阅读申明

1.本站收集的数据手册和产品资料都来自互联网，版权归原作者所有。如读者和版权方有任何异议请及时告之，我们将妥善解决。
2.本站提供的中文数据手册是英文数据手册的中文翻译，其目的是协助用户阅读，该译文无法自动跟随原稿更新，同时也可能存在翻译上的不当。建议读者以英文原稿为参考以便获得更精准的信息。
3.本站提供的产品资料，来自厂商的技术支持或者使用者的心得体会等，其内容可能存在描叙上的差异，建议读者做出适当判断。
4.如需与我们联系，请发邮件到marketing@iczoom.com，主题请标有"数据手册"字样。

Read Statement

1. The datasheets and other product information on the site are all from network reference or other public materials, and the copyright belongs to the original author and original published source. If readers and copyright owners have any objections, please contact us and we will deal with it in a timely manner.

2. The Chinese datasheets provided on the website is a Chinese translation of the English datasheets. Its purpose is for reader's learning exchange only and do not involve commercial purposes. The translation cannot be automatically updated with the original manuscript, and there may also be improper translations. Readers are advised to use the English manuscript as a reference for more accurate information.

3. All product information provided on the website refer to solutions from manufacturers' technical support or users the contents may have differences in description, and readers are advised to take the original article as the standard.

4. If you have any questions, please contact us at marketing@iczoom.com and mark the subject with "Datasheets".

1 KEY TOUCH PAD DETECTOR IC

GENERAL DESCRIPTION

The TTP233B-HA6 TonTouch[TM] is a touch pad detector IC which offers 1 touch key. The device built-in regulator for touch sensor. Stable sensing method can cover diversity condition. The touching detection IC is designed for replacing traditional direct button key with diverse pad size. Low power consumption and wide operating voltage are the contact key features for DC or AC application.

FEATURES

- Operating voltage 2.4V~5.5V
- Built-in regulator for touch sensor
- TTP233B-HA6 Operating current @VDD=3V, no load
  At low power mode typical 2.5uA, maximum 5uA
- The response time max about 220mS at low power mode @VDD=3V
- Sensitivity can adjust by the capacitance(1~50pF) outside
- Stable touching detection of human body for replacing traditional direct switch key
- Provides Low Power mode
- Provides direct output or toggle output selection by pad option(TOG pin)
- Q pin is CMOS output can be selected active high or active low by pad option(AHLB pin)
- Have the maximum on time 16 sec
- After power-on have about 0.5 sec stable-time, during the time do not touch the key pad,
  And the function is disabled
- Auto calibration for life
  The re-calibration period is about 1 sec within 8 sec after power-on. When key has be touched within 8 sec or key has not be touched more than 8 sec after power-on, then the re-calibration period change to 4 sec.

