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	2023-11-28	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

LCM

ITEM	STANDARD VALUES	UNITS
LCD type	10.1"TFT	--
Dot arrangement	1920×3(RGB)×1200	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally Black	-
Viewing Direction	80/80/80/80	--
Module size	247(W)×166(H)×11.08(T)	mm
Active area	216.8064(H)*135.504(V)	mm
Dot pitch	0.03764(H)×RGB×0.11292(V)	mm
Interface	Dual LVDS	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
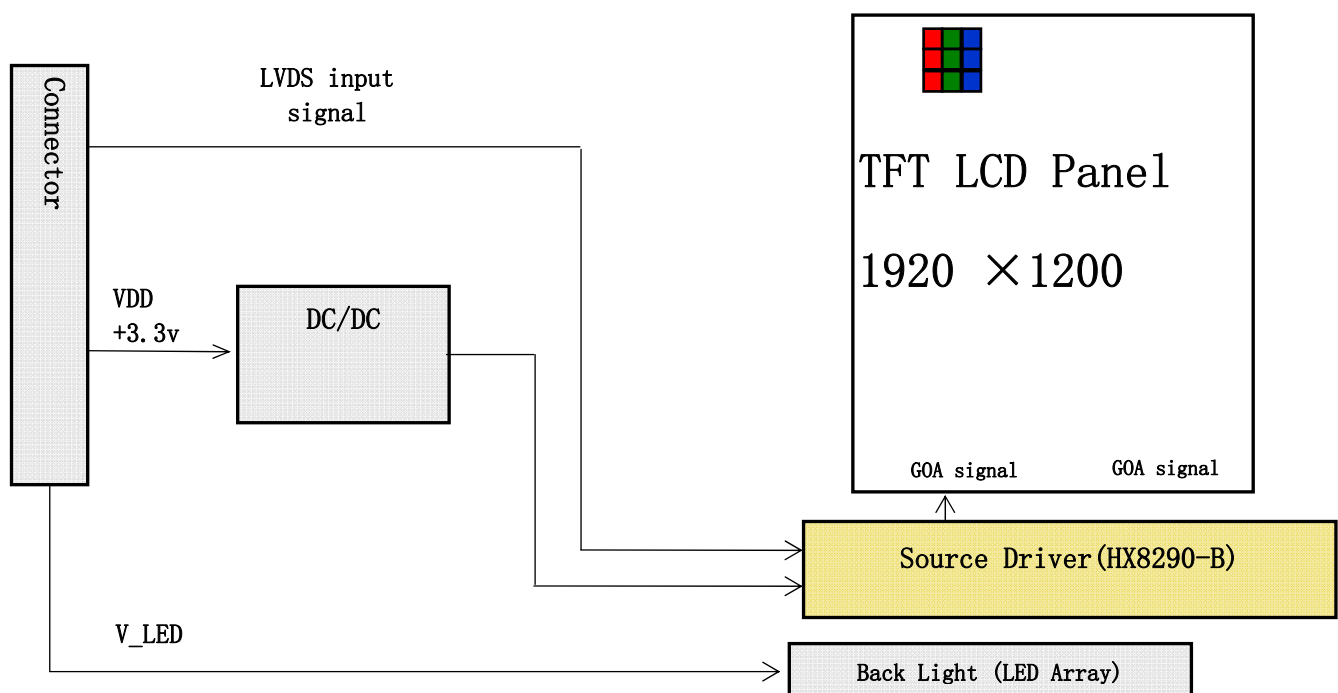
CTP

ITEM	STANDARD VALUES	UNITS
CTP type	Cover Lens + Sensor + FPC	--
CTP Driver IC	EXC80W32	--
Transmittance	≥85％	--
The cover hardness	6H	--
CTP Viewing area	21796(W)×136.60(H)	mm
CTP Interface	I2C/USB	
I2C Address (7 Bits)	-	
Operating temperature	-20 ～ +70	°C
Storage temperature	-30 ～ +80	°C

3. External Dimensions

Notes:
1. Unit:mm.
2. Do not scale drawing.
3. All radii without dimension R0.2.
4. △Modification Mark.
5. draft angle: 1°
6. draft angle: 1°
7. Luminance uniformity: 75%(min)(min/max*100%)
8. Backlight luminance :800cd/m^2(Min) /1000cd/m^2(Typ)
9. UnSpecified Tolerance is ±0.2
10. Operation conditions :If= 200mA, Vf=26.5V(typ)
    Color coordinate:X=0.27-0.35,Y=0.27-0.35
11. All materials comply with RoHS
12. The measured value of luminance and
    color coordinate bases FX's BM-7
13. Check item:1~9

If=200mA·Vf=26.5V

BOE 1920×3(RGB)×1200
ALL VIEWING DIRECTION

166.00(CG 外形)
(149.30)
149.00±0.2(LCM 外形)
138.50±0.2(CG A.A)
135.50(A.A)
72.70
247.00(CG 外形)
228.50±0.2(LCM 外形)
217.96(CTP V.A)
216.81(A.A)
112.99

ROHS

CTP技术参数:
1、工作条件: USB DC-5V / I2C DC-3.3V, 接口界面: USB/I2C;
2、支持操作: 5指;
3、表面硬度: ≥7H;
4、工作环境: -20℃～+70℃;
5、储存环境: -30℃～+80℃;
6、透 光 率: ≥85%;
7、结构类型: G+G(钢化玻璃+ITO 玻璃);
8、出线方式: FPC出线;
9、所用材料均符合ROHS标准;
10、IC 选用: EXC80W32。

