PANEL

Specifications

BD097XGA

VERSION Ver 1.1

Issue Date. 2018. 07. 25

Doc No. BD097XGA PANEL 01

Note | Specification is subject to change without notice.
Conseuently it is better to contact to our company before proceeding with the design of your product incorporating this Panel.

Prepared	Checked I	CheckedII	Approved
			YH. HAN

HIDISPLAY High Quality Display Solution

(주)하이디스플레이 | 경기도 군포시 공단로140번길 52, 610/611호 (당정동, 에이스하이테크시티군포)
HIDISPLAY Co., Ltd. #610/611, ACE-Gunpo, 52, Gongdan-ro 140beon-gil, Gunpo-si, Gyeonggi-do, Korea
T +82. 31. 478. 8142 F +82. 31. 601. 9081 E pys1538@hi-display.co.kr H www.hidisplay.co.kr

BD097XGA

1. Revision Recode

Rev.	ECN No.	Description of Changes	Date	Prepared
1.0		Initial Release	2018/02/05	
1.1		Add Connector Size Page：4/14	2018/07/25	

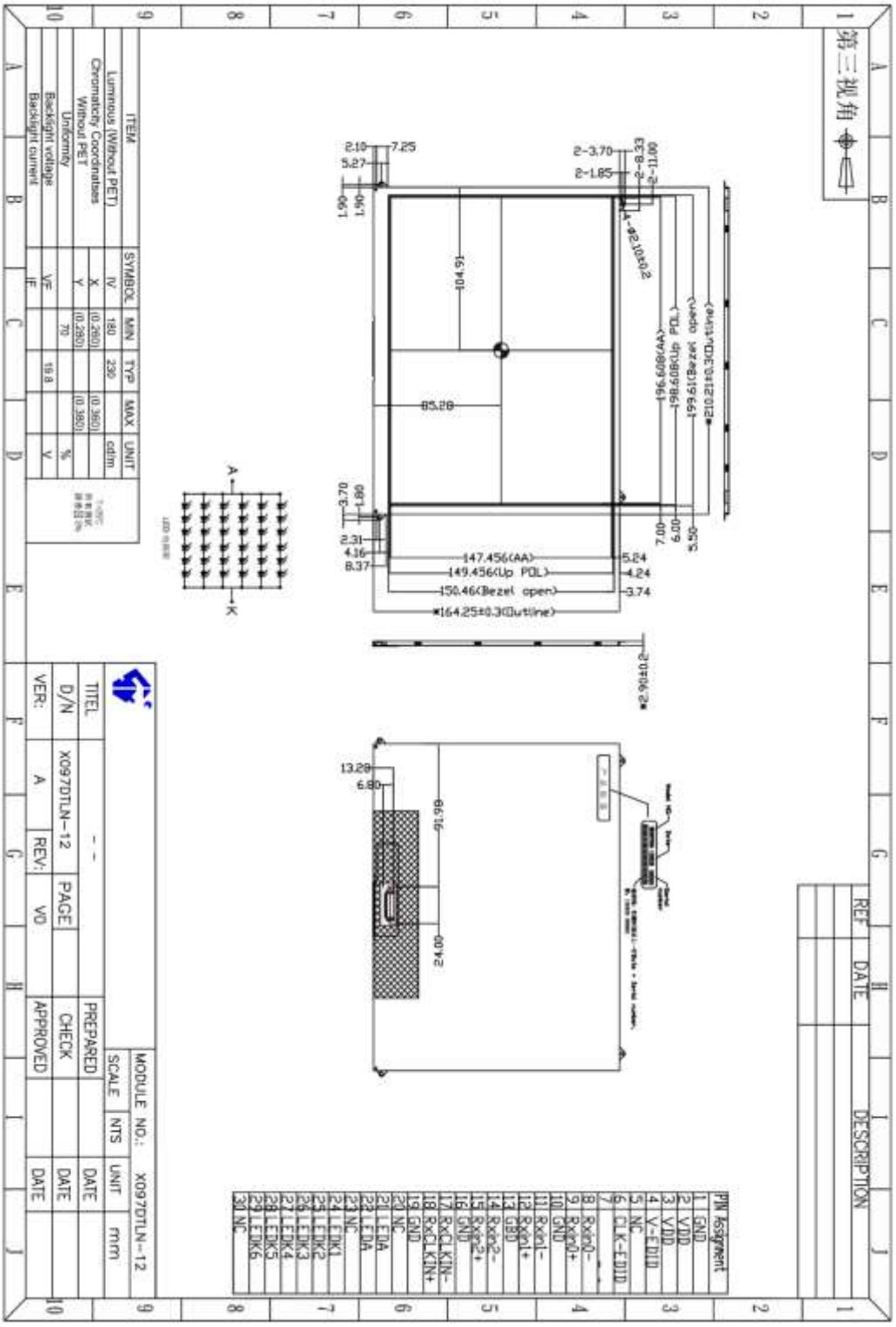
2. General Description and Features

The 9.7 inch Module named BD097XGA is a-Si TFT-LCD module, which is the type of transmissive. It is consisted of TFT-LCD Panel, Driver IC, FPC and Back-Light unit. Features of this product are listed in the following table.

No.	Item	Contents	Unit
1	Module Outline	210.21 x 164.25 x 2.9	mm
2	LCD Active area	196.608x 147.456	mm
3	Dot Number	1024 x 3(RGB) x 768	/
4	Dot size	0.192(H) x 0.192(V)	mm
5	LCD type	TFT Transmissive	/
6	Display Color	262K	/
7	Backlight Type	36-chip LED	/
8	Power Supply	3.3(TYP)	V
9	Interface	FPC 0. 5mm_Pitch 30pin	/
