深圳市勋瑞光电科技有限公司
Xunrui photoelectric technology （shenzhen） CO,.LTD.

Product Specification

Customer: _____

ModelName: H039BWQ40I6001

Date: 2023-11-20

Version: V0

■ **Preliminary Specification**

☐ **Final Specification**

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by

Contents

1. Record of Revision

Version	Revise Date	Content	Editor
V0	2023/11/20	FirstRelease.	

2 General Specifications

Feature		Spec
Characteristics	LCD Size	3.9inch
	Display Format	480(RGB)×128
	Interface	24-bit RGB
	Color Depth	16.7M
	Technology type	a-Si
	DisplaySpec.	0.1980x0.1980
	DisplayMode	Normally Black
	Driver IC	ST7282A
	Surface Treatment	HC
	ViewingDirection	ALL
	Gray Viewing Direction	FREE
Mechanical	LCM(WxHxD)(mm)	103.20*34.85*2.50
	ActiveArea(mm)	95.04x25.34
	With/WithoutTSP	Without TSP
	Weight (g)	TBD
	LEDNumbers	12LEDs

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 Input/Output Terminals

No.	Symbol	Description
1	LEDK	Backlight LED Cathode
2	LEDA	Backlight LED Anode.
3	GND	System Ground
4	VDD	Power supply for logic operation
5~12	R0~R7	Data bus
13~20	G0~G7	Data bus
21~28	B0~B7	Data bus
29	GND	System Ground
30	DCLK	Pixel clock signal
31	DISP	Display on/off control
32	HSYNC	Horizontal Sync signal
33	VSYNC	Vertical Sync signal
34	DE	Data Enable
35	NC	No connect
36	GND	System Ground
37	NC	No connect
38	NC	No connect
39	NC	No connect
40	NC	No connect

4 Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	V_{DD}	-0.3	4.0	V	
Input Signal VoltageV	V_{in}	-0.3	VDD+0.3	V	
Logic Output Voltage	V_{OUT}	-0.3	VDD+0.3	V	
Operating Temperature	T_{OPR}	-30	85	℃	
Storage Temperature	T_{STG}	-30	85	℃	

5 Electrical Characteristics

5.1 Operating conditions:

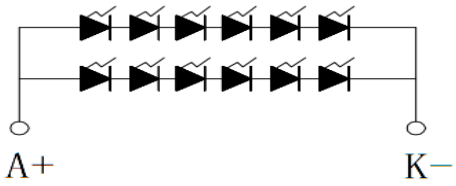
Parameter	Symbol	MIN	TYP	MAX	Unit	Remark
Power Voltage	V_{DD}	3.0	3.3	3.6	V	Note1
Digital Operation Current	IDD	-	30	-	mA	No Load@ FR=60Hz
Standby Current	Isc	-	-	50	uA	
Logic-High Input Voltage	Vih	0.7VDD	-	VDD	V	
Logic-Low Input Voltage	Vil	DGND	-	0.3VDD	V	

Notes :1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25 ℃
Max value at Black Pattern

5.2 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
LED current	I_F	-	40	-	mA	
Power Consumption		-	720	-	mW	
LED Voltage	V_F	16.8	18	19.2	V	Note 1
LED Life Time	W_{BL}	25000	--	-	Hr	Note 2,3

Note1:Thereare 2 GroupsLED



BACKLIGHT CIRCUIT DIAGRAM:
(If=40mA, 16.8V~19.2V)

