SPECIFICATION

PRODUCT NO. : TCXD015IWLON-1
VERSION : Ver 1.1
ISSUED DATE : 2020-4-14

This module uses ROHS material

FOR CUSTOMER:

□: APPROVAL FOR SPECIFICATION
■: APPROVAL FOR SAMPLE

DATE	APPROVED BY

Xinli Optoelectronics :

Presented by	Reviewed by	Organized by
馮志文	趙春曉	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

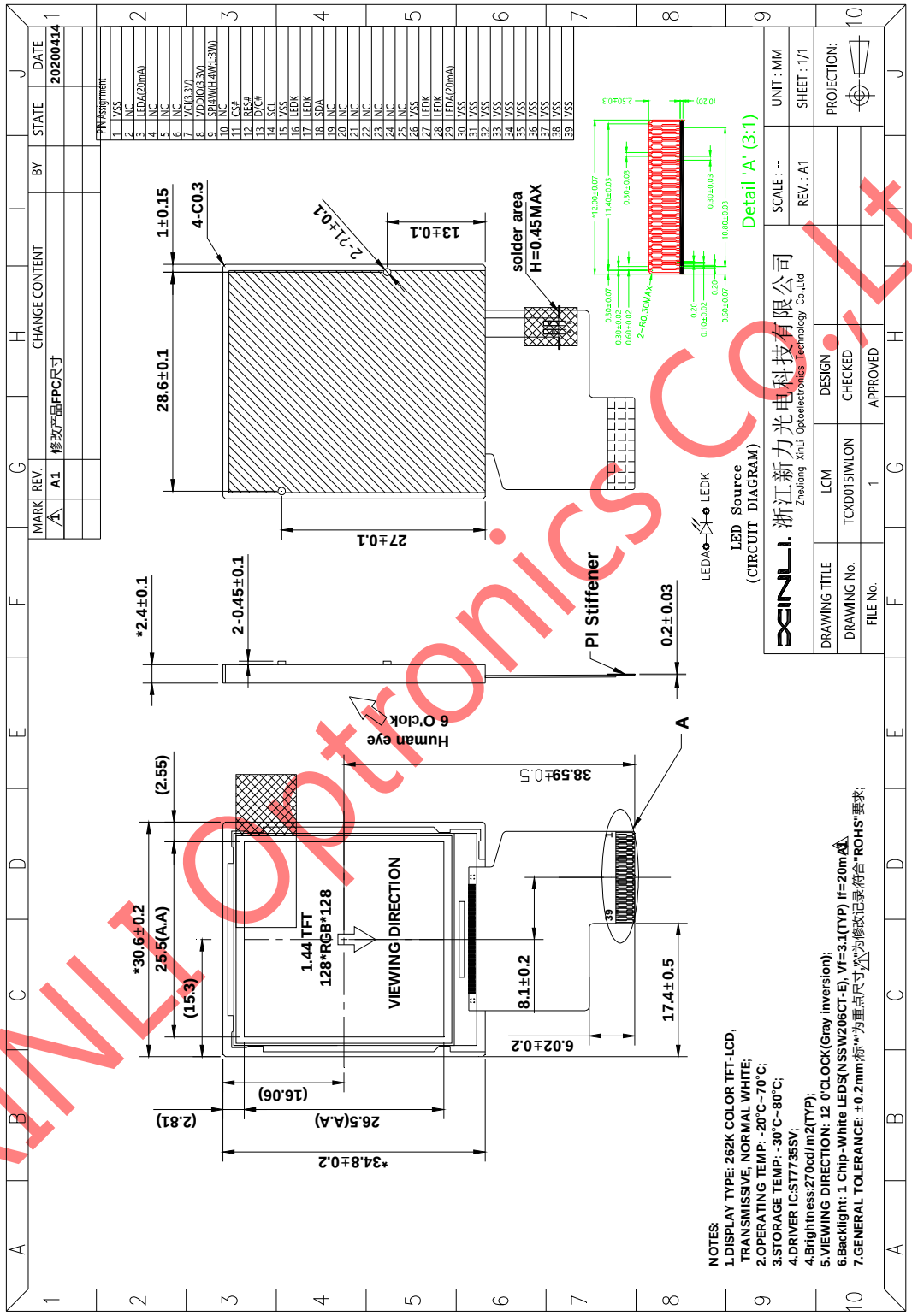
Revision	Description	Date
1.0	Initial Release	2020/4/13
1.1	Change the FPC size	2020/4/14

