

**SPECIFICATION  
FOR  
LCM+CTP Module**

MODULE No:	KD070WXFID027-C038A
CUSTOMER:	

STARTEK	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		



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## 1. Basic Specifications

### \* 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 module is composed of a Transmissive type TFT-LCD Panel, driver circuit, capacitance touch panel, back-light unit. The resolution of a 7.0 " TFT-LCD contains 800x1280 pixels, and can display up to 16.7M colors.

### 1.1 TFT Features

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	94.2(H)*150.72(V) (7.0inch)	mm	
Driver element	TFT active matrix	-	
Display colors	16.7M	colors	
Number of pixels	800(RGB)*1280	dots	
Pixel arrangement	RGB vertical stripe	-	
Pixel pitch	0.11775(H)*0.11775(V)	mm	
Viewing angle	Free	o'clock	
Controller IC	JD9366	-	
Display mode	Transmissive /Normally Black	-	
LCM Interface	4-Lane MIPI	-	
Operating temperature	-20~+70	°C	
Storage temperature	-30~+80	°C	
Module bonding technology	Use Optical bonding between LCM and CTP	-	

### 1.2 CTP Features

General Information Items	Specification	Unit	Note
	Main Panel		
Resolution	800(H)*1280(V)	-	
Structure	G+G	-	
Controller IC	GT9271	-	
Interface	I2C	-	
Slave Adress	0x5D(7bit) or 0x14(7bit)	-	Note1
Touch mode	Five points and Gestures	-	-

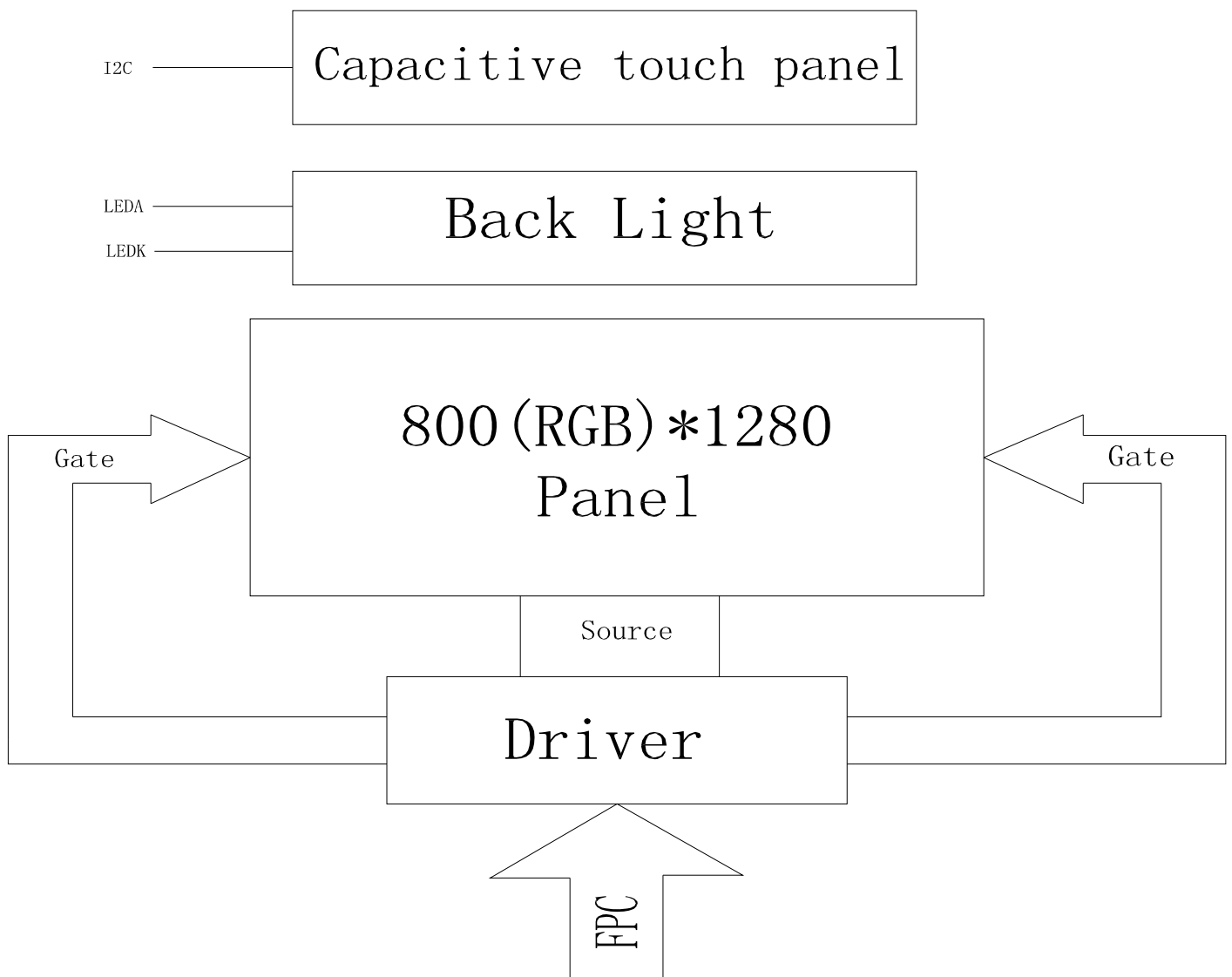
**Note1:** For specific configuration method, please refer to section 8.2

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### 1.3 Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	119.46	-	mm	
	Vertical(V)	-	176.78	-	mm	
	Depth(D)	-	4.78	-	mm	
Weight		-	TBD	-	g	

