CHENG UEI PRECISION INDUSTRY CO., LTD.

PRODUCT SPECIFICATION

RoHS

4.3" a-Si TFT LCD MODULE
MODEL: FL430QHR01-B0T

< ◇ > Preliminary Specification

< ◇ > Engineering Specification

< ◆ > Approval Specification

CUSTOMER'S APPROVAL	
CUSTOMER :	
SIGNATURE:	DATE:

APPROVED BY	PM REVIEWED	PD REVIEWED	PREPARED By

Prepared By:

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- This specification is subject to change without notice. Please contact Foxlink or it's representative before designing your product based on this specification.

Revision Status

Version	Revise Date	Page	Content	Modified By
V1.0			First Issued	Terry Guo

Table of Contents

No. Contents Page

1. General Description

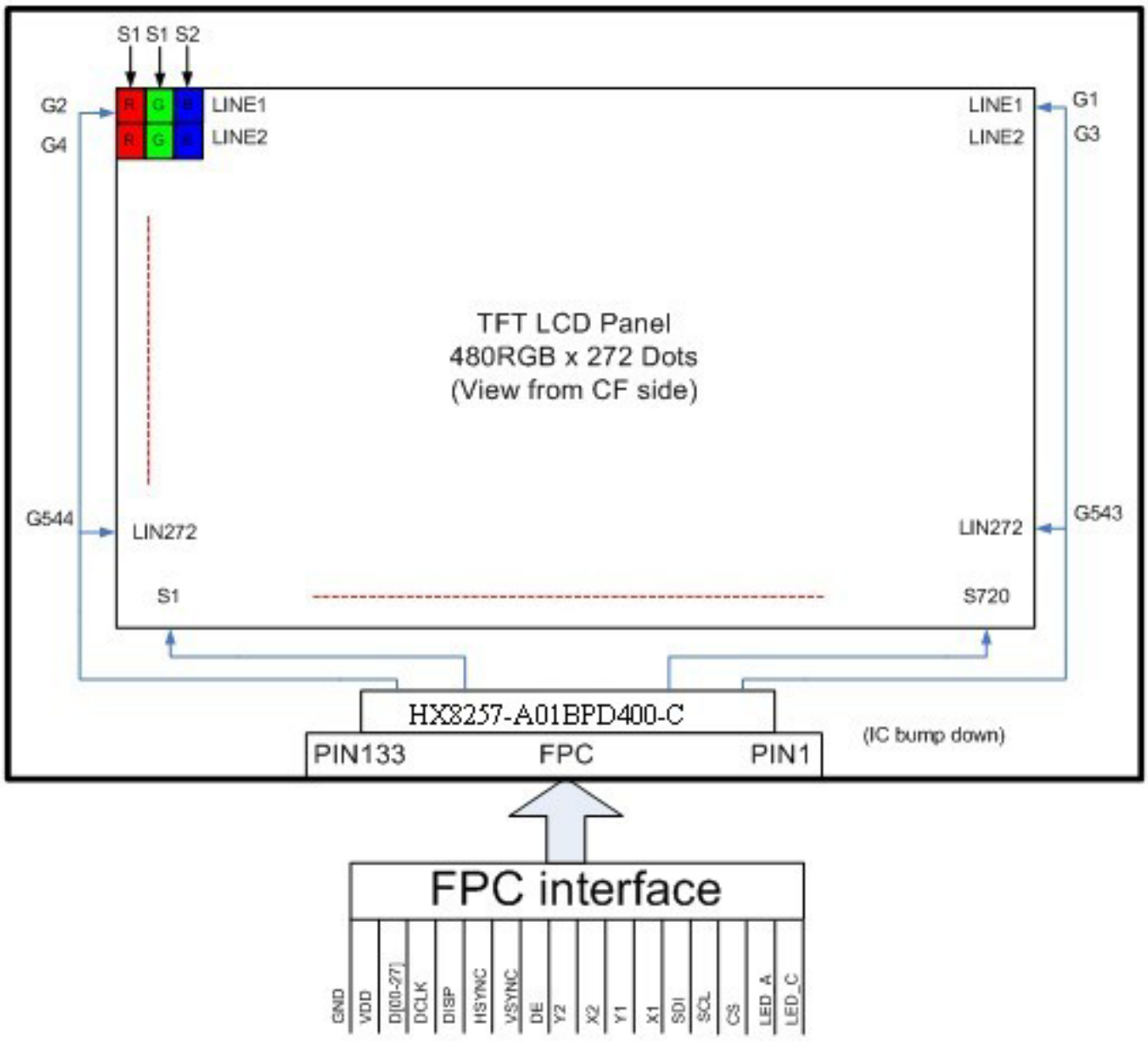
1.1 Description

The specifications is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, driver IC,FPC TP and a backlight unit. The following table described the features of FL430QHR01-B0T.