2. General Description and Features

The 1.44 inch Module named TCXD015IWLON-1 is a-Si TFT-LCD module, which is the type of transmissive. It is consisted of TFT-LCD Panel, Driver IC, FPC and Back-Light unit. Features of this product are listed in the following table.

NO	Item	Contents	Unit
(1)	Module Outline	30.6*34.8*2.4	mm
(2)	LCD Active area	25.5*26.5	mm
(3)	Number of Pixel	128*3(RGB)*128	/
(4)	Pixel pitch	0.1992*0.207	mm
(5)	LCD type	TFT Transmissive	/
(6)	Display Color	262K	/
(7)	Viewing direction(Gray inversion)	12	O'clock
(8)	Backlight Type	1-chip LEDs	/
(9)	Power Supply	2.8（TYP)	V
(10)	IC	ST7735SV	/
(11)	Interface	FPC 0.3mm_Pitch 39 pin	/
(12)	Interface type	3wire or 4 wire SPI interface	/
(13)	Module weight	TBD	g

3. Mechanical Dimension



4. Interface Pin Connection

LCM interface Pin

NO	Symbol	Level	Description
1	VSS	P	Power Ground
2	NC	-	Not connect
3	LEDA	P	LED power supply
4	NC	-	Not connect
5	NC	-	Not connect
6	NC	-	Not connect
7	VCI	P	Power Supply for Analog,
8	VDDIO	P	Power Supply for I/O system.
9	SPI4W	I	- SPI4W='0', 3-line SPI Enable. - SPI4W='1', 4-line SPI Enable. -If Not Used, Please fix this Pin at DGND Level.
10	NC	-	Not connect
11	CS	I	-Chip Selection Pin -Low Enable.
12	RES	I	-This signal will reset the device and it must be applied to properly initialize the chip. -Signal is active low.
13	D/C	I	-In 4-line SPI, this pin is used as D/CX (data/ command selection). -D/C='1': Display Data or Parameter. -D/C='0': Command Data.
14	SCL	I	Serial clock signal in serial interface mode.
15	VSS	P	Power Ground
16	LEDK	P	Ground for backlight
17	LEDK	P	Ground for backlight
18	SDA	I/O	serial input/output signal in serial interface mode.
19	NC	-	Not connect
20	NC	-	Not connect
21	NC	-	Not connect
22	NC	-	Not connect
23	NC	-	Not connect

24	NC	-	Not connect
25	NC	-	Not connect
26	VSS	P	Power Ground
27	LEDK	P	Ground for backlight
28	LEDK	P	Ground for backlight
29	LEDA	P	LED power supply
30	VSS	P	Power Ground
31	VSS	P	Power Ground
32	VSS	P	Power Ground
33	VSS	P	Power Ground
34	VSS	P	Power Ground
35	VSS	P	Power Ground
36	VSS	P	Power Ground
37	VSS	P	Power Ground
38	VSS	P	Power Ground
39	VSS	P	Power Ground

5. Maximum Rating

Item	Symbol	Rating	Unit
Operating temperature	Top	-20 to 70	℃
Storage temperature	Tst	-30 to 80	℃
power supply for Analog Voltage	VCI	2.5~4.8	V
power supply for I/O Voltage	VDDIO	1.65~3.7	V

NOTE:

If the module was used these absolute maximum ratings as above, it may be damaged permanently. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability. VCC>GND must be maintained.

