SPECIFICATION

PRODUCT NO. : **TCX043DTLN-16**
VERSION : **Ver 1.3**
ISSUED DATE : **2019-12-30**

This module uses ROHS material

FOR CUSTOMER: _____
□: APPROVAL FOR SPECIFICATION
■: APPROVAL FOR SAMPLE

DATE	APPROVED BY

Xinli Optoelectronics :

Presented by	Reviewed by	Organized by
胡 明	赵春晓	王俊傑

Note:

1.Xinli Optronics reserves the right to make changes without further notice to any products herein to improve reliability, function or design.

1. Record of Revision

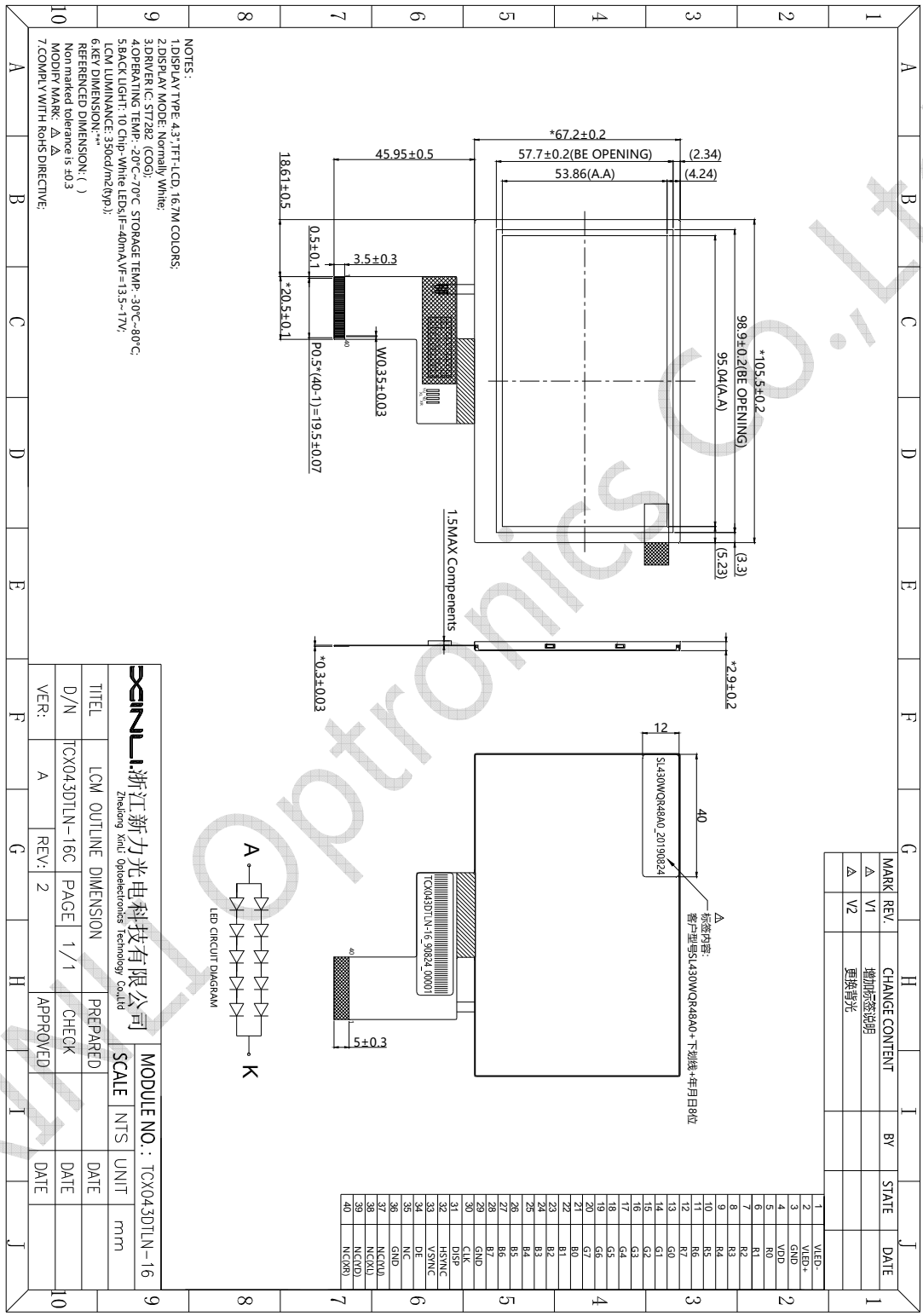
Revision	Description	Date
1.0	Initial Release	2019/07/31
1.1	Add label description in the drawing	2019/9/29
1.2	Update the content of TBD	2019/10/24
1.3	Change the backlight	2019/12/30

2. General Description and Features

The 4.3 inch Module named TCX043DTLN-16 is a-Si TFT-LCD module, which is the type of transmissive. It is consisted of TFT-LCD Panel, Driver IC, FPC ,Back-Light unit. Features of this product are listed in the following table.

