Display Elektronik GmbH

DATA SHEET

TFT MODULE

DEM 1280800D VMH-PW-N

(C-TOUCH)

10,1“ TFT

Product Specification

Version: 0

13.12.2024

Revision History

Date	Rev. No.	Page	Summary
13.12.2024	0	ALL	FIRST ISSUE

Contents

Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This model is composed of a Transmissive type TFT-CD Panel, driver circuit，capacitance touch panel，back-light unit. The resolution of a 10.1’TFT-CD contains 1280x800 pixels, and can display up to 16.7M colors.

*** Features**

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	216.96 x 135.60 (10.1 inch)	mm	
Driver element	TFT active matrix	-	
Display colors	16.7M	colors	
Number of pixels	1280(RGB)*800	dots	
Pixel arrangement	RGB vertical stripe	-	
Pixel pitch	0.1692(H)*0.1692(V)	mm	
Viewing angle	ALL	o'clock	
Controller IC	EK79202B1	-	
LCM Interface	8 BIT LVDS	-	
Display mode	Transmissive /Normally Black	-	
Operating temperature	-20～+70	℃	
Storage temperature	-30～+85	℃	
Module bonding technology	Use tape bonding between LCM and CTP	-	

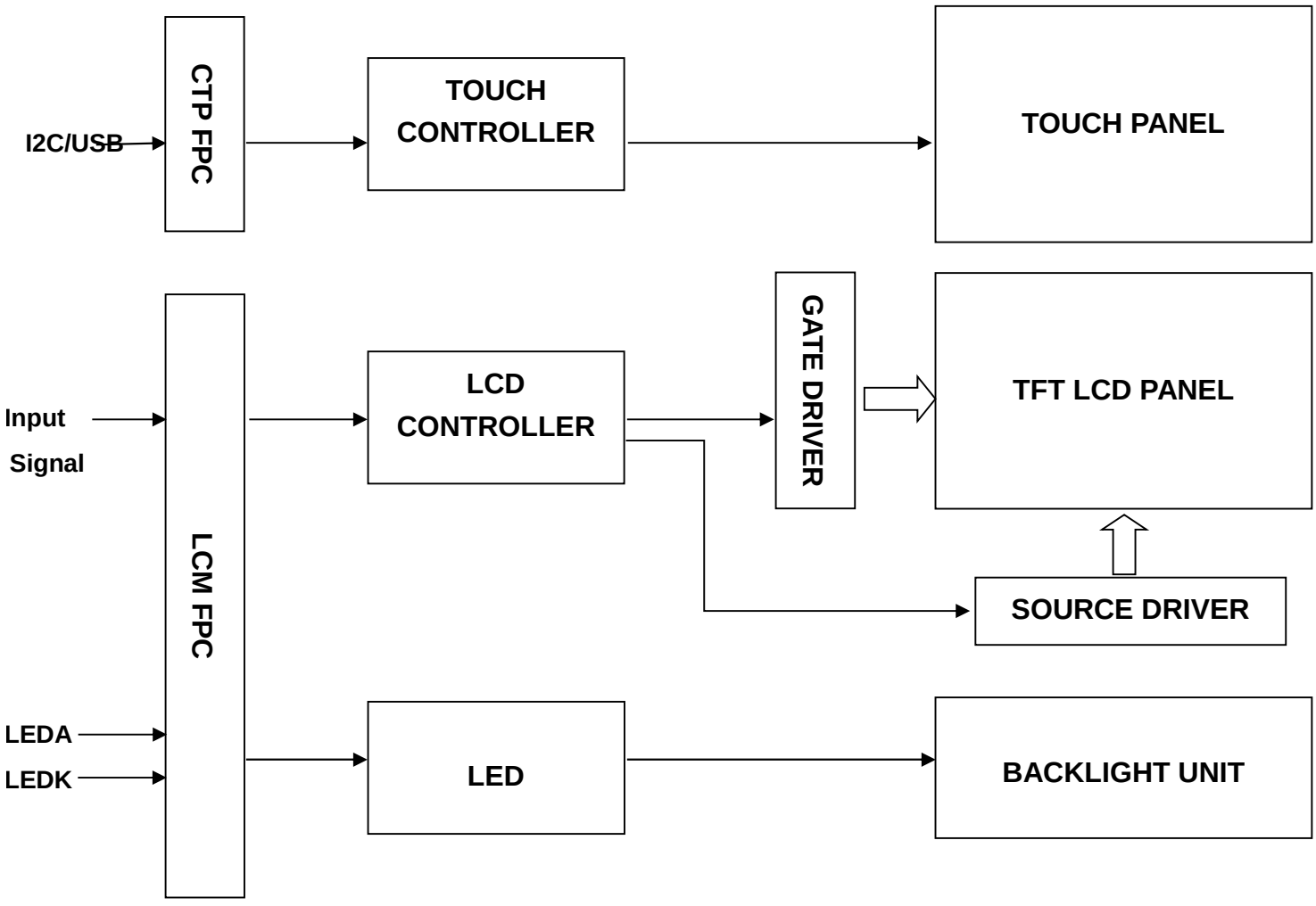
***CTP Features**

General Information Items	Specification	Unit	Note
	Main Panel		
Structure	G+G	-	
Controller IC	II2511	-	
Interface	I2C/USB	-	
Slave Adress	0x41	-	
Touch mode	Ten points	-	-
Logic level	3.3	V	

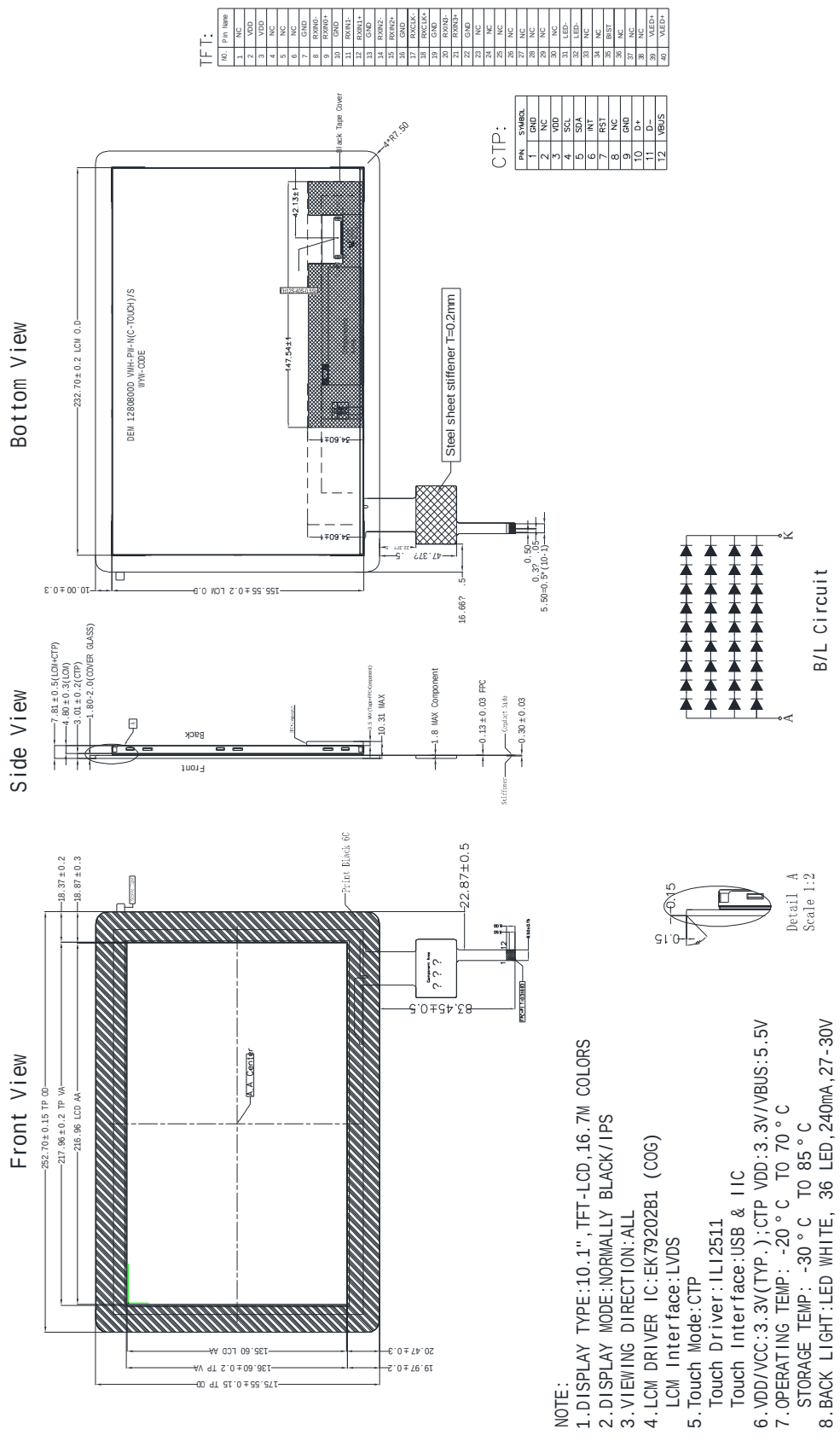
Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)		252.70		mm	-
	Vertical(V)		175.55		mm	-
	Depth(D)		8.01		mm	-
Weight			TBD		g	-

1. Block Diagram



2. Outline dimension



3. Input terminal Pin Assignment

3.1 TFT

40pin connector is used for the module electronics interface. The recommended model is Molex_505110-4096 manufactured by Molex.

