

*** Records of Revision ***

Rev.	Page	Description of changes	Date	prepared by
o	All	Original Release	2010.04.13	LIUGUOFANG

Preliminary version

一般事项 特殊事项
 特殊事项内容:

* Contents *

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2. Mechanical Specifications
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4. Electrical Characteristics
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17. LCD Module Operation Instruction

1. Features

The features of BTL221722-350L are as follows

- * Display mode : TFT 262K Colors, Transmissive, Normally White
- * Driving Condition : 240x3Ch-Source / 400Ch-Gate
- * Connection : Soldering Type
- * LCD Driver & Control IC : R61509V (Renesas)
- * Back Light : White LED Back Light (4 Chips in Parallel)
- * MPU Interface : 80-Series, 8-/16-Bit Parallel Data Bus
- * Type of Surface Contion : Clear Type

2. Mechanical Specifications

Item		Specification	Unit
Resolution	Main	240(× RGB) × 400	Dot
	Sub	NA	
LCM Outline Demension		42.50x71.40x2.1(Typ)	mm
Active Area (W × H)	Main	36.72 x 61.20	mm
	Sub	NA	
Pixel Pitch (W x H)	Main	0.153 x 0.153	mm
	Sub	NA	
Viewing Direction (Human Eye)	Main	6	O'clock
	Sub	NA	
Gray Scale Inversion Direction (Contrast Ratio)	Main	12	O'clock (Rubbing Direction)
	Sub	NA	
Weight		About 10	g

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3. Absolute Maximum Ratings

(Ta=25°C Note1)

Items	Symbol	Min.	Max.	Unit	Remark
Logic voltage	I_{OVCC}	-0.3	4.6	V	
Analoge voltage	V_{CI}	-0.3	4.6	V	
Input signal voltage	V_{IN}	-0.3	$I_{OVCC}+0.3$	V	
LED forward current	I_{LED}	-	25	mA	For each LED
Operation temeprature	T_{OPR}	-20	70	°C	
Storage temperature	T_{STG}	-30	80	°C	
Humidity (ambient)	$T_a \leq 60^\circ\text{C}$		90% RH Max.		

Note1 : Device is subject to be damaged permanently,
if stresses beyond those absolute maximum ratings listed above.

4. Electrical Characteristics

Main		Ta=25°C					
Items	Symbol	Min.	Typ.	Max.	Unit	Remark	
Logic voltage	I_{OVCC}	2.72	2.8	3.3	V		
Analog(Power) voltage	V_{CC}	2.72	2.8	2.88	V		
Gate voltage	High level	V_{GH}	TBD	-	TBD	V	Note 1
	Low level	V_{GL}	TBD	-	TBD	V	
Input signal voltage	High level	V_{IH}	0.8xlovcc	-	lovcc	V	
	Low level	V_{IL}	-0.3	-	0.2xlovcc	V	
current consumption	I_{CC}	-	TBD	TBD	mA	Note 2	

Note 1) The value can be adjusted by software to optimize display quality

Note 2) Display Black Pattern

5. Recommended Software Setting Value (LDI: R61509V)

Initial Code

INDEX	DATA	INDEX	DATA
Power On		R0502	005F
50ms delay or more		R0401	0001
Hardware Reset		R0404	0000
50ms delay or more		100ms delay or more	
Driving ability Setting		Power Voltage Setting	
R0000	-	R0007	0100
R0000	-	R0100	0230
R0000	-	R0101	0237
R0000	-	R0103	1000
10ms delay or more		R0280	CE00
R0400	6200	R0102	81B0
R0008	0808	10ms delay or more	
GAMMA SETTING		R0200	0000
R0300	0403	R0201	0000
R0301	7E1F	R0202	-
R0302	0A06		
R0303	1113		
R0304	1130		
R0305	1313		
R0306	B40A		
R0307	1F0C		
R0308	0203		
R0309	1330		
10ms delay or more			
USER SETTING			
R0010	0014		
R0011	0101		
R0012	0000		
R0013	0001		
R0001	0100		
R0002	0100		
R0003	5030		
R0009	0001		
R000C	0000		
R0090	8000		
R0210	0000		
R0211	00EF		
R0212	0000		
R0213	018F		
R0500	0000		
R0501	0000		

备注: R0003寄存器16bit时为5030, 18bit时为9030

NOTE: BOE requires the customer to follow the above instructions strictly. If customer would like to change the above instructions, the customer should inform BOE and get re-check from BOE, or the customer will be responsible for any unexpected result because of the change.

Into Standby Mode

INDEX	DATA
DISPLAY OFF	
0007	0000
DELAY 100ms	
POWER OFF	
0102	0180
DELAY 200ms	
0100	0004

Exit Standby Mode

INDEX	DATA
0000	-
0000	-
DELAY 20ms	
0000	-
0000	-
0000	-
0000	-
DELAY 10ms	
Call Initial Code	

Partial Display Setting

INDEX	DATA
0210	StartX
0211	EndX
0212	StartY
0213	EndY

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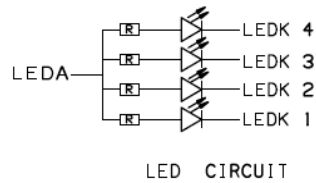
6. Back Light System Characteristics

Ta=25°C

Items	Symbol	Min.	Typ.	Max.	Unit	Remark
Forward current	If	-	15	20	mA	Note1
Forward voltage	Vf	3.0	-	3.4	V	Note1
B/L Power consumption	P_{BL}	-	-	270	mW	Note2

Note 1: The Driving conditon is defined for each LED chip.

Note 2: The B/L Power consumption is defined for the backlight module.the schematic drawing of the backlight module as the figure.



Ref. Total power consumption(max) depends on LED current/ LED driver efficiency, etc.

