

- Tentative Specification
- Preliminary Specification
- Approval Specification

## MODELNAME:YH065MS4001

### Version:RQ01

<b>Customer: Common</b>	
<b>APPROVED BY</b>	<b>SIGNATURE</b>
<b>Name / Title</b> _____	_____
Note	
_____	
Please return 1 copy for your confirmation with your signature and comments.	

Approved By	Checked By	Prepared By



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## 1. General Specifications

### 1.1 LCM General Information

Item	Specification	Unit
LCD Size	6.5	inch
Number of Pixels	1024(H) RGB x 400(V)	pixels
Display Mode	Normally Black	-
Viewing Direction	Free	o' clock
Interface	LVDS	-
Display Colors	16.7M	colors
Outline Dimension	165.00(H) x 72.86(V) x 3.5(D)	mm
Active Area	154.21(H) x 57.28 (V)	mm
Pixel Pitch	0.1505(H) x 0.1432(V)	mm
Driver IC	EK79001HN+EK73215BCGA	-
Operation Temperature	-20~70	°C
Storage Temperature	-30~80	°C

Note1:Requirements on environmental protection RoHS compliant.

## 2. Absolute Maximum Ratings

Item	Symbol	MIN.	MAX.	Unit	Note
Analog Supply voltage	VDD	-0.3	5.0	V	Note 1

Note 1:Permanent damage may occur to the LCD module if beyond this specification.

Functional operation should be restricted to the conditions described under normal operating conditions.

## 3. Electrical Characteristics

### 3.1 Recommended Operating Condition for TFT LCD

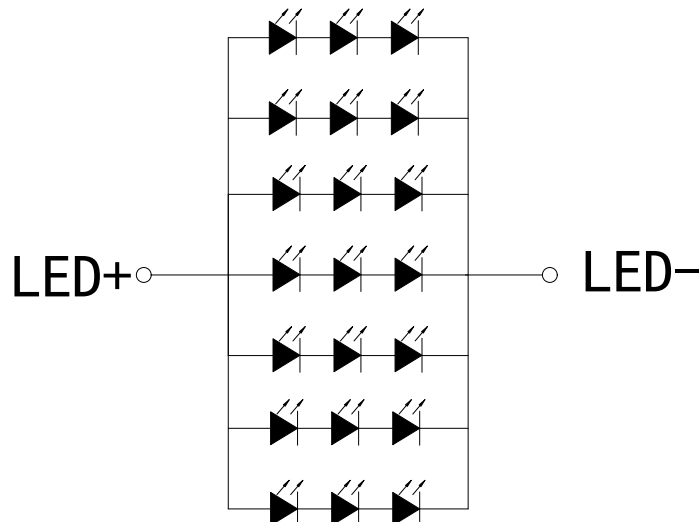
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	VDD	3.0	3.3	3.6	V	
Analog supply current	I <sub>VDD</sub>	-	TBD	-	mA	VDD=3.3V
Power supply for LCD	AVDD	9.0	9.8	10.5	V	
	VGH	16.0	18.0	20	V	
	VGL	-7.5	-6.0	-5.0	V	
	VCOM	2.9	3.25	3.5	V	
Logic input voltage	VIH	0.7*IOVCC	-	IOVCC	V	
	VIL	GND	-	0.3*IOVCC	V	

### 3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Driving Current	I <sub>F</sub>	-	140	-	mA	
Driving Voltage	V <sub>F</sub>	8.1	-	10.2	V	
Power consumption	W <sub>BL</sub>	1.134	-	1.428	W	
LED Life-Time	N/A	30,000	-	-	Hours	Ta=25°C Note 1

Note 1: LED lifetime is defined as the module brightness decay 50% of original brightness at Ta=25 degree, typical current.

Note 2: LED circuit :



## 4. Interface Pin Assignment

### 4.1 LCM Pin Assignment

Recommended connector: FH12-40S-0.5SH manufactured by HIROSE

No.	Symbol	Description
1	VCOM	Common voltage
2	VDD	Power voltage for digital circuit
3	VDD	Power voltage for digital circuit
4	NC	No connection
5	RESET	Global reset pin
6	STBYB	Standby mode normally pulled high STBYB=1,normal operation STBYB=0,timing contrller,source Driver will turn off,all output are High-Z
7	GND	Ground
8	RXIN0-	-LVDS differential data input
9	RXIN0+	+LVDS differential data input
10	GND	Ground
11	RXIN1-	-LVDS differential data input
12	RXIN1+	+LVDS differential data input
13	GND	Ground
14	RXIN2-	-LVDS differential data input
15	RXIN2+	+LVDS differential data input
16	GND	Ground
17	RXCLKIN-	-LVDS differential clock input
18	RXCLKIN+	+LVDS differential clock input
19	GND	Ground
20	RXIN3-	-LVDS differential data input
21	RXIN3+	+LVDS differential data input
22	GND	Ground
23	NC	No connection
24	NC	No connection
25	GND	Ground
26	NC	No connection

27	DIMO	Backlight CABc controller signal output
28	SELB	6bit/8bit mode select (Note 1)
29	AVDD	Power for analog circuit
30	GND	Ground
31	LED-	LED cathode
32	LED-	LED cathode
33	L/R	Horizontal inversion (Note 2)
34	U/D	Vertical inversion (Note 2)
35	VGL	Gate off voltage Power supply
36	NC	No connection
37	NC	No connection
38	VGH	Gate on voltage
39	LED+	LED anode
40	LED+	LED anode

