



ELECTRONICS

Product Information

ISSUE DATE : 02-04-01

MODEL : LTS500Q1-GF1

Note : This product information is subject to change after 3 months of issue date.

PREPARED BY : AMLCD Technical Customer Service Team

Samsung Electronics Co . , LTD.

Contents

Revision History	-----	(3)
General Description	-----	(4)
1. Absolute Maximum Ratings	-----	(5)
1.1 Absolute Ratings Of Environment		
1.2 Electrical Absolute Ratings		
2. Optical Characteristics	-----	(7)
3. Electrical Specification	-----	(11)
3.1 Interface signal pin Assignment		
4. Block Diagram	-----	(12)
4.1 TFT-LCD Module		
5. Pixel Format	-----	(13)
6. Outline Dimesions	-----	(14)
6.1 Module Outline Dimensions		
7. General Precaution	-----	(16)
7.1 Handling		
7.2 Storage		
7.3 Others		

Revision History

Data	Rev. No.	Page	Summary
Apr. 01. 2002	000		Rev.000 was issued.

General Description

* Description

LTS500Q1-GF1 is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching devices. Customer can use the high quality display. This model is composed of a TFT-LCD Module(TFT-LCD panel, back-light system). The resolution of a 5.0" contains 320 x 240 pixels and can display Analog RGB colors.

* Features

- Thin and light weight
- High Luminance, high contrast ratio
- NTSC Analog Interface

* Applications

- Display terminal for AV Units(DVD, VTR)
- Portable LCD TV

* General Information

Items	Specification	Unit	Note
Display area	101.76(H) x 76.36(V) (5.0" Diagonal)	mm	
Driver element	a-Si TFT active matrix		
Display colors	Analog RGB	colors	
Number of pixels	320(H) x 240(V) (QVGA)	pixel	
Pixel arrangement	RGB vertical stripe		
Dot pitch	0.106(H) x 0.318(V)	mm	Dot
Display mode	Normally White		
Viewing Direction	6:00	o'clock	
Surface Treatment	Thin POL/ Haze 25		

* Mechanical Information

Item	Min.	Typ.	Max.	Unit	Note
Size	Horizontal	12.9.9	130.4	mm	
	Vertical	93.4	93.9		
	Depth	6.6	7.1		
Weight	76.5	91.5	106.5	g	

1. Absolute Maximum Ratings

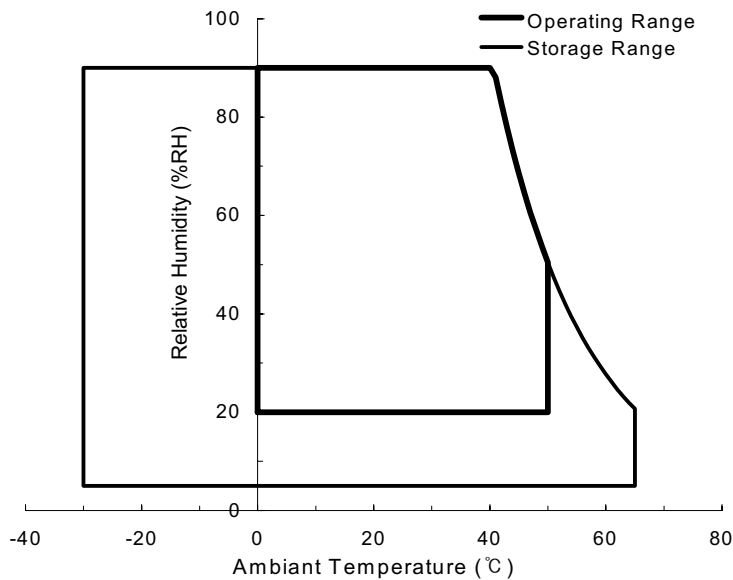
1.1 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	T _{STG}	-25	60	°C	
Operating temperature (Ambient temperature)	T _{OPR}	0	50	°C	

Note 1) Temperature and relative humidity range are shown in the figure below.

95 % RH Max. (40 °C > Ta)

Maximum wet - bulb temperature at 39 C or less. (Ta > 40°C) No condensation.