7. Optical Characteristics

Transmissive Mode

Ta=25°C

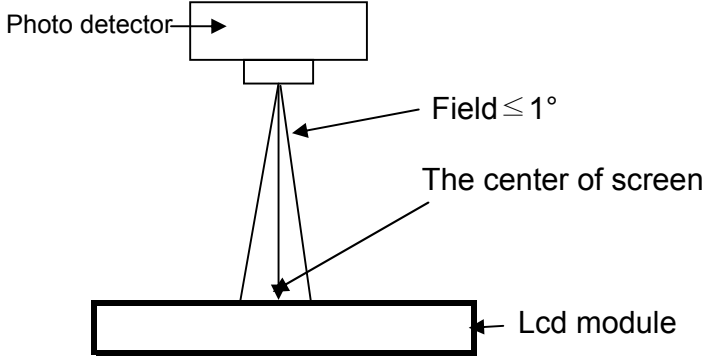
Item	Symbol	Min.	Typ.	Max.	Unit	Condition	Note	
Viewing Angle	θ	$\varnothing=0^\circ$ (X1)	-	55	-	deg.	Cr > 10	Note2
		$\varnothing=180^\circ$ (X2)	-	55	-			
		$\varnothing=90^\circ$ (Y1)	-	30	-			
		$\varnothing=270^\circ$ (Y2)	-	60	-			
Contrast ratio (transmissive)	Cr	250	300	-	-	$\theta = 0$ $\varnothing = 0$	Note1 Note4	
Response Time	Tr + Tf	-	25	-	ms	$\theta = 0$ $\varnothing = 0$	Note3	
CIE Coordi- -nate	R	(x,y)	0.60, 0.28	0.64, 0.32	0.68, 0.36	$\theta = 0$ $\varnothing = 0$		
	G	(x,y)	0.27, 0.55	0.31, 0.59	0.35, 0.63			
	B	(x,y)	0.10, 0.04	0.14, 0.08	0.18, 0.12			
	W	(x,y)	0.24, 0.27	0.28, 0.31	0.32, 0.35			
Brightness	L	150	190	-	cd/m2	15mA/LED	Note5	
Uniformity		70	-	-		15mA/LED	Note6	

* $\varnothing = 0^\circ$, $\varnothing = 90^\circ$, $\varnothing = 180^\circ$, $\varnothing = 270^\circ$ means viewing direction.

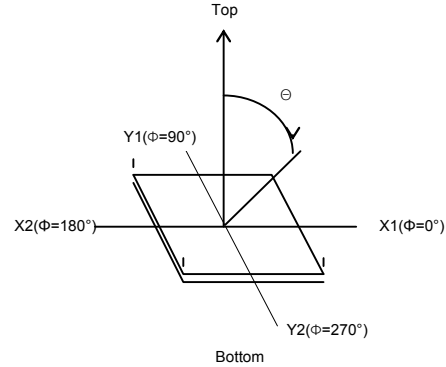
* B/L is turned on.

The optical characteristics should be measured in dark room, and after 5 minutes operation, the measurement begin.

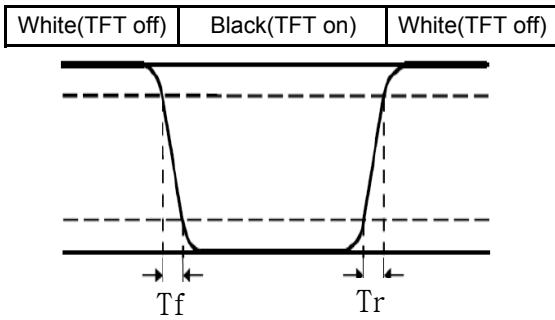
Note1. Definition of Measure System



Note2. Definition of Angle Θ .



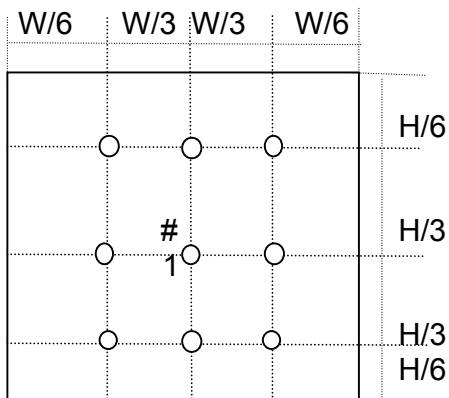
Note3. Definition of Response Time



Note4. definition of contrast ratio

$$Cr = \frac{\text{Liuminance of LCD white state}}{\text{Liuminance of LCD Black state}}$$

Note 5. Measuring Point(9 Points) (WxH)



Rating is defin O0EF

brightness inside the viewing area

Note 6. definition of Uniformity

$$\text{Uniformity} = \frac{\text{max. Liuminance of measurede point}}{\text{max. Liuminance of measurede poin}}$$

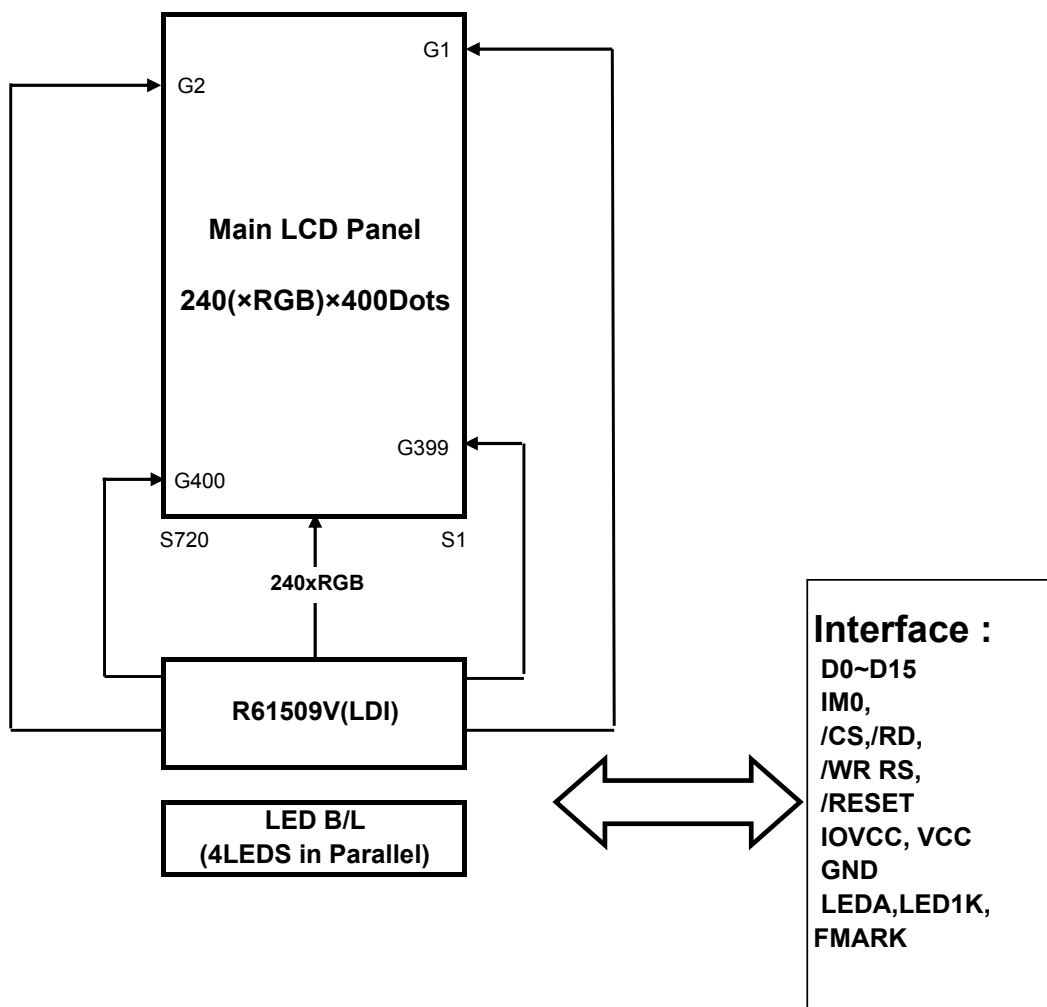
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8. Block Diagram