1.2 Features:

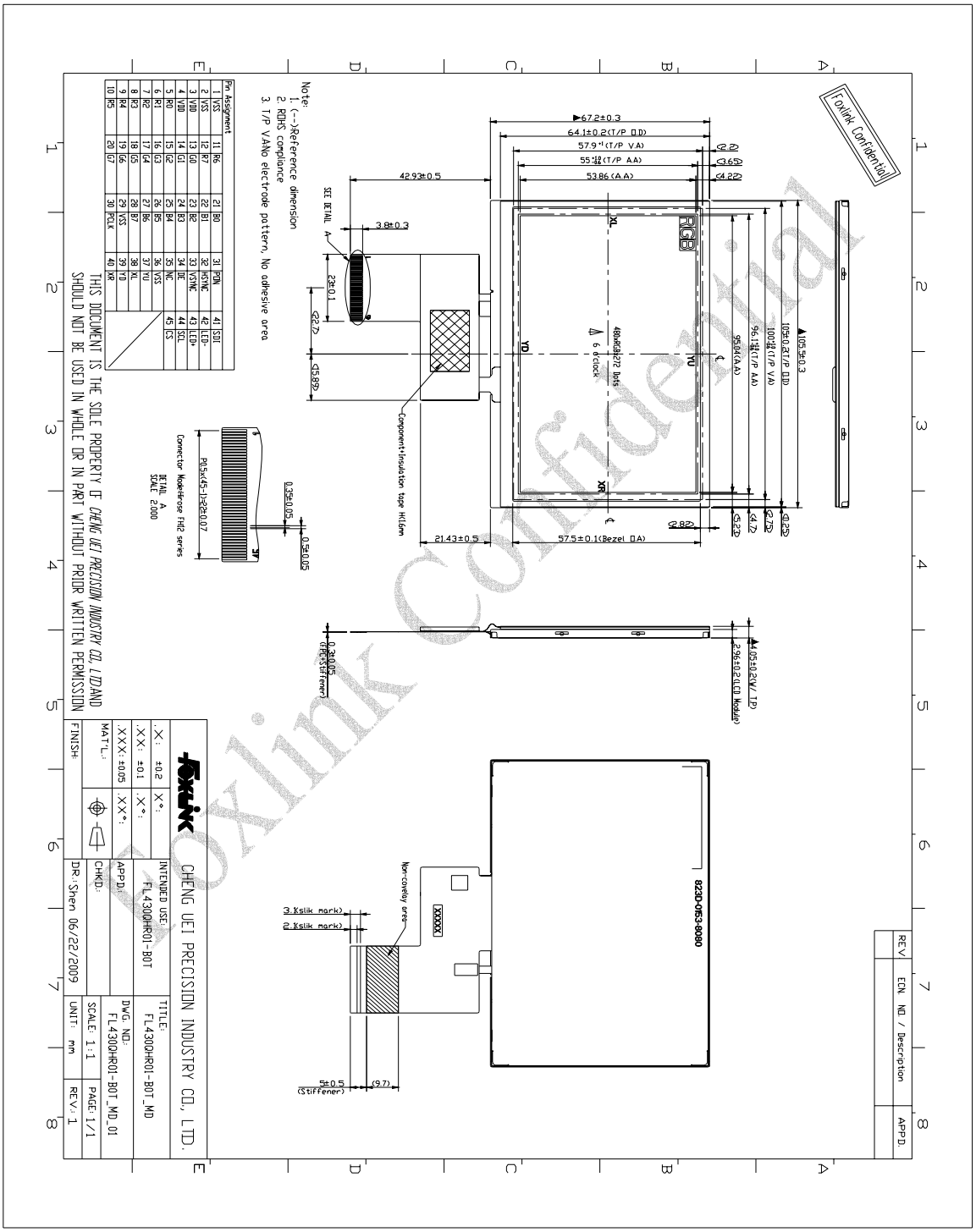
No.	Item	Specification	Unit
1	Panel Size	4.3” Diagonal	inch
2	Number of Pixels	480(H) x RGB x 272(V)	Pixels
3	Active Area	95.04(H) x 53.856(V)	mm
4	Pixel Pitch	0.198(H) x 0.198 (V)	mm
5	Outline Dimension	105.5(W) x 67.2(H) x 4.05 (D)	mm
6	Number of Colors	16.7M Colors	-
7	Pixel Arrangement	RGB Vertical Stripe	-
8	Display Mode	Normally White TN/Transmissive	-
9	Brightness (LED If=20mA)	350 (Typ.) / 310(Min.)	cd/m^2
10	Contrast Ratio	250:1 (Typ.)	-
11	Chromaticity(White, x/y)	0.310 / 0.330 (Typ.)	
12	Uniformity	80%(Typ.)	
13	Response time (Tr+Tf)	20(Typ.)	ms
14	Viewing Direction	6 o’clock	-
15	Input Interface	RGB interface	-
16	Viewing Angle (U/D/L/R)	50/55/60/60	degree
17	Backlight unit	LED	-
18	Surface Treatment	Anti-Glare with Touch Panel (Haze: 7%)	-
19	Driver IC	HX8257-A01BPD400-C	
20	Weight	(59.5)	g

2. Functional Block Diagram



3. Mechanical Specification

3.1 Mechanical Dimension



4. Pin Description

4.1 Interface Pin Description

No.	Symbol	I/O	Function	Remark
1	VSS	P	Ground	
2	VSS	P	Ground	
3	VDD	P	Power supply	
4	VDD	P	Power supply	
5	R0	I	Red signal data bus (LSB)	
6	R1	I	Red signal data bus	
7	R2	I	Red signal data bus	
8	R3	I	Red signal data bus	
9	R4	I	Red signal data bus	
10	R5	I	Red signal data bus	
11	R6	I	Red signal data bus	
12	R7	I	Red signal data bus (MSB)	
13	G0	I	Green signal data bus (LSB)	
14	G1	I	Green signal data bus	
15	G2	I	Green signal data bus	
16	G3	I	Green signal data bus	
17	G4	I	Green signal data bus	
18	G5	I	Green signal data bus	
19	G6	I	Green signal data bus	
20	G7	I	Green signal data bus (MSB)	
21	B0	I	Blue signal data bus (LSB)	
22	B1	I	Blue signal data bus	
23	B2	I	Blue signal data bus	
24	B3	I	Blue signal data bus	
25	B4	I	Blue signal data bus	
26	B5	I	Blue signal data bus	
27	B6	I	Blue signal data bus	
28	B7	I	Blue signal data bus (MSB)	
29	VSS	P	Ground	
30	PCLK	I	Dot clock signal	

31	PON	I	Display on/off mode control	
32	HSYNC	I	Horizontal synchronous signal	
33	VSYNC	I	Vertical synchronous signal	
34	DE	I	Data enable signal	
35	NC	-	NA	
36	VSS	P	Ground	
37	YU	I	Touch panel signal (Y - Top)	
38	XL	I	Touch panel signal(X - Left)	
39	YD	I	Touch panel signal (Y - Bottom)	
40	XR	I	Touch panel signal (X - Right)	
41	SDI	I	Data input pin in serial mode	
42	LED-	P	Cathode for LED	
43	LED+	P	Anode for LED	
44	SCL	I	Clock pin of serial interface	
45	CS	I	Chip select pin of serial interface	

Note：

It must send the initial code to the module through the serial interface. If not, it will be not intialized and can't receive the RGB data.

