HIGHNESS™

One of a kind

HM101WX101HT

10.1" Color TFT-LCD

Update Date
02nd July 2020

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1. Scope

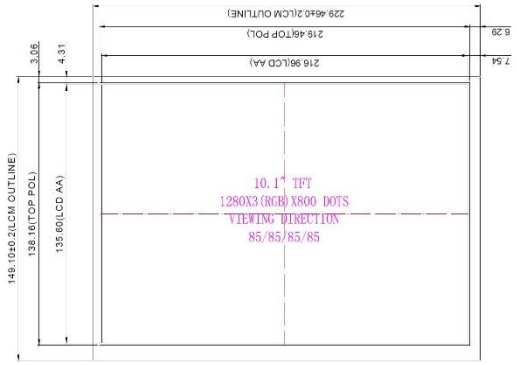
This specification defines general provisions as well as inspection standards for TFT module If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution

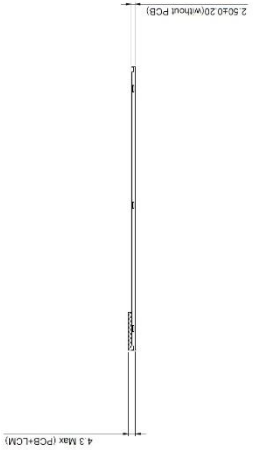
2. General Information LCM

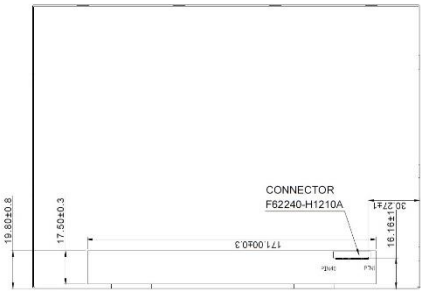
ITEM	STANDARD VALUES	UNITS
LCD type	10.1''TFT	--
Dot arrangement	1280×3(RGB)×800	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally Black	-
Viewing Direction	85/85/85/85	--
Module size	229.46(W)×149.10(H)×2.50(T)	mm
Active area	216.96(W)×135.60(H)	mm
Dot pitch	0.1695(W)×0.1695(H)	mm
Interface	LVDS Interface	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Weight	TBD	g

3. External Dimensions

ROHS







1	VCOM
2	VDD
3	VDD
4	NC
5	NC
6	NC
7	GND
8	RXIN0-
9	RXIN0+
10	GND
11	RXIN1-
12	RXIN1+
13	GND
14	RXIN2-
15	RXIN2+
16	GND
17	RXCLK-
18	RXCLK+
19	GND
20	RXIN3-
21	RXIN3+
22	GND
23	NC
24	NC
25	GND
26	NC
27	LED_PWM
28	NC
29	AVDD
30	GND
31	LEDK
32	LEDK
33	NC
34	NC
35	VGL
36	NC
37	CABC_EN
38	VGH
39	LEDA
40	LEDA

TFT NOTE:

1, LCD TYPE : 10.1" ,TFT

2, VIEWING DIRECTION:

WIDE VIEWING 85/85/85/85

3, BACKLIGHT: 350 nits

4, DPERATION TEMP.: -20°~70°

5, STORAGE TEMP.: -30°~80°

6,UNMARKERTOLERANCE:±0.2

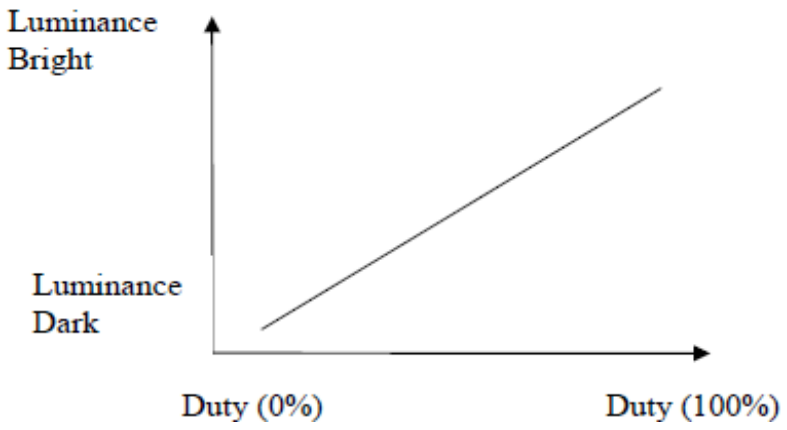
4. Interface Description

PIN	PIN NAME	DESCRIPTION	Remark
1	VCOM	Common Voltage	
2	VDD	Power Supply	
3	VDD		
4	NC	No connection	
5	NC		
6	NC		
7	GND	Ground	
8	Rxin0-	-LVDS Differential Data Input	R0~R5,G0
9	Rxin0+	+LVDS Differential Data Input	
10	GND	Ground	
11	Rxin1-	-LVDS Differential Data Input	G1~G5,B0, B1
12	Rxin1+	+LVDS Differential Data Input	
13	GND	Ground	
14	Rxin2-	-LVDS Differential Data Input	B2~B5,HS, VS,DE
15	Rxin2+	+LVDS Differential Data Input	
16	GND	Ground	
17	RxCLK-	-LVDS Differential Clock Input	LVDS CLK
18	RxCLK+	+LVDS Differential Clock Input	
19	GND	Ground	
20	Rxin3-	-LVDS Differential Data Input	R6,R7,G6,G7, B6,B7
21	Rxin3+	+LVDS Differential Data Input	
22	GND	Ground	
23	NC	No connection	
24	NC		
25	GND	Ground	
26	NC	No connection	
27	LED_PWM	CABC controller signal output for backlight	Note2
28	NC	No connection	
29	AVDD	Power for Analog Circuit	
30	GND	Ground	
31	LEDK	LED Cathode	
32	LEDK	LED Cathode	
33	NC	No connection	
34	NC		
35	VGL	Gate OFF Voltage	
36	NC	No connection	
37	CABC_EN	CABC Enable Input	Note1
38	VGH	Gate ON Voltage	
39	LEDA	LED Anode	
40	LEDA	LED Anode	

Note1: The setting of CABC function are as follows.