IM0	0	80-System 16bit	DB[17:10], DB[8:1]
	1	80-System 8bit	DB[17:10]

If not use, please fix DB pin at GND level .

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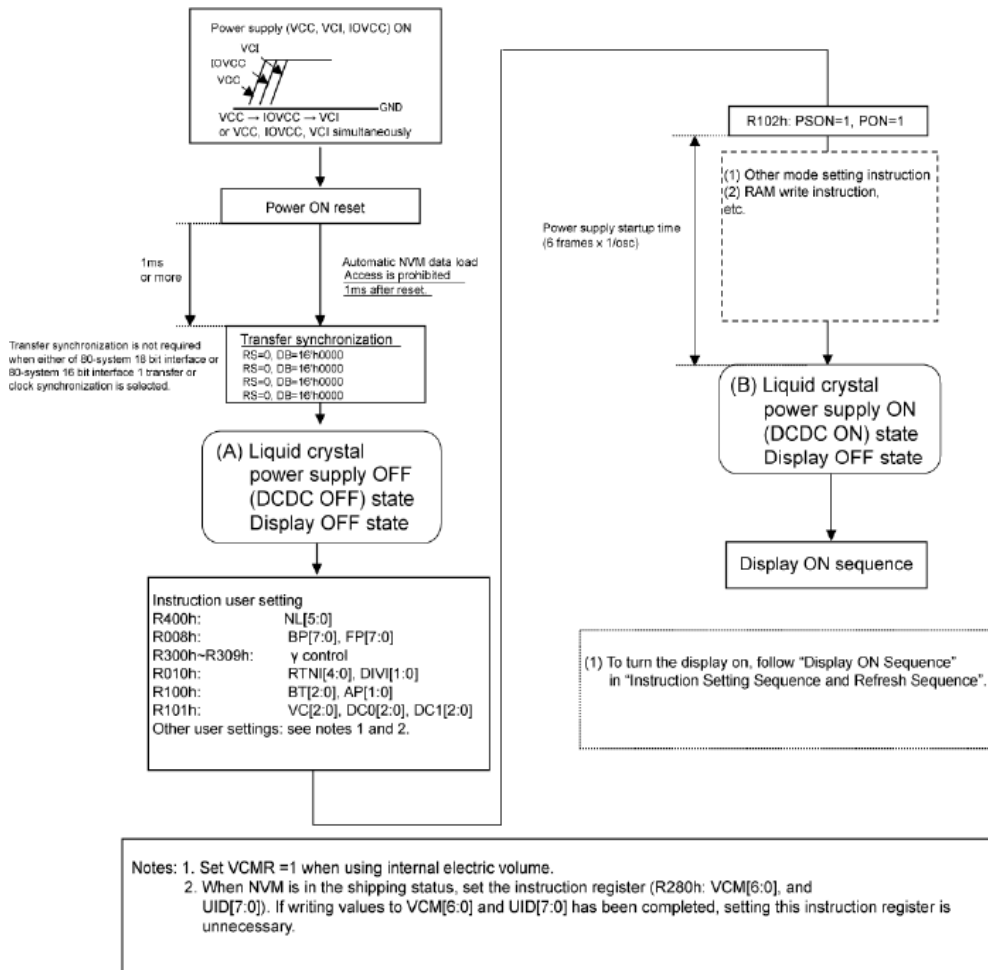
PRODUCT SPECIFICATION

9. Interface Pin Assignment

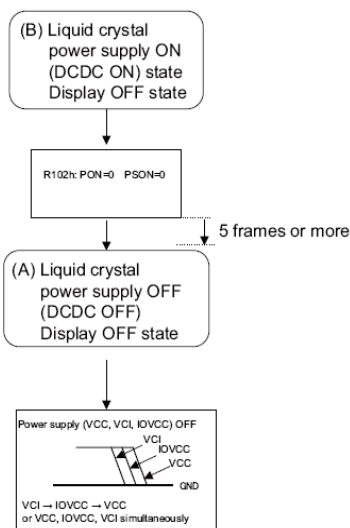
No	Symbol	Description
1	GND	Ground
2	IM0	System interface selection pins.
3	RESET	Hardware Reset Signal(low active)
4	RS	RS Signal (RS=0:Index, RS=1:Data)
5	/WR	Write Signal (low active)
6	RD	Read Signal(low active)
7	DB0	Bi-directional (I/O) Data Line
8	DB1	Bi-directional (I/O) Data Line
9	DB2	Bi-directional (I/O) Data Line
10	DB3	Bi-directional (I/O) Data Line
11	DB4	Bi-directional (I/O) Data Line
12	DB5	Bi-directional (I/O) Data Line
13	DB6	Bi-directional (I/O) Data Line
14	DB7	Bi-directional (I/O) Data Line
15	DB8	Bi-directional (I/O) Data Line
16	DB9	Bi-directional (I/O) Data Line
17	DB10	Bi-directional (I/O) Data Line
18	DB11	Bi-directional (I/O) Data Line
19	DB12	Bi-directional (I/O) Data Line
20	DB13	Bi-directional (I/O) Data Line
21	DB14	Bi-directional (I/O) Data Line
22	DB15	Bi-directional (I/O) Data Line
23	/CS	Chip Select Signal(low active)
24	FMARK	Frame head pulse
25	IOVCC	Power Supply for Internal Logic(1.8V or 2.8V)
26	LCM_ID	NC
27	VCC	Power Supply 2.8V
28	LEDA	LED Anode(+)
29	LEDK	LED Cathode(-)
30	NC	NC
31	GND	Ground

