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	2012-07-10	NEW ISSUE	
B	2013-04-08	Add Touch Panel Characteristics	
C	2019-05-16	Modify Backlight and FPC	

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	3.5"TFT	--
Dot arrangement	320(RGB)×240	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally white TN	-
Gray Scale Inversion Direction	6 O'clock	--
Eyes　Viewing Direction	12 O'clock	--
Driver IC	HX8238-D	--
Module size	76.90(W)×63.90(H)×4.46(T)	mm
Active area	70.08(W)×52.56(H)	mm
Dot pitch	0.219W)×0.219(H)	mm
Interface	24-bit RGB interface	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Back Light	6 White LED	--
Weight	TBD	g

RTP

ITEM	STANDARD VALUES	UNITS
RTP type	Film + Glass + FPC	--
Surface hardness	3H	--
Transmittance	≥78％	--
RTP size	76.50 (W)×63.50 (H)×1.33(T)	mm
Active area	71.10 (W)×53.60 (H)	mm
Response Time	≤10ms	ms
Response Time	≤1.5%	%
Insulation resistance	>20MΩ	MΩ
Operation force	≤100g	g
Resistance	X:200Ω ~ 900Ω Y: 200Ω ~ 900Ω	Ω

3. External Dimensions

NOTES:
1. DISPLAY TYPE: 3.5"TFT
2. VIEWING DIRECTION: 6:00
3. LCD DRIVE IC: HX8238D
4. POLARIZER MODE: TRANSMISSIVE/POSITIVE
5. OPERATING TEMP: -20°C~+70°C
6. STORAGE TEMP: -30°C~+80°C
7. UNMARKER TOLERANCE: ±0.20
8. REQUIREMENTS ON ENVIRONMENTAL PROTECTION: RoHS

技术参数:
1.结构: film+glass+tail
film:雾面防牛 (0.188mm)
glass:500Ω/□ 0.7mm
2.线性: FPC (pitch=1.3mm)
tail:FPC (pitch=1.3mm)
3.线性: ≤1.5%: 绝缘阻抗: ≥20MΩ(25V DC)
4.透光率: ≥78%
5.操作压力: 50~120g
6.使用寿命: ≥1,000,000次
7.笔划寿命: ≥100,000次
8.工作环境: -10℃~+60℃,
9.储存环境: -20℃~+70℃,
10.X:200~900Ω Y:200~900Ω.
11.响应时间: <20ms.
12.未注尺寸公差按±0.50

3.5" TFT
320x3(RGB)X240 DOTS
VIEWING DIRECTION

BL Circuit Diagram:
LEDA ── LEDK

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.

Rev:B
D/N:AM320240-035CT
SCALE 1:1
SHEET NO. 1 OF 1
UNIT: mm

SYM.	DESCRIPTION OF REVISION	REASON	REVISED BY	DATE
A	first issue	XG.SU	XG.SU	2012/07/10
B	modify backlight and FPC	XG.SU		2019/05/16

PIN NO.	PIN NAME	PIN NO.	PIN NAME
1	LEDK	28	DR0
2	LEDK	29	DR1
3	LEDA	30	DR2
4	LEDA	31	DR3
5	NC	32	DR4
6	/RESET	33	DR5
7	NC	34	DR6
8	YU	35	DR7
9	XR	36	HSYNC
10	YD	37	VSYNC
11	XL	38	DOTCLK
12	DB0	39	NC
13	DB1	40	NC
14	DB2	41	VCC
15	DB3	42	VCC
16	DB4	43	SPENA
17	DB5	44	NC
18	DB6	45	NC
19	DB7	46	NC
20	DG0	47	NC
21	DG1	48	NC
22	DG2	49	SPCLK
23	DG3	50	SPDAT
24	DG4	51	NC
25	DG5	52	NC
26	DG6	53	GND
27	DG7	54	GND

Dimensions: 37.20±0.5, 63.9±0.25(LCM OUTLINE), 55.50±0.2(BEZEL WINDOW), 2.9, 53.00±0.2(TP A.A), 2.35, 52.56(LCD A.A), 3.32, 24.82±0.5, 27.50±0.1, 5.00±0.3, 76.9±0.25(LCM OUTLINE), 73.10±0.2(BEZEL WINDOW), 70.70±0.2(TP A.A), 70.08(LCD A.A), 1.9, 2.35, 3.41, 0.3±0.05 PI+FPC, Stiffener, Conductor, 4.46±0.3, 0.50±0.05, W=0.25, 3.00±0.3, P0.5*(54-1)=26.50

RoHS

4. Interface Description

PIN NO.	PIN NAME	DESCRIPTION
1	LEDK	LED backlight cathode
2	LEDK	LED backlight cathode
3	LEDA	LED backlight anode
4	LEDA	LED backlight anode
5	NC	No Connection
6	/RESET	System Reset
7	POL	Write signal input terminal, Active at 'L'. Synchronizing clock signal in SPI mode.
8	YU	Connection / TP Up
9	XR	Connection / TP Right
10	YD	Connection / TP Bottom.
11	XL	Connection / TP Left
12	DB0	RGB Data Bus
13	DB1	
14	DB2	
15	DB3	
16	DB4	
17	DB5	
18	DB6	
19	DB7	
20	DG0	
21	DG1	
22	DG2	
23	DG3	
24	DG4	
25	DG5	
26	DG6	
27	DG7	
28	DR0	
29	DR1	
30	DR2	
31	DR3	
32	DR4	