Pin	Enable	Disable
CABC_EN	High Voltage	Low Voltage or open

Note2: LED_PWM is used to adjust backlight brightness.



5. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Min.	Max.	Unit	Remark
Digital Supply Voltage	VDD	-0.3	3.9	V	
Analog Supply Voltage	AVDD	-0.3	14	V	
Gate On Voltage	V_{GH}	-0.3	42	V	
Gate Off Voltage	V_{GL}	-19	0.3	V	
Gate On ~ Gate Off Voltage	V_{GH}-V_{GL}	12	40	V	
Operating Temperature	T_{OP}	-20	70	°C	
Storage Temperature	T_{ST}	-30	80	°C	
LED Reverse Voltage	V_F	2.1	3.1	V	I_F=20mA
LED Forward Current	I_R	-	50	mA	V_R=5V

Current Consumption

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
High Supply for Current	I_{GH}	-	705	750	uA	V_{GH} =22V
Low Supply for Current	I_{GL}	-	705	750	uA	V_{GL} = -7V
Logic Supply for Current	IV_{DD}	-	95	120	mA	V_{DD} =2.5V
Analog Supply for Current	IA_{VDD}	-	45	70	mA	AV_{DD} =8.2V

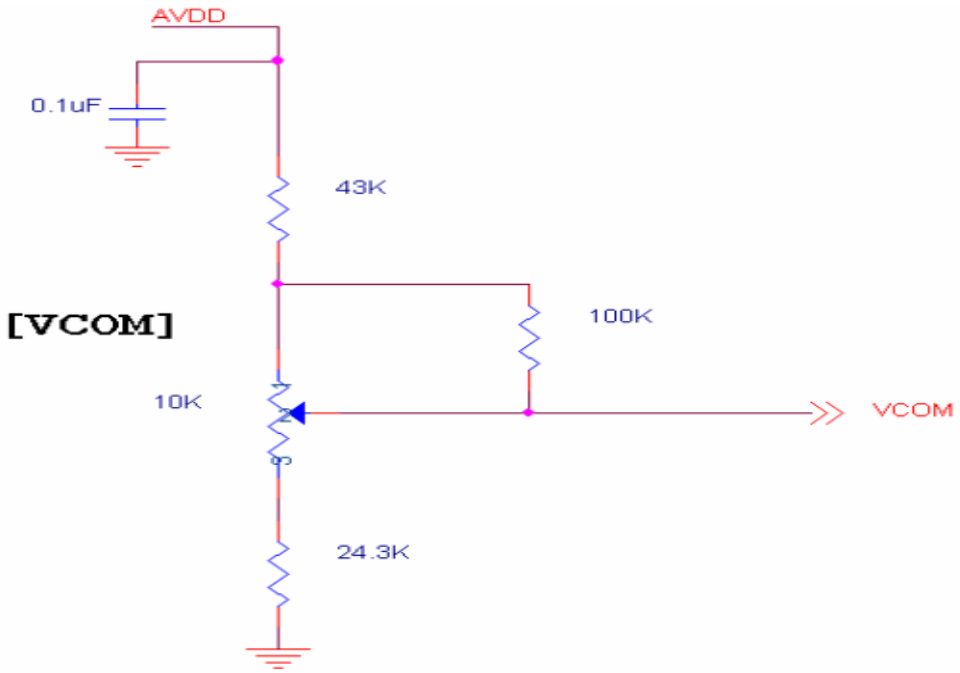
6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Digital Supply Voltage	VDD	2.3	2.5	2.7	V	Note 1 ; Note 2
Analog Supply Voltage	AVDD	8.0	8.2	8.4	V	-
Gate On Voltage	V_{GH}	21.7	22	22.3	V	Note 1
Gate Off Voltage	V_{GL}	-7.3	-7.0	-6.7	V	Note 1
Input signal voltage	VCOM	2.7	3.0	3.3	V	Note 4
Input logic high voltage	V_{IH}	0.8VDD	-	3.6	V	Note 3
Input logic low voltage	V_{IL}	GND	-	0.2DVDD	V	

Note 1: Be sure to apply VDD and V_{GL} to the LCD first, AND THEN APPLY V_{GH}

Note 2: VDD setting should match the signals output voltage (refer to Note 3) of customer's System board

