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PRODUCT SPECIFICATIONS

For Customer: _____   ☐ : APPROVAL FOR SPECIFICATION

Customer Model No. _____   ☐ : APPROVAL FOR SAMPLE

Module No.: ZW-T035GLS-03   Date : 2021-10-08

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For Customer's Acceptance:

Approved By	Comment

PREPARED	CHECKED	VERIFIED BY QA DEPT	VERIFIED BY R&D DEPT
Nikola			

2. Revision Record

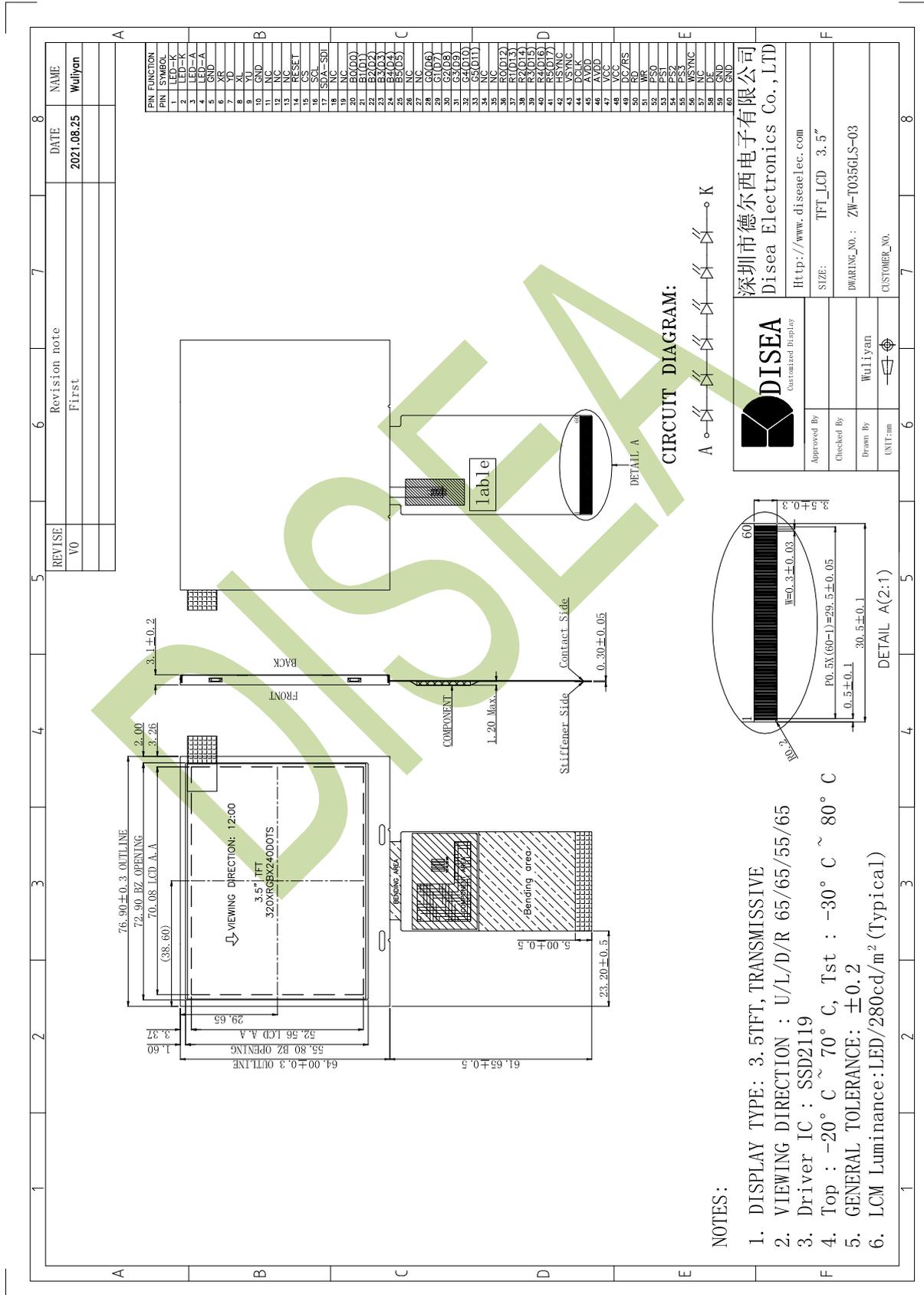| Date	Rev.No.	Page	Revision Items	Prepared
2021-10-08	**V0**		**The first release**	**Nikola**

3. General Specifications

ZW-T035GLS-03 is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light unit. The 3.5'' display area contains 320 x 240 pixels and can display up to 16.7M colors. This product accords with RoHS environmental criterion.