Note 2 : Ta = 25℃

Note 3 : Brightness to be decreased to 50% of the initial value

6.RGB InterfaceTiming

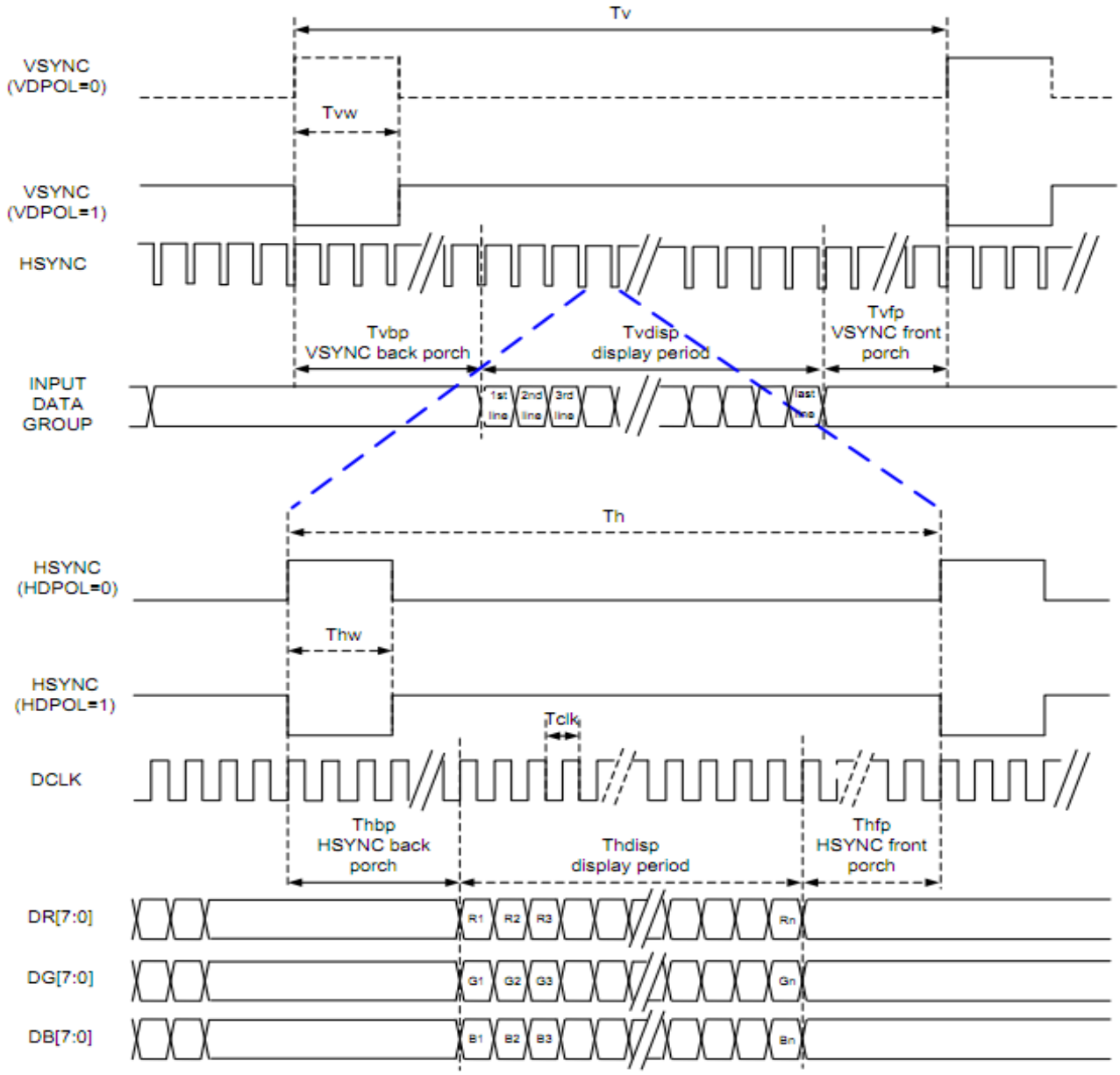
6.1 Parallel 24 bit RGB Input Timing Table

Parallel 24-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

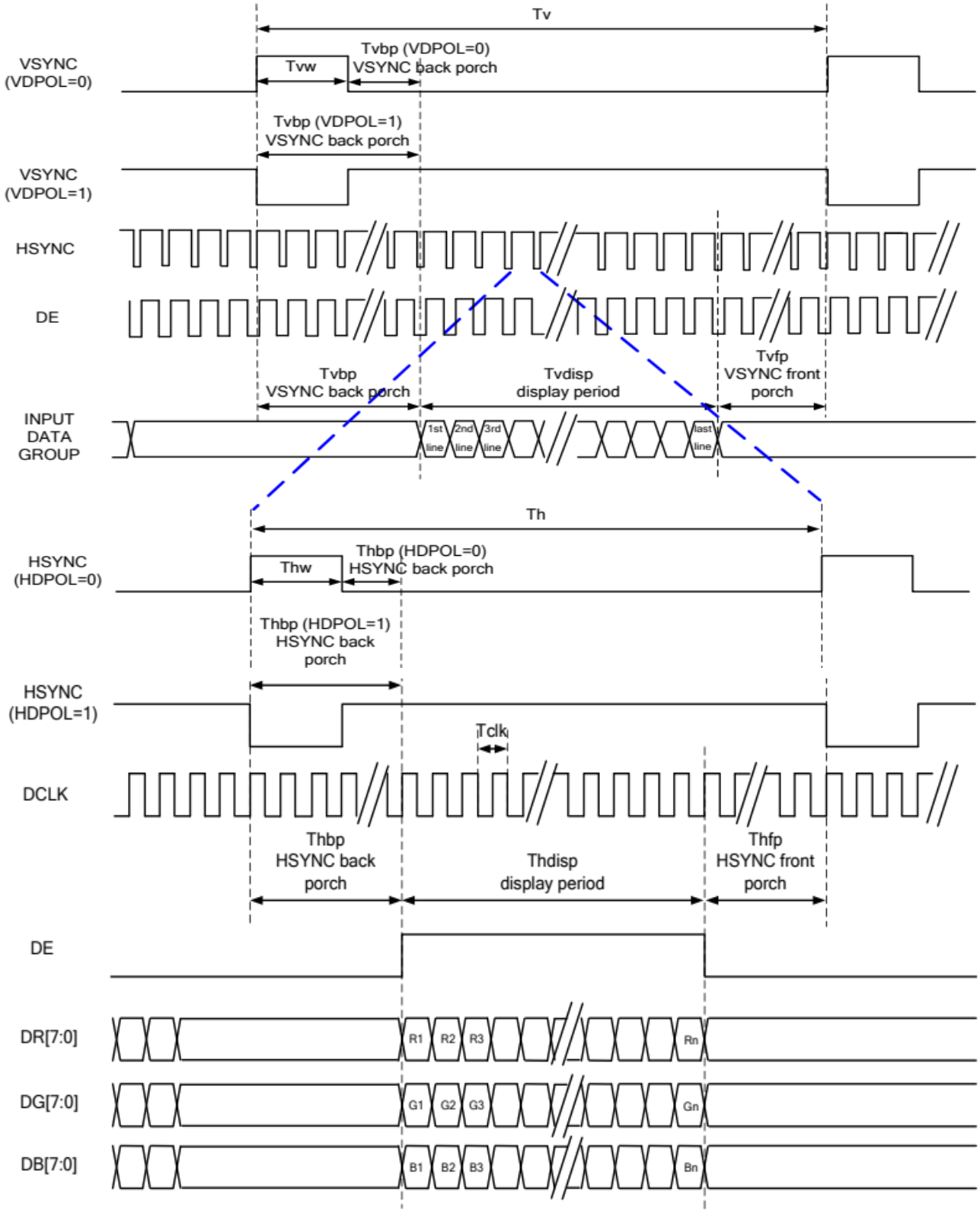
480RGB X 128 Resolution Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	8	9	12	MHz	
DCLK Period		Tclk	83	111	125	ns	
HSYNC	Period Time	Th	485	531	598	DCLK	
	Display Period	Thdisp	-	480	-	DCLK	
	Back Porch	Thbp	3	43	43	DCLK	By H_BLANKING setting
	Front Porch	Thfp	2	8	75	DCLK	
	Pulse Width	Thw	2	4	43	DCLK	
VSYNC	Period Time	Tv	132	148	177	HSYNC	
	Display Period	Tvdisp	-	128	-	HSYNC	
	Back Porch	Tvbp	2	12	12	HSYNC	By V_BLANKING setting
	Front Porch	Tvfp	2	8	37	HSYNC	
	Pulse Width	Tvw	2	4	12	HSYNC	