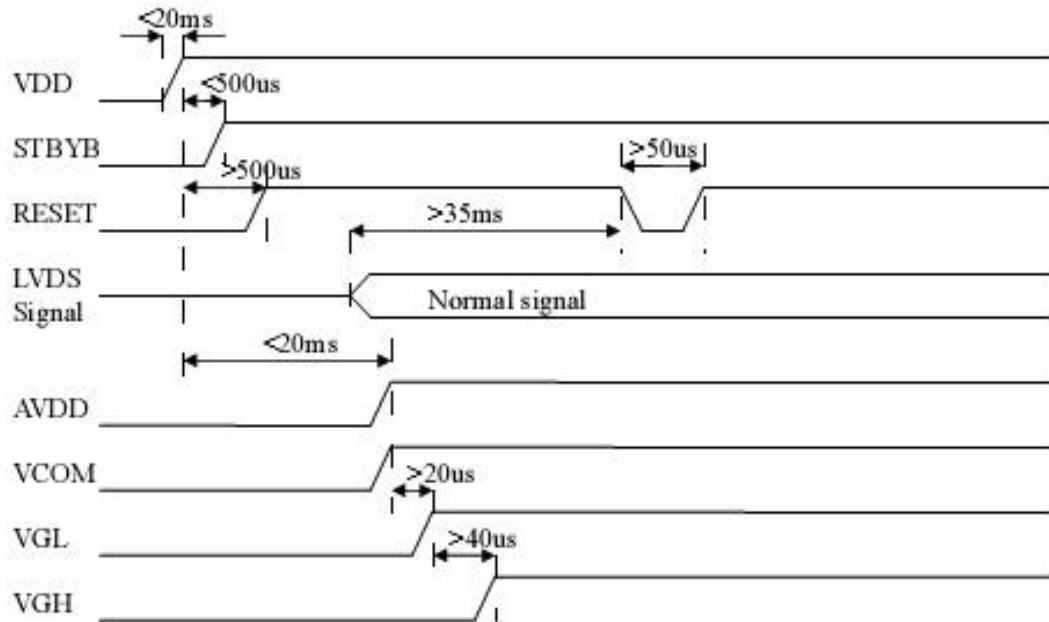
Note 1: If LVDS input data is 6bit, selb must be set to high  
 If LVDS input data is 8bit, selb must be set to low

Note 2: When L/R=0 set right to left scan direction  
 When L/R=1 set left to right scan direction  
 When U/D=0 set top to bottom scan direction  
 When U/D=1 set bottom to top scan direction