10. Power Supply Sequence

Power Supply ON Sequence

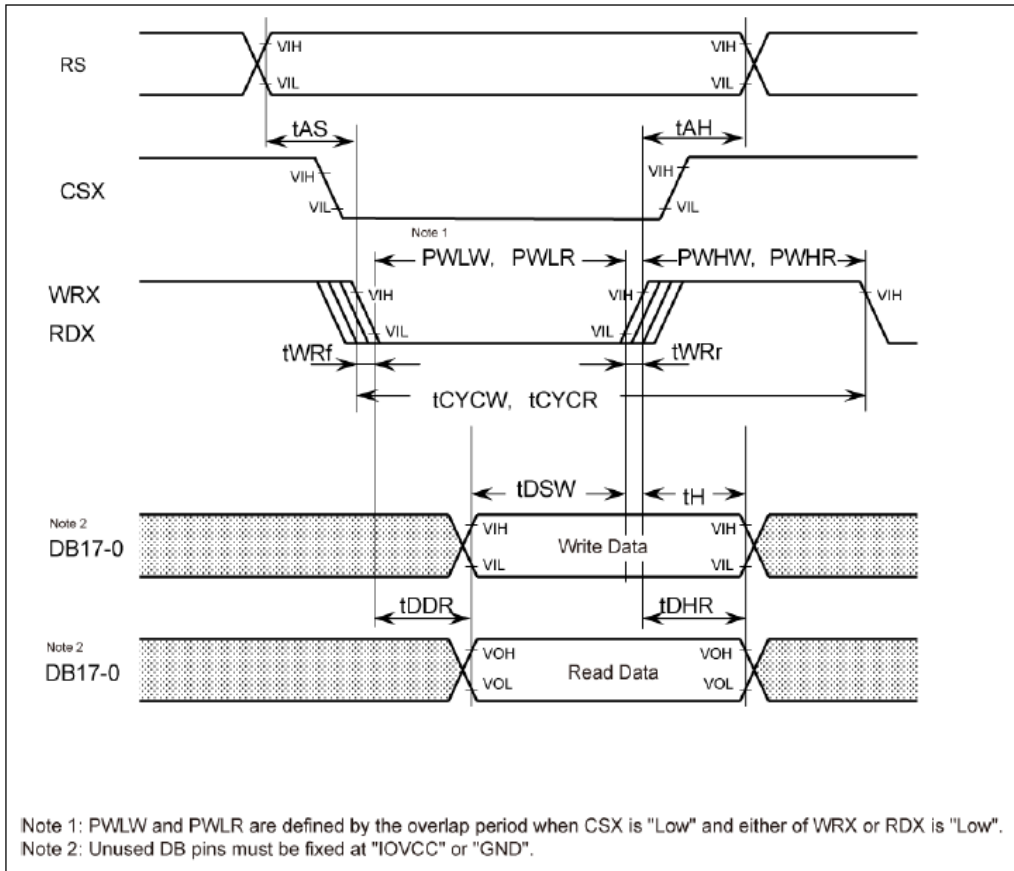


Power Supply OFF Sequence



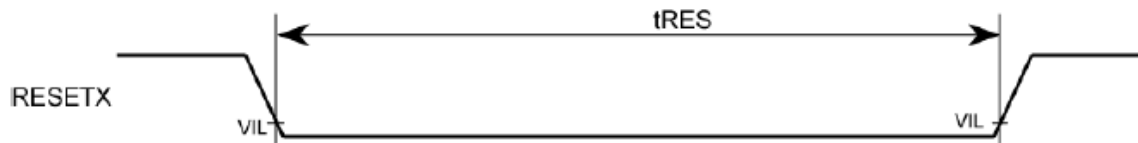
11. Read/Write Timing characteristics (80 series MPU)

1) Read/Write Timing



Items	Symbol	Unit	Test condition	Min.	Typ.	Max.	Note	
Bus cycle time	Write	t _{CYCW}	ns	Figure A	75	—	—	11
	Read	t _{CYCR}	ns	Figure A	450	—	—	—
Write "Low" level pulse width	PWLW	ns	Figure A	30	—	—	—	
Read "Low" level pulse width	PWLR	ns	Figure A	170	—	—	—	
Write "High" level pulse width	PWHW	ns	Figure A	25	—	—	—	
Read "High" level pulse width	PWHR	ns	Figure A	250	—	—	—	
Write read rise/fall time	t _{WRr} , t _{WRf}	ns	Figure A	—	—	15	—	
Set up time	Write (RS to CSX, WRX)	t _{AS}	ns	Figure A	0	—	—	—
	Read (RS to CSX, RDX)		ns	Figure A	10	—	—	—
Address hold time	t _{AH}	ns	Figure A	2	—	—	—	
Write data setup time	t _{DSW}	ns	Figure A	25	—	—	—	
Write data hold time	t _H	ns	Figure A	10	—	—	—	
Read data delay time	t _{DDR}	ns	Figure A	—	—	150	—	
Read data hold time	t _{DHR}	ns	Figure A	5	—	—	—	

2) Reset Timing characteristics



(IOVCC=1.65V ~ 3.30V)

Item	Symbol	Unit	Test condition	Min.	Typ.	Max.
Reset "Low" level width	tRES	ms	Figure C	1	—	—

12. External Dimension

NOTE:
 1.GENERAL TOLERANCE:±0.2
 2.BACKLIGHT LED USED 4CHIP
 3.IC:R61509V
 4.*KEY DIMENSION

LED CIRCUIT

```

    LEDA ---|> LEDK 4
            |> LEDK 3
            |> LEDK 2
            |> LEDK 1
    
```

LED PIN LIST

No.	PIN NAME
1	GND
2	1V0
3	/RESET
4	RS
5	/VR
6	/RD
7	DB00
8	DB01
9	DB02
10	DB03
11	DB04
12	DB05
13	DB06
14	DB07
15	DB08
16	DB09
17	DB10
18	DB11
19	DB12
20	DB13
21	DB14
22	DB15
23	VCS
24	FMARK
25	IDVCC
26	IC-TD
27	VDD
28	VLED+
29	VLED-
30	NC
31	GND

PRELIMINARY
CONFIDENTIAL

REF. DESIG.	9080010605	DESCRIPTION	MATERIAL
DESIGNED BY	T.T.HAD	APPROVED BY	
DATE	20100409	DATE	20100409
MODEL	BTL282440-350L	SCALE	N/S
SIZE	A3	DWG NO	BME-10-056
REVISION		REMARKS	
REV		REVISION	
1/1			

