SPECIFICATION
FOR
LCM+CTP Module

MODULE No:	KD050WVTPA045-C005A
CUSTOMER:	

STARTEK	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		

Revision History

Date	Rev. No.	Page	Summary
2020.04.20	V1.0	ALL	FIRST ISSUE
2022.01.08	V1.1	1	Update module name

Contents

* Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorpho us silicon TFT as a switching device. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit,back-light unit. The resolution of a 5.0'TFT-LCD contains 800x480 pixels, and can displa y up to 16.7M colors.

* Features

-Low Input Voltage: 3.3V(TYP)

-Display Colors of TFT LCD: 65K/262K/16.7M colors

-TFT Interface: 16/18/24bit RGB Interface

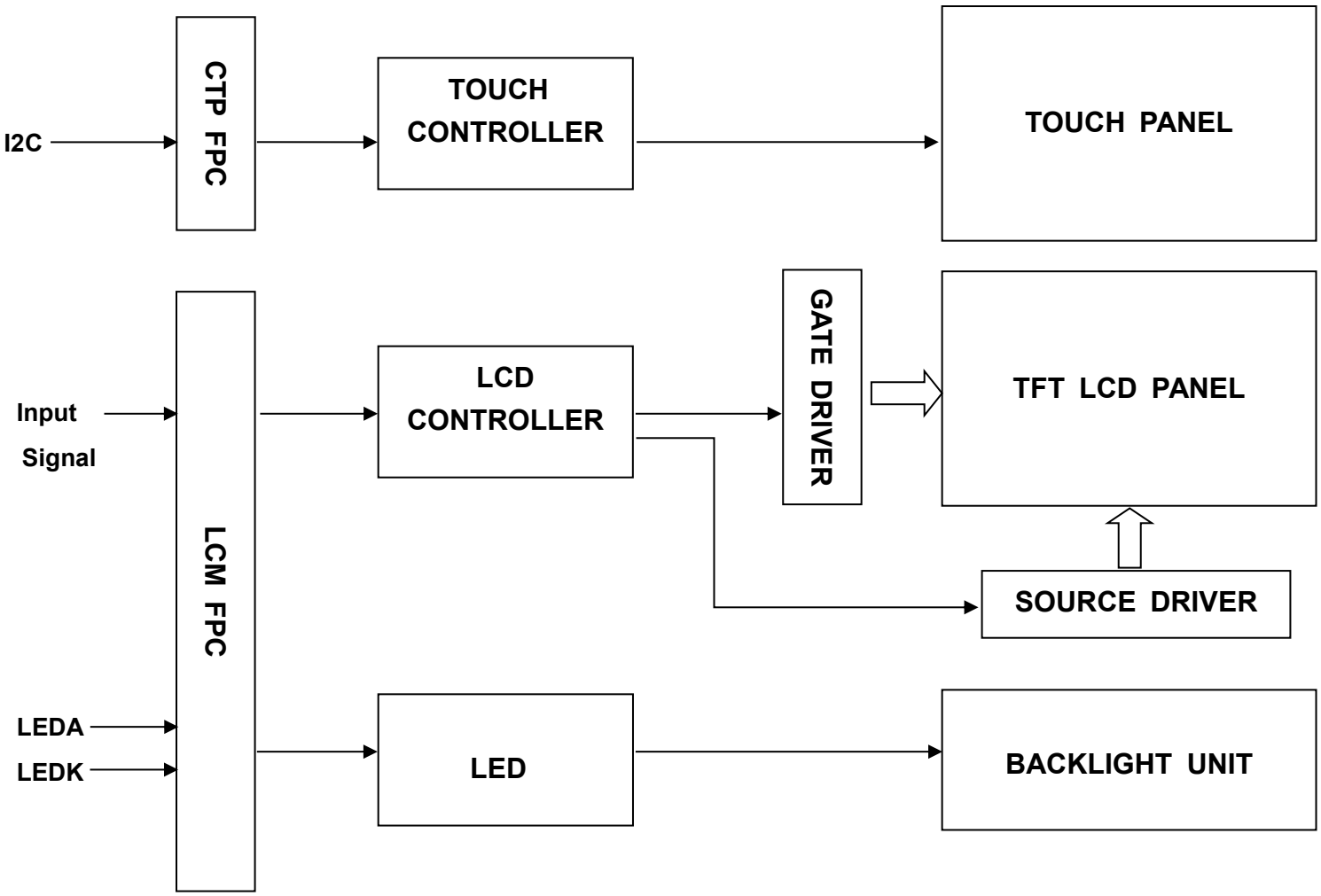
-CTP Interface: I2C

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	108.00(H) *64.80(V) (5.0inch)	mm	-
CTP View area	109.00(H)*65.80(V)	mm	
Driver element	TFT active matrix	-	-
Display colors	16.7M	colors	-
Number of pixels	800(RGB)*480	dots	-
TFT Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.135(H) x 0.135(V)	mm	-
Viewing angle	12:00	o'clock	-
TFT Controller IC	ILI5960/ILI6122	-	-
CTP Driver IC	GT911		
Display mode	Transmissive/Normally White	-	-
Touch mode	5-point touch		
Operating temperature	-20～+70	℃	-
Storage temperature	-30～+80	℃	-

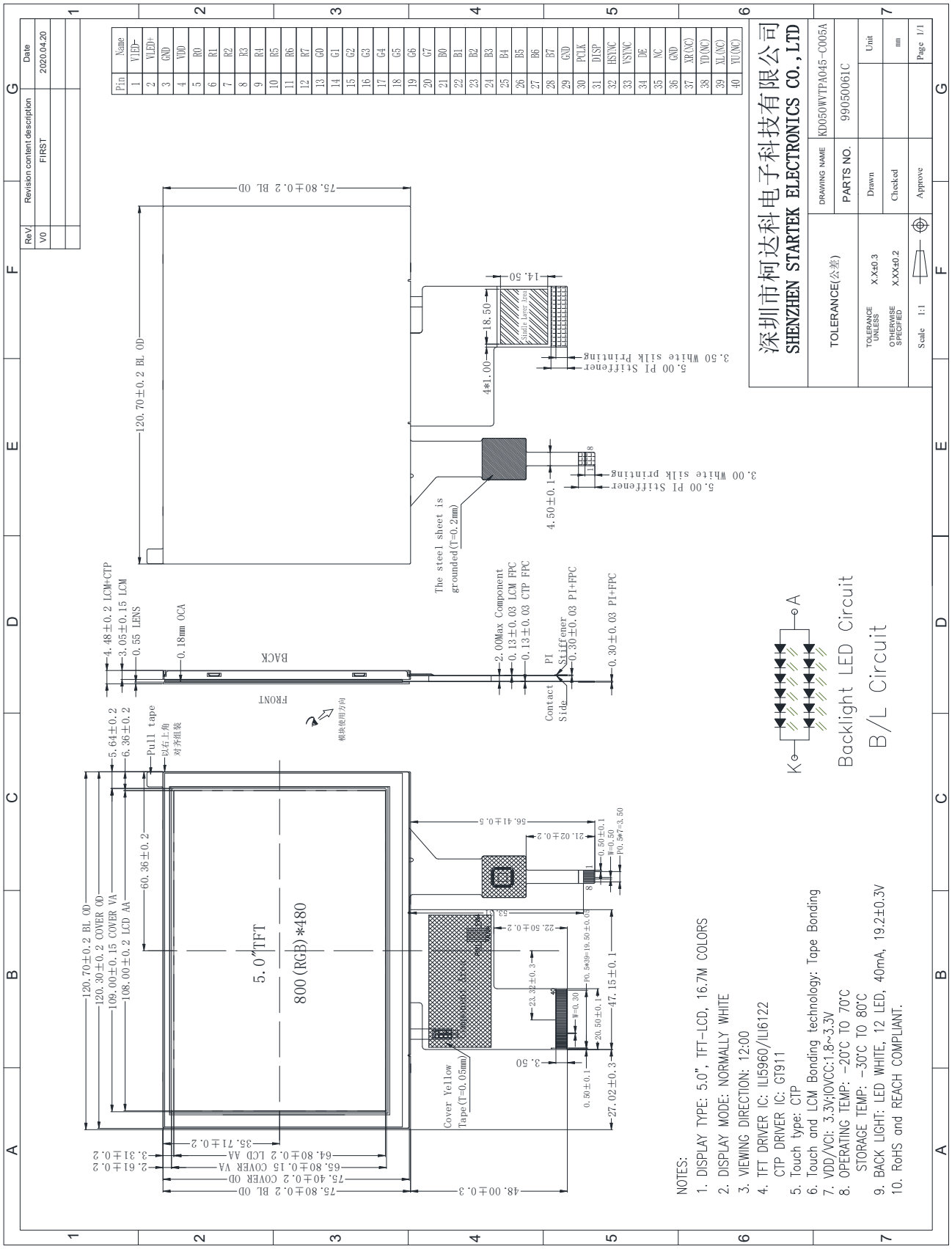
* Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)		120.70		mm	-
	Vertical(V)		75.80		mm	-
	Depth(D)		4.48		mm	-
Weight			TBD		g	-

