voltage
- Constant current accuracy: ± 5%
- Limit accuracy: ± 6%; Limiting voltage: 50mV.
- VDD over voltage shutdown
- Temperature protection (130 ℃ protection point)

Applications

- A constant current source, such as LED flashlight, backlight, etc.
- A constant voltage source, and Bluetooth speaker, mobile power, etc.
- Input current needs precisely defined situations, such as limiting the program LED Flashlight

Typical application:

Scheme 1: constant current, current limiting WLED driver solution.

Double dry cell or lithium battery as the power input driven cascaded WLED or multiple tandem WLED scheme, with a constant current, current limiting function. Its typical application circuit diagram is shown in figure 1.

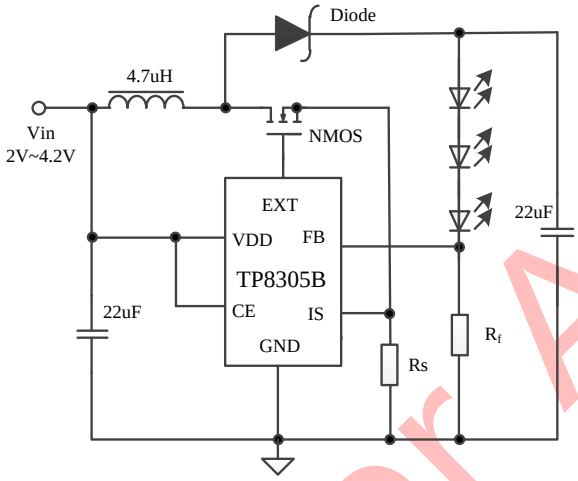


Fig. 1 typical application circuit of driving 3 WLED

Scheme 2: constant voltage and current limiting function driver load plan.

Double dry-cell batteries or lithium batteries as input, can drive high power load, with constant voltage output and current limiting function. The maximum output voltage depends on the NMOS compression. Typical application circuit is shown in figure 2. Constant voltage is determined by the resistor R1 with R_f ratio and VFB (VFB 46 mV) value is fixed. Specific Settings refer to the below instructions.

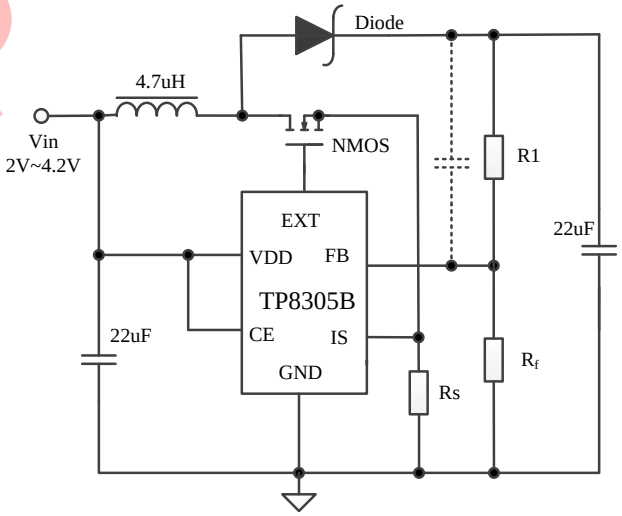


Figure 2 constant voltage plan

Scheme 3: low input voltage, constant current, current limiting function driver WLED scheme.

Single or double dry-cell as input, can drive single WLED, with constant current, output current limit and overvoltage protection function, the highest output voltage depends on the chip VDD overvoltage protection (5.8 V). Typical application circuit is shown in figure 3.

