

Product Specification

Customer: _____

Model Name: HXT-028QI-B10

Date: _____

Version: _____

☒ Preliminary Specification

☐ Final Specification

For Customer’s Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by

1. Record of Revision

[illegible]

Contents

1.Record of Revision.....	3
2 .General Specifications	4
3 .Input/Output Terminals	5
4. Absolute Maximum Ratings.....	6
5 .Electrical Characteristics.....	6
6 .Interface Timing.....	7
7. Optical Characteristics.....	8
8 . Environmental / Reliability Tests	11
9. Mechanical Drawing	12
10.Packing.....	13
11. Precautions For Use of LCD modules.....	14

2 General Specifications

Feature		Spec
Characteristics	Size	2.8 inch
	Resolution	240(horizontal)*320Vertical)
	Interface	SPI
	Connect type	Connector
	Color Depth	16.7M
	Technology type	IPS
	Pixel pitch (mm)	0.051*0.153
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally White
	LCD Driver IC	ST7789V
	Viewing Direction	ALL o'clock
	Gray Scale Inversion Direction	-
Mechanical	LCM (W x H x D) (mm)	50*69.2*2.4
	Active Area(mm)	43.2*57.6
	With /Without TSP	-
	Weight (g)	TBD
	LED Numbers	4 LED

Note 1: Viewing direction is following the data which measured by optics equipment.

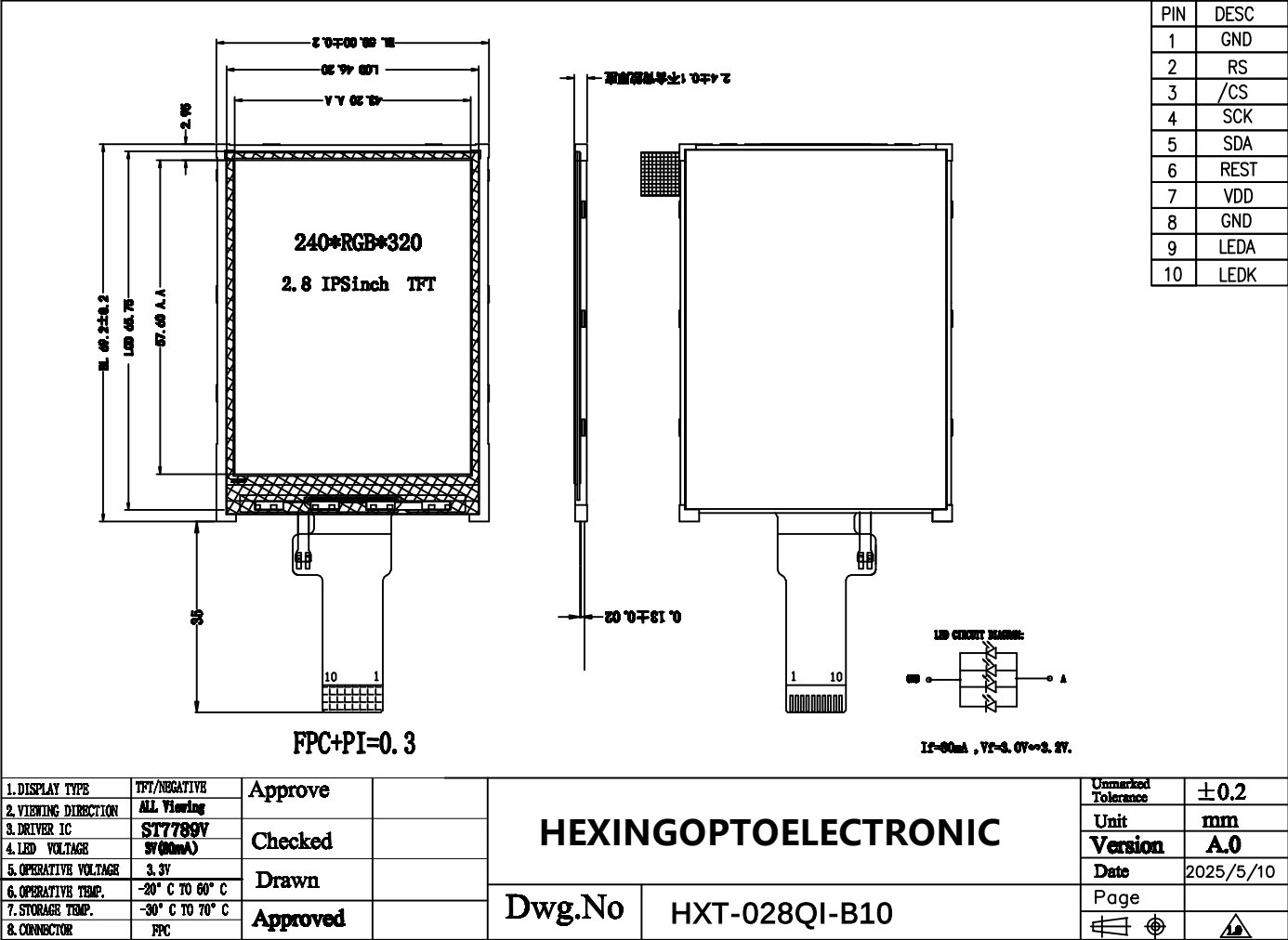
Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%

