



PHOENIX DISPLAY INTERNATIONAL, INC.

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SPECIFICATION FOR LCD MODULE

CUSTOMER	
PART NUMBER	PDIS070BWX43EP
DESCRIPTION	7.0" 800 (RGB) x 1280 Dots
VERSION	1.0
ISSUE DATE	23-Apr-19

COMPANY ADDRESS:

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2 General Specifications

	Feature	Spec
Characteristics	Size	7 inch
	Resolution	800(Horizontal)*1280(Vertical)
	Interface	MIPI
	Connect type	Connector
	Color Depth	16.7M
	Technology type	a-Si
	Display Spec. Pixel pitch (mm)	0.117(H)×0.117(V)
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally Black
	Driver IC	JD9366AB
	Viewing Direction	full view
Mechanical	LCM (W x H x D) (mm)	107.98(W)*163.80(H)*4.2 (D)
	Active Area(mm)	94.2(H)x 150.72(V)
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	45 LEDs

Note 1: Viewing direction is follow the data which measured by optics equipment.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%

3 Input/Output Terminals

LCD PIN-MAP

No	Symbol	Description
1~3	LED+	LED anode
4	LED-PWM(NC)	No connect
5~8	LED-	LED-
9	GND	GROUND
10	GND	GROUND
11	MIPI_D2P	MIPI Positive data signal(+)
12	MIPI_D2N	MIPI Negative data signal(-)
13	GND	GROUND
14	MIPI_D1P	MIPI Positive data signal(+)
15	MIPI_D1N	MIPI Negative data signal(-)
16	GND	GROUND
17	MIPI_CKP	MIPI Positive clock signal(+)
18	MIPI_CKN	MIPI Negative clock signal(-)
19	GND	GROUND
20	MIPI_D0P	MIPI Positive data signal(+)
21	MIPI_D0N	MIPI Negative data signal(-)
22	GND	GROUND
23	MIPI_3P	MIPI Positive data signal(+)
24	MIPI_3N	MIPI Negative data signal(-)
25	GND	GROUND
26	ID(NC)	No connect
27	RST	Device reset signal
28	VDDIO(1.8V)	Power supply for system.iovcc=1.8v
29	VDD(3.3V)	Power supply for logic operation
30	VDD(3.3V)	Power supply for logic operation
31	VDD(3.3V)	Power supply for logic operation

4 Absolute Maximum Ratings

Item	Symbol	MIN	Typ	MAX	Unit	Remark
Supply Voltage	VDD	-0.3	-	5.0	V	-
Operating Temperature	TOPR	-20	-	60	°C	-
Storage Temperature	TSTG	-30	-	70	°C	-

5 Electrical Characteristics

5.1 Driving TFT LCD Panel

Item	Symbol	MIN	Typ	MAX	Unit	Remark
Supply Voltage	VDD	2.8	3.3	3.6	V	-
Current of power supply	I _{VDD}	-	40	60	mA	-
Input voltage “H”level	V _{IH}	0.7VDD	-	VDD	V	-
Input voltage “L”level	V _{IL}	0	-	0.3VDD	V	-

5.2 Operating Conditions

< Table 3. Electrical specifications >

[Ta = 25 ± 2 °C]

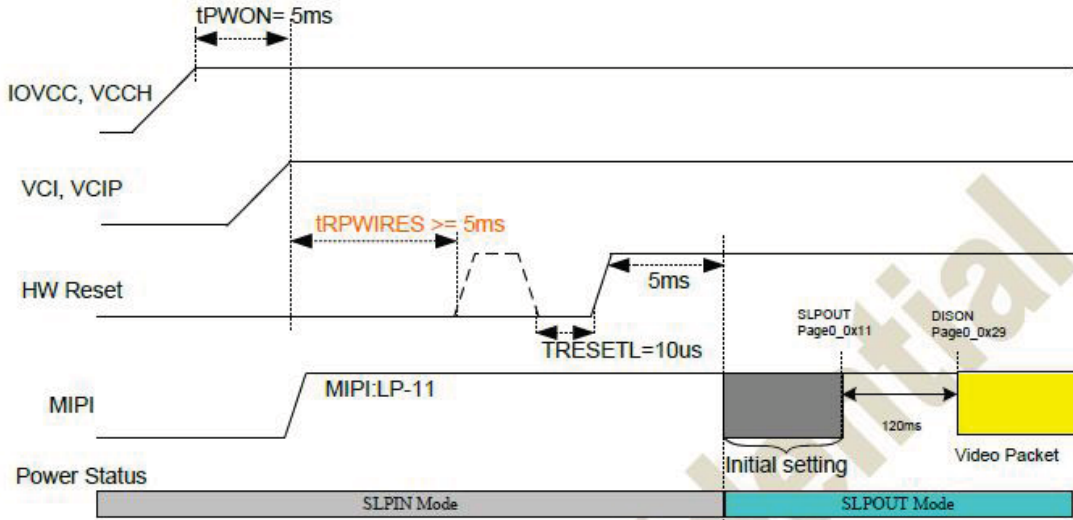
Parameter	Symbol	Value	Unit	Remarks
TFT Gate ON Voltage	VGH	12~17	V	VGH-VGL L≤30V
TFT Gate OFF Voltage	VGL	-7~-16	V	
TFT Common Electrode Voltage	VCOMH	0	V	
	VCOML	-2	V	

