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# Single touch single output LED dimming IC

## 1. Product overview

8022W is a capacitive touch control ASIC, which supports single-channel touch input and single-channel PWM output, and can be pin-configured for 4 functions. 8022W is mainly used in touch dimming LED lamps, which has the outstanding advantages of low power consumption, high anti-interference, wide operating voltage range, no flicker of light, and few peripheral components.

## 2. Main features

• **Working** voltage range: 2.4~5.5V

• **Standby** current about 9uA@VDD=5V&CMOD=10nF

• **Single** channel touch input

• **Single** PWM output, frequency 20KHz • **Using**

charge sharing to realize touch

• **Pin** configurable 4 functions

• Built-in voltage regulator, power-on reset and low-voltage reset hardware modules

• Built-in real-time environment self-adaptation, high-efficiency digital filtering and other software algorithms

• HBM ESD better than 4KV

## 3. Package and pin description

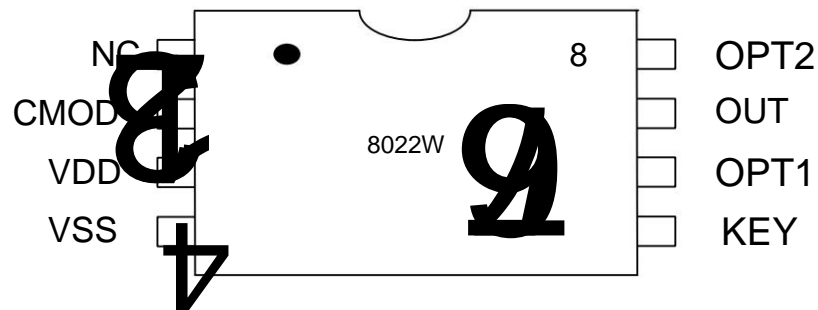


Figure 1 SOP8 pin diagram 1 pin description

Table 1: Pin Description

NO.	Pin Name I/O		describe
1	NC		
2	CMOD	I/O sampling capacitor input pin	
3	VDD	P power positive	
4	VSS	P power negative	
5	KEY	I/O touch input pin	
6	OPT1	I/O option input pin 1	
7	OUT	I/O PWM output pin	
8	OPT2	I/O option input pin 2	

#### 4. Function introduction

KEY touch input corresponds to OUT light control output (PWM). There are four optional functions, which are determined by the input state of the OPT1/OPT2 pin before power-on. The pins of the chip have internal pull-ups, 1 when floating, and 0 when connected to GND, as shown in the following table: Table 2 Functional mode

Mode	OPT1	OPT2	output	Dimming method
1	1	1	1	Single Brightness No Memory No Buffer stepless dimming
2	1	0	1	Single Brightness No Memory Buffered stepless dimming
3	1	0	0	Single brightness with memory and buffer stepless dimming
4	0	0	0	Single sequence low->middle->high->off Three stage dimming

The detailed function description is as follows:

Mode 1: Brightness, no memory, no buffer, LED touch stepless dimming function

KEY touch input corresponds to OUT PWM dimming LED output. When initially powered on, the light is off.

When the touch is short-pressed (the touch duration is less than 550ms), the light on and off control can be realized. Short press the touch once, the light is on; short press the touch again, the light is off, and so on. When the light is on or off, there is no brightness buffer, and the initial brightness of the light is fixed at 90% duty cycle.

• **When** the touch is long pressed (the touch duration is greater than 550ms), the stepless brightness adjustment of the light can be realized. Once you press and hold the touch, the brightness of the light will gradually increase, and when you release it, the brightness of the light will stop at the corresponding brightness at the time of the release. If you press and hold for more than 3 seconds, the brightness of the light will not change after reaching the maximum brightness; press and hold the touch again, the brightness of the light gradually decreases, and when the button is released, the brightness of the light stops at the corresponding brightness at the time of releasing the button. If the button is pressed for more than 3 seconds, the brightness of the light reaches the minimum brightness and will not change again, and so on.

• **The** PWM signal duty cycle of the lowest brightness is 2%, and the highest brightness is 100%. When the light is turned off, press and hold the touch button to turn on the light. At this time, after the button is pressed, the light will be turned on at 90% brightness. If it is not released after more than 550ms, it will be dimmed steplessly downward.

• **Short** -press touch and long-press touch can be used freely at any time, and the functions of each other are not interfered and restricted.

• **Mode 2** : Brightness without memory and buffer LED touch stepless dimming function

• **Based** on Mode 1, when you click to turn on and off the light, the light transitions smoothly from a lower brightness to the initial brightness of the light, and when you click to turn off the light, the light decreases smoothly from the current brightness until it is turned off. Off, so as to achieve the visual buffering effect of smooth brightness changes, and protect the eyes and vision.