3.PinAssignments

PinNo	Symbol	Function
1	GND	Ground
2	RS	It determines whether the access is related to data or command. /RS= "H" : Indicates that signals on D[7:0] are display data. /RS= "L" : Indicates that signals on D[7:0] are command.
3	/CS	Chip select signal, When /CS = 'L' , the chip select becomes active, and data/command I/O is enabled
4	SCL	Serial clock input
5	SDA	Serial data input
6	RESET	When /RESET is set to "L" , the register settings are initialized
7	VCC	Power supply for logic
8	GND	Ground
9	A	Anode of LED backlight
10	K	Cathode of LED backlight

4.Mechanical



5.ElectricalSpecification

AbsoluteMaximumRatings

Item	Symbol	Value	Unit	Remark
Analog Power Supply Voltage	VCI	2.5~+3.3	V	-
Digital Power Supply Voltage	VDD	2.5~+3.3	V	-
I/O Power Supply Voltage	IOVCC	1.65~+3.3	V	-

TypicalOperationConditions

Item 项目	Symbol	Min.最小	Typ.典型	Max.最大	Unit
Analog Supply Voltage	VCI	2.5	2.8	3.3	V
Digital Supply Voltage	VDD	2.5	2.8	3.3	V
I/O Supply Voltage	IOVCC	1.65	2.8	3.3	V
Input High Voltage	V _{IH}	0.7*IOVCC	-	IOVCC	V
Input Low Voltage	V _{IL}	-	-	0.3*IOVCC	V
Output High Voltage	V _{OH}	0.8*IOVCC	-	-	V
Output Low Voltage	V _{OL}	-	-	0.2*IOVCC	V

BacklightCircuitCharacteristics 背光功耗

Item	Symbol	Min.	Typ.	Max.	Unit
LED Current	I_B	70	80	85	mA
LED Voltage	V_f	2.8	3.1	3.3	V
Power Consumption	P_{BL}	-	256	-	mW

LCDCurrentConsumption

Item	Symbol	Typ.	Max.	Unit
Full Mode	VCI+IOVCC	TBD	TBD	mA
测试条件: VCI=2.8V, IOVCC=2.8V; Interface 驱动类型: 行翻转或列翻转 TN Type=>All Black Pattern. TN型液晶面板=>黑色画面; IPS Type=>All White Pattern. IPS型液晶面板=>白色画面; Temperature: 25°C; 温度: 室温25摄氏度;				
Sleep Mode 休眠模式	VCI+IOVCC	-	-	uA
测试条件: VCI=2.8V, IOVCC=2.8V; DC/DC converter is enabled. Internal oscillator is started and panel scanning is started. 除IC内部晶振和面板扫描外, 其他功能都暂停工作; Temperature: 25°C; 温度: 室温25摄氏度;				