10	Interface type	LVDS	/
11	Module weight	(212)	g

BD097XGA

3. Mechanical Dimension



4. Interface Pin Connection

Pin No.	Signal	Description
1	GND	Ground
2	VDD	3.3V Power
3	VDD	3.3V Power
4	V_EDID	3.3V Power for EDID
5	NC	No Connection
6	CLK_EDID	EDID Clock Input
7	NC	No Connection
8	RXIN0-	- LVDS differential data input
9	RXIN0+	+LVDS differential data input
10	GND	Ground
11	RXIN1-	- LVDS differential data input
12	RXIN1+	+LVDS differential data input
13	GND	Ground
14	RXIN2-	- LVDS differential data input
15	RXIN2+	+LVDS differential data input
16	GND	Ground
17	RXCLKIN-	- LVDS differential clock input
18	RXCLKIN+	+LVDS differential clock input
19	GND	Ground
20	NC	No Connection
21	LEDA	LED Anode (Positive)
22	LEDA	LED Anode (Positive)
23	NC	No Connection
24	LEDK1	LED Cathode (Negative)
25	LEDK2	LED Cathode (Negative)
26	LEDK3	LED Cathode (Negative)
27	LEDK4	LED Cathode (Negative)
28	LEDK5	LED Cathode (Negative)
29	LEDK6	LED Cathode (Negative)
30	NC	No Connection

5. Maximum Rating

Item	Symbol	Rating	Unit
Operating temperature	Top	-20 to 60	℃
Storage temperature	Tst	-30 to 70	℃
Digital Power	VDD	-0.3 ~ 5.0	V

NOTE :

If the module was used these absolute maximum ratings as above, it may be damaged permanently. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.

VDD>GND must be maintained.

6. Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Analog power supply	VDD	-	3.0	3.3	3.6	V