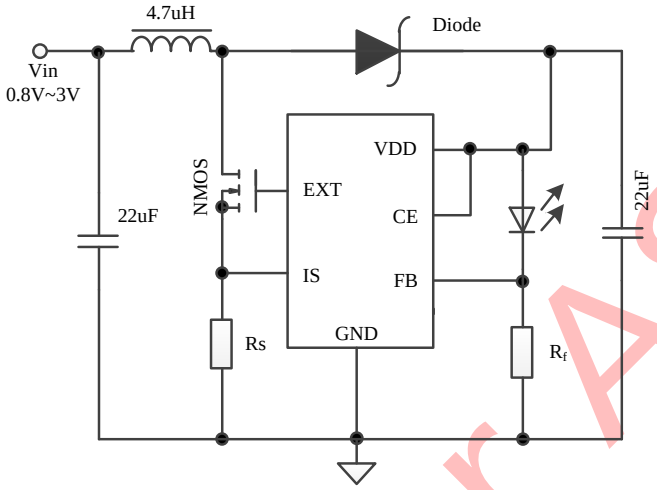


Figure 3 drive single high-power WLED typical application circuit

Scheme 4: high efficiency, current limiting function driver WLED scheme.

Lithium battery as input, the use of Buck-Boost model can drive single high-power WLED, apply to the input voltage is higher than the output voltage. Typical application circuit is shown in figure 4.

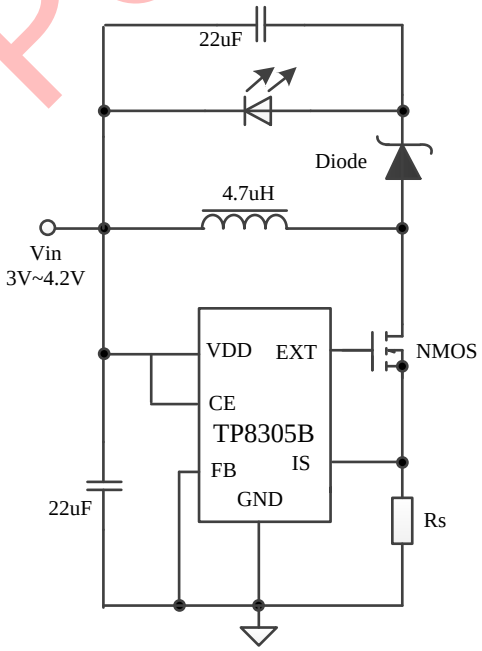
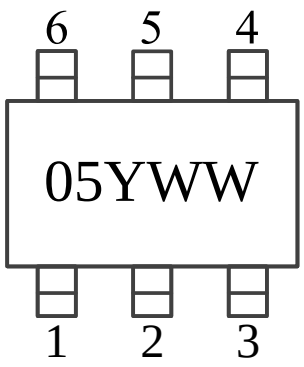


Figure 4 input lithium battery driven WLED scheme

Pin order and description



SOT23-6

Order type
TP8305B-SOT236

Pin number	PIN	pin description
1	EXT	Drive NMOS
2	GND	Ground
3	VDD	The input voltage pin
4	CE	Enable pin
5	FB	Constant current sampling pin
6	IS	Current limit sample pin

Pin function

EXT for chip to drive the switch tube port, due to external MOS, so it can drive high power load;

GND for grounding port;

VDD for chip power supply pin, the internal overvoltage protection function, when the VDD voltage is higher than 5.8 V, Chip into the over voltage protection, closed oscillator. Such as scheme 3;

CE Enable pin. It can be used for the LED dimming solution. Such as adding 100 HZ ~ 8 KHZ, rectangular pulse signal amplitude around 3V ~ 4V, adjusting the duty ratio can adjust the brightness of the WLED;

FB is constant current sampling pins, internal 46 mv voltage produced by the benchmark. Can precisely control the output constant current constant voltage;

IS is current limit sample pin, it can restrict the biggest peak current of the input system, have the effect of protection circuit.

