



深圳市思迪科科技有限公司
SHENZHEN CDTECH ELECTRONICS

Product Specification

Model Name	S015HQ01HN
Description	TFT LCD Module 1.5" QVGA 240(RGB)x240Dots
Date	2021/09/29
Version	1.0

Approved by/Date	Check by/Date	Prepared by/Date
ZHP 2021/09/29	HZX 2021/09/29	ZWF 2021/09/29

Customer Approval	
Date	



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1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2021/8/21	First Release.	ZWF
	2021/9/17	Update brightness to 500nitsTYP	ZWF
	2022/3/01	Update the drawing	HL

2. General Specifications

	Feature	Spec
Characteristics	Size	1.54 inch
	Resolution	240(horizontal)*240(Vertical)
	Interface	SPI+RGB
	Connect type	Ziff 0.5mm
	Display Colors	262K
	Technology type	a-Si
	Pixel pitch (mm)	0.116*0.116
	Pixel Configuration	R.G.B.-Stripe
	Display Mode	Normally White
	Driver IC	ST7789V2
	CTP Driver IC	-
	Viewing Direction	full view
Mechanical	LCM (W x H x D) (mm)	31.42*34.00*2.03
	Active Area(mm)	27.72*27.72
	With /Without TSP	Without CTP
	Weight (g)	TBD
	LED Numbers	3 LEDs

Note 1: Requirements on Environmental Protection: RoHs

Note 2: LCM weight tolerance: +/- 5%

3. Input/Output Terminals

LCD PIN-MAP

No.	Symbol	Description
1	LEDK	LED Cathode K
2	LEDA	LED Anode A
3	GND	Power Ground
4	VDD	Interface I/O Power supply (2.8V-3.3V)
5-6	NC	No connect
7-12	R0-R5	Data bus
13-14	NC	No connect
15-20	G0-G5	Data bus
21-22	NC	No connect
23-28	B0-B5	Data bus
29	GND	Power Ground
30	DCLK	t clock signal input. Latching input data at its rising edge.
31	VPP(NC)	No connect
32	HSYNC	Horizontal sync input. Negative polarity.
33	VSYNC	Vertical sync input. Negative polarity..
34	DE	Data enable input. Active high to enable the input data bus under “ DE Mode.”
35	NC	No connect
36	GND	Power Ground
37	SPI-CLK	clock for 4 line serial interface
38	SPI-DATA	Serial input signal
39	SPI-CS	Chip select pin
40	SPI-RST	Reset signal pin

4. Absolute Maximum Rating

Driving TFT LCD Panel

Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	V _{CC}	2.5	4.8	V	
Input Voltage	IOVCC	1.65	3.3	V	
Operating Temperature	T _{OPR}	-20	70	°C	
Storage Temperature	T _{STG}	-30	80	°C	

5. Electrical characteristics

5.1 ELECTRICAL CHARACTERISTICS

Item	Symbol	MIN	TYP	MAX	Unit	Remark	
Analog Supply Voltage	V _{CC}	2.5	2.8	3.3	V		
Logic Signal Input /Output Voltage	IOVCC	1.65	1.8	3.3	V		
Input Signal Voltage	Low Level	V _{IL}	V _{SS}	-	0.3x IOVCC	V	
	High Level	V _{IH}	0.7x IOVCC	-	IOVCC	V	
TFT Common Electrode	V _{COMH}	2.5	-	5	V		
TFT Gate ON Voltage	V _{GH}	10	-	16	V		
TFT Gate ON Voltage	V _{GL}	-10	-	-5	V		

5.3 LED Driving Conditions

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I _F	-	60	-	mA	
Forward Voltage	V _F	2.7	-	3.4	V	
Backlight Power consumption	W _{BL}	0.16	-	0.20	W	
LED Lifetime		-	25000	-	Hrs	

Note 1: Each LED: $I_F = 60 \text{ mA}$, $V_F = 2.7\text{-}3.4\text{V}$.

Note 2: Optical performance should be evaluated at $T_a = 25^\circ\text{C}$ only.

Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life Time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

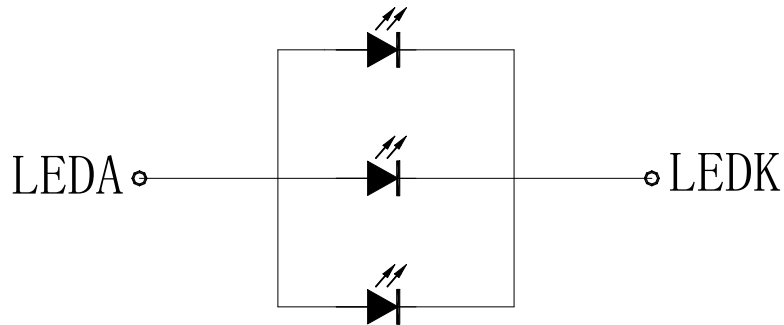


Figure: LED connection of backlight(Constant Current)