CN2
PIN	Definition
1	VBUS
2	D-
3	D+
4	GND

CN1
PIN	Definition
1	GND
2	CTP_VDD
3	SCL
4	SDA
5	INT
6	RESET

3.95
4.95
7.98
14.51
15.09
71.90±0.5
34.76±0.5
7.60Max
Pull PF
Steel Stiffener
AR+AF Coating
3M VHB GPL-060GF T=0.6
228.80(SENSOR 外形)
5.90±0.45(不含泡棉)
5.00 (Cover Lens)
0.70(Sensor)
0.20 (OCA)
0.60 (框贴泡棉)
4.58±0.25(LCM)
11.08±0.3(LCM+CTP)
195.19±0.5(需避空)
(41.22)
45
(19.95)
148.00(SENSOR 外形)
6.70
1.0max(需避空)
10.04
38
32

TITLE: OUTLINE DIMENSION
DRAWN BY:
CHECKED BY:
APPROVED BY:
于都上晴电子有限公司
YU DU AMSON ELECTRONICS Co.,Ltd.
D/N:AM19201200-101BP-A
Rev:A
SCALE: 1:1
SHEET NO. 1 OF 1
UNIT: mm

SYM	DESCRIPTION OF REVISION	REASON	REVISED BY	DATE
△	first issue	A	XG,SU	2023/11/17

PIN		PIN		PIN	
1	VLED-	16	E_D1N	31	O_D1P
2	VLED-	17	E_D1P	32	O_D1N
3	VLED+	18	E_D1N	33	GND
4	VLED+	19	E_D0P	34	O_D0P
5	NC	20	E_D0N	35	O_D0N
6	GND	21	GND	36	GND
7	E_D3P	22	O_D3P	37	I2C_SDA
8	E_D3N	23	O_D3N	38	I2C_SCL
9	GND	24	GND	39	VDD_OTP
10	E_D2P	25	O_D2P	40	EEPEN
11	E_D2N	26	O_D2N	41	VDDIN
12	GND	27	GND	42	VDDIN
13	E_CLKP	28	O_CLKP	43	VDDIN
14	E_CLKN	29	O_CLKN	44	VDDIN
15	GND	30	GND	45	VDDIN

4. Interface Description

4.1 LCM This model used FH34SRJ-45S-0.5SH(50) (HRS) or equivalent

PIN	PIN NAME	DESCRIPTION
1	VLED-	LED Cathode NC
2	VLED-	LED Cathode NC
3	VLED+	LED Anode NC
4	VLED+	LED Anode NC
5	NC	
6	GND	Ground
7	E_D3P	EVEN LVDS Positive data signal (+)
8	E_D3N	EVEN LVDS Negative data signal (-)
9	GND	Ground
10	E_D2P	EVEN LVDS Positive data signal (+)
11	E_D2N	EVEN LVDS Negative data signal (-)
12	GND	Ground
13	E_CLKP	EVEN LVDS Positive CLK signal (+)
14	E_CLKN	EVEN LVDS Negative CLK signal (-)
15	GND	Ground
16	E_D1P	EVEN LVDS Positive data signal (+)
17	E_D1N	EVEN LVDS Negative data signal (-)
18	GND	Ground
19	E_D0P	EVEN LVDS Positive data signal (+)
20	E_D0N	EVEN LVDS Negative data signal (-)
21	GND	Ground
22	O_D3P	Odd LVDS Positive data signal (+)
23	O_D3N	Odd LVDS Negative data signal (-)
24	GND	Ground
25	O_D2P	Odd LVDS Positive data signal (+)
26	O_D2N	Odd LVDS Negative data signal (-)
27	GND	Ground
28	O_CLKP	Odd LVDS Positive CLK signal (+)
29	O_CLKN	Odd LVDS Negative CLK signal (-)
30	GND	Ground
31	O_D1P	Odd LVDS Positive data signal (+)
32	O_D1N	Odd LVDS Negative data signal (-)
33	GND	Ground
34	O_D0P	Odd LVDS Positive data signal (+)
35	O_D0N	Odd LVDS Negative data signal (-)
36	GND	Ground
37	I2C_SDA	Reserved for LCD manufacturer's use ,not connection
38	I2C_SCL	
39	VDD_OTP	
40	EEPEN	Not Connection
41~45	VDDIN	Power Supply

4.2 Backlight

used BHSR-02VS-1(JST) or equivalent

PIN	PIN NAME	DESCRIPTION
1	VLED +	LED Anode
2	VLED-	LED Cathode

4.3 CTP I2C PIN: CN2

Pin	Pin Name	Description
1	GND	Ground
2	CTP_VDD	Power supply: + 3.3V
3	SCL	I2C Clock. (T/P)
4	SDA	I2C Data. (T/P)
5	INT	Output interrupt signal for host controller.
6	RESET	Input reset signal.