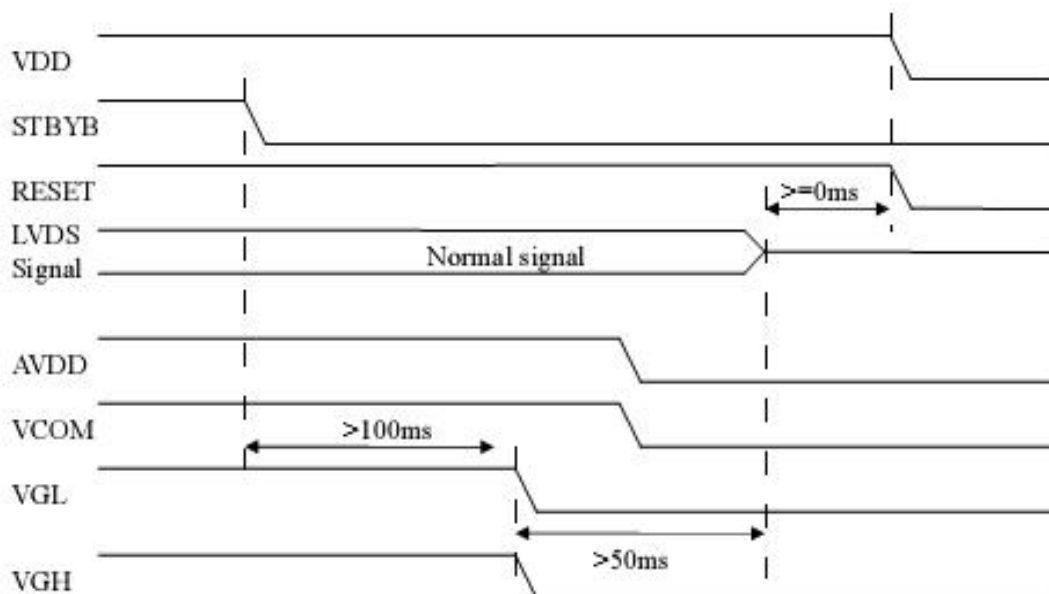
## 5. Interface Characteristics

### 5.1 Power sequence

#### a. Power on:



#### b. Power off:

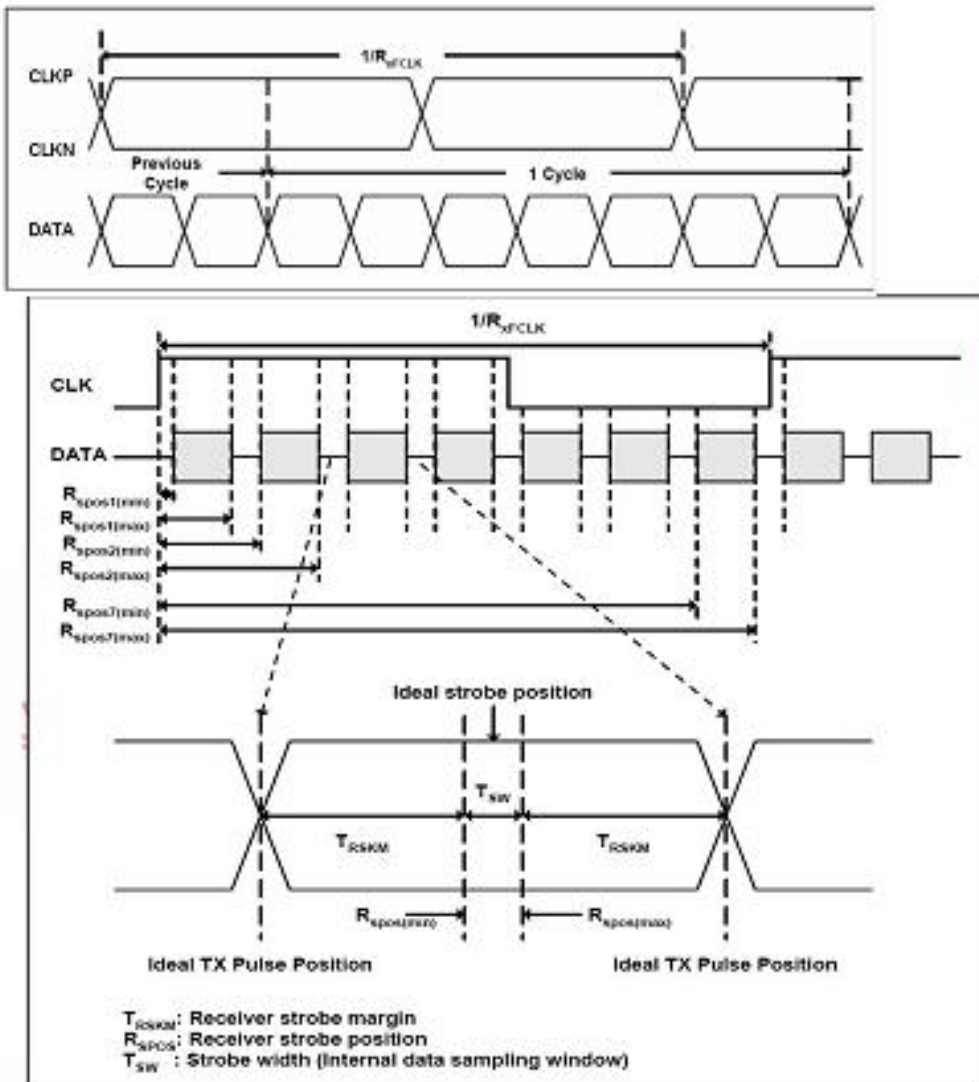


## 5.2 Timing Characteristics

### 3.3.1. AC Electrical Characteristics

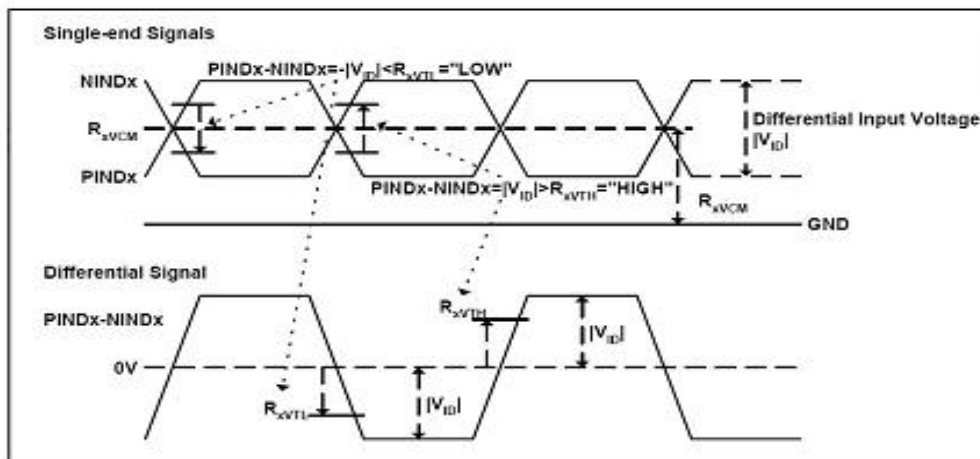
Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock frequency	$R_{XFCLK}$	40.8	51.2	67.2	MHz	
Input data skew margin	$T_{RSKM}$	500	-	-	ps	
Clock high time	$T_{LVCH}$	-	$4/(7 * R_{XFCLK})$	-	ns	
Clock low time	$T_{LVCL}$	-	$3/(7 * R_{XFCLK})$	-	ns	

### 3.3.2. Input Clock and Data Timing Diagram



### 3.3.3. DC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Differential input high Threshold voltage	$R_{xvTH}$	-	-	+0.1	V	$R_{xvcm}=1.2V$
Differential input low Threshold voltage	$R_{xvTL}$	-0.1	-	-	V	
Input voltage range (singled-end)	$R_{xvIN}$	0	-	2.4	V	
Differential input common mode voltage	$R_{xvcm}$	$ V_{ID} /2$	-	$2.4- V_{ID} /2$	V	
Differential voltage	$ V_{ID} $	0.2	-	0.6	V	
Differential input leakage current	$R_{V_{xIz}}$	-10	-	+10	$\mu A$	

