Shanghai Hai oak Microelectronics Co., Ltd.

CST816S Data Sheet

High performance capacitive touch chips from

Rev : V1.1

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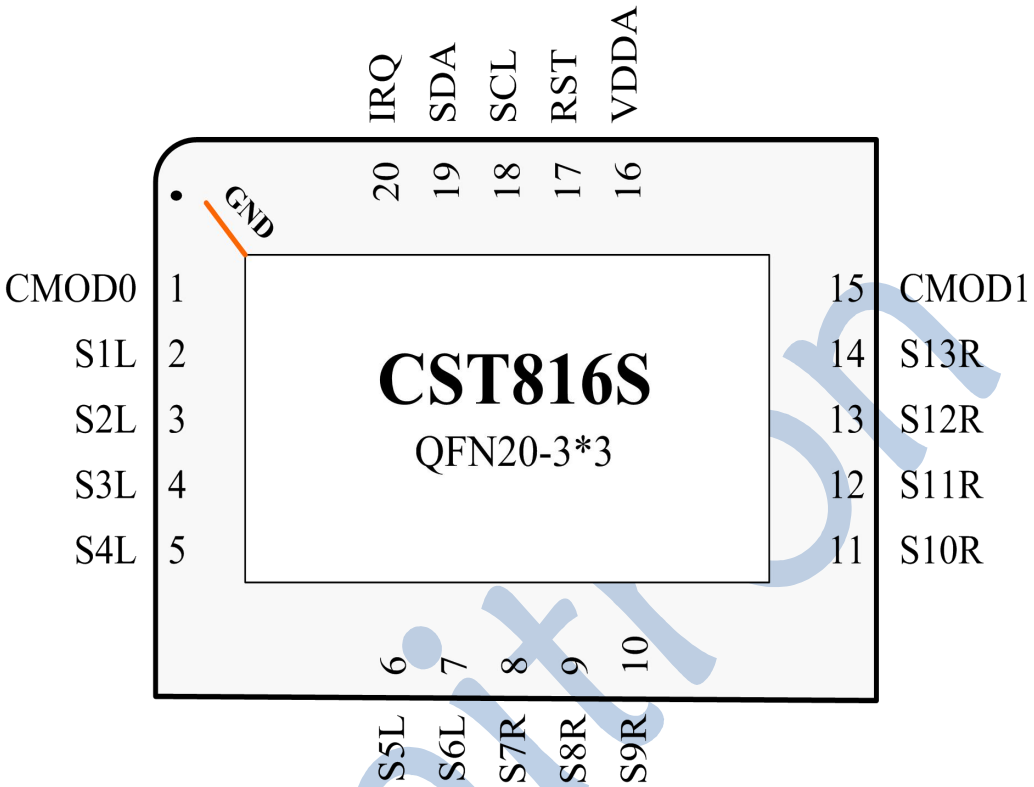
1 Overview

CST816S Since capacitive touch chip, high-speed MCU Kernel and Embedded DSP Circuit, with its own self-capacitance sensing technology is fast, and can be widely triangle support pattern including a plurality of self-capacitance, in which the single-point gesture and the two real operation, to achieve high sensitivity and low standby power consumption.

2. Chip Features

- **Rapid detection circuit built-in self-capacitance and high-performance DSP Module**
  - Support online programming;
  - Built-in watchdog;
  - A plurality of key support;
  - Gesture support standby wake-up function;
- Capacitive screen support
  - **Supports up 13 Induction passage;**
  - Channel floating / pull-down design support;
  - Automatic parameter adjustment module;
- Performance
  - **Refresh rate> 100Hz ;**
  - And two real single point gesture operation;
  - **Dynamic mode power consumption is typically < 2.5mA ;**
  - **Typical power consumption in standby mode < 10uA ;**
  - Typical power consumption in sleep mode < 5uA;
- Communication Interface
  - **I2C Master / slave communication interface, the rate of 10Khz ~ 400Khz Configurable;**
  - **compatible 1.8V / 3.3V The interface level.**
- Power supply
  - **Single-Supply 2.7V ~ 3.6V , Power supply ripple <= 50mv ;**
- **Package Type: QFN20 3mm * 3mm * 0.4mm ;**

