



SPECIFICATION

NO.:PJ236002T

ACCEPTED BY CUSTOMER	
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Product: 2.36" TFT 480(RGB)*234 Pixels

Verson: V00

Date: 2016-06-02

APPROVED	CHECKED	PREPARED

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1. History Version

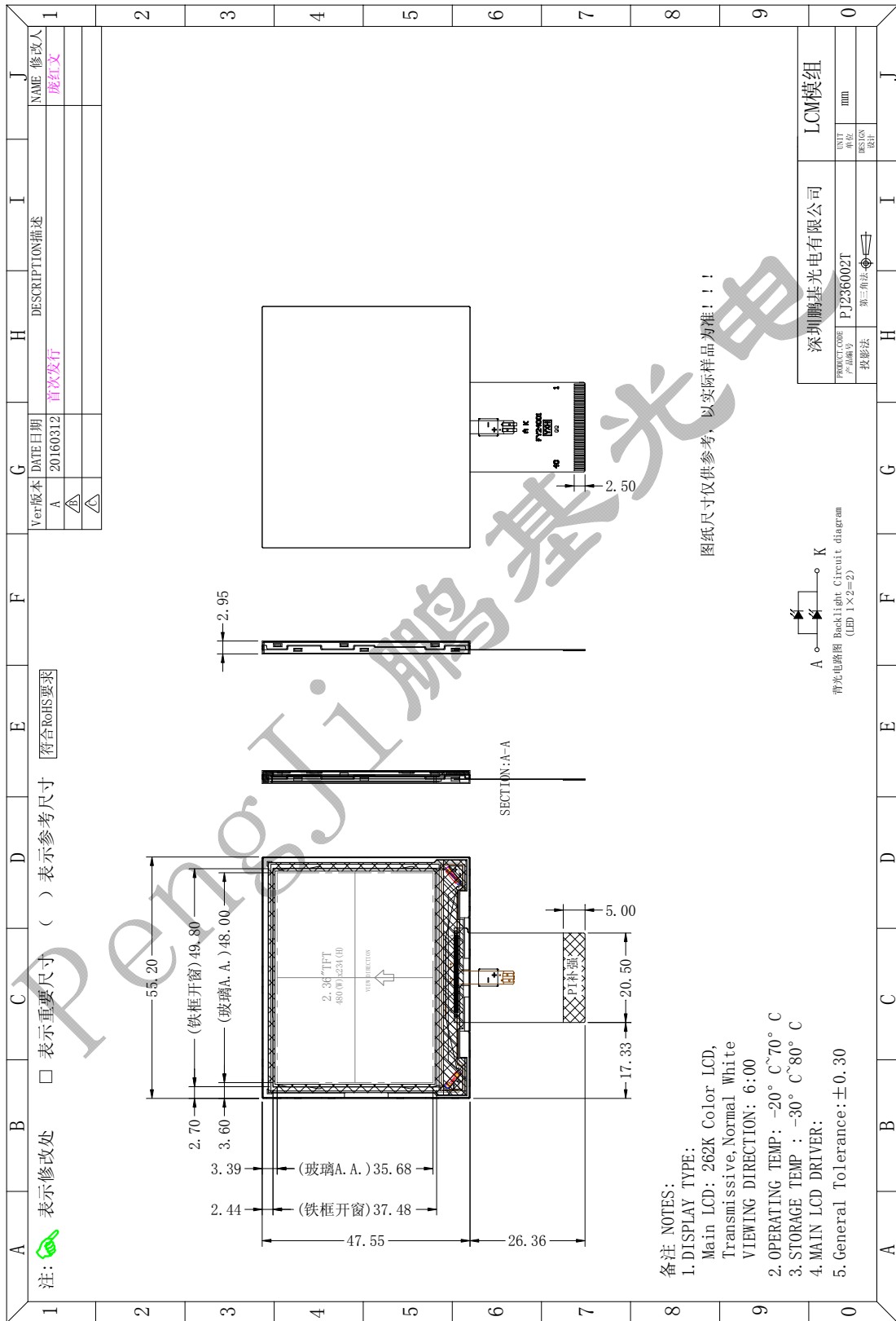
Sample version	Doc. version	Date	Description	Modify
V00	V00	2016-06-02	First issue	LW