5. Electrical Characteristics

5.1 Absolute Maximum Ratings

5.1.1 Electronic Absolute Maximum Ratings

Item	Symbol	Values		Unit	Remark
		Min	Max.		
Power Supply Voltages	VDD	-0.3	5	V	GND=0
LED Forward Voltage	V_F	3.2		V	One LED
LED Forward Current	IF	20		mA	
Storage Temperature	TST	-30	80	℃	
Operating Temperature	Topa	-20	70	℃	

5.2 DC Electrical Characteristics

5.2.1 LCD DC Characteristics

Typical Operating Conditions (Ta=25℃)

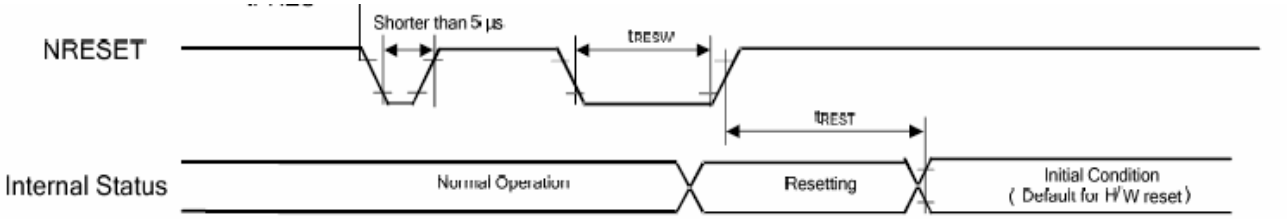
Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Operating voltage	VDD	1.8	2.8	3.6	V	
Input high voltage	V_{IH}	0.8*VDD		VDD	V	
Input low voltage	V_{IL}	0		0.2*VDD	V	
Output high voltage	V_{OH}	0.9*VDD		VDD	V	
Output low voltage	V_{OL}	0		0.1*VDD	V	
Current Consumption	I_{VDD}	-	14.0	21.0	mA	VDD=2.8V
Power Consumption	PLCD	-	46.2	69.3	mW	

5.2.2 Backlight Unit (GND=0V)

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
LED Voltage	V_L	-	30	-	V	LED*9
LED Current	I_F	-	20	-	mA	LED*9
Power Consumption	P_{LED}	-	600	-	mW	LED*9

5.2.3 Reset Timing Characteristics(VDD =1.8 ~ 3.3V)

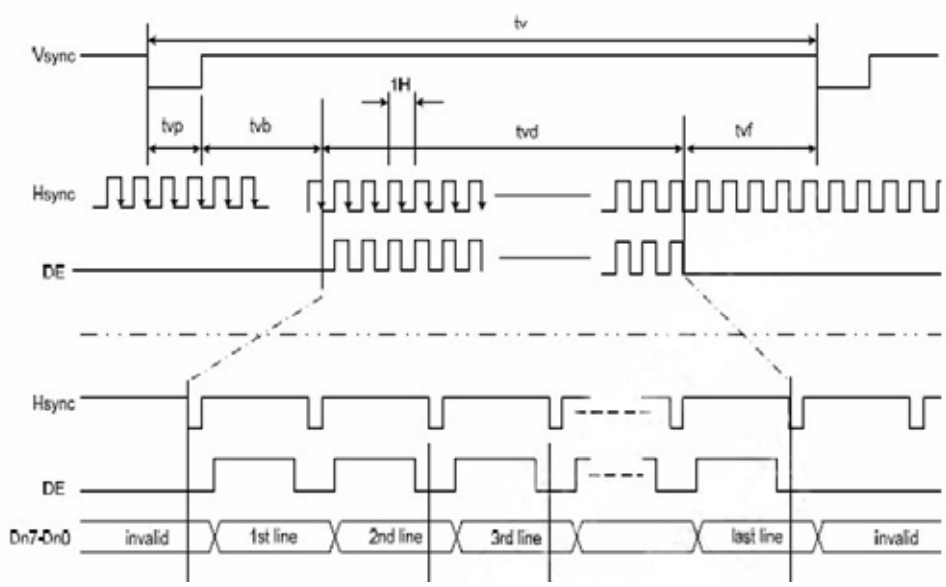
Item	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Reset low pulse width	t_{RESW}	10	-	-	μs	
Reset complete width	t_{REST}	-	-	5	ms	Sleep mode
		-	-	120	ms	Normal mode