4.4 CTP USB PIN: CN1

Pin	Pin Name	Description
1	VBUS	Power supply: + 5V
2	DATA-	DATA- Differential Data Input.
3	DATA+	DATA+ Differential Data Input.
4	GND	Ground

5. Absolute Maximum Ratings

Parameter		Symbol	Values			Unit	Notes
			Min.	Typ.	Max.		
Power Supply Voltage		VDD	3.0	3.3	3.6	V	
		VRP			300	mV	Ripple
Power Supply Current		IDD	-	300	360	mA	Note 1
Power Consumption		PLCD	-	1	1.2	W	
Rush current		IRUSH	-	-	3.0	A	Note 2
CMOS Interface	Input Voltage	VIH	2.7		3.3	V	
		VIL	0		0.5	V	
	Output Voltage	VOH	2.7		3.3	V	
		VOL	0		0.5	V	

Notes :

1. The supply voltage is measured and specified at the interface connector of LCM.
   The current draw and power consumption   specified is for VDD=3.3V, Frame rate fV=60Hz and Clock frequency = 80MHz. Test Pattern of power supply current
   a) Typ : Mosaic 8 x 6 Pattern(L0/L255)   b) Max : skip subPixel(L255)
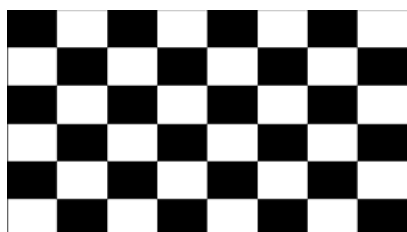
 2. The duration of   rush current is about 2ms and rising time of Power Input is 1ms(min)

6. DC Characteristics

6.1 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

Parameter		Symbol	Min.	Max.	Unit	Remarks
Power Supply	LCD Module	VDD	VSS-0.3	3.6	V	Ta = 25 ℃
Operating Temperature		TOP	-20	+70	℃	
Storage Temperature		TST	-30	+85	℃	
Operating Ambient Humidity		Hop	10	90	%RH	
Storage Humidity		Hst	10	90	%RH	

6.2 Interface timing Parameter and AC/DC Parameter

The LCM is operated by the DE only

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK Frequency	Fdclk	74.5	77.56	85	MHz
Horizontal display area	Thd		960		DCLK
HSYNC period time	Th	989	1040	1248	DCLK
Horizontal Blank	THB	29	80	288	DCLK
HSYNC pulse width	Thp	2	10	255	DCLK
HSYNC back porch	thbp	3	6	255	DCLK
HSYNC Front porch	thfp	24	64	260	DCLK
Vertical display area	Tvd		1200		H
VSYNC period time	Tv	1243	1243	1560	H
Vertical Blank	TVB	43	43	360	H
VSYNC Pluse width	Tvp	4	4	20	H
VSYNC back porch	Tvbp	20	20	255	H
VSYNC front porch	Tvfp	19	19	260	H
Frequency	fV	-	60	-	Hz

Item	Symbol	Min	Typ	Max	Unit
CLKfrequency	Frcip	20	-	85	MHZ
CLKIN Period	tRCIP	11.76	-	-	nsec
Input Data 0	tRIP1	tRCIP/7×(-0.2)	0.0	tRCIP/7×0.2	nsec
Input Data 1	tRIP0	tRCIP/7×0.8	tRCIP/7	tRCIP/7×1.2	nsec
Input Data 2	tRIP6	tRCIP/7×1.8	tRCIP/7×2	tRCIP/7×2.2	nsec
Input Data 3	tRIP5	tRCIP/7×2.8	tRCIP/7×3	tRCIP/7×3.2	nsec
Input Data 4	tRIP4	tRCIP/7×3.8	tRCIP/7×4	tRCIP/7×4.2	nsec
Input Data 5	tRIP3	tRCIP/7×4.8	tRCIP/7×5	tRCIP/7×5.2	nsec
Input Data 6	tRIP2	tRCIP/7×5.8	tRCIP/7×6	tRCIP/7×6.2	nsec
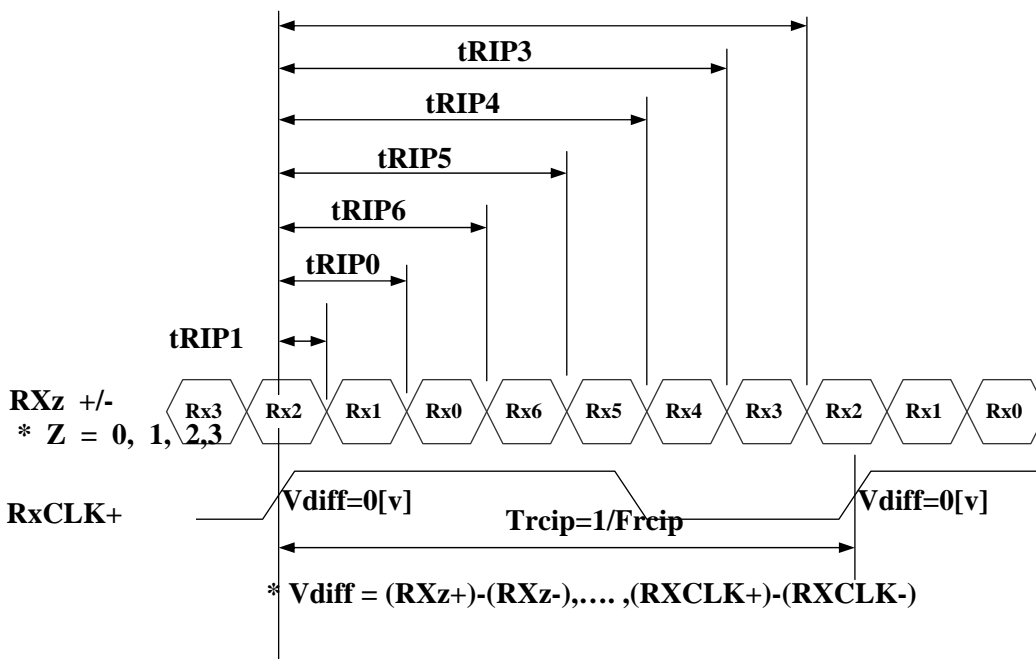
Item	Symbol	Condition	MIN	TYP	MAX	Unit
Differential input high Threshold voltage	Vth	Vcm=1.2V	-	-	+0.1	V
Differential input low Threshold voltage	Vtl	-	-0.1	-	-	V
Differential input common Threshold voltage	Vcm	-	1	1.2	1.7-|Vid|/2	V
LVDS input voltage	Vinlv	-	0.7	-	1.7	V
Differential input voltage	|Vid|	-	0.35	-	0.6	V
Differential input leakage voltage	Ilvleak	-	-10	-	+10	uA

