Specification for Approval

Customer:_____

Model Name:_____

Supplier Approval			Customer approval
R&D Designed	R&D Approved	QC Approved	
Peter	*Peng Jun*		

Revision Record

REV NO.	REV DATE	CONTENTS	Note
A	2017-05-15	NEW ISSUE	

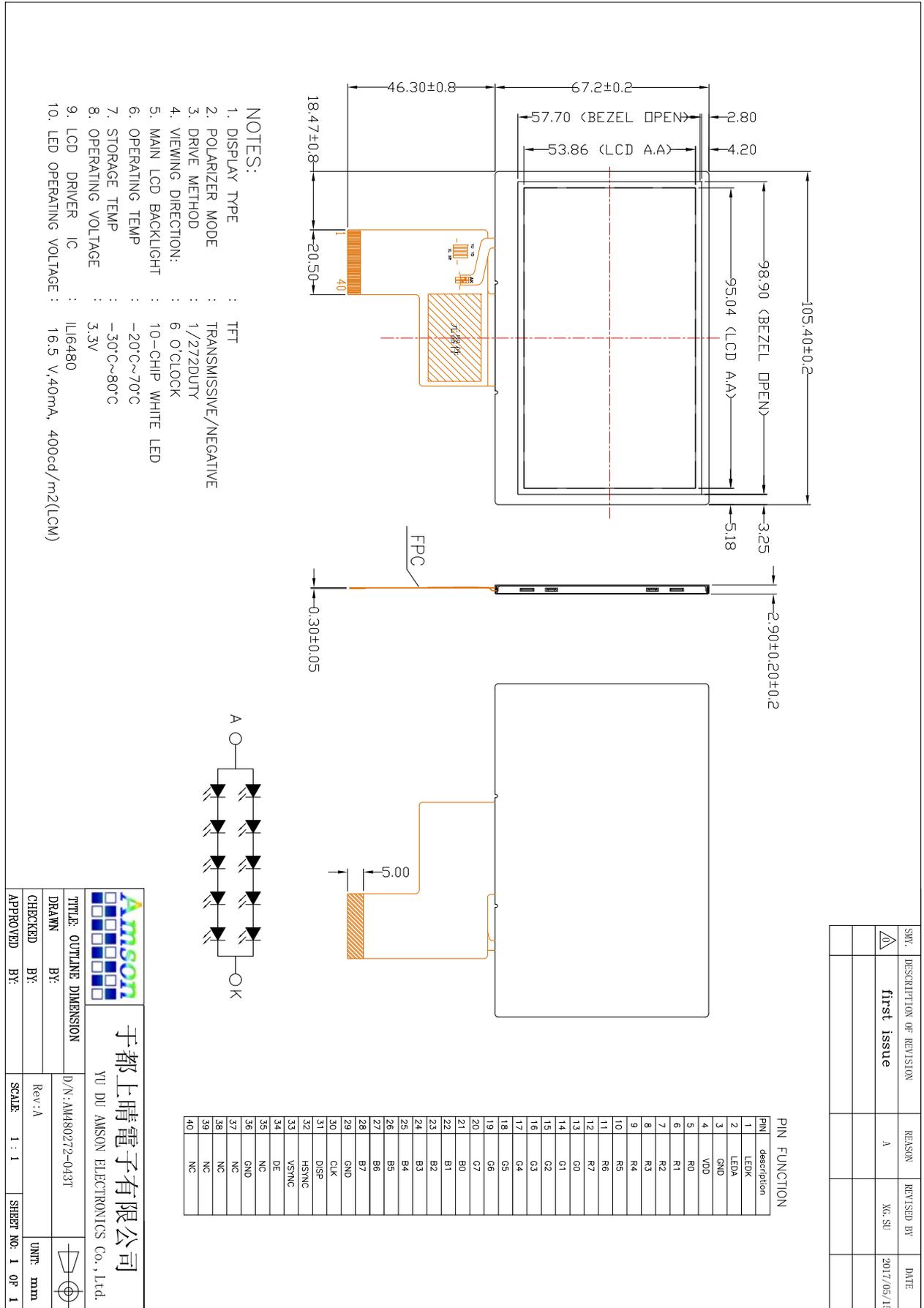# Table of Contents

1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied by AMSON electronics.

If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution.

2. General Information

ITEM	STANDARD VALUES	UNITS
LCD type	4.3"TFT	--
Dot arrangement	480(RGB)×272	dots
Color filter array	RGB vertical stripe	--
Display mode	TN / Transmission / Normally White	-
Gray Scale Inversion Direction	6 O'clock	--
Eyes　Viewing Direction	12 O'clock	--
Driver IC	ILI6480	--
Module size	105.5(W)×67.2(H)×2.9(T)	mm
Active area	95.04(W)×53.86(H)	mm
Interface	24bit RGB	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Back Light	10 White LED	--
Weight	TBD	g

3. External Dimensions

NOTES:
1. DISPLAY TYPE : TFT
2. POLARIZER MODE : TRANSMISSIVE/NEGATIVE
3. DRIVE METHOD : 1/272DUTY
4. VIEWING DIRECTION: 6 O'CLOCK
5. MAIN LCD BACKLIGHT : 10-CHIP WHITE LED
6. OPERATING TEMP : -20°C~70°C
7. STORAGE TEMP : -30°C~80°C
8. OPERATING VOLTAGE : 3.3V
9. LCD DRIVER IC : ILI6480
10. LED OPERATING VOLTAGE : 16.5 V,40mA, 400cd/m2(LCM)

PIN	description
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	CLK
31	DISP
32	HSYNC
33	VSYNC
34	DE
35	NC
36	GND
37	NC
38	NC
39	NC
40	NC

PIN FUNCTION

TITLE: OUTLINE DIMENSION
DRAWN BY:
CHECKED BY:
APPROVED BY:

于都上晴電子有限公司
YU DU AMSON ELECTRONICS Co.,Ltd.

