CDTech(H.K.)Electronics Limited

Product Specification

Model Name	S024HQ34NN
Description	2.4" QVGA 240(RGB)x320 Dots
Date	2019/4/18
Version	4.0

Approved by/Date	Check by/Date	Prepared by/Date
ZHP 2019/4/18	HZX 2019/4/18	Yigui.Han 2019/4/18

Customer Approval	
Date	

CDTech(H.K.)Electronics Limited

Table of Contents

CDTech(H.K.)Electronics Limited

1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2016/10/19	First Release.	Jack Guo
2.0	2016/10/31	Update the shape and thickness .	Jack Guo
3.0	2016/11/2	Update FPC&Add Vcc current.	Jack Guo
4.0	2019/4/18	Update FPC	Yigui.Han

CDTech(H.K.)Electronics Limited

2. General Specifications

Feature		Spec
Characteristics	Size	2.4 inch
	Resolution	240(horizontal)*320(Vertical)
	Interface	MCU 16bit
	Connect type	Connector
	Display Colors	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.153*0.153
	Pixel Configuration	R.G.B.-Stripe
	Display Mode	Normally White
	Driver IC	ILI9341V
	Viewing Direction	6 O'clock
	Gray Inversion Direction	12 O'clock
Mechanical	LCM (W x H x D) (mm)	42.72*59.26*2.40
	Active Area(mm)	36.72*48.96
	Weight (g)	TBD
	LED Numbers	3 LEDs

Note 1: Requirements on Environmental Protection: RoHs
Note 2: LCM weight tolerance: +/- 5%

3. Input/Output Terminals

No.	Symbol	Description
1	NC	-
2	RESET	Reset signal
3	DB15	Data bus
4	DB14	
5	DB13	
6	DB12	
7	DB11	
8	DB10	
9	DB9	
10	DB8	
11	DB7	
12	DB6	
13	DB5	
14	DB4	
15	DB3	
16	DB2	
17	DB1	
18	DB0	
19	RD	Read signal
20	WR	Write signal
21	RS	Command/data select pin
22	CS	Chip Select signal
23	GND	Ground
24	VDD	Digital power supply
25	LED_K	Back light cathode
26	LED_A	Back light anode

4. Absolute Maximum Rating

Item	Symbol	MIN	Typ	MAX	Unit	Remark
Supply Voltage	V_{DD}	-0.3	-	4.6	V	-
Operating Temperature	T_{OPR}	-20	-	70	℃	-
Storage Temperature	T_{STG}	-30	-	80	℃	

5. Timing characteristics

5.1 Electrical Characteristics

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Analog Supply Voltage		V_{CC}	2.5	2.8	3.3	V	
Analog Supply Current		Icc	-	10	14	mA	
Logic Signal Input /Output Voltage		IOVCC	1.65	1.8	3.3	V	
Input Signal Voltage	Low Level	V_{IL}	VSS	-	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	

5.2 LED Driving Conditions

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	20	-	mA	
Forward Voltage	V_F	9	9.6	10.2	V	
LED Lifetime		-	25000	-	Hrs	

Note 1: Each LED: IF =20 mA, VF =3.2+/0.2V.

Note 2: Optical performance should be evaluated at Ta=25℃ 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.
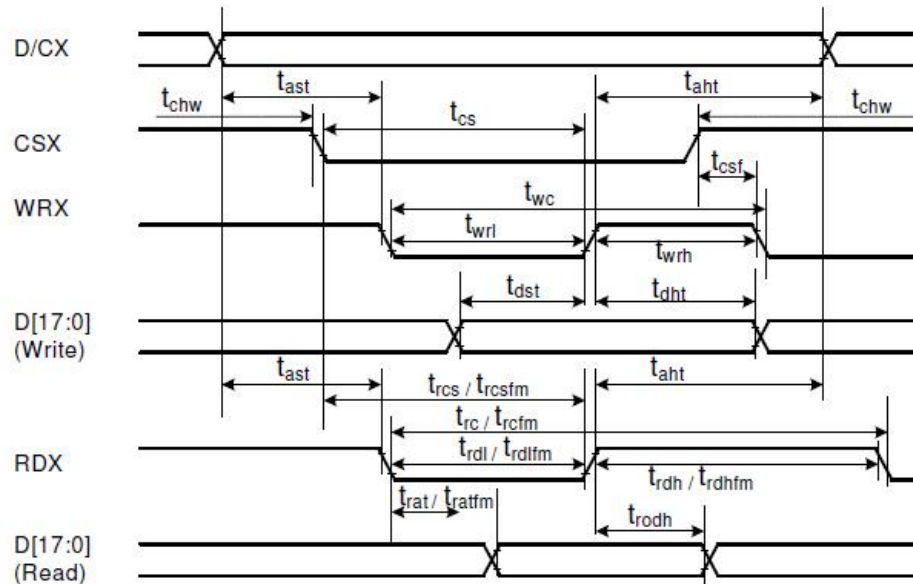
A ⊶▷|◁ ▷|◁ ▷|◁⊶ K
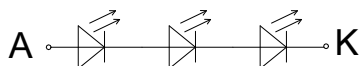
LED CIRCUIT DIAGRAM