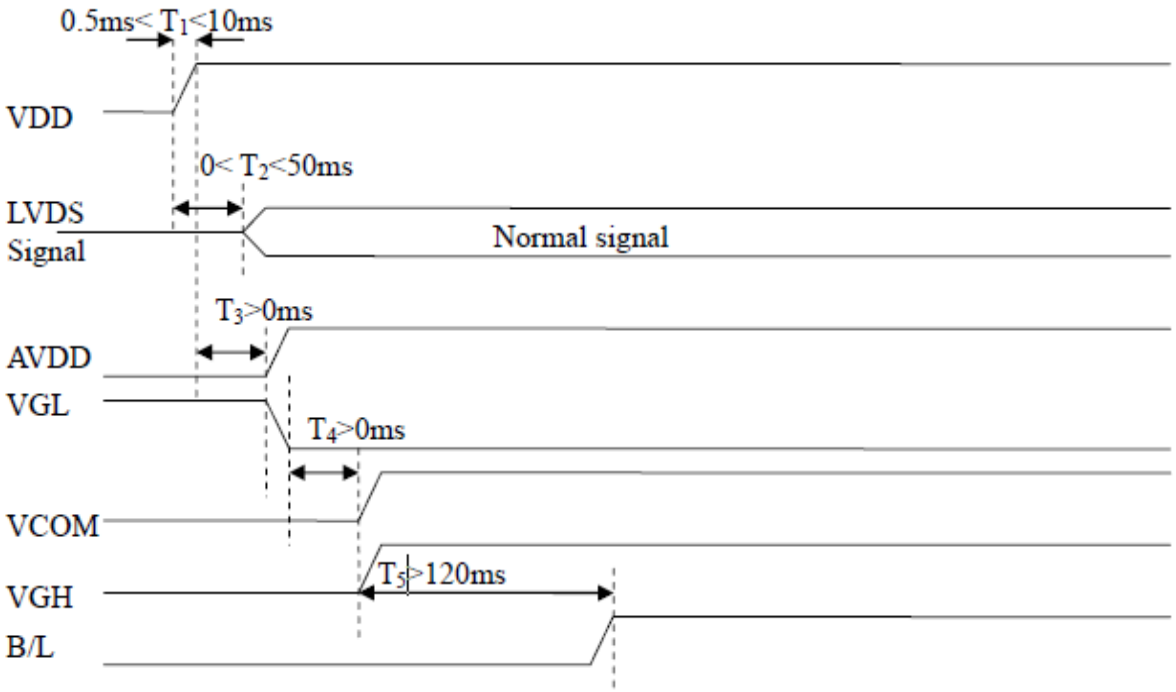
Note 4: Typical VCOM is only a reference value, it must be optimized according to each LCM. Be sure to use VR.



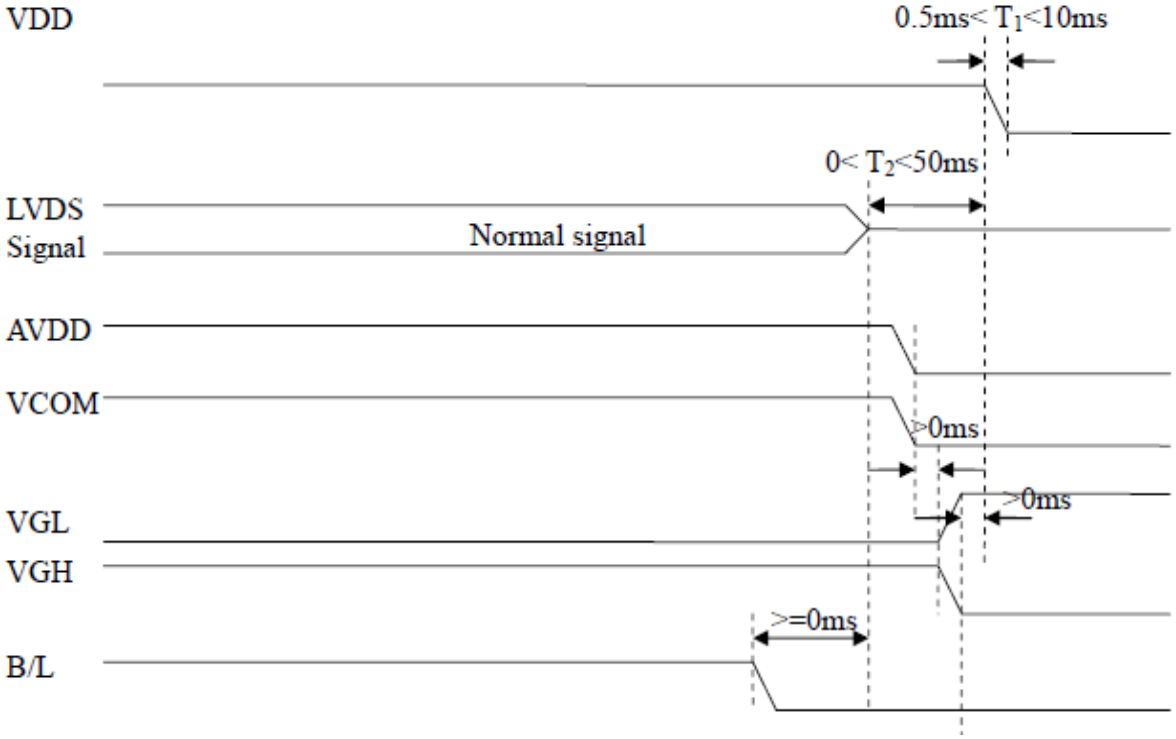
7. Timing Characteristics

7.1 Power Sequence

a. Power on:



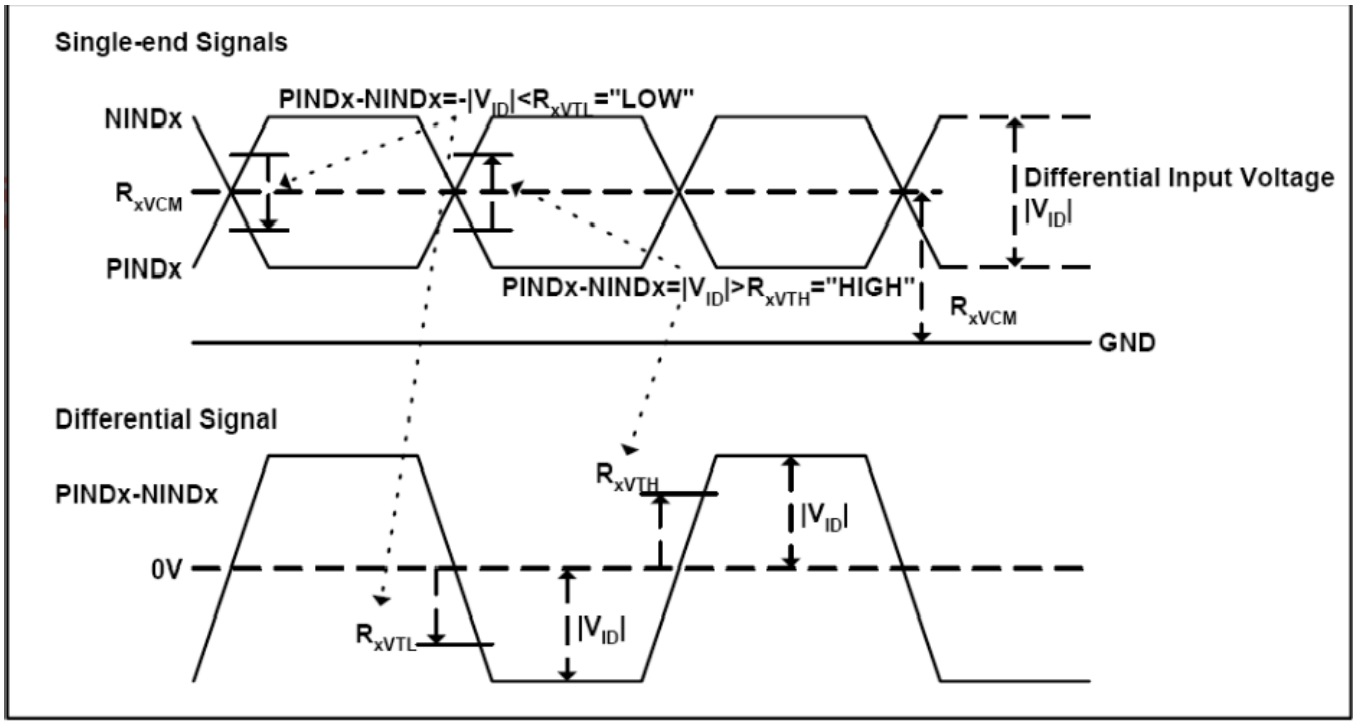
b. Power off:



7.2 LVDS Signal Timing Characteristics

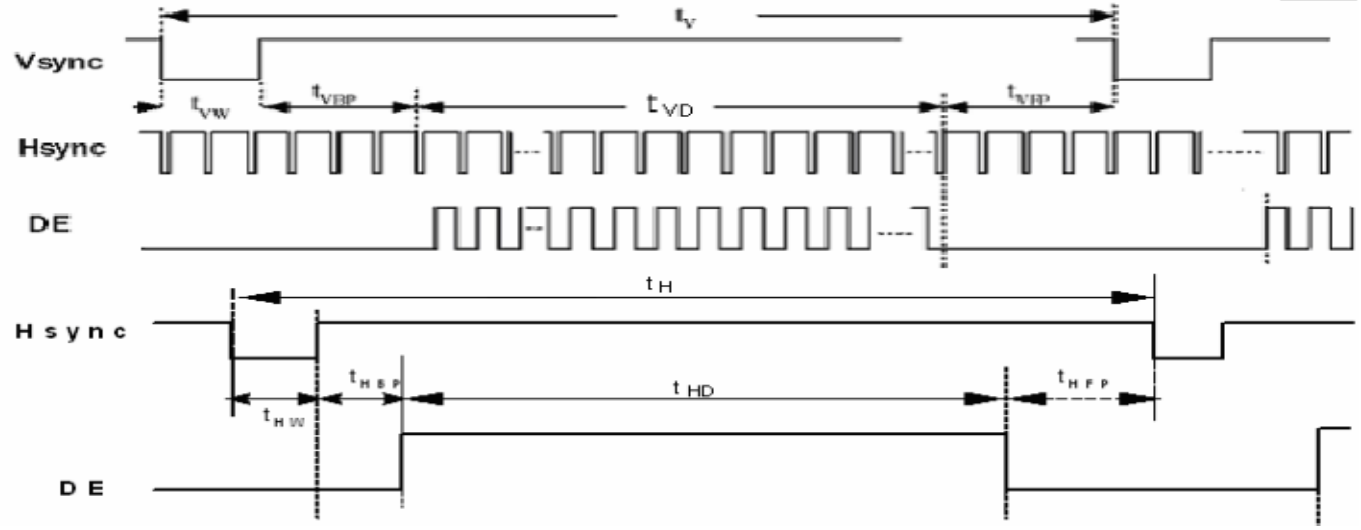
7.2.1 AC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	R_{xVTH}	-	-	+100	mV	R_{XVCM}=1.2V
LVDS Differential input low Threshold voltage	R_{xVTL}	-100	-	-	mV	
LVDS Differential input common mode voltage	R_{xVCM}	0.7	-	1.6	V	
LVDS Differential voltage	$\|V_{ID}\|$	200	-	600	mV	