D/N:AM480272-043T
Rev:A
SCALE: 1:1
SHEET NO: 1 OF 1
UNIT: mm

SMK.	DESCRIPTION OF REVISION	REASON	REVISED BY	DATE
	first issue	A	XG. SU	2017/05/15

4. Interface Description

PIN NO.	PIN NAME	DESCRIPTION
1	LEDK	LED backlight (Cathode).
2	LEDA	LED backlight (Anode).
3	GND	Ground for logic.
4	VDD	Power supply for voltage
5-12	R0-R7	Red Data.
13-20	G0-G7	Green Data.
21-28	B0-B7	Blue Data.
29	GND	Ground for logic.
30	PCLK	Dot clock signal input. Latching input data at its rising edge.
31	DISP	Display on/off.
32	HSYNC	Horizontal sync input. Negative polarity.
33	VSYNC	Vertical sync input. Negative polarity.
34	DE	Data enable input. Active high to enable the input data bus.
35	NC	No connection
36	GND	Ground for logic.
37	NC	No connection
38	NC	No connection
39	NC	No connection
40	NC	No connection

5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Supply Voltage	VDD	-0.5	5.0	V
Operating Temperature	T_{OP}	-20	70	°C
Storage Temperature	T_{ST}	-30	80	°C

6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Logic Supply Voltage	VDD	2.7	3.3	3.6	V	-
Input High Voltage	V_{IH}	0.7 VDD	-	VDD	V	-
Input Low Voltage	V_{IL}	GND	-	0.3 VDD	V	-
Output High Voltage	V_{OH}	VDD-0.4	-	-	V	-
Output Low Voltage	V_{OL}	GND	-	GND+0.4	V	-
Current Consumption All Black	IDD	-	20	-	mA	-