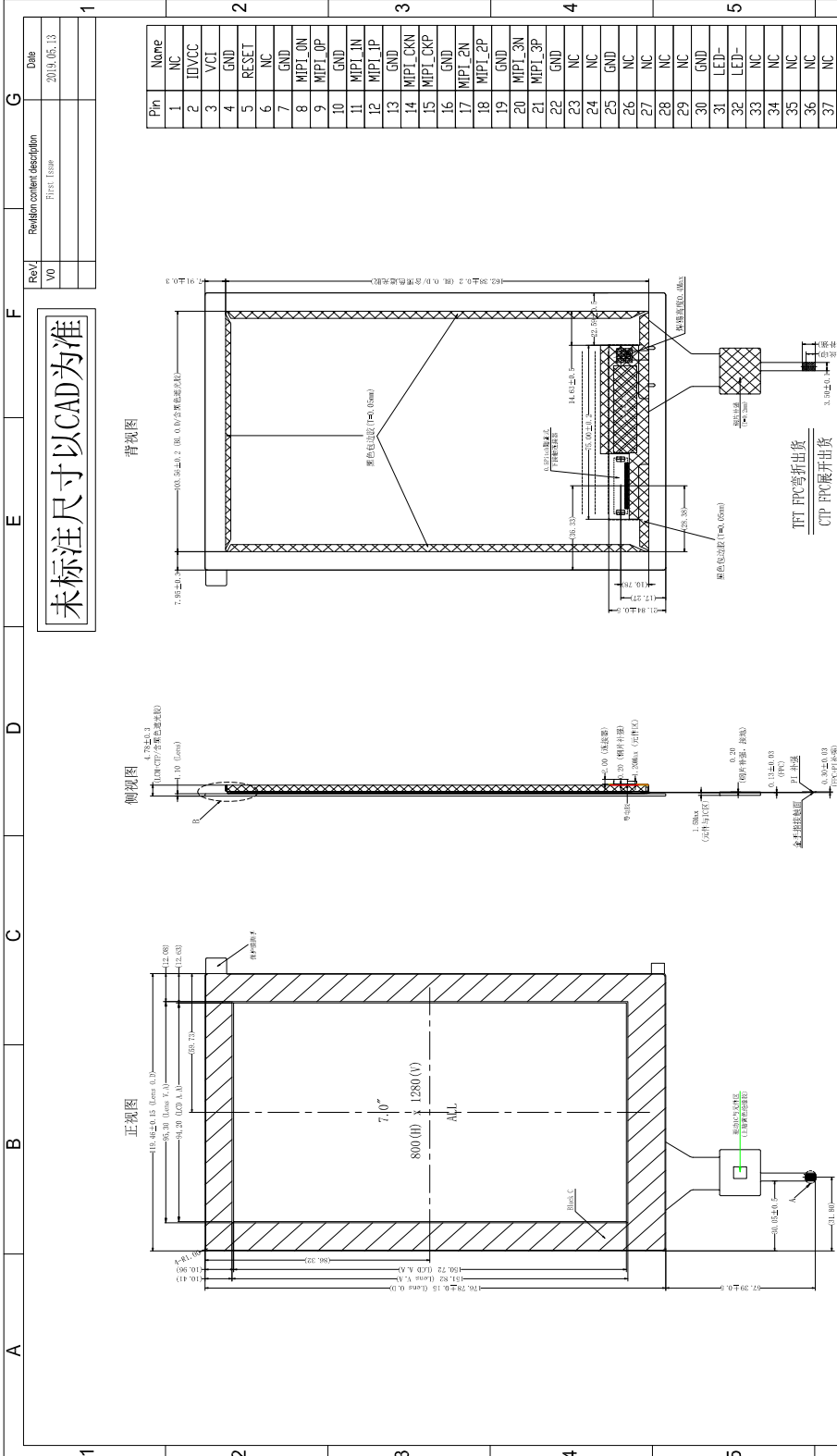
### 2. Block Diagram



### 3. Outline dimension

Rev/V	V0	Revision content description First Issue	Date 2019.05.13
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未标注尺寸以CAD为准



**正视图**  
800(H) x 1280(V)  
7.10"

**侧视图**  
1.00 (0.04) (0.015) (0.005) (0.002)

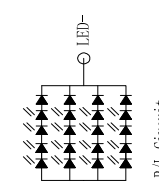
**背视图**  
14.0 (0.54)  
1.00 (0.04) (0.015) (0.005) (0.002)

Pin	None
1	NC
2	IDVCC
3	VCI
4	GND
5	RESET
6	NC
7	GND
8	MPI_ON
9	MPI_DP
10	GND
11	MPI_IN
12	MPI_IP
13	GND
14	MPI_CLK
15	MPI_CKP
16	GND
17	MPI_2N
18	MPI_2P
19	GND
20	MPI_3N
21	MPI_3P
22	GND
23	NC
24	NC
25	GND
26	NC
27	NC
28	NC
29	NC
30	GND
31	LED-
32	LED-
33	NC
34	NC
35	NC
36	NC
37	NC
38	NC
39	LED+
40	LED+

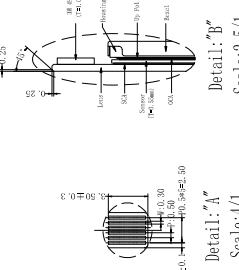
TFT FPC弯折出货  
CTP FPC展开出货

NO.	Pin Name
1	VCC
2	RST
3	INT
4	SCL
5	SDA
6	GND

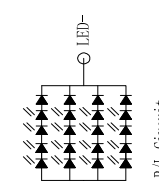
**DETAIL: "A"**  
Scale: 4/1



**DETAIL: "B"**  
Scale: 2.5/1



**B/L Circuit**



**NOTES:**

1. DISPLAY TYPE: 7.0", TFT-LCD, 16.7M COLORS
2. DISPLAY MODE: NORMALLY BLACK
3. TOUCH PANEL: 5 POINT TOUCH (OPTIONAL)
4. LCM DRIVER IC: JDS595 (COG)
5. Touch Mode: CTP
6. Touch Driver IC: G9271
7. Touch and LCM Bonding technology: Optical bonding
8. CTP IC Communication voltage: 3.3V
9. VCI=3.3V(REF. IC D.S.), IDVCC: 1.65~3.6V
10. OPERATING TEMP.: -20°C TO 70°C
11. STORAGE TEMP.: -30°C TO 80°C
12. BACK LIGHT: LED WHITE, 20 LED, 80mA, 1650.0m(W)
13. DIMENSIONS: mm
14. " " : critical dimension( reference dimension).

深圳市阿达科电子科技有限公司  
SHENZHEN STARTEK ELECTRONICS CO.,LTD

DRAWING NAME	KD070WXFID027-C038A
PARTS NO.	990700032D
Drawn	
Checked	
Approve	

TOLERANCE(公称)  
TOLERANCE UNLESS OTHERWISE SPECIFIED  
X.XXA.3  
X.XX.X.2

Scale 1:1

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## 4. Input terminal Pin Assignment

### 4.1 TFT PIN Define

NO.	SYMBOL	DISCRIPTION	I/O
1	NC	No connected	
2	IOVCC	A power supply for the I/O circuit. IOVCC=1.65 to 3.6V	P
3	VCI	A power supply for DC/DC circuit. VCI=2.5V to 4.8V	P
4	GND	Ground	P
5	RESET	Device reset signal.	I
6	NC	No connected	--
7	GND	Ground	P
8	MIPI_0N	MIPI Negative data signal (-)	I/O
9	MIPI_0P	MIPI Positive data signal (+)	I/O
10	GND	Ground	P
11	MIPI_1N	MIPI Negative data signal (-)	I/O
12	MIPI_1P	MIPI Positive data signal (+)	I/O
13	GND	Ground	P
14	MIPI_CKN	MIPI Negative clock signal (-)	I/O
15	MIPI_CKP	MIPI Positive clock signal (+)	I/O
16	GND	Ground	P
17	MIPI_2N	MIPI Negative data signal (-)	I/O
18	MIPI_2P	MIPI Positive data signal (+)	I/O
19	GND	Ground	P
20	MIPI_3N	MIPI Negative data signal (-)	I/O
21	MIPI_3P	MIPI Positive data signal (+)	I/O
22	GND	Ground	P
23	NC	No connected	
24	NC	No connected	
25	GND	Ground	P
26	NC	No connected	
27	NC	No connected	
28	NC	No connected	
29	NC	No connected	
30	GND	Ground	P

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31	LED-	LED Cathode	P
32	LED-	LED Cathode	P
33	NC	No connected	
34	NC	No connected	
35	NC	No connected	
36	NC	No connected	
37	NC	No connected	
38	NC	No connected	
39	LED+	LED anode	P
40	LED+	LED anode	P

#### 4.2 CTP PIN Define

NO.	SYMBOL	DISCRIPTION	I/O
1	VDD	Supply voltage	P
2	RST	External Reset, Low is active	I
3	INT	External interrupt to the host	I
4	SCL	I2C clock input	I/O
5	SDA	I2C data input and output	I
6	GND	Ground	P



