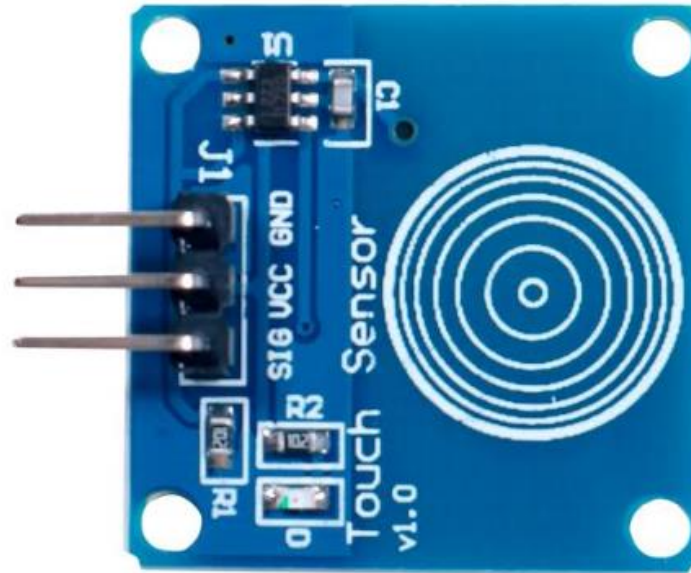


TTP223-1 Channel Capacitive Touch Sensor Module



1 Channel Capacitive Touch Sensor Module uses the touch-sensing IC TTP223 to sense the touch input thus making it easy to add capacitive touch input to your project. The touching detection IC is designed for replacing traditional direct button key with diverse pad size. The module has single touch pad. Power the module with 2 ~ 5.5V DC and the touch pad is all active to sense the input.

Single Channel Capacitive Touch Sensor Module is easy to interface. It can be used along with a microcontroller or an arduino or even without one. When a capacitive load (such as a human hand) is in close proximity to the sense-pad, the sensor detects the change in capacitance and activates the switch. Custom sense-pads can be made from nearly any conductive material and these sensors can detect touch through thin layers of non-conductive materials such as glass, plastic, fabric or even wood.

In the normal state, the module output is low, low power consumption; When a finger touches the corresponding position, the module output high, if not touched for 12 seconds, switch to low-power mode.

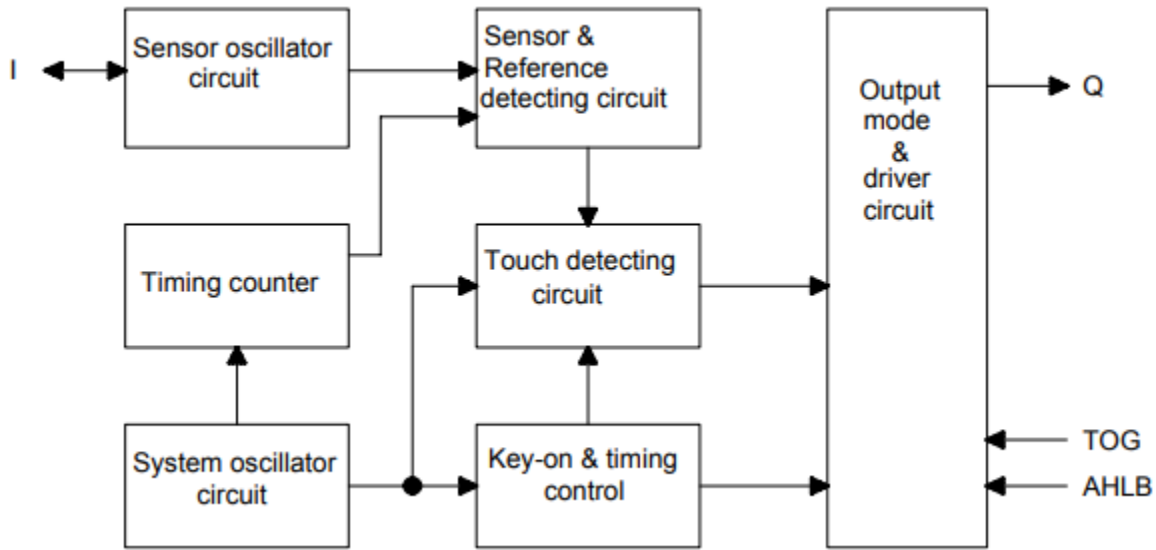
FEATURES:

- Low power consumption
- Power supply for 2 ~ 5.5V DC
- Can replace the traditional touch of a button
- Four M2 screws positioning holes for easy installation

SPECIFICATIONS:

- Power supply voltage(VCC): 2.0, 3, 5.5 V.
- Output high VOH: 0.8VCC V
- Output low VOL: 0.3VCC V
- Response time (touch mode) : 60 mS
- Output Pin Sink Current (@ VCC = 3V, VOL = 0.6V) : 8 mA
- Output pin pull-up current (@ VCC = 3V, VOH = 2.4V) : 4 mA
- Response time (low power mode) : 220 mS
- Size : 24 x 24 x 7.2 mm

FUNCTIONAL DESCRIPTION:

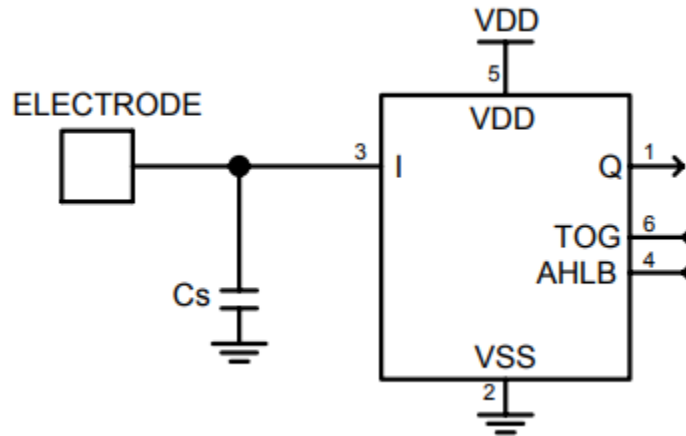


- The TTP223b is a capacitive touch sensor module and the sensor driver is based on the driver IC TTP223. This capacitive touch sensor is an ideal alternative for the old-fashioned keypads and buttons. The operating voltage of the TTP223 IC is from the 2V to 5.5V and the power consumption of the touch sensor is very low.
- TTP223 is a touch indicator IC that offers 1 touch key. This touch detection IC is designed as a substitute for the traditional direct button key with a diverse pad size. Touch sensors allow electronic devices to sense when your finger is within a few millimeters of a surface to simulate a button “push” just like how the pushbutton works.

1. Sensitivity adjustment:

The total loading of electrode size and capacitance of connecting line on PCB can affect the sensitivity. So the sensitivity adjustment must according to the practical application on PCB. The TTP223-BA6 offers some methods for adjusting the sensitivity outside. 1-1 by the electrode size Under other conditions are fixed. Using a larger electrode size can increase sensitivity. Otherwise it can decrease sensitivity. But the electrode size must use in the effective scope. 1-2 by the panel thickness Under other conditions are fixed. Using a thinner panel can increase sensitivity. Otherwise it can decrease sensitivity. But the panel thickness must be below the maximum value. 1-3 by the value of C_s (please see the down figure) Under other conditions are fixed. When do not use the C_s to VSS, the

sensitivity is most sensitive. When adding the values of Cs will reduce sensitivity in the useful range ($0 \leq C_s \leq 50\text{pF}$).



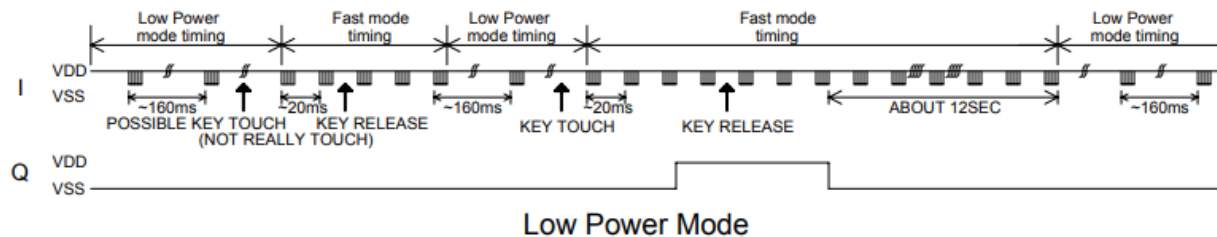
2. Output mode:

The TTP223-BA6 has direct mode active high or low by AHLB pad option. And has toggle mode by TOG pad option. Pad Q is CMOS output.

