S P E C I F I C A T I O N

SHENZHEN YAOYU

YM240T-104AT   LCM

(Revision: 1.1)   2010-4-24

SHENZHEN YAOYU TECHNOLOGY CO.,LTD :

Quality Assurance Department:_____

Approved by:_____

Technical Department:_____

CUSTOMER:_____

Approved by:_____

REVISION RECORD

REV NO.	REV DATE	CONTENTS	REMARKS
2009-3-15	1.0	First release	Preliminary
2009-3-15	1.1	Add panel optical characteristics	---

ONTENTS

1. GENERAL FEATURE

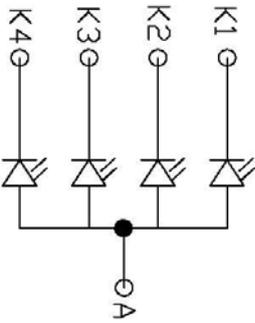| ITEM	STANDARD VALUE	UNIT
LCD Type	2.4'' QVGA TFT-LCD	---
Viewing Direction	12:00	O'clock
Backlight Type	4-parallel-White LED	---
Module Outsize	42.72*60.26*3.6(WITH TP)	mm
TP Viewing area	38.72*54.16	mm
TP Active area	37.72*53.16	mm
LCD Active area	36.72*48.96	mm
Dot Number	240(RGB) × 320	---
Operation temperature	-10~60	℃
Storage temperature	-20 ~70	℃
Driver IC	ST7781	---
Interface mode	8080 System 8/16 bit Interface	---

Remark:

2. BLOCK DIAGRAM

VCC

VSS

CS

RS

RD

WR

RESET

D0-D15

ST7781
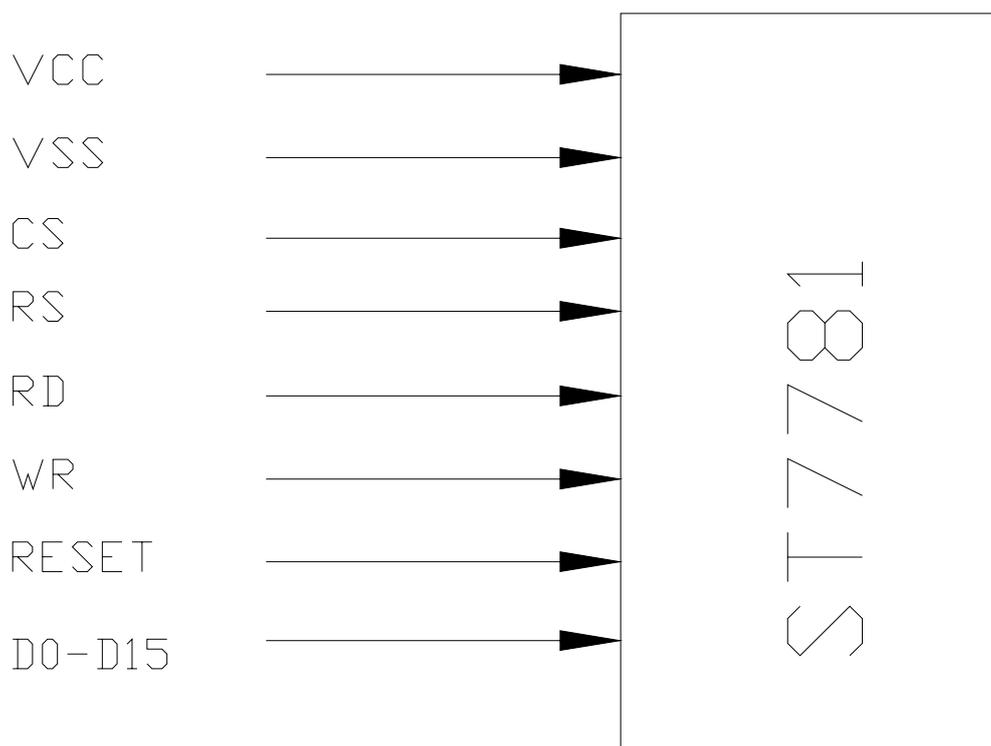
3. OUTLINE DIMENSIONS

PIN	SYMBOL
1	GND
2	YD
3	XR
4	YU
5	XL
6	GND
7	IM0
8	IM3(NC)
9	IM2(NC)
10	IM1(NC)
11	LCD-ID
12	RESET
13	DB9(NC)
14	DB0(NC)
15	DB17
16	DB16
17	DB15
18	DB14
19	DB13
20	DB12
21	DB11
22	DB10
23	DB8
24	DB7
25	DB6
26	DB5
27	DB4
28	DB3
29	DB2
30	DB1
31	RD
32	WR
33	RS
34	CS
35	GND
36	VCC
37	VCC
38	VCC
39	LED-K4
40	LED-K3
41	LED-K2
42	LED-K1
43	LED-A
44	GND
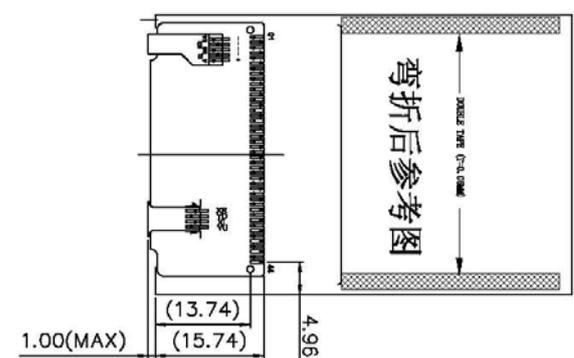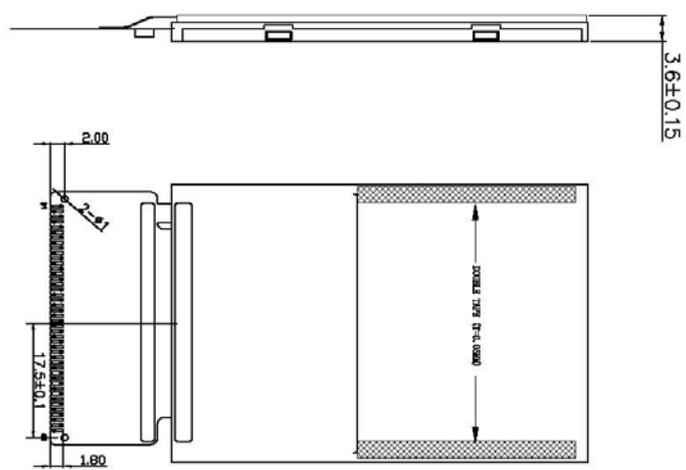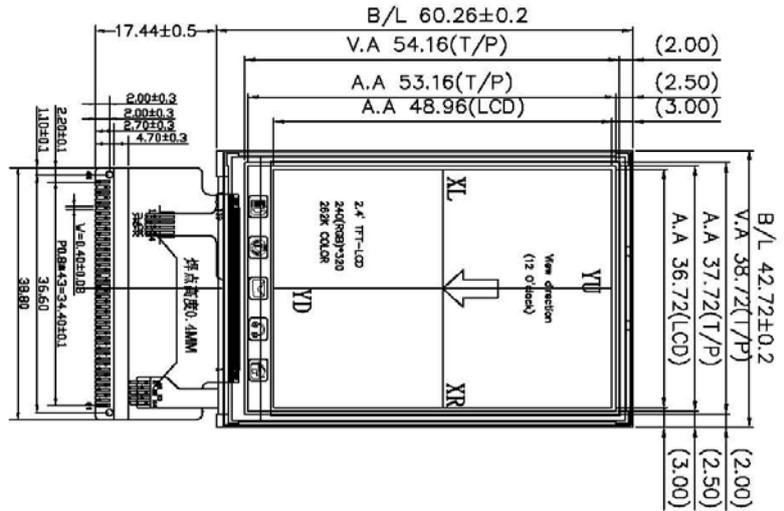
NOTES:
1. DRIVE IC: ST7781
2. TYPE:2.4"TFT
3. DISPLAY MODE:T/M
4. VIEWING DIRECTION: 12 O'CLOCK
5. OPERATING TEMP:-20°C~70°C
   STORAGE TEMP:-30°C~80°C

B/L 60.26±0.2
V.A 54.16(T/P)
A.A 53.16(T/P)
A.A 48.96(LCD)

(2.00)
(2.50)
(3.00)

17.44±0.5

2.00±0.3
2.00±0.3
2.70±0.3
4.70±0.3

2.20±0.1
110±0.1

P0.8×43=34.40±0.1
V=0.46±0.08

焊点高度0.4MM

2.4" TFT-LCD
240(RGB)×320
262K COLOR

View direction
(12 o'clock)