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2. Mechanical Description

Name	Content	Unit
Outline Size	55.2 (W) * 47.55 (H) * 2.95(T)	mm
Module size	2.36 (V. A)	inch
Resolution	480(RGB)* 234 Pixels	-
Viewing size	48.0(W) * 35.69(H)	mm
Pixel size	0.3 * 0.153	mm
LCD Type	TFT (16.7M) / Transmissive / Positive	-
Viewing Angle	6 0' CLOCK	-
Driver IC	-	-
Backlight Type	2 LED Parallel	-
Interface Type	SPI & 8Bit RGB	-

3. Mechanical Drawing



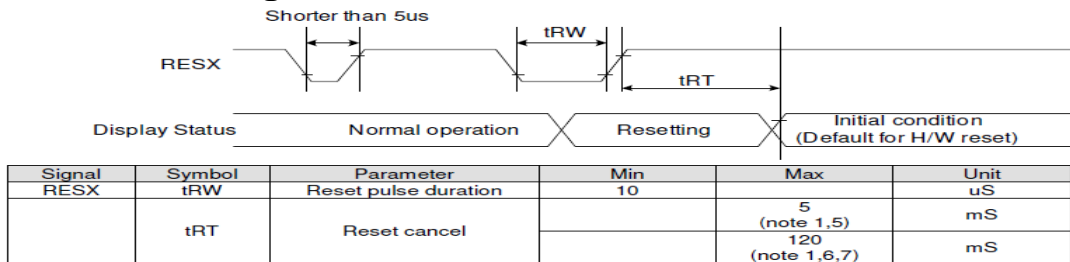
4. Interface Definition

PinNo.	Symbol	Description
1-8	D0-D7	Data bus
9	DCLK	Data clock input
10	VSYNC	Vertical sync input
11	HSYNC	Horizontal sync input
12	SCL	Serial command clock input
13	SDA	Serial command data input
14	CS	Serial communication chip select
15	VCC	Digital power supply
16	GND	Ground terminal in the logic circuit
17	NC	No connection
18	FB(LED_K)	LED power cathode
19	NC	No connection
20	LED_A	LED power anode
21	DRV	Gate signal for the power transistor of the boost converter
22	PVDD	Charge Pump power VDD
23	PGND	Charge Pump Power GND
24	C1M	Pins to connect capacitance for power circuitry
25	C1P	Pins to connect capacitance for power circuitry
26	NC	No connection
27	C2M	Pins to connect capacitance for power circuitry
28	C2P	Pins to connect capacitance for power circuitry
29	VINT2	Intermediate voltage for charge Pump
30	C3M	Pins to connect capacitance for power circuitry
31	C3P	Pins to connect capacitance for power circuitry
32	VINT3	Intermediate voltage for charge Pump
33	VCAC	Define the amplitude of VCOM swing
34	FRP	Frame polarity output for VCOM
35	VGH	Positive power supply for gate driver output
36	C4M	Pins to connect capacitance for power circuitry
37	C4P	Pins to connect capacitance for power circuitry
38	VGL	Negative low power supply for gate driver output(-12.5v)
39	NC	No connection
40	VCOM	Common electrode driving voltage

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5. Interface Timing:

