Manual

DATASHEET V1.1

UTouch_01B

I. Overview

The UTouch01B is a single-channel, single-button capacitive touch and proximity sensor IC that replaces traditional mechanical switches.

The IC is fabricated in a CMOS process with a simple structure and stable performance. The IC can be configured in a variety of modes through pins, and can be widely used in lighting control, toys, household appliances and other products.

II. Characteristics

1. Working voltage: 2.0V ~ 5.5V

2. The highest power consumption is 11.5uA, and the low power mode is only 1.5uA (both refers to 3V and no load)

3. The external configuration pin is set to multiple modes

4. high reliability, chip built-in debounce circuit, can

effectively prevent external noise interference caused by malfunction

5. Can be used for glass, ceramic, plastic and other media surface

III. The scope of application:

1. Household appliances
2. Security products
3. Digital products
4. Consumer electronics
5. LED lighting
6. Toys

IV. the package schematic

The UTouch01B is packaged in a SOT23-6 package. The package schematic is shown below.

V. Pin descripton

Pin number	Pin name	Pin function
1	OUT	CMOS output
2	GND	Negative power supply
3	TCH	TOUCH PAD input
4	AHLB	Output high/low active mode selection
5	VCC	VDD positive power supply
6	TOG	Hold/synchronous mode selection

VI. Functional description

The UTouch01B can be set to multiple modes via external configuration pins. When the external configuration pin is hanging, the configuration bit is automatically set to the default value (Default).

Table 2 Function Description Table

Pin name	Selection	Functional description
TOG	=1	Keep mode
	=0(Default)	Synchronous mode
AHLB	=1	Output low active
	=0(Default)	Output high active

6.1 Hold/Sync Mode (TOG)

When the PIN TOG is floating, the default pull-down is low and set to synchronous mode.

When TOG =0 is set, the synchronization mode is selected. At this time, the state of the PIN OUT is synchronized with the touch response; only the output response is detected when the touch is detected; when the touch disappears, the state of the OUT returns to the initial state, as shown in the following figure.

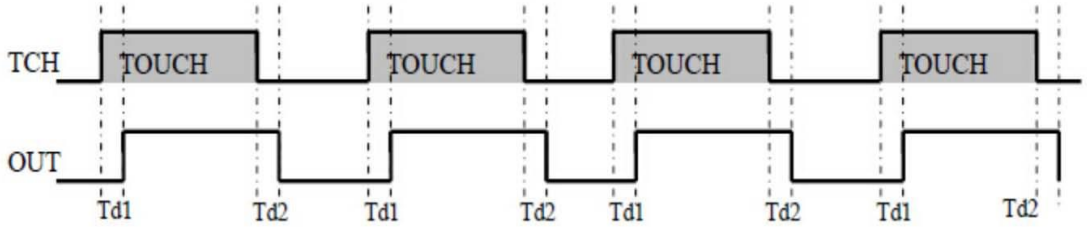

Figure 2 Synchronous mode

When TOG =1 is set, the hold mode is selected. At this time, the state of PIN OUT is held under the control of touch response. When the touch disappears, it remains in the response state; after touching and responding, it returns to the initial state, as shown in the figure below.

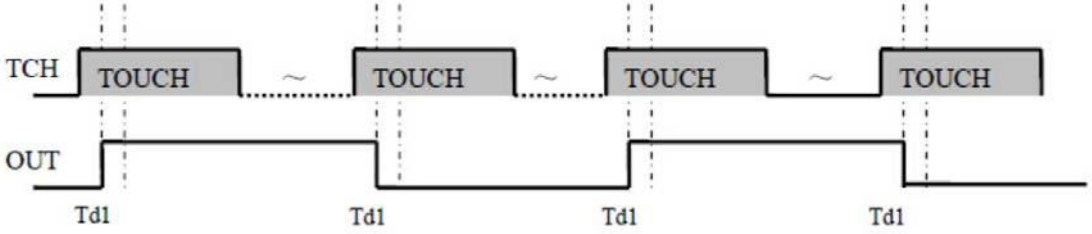

Figure 3 Asynchronous mode

Note: Td1 is the TOUCH response delay time and Td2 is the TOUCH cancellation delay.

6.2 Output mode selection (AHLB, OUT)

The UTouch01B can be set to a variety of output modes. When the PIN pin (AHLB)

is left floating, the default pull-down is low and is set to active-high mode.