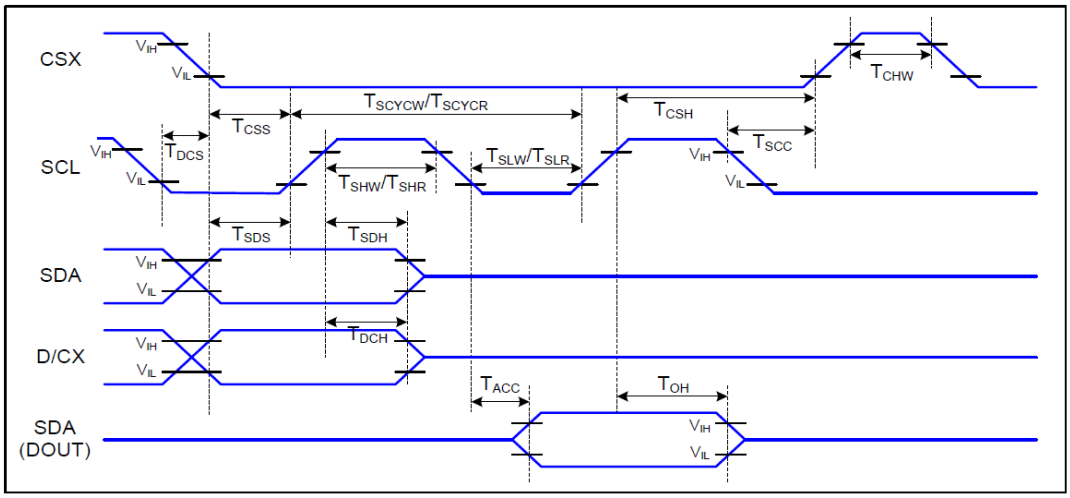
6 Electrical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Analog power supply		VCI	-	2.5	2.8	4.8	V
power supply for I/O Voltage		VDDIO	-	1.65	1.8	3.7	V
Logic input signal Voltage	H level	V_{IH1}	-	0.7*VDDIO	-	VDDIO	V
	L level	V_{IL1}		GND	-	0.3*VDDIO	V
Logic output signal Voltage	H level	V_{OH}	-	0.8*VDDIO	-	VDDIO	V
	L level	V_{OL}	-	GND	-	0.2*VDDIO	V

7. Backlight Characteristics

Item	syb	Min	Typ	Max	Unit	Condition
Voltage	Vf	-	3.1	-	V	IF=20mA
Power Consumption	PWF	-	62	-	mW	-
LED life-span	-	-	(20000)	-	Hrs	NSSW206CT-E

8. Timing Characteristics



Ta=25 ℃, VDDI=1.65~3.7V, VDD=2.5~3.7V

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	TCSS	Chip Select Setup Time (Write)	45		ns	
	TCSH	Chip Select Hold Time (Write)	45		ns	
	TCSS	Chip Select Setup Time (Read)	60		ns	
	TSCC	Chip Select Hold Time (Read)	65		ns	
	TCHW	Chip Select "H" Pulse Width	40		ns	
SCL	TSCYCW	Serial Clock Cycle (Write)	20		ns	-Write Command & Data Ram
	TSHW	SCL "H" Pulse Width (Write)	10		ns	
	TSLW	SCL "L" Pulse Width (Write)	10		ns	
	TSCYCR	Serial Clock Cycle (Read)	150		ns	-Read Command & Data Ram
	TSHR	SCL "H" Pulse Width (Read)	60		ns	
	TSLR	SCL "L" Pulse Width (Read)	60		ns	
D/CX	TDCS	D/CX Setup Time	10		ns	
	TDCH	D/CX Hold Time	10		ns	
SDA (DIN) (DOUT)	TSDS	Data Setup Time	10		ns	For Maximum CL=30pF For Minimum CL=8pF
	TSDH	Data Hold Time	10		ns	
	TACC	Access Time	10	50	ns	
	TOH	Output Disable Time	15	50	ns	