6.Interface Timing

6.1 Serial Interface Characteristics (3-line serial):

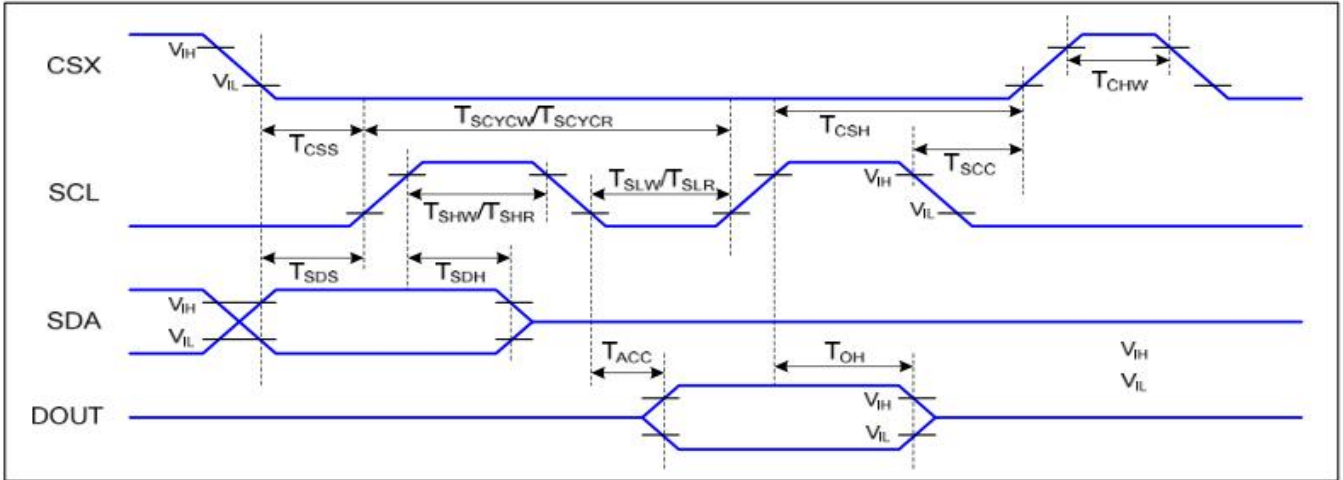


Figure 4 3-line serial Interface Timing Characteristics

V_{DDI}=1.65 to 3.3V, V_{DD}=2.4 to 3.3V, A_{GN}D=D_{GN}D=0V, T_a=25°C

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	T _{CSS}	Chip select setup time (write)	15		ns	
	T _{CSH}	Chip select hold time (write)	15		ns	
	T _{CSS}	Chip select setup time (read)	60		ns	
	T _{SCC}	Chip select hold time (read)	65		ns	
	T _{CHW}	Chip select "H" pulse width	40		ns	
SCL	T _{SCYCW}	Serial clock cycle (Write)	16		ns	
	T _{SHW}	SCL "H" pulse width (Write)	7		ns	
	T _{SLW}	SCL "L" pulse width (Write)	7		ns	
	T _{SCYCR}	Serial clock cycle (Read)	150		ns	
	T _{SHR}	SCL "H" pulse width (Read)	60		ns	
	T _{SLR}	SCL "L" pulse width (Read)	60		ns	
SDA (DIN)	T _{SDS}	Data setup time	7		ns	
	T _{SDH}	Data hold time	7		ns	
DOUT	T _{ACC}	Access time	10	50	ns	For maximum CL=30pF
	T _{OH}	Output disable time	15	50	ns	For minimum CL=8pF

Table 5 3-line serial Interface Characteristics

6.2 Serial Interface Characteristics (4-line serial):

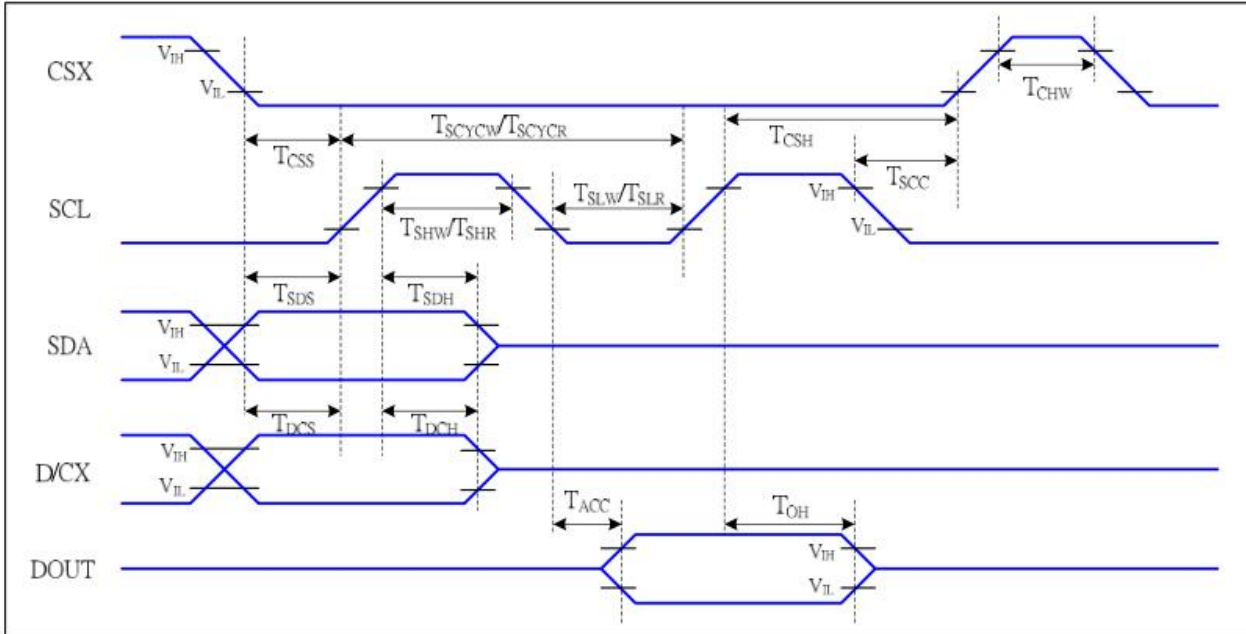


Figure 5 4-line serial Interface Timing Characteristics

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=25°C

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T _{CSS}	Chip select setup time (write)	15		ns	
	T _{CSH}	Chip select hold time (write)	15		ns	
	T _{CSS}	Chip select setup time (read)	60		ns	
	T _{SCC}	Chip select hold time (read)	65		ns	
	T _{CHW}	Chip select "H" pulse width	40		ns	
SCL	T _{SCYCW}	Serial clock cycle (Write)	16		ns	-write command & data ram
	T _{SHW}	SCL "H" pulse width (Write)	7		ns	
	T _{SLW}	SCL "L" pulse width (Write)	7		ns	
	T _{SCYCR}	Serial clock cycle (Read)	150		ns	-read command & data ram
	T _{SHR}	SCL "H" pulse width (Read)	60		ns	
	T _{SLR}	SCL "L" pulse width (Read)	60		ns	
D/CX	T _{DCS}	D/CX setup time	10		ns	
	T _{DCH}	D/CX hold time	10		ns	
SDA (DIN)	T _{SDS}	Data setup time	7		ns	
	T _{SDH}	Data hold time	7		ns	
DOUT	T _{ACC}	Access time	10	50	ns	For maximum CL=30pF
	T _{OH}	Output disable time	15	50	ns	For minimum CL=8pF

Table 6 4-line serial Interface Characteristics

6.3 Capacitive touch panel Specification

I2C

The I2C is always configured in the Slave mode. The data transfer format is shown in [Figure 2-4](#).