33	DR5	
34	DR6	
35	DR7	
36	HSYNC	Line synchronizing signal for RGB interface operation
37	VSYNC	Frame synchronizing signal for RGB interface operation
38	DOTCLK	Dot Clock
39	NC	No Connection.
40	NC	No Connection.
41	VCC	Power supply.
42	VCC	Power supply.
43	SPENA	SPI ENABLE
44	NC	No Connection.
45	NC	No Connection.
46	NC	No Connection.
47	NC	No Connection.
48	NC	No Connection.
49	SPCLK	SERIAL CLOCK SIGNAL
50	SPDAT	SERIAL DATA SIGNAL
51	NC	No Connection.
52	DEN	Display enable pin from controller
53	GND	Power ground
54	GND	Power ground

5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Power Voltage	VCC	-0.3	4.6	V
Input Voltage	Vin	-0.3	VCC +0.3	V
Operating Temperature	T_{OP}	-20	70	°C
Storage Temperature	T_{ST}	-30	80	°C
Storage Humidity	HD	20	90	%RH

6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power Voltage	VCC	2.5	2.8	3.6	V	-
Input High Voltage	V_{IH}	0.7VCC	-	VCC	V	-
Input Low Voltage	V_{IL}	GND	-	0.3 VCC	V	-
Output High Voltage	V_{OH}	0.8 VCC	-	VCC	V	-
Output Low Voltage	V_{OL}	GND	-	0.2 VCC	V	-
I/O Leak Current	I_{LI}	-1	-	1	uA	-

7. Timing Characteristics
7.1.1 Parallel RGB Interface Timing Characteristics

Hsync and Vsync timing

CCIR601 timing waveform VS_POL=H, HS_POL=L in Register R2)