5.1 Reset Timing



5.2 Interface Timing

Write Sequence

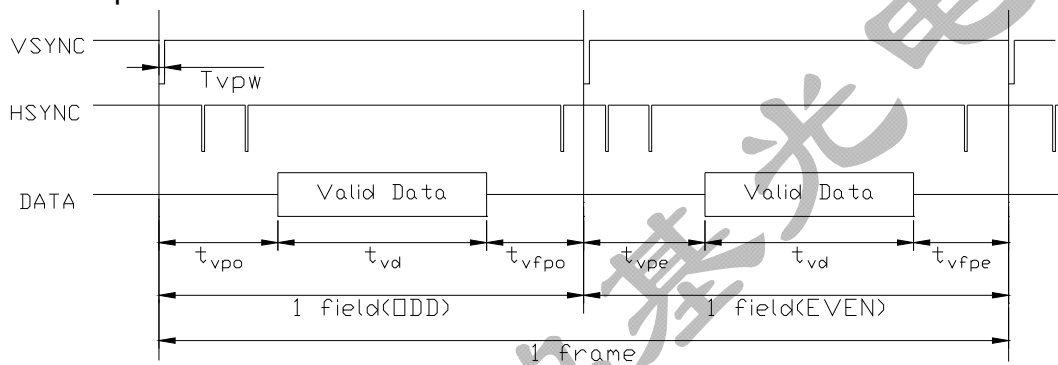
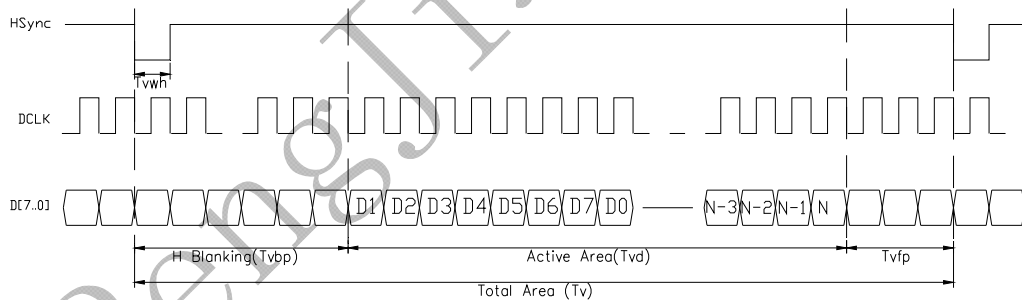


Figure 13: Vertical input timing diagram for interlace application

Read Sequence



HORIZONTAL INPUT TIMING

Parameter	Symbol	Value		
Horizontal display area	Tvwh	400		
		MIN.	Typ.	Max.
DCLK frequency	Fclk	8.1	9.7	11.3
1 Horizontal Line	Tv	617		
HSYNC pulse width	Min.	1		
	Typ.	1		
	Max.	96		
HSYNC blanking	Tvbp	84	100	115
HSYNC front porch	Tvfp	53	37	22

5.3 SPI Timing Diagram

There is a total of 16 registers each containing several parameters. For a detailed description of the parameters refer to Table 1. The serial register has read/write function. D[15:12] are the register address, D[11] defined the read or write mode and D[10:0] are the data.

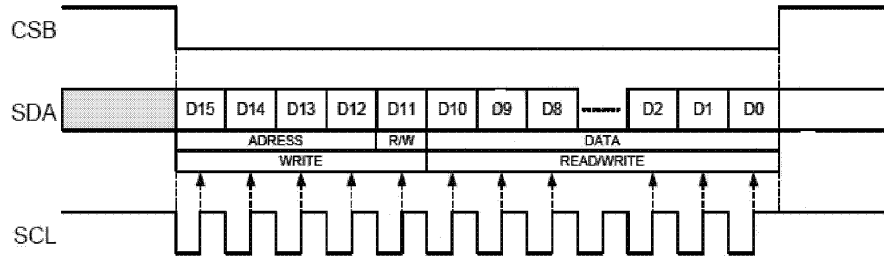


Figure 2: Serial Interface read/write sequence

At power-on, the default values specified for each parameter (in Table 1) are taken.
All data, except S0 D[3:2], are validated on the negative edge of Vsync.
In 3-wire register, GRB clear registers to default value except GRB value.
If less than 16-bit data are read during the CS low time period the data is cancelled.