7. Timing Characteristics
7.1 Power ON Sequence
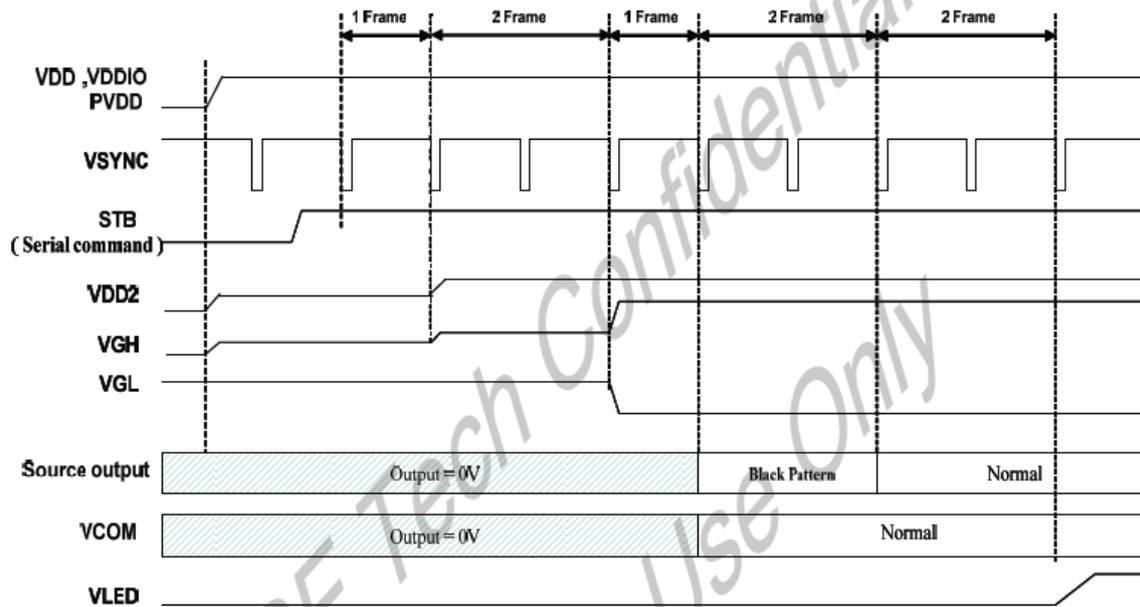
7.2 Power OFF Sequence
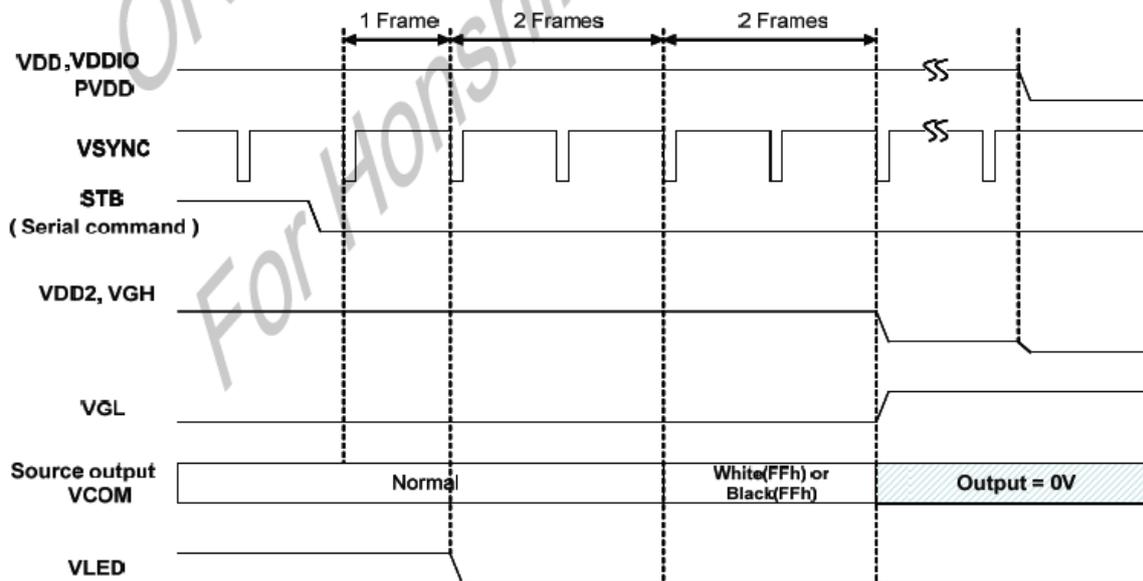
7.3 Clock and Data Input Waveforms
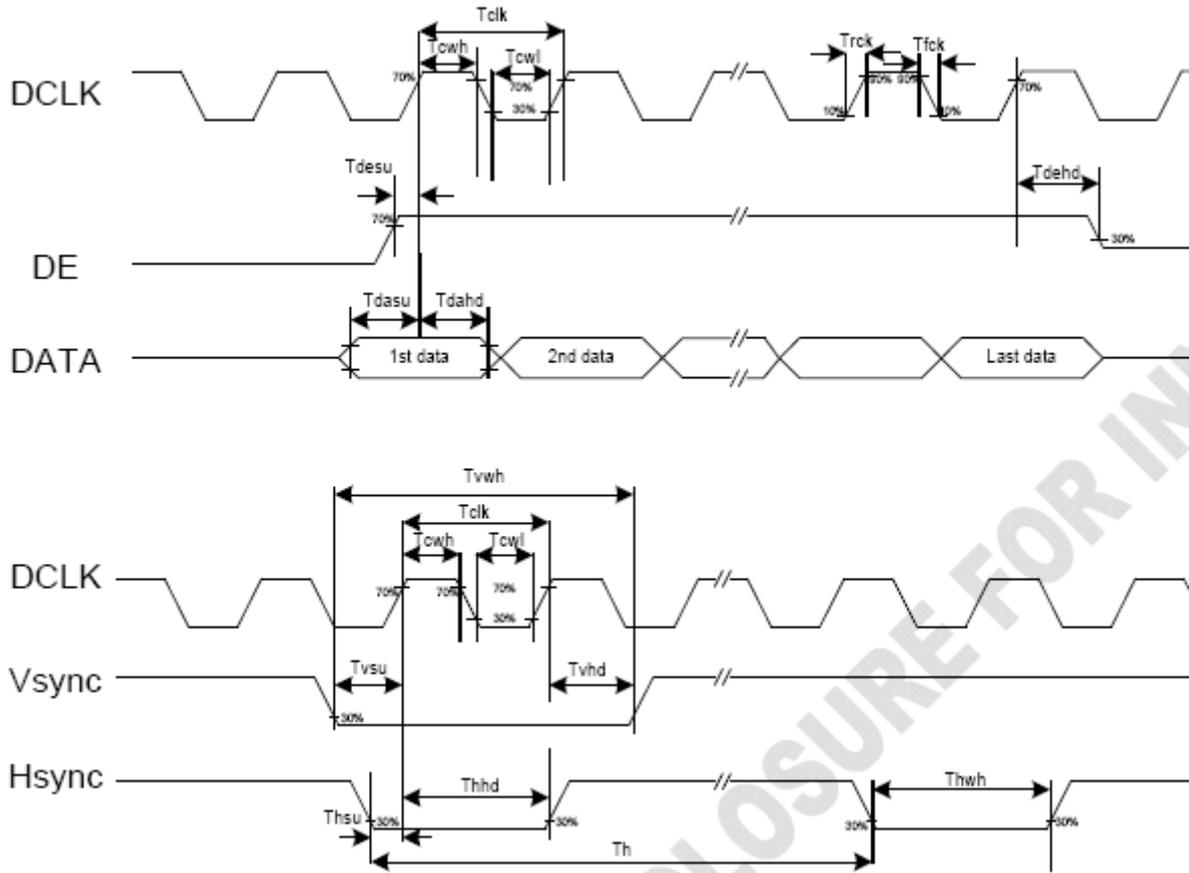
7.4 Input setup Timing requirement