IHS and IVS timing

● Odd field

IHS

IVS
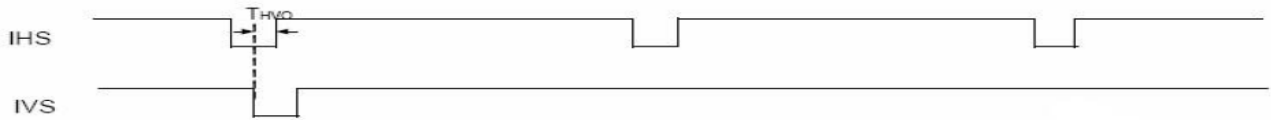
IHS and IVS waveforms in odd field

● Even field

IHS

IVS
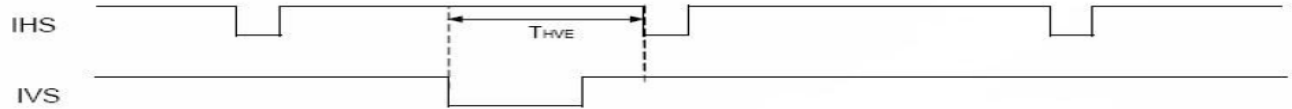
IHS and IVS waveforms in even field

Hsync and horizontal control timing waveform

HSD

DEN

OEH

STH

CKV

OEV

POL
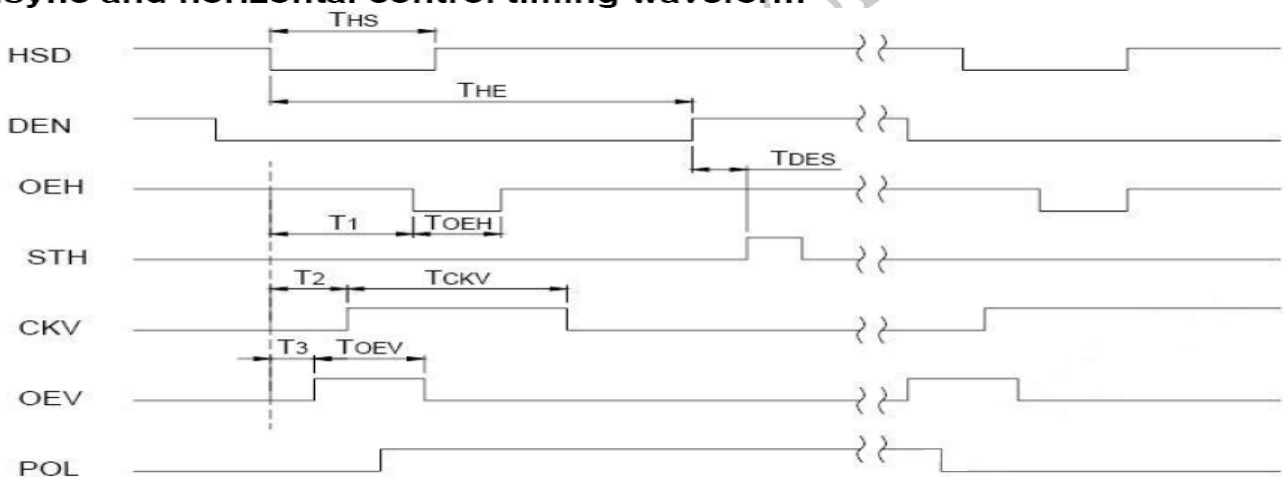
Hsync and vertical shift clock timing waveform
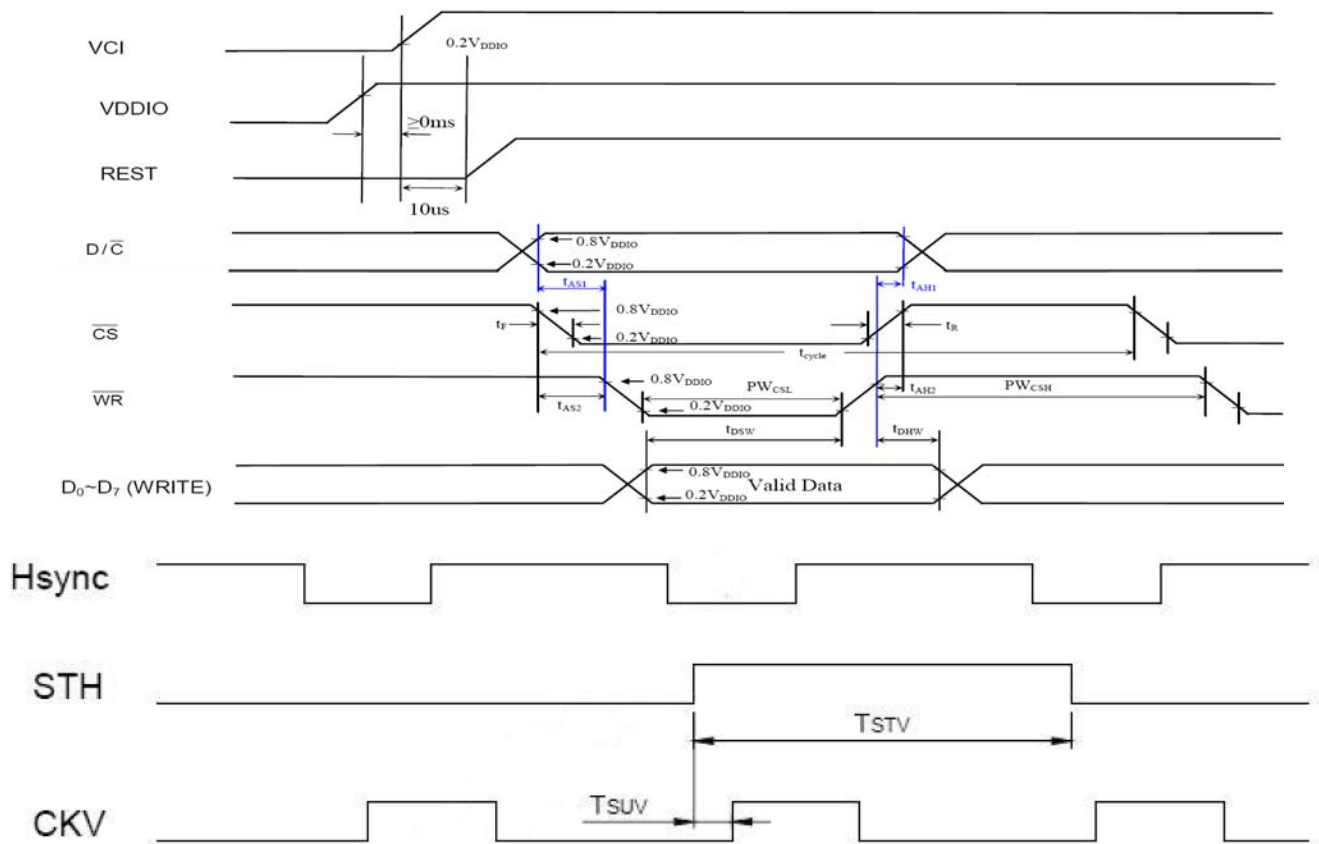
7.1.2   Power Up Sequence for RGB mode
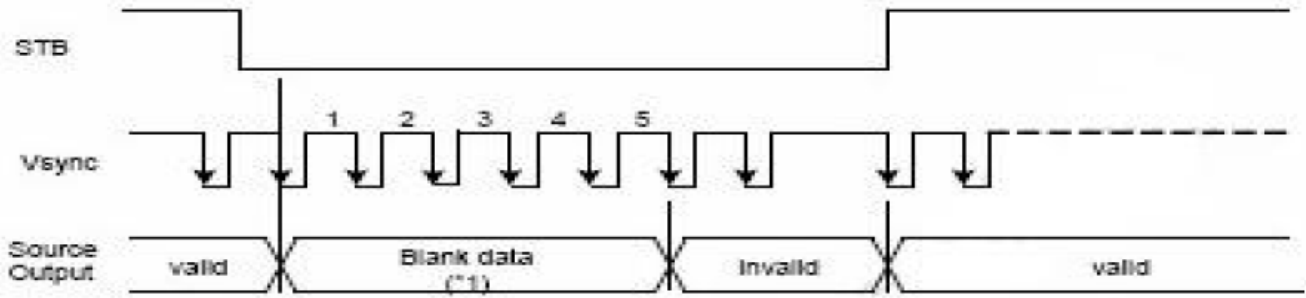
7.1.3 SPI Timing Characteristics

