1 key Touch Pad Detector IC

Outline

- The TTP118-CA6 is a touch pad detector IC which offers 1 touch key. Stable sensing method can cover diversity conditions. 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.

Characteristic

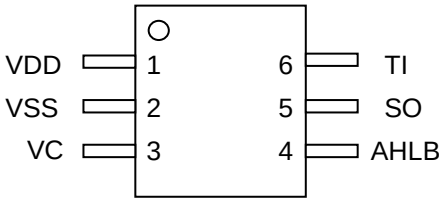
- Operating voltage 2.4V ~ 5.5V
- Built-in power on initial(POR) and low voltage reset (LVR) function
- Lower Operating Current (no load)
  @VDD=3.3V, typical 4.0uA, maximum 8uA
  @VDD=5.0V, typical 8.0uA, maximum 16uA
- The response time about 132mS at standby mode
- Sensitivity can adjust by the capacitance（1~47nF）outside
- Stable touching detection of human body for replacing traditional direct switch key
- SO pin is CMOS output can be selected active high or active low by pin option (AHLB pin)
- After power-on have about 0.25 seconds 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 62.5 milliseconds within 4 seconds after power-on. Power on after 4 seconds then it returns to standby mode, then the re-calibration period change to about 1 second.

Applications

- Wide consumer products
- Button key replacement

Pin assignment

SOT23-6L



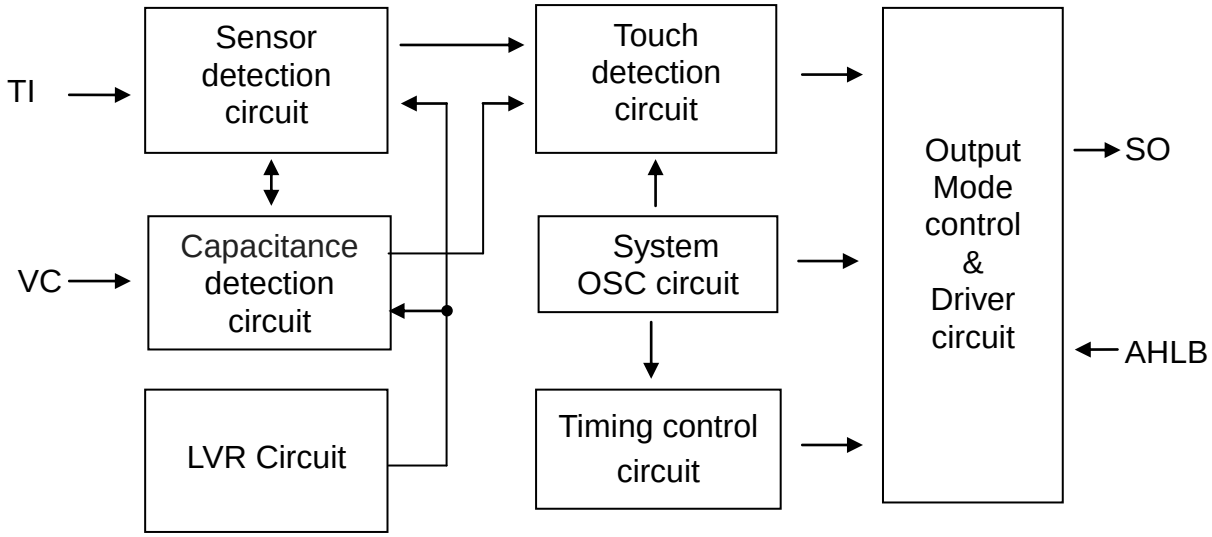
Pin Description

Pin NO	Pin Name	Type	Pin Description
1	VDD	P	Positive power supply
2	VSS	P	Negative power supply, ground
3	VC	I/O	Capacitance detection
4	AHLB	I-PH	Output SO active high or low selection, 0=>Active high; 1(Default)=>Active low
5	SO	O	CMOS output pin
6	TI	I/O	Input sensor port