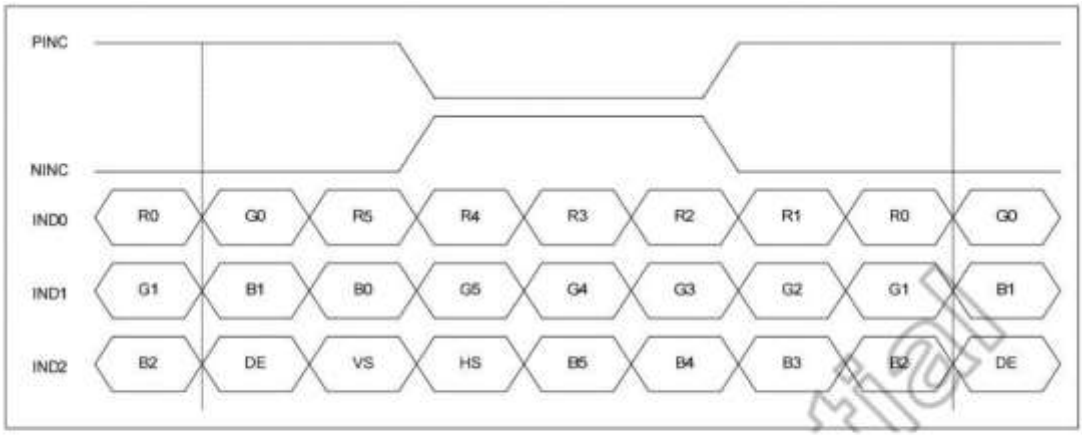
Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Differential input high Threshold voltage	R_{XVTH}	-	-	+0.1	V	R_{XVCM}=1.2V
Differential input low Threshold voltage	R_{XVTL}	-0.1	-	-	V	
Input voltage range (singled-end)	R_{XVIN}	0	-	VDD-1.2+ | V_{ID} | /2	V	-
Differential input common Mode voltage	R_{XVCM}	| V_{ID} | /2	-	VDD-1.2	V	-
Differential input voltage	| V_{ID} |	0.2	-	0.6	V	-
Differential input leakage Current	RV_{Xliz}	-10	-	+10	μA	-
LVDS Digital Operating Current	Iddlvds	-	15	30	mA	Fclk=65MHz, VDD=3.3V
LVDS Digital Stand-by Current	Istlvds	-	10	50	μA	Clock & all Functions are stopped

BD097XGA

7. Backlight Characteristics

Item	Syb	Min.	Typ.	Max.	Unit	Condition
Voltage	Vf	-	19.8	-	V	IF=120mA
Number of LED	-		36		pcs	-
Power Consumption	PWF	-	2376	-	mW	-
LED life-span	-	-	(20000)	-	Hrs	-

8. Timing Characteristics



- **DE mode**

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	52	65	71	MHz
Horizontal Display Area	thd		1024		DCLK
HSD Period	th	1114	1344	1400	DCLK
HSD Blanking	thb+ thfp	90	320	376	DCLK
Vertical Display Area	tvd		768		T_H
VSD Period	tv	778	806	845	T_H
VSD Blanking	tvbp+ tvfp	10	38	77	T_H

- **HV mode**

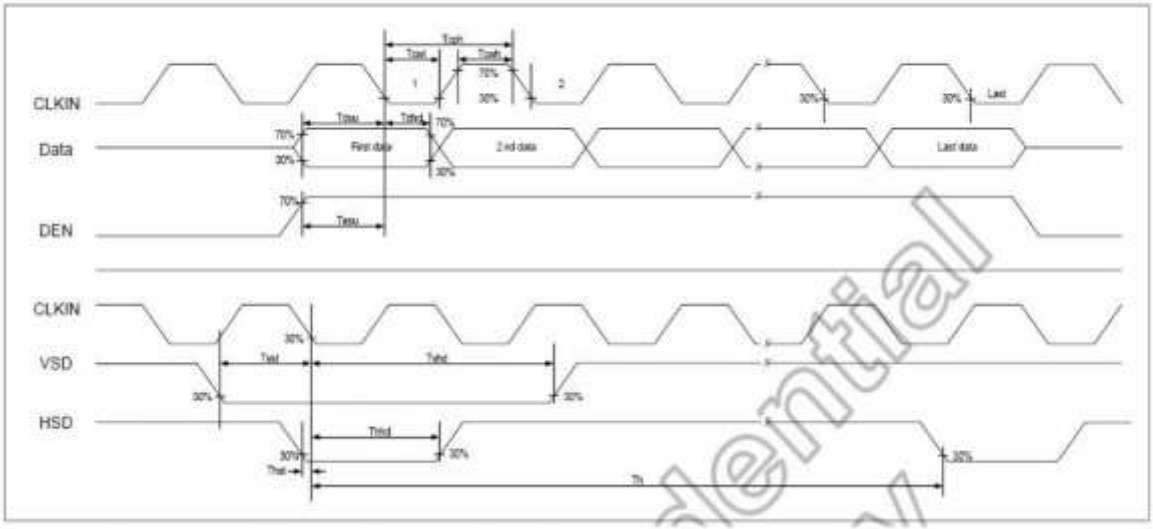
Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	57	65	70.5	MHz
Horizontal Display Area	thd		1024		DCLK
HSD Period	th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1		140	DCLK
HSD Back Porch	thbp		160		DCLK
HSD Front Porch	thfp	16	160	216	DCLK