1. Block Diagram



2. Outline dimension



3. Input terminal Pin Assignment

3.1 TFT

NO.	SYMBOL	DISCRIPTION	I/O
1	LEDK	Cathode pin OF backlight	P
2	LEDA	Anode pin of backlight	P
3	GND	Ground.	P
4	VDD	Supply voltage (3.3V).	P
5	R0	Red data input.	I
6	R1	Red data input.	I
7	R2	Red data input.	I
8	R3	Red data input.	I
9	R4	Red data input.	I
10	R5	Red data input.	I
11	R6	Red data input.	I
12	R7	Red data input.	I
13	G0	Green data input.	I
14	G1	Green data input.	I
15	G2	Green data input.	I
16	G3	Green data input.	I
17	G4	Green data input.	I
18	G5	Green data input.	I
19	G6	Green data input.	I
20	G7	Green data input.	I
21	B0	Blue data input.	I
22	B1	Blue data input.	I
23	B2	Blue data input.	I
24	B3	Blue data input.	I
25	B4	Blue data input.	I

26	B5	Blue data input.	I
27	B6	Blue data input.	I
28	B7	Blue data input.	I
29	GND	Ground.	P
30	PCLK	Clock signal. Latching data at the rising edge	I
31	DISP	Standby setting for testing, it should be connected to VDD in normal operation mode. If connected to GND, the IC is in standby mode.	I
32	HSYNC	Horizontal Sync input. Negative polarity.	I
33	VSYNC	Vertical Sync input. Negative polarity.	I
34	DE	Data input Enable. Active High to enable the data input Bus under “DE Mode”.	I
35	NC	NC.	
36	GND	Ground.	P
37	XR(NC)		
38	YD(NC)		
39	XL(NC)		
40	YU(NC)		

3.2 CTP

NO.	SYMBOL	DISCRIPTION	I/O
1	GND	Ground.	P
2	VDDIO	I/O power supply voltage.	P
3	VDD	Supply voltage.	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	GND	Ground.	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	--	500			(1)(2)
Response time	Rising	T_R		--	10	20	msec	(1)(3)
	Falling	T_F		--	15	30		
Color gamut		S(%)		--	45	--	%	C-light
Color Filter Chromacicity	White	W_X		0.2559	0.2959	0.3359		(1)(4) CA-310
		W_Y		0.2722	0.3122	0.3522		
	Red	R_X		0.5240	0.5440	0.5640		
		R_Y		0.3130	0.3330	0.3530		
	Green	G_X		0.3375	0.3375	0.3575		
		G_Y		0.5401	0.5601	0.5801		
	Blue	B_X		0.1286	0.1486	0.1686		
		B_Y		0.0680	0.0880	0.1080		
Viewing angle	Hor.	Θ_L	CR>10	--	70	--		(1)(4)
		Θ_R		--	70	--		
	Ver.	Θ_U		--	50	--		
		Θ_D		--	70	--		
Option View Direction		12 o'clock						

*The data comes from the LCD specification.

Measuring Condition

Measuring surrounding : dark room

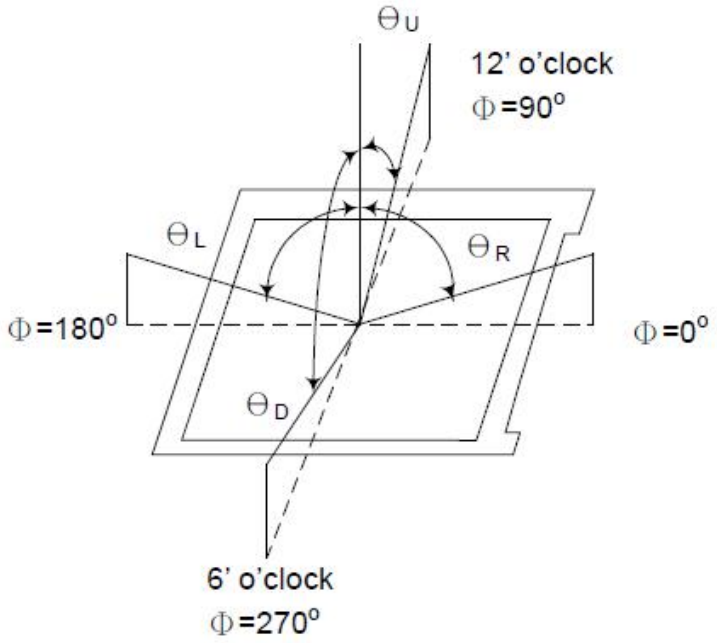
Ambient temperature : 25±2°C

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.

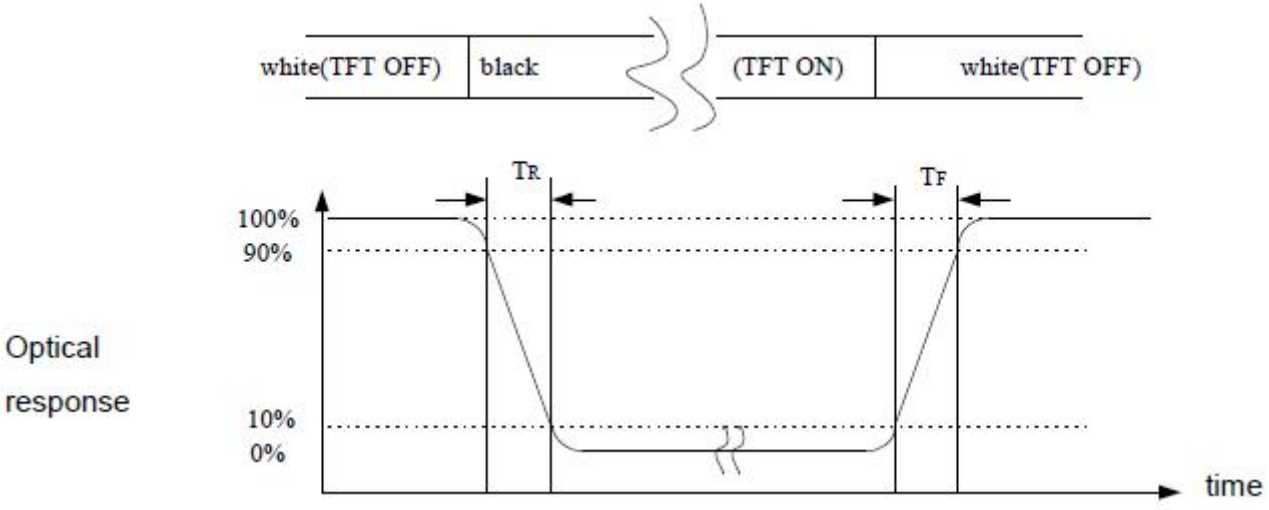
Note (1): Definition of Viewing Angle :



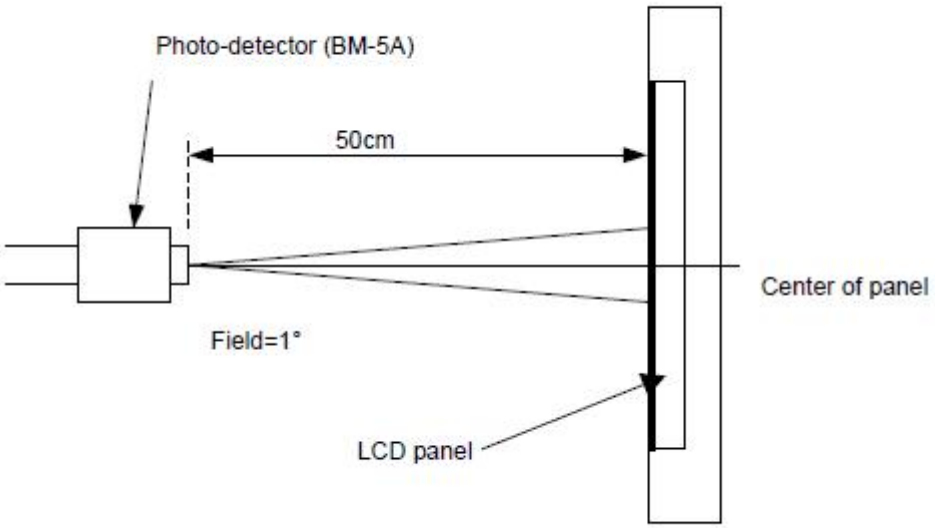
Note (2): Definition of Contrast Ratio(CR) :measured at the center point of panel