TOG	AHLB	Pad Q option features
0	0	Direct mode, CMOS active high output
0	1	Direct mode, CMOS active low output
1	0	Toggle mode, Power on state=0
1	1	Toggle mode, Power on state=1

3. Low power mode:

The TTP223-BA6 is Low Power mode. It will be saving power. When detecting key touch, it will switch to Fast mode. Until the key touch is released and will keep a time about 12sec. Then it returns to Low Power mode. The states and timing please see below figure.



4. Option pin:

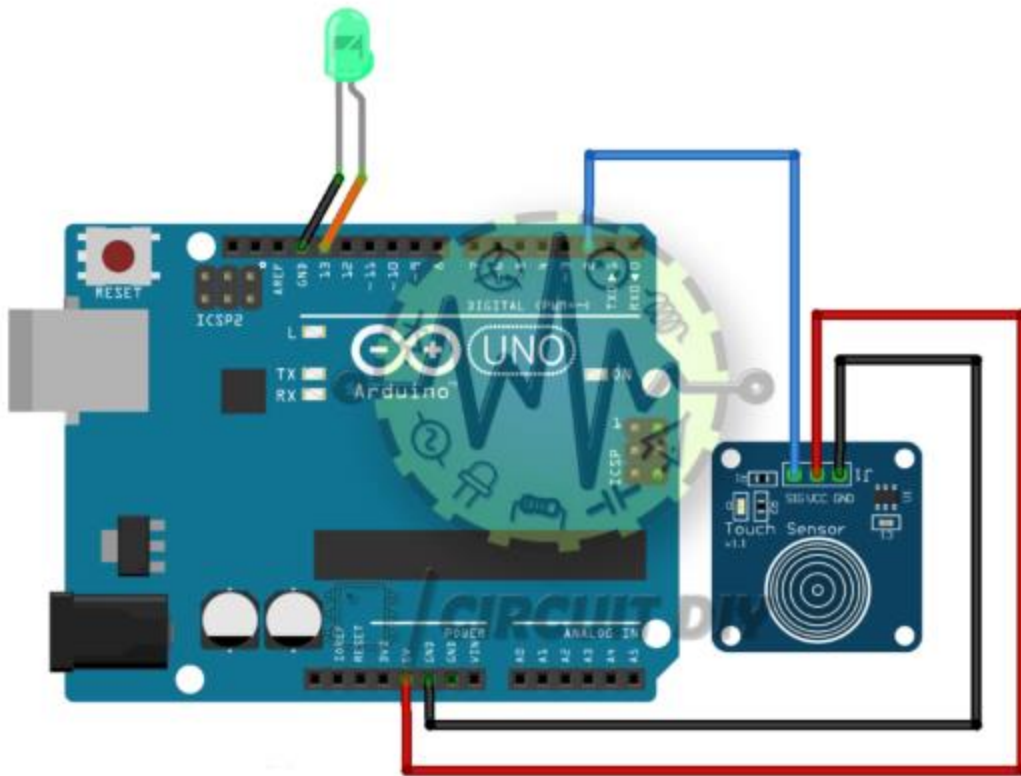
For power saving concern and package bonding option consideration, all the feature option pins with latch type design and initial states are 0 or 1 as power on. If those pins are forced to VDD or VSS, the states will be changed to 1 or 0 without any current leakage to conflict the power saving issue.

Feature option pins	Initial state by Power on
AHLB	0
TOG	0

Touch Sensor Interface:

- Control Interface: A total of three pins (GND, VCC, SIG), GND to ground, VCC is the power supply, SIG digital signal output pin
- Power Indicator: Green LED, power on the light that is shiny
- Touch area: Similar to a fingerprint icon inside the area, you can touch the trigger finger.
- Positioning holes: 4 M2 screws positioning hole diameter is 2.2mm, the positioning of the module is easy to install, to achieve inter-module combination.