Functional block diagram

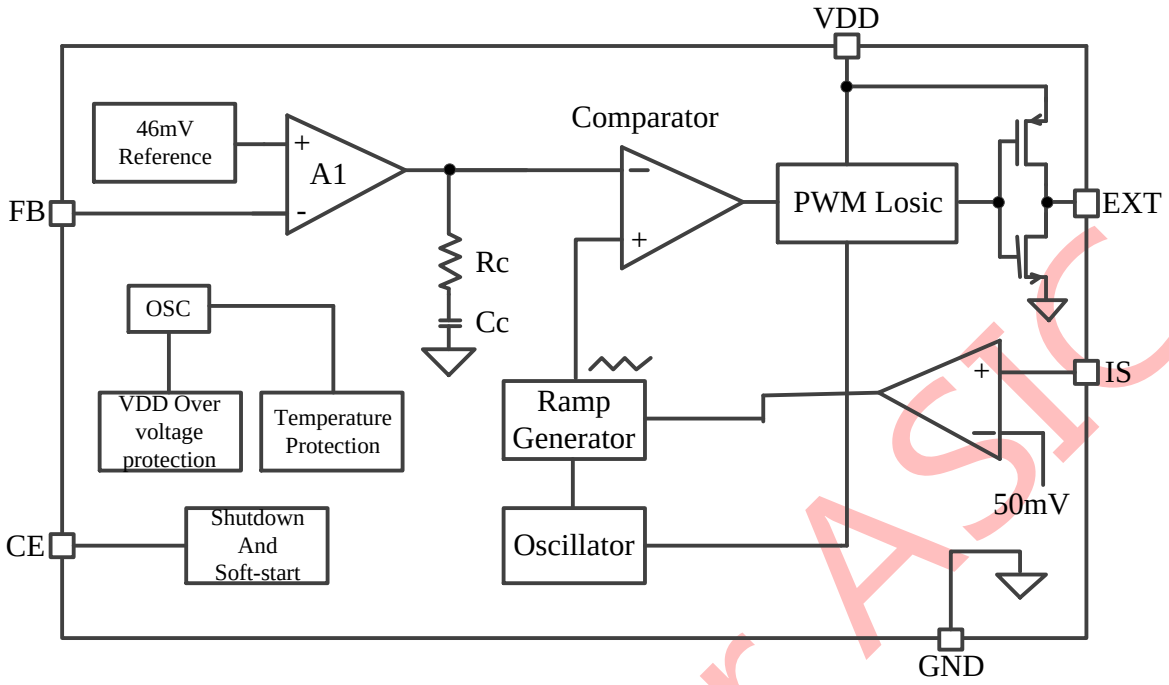


Figure 5 Functional block diagram

The limit parameter

Parameter	Rated value	Unit
VDD，CE，FB，IS，EXT	-0.3~10	V
Working temperature range	-35~160	℃
Welding temperature（10s）	260	℃
Storage temperature	-65~125	℃

Electrical characteristics

(T_A=25℃，V_{IN}=2.4V，I_{LED}=750mA，VF=3.6V，V_{DD}=V_{CE}，L=4.7μH，C_{IN}=22μF，C_{OUT}=22μF)

Parameter	Symbol	Test Condition	MIN	typical	MAX	Unit
input voltage	VIN	Plan 3 circuit	0.8		5.5	V
sustaining voltage	VHOLD	Plan 3 circuit		0.35		V
Starting Voltage	VSTART	Plan 3 circuit		1		V
VDD overvoltage protection	VOVP		5.6	5.8	6.2	V
Temperature protection	TOV			130		℃
Feedback voltage	VFB		43.7	46	48.3	mV
Peak current sampling voltage	VIS		43.2	46	48.7	mV
Frequency	FOSC		700			KHz

t_{off}		t			450		nS
EXT drive capability	Pull on the current	IEXTP	VDD=2V，VOH=1.6V		53		mA
	drop-down current	IEXTN	VDD=2V，VOL=0.4V		160		mA
CE voltage		VCE	Figure 6，VIN=2.5V FB=0	0.55	0.75	0.95	V
IDDQ		IQ	Figure 6，Vin=CE=5.2V，VFB=0.5V		76		μA
Shutdown Current		IQ	CE=0			1	uA
efficiency		η	Plan 3 circuit		90		%