1.2 Electrical Absolute Ratings

(1) TFT-LCD Monitor

(Ta=25±2°C, V_{gg}=GND=0V)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Input Voltage	VDD1	2.85	3	3.3	V	(1)
Input Voltage2	VDD2	4.75	5	5.25	V	(1)
Input Voltage3	V _{on}	20	21	22	V	(1)
Input Voltage4	V _{off}	-11	-10	-9	V	(1)
Power Consumption1	P _{VDD1}		4		mA	(1)
Power Consumption2	P _{VDD2}		17		mA	(1)
Power Consumption3	P _{Von}		1		mA	(1)
Power Consumption4	P _{VOFF}		1		mA	(1)

Note 1) Whin operating temperature.

(2) Back-Light Unit

ITEM	SYMBOL	MIN.	TYP	MAX.	UNIT	NOTE
Lamp Current	I_L	2.0	-	5.5	mA_{rms}	(1)
Lamp frequency	f_L	-	62.936	-	kHz	(1)
Lamp Voltage	V_L		(665)		V_{rms}	(2)

Note 1) Brightness Range : OSD Min./Max.

Note 2) Lamp Current 5.0mA_{rms}

2. Optical Characteristics

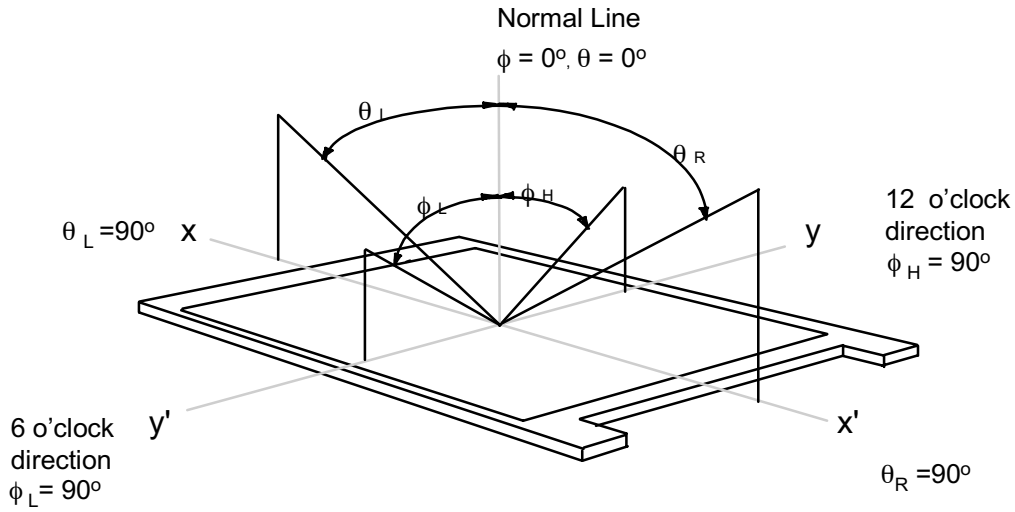
The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state. Measuring equipment: BM-5A.

(VDD1=3V, VDD2=5V, fV=60Hz, fH=15.734kHz, Built-in inverter, Ta = 25 ± 2°C)

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast Ratio		CR	Viewing Normal Angle $\phi = 0$ $\theta = 0$	200	-	-		2)-①
Response time at 25 °C	Rising	TR		-	-	10	ms	3)
	Falling	TF		-	-	40		
Average Luminance of White(9 Points)		YL, AVE		-	(400)	-	cd/m ²	2)-②
Center Luminance		Y _L		-	350	-		
Color Gamut				-	42	45	%	Measuring Equipment: PR-650 1)
Color Chromaticity (CIE 1931)	Red	RX		± 0.0 25	0.580	± 0.02 5		
		RY			0.340			
	Green	GX			0.308			
		GY			0.537			
	Blue	BX	0.153					
		BY	0.124					
	White	WX	0.310					
		WY	0.320					
	Viewing Angle	Hor.	θ L		CR ≥ 10			45
θ R			45	-		-		
Ver.		ϕ H	30	-		-		
		ϕ L	10	-		-		
9 Points White Variation		δ W	-	-	2.0		2)-③	