ZONE	LTR	EON NO	REVISION	DATE	APPL
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13.COLOR LCD MODULE NUMBERING SYSTEM

B	T	L	2	8	2	4	4	0	-			3	5	0	L		
(1)	(2)	(3)	(4)	(5)			(6)	(7)		(8)	(9)	(10)					

(1) B: BHL

(2) Drive System

C : CSTN T : TFT E : OLED M: MONO

(3) Product Status

L: LCD Model F: FOG Model G: COG Model P: PANEL Model C: CELL Model

(4) Display size(精确到小数点后1位,四舍五入)

EX) 2.22 inch:22 1.76 inch:18 2.0 inch:20 10.1inch:A1
 1.9 inch:19 1.12 inch:11 1.8 inch:18 15.5inch:F5

(5) Resolution

Number of Row Dots * Number of column Dots(前两位有效)

EX) 128 * 128 = 1212 96 * 64 = 9664 128 * 160 = 1216 101 * 80 = 1080
 176 * 220 = 1722 128 * 96 = 1296 320 * 240 = 3224 1024*576 = 1057

(6) Viewing Direction

Nil: 6 H U: 12 H L: 9 H R: 3 H W: Wide view E: 其他

(7) Serial Number (*001-9999: 按照产品状态, 各类产品序列号实行大排行处理, *为0时省略不写)

(8) Back Light

Nil:Without backlight + Reflective	H:CCFL + Translective
T:Without backlight + Transflective	E:LED Frontlight + Reflective
F:CCFL Frontlight + Reflective	D:LED + Transflective
L:LED + Transmissive	

(9)DUAL LCD

Nil: Single LCD M:MONO C:CSTN T:TFT O:OLED

(10)TOUCH PANEL

14. Package Terms

1、Tray Size

L:340mm

W:248mm

(TBDpcs LCM/Tray)

TBD

Tray Drawing

2、Inner BOX Size

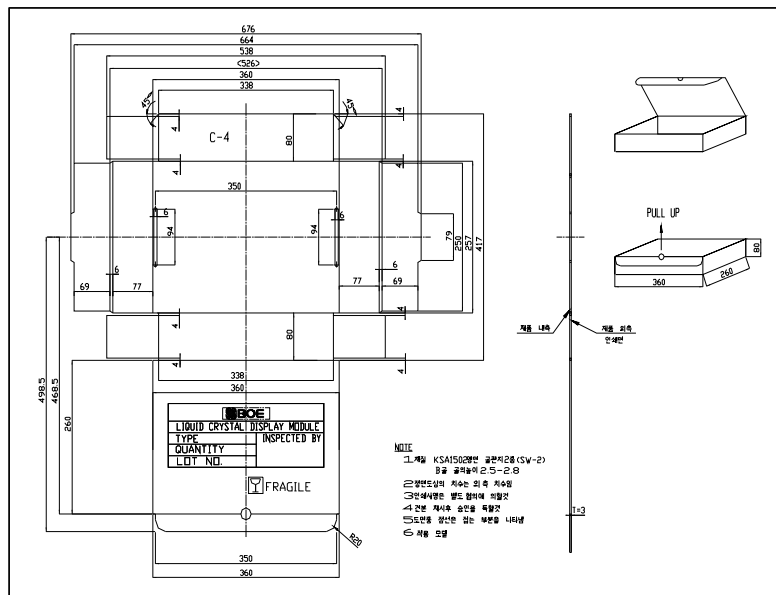
L:360mm

W:260mm

H:80mm

(7pcsTray/ Inner Box)

Note: there's one empty
tray in every inner box.



Model

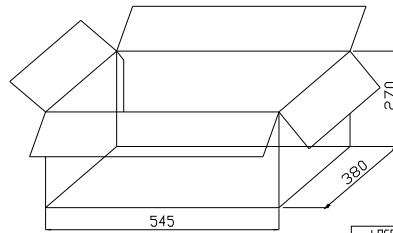
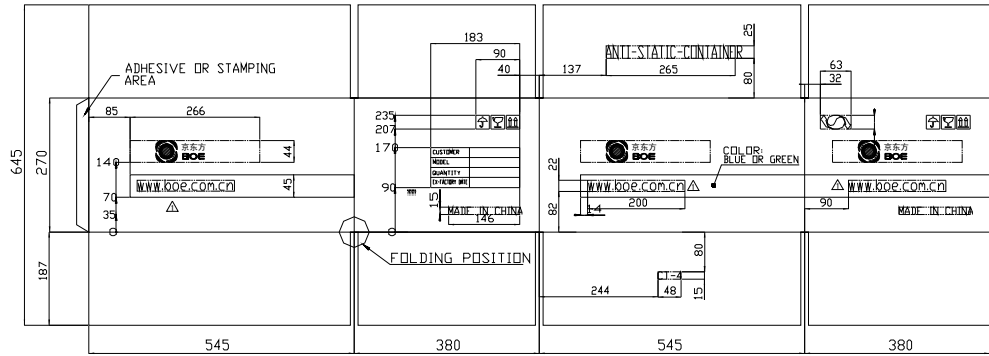
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3、Out BOX Size

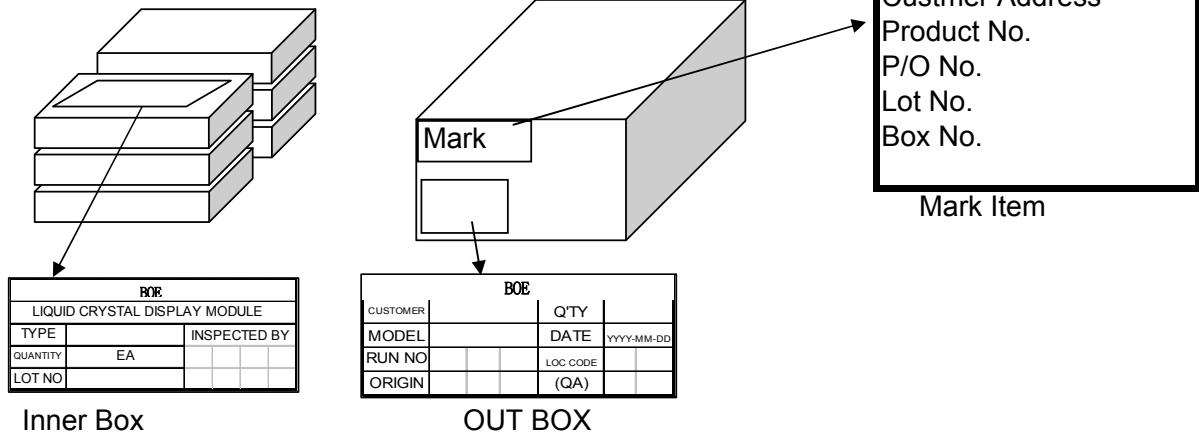
L: 545mm
W: 380mm
H: 270mm
(6pcs Inner / Out)



NOTE
1.MATERIAL: KSA 1531,DW2(T=8mm)
2.DRAWING DIMENSIONS ARE EQUAL TO OUTSIDE DIMENSION.
3.INNER BOX(C-4) ARRANGEMENT: 3STEPS X2ROWS
4.MARKS ARE REFER TO SEPERATE CONSULTATION.