NO.	SYMBOL	DISCRIPTION	I/O
1	NC	--	--
2	VDD	A power supply for analog circuit. VDD=3.3V；	P
3	VDD		
4	NC	--	--
5	NC	--	--
6	NC	--	--
7	GND	Ground	P
8	RXIN0-	-LVDS Differential Data Input	I
9	RXIN0+	+LVDS Differential Data Input	I
10	GND	Ground	P
11	RXIN1-	-LVDS Differential Data Input	I
12	RXIN1+	+LVDS Differential Data Input	I
13	GND	Ground	P
14	RXIN2-	-LVDS Differential Data Input	I
15	RXIN2+	+LVDS Differential Data Input	I
16	GND	Ground	P
17	RXCLK-	-LVDS Differential Clock Input	I
18	RXCLK+	+LVDS Differential Clock Input	I
19	GND	Ground	P
20	RXIN3-	-LVDS Differential Data Input	I
21	RXIN3+	+LVDS Differential Data Input	I
22	GND	Ground	P
23	NC	--	--
24	NC	--	--
25	GND	Ground	P
26	NC	--	--
27	NC	--	--
28	NC	--	--
29	NC	--	--
30	NC	--	--
31	LED-	LED Cathode	P

32	LED-	LED Cathode	P
33	NC	--	--
34	NC	--	--
35	NC	--	--
36	NC	--	--
37	NC	--	--
38	NC	--	--
39	LED+	LED Anode	P
40	LED+	LED Anode	P

3.2 CTP

NO.	SYMBOL	DISCRIPTION	I/O
1	GND	Ground.	P
2	NC	No connection.	--
3	VDD	Power Supply voltage for I2C(3.3V)	P
4	SCL	I2C clock input.	I
5	SDA	I2C data input and output	I/O
6	INT	External interrupt to the host.	I
7	RST	External Reset, Low is active.	I
8	NC	No connection.	--
9	GND	Ground.	P
10	D+	USB D+	I/O
11	D-	USB D-	I/O
12	VBUS	Power Supply voltage for USB(5.0V)	P

4. LCD Optical Characteristics

4.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	Θ=0 Normal viewing angle	800	1000	--		CA-31
Response time	Rising	$T_{R+}T_F$		--	25	35	msec	*
	Falling							*
Uniformity		S(%)		41	46.8	--	%	*
Color Filter Chromacicity ((CIE 1931))	White	W_X		-0.04	0.328	+0.04		CA-310
		W_Y			0.365			
	Red	R_X			0.593			
		R_Y			0.359			
	Green	G_X			0.360			
		G_Y			0.559			
	Blue	B_X			0.150			
		B_Y			0.123			
Viewing angle	Hor.	ΘL	CR>10	70	80	--		*
		ΘR		70	80	--		
	Ver.	ΘU		70	80	--		
		ΘD		70	80	--		
Option View Direction		ALL						

* The data comes from the LCD specification.

Measuring Condition

Measuring surrounding : dark room

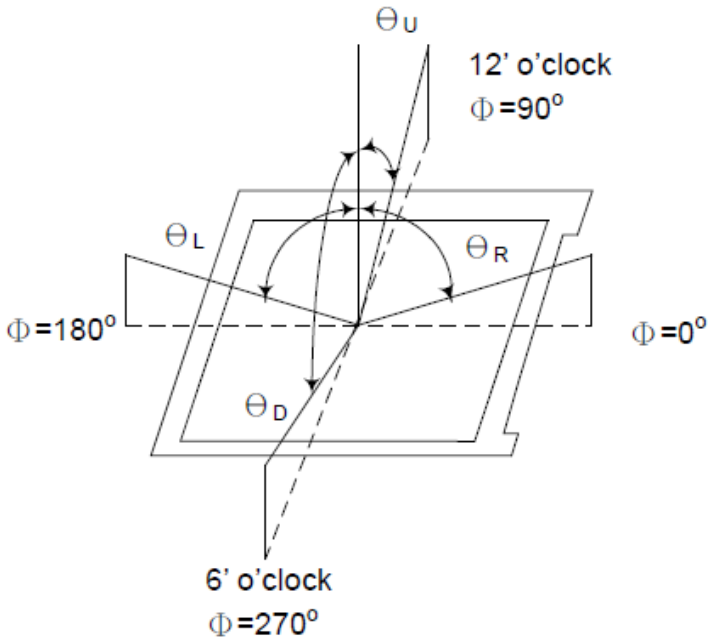
Ambient temperature : 25±2oC

15min. warm-up time.

Measuring Equipment

FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

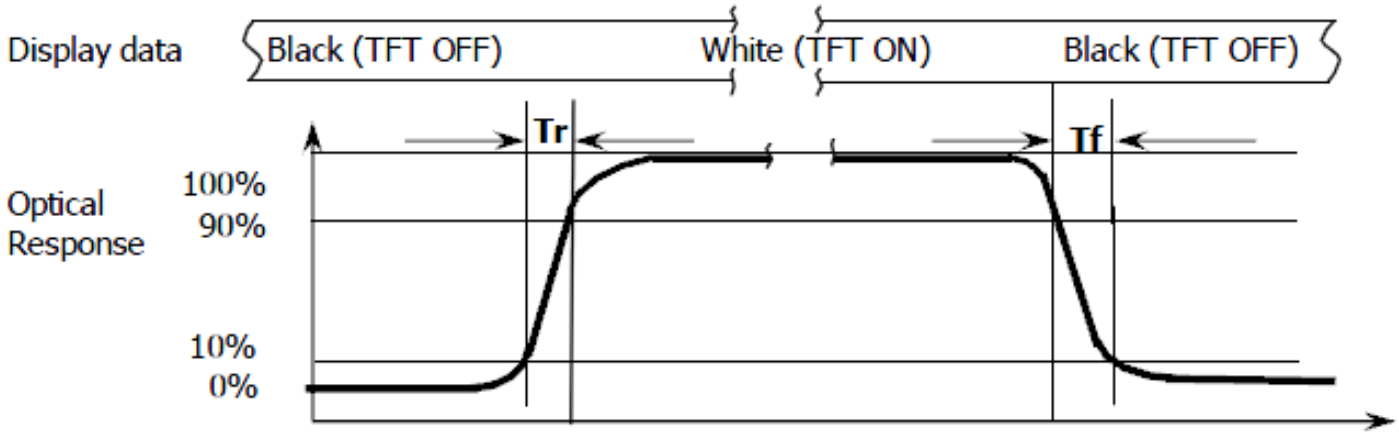
Note (1): Definition of Viewing Angle :



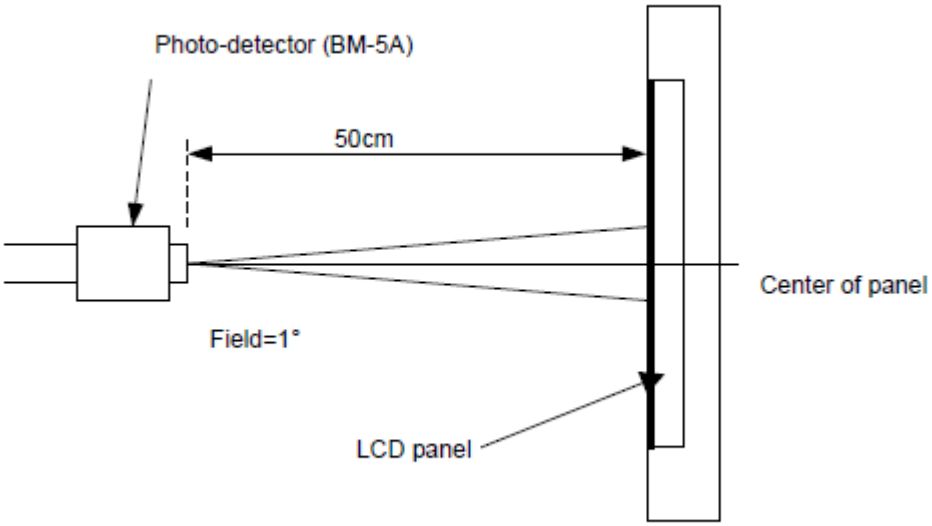
Note (2): Definition of Contrast Ratio(CR) :measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3): Response Time



Note (4): Definition of optical measurement setup



5. Electrical Characteristics

5.1 Absolute Maximum Ratings

Characteristics	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	VDD	-0.5	4	V	Note1
Operating temperature	T_{OP}	-20	+70	℃	
Storage temperature	T_{ST}	-30	+85	℃	