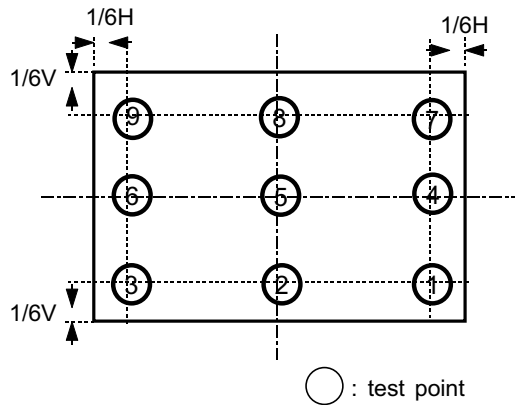
* Luminance measurement condition: 1. OSD Key Setting : Maximum Luminance

Note 1) Definition of Viewing Angle : Viewing angle range ($10 \leq CR$)



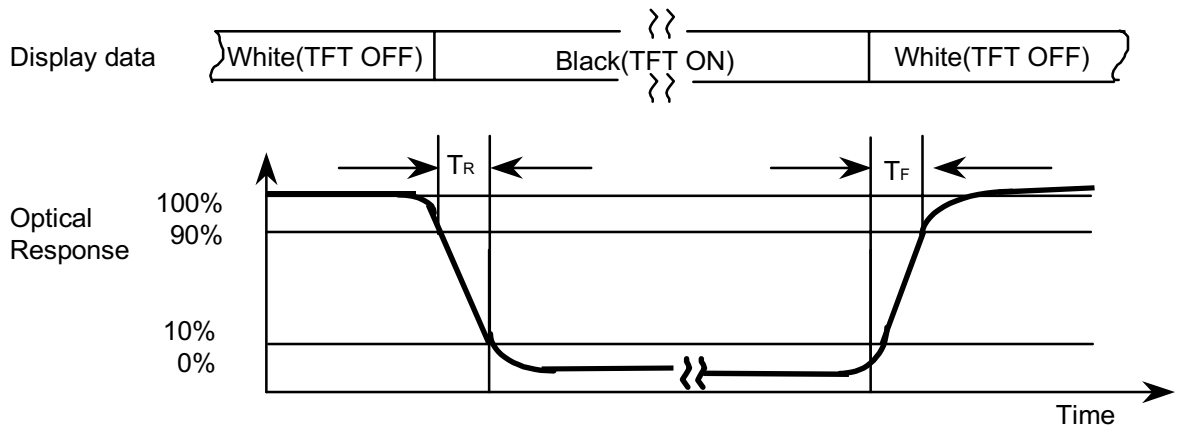
Note 2) Definition of Average Luminance of White, 9points White variation, Contrast Ratio

ACTIVE AREA (H:101.76mm/ V:76.36mm)



- ① Definition of Contrast Ratio (CR) : Ratio of gray max (Gmax), gray min (Gmin) at 9 points
- ② Definition of Average Luminance of White : measure the luminance of white at 9 points.
- ③ Definition of White Variation(δw) : measure the Variation at 9 points.