Figure: LED connection of backlight(Constant Current)

6 Interface Timing

Display Parallel 18/16/9/8-bit Interface Timing Characteristics:

Signal	Symbol	Parameter	min	max	Unit	Description
DCX	tast	Address setup time	0	-	ns	
	taht	Address hold time (Write/Read)	0	-	ns	
CSX	tchw	CSX "H" pulse width	0	-	ns	
	tcs	Chip Select setup time (Write)	15	-	ns	
	trcs	Chip Select setup time (Read ID)	45	-	ns	
	trcsfm	Chip Select setup time (Read FM)	355	-	ns	
	tcsf	Chip Select Wait time (Write/Read)	10	-	ns	
WRX	twc	Write cycle	66	-	ns	
	twrh	Write Control pulse H duration	15	-	ns	
	twrl	Write Control pulse L duration	15	-	ns	
RDX (FM)	trcfm	Read Cycle (FM)	450	-	ns	
	trdhfm	Read Control H duration (FM)	90	-	ns	
	trdlfm	Read Control L duration (FM)	355	-	ns	
RDX (ID)	trc	Read cycle (ID)	160	-	ns	
	trdh	Read Control pulse H duration	90	-	ns	
	trdl	Read Control pulse L duration	45	-	ns	
D[17:0], D[15:0], D[8:0], D[7:0]	tdst	Write data setup time	10	-	ns	For maximum CL=30pF For minimum CL=8pF
	tdht	Write data hold time	10	-	ns	
	trat	Read access time	-	40	ns	
	tratfm	Read access time	-	340	ns	
	trod	Read output disable time	20	80	ns	

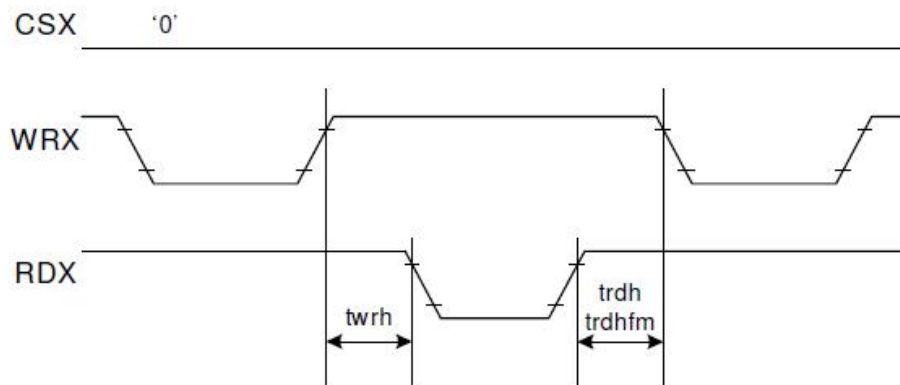Note: Ta = -30 to 70 ℃, VDDI=1.65V to 3.3V, VCI=2.5V to 3.3V, VSS=0V
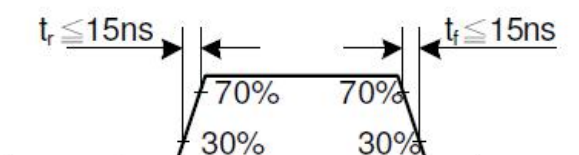
CSX timings :
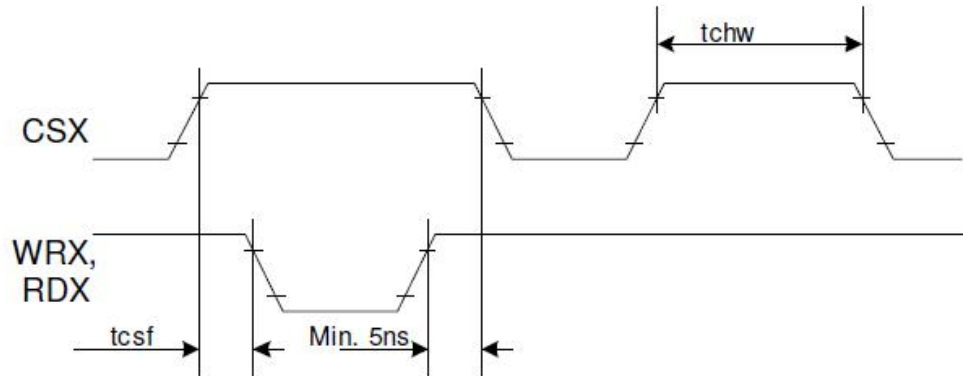
Note: Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