NO	Item	Contents	Unit
(1)	Module Outline	105.5*67.2*2.9	mm
(2)	LCD Active area	95.04*53.86	mm
(3)	Dot Number	480*3(RGB)*272	/
(4)	Pixel size	0.198*0.198	mm
(5)	LCD type	TFT Transmissive	/
(6)	Display Color	16.7M	/
(7)	Viewing direction	6(Gray inversion)	O'clock
(8)	Backlight Type	10-chip LEDs	/
(9)	Power Supply	3.3（TYP)	V
(10)	Interface	FPC 0. 5mm_Pitch 40 pin	/
(11)	Interface type	RGB interface	/
(12)	Module weight	40	g

3. Mechanical Dimension

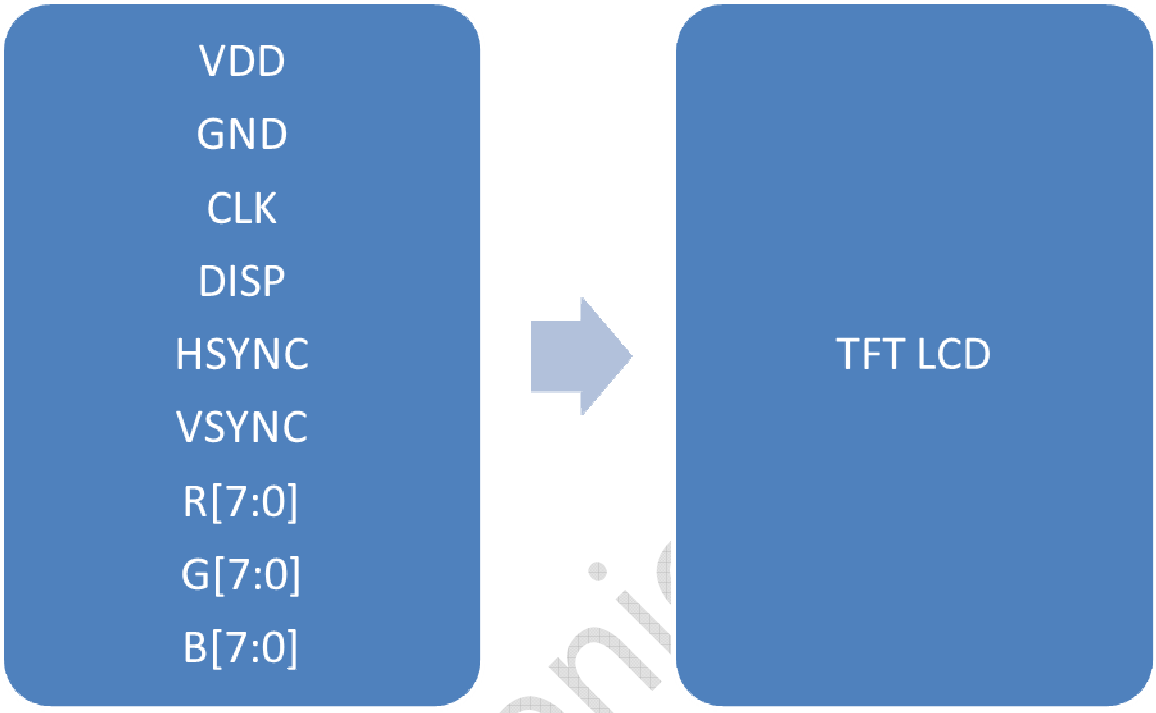


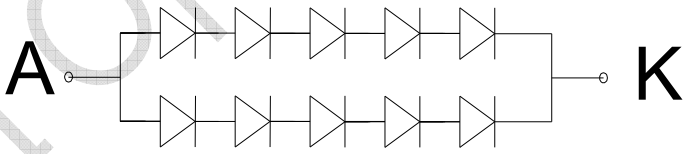
4. Interface Pin Connection

NO	Symbol	Level	Description
1	VLED-	P	Blacklight ground
2	VLED+	P	Blacklight anode
3	GND	P	Power ground
4	VDD	P	Power voltage
5	R0	I	Red data
6	R1	I	
7	R2	I	
8	R3	I	
9	R4	I	
10	R5	I	
11	R6	I	
12	R7	I	
13	G0	I	Green data
14	G2	I	
15	G1	I	
16	G3	I	
17	G4	I	
18	G5	I	
19	G6	I	
20	G7	I	
21	B0	I	Blue data
22	B1	I	
23	B2	I	
24	B3	I	
25	B4	I	
26	B5	I	
27	B6	I	
28	B7	I	
29	GND	P	Power ground
30	CLK	I	Pixel clock