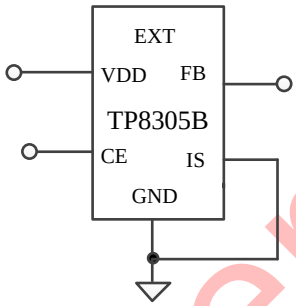
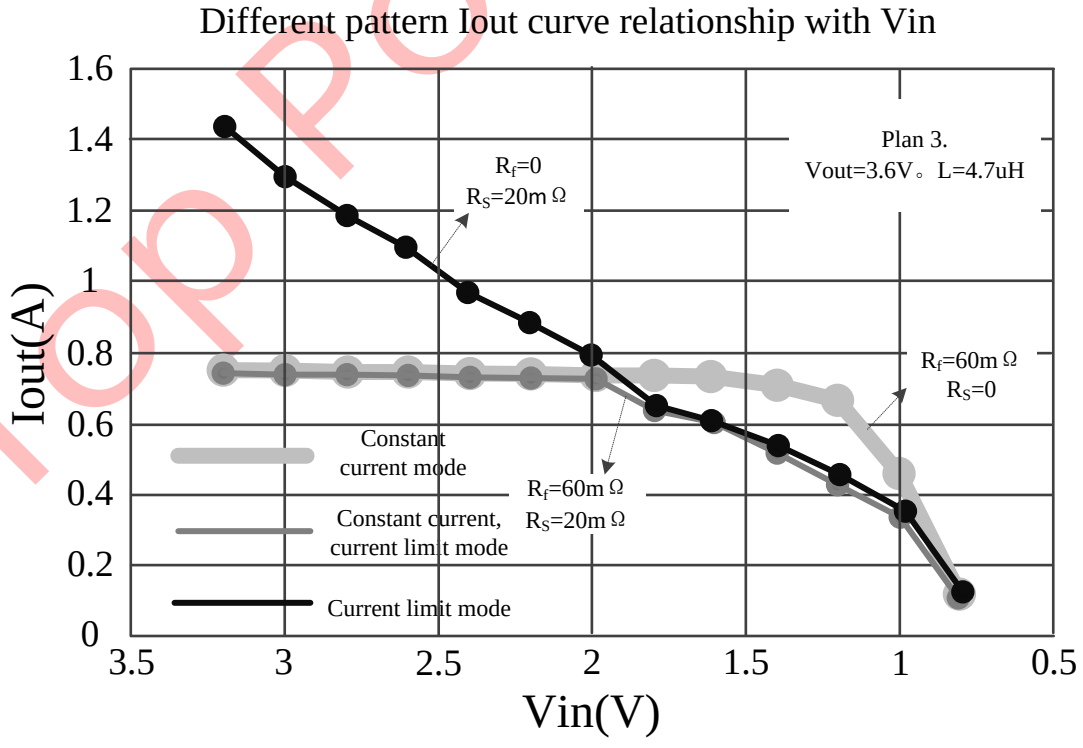
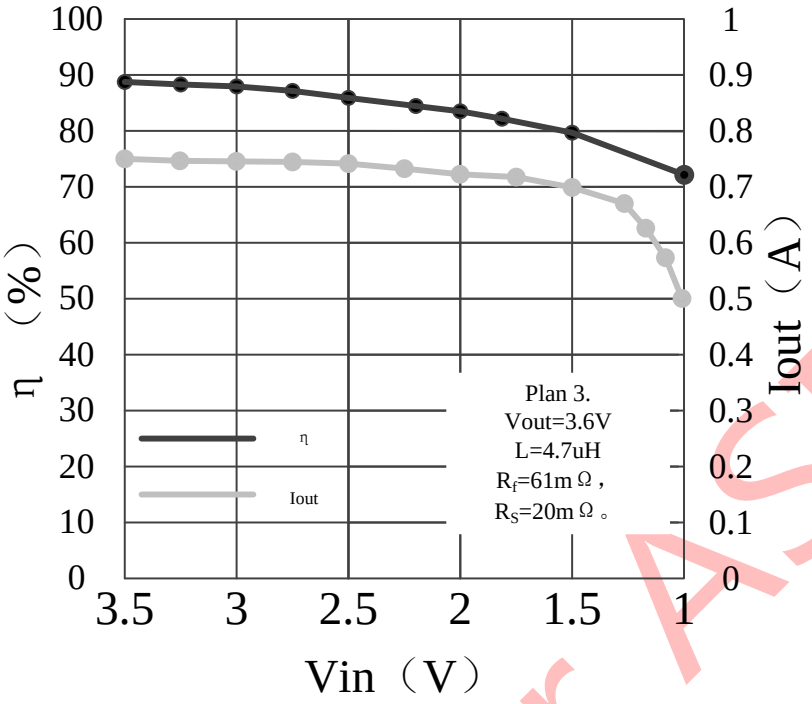
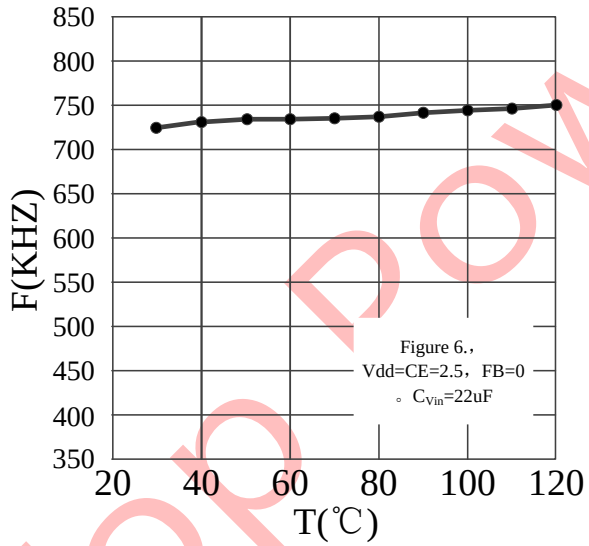