Write to read or read to write timings:

Note: Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

7 Optical Characteristics

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note
Response time		Tr+Tf	-	-	30	40	ms	FIG.1	Note4
Contrast Ratio		CR		-	450	-	-	FIG.2	Note1
Surface luminance		LV	$\theta =0°$	-	250	-	cd/m2	FIG.2	Note2
Luminance uniformity		Yu	$\theta =0°$	75	80	-	%	FIG.2	Note3
NTSC		-	$\theta =0°$	-	50	-	%	FIG.2	Note5
Viewing angle		θ Cr>10	$\varnothing=90°$	60	70	-	deg	FIG.3	Note6
			$\varnothing=270°$	50	60	-	deg	FIG.3	
			$\varnothing=0°$	60	70	-	deg	FIG.3	
			$\varnothing=180°$	60	70	-	deg	FIG.3	
Chromaticity	Red	R_X	$\theta =0°$ $\varnothing=0°$ Ta=25°	0.4884	0.5384	0.5884	-	FIG.2 CIE1931	Note5
		R_Y		0.2517	0.3017	0.3517	-		
	Green	G_X		0.2598	0.3098	0.3598	-		
		G_Y		0.5399	0.5899	0.6399	-		
	Blue	B_X		0.1097	0.1597	0.2097	-		
		B_Y		0.0476	0.0976	0.1476	-		
	White	W_X		0.2049	0.2549	0.3049	-		
		W_Y		0.2556	0.3056	0.3556	-		

Note1. Definition of contrast ratio

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

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

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.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3, ...,Pn)

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

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 (Tr) is the time between photo detector output intensity changed from 90% to 10%. And fall time (Tf) 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
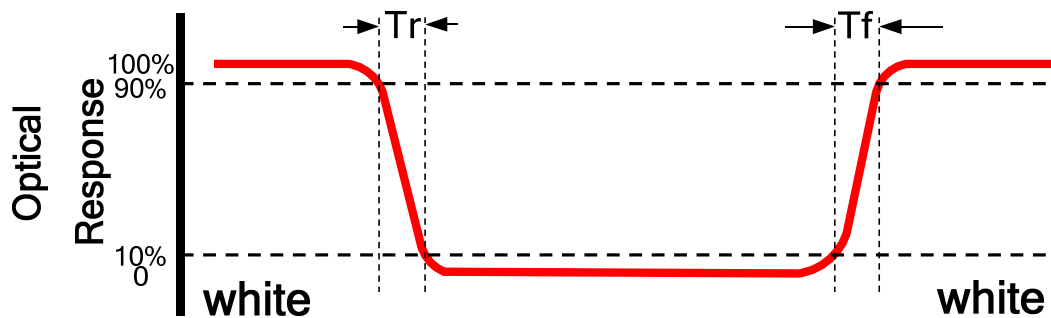
FIG.2. Measuring method for contrast ratio, surface luminance,

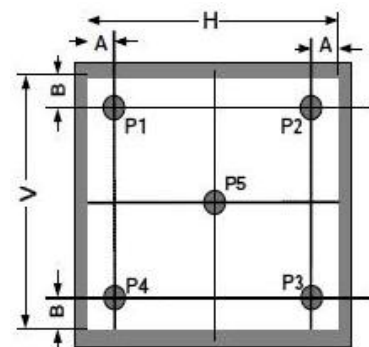   **luminance uniformity, CIE (x,y) chromaticity**