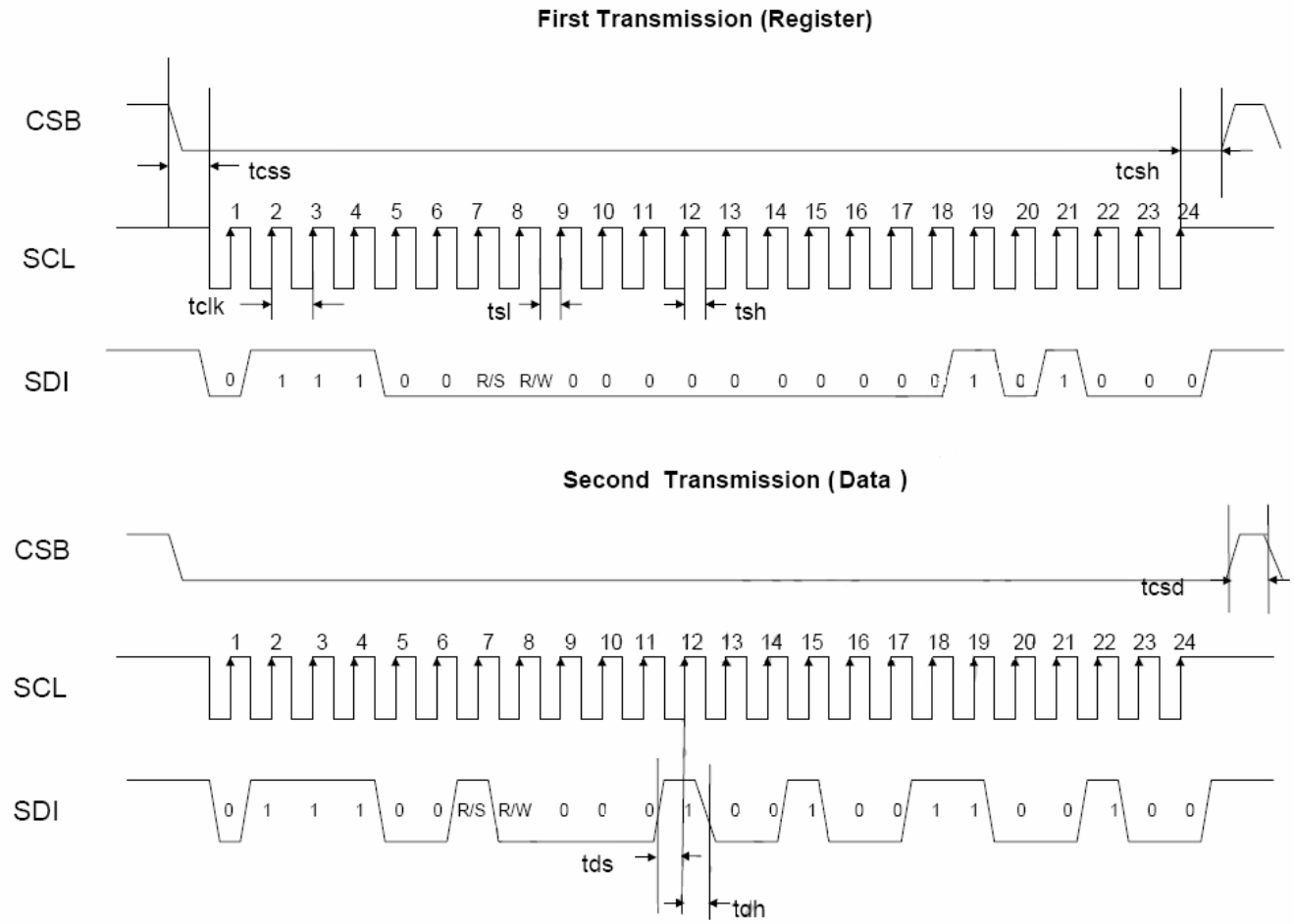
5.3 AC Electrical Characteristics

5.3.1 AC Timing Diagrams

Characteristics	Symbol	Values			Unit	Remark
		Min	Typ	Max.		
Clock cycle	fclk	-	9	15	MHz	
Hsync cycle	1/th	-	17.14	-	KHz	
Vsync cycle	1/tv	-	59.94	-	Hz	
Horizontal Signal						
Horizontal cycle	th	525	525	605	CLK	
Horizontal display period	thd	480	480	480	CLK	
Horizontal front porch	thf	2	2	82	CLK	
Horizontal pulse width	thp	2	41	41	CLK	
Horizontal back porch	thb	2	2	41	CLK	
Vertical Signal						
Vertical cycle	tv	285	286	511	H	
Vertical display period	tvd	272	272	272	H	
Vertical front porch	tvf	1	2	227	H	
Vertical pulse width	tvp	1	10	11	H	
Vertical back porch	Tvb	1	2	11	H	



5.3.2 SPI Timing Diagrams & transaction example



Note: the example writes “0x1264” to the register R28h.

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Serial Clock Frequency	fclk	-	-	20	MHz
Serial Clock Cycle Time	tclk	50	-	-	ns
Clock Low Width	tsl	25	-	-	ns
Clock High Width	tsh	25	-	-	ns
Chip Select Setup Time	tcss	0	-	-	ns
Chip Select Hold Time	tcsh	10	-	-	ns
Chip Select High Delay Time	tcsd	20	-	-	ns
Data Setup Time	tds	5	-	-	ns
Data Hold Time	tdh	10	-	-	ns

6. Optical Characteristics

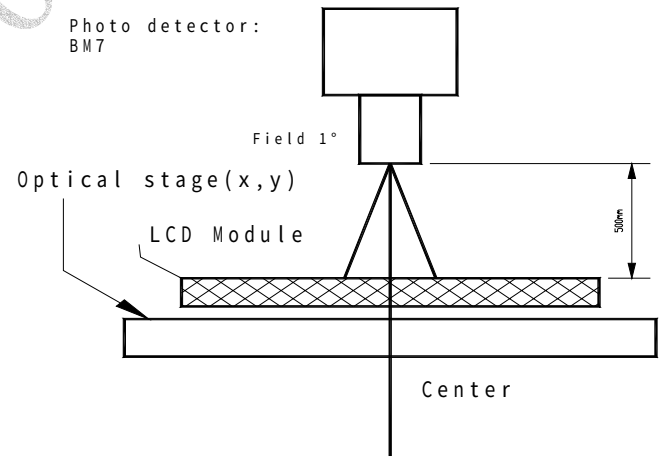
The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note.1.

6.1 Main LCD Optical Characteristics

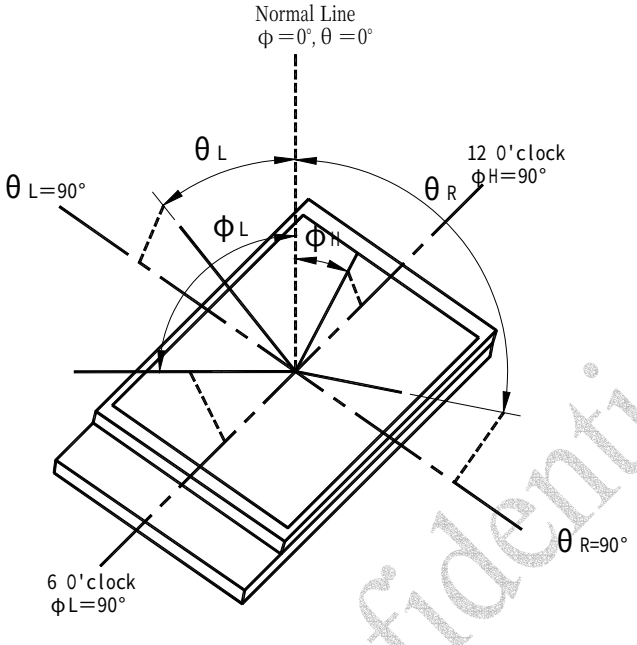
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	
Viewing Angle	Top	ΦU	CR≧10	-	50	-	degree	Note.2
	Bottom	ΦD		-	55	-		
	Left	θL		-	60	-		
	Right	θR		-	60	-		
Response time(Tr+Tf)			T=0	-	20	-	ms	Note.3
Brightness			Center	310	350	-	cd/m^2	
Uniformity				-	80	-	%	Note.4
Contrast Ratio		CR	At optimized viewing angle	230	250	-	-	Note.5
Color Chromaticity	White	Xw	Viewing normal angle Φ,T=0	(0.26)	(0.31)	(0.36)	-	Note.6
		Yw		(0.28)	(0.33)	(0.38)		
	Red	XR		(0.56)	(0.61)	(0.66)		
		YR		(0.31)	(0.36)	(0.41)		
	Green	XG		(0.30)	(0.35)	(0.40)		
		YG		(0.52)	(0.57)	(0.61)		
	Blue	XB		(0.09)	(0.14)	(0.19)		
		YB		(0.03)	(0.08)	(0.13)		