## 5. LCD Optical Characteristics

### 5.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	$\Theta=0$	700	850	--		(2)
Response time	Rising	$T_{R+T_F}$	Normal viewing angle	--	30	40	msec	(3)
	Falling			--				
Color Gamut		S(%)		45	50	55	%	
Color Filter Chromacicity	White	$W_X$		0.2589	0.2989	0.3389		(4) CF glass
		$W_Y$		0.2994	0.3394	0.3794		
	Red	$R_X$		0.5762	0.5962	0.6162		
		$R_Y$		0.3396	0.3596	0.3796		
	Green	$G_X$		0.2998	0.3198	0.3398		
		$G_Y$		0.5319	0.5519	0.5719		
	Blue	$B_X$		0.1419	0.1619	0.1819		
		$B_Y$		0.1263	0.1463	0.1663		
Viewing angle	Hor.	$\Theta_L$	CR>10	--	89	--		(1)
		$\Theta_R$		--	89	--		
	Ver.	$\Theta_U$		--	89	--		
		$\Theta_D$		--	89	--		
Option View Direction		Free						

### 5.2 Measuring Condition

- Measuring surrounding: dark room
- Ambient temperature:  $25 \pm 2^\circ\text{C}$
- 15min. warm-up time.

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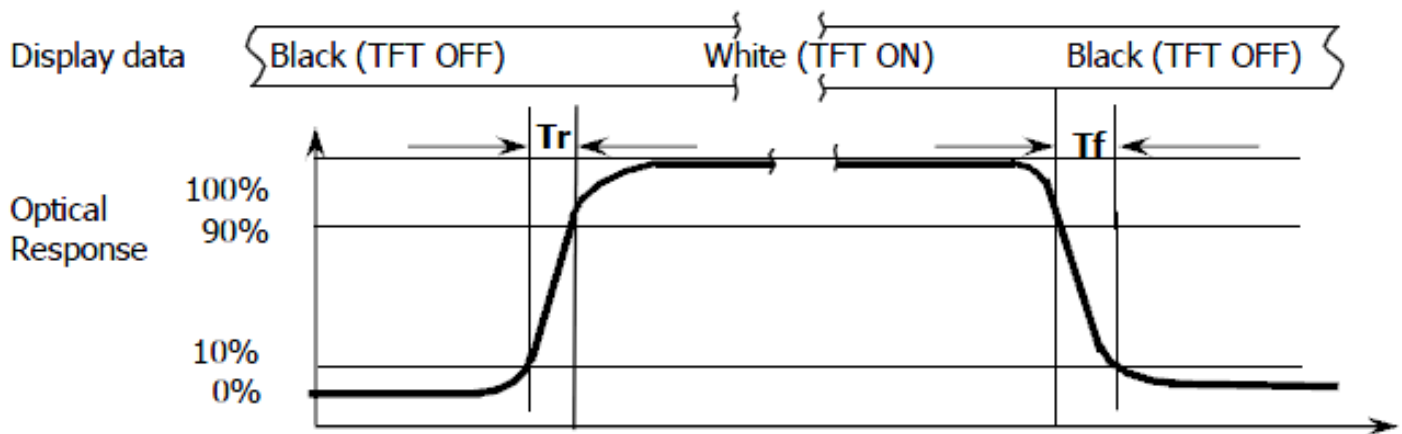
### 5.3 Measuring Equipment

**Note :**

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).
2. Contrast measurements shall be made at viewing angle of  $\Theta = 0$  and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

**Note3**



**Note4**

The color chromaticity coordinates specified shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

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## 6. Electrical Characteristics

### 6.1 Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	V <sub>CI</sub>	-0.3	3.6	V	Note1
Interface Supply Voltage	IOVCC	-0.3	6.6	V	
Operating temperature	T <sub>OP</sub>	-20	+70	°C	
Storage temperature	T <sub>ST</sub>	-30	+80	°C	

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.

### 6.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	V <sub>CI</sub>	2.5	3.3	6.0	V	
Interface Supply Voltage	IOVCC	1.65	1.8/3.3	3.6	V	
Normal mode Current	I <sub>DD</sub>	--	160	--	mA	
Level input voltage	V <sub>IH</sub>	0.7V <sub>CI</sub>		V <sub>CI</sub>	V	
	V <sub>IL</sub>	GND		0.3 V <sub>CI</sub>	V	
Level output voltage	V <sub>OH</sub>	V <sub>CI</sub> -0.4		--	V	
	V <sub>OL</sub>	GND		GND+0.4	V	

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### 6.3 LED Backlight Characteristics

The back-light system is edge-lighting type with 20 chips LED

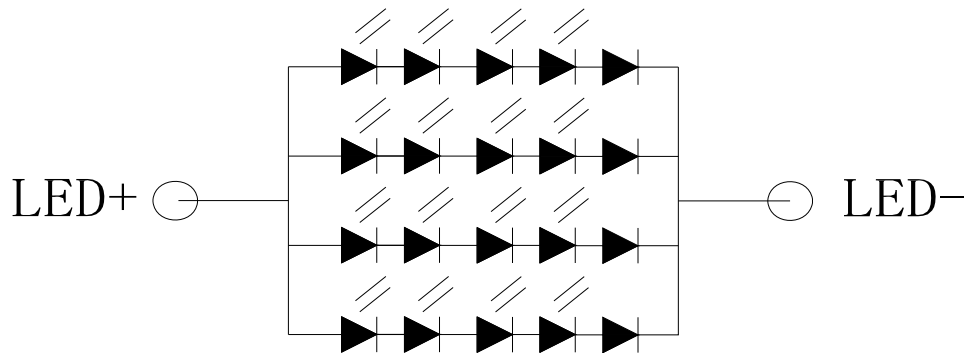
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	$I_F$		80	--	mA	
Forward Voltage	$V_F$	--	16	--	V	
LCM Luminance	LV	310	360	--	cd/m <sup>2</sup>	Note3
LED life time	Hr	--	50000	--	Hour	Note1,2
Uniformity	Avg	80	--	--	%	Note3

Note1: LED life time (Hr) can be defined as the time in which it continues to operate under the condition:

$T_a=25\pm3\text{ }^\circ\text{C}$ , 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