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

Note (3): Response Time



Note (4): Definition of optical measurement setup



5. Electrical Characteristics

5.1 Absolute Maximum Rating (Ta=25 VSS=0V)

Characteristics	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VCI/VDD	-0.3	7.0	**V**
Operating temperature	T_{OP}	-20	+70	℃
Storage temperature	T_{ST}	-30	+80	℃

5.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VCI/VDD	2.7	3.3	3.6	V	
Normal mode Current consumption	IDD	--	200	--	mA	
Level input voltage	V_{IH}	$0.7V_{DDIO}$	--	V_{DDIO}	V	
	V_{IL}	GND	--	$0.3V_{DDIO}$	V	
Level output voltage	V_{OH}	V_{DDIO}-0.4	--	--	V	
	V_{OL}	GND	--	GND+0.4	V	

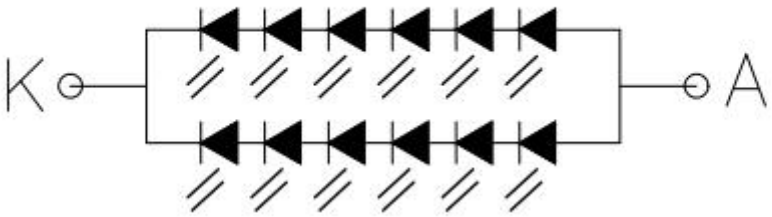
5.3 LED Backlight Characteristics

The back-light system is edge-lighting type with 12 chips White LED

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	30	40	--	mA	
Forward Voltage	V_F	--	19.2	--	V	
LCM Luminance	L_V	270	315	--	cd/m2	If=40mA
LED life time	Hr	50000	--	--	Hour	Note1,2
Uniformity	AVg	80	--	--	%	

Note (1) 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=40mA. The LED lifetime could be decreased if operating IL is larger than 40mA. The constant current driving method is suggested.

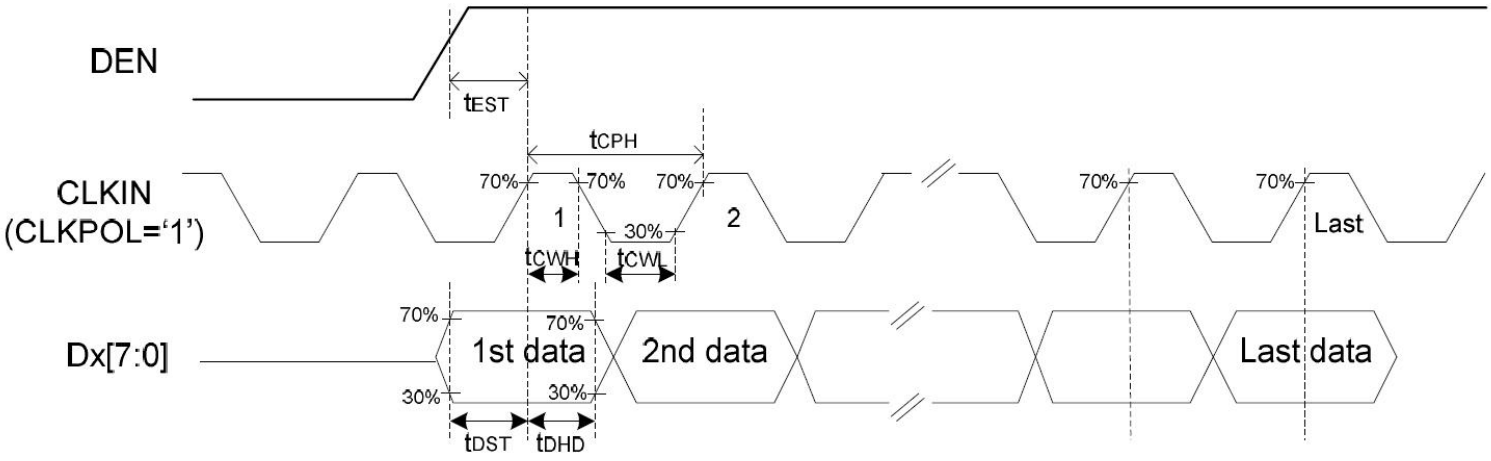


Backlight LED Circuit

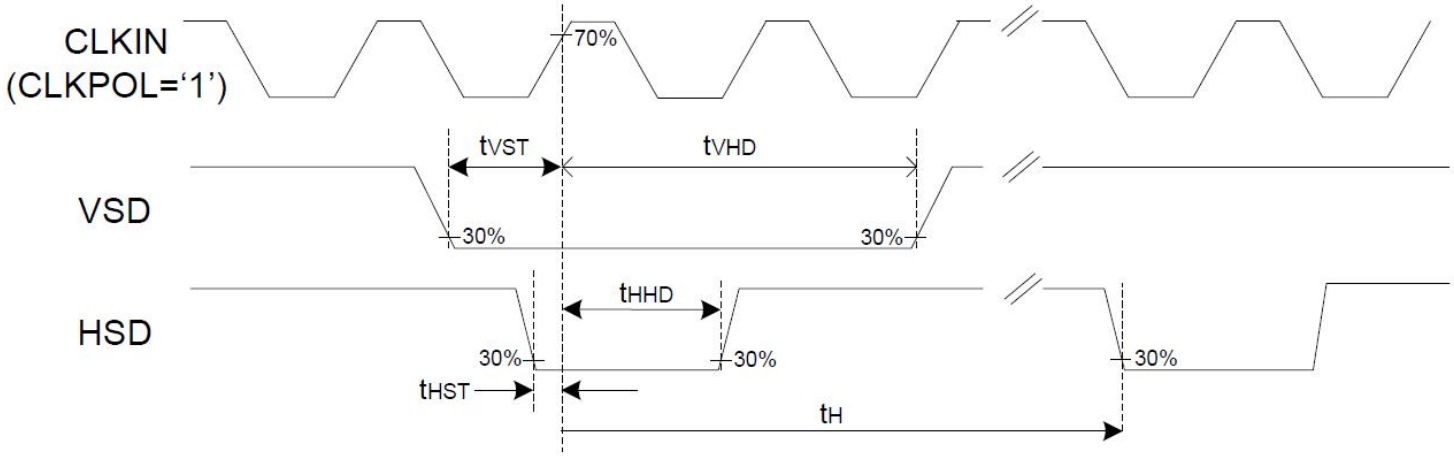
6. TFT AC Characteristic

6.1 AC Timing characteristics

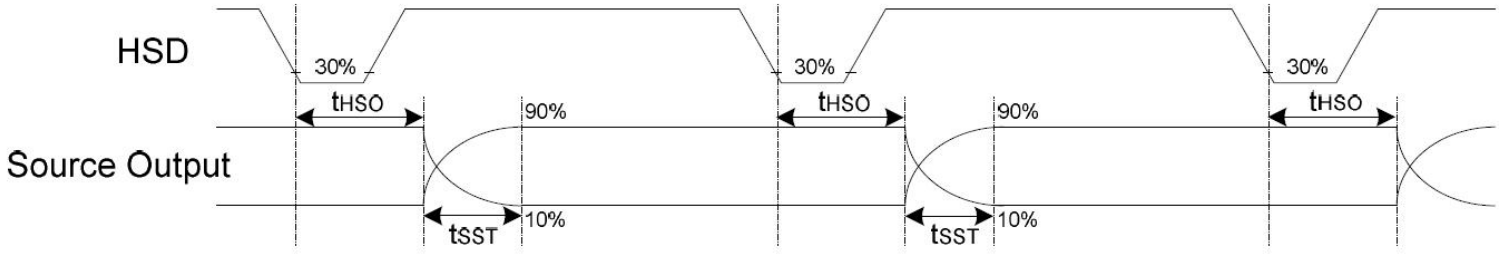
DE Mode (MODE='1')



