CHIPHOMER TECHNOLOGY (SHANGHAI) LIMITED

CP2680 Datasheet

4 Channels Capacitive Touch Detection Device

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1 GENERAL DESCRIPTION

The CP2680 is a four channels capacitive sensor device, which enables streamlining of human-machine interface with implementation of touch-base input. Employing a high power and RF noise immunity architecture, the device can reliably detect small changes in capacitance, allowing touch-based input to replace mechanical implantations. On-chip automatic calibration and tracking mechanism simplify the system design process. Touch input can be access directly as in conventional mechanical buttons, or PWM signals. An advanced touch detection algorithm has been equipped inside the chip for water proof purpose and noise immunity.

Features

- Support up to 4 touch sensors
- PWM touch status output to eliminate external resistor network for analogy interface
- Support open-drain I/O to outputs touch status
- High power and RF noise immunity
- Water Proof
- Automatic drifting tracking and self calibration to optimize the system performance
- Uniform sensitivity among all sensors
- Simple sensitivity adjustment via a single capacitor
- Adjacent Sensor Suppression technology for reliable touch detection
- 2.8 - 5.5V power supply
- SOP8 package & SOP14 package

Contents

List of Figures

List of Tables

2 PACKAGE AND PIN ASSIGNMENT

2.1 Pin Assignment

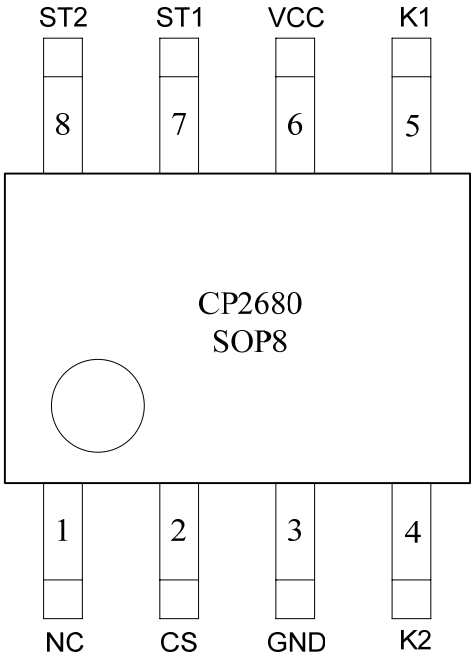

Figure 1 CP2680 SOP8 Pin Assignment

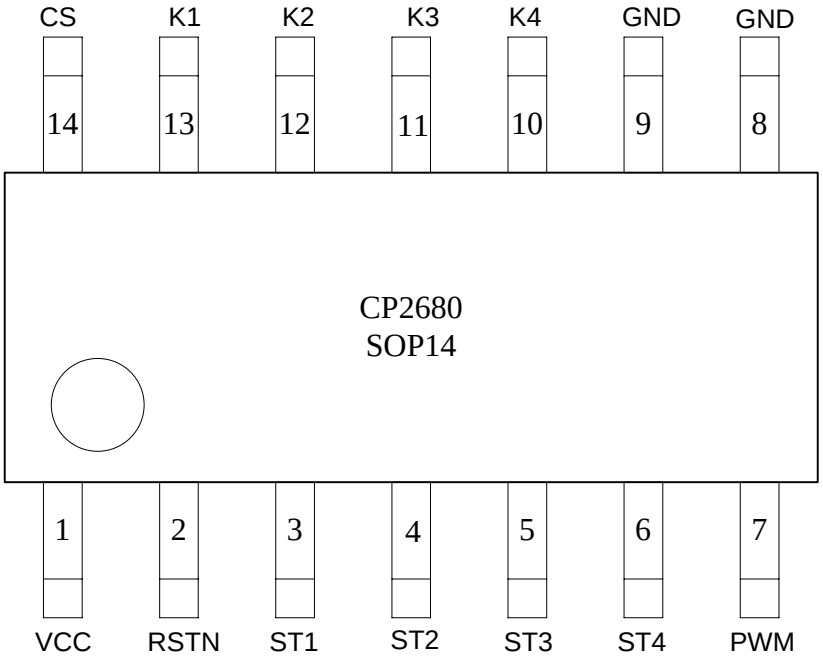

Figure 2 CP2680 SOP14 Pin Assignment

2.2 Pin Descriptions

Table 1 CP2680 Pin function descriptions

Pin Name	SOP8 Pin No.	SOP14 Pin No.	I/O Type	Description
ST1	**7**	**3**	**O**	This pin open drain outputs the touch status of sensor 1.
ST2	**8**	**4**	**O**	This pin open drain outputs the touch status of sensor 2.
ST3	**-**	**5**	**O**	This pin open drain outputs the touch status of sensor 3.
ST4	**-**	**6**	**O**	This pin open drain outputs the touch status of sensor 4.
PWM	**-**	**7**	**O**	This pin open drain outputs PWM signal for touch status of sensors.