Notes :

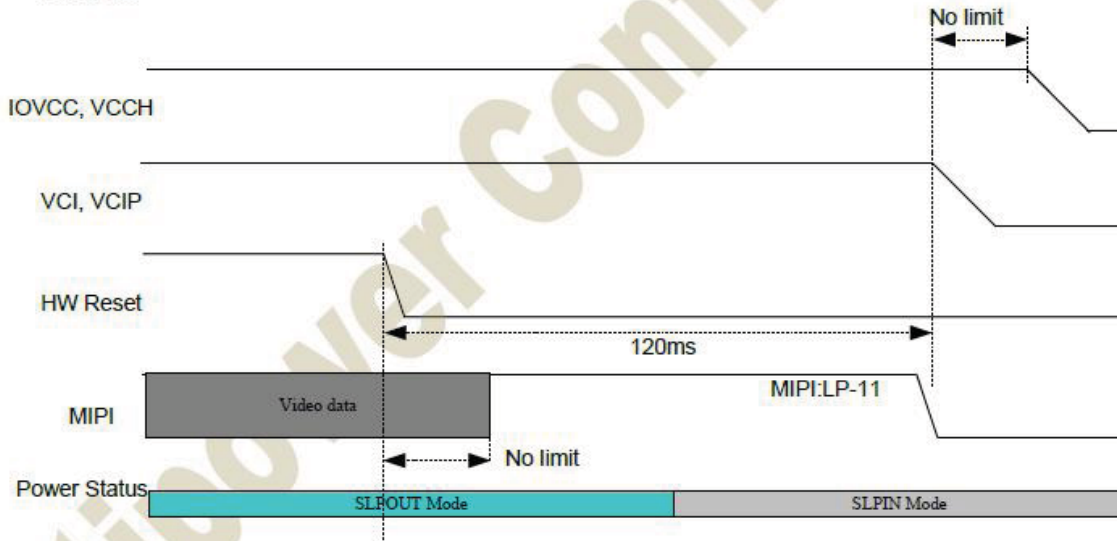
1. VGH is TFT Gate operating voltage.
2. VGL is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuates with same phase as Vcom.
3. Vcom must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc..
4. The value is just the reference value. The customer can optimize the setting value by the different D-IC

5.3 POWER ON/OFF SEQUENCE

BOOSTM[2:1]=01 (Internal DC/DC power mode : PFM, Charge Pump, JD5001)
 IOVCC=VCCH=1.65V ~ 3.6V, VCI=VCIP=2.5V ~ 4.8V.
 Power on:



Power off:



5.4 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	300	-	mA	
Forward Voltage	V_F	8.4	9.6	10.8	V	
Backlight Power consumption	W_{BL}	-	2.88	-	W	
LED Lifetime		-	30000	-	Hrs	

Note 1: Each LED : $I_F = 20 \text{ mA}$, $V_F = 3.2 \text{ V}$.

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.

