IPS-BN0703601 Specification

Module Name	IPS-BN0703601
Document Version	V0.1
Release date	2012-05-15

Date	Rev	Old description	New description	Remark
2012-05-15	V0.1	First Release		L00

Approved	Checked	Prepared
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Contents

1 Introduction

The purpose of this specification is defined the general provision and quality requirement apply to 7.0 inch Balance Capacitive Touch module integrated by Inferpoint International Limited. This document, together with the module drawing, is the highest level specification for this product. When users touch module by finger, the module can send coordinates of point at the contact point to host. The finger position information is sent to host by I2C bus which is determined by host through INT line.

2 General Description

This document contains the Balance Capacitive Touch module specification. The maximum rating, characteristics, hardware, and inspection of the module are described in the subsequent sections. In special, I2C protocol will be introduced in detail.

2.1 Touch Sensor Characteristics

- Technology: Use the character of balance capacitive among the touch electrodes on touch panel to
- identify the positions of touch signals
- Touch method: one finger touch or two fingers multi touch
- Interface: I2C

2.2 General Specification

Item	Specification	Unit
Screen Diagonal	7.0	inch
Applied Resolution	1500×2700	dot
Module Outline	161.92±0.2(H) x 99.00±0.2(V) x 1.40±0.15(T) (Excluded FPC)	mm
Touch Area	155.08(H) x 87.64(V) x1.40 ±0.15(T).	mm
Cover Lens Material	None	-
Transparency	85	%

3 Absolute Maximum Ratings

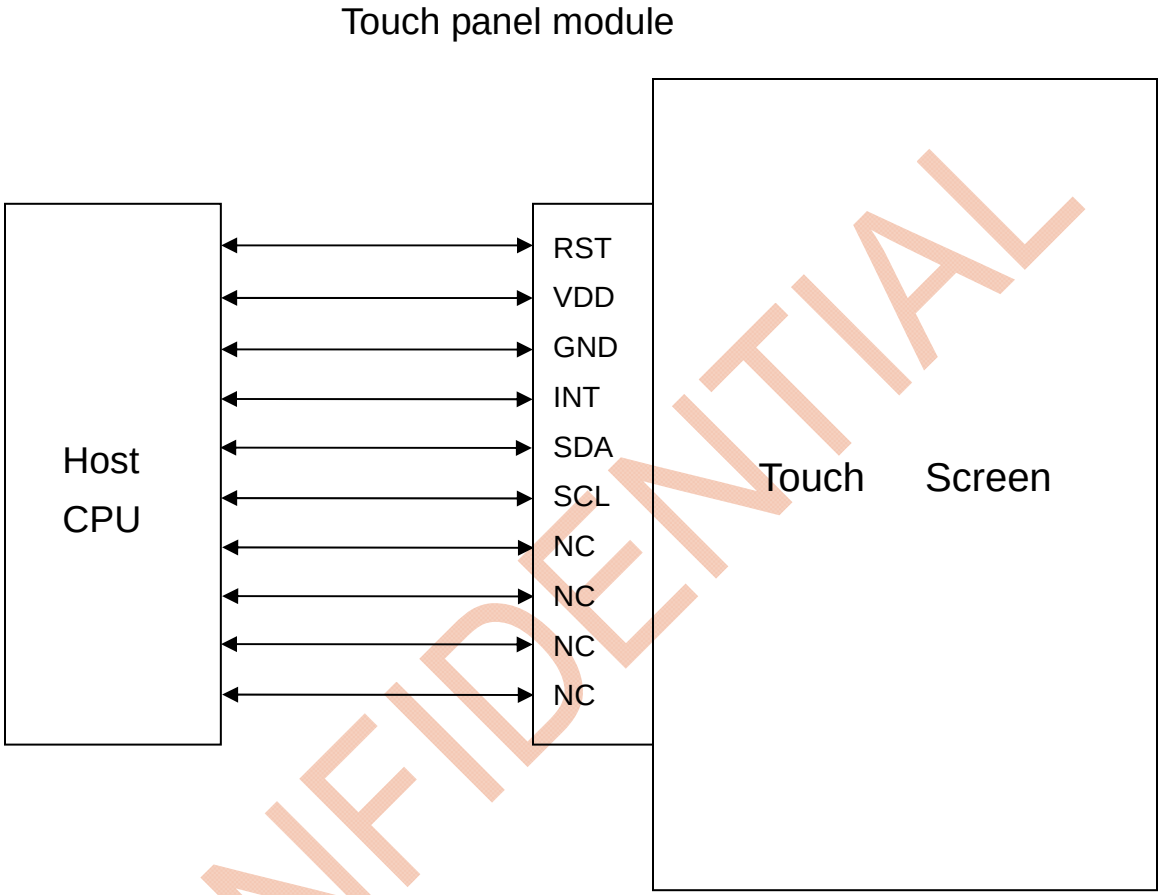
Absolute Maximum rating of touch panel module is as following

Symbol		Description	Min	Type	Max	Unit	Note
Top		Operating Temperature	-10	25	60	℃	To be defined base on fine tune result
Tst		Storage Temperature	-20	-	70	℃	
VDD		Input Voltage	3.0	3.3	3.6	V	
ESD	(Air test)	Electrostatic discharge voltage	-	-	8	KV	
	(Contact test)		-	-	4	KV	
Static Electricity		Be sure that you are grounded when handing TP					

Note1: If the module exceeds the absolute maximum ratings, it may be damaged permanently. Also, if the module operated with the absolute maximum ratings for a long time ,its reliability may drop.

