Specification Sheet

Model No. : MTF0350HT-06

Description : 3.5 inch 320 x 480 Pixel Resolution

MCU/RGB Interface TFT LCD Module

Option Capacitance Touch Panel

History of Versions and Modifications

Version	Modifications	Date
V1.0	Generation first version	Jan 02,2011
V2.0	Change the backlight brightness	Dec 22,2011
V3.0	FPC increased 10mm	Sep 16,2013
V3.1	Modify driver IC from ILI9481 to ILI9488	Jan 06,2014

CONTENTS

1.General Specifications

Item	Main LCD	Unit	Note
LCD Type	3.5'' TFT LCD	-	
Display color	262K	-	
LCD Duty	1/480	-	
LCD Bias	-	-	
Viewing Direction	12	O˙clock	
Viewing Area(W×H)	-	mm	
Active Area(W×H)	48.96X73.44	mm	
Number of Dots	320(R,G,B)×480	-	
Dot Size(W×H)	-	mm	
Dot Pitch(W×H)	-	mm	
Controller	ILI9488	-	
V_{DD}	2.7~3.3V	V	
Outline Dimensions	Refer to outline drawing on next page		
Backlight	LED(white)	-	
Operating Temperature	-20～+70℃	-	
Storage Temperature	-30～+80℃	-	
Weight	TBD	g	
Data Transfer	16/18bit sparalle ,RGB, or SPI interface.	-	
Display Type	Transmissive type	-	

Note 1:   Select by software, and color tune is slightly changed by temperature and driving voltage.
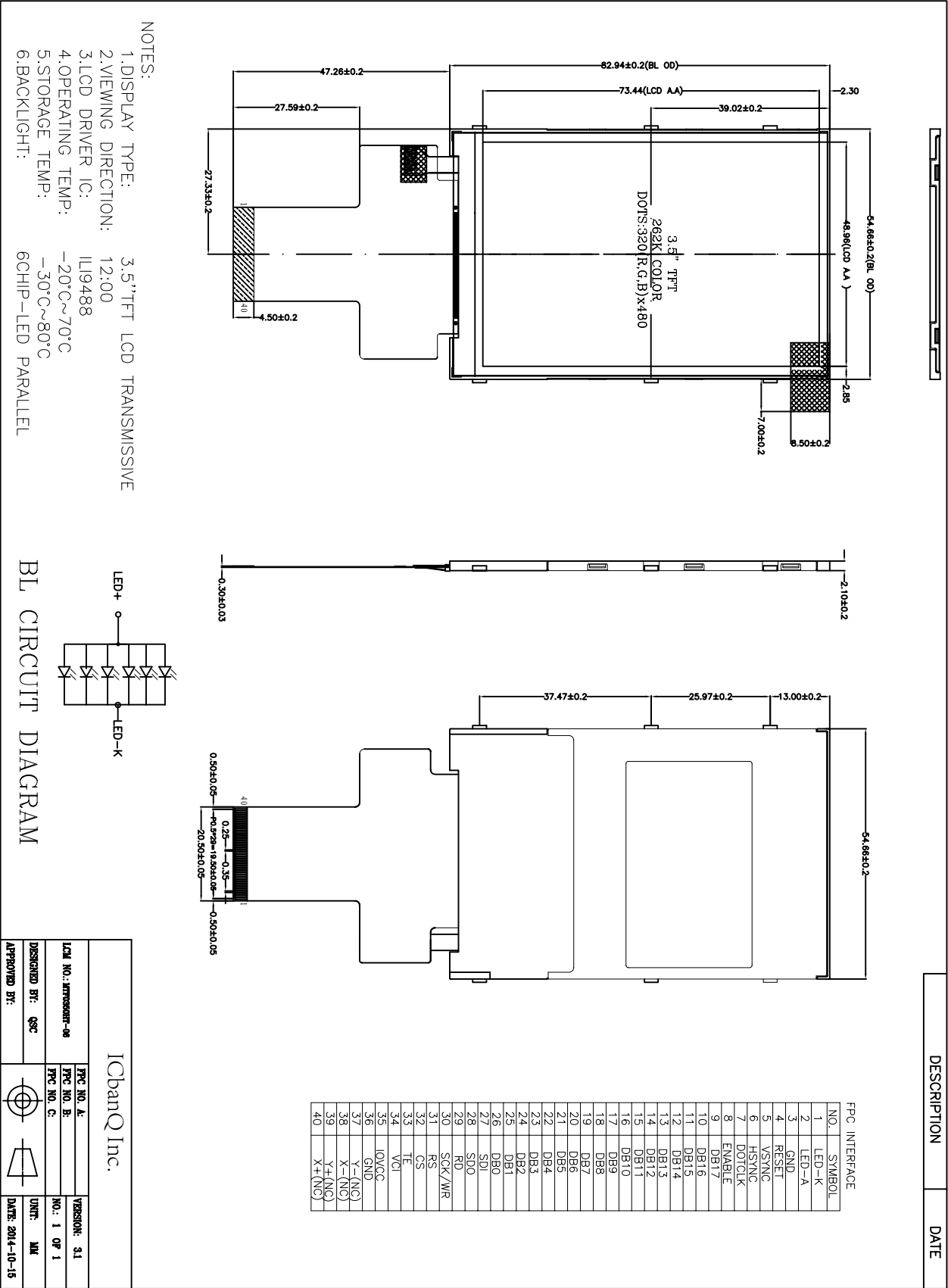Note 2:   TBD- To Be Determined.
Note 3:   Requirements on Environmental Protection:RoHS