Note: It is necessary to keep Tvbp =12 and Thbp =43 in sync mode. DE mode is unnecessary to keep it.

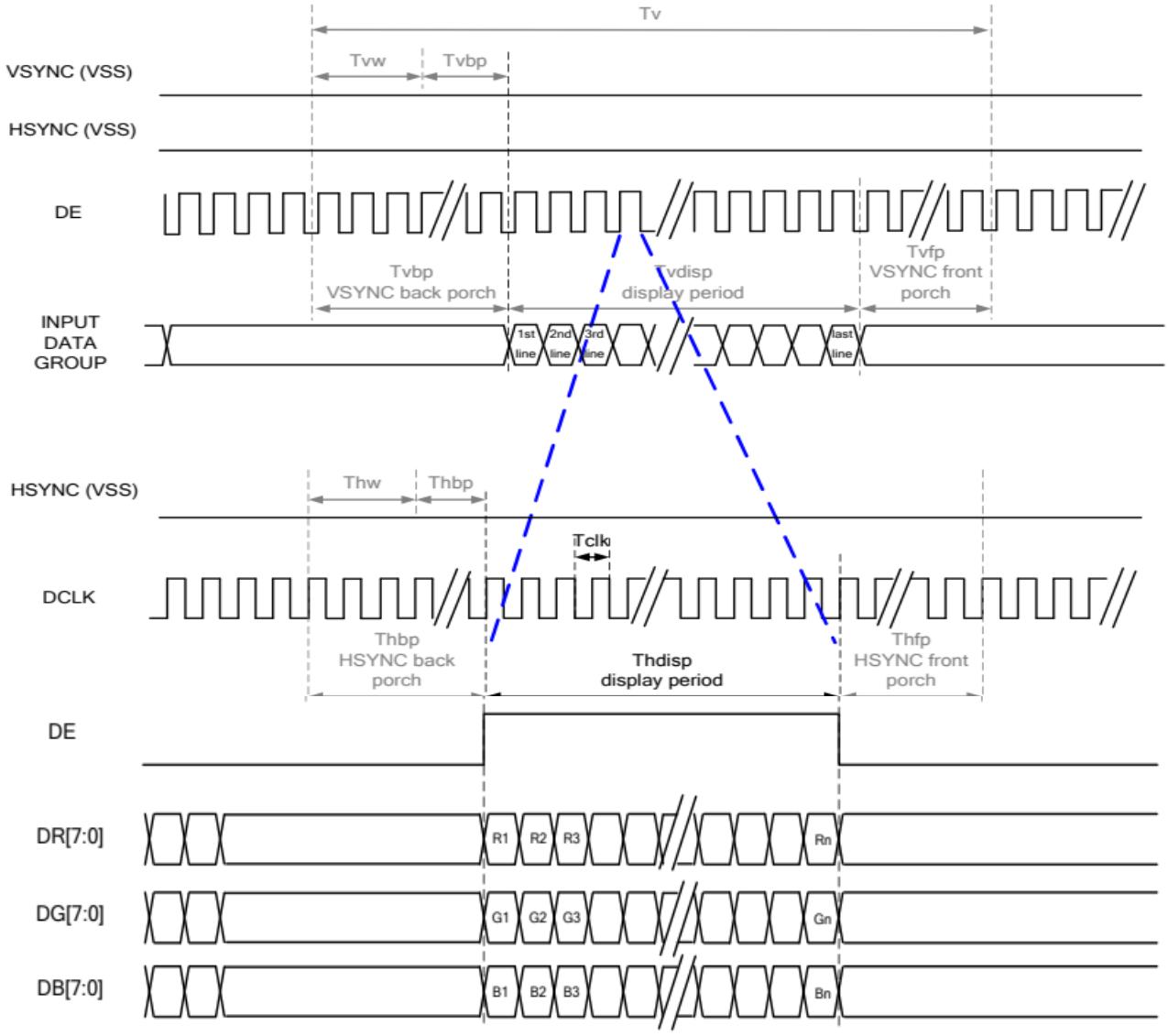
6.2 SYNC-ModeTimingDiagram



6.3 SYNC-DE Mode Timing Diagram



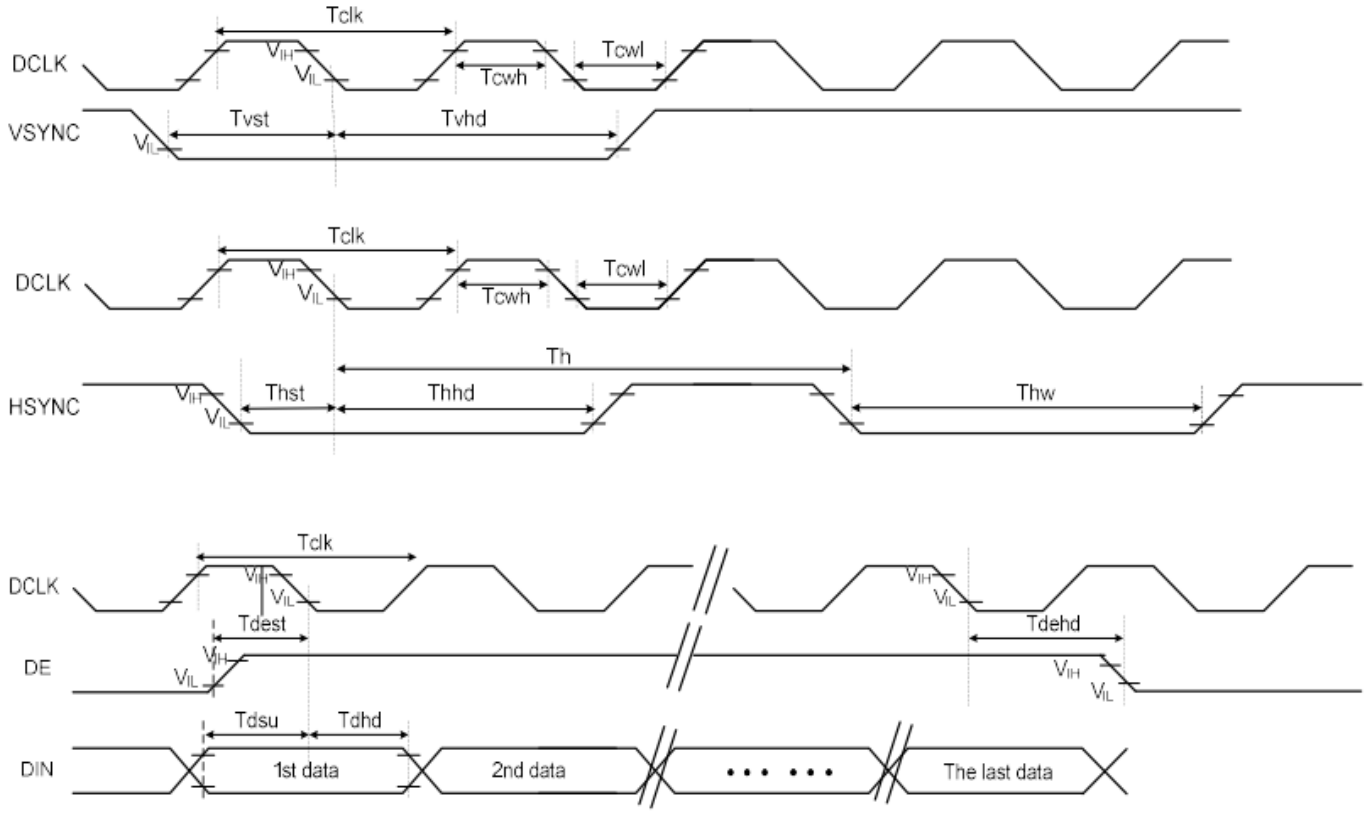
6.4.DE ModeTimingDiagram



RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

Note: "Input" means these signals are driven by host side.