3. pinout / description



name	Explanation	Remark
S1 ~ S13	Sensing channels	
VDDA	power supply	2.7V ~ 3.6V , Then 2.2uF ~ 10uF capacitance
CMOD0 / CMOD1	Stabilizing capacitance	Meet 1nF ~ 5.6nF Stabilizing capacitance
IRQ	Interrupt Output	Rising / falling edge Optional
SCL / SDA	I2C	Alternatively pull / internal open-drain mode
RST	Reset input	Low effective, suspended

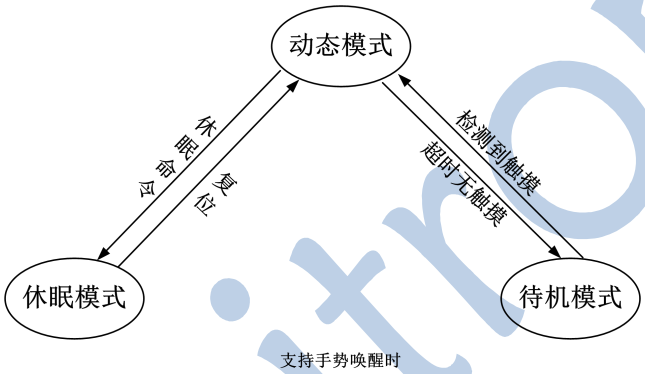
Remarks:

1. CMOD0 / CMOD1 Regulators must be connected capacitor size 1nF ~ 5.6nF;

4. Functional description

CST816S Since capacitive touch chip, through its built-in self-capacitance sensing module quickly, without any external devices may be (except bypass capacitor circuit), and can achieve real single point gesture function in the two o'clock triangular pattern; Rapid response in at the same time, extremely excellent anti-noise, waterproof, low-power performance.

4.1 Modes



- Dynamic Mode

  When the touch operation frequency, in this mode; In this mode, the touch quickly chip self capacitance touch screen scanning, and a touch is detected and reported to the host.

- Standby mode

  When receiving the standby command, in this mode; In this mode, the touch chips at a lower frequency scan the touch screen, gesture enters the wake-up match dynamic model, through IRQ Pin wake up the host; can also be switched to the dynamic mode by the reset pin.

- Sleep Mode

  After receiving the sleep command, in this mode; In this mode, the touch chip in deep sleep state, in order to maximize power savings, may be switched to the dynamic mode by the reset pin.

4.2 channel / node configuration

CST816S Since most available chip capacitive touch 13 A sensing channels, each channel no external components are needed to support self-capacitance scan. Each channel can support self-capacitance size range: 1pF ~ 400pF

4.3 power / reset

Built reset module holds the chip in the reset state until the normal voltage, when the voltage is below a certain threshold, the chip will be reset;

When the external reset pin RST *n* It is low resets the entire chip, and pull-up resistors on the pin has an internal RC Filtering, the pin can be left floating;-chip watchdog to ensure that when an abnormality occurs, the chips can still return to normal operation within a predetermined time.

4.5 low-power mode

CST816S Low-power touch controller IC supports the following way:

- Sleep mode: After issuing a sleep command to the chip, the chip will immediately enter deep sleep mode to achieve the lowest power consumption; by resetting the chip wakes up and enters the dynamic mode of operation;
- Standby mode: In this mode, the chip has been at a low frequency, as to match a minimum scan a predefined wake-up gesture;

4.6 I2C communication

The chip supports standard I2C Communication protocol standard, can be achieved 10Khz ~ 400Khz It may be equipped with a communication rate. Two I2C Pin SCL with SDA , In addition to support the open drain mode, also supports internal pull mode for flexible choice.

4.7 interrupt

Chip valid only touch the touch is detected, When and needs to be reported to the host, will pass IRQ Pin notifies the host reads valid data, to improve efficiency, reduce CPU burden;

Interrupt rising or falling edge can be effectively arranged as desired; standby mode when the matching predefined gesture, IRQ Pin also serves as a wake-up hosts.

5. Design Specification

Power supply decoupling capacitor 5.1

In general chip VDD with VSS End and by one 0.1uF with 10uF The ceramic capacitor can function as decoupling and bypass. Decoupling capacitors should be placed as close to the chip, to minimize the current loop area.

5.2 COMD filter capacitor

Using at least a filter capacitor 10% Accuracy NPO / COG Choice of material capacitive, the capacitance value of 1nF To 5.6nF Between, the general choice 1.5nF . The particular optimum value and the corresponding body related to the capacitance. COMD Filter capacitor must be placed close to the corresponding pins of the chip, between the chip and the traces as short as possible.

