

TC301D Datasheet

Catalogue

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1. Description

Man-machine interfaces, which require more functionality and intuitive, touch-based interfaces, are rapidly becoming the new norm.

TC301D is a single-button capacitive sensing device. The device can act as a single-key controller.

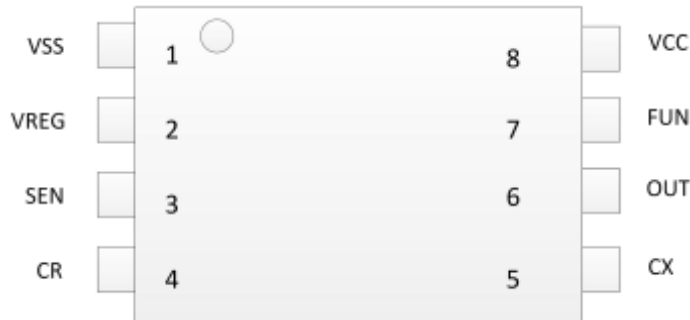
2. Features

- ☐ The device controls one touch sensing keys.
- ☐ Automatic sensitivity correction.
- ☐ System cost reduction.
- ☐ Reliability through reducing system complexity.
- ☐ Embedded noise immunity circuit.
- ☐ RoHS compliant SOT23-8L package.

3. Applications

- ☐ Water level detection
- ☐ Human body induction

4. Pin Diagram



5. Pin Description

Pin	Name	I/O	Description
1	VSS	Ground	Supply Ground
2	VREG	Analog Output	Reference output
3	SEN	Analog I/O	Sensitivity Set
4	CR	Analog I/O	Base Set
5	CX	Analog I/O	Sensor pad for channel
6	OUT	Digital Outpu	Output for channel
7	FUN	Inpu	Function set
8	VCC	Power	Power in

SEN

Sensitivity set pin, the capacitance range is 15pf ~100pf , the smaller the value the higher the sensitivity.

VREG

Reference voltage output, connected to 4.7nf capacitance.

CR

Set the test reference value.

CX

Capacitive sense pins connected to electrodes. Series resistance is 3KΩ.

FUN

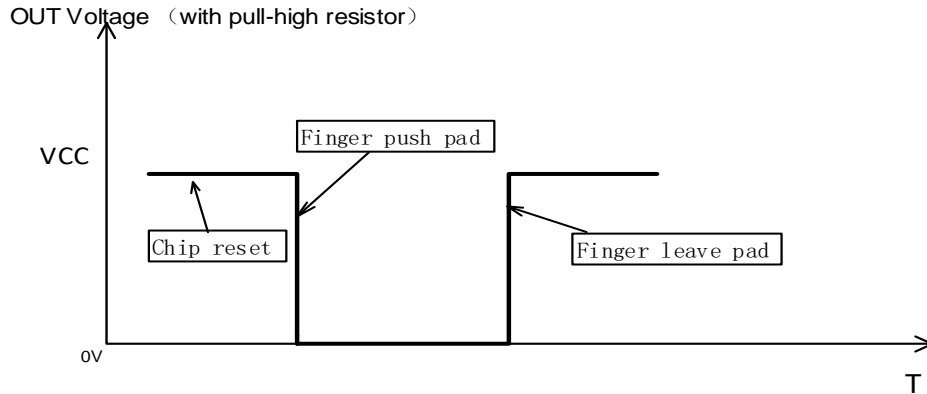
When the FUN is suspended, the appropriate application is that the sensitivity requirement is not high, and the capacitance of CX may change very slowly, such as water level detection.

When FUN is connected to VCC, the appropriate application requires high sensitivity, and CX capacitance

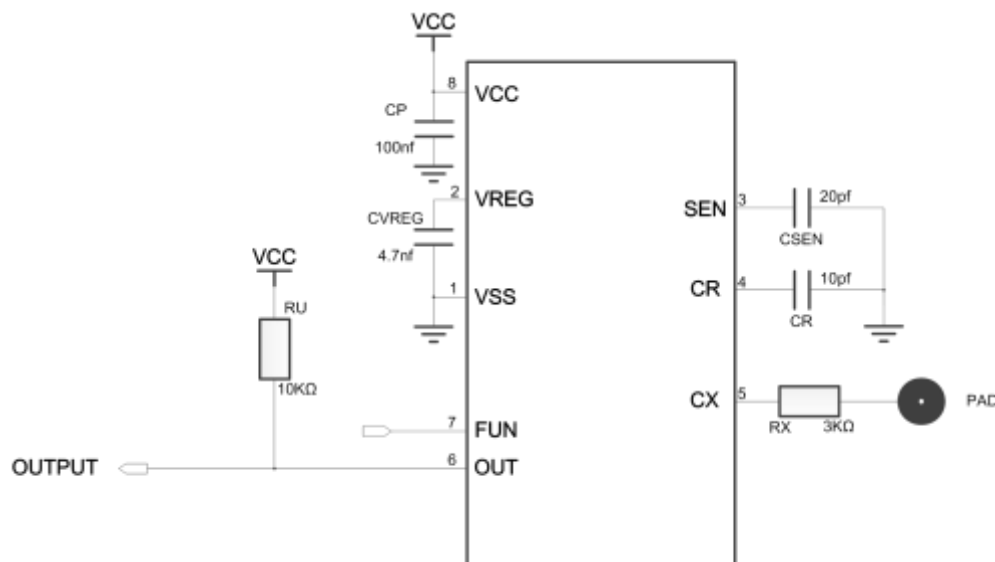
changes quickly, so it needs to self-correct the environment, such as toilet seat human detection.

OUT

Key output port, there are two states of high resistance and low level.