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M		
Viewing Direction	12	O'Clock	
Gray scale inversion direction	6	O'Clock	
Operating temperature	-20~+70	℃	
Storage temperature	-30~+80	℃	
Module size	Refer to outline drawing	mm	
Active Area(W×H)	70.08X52.56	mm	
Number of Dots	320×240	dots	
Controller	SSD2119	-	
Power Supply Voltage	3.3	V	
Outline Dimensions	Refer to outline drawing	-	
Backlight	6-LEDs (white)	pcs	
Weight	---	g	
Interface	MCU/RGB/SPI	-	

Note 1:   Color tune is slightly changed by temperature and driving voltage.

Note 2:   Without FPC and Solder.

4.Outline.Drawing

CIRCUIT DIAGRAM:

DETAIL A(2:1)

NOTES:
1. DISPLAY TYPE: 3.5TFT, TRANSMISSIVE
2. VIEWING DIRECTION : U/L/D/R 65/65/55/65
3. Driver IC : SSD2119
4. Top : -20°C ~ 70°C, Tst : -30°C ~ 80°C
5. GENERAL TOLERANCE: ±0.2
6. LCM Luminance:LED/280cd/m² (Typical)

3.5" TFT
320XRGBX240DOTS

VIEWING DIRECTION: 12:00

深圳市德尔西电子有限公司
Disea Electronics Co.,LTD
Http://www.diseaelec.com

SIZE: TFT_LCD 3.5"
DWARING_NO.: ZW-T035GLS-03
CUSTOMER_NO.

REVISE		Revision note		DATE	NAME
V0		First		2021.08.25	Wuliyan

Approved By
Checked By
Drawn By Wuliyan
UNIT:mm

5. Absolute Maximum Ratings(Ta=25℃)

5.1 Electrical Absolute Maximum Ratings.(Vss=0V ,Ta=25℃)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	VCC	-0.3	5.0	V	1，2
Logic Signal Input /Output Voltage	V_{DDIO}	-0.3	4.0	V	

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.

3. Please be sure users are grounded when handing LCD Module.

5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-30℃	80℃	-20℃	70℃	1,2
Humidity	-	-	-	-	3

1. The response time will become lower when operated at low temperature.

2. Background color changes slightly depending on ambient temperature.

The phenomenon is reversible.

3. Ta<=40℃:85%RH MAX.

Ta>=40℃:Absolute humidity must be lower than the humidity of 85%RH at 40℃.

6. Electrical Specifications and Instruction Code

6.1 Electrical characteristics(Vss=0V ,Ta=25℃)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		VCC	Ta=25℃	2.5	3.3	3.6	V	
		VDDIO	Ta=25℃	1.4	3.3	3.6		
Input voltage	'H'	V_{IH}	VCC=3.3V	$0.7V_{CC}$	-	V_{CC}	V	
	'L'	V_{IL}	VCC=3.3V	0	-	$0.3V_{CC}$	V	
Current Consumption		I_{CC1}	Normal mode	-	--		mA	1
		I_{CC2}	Sleep mode	-			mA	1
Clock Frequency		f_{CLK}	-	-	5.5	5.2	MHz	

Note:

1: Tested in 1×1 chessboard pattern.