5.3 waterproof Notes

Sensor Do not walk around and there are large line of the field, for a large area of land to be broken handle.

5.4 ESD Precautions

FPC The design will directly affect the ESD The effect of the design must note the following:

- FPC Try to use fully shielded magnetic film, the magnetic film must be grounded simultaneously.
- FPC versus Sensor Slit means and pressure as far away from the assembly to reduce ESD Impact.
- Consider increasing the power access TVS To the pipe, in order to enhance the anti- ESD Interference performance.

5.5 Electromagnetic Interference Considerations

Sensor Traces must be isolated from the line possible interference, such as power traces, audio cable, LCD Driving line, a Bluetooth antenna, RF Antenna. special, TP When the all-fitting design, there is likely to be LCD Interference at this time TP The parameters need special debugging.

5.6 Ground

Touch detection precision internal chip circuit more sensitive to ground, if possible, the user should use the star ground to dampen the noise of the other chips. Meanwhile, as far as possible into the string is grounded at the beads in order to enhance anti-jamming capability.

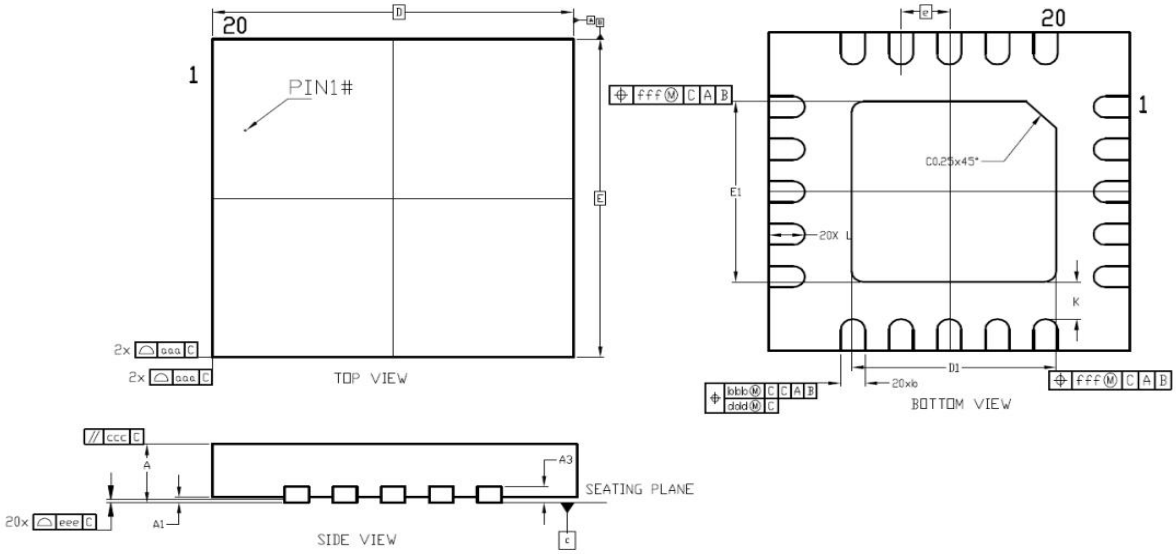
The star-shaped ground is difficult to achieve, the user needs to try to separate high current device with a touch chip ground traces.

6. Electrical Characteristics

Ambient temperature 25 •C, VDDA = 3.3V.

parameter	Minimum	Typical values	Maximum	unit
Operating Voltage	2.7	3.3	3.6	V
Operating temperature	- 40	+ 25	+ 85	•C
storage temperature	- 60	-	+150	•C
Working humidity	-	-	95	%
Power Supply Ripple	-	-	50	mV
Operating current (dynamic mode)	-	2.5	-	mA
Operating current (standby mode)	-	10	-	uA
Operating Current (Sleep mode)	-	5	-	uA

7. Product Package



QFN20 外形图

DIM / SYMBOL	MIN.	NOM.	MAX.
A	0.50	0.55	0.60
A1	0	0.02	0.05
A3	–	0.152 REF	–
b	0.15	0.20	0.25
D		3.00BSC	
E		3.00BSC	
D2	1.60	1.70	1.80
E2	1.60	1.70	1.80
e		0.40BSC	
L	0.25	0.30	0.35
K	0.20	–	–
aaa		0.10	
bbb		0.07	
ccc		0.10	
ddd		0.05	
eee		0.08	
fff		0.10	

QFN20 外形尺寸

8. A reference circuit