Differential:

LVCLKP(R)-LVCLKN(R)

LVD[3:0]P(R)-

LVD[3:0]N(R)
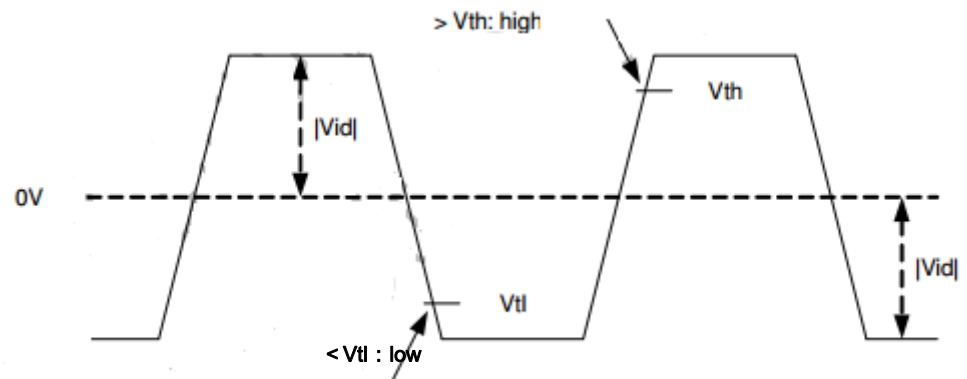
7. Timing Characteristics
7.1 Power Sequence
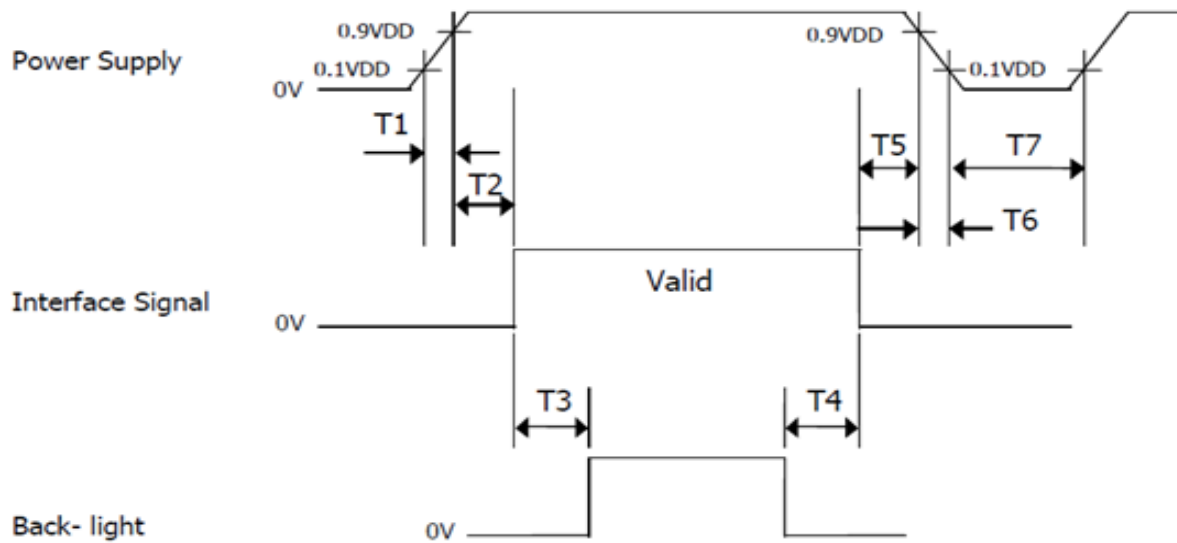
Parameter	Values			Units
	Min	Typ	Max	
T1	0	-	10	ms
T2	0	-	50	ms
T3	200	-	-	ms
T4	500	-	-	ms
T5	0	-	50	ms
T6	0	-	10	ms
T7	500	-	-	ms
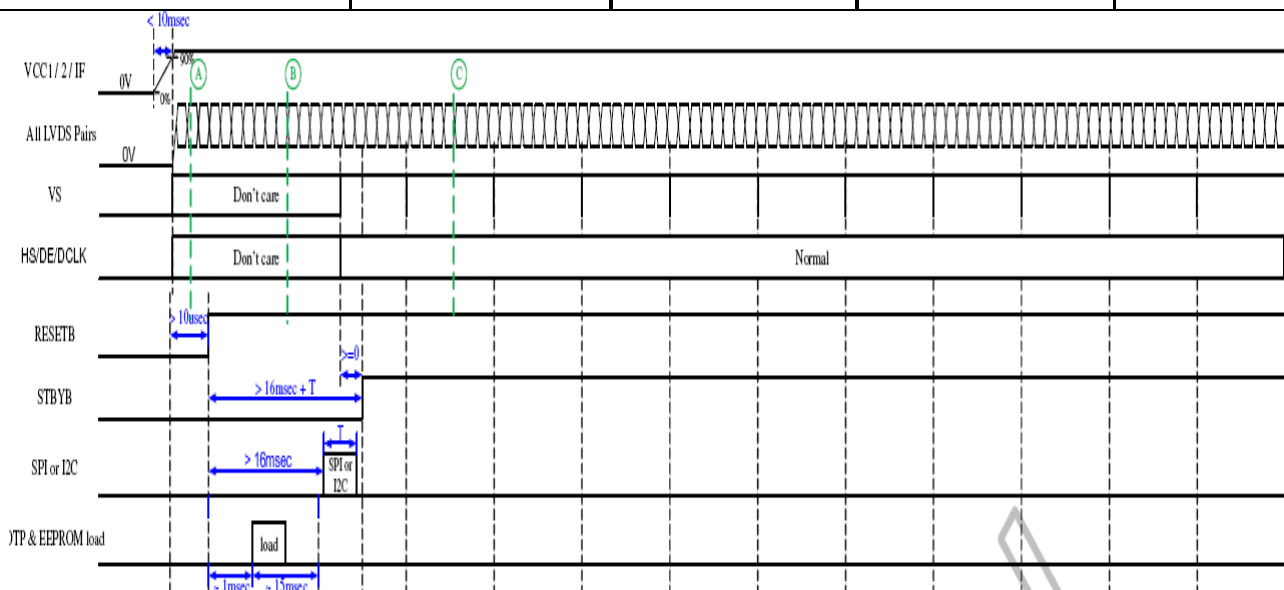
