PRODUCT SPECIFICATIONS

BT8110XTTDA

Product

Standard LCD Module
800 x RGB x 480 Dots graphic type
7.0" 262K TFT LCD
COG bonding type
Wide temperature
With LED back light

Version	Prepared / dd-mm-yy	Approved / dd-mm-yy
A	HB.Wan 08-08-2009	Zhanghong 10/08-2009

Table of Contents

1. Revision History

Version	Summary	Date dd-mm-yy
A	Original	08-08-2009

2. MODULE CLASSIFICATION INFORMATION

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(a) (b) (c)   (d) (e) (f) (g)   (h)

(a) BT：Company Name Abbreviation

(b) Product Type
   T—TFT（NUL）
   C—CSTN
   S—STN
   O—OTHER

(c) Product Serial Number

(d) Number of Columns
   A-16 B-32 C-64 D-67 E-80 F-96 G-100 H-102
   I-112 J-120 K-128 L-120 M-122 N-160 O-176
   P-220 Q-234 R-240 S-320 T-480 U-640 V-960
   W-272 X-800

(e) Number of Rows
   A-16 B-32 C-64 D-67 E-80 F-96 G-100 H-102
   I-112 J-120 K-128 L-120 M-122 N-160 O-176
   P-220 Q-234 R-240 S-320 T-480 U-640 V-960
   W-272 X-800

(f) Display Mode
   T:Transmissive R:Reflective F:Transflective C:Oled Color
   M:Oled Mono

(g) Optimal View Direction
   D---6 O'CLOCK
   U—12 O'CLOCK
   L—9 O'CLOCK
   R—3 O'CLOCK
   O—Other

(h) Product Version: From A to Z

3. PHYSICAL DATA

Item	Contents	Unit
LCD type	7.0 inch TFT	---
Polarizer mode	Transmissive	---
Viewing direction	6:00	O'clock
Module size (W×H×T)	165.0x 104.44 x 5.2	mm
Active area (W×H)	152.40x 91.44	mm
Number of dots	800 (W) x RGB x 480 (H)	Dots
Dot Pitch	0.1905x0.1905	mm
Operation temperature	-20 ~70	℃
Storage temperature	-30 ~80	℃
Back light type/Color	LED back light/ White	---

4. OUTLINE DIMENSIONS

5. BLOCK DIAGRAM
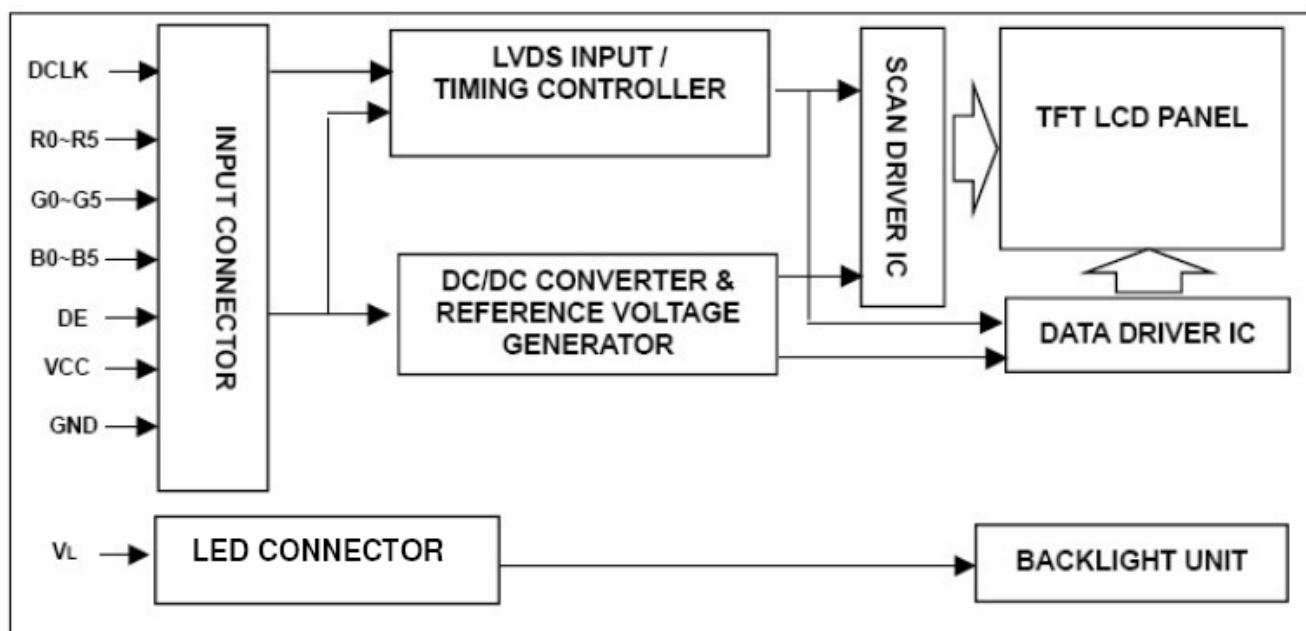
6. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Min.	Max.	Unit	Remark
Power voltage	Vcc	GND=0	-0.3	6.0	V	---
Input logic voltage	VI	GND=0	-0.3	VCC+0.3	V	Note 1