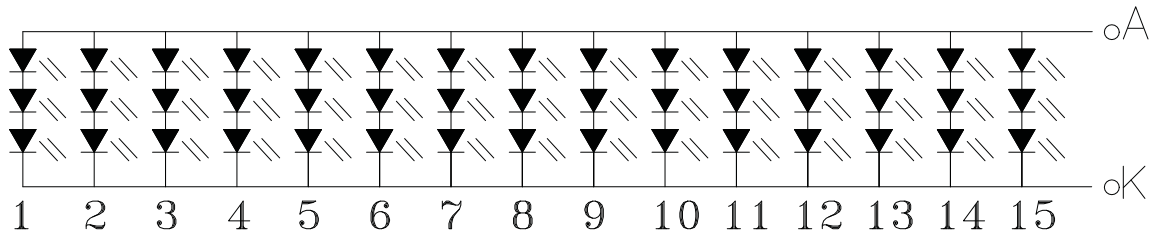
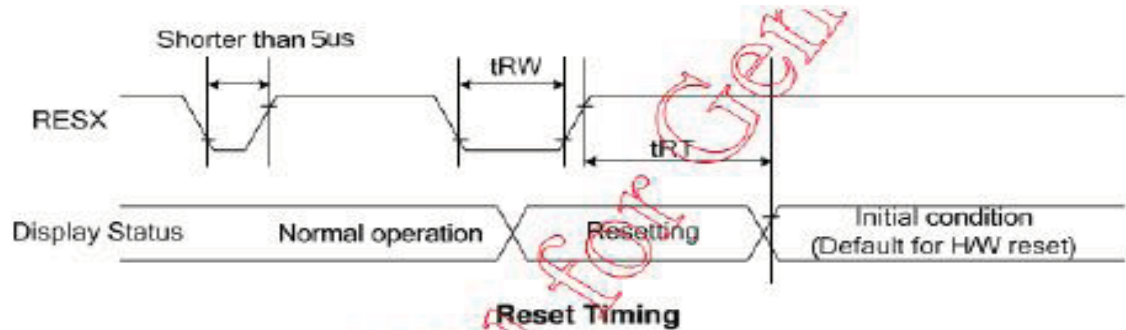


Figure : LED connection of backlight

5.5 RESET TIMING CHARACTERISTICS



Signal	Symbol	Parameter	Min	Max	Unit
RESX	tRW	Reset pulse duration	10		µs
	tRT	Reset cancel		TBD (note 1,5)	mS
				TBD (note 1,6,7)	mS

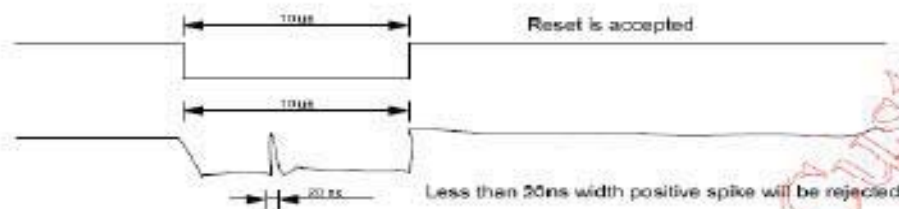
Notes:

1. The reset cancel also includes required time for loading ID bytes, VCOM setting and other settings from EEPROM to registers. This loading is done every time when there is HW reset cancel time (tRT) 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
- 3.

Reset Descript

RESX Pulse	Action
Shorter than 5µs	Reset Rejected
Longer than 10µs	Reset
Between 5µs and 10µs	Reset starts

4. During the Resetting period, the display will be blanked (The display enters the blanking sequence, which maximum time is 120 ms, when Reset Starts in the Sleep Out mode. The display remains the blank state in the Sleep In mode.) and then return to Default condition for Hardware Reset.
5. Spike Rejection can also be applied during a valid reset pulse, as shown below:



6. When Reset applied during Sleep In Mode.
7. When Reset applied during Sleep Out Mode.
8. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

5.6 MIPI-DSI CHARACTERISTICS

5.6.1 High speed mode

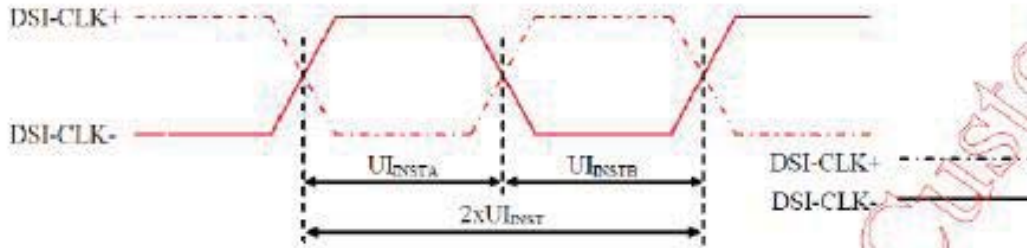
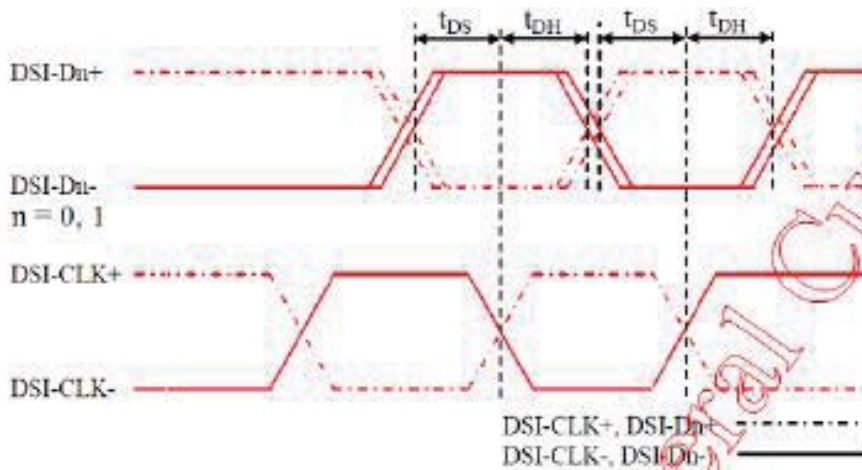