6.5. System Bus Timing for RGB Interface

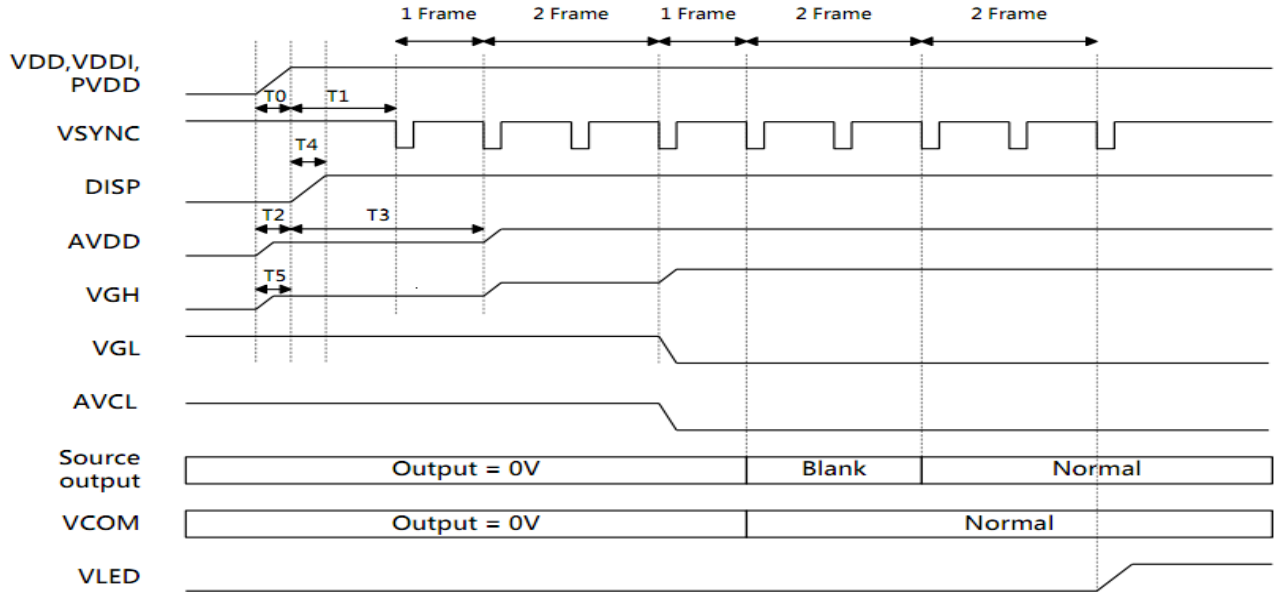


Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Pulse Duty	Tcw	40	50	60	%	
HSYNC Width	Thw	2	-	-	DCLK	
HSYNC Period	Th	55	60	65	us	
VSYNC Setup Time	Tvst	12	-	-	ns	
VSYNC Hold Time	Tvhd	12	-	-	ns	
HSYNC Setup Time	Thst	12	-	-	ns	
HSYNC Hold Time	Thhd	12	-	-	ns	
Data Setup Time	Tdsu	12	-	-	ns	
Data Hold Time	Tdhd	12	-	-	ns	
DE Setup Time	Tdest	12	-	-	ns	
DE Hold Time	Tdehd	12	-	-	ns	