Size : S≤5"(see Figure a) A : 5 mm B : 5 mm

H,V : Active area

Light spot size ⌀=5mm(BM-5) or ⌀=7.7mm (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
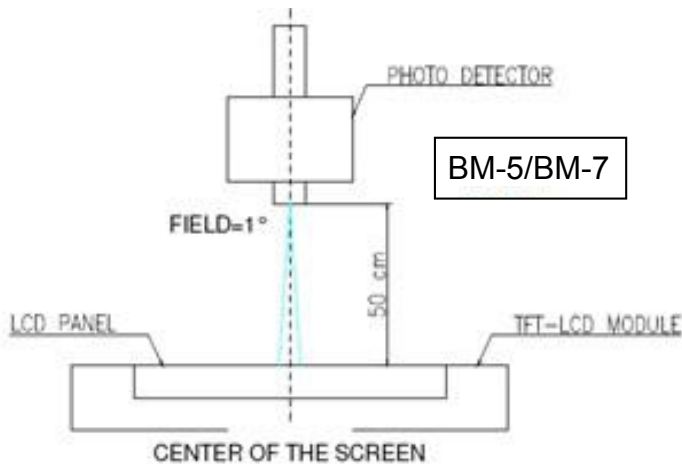
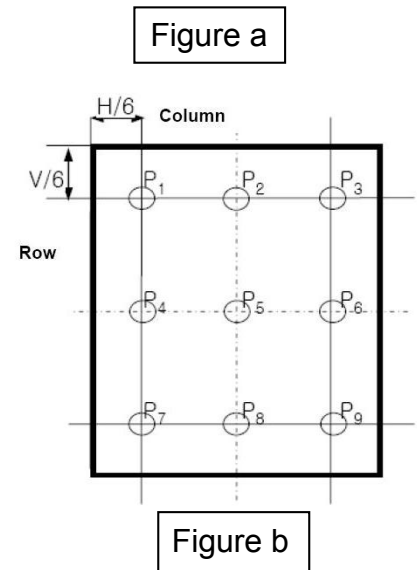BM-7 or compatible (see Figure c).

Figure a

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

Light spot size ⌀=5mm(BM-5) or ⌀=7.7mm (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).