31	DISP	I	Display on/off
32	HSYNC	I	Horizontal sync input with negative.Internally pull high

33	**VSYNC**	**I**	**Vertical sync input with negative.Internally pull high**
34	**DE**	**I**	**Input data enable control**
35	**NC**	**-**	**Not connection**
36	**GND**	**P**	**Power ground**
37	**NC(YU)**	**-**	**Not connect**
38	**NC(XL)**	**-**	**Not connect**
39	**NC(YD)**	**-**	**Not connect**
40	**NC(XR)**	**-**	**Not connect**

5. Block Diagram





LED CIRCUIT DIAGRAM

6. Maximum Rating

Item	Symbol	Rating	Unit
Operating temperature	Top	-20 to 70	℃
Storage temperature	Tst	-30 to 80	℃
Booster power supply	VDD	-0.3~ 4.6	V

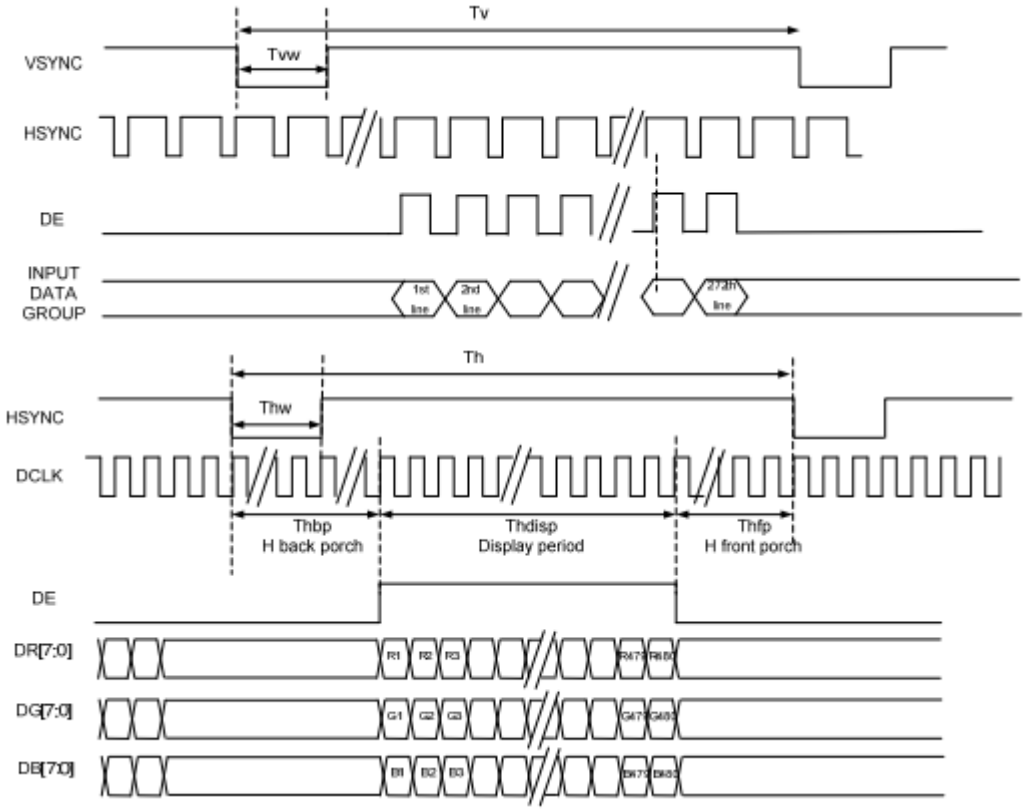
7. Electrical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Analog power supply		VDD	-	3.0	3.3	3.6	V
Logic input signal Voltage	H level	V_{IH1}	-	0.7*VDD	-	VDD	V
	L level	V_{IL1}		0	-	0.3*VDD	V
Logic output signal Voltage	H level	V_{OH}	-	VDD-0.4	-	VDD	V
	L level	V_{OL}	-	0	-	VDD+0.4	V