Note.0: ΔB=B(min)/B(max)

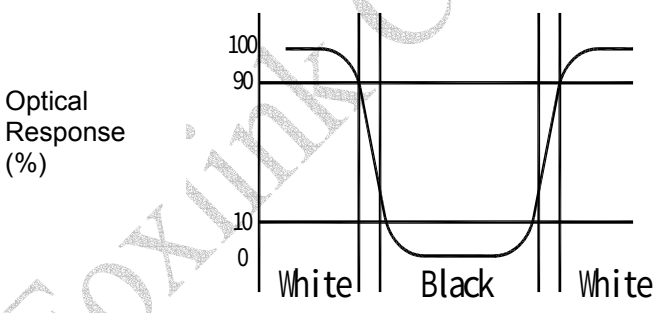
Note.1: After stabilizing and leaving the panel alone at a given temperature for 30 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7(fast) with a viewing angle of 1° at a distance of 50cm and normal direction.



Note.2: Definition of Viewing Angle: Refer to figure as below:



Note.3: Definition of Response Time: TR and TF
The figure below is the output signal of the photo detector.

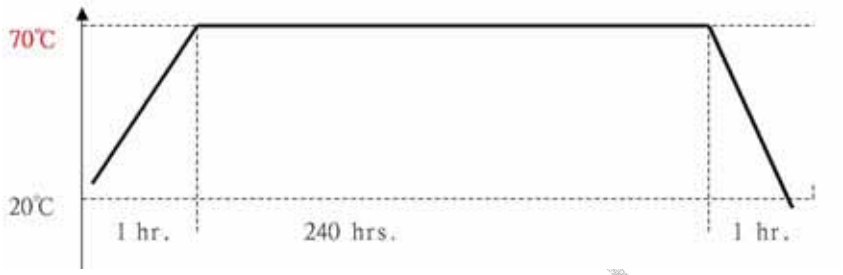
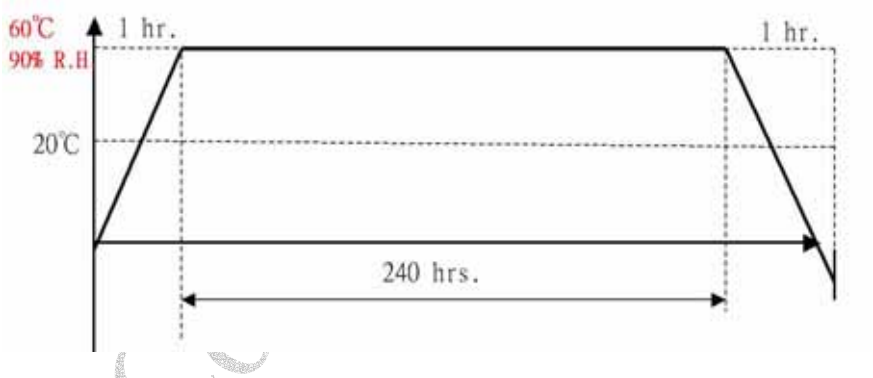
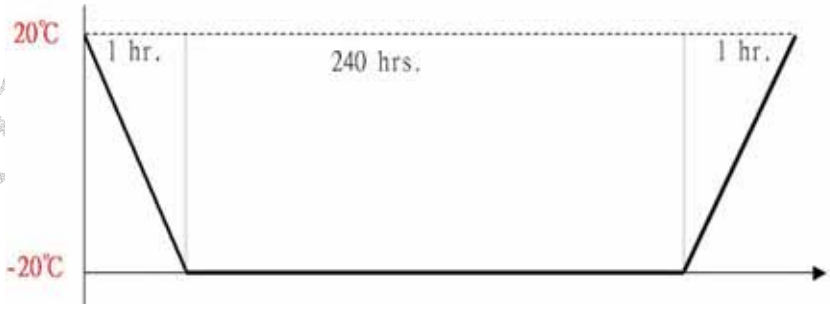
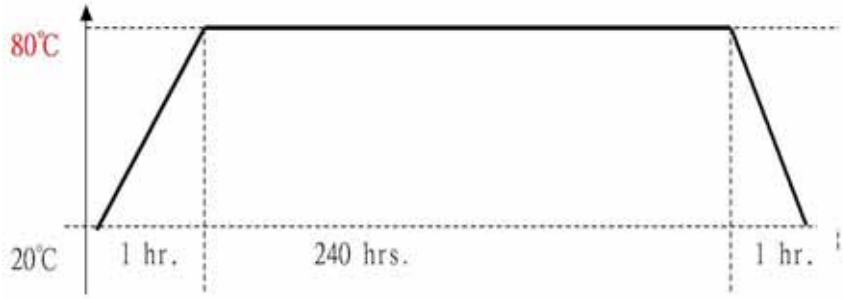