4 Interface Characteristics

4.1 Interface Diagram



4.2 Pin Definition

NO.	SYMBOL	I/O	FUNCTION
1	RST	I	Sensor System Global Reset
2	VDD	P	DC Voltage Supply
3	GND	P	Ground
4	INT	O	Sensor data ready request
5	SDA	I/O	I2C serial data pin
6	SCL	I	I2C serial clock pin
7	NC	-	No Connection
8	NC	-	No Connection
9	NC	-	No Connection
10	NC	-	No Connection

5 Electrical Characteristics

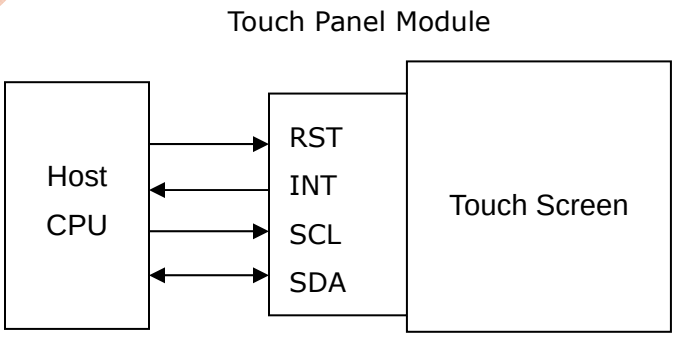
(Ta=25℃,V_{DD}=3.3V)

ITEM		SYMBOL	CONDITION	MIN	TYP	MAX	UINT
Input power voltage		VDD	-	3.3±5%			V
Input Signal Voltage	H Level	VIH	-	2.6	-	3.6	V
	L Level	VIL	-	GND	-	0.6	V
Output Signal Voltage	H Level	VOH	-	2.6	-	-	V
	L Level	VOL	-	-	-	0.6	V
Module Supply Current(Normal)		IDD(normal)	Vdd=3.3V	-	7.5	-	mA

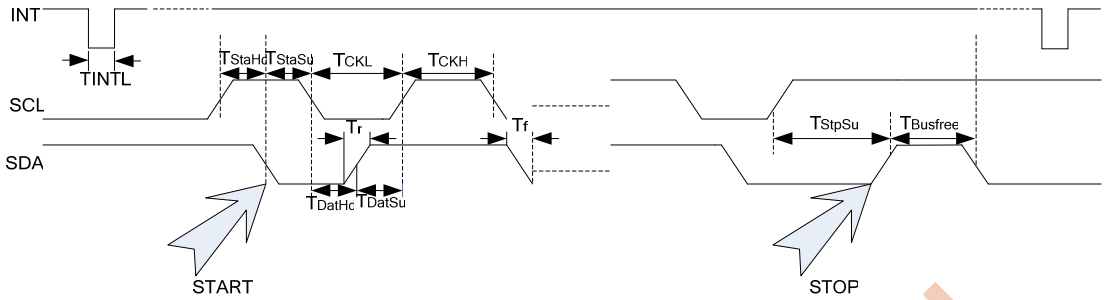
6 I2C Interface

6.1 Interface Diagram

The system block diagram is as shown in below .There are three communication pins connected between CPU and Touch Panel Module which are including external interrupt INT,I2C pins SCL and SDA .The INT is active low while the touch state is calculated by Touch Panel Module and the touch information can be translated via I2C communication interface .The I2C data format ,protocol and report packet are described as following.



6.2 Timing Characteristic



Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Working Frequency	Fclk	-	-	200	Khz	VDD=3.3V,TA=25℃
INT Low Time	TINTL	-	2	-	uS	VDD=3.3V,TA=25℃
I2C Clock Low	TCKL	2.5	-	-	uS	VDD=3.3V,TA=25℃
I2C Clock High	TCKH	2.5	-	-	uS	VDD=3.3V,TA=25℃
I2C Data rising time	Tr	-	-	300	nS	VDD=3.3V,TA=25℃
I2C Data falling time	Tf	-	-	300	nS	VDD=3.3V,TA=25℃
I2C Data hold time	TDatHd	0	-	-	nS	VDD=3.3V,TA=25℃
I2C Data setup time	TDatSu	100	-	-	nS	VDD=3.3V,TA=25℃
I2C Start Condition hold time	TStaHd	200	-	-	nS	VDD=3.3V,TA=25℃
I2C Start Condition setup time	TStaSu	600	-	-	nS	VDD=3.3V,TA=25℃
I2C Stop Condition setup time	TStpSu	600	-	-	nS	VDD=3.3V,TA=25℃
I2C Bus free time	TBusFree	2.5	-	-	uS	VDD=3.3V,TA=25℃