8. Backlight Characteristic
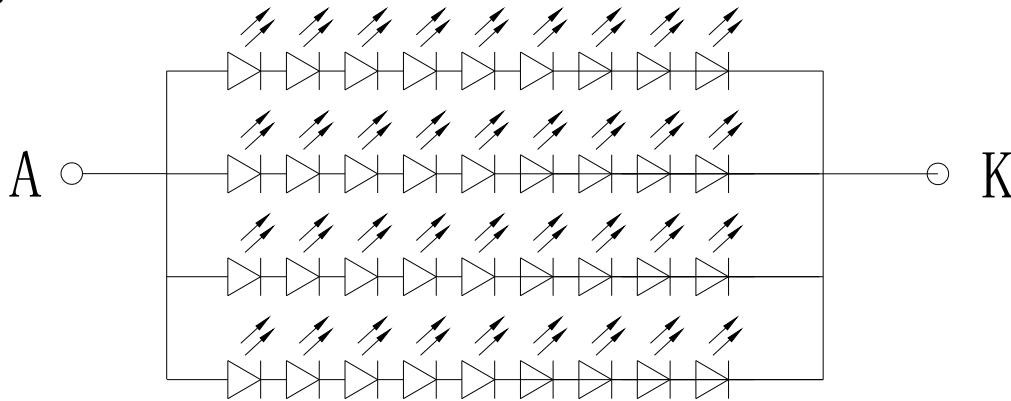
Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	24.5	26.5	29	V	If=200mA
Supply Current	If	-	200	-	mA	-
Luminous Intensity for LCM	-	800	1000		cd/m^2	If=200mA
Uniformity for LCM	-	70		-	％	If=200mA
Life Time	-	30000		-	Hrs	If=200mA
Backlight Color	White					