*Please refer to IC specification for details

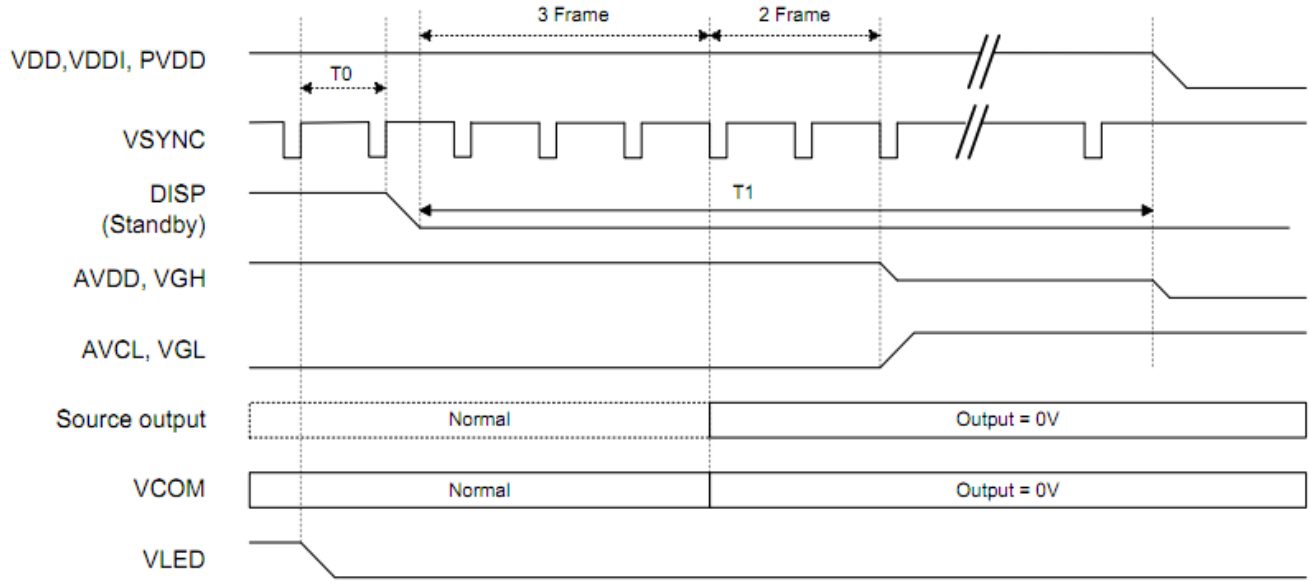
6.6 POWER SEQUENCE

Power On Sequence



	Description	Min. Time
T0	Determined by the external power	
T1	Time from stable VDD, VDDI, PVDD set-up to the first VSYNC	T1=0
T2	Time from AVDD=0V to AVDD=3.3V	T2=T0
T3	Time from AVDD=3.3V to AVDD=6.0V	T3=T1+ (1*Frame)
T4	Time from stable VDD, VDDI, PVDD set-up to DISP asserted	T4=0
T5	Time from VGH=0V to VGH=3.3V	T5=T0

Power Off Sequence



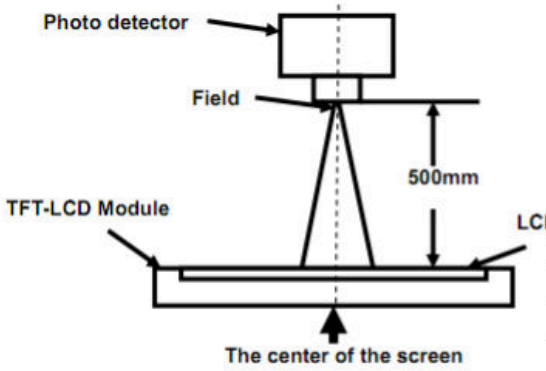
Item	Description	Min. Time
T0	Time from backlight power off to DISP="L"	1*Frame
T1	Time from DISP="L" to LCM Power off	5*Frame

7 Optical Characteristics

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles		θ_T	Center CR≥10	80	85	-	Degree.	Note2
		θ_B		80	85	-		
		θ_L		80	85	-		
		θ_R		80	85	-		
Contrast Ratio		CR	Θ =0	1000	1200	-	-	Note1, Note3
Response Time		T_{ON}	25° C	-	30	45	ms	Note1, Note4
		T_{OFF}		-	30	45		
Chromaticity	White	X_W	Backlight is on	0.300	0.330	0.360	-	Note1, Note5
		Y_W		0.310	0.340	0.370	-	
	Red	X_R		0.591	0.621	0.651	-	
		Y_R		0.304	0.334	0.364	-	
	Green	X_G		0.259	0.289	0.319	-	
		Y_G		0.513	0.543	0.573	-	
	Blue	X_B		0.113	0.143	0.173	-	
		Y_B		0.140	0.170	0.200	-	
Uniformity		U		-	80	-	%	Note1, Note6
NTSC				40	50		%	Note5
Luminance		L		600	800	-	CD/M^2	Note1, Note7

Test Conditions:
1.IF=40Ma(onechannel),theambienttemperatureis25°C.
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.
The optical characteristics should be measured in dark room. After 5 minutes operation, the optical Properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	BM-7A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	SR-3A	2°

Note 2: Definition of viewing angle range and measurement system.
Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80).