6.3 I2C Buffer and Data Format

Touch panel is used as I2C Slave Device，I2C Salve address is 0x01。

I2C Buffer Address	Function of this I2C Buffer	Status
00H	Gesture ID Code	R
01H	Gesture Data 1	R
02H	Gesture Data 2	R
03H	Gesture Data 3	R
04H	Gesture Data 4	R
05H	Gesture Data 5	R
06H	Gesture Data 6	R
07H	Gesture Data 7	R
08H	Gesture Data 8	R
09H	Resolution 1	R
0AH	Resolution 2	R
0BH	Resolution 3	R
0CH	Resolution 4	R
0DH	Sensor Operation Control	R/W
0EH	Chip ID	R
0FH	Software Version	R

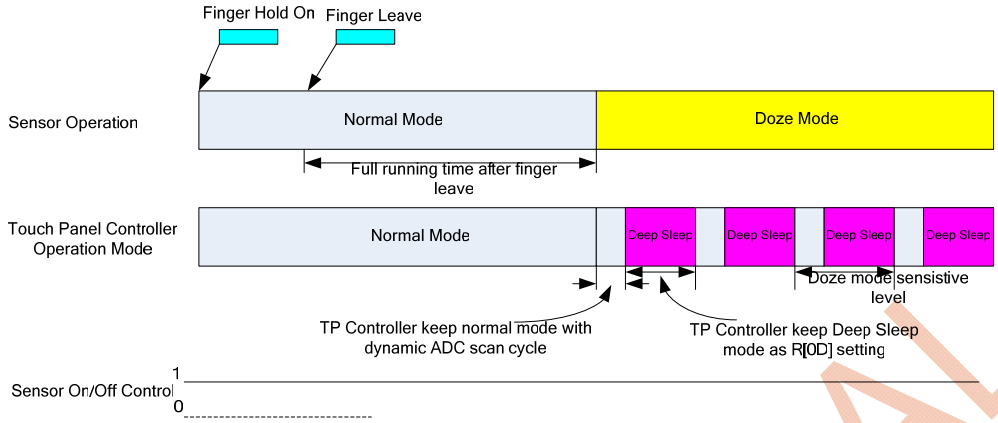
6.4 Function Description

I2C Buffer Address	Bit	Function Description	Status
00H	1…0	Packet ID 00: finger leave 01: one point，(X1,Y1)valid 10: one point，(X2,Y2)valid 11: two point, (X1,Y1,(X2,Y2)valid	R
	7…2	Reserve	R
01H	X1[15:8]		R
02H	X1[7:0]		R
03H	Y1[15:8]		R
04H	Y1[7:0]		R
05H	X2[15:8]		R
06H	X2[7:0]		R
07H	Y2[15:8]		R
08H	Y2[7:0]		R
09H	Horizontal Pixels X[15:8]		R
0AH	Horizontal Pixels X[7:0]		R
0BH	Vertical Pixels Y[15:8]		R
0CH	Vertical Pixels Y[7:0]		R

6.5 Sensor Operation Control Register

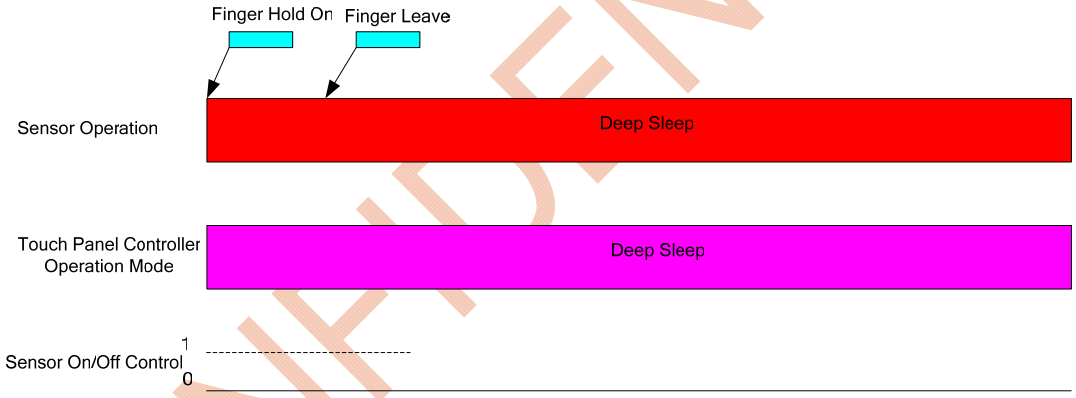
I2C Buffer Address	Bit	Function Description	Status
0DH	7	Sensor On/Off Control 0:Disable Sensor 1:Enable Sensor(Default)	R/W
	6…5	Reserve	
	4…3	Sensor full running time after finger leave 00:8 second(Default) 01:5 second 10:3 second 11:1 second	
	2…0	Doze mode sensitive level 000:32ms Deep Sleep +5 ADC wakeup cycles 001:64ms Deep Sleep +5 ADC wakeup cycles 010:128ms Deep Sleep +5 ADC scan cycles (Default) 011:256ms Deep Sleep +6 ADC scan cycles 100:512ms Deep Sleep +8 ADC scan cycles 101:1025ms Deep Sleep +10 ADC scan cycles 110:2048ms Deep Sleep +20 ADC scan cycles 111:4096ms Deep Sleep +40 ADC scan cycles	