2. Functional block diagram

3.Outline Drawing

NOTES:
1.DISPLAY TYPE: 3.5"TFT LCD TRANSMISSIVE
2.VIEWING DIRECTION: 12:00
3.LCD DRIVER IC: ILI9488
4.OPERATING TEMP.: −20°C~70°C
5.STORAGE TEMP.: −30°C~80°C
6.BACKLIGHT: 6CHIP−LED PARALLEL

BL CIRCUIT DIAGRAM

LED+
LED−K

3.5" TFT
262K COLOR
DOTS:320(R.G.B)x480

82.94±0.2(BL OD)
73.44(LCD AA)
47.26±0.2
39.02±0.2
27.59±0.2
27.33±0.2
4.50±0.2
2.30
54.66±0.2(BL OD)
48.96(LCD AA)
7.00±0.2
8.50±0.2
2.85

0.30±0.03
2.10±0.2

37.47±0.2
25.97±0.2
13.00±0.2
0.50±0.05
0.25~0.35
P0.5*39=19.50±0.05
20.50±0.05
0.50±0.05
54.66±0.2

FPC INTERFACE

NO.	SYMBOL
1	LED−K
2	LED−A
3	GND
4	RESET
5	VSYNC
6	HSYNC
7	DOTCLK
8	ENABLE
9	DB17
10	DB16
11	DB15
12	DB14
13	DB13
14	DB12
15	DB11
16	DB10
17	DB9
18	DB8
19	DB7
20	DB6
21	DB5
22	DB4
23	DB3
24	DB2
25	DB1
26	DB0
27	SDI
28	SDO
29	RD
30	SCK/WR
31	RS
32	CS
33	TE
34	VCI
35	IOVCC
36	GND
37	Y−(NC)
38	Y+(NC)
39	X−(NC)
40	X+(NC)

DESCRIPTION	DATE

ICbanQ Inc.

LCM NO.: MTF0350HT-06		
FPC NO. A:	VERSION: 3.1	
FPC NO. B:	NO.: 1 OF 1	
FPC NO. C:	UNIT: MM	
DESIGNED BY: QSC	DATE: 2014-10-15	
APPROVED BY:		

4. Absolute Maximum Ratings(Ta=25℃)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage(1)	V_{BAT}	-	-	V	
Power Supply Voltage(2)	V_{DD}	2.4	3.3	V	
Power Supply Voltage for Mail LCD	Vop	-	-	V	
Logic Signal Input Voltage	V_I	-0.3	$V_{DD}+0.3$	V	1,2
Operating Temperature	Top	-20	+70	℃	
S torage Temperature	Tst	-30	+80	℃	

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.

2. $V_{DD} > V_{SS}$ must be maintained.