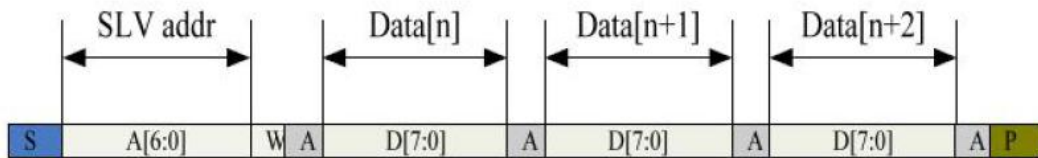
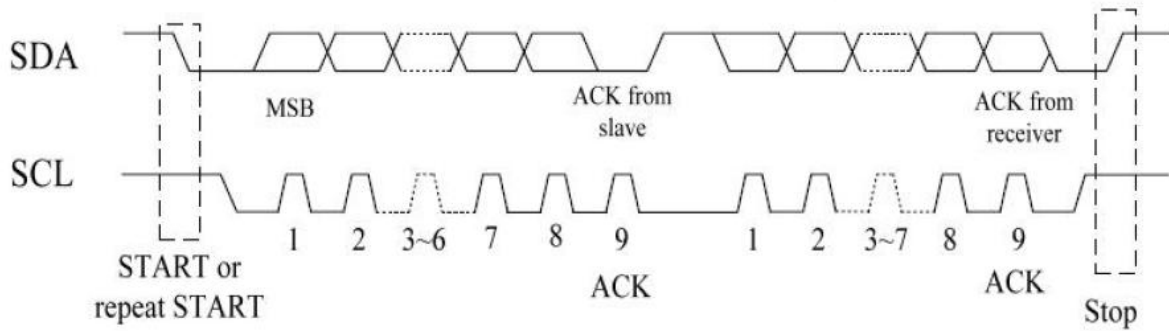


Figure 2-5 I2C master write, slave read

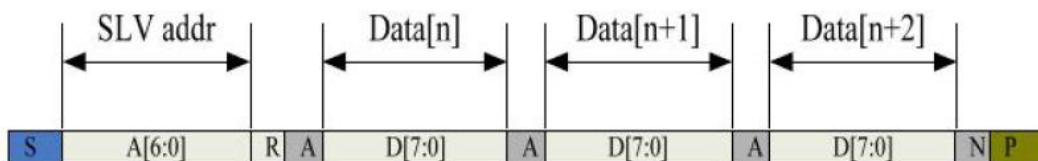


Figure 2-6 I2C master read, slave write

Table 2-1 lists the meanings of the mnemonics used in the above figures.

Table 2-1 Mnemonics Description

Mnemonics	Description
S	I2C Start or I2C Restart
A[6:0]	Slave address A[6:4]: 3'b011 A[3:0]: data bits are identical to those of I2CCON[7:4] register.
W	1'b0: Write
R	1'b1: Read
A(N)	ACK(NACK)
P	STOP: the indication of the end of a packet (if this bit is missing, S will indicate the end of the current packet and the beginning of the next packet)

I2C Interface Timing Characteristics is shown in Table 2-2.

Table 2-2 I2C Timing Characteristics

Parameter	Min	Max	Unit
SCL frequency	0	400	KHz
Bus free time between a STOP and START condition	1.3		US
Hold time (repeated) START condition	0.6		US
Data setup time	100		ns
Setup time for a repeated START condition	0.6		US
Setup Time for STOP condition	0.6		US