Behavior of sensor operation while Sensor On/Off Control=1



Behavior of sensor operation while Sensor On/Off Control=0

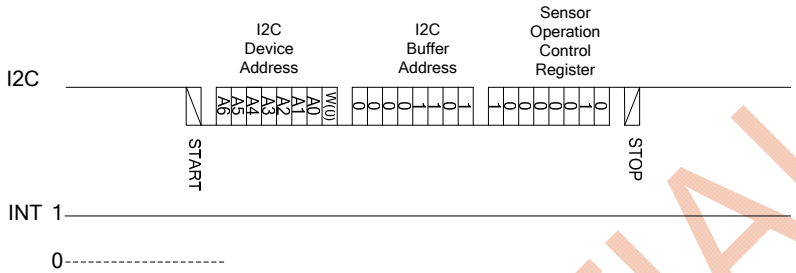
(Host controller can clear Sensor On/Off Control register to 0 to force sensor system going Deep Sleep Mode)



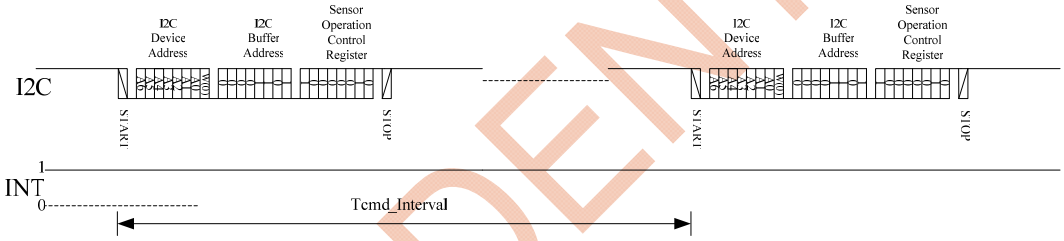
6.6 Operation Definition

6.6.1 I2C Write Timing Table

6.6.1.1 Write a byte to Sensor Operation Control Register



6.6.1.2 The interval between two write command

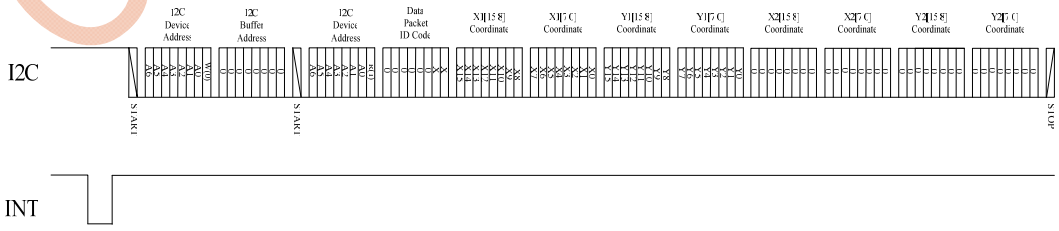


Symbol	Min.	Typ.	Max.	Unit	Condition
Tcmd_interval	10	-	-	mS	-

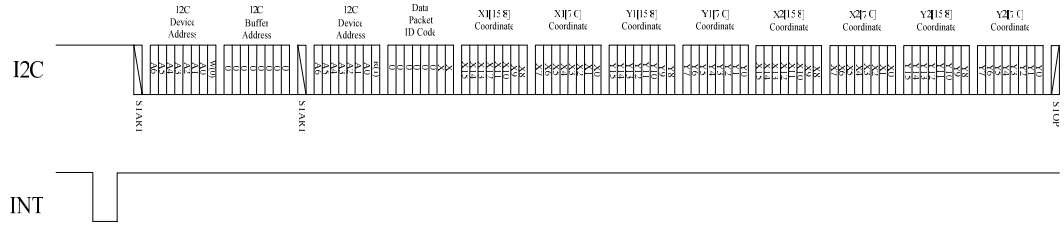
6.6.2 Touch event

First time finger touch on the panel, INT will active a falling edge signal that there is a touch event.