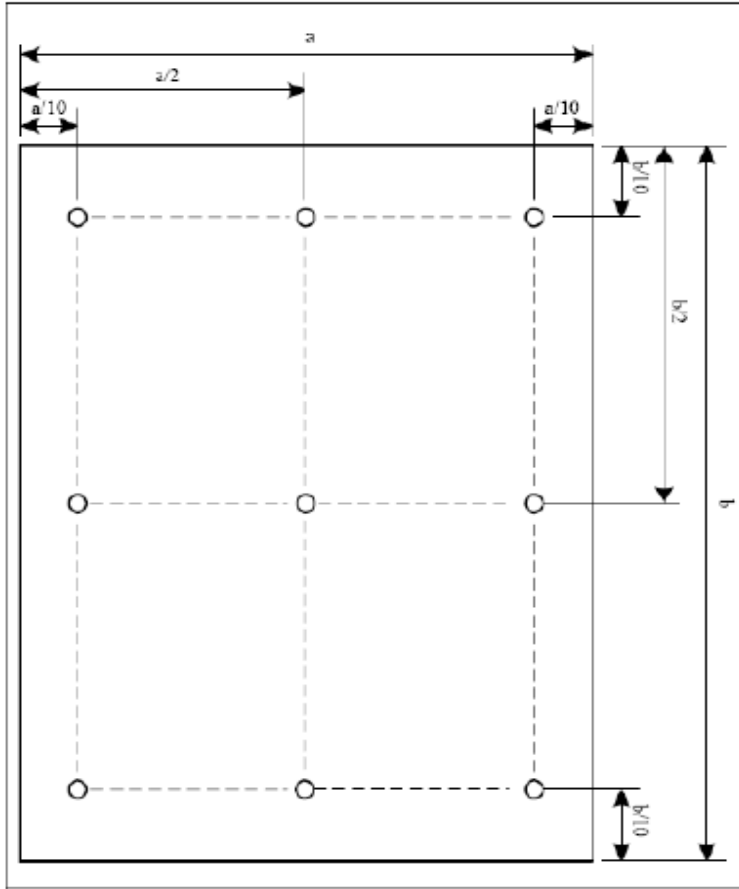
$T_a=25\text{ }^\circ\text{C}$  and  $I_L=80\text{mA}$ . The LED lifetime could be decreased if operating  $I_L$  is larger than 80mA. The constant current driving method is suggested.



B/L Circuit

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



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

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

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## 7. AC Characteristics

### 7.1 Timings for DSI Video mode

#### Vertical Timings

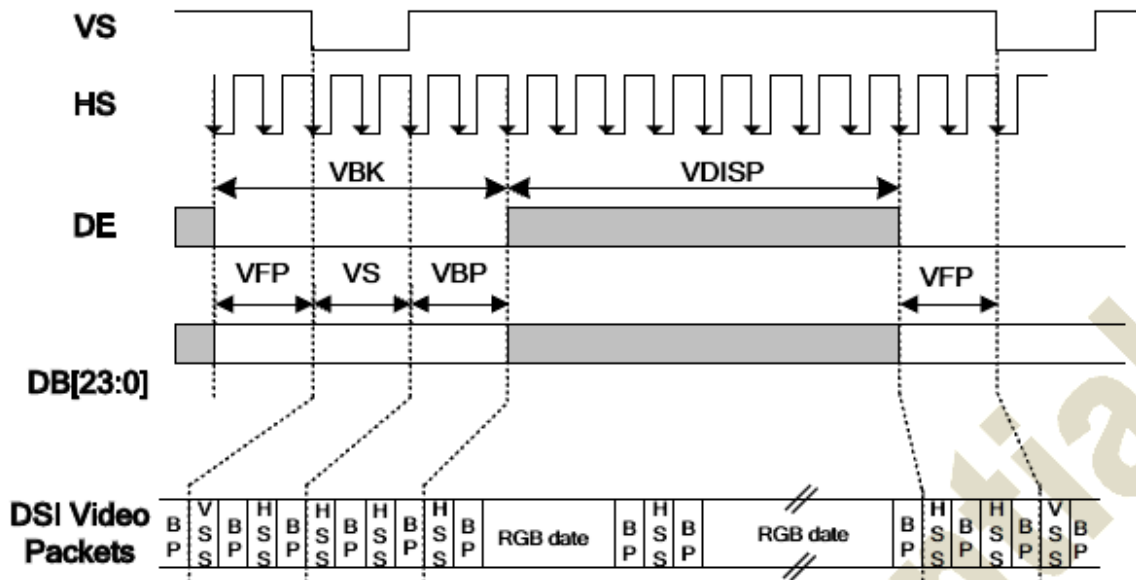


Figure 11.9: Vertical Timings for DPI I/F

Resolution=800x1280( $T_A=25^\circ\text{C}$ ,  $\text{IOVCC}=1.8\text{V}$ ,  $\text{VCIP}=2.8\text{V}$ ,  $\text{VCI}=2.8\text{V}$ )

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical low pulse width	VS	-	2	4	200 Note(1)	Line
Vertical front porch	VFP	-	4	20	200	Line
Vertical back porch	VBP	-	2	10	200 Note(1)	Line
Vertical blanking period	VBK	VS+VBP+VFP	8	34	250	Line
Vertical active area	-	VDISP	-	1280	-	Line
Vertical Refresh rate	VRR	-	-	60	-	Hz

Note: (1) The VS and VBP pulse width are related to GIP start pulse and GIP clock pulse timing. The GIP start pulse and GIP clock pulse must be set at corresponding position for LCD normal display.

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### Horizontal Timings

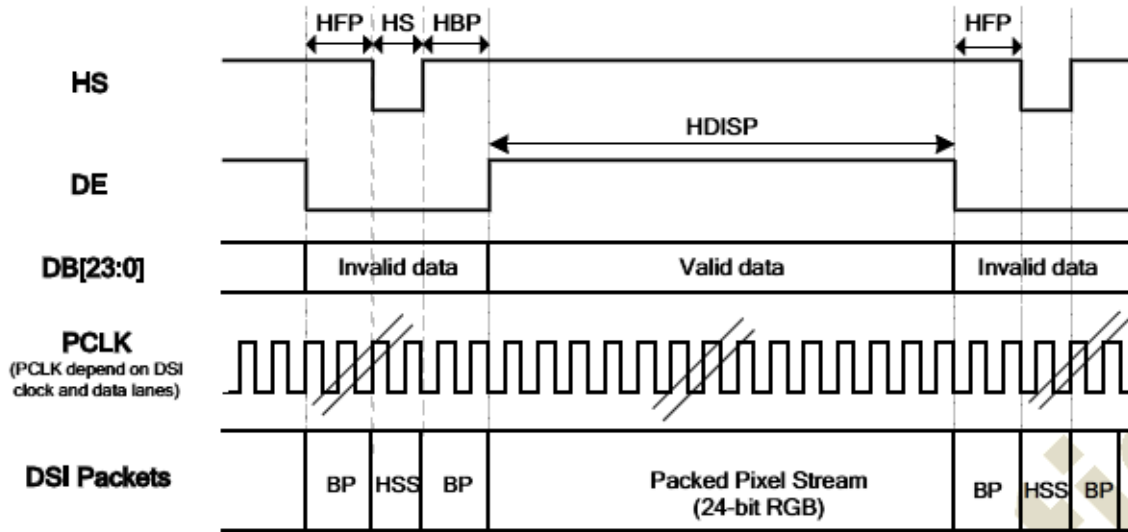


Figure 11.10: Horizontal Timing for DSI Video mode I/F

Resolution=800x1280 (T<sub>A</sub>=25°C, IOVCC=1.8V, VCIP=VCI=VCCH=2.8V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HS low pulse width	HS	-	6	18	78	DCK
Horizontal back porch	HBP	-	5	18	78	DCK
Horizontal front porch	HFP	-	5	18	78	DCK
Horizontal blanking period	HBLK	HS+HBP+HFP	16	54 (Note1)	88	DCK
Horizontal active area	HDISP	-	-	800	-	DCK
Pixel Clock	PCLK	-	63.06 (Note2)	67.33 (Note2)	81.51 (Note2)	MHz

Note 1: HS+HBP > 0.5us.

Note 2: Pixel Clock = (HBLK+HDISP) \* (VBK+VDISP) \* Frame rate, Frame rate=60Hz.