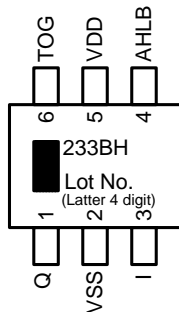## APPLICATION

- Wide consumer products
- Button key replacement

BLOCK DIAGRAM
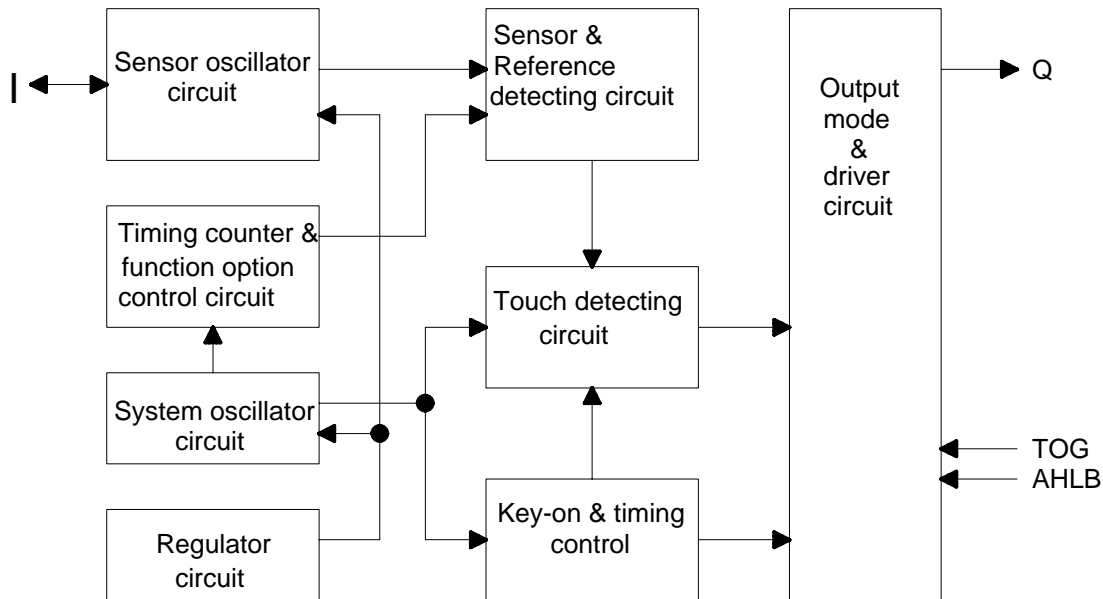
PACKAGE CONFIGURATION

TTP233B-HA6 : Package Type SOT-23

TTP233B-HA6 SOT-23

PAD DESCRIPTION

Pad No.	Pad Name	I/O Type	Pad 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 Q active high or low selection, 0(Default)=>Active high ; 1=>Active low
5	VDD	P	Positive power supply
6	TOG	I-PL	Output type option pin, 0(Default)=>Direct output ; 1=>Toggle output

Pin Type

  O : CMOS push-pull output

  I/O : CMOS I/O

  I-PL : CMOS input and pull-low resister

  P : Power / Ground

ELECTRICAL CHARACTERISTICS
 • **Absolute Maximum Ratings**

Parameter	Symbol	Conditions	Value	Unit
Operating Temperature	T_{OP}	—	-40 ~ +85	℃
Storage Temperature	T_{STG}	—	-50 ~ +125	℃
Power Supply Voltage	VDD	Ta=25°C	VSS-0.3 ~ VSS+5.5	V
Input Voltage	V_{IN}	Ta=25°C	VSS-0.3 ~ VDD+0.3	V
Human Body Mode	ESD	—	7	KV
Note：VSS symbolizes for system ground				

 • **DC/AC Characteristics**：(Test condition at room temperature=25℃)

Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Operating Voltage	VDD			2.4	3	5.5	V
Internal Regulator Output	**VREG**			2.2	2.3	2.4	**V**
System oscillator	F_{FAST}	VDD=3V			512K		Hz
	F_{LOW}				16K		
Sensor oscillator	F_{SEN}	VDD=3V no load		-	1M	-	Hz
Operating Current TTP233B-HA6 IC	I_{OP}	VDD=3V output no load	Low power mode		2.5	5	uA
			Fast mode		5.0	10	
Input Ports	V_{IL}	Input Low Voltage		0	-	0.2	VDD
Input Ports	V_{IH}	Input High Voltage		0.8	-	1.0	VDD
Output Port Sink Current	I_{OL}	VDD=3V, V_{OL}=0.6V		-	8	-	mA
Output Port Source Current	I_{OH}	VDD=3V, V_{OH}=2.4V		-	-4	-	mA
Output Response Time	T_R	VDD=3V, At fast mode				60	mS
		VDD=3V, At low power mode				220	
Input Pin Pull-low Resistor	R_{PL}	VDD=3V, (TOG, AHLB)			25K		ohm

FUNCTION DESCRIPTION

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 TTP233B-HA6 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 Cs (please see the down figure)

Under other conditions are fixed. When do not use the Cs to VSS, the sensitivity is most sensitive. When adding the values of Cs will reduce sensitivity in the useful range (1pF   Cs   50pF).
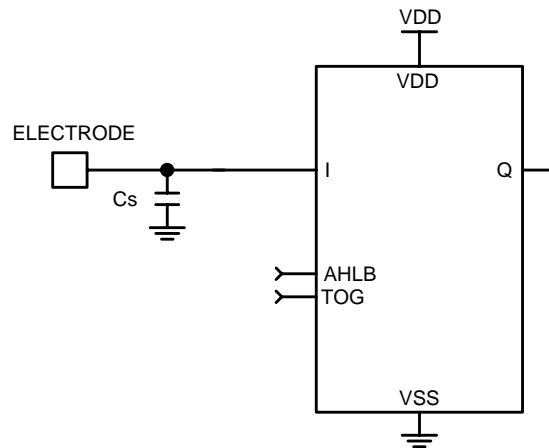
2. Output mode (By TOG, AHLB pad option)

TOG pad: Direct output or toggle output selection .

AHLB pad: Output Q active high or active low selection.