Parallel RGB Mode Data format
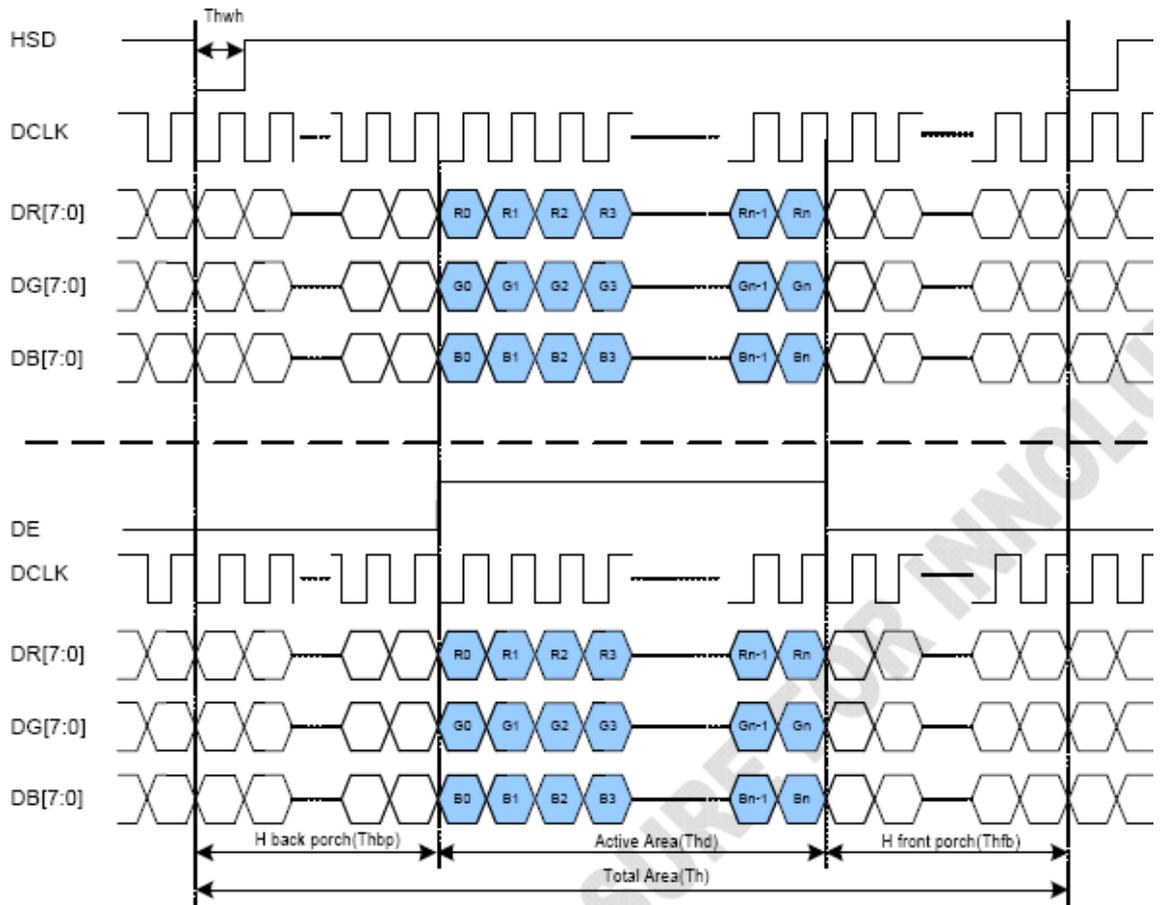
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	5	9	12	MHz
VSD period time	Tv	277	288	400	H
VSD display area	Tvd		272		H
VSD back porch	Tvb	3	8	31	H
VSD front porch	Tvfp	2	8	97	H
HSD period time	Th	520	525	800	DCLK
HSD display area	Thd		480		DCLK
HSD back porch	Thbp	36	40	255	DCLK
HSD front porch	Thfp	4	5	65	DCLK