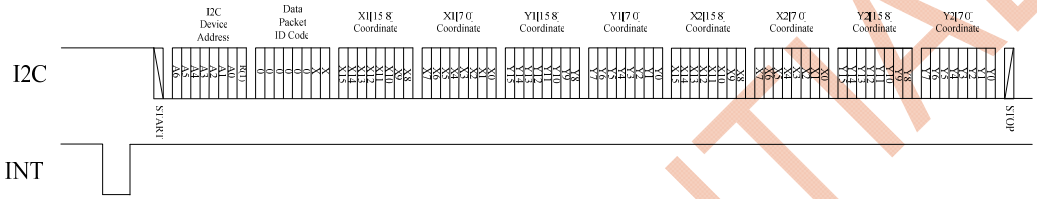
6.6.2.1 One points touch event



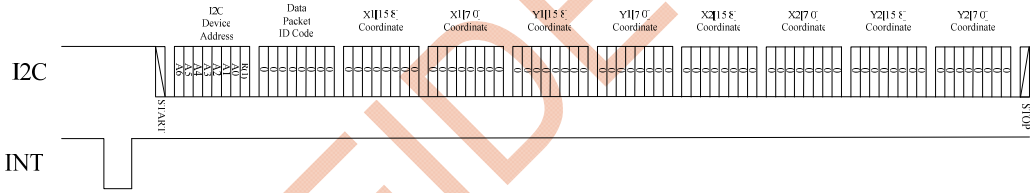
6.6.2.2 Two points touch event



6.6.2.3 Finger hold on touch panel, INT will active a falling edge signal each detect frame

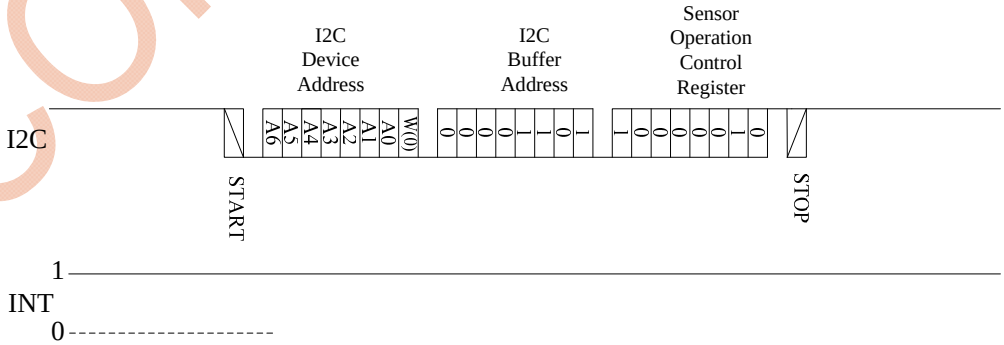


6.6.2.4 Finger leave from the touch panel, INT will active a falling edge signal to indicate finger leave from touch panel, and the touch sensor will respond(0,0) coordinate to I2C master

