6 KEYS Capacitive Touch Buttons

General description

- Provide six touch-sensitive buttons for one-to-one direct outputs with low power consumption mode for use on battery products and excellent water and interference resistance.

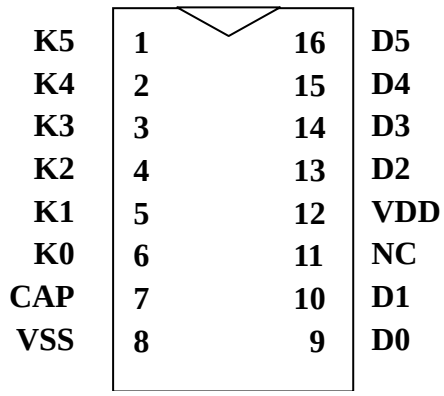
Features

- Operating voltage range : 3.1V – 5.5V
- Operating current : 3mA (normal mode) ; 15μA (hibernate mode) @5V
- Six touch-sensitive buttons
- Automatically hibernate when buttons are idle for four seconds.
- One-to-one direct output, with high output level when released, and low output level when touched.
- Easy sensitivity adjustment achieved by adjusting the external capacitance at the CAP pin: the greater the capacitance, the higher the sensitivity.
- Waterproof and with effective judgment when the pad is covered by overflow or dew.
- Built-in LDO reduces source interference.

Applications

- Suitable for use on all kinds of home appliances and entertainment products.

Packaging pins



TTP258RD-AOBN
16-SOP-A

Pin description

Pin No.	Pin Name	Type	Function Description
1	K5	I	Add resistance at 100-1,000Ω to the touch button pin to enhance interference and statistic resistance.
2	K4	I	Add resistance at 100-1,000Ω to the touch button pin to enhance interference and statistic resistance.
3	K3	I	Add resistance at 100-1,000Ω to the touch button pin to enhance interference and statistic resistance.
4	K2	I	Add resistance at 100-1,000Ω to the touch button pin to enhance interference and statistic resistance.
5	K1	I	Add resistance at 100-1,000Ω to the touch button pin to enhance interference and statistic resistance.
6	K0	I	Add resistance at 100-1,000Ω to the touch button pin to enhance interference and statistic resistance.
7	CAP	--	Use only NPO or X7R capacitors Capacitance : 6800pF-33000pF; the greater the capacitance, and higher the sensitivity.
8	VSS	P	Negative power supply
9	D0	O	Direct output pin at K0 state.
10	D1	O	Direct output pin at K1 state.
11	NC	P	Not connected.
12	VDD	P	Positive power supply
13	D2	O	Direct output pin at K2 state.
14	D3	O	Direct output pin at K3 state.
15	D4	O	Direct output pin at K4 state.
16	D5	O	Direct output pin at K5 state.

Pin type

- I Input
- O Output
- P Power

AC / DC Characteristics

- **Absolutely max. Ratings**

Item	Symbol	Rating	Unit
Operating Temperature	Top	-20- +70	℃
Storage Temperature	Tsto	-50- +125	℃
Supply Voltage	VDD	5.5	V
Voltage to input terminal	Vin	Vss-0.3 to Vdd+0.3	V

- **D.C. Characteristics (Condition : Ta= 25 ± 3 ℃，RH ≦ 65 %，VDD =＋ 5V，VSS=0V)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Operating voltage	VDD		3.1	5	5.5	V
Operating current	I_{OPR1}	VDD=5V		3		mA
Input low voltage for input and I/O port	V_{IL1}		0		0.3VDD	V
Input high voltage for input and I/O port	V_{IH1}		0.7VDD		VDD	V
Output port source current	I_{OH1}	V_{OH}=0.9VDD, @5V		4		mA
Output port sink current	I_{OL1}	V_{OL}=0.1VDD, @5V		8		mA

- **A.C. Characteristics**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
System clock	f_{SYS1}	OSC @5v	-	4	-	MHz
Low Voltage Reset	V_{lvr}		2.0	2.2	2.4	V

Output instructions

Provide six capacitive touch buttons for one-to-one direct output with high output level when released.

Function description

1. Fast response time : After a button is touched, the TTY6852 will respond within 60ms.
2. Touch-prioritized output : If K1 is recognized, other buttons will only be recognized after K1 is released, that is, only one button will be processed at a time.
3. Foolproof : A button will be reset when the valid output lasts for over 10 seconds consecutively.
4. Ambience-adaptive : The TTY6852 supports parameter adjustments based on the changes in ambient temperature and humidity to ensure accurate judgment and operation.
5. Touch discretion : The TTY6852 can distinguish water from finger touch to ensure correct judgment of button touch even when the pad is covered by overflow or dew, except for “water jet” which will be mistaken as finger touch to activate corresponding output.
6. The built-in LDO and power noise processing procedures can enhance resistance to ripple interference from the power supply.
7. Ground the idle outputs to prevent unwanted action due to high sensitivity