XL
YU
YD
XR

B/L 42.72±0.2
V.A 38.72(T/P)
A.A 37.72(T/P)
A.A 36.72(LCD)

(2.00)
(2.50)
(3.00)

3.6±0.15

2.00
2.41
17.5±0.1
1.80

DOUBLE TAPE (T=0.05MM)

客户确认签名：

弯折后参考图

DOUBLE TAPE (T=0.05MM)

1.00(MAX)
(15.74)
(13.74)
4.96

K1
K2
K3
K4
A

4. INTERFACE DESCRIPTION

PIN	SYMBOL	FUNCTION
1	GND	Ground
2	YD	TP bottom electrode
3	XR	TP right electrode
4	YU	TP top electrode
5	XL	TP left electrode
6	GND	Ground
7	IM0	MCU 8/16 BIT selection pin IM0=0, selection I80-system 16-bit interface DB[17:10] DB[8:1] IM0=1, selection I80-system 8-bit interface DB[17:10]
8	IM3(NC)	NO connect
9	IM2(NC)	NO connect
10	IM1(NC)	NO connect
11	LCD-ID	NO connect
12	RESET	This signal will reset the driver and it must be applied to properly initialize the chip.
13	DB9(NC)	NO connect
14	DB0(NC)	NO connect
15	DB17	Data bus
16	DB16	
17	DB15	
18	DB14	
19	DB13	
20	DB12	
21	DB11	
22	DB10	
23	DB8	
24	DB7	
25	DB6	
26	DB5	
27	DB4	
28	DB3	
29	DB2	
30	DB1	
31	/RD	-Read enable in 8080 MCU parallel interface.
32	/WR	-Write operation enable pin in 8080 MCU parallel interface.
33	RS	-Display data or command selection pin in MCU interface.
34	/CS	-Chip select input pin and signal is active low.
35	GND	Ground
36	IOVCC	Power supply(1.8V/2.8V)
37	VCC	Power supply(2.8V)

38	VCC	
39	LED-K4	
40	LED-K3	**Backlight ground**
41	LED-K2	
42	LED-K1	**Backlight ground**
43	LED-A	**Backlight Power supply**
44	GND	**ground**

5. ELECTRICAL CHARACTERISTICS

5.1 ABSOLUTE MAXIMUM RATING
Please Refer to the SPEC of   ST7781.
5.2 DC Characteristics
Please Refer to the SPEC of   ST7781.
5.3 AC Characteristics
Please Refer to the SPEC of   ST7781.

6. ELECTRO-OPTICAL CHARACTERISTICS

6.1 Backlight Unit

Item	Symbol	Min	Typ.	Max	Unit	Remark
Input voltage	V_{BL}	3.0	3.2	3.4	V	-
Current	I_{BL}	---	18	---	mA/chip	-
ICE	X	0.26	-	0.30	-	X>Y
	Y	0.27	-	0.31	-	
Brightness	-		T.B.D	---	cd/m²	
Luminous Intensity Ratio	-	---	----	20	%	-

6.2 LCD panel

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (without Polarizer)		T(%)	—	—	13.5	—	—	
Contrast Ratio		CR	Θ=0	400	500	—	—	(1)(2)
Response time	Rising	T_R	Normal viewing angle — —	—	2	4	msec	(1)(3)
	Falling	T_F		—	6	12		
Color gamut		S(%)			60		%	
Color chromaticity (CIE1931)	White	W_x		TBD	0.308	TBD		(1)(4) CF glass (C-light)
		W_y		TBD	0.325	TBD		
	Red	R_x		TBD	0.630	TBD		
		R_y		TBD	0.337	TBD		
	Green	G_x		TBD	0.284	TBD		
		G_y		TBD	0.543	TBD		
	Blue	B_x		TBD	0.143	TBD		
		B_y		TBD	0.120	TBD		
Viewing angle	Hor.	Θ_L	CR>10	TBD	45	—		
		Θ_R		TBD	45	—		
	Ver.	Θ_U		TBD	45	—		
		Θ_D		TBD	20	—		
Optima View Direction		12 O'clock						(5)

■ Measuring surrounding : dark room

■ Ambient temperature : 25±2°C

■ 15min. warm-up time.

■ FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

Note (1) Definition of Viewing Angle :

Θ_U

12' o'clock
$\Phi = 90°$

Θ_L Θ_R

$\Phi = 180°$ $\Phi = 0°$

Θ_D
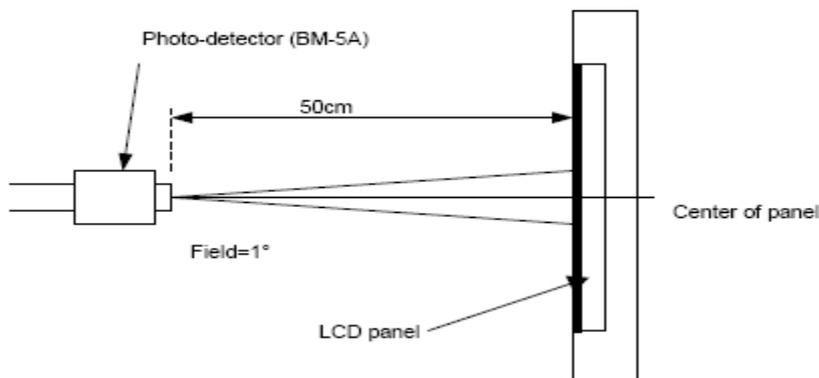
6' o'clock
$\Phi = 270°$
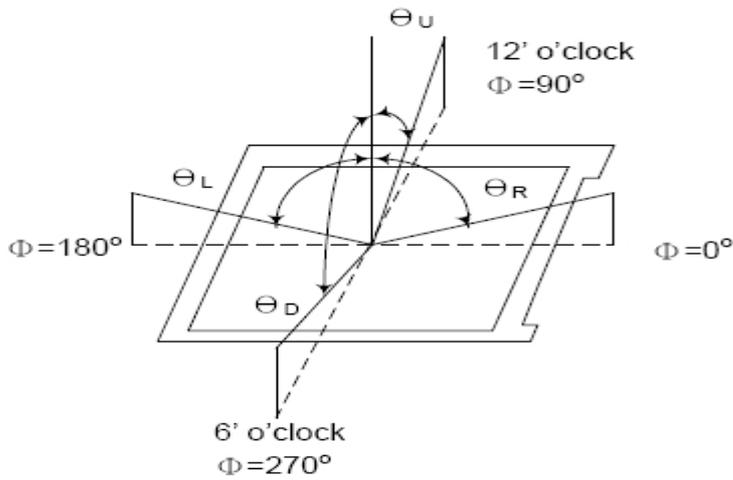
Note (2) Definition of Contrast Ratio(CR) :
        measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$
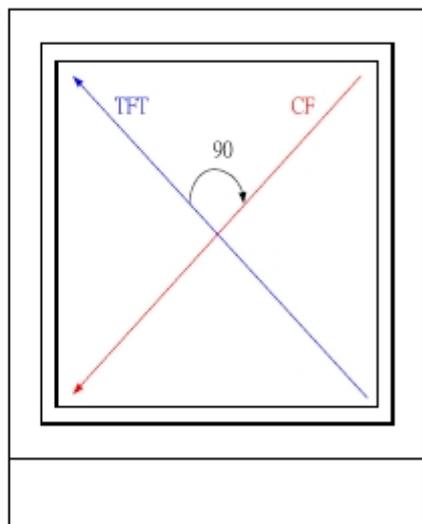
Note (3) Definition of Response Time : Sum of T_R and T_F

| white(TFT OFF) | black | (TFT ON) | white(TFT OFF) |

T_R T_F

Optical
response

100%
90%

10%
0%

time
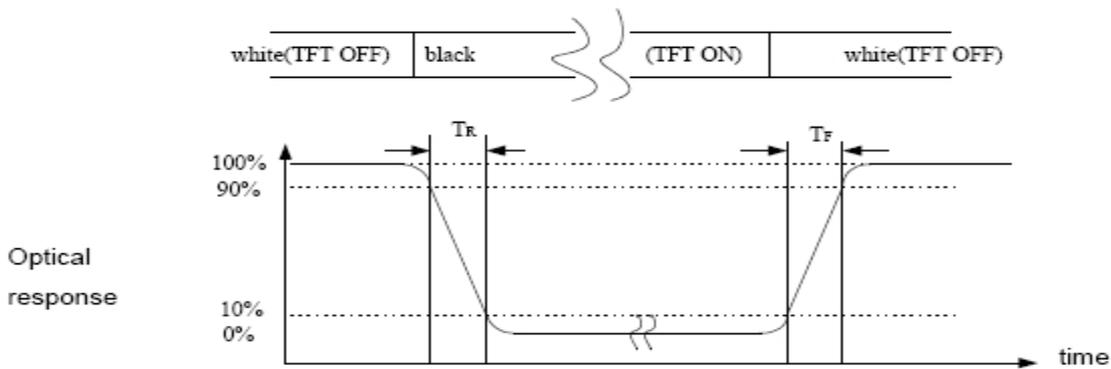
Note (4) Definition of optical measurement setup