6. Absolute Maximum Ratings:

Name	symbol	Min	Type	Max	Unit
Operation Temperature	T _{OP}	-20	-	70	°C
Storage Temperature	T _{ST}	-30	-	80	°C

7. DC Characteristics

7.1 Input Voltage and Output Voltage

Name	Symbol	Min	Type	Max	Unit
Logical Voltage	Vcc	3.0	3.3	3.6	V
Input High Voltage	V _{IH}	0.8IOVCC	-	IOVCC	V
Input Low Voltage	V _{IL}	-0.3	-	0.2IOVCC	V
Output High Voltage	V _{OH}	0.8IOVCC	-	-	V
Output Low Voltage	V _{OL}	-	-	0.2IOVCC	V
Current Consumption	IDD	-	-	15	mA

7.2 VGH and VGL

Name	Symbol	Min	Type	Max	Unit
VGH Voltage	VGH	-	-6.15	-	V
VGL Voltage	VGL	-	18.20	-	V

8. Backlight:

Name	Min	Type	Max	Unit
Current	30	40	50	mA
Voltage	2.8	3.1	3.4	V
Power Consumption	-	124	-	mW
luminance	180	200	-	CD/M ² (Note1)
Luminance uniformity	75%	80%	-	(Note2)
X Color Coordinates	0.27	0.28	0.31	-
Y Color Coordinates	0.27	0.28	0.31	-

Note1: This luminance is tested with assembling the LCD.

Note2: Definition of Luminance Uniformity.

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$

L-----Active area length W----- Active area width

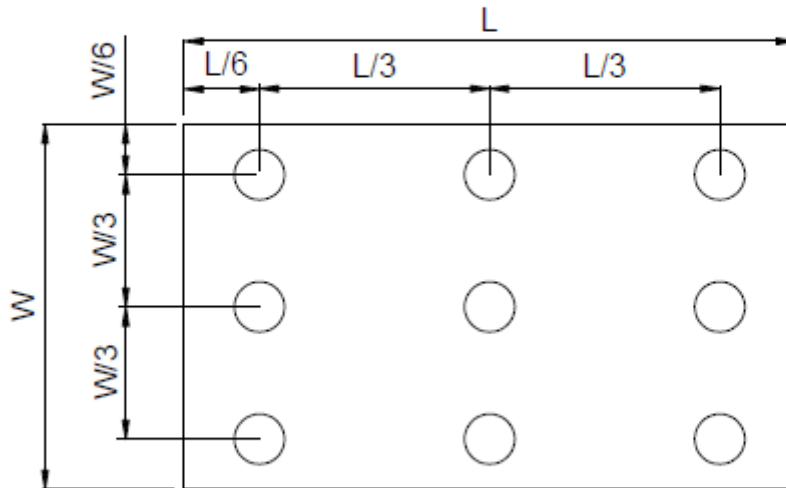


Fig. 4-4 Definition of measuring points

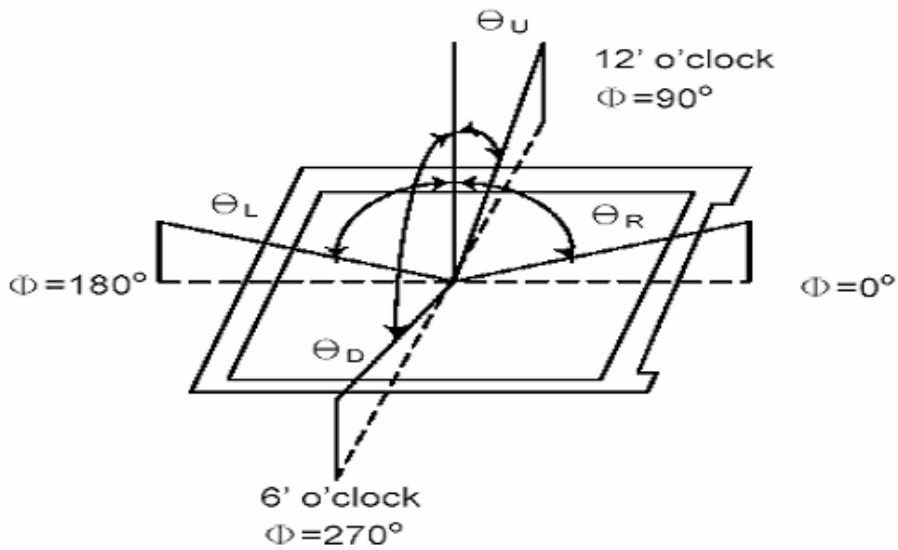
B_{max}: The measured maximum luminance of all measurement position.