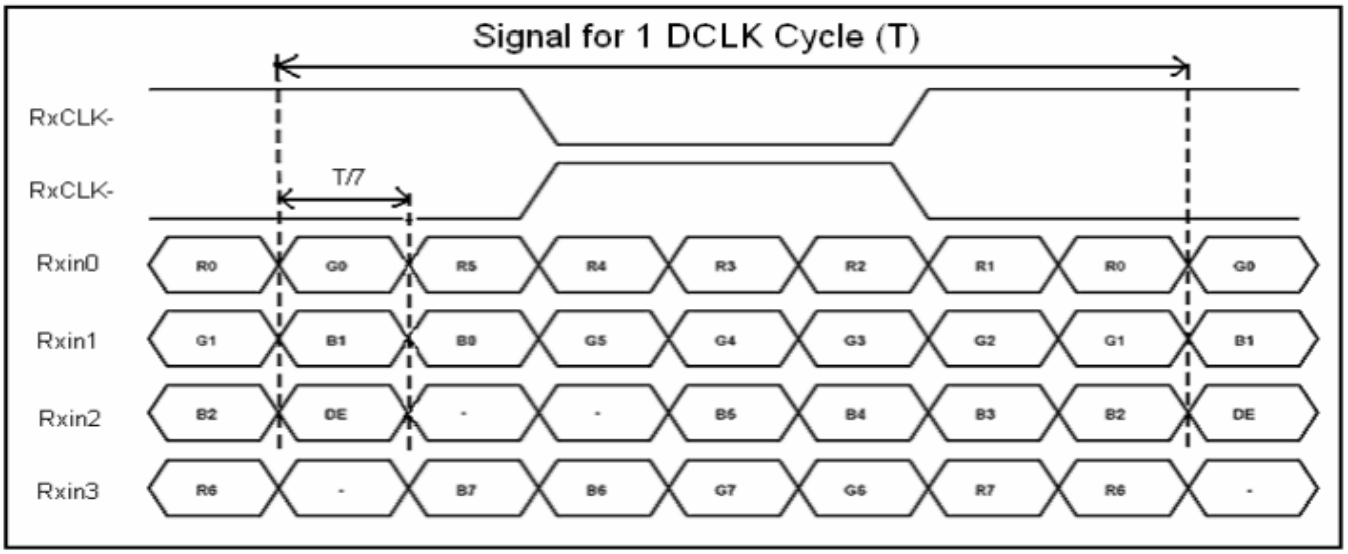


7.2.2 Timing Table

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	1/Tc	(68.9)	71.1	(73.4)	MHz	Frame rate =60Hz
Horizontal display area	tHD		1280		Tc	
HS period time	tH	(1410)	1440	(1470)	Tc	
HS Width +Back Porch +Front Porch	tHW+ tHBP +tHFP	(60)	160	(190)	Tc	
Vertical display area	tVD		800		tH	
VS period time	tV	(815)	823	(833)	tH	
VS Width +Back Porch +Front Porch	tVW+ tVBP +tVFP	(15)	23	(33)	tH	



7.2.3 LVDS Data Input Format


Signal for 1 DCLK Cycle (T)
RxCLK-
RxCLK-
T/7
Rxin0
R0
G0
R5
R4
R3
R2
R1
R0
G0
Rxin1
G1
B1
B0
G5
G4
G3
G2
G1
B1
Rxin2
B2
DE
-
-
B5
B4
B3
B2
DE
Rxin3
R6
-
B7
B6
G7
G6
R7
R6
-

8. Backlight Characteristic

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	8.1	(8.8)	9.3	V	Note 1
Current for LED backlight	I_L	180	200	220	mA	
LED life time	-	15000		-	Hr	Note 2

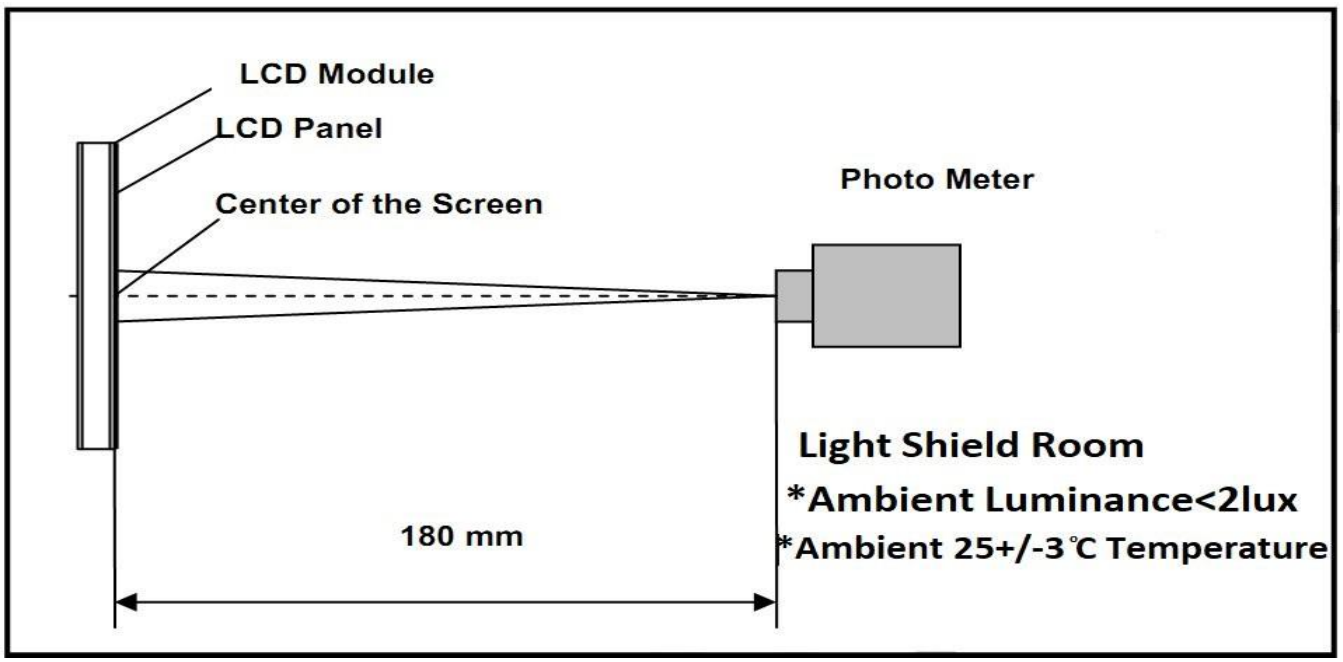
Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and I_L=200mA

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original Brightness at Ta=25°C and I_L=200mA. The LED life time could be decreased if operating I_L is larger than 200mA