NOTE1: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

5.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VDD	-	3.3	-	V	
Normal mode Current	IDD	--	300	600	mA	
Level input voltage	V_{IH}	0.8*VD	--	VDD	V	
	V_{IL}	GND	--	0.2*VD	V	

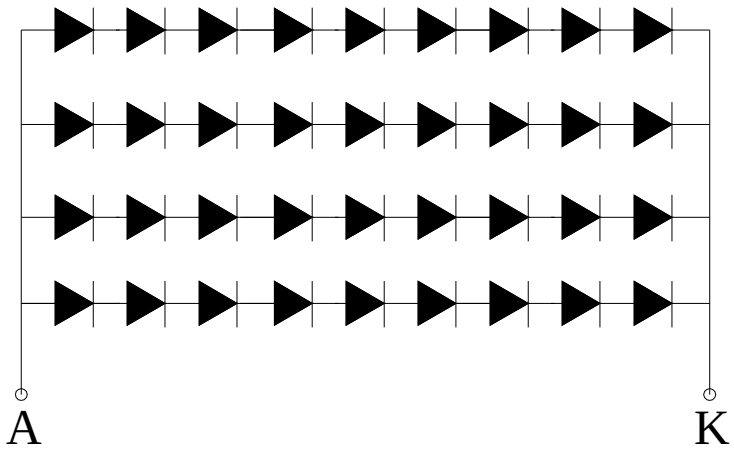
5.3 LED Backlight Characteristics

The back-light system is edge-lighting type with 36 chips LED

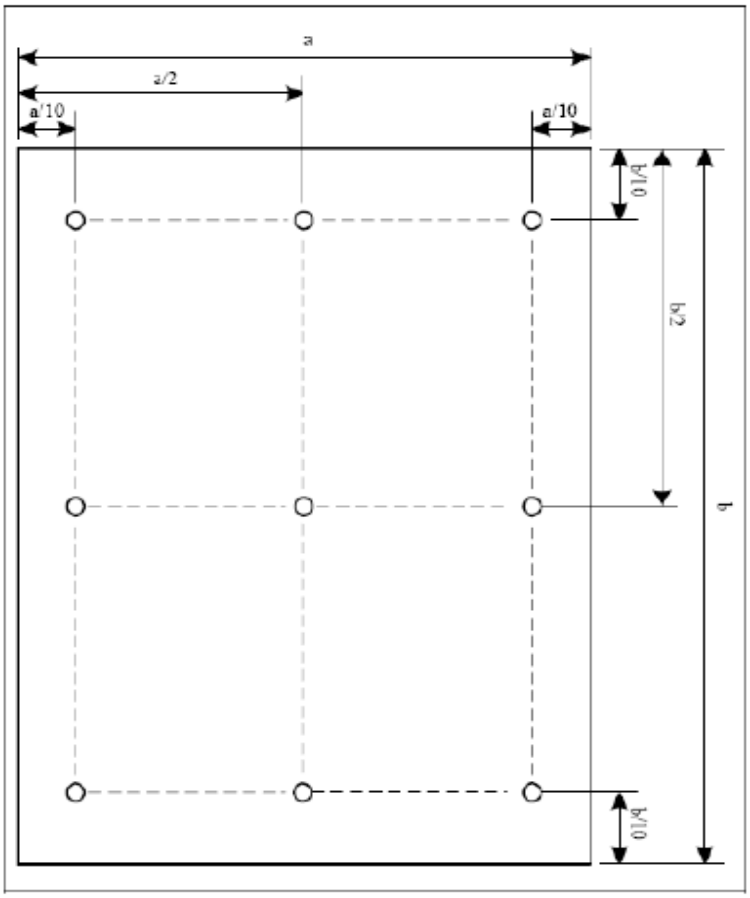
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	--	240	--	mA	Each LED=60mA
Forward Voltage	V_F	--	28	--	V	
LCM Luminance	LV	900	950	--	cd/m2	IF=240mA
LED life time	Hr	50000	--	--	Hour	Note1,2
Uniformity	Avg	70	80	--	%	Note3

Note1: LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 ℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL=240mA. The LED lifetime could be decreased if operating IL is larger than 240mA. The constant current driving method is suggested.



Note (3) Luminance Uniformity of these 9 points is defined as below:



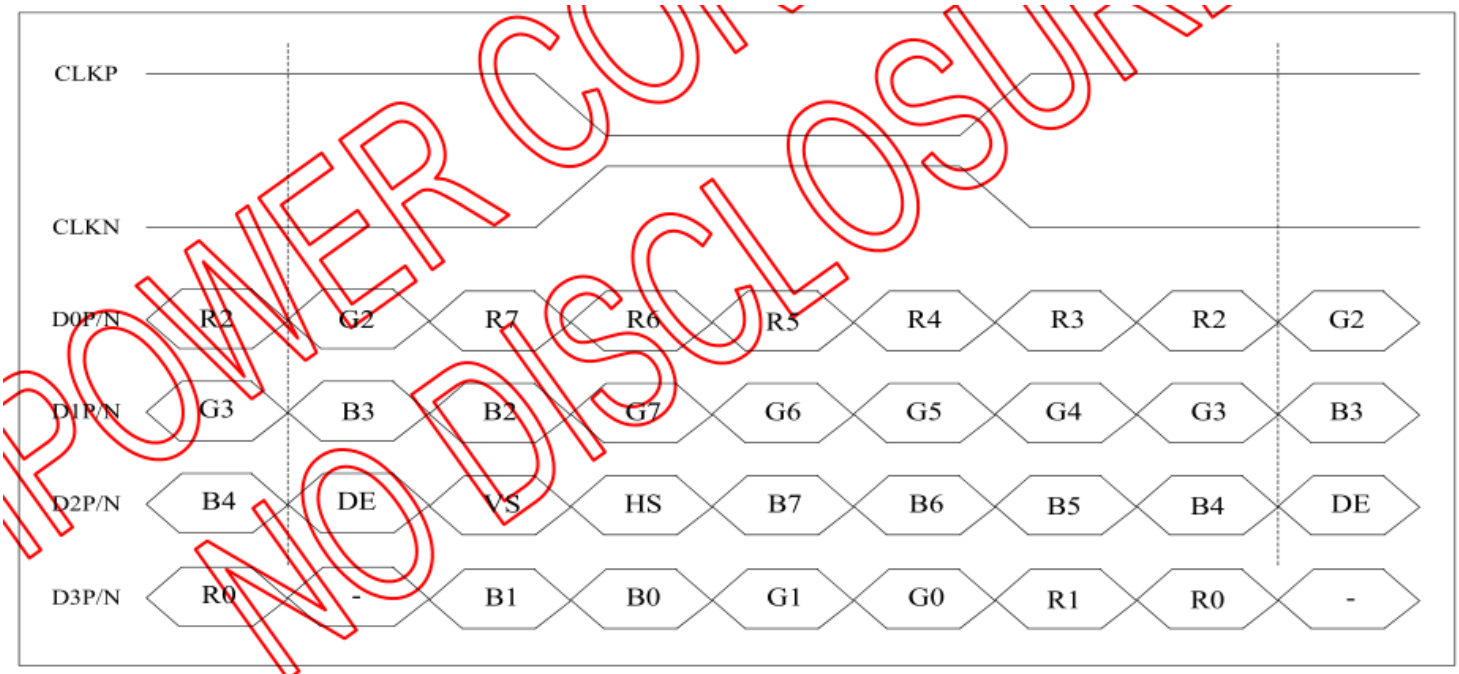
$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

$$\text{Luminance} = \frac{\text{Total Luminance of 9 points}}{9}$$

6. Video Interface and Timing Table

6.1 LVDS interface

6.1.1 Data input format for LVDS



8-bit LVDS input (LVBIT=H, LVFMT=L)

6.1.2 LVDS Input Timing Table

For 1280RGBx800

Parameter		Symbol	Value			Unit
			Min.	Typ.	Max.	
DCLK frequency @Frame rate=60Hz (LVDS)		F_{DCLK}	66.3	72.4	78.9	MHz
HSYNC period time		T_H	1380	1440	1500	DCLK
Horizontal display area		T_{HD}		1280		DCLK
HSYNC pulse width	Min.	T_{HPW}		2		
	Typ.			-		
	Max.			40		
HSYNC back porch(with pulse width)		T_{HBP}	88	88	88	DCLK
HSYNC front porch		T_{HFP}	12	72	132	DCLK
VSYNC period time		T_V	824	838	872	H
Vertical display area		T_{VD}		800		H
VSYNC pulse width	Min.	T_{VPW}		2		H
	Typ.			-		
	Max.			20		
VSYNC back porch(with pulse width)		T_{VBP}	23	23	23	H
VSYNC front porch		T_{VFP}	1	15	49	H