Photo-detector (BM-5A)
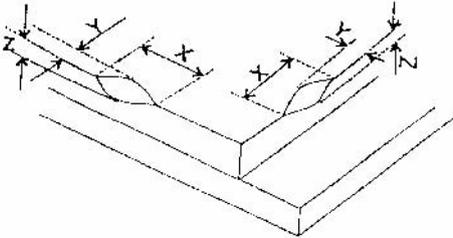
50cm

Field=1°

Center of panel

LCD panel

Note (5) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.

TFT Face up

7. INSPECTION CRITERIA

No.	Item	Criterion for defects	Defect type
1	spot defect	spot definition $\Phi=(X+Y)/2$ 1.spot defect | size（mm）	Acceptable number
---	---
$\Phi<0.2$mm	ignore
0.2mm$\leqq\Phi\leqq$0.25mm	2
$\Phi>$0.25mm	NG		Minor
2	line defect	line definition： | W(width)（mm）	L(length)mm ； N(Acceptable number)
---	---
W＜0.03	L＜5 ,ignore
0.03$\leqq$W$\leqq$0.05	L$\leqq$3.0 ，N$\leqq$2
0.05＜W$\leqq$0.1	L$\leqq$3.0 ，N$\leqq$1
0.1＜W	NG		Minor
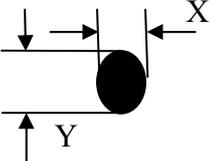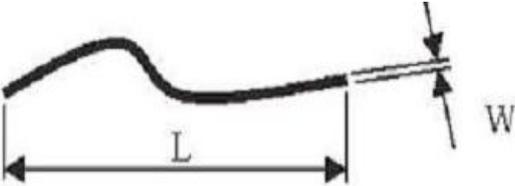
3	Touch panel Newton ring	1）Regular newton ring:	Minor

1）Regular newton ring:

(a) when area of newton ring is bigger than all TP's 1/6，that is NG。

(b) when area of newton ring is smaller than all TP's 1/6，and that can not make words and lines distortion in displaying ，that is OK.
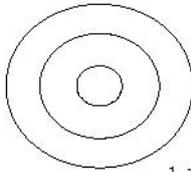
1.规律性

2）Non-regular newton ring:

(a) when area of newton ring is bigger than all TP's 1/4，that is NG。

(b) that make words and lines distortion in displaying，that is NG

(c) when area of newton ring is smaller than all TP's 1/4，and that can not make words and lines distortion in displaying ，that is OK.

2.非 规 则

4	GLASS defect	1) glass corner chipping	Minor

1) glass corner chipping
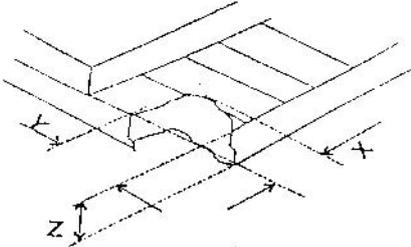
X	Y	Z
≤ 3.0	≤ S	≤ T

注：S=ITO lines width ；T = glass thickness

Corner chipping is't allowed extending into ITO lines area, Acceptable number: N≤2

2) glass side chipping

X	Y	Z
ignore	≤0.5	ignore

Acceptable number: N≤2

		3) crack: Acceptable number: N=0	
5	Stain on LCD panel surface	Stain which cannot be removed even when wiped lightly with a soft cloth or similar cleaning too are rejectable	Minor
6	Rust in bezel	Rust which is visible in the bezel is rejectable	Minor
7	Defect of land surface contact	Evident crevices which is visble are rejectable	Minor
8	Parts mounting	(1) failure to mount parts (2) parts not in the specification are mounted (3) polarith, for example,is reversed	Minor

8. CAUTION AND HANDING PRECAUTION

To avoid causing extended damages such as accidents resulting in injury or death, fire accidents, or social damages or social damages if the LCD module fails, Sunrise is always endeavor to maintain sufficient quality of the LCD module in process of designing and manufacturing.