Serial 8-bit RGB Mode Data format

Vertical input timing
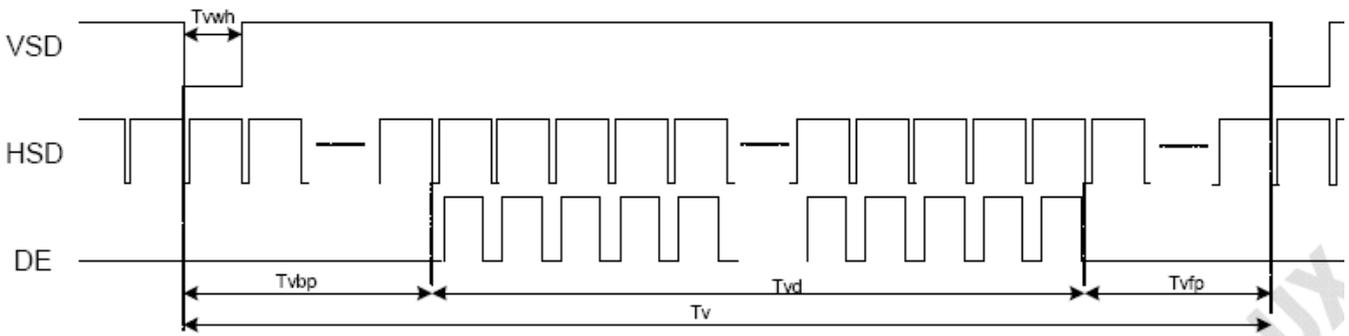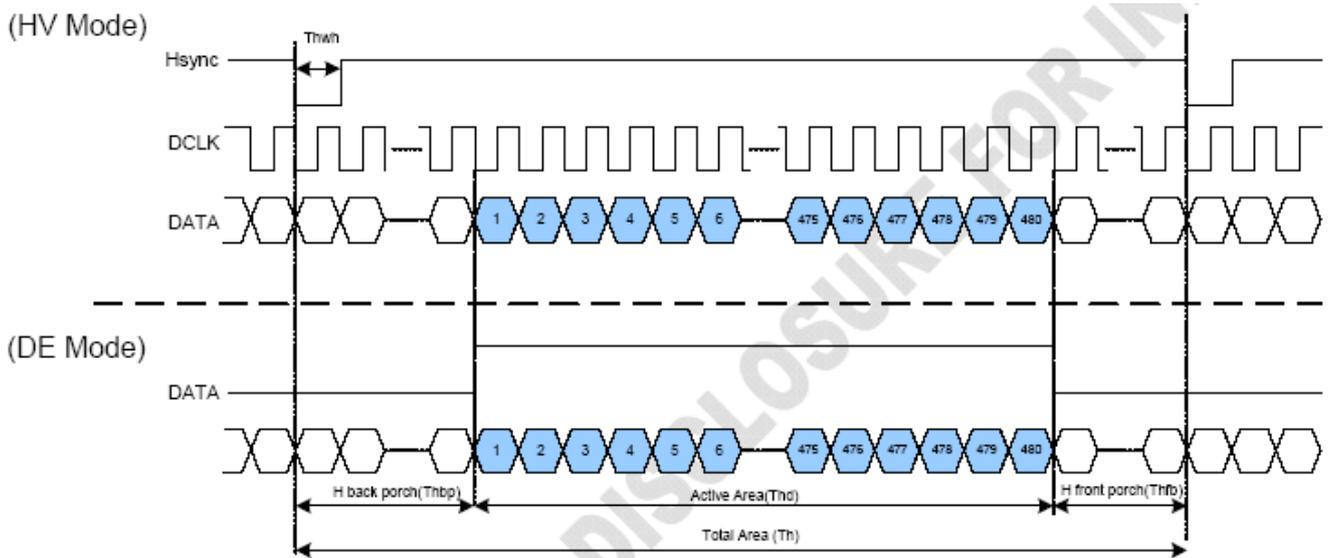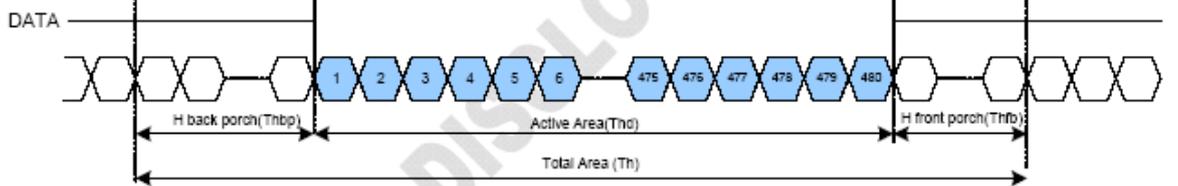
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	-	27	-	MHz
VSD period time	Tv	277	288	400	H
VSD display area	Tvd		272		H
VSD back porch	Tvb	3	8	31	H
VSD front porch	Tvfp	2	8	97	H
HSD period time	Th	-	1728	-	DCLK
HSD display area	Thd		1440		DCLK

8. Backlight Characteristic

K 1 —▷|—▷|—▷|—▷|—▷|— 4 A

K 2 —▷|—▷|—▷|—▷|—▷|— 3 A
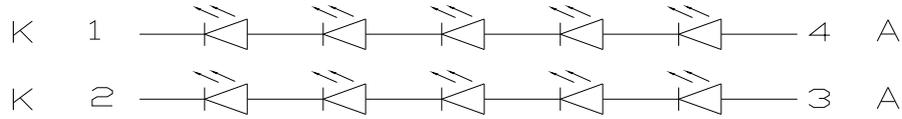
LED CIRCUIT

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	15	16	17	V	If=40mA
Supply Current	If	-	40	-	mA	-
Luminous Intensity for LCM	-	350	400	-	cd/m^2	If=40mA
Uniformity for LCM	-	-	80	-	％	If=40mA
Backlight Color	White					

9. Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	60	70	-	degree	(1),(2),(6)
		θR	60	70	-		
	Vertical	θT	40	50	-		
		θB	60	70	-		
Contrast Ratio	Center		400	500	-	-	(1),(3),(6)
Response Time	T$_R$ + T$_F$		-	25	50	ms	(1),(4),(6)
CF Color Chromaticity (CIE1931)	Red x		Typ. -0.05	0.559	Typ. +0.05	-	(1), (6)
	Red y			0.332		-	
	Green x			0.323		-	
	Green y			0.624		-	
	Blue x			0.143		-	
	Blue y			0.080		-	
	White x			0.288		-	
	White y			0.328		-	