5. LED Backlight Specification and Instruction Code

5.1 ABSOLUTE MAXIMUM RATINGS
（Ta=25°C.Unless specified,The Ambient temperature Ta=25°C)

Item	Symbol	Conditions	Rating	Unit
* Absolute maximum forward current	Ifm		150	mA
* Peak forward current	Ifp	1 msec Plus 10% Duty Cycle	100	mA
Reverse Voltage	Vr		5	V
* Power dissipation	Pd		510	mW
Operating Temperature Range	Topr		−30~+70	°C
Storage Temperature Range	Tstg		−40~+80	°C

5.2 ELECTRICAL-OPTICAL CHARACTERISTICS
（Ta=25°C.Unless specified,The Ambient temperature Ta=25°C)

Item	Symbol	min.	typ.	max.	Unit	Condition
Forward Voltage	Vf	3.0	3.2	3.4	V	I−= 120 mA
Reverse Current	Ir			−	μA	Vr= 5 V
Dominant wave length	λD	X 0.26 Y 0.26		X 0.30 Y 0.30	nm	If= 120 mA
Spectral Line Half width	$\triangle\lambda$				nm	If= 120 mA
* Luminance	Lv	3500	−		cd/m²	If= 120 mA

The luminance is the average value of 9 points, and
The Lvmin./Lvmax. is more than 80% Typical
The measurement instrument is BM-7 luminance
Colorimeter.The aperture is ø 5 mm.   lifetime=50000h
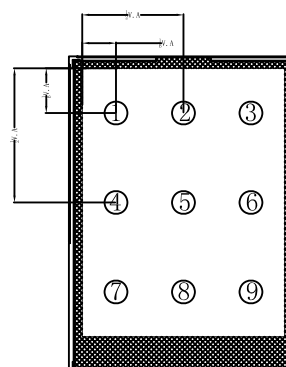
5.3 Interface Signal

Pin No.	Symbol	I/O	Description
1	LED-K	I	LED backlight Cathode
2	LED-A	I	LED backlight Anode
3	GND	I/O	Power ground
4	RESET	I	Reset signal pin
5	VSYNC	I	Frame synchronizing signal
6	HSYNC	I	Line synchronizing signal
7	CLK	I	Dot clock signal
8	DEN	I	Date ENEABLE signal for RGB interface operation
9	DB17	I/O	
10	DB16	I/O	
11	DB15	I/O	Select the MPU system interface mode
12	DB14	I/O	
13	DB13	I/O	
14	DB12	I/O	
15	DB11	I/O	
16	DB10	I/O	
17	DB9	I/O	
18	DB8	I/O	
19	DB7	I/O	
20	DB6	I/O	These pin are data bus. If not used, please connect these pins to GND.
21	DB5	I/O	
22	DB4	I/O	
23	DB3	I/O	
24	DB2	I/O	
25	DB1	I/O	
26	DB0	I/O	
27	SDI	I/O	Serial data input
28	SDO	I	No connection
29	RD	I	Read control pin for the DBI interface. If not used, please connect this pin to IOVCC.

The following table appears within the Description column (Pin 12–19 area):

IM2	IM1	IM0	MPU-Interface Mode	DB Pin in use	Colors
0	0	0	DBI Type B 18-bit	DB[17:0]	262K
0	0	1	DBI Type B 9-bit	DB[8:0]	262K
0	1	0	DBI Type B 16-bit	DB[15:0]	65K/262K
0	1	1	DBI Type B 8-bit	DB[7:0]	65K/262K
1	0	0	Setting prohibited	-	-
1	0	1	DBI Type C 9-bit	DIN, DOUT	8/262K
1	1	0	Setting prohibited	-	-
1	1	1	DBI Type C 8-bit	DIN, DOUT	8/262K

Pin No.	Symbol	I/O	Description
30	WRX/SCL	I	Write execute control pin When the DBI type C is selected, this pin is used as serial clock pin.
31	D/C	I	Register select signal If not used, please fix this pin at GND level.
32	CS	I	Chip select signal
33	FMARK	I	Tearing effect output pin to synchronies MCU to frame writing, activated by S/W command.
34	VCI	I/O	Liquid crystal analog circuit power supply
35	IOVCC	I/O	power supply
36	GND	I/O	Power Ground
37	YU	I/O	NC
38	XL	I/O	NC
39	YD	I/O	NC
40	XR	I/O	NC