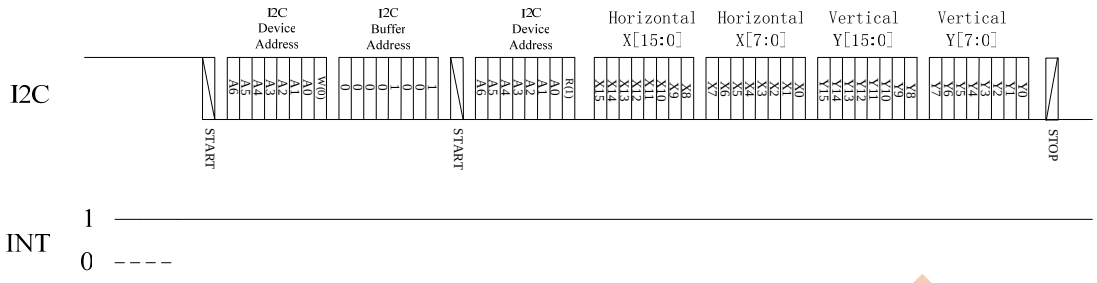


6.6.3 Setting Sensor Operation Mode

Write a byte to Sensor Operation Control Register

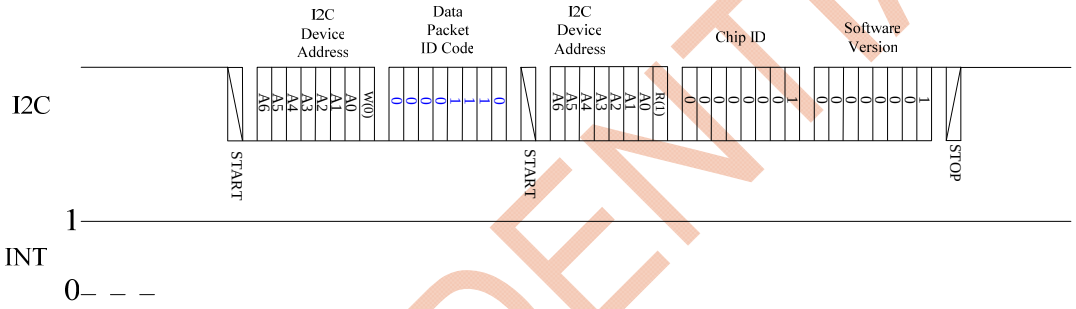


6.6.4 Get Touch Panel Resolution

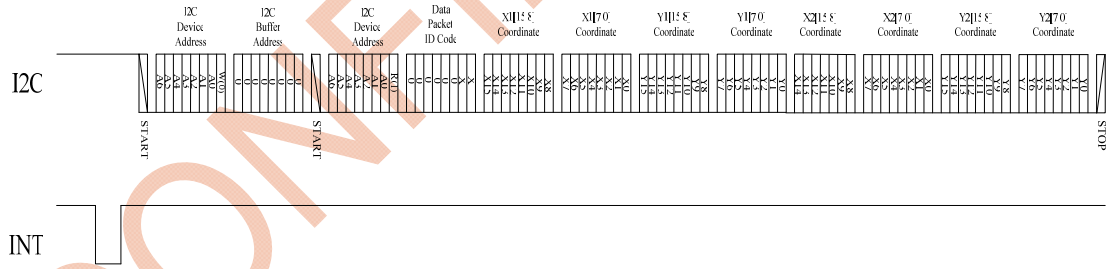


6.6.5 Get Chip ID/Software Version

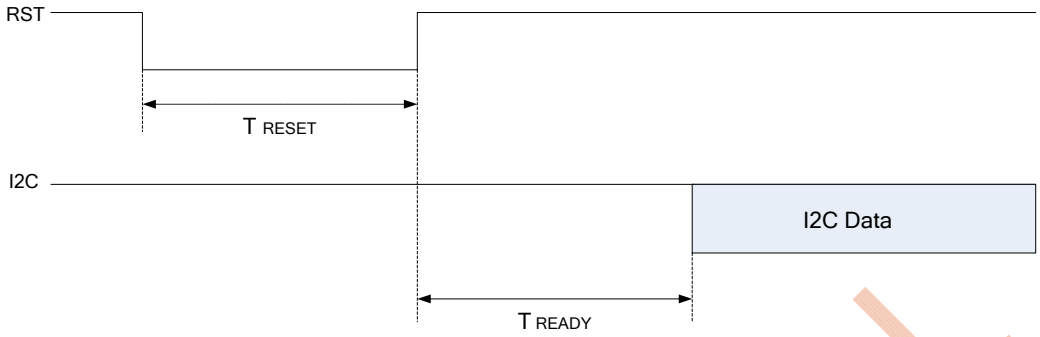
Read Chip ID and Software version



6.6.6 Return to I2C Buffer 0 and read moving register

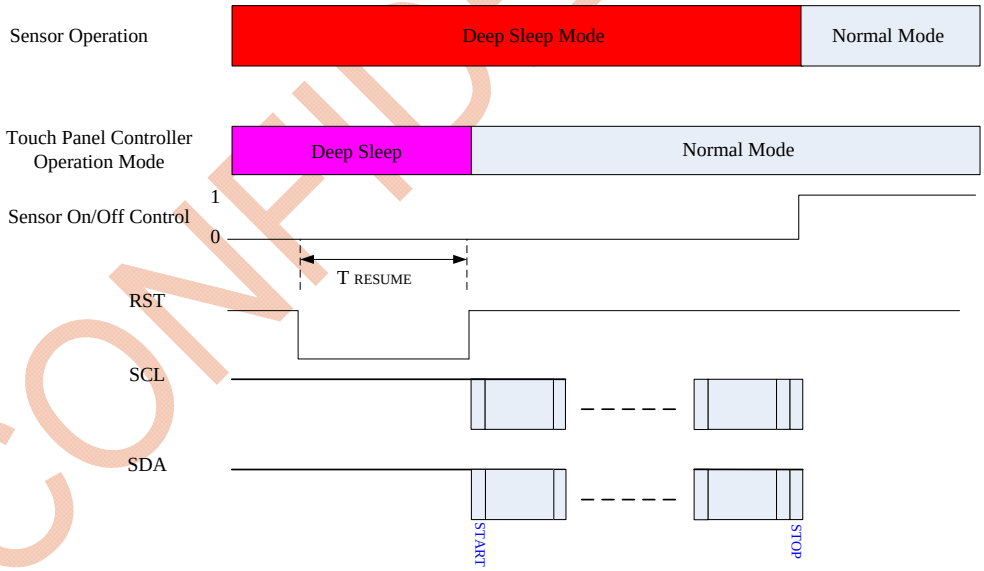


6.7 Reset Timing



	Min.	Typ.	Max.	Unit
TRESET	2	-	-	mS
TREADY	100	-	-	uS

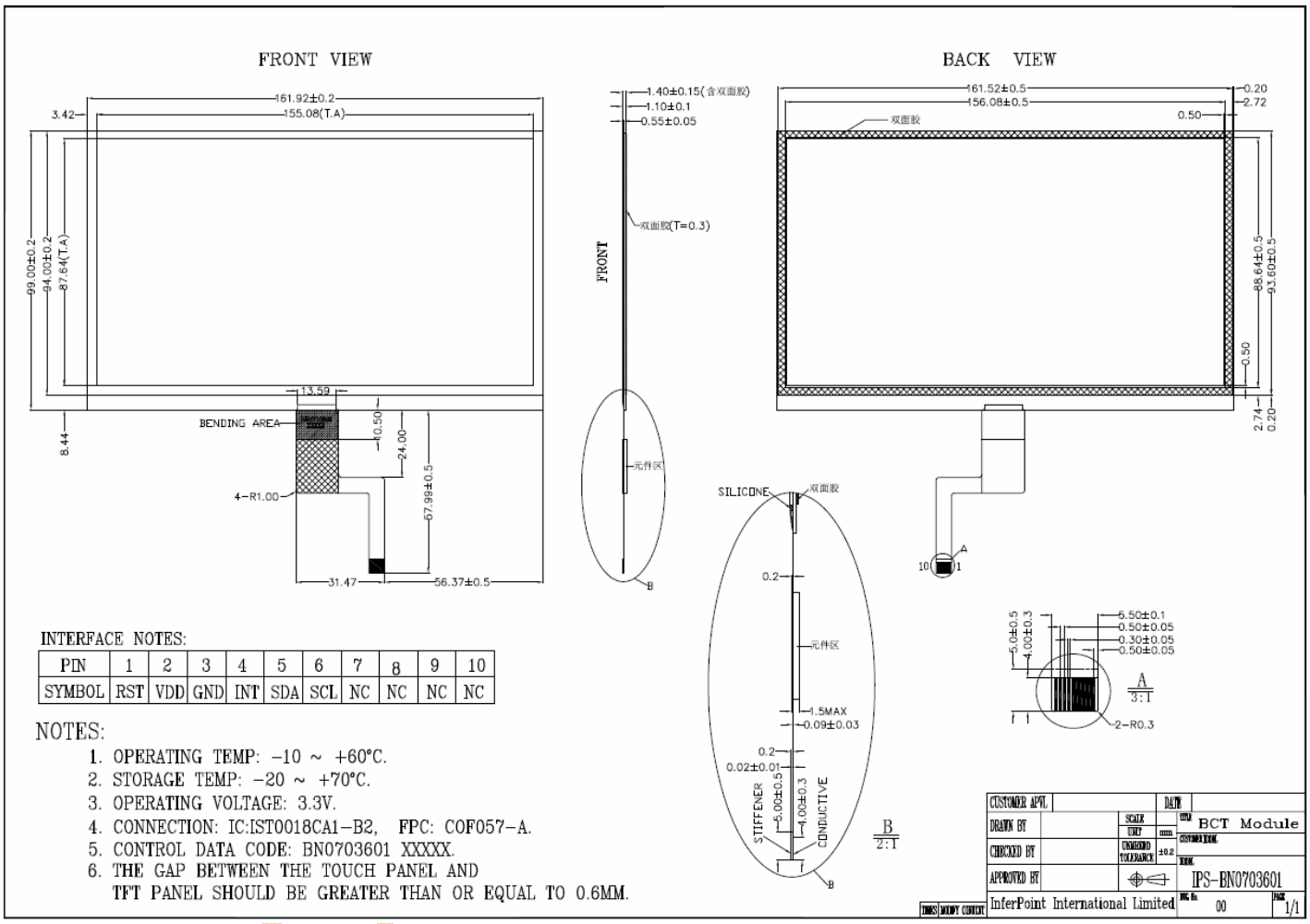
6.8 Resume MCU



	Min.	Type.	Max.	Unit
TRESUME	1	-	10	uS

7 Mechanical Characteristics

7.1 Whole Module.



INTERFACE NOTES:

PIN	1	2	3	4	5	6	7	8	9	10
SYMBOL	RST	VDD	GND	INT	SDA	SCL	NC	NC	NC	NC

NOTES:

1. OPERATING TEMP: −10 ~ +60°C.
2. STORAGE TEMP: −20 ~ +70°C.
3. OPERATING VOLTAGE: 3.3V.