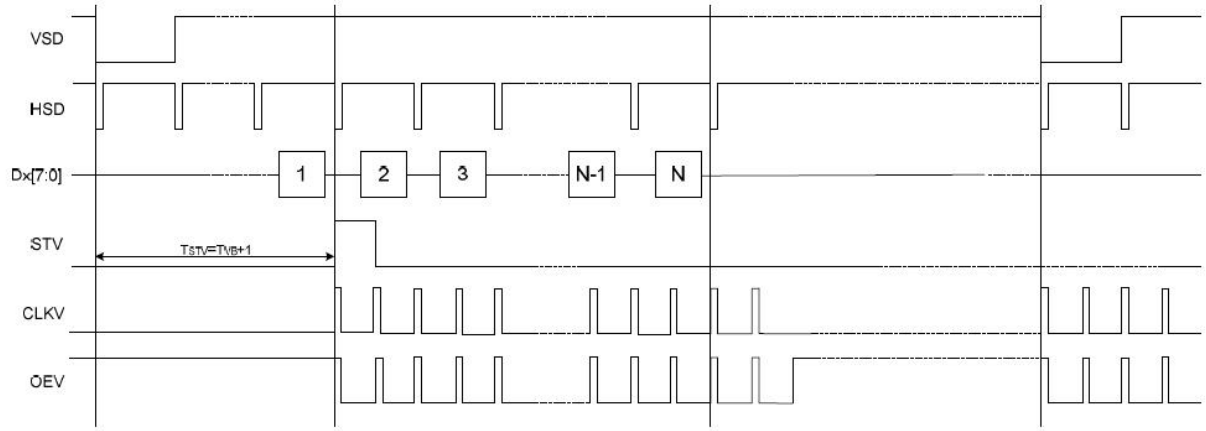
SYNC Mode (MODE='0')



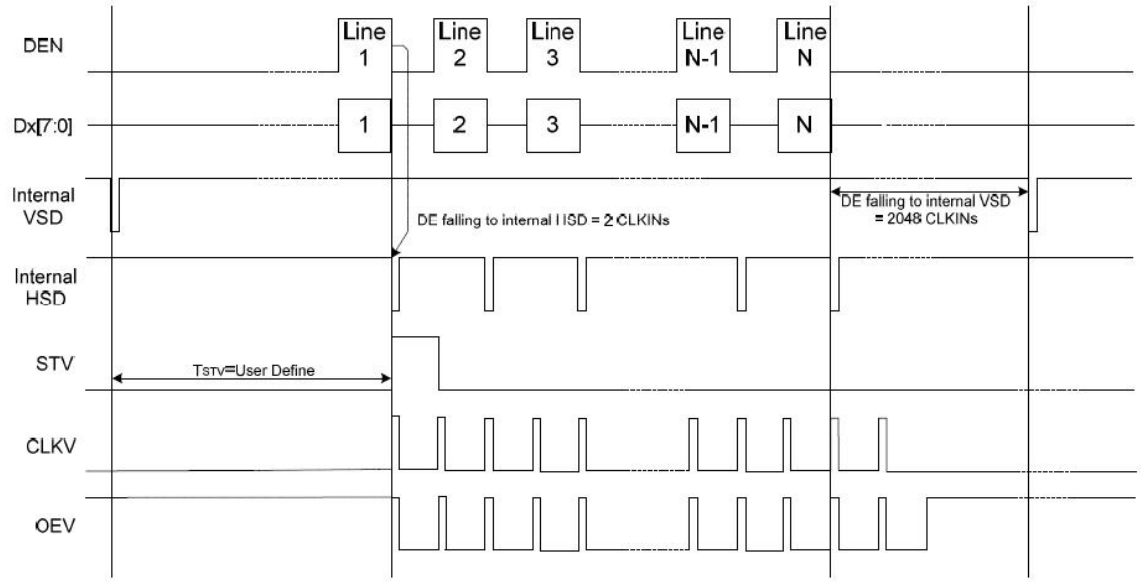
Source Output timing Diagram (Cascade)



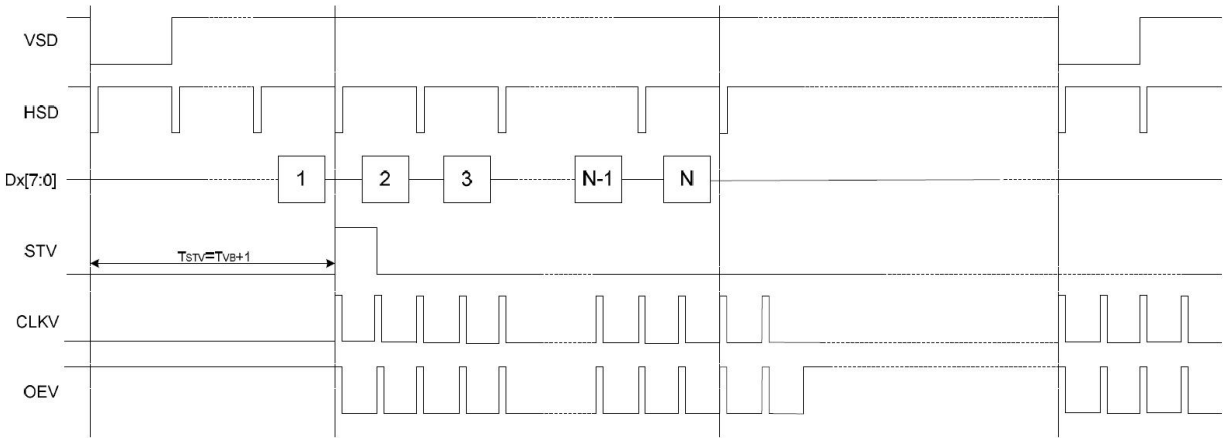
Vertical Timing Diagram of SYNC Mode (Dual Gate)



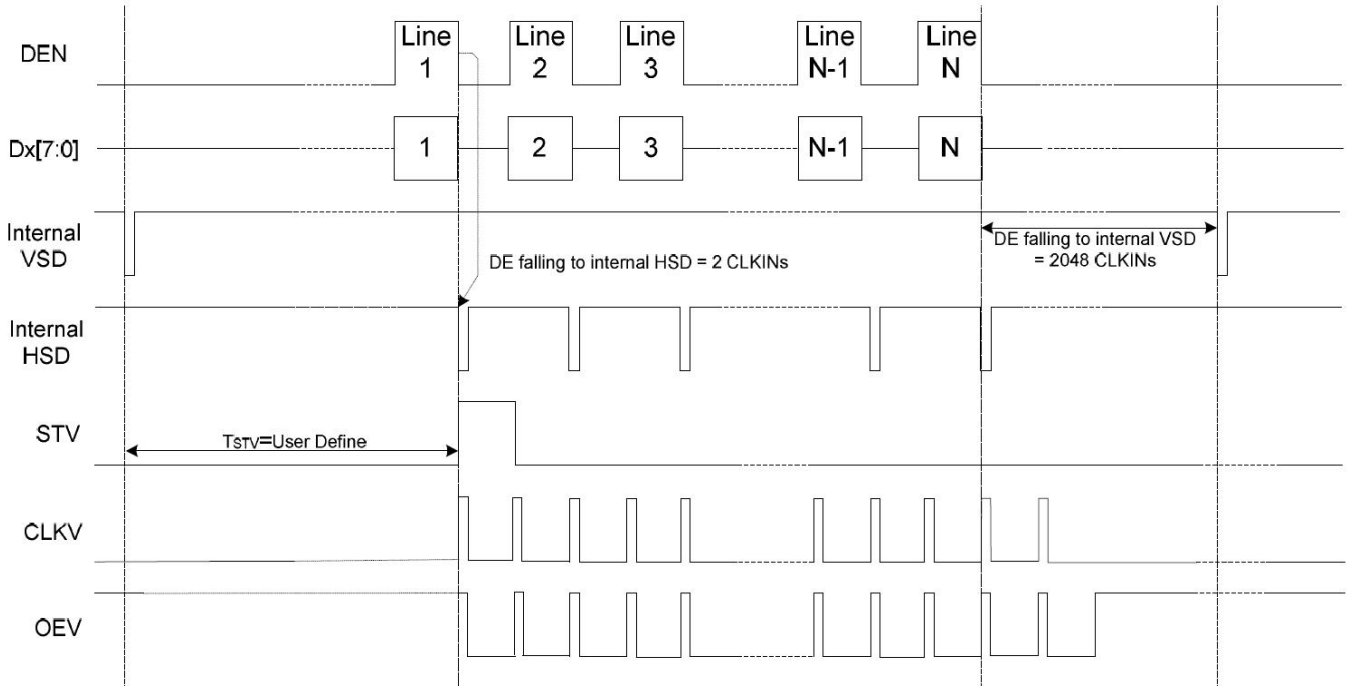
Vertical Timing Diagram of DE Mode (Dual Gate)