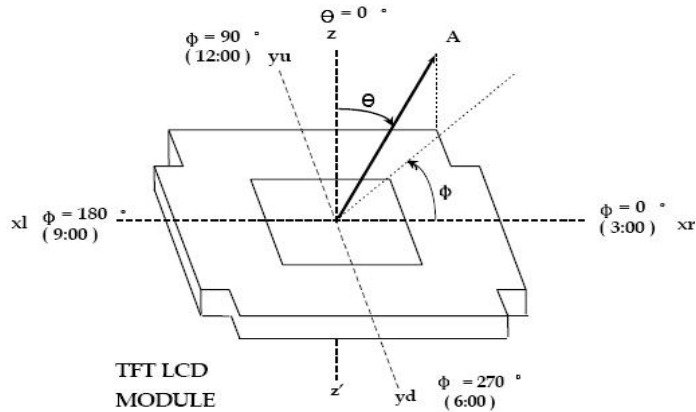
6.OpticalSpecification

LCMOpticalCharacteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle Range 视角	Left	θ_L	$CR \geq 10$	-	40	-	degree
	Right	θ_R		-	40	-	
	Top	θ_T		-	40	-	
	Bottom	θ_B		-	15	-	
Response Time 响应时间		$T_{on}+T_{off}$	$\theta=\phi=0^\circ$	-	30	-	ms
Contrast Ratio 对比度		CR	$\theta=\phi=0^\circ$	-	250	-	-
Luminance 亮度		L	$\theta=\phi=0^\circ$	260	350	-	cd/m ²
Uniformity 均匀度		U_L	$\theta=\phi=0^\circ$	80	85	-	%
Flicker 闪烁		-	-	$\leq 20\%$			-

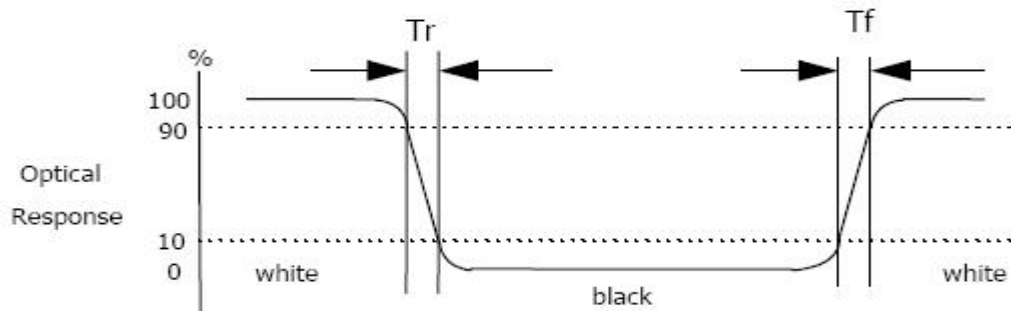
7.Measurement system

LCM ViewingAngle



Viewing angle is the angle at which 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.

Response time



Response time is the time required for the display to transition from white to black (Rising time, T_r) and from black to white (Falling time, T_f) for additional information.

Contrast Ratio(CR)

Contrast Ratio (CR) is defined mathematically as:

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

Surface luminance is the center point across the LCD surface 500mm from the surface with all pixels displaying white.

8.ReliabilityTestItems

Test Item 测试项目	Test Condition 测试条件	Test result determinant gist 实验结果判定
High temperature storage 高温存储	80±3℃, 24H;	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 试验结束后,已测试的LCD样品必须在室内正常温湿度环境下放置2~4个小时以上才能进行功能和外观检查, 样品不允许有以下缺陷: 1.Air bubble in theLCD; 模块中有气泡; 2.Non-display; 不显示; 3.Glasscrack; 玻璃破碎; 4. The electrical characteristics requirements shall be satisfied. 需要满足模块电气性能。
Low temperature storage 低温存储	-30±3℃, 24H;	
High temperature operation 高温运行测试	70±3℃, 24H;	
Low temperature operation 低温运行测试	-20±3℃, 24H;	
High temperature /humidity 高温高湿	50℃±3℃,90%±3%RH, 24H;	
Thermal Shock 冷热冲击	-30℃/0.5h~+80℃/0.5h for a total 24 cycles;	
Vibration Test 振动测试	Frequency10Hz~55Hz~10Hz Amplitude: 1.5mm, X, Y, Z direction for total 1H; (Packing condition)	
ESD test 静电测试	±8KV, Air Mode, 150pF/330Ω;	

Remark: 注意:

1. The test samples should be applied to only one testitem.每个被测试的模块只能用于其中的一个测试项目。

2. Sample size for each test item is2pcs.每个测试项目的样品数量为2片。

3. Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, OpticalCharacteristic.