Pad Q (CMOS output) option features:

| TOG	AHLB	Pad **Q** option features
0	0	Direct output, CMOS active high
0	1	Direct output, CMOS active low
1	0	Toggle output, power on state =0
1	1	Toggle output, power on state =1

3. Maximum key on duration time

If some objects cover in the sense pad, and causing the change quantity enough to be detected. To prevent this, the TTP233B-HA6 sets a timer to monitor the detection. The timer is the maximum on duration time. It is set about 16 sec at 3V. When the detection is over the timer, the system will return to the power-on initial state, and the output becomes inactive until the next detection.

4. Low power mode

The TTP233B-HA6 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 10 sec. Then it returns to Low Power mode.


Low Power Mode
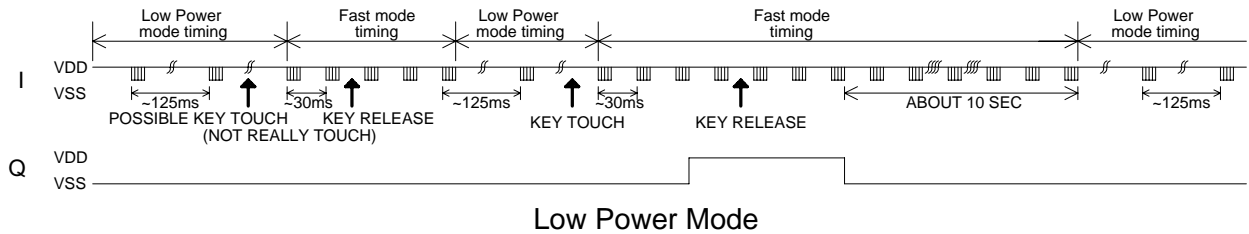
5. Option pin

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.

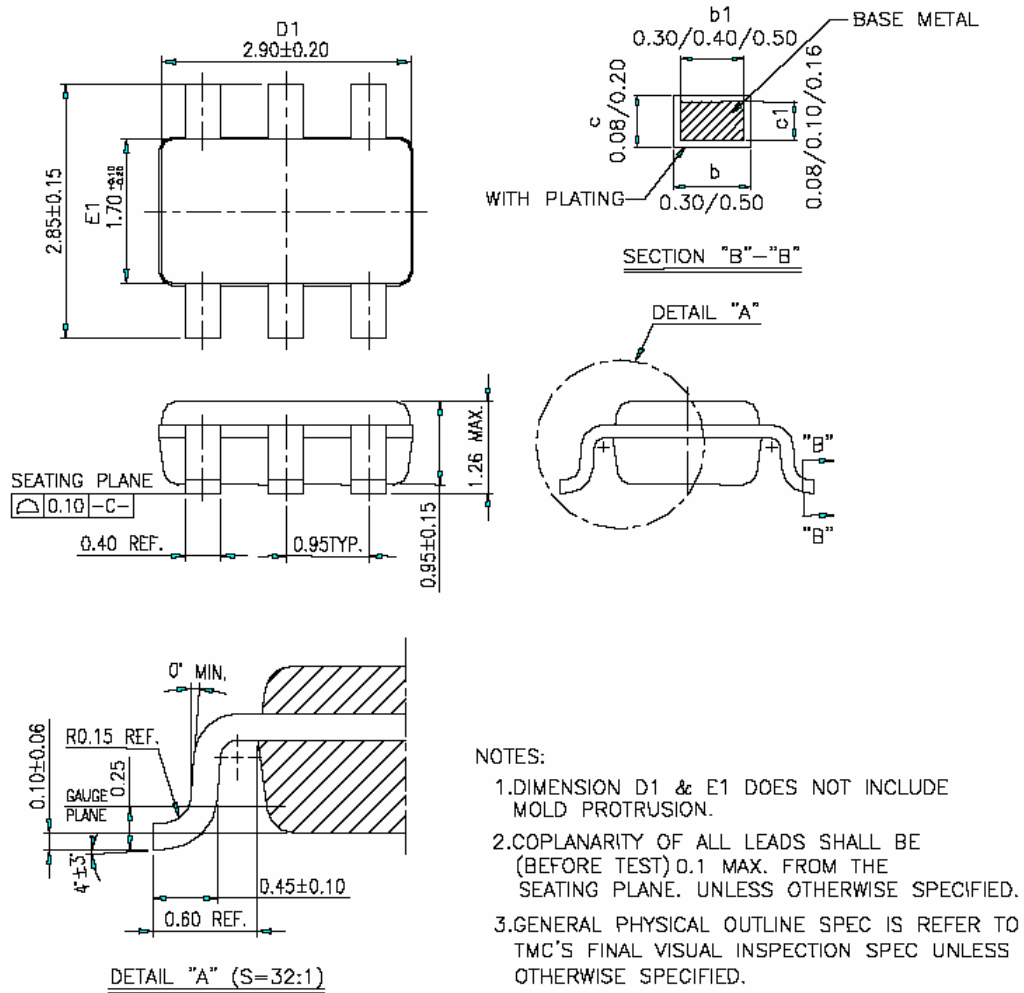| Feature option pins	Initial state by Power on
AHLB	0
TOG	0