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
SPCK period	T_{CK}	60	-	-	ns
SPCK high width	T_{CKH}	30	-	-	ns
SPCK low width	T_{CKL}	30	-	-	ns
Data setup time	T_{SU1}	12	-	-	ns
Data hold time	T_{HD1}	12	-	-	ns
SPENA to SPCK setup time	T_{CS}	20	-	-	ns
SPENA to SPDA hold time	T_{CE}	20	-	-	ns
SPENA high pulse width	T_{CD}	50	-	-	ns
SPDA output latency	T_{CR}	-	1/2	-	T_{CK}

- **SPI read timing**
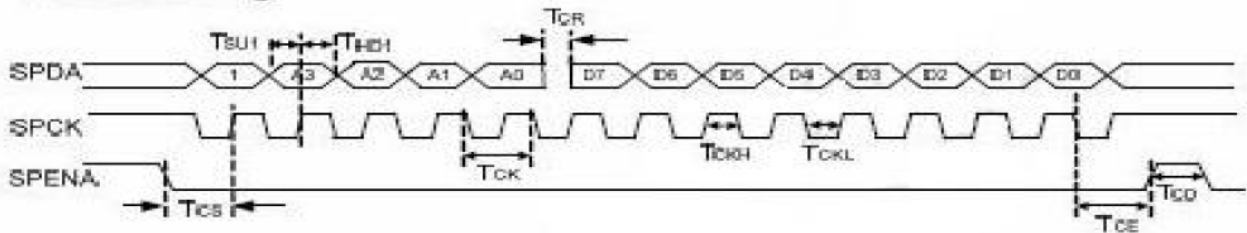
- **SPI write timing**
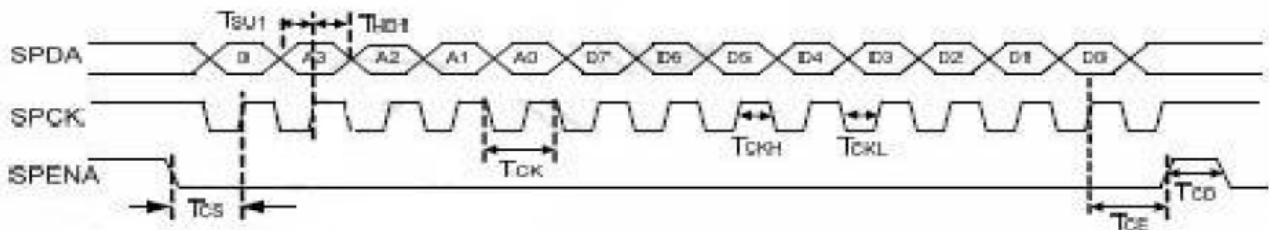
7.1.4 RGB Timing Characteristics

● **Digital Serial RGB**
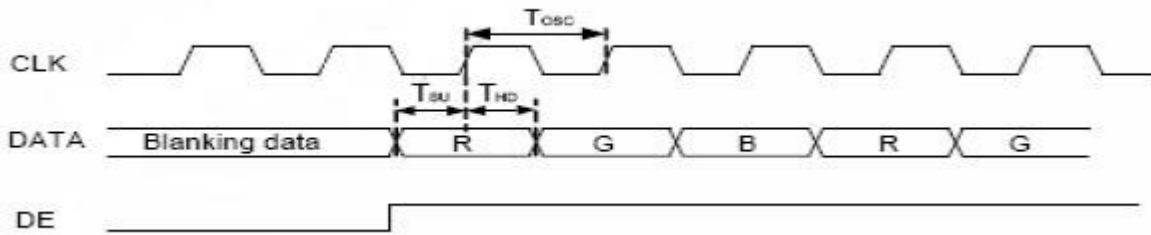
● **Digital Parallel RGB**
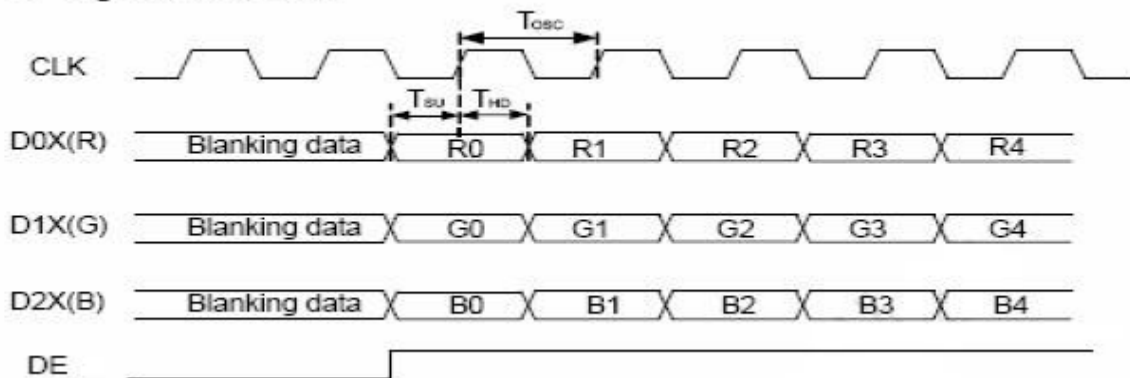
7.2 Reset Timing Characteristics