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and I$_L$=20mA

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original Brightness at Ta=25°C and I$_L$=20mA. The LED life time could be decreased if operating I$_L$ is larger than 20mA

9. Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	70	80	-	degree	(1),(2),(6)
		θR	70	80	-		
	Vertical	θT	70	80	-		
		θB	70	80	-		
Contrast Ratio	Center		700	900	-	-	(1),(3),(6)
Response Time	TR+TF		-	30	35	ms	(1),(4),(6)
CF Color Chromaticity (CIE1931)	Red x		Typ. -0.05	TBD	Typ. +0.05	-	(1), (6)
	Red y			TBD		-	
	Green x			TBD		-	
	Green y			TBD		-	
	Blue x			TBD		-	
	Blue y			TBD		-	
	White x			0.31		-	
	White y			0.33		-	
Color Gamut	CIE 1931		-	72	-	%	

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.
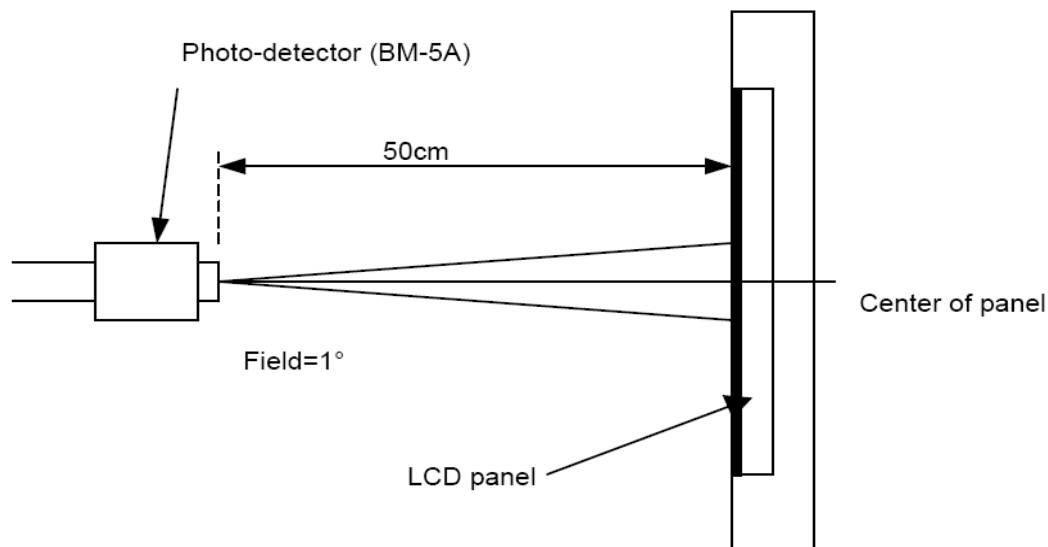
Note (2) Definition of Viewing Angle
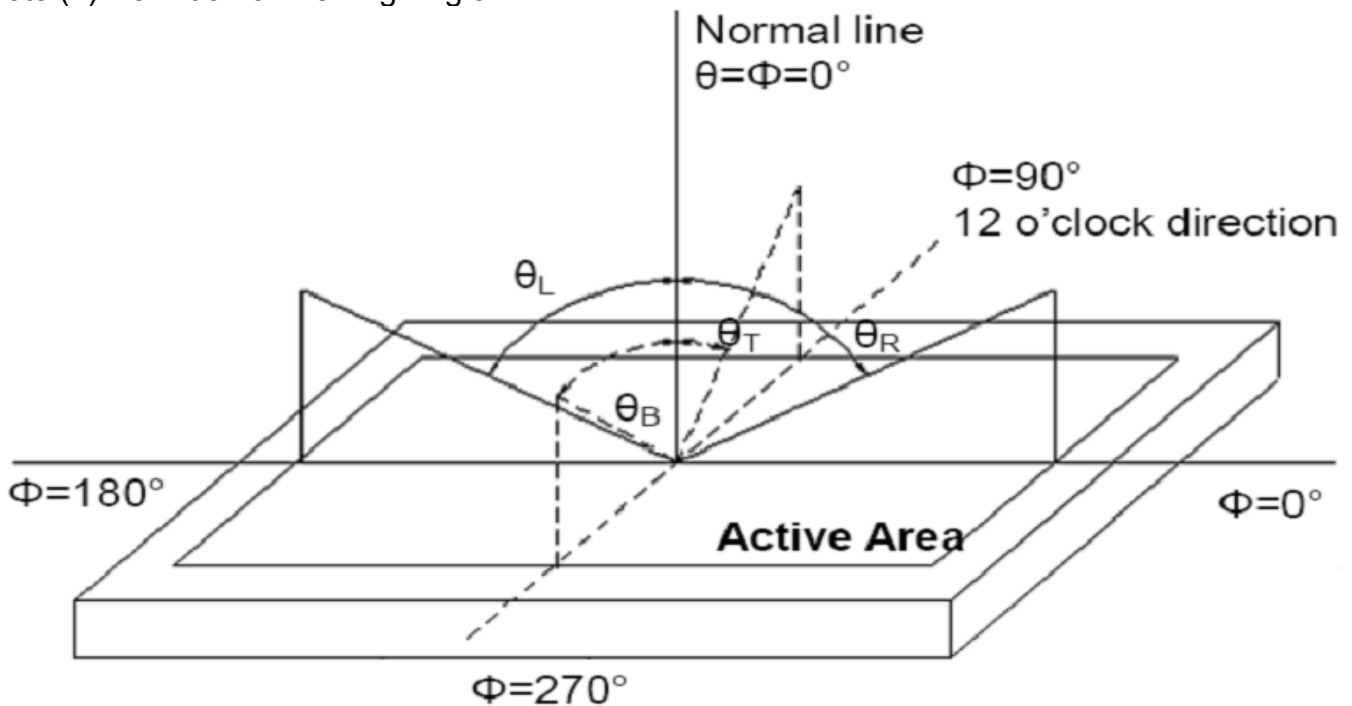
Note (3) Definition of Contrast Ratio (CR)
　　The contrast ratio can be calculated by the following expression
　　Contrast Ratio (CR) = L63 / L0
　　L63: Luminance of gray level 63, L0: Luminance of gray level 0