RSTN		**2**	**I**	Chip reset, low active
GND	**3**	**8, 9**	**G**	Ground
K4	**-**	**10**	**A**	Capacitive sensor 4, connect to GND if not used
K3	**-**	**11**	**A**	Capacitive sensor 3, connect to GND if not used
K2	**4**	**12**	**A**	Capacitive sensor 2, connect to GND if not used
K1	**5**	**13**	**A**	Capacitive sensor 1, connect to GND if not used
CS	**2**	**14**	**A**	Connect capacitor. (10nF typically)
VCC	**6**	**1**	**P**	Power supply

Notes:

I: digital input pin

O: digital output pin

IO: digital bidirectional pin

A: analog pin

P: power

G: ground

3 TYPICAL APPLICATIONS

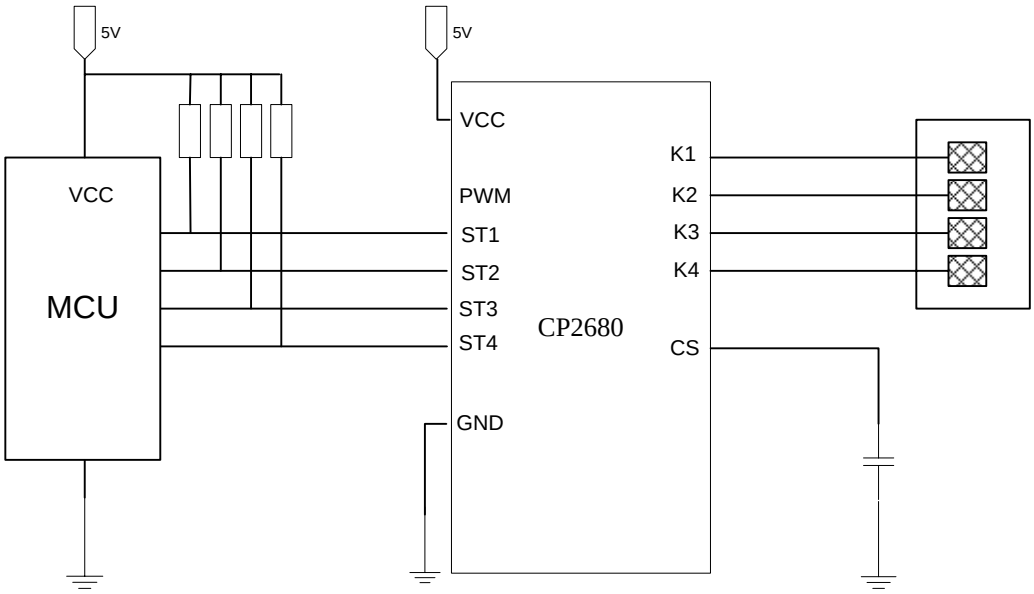

Figure 3 Typical application

4 FUNCTION DESCRIPTIONS

4.1 Reset

The CP2680 supports two types reset: power-on reset and hardware reset.

Power-on Reset: When power up, the internal power-on reset circuit generates reset signal to reset all internal logic and all registers to the default value.

Hardware Reset: Set RSTN pin to 0 will reset all internal logic and all registers to the default value.

4.2 Sensor Status Acquisition

In the CP2680, the sensor status is acquired in two ways:

- Acquire from ST1~ST4 pins
- Acquire from PWM pin

4.2.1 Acquire Sensor Status From ST1~ST4 Pins

The ST1~ST4 pins are used as sensor status indicator. These four pins are open drain output, active low.

Table 2 Sensor status indicator of ST1~ST4 pins

{ST4,ST3,ST2,ST1}	Sensor # (touch ON)
zzzz	NA
zzz0	1
zz0z	2
z0zz	3
0zzz	4

4.2.2 Acquire Sensor Status From PWM Pin

The PWM pin indicates the sensor status of K1~K4 in 4 steps

Table 3 Sensor Status indicator of PWM

K4	K3	K2	K1	PWM (Low active)
OFF	OFF	OFF	OFF	0%
OFF	OFF	OFF	ON	25%
OFF	OFF	ON	OFF	50%
OFF	ON	OFF	OFF	75%
ON	OFF	OFF	OFF	100%

4.3 Adjacent Sensor Suppression Function

The Adjacent Sensor Suppression (ASS) function can prevent multiple sensors from responding to a single touch, a kind of common complaint about capacitive touch panels. This case often happens with the sensors are too close, or with control surfaces that have water films on them.