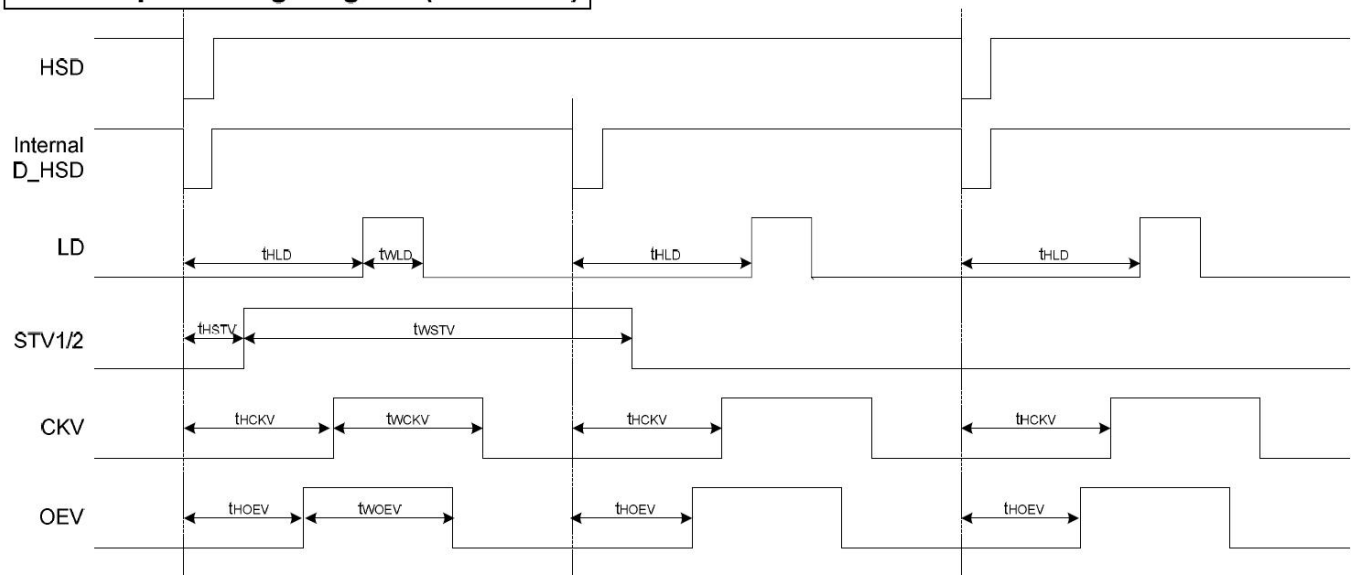
Vertical Timing Diagram of SYNC Mode (Dual Gate)



Vertical Timing Diagram of DE Mode (Dual Gate)



Gate Output Timing Diagram (Dual Gate)

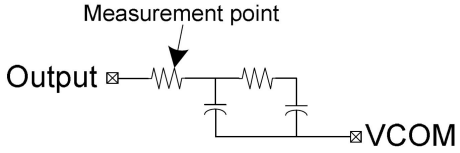


Parameter	Symbol	Spec			Unit.	Description
		Min.	Typ.	Max.		
VDD Power ON slew rate	t_{POR}	--	--	20	ms	0V ~ 0.9VDD
RSTB pulse width	t_{RST}	10	--	--	us	CLKIN=50MHz
CLKIN cycle time	t_{CPH}	20	--	--	ns	
CLKIN pulse duty	t_{CWH}	40	50	60	%	
VSD setup time	t_{VST}	8	--	--	ns	
VSD hold time	t_{VHD}	8	--	--	ns	
HSD setup time	t_{HST}	8	--	--	ns	
HSD hold time	t_{HST}	8	--	--	ns	
Data setup time	t_{DST}	8	--	--	ns	D0[7:0], D1[7:0], D2[7:0] to CLKIN
Data hold time	t_{DHD}	8	--	--	ns	D0[7:0], D1[7:0], D2[7:0] to CLKIN
DE setup time	t_{EST}	8	--	--	ns	
DE hold time	t_{EHD}	8	--	--	ns	
Output stable time	t_{SST}	--	--	6	us	10% to 90% target voltage.
CLKIN frequency	f_{CLK}	--	40	50	MHz	VDD=3.0 ~ 3.6V
CLKIN cycle time	t_{CLK}	20	25	--	ns	
CLKIN pulse duty	t_{CWH}	40	50	60	%	T_{CLK}
Time from HSD to Source output	t_{HSO}	--	20	--	CLKIN	
Time from HSD to LD	t_{HLD}	--	20	--	CLKIN	Note (2)
Time from HSD to STV	t_{HSTV}	--	20	--	CLKIN	
Time from HSD to CKV	t_{HCKV}	--	2	--	CLKIN	
Time from HSD to OEV	t_{HOEV}	--	4	--	CLKIN	
LD pulse width	t_{WLD}	--	10	--	CLKIN	Note (2)
CKV pulse width	t_{WCKV}	--	66	--	CLKIN	
OEV pulse width	t_{WOEV}	--	74	--	CLKIN	

Note: (1) VDD=3.0 ~ 3.6V, VDDA=6.5~13.5V, DGND=AGND=0V, Ta=-20~+85℃

(2) The contents of the data register are transferred to the latch circuit at the rising edge of LD. Then the gray scale voltage is output from the device at the falling edge of LD.

(3) Output loading condition :



7. CTP Specification

7.1 Electrical Characteristics

7.1.1 Absolute Maximum Rating

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	VDD	-0.3	3.47	V	1
Operating temperature	T_{OP}	-20	+70	℃	-
Storage temperature	T_{ST}	-30	+80	℃	-

NOTES:

1. *If used beyond the absolute maximum ratings, FT6236 may be permanently damaged. It is strongly recommanded that the device be used within the electrical characteristics in normal operations. If exposed to the condition not within the electrical characteristics, it may affect the reliability of the device.*

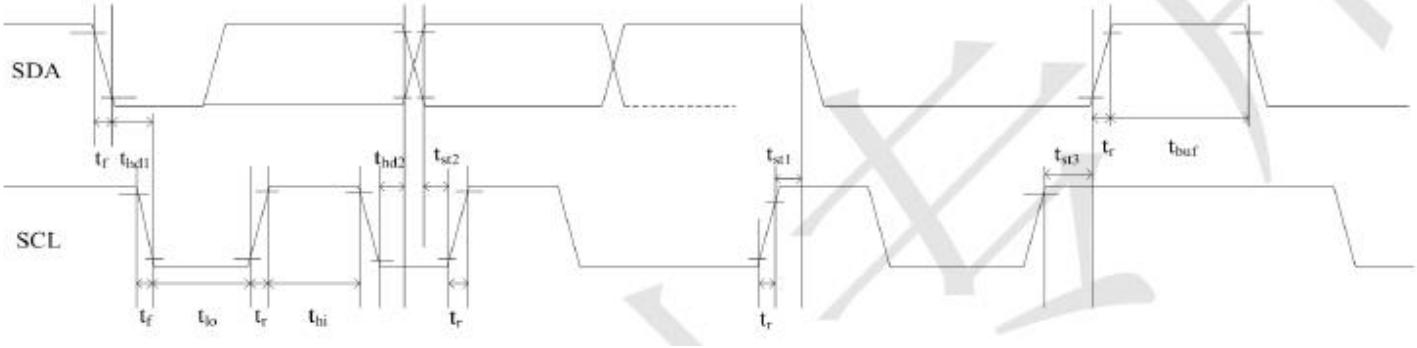
7.1.2 DC Electrical Characteristics (Ta=25℃)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Digital supply voltage	VDD	2.8	-	3.3	V	
Normal operation mode Current consumption	I_{opr}	-	8	14.5	mA	
Green mode Current consumption	I_{mon}	-	3.3	-	mA	
Sleep mode Current consumption	I_{slp}	70	-	120	uA	
Level input voltage	V_{IH}	$0.75V_{DDIO}$	-	$V_{DDIO}+0.3$	V	
	V_{IL}	-0.3	-	$0.25V_{DDIO}$	V	
Level output voltage	V_{OH}	$0.85V_{DDIO}$	-	-	V	
	V_{OL}	-	-	$0.15V_{DDIO}$	V	