CIRCUIT DIAGRAM:



The TTP223 touch sensor module provides a single integrated touch sensing area of 11 x 10.5mm with a sensor range of ~5mm. An on-board LED will give a visual indication of when the sensor is triggered. When triggered the module's output will switch from its idle low state to high. Solder jumpers allow for reconfiguring its mode of operation to be either active low or toggle output.

```
1. int ledPin = 13;
2. void setup()
3. {
4.   Serial.begin(9600);
5.   pinMode(ledPin, OUTPUT);
6.   pinMode(ctsPin, INPUT);
7. }
8.
9. void loop()
```

```

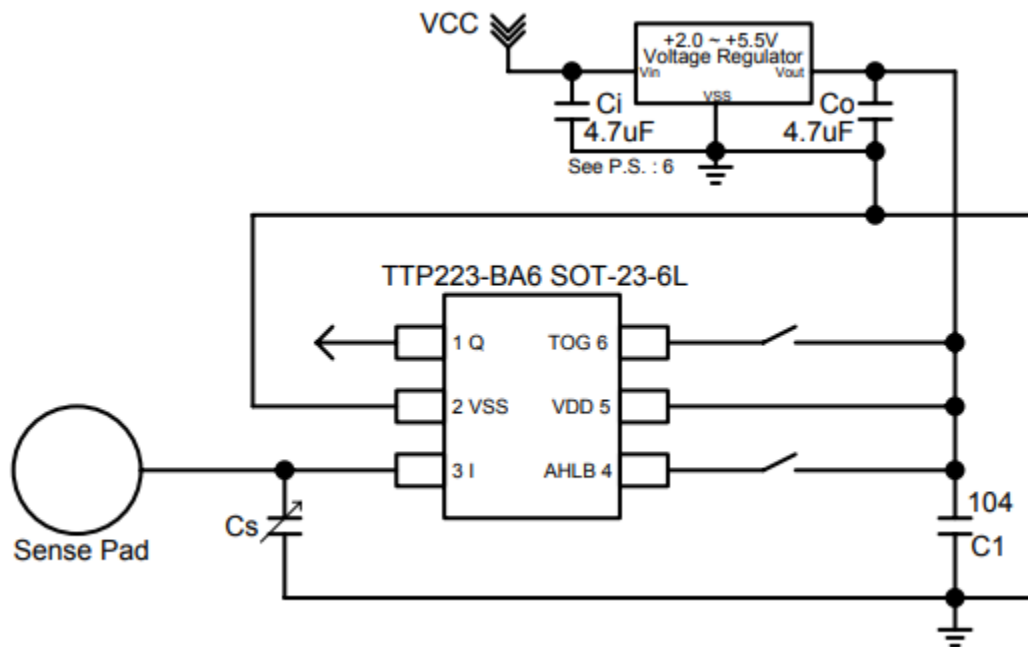
10. {
11.  int ctsValue = digitalRead(ctsPin);
12.
13.  if (ctsValue == HIGH)
14.  {
15.    digitalWrite(ledPin, HIGH);
16.    Serial.println("TOUCHED");
17.  }
18.  else
19.  {
20.    digitalWrite(ledPin, LOW);
21.    Serial.println("not touched");
22.  }
23.  delay(0.9);
24. }

```

PIN FUNCTION:

Pin No	Pin Name	I/O Type	Description
1	Q	O	CMOS output pin
2	VSS	P	Negative power supply, ground
3	I	I/O	Input sensor port
4	AHLB	I-PL	Output active high or low selection, 1=>Active low; 0(Default)=>Active high
5	VDD	P	Positive power supply
6	TOG	I-PL	Output type option pin, 1=>Toggle mode; 0(Default)=>Direct mode

TYPICAL APPLICATION CIRCUIT:



1. On PCB, the length of lines from touch pad to IC pin shorter is better. And the lines do not parallel and cross with other lines.
2. The power supply must be stable. If the supply voltage drift or shift quickly, maybe causing sensitivity anomalies or false detections.
3. The material of panel covering on the PCB can not include the metal or the electric element. The paints on the surfaces are the same.
4. The capacitance C_s can be used to adjust the sensitivity. The value of C_s use smaller, then the sensitivity will be better. The sensitivity adjustment must according to the practical application on PCB. The range of C_s value is 0~50pF.
5. The C_1 capacitor must be used between VDD and VSS; and should be routed with very short tracks to the device's VDD and VSS pins (TTP223-BA6) .
6. The value of capacitors can be used by the real application for C_i and C_o capacitors.

APPLICATIONS:

Capacitive touch sensing may be used in any place where low to no force touch sensing is desired.

PACKAGE INCLUDES:

1x TTP223 - 1 Channel Capacitive Touch Sensor Module Blue Color

TM