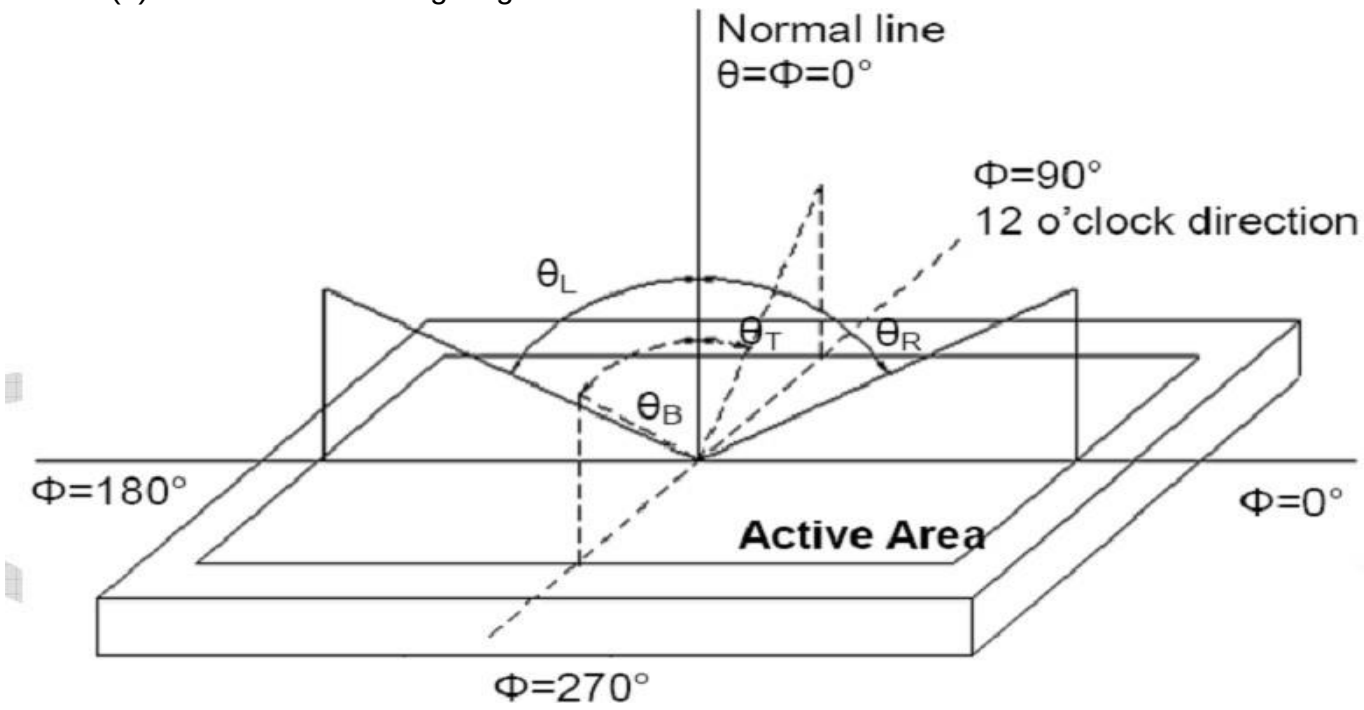
9. Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θ_L	75	85	-	degree	(1),(2),(6)
		θ_R	75	85	-		
	Vertical	θ_T	75	85	-		
		θ_B	75	85	-		
Contrast Ratio	Center		600	800	-	-	(1),(3),(6)
LCM Luminance	Center point		300	350	-	Cd/m^2	
Response Time	Rising		-	10	20	ms	(1),(4),(6)
	Falling		-	15	30		
CF Color Chromaticity (CIE1931)	Red x		Typ. −0.05	0.5778	Typ. +0.05	-	(1), (6)
	Red y			0.3362		-	
	Green x			0.3162		-	
	Green y			0.5920		-	
	Blue x			0.1495		-	
	Blue y			0.1120		-	
	White x			0.2858		-	
	White y			0.3351		-	
Luminance uniformity	Y_U		75	80	-	%	(1)

Note (1) Measurement Setup: The LCD module should be stabilized at given temp. 25°C for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.



Note (2) Definition of Viewing Angle



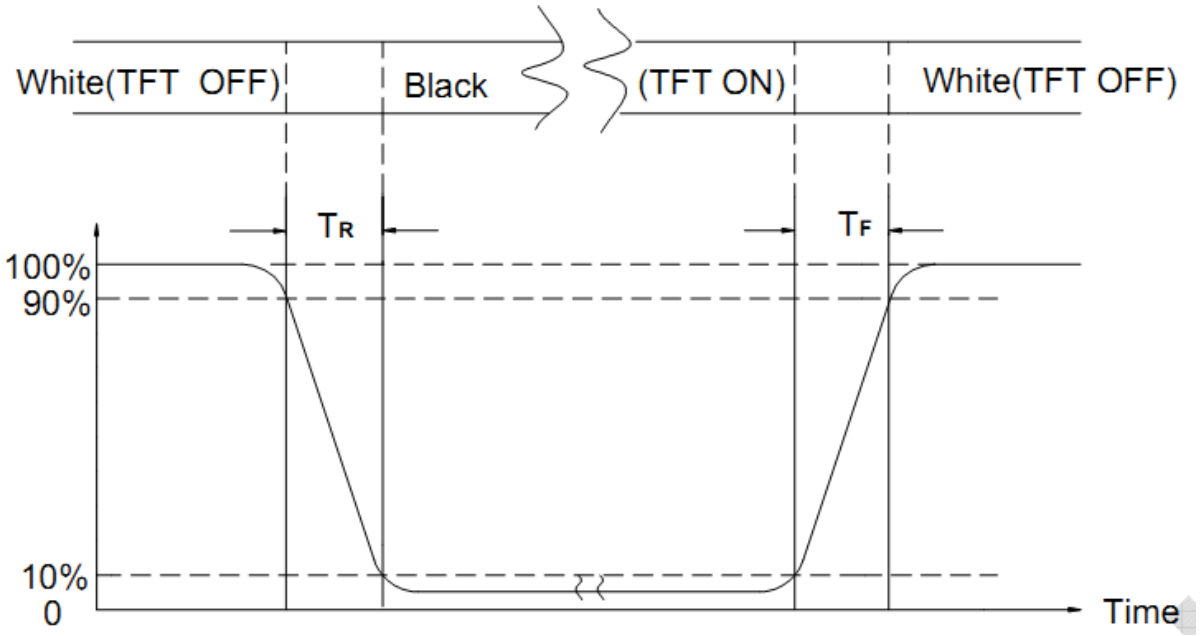
Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L63 / L0