The CP2680 supports ASS function. If multiple touches are detected, the CP2680 can select the most dominate one by the dedicated ASS algorithm.

There is only one ASS groups, all the four sensors (K1~K4) belong to same ASS group. So there is only one sensor reported ON in any time.

The touch status are always indicated by ST1~ST4 pins.

5 ELECTRICAL SPECIFICATION

VCC=5V,T_A=－40℃~85℃, all typical value below is tested on T_A=25℃

Table 4 Electrical Specifications

Parameter	symbol	unit	Min.	Typ.	Max
Absolute Maximum Ratings					
Storage Temperature	Tstg	℃	-40	25	95
Operating Temperature	Topr	℃	-35	25	90
Operating Humidity	Hopr	%	5	-	95
Power Supply Voltage	Vcc	V	2.8	5	5.5
Input Voltage	Vin	V	Vss-0.3	-	Vcc+0.3
ESD	HBM	V	8000	-	-
Recommended Operating Condition					
Operating Temperature	Top	℃	-30	25	85
Power supply Voltage	Vcc	V	2.8	5	5.5
Digital Input Rising Time	Tri	Ns	-	-	5
Digital Input Falling Time	Tfi	Ns	-	-	5
AC Electrical Specification (Typically values at Ta = 25℃ and Vcc=3.3V)					
Internal OSC frequency	Fosc	MHz	2.8	4.0	5.2
Touch Sensitivity	Stch	pF	-	0.02	-
Initial Time	Trn	ms	-	260	-
Output Rising time	Tro	ns	-	20	-
Output Falling Time	Tfo	ns	-	20	-
DC Electrical Specifications (Typically values at Ta = 25℃ and Vcc=3.3V)					
Supply Current	Idd	uA	-	220	-
Digital Input Low Voltage	Vil	V	-	0.8	-
Digital Input High Voltage	Vih	V	2.0	-	-
Digital Output Current	Io	mA	-	16	-