7. CTP Specification

7.1 Electrical Characteristics

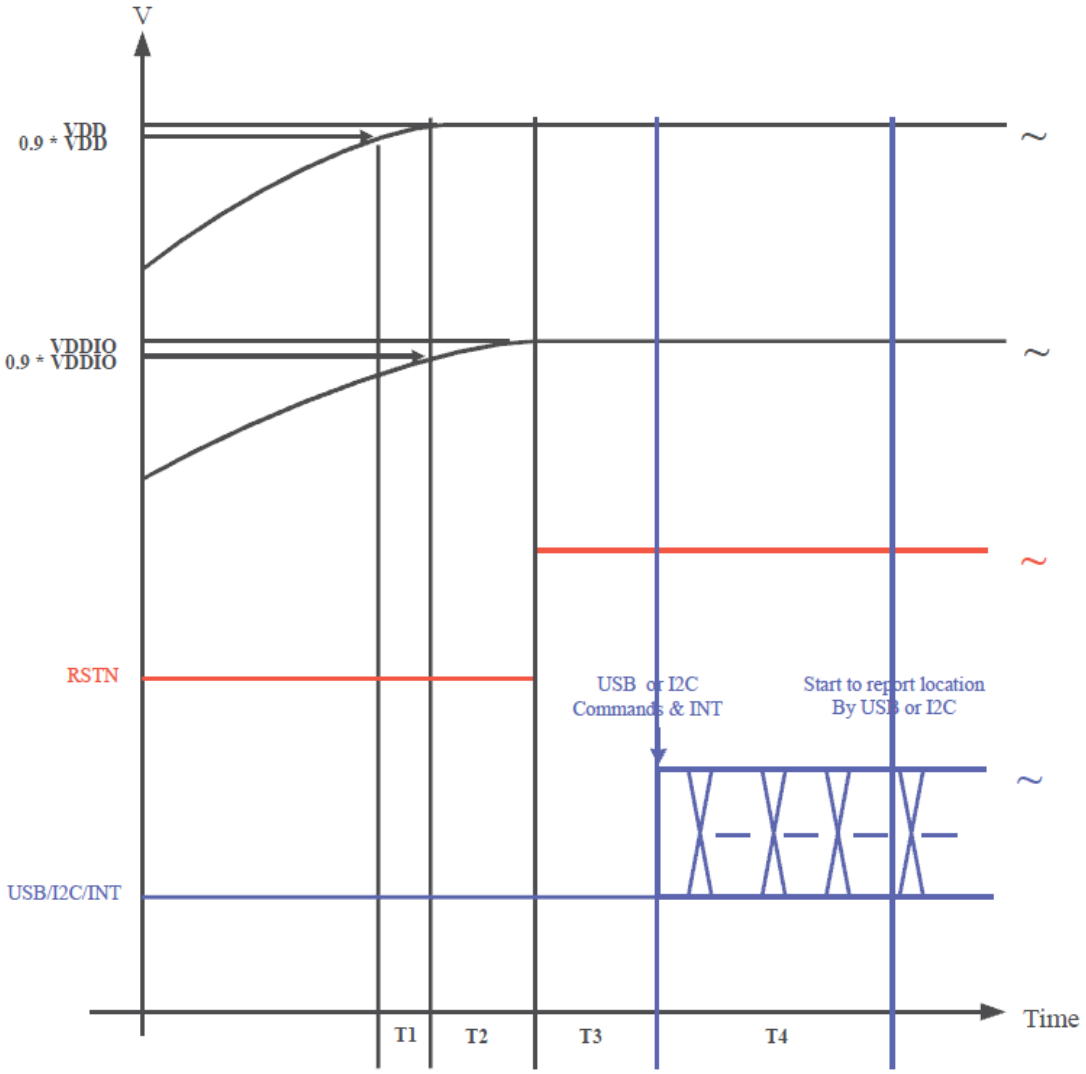
7.1.1 Absolute Maximum Rating

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage for I2C	VDD	-0.3	3.6	V	
Power Supply Voltage for USB	VBUS	2.2	6	V	
Operating temperature	T_{OP}	-20	+70	℃	
Storage temperature	T_{ST}	-30	+80	℃	

7.1.2 DC Electrical Characteristics (Ta=25℃)

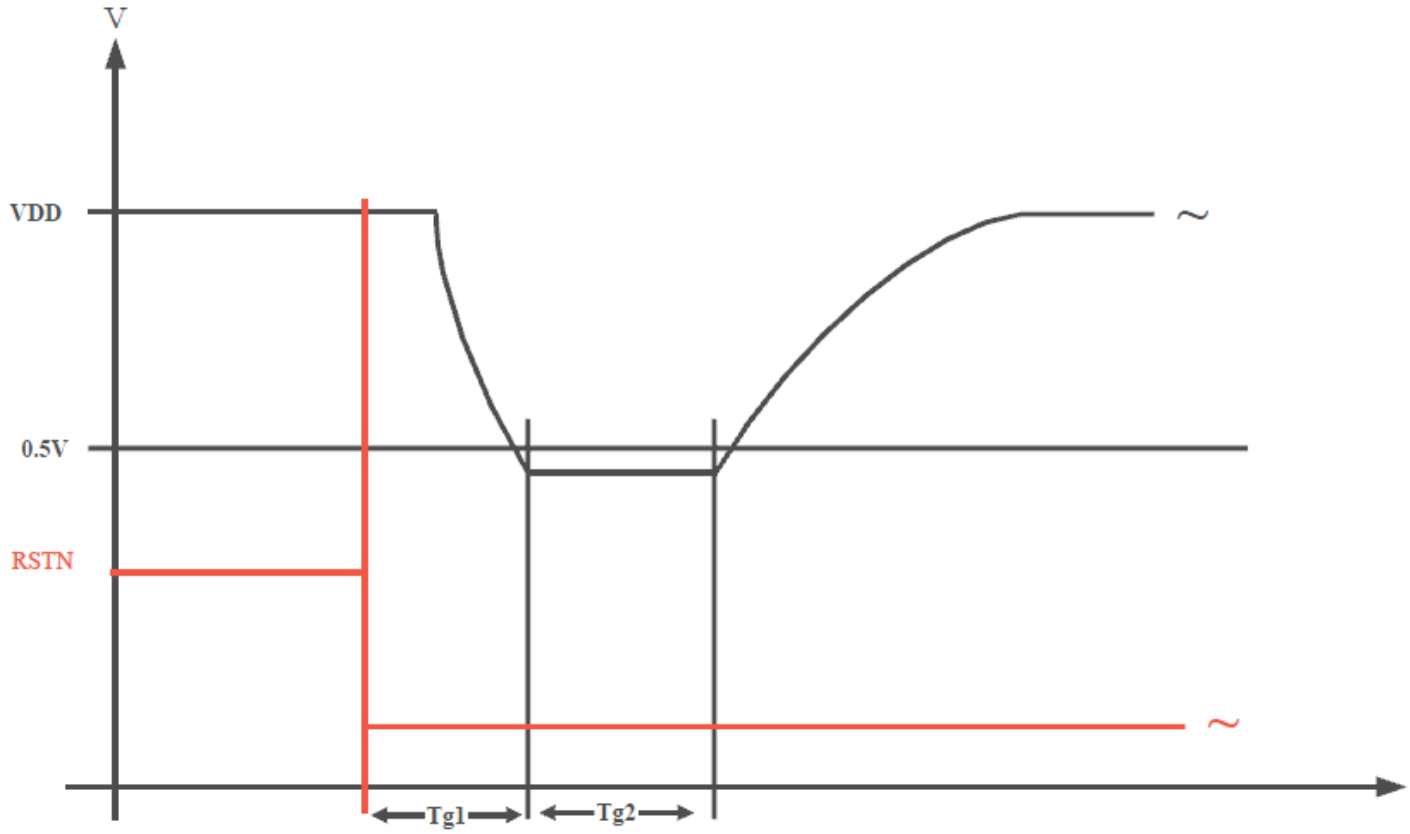
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage for I2C	VDD	3.0	3.3	3.6	V	
Power Supply Voltage for USB	VBUS	2.2	5	5.5	V	
Operation current	Iop		100		mA	Active Mode
Input Low Voltage	VIL1	0		0.3VD	mA	
Input High Voltage	VIH1	0.6VD		VDD+0	mA	
Hysteresis voltage	VHY		0.2VD		uA	
Input Low Voltage, XT_In	VIL2	0		0.6	mA	
Input High Voltage, XT_In	VIH2	2.6		VDD+0	V	
Negative going threshold, /Reset	VILS	0		0.2VD D	V	
Positive going threshold, /Reset	VIHS	0.6VD D		VDD+0 .5	V	
Output High Voltage	VOH	0.7VD			V	VDD =3.3V,
Output Low Voltage	VOL			0.3VD D		VDD =3.3V, IOL=10mA

7.1.3 Power up Sequence



1. T1: the time difference between 0.9*VDD and 0.9*VDDIO. T1 must be ≥ 0 sec.
2. T2: the time difference between 0.9*VDDIO and RSTN. T2 must be ≥ 200 us.
3. T3: the time difference between RSTN and Commands.T3 must be ≥ 150 ms.
4. T4: IC start to report point location to host. T4 must be ≥ 300 ms.

