TTP224/TTP224N TonTouch™

4 KEY TOUCH PAD DETECTOR IC

GENERAL DESCRIPTION

The TTP224/TTP224N TonTouch™ IC is capacitive sensing design specifically for touch pad controls. The device built in regulator for touch sensor. Stable sensing method can cover diversity conditions. Human interfaces control panel links through non-conductive dielectric material. The main application is focused at replacing of the mechanical switch or button. The ASSP can independently handle the 4 touch pads with 4 direct output pins.

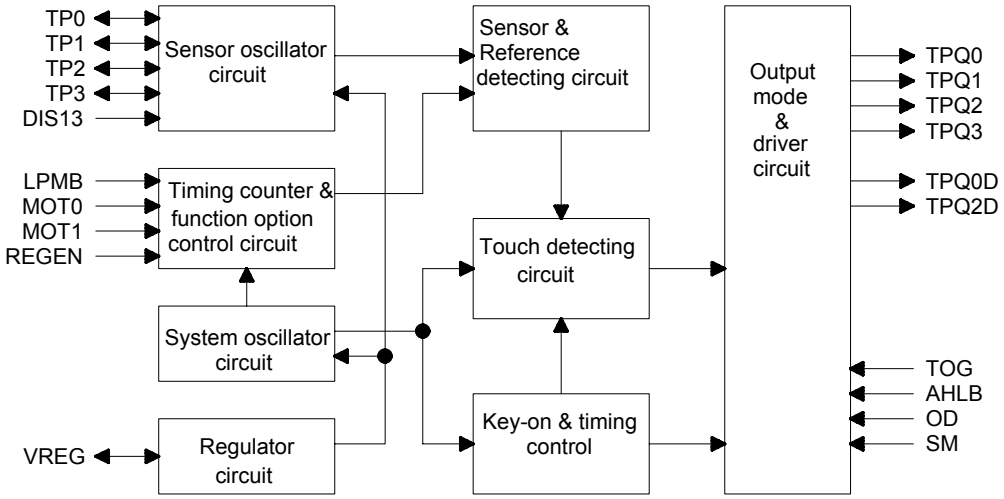
FEATURES

- Operating voltage 2.4V~5.5V
- Built-in regulator with external enable/disable option
- Operating current, @VDD=3V no load
  At low power mode typical 2.5uA
  At fast mode typical 9.0uA
- @VDD=3V operating voltage :
  The response time about 100mS at fast mode, 200mS at low power mode for TTP224
  The response time about 60mS at fast mode, 160mS at low power mode for TTP224N
- Sensitivity can adjust by the capacitance(0~50pF) outside for each touch pad
- Provides Fast mode and Low Power mode selection by pad option(LPMB pin)
- Provides direct mode or toggle mode、CMOS output or open drain output、active high or active low by pad option(TOG/OD/AHLB pin).
- Provides 2 output pins TPQ0D, TPQ2D that have no diode protection, active low
- Have the maximum on time 120sec/64sec/16sec/infinite by pad option(MOT1, MOT0 pin)
- After power-on have about 0.5sec stable-time, during the time do not touch the key pad, and the function is disabled
- Auto calibration for life, and the re-calibration period is about 4.0sec, when key has not be touched.

APPLICATION

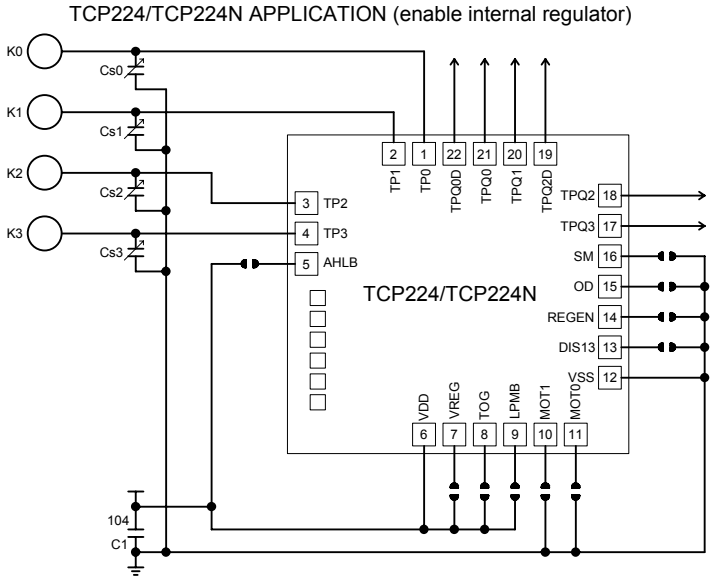
- Wide consumer products
- Button key replacement

BLOCK DIAGRAM



APPLICATION CIRCUIT

TCP224/TCP224N APPLICATION (enable internal regulator)



Option table:

Output mode:

TOG	OD	AHLB	Pad TPQ0~TP3 option features
open	open	open	Direct mode, CMOS active high output
open	open	VDD	Direct mode, CMOS active low output
open	VSS	open	Direct mode, Open drain active high output
open	VSS	VDD	Direct mode, Open drain active low output
VDD	open	open	Toggle mode, COMS output, Power on state=0
VDD	open	VDD	Toggle mode, COMS output, Power on state=1
VDD	VSS	open	Toggle mode, Power on state high-Z, Active high
VDD	VSS	VDD	Toggle mode, Power on state high-Z, Active low

TOG	Pad TPQ0D,TPQ2D (has no diode protection) option features
open	Direct mode, Open drain active low output, Power on state high-Z
VDD	Toggle mode, Open drain active low output, Power on state high-Z

Key operation mode:

SM	Option features
open	Multi-key mode
VSS	Single key mode

Maximum key on duration time:

MOT1	MOT0	Option features
VSS	VSS	Maximum on time 120sec
VSS	open	Maximum on time 64sec
open	VSS	Maximum on time 16sec
open	open	Infinite(Disable maximum on time)

Fast and Low power mode:

LPMB	Option features
VDD	Fast mode
open	Low Power mode

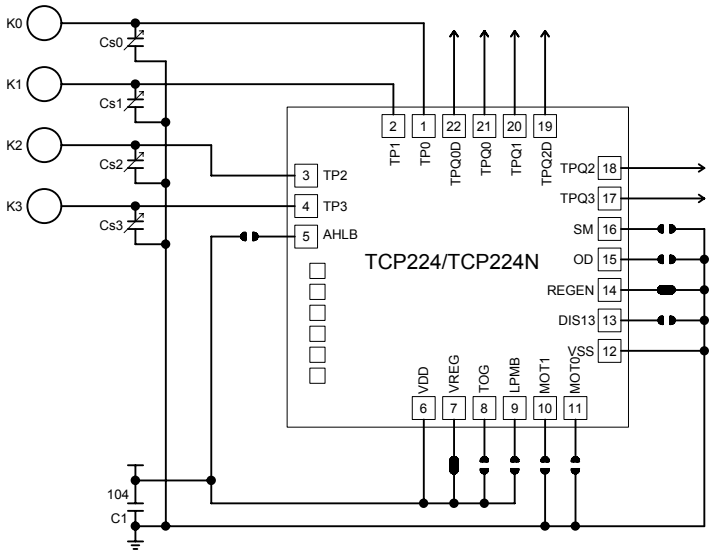
Input keys number select:

DIS13	Option features
open	Enable TP1, TP3
VSS	Disable TP1, TP3

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 material of panel covering on the PCB can not include the metal or the electric element. The paints on the surfaces are the same.
3. 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 (TTP224/TTP224N).
4. The capacitance Cs0~Cs3 can be used to adjust the sensitivity. The value of Cs0~Cs3 use smaller, then the sensitivity will be better. The sensitivity adjustment must according to the practical application on PCB. The range of Cs0~Cs3 value are 0~50pF.
5. The sensitivity adjustment capacitors (Cs0~Cs3) 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.

TCP224/TCP224N APPLICATION (disable internal regulator)



Option table:

Output mode:

TOG	OD	AHLB	Pad TPQ0~TP3 option features
open	open	open	Direct mode, CMOS active high output
open	open	VDD	Direct mode, CMOS active low output
open	VSS	open	Direct mode, Open drain active high output
open	VSS	VDD	Direct mode, Open drain active low output
VDD	open	open	Toggle mode, COMS output, Power on state=0
VDD	open	VDD	Toggle mode, COMS output, Power on state=1
VDD	VSS	open	Toggle mode, Power on state high-Z, Active high
VDD	VSS	VDD	Toggle mode, Power on state high-Z, Active low

TOG	Pad TPQ0D,TPQ2D (has no diode protection) option features
open	Direct mode, Open drain active low output, Power on state high-Z
VDD	Toggle mode, Open drain active low output, Power on state high-Z

Key operation mode:

SM	Option features
open	Multi-key mode
VSS	Single key mode

Maximum key on duration time:

MOT1	MOT0	Option features
VSS	VSS	Maximum on time 120sec
VSS	open	Maximum on time 64sec
open	VSS	Maximum on time 16sec
open	open	Infinite(Disable maximum on time)

Fast and Low power mode:

LPMB	Option features
VDD	Fast mode
open	Low Power mode

Input keys number select:

DIS13	Option features
open	Enable TP1, TP3
VSS	Disable TP1, TP3

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 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 (TTP224/TTP224N).
5. The capacitance Cs0~Cs3 can be used to adjust the sensitivity. The value of Cs0~Cs3 use smaller, then the sensitivity will be better. The sensitivity adjustment must according to the practical application on PCB. The range of Cs0~Cs3 value are 0~50pF.
6. The sensitivity adjustment capacitors (Cs0~Cs3) 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.