BD097XGA

Vertical timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		768		T_H
VSD Period	tv	792	806	840	T_H
VSD Pulse Width	tvpw	1	-	20	T_H
VSD Back Porch	tvbp		23		T_H
VSD Front Porch	tvfp	1	15	49	T_H



9. Application Circuit

Please consult our technical department for detail information.

10. Initial Code

Please consult our technical department for detail information.

BD097XGA

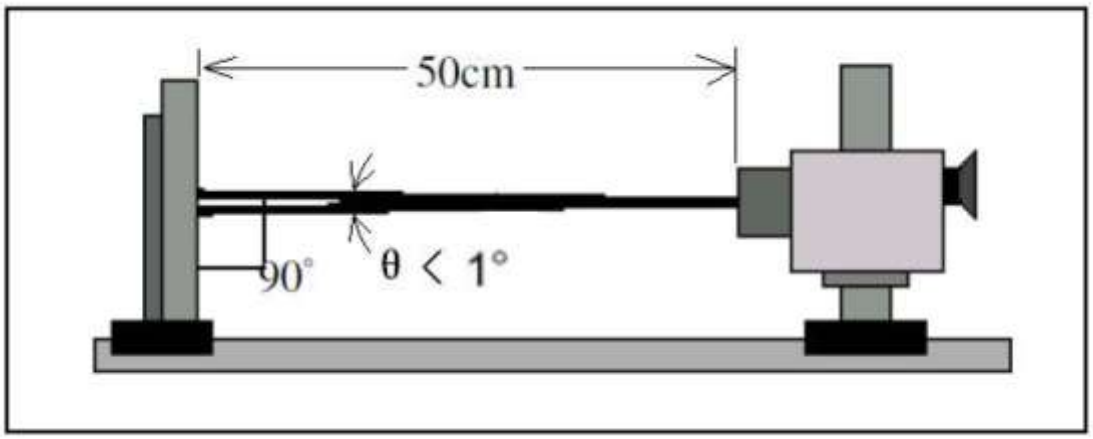
11. Electro-Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmission (with pol)		T			5.2	-	%	
Response time		Tr	θ = 0° Ø = 0° Ta = 25°C		5	-	ms	4
		Tf			15	-	ms	
Uniformity (Five point)		δ WHITE		70	-	-	%	7
Contrast ratio		Cr		-	500	-	-	3, 5
Surface Luminance		Lv		220	270	-	-	3, 7
Viewing angle range		θ	Ø = 90°	-	(80)	-	deg	6
			Ø = 270°	-	(70)	-	deg	
			Ø = 0°	-	(80)	-	deg	
			Ø = 180°	-	(80)	-	deg	
Color filter chromaticity (x, y)	White	X	θ = Φ = 0°	TBD	TBD	TBD		7
		Y		TBD	TBD	TBD		
	Red	X	θ = Φ = 0°	TBD	TBD	TBD		
		Y		TBD	TBD	TBD		
	Green	X	θ = Φ = 0°	TBD	TBD	TBD		
		Y		TBD	TBD	TBD		
	Blue	X	θ = Φ = 0°	TBD	TBD	TBD		
		Y		TBD	TBD	TBD		

Note 1 : Ambient temperature=25°C±2°C

Note 2 : To be measured in the dark room with backlight unit.