B_{min}: The measured minimum luminance of all measurement position.

9. Optical Specification

Name	Symbol	Min	Type	Max	Unit
Transmittance rate	T (%)	-	5	-	%
Contrast ratio	C/R	200	250	-	-
Response time	Tr+Tf	-	30	-	ms
Viewing Angle	θ U	20	30	-	degree (C/R>10)
	θ D	50	55	-	
	θ L	45	50	-	
	θ R	45	50	-	

*Viewing angle descriptin:

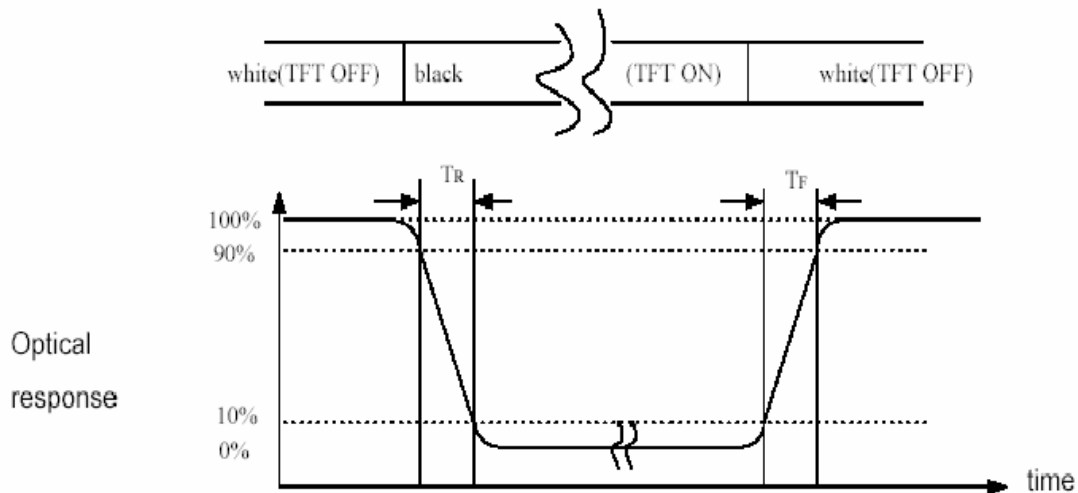


*Contrast rate description(CR) :

Tested in the center of the LCM panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

*Response time description : Sum of TR and TF



10. Reliability testing:

Item No	Name	Condition	Remark
1	High temperature Operating	70° C , 168Hours	Finish product (With polarizer)
2	Low temperature Operating	-20° C , 168 Hours	Finish product (With polarizer)
3	High temperature Storage	80° C , 168 Hours	Finish product (With polarizer)
4	Low temperature Storage	-30° C , 168 Hours	Finish product (With polarizer)
5	High temperature & humidity Storage	60° C , 90%RH, 168 Hours	Finish product (With polarizer)
6	Thermal Shock Storage (No operation)	-20° C , 30min. <=> 70° C , 30min. 10 Cycles	Finish product (With polarizer)
7	ESD test	Voltage:+8KV R:330 ohm,C:150pF Air discharge, 10 times	Finish product (With polarizer)
8	Vibration test	10 => 55 =>10 => 55 => 10 Hz, within 1 minute;Amplitude:1.5mm. 15 minutes for each Direction (X, Y, Z)	Finish product (With polarizer)
9	Drop test	Packed, 100CM free fall 6 sides, 1 corner, 3edges	Finish product (With polarizer)

*One single product test for only one item.

* Judgment after test: keep in room temperature for more than 2 hours.

