1. Overview

The JD9203ES06 is a single-channel LED constant current drive control integrated circuit that can directly drive high-voltage LED strings. The output current is set by an external sampling resistor, with a setting range of 5mA~60mA. The output current remains constant at the set value. The circuit is simple and requires very few external components.

2. Features

• Simple external circuitry, requiring no magnetic components.

• Can be used in parallel. •

Can share a PCB board with LEDs. • LED

current can be externally set. • No EMI

issues in the application circuit. • Built-in 500V

high-voltage MOSFET. • Over-temperature

current regulation capability. • ESOP-8 package

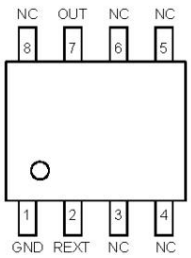
with PCB board-assisted heat dissipation.

3. Packaging

3.1 Package Shape

Model JD9203ES06	
Package form factor ESOP-8	
Application power	9W

3.2 Pin Diagram



JD9203ES06

Figure 1. Pin Diagram

3.3 Pin Description

JD9203ES06 Pin Description

pin symbols		describe
1	GND	ground terminal
2	REXT	current sampling terminal
3, 4, 5, 6	NC	empty feet
7	OUT	Output terminal (built-in MOSFET drain, internal power supply terminal)
8	NC	empty foot

4. Application

4.1 Scope of Application

LED fluorescent tubes (T5/T8/T10…) LED bulbs/corn lamps/candle lamps… Other low-power LED lighting 4.2 Typical Applications