Note 1: DCLK,DE,R0~R5,B0~B5.
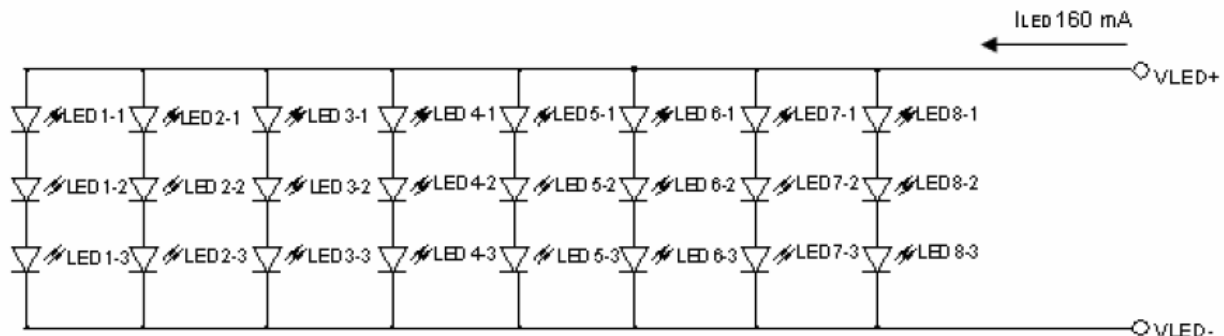
7. ELECTRICAL CHARACTERISTICS

7-1. TFT-LCD Module

Parameter		Symbol	Rating			Unit	Condition
			Min.	Typ.	Max.		
Power supply voltage		VCC	3.0	3.3	3.6	V	
Input logic voltage	High level	VIH	0.7VCC	---	VCC	V	Note1
	Low level	VIL	0	---	0.3VCC	V	Note1
LCD Power current		ICC	---	200	260	mA	Black pattern

Note 1:DCLK,DE,R0---R5,G0---G5,B0---B5.

7-2. Backlight unit

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	I_{LED}	-	160	-	mA	Note 1
LED voltage	V_{LED}	-	9.9	-	V	
LED Life Time	-	(10,000)	-	-	Hr	Note 2

Note 1 : There are 8 Groups LED shown as below , V_{LED}=9.9V , I_{LED}=160mA.

Note 2 : Brightess to be decreased to 50% of the initial value.