Figure 4: DSI Clock Channel Timing

DSI Clock Channel Timing

Signal	Symbol	Parameter	Min	Max	Unit
CLKP/N	$2xUI_{INST}$	Double UI instantaneous	TBD	TBD	ns
CLKP/N	UI_{INSTA}, UI_{INSTB} (Note 1)	UI instantaneous Half	TBD (Note 2)	TBD	ns

5.6.2 High Speed Mode - Data Clock Channel Timing

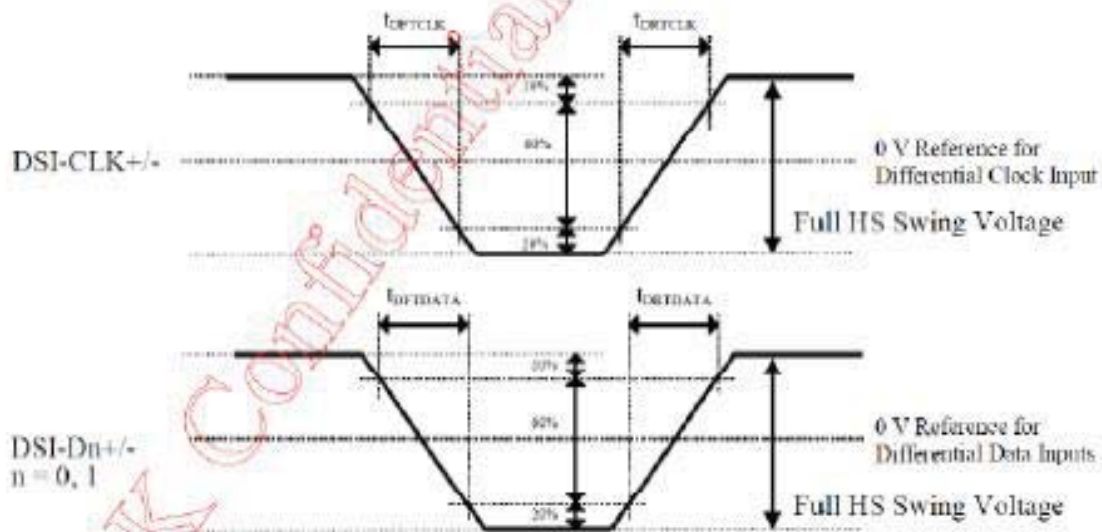


DSI Data to Clock Channel Timings

DSI Data to Clock Channel Timings

Signal	Symbol	Parameter	Min	Max
DnP/N, n=0 and 1	t_{DS}	Data to Clock Setup time	TBD	-
	t_{DH}	Clock to Data Hold Time	TBD	-

5.6.3 High Speed Mode - Rising and Falling Timings



Rising and Falling Timings on Clock and Data Channels

Rise and Fall Timings on Clock and Data Channels

Parameter	Symbol	Condition	Specification		
			Min	Typ	Max
Differential Rise Time for Clock	t_{DRCLK}	CLKP/N	TBD	-	TBD (Note)
Differential Rise Time for Data	t_{DRDATA}	DnP/N n=0 and 1	TBD	-	TBD (Note)
Differential Fall Time for Clock	t_{DFCLK}	CLKP/N	TBD	-	TBD (Note)
Differential Fall Time for Data	t_{DFDATA}	DnP/N n=0 and 1	TBD	-	TBD (Note)

Note: The display module has to meet timing requirements, which are defined for the transmitter (MCU) on MIPI D-Phy standard.