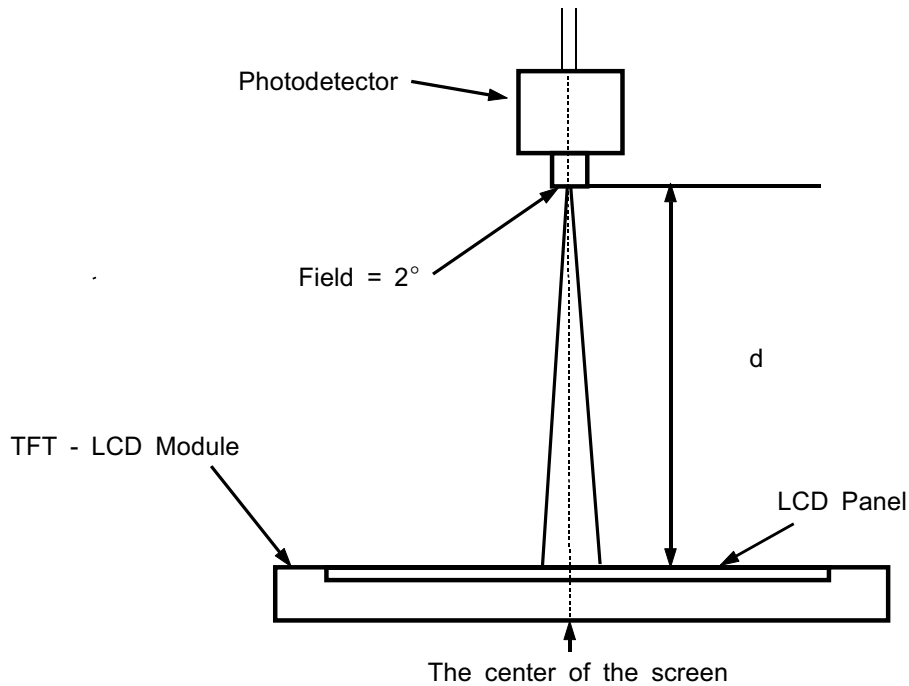
Note 3) Definition of Response time : Sum of T_R , T_F



Note 4) Test Equipment Setup

After stabilizing and leaving the panel alone at a given temperature for 30 min, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. 30 min after lighting the Front-light or reference light source. The reflected light intensity should be measured in the center of screen. The incident angle of the light source is 30° to the normal direction where the photodetector is positioned.

Environment condition : $T_a = 25 \pm 2 \text{ }^\circ\text{C}$



* Photodetector : BM-5A (d = 40cm), PR-650 (d = 50cm)