LOGO	COLOR
	BLUE OR GREEN
	CLEARNESS
OTHERS	BLUE OR GREEN

4、Packing label content



5、Packing notice

- [1]Sub LCD should be placed upwardly while in the tray.
- [2] Every seven full trays with a blank one while twining twice on both sides by adhesive tape.

6、Product label

- [1] There should be Logo and product modle of BOE on FPC ASS'Y.

7、Packing Q'ty list

	INNER BOX	TRAY	MODULE
OUT BOX	6	42	TBD
INNER BOX	1	7	TBD
TRAY	-	1	TBD

15. LCD Module Out-Going Quality Level

(1.0) Purpose

The LCD specification provides outgoing provision and its expected quality level based on our outgoing inspection of LCD.

(2.0) Applicable Scope

The LCD specification is applicable to the arrangement in regard to outgoing inspection and quality assurance after it.

(3.0) Quality Specification

(3.1) Quality Level

The quality level of BHL&BMDT are based on GB/T2828.1, Apply Level II, normal inspection by single sampling.

Rank	Item	AQL	Note
Major(MA)	Segment Short	0.65	
	Segment Missing		
	Solder Bridging		
	Outside Dimension		
	Cold Solder		
Minor (MI)	Black Spots, Foreign Substance, White Spots, Pinhole, Segment Deformation Air Bubbles between Glass & Polarizer, Scratches(Glass & Polarizer), Color Variation, Solder Ball, Misalignment	1.0	

Note) AQL- Acceptable Quality Level

(3.2) Appearance Standards

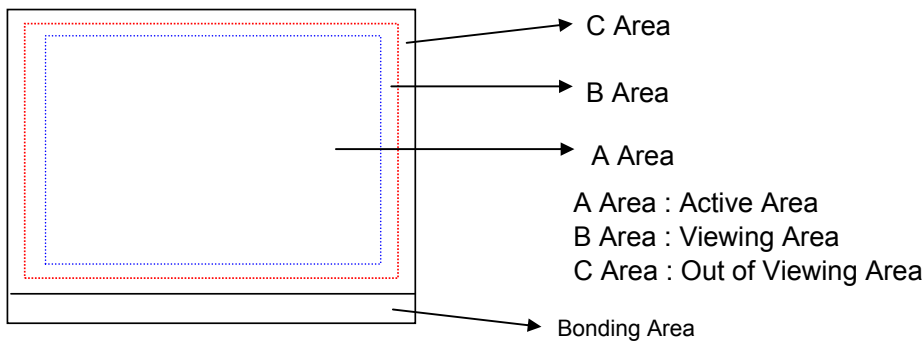
1) Inspection Conditions

The LCD shall be inspected under 20W white fluorescent lamp light.

The distance between the eyes and the sample shall be 30cm.

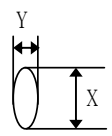
All directions for inspecting the sample should be within 30° to perpendicular line.

2) Definition of the Area

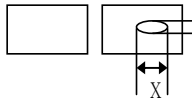
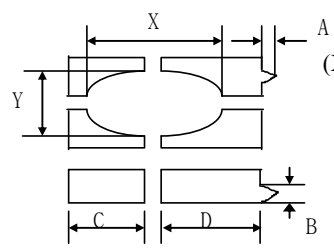
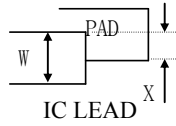



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(3.3) Appearance Spec

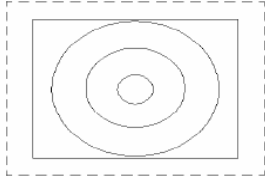

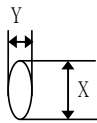
No	Item	Criteria	Rank	Remark																																													
1	Segment Short Segment Missing	Not allowed	MA																																														
2	Solder Bridging	Any bridging between components, except common circuit, is not allowed.	MA																																														
3	Outside Dimension	Drawing & specification must be within permissible tolerance.	MA																																														
4	Cold Solder	Cold solder is not allowed.	MA																																														
5	Black(White) Spots, Foreign Substances	<p>1) Round Type</p> <table border="1"> <thead> <tr> <th rowspan="2">Area Dimension**</th> <th colspan="2">Acceptable Q'ty</th> <th rowspan="2">Remark</th> </tr> <tr> <th>A Area</th> <th>B Area</th> </tr> </thead> <tbody> <tr> <td>≤ 0.1</td> <td colspan="2">Ignore</td> <td rowspan="4"></td> </tr> <tr> <td>≤ 0.2</td> <td>2</td> <td>Ignore</td> </tr> <tr> <td>≤ 0.3</td> <td>1</td> <td>Ignore</td> </tr> <tr> <td>0.3 <</td> <td>0</td> <td>Ignore</td> </tr> </tbody> </table> <p>2) Liner Type</p> <table border="1"> <thead> <tr> <th colspan="2">Dimension</th> <th colspan="2">Acceptable Q'ty</th> <th rowspan="2">Remark</th> </tr> <tr> <th>Length</th> <th>Width</th> <th>A Area</th> <th>B Area</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>≤ 0.025</td> <td colspan="2">Ignore</td> <td rowspan="4"></td> </tr> <tr> <td>≤ 2.5</td> <td>≤ 0.05</td> <td>3</td> <td>Ignore</td> </tr> <tr> <td>≤ 1.5</td> <td>≤ 0.075</td> <td>2</td> <td>Ignore</td> </tr> <tr> <td></td> <td>0.075 <</td> <td colspan="2">Follow round type</td> </tr> </tbody> </table> <p>At (1) & (2) total defect q'ty is must not exceed 5 pieces.</p>	Area Dimension**	Acceptable Q'ty		Remark	A Area	B Area	≤ 0.1	Ignore			≤ 0.2	2	Ignore	≤ 0.3	1	Ignore	0.3 <	0	Ignore	Dimension		Acceptable Q'ty		Remark	Length	Width	A Area	B Area	-	≤ 0.025	Ignore			≤ 2.5	≤ 0.05	3	Ignore	≤ 1.5	≤ 0.075	2	Ignore		0.075 <	Follow round type		MI	 <p>** : Mean Diameter (X + Y)/2</p>
Area Dimension**	Acceptable Q'ty			Remark																																													
	A Area	B Area																																															
≤ 0.1	Ignore																																																
≤ 0.2	2	Ignore																																															
≤ 0.3	1	Ignore																																															
0.3 <	0	Ignore																																															
Dimension		Acceptable Q'ty		Remark																																													
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≤ 2.5	≤ 0.05	3	Ignore																																														
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7	Air Bubbles Between Glass & Polarizer (Polarizer Defects)	<table border="1"> <thead> <tr> <th rowspan="2">Area Dimension**</th> <th colspan="2">Acceptable Q'ty</th> <th rowspan="2">Remark</th> </tr> <tr> <th>A Area</th> <th>B Area</th> </tr> </thead> <tbody> <tr> <td>≤ 0.15</td> <td colspan="2">Ignore</td> <td rowspan="5"></td> </tr> <tr> <td>≤ 0.3</td> <td>3</td> <td>Ignore</td> </tr> <tr> <td>≤ 0.5</td> <td>2</td> <td>Ignore</td> </tr> <tr> <td>≤ 0.7</td> <td>1</td> <td>Ignore</td> </tr> <tr> <td>Total</td> <td>5</td> <td>Ignore</td> </tr> </tbody> </table>	Area Dimension**	Acceptable Q'ty		Remark	A Area	B Area	≤ 0.15	Ignore			≤ 0.3	3	Ignore	≤ 0.5	2	Ignore	≤ 0.7	1	Ignore	Total	5	Ignore	MI																								
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(3.3) Appearance Spec