故障判断标准:基本规格,电气特性,机械特性,光电特性。

9.QUALITY SPECIFICATIONS检验标准

1.2 检验标准

1.2.1 POL外观检验标准。

点（POL表面凹、凸点，黑白点，针孔状亮点的）大小判定		判定标准	缺点区分	备注
大屏（即面积大于等于3500 mm ² 的屏）				
Φ≤0.10		不计	次缺	两缺陷之间距离<10MM 时以缺点之和判定, 不计为1cm ² 允许三个
0.15<Φ≤0.2		1		
0.25<Φ		0		
小屏（即面积小于3500 mm ² 的屏）				
Φ≤0.2		1	次缺	
0.25<Φ		0		
针孔状亮点（大、小屏）				
Φ≤0.2		1	次缺	
0.25<Φ		0		
线（线状异物，表面划伤，其大小用L表示线长度，W表示线的宽度，判定标准如下）				
大小判定		判定标准	缺点区分	备注
长（L）	宽（W）			
大屏（即面积大于等于3500 mm ² 的屏）				
-----	W≤0.02	不计	次缺点	两缺陷之间距离<10MM 时以缺点之和判定
L≤3.0	0.02<W≤0.03	2		
L≤2.5	0.03<W≤0.05	1		
-----	0.05< W	0		
小屏（即面积小于3500 mm ² 的屏）				
----	W≤0.02	不计	次缺点	两缺陷之间距离<10MM 时以缺点之和判定
L≤2.0	0.02<W≤0.03	2		
L≤1.0	0.03<W≤0.05	1		
-----	0.05< W	0		

POL表面气泡	判定标准	缺点区分	备注
点状气泡（大、小屏，Φ表示气泡的大小）			
Φ≤0.2	1	次缺	

线状气泡（大、小屏，L表示气泡的长度，W表达气泡的宽度）				
大小判定		判定标准	缺点区分	备注
长（L）	宽（W）			
L≤1	W≤0.1	不计	次缺点	两缺陷之间距离 <10MM 时 以 缺 点之和判定
L≤5	W≤0.1	2		
L≤10	W≤0.1	1		
-----	0.1<W	0		
POL的其它不良项目及判定标准（所有型号，大、小屏）				
不良项目		判定标准	缺点区分	备注
贴附位置偏移		不超出玻璃边沿，不进入可视区判定1 / 2 OK	次缺	其中保护膜漏贴为主缺
保护膜不良		破损，翻卷，漏贴不可		
水纹		不进入显示区 OK		
易揭撕膜标签		漏贴，贴附位置与样品承认书不附；		
边框 气泡		没有进入显示区属于OK		