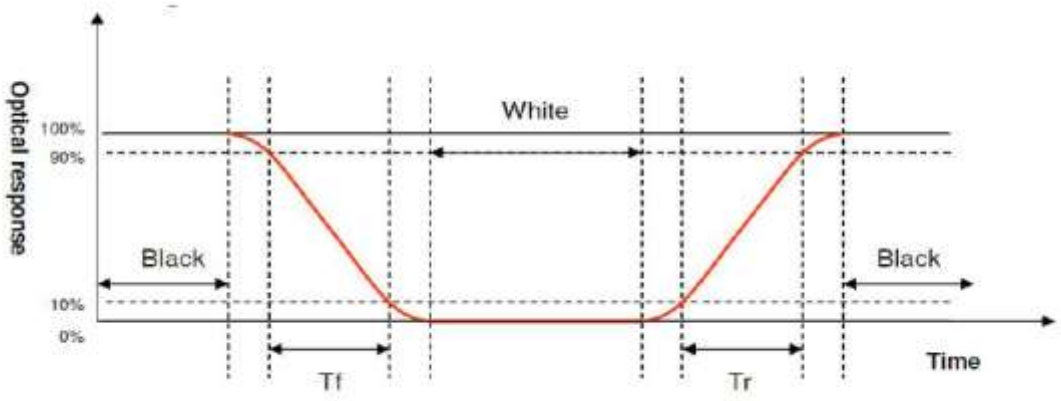
Note 3 : To be measured at the center area of panel with a viewing cone of 1 by Topcon luminance meter BM-7A, after 10 minutes operation (module).



Note 4. Definition of response time :

The output signals of photo detector are measured when the input signals are changed from "black" to "white" (rising time) and from "white" to "black" (falling time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes.

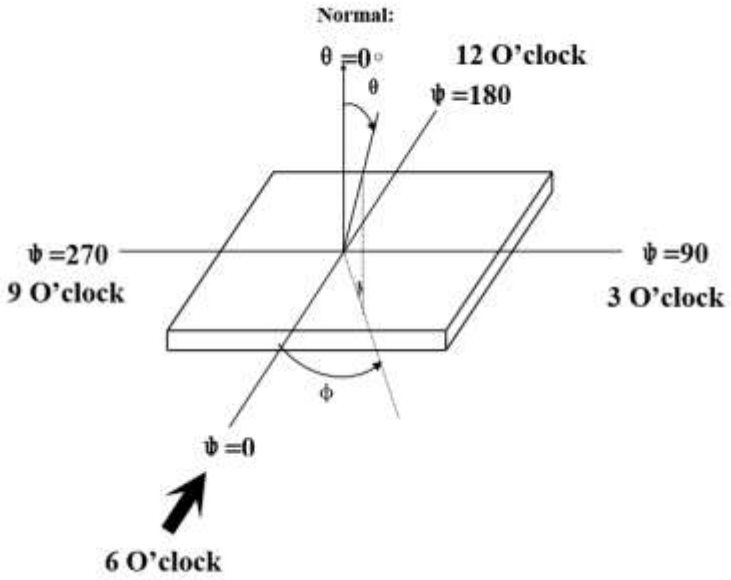
Refer to figure as below.



Note 5. Definition of contrast ratio:
Contrast ratio is calculated with the following formula:

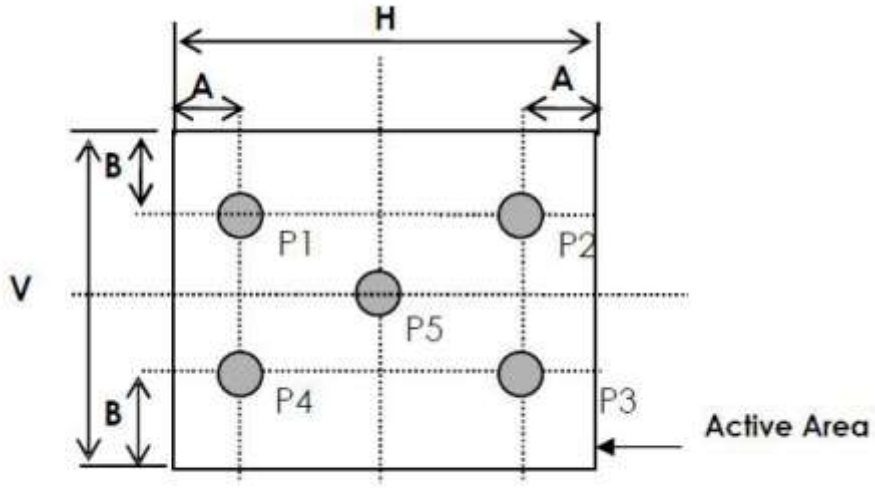
$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note 6. Definition of viewing angle
Viewing angle is the angle at which the contrast ratio is greater than 2, for TFT module the contrast ratio is greater than 10. The 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.