- Current consumption < 2 times of initial value
- Contrast > 1/2 initial value
- Function: work normally

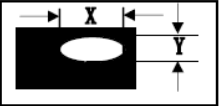
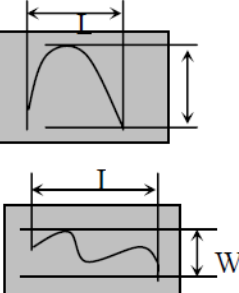
11. Inspection Standard

No.	Defect Class	Defination	Content
1	重缺陷 (MA)	影响显示的功能缺陷	短路、断路、缺划、大电流、视角错、漏液、显示不清等
		严重外观缺陷	产品尺寸不符、漏部品等
2	轻缺陷 (MI)	不影响产品功能, 但对产品外观有影响	反黑 / 反白点、偏光片缺陷、针孔、污点

11.1 Defect Defination

11.2 Standard

No.	Item	Inspection Standard	Classification of defects
1	显示状态	不显、显示乱码、多划、少划、少画面、视角错、闪烁等均不允许	重缺陷
		无法用文字描述的现象, 必要时制定限度样板进行参考。如: 显示不均、显示浓淡、斜纹等	
		显示的颜色效果参照开发、工程样品或按限度样板判定	
		画面切换过程中可见(但非画异)之不良现象(暂停画面时不良现象不可见)不作管控, 客户有特殊要求时依客户要求;	轻缺陷
		仅点背光不显示画面下可见不良现象(但显示画面时不良现象不可见)不作管控, 客户有特殊要求时依客户要求;	轻缺陷
2	背光	LED 灯不亮或闪烁不稳定不允许	重缺陷
		背光电流: 超出规格范围不允许	
		亮眼、漏光: 进入 LCD 的 A、B 区不允许, 必要时按限度样板做判定	轻缺陷
		背光颜色: 根据样品、规格书判定	轻缺陷
		亮度与发光均匀度参照开发、工程或限度样板判定	轻缺陷

No.	Item	Inspection Standard		Classification of defects	
3	显示黑点 白点 针孔	直径 ($\Phi = (X+Y) / 2$)	允收数	图示 	
		$\Phi \leq 0.1$ (密集不可)	不计		
		$0.1 < \Phi \leq 0.15$ [注2]	2		
		$0.15 < \Phi \leq 0.2$	1		
		$\Phi > 0.2$	0		
注1. 包括: 黑点、白点、针孔、异物。 注2. 整个产品不允许超过2个点, 且间距必须在10mm以上。				轻缺陷	
4	显示黑线 白线	尺寸 (L: 线长; W: 线宽)	允收数		图示 
		L 不计 W < 0.03 (密集不可)	不计		
		$L \leq 2$ $0.03 \leq W \leq 0.05$ [注2]	2		
		L 不计 W > 0.05	以点判断		
		注1. 包括: 显示黑线、白线、线状异物。 注2. 单个产品不允许超过2个线状缺陷, 且缺陷距离必须大于10mm以上。			
5	触摸屏	点击触摸屏测试点画面无转换不允许		重缺陷	

12. Precaution

12.1 Handling

- (1) Protect the panel from static, it may cause damage to the CMOS Gate Array IC.
- (2) Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (3) 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.
- (4) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Don't 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.
- (5) Pins of I/F connector shall not be touched directly with bare hands.

(6) Refrain from strong mechanical shock and / or any force to the panel. In addition to damage, this may cause improper operation or damage to the panel.

(7) Note that polarizers are very fragile and could be easily damaged. Do not press or scratch the surface harder than a B pencil lead.

(8) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur.

(9) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

12.2 Storage

(1) Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the panel with temperature from 0 to 35°C and relative humidity of less than 70%.

(2) The panel shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

12.3 Operation

(1) The LCD shall be operated within the limits specified. Operation at values outside of these limits may shorten life, and/or harm display images.

(2) Do not exceed the absolute maximum rating value. (the supply voltage variation, Input voltage variation in part contents and environmental temperature and so on). Otherwise the panel may be damaged.

(3) 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.