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.
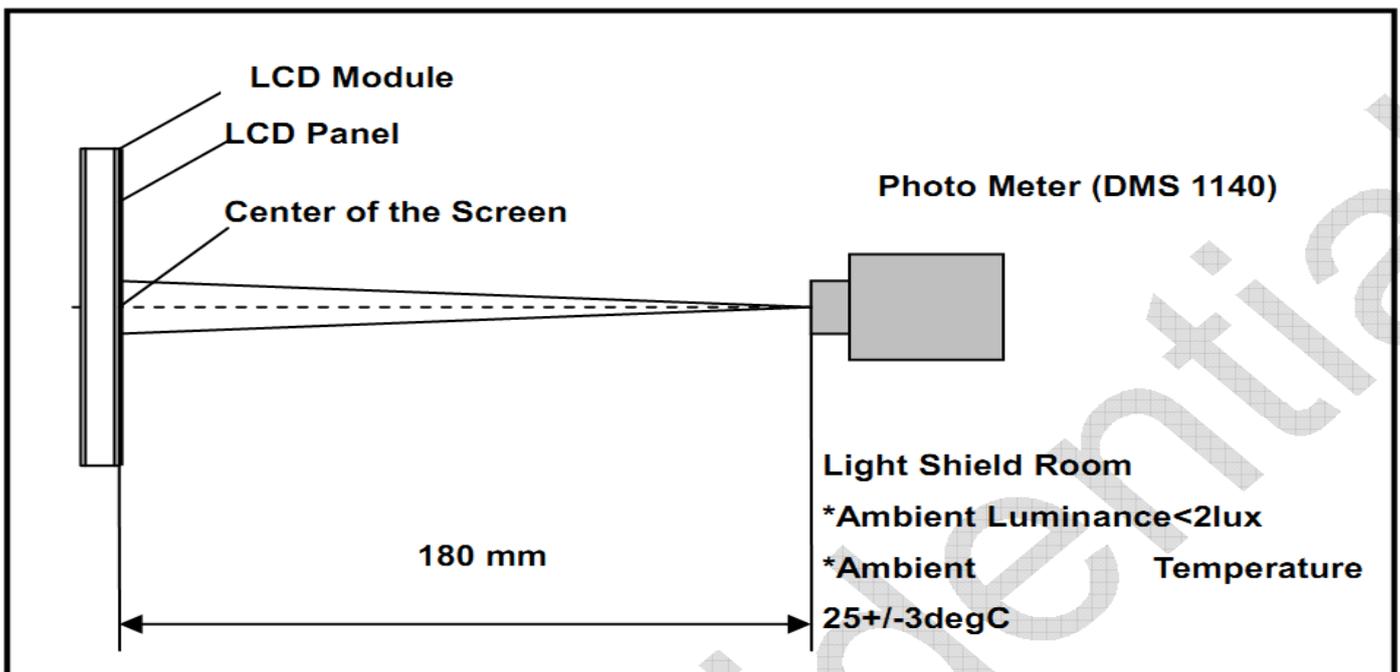
Note (2) Definition of Viewing Angle
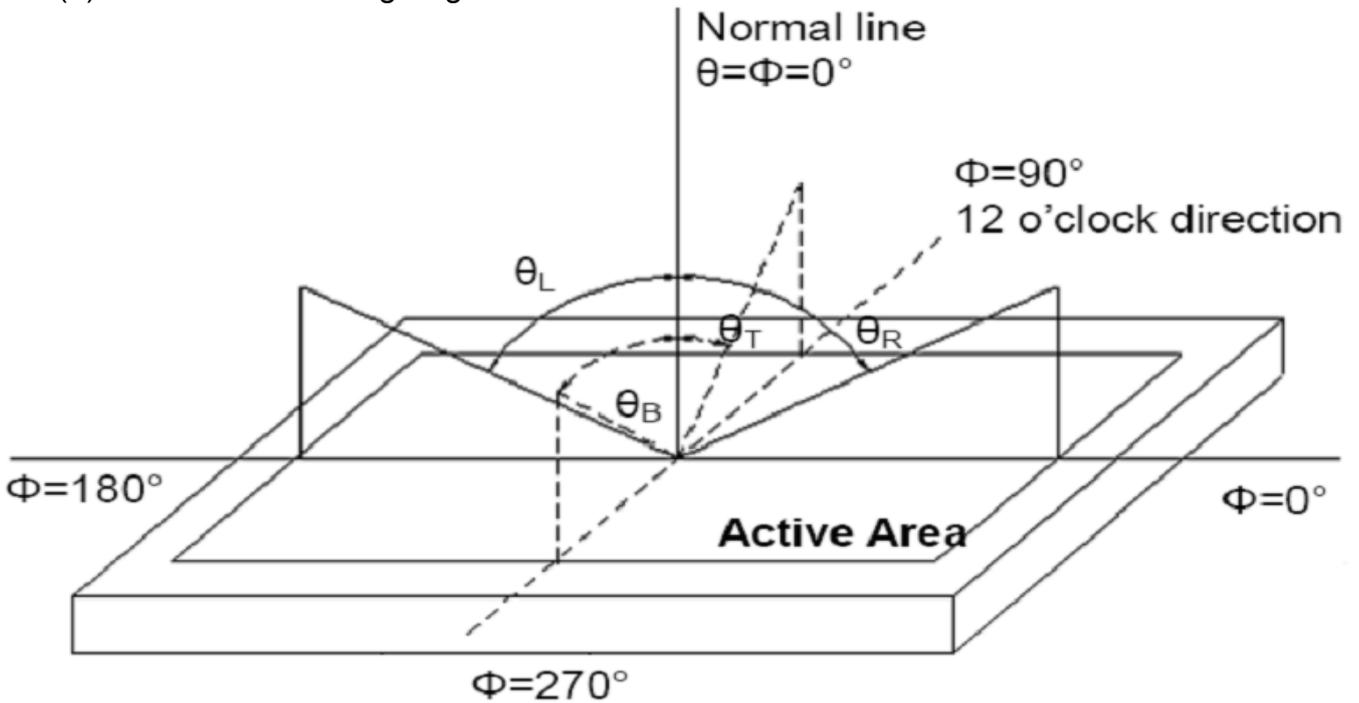
Note (3) Definition of Contrast Ratio (CR)
   The contrast ratio can be calculated by the following expression
   Contrast Ratio (CR) = L63 / L0