BM-5/BM-7

Figure b

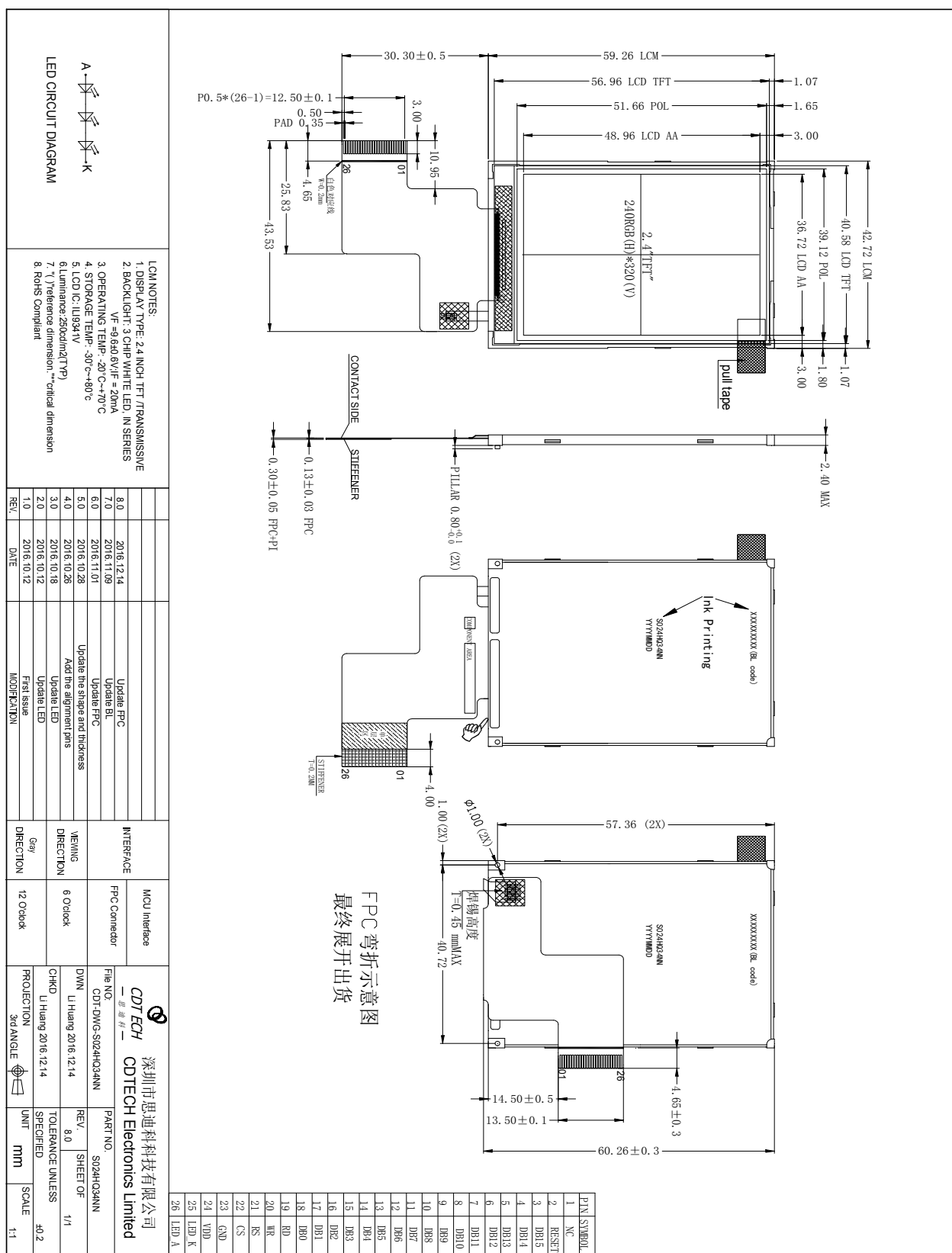Figure c

FIG.3.The definition of viewing angle

CDTech(H.K.)Electronics Limited
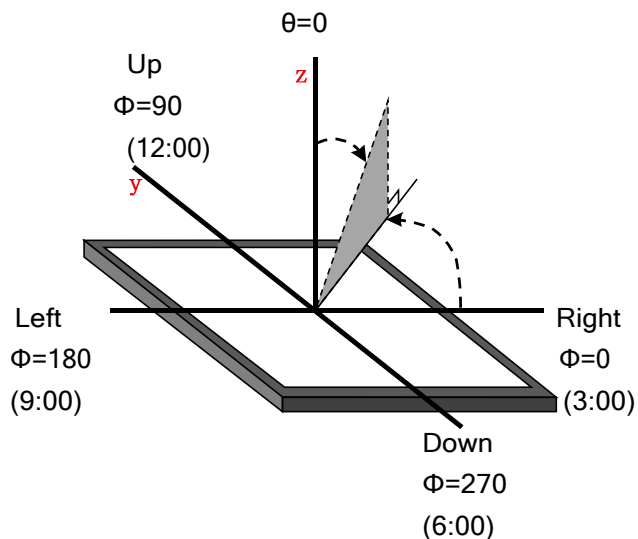
8 Environmental / Reliability Tests