8. AC CHARACTERISTIC

8-1 AC electrical characteristic

Frame rate range : 60Hz~65Hz

Parameter	Symbol	Rating			Unit
		Min.	Typ.	Max.	
Data setup time	Tdsu	6	-	-	ns
Data hold time	Tdhd	6	-	-	ns
DE setup time	Tesu	6	-	-	ns
CLK frequency	F_{CPH}	29.40	33.26	42.48	MHz
CLK period	T_{CPH}	23.54	30.06	34.01	ns
CLK pulse duty	T_{CWH}	40	50	60	%
CLK pulse duty	T_{CWL}	40	50	60	%
DE period	$T_{DEH}+T_{DEL}$	1000	1056	1200	T_{CPH}
DE pulse width	T_{DEH}	-	800	-	T_{CPH}
DE frame blanking	T_{DEB}	10	45	110	$T_{DEH}+T_{DEL}$
DE frame width	T_{DE}	-	480	-	$T_{DEH}+T_{DEL}$

8-2.CLOCK AND DATA INPUT WAVEFORMS
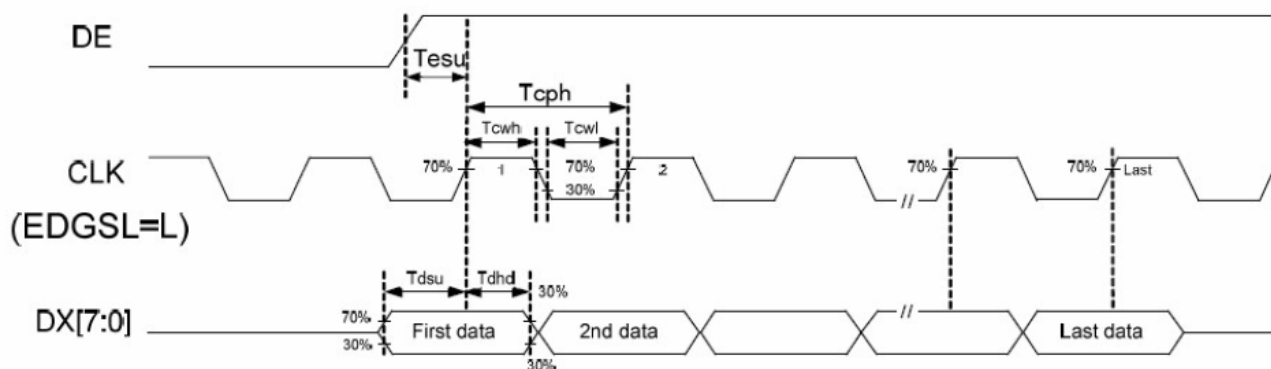
8-3.DATA INPUT FORMAT
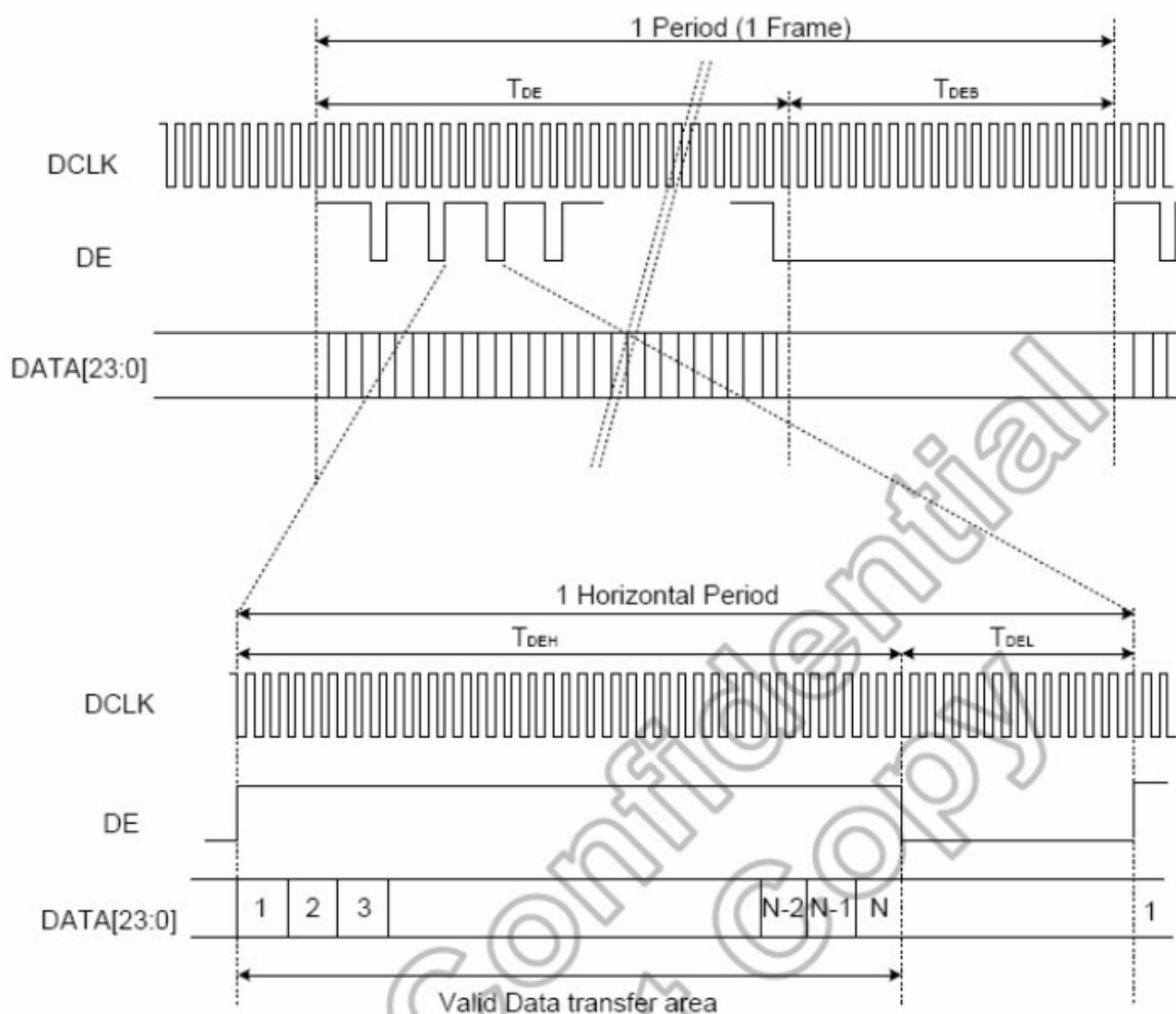
9. ENVIRONMENTAL REQUIREMENTS