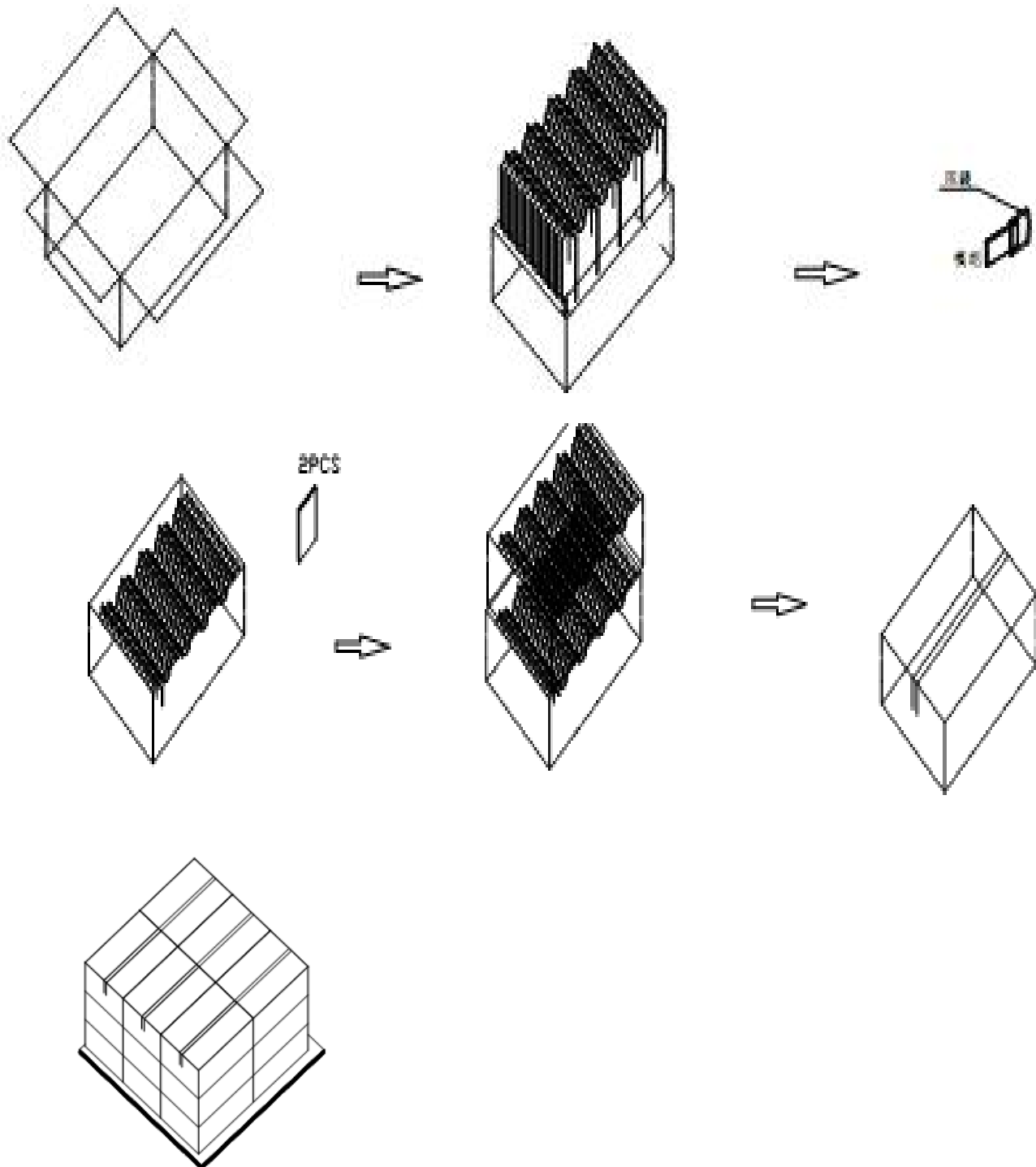
LCD的不良判定标准

1.2.2.1 LCD显示时点、线状不良判定标准

点（显示时玻璃内的凹、凸点，黑、白点，针孔状亮点、亮斑的）大小判定		判定标准	缺点区分	备注
大屏（即面积大于等于3500 mm ² 的屏）				
Φ≤0.10		不计	次缺	两缺陷之间距离<10MM时以缺点之和判定，不计为1cm ² 允许三个
0.10<Φ≤0.15		2		
0.15<Φ≤0.20		1		
0.25<Φ		0		
小屏（即面积小于3500 mm ² 的屏）				
Φ≤0.2		1	次缺	
0.25<Φ		0		
针孔状亮点（大、小屏）				
Φ≤0.2		1	次缺	
0.25<Φ		0		
亮斑（大、小屏，扩散点）				
Φ≤0.10		不计	次缺	两缺陷之间距离<10MM时以缺点之和判定，不计为1cm ² 允许三个
0.10<Φ≤0.15		2		
0.15<Φ≤0.20		1		
0.25<Φ		0	次缺	
线（显示时屏内的线状异物，屏划伤、纤维等，其大小用L表示线长度，W表示线的宽度，判定标准如下）				
大小判定		判定标准	缺点区分	备注
长（L）	宽（W）			
大屏（即面积大于等于3500 mm ² 的屏）				
-----	W≤0.02	不计	次缺	两缺陷之间距离<10MM时以缺点之和判定
L≤3.0	0.02W≤0.03	2		
L≤2.5	0.03<W≤0.05	1		
-----	0.05< W	0		
小屏（即面积小于3500 mm ² 的屏）				
----	W≤0.02	不计	次缺	两缺陷之间距离<10MM时以缺点之和判定
L≤2.0	0.02<W≤0.03	2		
L≤1.0	0.03<W≤0.05	1		
-----	0.05< W	0		

10. Packing

Packing Method



11. Precautions for Use of LCD modules

11.1 Handling Precautions

11.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

11.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

11.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

11.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

11.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketene
- Aromatic solvents

11.1.6. Do not attempt to disassemble the LCD Module.

11.1.7. If the logic circuit power is off, do not apply the input signals.

11.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

11.1.8.1. Be sure to ground the body when handling the LCD Modules.

11.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

11.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

11.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

11.2 Storage Precautions

11.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

11.2.2. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0℃ ~ 40℃ Relatively humidity: ≤80%

11.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

11.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.