7.1.4 Power-off to Power-on Sequence



Tg1 : the time difference between power-off and power-on. Tg1 must be > 10us.

Tg2 : the time difference between power-off and power-on. Tg2 must be > 10us.

Note. During the power off time, the VDD must be lower than 0.5V that make sure the touch cont have been correctly reset.

7.1.5 AC Characteristics

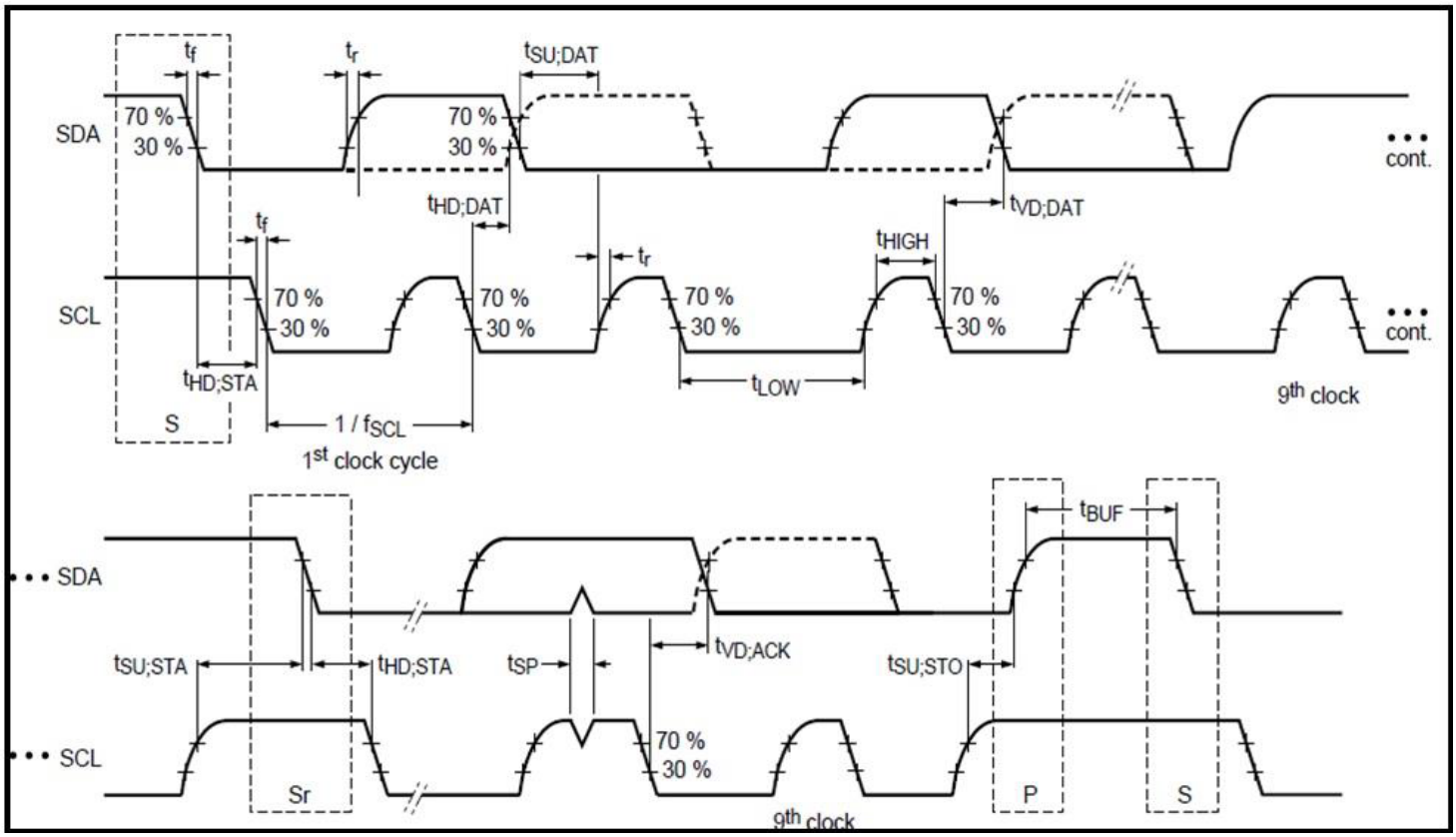


Table 5-7: I2C AC Characteristics

Parameter	Symbol	Standard-mode		Fast-mode		Unit
		Min	Max	Min	Max	
SCL clock frequency	f_{SCL}	0	100	0	400	kHz
Hold time START condition	$t_{HD;STA}$	4.0	-	0.6	-	us
LOW period of the SCL clock	t_{Low}	4.7	-	1.3	-	us
HIGH period of the SCL clock	t_{High}	4.0	-	0.6	-	us
Set-up time for a repeated START condition	$t_{SU:STA}$	4.7	-	0.6	-	us
Data hold time	$t_{HD;DAT}$	300	-	300	-	ns
Data set-up time	$t_{SU;DAT}$	250	-	100	-	ns
Rise time of both SDA and SCL signals (30% to 70%)	t_r	-	1000	20	300	ns
Fall time of both SDA and SCL signals (70% to 30%)	t_f	-	300	20	300	ns
Set-up time for STOP condition	$t_{SU;STO}$	4.0	-	0.6	-	us
Bus free time between a STOP and START condition	t_{BUF}	4.7	-	1.3	-	us
Capacitive load for each bus line	C_b	-	400	-	400	pF
Noise margin at the LOW level for each connected device	V_{nL}	$0.1V_{DD}$	-	$0.1V_{DD}$	-	V
Noise margin at the HIGH level for each connected device	V_{nH}	$0.2V_{DD}$	-	$0.2V_{DD}$	-	V

7.2 I2C Timing

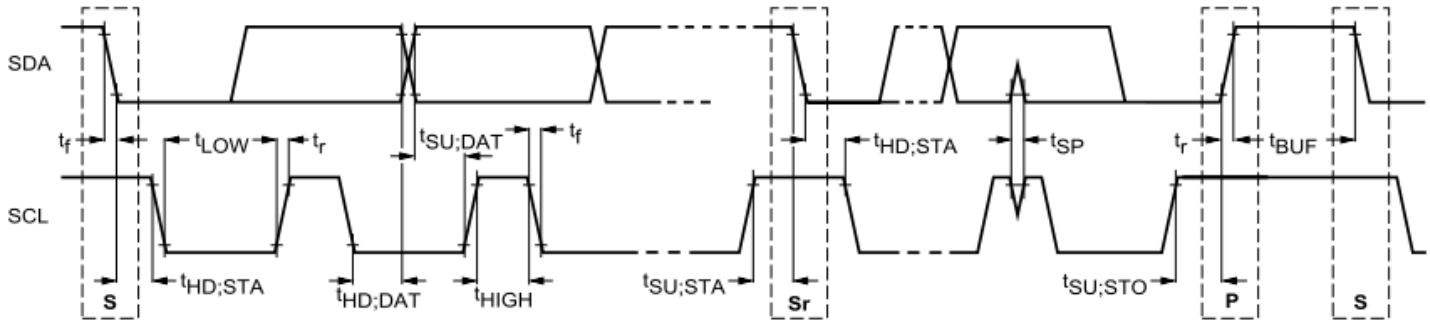


Fig 2: The timing of I^2C Interface

Characteristics of the SDA and SCL bus lines

Symbol	Parameter	Standard mode			Fast Mode		
		Min	Max	Unit	Min	Max	Unit
f_{SCL}	SCL clock frequency	0	100	kHz	0	400	kHz
$t_{HD;STA}$	Hold time (repeated) START condition. After this period, the first clock pulse is generated	4.0	–	µs	0.6	–	µs
t_{LOW}	LOW period of the SCL clock	4.7	–	µs	1.3	–	µs
t_{HIGH}	HIGH period of the SCL clock	4.0	–	µs	0.6	–	µs
$t_{SU;STA}$	Set-up time for a repeated START condition	4.7	–	µs	0.6	–	µs
$t_{HD;DAT}$	Data hold time	5.0	–	µs	0	0.9	µs
$t_{SU;DAT}$	Data set-up time	250	–	ns	100	–	ns
t_r	Rise time of both SDA and SCL signals	–	1000	ns	–	300	ns
t_f	Fall time of both SDA and SCL signals	–	300	ns	–	300	ns
$t_{SU;STO}$	Set-up time for STOP condition	4.0	–	µs	0.6	–	µs
t_{BUF}	Bus free time between a STOP and START condition	4.7	–	µs	1.3	–	µs

7.3 I2C Interface Data Structure

7.3.1 Device Address

The device addresses are 7-binary bits long and are conventionally expressed as 4 bits followed by 3 bits followed by the letter 'b', 1000 001b. These addresses occupy the high seven bits of an eight-bit field on the bus.