## 7.2 Reset input timings

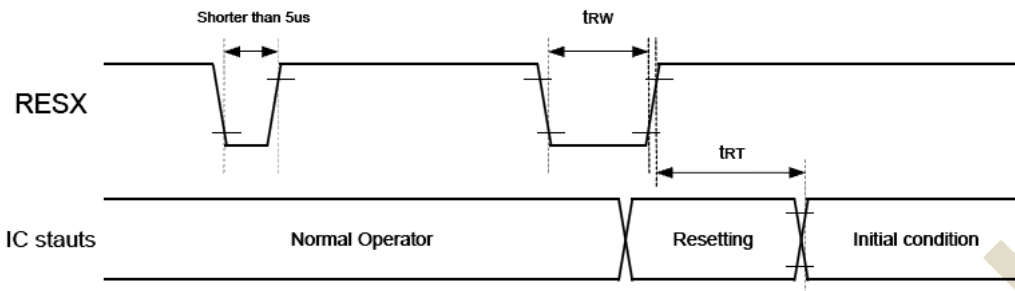


Figure 11.1: Reset input timings

Symbol	Parameter	Related pins	Min.	Max.	Unit
$t_{RW}$	Reset pulse width <sup>(2)</sup>	RESX	10	-	$\mu s$
$t_{RT}$	Reset complete time <sup>(3)</sup>	-	-	5 (Note 5)	ms
		-	-	120 (Note 6, 7)	ms

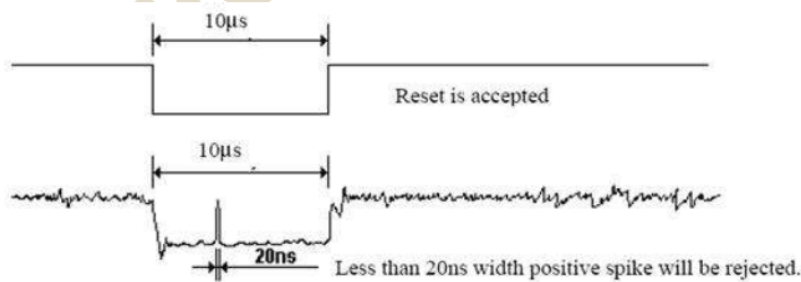
**Note:** (1) The reset complete time also required time for loading ID bytes from OTP to registers. This loading is done every time when there is HW reset cancel time ( $t_{RT}$ ) within 5 ms after a rising edge of RESX.

(2) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5 $\mu s$	Reset Rejected
Longer than 10 $\mu s$	Reset
Between 5 $\mu s$ and 10 $\mu s$	Reset Start

(3) During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode) and then returns to Default condition for H/W reset.

(4) Spike Rejection also applies during a valid reset pulse as shown below:



(5) When Reset is applied during Sleep In Mode.

(6) When Reset is applied during Sleep Out Mode.

(7) It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

(8) After Sleep Out Command, it is necessary to wait 120msec then send RESX.

Table 11.3: Reset timings

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## 8. CTP Specification

### 8.1 Electrical Characteristics

#### 8.1.1 Absolute Maximum Rating

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	VDD	2.66	3.47	V	
Operating temperature	T <sub>OP</sub>	-30	+85	°C	
Storage temperature	T <sub>ST</sub>	-40	+90	°C	

#### 8.1.2 DC Electrical Characteristics (Ta=25°C)

(Ambient temperature:25°C, VDD=2.8V, VDDIO=1.8V or VDDIO=VDD)

Item	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage/VDD	2.66	3.3	3.47	V	
Normal mode operating current	--	13	--	mA	
Green mode operating current	--	4.5	--	mA	
Sleep mode operating current	70	--	120	uA	
Digital Input low voltage/VIL	-0.3	--	0.25*VDD	V	
Digital Input high voltage/VIH	0.75*VDD	--	VDD+0.3	V	
Digital Output low voltage/VOL	--	--	0.15*VDD	V	
Digital Output high voltage/VOH	0.85*VDD	--	--	V	

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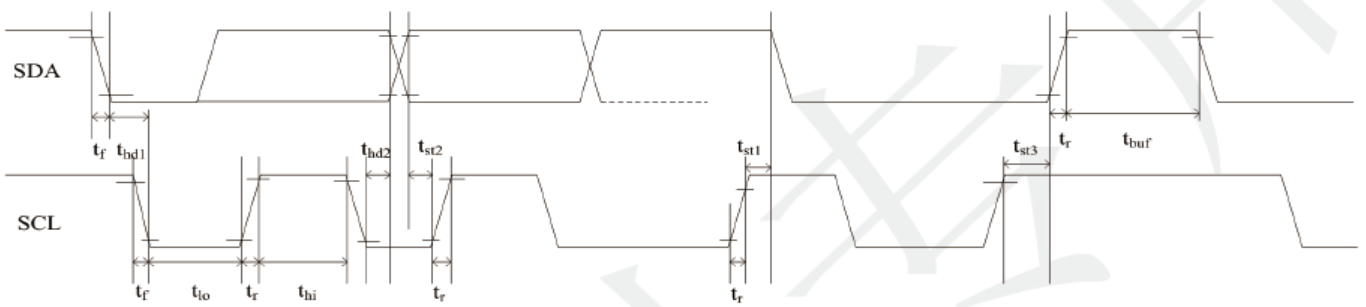
### 8.1.3 AC Characteristics

(Ambient temperature:25°C, VDD=2.8V, VDDIO=1.8V)

Parameter	Min	Typ	Max	Unit	Note
OSC oscillation frequency	59	60	61	MHZ	
I/O output rise time,low to high	-	14	-	ns	
I/O output rfall time,high to low	-	14	-	ns	

### 8.2 I2C Timing

GT9271 provides a standard I2C interface for SCL and SDA to communicate with the host. GT9271 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:



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

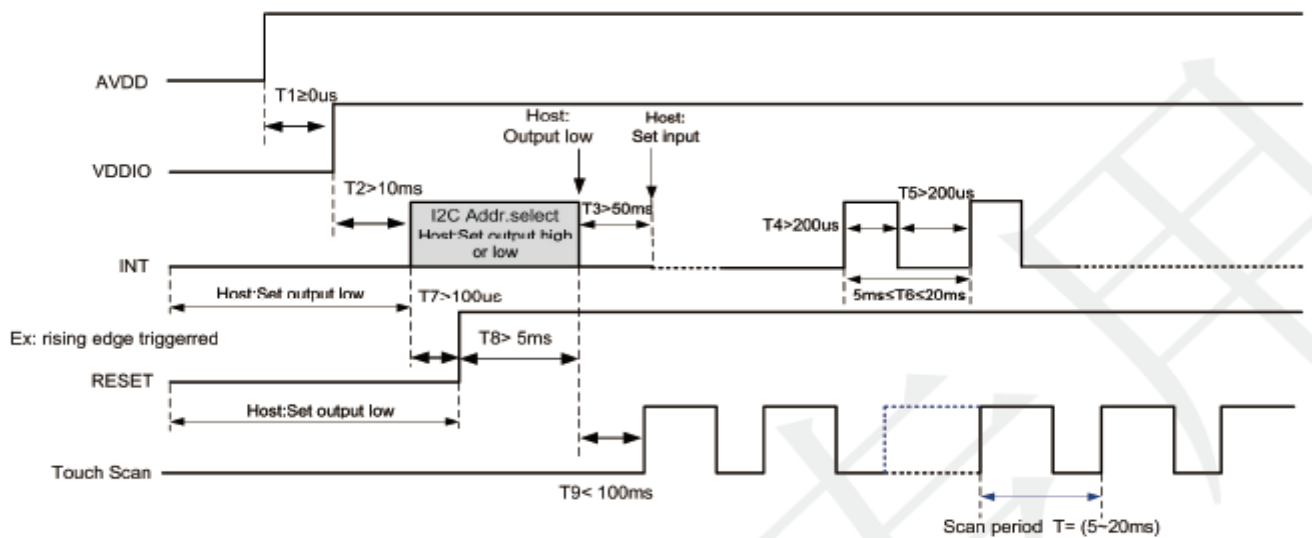
Parameter	Symbol	Min.	Max.	Unit
SCL low period	$t_{lo}$	1.3	-	us
SCL high period	$t_{hi}$	0.6	-	us
SCL setup time for Start condition	$t_{st1}$	0.6	-	us
SCL setup time for Stop condition	$t_{st3}$	0.6	-	us
SCL hold time for Start condition	$t_{hd1}$	0.6	-	us
SDA setup time	$t_{st2}$	0.1	-	us
SDA hold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