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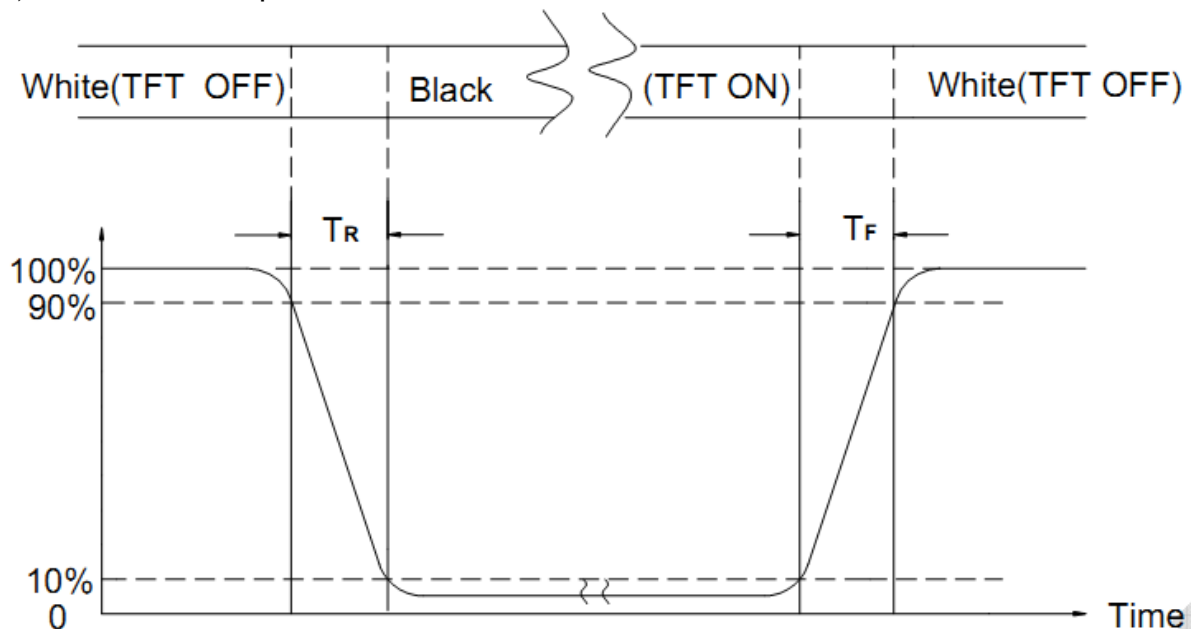
Note (5) Definition of Transmittance (Module is without signal input)
　　Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 100%

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
①	High Temperature Storage	Keep in 80°C±2°C×96Hrs Surrounding temperature, then storage at normal condition 4hrs.
②	Low Temperature Storage	Keep in -30°C±2°C×96Hrs Surrounding temperature, then storage at normal condition 4hrs.
③	High Temperature Operating Test	70°C±2°C×96Hrs
④	Low Temperature Operating Test	-20°C±2°C×96Hrs
⑤	High Temperature / High Humidity Storage Test	Keep in 60°C±5°C×90%RH×96Hrs Surrounding temperature, then storage at normal condition 4hrs.
⑥	Temperature Cycling Storage Test	-30°C → +25°C → 80°C → +25°C (30mins) (5mins) (30mins) (5mins) ◄─────────────────────────► 10 Cycle Surrounding temperature, then storage at normal condition 4hrs.
⑦	ESD Test	Air Discharge: Apply 6 KV with 5 times Discharge for each polarity +/- Contact Discharge: Apply 4KV with 5 times discharge for each polarity +/- 1. Temperature ambiance : 15°C～35°C 2. Humidity relative : 30%～60% 3. Energy Storage Capacitance (Cs + Cd): 150pF±10% 4. Discharge Resistance (Rd): 330Ω±10% 5. Discharge, mode of operation: Single Discharge (time between successive discharges at least 1 sec) (Tolerance if the output voltage indication : ±5%)
⑧	Vibration Test (Packaged)	1. Sine wave 10～55 Hz frequency (1 min/sweep) 2. The amplitude of vibration :1.5 mm 3. Each direction (X、Y、Z) duration for 2Hrs
⑨	Drop Test (Packaged)	<table><tr><td>Packing Weight (Kg)</td><td>Drop Height (cm)</td></tr><tr><td>0 ~ 45</td><td>122</td></tr><tr><td>45.4 ~ 90.8</td><td>76</td></tr><tr><td>90.8 ~ 454</td><td>61</td></tr><tr><td>Over 454</td><td>46</td></tr></table>Drop Direction: ※1 corner / 3 edges / 6 sides each 1time

PS：①～⑦ test exclude Polaroid;

Note 1: The test samples have recovery time need more than 2 hours at room temperature before the function check. In the standard conditions, there is no abnormal display function occurred.

Note 2: After the reliability test, the product only guarantees operational function, but don't guarantee all of the cosmetic specification.

Note 3: Under no condensation of dew.