MSB							LSB
1	0	0	0	0	0	1	0/1
Device Address							R/W

7-bit Device Address: 0x41

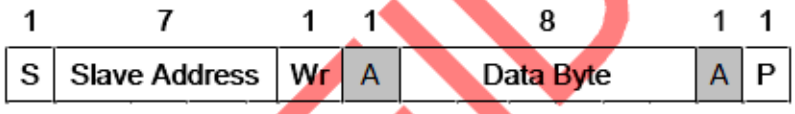
8-bit Device Read Address:0x83

8-bit Device Write Address:0x82

Fig 3: I²C Device Address

7.3.2 Data Transfer

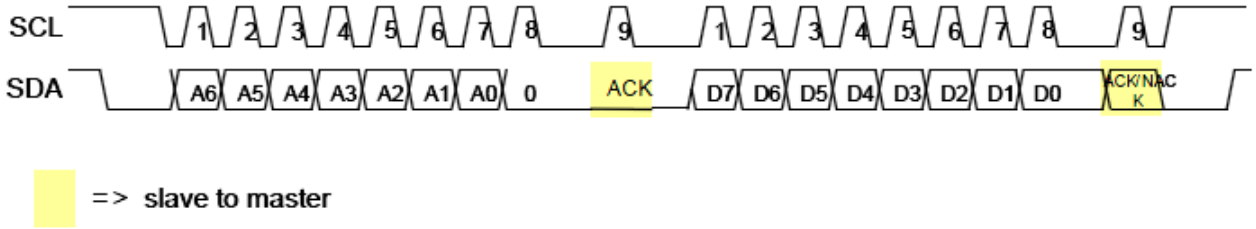
Data is transferred over the I²C bus with 8-bit address and 8-bit data. The related protocol and timing diagrar are shown as below.



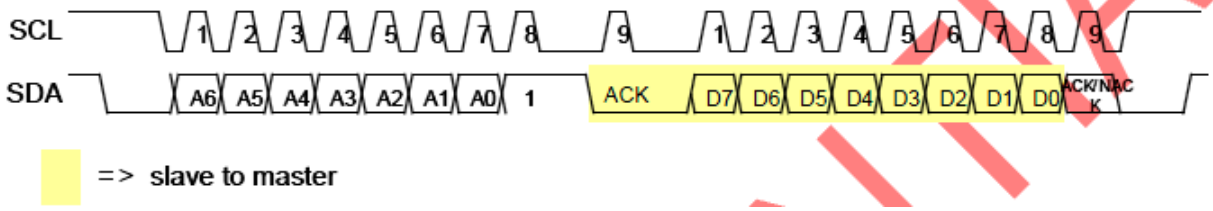
S	Start Condition
Sr	Repeated Start Condition
Rd	Read (bit value of 1)
Wr	Write (bit value of 0)
A/NA	Acknowledge (this bit position may be '0' for an ACK or '1' for a NACK)
P	Stop Condition
	Master-to-Slave
	Slave-to-Master
---	Continue

Fig 4: Generic Transaction Diagram

I2C Write timing



I2C Read timing



Byte Write

S	Slave Address	Wr	A	Command Code	A	Data Byte	A	P

Fig 5: Byte Write

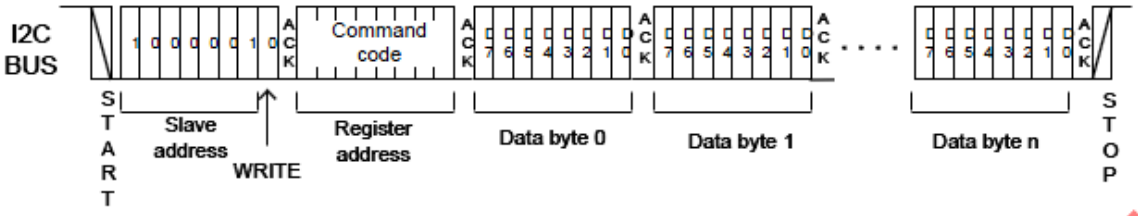
Byte Read

c

S	Slave Address	Wr	A	Command Code	A	Sr	Slave Address	Rd	A	Data Byte	A	P

Fig 6: Byte Read

Multi-Byte Write



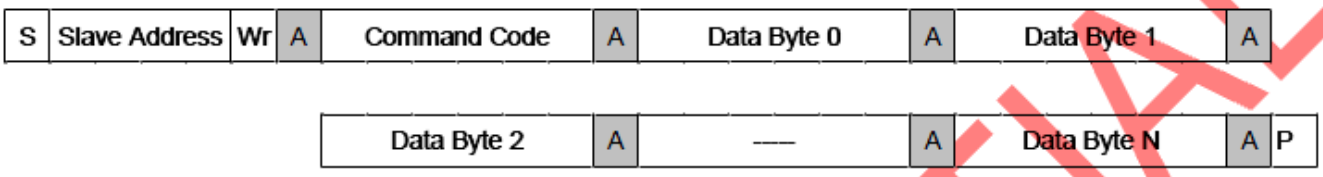
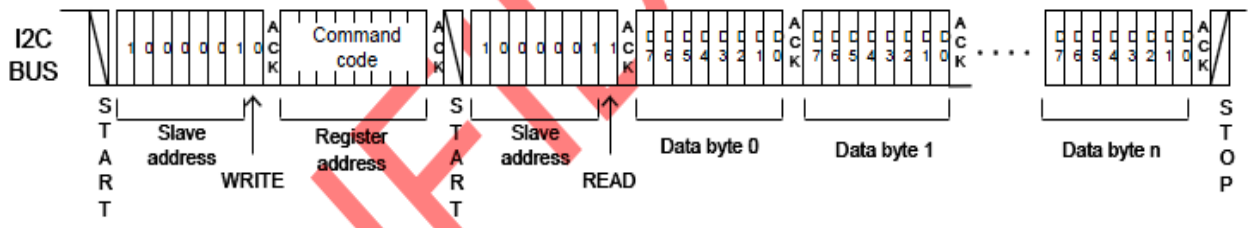


Fig 7: Multi-Byte Write

Multi-Byte Read



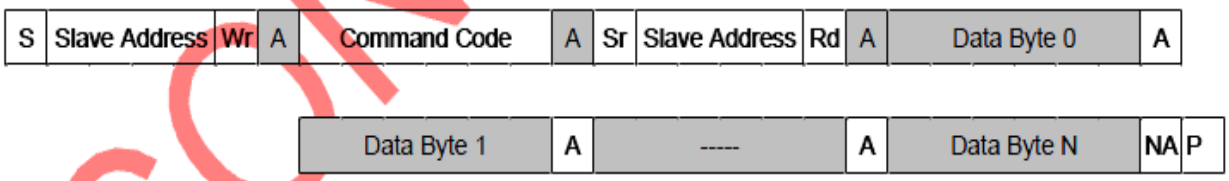


Fig 8: Multi-Byte Read

7.4 Interrupt Pin (INT) Control

ILI Touch device uses interrupt pin to signal the host when detecting touch events on the sensor. When a f

touches on the sensor surface, the $\overline{INT}$ pin will be pull low. ILI Touch device supports two different type

control method.

Method 1(Polling): The $\overline{INT}$ will continue to be low until the finger leaves the sensor surface.

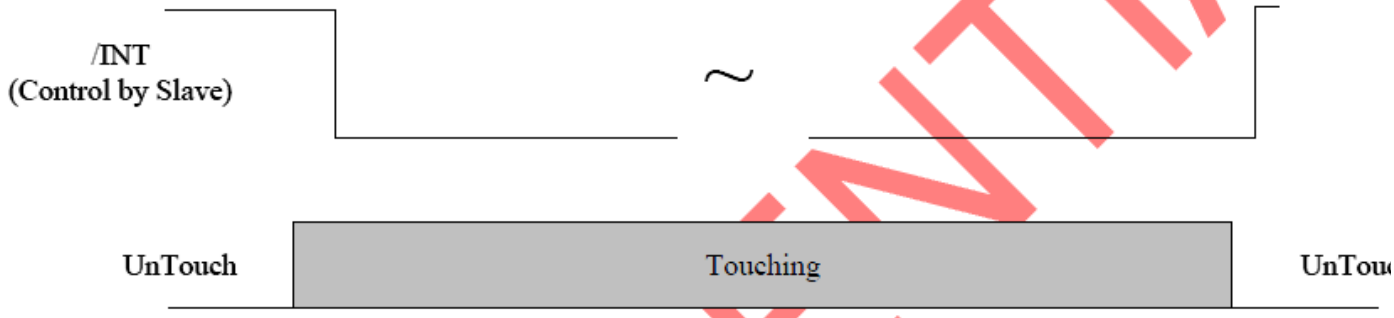


Fig 9: Method 1: $\overline{INT}$ Pin Control Diagram (Finger Touch)

Method 2(Interrupt): The $\overline{INT}$ will continue to be pull low until host read 0x10 command.