Item	Operating temperature (Topr)		Storage temperature (Tstg) (Note 1)		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature (Ta)	-20°C	+70°C	-30°C	+80°C	Dry
Humidity (Note 1)	90% max. RH for Ta ≤ 40°C < 50% RH for 40°C < Ta ≤ Maximum operating temperature				No condensation
Vibration (IEC 68-2-6) cells must be mounted on a suitable connector	Frequency: 10 ~ 55 Hz Amplitude: 0.75 mm Duration: 20 cycles in each direction.				3 directions
Shock (IEC 68-2-27) Half-sine pulse shape	Pulse duration: 11 ms Peak acceleration: 981 m/s^2 = 100g Number of shocks: 3 shocks in 3 mutually perpendicular axes.				3 directions

Note: Product cannot sustain at extreme storage conditions for long time.

10. INTERFACE PIN CONNECTIONS

LCM PIN

Pin No.	Symbol	Description	Remark
1	GND	Power ground	
2	GND	Power ground	
3	N/A	---	
4---7	VCC	Power supply for digital circuit	
8	NC	Not connect	
9	DE	Data enable	
10	GND	Power ground	
11	GND	Power ground	
12	GND	Power ground	
13	B5	Blue data 5(MSB)	
14	B4	Blue data 4	
15	B3	Blue data 3	
16	GND	Power ground	
17	B2	Blue data 2	
18	B1	Blue data 1	
19	B0	Blue data 0(LSB)	
20	GND	Power ground	
21	G5	Green data 5(MSB)	
22	G4	Green data 4	
23	G3	Green data 3	
24	GND	Power ground	
25	G2	Green data 2	
26	G1	Green data 1	
27	G0	Green data 0(LSB)	
28	GND	Power ground	
29	R5	Red data 5(MSB)	
30	R4	Red data 4	
31	R3	Red data 3	
32	GND	Power ground	
33	R2	Red data 2	
34	R1	Red data 1	
35	R0	Red data 0(LSB)	
36	GND	Power ground	
37	GND	Power ground	
38	DCLK	Clock signals; Latch data at the falling edge	
39	GND	Power ground	
40	GND	Power ground	

Note: User's connector part number is **PF050-40ZSG-F09-S** manufactured by UJU or equivalent.