6.2 LED backlight specification(VSS=0V ,Ta=25℃)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	Vf	If=20mA	-	18	-	V	
Uniformity	△Bp	If=20mA	80			%	
Life Time	time	If=20mA		20K		hours	1
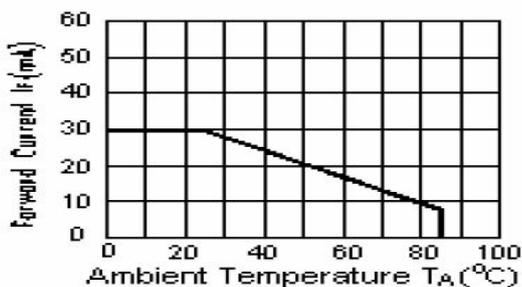
6.3 Interface signals

Pin No.	Symbol	Function
1-2	LED-K	LED back light(Cathode)
3-4	LED-A	LED back light(Anode)
5	GND	Connect to Ground.
6	XR	RTP control pin, no use please NC
7	YD	
8	XL	
9	YU	
10	GND	Connect to Ground.
11-13	NC	NO connect
14	RESET	Global reset signal input pin
15	CS	Chip select input pin
16	SCL	Serial interface clock pin
17	SDA-SDI	Serial in/out signal pin
18-19	NC	NO connect
20-25	B0-B5(D0-D5)	Blue data input pin
26-27	NC	NO connect
28-33	G0-G5(D6-D11)	Green data input pin
34-35	NC	NO connect
36-41	R0-R5(D12-D17)	Red data input pin
42	HSYNC	Line synchronizing signal
43	VSYNC	Vertical synchronizing signal
44	DCLK	Dot clock signal
45-46	AVDD	Power for analog circuit
47-48	VCC	Analog or digital supply voltage
49	DC/RS	Serves as the selector of command or data
50	RD	Read signal
51	WR	Write signal
52-55	PS0-PS3	Interface Selection (note1)
56	WSYNC	Ram Write Synchronization output
57	NC	NO connect
58	DE	Data enable signal
59-60	GND	Connect to Ground.

note1:

PS3	PS2	PS1	PS0	Interface Mode
0	0	0	0	16-bit 6800 parallel interface
0	0	0	1	8-bit 6800 parallel interface
0	0	1	0	16-bit 8080 parallel interface
0	0	1	1	8-bit 8080 parallel interface
0	1	0	0	9-bit generic D[17:9] (262k colour) + 3-wire SPI If 65K color, D12 shorts to D17 internally
0	1	0	1	16-bit generic (262k colour) + 3-wire SPI
0	1	1	0	18-bit generic (262k colour) + 3-wire SPI
0	1	1	1	6-bit generic D[17:12] (262k colour) + 3-wire SPI
1	0	0	0	18-bits 6800 parallel interface
1	0	0	1	9-bits 6800 parallel interface
1	0	1	0	18-bit 8080 parallel interface
1	0	1	1	9-bit 8080 parallel interface
1	1	1	0	3-wire SPI
1	1	1	1	4-wire SPI

7. Optical Characteristics

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp		θ=0° Φ=0°	-	280	-	Cd/m²	1
Uniformity	⊿Bp			80	-	-	%	1,2
Viewing Angle	3:00		Cr≥10	-	65	-	Deg	3
	6:00			-	55	-		
	9:00			-	65	-		
	12:00			-	65	-		
Contrast Ratio	Cr		θ=0° Φ=0°	200	300	-	-	4
Response Time	T_r			-	10	-	ms	5
	T_f			-	15	-	ms	
Color of CIE Coordinate	W	x	θ=0° Φ=0°	+0.05	0.298	-0.05	-	1,6
		y			0.308		-	
	R	x			0.653		-	
		y			0.331		-	
	G	x			0.315		-	
		y			0.574		-	
	B	x			0.138		-	
		y			0.133		-	
NTSC Ratio	S				60.7		%	

Note：*The parameter is slightly changed by temperature, driving voltage and materiel*

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment PR-705 (Φ8mm)

Measuring condition:
- *Measuring surroundings: Dark room.*
- *Measuring temperature: Ta=25 ℃.*
- *Adjust operating voltage to get optimum contrast at the center of the display.*