6.4 RGB Interface Characteristics:

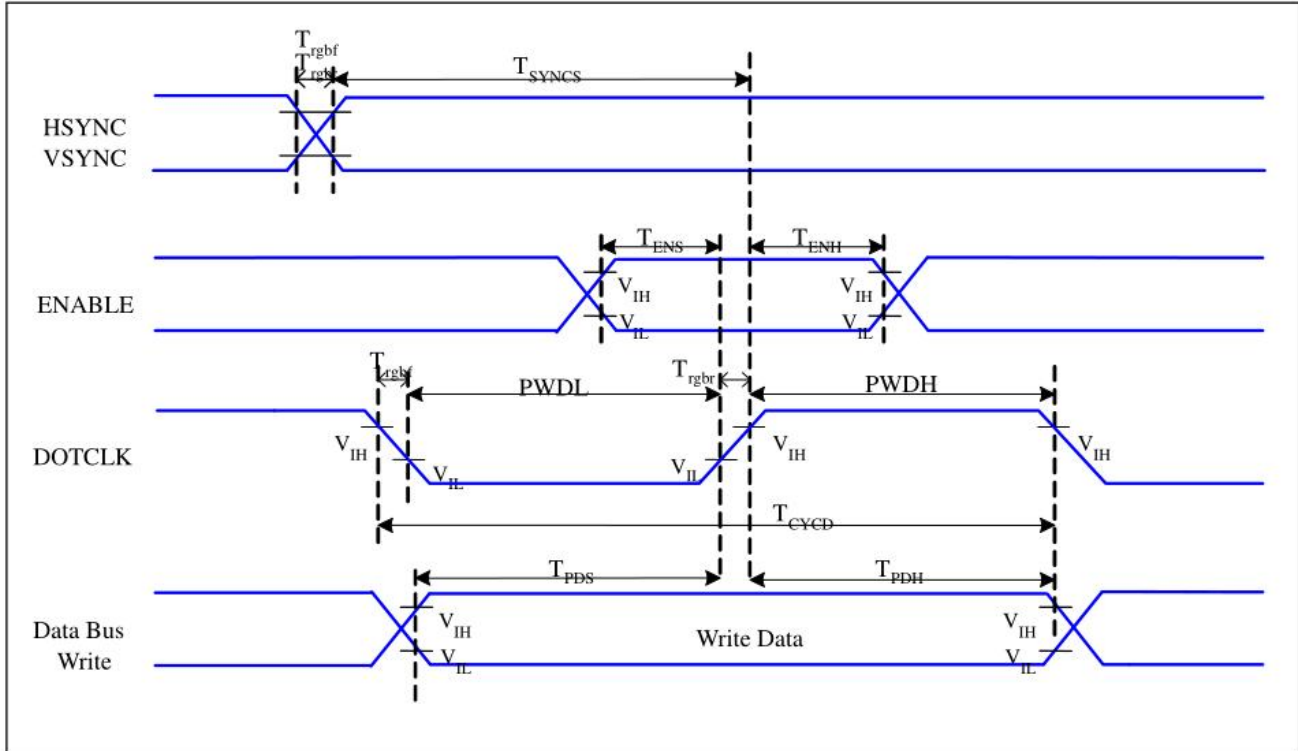


Figure 6 RGB Interface Timing Characteristics

$V_{DDI}=1.65$ to $3.3V$, $V_{DD}=2.4$ to $3.3V$, $AGND=DGND=0V$, $T_a=25^{\circ}C$

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	T_{SYNCS}	VSYNC, HSYNC Setup Time	30	-	ns	
ENABLE	T_{ENS}	Enable Setup Time	25	-	ns	
	T_{ENH}	Enable Hold Time	25	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	60	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	60	-	ns	
	T_{CYCD}	DOTCLK Cycle Time	120	-	ns	
	Trghr, Trghf	DOTCLK Rise/Fall time	-	20	ns	
DB	T_{PDS}	PD Data Setup Time	50	-	ns	
	T_{PDH}	PD Data Hold Time	50	-	ns	

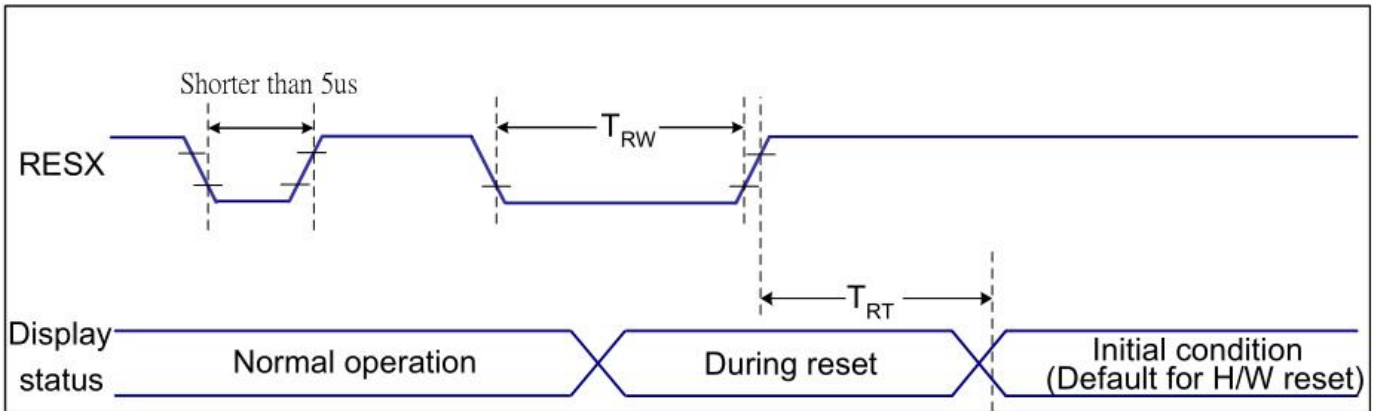
Table 7 18/16 Bits RGB Interface Timing Characteristics

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	T _{SYNCS}	VSYNC, HSYNC Setup Time	35	-	ns	
ENABLE	T _{ENS}	Enable Setup Time	35	-	ns	

	T _{ENH}	Enable Hold Time	35	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	35	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	35	-	ns	
	T _{CYCD}	DOTCLK Cycle Time	80	-	ns	
	Trghr, Trghf	DOTCLK Rise/Fall time	-	10	ns	
DB	T _{PDS}	PD Data Setup Time	35	-	ns	
	T _{PDH}	PD Data Hold Time	35	-	ns	

Table 8 6 Bits RGB Interface Timing Characteristics

6.5 Reset Timing:



7. Optical Characteristics

Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note
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Response time	Tr+Tf	-	-	30	40	ms	FIG.1	Note4	
Contrast Ratio	CR	-	900	700	-	-	FIG.2	Note1	
Surface luminance	LV	$\theta = 0^\circ$	400	500	-	cd/m2	FIG.2	Note2	
Luminance uniformity	Yu	$\theta = 0^\circ$	80	-	-	%	FIG.2	Note3	
NTSC	-	$\theta = 0^\circ$	-	80	-	%	FIG.2	Note5	
Viewing angle	θ Cr>10	θ_T	-	80	-	deg	FIG.3	Note6	
		θ_B	-	80	-	deg	FIG.3		
		θ_L	-	80	-	deg	FIG.3		
		θ_R	-	80	-	deg	FIG.3		
Chromaticity	Red	R_X	$\theta = 0^\circ$ $\phi = 0^\circ$ $T_a = 25^\circ$	0.562	0.612	0.662	-	FIG.2 CIE1931	Note5
		R_Y		0.277	0.327	0.377	-		
	Green	G_X		0.284	0.334	0.384	-		
		G_Y		0.486	0.536	0.586	-		
	Blue	B_X		0.087	0.137	0.187	-		
		B_Y		0.100	0.150	0.200	-		
	White	W_X		0.270	0.320	0.370	-		
		W_Y		0.293	0.343	0.393	-		

Note1. Definition of contrast ratio

Contrast ratio(Cr) is defined mathematically by the following formula. For more information see FIG.2.

$$\text{Contrast ratio} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

For contrast ratio, Surface Luminance, Luminance uniformity and CIE,the testing data is base on TOPCON' s BM-5 or BM-7 photo detector or compatible.