The RESET input must be held at least 1ms after power is stable
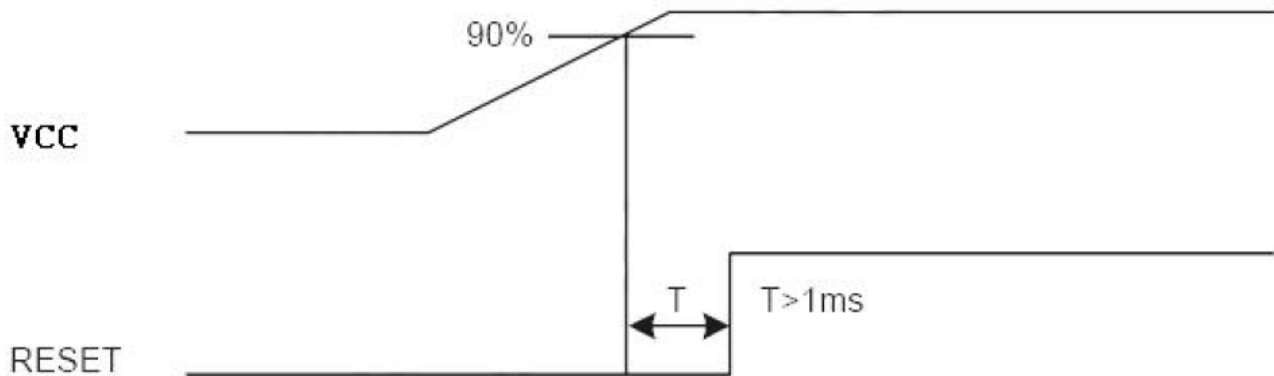
Reset timing

8. Backlight Characteristics

BL Circuit Diagram:

LEDA ———▷|—▷|—▷|—▷|—▷|—▷|——— LEDK
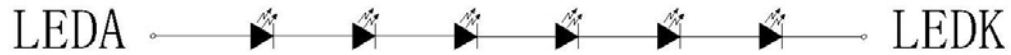
Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	16.8	18	21	V	If=20mA
Supply Current	If	-	20	-	mA	-
Luminous Intensity for LCM	-	250	300	-	Cd/m^2	If=20mA
Uniformity for LCM	-	80	-	-	℅	If=20mA
Life Time(25℃)	-	50000	-	-	Hr	If=20mA
Backlight Color	White					

9. Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	-	(15)	-	degree	(1),(2),(6)
		θR	-	(35)	-		
	Vertical	θT	-	(45)	-		
		θB	-	(45)	-		
Contrast Ratio	Center		200	300	-	-	(1),(3),(6)
Response Time	Rising		-	15	30	ms	(1),(4),(6)
	Falling		-	35	50		
CF Color Chromaticity (CIE1931)	Red x		Typ. -0.05	0.6105	Typ. +0.05	-	(1), (6)
	Red y			0.3716		-	
	Green x			0.3416		-	
	Green y			0.6187		-	
	Blue x			0.1513		-	
	Blue y			0.0870		-	
	White x			0.3063		-	
	White y			0.3340		-	
Transmittance	-		-	5.0	-	%	(1),(5),(6)