Precautions

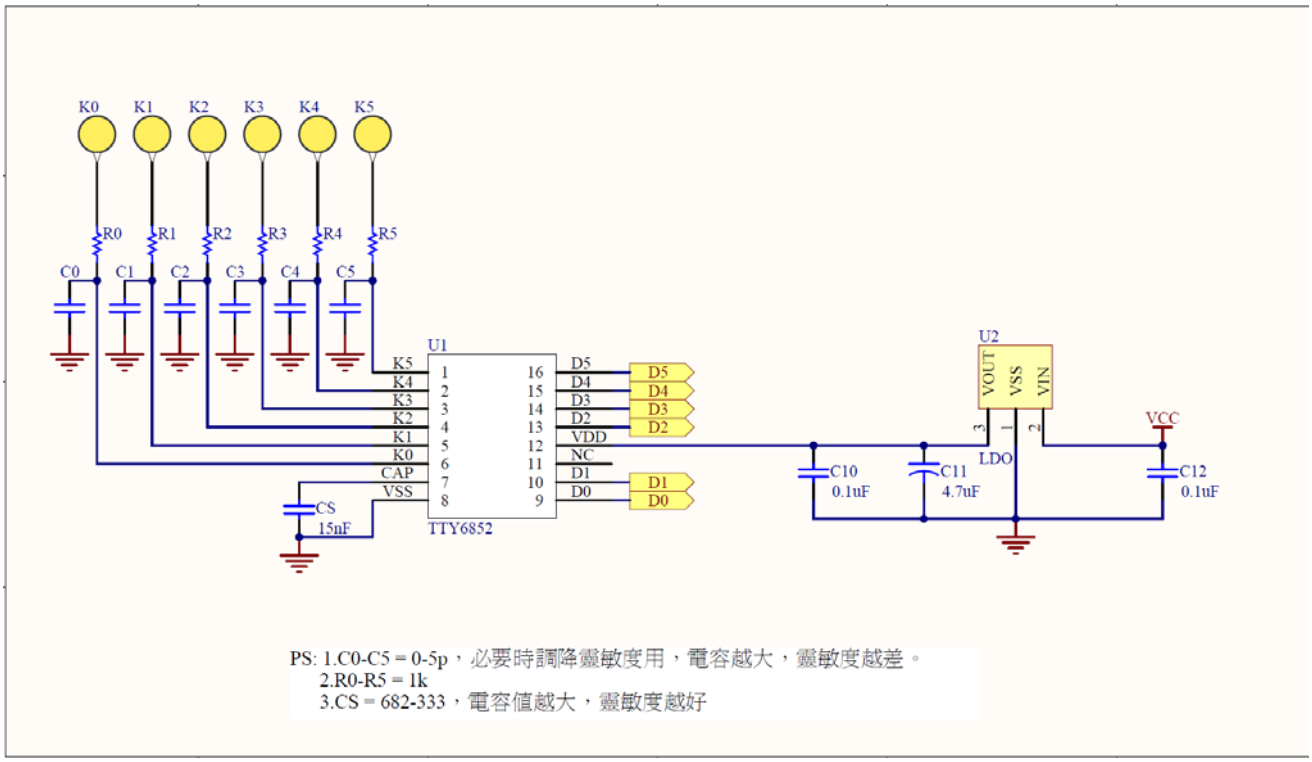
1. Correlations between capacitance (Cs) and sensitivity :
   (1) The smaller the Cs, the lower the sensitivity.
   (2) The greater the Cs, the higher the sensitivity.
   (3) Cs range : 6800pF (682) — 33000pF (333).
   (4) When measuring capacitance by Cs, capacitor materials with a lower temperature change coefficient and high capacitance stability. Therefore, use only NPO or X7R capacitors.
2. In power layout, divide the circuit by block. A touch IC requires independent routing to positive power supply. When branch routing cannot be isolated, route the positive power supply to the touch IC before routing to other blocks. The same should apply to the grounding section to arrange independent branch routing to the ground of the power supply, i.e. star-earthed topology, to prevent the interference of other circuits in order to significantly enhance touch circuit stability.
3. In single-sided PCB design, touch-sensitive button springs are recommended for the pad, springs with a plate are the best choice for the highest sensitivity of the tough pad.
4. In double-sided PCB design, pads can be either circular or rectangular, with a recommended area of 12mm x 12mm. Cables linking the IC should be routed on the other side of the pad. Lower gauge cables are recommended to shorten routing.
5. The PCB must be tightly installed to the case. Loosened PCB-case installation will result in dielectric change to affect capacitance measurement and cause instability. Bonding the case and pad with non-conductive adhesive is recommended, such as acrylic glue, 3M HBM series.