4. CONNECTION: IC:IST0018CA1−B2, FPC: COF057−A.
5. CONTROL DATA CODE: BN0703601 XXXXX.
6. THE GAP BETWEEN THE TOUCH PANEL AND TFT PANEL SHOULD BE GREATER THAN OR EQUAL TO 0.6MM.

8 RA Test Condition

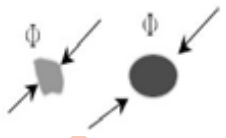
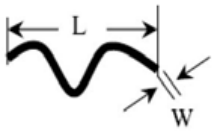
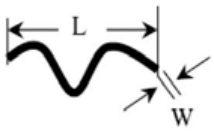
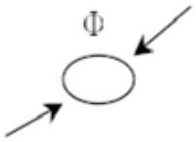
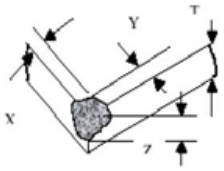
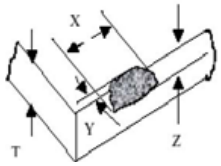
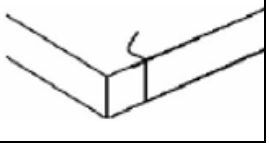
Item		Test condition
Operating	High temperature	60℃, 96hrs
	Low temperature	-10℃, 96hrs
Storage	High temperature	70℃, 240hrs and recovery for 2hrs
	Low temperature	-20℃, 240hrs and recovery for 2hrs
	High temperature and high humidity	50℃ ,90%RH, 240hrs and recovery for 2hrs
Thermal	Cycle	Rt→(-20℃→Rt→ 70℃→ Rt) 0min 30min 5min 30min 5min ×50circle
	Shock	Rt→(-20℃→70℃) 0min 30min 30min ×50circle