6 PACKAGE INFORMATION

6.1 SOP8

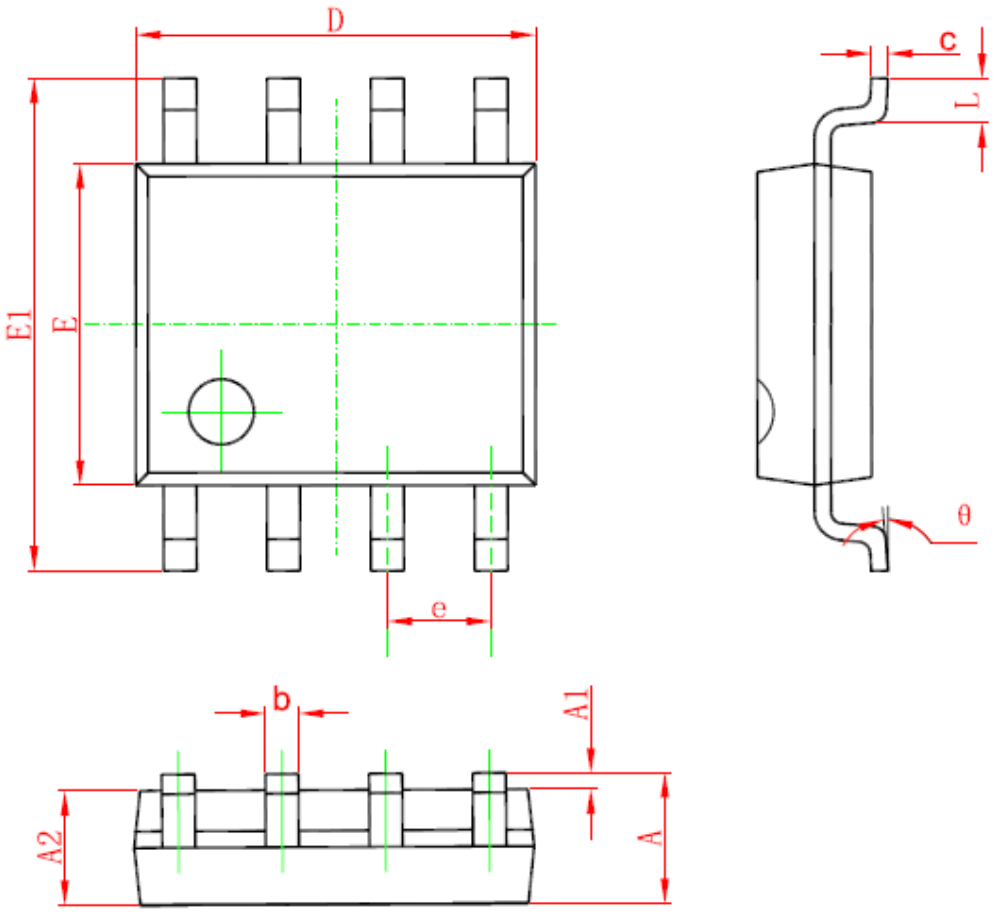

Figure 4 SOP8 Package

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

6.2 SOP14

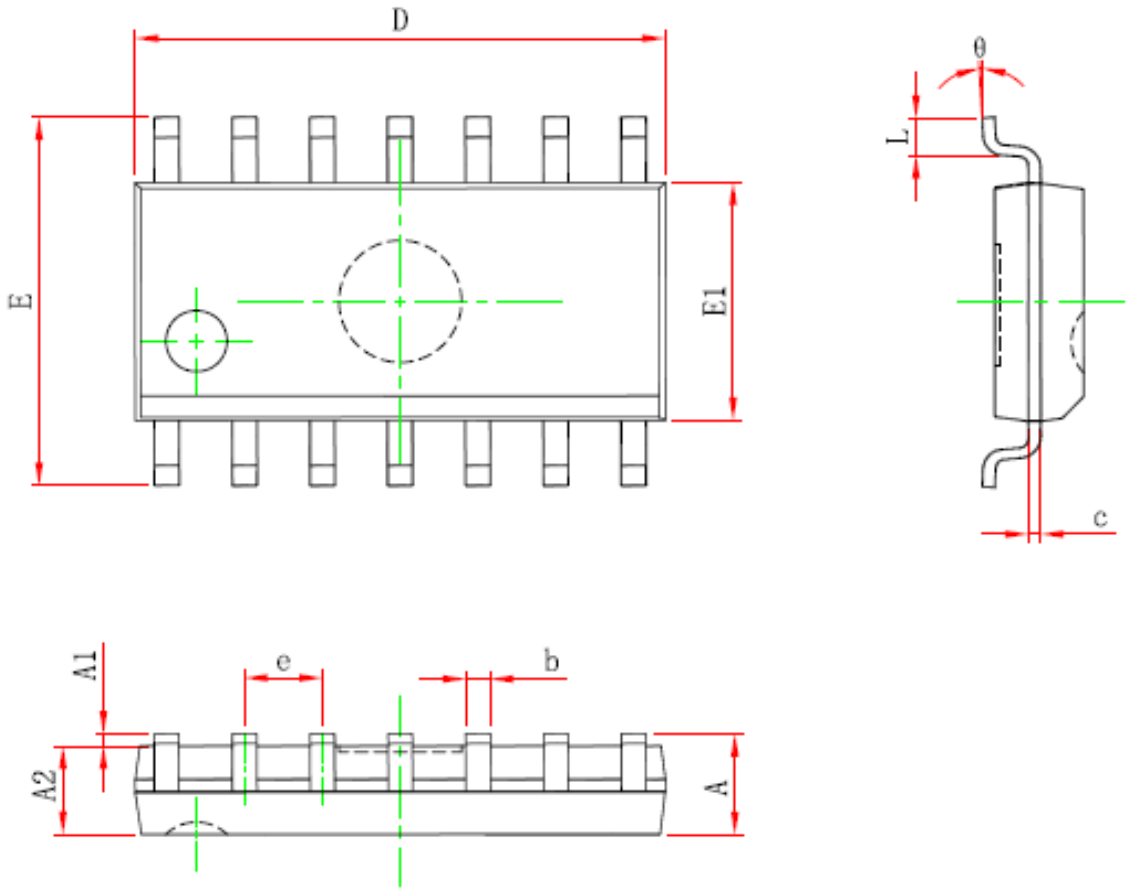

Figure 5 SOP14 Package

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	— —	1.750	— —	0.069
A1	0.100	0.250	0.004	0.010
A2	1.250	— —	0.049	— —
b	0.310	0.510	0.012	0.020
c	0.100	0.250	0.004	0.010
D	8.450	8.850	0.333	0.348
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

7 ORDERING INFORMATION

Order Number	Temperature Range	Package	RoHS	Marking	Packing Type
CP2680SP8-A1	-40℃～85℃	SOP8L	Yes	T2680 LLLL*1	3000units/Tape and Reel
CP2680SP14-A1	-40℃～85℃	SOP14L	Yes	T2680 LLLLL*2	2000units/box

*1:"LLLL" represents Lot Number

*2 "LLLLL" represents Lot Numbe