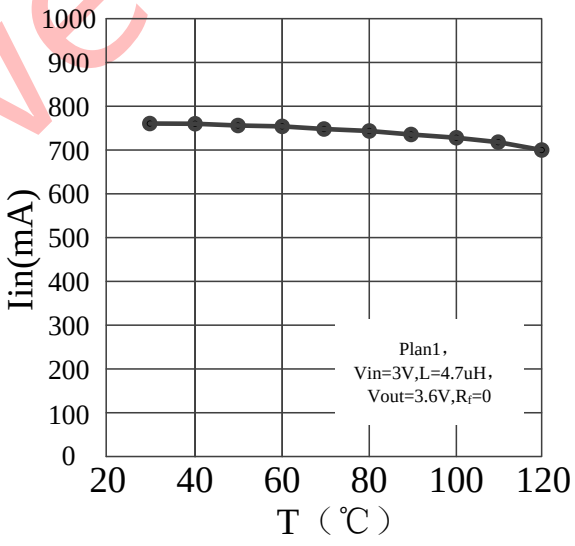
Figure 6

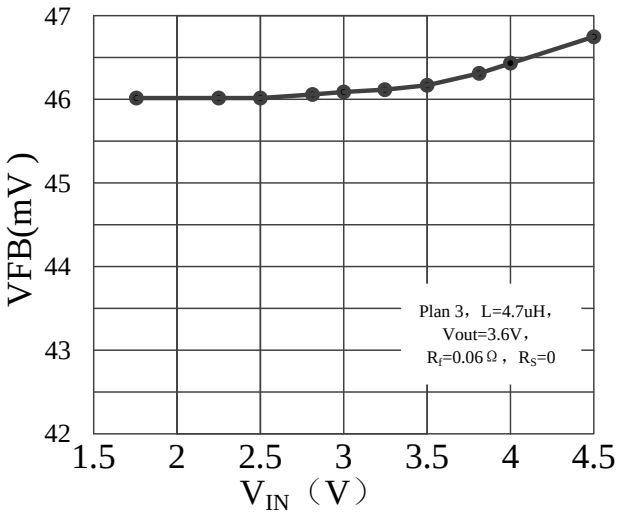
Typical characteristic

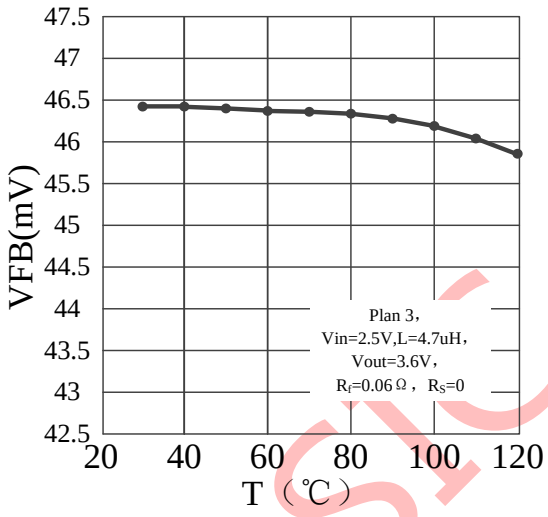












Constant Voltage Settings:

Set output voltage in scheme 2，VOUT value consists of VFB (VFB = 0.046 V) and two resistors. Resistance to 1% accuracy.

$$V_{out} = V_{FB}(R_1 + R_f)/R_f$$

Table 1

Vout(V)	$R_f(\Omega)$	$R_1(\Omega)$
5V	1K	107K
9V	1K	196K
12V	1K	261K

Current Settings

Constant current setting:

Constant current is determined by the external resistor Rf, as shown in figure 1.

$$I=V_{FB}/R_f$$

$$R_f = V_{FB} / I_{LED}$$

Table 2

I_{LED}(A)	R_f(Ω)
2.3	0.02
0.9	0.051
0.46	0.1
0.15	0.3

Current limit Settings:

$$I_{lim}=V_{IS}/R_S$$

$$R_S = V_{IS} / I_{lim}$$

Table 3

I_{lim}(A)	R_S(Ω)
2.5	0.02
0.98	0.051
0.5	0.1
0.16	0.3