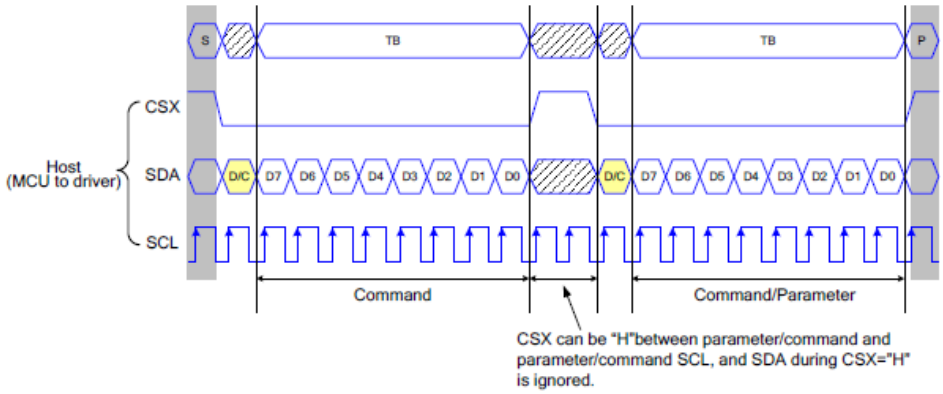


Figure 17 3-line Serial Interface Write Protocol (Write to Register with Control Bit in Transmission)

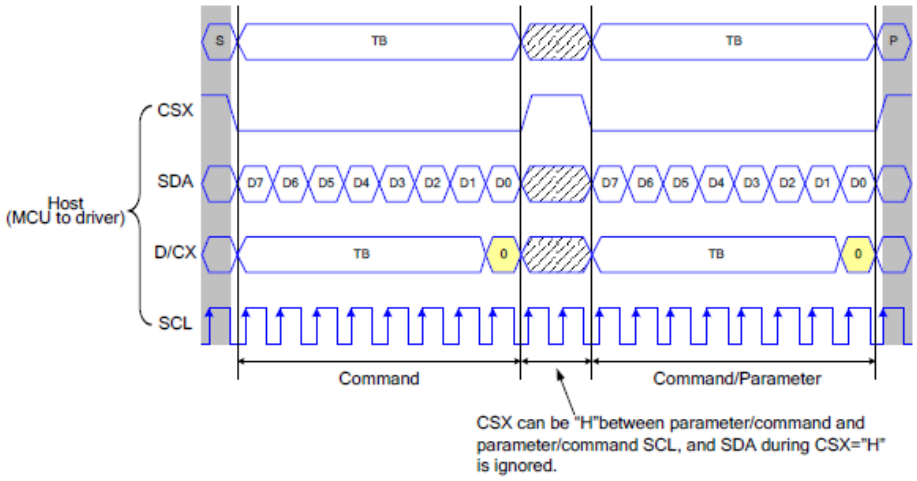


Figure 18 4-line Serial Interface Write Protocol (Write to Register with Control Bit in Transmission)