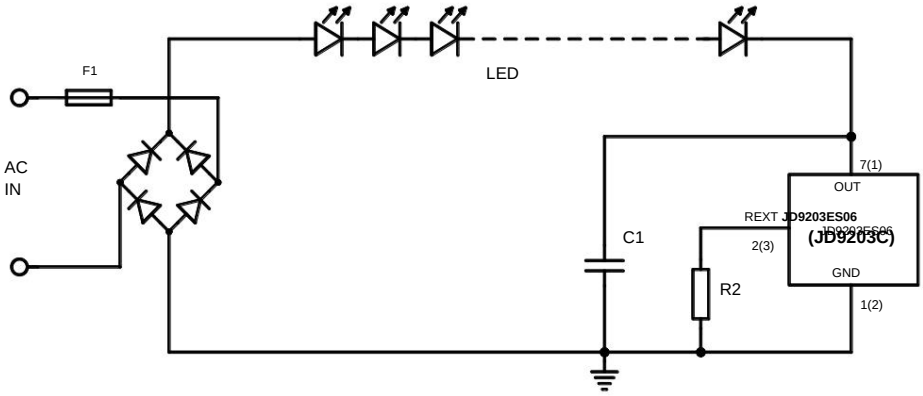


Figure 2. Application scheme of surface mount capacitors

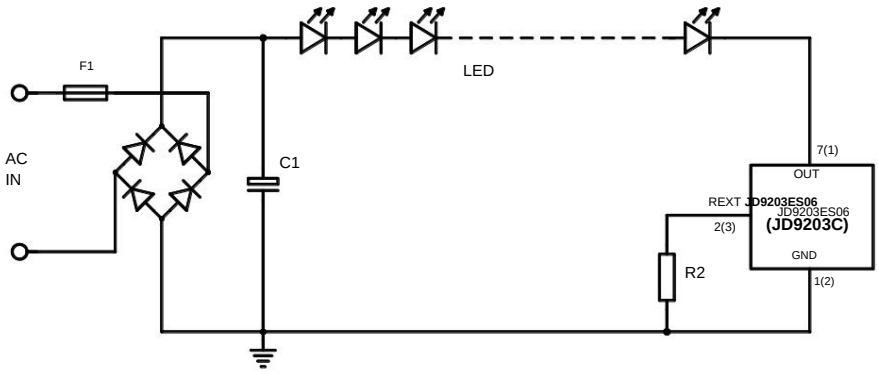


Figure 3. Electrolytic capacitor application scheme

5. Electrical characteristics

5.1 Limiting Parameters

project		symbol	Rated value,		unit
			minimum value,	maximum value	
Sampling terminal		VREXT	-0.3	7	In
voltage Output terminal voltage		VOUT		500	In
Operating current		IOUT		60 mA	
Power loss (TA=25ÿ)	ESOP8	PD		1.1 In	
Thermal resistance (TA=25ÿ)		ÿJA ESOP-8		63	ÿ/W
ESD Protection (Human Body Mode) Storage		ESD 2000			In
Temperature		TSTG	-55	150	ÿ
Junction		TJ		150	ÿ
Temperature* Soldering Temperature (Soldering, 10		TB		270	ÿ

seconds) *Recommended Operating Temperature 0ÿ-100ÿ

5.2 Electrical Performance

TA = 25ÿ (unless otherwise specified)

Parameter name	symbol	Test conditions	Rated			unit
			value, minimum	value, typical value	maximum value	
Output breakdown voltage BVOUT		IOUT=10mA	500			In
startup voltage	VOUT_S	IOUT=30mA	11			In
Sampled Current	IREXT		5		60 mA	
sampling terminal reference voltage VREXT			0.565	0.6	0.615V	
temperature compensation	TSC			140		ÿ

6. Design Information

6.1 Design of High-Voltage LED String

Parameters required for the design:

ÿ1ÿ AC input voltage *VAC*

ÿ2ÿ LED operating current *If*

ÿ3ÿ The forward voltage *Vf* of the LED under If

The number of LEDs is determined by the following formula:

$$N_{ÿ} = \frac{\text{AC} \quad ÿ\ 1.414 ÿ\ 1 \quad \text{In}}{VV_{f}}$$

Where *V1* is the voltage drop across the IC during operation (i.e., VOUT), which can be adjusted according to the heat dissipation conditions in the actual application.

When adjusting, it is recommended that the IC power consumption not exceed 1.2W.

6.2 Efficiency Design

Efficiency is the ratio of LED power consumption to input power:

$$\ddot{y} = \frac{P_{LED}}{P_{IN}} = \frac{n \times V_f \times I_f}{V_{AC} \times 1.414 \times I_{AC}} = \frac{n \times V_f}{V_{AC} \times 1.414}$$

Where *VAC* is the AC input voltage, Vf is the voltage drop when a single LED is working, and If is the operating current of the LED.

The larger the number *N* of LEDs connected in series in the circuit , the higher the system efficiency.

During the design process, V1 can be adjusted reasonably according to actual application conditions to optimize efficiency.

6.3 Constant current control, output current setting

The JD9203ES06 allows for precise setting of the operating current via an external resistor. The operating current calculation formula is as follows:

$$I = \frac{V_{RULE}}{R_2}$$

Note: When laying out PCB circuitry, the chip must have a good heat dissipation environment.

The larger the value of electrolytic capacitor C1, the smaller the voltage ripple Vin, and the lower the voltage ripple supplied to JD9203ES06 for operation.

The smaller the value, the greater the C1 value. The C1 value depends on the total operating current of the LED tube: the higher the current, the larger the C1 capacity.

The typical value is 4.7uF/400V to 22uF/400V.

6.4 Over-temperature regulation function

To improve chip reliability, the JD9203ES06 employs an over-temperature regulation design. This design prevents overheating of the drive power supply.

At the same time, the output current is gradually reduced, thereby controlling the output current and temperature rise, so that the power supply temperature is maintained at the set value.

Improve system reliability. The chip's internal over-temperature regulation point is set at 140ÿ.

When the chip temperature exceeds the OTP point, the output power will gradually decrease to prevent the chip from being damaged due to overheating.