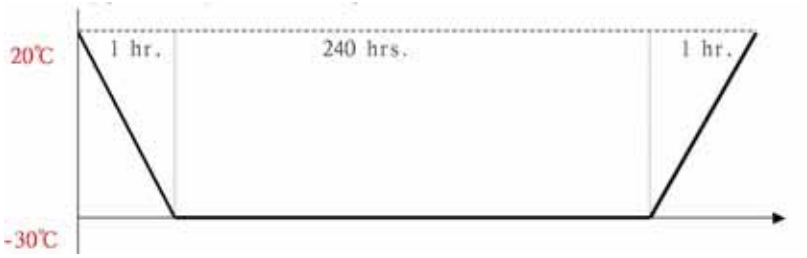
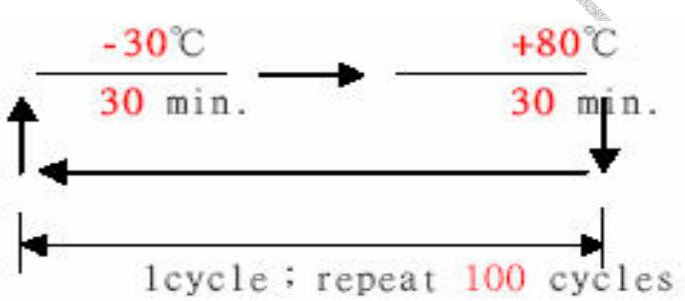
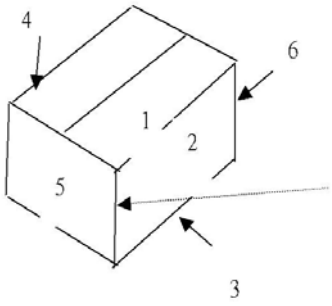
Note.4: Definition of Contrast Ratio (CR)

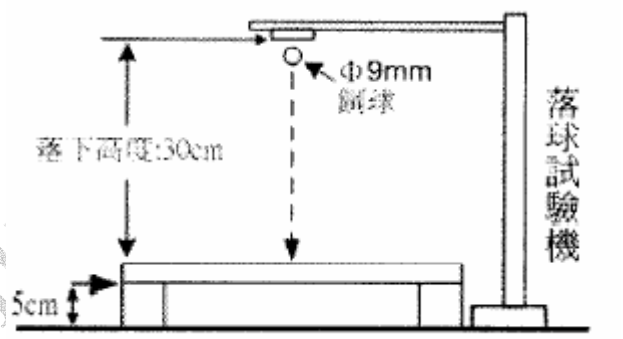
Ratio of gray max (G max)& gray min(G min)
Contrast ratio (CR) =(G max) / (G min)
(G max)=luminance with central pixel white
(G min)=luminance with central pixel black

Note.5: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

7. Reliability

Test Item	Test Condition
High Temperature Operation	70℃ for 240 hours 
High Temperature Operation Humidity Operation	60℃,90%RH for 240 hours 
Low Temperature Operation	-20℃ for 240 hours 
High Temperature Storage	80℃ for 240 hours 

Test Item	Test Condition
Low Temperature Storage	-30℃ for 240 hours 
Thermal Shock	-30℃(30min) ~ +80℃(30min) for 100 cycles 
Electrostatic Discharge (Not operation)	Discharge Resistance ：330 Ω Energy Storage Capacitor：150 pF Output voltage： (1)Contact Discharge ±4KV. (2)Air Discharge ± 8KV. Polarity of the output voltage ：positive and negative Discharge times ：5 times
Package Vibration	Frequency (Random Wave) ： 10**Hz ~ 55Hz~**10**Hz** Amplitude ： 2mm Orientation ： X，Y，Z (3 axis) Test Time ：2 hr.each axis, total 6 hrs
Package Drop Test	100cm height natural falling Drop sequence：1 corner, 3 edges, and 6 faces, total 10 times.  1) 角corner 2－3－5 2) 稜edge 2－5 3) 稜edge 2－3 4) 稜edge 3－5 5) 面face 5 6) 面face 6 7) 面face 2 8) 面face 4 9) 面face 3 10) 面face 1

Test Item	Test Condition
Tapping durability	By using Φ12mm/R8.0mm silicon rubber, under the loading of **250g** to impact the surface of touch panel under the speed of 2 time/second, after repeat knocking **300k times**, The requirements in item “Electric characteristics” shall be satisfied.
Pen sliding durability	By using Φ3.0mm/R0.8mm/POM pen with **2.45N (250g)** loading under **70mm/sec** moving speed, within the touch panel **35mm** linear contact range and repeat **30K times**(one direction moving as test one time), The requirements in item “Electric characteristics” shall be satisfied. **Test area :** Along the diagonals of active area of the touch panel, and the friction center is the same as the center of active area. It means that the distance is **17.5mm** extended both at the friction center two sides along the diagonals of active area of the touch panel and proceeding handwriting friction test.
Impact resistance	By using Φ9mm steel ball from the height of **30cm** and falling on touch panel surface, must pass below conditions: Appearance:the appearance without any change, including the panel broken. 

Notes: Electric characteristics

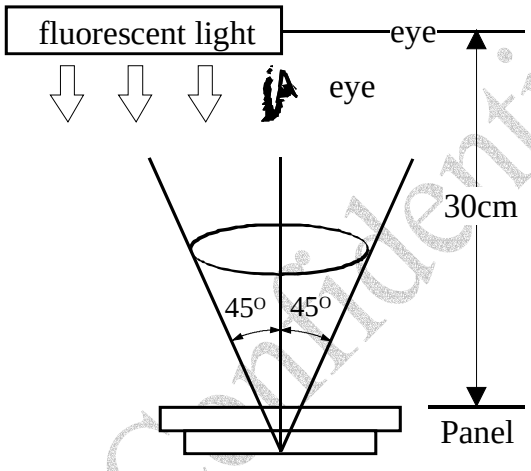
Item		Spec.
Linearity errors	**X-axis**	≦ 1.5%
	Y-axis	
Terminal resistance	**X-axis**	200~900Ω
	Y-axis	200~900Ω
Insulation resistance		DC 25V，≧20MΩ