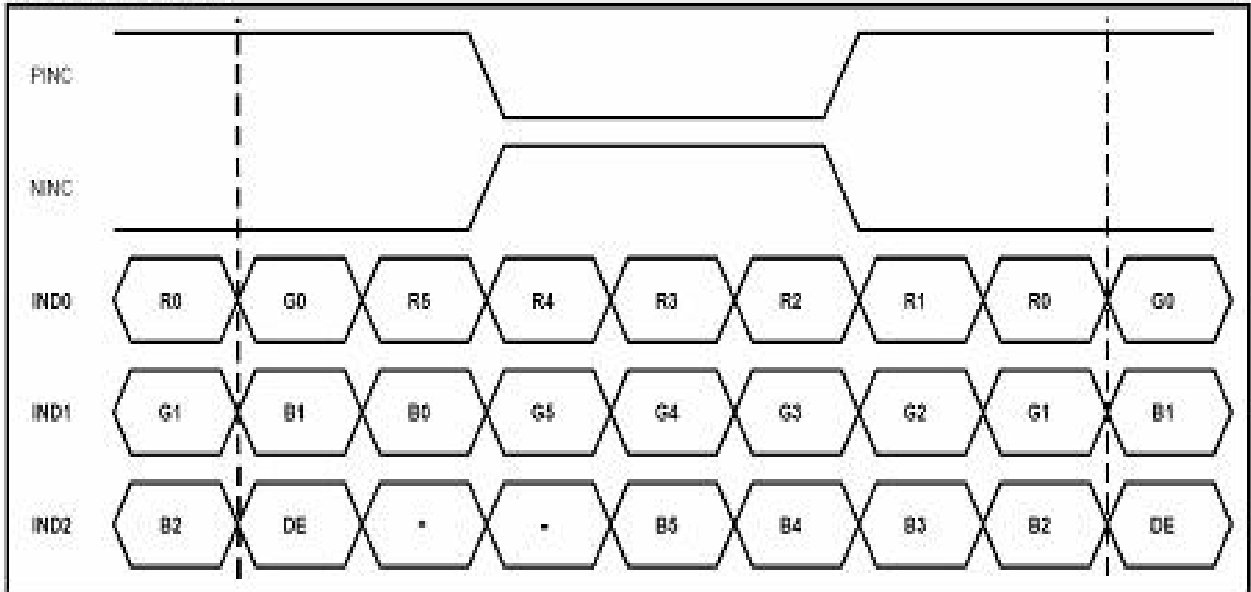


### 3.3.4. Timing

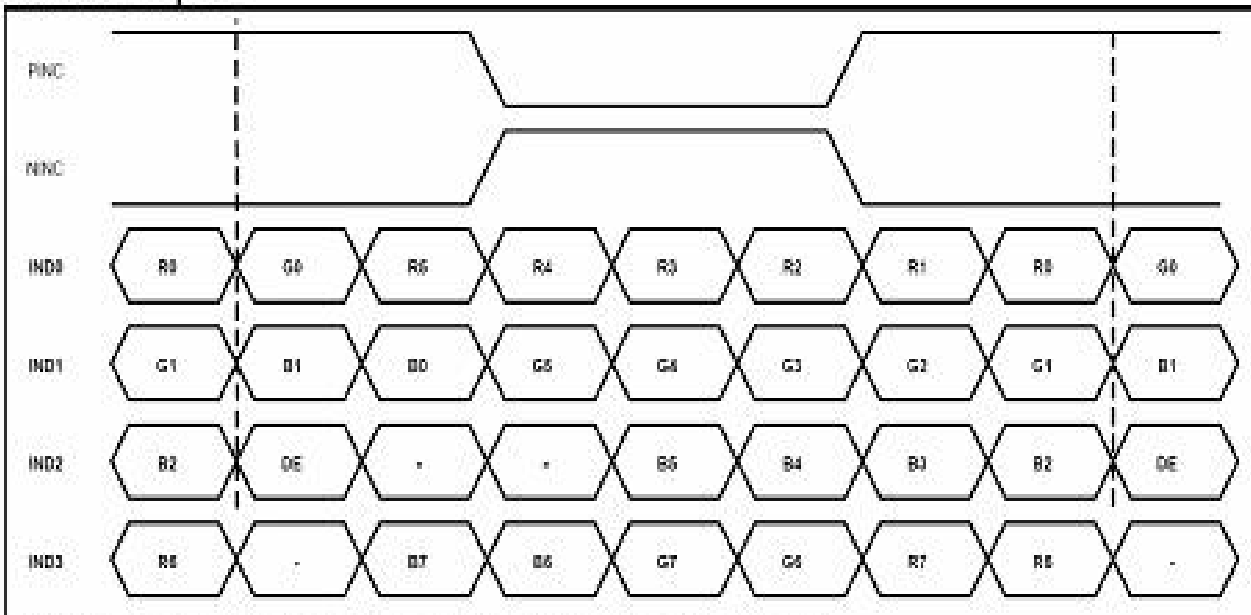
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	fclk	40.8	51.2	67.2	MHz	Frame rate =60Hz
Horizontal display area	thd	1024			DCLK	
HS period time	th	1114	1344	1400	DCLK	
HS Blanking	thb	90	320	376	DCLK	
Vertical display area	tvd	600			H	
VS period time	tv	610	635	800	H	
VS Blanking	thb	10	35	200	H	

## 3.3.5. Data Input Format

### 6bit LVDS input



### 8bit LVDS input



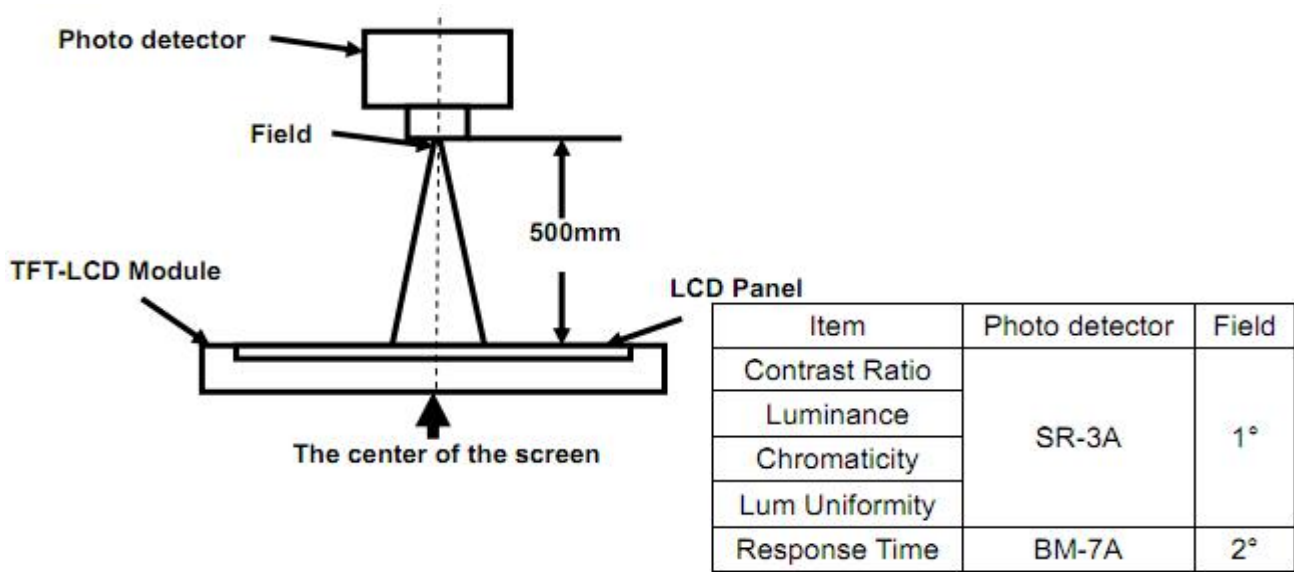
Note: Support DE timing mode only, SYNC mode not supported.