3. Electrical Specification

3.1 Interface signals pin assignment

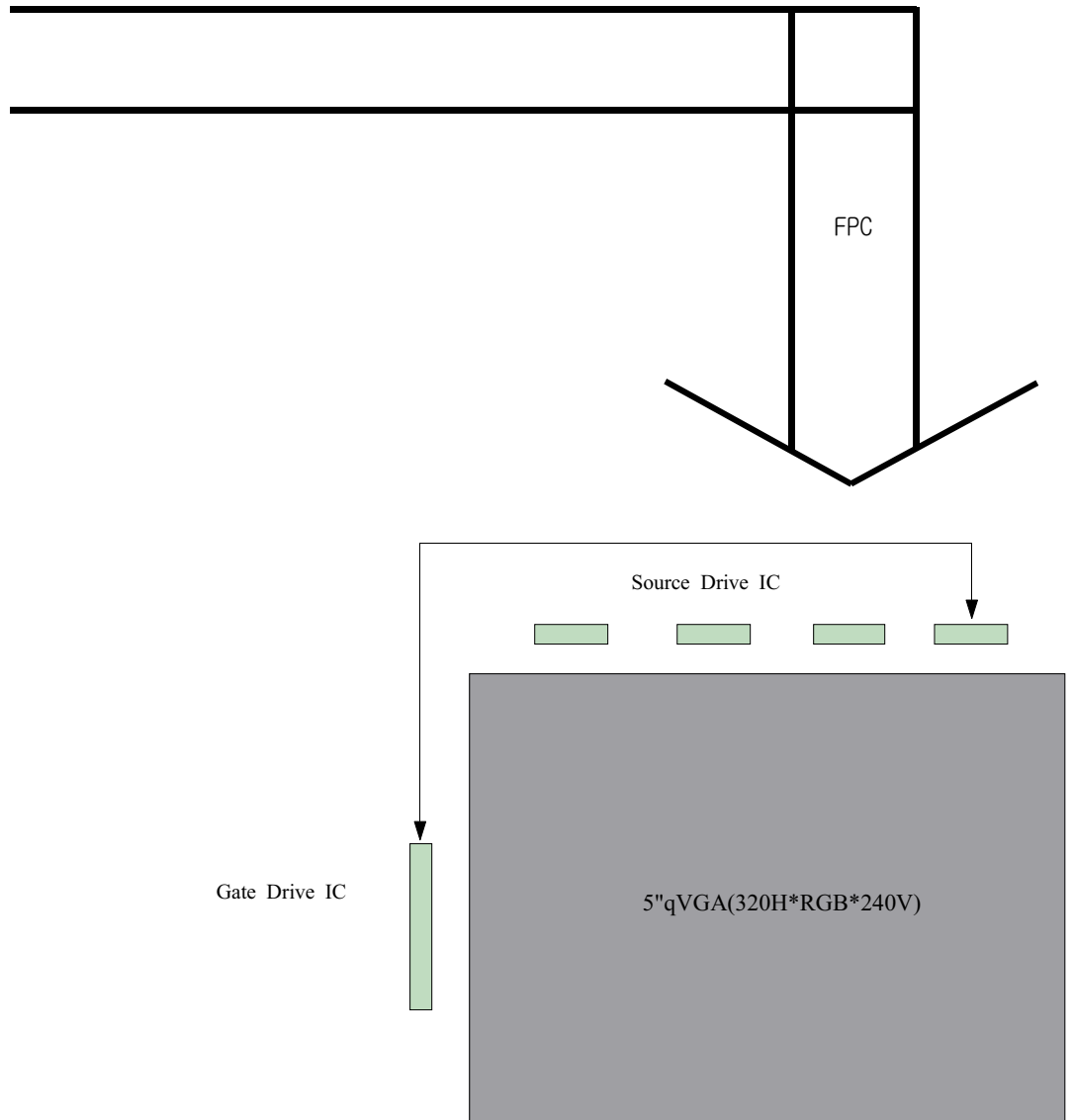
Pin	Signal	Description
1	GND	Ground
2	VCOMS	L/C Conversion Pulse 1
3	GND	Ground
4	STH	Source IC Start Pulse
5	VBS	Bias Control Voltage
6	GND	Ground
7	RIN	Analog Red Data Input
8	GIN	Analog Green Data Input
9	BIN	Analog Blue Data Input
10	GND	Ground
11	OE	Output Enable Signal
12	VDD1	Input Voltage1
13	MOD	Smpling Mode selection Terminal
14	GND	Ground
15	CPH1	Source IC Clock1
16	CPH2	Source IC Clock2
17	CPH3	Source IC Clock3
18	GND	Ground
19	VDD2	Input Voltage 2
20	VDD2	Input Voltage 2
21	STV	Gate IC Start Pulse
22	OEV	GATE IC Output Enable Signal
23	CPV	Gate IC Clock
24	GND	Ground
25	VOFF	Gate IC Output Part Ground Voltage
26	GND	Ground
27	VDD1	Input Voltage 1
28	VON	Gate IC Output Part Drive Voltage
29	GND	Ground
30	VCOMG	L/C Conversion Pulse 2

4. Block Diagram

4.1 TFT-LCD Module

(INPUT Signal)