No	Item	Criteria	Rank	Remark								
8	Pin hole (On Segment)	 <p> $(X+Y)/2 \leq 0.2\text{mm}$ Within 1 per one segment (Less than 0.1mm is not counted) Total defects q'ty is must not exceed 5 pieces. </p>	MI									
9	Segment Deformation	 <p> $(X+Y)/2 \leq 0.2\text{mm}$ $A \leq 0.2\text{mm}$ $B \leq 0.2\text{mm}$ $(C-D) \leq 0.2\text{mm}$ </p> <table border="1" data-bbox="526 750 1125 869"> <thead> <tr> <th></th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>Dot, Segment</td> <td>1</td> </tr> <tr> <td>LCD</td> <td>5</td> </tr> <tr> <td>≤ 0.1</td> <td>Ignore all defect</td> </tr> </tbody> </table> <p>Each visible dot must be more than half effective dot area</p>		Acceptable Q'ty	Dot, Segment	1	LCD	5	≤ 0.1	Ignore all defect	MI	$(X + Y)/2 \leq 0.2\text{mm}$
	Acceptable Q'ty											
Dot, Segment	1											
LCD	5											
≤ 0.1	Ignore all defect											
10	Color Variation	Within the three colors, except LCD Standard color is acceptable.	MI									
11	Glass & Polarizer Scratch	Follow NO.5(2) condition	MI									
12	Solder Ball	1)Acceptable if the size of void is less than 0.18mm 2)Acceptable if a solder ball is not movable 3)Rejectable if the solder ball exceed 5EA in $2.54 \times 2.54\text{mm}$ area.	MI									
13	Miss Alignment	1)Acceptable if it dose not exceed 50% of the lead width IC.  <p> $X \leq W/2$: Accept $X > W/2$: Reject </p> 2)Rejectable, provided that it does exceed 50% of the component termination width.  <p> $W1 > W2$: Reject </p>										

Note : A limitation sample is given top priority

(3.3) Appearance Spec

No	Item	Criteria	Rank	Remark																																																
14	Touch Panel	<p>1) Round Type、Foreign Substances</p> <table border="1"> <thead> <tr> <th rowspan="2">Area Dimension**</th> <th colspan="2">Acceptable Q'ty</th> <th rowspan="2">Remark</th> </tr> <tr> <th>A Area</th> <th>B Area</th> </tr> </thead> <tbody> <tr> <td>≤ 0.1</td> <td colspan="2">Ignore</td> <td rowspan="4"></td> </tr> <tr> <td>≤ 0.2</td> <td>2</td> <td>Ignore</td> </tr> <tr> <td>≤ 0.3</td> <td>1</td> <td>Ignore</td> </tr> <tr> <td>0.3 <</td> <td>0</td> <td>Ignore</td> </tr> </tbody> </table> <p>2) Liner Type & Scratch</p> <table border="1"> <thead> <tr> <th colspan="2">Dimension</th> <th colspan="2">Acceptable Q'ty</th> <th rowspan="2">Remark</th> </tr> <tr> <th>Length</th> <th>Width</th> <th>A Area</th> <th>B Area</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>W ≤ 0.025</td> <td colspan="2">Ignore</td> <td rowspan="5">Ignore</td> </tr> <tr> <td>L ≤ 3.0</td> <td rowspan="2">W ≤ 0.05</td> <td colspan="2">Ignore</td> </tr> <tr> <td>3.0 < L ≤ 5.0</td> <td colspan="2">2</td> </tr> <tr> <td>≤ 7</td> <td>W ≤ 0.1</td> <td colspan="2">1</td> </tr> <tr> <td>-</td> <td>W > 0.1</td> <td colspan="2">Follow round type</td> </tr> </tbody> </table> <p>3) Newton Ring</p> <p>a) Regular</p>  <p>The area of the Newton ring is more than 1/3 area of the touch panel It's NG. The area of the Newton ring is less than 1/3 area of the touch panel It's OK.</p> <p>b) None-regularity</p>  <p>The area of the Newton ring is more than 1/2 area of the touch panel It's NG. The area of the Newton ring is less than 1/2 area of the touch panel It's OK.</p>	Area Dimension**	Acceptable Q'ty		Remark	A Area	B Area	≤ 0.1	Ignore			≤ 0.2	2	Ignore	≤ 0.3	1	Ignore	0.3 <	0	Ignore	Dimension		Acceptable Q'ty		Remark	Length	Width	A Area	B Area	-	W ≤ 0.025	Ignore		Ignore	L ≤ 3.0	W ≤ 0.05	Ignore		3.0 < L ≤ 5.0	2		≤ 7	W ≤ 0.1	1		-	W > 0.1	Follow round type		MI	 <p>** : Mean Diameter (X + Y)/2</p>
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(4.0) Reliability Condition