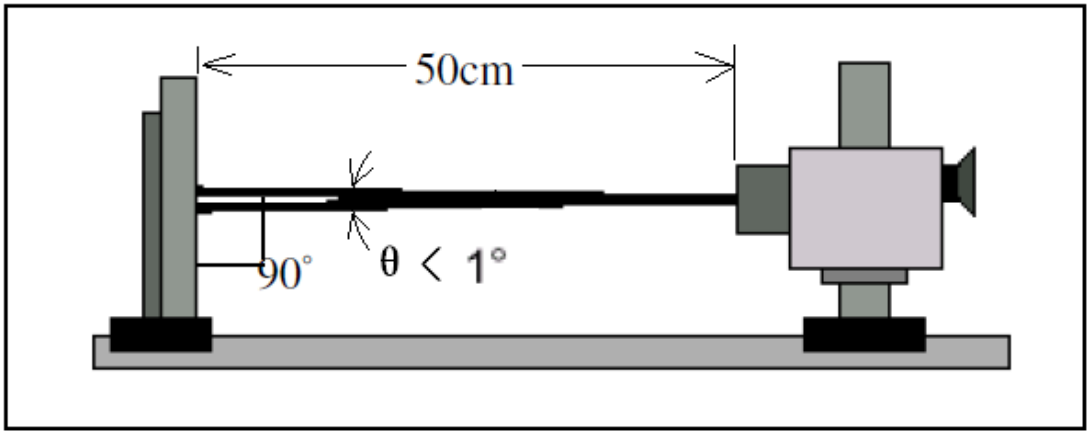
9. Electro-Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Response time		Tr+ Tf	θ =0°	-	16	32	ms	4
Uniformity （Five point）		δ WHITE	Æ=0° Ta=25℃	80		-	%	7
Contrast ratio		Cr		-	500	-	-	**3 ,5**
Surface Luminance		Lv		210	270	-	-	**3 ,7**
Viewing angle range		q	Æ= 90°	-	70	-	deg	**6**
			Æ= 270°	-	70	-	deg	
			Æ= 0°	-	60	-	deg	
			Æ= 180°	-	70	-	deg	
Color filter chromaticity (x, y)	White	X	θ = ϕ = 0°	TBD	TBD	TBD		**7**
		Y		TBD	TBD	TBD		

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).

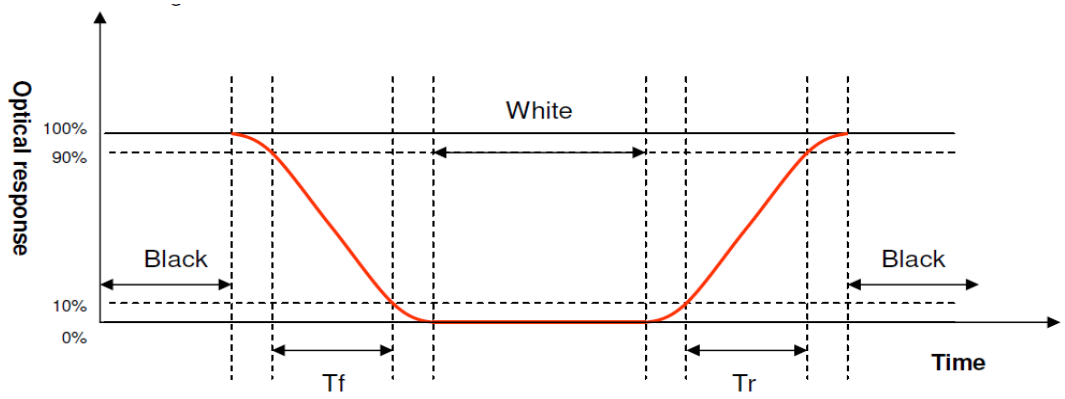


Note 4: Definition of response time:

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.