6. Electro-optical Units

Item		Symbol	Conditions	Specifications			Unit	Note
				Min.	Typ.	Max.		
Transmittance		T%	Viewing normal angle $\theta_X = \theta_Y$ $=0°$	–	5.0	–	%	All left side data are based on CMO's following condition -
Contrast Ratio		CR		–	500	–		1. CG : NTSC 70% (CIE1931)
Response Time (by Quick)		$T_R + T_F$		–	30	–	ms	2. LC : VA LC
Viewing Angle	Hor.	θ_{X+}	Center CR>10		70		deg.	3. Light Source : CMO LED BLU
		θ_{X-}		–	70	–		4. Film : Circular polarizer
	Ver.	θ_{Y+}		–	70	–		5. Machine : DMS 803
		θ_{Y-}		–	60	–		6. LC driving voltage: 5V
CF only Chromaticity	Red	X_R	Viewing normal angle $\theta_X = \theta_Y$ $=0°$	0.631	0.661	0.691		Under C light
		Y_R		0.292	0.322	0.352		
	Green	X_G		0.247	0.277	0.307		
		Y_G		0.547	0.577	0.607		
	Blue	X_B		0.106	0.136	0.166		
		Y_B		0.073	0.103	0.133		
	White	X_W		0.260	0.290	0.320		
		Y_W		0.291	0.321	0.351		

*Note (1) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0
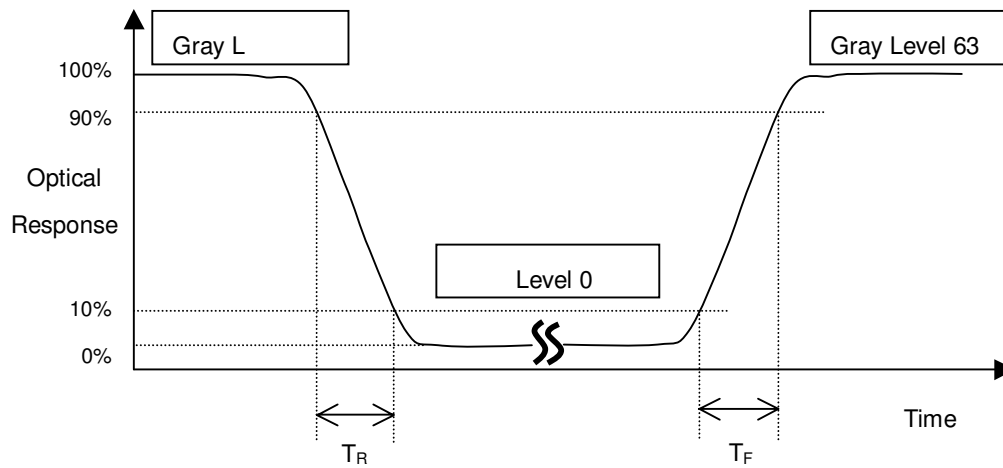
L63: Luminance of gray level 63