Note2. Definition of surface luminance.

Surface luminance is the luminance with all pixels displaying white. For more information see FIG.2.

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

Note3. 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.

$$YU = \frac{\text{Minimum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}{\text{Maximum surface luminance with all white pixels (P1,P2,P3,.....,Pn)}}$$

Note4. Definition of response time

The response time is defined as the LCD optical switching time interval between "White" state and

“Black”state. Rise time (T_r) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_f) is the time between photo detector output intensity changed from 10% to 90%.

For additional information see FIG1.

Note5. Definition of color chromaticity (CIE1931)

CIE (x,y) chromaticity, The x,y value is determined by screen active area center position P5. For more information see FIG.2.

Note6. Definition of viewing angle

Viewing angle is the angle at which the contrast ratio is greater than 10. Angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG.3.

For viewing angle and response time testing, the testing data is base on Autronic-Melchers’ s ConoScope or DMS series Instruments or compatible.

FIG.1. The definition of response Time

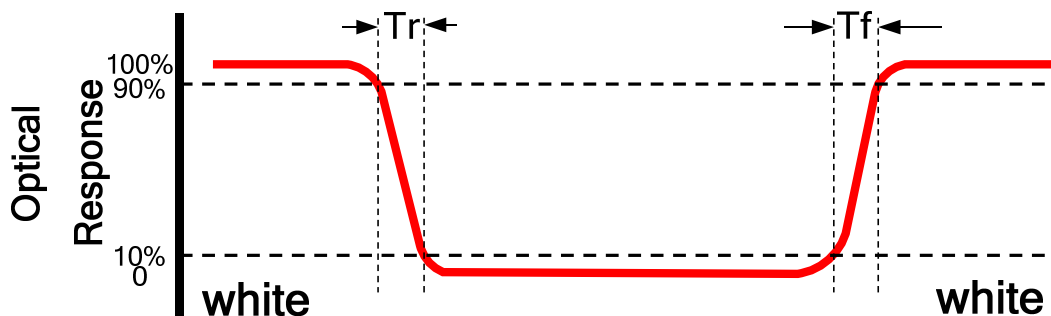


FIG.2. Measuring method for contrast ratio, surface luminance,

luminance uniformity, CIE (x,y) chromaticity

Size : $S \leq 5"$ (see Figure a) A : 5 mm B : 5 mm

H,V : Active area

Light spot size $\varnothing = 5\text{mm}$ (BM-5) or $\varnothing = 7.7\text{mm}$ (BM-7) 50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure a.

measurement instrument : TOPCON's luminance meter BM-5 or BM-7 or compatible (see Figure c).

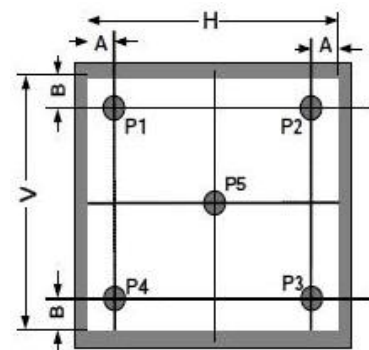


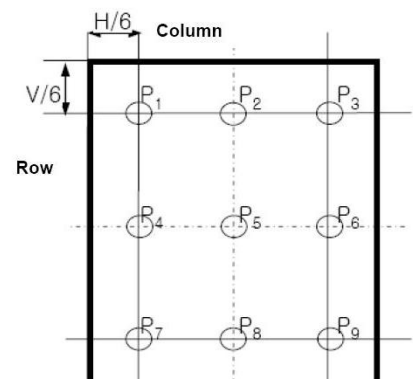
Figure a

Size : $5" < S \leq 12.3"$ (see Figure b) H,V : Active area

Light spot size $\varnothing = 5\text{mm}$ (BM-5) or $\varnothing = 7.7\text{mm}$ (BM-7) 50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure b.

measurement instrument : TOPCON's luminance meter BM-5 or



BM-7 or compatible (see Figure c).

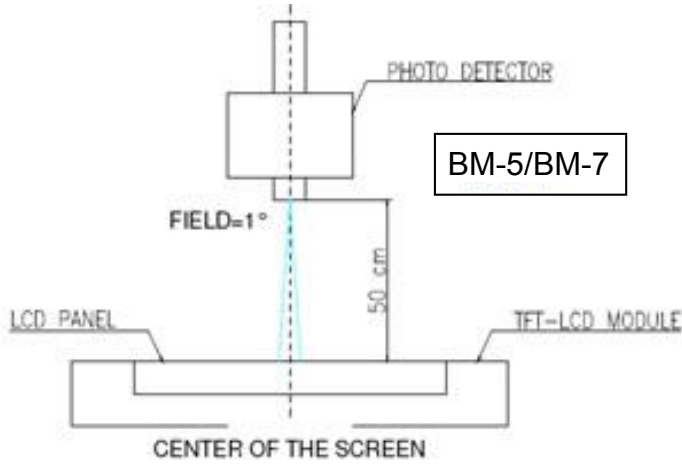
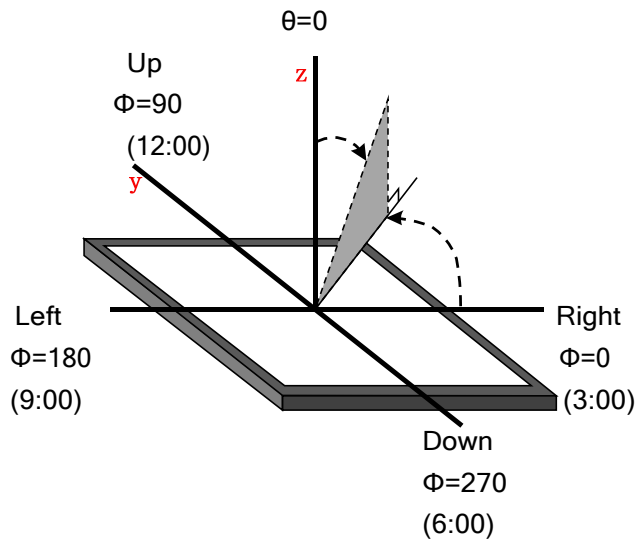