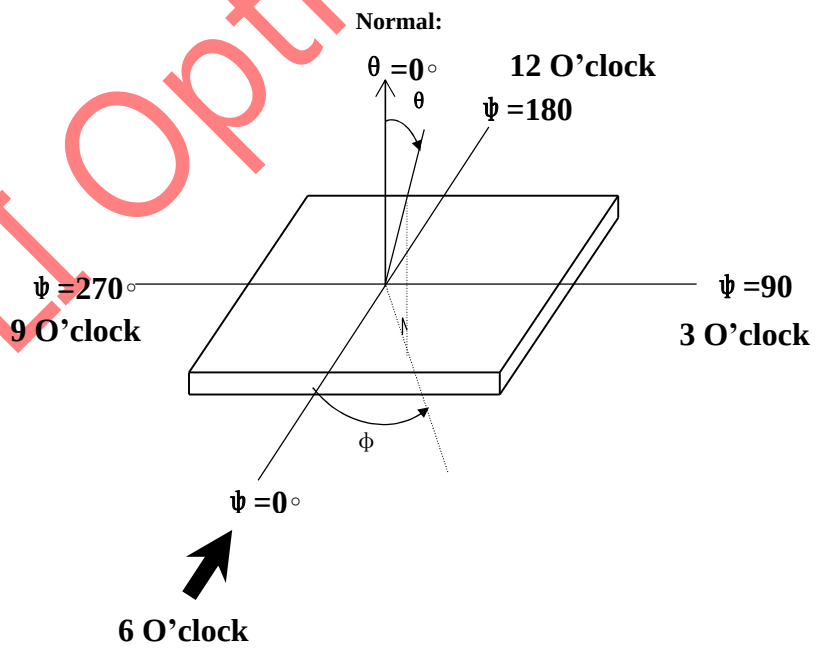
Note 5. Definition of contrast ratio:

Contrast ratio is calculated with the following formula:

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

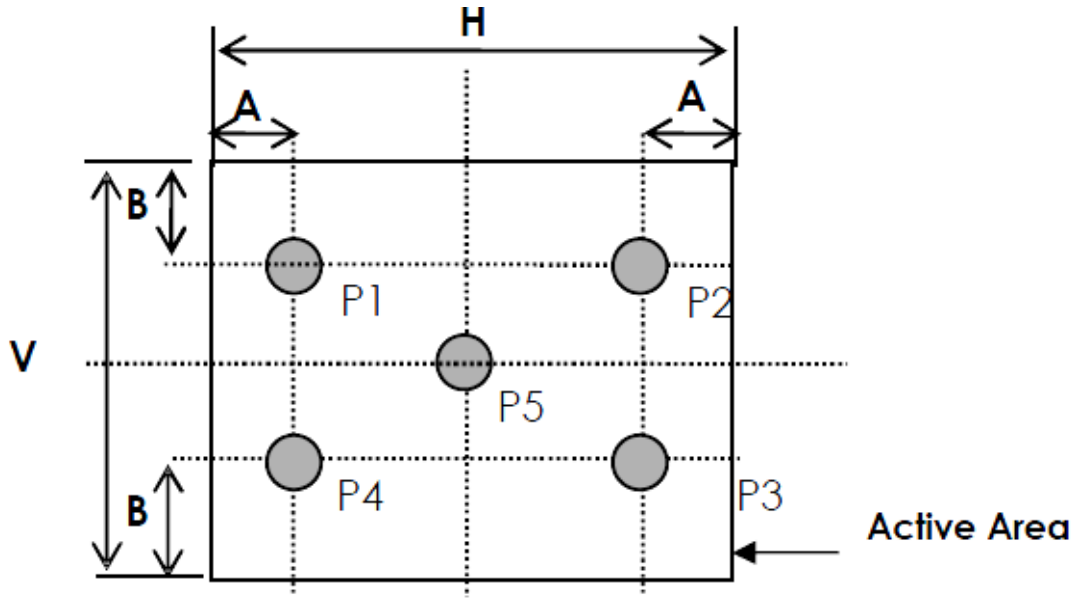
Note 6. Definition of viewing angle

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 = Average Surface Luminance with all white pixels (P_1, P_2, P_3, P_4, P_5)

10. Quality Assurance

TBD.

11. 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℃,200 H
2	Low temperature storage	Endurance test applying the low storage temperature for a long time	-30℃,200H
3	High temperature operation	Endurance test applying the electric stress under high temperature for a long time	70℃,120H
4	Low temperature operation	Endurance test applying the electric stress under low temperature for a long time	-20℃,120H
5	High temperature /humidity storage	Endurance test applying the high temperature and high humidity storage for a long time	50℃,90% RH, 120H
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

12. 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.

13. Package Specification

TBD