Table 3 Output Mode Menu

AHLB	OUT
0	Output high level after touch response
1	Output low level after touch response

6.2.1

The false trigger caused by collisions with other factors such as the environment will keep it working. To prevent this from happening, the UTouch01B provides the longest time output function of the valid key. When the touch time exceeds the set time (continuously press the contact 75 seconds), the system will return to the power-on initialization state, stop output until the next touch event occurs.

Ⅷ、Absolute maximum

Table 4 Working condition specification table

Item	Symbol	Range	Unit
Operating Voltage	VCC	-0.3~6.0	V
Input Voltage	V_i	GND-0.3~VCC+0.3	V
Operating Temperature	TOPR	-40~85	℃
Stored Temperature	TSTG	-65~150	℃
Flow through VDD maximum current	IVDDmax	50	mA
Flow through GND maximum current	IGNDmax	50	mA
The listed voltages are referenced to GND			

Ⅸ、Electrical parameter

Table 5 Electrical parameter

Parameter	Symbol	Condition	Minimum value	Typical value	Maximum value	Unit
Operating Voltage	VCC	TOPR=-20~70℃	2.0	3.0	5.5	V
Operating Current	I_{DD}		1.5	10.0	15.0	uA
Input PIN pull-up resistor	R_{UP}		50	80	160	kΩ
High level output current (OUT)	I_{OL}	V_{DD}=5V	3	6	-	mA
		V_{DD}=3V	1.5	3.5	-	mA
Unless otherwise specified, VDD is 3.0V, ambient temperature is 25°C, and the chip output is unloaded.						

Ⅹ、Application circuit diagram

9.1 reference circuit

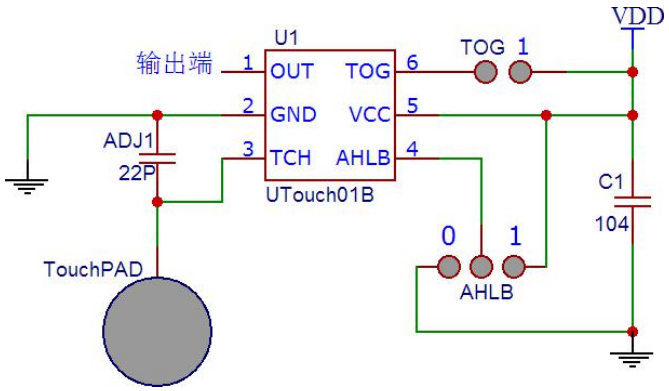

Table 4 reference circuit

The following instructions are available for reference:

1. ADJ1 refers to the capacitance that adjusts the sensitivity. The capacitance value ranges from 0pF to 75pF.
2. Between VDD and GND, filter capacitor C1 should be connected in parallel to eliminate noise. The recommended value is 10uF or greater. The power supply must be stable. If the power supply voltage drifts or changes rapidly, it may cause sensitivity drift or detection errors.
3. The shape and area of the TOUCH PAD and the length of the wire between the TTCH and the TCH pin all affect the sensitivity of the touch sensing.
4. From TOUCH PAD to IC pin TCH Do not cross other fast-jumping signal lines or cross other lines. TOUCH PAD needs to be protected by GROUND, please refer to Figure 5

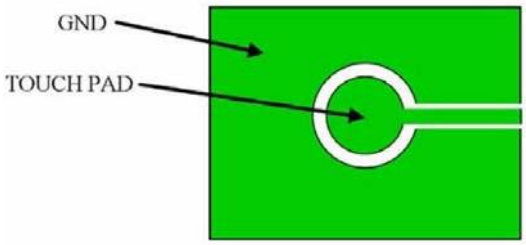

Figure 5 TOUCH PAD Reference Drawing

5. If the above function option pin selects the default value, it is recommended to receive a fixed level. To select the output synchronization mode, the TOG pin is recommended to be connected to GND.