8. Backlight Characteristics

Item	syb	Min	Typ	Max	Unit	Condition
Voltage	Vf	-	15	-	V	IF=40mA
Luminance(module)	Lv	-	350	-	cd/m2	
Number of LED	-	10			pcs	

9. Timing Characteristics



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	525	532	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	3	43	50	DCLK	By H_Blanking setting
	Front Porch	Thfp	2	2	2	DCLK	
	Pulse Width	Thw	1	1	1	DCLK	
VSYNC	Period Time	Tv	275	285	303	H	
	Display Period	Tvdisp		272		H	
	Back Porch	Tvbp	2	12	30	H	By V_Blanking setting
	Front Porch	Tvfp	1	1	1	H	
	Pulse Width	Tvw	1	1	1	H	

10. Application Circuit

Please consult our technical department for detail information.

11. Initial Code

Please consult our technical department for detail information.

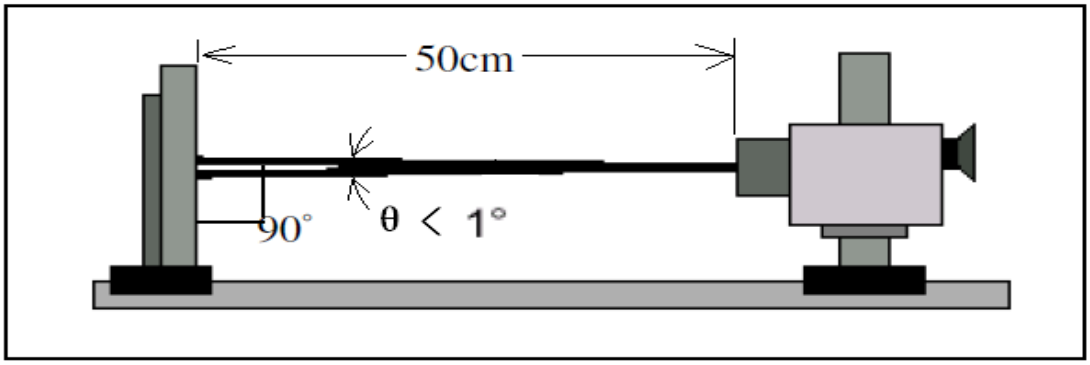
12. Electro-Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Response time		Tr	θ =0° ∅=0° Ta=25℃	-	10	-	ms	4
		Tf		-	15	-	ms	
Uniformity （Five point）		δ WHITE		-	80	-	%	7
Contrast ratio		Cr		-	500	-	-	3 ,5
Surface Luminance		Lv		-	350	-	-	3 ,7
Viewing angle range		θ	∅ = 90°	-	70	-	deg	6
			∅ = 270°	-	70	-	deg	
			∅ = 0°	-	50	-	deg	
			∅ = 180°	-	60	-	deg	
Color filter chromaticity (x, y)	White	X	θ = ϕ = 0°	0.276	0.316	0.356		7
		Y		0.262	0.302	0.342		

Note 1: Ambient temperature=25℃±2℃

Note 2: To be measured in the dark room with backlight unit.