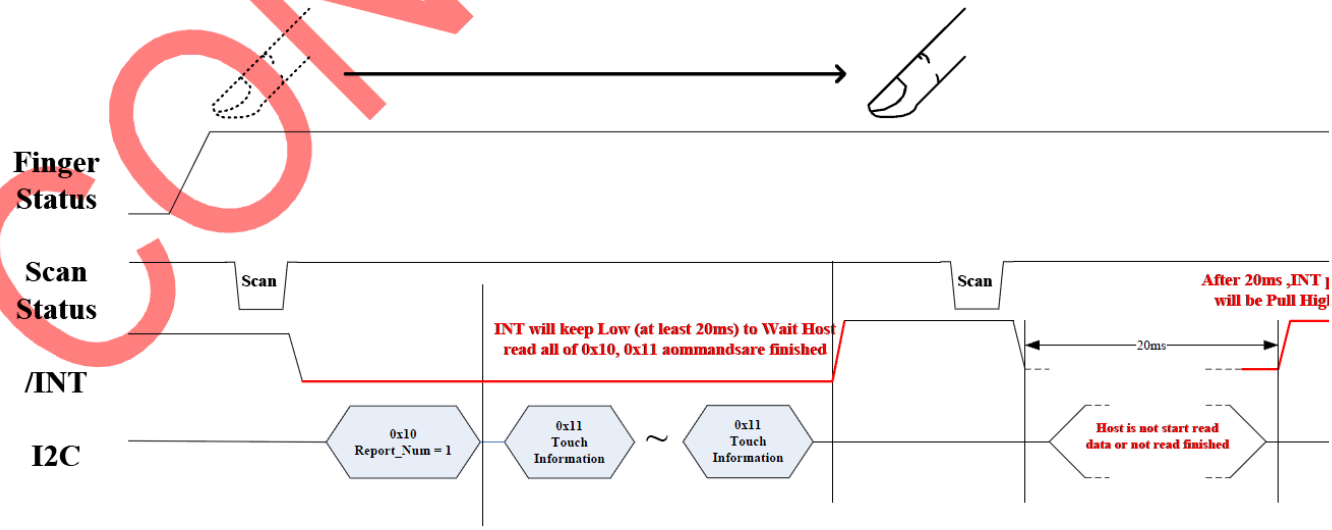


Fig 10: Method 2: $\overline{INT}$ Pin Control Diagram (Finger Touch)

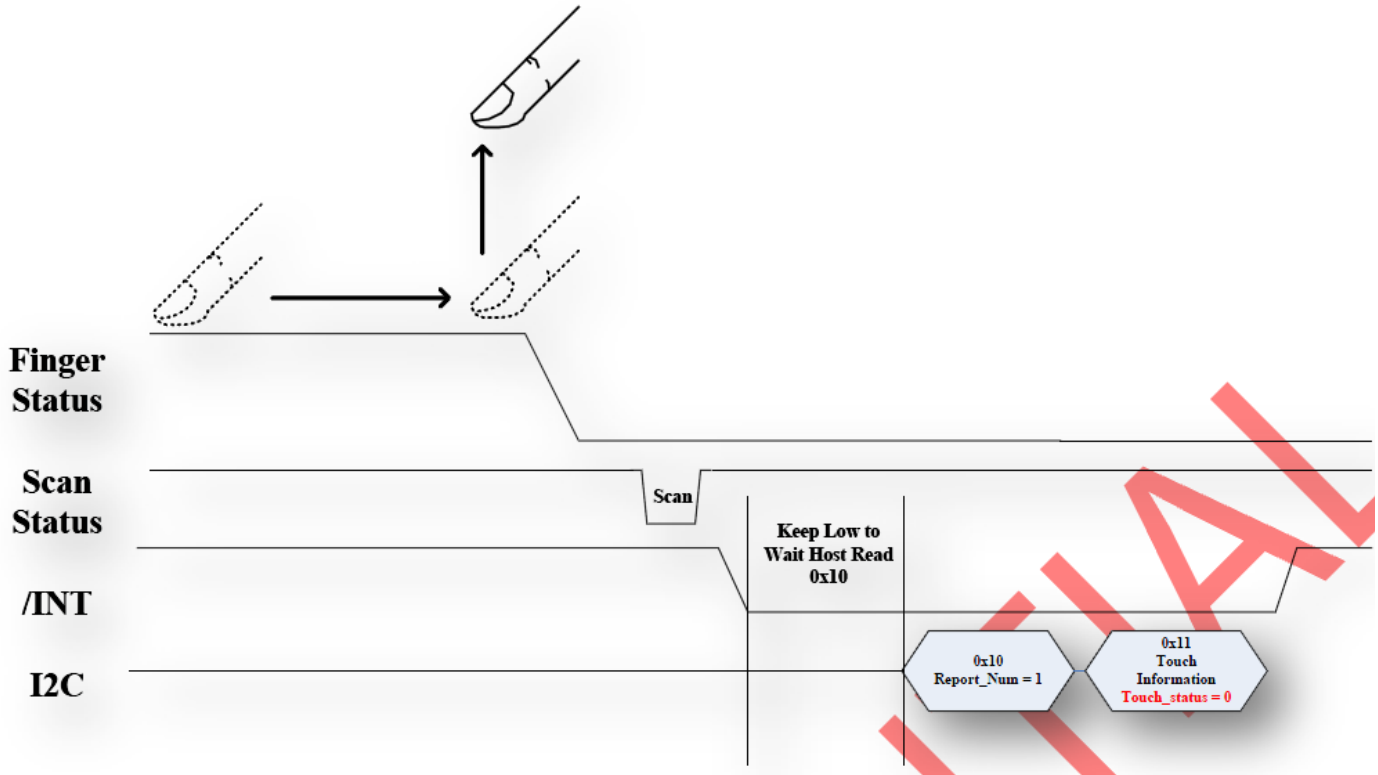


Fig 11: Method 2: $\overline{\text{INT}}$ Pin Control Diagram (Finger Release)

8. LCD Module Out-Going Quality Level

8.1 VISUAL & FUNCTION INSPECTION STANDARD

8.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

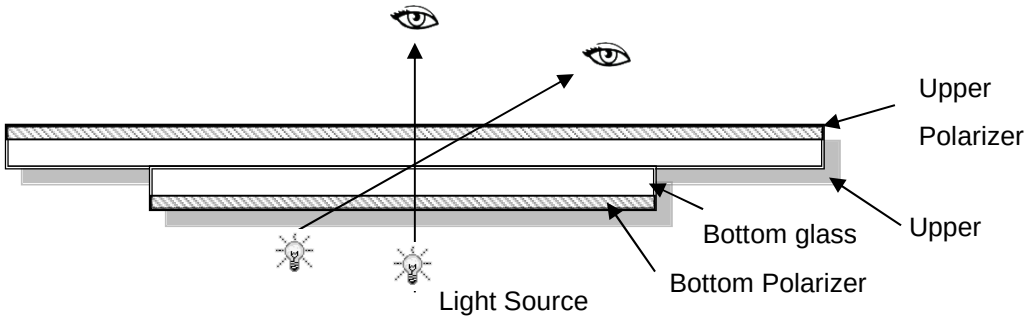
Temperature : 25±5℃

Humidity : 65%±10%RH

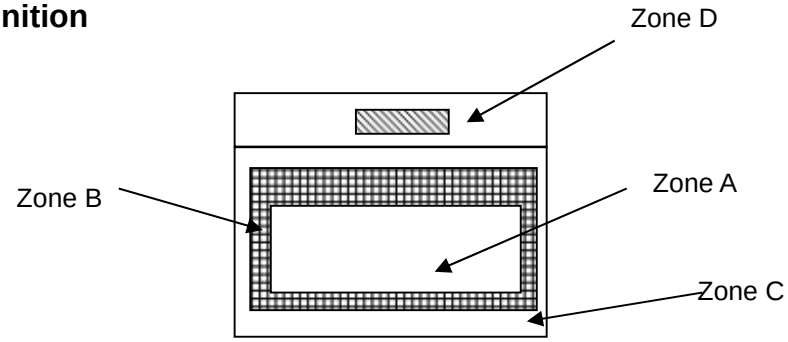
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



8.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C Cover (Zone A+Zone B) which can not be seen after assembly by customer .)