Pin Type

- I COMS input only
- O CMOS push-pull output
- I/O COMS I/O
- P Power / Ground
- I-PH CMOS input and pull-high resister
- I-PL CMOS input and pull-low resister
- OD Open drain output, have no Diode Protective circuit

Block diagram



Electrical Characteristics

- **Absolute maximum ratings**

Parameter	Symb	Conditions	Rating	Unit
Operating Temperature	T_{OP}	—	-40～+85	℃
Storage Temperature	T_{STG}	—	-50～+125	℃
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	—	4	KV
Note：VSS symbolizes for system ground				

- **DC / AC characteristics：（Test condition at room temperature = 25 ℃）**

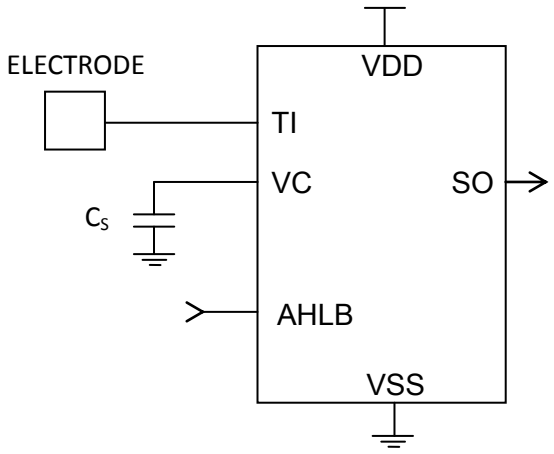
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Operating Voltage	VDD		2.4	3.3	5.5	V
System oscillator	F_{OSC}	VDD=5.0V	-	16K	-	Hz
Operating Current (Standby mode)	I_{OPL}	VDD=3.3V, VC=10nF	-	4.0	8.0	uA
		VDD=5.0V, VC=10nF	-	8.0	16.0	uA
Input Ports	V_{IH}	Input High Voltage	2/3	-		VDD
	V_{IL}	Input Low Voltage		-	1/3	VDD
Output Port Source Current	I_{OH}	VDD=3.3V, V_{OH}=2.8V	-	-3.5	-	mA
		VDD=5.0V, V_{OH}=4.5V	-	-5.0	-	mA
Output Port Sink Current	I_{OL}	VDD=3.3V, V_{OL}=0.5V	-	8.0	-	mA
		VDD=5.0V, V_{OL}=0.5V	-	12.0	-	mA
Output Response Time	T_R	VDD=5.0V at standby mode	-	132	-	mS
		VDD=5.0V at detective mode	-	48	-	ms

Function Description

Ⅰ. Sensitivity adjustment

The total loading of electrode size and capacitance of connecting line on PCB can affect the sensitivity. C_S the sensitivity adjustment must according to the practical application on PCB. The TTP118-CA6 offers some methods for adjusting the sensitivity outside.

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.
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.
3. by the value of C_S（please see the down figure）
   Under other conditions are fixed. PAD VC to VSS capacitor Cs can adjust sensitivity, When adding the value of C_S will increase sensitivity in the useful range（1nF≦C_S≦47nF）



Ⅱ. Output mode（By AHLB pin option）

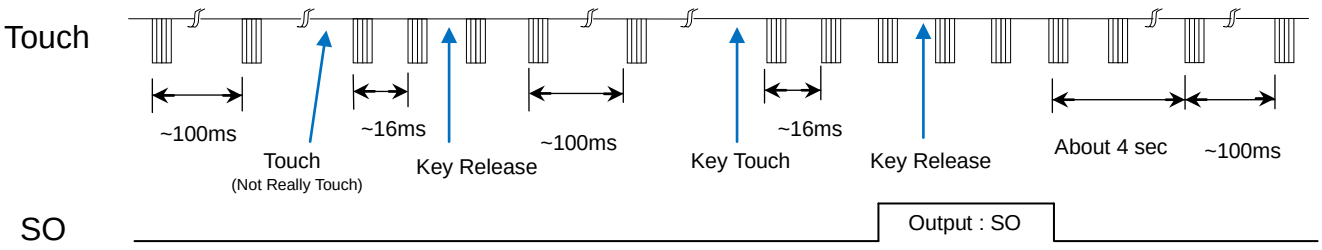
AHLB: Output SO active high or active low selection.