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.
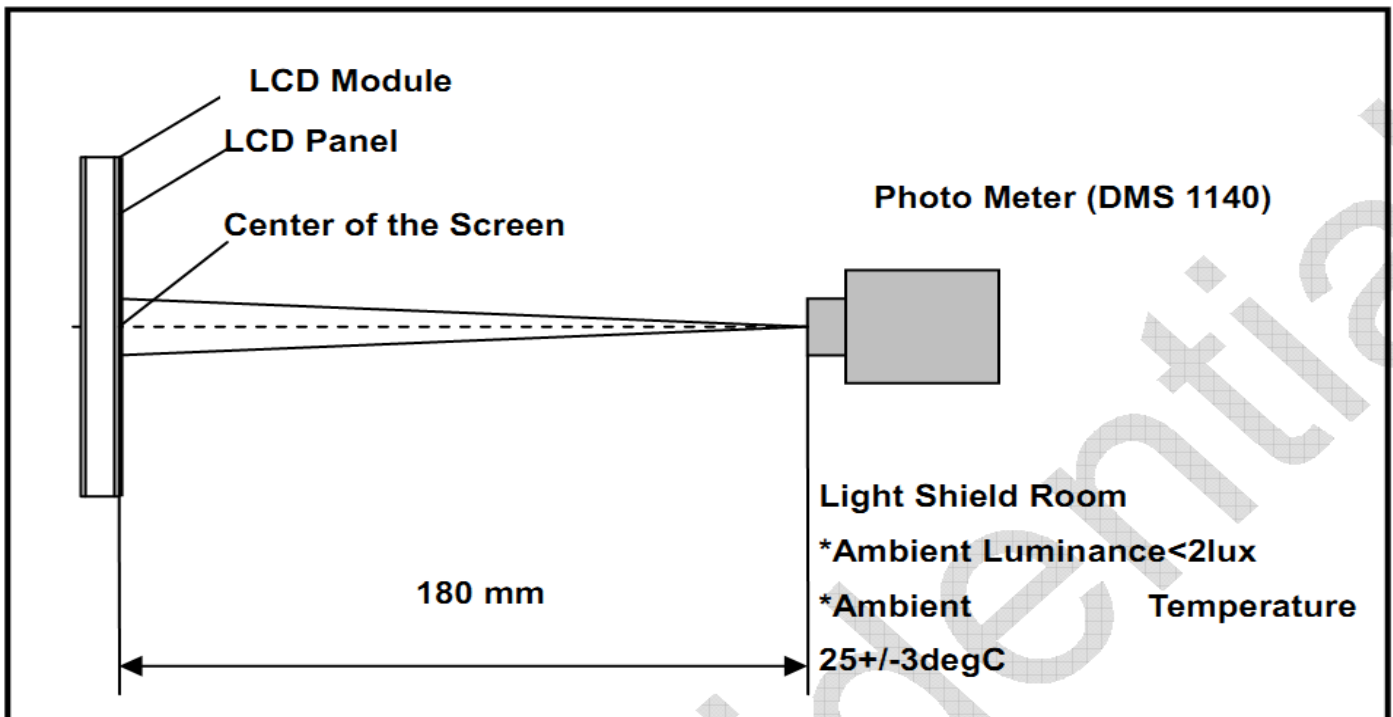
Note (2) Definition of Viewing Angle
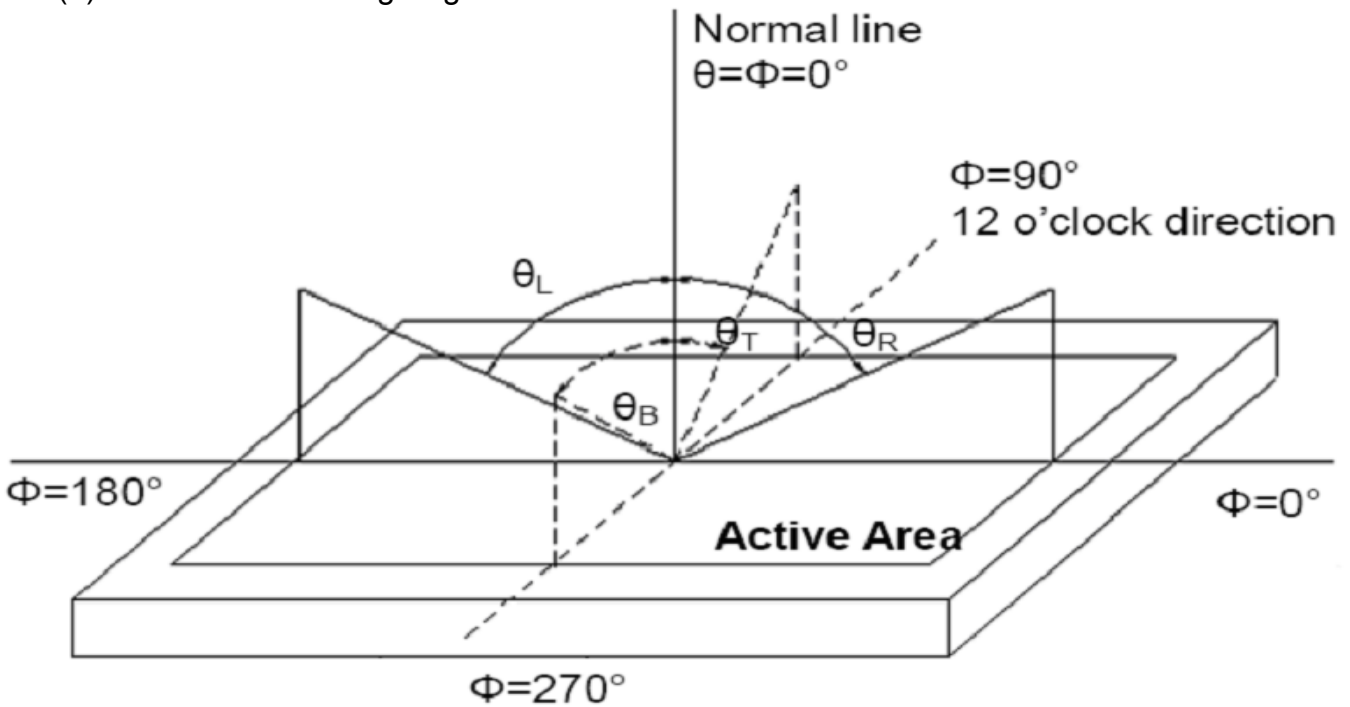
Note (3) Definition of Contrast Ratio (CR)