7.2 AC Characteristics

7.2.1 I2C Interface

GT911 provides a standard I²C interface for SCL and SDA to communicate with the host. GT911 always serves as slave device in the system with all communication being initialized by the host. It is strongly recommended that transmission rate be kept at or below 400Kbps. The I²C timing is shown below:



Test condition 1: 1.8V host interface voltage, 400Kbps transmission rate, 2K pull-up resistor

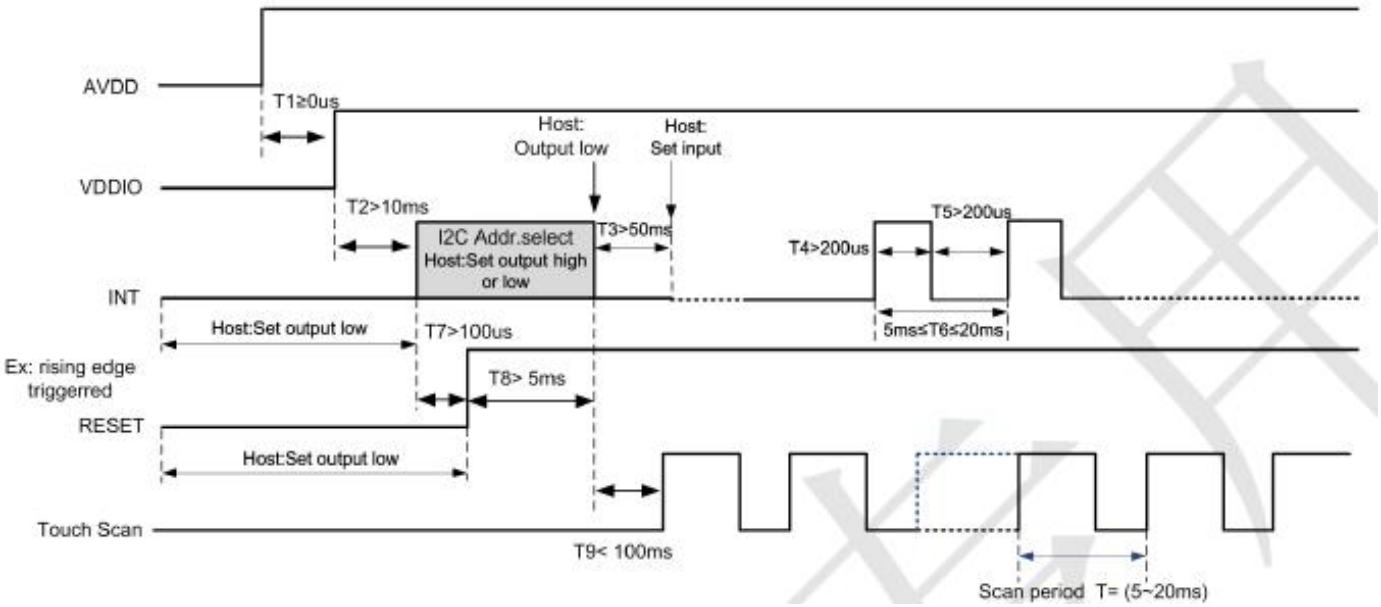
Parameter	Symbol	Min.	Max.	Unit
SCL low period	t_{lo}	1.3	-	us
SCL high period	t_{hi}	0.6	-	us
SCL setup time for Start condition	t_{st1}	0.6	-	us
SCL setup time for Stop condition	t_{st3}	0.6	-	us
SCL hold time for Start condition	t_{hd1}	0.6	-	us
SDA setup time	t_{st2}	0.1	-	us
SDA hold time	t_{hd2}	0	-	us

Test condition 2: 3.3V host interface voltage, 400Kbps transmission rate, 2K pull-up resistor

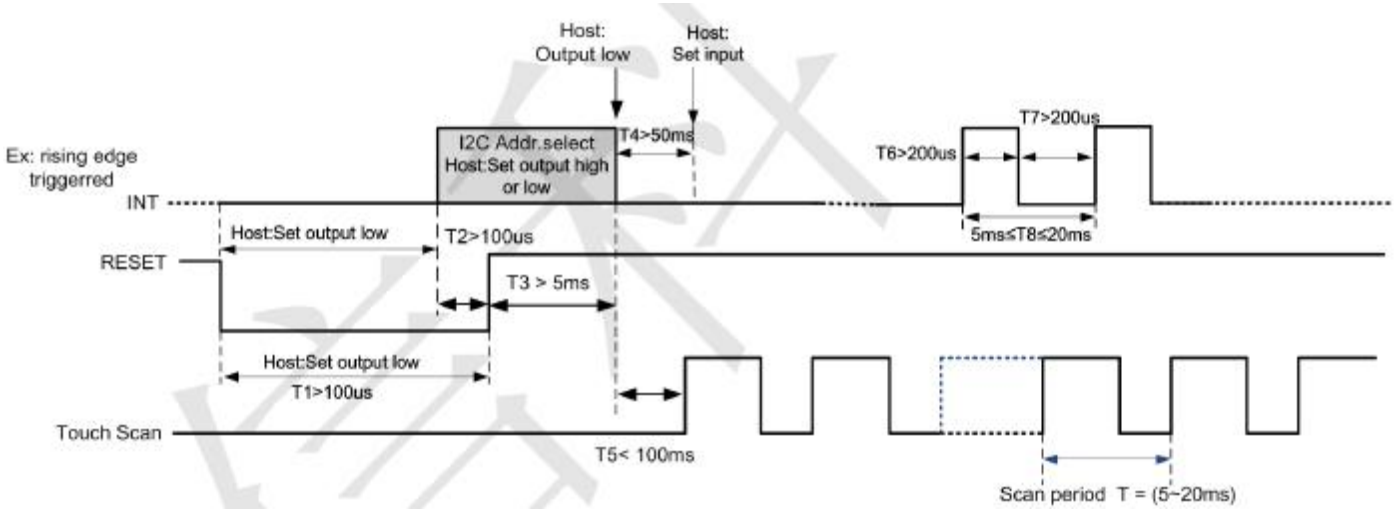
Parameter	Symbol	Min.	Max.	Unit
SCL low period	t_{lo}	1.3	-	us
SCL high period	t_{hi}	0.6	-	us
SCL setup time for Start condition	t_{st1}	0.6	-	us
SCL setup time for Stop condition	t_{st3}	0.6	-	us
SCL hold time for Start condition	t_{hd1}	0.6	-	us
SDA setup time	t_{st2}	0.1	-	us
SDA hold time	t_{hd2}	0	-	us

GT911 supports two I2C slave addresses: 0xBA/0xBB and 0x28/0x29. The host can select the address by changing the status of Reset and INT pins during the power-on initialization phase. See the diagram below for configuration methods and timings:

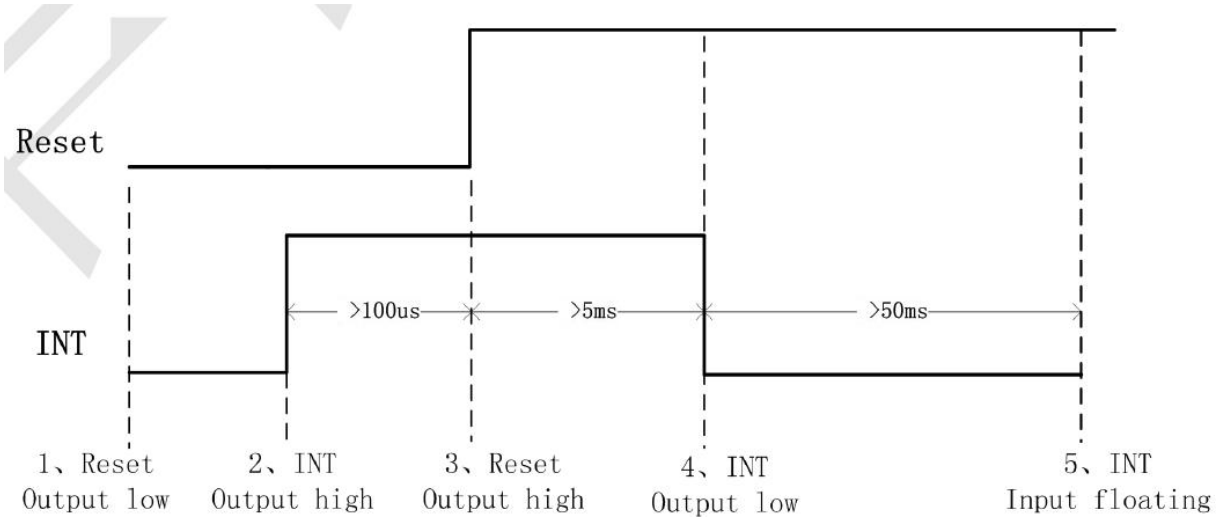
Power-On Timing:



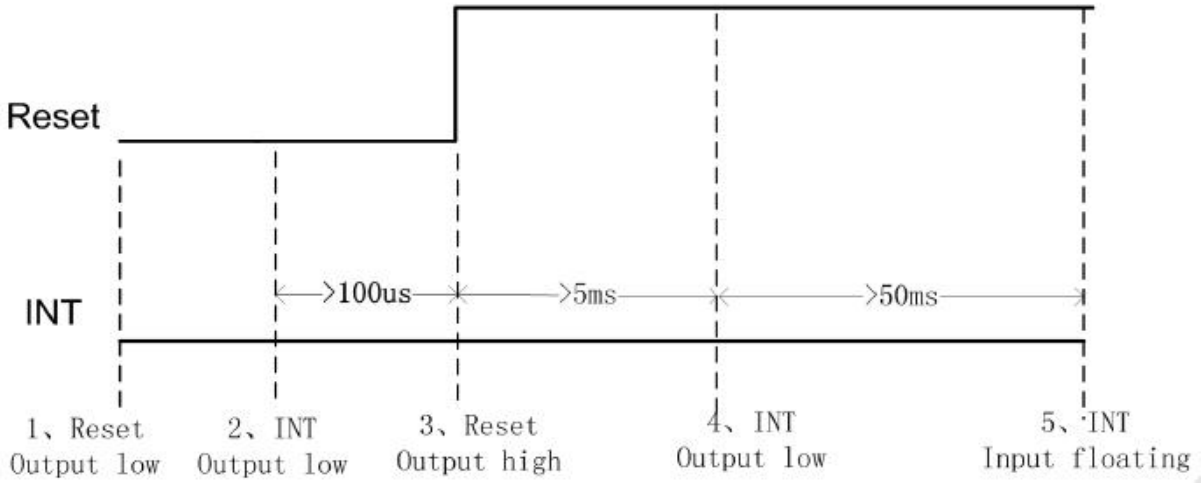
Timing for host resetting GT911:



Timing for setting slave address to 0x28/0x29:



Timing for setting slave address to 0xBA/0xBB:



a) Data Transmission

(For example：device address is 0xBA/0xBB)

Communication is always initiated by the host. Valid Start condition is signaled by pulling SDA line from “high” to “low” when SCL line is “high”. Data flow or address is transmitted after the Start condition.

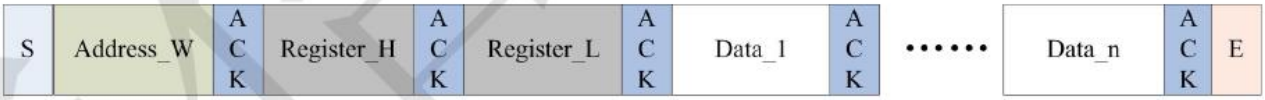
All slave devices connected to I^2C bus should detect the 8-bit address issued after Start condition and send the correct ACK. After receiving matching address, GT911 acknowledges by configuring SDA line as output port and pulling SDA line low during the ninth SCL cycle. When receiving unmatched address, namely, not 0XBA or 0XBB, GT911 will stay in an idle state.

For data bytes on SDA, each of 9 serial bits will be sent on nine SCL cycles. Each data byte consists of 8 valid data bits and one ACK or NACK bit sent by the recipient. The data transmission is valid when SCL line is “high”.

When communication is completed, the host will issue the STOP condition. Stop condition implies the transition of SDA line from “low” to “high” when SCL line is “high”.

b) Writing Data to GT911

(For example：device address is 0xBA/0xBB)



Timing for Write Operation

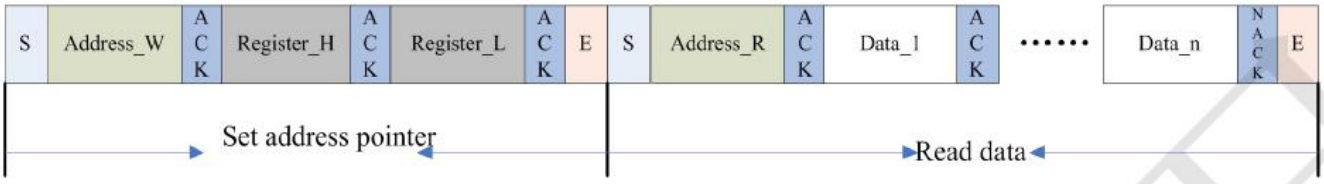
The diagram above displays the timing sequence of the host writing data onto GT911. First, the host issues a Start condition. Then, the host sends 0XBA (address bits and R/W bit; R/W bit as 0 indicates Write operation) to the slave device.

After receiving ACK, the host sends the 16-bit register address (where writing starts) and the 8-bit data bytes (to be written onto the register).

The location of the register address pointer will automatically add 1 after every Write Operation. Therefore, when the host needs to perform Write Operations on a group of registers of continuous addresses, it is able to write continuously. The Write Operation is terminated when the host issues the Stop condition.

c) Reading Data from GT911

(For example：device address is 0xBA/0xBB)



Timing for Read Operation

The diagram above is the timing sequence of the host reading data from GT911. First, the host issues a Start condition and sends 0XBA (address bits and R/W bit; R/W bit as 0 indicates Write operation) to the slave device.

After receiving ACK, the host sends the 16-bit register address (where reading starts) to the slave device. Then the host sets register addresses which need to be read.

Also after receiving ACK, the host issues the Start condition once again and sends 0XBB (Read Operation). After receiving ACK, the host starts to read data.

GT911 also supports continuous Read Operation and, by default, reads data continuously. Whenever receiving a byte of data, the host sends an ACK signal indicating successful reception. After receiving the last byte of data, the host sends a NACK signal followed by a STOP condition which terminates communication.

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.

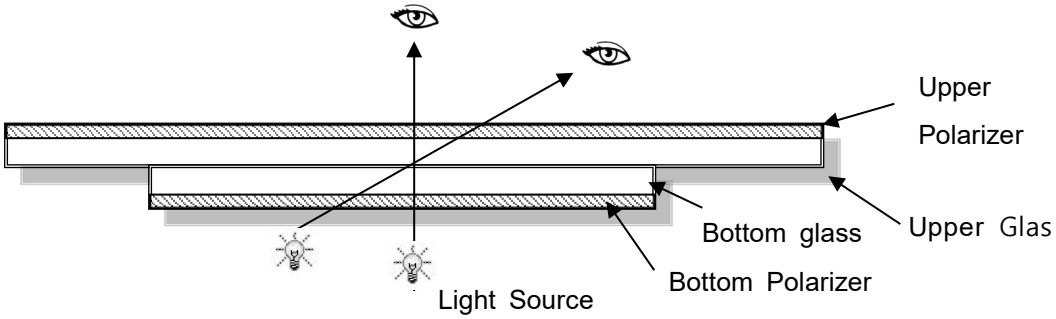
Temperature : 25±5℃

Humidity : 65%±10%RH

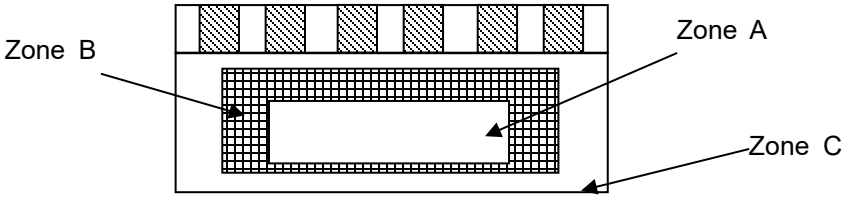
Viewing Angle : Normal viewing Angle.

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

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 2828-2003 ; , normal inspection, Class Ⅱ

AQL:

Major defect	Minor defect
0.65	1.5

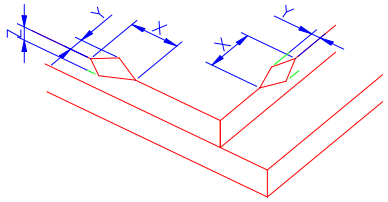
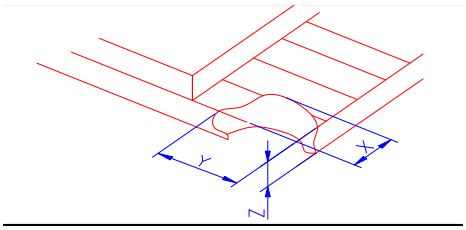
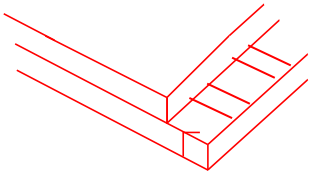
LCD: Liquid Crystal Display , LCM: Liquid Crystal Module, CTP: Capacitive Touch Panel

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.	