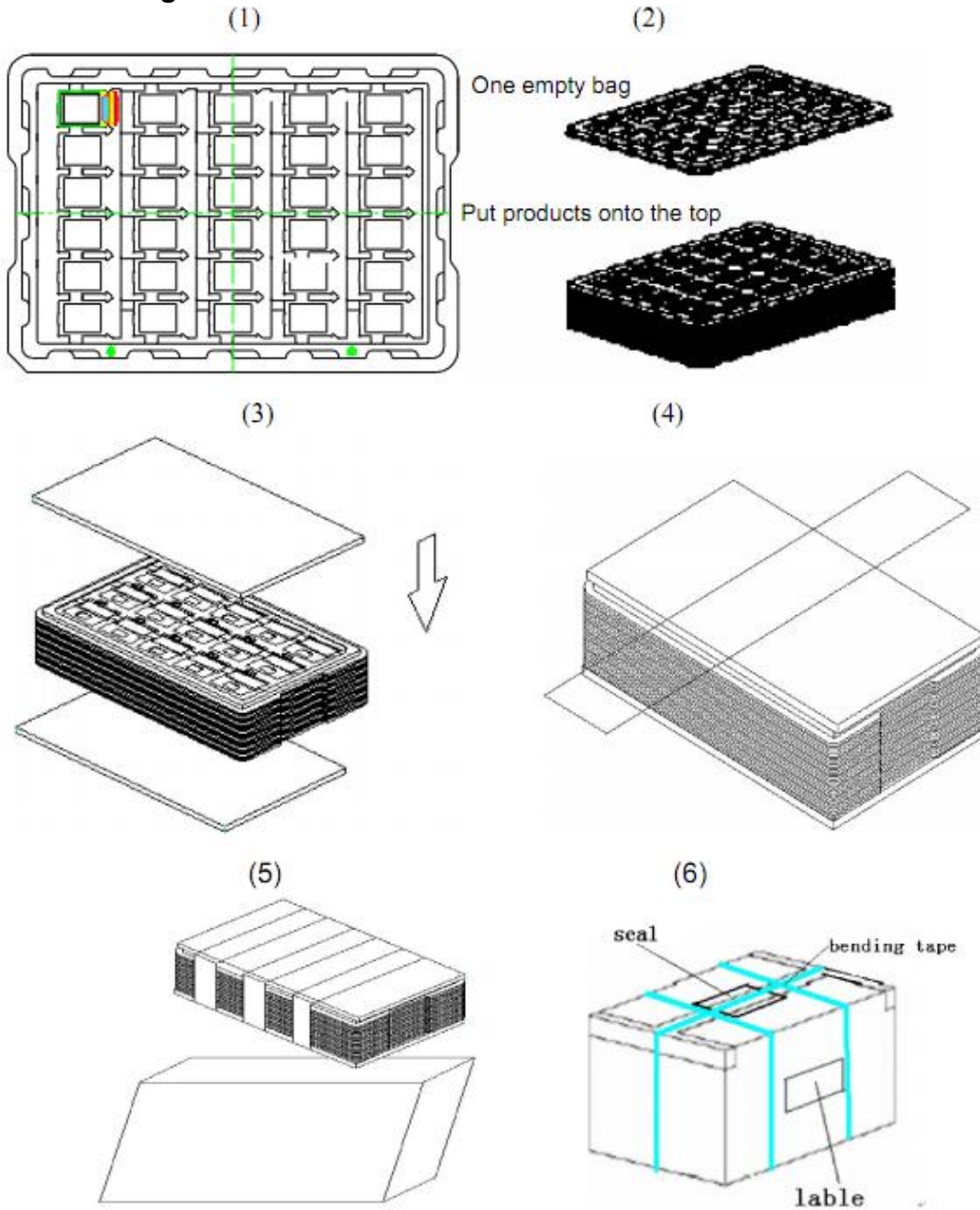| No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -20℃, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80℃, 96hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30℃, 96hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60℃, 90% RH max,96 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-20℃ 30 min ~ +60℃ 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Static Discharge (Operation)	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15℃ ~ 35℃, 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.

3. The size of sample is 5pcs.

CDTech(H.K.)Electronics Limited

9 Mechanical Drawing

10 Packing

Packing Method

(1)

(2)

One empty bag

Put products onto the top

(3)

(4)

(5)

(6)