6 Optical Characteristics

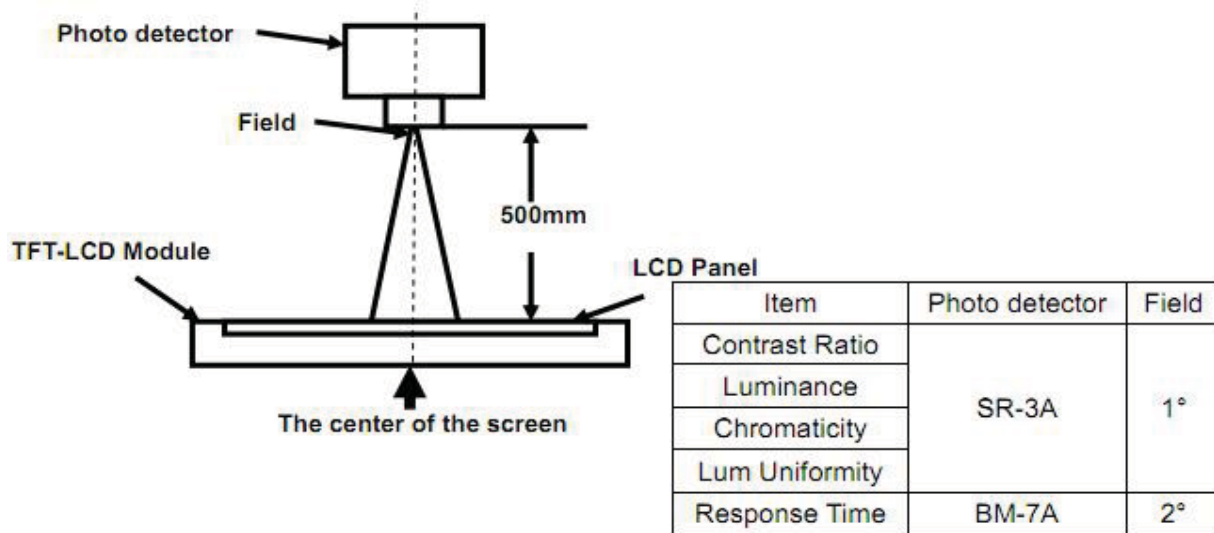
Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	
Viewing angles	θ_T	Center CR \geq 10		80	-	Degree.	Note2	
	θ_B			80	-			
	θ_L			80	-			
	θ_R			80	-			
Contrast Ratio	CR	$\Theta = 0$	750	800	-	-	Note1, Note3	
Response Time	T_{ON}	25°C	-	30	35	ms	Note1, Note4	
	T_{OFF}							
Chromaticity	White	X_W	Backlight is on	TBD	TBD	TBD	-	Note1, Note5
		Y_W		TBD	TBD	TBD	-	
	Red	X_R		TBD	TBD	TBD	-	
		Y_R		TBD	TBD	TBD	-	
	Green	X_G		TBD	TBD	TBD	-	
		Y_G		TBD	TBD	TBD	-	
	Blue	X_B		TBD	TBD	TBD	-	
		Y_B		TBD	TBD	TBD	-	
Uniformity	U		-	50	-	%	Note1, Note6	
Luminance	L		1000	1200		cd/m ²	Note1, Note7	

Test Conditions:

1. IF= 20mA(one channel),the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

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).