Please pay attention to the followings when you use this TFT LCD module.

1) Disassembling or modification

Do not disassemble or modify the modules. Sensitive parts inside LCD module may be damaged, and dusts or scratches may mar the displays.

2) Breakage of LCD panel

Do not ingest liquid crystal material, do not inhale this material, and do not permit this material to contact the skin, if glass of LCD panel id broken. If liquid crystal material contacts the skin, mouth or clothing, take the following actions immediately.

In case contact to the eye or mouth, rinse with large amount of running water for more than 15 minutes. in case contact to the skin or clothing, wipe id off immediately and wash with soap and large amount of running water for moue than 15 minutes. the skin or closing may be damaged if liquid crystal material is left adhered. in case ingestion, rinse out the mouth well with water. After spewing by drinking large amount of water, get medical treatment.

3) Glass of LCD panel

Be careful with chips of grass that may cause injuring fingers or skin, when the glass is broken.

4) Absolute maximum ratings

Do not exceed the absolute maximum rating value under the worst probable condition caused by the supply voltage variation, input voltage variation, variation in parts' constants, environmental temperature, etc., otherwise LCD module may be damaged.

5) Power protection circuit

Employ protection circuit for power supply, whenever the specification specifies it.

A suitable protection circuit should be applied, based on each system design.

A fuse is not fitted to this module. Therefore, without a suitable power-supply protection device, dust or partial circuit failure may cause overheating and/or burning, which may lead to injury.

6) Disposal

Always comply with all applicable environmental regulations, when disposing of the LCD.

7) Edges of parts

Be careful with edges of glass parts and metal frame, it may cause injuring.

For designing the system, give special consideration that the wiring and parts do not touch those edges.

8) Recommended operating conditions

Don't exceed the recommended operation conditions in this specification. The performance and quality of the LCD module are warranted only when the LCD module is used within the recommended operation conditions. To use the LCD module over the recommended operation condition may have bad influence on the characteristics and reliability of the LCD module and may shorten the life of the LCD module.

Therefore, when designing the whole set, not to be over the recommended operation conditions, you should fully take care of supply voltage change, characteristic of connection parts, serge of input-and-output line, and surrounding temperature.

9. INSTALLATION IN ASSEMBLY

9.1 ESD(electro-static discharge) prevention

The circuit used in LCD module is very sensitive to ESD. The following caution should be taken when installing LCD module to an enclosure of the system in order to prevent damage of circuit used in LCD module.

1) Humidity

Ambient humidity of working area is recommended to be higher than 50%(RH)in order avoid ESD.

2) Grounding

-Person handling LCD modules should be grounded with wrist band.

-Tools like soldering iron and screw drivers and working benches should be grounded.

-Grounded electro-conductive mats are recommended to be covered on the floor of working area and surface of working benched.

-The grounding should be done through a resister of 0.5-1Mohms in order to prevent spark of ESD.

3) Be careful with touching metal portion of testing instruments in order to prevent unnecessary ESD.

4) Do not touch the electrode area of PCB and electrical parts like LSI, capacitor, connector pin, etc.

5) Ionizer

Using ionizer (an antistatic blower) is recommended at working area in order to reduce electro-static voltage.

6) Removing protection film

When removing protection film from LCD panel, peel off the tag slowly (more than one second) while blowing with ionizer toward the peeling face to minimize ESD which may damage electrical circuit.

9.2 Dust and stain prevention

1) Working area

Reduce dust level in working area. Especially, the level of metal particle should be decreased. Otherwise electrical circuit in LCD module may be damaged due to short circuit by metal particles.

2) Protection film

LCD module may be shipped with protection film on LCD panel in order to prevent from scratches and dust. It is recommended to remove the film at later process of assembling.

a) Wiping off dust on the panel

When LCD panel becomes dirty, wipe the panel surface off softly with absorbent cotton or another soft cloth. If necessary, breathe upon the panel surface and then wipe off immediately and softly again. Be careful not to spill organic solvents into the inside of LCD module. The solvents may be damaged by the solvents, so do not use any organic solvents for wiping off LCD panel.

b) Adhesive on LCD panel

Be careful not to attach adhesive, grease. etc., on LCD panel, because it is difficult to remove them without any damages on LCD panel.

c) Water spots on the panel

Avoid the dewing or water condensation.

Wipe off a spot or mist on LCD panel softly with absorbent cotton another cloth as soon as possible if happened, otherwise discoloration or stain may be caused. And damage may occur if water penetrates the inside.