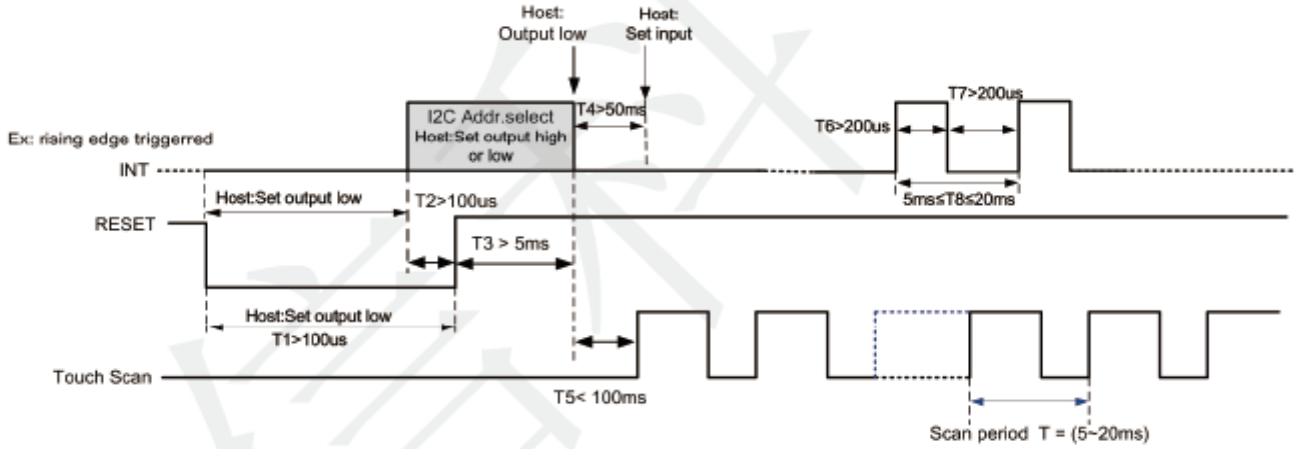
GT9271 supports two I2C slave addresses: 0xBA/0xBB and 0x28/0x29. The host can select the address by changing the status of Reset and INT pins during the power-on initialization phase. See the diagram below for configuration methods and timings:

**Power-on Timing:**

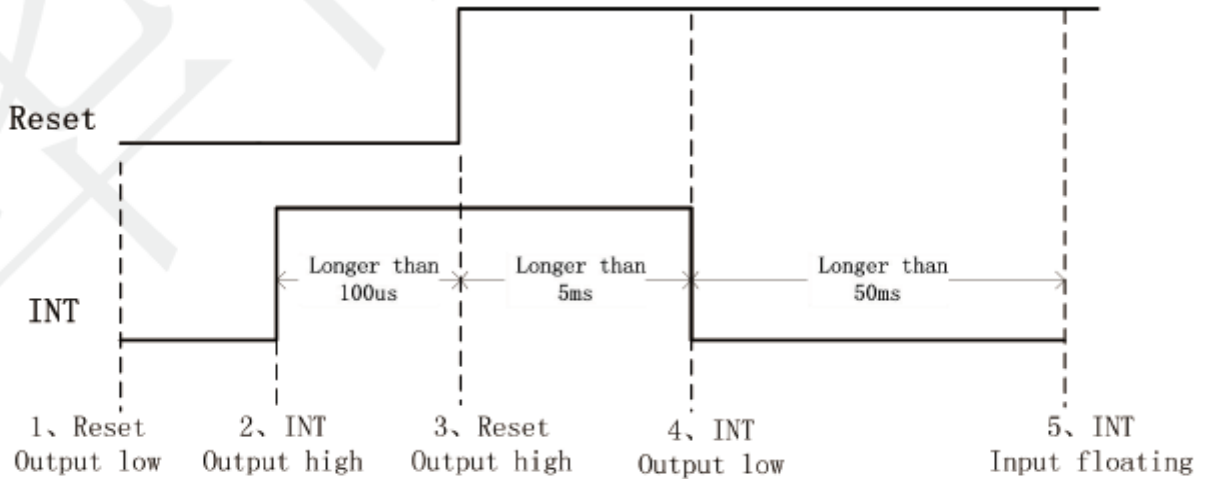


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常备库存 Stock For Sale	长期供货 Long Time supply	支持小量 NO MOQ	品种齐全 In Full Range	

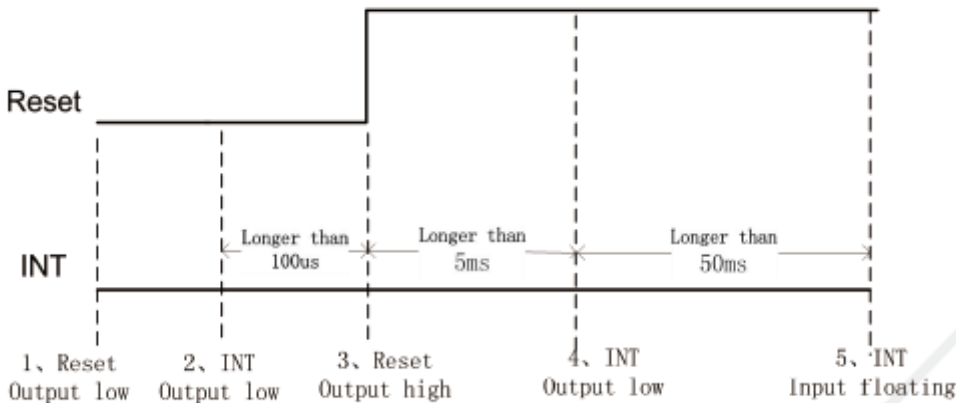
**Timing for host resetting GT9271:**



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



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



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**a) Data Transmission**

(For example: slave 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<sup>2</sup>C bus should detect the 8-bit address issued after Start condition and send the correct ACK. After receiving matching address, GT9271 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, GT9271 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 which implies the transition of SDA line from low to high when SCL line is high.

**b) Writing Data to GT9271**

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



**Timing for Write Operation**

The diagram above displays the timing sequence of the host writing data onto GT9271. 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.

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**c) Reading Data from GT9271**

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



**Timing for Read Operation**

The diagram above is the timing sequence of the host reading data from GT9271. 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.