L 0: Luminance of gray level 0
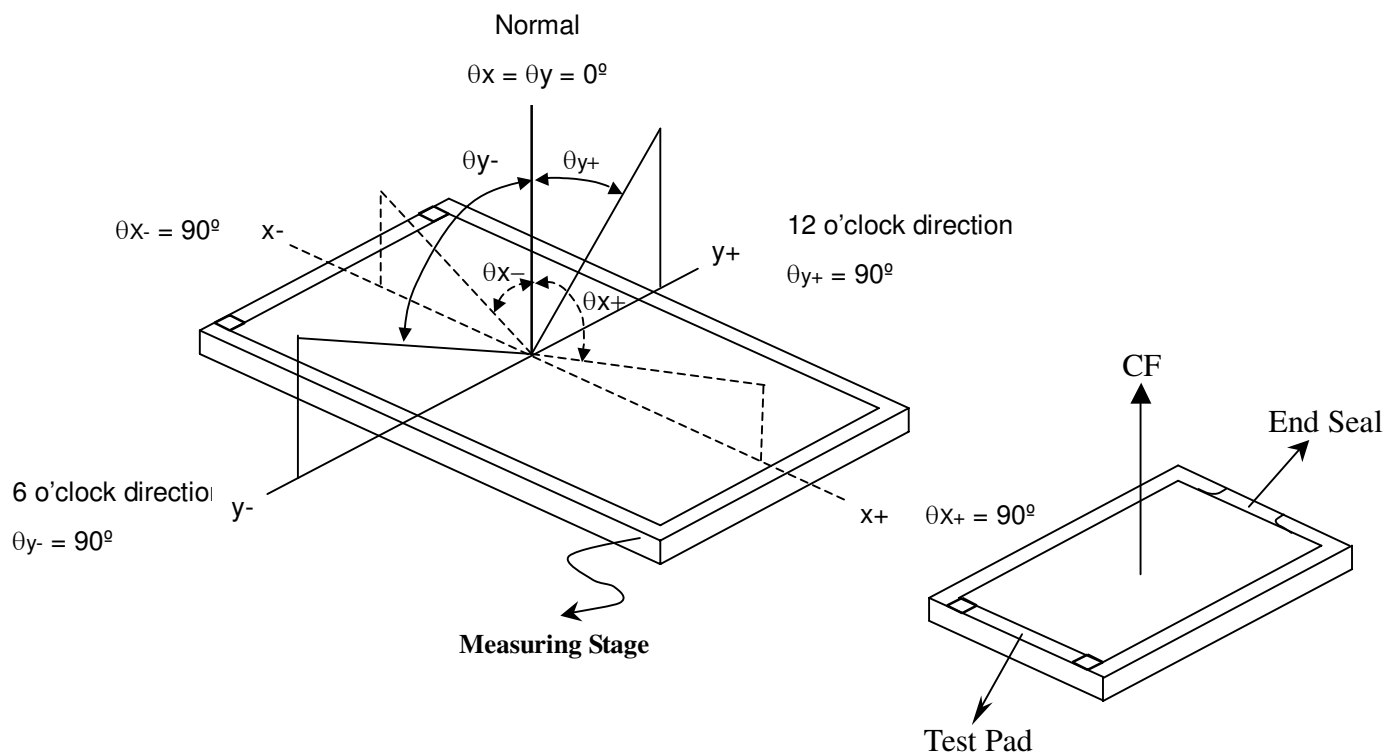
CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

*Note (2) Definition of Response Time (T_R, T_F):

Gray L

Gray Level 63

100%

90%

Optical

Response

Level 0

10%

0%

Time

T_R

T_F

*Note(3) Definition of Viewing Angle

Normal

$\theta x = \theta y = 0^\circ$

$\theta y-$ $\theta y+$

$\theta x- = 90^\circ$ x-

12 o'clock direction

$\theta y+ = 90^\circ$

$\theta x-$ $\theta x+$

y+

CF

End Seal

6 o'clock direction   y-

$\theta y- = 90^\circ$

x+ $\theta x+ = 90^\circ$

Measuring Stage

Test Pad

7.Standard Specification for Reliability

No.	Test Item	Test condition	Criterion
1	High Temperature Storage	80℃±2℃96H Restore 4H at 25℃	1. After testing, cosmetic defects should not happen. 2.Total current consumption should not be over 10% of initial value.
2	Low Temperature Storage	-30℃±2℃ 96H Restore 4H at 25℃	
3	High Temperature Operation	70℃±2℃ 48H Restore 4H at 25℃	
4	Low Temperature Operation	-20℃±2℃ 48H Restore 4H at 25℃	
5	High Temperature /Humidity Storage	40℃±2℃ 90%RH 48H	
6	Temperature Cycle	-30℃——25℃——80℃ 5min 30min ——25℃ , 5min after 10cycle, Restore 4H at 25℃	
7	Vibration Test (package state)	10Hz~150Hz, 100m/s2, 120min	Not allowed cosmetic and electrical defects.
8	Shock Test (package state)	Half- sine wave, 300m/s2, 18ms	
9	Atmospheric Pressure Test	25kPa 16H Restore 2H	
10	Cable Bending Test	Bending area and angle follow design document requirement	More than 50000 times7

8. Precautions for Use of LCD Modules

8. 1 Handling Precautions

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

8.1.2 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.

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

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

8.1.5 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

    — Ketone

    — Aromatic solvents

8.1.6 Do not attempt to disassemble the LCD Module.

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

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

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

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

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

      d. 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.

8. 2 Storage precautions

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

8.2.2 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 : $0℃ \sim 40℃$

         Relatively humidity: $≤80\%$

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

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