## 6. Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR≥10) B/L ON	$\theta_T$	$\Phi=90^\circ$ (12 o'clock)	-	85	-	deg	Note2
	$\theta_B$	$\Phi=270^\circ$ (6 o'clock)	-	85	-	deg	Note2
	$\theta_L$	$\Phi=180^\circ$ (9 o'clock)	-	85	-	deg	Note2
	$\theta_R$	$\Phi=0^\circ$ (3 o'clock)	-	85	-	deg	Note2
Response Time	$T_{ON}$	Normal $\theta=\Phi=0^\circ$	-	15	20	msec	Note4
	$T_{OFF}$		-	15	20	msec	Note4
Contrast Ratio	CR		-	800	-	-	Note1 Note3
Color Chromaticity	$W_X$		0.258	0.308	0.358	-	Note1 Note5
	$W_Y$		0.286	0.336	0.386	-	Note1 Note5
Luminance	L		500	600	-	cd/m <sup>2</sup>	Note1 Note7
Luminance Uniformity	$Y_U$		75	80	-	%	Note1 Note6
NTSC	-		-	50	-	%	-

Note 1: Definition of optical measurement system

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system

Viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

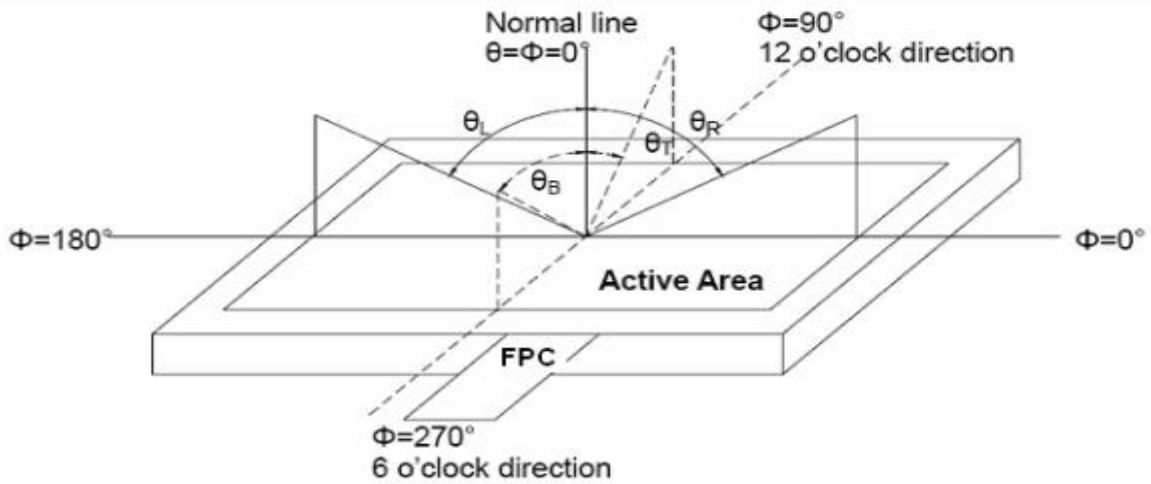


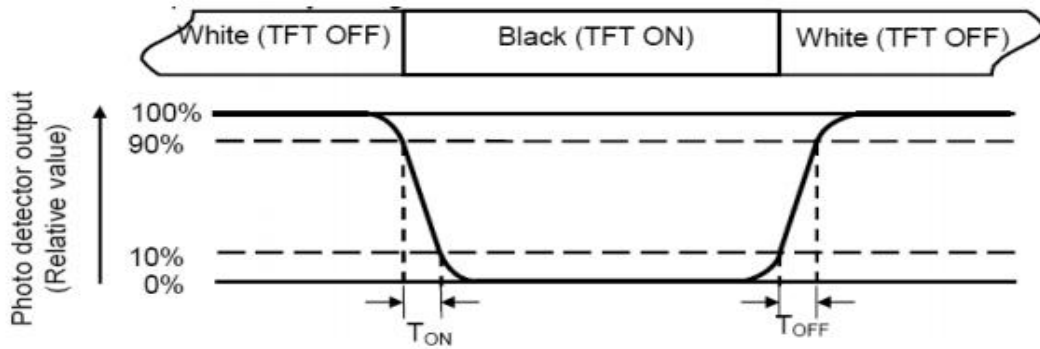
Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

**Note 4: Definition of Response time**

The response time is defined as the LCD optical switching time interval between “White” state and “Black”state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



**Note 5: Definition of color chromaticity (CIE1931)**

Color coordinates measured at center point of LCD.

**Note 6: Definition of Luminance Uniformity**

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance. For more information see FIG.2.

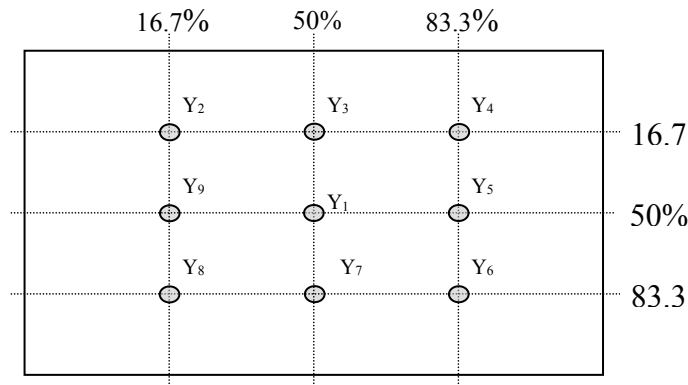


Fig. 2 Definition of points

**Note 7: Definition of Luminance (Refer Fig. 2)**

Surface luminance is the luminance with all pixels displaying white.

$L_v = \text{Average Surface Luminance with all white pixels}(P_1, P_2, P_3, \dots, P_n)$ .