8. Cosmetic Criteria of LCD Screen

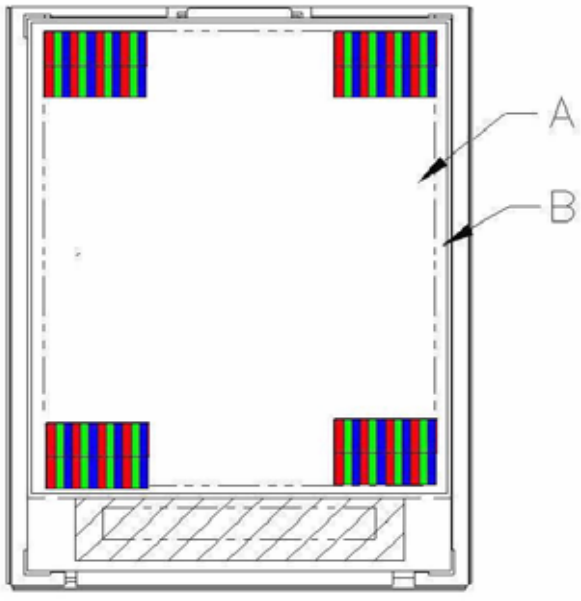
8.1 Inspection Condition

- Inspect under 300~500Lux fluorescent light, leaving 30~35cm between panels and eyes, and between panels and lights.
- Inspection condition is 23±5°C, 50±20%RH maximum.
- Judge criterion

Judgment under above mentioned criterion (panel must be tested under light transparent),testing goods defect can be visible within 10 seconds, which will be judged as major defects.



- Definition of area:



A Area : Viewing area.
B Area : Out of viewing. (Don't care cosmetic in outside viewing area)

8.2 Inspection Specification

NO	Item	Acceptable specification	Judgment Criterion
1	Electrical Testing	**1-1 sub pixel classification** ● Sub Pixel: a> Bright dot ---- Three Allowed b> Two dots link together doesn't exceed two c> The definition of dot----- The size of a defective dot over 1/2 of whole dot is regarded as one defective dot. d> Bright sub pixel:The distance more than 5mm between bright dot and bright dot.  Sub Pixel (Dot) ● Pixel : Three dots link together doesn't exceed ones  Pixel **1-2 Pervious to light** ● Pervious to light be not allowed. **1-3 Picture to shake** ● Picture had shake, twinkle and noise etc. instable of defect that be not allowed. **1-4 Function** ● No display or No function. ● Missing vertical, horizontal segment. ● Segment Contrast defect. ● Viewing angle defect. ● Current consumption exceeds product specifications. ● Display malfunction.	N≦3 N≦2 ≧5mm N≦1 N=0 N=0 N=0
2	Mechanical Dimension	2-1 Mechanical Dimension exceeds product specifications. 2-2 Out of frame and boss of plastic changed shape that be not allowed.	N=0
3	Mura	6%ND filter Inspection	
4	Micro-Dot Defect	6%ND filter Inspection	

<table>
<tr><th>NO</th><th>Item</th><th>Acceptable specification</th></tr>
<tr><td>5</td><td>Cosmetic Inspection</td><td>

5-1 Scratch

Length	Width	Acceptable number	Mini. space
---	W≦0.03	Ignore	5 m m
L≦3.0	0.03<W≦0.05	4	
L≦3.0	0.05<W≦0.08	2	
--	W＞0.08	Not allowed	---

5-2 Linear Foreign Matter

Length	Width	Acceptable number	Mini. space
---	W≦0.03	Ignore	5 m m
L≦3.0	0.03<W≦0.05	4	
L≦3.0	0.05<W≦0.08	2	
--	W＞0.08	Not allowed	---

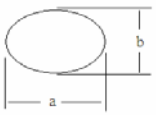
L: length(mm)
W: width(mm)

5-3 dot shapes of defect.

Dimension	Acceptable number	Mini. space
ϕ ≦0.20	Ignore	**---**
0.20＜ϕ≦0.30	**3**	5 m m
ϕ＞0.30	0	**---**

5-4 Fish eye/ Bubble/Dent

Dimension	Acceptable number	Mini. space
ϕ ≦0.20	Ignore	**---**
0.2< ϕ ≦0.4	3	5 m m
0.4≦ ϕ ≦0.5	1	
ϕ ＞0.5	Not Allowed	--



ϕ =(a+b)/2

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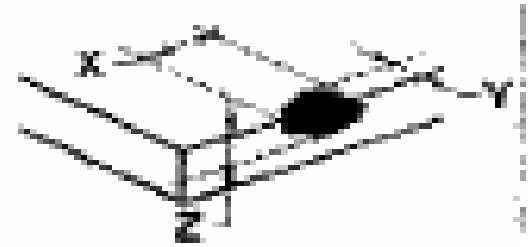
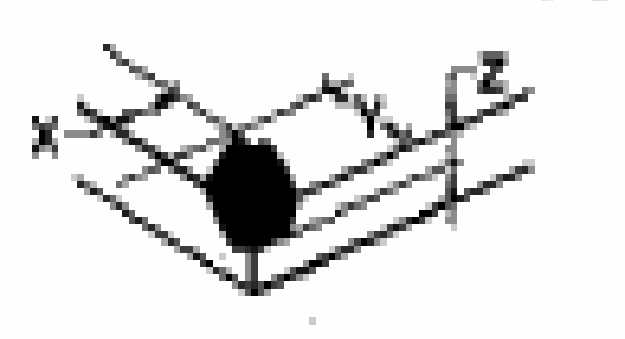
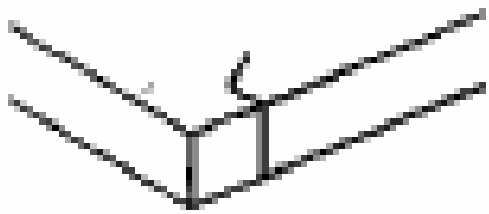
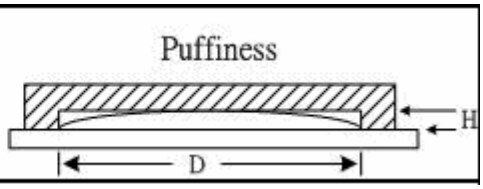
<tr><th>NO</th><th>Item</th><th>Acceptable specification</th></tr>
<tr><td>6</td><td>T/P
General
Crack</td><td>X≦3mm,Y≦2mm,Z≦t
  </td></tr>
<tr><td>7</td><td>T/P
Corner
Crack</td><td>X≦3mm,Y≦2mm,Z≦t
  </td></tr>
<tr><td>8</td><td>T/P
Bad
Crack</td><td>All shall be rejected.
By naked eyes.
  </td></tr>
<tr><td>9</td><td>T/P
Newton
Ring</td><td><table><tr><th>D</th><th>Acceptable number</th></tr><tr><td>D≦8mm</td><td>1</td></tr><tr><td>D＞8mm</td><td>Not Allowed</td></tr></table></td></tr>
<tr><td>10</td><td>Puffiness
(Baggy)</td><td><table><tr><td>H≦0.4mm</td><td>Acceptable</td><td>  </td></tr></table></td></tr>
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9. Package