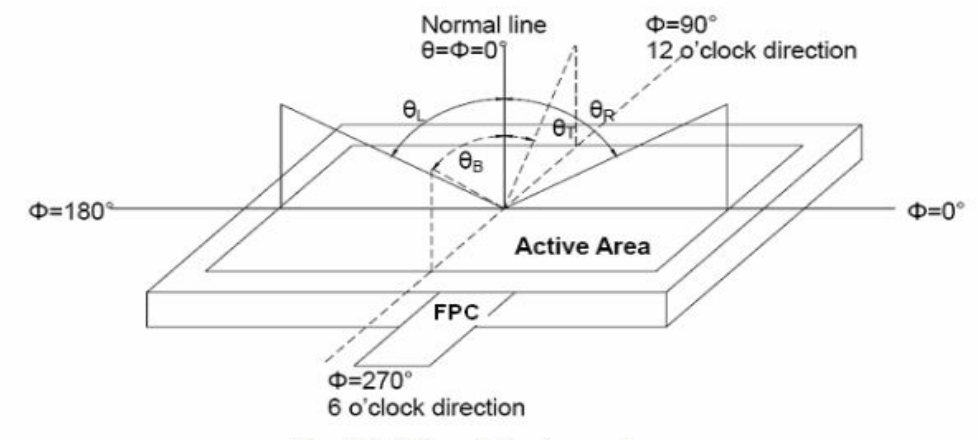


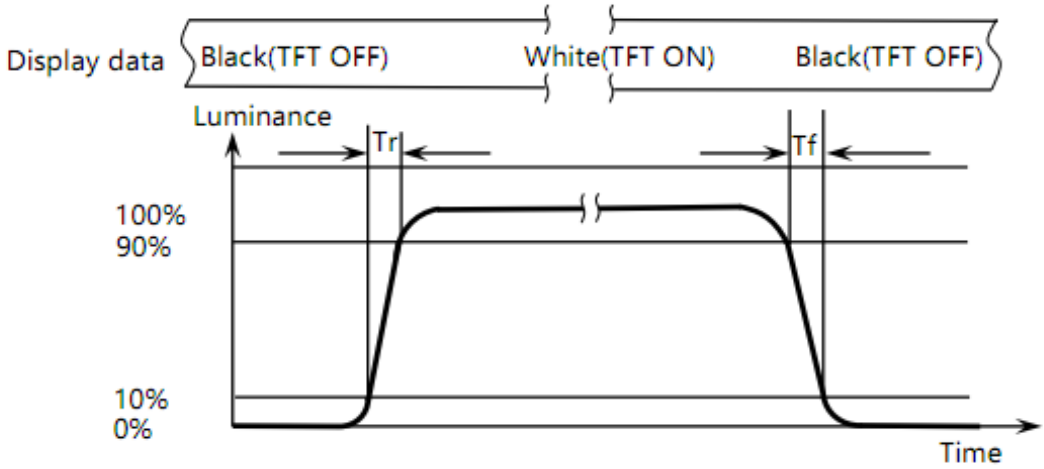
Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval Between “White” state and “Black” state. Rise time (TON) is the time between Photo detector output intensity changed from10%to 90%.Andfall time (TOFF) is The time between photo detector output intensity changed from 90%to 10%



Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.
Note 6: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the Center of each measuring area
Luminance Uniformity (U) = Lmin/ Lmax X100%
L-------Active area length W----- Active area width

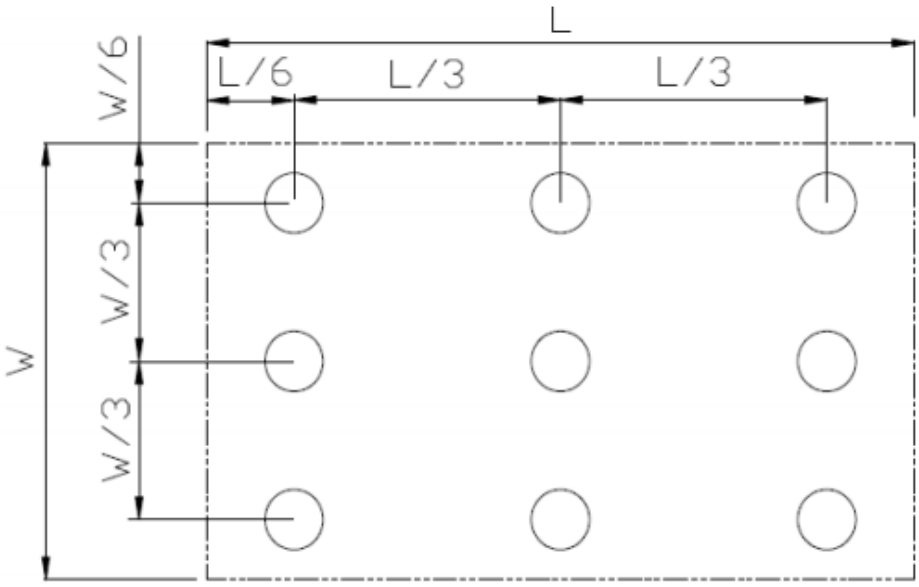


Fig. 2 Definition of uniformity
Lmax: The measured maximum luminance of all measurement position.
Lmin: The measured minimum luminance of all measurement position.
Note 7: Definition of Luminance:
Measure the luminance of white state at center point.