Note 7. Surface luminance is the LCD surface from the surface with all pixels displaying white. Refer to figure as below.

Measuring method for Contrast ratio, surface luminance, Luminance uniformity , CIE (x, y) chromaticity



A : 5 mm B : 5 mm H,V : Active Area

Light spot size Æ=7mm, 500mm distance from the LCD surface to detector lens measurement instrument is TOPCON's luminance meter BM-7A

Uniformity definition= [min of 5point/max of 5points] x100%

Lv = Average Surface Luminance with all white pixels (P_1, P_2, P_3, P_4, P_5)

12. Reliability Test

This standard reliability test is done only for the first lot of MP products. Customer and supplier must hold a discussion if other reliability test is requested by customer.

No.	Test Item	Description	Test Condition
1	High temperature storage	Endurance test applying the high storage temperature for a long time	70℃, 240 H
2	Low temperature storage	Endurance test applying the low storage temperature for a long time	-30℃, 240 H
3	High temperature operation	Endurance test applying the electric stress under high temperature for a long time	60℃, 240 H
4	Low temperature operation	Endurance test applying the electric stress under low temperature for a long time	-20℃, 240 H
5	High temperature / humidity storage	Endurance test applying the high temperature and high humidity storage for a long time	50℃, 90% RH, 240 H
6	Temperature Cycle (Non operation)	Endurance test applying the low and high temperature cycle -30℃← →25℃ ← →70℃ 30min←→5min←→30min ◀——————————▶ one cycle	-30℃ / 70℃ 10 cycles

13. Precautions for Operation and Storage

1. Precautions for Operation

1) Since LCD panel made of glass, in order to prevent from glass broken or color tone change, please do not apply any mechanical shock or impact or excessive force to it when installing the LCD module.

2) If LCD panel is broken and liquid crystal substance leaks out and contact your skin or clothes, please immediately wash it off by using soap and water.

3) The polarizer on the LCD surface is soft and easily scratched. Please be careful when handling.

4) If LCD surface becomes contaminated, please wipe it off gently by using moisten soft cloth with normal hexane, do not use acetone, ketone, ethanol, alcohol or water. If there is saliva or water on the LCD surface, please wipe it off immediately.

5) When handling LCD module, please be sure that the body and the tools are properly grounded. And do not touch I/F pins with bare hands or contaminate I/F pins.

6) Do not attempt to disassemble or process the LCD module.

7) LCD modules should be used under recommended operating conditions shown in chapter 6 and 7.

8) Response time will be extremely slower at lower temperature than at specified temperature and LCD will show different color when at higher temperature. The phenomenon will disappear when returning to specified condition.

9) Foggy dew, moisture condensation or water droplets deposited on surface and contact terminals will cause polarizer stain or damage, the deteriorated display quality and electrochemical reaction then leads to the shorter life time and permanent damage to the module probably. Please pay attention to the environmental temperature and humidity.

2. Precautions for Storage

1) Please store LCD module in a dark place, avoid exposure to sunlight, the light of fluorescent lamp or and ultraviolet ray.

2) Keep the environment temperature at between 10℃ and 35℃ and at normal humidity. Avoid high temperature, high humidity or temperature below 0℃.

3) That keeps the LCD modules stored in the container shipped from supplier be for using them is recommended.

4) Do not leave any article on the LCD module surface for an extended period of time.

3. Warranty period

Warrants for a period of 12 Months from the shipping data when stored or used under normal condition.

BD097XGA

14. Package Specification