Other application scheme

Equipped with output overvoltage protection scheme.

This scheme is suitable for driving two or multiple series of WLEDs and has constant current and overvoltage protection functions. The solution is to use a voltage regulator diode to effectively prevent the NMOS from being burned out due to VOUT overvoltage when the LED is not connected or damaged, thereby protecting the NMOS. The application circuit is shown in Figure 7.

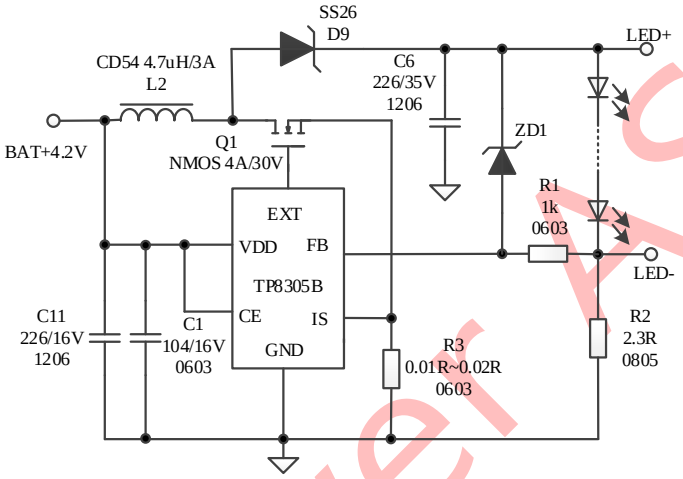


Figure 7

Input high voltage, drive ultra-high-power scheme

This scheme is suitable for use under high input power voltage conditions and can drive multiple series of WLEDs. In the scheme, a voltage regulator or LDO device needs to be connected to the VDD end to achieve high-voltage input. The application circuit is shown in Figure 8.