Pin SO（CMOS output）option features：

AHLB	Pin SO option features
1	Direct output, CMOS active low (Default)
0	Direct output, CMOS active high

Ⅲ. Stand-by mode key De-bounce time

1. The TTP118-CA6 is standby mode, it will be saving power. When detecting key touch, it will switch to detective mode. Until the key touch is released and will keep a time about 4 sec. Then it returns to standby mode. At standby mode SO output response time about 132 milliseconds. At detective mode SO output response time about 48 milliseconds.

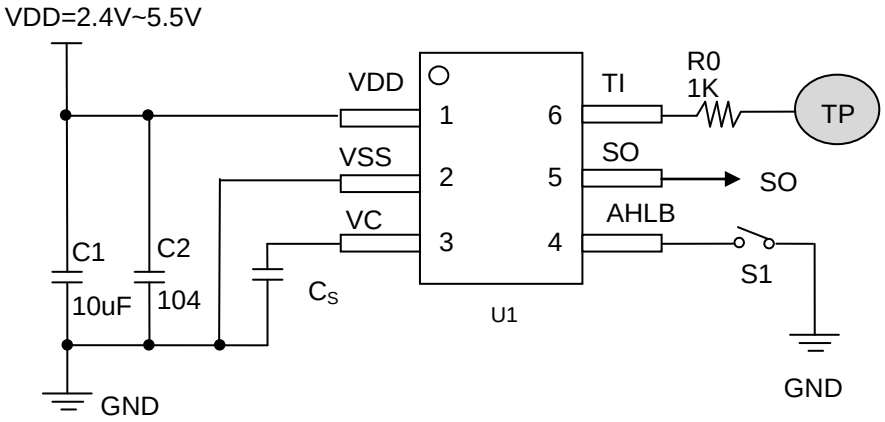


2. AHLB = 1 (Default) : Direct output, CMOS active low
   After initial power on SO output is high.
   Touch electrode SO output is low.

3. AHLB = 0: Direct output, CMOS active high
   After initial power on SO output is low.
   Touch electrode SO output is high.

Application circuit

Reference only



P.S. :

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 C2 capacitor must be used between VDD and VSS; and should be routed with very short tracks to the device's VDD and VSS pins (TTP118-CA6).
5. The capacitance C_S can be used to adjust the sensitivity. The value of C_S use larger, then the sensitivity will be better. The sensitivity adjustment must according to the practical application on PCB. The range of C_S value are 1nF~47nF.
6. The sensitivity adjustment capacitors（C_S）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.
7. Medium type for adjustment capacitors（C_S）