• **Mode 3** : Brightness with memory and buffer LED touch stepless dimming function

• **Added** brightness memory function on the basis of mode 2. That is to say, when the power supply is uninterrupted, the brightness when the light is turned off by short pressing the touch will be memorized each time, and this brightness will be used as the initial brightness when the light is turned on by the next short press. • **Initial** power-on or power-on after power-off, the initial brightness of the first time the light is turned on is fixed at 90% of the highest brightness, the first The direction of secondary dimming is fixed as down dimming.

• **The** dimming direction of the first long press after turning on the light without power off is determined by the previously stored brightness value. If the stored brightness value is greater than 45%, it will be dimmed down; if the stored brightness value is less than 45%, it will be adjusted upwards. Dimming.

• **Mode 4** : LED three - stage touch dimming function

• **When** initially powered on, the OUT output is all low level, and the light is off.

• **Each** time you click and touch, the brightness of the light will cycle through low brightness->medium brightness->high brightness->off.

## 5. Application circuit

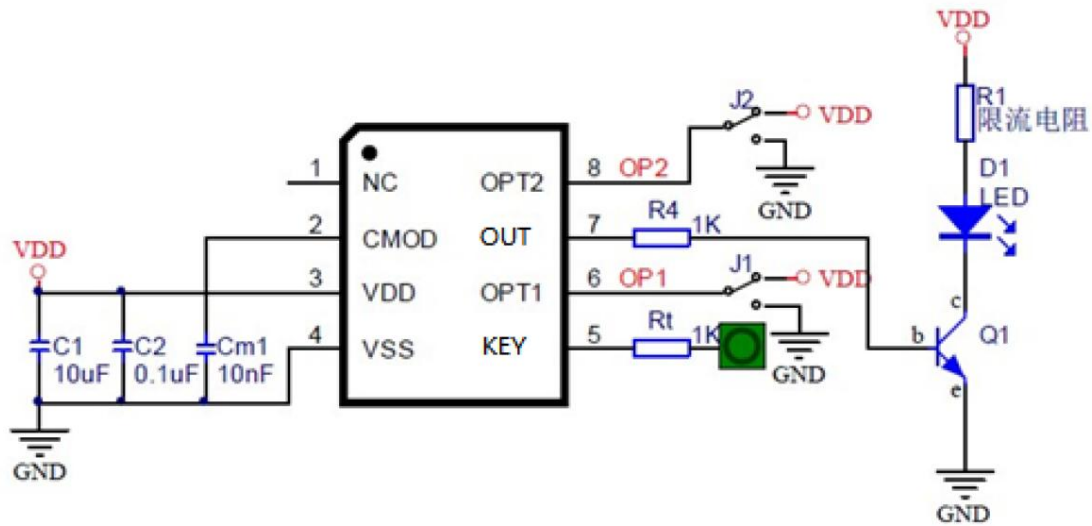


Figure 2 Standard application circuit

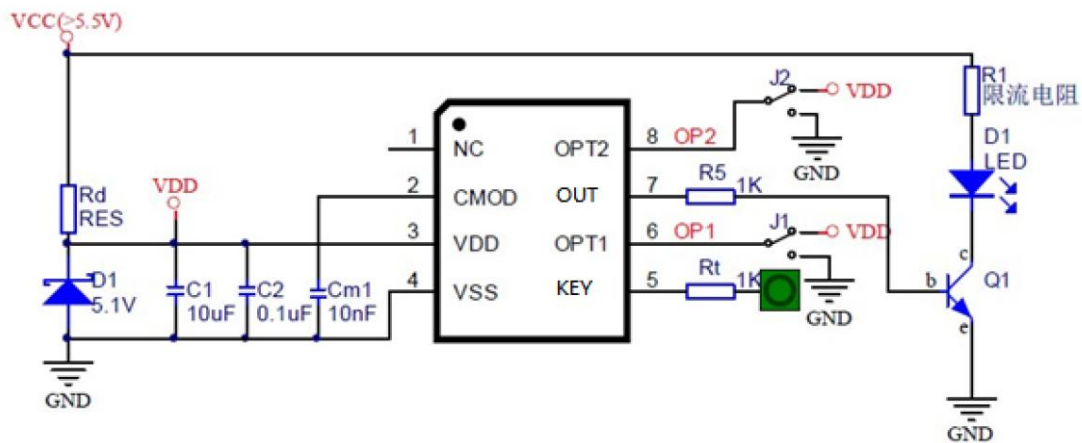


Figure 3 DC high voltage power supply application circuit

Notice:

When the dielectric material and thickness are quite different, the touch sensitivity can be adjusted by adjusting the Cm capacitance between CMOD and GND. The larger the capacitor value, the higher the sensitivity; the smaller the capacitor value, the lower the sensitivity. The following data are for reference only, and the actual situation shall prevail. Table 3 CMOD sampling capacitance

media type	CMOD sampling capacitor	
	device type	Device parameters
directly touch the metal case	333 NPO Capacitor	33nF/25V

Acrylic glass within 3mm	103 NPO capacitor	10nF/25V
3-6mm acrylic glass	203 NPO Capacitor	20nF/25V
6-10mm acrylic glass	473 NPO Capacitor	47nF/25V

## 6. Electrical parameters

### 6.1 Limit parameters of electrical characteristics

Table 4 Limit parameters

parameter	label	condition	scope	unit
supply voltage	VDD	.	-0 to +6.0	IN
Input voltage	WE	All I/O ports	-0.3 to VDD + 0.3	IN
Operating temperature	FACING	.	-20 to + 70	°C
stored temperature	TSTG	-	-40 to + 125	°C

### 6.2 DC characteristics

Table 5 DC characteristics (unless otherwise specified VDD = 2.4V~5.5V, Temp = 25°C)

Parameter conditions	Label	Minimum value	Typical value	Maximum value	Unit
Operating Voltage	VDD		2.4	5.5	IN
Input High Voltage Threshold	HIV		0.75VDD		IN
Input Low Voltage Threshold	WILL			0.25 VDD	IN
Output <b>source</b> current IOH_SO		VDD=5V, VOH=9/10VDD		-4.5	mA
		VDD=5V, VOH=2/3VDD		-12	mA
Output <b>sink</b> current	IOH_SO	VDD=5V, VOL=1/10VDD		12	mA
		VDD=5V, VOL=1/3VDD		28	mA
stand-by current	ISB	VDD=5V,Cmod=10nF		9	uA
		VDD=3V,Cmod=10nF		6.5	
PWM output frequency	FPWM		20		KHz

## 7. Package Dimensions

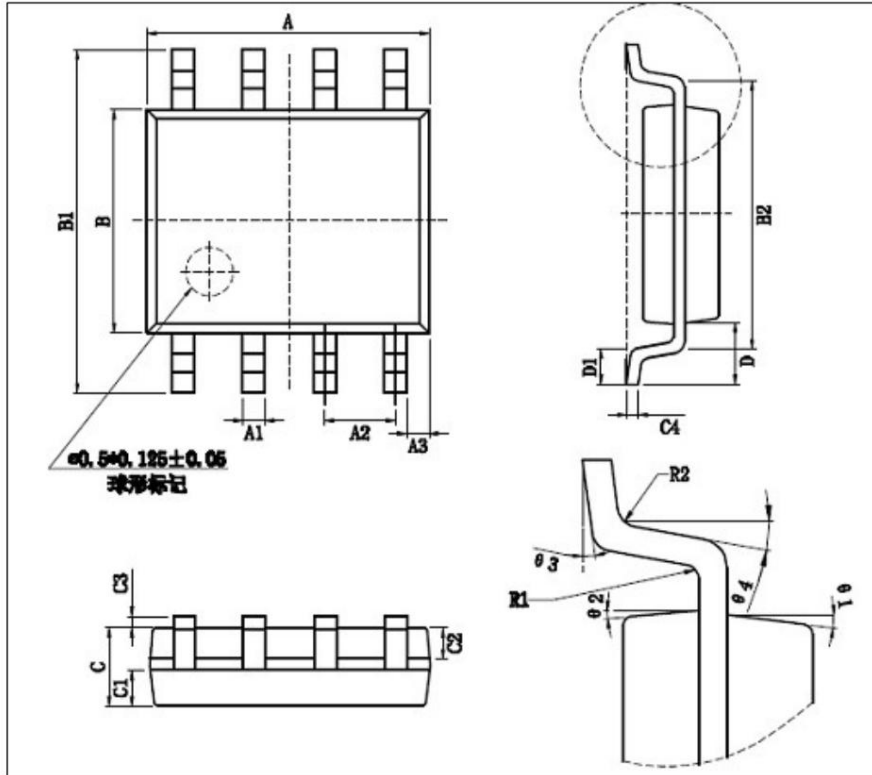


Figure 4 SOP8 package

Table 6 SOP8 package size

symbol	Dimensions (mm unit)		
	minimum value	typical value	maximum value
	A	4.80	-
A1	0.35	-	0.45
A2	-	1.27	-
A3	-	0.345	-
B	3.80	-	4.00
B1	5.80	-	6.20
B2	-	5.00	-
C	1.30	-	1.50
C1	0.55	-	0.65

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C2	0.55	-	0.65
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## 8. History

Version number	modification record	release date
V1.0	first edition	2018-03-10
V1.1	update standard application circuit	2019-11-25
V1.2	Change ESD parameters	2020-11-10