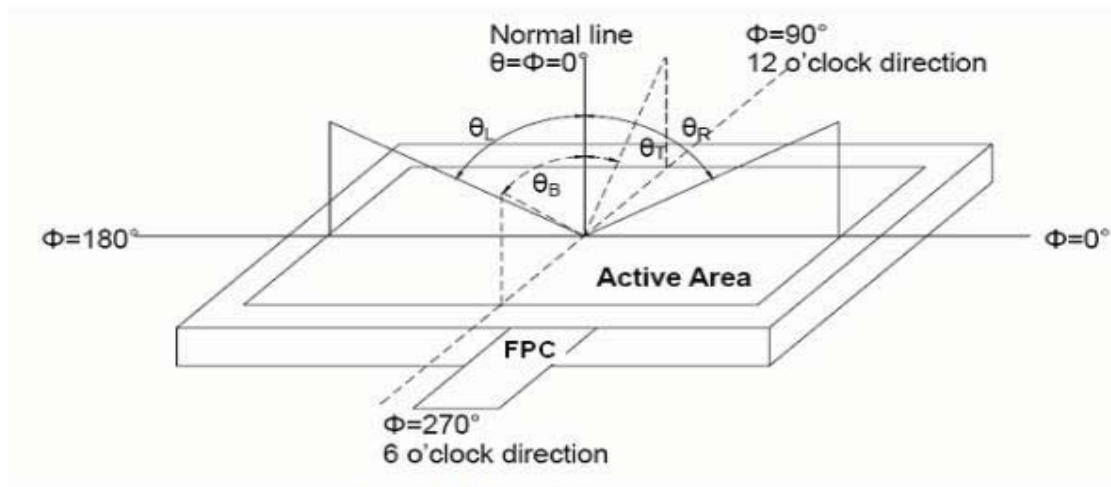


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

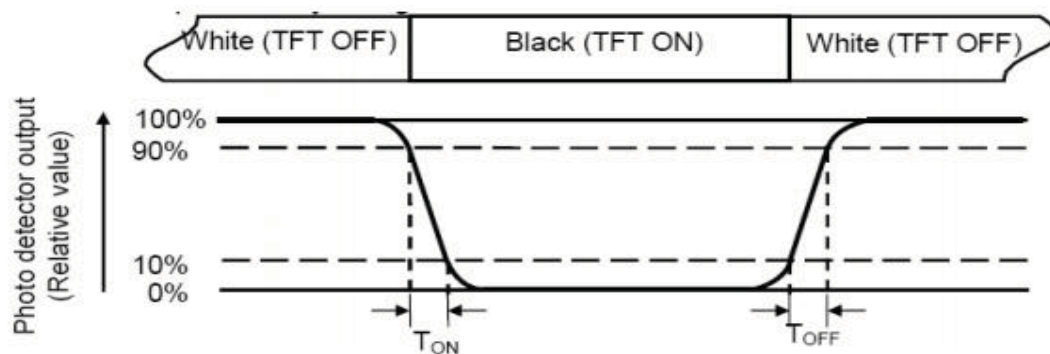
“White state “:The state is that the LCD should driven by Vwhite.

“Black state”: The state is that the LCD should driven by Vblack.

Vwhite: To be determined Vblack: To be determined.

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

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity(U) = $L_{min} / L_{max} \times 100\%$

L-----Active area length W----- Active area width

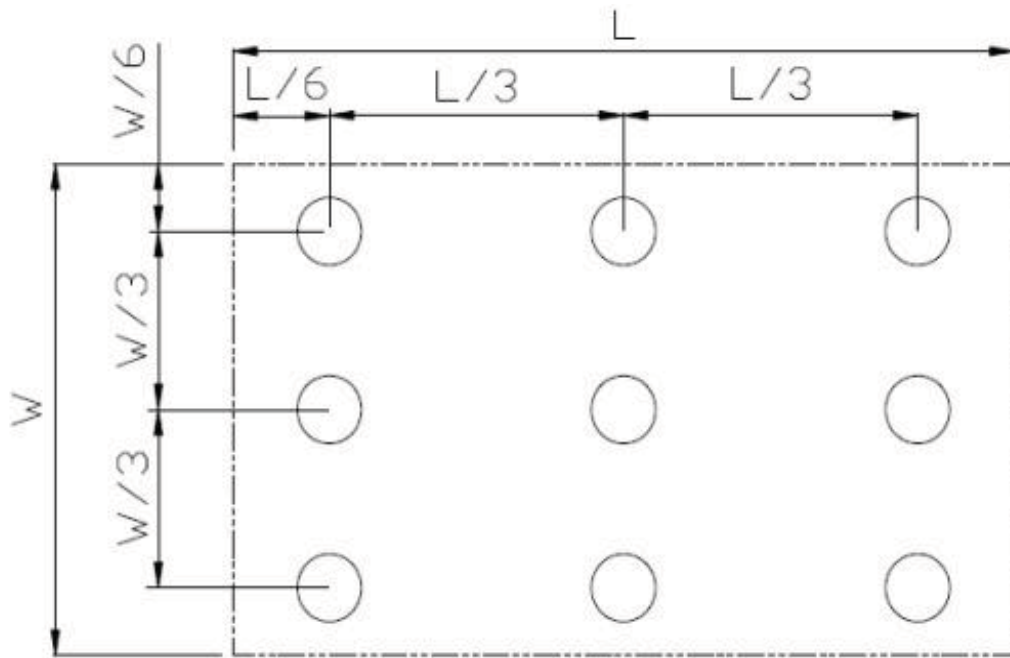


Fig. 2 Definition of uniformity

L_{max} : The measured maximum luminance of all measurement position.

L_{min} : The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :

Measure the luminance of white state at center point.