APPLICATION CIRCUIT
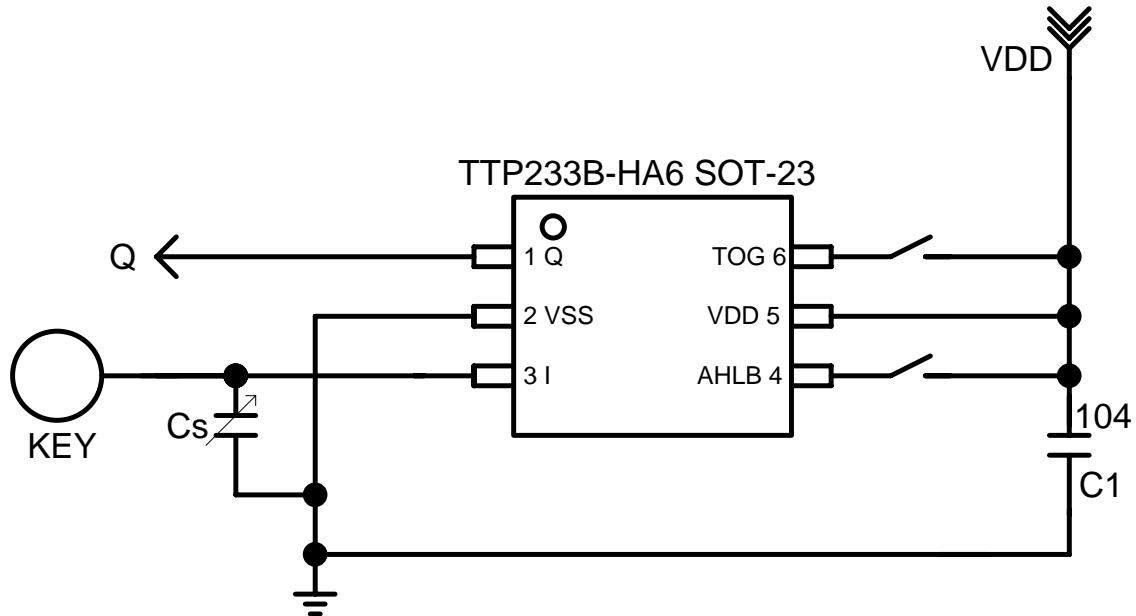
PS：1. On PCB, the length of lines from touch pad to IC pin shorter is better.
     And the lines do not parallel and cross with other lines.

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 Cs can be used to adjust the sensitivity. The value of Cs use smaller, then the sensitivity will be better. The sensitivity adjustment must according to the practical application on PCB. The range of Cs value is 1~50pF.

5. The C1 capacitor must be used between VDD and VSS; and should be routed with very short tracks to the device's VDD and VSS pins .

6. The sensitivity adjustment capacitors (Cs) must use smaller temperature coefficient and more stable capacitors. Such are X7R, NPO for example. So for touch application, recommend to use NPO capacitor, for reducing that the temperature varies to affect sensitivity.

TTP233B-HA6
TonTouch™

Package Type: SOT-23-6L

Package Outline Dimension

NOTES:

1. DIMENSION D1 & E1 DOES NOT INCLUDE MOLD PROTRUSION.

2. COPLANARITY OF ALL LEADS SHALL BE (BEFORE TEST) 0.1 MAX. FROM THE SEATING PLANE. UNLESS OTHERWISE SPECIFIED.

3. GENERAL PHYSICAL OUTLINE SPEC IS REFER TO TMC'S FINAL VISUAL INSPECTION SPEC UNLESS OTHERWISE SPECIFIED.

ORDER INFORMATION
a. Package form:　　TTP233B-HA6

REVISE HISTORY
1. 2011/08/30
　-Original version：V_1.0