Zone D : IC Bonding Area

Note:

As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer

8.1.3 Sampling Plan

According to GB/T 2828-2012 ; , normal inspection, Class Ⅱ

AQL:

Major defect	Minor defect
0.65	1.5

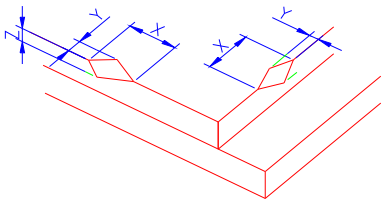
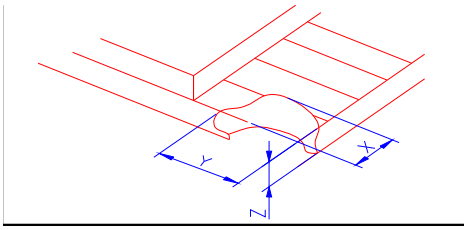
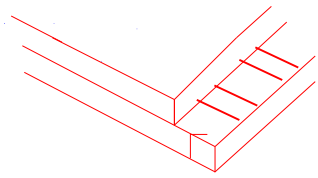
LCD: Liquid Crystal Display , LCM: Liquid Crystal Module, CTP: Capacitive Touch Panel

No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. etc	Major
2	Missing	Missing components and etc	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed,deformation and etc	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot/Line defect	Light dot,Dim spot,(Note1) Polarizer Air Bubble, Polarizer accidented spot and etc	
6	Soldering appearance	Good soldering , Peeling off is not allowed and etc	
7	LCD/Polarizer/CTP	Black/White spot/line, scratch, crack, etc.	

Note1: a) Light dot：Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

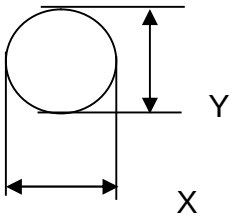
b) Dim dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

8.1.4 Criteria (Visual)

<table>
<tr><th>Number</th><th>Items</th><th>Criteria(mm)</th></tr>
<tr><td rowspan="3">1.0 LCD Crack/Broken
NOTE:
X: Length
Y: Width
Z: Height
L: Length of ITO,
T: Height of LCD</td><td>(1) The edge of LCD broken</td><td> 
<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></table></td></tr>
<tr><td>(2)LCD corner broken</td><td> 
<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table></td></tr>
<tr><td>(3) LCD crack</td><td> 
Crack
Not allowed</td></tr>
</table>

2
.0

Spot defect



Φ=(X+Y)/2

① light dot（ black/white spot , pinhole, stain，etc.）

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.15	Ignore	Ignore	
0.15<Φ≤0.25	3(distance≧10mm)		
0.25<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

② Dim spot（light leakage、dent、dark spot，etc）

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.15	Ignore	Ignore	
0.15<Φ≤0.25	3(distance≧10mm)		
0.25<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

③ Polarizer accidented spot

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.2<Φ≤0.5	2(distance≧10mm)		
Φ>0.5	0		

④Polarizer Bubble

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.2<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

3.0 LCD Pixel defect

Pixel bad points

Item	Zone A	Acceptable
Bright dot	Random	N≤2
	2 dots adjacent	N≤0
	3 dots adjacent	N≤0
Dark dot	Random	N≤3
	2 dots adjacent	N≤0
	3 dots adjacent	N≤0
Distance	1. Minimum Distance Between Bright dots. 2. Minimum Distance Between dark dots 3. Minimum Distance Between dark and bright dot	5mm
Total bright and dark dot		N≤4

Note:

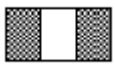
A) Bright dot：Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

B) Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

C) 2 dot adjacent = 1 pair = 2 dots

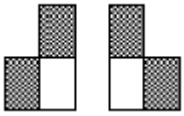
Picture:

2 dot adjacent

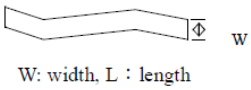


2 dot adjacent

2 dot adjacent (vertical)



2 dot adjacent (slant)

<table>
<tr>
<td>4.0</td>
<td>Line defect (LCD /Polarizer backlight black/white line, scratch, stain)
 

N：Count</td>
<td>
<table>
<tr><th rowspan="2">Width(mm)</th><th rowspan="2">Length(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.05</td><td>Ignore</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.05<W≤0.06</td><td>L≤5.0</td><td colspan="2">N≤3</td></tr>
<tr><td>0.06<W≤0.08</td><td>L≤4.0</td><td colspan="2">N≤2</td></tr>
<tr><td>W>0.08</td><td colspan="4">Define as spot defect</td></tr>
</table>
</td>
</tr>
<tr>
<td>5.0</td>
<td>Electronic Components SMT.</td>
<td>Not allow missing parts，solderless connection，cold solder joint，mismatch，The positive and negative polarity opposite</td>
</tr>
<tr>
<td>6.0</td>
<td>Display color& Brightness.</td>
<td>1. Color：Measuring the color coordinates, The measurement standard according to the datasheet or samples.
2. Brightness：Measuring the brightness of White screen, The measurement standard according to the datasheet or Samples.</td>
</tr>
<tr>
<td>7.0</td>
<td>LCD Mura/Waving
/
Hot spot</td>
<td>Not visible through 5% ND filter in 50% gray or judge by limit sample if necessary.</td>
</tr>
</table>

<table>
<tr>
<td>8.0</td>
<td>CTP Related</td>
<td>CTP Cover sensor accidented black/white spot</td>
<td>
<table>
<tr><th rowspan="2">Size Φ(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.15</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.15<Φ≤0.25</td><td colspan="2">4 (distance ≥ 10mm)</td></tr>
<tr><td>0.25<Φ≤0.35</td><td colspan="2">2 (distance ≥ 10mm)</td></tr>
<tr><td>Φ>0.35</td><td colspan="2">0</td><td></td></tr>
</table>
</td>
</tr>
</table>

CTP Cover scratch

Width(mm)	Ignore(mm)	Acceptable Qty		
		A	B	C
Φ≤0.05	Ignore	Ignore		
0.05<W≤0.06	L≤4.0	N≤3		
0.06<W≤0.08	L≤3.0	N≤2		
0.08<W	Define as spot defect			

CTP Cover Pinhole/ Lack of ink

Zone	Acceptable Qty
	C
Φ≤0.2	Ignore
0.2<Φ≤0.3	4(distance≧10mm)
0.3<Φ≤0.4	2(distance≧10mm)
Φ>0.4	0

CTP Bonding bubble/ accidented spot

Size Φ(mm)	Acceptable Qty	
	A	B
Φ≤0.1	Ignore	
0.1<Φ≤0.2	2(distance≧10mm)	
0.2<Φ≤0.3	2(distance≧10mm)	
Φ>0.3	0	

Assembly deflection

beyond the edge of backlight ≤0.2mm

CTP cover broken

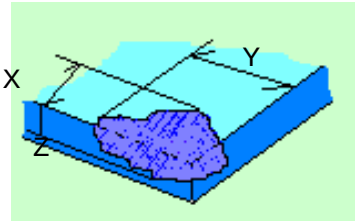
X : length

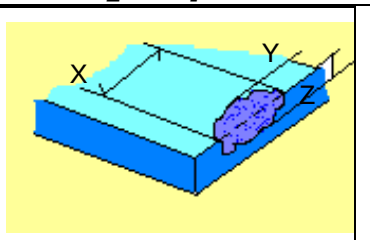
Y : width

Z : height

X	Y	Z
X≤0.5mm *	Y≤0.5mm	Z<cover thickness

Circuitry broken is not allowed.



		CTP cover broken X : length Y : width Z : height	<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>X≤ 0.3mm</td><td>Y≤ 0.3mm</td><td>Z<cover thickness</td></tr></table> * Circuitry broken is not allowed.	

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	CTP no function	Not allowed

9. Reliability Test Result

Remark:

Item	Condition	Inspection after test
High Temperature Operating	70℃,96H	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Non-display; 3.Missing segments/line; 4.Glass crack; 5.Current IDD is twice higher than initial value.
Low Temperature Operating	-20℃, 96HR	
High Temperature Storage	85℃, 96HR	
Low Temperature Storage	-30℃, 96HR	
High Temperature & High	+60℃, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-30℃,30 min ↔ +80℃,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panel Air:±6KV, 5times; Contact:±4KV, 5 times; (Environment: 15℃~35℃, 30%~60%).	
Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition).	
Box Drop Test	1 Corner 3 Edges 6 faces,80㎝(MEDIUM BOX)	

1.The test samples should be applied to only one test item.

2.Sample size for each test item is 5~10pcs.

3.For Damp Proof Test, Pure water(Resistance > 10MΩ) should be used.

4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

5.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

10. Cautions and Handling Precautions

10.1 Handling and Operating the Module

(1) When the module is assembled, it should be attached to the system firmly.

Do not warp or twist the module during assembly work.

(2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.

(3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.

(4) Do not allow drops of water or chemicals to remain on the display surface.

If you have the droplets for a long time, staining and discoloration may occur.

(5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.

Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.

(8) Protect the module from static; it may cause damage to the CMOS ICs.

(9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(10) Do not disassemble the module.

(11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

(12) Pins of I/F connector shall not be touched directly with bare hands.

(13) Do not connect, disconnect the module in the “Power ON” condition.

(14) Power supply should always be turned on/off by the item 6.1 Power On Sequence &6.2 Power Off Sequence

10.2 Storage and Transportation.

(1) Do not leave the panel in high temperature, and high humidity for a long time.

It is highly recommended to store the module with temperature from 0 to 35 ℃ and relative humidity of less than 70%

(2) Do not store the TFT-LCD module in direct sunlight.

(3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.

(4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.

In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.

(5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.