6. To enhance sensitivity, the smaller the overall parasitic capacitance, the better the effect. Although neither the front nor the back of the routing area between the touch IC pins and the pad will be earthed, the area outside this area and around the PCB should be earthed to isolate this routing area to isolate capacitance interference around the pad like a wall for the circuit to receive only the capacitance above the pad. The ground should at least be 2mm away from the routing area, and the same space should be maintained between pads to maintain adequate spacing for the parallel leads of individual pads, in order to reduce the parasitic capacitance between pads and ground to enhance sensitivity.

7. For capacitive touch buttons, fingers are considered as a conductor. When a finger approaches the pad, parasitic capacitance to the ground path increases for the IC to detect capacitance change and judge if the finger touches the pad. The capacitance change of pad-finger contact is opposite to that of pad-case contact, while the capacitance change of pad-finger contact and the area of touch is proportional.

8. Case materials also affect sensitivity due to dielectric difference, for example, glass > organic glass (acrylic) > plastics. At the same thickness, the greater the dielectric constant is, the greater the capacitance will be generated by a finger-pad contact. In measurement, the higher capacitance change is, the more easily a button is recognized, and the higher the sensitivity is.

Application layout



PS :

1. C0-C5 = 1-5P. Reduce sensitivity as necessary. The greater the capacitance, the higher the sensitivity.
2. R0-R5 = 1KΩ.
3. Cs=682-333 The greater the capacitance, the higher the sensitivity.

Correlations between external capacitance (Cs) and acrylic thickness

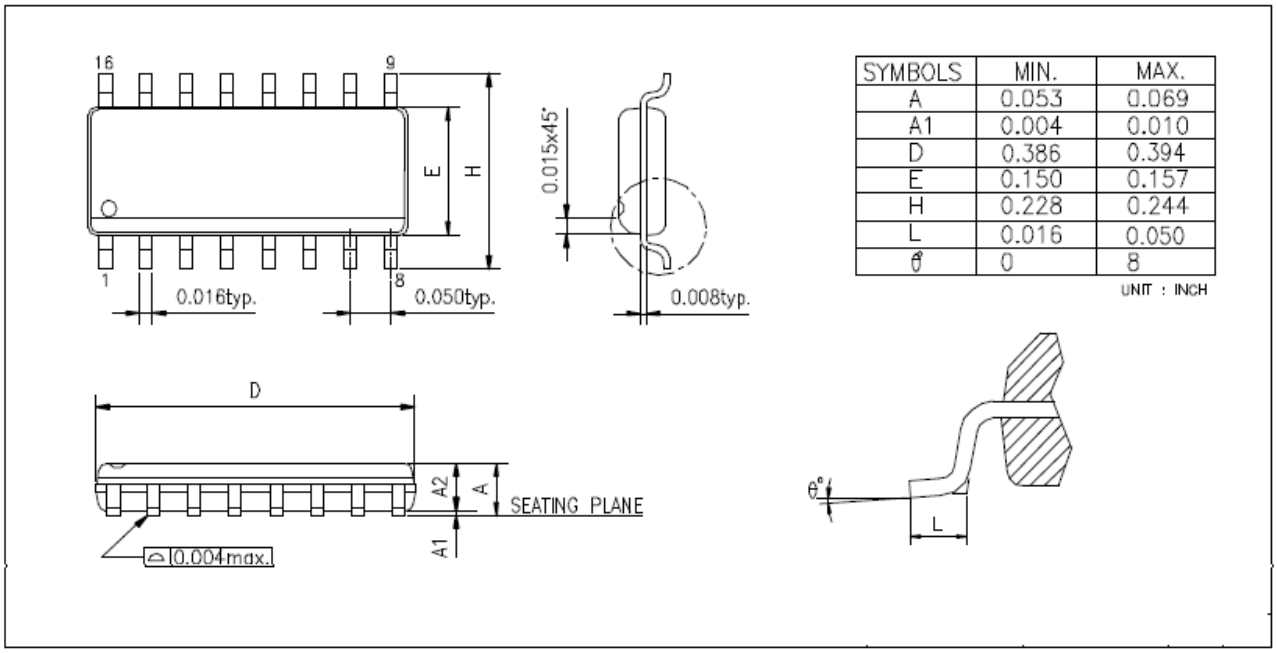
Correlations between acrylic thickness and capacitance (Cs) with an example of round metal flat spring at 12mm dia. :

Acrylic thickness (mm)	Cs	Sensitivity setting
1	682	30
2	103	30
3	153	30
4	223	30
5	223	30
10	333	30

Values in the above table are for reference only. Pad size and PCB layout will affect actual results.

Packaging description

- **16-SOP**



SYMBOLS	MIN.	MAX.
A	0.053	0.069
A1	0.004	0.010
D	0.386	0.394
E	0.150	0.157
H	0.228	0.244
L	0.016	0.050
θ°	0	8

UNIT : INCH

Ordering Information

TTY6852		
Package Type	**Chip Type**	**Wafer Type**
TTP258RD-AOBN	—	—

Revision history

1. 2014/09/12- Original version : Version : 1.00
2. 2015/05/08- Revised operating voltage range : 3.1V – 5.5V