C_S value Table

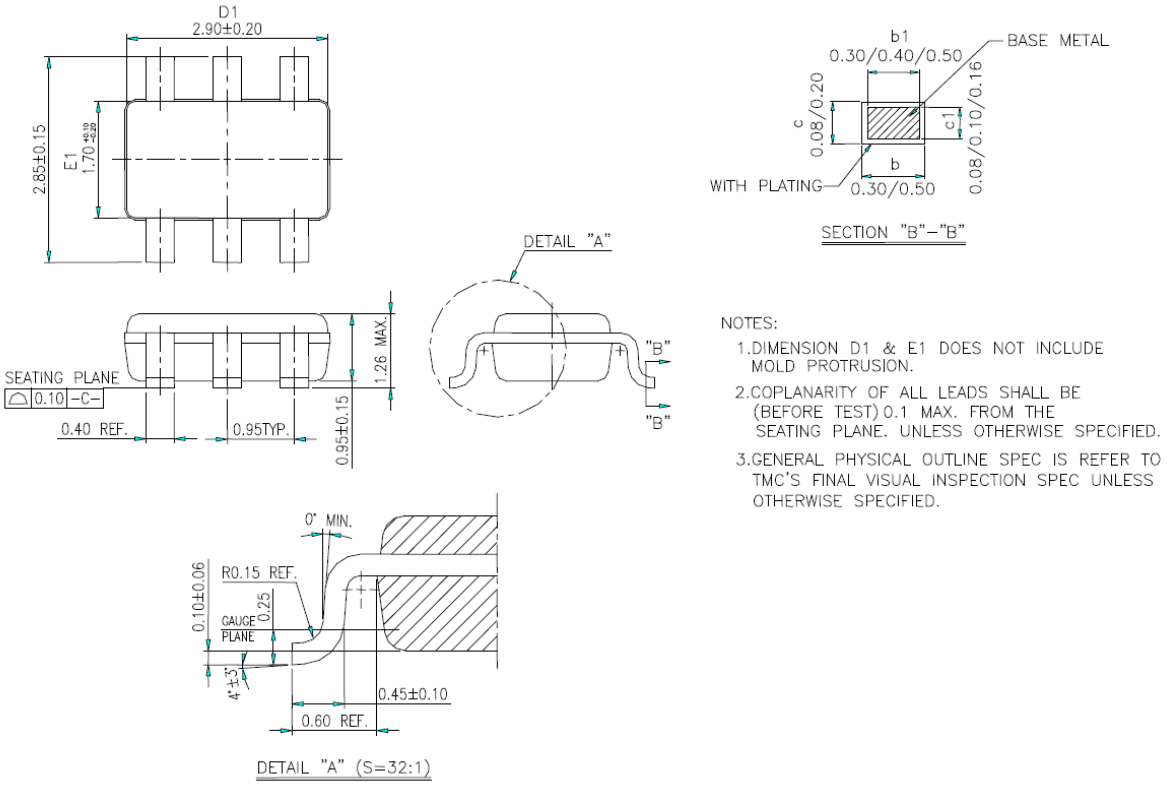
Medium Types	C_S Capacitance (Reference)
Acrylic sheet ≦ 3mm	6.8nF/25V
3mm ≦ Acrylic sheet ≦ 6mm	10nF/25V
Acrylic sheet ≦ 6-10mm	22nF/25V

BOM table

Symbol	Type	Element parameter
C1	Electrolytic capacitor	10uF/25V
C2	Ceramic capacitor	104
C_S	capacitor*	Reference **Cs value Table**
R0	Carbon film resister	1KΩ reference application
S1	switch	Single pole single throw switch

Package outline

Package Type: SOT23-6L



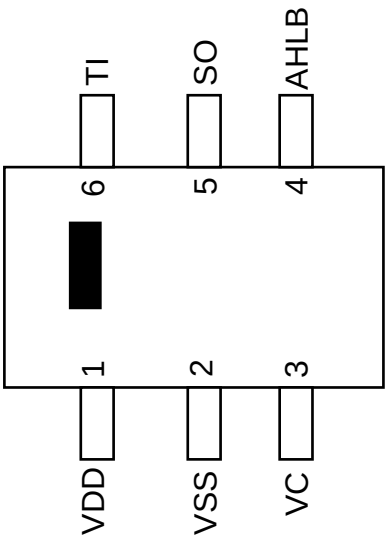
NOTES:

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.

Package configuration

TTP118-CA6N

Package Type SOT23-6L



Ordering Information

TTP118		
Package Type	**Chip Type**	**Wafer Type**
TTP118-CA6N	No support	No support

REVISION HISTORY：

2019/03/29: Initial version V1.0

2019/04/10: Modify version V1.1