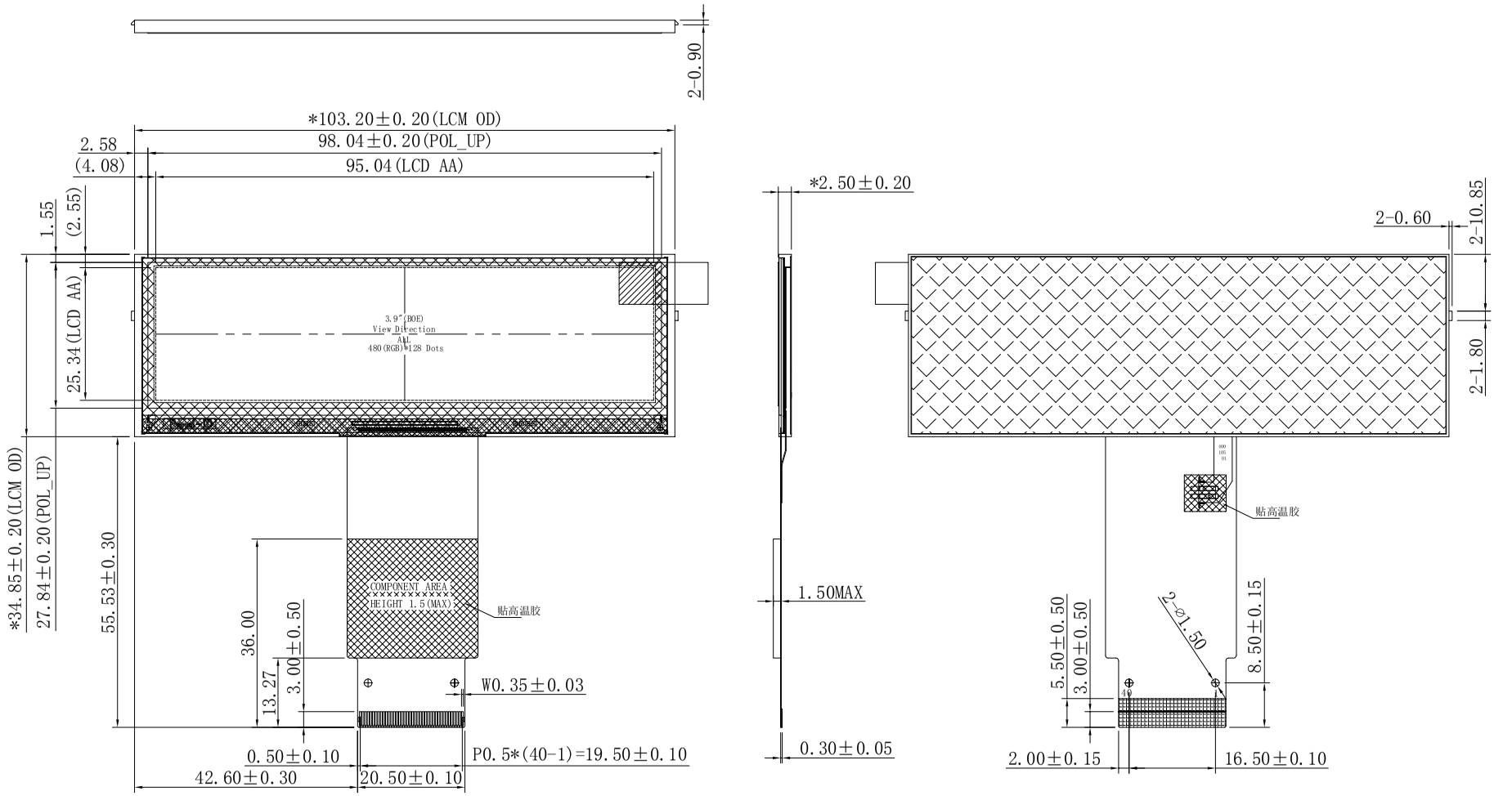
8 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts=+85℃,96hrs	
2	Low Temperature Operation	Ta=-30℃,96hrs	
3	High Temperature Storage	Ta=+85℃,96hrs	
4	Low Temperature Storage	Ta=-30℃, 96hrs	
5	High Temperature & Humidity Storage	Ta= +60℃,90%RHmax,96 hours	
6	Thermal Shock (Non-operation)	-30℃ 30min~+85 ℃ 30min Changetime:5min,20Cycle	
7	Electro Static Discharge (Operation)	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15℃ ~ 35℃, 30% ~ 60%, 86Kpa ~ 106Kpa)	
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	
9	Shock (Non-operation)	60G 6ms, ± X, ±Y , ± Z 3 times for each direction	
10	Package Drop Test	Height: 60 cm, 1 corner, 3 edges, 6 surfaces	

Note: 1. T_S is the temperature of panel's surface.
2. Ta is the ambient temperature of sample.

9 Mechanical Drawing

A0	2023/11/02	First issue



PIN	SYMBLE
1	LEDK
2	LEDA
3	GND
4	VDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	DCLK
31	DISP
32	HSYNC
33	VSYNC
34	DE
35	NC
36	GND
37	NC
38	NC
39	NC
40	NC

NOTES:

1. DISPLAY TYPE:3.9 INCH TFT /BLACK
2. BACKLIGHT: 12 CHIP WHITE LED, IN PARALLEL
3. OPERATING TEMP: -30° C~+85° C
4. STORAGE TEMP: -30° C~+85° C
5. RESOLUTION: 480xRGBx128
6. Luminous instensity(9 AVG):Module:600cd/m2(MIN.),800cd/m2(TYP.)
   Chromaticity(centre point):0.33+/-0.03;0.34+/-0.03.
7. Uniformity:75%(Min)
8. LCD IC:ST7282A
9. "( )"reference dimension. "*"critical dimension
10. RoHS Compliant

BACKLIGHT CIRCUIT DIAGRAM:
(If=40mA, 16.8V~19.2V)

INTERFACE	RGB Interface	深圳市勋瑞光电科技有限公司 Xunrui photoelectric technology (shenzhen) CO.,LTD.	
	FPC Connector	MODEL NAME: TFT Display Module	PART NO.: H039BWQ40I6001
VIEWING **DIRECTION**	ALL	DWN	REV.: A0 / SHEET OF: 1/1
		CHKD	TOLERANCE UNLESS SPECIFIED: ±0.3
Gray Scale **DIRECTION**	FULL	PROJECTION: 3RD ANGLE	UNIT: mm / SCALE: 1:1

1 0.Packing

TBD

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.