L63: Luminance of gray level 63, L0: Luminance of gray level 0

Note (4) Definition of response time



Note (5) Definition of Transmittance (Module is without signal input)

Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 100%

Note (6) Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD

10. Reliability Test Conditions and Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	80°C±2°C×200Hours	Inspection after 2~4hours storage at room temperature, the samples should be free from defects: 1, Air bubble in the LCD. 2, Seal leak. 3, Non-display. 4, Missing segments. 5, Glass crack. 6, Current IDD is twice higher than initial value. 7, The surface shall be free from damage. 8, The electric characteristic requirements shall be satisfied.
②	Low Temperature Storage	-30°C±2°C×200Hours	
③	High Temperature Operating	70°C±2°C×120Hours	
④	Low Temperature Operating	-20°C±2°C×120Hours	
⑤	Temperature Cycle(Storage)	-20°C ⟺ 25°C ⟺ 70°C (30min) (5min) (30min) 1cycle Total 10cycle	
⑥	Damp Proof Test (Storage)	50°C±5°C×90%RH×120Hours	
⑦	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5M X,Y,Z direction for total 3hours (packing condition test will be tested by a carton)	
⑧	Drooping Test	Drop to the ground from 1M height one time every side of carton. (packing condition test will be tested by a carton)	
⑨	ESD Test	Voltage:±8KV,R:330Ω,C:150PF,Air Mode,10times	

REMARK:
1, The Test samples should be applied to only one test item.
2, Sample side for each test item is 5~10pcs.
3,For Damp Proof Test, Pure water(Resistance＞10MΩ)should be used.
4,In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
5, EL evaluation should be accepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
6, Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

11. Inspection Standard

11.1. QUALITY :

THE QUALITY OF GOODS SUPPLIED TO PURCHASER SHALL COME UP TO THE FOLLOWING STANDARD.

11.1.1. THE METHOD OF PRESERVING GOODS

AFTER DELIVERY OF GOODS FROM AMSON TO PURCHASER. PURCHASER SHALL CONTROL THE LCM AT -10℃ TO 40℃ ,AND IT MIGHT BE DESIRABLE TO KEEP AT THE NORMAL ROOM TEMPERATURE AND HUMIDITY UNTIL INCOMING INSPECTION OR THROWING INTO PROCESS LINE.

11.1.2. INCOMING INSPECTION

(A) THE METHOD OF INSPECTION

IF PURCHASER MAKE AN INCOMING INSPECTION , A SAMPLING PLAN SHALL BE APPLIED ON THE CONDITION THAT QUALITY OF ONE DELIVERY SHALL BE REGARDED AS ONE LOT.

(B) THE STANDARD OF QUALITY

ISO-2859-1 (SAME AS MIL-STD-105E) , LEVEL Ⅱ SINGLE PLAN.

CLASS	AQL(%)
CRITICAL	0.4 %
MAJOR	0.65 %
MINOR	1.5 %
TOTAL	1.5 %

EVERY ITEM SHALL BE INSPECTED ACCORDING TO THE CLASS.

(C) MEASURE

IF AS THE RESULT OF ABOVE RECEIVING INSPECTION , A LOT OUT IS DISCOVERED. PURCHASER SHALL BE INFORM SELLER OF IT WITHIN SEVEN DAYS. BUT FIRST SHIPMENT WITHIN FOURTEEN DAYS.

11.1.3. WARRANTY POLICY

AMSON WILL PROVIDE ONE-YEAR WARRANTY FOR THE PRODUCTS ONLY IF UNDER SPECIFICATION OPERATING CONDITIONS. AMSON WILL REPLACE NEW PRODUCTS FOR THESE DEFECT PRODUCTS WHICH UNDER WARRANTY PERIOD AND BELONG TO THE RESPONSIBILITY OF AMSON.

11.2. CHECKING CONDITION

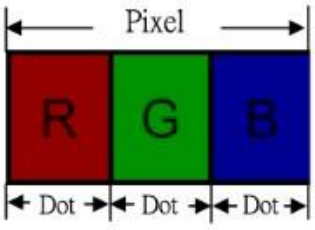
11.2.1. CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.

11.2.2. CHECKER SHALL SEE OVER 300±25 mm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

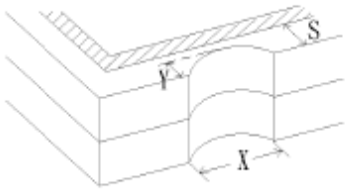
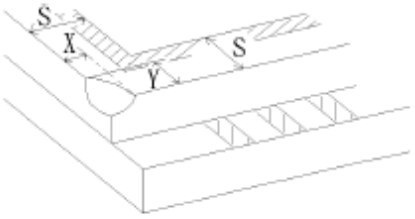
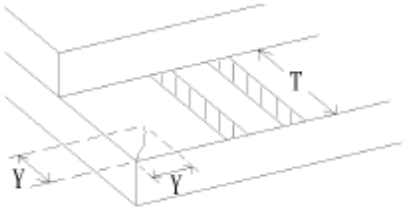
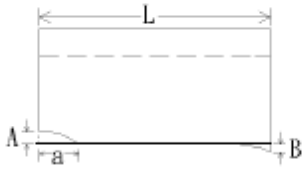
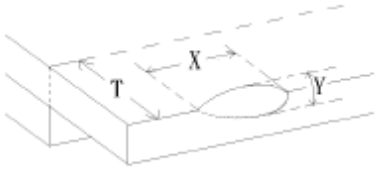
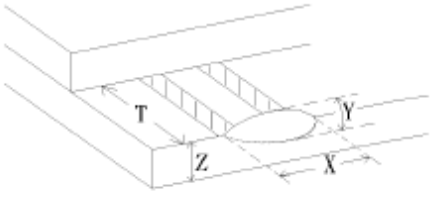
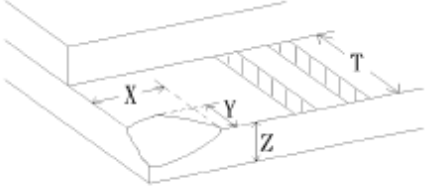
11.3. INSPECTION PLAN :

CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED.....REJECTED QUANTITY SHORT OR OVER.....REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE ON THE PRODUCT	Major
ASSEMBLY	4. DIMENSION, LCD GLASS SCRATCH AND SCRIBE DEFECT.	ACCORDING TO SPECIFICATION OR DRAWING.	Major
APPEARANCE	5. VIEWING AREA	POLARIZER EDGE OR LCD'S SEALING LINE IS VISABLE IN THE VIEWING AREA .....REJECTED	Minor
	6. BLEMISH、BLACK SPOT、 WHITE SPOT IN THE LCD AND LCD GLASS CRACKS	ACCORDING TO STANDARD OF VISUAL INSPECTION(INSIDE VIEWING AREA)	Minor
	7. BLEMISH、BLACK SPOT WHITE SPOT AND SCRATCH ON THE POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION(INSIDE VIEWING AREA)	Minor
	8. BUBBLE IN POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION(INSIDE VIEWING AREA)	Minor
	9. LCD'S RAINBOW COLOR	STRONG DEVIATION COLOR (OR NEWTON RING) OF LCD.....REJECTED. OR ACCORDING TO LIMITED SAMPLE (IF NEEDED, AND INSIDE VIEWING AREA)	Minor
ELECTRICAL	10. ELECTRICAL AND OPTICAL CHARACTERISTICS (CONTRAST、VOP、 CHROMATICITY ... ETC)	ACCORDING TO SPECIFICATION OR DRAWING . (INSIDE VIEWING AREA)	Critical
	11.MISSING LINE	MISSING DOT、LINE、CHARACTER ....REJECTED	Critical
	12.SHORT CIRCUIT、 WRONG PATTERN DISPLAY	NO DISPLAY、WRONG PATTERN DISPLAY、CURRENT CONSUMPTION OUT OF SPECIFICATION..... REJECTED	Critical
	13. DOT DEFECT (FOR COLOR AND TFT)	ACCORDING TO STANDARD OF VISUAL INSPECTION	Minor

11.4. STANDARD OF VISUAL INSPECTION

<table>
<tr><th>NO.</th><th>CLASS</th><th>ITEM</th><th>JUDGEMENT</th></tr>
<tr><td>11.4.1</td><td>MINOR</td><td>BLACK AND WHITE SPOT
FOREIGN MATERIEL
DUST IN THE CELL
BLEMISH
SCRATCH</td><td>(A) ROUND TYPE: unit : mm.
<table>
<tr><th>DIAMETER (mm.)</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>Φ ≦ 0.1</td><td>DISREGARD</td></tr>
<tr><td>0.1 < Φ ≦ 0.25</td><td>3 (Distance>5mm)</td></tr>
<tr><td>0.25 < Φ</td><td>0</td></tr>
</table>
NOTE: Φ=(LENGTH+WIDTH)/2
(B) LINEAR TYPE: unit : mm.
<table>
<tr><th>LENGTH</th><th>WIDTH</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>------</td><td>W ≦0.03</td><td>DISREGARD</td></tr>
<tr><td>L ≦ 5.0</td><td>0.03 < W ≦0.07</td><td>3 (Distance>5mm)</td></tr>
<tr><td>------</td><td>0.07 < W</td><td>FOLLOW ROUND TYPE</td></tr>
</table></td></tr>
<tr><td>11.4.2</td><td>MINOR</td><td>BUBBLE IN POLARIZER
DENT ON POLARIZER</td><td>unit : mm.
<table>
<tr><th>DIAMETER</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>Φ ≦ 0.2</td><td>DISREGARD</td></tr>
<tr><td>0.2 < Φ ≦ 0.5</td><td>2 (Distance>5mm)</td></tr>
<tr><td>0.5 < Φ</td><td>0</td></tr>
</table></td></tr>
<tr><td>11.4.3</td><td>MINOR</td><td>Dot Defect</td><td>
<table>
<tr><th>Items</th><th>ACC. Q'TY</th></tr>
<tr><td>Bright dot</td><td>N≦ 4</td></tr>
<tr><td>Dark dot</td><td>N≦ 4</td></tr>
</table>
Pixel Define :
 

Note 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.
Note 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
Note 3: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green ,blue pattern.</td></tr>
</table>

NO.	CLASS	ITEM	JUDGEMENT
11.4.4	MINOR	LCD GLASS CHIPPING	 Y > S Reject
11.4.5	MINOR	LCD GLASS CHIPPING	 X or Y > S Reject
11.4.6	MAJOR	LCD GLASS GLASS CRACK	 Y > (1/2) T Reject
11.4.7	MAJOR	LCD GLASS SCRIBE DEFECT	 1. a> L/3 , A>1.5mm. Reject 2. B : ACCORDING TO DIMENSION
11.4.8	MINOR	LCD GLASS CHIPPING (ON THE TERMINAL AREA)	 Φ= (x+y)/2 > 2.5 mm Reject
11.4.9	MINOR	LCD GLASS CHIPPING (ON THE TERMINAL SURFACE)	 Y > (1/3) T Reject
11.4.10	MINOR	LCD GLASS CHIPPING	 Y > T Reject

12. Handling Precautions

12.1 Mounting method

The LCD panel of HIGHNESS TFT module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

12.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent

[Recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (CI), Sulfur (S) from customer, Responsibility is on customer.

12.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to Power or Ground, do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

12.4 packing

- Module employs LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

12.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.

- Slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

12.6 storing

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it. And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.

[It is recommended to store them as they have been contained in the inner container at the time of delivery from us

12.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

13. Precaution for Use

13.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

13.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to YUXIANG TFT , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.