FU GANG ELECTRONIC CO.,LTD.CHENG UEI GROUP

Customer		LCM包裝規格書 LCM Packaging specifications	Prepared	Checked	DATE
			hui	Jos	07/01/07
LCM Model	FL037-A3		版次Ver	Modify Description	
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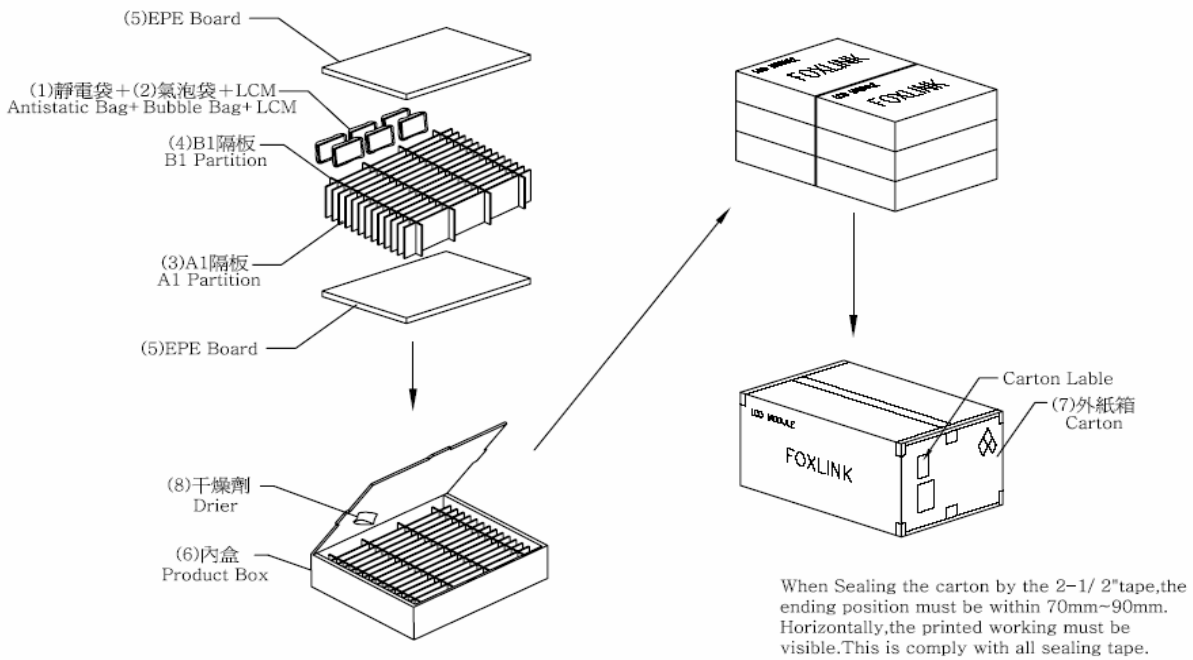
1.包裝材料規格表(Packaging Material):(per carton)

No.	Item	Dimension(mm)	Weight(g/pcs)	Net Quantity
1	成品(LCD MODULE)	98.3*62.4*4.95	TBD	216pcs
2	靜電袋（1）Antistatic Bag	130*120	2.1	216pcs
3	氣泡袋（2）Bubble Bag	140*120	3.2	216pcs
4	A1隔板（3）A1 Partition	465*74*2.5	12.7	78pcs
5	B1隔板（4）B1 Partition	275*74*2.5	8.6	24pcs
6	EPE Board(5)	270*460*10	27.65	12pcs
7	內盒(6)Product Box	285*475*100	265	6pcs
8	外紙箱(7)Carton	585*490*315	1310	1pcs
9	乾燥劑(8)(Drier)	10g/pcs	11.01	6pcs

2.單箱數量規格表(Packaging Specifications and Quantity):
(1)Quantity of spacer per box： A1 Partition * 13 ;B1 Partition * 4
(2)Total LCD quantity in carton：number per box 36 * number of box 6 = 216



When Sealing the carton by the 2-1/ 2"tape,the ending position must be within 70mm~90mm. Horizontally,the printed working must be visible.This is comply with all sealing tape.

10. Precautions for Use

10.1 Safety

(1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
(2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
(3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

10.2 Storage Conditions

(1)Store the panel or module in a dark place where the temperature is 23±5°C and thehumidity is below 50±20%RH.
(2)Store in anti-static electricity container.
(3)Store in clean environment, free from dust, active gas, and solvent.
(4)Do not place the module near organics solvents or corrosive gases.
(5)Do not crush, shake, or jolt the module.

10.3 Handling Precautions

(1)Avoid static electricity which can damage the CMOS LSI.
(2)The polarizing plate of the display is very fragile. So, please handle it very carefully.
(3)Do not give external shock.
(4)Do not apply excessive force on the surface.
(5)Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
(6)Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
(7)Do not operate it above the absolute maximum rating.
(8)Do not remove the panel or frame from the module.
(9)When the module is assembled, it should be attached to the system firmly,Be careful not to twist and bend the module.
(10)Wipe off water droplets or oil immediately . If you leave the droplets for a long time,staining and discoloration may occur.
(11) 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.

10.4 Warranty

(1)The period is within twelve months since the date of shipping out under normal using and storage conditions.
(2) Do not repaired or modified the LCM . It may cause function to lose efficacy ,Foxlink does not warrant the LCM.
(3) All process and material comply ROHS.