Item	Content
Room Temperature Operation	50,000 hrs

(4.1) Reliability Test - Module Middle Reliability

No.	Item	Condition	Test Time	Sample Numbers	Creteria (Acc/Rej)	Note
1	High Temp Operation	70 ± 2℃	120 hrs	3	0/1	
2	High Temp Storage	80 ± 2℃	120 hrs	3	0/1	
3	Low Temp Operation	-20 ± 2℃	120 hrs	3	0/1	
4	Low Temp Storage	-30 ± 2℃	120 hrs	3	0/1	
5	High Humidity Storage	60℃ 90%rh	120 hrs	3	0/1	
6	Thermal Shock	-25℃(0.5h) ↔ 70℃(0.5h)	20cycle	3	0/1	
7	Vibration Test	To be measured after subjecting to total fixed amplitude of 1.5mm vibrating frequency 10 to 55Hz, one cycle 60 seconds to direction of X,Y,Z for each 15 minutes,(Total 45minutes) and after removing vibration(Non-operation state)				
8	Shock Test (Drop Test)	To be measured after dropping from 60cm high onto steel board of 15mm thick and from 3 direction X,Y,Z each one time (Non-Operation State)				
9	ESD	<ul style="list-style-type: none"> - Condition:150pf, 330Ω, ±8KV, 5 times Air Discharge (ESD which is made by above condition should be shot on LCD glass panel, not other's area(such as on IC and so on) - After testing, cosmetic and electrical defects should not happen. - Total current consumption should be below double of initial value. - In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part. 				

(4.2) Criteria

- a. No. 1 ~ 8 : No changes for indication and appearance.
- b. No. 1 ~ 3, 5 ~ 8 : Leave the all samples under room temperature 4 hours after reliability test ends.
- c. No. 4 : Leave the all samples under room temperature 12 hours after reliability test ends.

16. BHL&BMDT Customer Quality Service Process

In order to provide better service to Customer, BHL&BMDT shall apply the after-sales product quality service process as below:

1. According to the P/O from Customer, BHL&BMDT should deliver required product to the place appointed by Customer.
2. Customer will do IQC for the incoming product.
3. Inspection standard should be provided by BHL&BMDT, and it will be valid after confirmed by Customer. Inspection and Defects determination should be carried out according to the standard agreed by both Parties.
4. In order to guarantee in-time communication of product quality information and effective service, QA staff on Customer side should send Weekly Quality Report to the appointed CS staff in BHL&BMDT.
5. After BHL&BMDT get related information, both sides should arrange time and place to determine the defects found by Customer.
6. BHL&BMDT should cooperate with Customer for special quality requirement.
7. After confirmed by both side, BHL&BMDT should be responsible for the defect products which caused by its quality problem. BHL&BMDT should take back the confirmed defect product and return the good product to the place required by customer.
8. BHL&BMDT agree to provide related training of LCD product technology and usage.
9. Customer should use the LCD product according to the instruction. BHL&BMDT will not be responsible for the defect product caused by violation of Users' Instruction.
10. Both parties should deal with the quality problem with friendly cooperative policy. And both parties should negotiate to deal with the defect products of which the responsibility is not very clear.

17. LCD Module Operation Instruction

BHL&BMDT

Part I. How to use the LCD Module

1. Don't hit the LCD Panel in any way because the LCD is made of glass.
2. Don't clean the surface of LCD with hard things. Please clean LCD with Air-gun or very soft cloth when necessary. The protective film on the POL can be removed just before assembly, otherwise, dust, spit or other foreign matter may attached on the LCD under the protective film. After the protective film is removed, only air-gun can be used to remove any dust or foreign matter. Fingure or cloth **MUST NOT** be used in such cases.
3. No chemical liquid is allowed to clean the LCD, such as alcohol, acetone and IPA. All of these can damage the LCD. Water on the LCD must be cleaned as soon as possible, for it will cause POL color change or other defect.
4. Please move and assemble LCD very carefully during assembly, and don't push or twist it.
5. Don't damage the FPC of LCD module. It will cause permanent defect.
6. Don't disassemble LCD module. It will cause permanent defect.
7. Don't expose LCD module under sunshine, strong fluorescence or ultraviolet radiation.
8. Please make sure that operators wear static-protective bands effectively and working tables are effectively earthing during operation.
9. Please place LCD module on the tray provided by BHL&BMDT while moving it, in order to avoid mechanical damage. Hold the module's side frames to avoide damage during moving.
10. Don't twist, disassemble, squeeze or hit the PCB. It will damage the circuit or component on PCB and cause functional defect.
11. Please use the connector according to the instruction provided by BHL&BMDT.
12. Please place dual module with the sub-panel upward. Trays should be placed in contrary direction. An empty tray should be placed on the top.
13. Sealing operation on PCB must be very careful to avoid short or cut the original circuit on PCB. Otherwise, it will cause permanant damage to the LCD.
14. Don't add direct DC or high voltage to LCD panel. It will cause functional damage to the LCD or shorten the life of LCD product.
15. LCD may respond slowly or display abnormally in extrem temperature (lower than -20℃ or higher than 50℃). But this doesn't mean LCD functional defect. LCD will display normally in regular temperature. Therefore, don't use LCD product in extrem temperature.
16. Don't push the display area of LCD panel, it will cause abnormal display. This doesn't mean LCD functional defect, neither. LCD will display normally in regular temperature.
17. Electrical test of LCD product is made by using mobile phone provided by Customer. We can use special test equipment to do the test, also.
18. The black band on IC on LCD product is used to protect the IC from light. Please do **NOT** remove it.
19. Please take great care to use connector. Customer should be responsible for connector defect caused by operation on Customer side.

Part II Storage

1. Physical status of liquid crystal will change in extrem temperature, and it can not be resumed when the temperature returns to be normal. So LCD module should be stored in required temperature.
2. LCD module should be stored in required humidity. Low humidity may add static, while high humidity may corrode the ITO circuit of LCD product. The suitable storage environment is: temperature: $22\pm 5^{\circ}\text{C}$, humidity: $55\%\pm 10\%$.
3. Don't expose LCD module under sunshine, strong fluorescence or ultraviolet radiation for a long time. It should be stored in dark area.
4. LCD should be stored in static-protective polythene bag. Don't expose it in the air for a long time.