seal

bending tape

lable

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

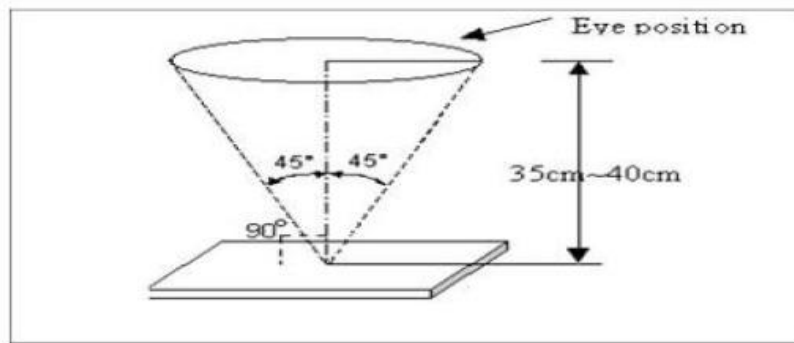## 11.4 Inspection Conditions

4.1 Ambient conditions:
a. Temperature: Room temperature $25\pm5℃$
b. Humidity: (60±10) ％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 ㎝.
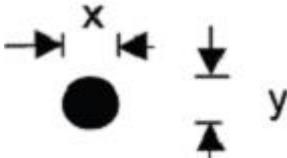4.3 Viewing Angle
U/D: 45 °/45°, L/R: 45°/45°
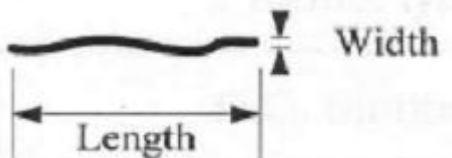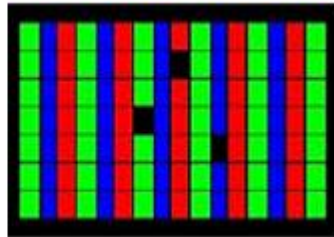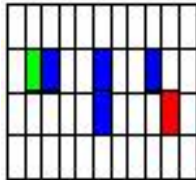
11.5 Inspection Criteria

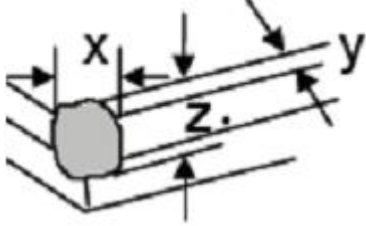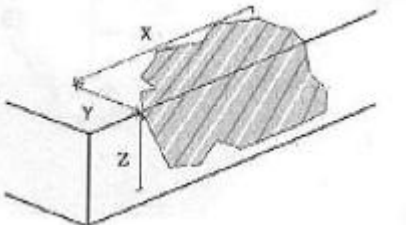Defects are classified as major defects and minor defects according to the degree of Defectiveness defined herein.

11.5.1 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

11.5.2 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 φ(mm)	Acceptable Quantity
		φ≤0.05	Ignore
		0.05 < φ ≤0.15	2
		0.15< φ	Not allowed
5.2.2	Polarizer dirt,	Size φ (mm)	Acceptable Quantity

	particle	Φ≤0.15	1
		Φ>0.15	**Not allowed**

5.2.3	**Line Defect Including Black line White line Scratch**	Define: 	

Width(mm) Length(mm)	Acceptable Quantity
W≤0.05	Ignore
0.05 < W≤0.1 L≤1.5	1
0.1 < W，or L>1.5	Not allowed

5.2.4	**Polarizer Dent/Bubble**	**Not allowed**

5.2.5	**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	Note
Black dot defect	1		(5mm≤Distance)
Bright dot defect	1		
Two Adjacent Dot	Not allow		

5.2.6	Glass defect	1.Corner Fragment:	
		Size(mm)	Acceptable Quantity
		X≤2mm Y≤1mm Z≤T	Ignore T：Glass thickness X: Length Y: Width Z: thickness
		2. Side Fragment:	
		Size(mm)	Acceptable Quantity
		X≤5.0mm Y ≤1mm Z≤T	T：Glass thickness X: Length Y: Width Z: thickness
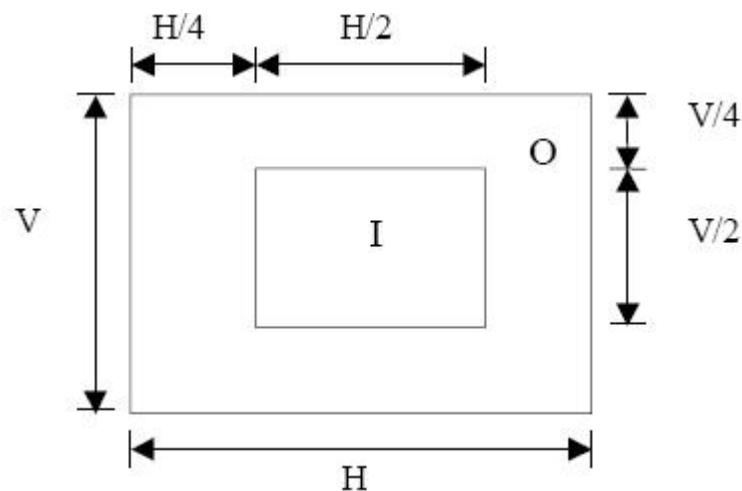
I area & O area

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.

11.6 Mechanics specification

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

CDTech(H.K.)Electronics Limited

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℃ ～ 40℃   Relatively humidity: ≤80%

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

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.