Note: Rt means room temperature

9 Appearance Specification

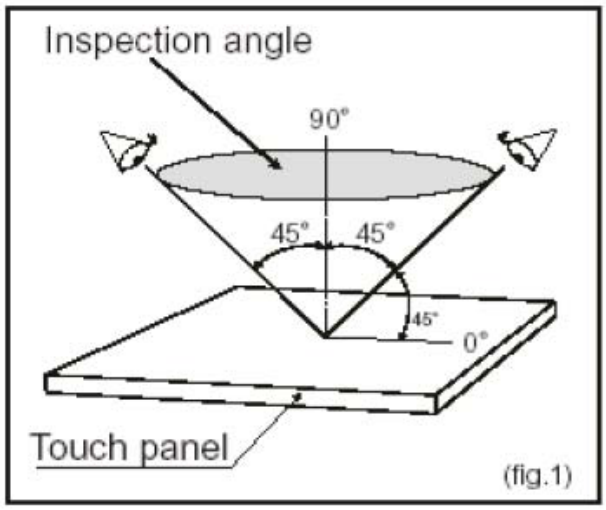
The following description is defined to offer cosmetic specification for meeting Customer Incoming Inspection

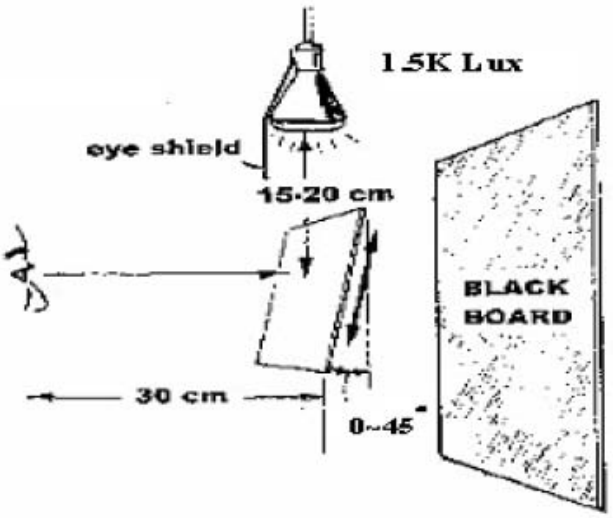
9.1 Cosmetic Specification and Inspection Items

Inspection Item	Criteria	Portray
Black/White Spot	- D≤0.3mm, ignore - 0.3mm＜D≤0.8mm, Acceptable if less than 4pcs - D＞0.8 mm, not allowed	
Scratch	- W≤0.05mm, ignore - 0.03mm＜W≤0.05 mm , L≤2.5 mm (Acceptable ≤ 4pcs) - Distance over 10mm - W＞0.1mm or L＞2.5mm not allowed.	
Linear type/ foreign fiber	- W≤0.05mm, ignore - 0.05 mm＜W ≤ 0.1 mm , L ≤ 3 mm (Acceptable ≤ 3pcs) - W＞0.1mm or L＞3mm not allowed	
Bubble/Dent	- D≤0.2mm, ignore - 0.2mm＜D≤0.5mm, Acceptable ≤ 5pcs - D＞0.5mm Not allowed	
ITO corner chipping	X<3 mm, Y<3 mm, Z<Glass thickness	
ITO edge chipping	X<3 mm, Y<3 mm, Z<Glass thickness	
Crack	No allowed	

Note:(a). The foreign materials that can be blown out by air and washed out by wet cleaning are not regarded as a defect
(b) Inspection Environment Conditions

- Temperature : 25±5℃
- Humidity : 55±10%RH
- Illumination : At lease 1.5K Lux
- Light Source : Fluorescent Light
- Inspection Viewing distance : 30±5cm
- Inspection Viewing Angle : The surface of the panel and inspector eyes shall be 90° ± 45°
- Background : Black





10 Caution

10.1 Storage Condition

Storage under the state of packing when delivering

10.2 Handling Precautions

- Sensor devices are made of fragile material such as glass and may be broken or cracked if dropped it, so please handle them with care.
- Please don't touch glass surface and keep it clean.
- Please wear wrist strap when handling to prevent and electrostatic discharge (ESD)
- Please keep the sensor in specified, original packing boxed and do not open sealing bags when storage.
- Do not stack the sensor to avoid damage and contamination

11 ROHS Compliant Warranty

RoHS Hazardous substances including

Cd<100ppm

Pb<1000ppm

Hg<1000ppm

Cr+6<1000ppm

PBDE<1000ppm

PBB<1000ppm