Figure b

Figure c

FIG.3.The definition of viewing angle



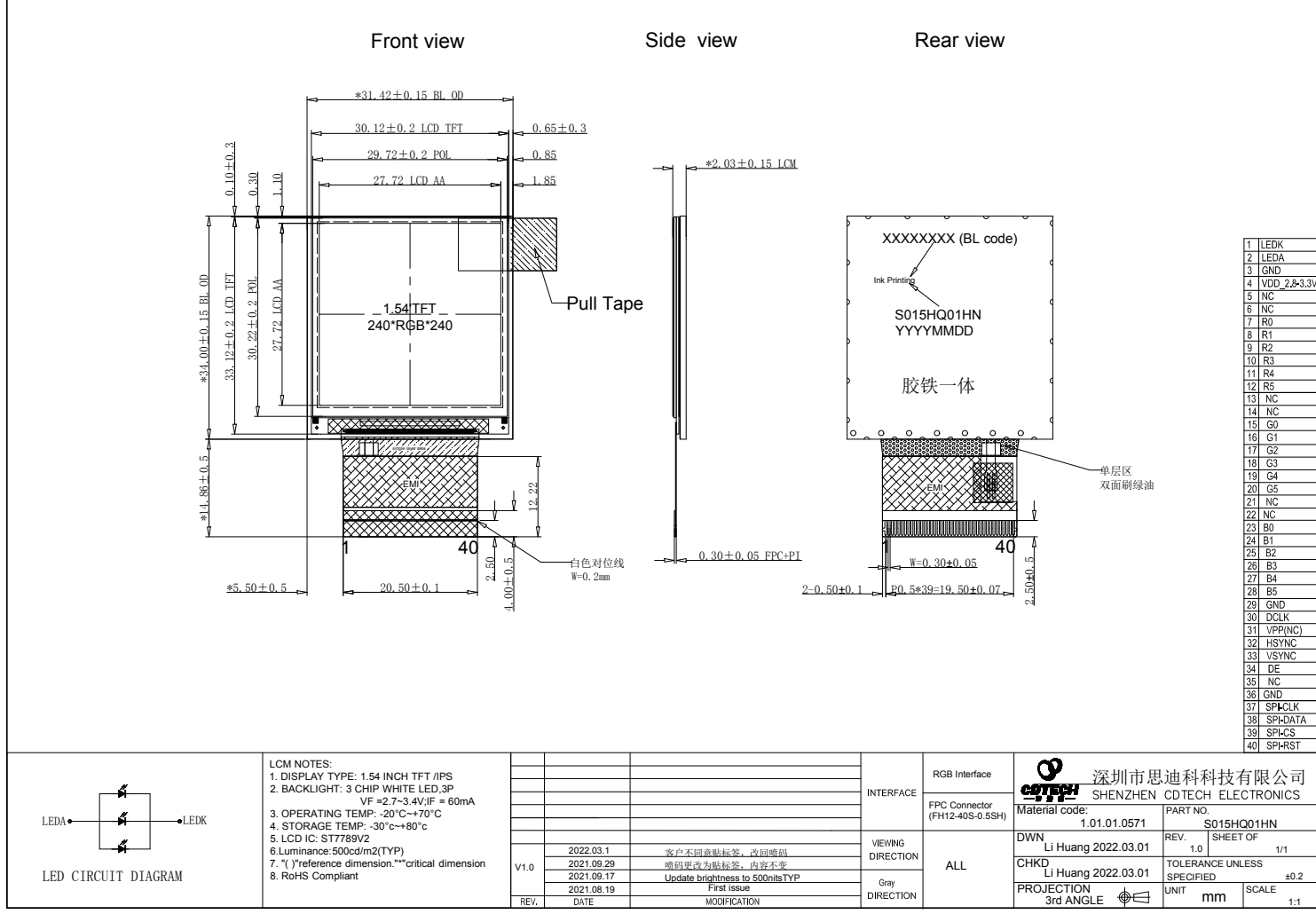
8.Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70°C, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89