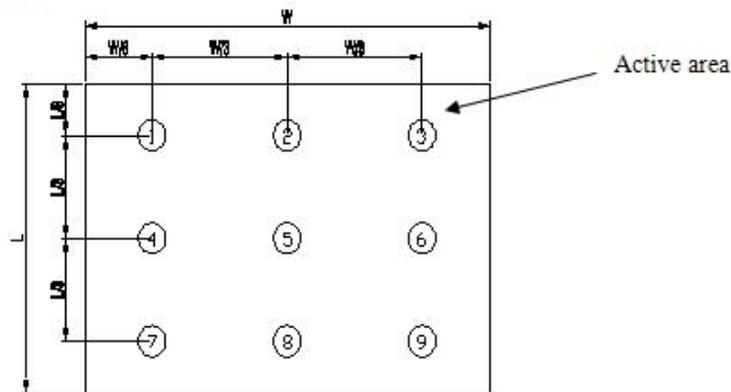*Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.*
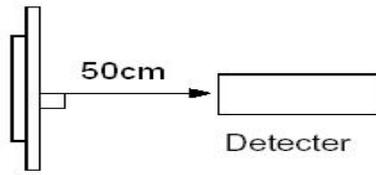
Note 2: The luminance uniformity is calculated by using following formula.

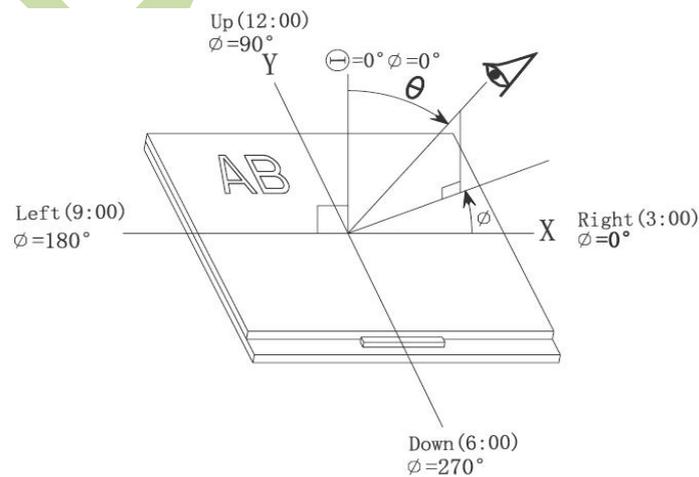$\triangle Bp = Bp \ (Min.) \ / \ Bp \ (Max.) \times 100 \ (\%)$

$Bp \ (Max.) = Maximum \ brightness \ in \ 9 \ measured \ spots$

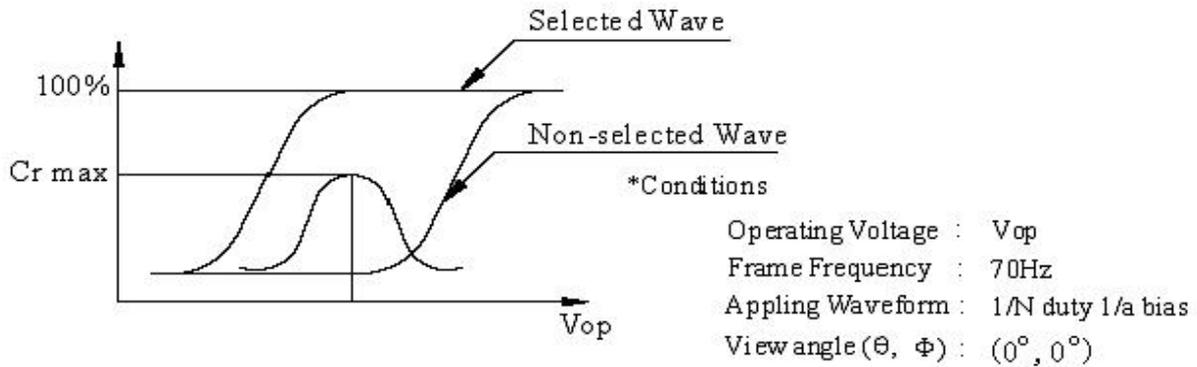$Bp \ (Min.) = Minimum \ brightness \ in \ 9 \ measured \ spots.$