6. Application Circuit



7. PCB Layout Notice

1. VCC and VSS power line should be drawn alone, and can not share power line with other chips(micro-controller and LCD driver,etc.). So as to prevent the chip from being affected by noise signal going through the power line.
2. CP, CVREG, CSEN these three capacitances should be placed as close as possible to the chip. And the series resistors on wire of sense pad should also be placed as close as possible to the chip.
3. The larger area of grounded copper, the more immunity to noise Interference.
4. The sense traces and pad should be paid more attention to. The chip should be placed as close as possible to sense pad. The sense traces should be drawn to sense pad directly. The length of the different sense traces is not necessarily equal. The width of sense traces should be as small as possible. There should not be other power line and signal traces around the sense trace. If it can not be avoided, the other traces should cross the sense trace vertically. The distance between sense pads should be greater than 5mm. The distance between sense pad and grounded copper should be greater than 1.5mm.

8. Absolute Maximum Ratings

Operating temperature	-40 ~ +85°C
Storage temp	-50 ~ +150°C
VCC	-0.3 ~ +6.5V
Max continuous pin current, any control or drive pin	±20mA
Voltage forced onto any pin	-0.3V ~ (Vcc+ 0.3) Volts
* NOTICE: Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device	

9. Electrical Characteristics

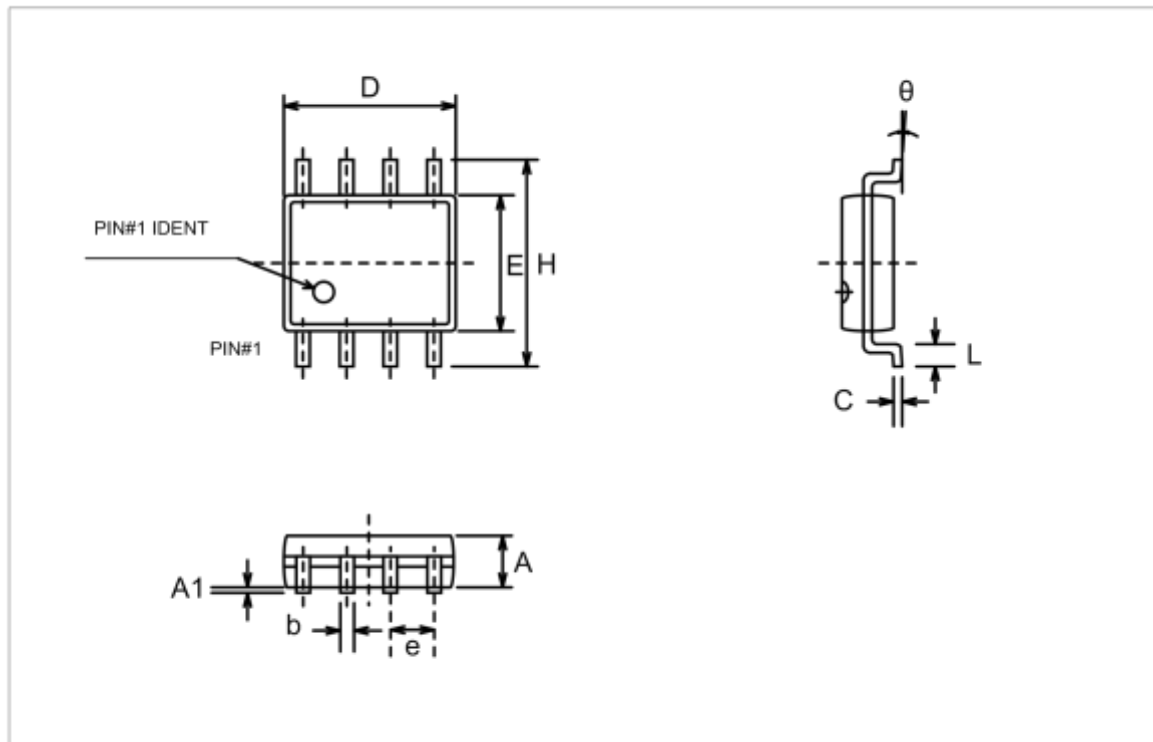
TA = 25°C

Characteristics	Symbo	Condition	Min	Typ	Max	Units
Operating voltage	Vcc		2.5		6.5	V
Current consumption	Idd	VCC=5.0V		810		uA
		VCC=3.0V		460		uA
		VCC=5.0V &SLEEP		70		uA
		VCC=3.0V &SLEEP		38		uA
Self calibration	Tini			120		ms
Range of capacitance on Pad	CX				2.5*CSE N	
Output impedance (open drain)	Zo	Low voltage		50		Ohm
		Hi-z		100M		
Output sink	Isk	VCC=5V			10.0	mA
Minimum	delta_CX	CSEN=15pf		0.2		pF
Sample cycle	Tsi	Normal working state		2.7		ms

10.ESD Characteristics

Mode	Polarity	Max	Reference
H.B.M	POS/NEG	8000V	VCC
		8000V	VSS
		8000V	P to P
M.M	POS/NEG	500V	VCC
		500V	VSS
		500V	P to P

11. Package Diagram (SO-8)



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	1.30	1.50	1.70	0.051	0.059	0.067
A1	0.06	0.16	0.26	0.002	0.006	0.010
b	0.30	0.40	0.55	0.012	0.016	0.022
C	0.15	0.25	0.35	0.006	0.010	0.014
D	4.72	4.92	5.12	0.186	0.194	0.202
E	3.75	3.95	4.15	.0148	0.156	0.163
e	--	1.27	--	--	0.050	--
H	5.70	6.00	6.30	0.224	0.236	0.248
L	0.45	0.65	0.85	0.018	0.026	0.033
θ	0°	--	8°	0°	--	8°