BACK LIGHT UNIT

Pin No.	Symbol	Description
1	VLED+	Red, LED_ Anode
2	VLED-	White, LED_ Cathode

Note: The backlight interface connector is a model **SM02B-BHSS-1-TB** manufactured by JST or equivalent. The matching connector part number is **BHSR-20VS-1** manufactured by JST or equivalent.

11. OPTICAL CHARACTERISTICS

| Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Brightness		-		300	350	-	cd/m²	Center of display
Response time		Tr	Viewing normal angle $\theta = \phi = 0$	-	5	10	.ms	Note 3,5
		Tf		-	11	16	.ms	
Contrast ratio		CR		250	400	-	-	Note 4,5
Color Chromaticity	White	Wx		0.249	0.299	0.349	-	Note 2,6,7
		Wy		0.278	0.328	0.378		
Viewing angle	Hor.	θR	CR ≥ 10	60	70	-	Deg.	Note 1
		θL		60	70	-		
	Ver.	ϕT		50	60	-		
		ϕB		60	70	-		

Note 1: Definition of viewing angle range
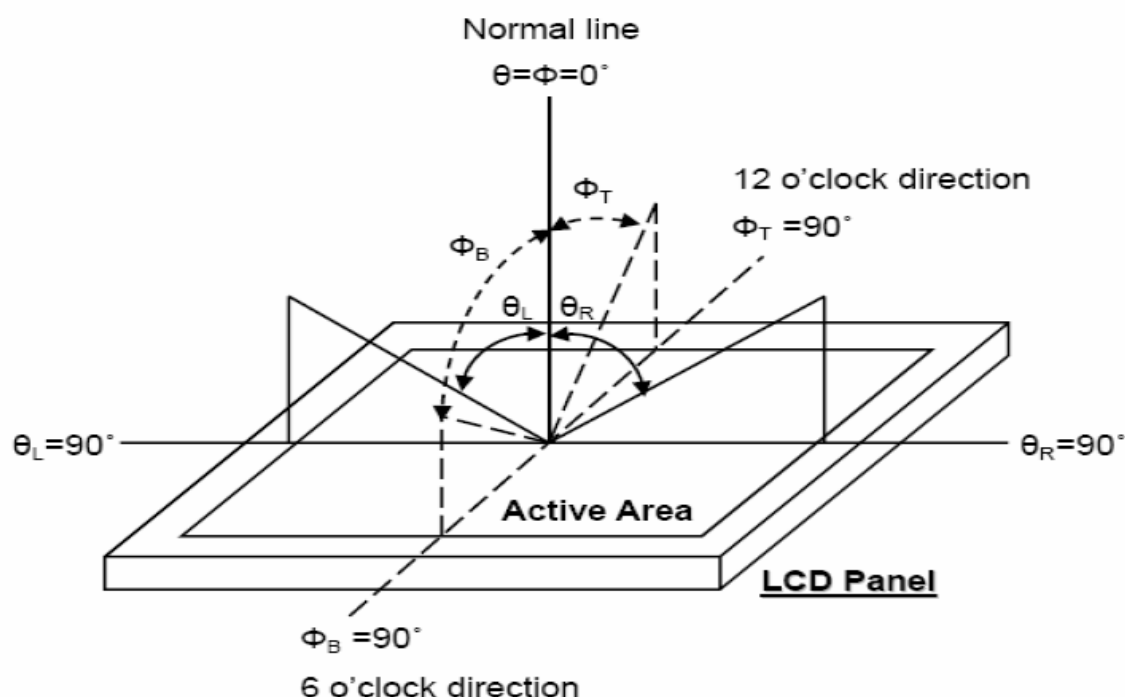
Note 2: Test equipment setup:
After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 luminance meter 1.0° field of view at a distance of 50cm and normal direction.
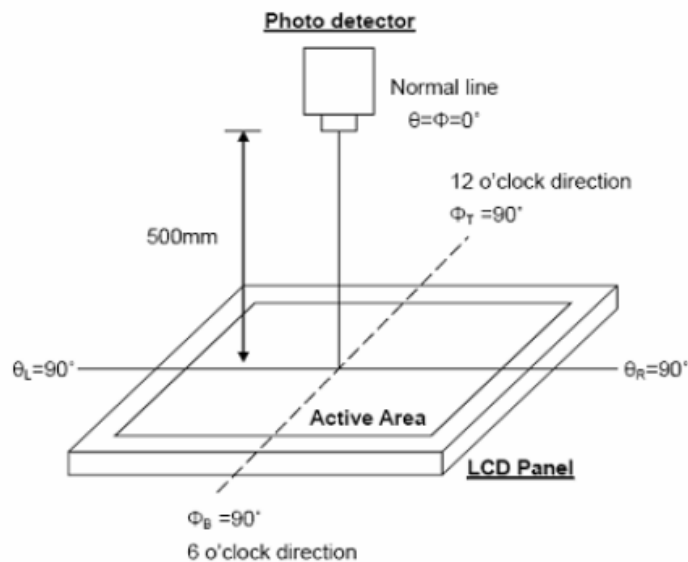
Note 3: definition of response time