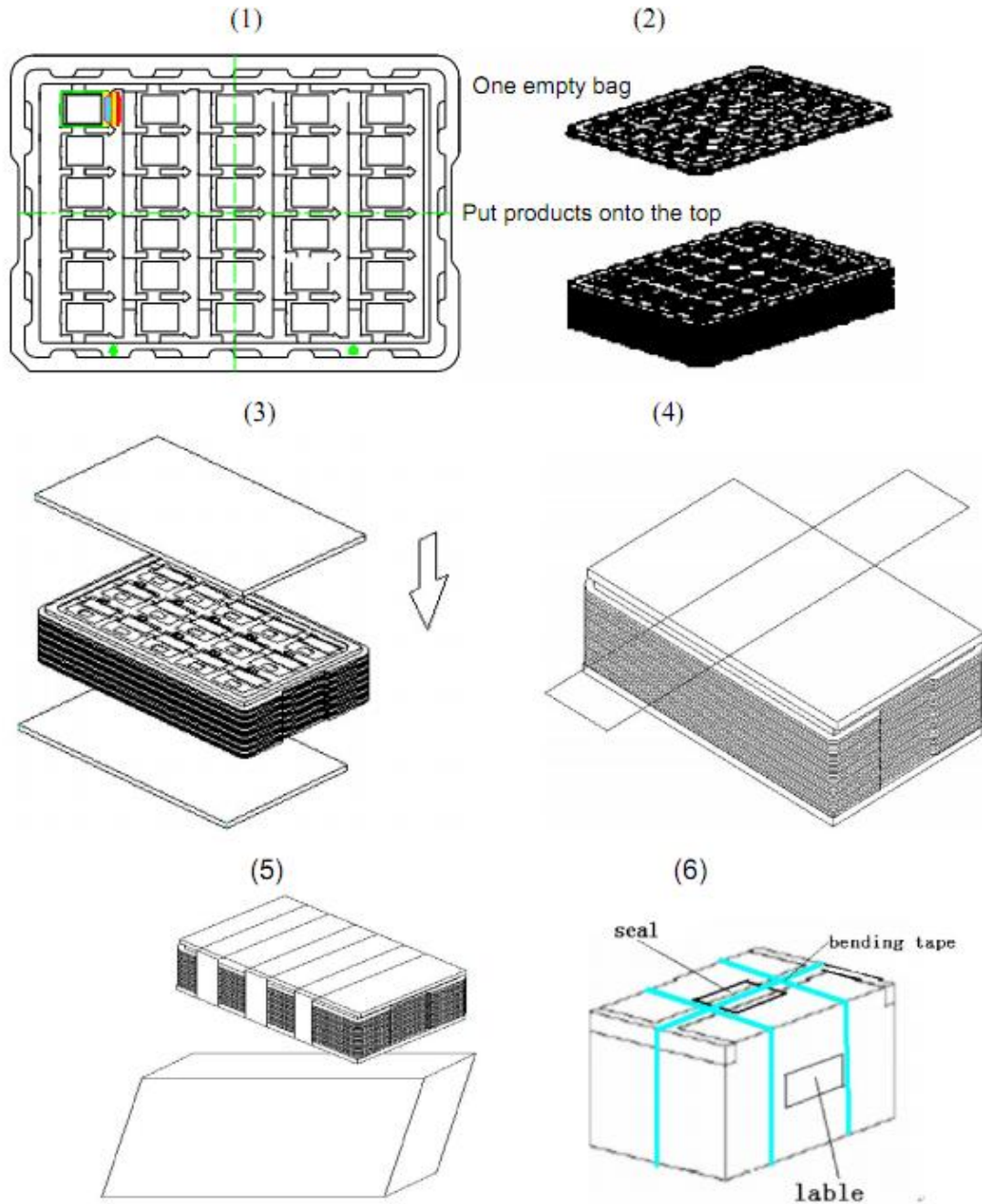
2	Low Temperature Operation	Ta= -20°C, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80°C, 96hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30°C, 96hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60°C, 90% RH max,96 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-20°C 30 min ~ +60°C 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Discharge (Operation) Static	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15°C ~ 35°C, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ±Y , ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 100 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

- Note:1. Ts is the temperature of panel's surface.
2. Ta is the ambient temperature of sample.
3. The size of sample is 5pcs.

9. Mechanical Drawing



10.Packing



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.



11. TFT-LCD Module Inspection Criteria

11.1 Scope

The incoming inspection standards shall be applied to TFT - LCD Modules (hereinafter Called "Modules") that supplied by CDTech Technology LTD.

11.2 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

11.3 Inspection Sampling

- 3.1. Lot size: Quantity per shipment lot per model
 - 3.2. Sampling type: Normal inspection, Single sampling
 - 3.3. Inspection level: II
 - 3.4. Sampling table: MIL-STD-105E
 - 3.5. Acceptable quality level (AQL)
- Major defect: AQL=0.65 Minor defect: AQL=1.00

11.4 Inspection Conditions

4.1 Ambient conditions:

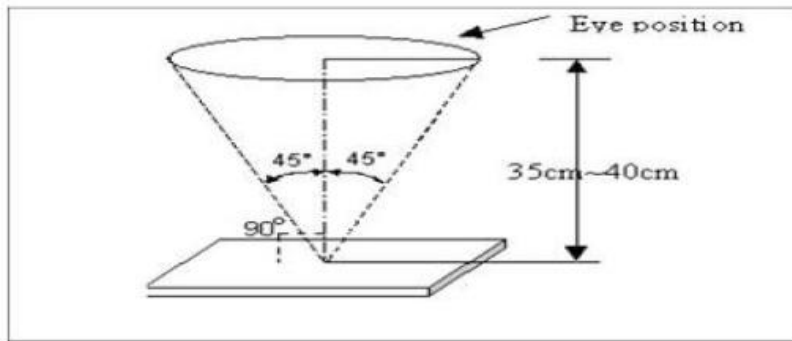
- a. Temperature: Room temperature $25 \pm 5^{\circ}\text{C}$
- b. Humidity: $(60 \pm 10) \% \text{RH}$
- c. Illumination: Single fluorescent lamp non-directive (300 to 700 Lux)

4.2 Viewing distance

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

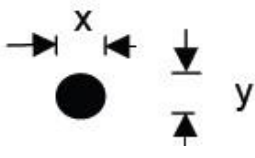
4.3 Viewing Angle

U/D: 45° / 45° , L/R: 45° / 45°

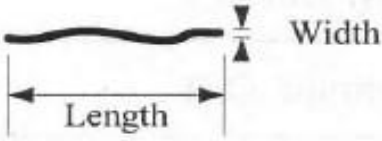
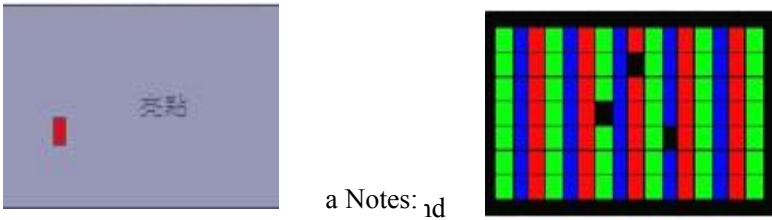