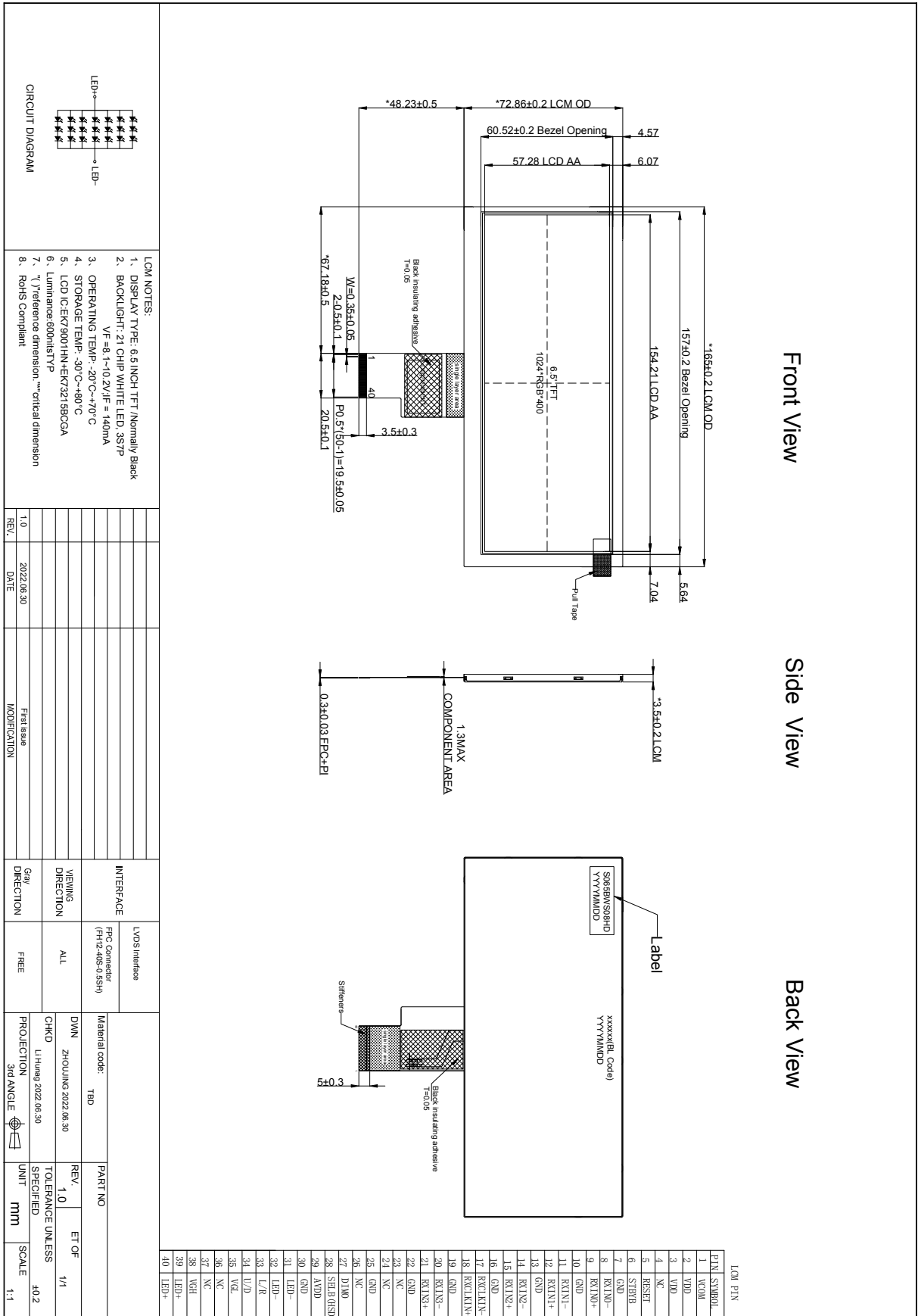
## 7. Reliability Test Items

Test Item	Test Conditions
High Temperature Storage	Ta= +80°C 96hrs
Low Temperature Storage	Ta= -30°C 96hrs
High Temperature Operation	Ta= +70°C 96hrs
Low Temperature Operation	Ta= -20°C 96hrs
High Temperature and Humidity Operation	Ta= +60°C, 90% RH 96hrs
Thermal Shock (Non-operation)	-30°C/30 min ~ +80°C/30 min for 20 cycles Start with cold temperature end with high temperature
Electro Static Discharge	Contact = ± 4 kV, class B Air = ± 8 kV, class B R=330Ω,C=150pF
Vibration	Sweep: 10Hz~55Hz~10Hz Stroke: 1.5mm 2 hrs for each direction of X .Y. Z.
Mechanical Shock	60G 6ms,±X,±Y,±Z 3 times for each direction
Package Drop Test	Height: 60 cm 1 corner, 3 edges, 6 surfaces

Notes: The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:

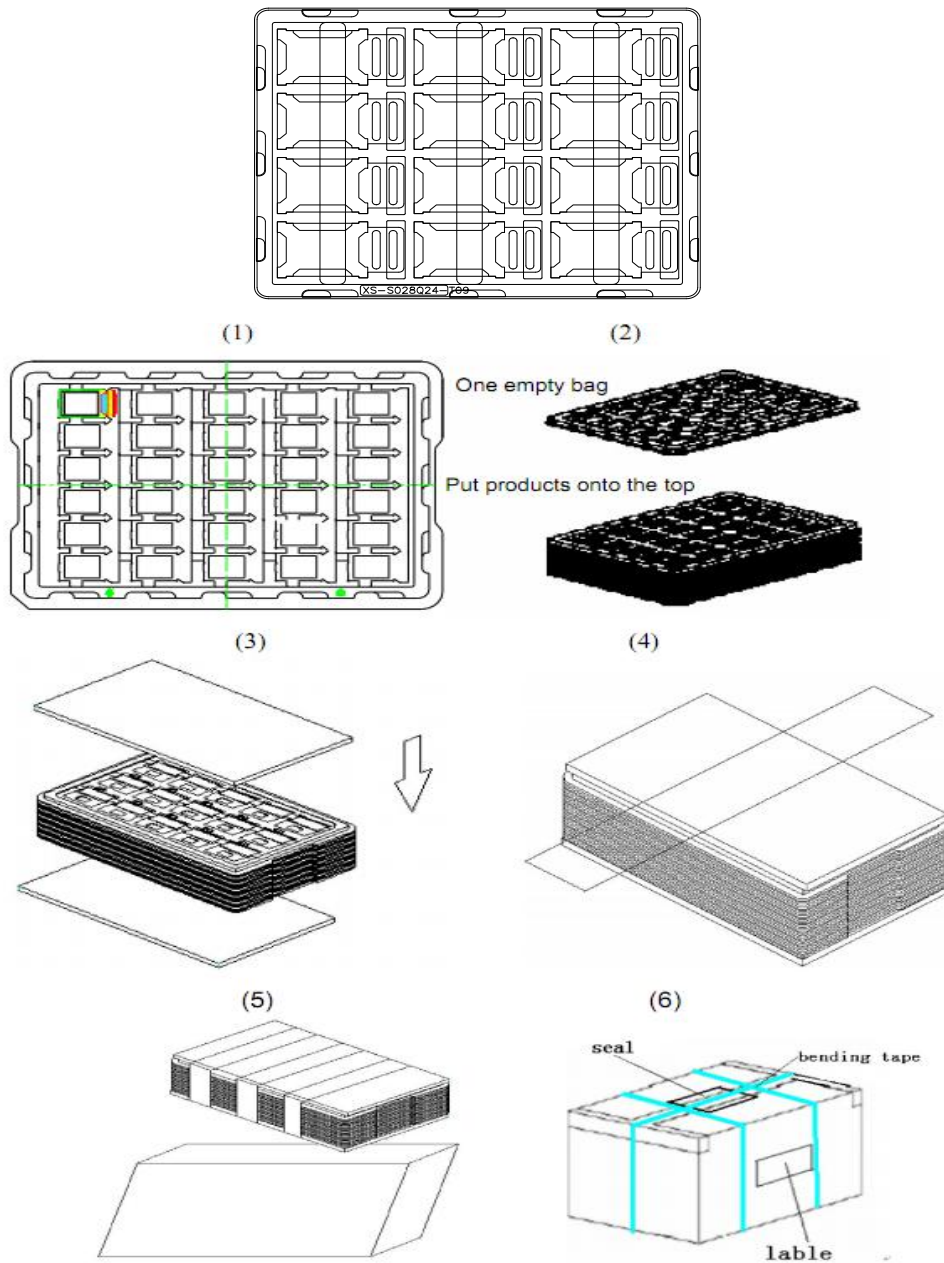
- 1). Air bubble in the LCD
- 2). Seal leak or Glass crack
- 3). Non display or abnormal display
- 4). Brightness reduction >50%

## 8. Mechanical Drawing



## 9. Packing

### Packing Method



Steps:

1. Put module into tray cavity
2. Tray stacking
3. Put 1 cardboard under the tray stack and 1 cardboard above
4. Fix the cardboard to the tray stack with adhesive tape
5. Put the tray stack into carton
6. Carton sealing with adhesive tape

## 10. TFT-LCD Module Inspection Criteria

### 10.1 Scope

The incoming inspection standards shall be applied to TFT –LCD Modules (hereinafter called "Modules") that supplied by CDTech.

### 10.2 Incoming Inspection

The customer shall inspect the modules within twenty calendar days of the delivery date (the "inspection period") at its own cost. The result of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to the seller, If the results of the inspecting from buyer does not send to the seller within twenty calendar days of the delivery date. The modules shall be regards as acceptance. Should the customer fail to notify the seller within the inspection period, the buyers right to reject the modules shall be lapsed and the modules shall be deemed to have been accepted by the buyer.

### 10.3 Inspection Sampling

10.3.1. Lot size: Quantity per shipment lot per model

10.3.2. Sampling type: Normal inspection, Single sampling

10.3.3. Inspection level: II

10.3.4. Sampling table: MIL-STD-105E

10.3.5. Acceptable quality level (AQL )

Major defect: AQL=0.65

Minor defect: AQL=1.00

### 10.4 Inspection Conditions

10.4.1 Ambient conditions:

a. Temperature: Room temperature  $25\pm 5^{\circ}\text{C}$

b. Humidity:  $(60\pm 10)\% \text{RH}$

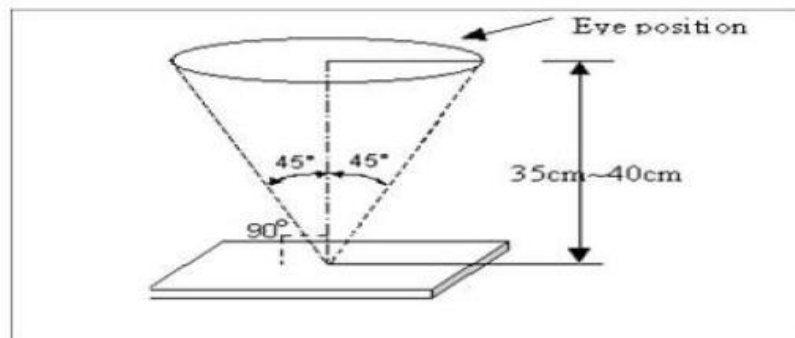
c. Illumination: Single fluorescent lamp non-directive (300 to 700 Lux)

10.4.2 Viewing distance

The distance between the LCD and the inspector's eyes shall be at least  $35\pm 5$  cm.