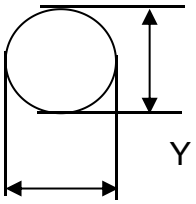
Note1: a) Light dot：Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

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	3(distance≧10mm)		
Φ>0.4	0		

3.0 LCD Pixel defect

Pixel bad points

Item	Zone A	Acceptable Qt
Bright dot	Random	N≤2
	2 dots adjacent	N≤0
	3 dots adjacent	N≤0
Dark dot	Random	N≤2
	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:

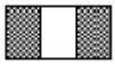
A) Bright dot：Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

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

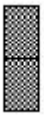
C) 2 dot adjacent = 1 pair = 2 dots

Picture:

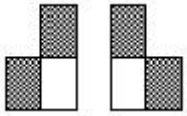
2 dot adjacent



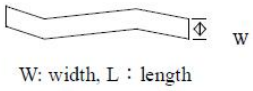
2 dot adjacent



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≤4.0</td><td colspan="2">N≤3</td></tr>
<tr><td>0.06<W≤0.08</td><td>L≤3.0</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>
<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≤0.1</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.1<Φ≤0.2</td><td colspan="2">2 (distance ≥ 10mm)</td></tr>
<tr><td>0.20<Φ≤0.25</td><td colspan="2">2 (distance ≥ 10mm)</td></tr>
<tr><td>Φ > 0.25</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 / Size (mm)	Acceptable Qty
	C
Φ≤0.1	Ignore
0.1<Φ≤0.25	3(distance≧10mm)
0.25<Φ≤0.3	2(distance≧10mm)
Φ>0.3	0

CTP Bonding bubble/ accidented spot

Size Φ(mm)	Acceptable Qty	
	A	B
Φ≤0.1	Ignore	
0.1<Φ≤0.2	[illegible]	
0.2<Φ≤0.25	[illegible]	
Φ>0.25	0	

Assembly deflection

beyond the edge of backlight ≤0.2mm

CTP cover broken

X : length

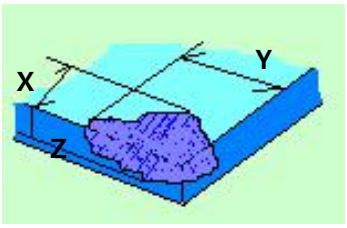
Y : width

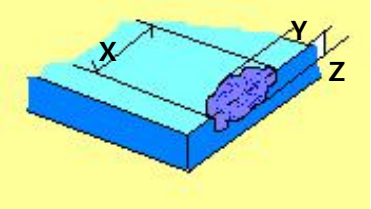
Z : height

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><td>X</td><td>Y</td><td>Z</td></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

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	80℃, 96HR	
Low Temperature Storage	-30℃, 96HR	
High Temperature & High Humidity Operating	+60℃, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-10℃,30 min ↔ +60℃,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panel Air:±8KV, 5times; Contact:±6KV, 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)	

Remark:

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.

6. The color fading mura of polarizing filter should not care.

10. Cautions and Handling Precautions

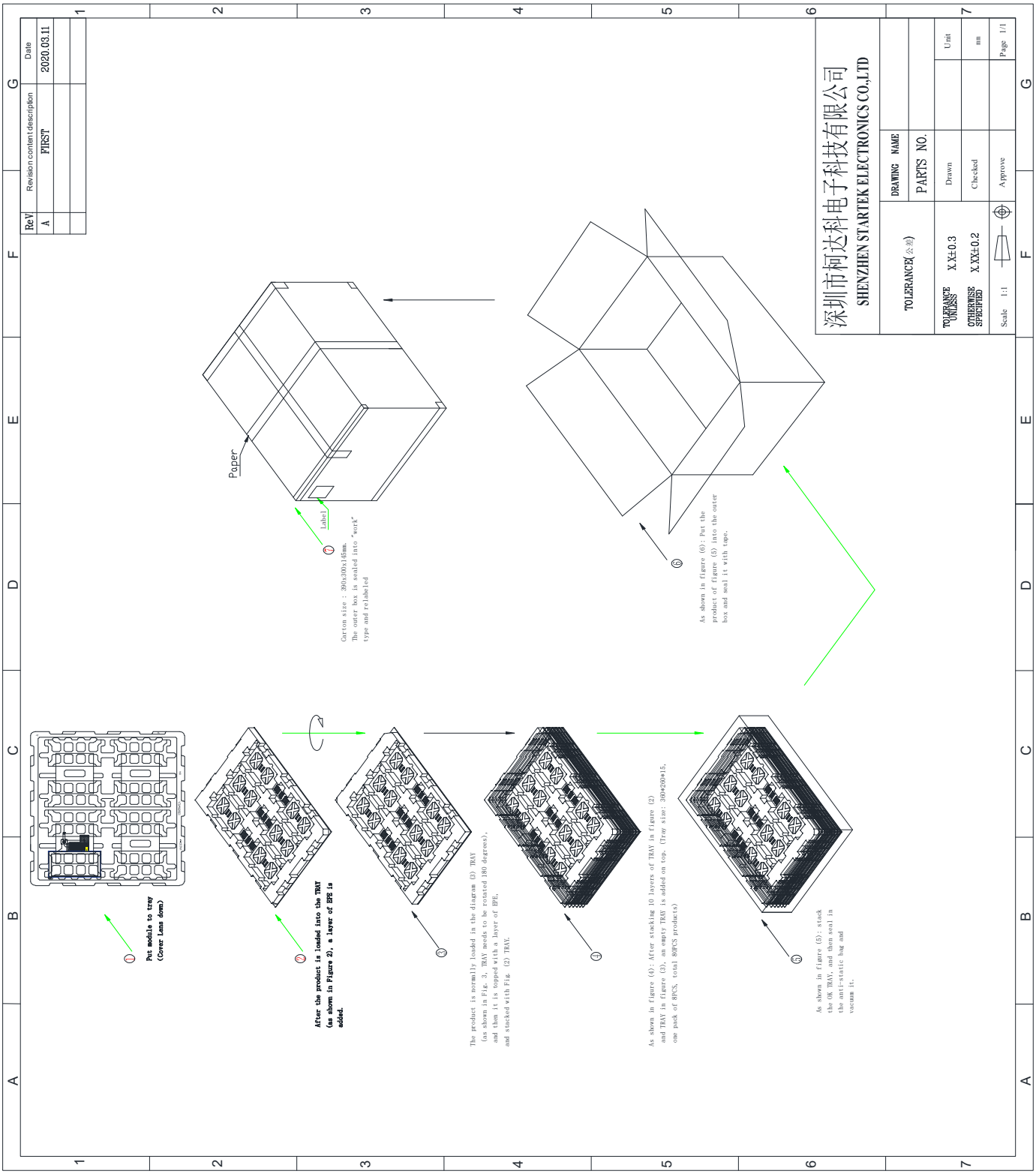
10.1 Handling and Operating the Module

(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.

11. Packing


Rev
Revision content description
Date
A
FIRST
2020.03.11
深圳市柯达科电子科技有限公司
SHENZHEN STARTEK ELECTRONICS CO.,LTD
TOLERANCE(公差)
DRAWING NAME
PARTS NO.
Drawn
Checked
Approve
Unit
mm
Page 1/1
Scale 1:1
TOLERANCE UNLESS OTHERWISE SPECIFIED
X.X±0.3
X.XX±0.2
Paper
Label
Carton size : 390x200x145mm.
The outer box is sealed into "work" type and relabeled
As shown in figure (6): Put the product of figure (5) into the outer box and seal it with tape.
Put module to tray (Cover Lens down)
After the product is loaded into the TRAY (as shown in Figure 2), a layer of EPE is added.
The product is normally loaded in the diagram (3) TRAY (as shown in Fig. 3, TRAY needs to be rotated 180 degrees), and then it is topped with a layer of EPE, and stacked with Fig. (2) TRAY.
As shown in figure (4): After stacking 10 layers of TRAY in figure (2) and TRAY in figure (3), an empty TRAY is added on top. (Tray size: 305*260*15, one pack of 8PCS, total 80PCS products)
As shown in figure (5): stack the OK TRAY, and then seal in the anti-static bag and vacuum it.