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

Note (4) Definition of response time
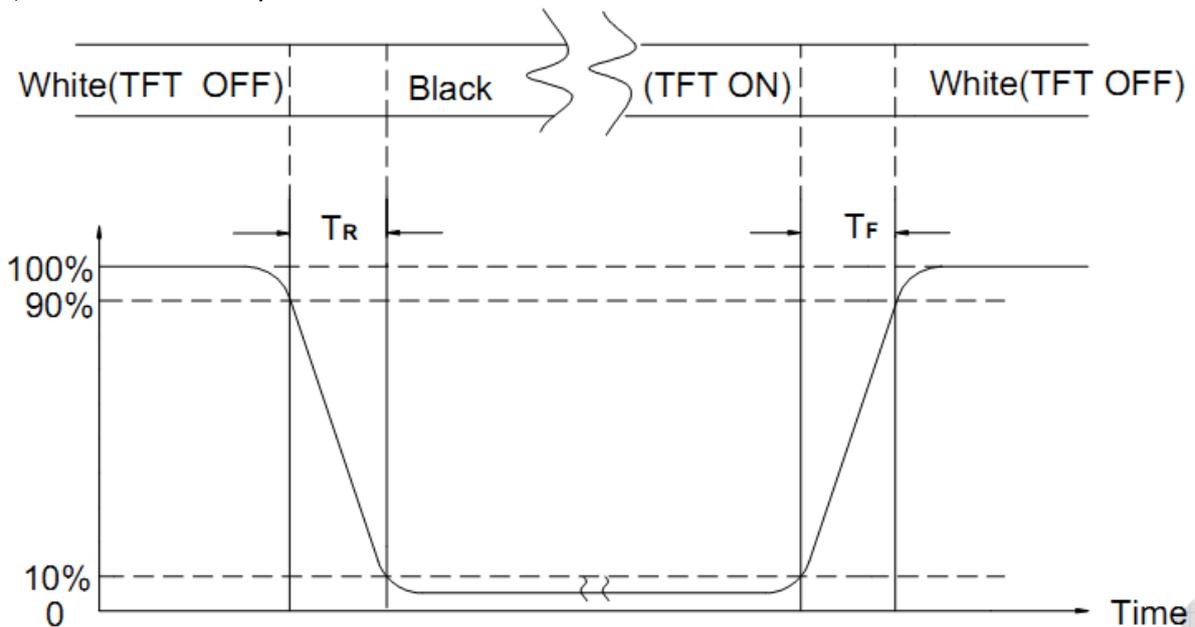
Note (5) Definition of Transmittance (Module is without signal input)
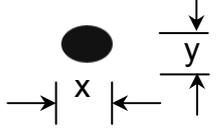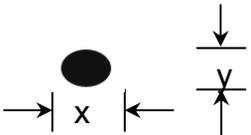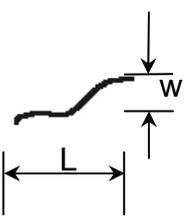   Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 100%

Note (6) Definition of color chromaticity (CIE1931)
      Color coordinates measured at the center point of LCD

10. Reliability Test Conditions and Methods
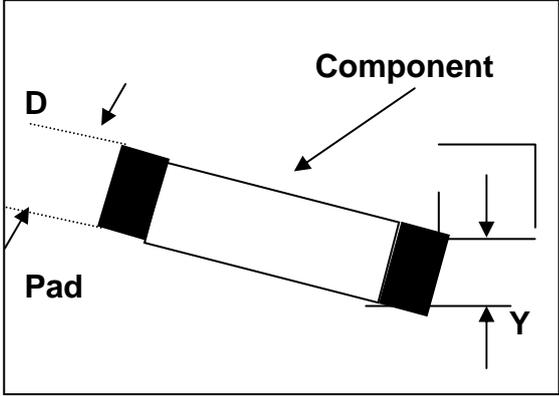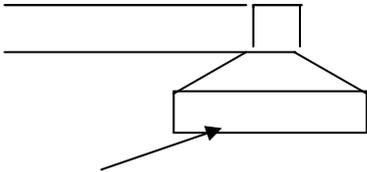
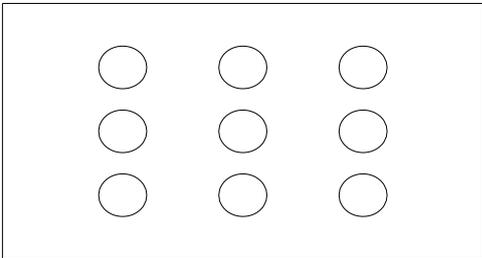| NO	Item	Condition	Method
1	High / Low Temperature Storage	80℃/-30℃ 120hrs	Check and record every 48Hrs
2	High / Low Temperature Life	70℃/-20℃ 120hrs (operating mode)	Check and record every 48Hrs
3	High Temperature、High Humidity Operating	60℃,90% RH, 96Hrs	Check and record every 48hrs
4	Thermal Shock	-30℃(30Min) ⟶ 25℃(5Min) ⟶ 80℃(30Min) (conversion time, : 5 sec) 20 cycles	Each 10 cycles end , check
5	Vibration	10Hz~55Hz~10Hz Amplitude: 1.5mm 2hrs for each direction(X,Y,Z)	Each direction end, Check the Appearance and Electrical Characteristics
6	Static Electricity	Gap mood: ±1KV~±8KV (10 times air discharge with positive/negative voltage voltage gap : 1kv) Touch mood: ±1KV~±4KV	Each discharge end, Check the Electrical Characteristics
7	Curve	60 Thousand times, 40 times/min 150° (according to die if exist)	Check and record every 2~4 thousand times
8	Slump	Free faller movement for each side、cording、angle (75cm High、6 sides、2 angle、2 cording)	End

11. Inspection Standard

No	Item	Criterion	
01	Outline Dimension	In accord with drawing	
02	Position-finding Dimension Assemble Dimension	In accord with drawing	
03	LCD black spots, white spots (Round type)	Round type: non display 3.1 Small area LCD　　　　Unit : mm 3.2 Large area LCD C-STN : if D＞0.1 , unqualified	
04	LCD black spots, white spots (Line Style)	4.1　　Small　　area　　LCD Unit : mm	