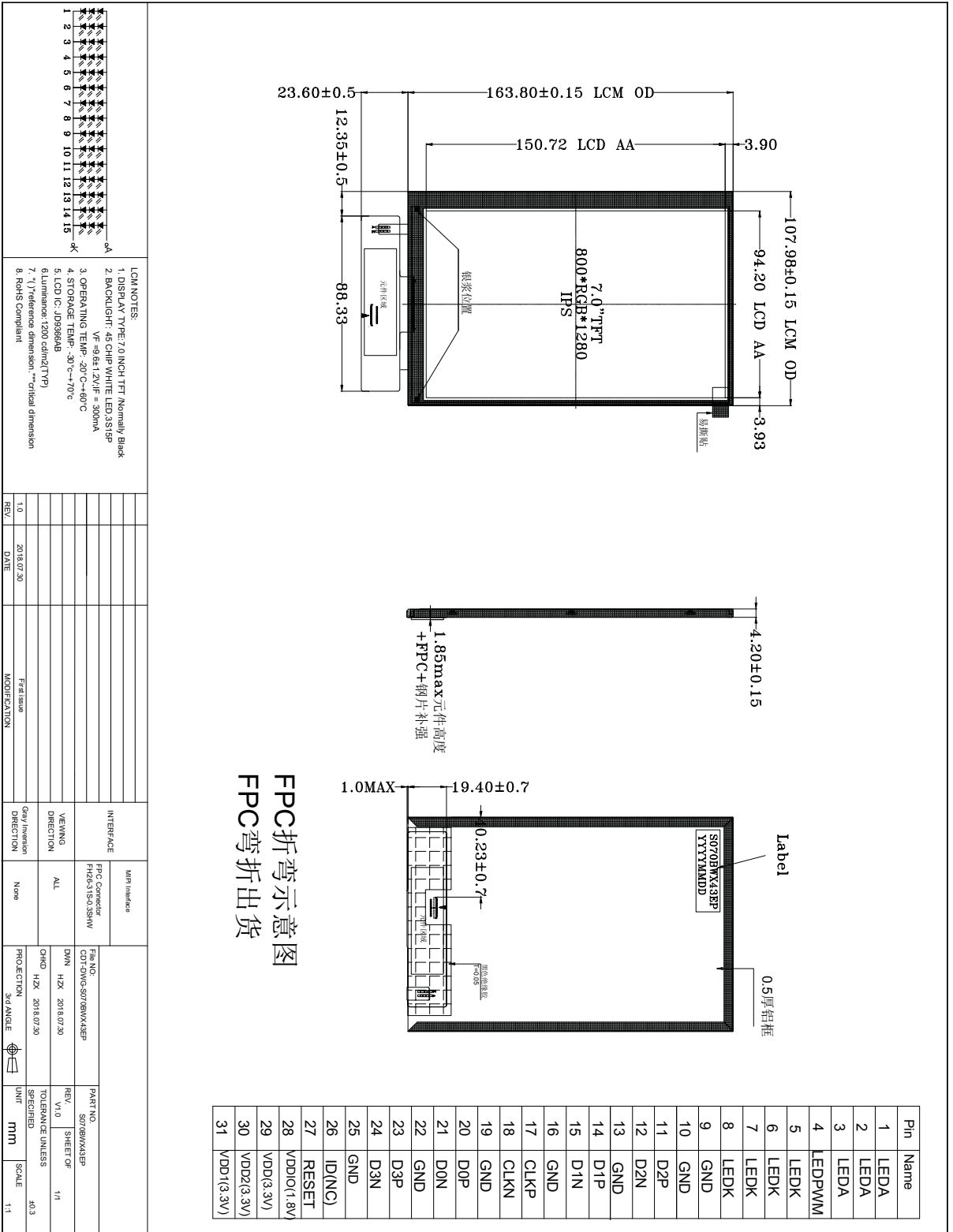
7 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Opeartion	Ts= +60°C, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Opeartion	Ta= -20°C, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +70°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, 120 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30°C 30 min ~ +80°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 (Opeartion) 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: 80 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.

8 Mechanical Drawing



FPC折弯示意图
FPC弯折出货

9 Packing

Packing Method

TBD

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 Technology LTD.

10.2 Incoming Inspection

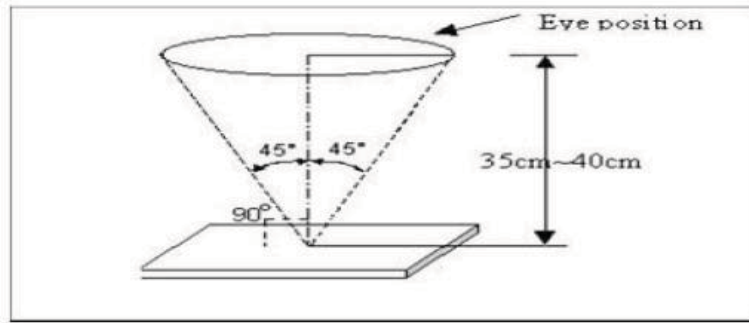
The customer shall inspect the modules within twenty calendar days of the delivery date (the "inspection period") at its own cost. The result of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to The seller, If the results of the 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