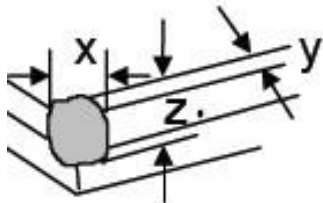
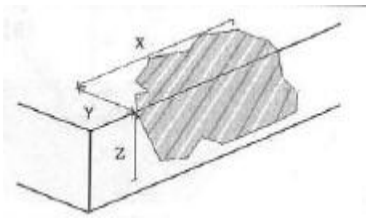
11.5 Inspection Criteria

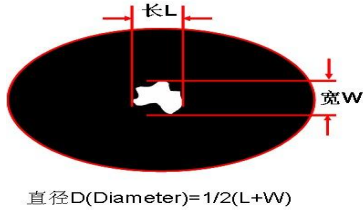
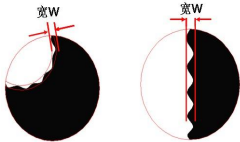

Defects are classified as major defects and minor defects according to the degree of Defectiveness defined herein.

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	Not allowed
5.1.2	missing	Missing function component	Not allowed
5.1.3	Crack	TFT Glass crack	Not allowed
Item No.	Items to be inspected	Inspection standard	
5.2.1	Spot Defect (Including: Black spot, White spot, Pinhole, Foreign particle, Polarizer dirt, Touch panel, Pol	Define:	
		$\varphi = (x + y) / 2$ 	
		Size φ (mm)	Acceptable Quantity
		$\varphi \leq 0.15$	Ignore
		$0.15 < \varphi \leq 0.30$	2

	particle Cell particle)	$0.30 < \phi$	Not allowed
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5.2.2	Line Defect (Including: Black line, White line, Scratch, Touch panel White line Scratch)	Define:	
		Width (mm), Length (mm)	Acceptable Quantity
		$W \leq 0.05, L \leq 5.0$	Ignore
		$0.05 < W \leq 0.10, L \leq 5.0$	2
		$0.10 < W, 5.0 < L$	Follow 5.2.1
5.2.3	Electrical Dot Defect	Bright and Black dot define:	
		Pixel = 3 sub-pixel (R+G+B)	
		Dot = R or G or B sub-pixel	
		More than 1/2 of dot size is con dot.	sidered a full bright dot or dark
		Inspection pattern: Full white, full black, red, green and blue	scr ens.
		Item	Acceptable Quantity
		Black dot defect	2
Bright dot defect	0		
Total dot	2		
Distance between black dot	> 5mm		

5.2.4	Mini Electrical Dot Defect	Not accepted under 5% ND filter	
5.2.5	Mura	Not accepted under 5% ND filter, but a limits sample will allowed	
5.2.6	Polarizer Dent/Bubble	Size ϕ (mm)	Acceptable Quantity
		$\phi \leq 0.20$	Ignore
		$0.20 < \phi \leq 0.50$	3
		$0.50 < \phi$	Not allowed
5.2.7	FPC	Broken	Not allowed
		Crease	Can't restore is not allowed
5.2.8	Bezel	Dirt	No harm
		Wrap	
		Broken	
		Sunken	No dangerous
5.2.9	Touch panel defect crack	Corner Fragment:	
			
		Size(mm)	Acceptable Quantity
		$X \leq 3.0\text{mm}$ $Y \leq 3.0\text{mm}$ $Z \leq T$	Ignore (T: Glass thickness, X: Length, Y: Width, Z: Thickness)
		Side Fragment:	
			
		Size (mm)	Acceptable Quantity

		$X \leq 5.0\text{mm}$ $Y \leq 3.0\text{mm}$ $Z \leq T$	Ignore (T: Glass thickness, X: Length, Y: Width, Z: Thickness)						
5.2.10	Touch panel newton ring	Compare with limit sample							
5.2.11	Pin hole	Define:  $\text{直径D(Diameter)} = 1/2(L+W)$							
		<table border="1"> <thead> <tr> <th>Size D (mm)</th> <th>Acceptable Quantity</th> </tr> </thead> <tbody> <tr> <td>$0.1 \leq D \leq 0.2$</td> <td>3</td> </tr> <tr> <td>$D > 0.2$</td> <td>Not allowed</td> </tr> </tbody> </table>	Size D (mm)	Acceptable Quantity	$0.1 \leq D \leq 0.2$	3	$D > 0.2$	Not allowed	
Size D (mm)	Acceptable Quantity								
$0.1 \leq D \leq 0.2$	3								
$D > 0.2$	Not allowed								
5.2.12	Ink jag	Define: 							
		<table border="1"> <thead> <tr> <th>Size w (mm)</th> <th>Acceptable Quantity</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.3$</td> <td>Ignore</td> </tr> <tr> <td>$W > 0.3$</td> <td>Not allowed</td> </tr> </tbody> </table>	Size w (mm)	Acceptable Quantity	$W \leq 0.3$	Ignore	$W > 0.3$	Not allowed	
		Size w (mm)	Acceptable Quantity						
$W \leq 0.3$	Ignore								
$W > 0.3$	Not allowed								
5.2.13	LOGO/ICON defect	Font / Logo should be printed smoothly, with no Zigzag, penetration ,abrasion, misalignment, disconnection and connection defects like below example. 							
5.2.14	Printing ink color	The printing ink color should be consistent with design drawing. (PANTONE BLACK 3C).							

① Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area, Mini Dot Defect is defined



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as the defective area of the dot area is less than 50% of the dot area.

- ② 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.
- ③ Foreign particle on the surface of the LCM should be ignore.
- ④ ND filter: There are 3~5mm between ND filter and panel in the horizontal direction, and 30±5cm perpendicular distance from eye inspection to panel.

12. Precautions for Use of LCD modules

12.1 Handling Precautions

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

12.1.2. 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.

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

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

12.1.5. 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

12.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

12.1.8.4. 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.

12.2 Storage Precautions

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

12.2.2. 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%

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



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12.3 Transportation Precautions

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

LCD Warranty Time: 1 year