GT9271 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.

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## 9. LCD Module Out-Going Quality Level

### 9.1 VISUAL & FUNCTION INSPECTION STANDARD

#### 9.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

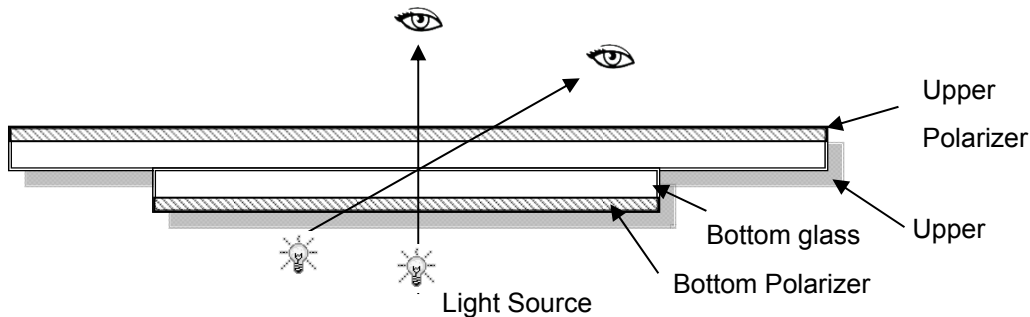
Temperature :  $25\pm 5^{\circ}\text{C}$

Humidity :  $65\%\pm 10\%\text{RH}$

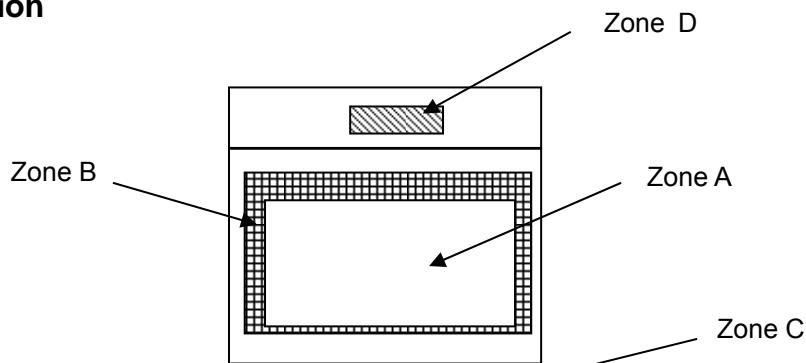
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



#### 9.1.2 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 .)

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

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### 9.1.3 Sampling Plan

According to GB/T 2828.1-2003 ; , normal inspection, Class II

AQL:

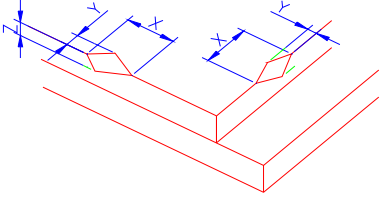
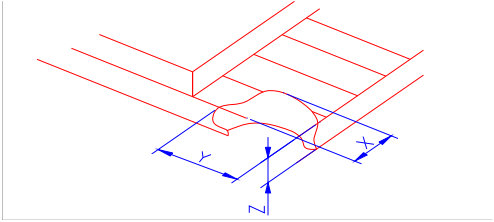
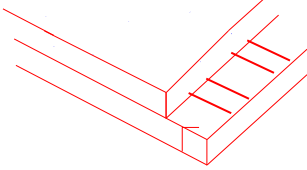
Major defect	Minor defect
0.65	1.5

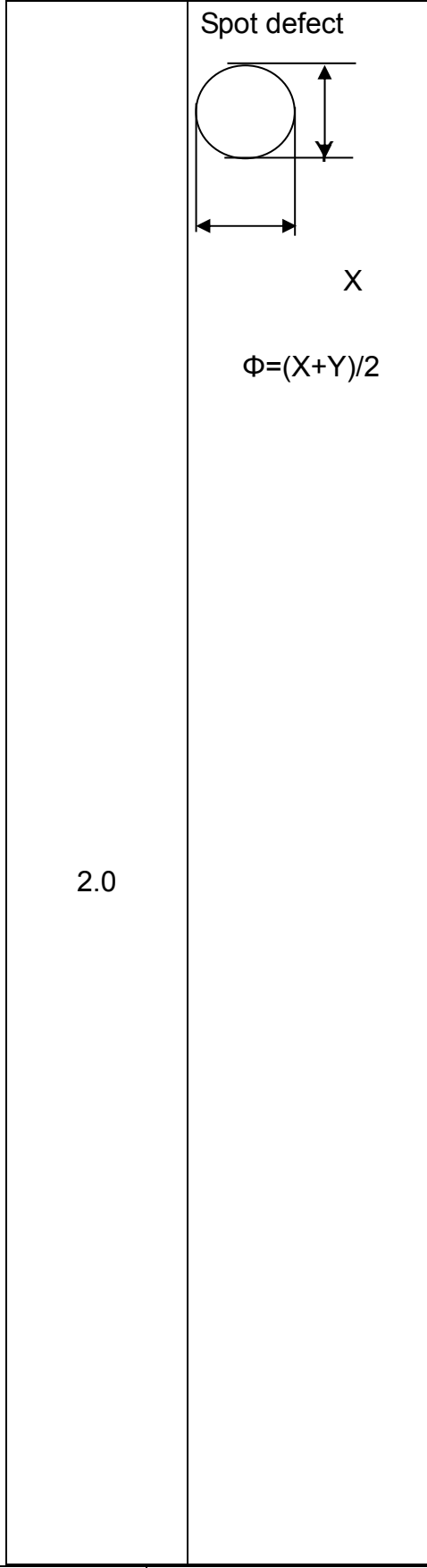
LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

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. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot Line defect	Light dot, Dim spot,Polarizer Bubble ; Polarizer accidented spot.	
6	Soldering appearance	Good soldering , Peeling off is not allowed.	
7	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	



### 9.1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD	(1) The edge of LCD broken	 <table border="1" data-bbox="756 667 1453 817"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>≤3.0mm</td> <td>&lt;Inner border line of the seal</td> <td>≤T</td> </tr> </tbody> </table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
X	Y	Z						
≤3.0mm	<Inner border line of the seal	≤T						
	(2)LCD corner broken	 <table border="1" data-bbox="815 1122 1394 1223"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>≤3.0mm</td> <td>≤L</td> <td>≤T</td> </tr> </tbody> </table>	X	Y	Z	≤3.0mm	≤L	≤T
X	Y	Z						
≤3.0mm	≤L	≤T						
	(3) LCD crack	 <p style="text-align: center;">Crack Not allowed</p>						



① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.10$	Ignore		
$0.10 < \Phi \leq 0.25$	4( distance $\geq 10\text{mm}$ )		
$0.25 < \Phi \leq 0.35$	3		
$\Phi > 0.4$	0		

② Dim spot (LCD/TP/Polarizer dim dot, light leakage, dark spot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.1$	Ignore		
$0.10 < \Phi \leq 0.25$	4( distance $\geq 10\text{mm}$ )		
$0.25 < \Phi \leq 0.35$	3		
$\Phi > 0.4$	0		

③ Polarizer accidented spot

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.2$	Ignore		
$0.3 < \Phi \leq 0.5$	3( distance $\geq 10\text{mm}$ )		
$\Phi > 0.5$	0		