9.3 Installing LCD module to the enclosure

1) Installing LCD module to the enclosure

Do not bend or twist LCD module even momentarily when the LCD module is installed into the system. Bending or twisting the LCD module may cause permanent damage.

When the FPC is bent, the radius of FPC curvature must be more than value of recommendation to prevent bending and twisting forces from affecting the connection of FPC. Even temporary bending or twisting sometimes causes damage.

2) Interface

Do not fasten screw, with catching interface FPC between LCD module and enclosure. This may cause bending of LCD module, or become the cause of a failure by damaging FPC.

9.4 Mechanical forces

1) Carry

Hold the side of the plastic frame when you carry an LCD module by hand. If an LCD is carried using the FPC, it is likely to be damaged and the LCD will then malfunction. If you turn on the LCD with a broken FPC, it may cause smoke or burning.

Protection (EG. gloves) for fingers and hands is recommended to avoid injury by broken glass.

2) Strong mechanical shock

Avoid strong mechanical shock. such as dropping the LCD from the work bench, or knocking it against a hard object.

3) Excessive force

Avoid applying excessive force, like pushing the surface of LCD panel. This may cause scratches or breakage of the panel, or a failure of the module.

4) Scratches on the panel

Do not put heavy object such as tools, books, etc., and do not pile up LCD modules.

Be careful not to touch the surface of the polarizer with any hard and sharp object. These parts are so sensitive and can easily be scratched, even if protected by a film.

5) Connector

When inserting or disconnecting the connector into a connector of the LCD module, care should be taken to ensure that no strong external force is supplied to the connector on the LCD module side.

A strong external force applied to the connector or the FPC may damage that no part such as the FPC etc. should be caught between the case of the system and the module. Make sure that the input signal connector of

a module is securely and correctly connected to the connector on the system, not skewed, or incompletely connected.

Inputting a signal etc. into the module with connectors incorrectly inserted may cause a circuit component or components to malfunction.

6) FPC

When inserting or disconnecting the connector of the LCD module into a connector of the system, care should be taken to ensure that no strong external force is applied to the FPC on the LCD module side. A strong external force applied to the FPC may damage their connections.

When assembling a module into a system, pay extra attention to ensure that no part such as the FPC etc. should be caught between the case of the system and the module.

Make sure that the input signal connector of a module is securely and correctly connected to the connector on the system. not skewed, or incompletely connected. Inputting a signal etc. into the module with connectors incorrectly inserted may cause a circuit component or components to malfunction. be careful not to pull or damage the FPC cables, to avoid mechanical damage in FPC and connection part of FPC and cell.

9.5 Operation

1) Power supply

Power supplies should always be turned off during the assembly process.

Do not connect or disconnect the power cables and connectors with power applied to LCD module. This may cause damage to the LCD module circuit.

In operating module at the inspection process, and so on, the supply voltage and signals of driving device must satisfy the sequence of power supplies and signals described in this specification.

2) Gas

Do not expose the LCD module to any gas which is not normally contained in the atmosphere, it may cause misoperation or defects.

3) Used of long term

When a LCD module is used for a long term, the characteristics of LCD module might be changed and it may be out of the standard of optical specifications due to LED discoloration.

LED has the characteristics of shifting optical characteristics by the long term use.

10. TRANSPORTATION AND STORAGE

1) temperature

Do not store LCD module in a high temperature and high humidity condition, high than 35 and 70%℃ (RH) for a long term, meaning about one month or more, otherwise this may deteriorate the quality of the display. When you unavoidably store LCD modules for a long time, store between 0 and 35℃ and with a relative humidity 70% or lower.

2) Low temperature

Be careful not to leave it where the temperature is below specified storage temperature because the liquid crystal of the display panel may be damaged.

3) Ultra violet ray

Store LCD module without exposure to direct sunlight or fluorescent lamps in order to prevent the module from strong ultra violet ray.

4) Cleanliness

Keep the LCD module in clean place, because any dust, hard particle may damage the polarizer, or dust invades the inside of the LCD module.

5) Condensation of water

 The module should be stored under a condition where no condensation of water is allowed. It may cause misoperation or defects. Be especially careful not to make a module work under the condition that condensation of water appears.

6) Packing

 When you must re-package a LCD module after it has been removed from the original packaging, it is recommended to re-pack using the original package box and package material.