9.2 LED lamp

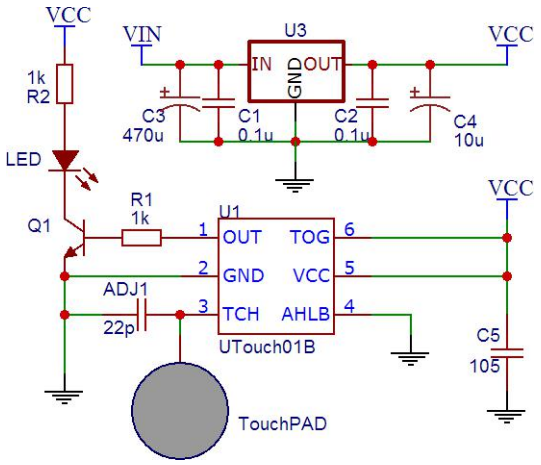

Figure 6 LED desk lamp application circuit diagram

9.3 XIAOMI touch LED portable light

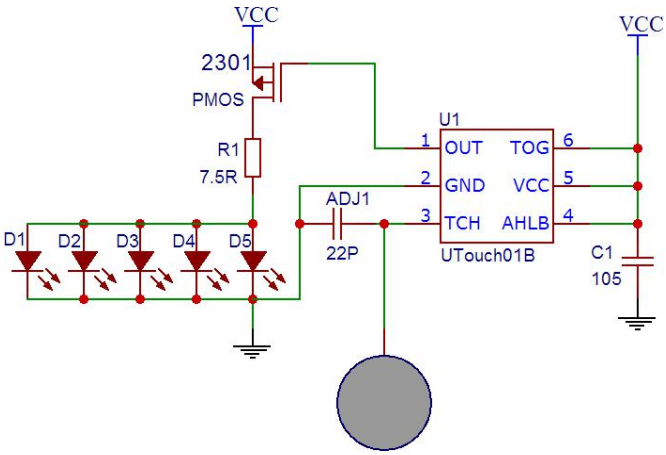

Figure 7 Xiaomi touch LED portable light schematic

9.4 Wall 86 Switch Application Circuit Diagram

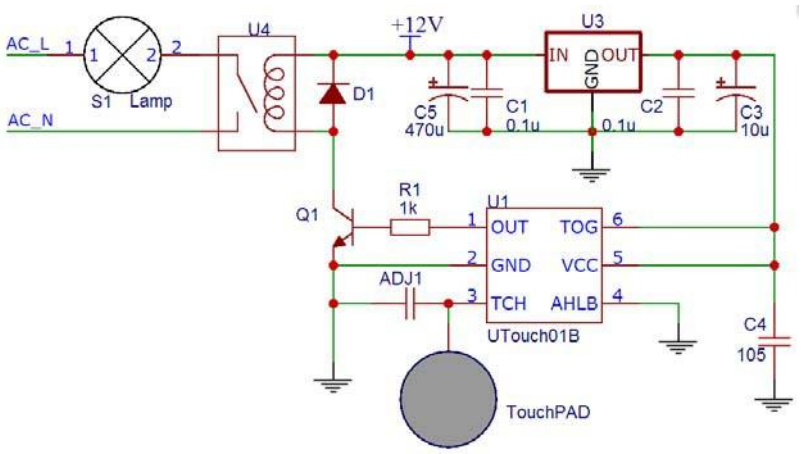

Figure 8 Wall 86 Switch Application Schematic

XI Penetration application note

10.1 Correspondence between penetration force and floor and induction electrode size

Induction electrode area	PCB top layer is not paved Top floor is not paved	PCB top layer copper 35% floor
6×6mm	8mm	1.7mm
7×7mm	10mm	2.8mm
8×8mm	14mm	2.8mm
10×10mm	16mm	4.9mm
12×12mm	18mm	6mm
15×15mm	22mm	8mm

Description:

1. This table is for reference only. The specific pad size should be adjusted according to the actual die casing thickness.
2. The larger the touch pad area, the thicker the dielectric material can penetrate.
3. The smaller the PCB paving ratio, the smaller the parasitic capacitance between the PCB touch pad and the ground. The larger the finger capacitance of the new finger capacitance changes with respect to the PCB, the higher the touch sensitivity, the thicker the penetrating medium. .
4. The smaller the proportion of PCB paving, the more susceptible it is to outside interference.
5. It is recommended to take into account the sensitivity and anti-interference design PCB layout. If the thickness of the penetrating medium is not high, it is recommended to increase the proportion of paving to improve the anti-interference performance.

10.2 Correspondence between penetration force and touch pin parallel capacitance

Capacitance value (pF)	Acrylic material penetration (mm)
Unsoldered	4.9
1	4.9
5	3
10	2
20	1
30	1
Touch pin parallel capacitor to ground, test conditions: sensing electrode (diameter 10mm), PCB top layer copper, PCB bottom layer 35% paving	

Note: This table is for reference only. The smaller the parallel capacitance, the thicker the material that can penetrate the dielectric.