④ Pixel bad points (light dot, Dim dot, color dot)

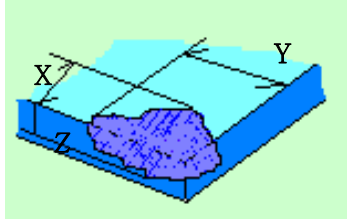
Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.15$	Ignore		
$0.2 < \Phi \leq 0.3$	2( distance $\geq 10\text{mm}$ )		
$\Phi > 0.4$	0		

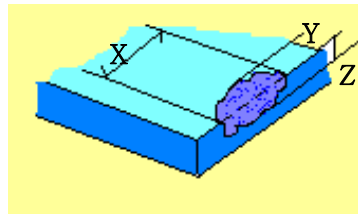
⑤ Polarizer Bubble

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.2$	Ignore		
$0.3 < \Phi \leq 0.4$	4(distance $\geq 10\text{ m}$ )		
$0.4 < \Phi \leq 0.5$	3		
$\Phi > 0.5$	0		

3.0	Line defect (LCD/TP /Polarizer backlight black/white line, scratch, stain)	Width(mm)	Length(m)	Acceptable Qty		
				A	B	C
		$\Phi \leq 0.05$	Ignore	Ignore		
		$0.05 < W \leq 0.06$	$L \leq 4.0$	N $\leq$ 3		
		$0.07 < W \leq 0.08$	$L \leq 3.0$	N $\leq$ 2		
	$0.08 < W$	Define as spot defect				
4.0	Electronic Components SMT	Not allow missing parts, solderless connection, cold solder joint, mismatch, The positive and negative polarity opposite				
5.0	Display color & Brightness	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.				
6.0	LCD Mura	By 5% ND filter invisible.				

7.0	CTP Related	CTP Cover sensor accidented black/white spot	Size $\Phi$ (mm)	Acceptable Qty		
				A	B	C
			$\Phi \leq 0.1$	Ignore		
			$0.15 < \Phi \leq 0.25$	4 (distance $\geq$ 10mm)		
			$0.25 < \Phi \leq 0.35$	3		
	$\Phi > 0.4$	0				

		CTP Cover scratch	<table border="1"> <thead> <tr> <th rowspan="2">Width(mm)</th> <th rowspan="2">Ignore(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.05</math></td> <td>Ignore</td> <td colspan="3">Ignore</td> </tr> <tr> <td><math>0.05 &lt; W \leq 0.06</math></td> <td><math>L \leq 4.0</math></td> <td colspan="3"><math>N \leq 3</math></td> </tr> <tr> <td><math>0.07 &lt; W \leq 0.08</math></td> <td><math>L \leq 3.0</math></td> <td colspan="3"><math>N \leq 2</math></td> </tr> <tr> <td><math>0.08 &lt; W</math></td> <td colspan="4">Define as spot defect</td> </tr> </tbody> </table>	Width(mm)	Ignore(mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.05$	Ignore	Ignore			$0.05 < W \leq 0.06$	$L \leq 4.0$	$N \leq 3$			$0.07 < W \leq 0.08$	$L \leq 3.0$	$N \leq 2$			$0.08 < W$	Define as spot defect			
			Width(mm)			Ignore(mm)	Acceptable Qty																								
				A	B		C																								
			$\Phi \leq 0.05$	Ignore	Ignore																										
			$0.05 < W \leq 0.06$	$L \leq 4.0$	$N \leq 3$																										
$0.07 < W \leq 0.08$	$L \leq 3.0$	$N \leq 2$																													
$0.08 < W$	Define as spot defect																														
CTP Cover Pinhole/ Lack of ink	<table border="1"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th>Acceptable Qty</th> </tr> </thead> <tbody> <tr> <td></td> <td>C</td> </tr> <tr> <td><math>\Phi \leq 0.2</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.2 &lt; \Phi \leq 0.3</math></td> <td>4(distance <math>\geq 10</math>mm)</td> </tr> <tr> <td><math>0.3 &lt; \Phi \leq 0.4</math></td> <td>3</td> </tr> <tr> <td><math>\Phi &gt; 0.4</math></td> <td>0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty		C	$\Phi \leq 0.2$	Ignore	$0.2 < \Phi \leq 0.3$	4(distance $\geq 10$ mm)	$0.3 < \Phi \leq 0.4$	3	$\Phi > 0.4$	0																		
	Zone Size (mm)		Acceptable Qty																												
			C																												
	$\Phi \leq 0.2$	Ignore																													
	$0.2 < \Phi \leq 0.3$	4(distance $\geq 10$ mm)																													
$0.3 < \Phi \leq 0.4$	3																														
$\Phi > 0.4$	0																														
CTP Bonding bubble/ accident spot	<table border="1"> <thead> <tr> <th rowspan="2">Size <math>\Phi</math>(mm)</th> <th colspan="2">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.1</math></td> <td colspan="2">Ignore</td> </tr> <tr> <td><math>0.15 &lt; \Phi \leq 0.2</math></td> <td colspan="2">3(distance <math>\geq 10</math>mm)</td> </tr> <tr> <td><math>0.2 &lt; \Phi \leq 0.25</math></td> <td colspan="2">2</td> </tr> <tr> <td><math>\Phi &gt; 0.25</math></td> <td colspan="2">0</td> </tr> </tbody> </table>	Size $\Phi$ (mm)	Acceptable Qty		A	B	$\Phi \leq 0.1$	Ignore		$0.15 < \Phi \leq 0.2$	3(distance $\geq 10$ mm)		$0.2 < \Phi \leq 0.25$	2		$\Phi > 0.25$	0														
	Size $\Phi$ (mm)		Acceptable Qty																												
		A	B																												
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	$0.15 < \Phi \leq 0.2$	3(distance $\geq 10$ mm)																													
$0.2 < \Phi \leq 0.25$	2																														
$\Phi > 0.25$	0																														
Assembly deflection	beyond the edge of backlight $\leq 0.2$ mm																														
TP cover broken X : length Y : width Z : height	<table border="1"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td><math>X \leq 0.5</math>mm</td> <td><math>Y \leq 0.5</math>mm</td> <td><math>Z &lt; \text{cover thickness}</math> s</td> </tr> </tbody> </table>	X	Y	Z	$X \leq 0.5$ mm	$Y \leq 0.5$ mm	$Z < \text{cover thickness}$ s																								
X	Y	Z																													
$X \leq 0.5$ mm	$Y \leq 0.5$ mm	$Z < \text{cover thickness}$ s																													
Circuitry broken is not allowed.																															

		TP cover broken X : length Y : width Z : height	X	Y	Z	
			$X \leq 0.3\text{mm}$	$Y \leq 0.3\text{mm}$	$Z < \text{LCD thickness}$ $s$	
* 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	TP no function	Not allowed

## 10. Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	70°C,96HR	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°C, 96HR	
High Temperature Storage	80°C, 96HR	
Low Temperature Storage	-30°C, 96HR	
High Temperature & High Humidity Operating	+60°C, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-30°C,30 min ↔ 80°C,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panelS Air:±8KV, 5times; Contact:±6KV, 5 times; (Environment: 15°C~35°C, 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,80cm(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.

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## 11. Cautions and Handling Precautions

### 11.1 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

### 11.2 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 °C 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.

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## 12. Packing

---TBD-----

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