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 tiem,Tf, is the time between photo detector output intensity changed from 10% to 90%
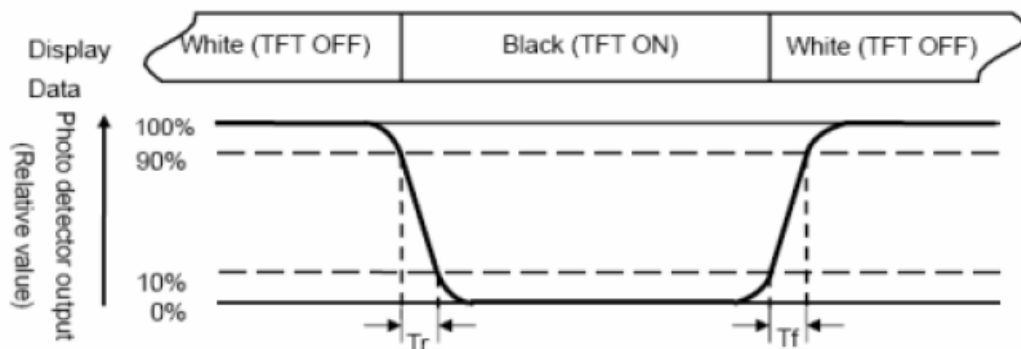
Note 4: Definition of contrast ratio:
The contrast ratio is defined as the following expression.

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

Note 5: White $V_i = V_{i50} \pm 1.5V$
Black $V_i = V_{i50} \pm 2.0V$
"±" means that the analog input signal swings in phase with VCOM signal.
"±" means that the analog input signal swings out of phase with VCOM signal.
The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)
Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 8: Uniformity (U)= $\dfrac{\text{Brightness(min)}}{\text{Brightness(max)}}$ X100%

12. USING LCD MODULES

12-1. Liquid Crystal Display Modules

LCD is composed of glass and polarizer. Pay attention to the following items when handling.

1. Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

2. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc).

3. N-hexane is recommended for cleaning the adhesive used to attach front/rear polarizers and reflectors made of organic substances which will be damaged by chemicals such as acetone, toluene, ethanol and isopropylalcohol.

4. When the display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum benzin. Do not scrub hard to avoid damaging the display surface.

5. Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.

6. Avoid contacting oil and fats.

7. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizers. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.

8. Do not put or attach anything on the display area to avoid leaving marks on.

9. Do not touch the display with bare hands .This will stain the display area and degradate insulation between terminals (some cosmetics are determinated to the polarizers).

10. As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

12-2. Precaution for Handling LCD Modules

Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

1. Do not alter, modify or change the shape of the tab on the metal frame.

2. Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.