Item 03, 3.1 Small area LCD:

Dimension	Qualified Quantity
D≤0.1	Ignore
0.1＜D≤0.15	2
D＞0.15	0

Item 03, 3.2 Large area LCD:

Dimension	Qualified Quantity
D≤0.1	Ignore
0.1＜D≤0.15	2
0.15＜D≤0.20	1
D＞0.20	0

Item 04, 4.1 Small area LCD:

Length	Width	Qualified Quantity
-	≤0.015	Ignore
≤1.0	0.015＜W≤	2
≤2.0	0.025	1
≤1.0	0.025＜W≤ 0.05	1
-	D＞0.05	According to circle

<table>
<tr><td colspan="3" align="center">4.2Large area LCD</td></tr>
</table>

Length	Width	Qualified Quantity
-	≤0.015	Ignore
L≤2.0	0.015＜W≤0.025	2
≤1.0	0.025＜W≤0.05	1
-	D＞0.05	According to circle

CSTN : If W ≥ 0.015 , unqualified
Ignore beyond viewing area

05	LCD Scratch 、 Threadlike Fiber	Same to NO.3 circle sightline and surface of LCD is vertical (2)Same to NO.3 line style	
06	POL	It is not admissible that POL is beyond the edge of glass, else, unqualified. It is essential that POL is over the 50 percent of width of frame , else ,unqualified. According to the drawing in case of special definition.	

07	IC/FPC Bonding	Scratch	Reject
		Intensity Of Adhesion	If lower than specification, reject
		Gold Fold Twist	Reject

07	IC/FPC Bonding	Silicon	According to outline, no gold outside, seal can not be higher than LCD
		FPC Gold Sever	Reject

08	SMT	Lack of Component、 Polarity Inverse	If exist, reject
		Leak Solder、 Virtual Solder	If exist, reject
		Short Circuit In Solder Point	If exist, reject
		Tin Ball	If exist, reject
		Tin Acumination	If visual, reject

		Height Solder Point	If higher 0.5mm than component. reject	
		Height of component	Either side higher 0.5mm than component, reject	
		Component Shift	X<3/4Z reject y＞1/3D reject	
08	SMT	Few Tin	If θ≤20° reject	
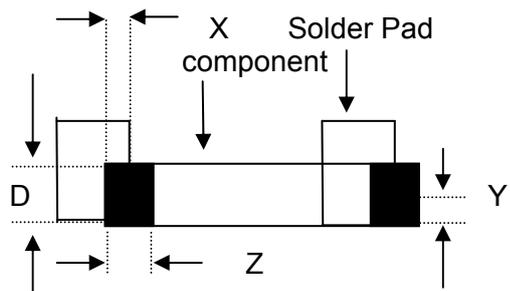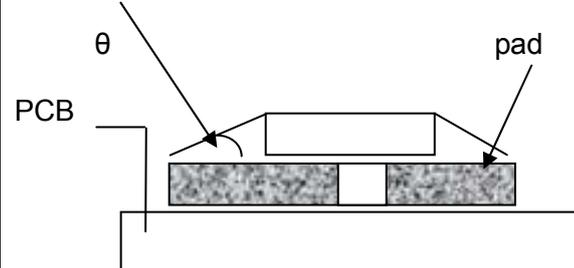
		Component Deflection	If Y >1/3D reject		
		Component Carcass Sideways	Reject		
		Component Carcass Sideways	If exist with visual inspection , reject		
		Lot Tin	A: Tin accrete the solder side completely , hollowly ,Ok B: Tin accrete the solder side completely , full circle arc , ok C: Jointing include whole solder side, height of tin>50 percent of height of component, reject		
		Few Tin	A: Tin accrete the solder side completely , hollowly ,Ok B: height of tin > 1/3 of solder side of component , ok C: height of tin ≤ 1/3 of solder side of component, reject		
08	SMT		Normal Jointing side		
09	Light	Short circuit 、Open circuit	Forbid		

10	Color Of CIE Coordinate		x	y	Drive LCD under normal condition, 25℃ Φ=0 Θ=0 Test white、red、green blue with DMS Record	
		white	±0.05	±0.05		
		Red	±0.05	±0.05		
		Green	±0.05	±0.05		
		Blue	±0.05	±0.05		
		According to the specification or sample customer have approved				

The top row of the table before item 10:

		Quality of CSTN Display	1、Rolling strake with visual inspection, forbid 2、Differentness of color in viewing area with visual inspection (full white、red、green、blue), forbid 3、Display change with visual inspection , forbid	

11	Brightness	In accord with product specification	Drive condition is according to specification Measure location is in Follow Picture 3、Adjust brightness instrument tozero , burrow against the surface of LCD , press "measure" , record when the display is steady. (YOKOGAWA-3298) Measure location	
12	CR (Max)	According to specification	According to product specification Measure instrument (DMS-501)	
13	Response time	According to specification	According to product specification Measure instrument (DMS-501)	
14	Viewing angle	According to specification	According to product specification Measure instrument (DMS-501)	
15	Vibration、Ring	Compare with the sample customer supply	Compare with the sample customer supply when assemble	
16	Frequency Of FPC Bend	According to the use of product (main FPC of foldaway cell phone ≥6 thousand)	Measure instrument Bend angle : 150° Fix FPC in the casement when customer supply	

12. Handling Precautions

12.1 Mounting method

The LCD panel of AMSON 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 (CI) , 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 AMSON 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.

14. Packing Method
TBD