*Note 3: The definition of viewing angle:*

Refer to the graph below marked by ϑ and Φ

*Note 4: Definition of contrast ratio.(Test LCD using DMS501)*

Note 5: Definition of Response time. (Test LCD using DMS501):

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes.Refer to figure as below.
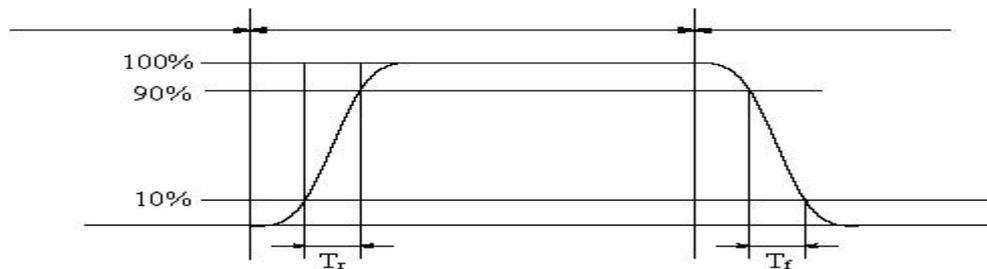
The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.

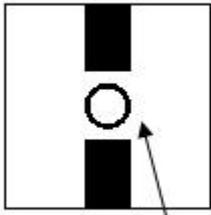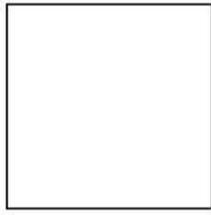
1931 CIE Chromaticity Diagram
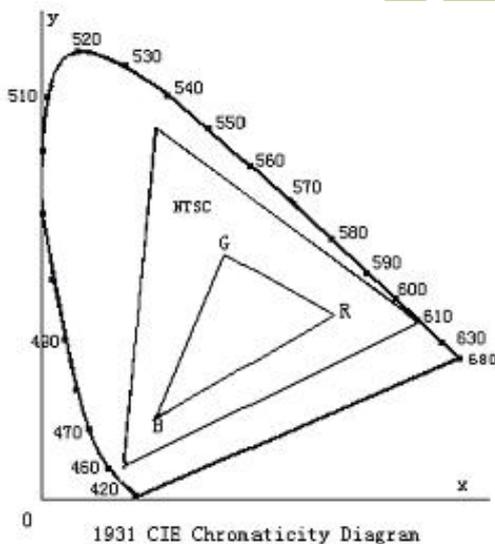
Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 7: Definition of cross talk.

*Cross talk ratio(%)=|pattern A Brightness-pattern B Brightness|/pattern A Brightness*100*

Pattern A

Pattern B

Measurement point(center)

Electric volume value=3F+/-3Hex

8. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80℃±2℃ 96H Restore 2H at 25℃ Power off	1. After testing, cosmetic and electrical defects should not happen. 2. Total current consumption should not be more than twice of initial value.
2	Low Temperature Storage	-30℃±2℃ 96H Restore 2H at 25℃ Power off	
3	High Temperature Operation	70℃±2℃ 96H Restore 2H at 25℃ Power on	
4	Low Temperature Operation	-20℃±2℃ 96H Restore 4H at 25℃ Power on	
5	High Temperature/Humidity Storage	60℃±2℃ 90%RH 96H Power off	
6	Temperature Cycle	–30℃ ←———→ 80℃ after 5 cycle, Restore 2H at 25℃ 30min 5min 30min Power off	
7	Vibration Test	10Hz~150Hz, 100m/s2, 120min	Not allowed cosmetic and electrical defects.
8	Shock Test	Half- sine wave,300m/s2,11ms	

Note: Operation: Supply 3.3V for logic system.

The inspection terms after reliability test, as below

ITEM	Inspection
Contrast	CR>50%
IDD	IDD<200%
Brightness	Brightness>60%
Color Tone	Color Tone+/-0,05

9. *Precautions for Use of LCD Modules*

9.1 Handling Precautions

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

9.1.2 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.

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

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

9.1.5 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

9.1.6 Do not attempt to disassemble the LCD Module.

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

9.1.8 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.

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9.2 Storage precautions

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

9.2.2 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%

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

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