3. Do not damage or modify the pattern writing on the printed circuit board.

4. Absolutely do no modify the zebra rubber strip (conductive rubber) or heat seal connector.

5. Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

6. Do not drop, bend or twist LCM.

12-3. Electro-Static Discharge Control

Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC.

1. Make certain that you are grounded when handing LCM.

2. Before remove LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential.

3. When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.

4. When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.

5. As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.

6. To reduce the generation of static electricity be careful that the air in the work is not too dried. A relative humidity of 50%~60% is recommended.

12-4. Precaution for soldering to the LCM

1. Observe the following when soldering lead wire, connector cable and etc. to the LCM.
   - Soldering iron temperature: $280℃\pm10℃$
   - Soldering time: 3-4 sec.
   - Solder: eutectic solder.

   If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation. (This does not apply in the case of a non- halogen type of flux.) It is recommended that you protect the LCD surface with a cover during soldering to prevent any damage dug to flux spatters.

2. When soldering the electroluminescent panel and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature of the soldering iron.

3. When remove the electroluminescent panel form the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged

12-5. Precaution for Operation

1. Viewing angle varies with the change of liquid crystal driving voltage (Vo). Adjust Vo to show the best contrast.

2. Driving the LCD in the voltage above the limit shortens its life.

3. Response time is greatly at temperature below the operating temperature range. However, this does not mean the LCM will be out of the order. It will recover when it returns to the specified temperature range.

4. If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.

5. Condensation of terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, it must be used under the relative condition of $40℃,50\%RH$.

6. When turning the power on, input each signal after the positive/negative voltage becomes stable.
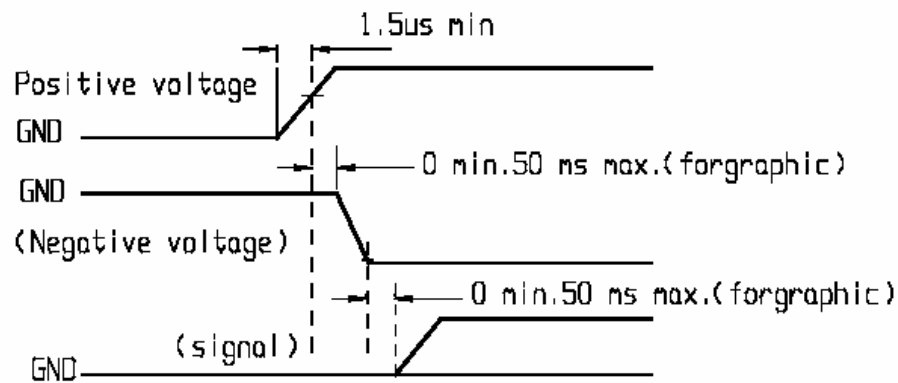
12-6. Storage

When storing LCD as spares for some years, the following precaution are necessary.

1. Store them in a sealed polyethylene bag. If properly sealed, there is no need for dessicant.

2. Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0℃ and 35℃.

3. The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped.)

4. Environmental conditions:

   - Do not leave them for more than 168hrs. at 60℃.

   - Should not be left for more than 48hrs. at -20℃.

12-7. Safety

1. It is recommended to crush damaged or unnecessary LCD into pieces and wash off with solvents such as acetone and ethanol, which should later be burned.

2. If any liquid leak out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

12-8. Limited Warranty

Unless agreed between BONA and customer, BONA will replace or repair any of its LCD modules which are found to be functionally defective when inspected in accordance with BONA LCD acceptance standards (copies available upon request) for a period of one year from date of shipments. Cosmetic/ visual defects must be returned to BONA within 90 days of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of BONA limited to repair and/or replacement on the terms set forth above. BONA will not be responsible for any subsequent or consequential events.

12-9. Return LCM under warranty

No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are:

   - Broken LCD glass.

   - PCB eyelet's damaged.

   - PCB conductors damaged.

   -Circuit modified in any way, including addition of components.

   - PCB tampered with by grinding, engraving or painting varnish.

| BT8110XTTDA Rev. A | *BONA Fide Photonics Technology CO. Ltd* | P.16 of 17 |

-Soldering to or modifying the bezel in any manner.

Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet's conductors and terminals.