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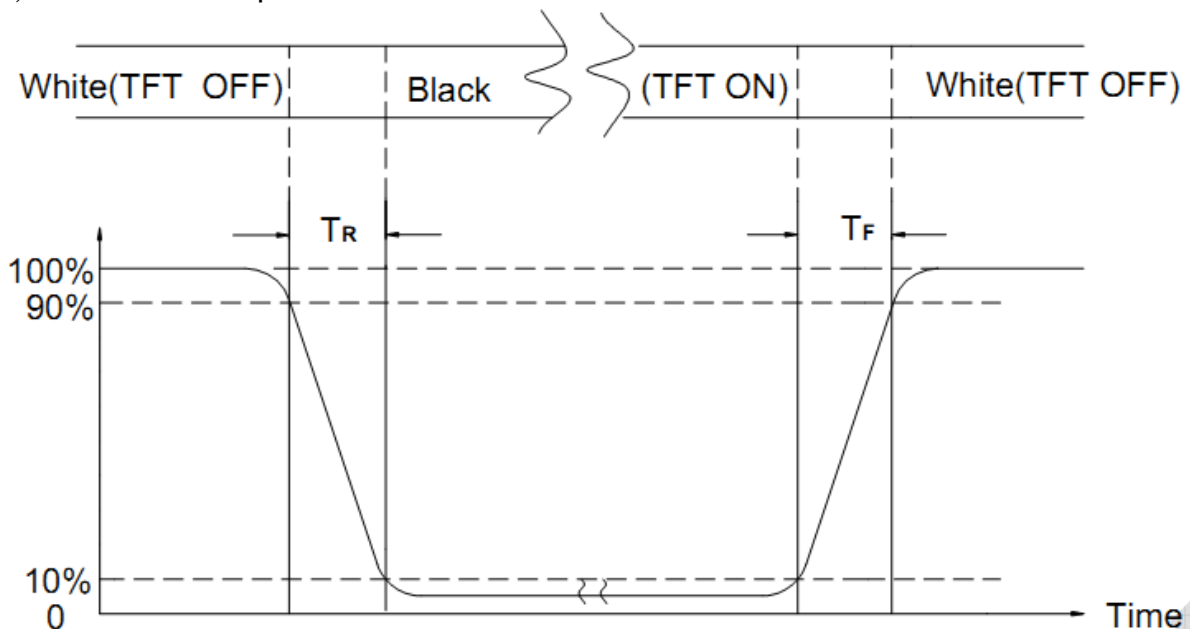
Note (5) Definition of Transmittance (Module is without signal input)

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
	High Temperature Storage	80°C±2°C×96Hours	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.
	Low Temperature Storage	-30°C±2°C×96Hours	
	High Temperature Operating	70°C±2°C×96Hours	
	Low Temperature Operating	-20°C±2°C×96Hours	
	Temperature Cycle(Storage)	-20°C ⟷ 25°C ⟷ 70°C (30min) (5min) (30min) 1cycle Total 10cycle	
	Damp Proof Test (Storage)	50°C±5°C×90%RH×96Hours	
	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5MM X,Y,Z direction for total 3hours (packing condition test will be tested by a carton)	
	Drooping Test	Drop to the ground from 1M height one time every side of carton. (packing condition test will be tested by a carton)	
	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
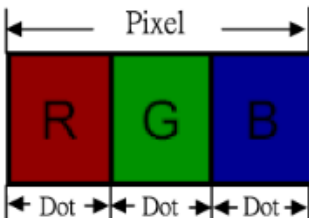
11.2.1. CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.
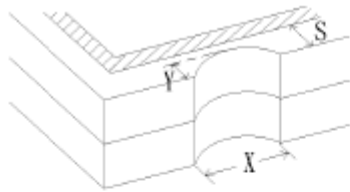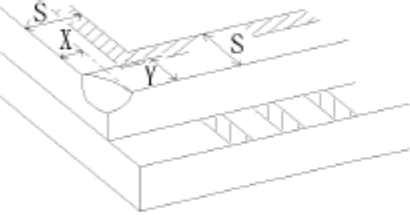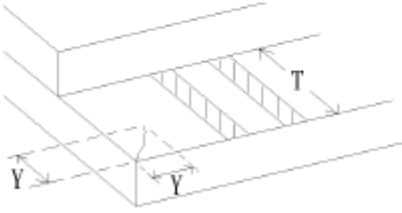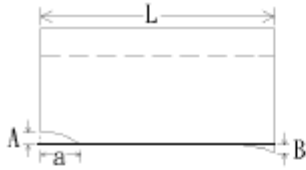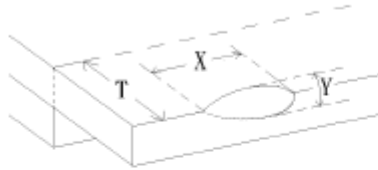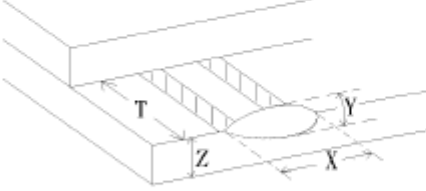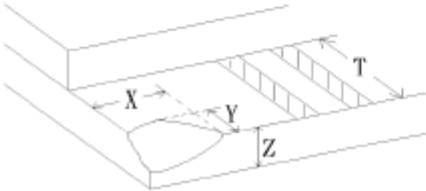
11.2.2. CHECKER SHALL SEE OVER 300±25 mm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS.
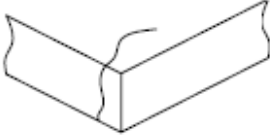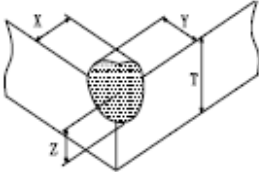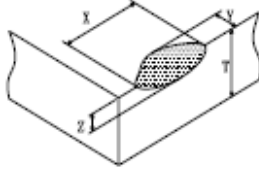OF 20W FLUORESCENT LAMP.