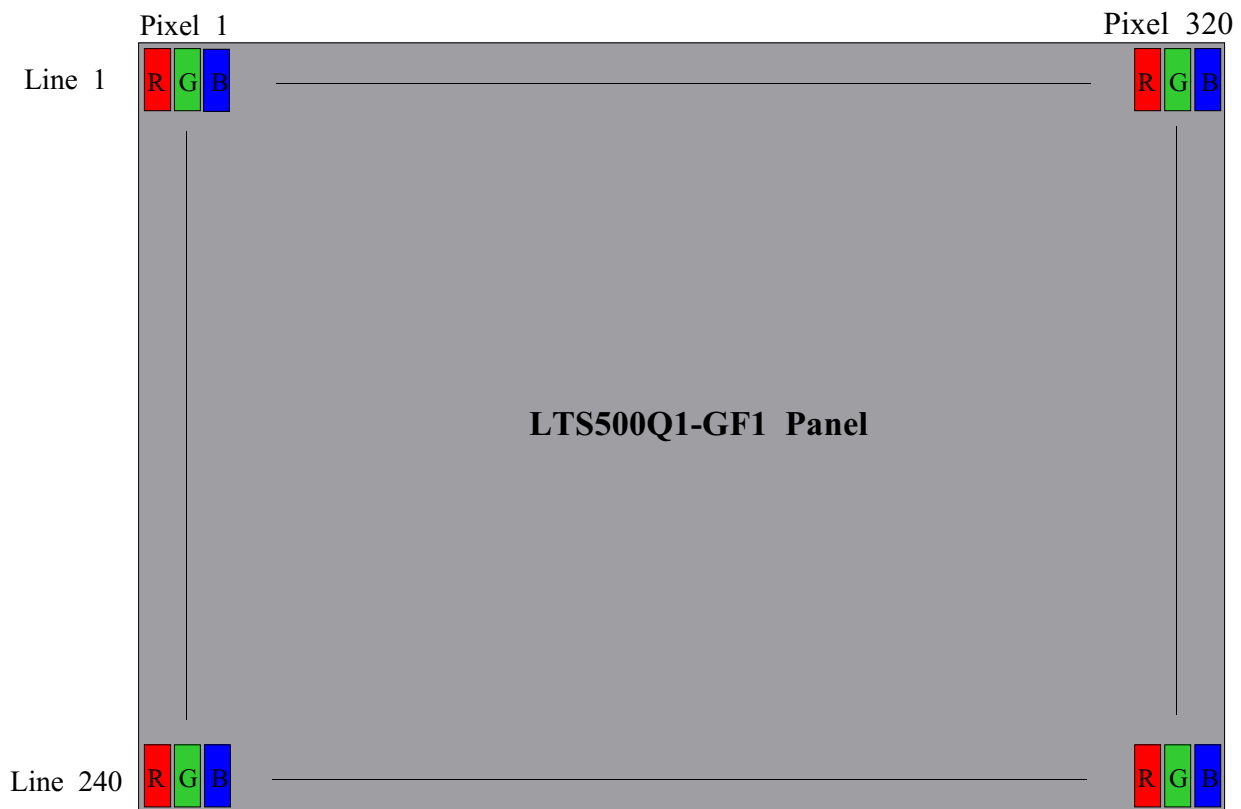
- #1 GND
- #2 VCOMS
- #3 GND
- #4 STH
- #5 VBS
- #6 GND
- #7 R_IN
- #8 G_IN
- #9 B_IN
- #10 GND
- #11 OE
- #12 VDD1
- #13 MOD
- #14 GND
- #15 CPH1
- #16 CPH2
- #17 CPH3
- #18 GND
- #19 VDD2
- #20 VDD2
- #21 STV
- #22 OEV
- #23 CPV
- #24 GND
- #25 VOFF
- #26 GND
- #27 VDD
- #28 VON
- #29 GND
- #30 VCOMG



4.2 Back Light



5. Pixel Format



6. Outline Dimensions

6.1 Module Outline Dimensions

- Refer to the Next Page.

7. General Precautions

7.1 Handling

- (a) When the module is assembled, it should be attached to the system firmly. Be careful not to twist and bend the module.
- (b) Refrain from strong mechanical shock and / or any force to the module. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
- (c) Note that polarizers are very fragile and could be easily damaged. Do not press or scratch the surface harder than a HB pencil lead.
- (d) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, Staining and discoloration may occur.
- (e) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
- (f) The desirable cleaners are water, IPA(Isopropyl Alcohol) or Hexane. Do not use Ketone type materials(ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
- (g) 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.
- (h) Protect the module from static , it may cause damage to the CMOS Gate Array IC.
- (i) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (j) Do not disassemble the module.
- (k) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (l) Pins of I/F connector shall not be touched directly with bare hands.

7.2 Storage

- (a) Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35° C and relative humidity of less than 70%.
- (b) Do not store the TFT-LCD module in direct sunlight.
- (c) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

7.3 Others

- (a) The liquid-crystal is deteriorated by ultraviolet rays. Do not leave it in direct sunlight and strong ultraviolet rays for many hours.
- (b) Avoid condensation of water. It may result in improper operation or disconnection of electrode.
- (c) Do not exceed the absolute maximum rating value. (the supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on)
Otherwise the panel may be damaged.
- (d) If the panel displays the same pattern continuously for a long period of time, it can be the situation when the image "Sticks" to the screen.
- (e) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.