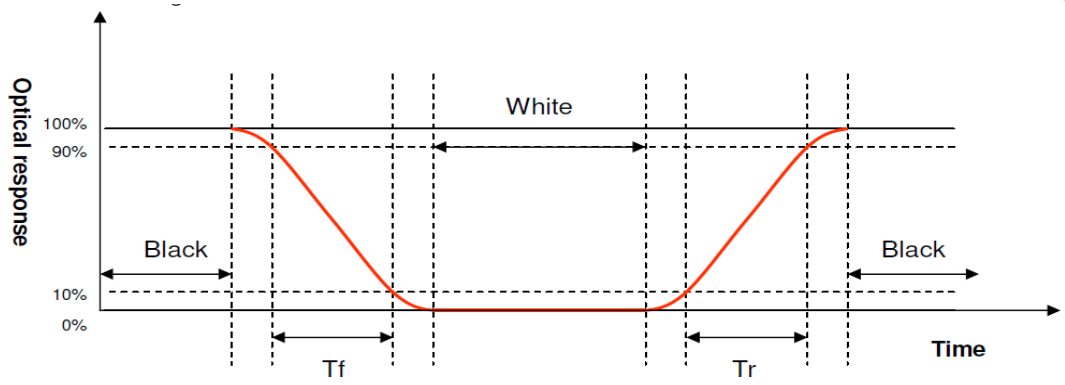
Note 3: To be measured at the center area of panel with a viewing cone of 1 by Topcon luminance meter BM-7A, after 10 minutes operation (module).



Note 4: Definition of response time:

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

Refer to figure as below.



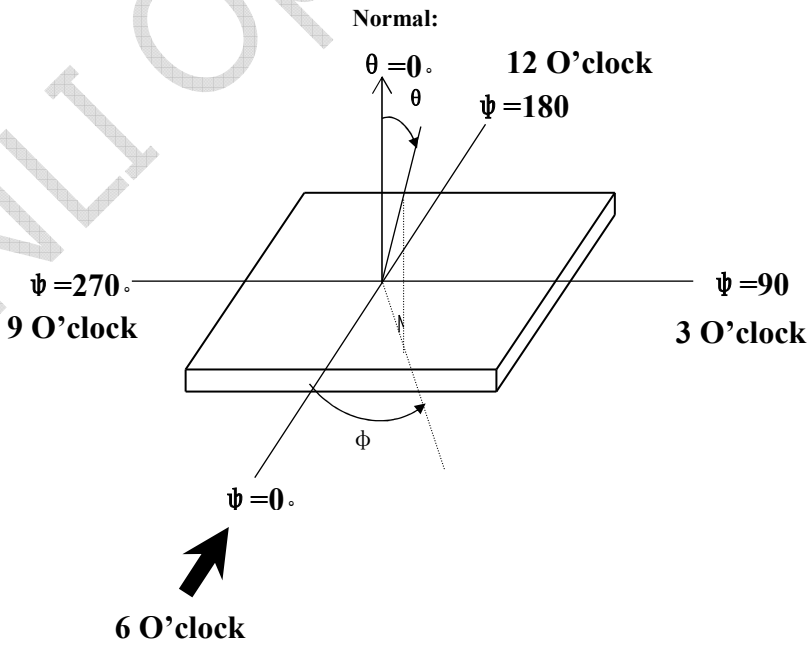
Note 5. Definition of contrast ratio:

Contrast ratio is calculated with the following formula:

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

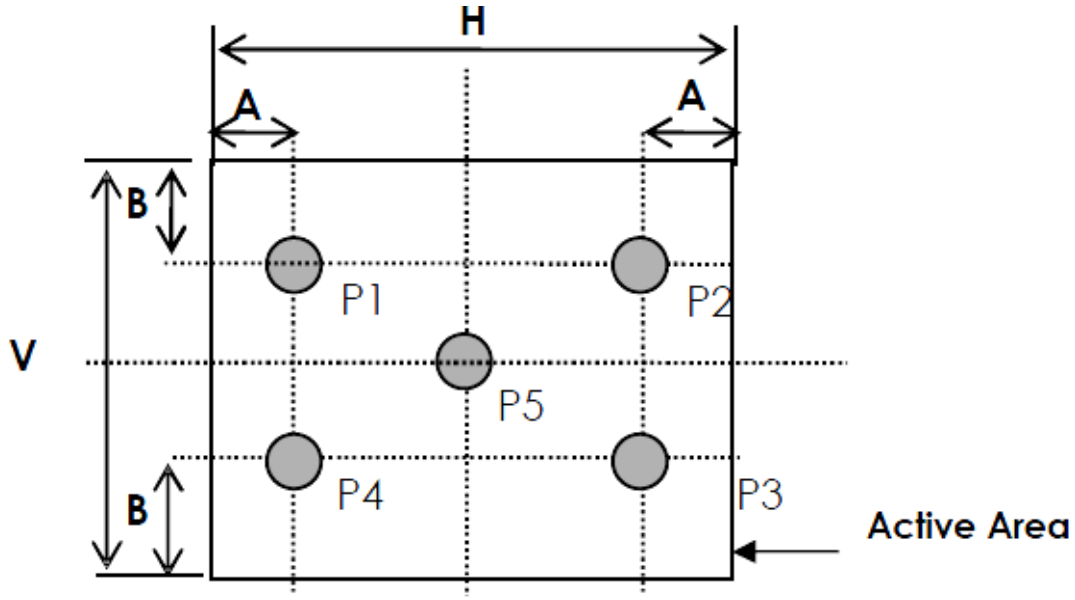
Note 6. Definition of viewing angle

Viewing angle is the angle at which the contrast ratio is greater than 10 for TFT module. 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.



Note 7. Surface luminance is the LCD surface from the surface with all pixels displaying white. Refer to figure as below.

Measuring method for Contrast ratio, surface luminance, Luminance uniformity，CIE (x, y) chromaticity



A : 5 mm B : 5 mm H,V : Active Area

Light spot size Æ=7mm, 500mm distance from the LCD surface to detector lens

measurement instrument is TOPCON's luminance meter BM-7A

Uniformity definition= [min of 5point/max of 5points]x100%

Lv = Surface Luminance with all white pixels (P_5)

13. Quality Assurance

TBD.

14. Reliability Test

This standard reliability test is done only for the first lot of MP products. Custom er and supplier must hold a discussion if other reliability test is requested by customer.

NO.	Test Item	Description	Test Condition
1	High temperature storage	Endurance test applying the high storage temperature for a long time	80℃,96 H
2	Low temperature storage	Endurance test applying the low storage temperature for a long time	-30℃,96H
3	High temperature operation	Endurance test applying the electric stress under high temperature for a long time	70℃,96H
4	Low temperature operation	Endurance test applying the electric stress under low temperature for a long time	-20℃,96H
5	High temperature /humidity storage	Endurance test applying the high temperatu re and high humidity storage for a long time	60℃,90% RH, 96H
6	Temperature Cycl e	Endurance test applying the low and high temperature cycle -20℃ ← →25℃ ← →70℃ 30min←→5min←→30min ◄——————————► one cycle	-20℃/70℃, 10 cycles
7	ESD Test	To check the product operating capability after electrostatic environment.	Voltage: ± 2KV(contact discharge); ±4 KV(air discharge)

15. Precautions for Operation and Storage

1. Precautions for Operation

(1)Since LCD panel made of glass,in order to prevent from glass broken or color tone change,please do not apply any mechanical shock or impact or excessive

force to it when installing the LCD module.

(2)If LCD panel is broken and liquid crystal substance leaks out and contact your skin or clothes,please immediately wash it off by using soap and water.

(3)The polarizer on the LCD surface is soft and easily scratched.Please be careful when handling.

(4)If LCD surface becomes contaminated,please wipe it off gently by using mois ten soft cloth with normal hexane,do not use acetone,ketone,ethanol, alcohol or water.If there is saliva or water on the LCD surface,please wipe it off immediate ly.

(5)When handing LCD module,please be sure that the body and the tools are properly grounded.And do not touch I/F pins with bare hands or contaminate I/F pins.

(6)Do not attempt to disassemble or process the LCD module.

(7)LCD module should be used under recommended operating conditions shown in chapter 6 and 7.

(8)Response time will be extremely slower at lower temperature than at specified temperature and LCD will show different color when at higher temperature.The phenomenon will disappear when returning to specified condition.

(9)Foggy dew,moisture condensation or water droplets deposited on surface and contact terminals will cause polarizer stain or damage,the deteriorated display quality and electrochemical reaction then leads to the shorter life time and permanent damage to the module probably.Please pay attention to the enviro nmental temperature and humidity.

1. Precautions for Storage

(1)Please store LCD module in a dark place,avoid exposure to sunlight,the light of fluorescent lamp or any ultraviolet ray.

(2)Keep the environment temperature at between 10℃and 35 ℃ and at normal humidity.Avoid high temperature,high humidity or temperature below 0℃.

(3)That keeps the LCD modules stored in the container shipped from supplier be fore using them is recommended.

(4)Do not leave any article on the LCD module surface for an extended period of time.

2. Warranty period

Warrants for a period of 12 Months from the shipping date when stored or used under normal condition.

16. Package Specification