- 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

10.4 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: $45^{\circ} / 45^{\circ}$, L/R: $45^{\circ} / 45^{\circ}$



10.5 Inspection Criteria

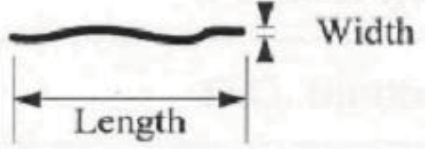
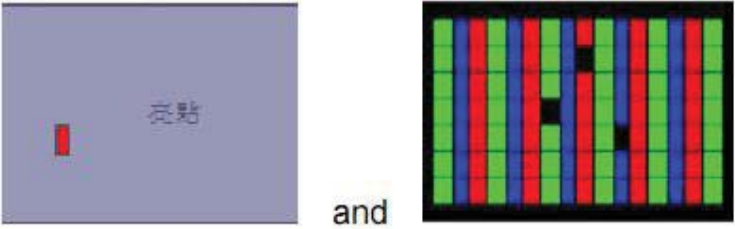
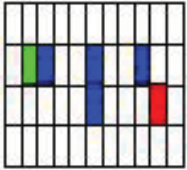
Defects are classified as major defects and minor defects according to the degree of Defectiveness defined herein.

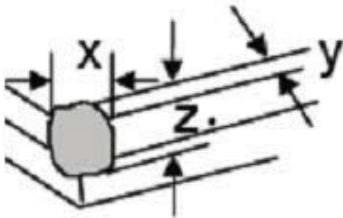
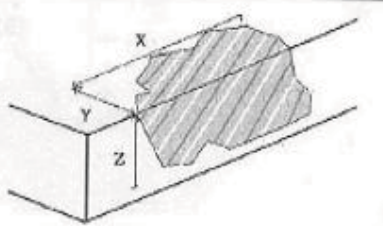
10.5.1 Major defect

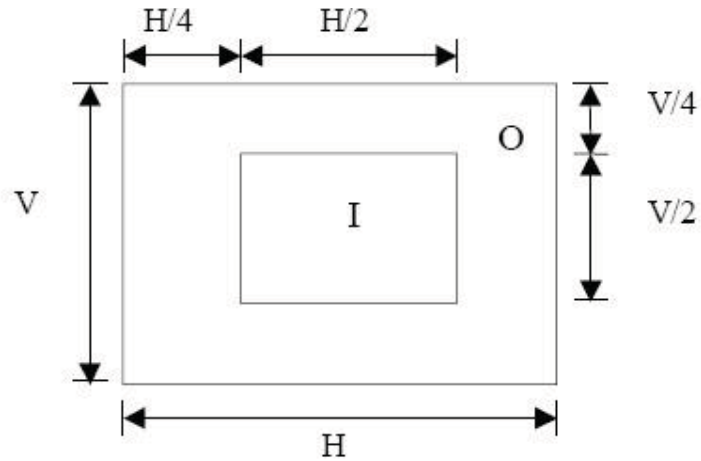
Item No	Items to be inspected	Inspection Standard
5.1.1	All functional defects	1) No display 2) Display abnormally 3) Short circuit 4) line defect
5.1.2	Missing	Missing function component
5.1.3	Crack	Glass Crack

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	
		$\phi = (x+y) / 2$	
		Size ϕ (mm)	Acceptable Quantity
		$\phi \leq 0.2$	Ignore
$0.2 < \phi \leq 0.5$	3		
$0.5 < \phi$	Not allowed		

5.2.2	Line Defect Including Black line White line Scratch	Define: 			
		Width(mm) Length(mm)		Acceptable Quantity	
		$W \leq 0.03$		Ignore	
		$0.03 < W \leq 0.04$ $L \leq 5.0$		4	
		$0.04 < W, \text{ or } L > 5.0$		Not allowed	
5.2.3	Polarizer Dent/Bubble	Size ϕ (mm)		Acceptable Quantity	
		$\phi \leq 0.25$		Ignore	
		$0.25 < \phi \leq 0.5$		3	
		$0.5 < \phi$		Not allowed	
		Total QTY		3	
5.2.4	Electrical Dot Defect	Bright and Black dot define: 			
					
		Two Adjacent Dot			
		Inspection pattern: Full white, Full black, Red, green and blue screens			
		Item		Acceptable Quantity	
				I	O
Black dot defect		2	3	4	
Bright dot defect		0	3	3	
Total Dot		2	4	5	
3% Bright Dot is allowed					

5.2.5	Glass defect	 <p>1. Corner Fragment:</p>	
		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



I area & O area

- 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

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.