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

CLASS	AQL(%)
CRITICAL	0.4 %
MAJOR	0.65 %
MINOR	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
Ambient Illumination:
Appearance detection in 800~1000 Lux external environment
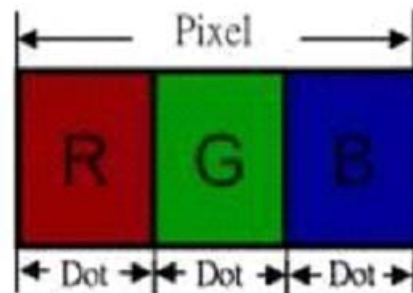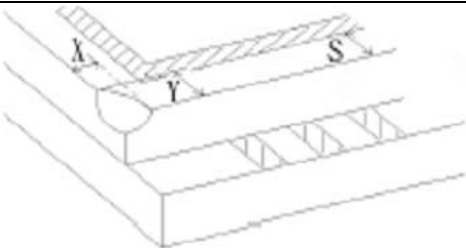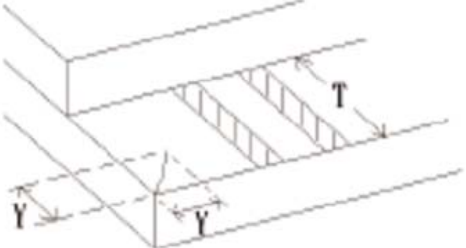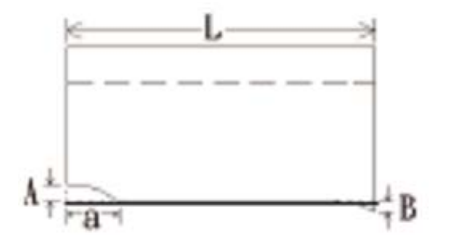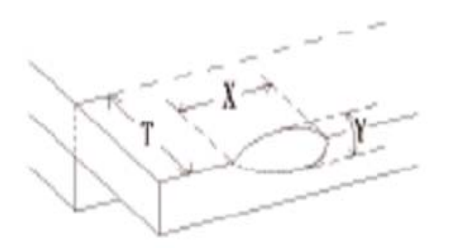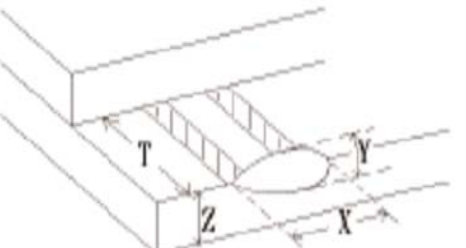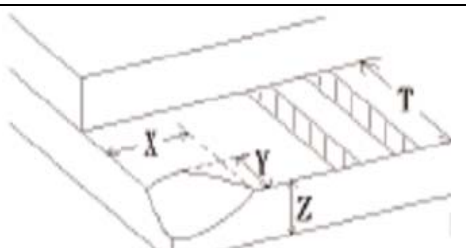
11.3. Inspection Plan:

Class	Item	Judgement	Class
Packing & Indicate	1. Outside and inside package	"Model On.", "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 On." 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 visible 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 or visual inspection	Minor

11.4. Standard of visual inspection

No	Class	Item	Judgement
11.4.1	Minor	Black and white spot foreign materiel dust in the cell blemish scratch.	(A) Round type: unit: mm **Round type table** Diameter (mm) / Acceptable Q'ty Ø ≦ 0.2 / Distance ≧ 1mm 0.2 < Ø ≦ 0.3 / 4(Distance ≧ 15mm) 0.3 < Ø ≦ 0.4 / 3(Distance ≧ 15mm) 0.4 < Ø / 0 Note: Ø=(Length*Width)/2 (B) Linear type: unit: mm Length / Width / Acceptable Q'ty - / W ≦ 0.03 / Distance ≧ 1mm L ≦4.0 / 0.03 < W ≦ 0.05 / 3(Distance ≧ 15mm) - / 0.05 < W / Follow round type Note: Ø=(Length*Width)/2

(A) Round type: unit: mm

Diameter (mm)	Acceptable Q'ty
Ø ≦ 0.2	Distance ≧ 1mm
0.2 < Ø ≦ 0.3	4(Distance ≧ 15mm)
0.3 < Ø ≦ 0.4	3(Distance ≧ 15mm)
0.4 < Ø	0

Note: Ø=(Length*Width)/2

(B) Linear type: unit: mm

Length	Width	Acceptable Q'ty
-	W ≦ 0.03	Distance ≧ 1mm
L ≦4.0	0.03 < W ≦ 0.05	3(Distance ≧ 15mm)
-	0.05 < W	Follow round type

Note: Ø=(Length*Width)/2

11.4.2 Minor — Bubble in polarizer dent on polarizer.

unit: mm

Diameter (mm)	Acceptable Q'ty
Ø ≦ 0.2	Distance ≧ 1mm
0.2 < Ø ≦ 0.3	4(Distance ≧ 15mm)
0.3 < Ø ≦ 0.5	2(Distance ≧ 15mm)
0.5 < Ø	0

11.4.3 Minor — Dot Defect

Items	ACC. Q'TY
Bright dot	N ≦ 2 (Distance ≧ 15mm)
Dark dot	N ≦ 4 (Distance ≧ 15mm)

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. Definition: <1/2dot and visible by 5% ND filter N ≦ 5

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.

11.4.4 Minor — Mura

Not visible through 5% ND filter in 50% gray or judge by limit sample if necessary.

11.4.5 Minor — LCD glass chipping

X ≧ 3mm
Y > S

11.4.6	Minor	LCD glass chipping		X or Y > S
11.4.7	Minor	LCD glass Glass crack		Continuous burst NG
11.4.8	Minor	LCD glass Scribe defect		According to dimension
11.4.9	Minor	LCD glass Chipping (on the terminal area)		Y < 1/2Z Y $\geq$ 0.5mm X $\geq$ 3mm
11.4.10	Minor	LCD glass Chipping (on the terminal surface)		Y < 1/2Z Y $\geq$ 0.5mm X $\geq$ 3mm
11.4.11	Minor	LCD glass chipping	 If touch the electrode lines, the need to retain the two-thirds electrode lines.	X $\geq$ 3mm X $\geq$ T

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 (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 (Cl), 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 this is not specified in this specification.
● 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