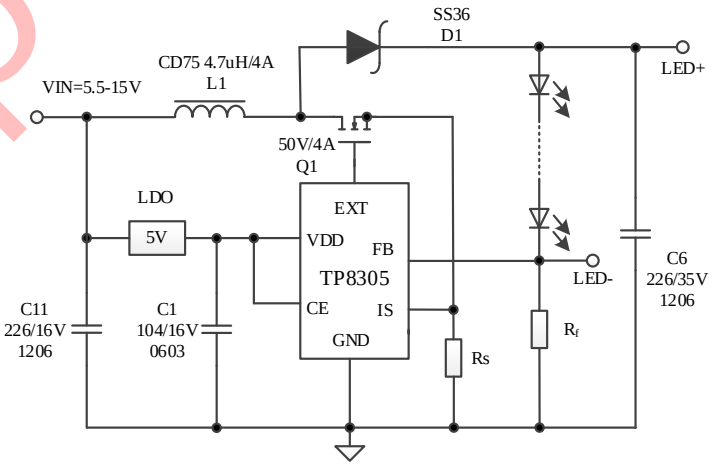
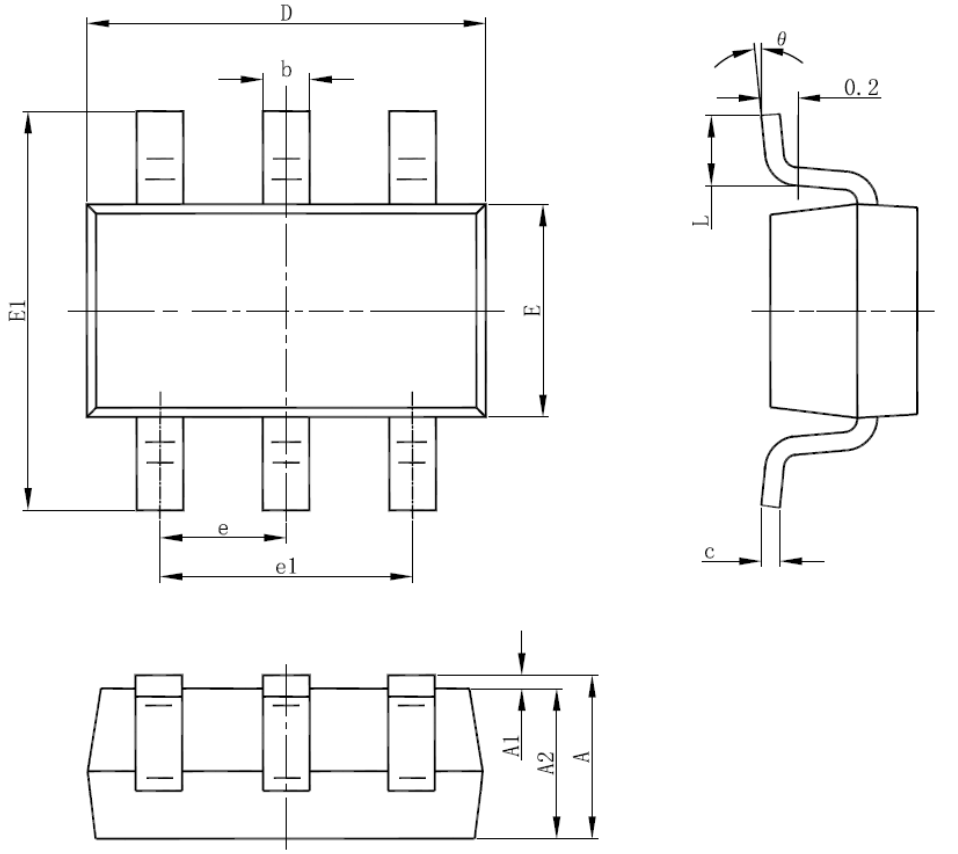


Figure 8

Encapsulation structure

SOT-23-6L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
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°