Therefore, the chip's operating temperature must be considered when applying it. The output power versus chip temperature curve is shown in the following figure:

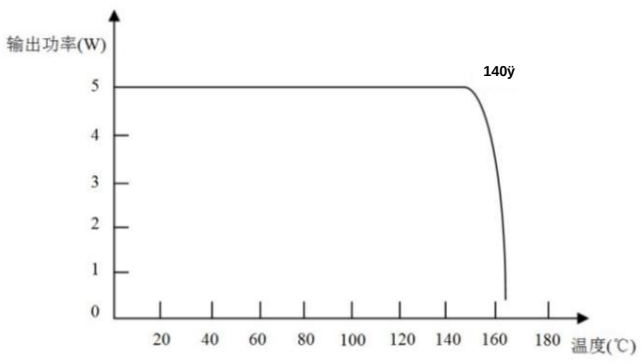


图 4. 输出功率-温度关系

Figure 4. Output power as a function of IC temperature

6.5 Application Examples

Requirements: AC 220V input, LED current 25mA, voltage drop across the IC 50V. Lamp parameters are determined as follows: 1. Measure Vf: The forward voltage drop *Vf* of the LED at 25mA current is measured to be 3.2V. 2. Determine the number of LEDs in the string: *Given: VAC=220V, Vf=3.2V, V1=50V*

$$N = \frac{A - 1.414 \cdot \ln\left(1 - \frac{220 - 1.414 \cdot 50}{C \cdot V \cdot V_f}\right)}{3.2} = 81$$

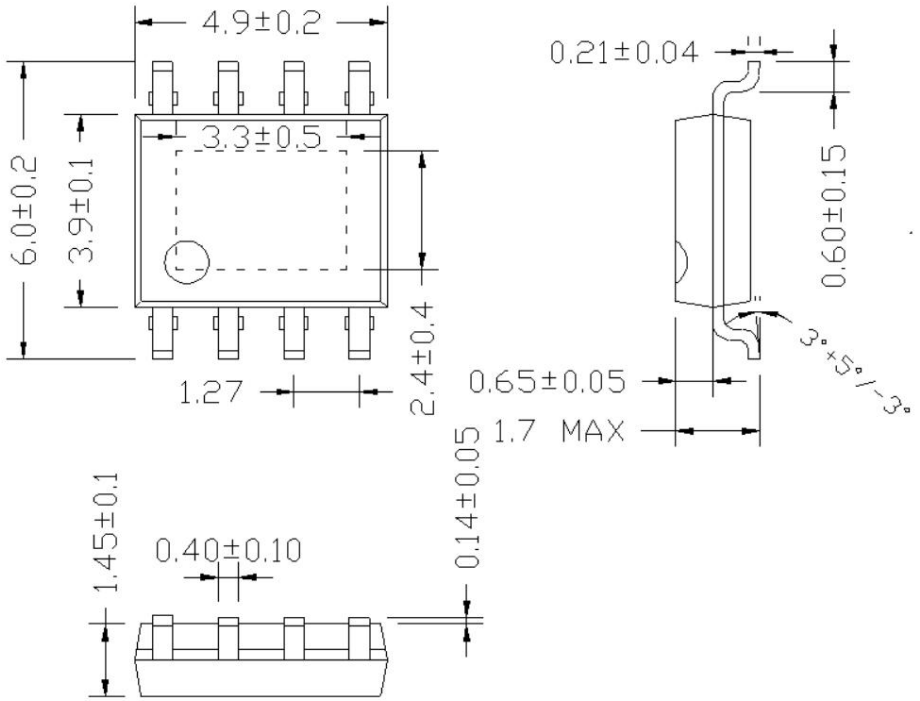
3. Sampling resistance calculation:

$$R_2 = \frac{In_{RULE}}{I_f} = \frac{0.6V}{25\,mA} = 24\Omega$$

The JD9203ES06 can be flexibly connected in series before, in the middle, or after an LED string, depending on the application environment and requirements.

7. External View

ESOP-8 outline drawing (unit: mm)



Version modification information:

V1.0... Initial version.

V2.0……Changed address.