10.4.3 Viewing Angle

U/D:  $45^{\circ}/45^{\circ}$ , L/R:  $45^{\circ}/45^{\circ}$



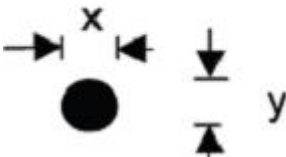
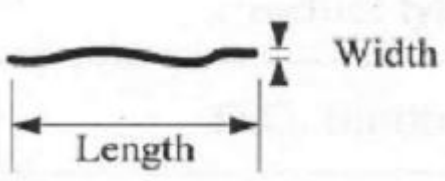
## 10.5 Inspection Criteria

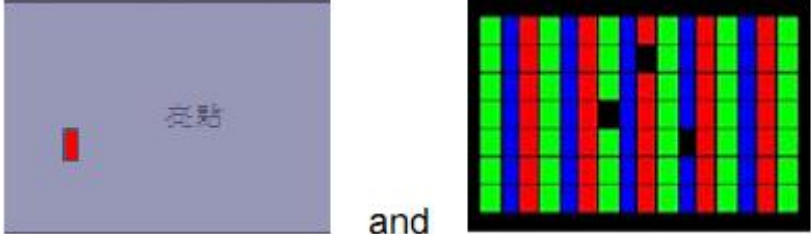
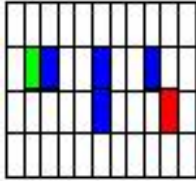
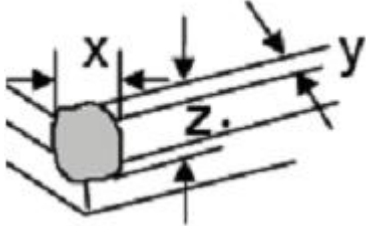
Defects are classified as major defects and minor defects according to the degree of defectiveness defined here in.

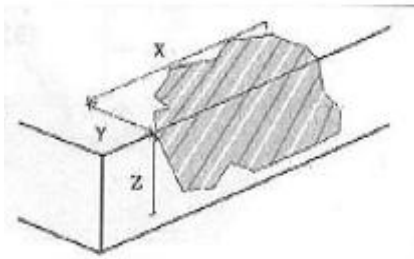
### 10.5.1; Ma or defect

Item No	Items to be inspected	Inspection Standard
5.1.1	All functional defects	1) No display 2) Display abnormally 3) Short circuit 4) line defect
5.1.2	Missing	Missing function component
5.1.3	Crack	Glass Crack

### 10.5.2. Minor defect

Item No	Items to be inspected	Inspection standard	
5.2.1	Spot Defect Including Black spot White spot Pinhole Foreign particle Polarizer dirt	For dark/white spot is defined $\varphi = (x+y) / 2$ 	
		Size $\varphi$ (mm)	Acceptable Quantity
		$\varphi \leq 0.2$	Ignore
		$0.2 < \varphi \leq 0.35$	3
		$0.35 < \varphi$	Not allowed
5.2.2	Line Defect Including Black line White line Scratch	Define: 	
		Width(mm) Length(mm)	Acceptable Quantity
		$W \leq 0.05$	Ignore

		$0.05 < W \leq 0.1$ $L \leq 2.5$	4						
		$0.1 < W, \text{ or } L > 2.5$	Not allowed						
5.2.3	Polarizer Dent/Bubble	Size $\phi$ (mm)	Acceptable Quantity						
		$\phi \leq 0.2$	Ignore						
		$0.2 < \phi \leq 0.35$	3						
		$0.35 < \phi$	Not allowed						
		Total QTY	3						
5.2.4	Electrical Dot Defect	Bright and Black dot define:							
									
		and							
									
		Two Adjacent Dot							
		Inspection pattern: Full white, Full black, Red, green and blue screens							
		<table border="1"> <thead> <tr> <th>Item</th> <th>Acceptable Quantity</th> </tr> </thead> <tbody> <tr> <td>Black dot defect</td> <td>3</td> </tr> <tr> <td>Bright dot defect</td> <td>2</td> </tr> <tr> <td>Total Dot</td> <td>3</td> </tr> </tbody> </table>		Item	Acceptable Quantity	Black dot defect	3	Bright dot defect	2
Item	Acceptable Quantity								
Black dot defect	3								
Bright dot defect	2								
Total Dot	3								
5.2.5	Glass defect	1. Corner Fragment:							
									
		<table border="1"> <thead> <tr> <th>Size(mm)</th> <th>Acceptable Quantity</th> </tr> </thead> <tbody> <tr> <td><math>X \leq 3\text{mm}</math> <math>Y \leq 1\text{mm}</math> <math>Z \leq T</math></td> <td>Ignore T: Glass thickness X: Length Y: Width</td> </tr> </tbody> </table>	Size(mm)	Acceptable Quantity	$X \leq 3\text{mm}$ $Y \leq 1\text{mm}$ $Z \leq T$	Ignore T: Glass thickness X: Length Y: Width			
Size(mm)	Acceptable Quantity								
$X \leq 3\text{mm}$ $Y \leq 1\text{mm}$ $Z \leq T$	Ignore T: Glass thickness X: Length Y: Width								

			Z: thickness
		 <p>2. Side Fragment:</p>	
		Size(mm)	Acceptable Quantity
		$X \leq 5.0\text{mm}$ $Y \leq 1\text{mm}$ $Z \leq T$	T: Glass thickness X: Length Y: Width Z: thickness

- Note:
- 1). Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area.
  - 2). The distance between two bright dot defects (red, green, blue, and white) should be larger than 15mm.
  - 3). The distance between black dot defects or black and bright dot defects should be more than 5mm apart.
  - 4). Polarizer bubble is defined as the bubble appears on active display area. The defect of polarizer bubble shall be ignored if the polarizer bubble appears on the outside of active display area.

## 10.6 Mechanics specification

As for the outside dimension, weight of the modules, please refer to product specification for more details.

## 11. Precautions for Use of LCD modules

### 11.1 Handling Precautions

11.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

11.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

11.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

11.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

11.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketene
- Aromatic solvents

11.1.6. Do not attempt to disassemble the LCD Module.

11.1.7. If the logic circuit power is off, do not apply the input signals.

11.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

11.1.8.1. Be sure to ground the body when handling the LCD Modules.

11.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

11.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

11.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

### 11.2 Storage Precautions

11.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

11.2.2. The LCD modules should be stored under the storage temperature range if the LCD modules will be stored for a long time, the recommend condition is :

Temperature : 0°C ~40°C    Relatively humidity: ≤80%

11.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

### 11.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.