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

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.
			(B) LINEAR TYPE: unit : mm.
11.4.2	MINOR	BUBBLE IN POLARIZER DENT ON POLARIZER	unit : mm.
11.4.3	MINOR	Dot Defect	

(A) ROUND TYPE: unit : mm.

DIAMETER (mm.)	ACCEPTABLE Q'TY
$\Phi \leq 0.1$	DISREGARD
$0.1 < \Phi \leq 0.25$	3 (Distance>5mm)
$0.25 < \Phi$	0

NOTE: $\Phi = (LENGTH+WIDTH)/2$

(B) LINEAR TYPE: unit : mm.

LENGTH	WIDTH	ACCEPTABLE Q'TY
------	$W \leq 0.03$	DISREGARD
$L \leq 5.0$	$0.03 < W \leq 0.07$	3 (Distance>5mm)
------	$0.07 < W$	FOLLOW ROUND TYPE

BUBBLE IN POLARIZER / DENT ON POLARIZER unit : mm.

DIAMETER	ACCEPTABLE Q'TY
$\Phi \leq 0.2$	DISREGARD
$0.2 < \Phi \leq 0.5$	2 (Distance>5mm)
$0.5 < \Phi$	0

Dot Defect

Items	ACC. Q'TY
Bright dot	$N \leq 4$
Dark dot	$N \leq 4$

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.

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)	$\Phi = (x+y)/2 > 2.5$ 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

11.5 INSPECTION STANDARD OF TOUCH PANEL

NO.	CLASS	ITEMS			JUDGEMENT	
11.5.1	MAJOR	Touch Panel Crack				Reject
11.5.2	MINOR	Touch Panel Chipping	Corner		$X \leqq 2mm$, $Y \leqq 2mm$, $Z < 1/2T$	Accept
			Edge		$X \leqq 3mm$, $Y \leqq 3mm$, $Z < 1/2T$	Accept
11.5.3	MINOR	Scratch Dust and Foreign materiel (Linear Type)			$W \leqq 0.05$, $L \leqq 20mm$	Accept
					$0.05mm < W \leqq 0.07mm$; $L \leqq 10.0mm$ Distance between seratch $> 5.0mm$	Accept 3 ea Max.
					$W > 0.07mm$	Reject
11.5.4	MINOR	Scratch Dust and Foreign materiel (Round Type: $\Phi = (Length+Width)/2$)			$\Phi \leqq 0.25mm$	Accept
					$0.25mm < \Phi \leqq 0.35mm$ Distance between spots $> 5.0mm$	Accept 5 ea Max.
					$\Phi > 0.35mm$	Reject
11.5.5	MINOR	Touch Panel Dent / Fish Eyes			$\Phi \leqq 0.35mm$	Accept
					$0.35mm < \Phi \leqq 1.0mm$ Distance $> 5.0mm$	Accept 3 ea Max.
					$\Phi > 1.0mm$	Reject
11.5.6	MINOR	Touch Panel Air Bubble			$\Phi \leqq 0.2mm$	Accept
					$0.2mm < \Phi \leqq 0.5mm$ Distance between bubbles $> 5.0mm$	Accept 3 ea Max.
					$\Phi > 0.5mm$	Reject
11.5.7	MINOR	Touch Panel Printing area Scratch			$W \leqq 0.05mm$, $L \leqq 5mm$ Distance between scratch $> 5.0mm$	Accept 3 ea Max.
					$W > 0.05mm$ or $L > 5mm$ ($W > 0.05$ Follow 11.5.4 Round type)	Reject
11.5.8	MINOR	Touch Panel White Haze Mark / Dust			Can not be removed	Reject

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 sili8con 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 VDDIO or GND, 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