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	2016-06-07	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	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	SSD2119	--
Module size	76.90(W)×63.90(H)×3.2(T)	mm
Active area	70.08(W)×52.56(H)	mm
Dot pitch	0.219W)×0.219(H)	mm
Interface	4-lines_8bit / 3-lines_9bit SPI 8-/ 9-/16-/18-bit 6800/8080-series system interface 6-/9-/16-/18-bit RGB interface	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Back Light	6White LED	--
Weight	TBD	g

3. External Dimensions

NOTES:
1. DISPLAY TYPE: 3.5"TFT
2. VIEWING DIRECTION: 6:00(Gray inversion)
3. LCD DRIVE IC: SSD2119
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

BL CIRCUIT DIAGRAM
LEDA --|>|--|>|--|>|--|>|--|>|-- LEDK
VF=18V,IF=20mA

1	LEDK	28	D7		
2	LEDK	29	D6		
3	LEDA	30	D5		
4	LEDA	31	D4		
5	NC	32	D3		
6	/RESET	33	D2		
7	NC	34	D1		
8	NC	35	D0		
9	NC	36	HSYNC		
10	NC	37	VSYNC		
11	NC	38	DOTCLK		
12	NC	39	NC		
13	D/C	40	NC		
14	RD	41	NC		
15	WR	42	VDD		
16	CS	43	NC		
17	WSYNC	44	PS0		
18	D17	45	NC		
19	D16	46	PS1		
20	D15	47	NC		
21	D14	48	PS2		
22	D13	49	SCL		
23	D12	50	SDI		
24	D11	51	PS3		
25	D10	52	DE		
26	D9	53	GND		
27	D8	54	GND		

SMY.	DESCRIPTION OF REVISION	REASON	REVISED BY	DATE
⚠	first issue	A	XG. SU	2016/06/07

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:AM320240-035I-1
Rev:A

SCALE: 1:1
SHEET NO: 1 OF 1
UNIT: mm

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	REST	Reset signal input terminal, active at 'L'
7	NC	No connection
8	NC	No connection
9	NC	No connection
10	NC	No connection
11	NC	No connection
12	NC	No connection
13	D/C	Register select signal input terminal: DC='H': control register; DC='L': index or status register.
14	/RD	Read signal input terminal, Active at 'L'.
15	/WR	Write signal input terminal, Active at 'L'. Synchronizing clock signal in SPI mode.
16	/CS	Chip select signal input terminal, Active at 'L'
17	WSYNC	Ram write synchronization output
18	D17	Data bus
19	D16	Data bus
20	D15	Data bus
21	D14	Data bus
22	D13	Data bus
23	D12	Data bus
24	D11	Data bus
25	D10	Data bus
26	D9	Data bus
27	D8	Data bus
28	D7	Data bus
29	D6	Data bus
30	D5	Data bus
31	D4	Data bus
32	D3	Data bus
33	D2	Data bus
34	D1	Data bus
35	D0	Data bus
36	HSYNC	Line synchronizing signal for RGB interface operation.
37	VSYNC	Frame synchronizing signal for RGB interface operation.

38	DOTCLK	Dot clock signal for RGB interface operation.
39	NC	No connection
40	NC	No connection
41	VDD	System power supply.
42	VDD	System power supply.
43	NC	No connection
44	PS0	Select the MPU system interface mode(Note1)
45	NC	No connection
46	PS1	Select the MPU system interface mode(Note1)
47	NC	No connection
48	PS2	Select the MPU system interface mode(Note1)
49	SCL	Write signal input terminal, Active at 'L'. Synchronizing clock signal in SPI mode.
50	SDI	SPI interface input pin.
51	PS3	Select the MPU system interface mode(Note1)
52	DE	Data ENEABLE signal for RGB interface operation.
53	GND	Power ground
54	GND	Power ground

Note:

PS3	PS2	PS1	PS0	Interface Mode
0	0	0	0	16-bit 6800 parallel interface
0	0	0	1	8-bit 6800 parallel interface
0	0	1	0	16-bit 8080 parallel interface
0	0	1	1	8-bit 8080 parallel interface
0	1	0	0	9-bit generic D[17:9] (262k colour) + 3-wire SPI If 65K color, D12 shorts to D17 internally
0	1	0	1	16-bit generic (262k colour) + 3-wire SPI
0	1	1	0	18-bit generic (262k colour) + 3-wire SPI
0	1	1	1	6-bit generic D[17:12] (262k colour) + 3-wire SPI
1	0	0	0	18-bits 6800 parallel interface
1	0	0	1	9-bits 6800 parallel interface
1	0	1	0	18-bit 8080 parallel interface
1	0	1	1	9-bit 8080 parallel interface
1	1	1	0	3-wire SPI
1	1	1	1	4-wire SPI

5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Analog Supply Voltage	VDD	-0.3	4.0	V
Operating Temperature	T_{OP}	-20	70	°C
Storage Temperature	T_{ST}	-30	80	°C
Storage Humidity	HD	-	90	%RH

6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Analog Supply Voltage	VDD	2.5	-	3.6	V	-
Input High Voltage	V_{IH}	0.8VDD	-	-	V	Digital input pins
Input Low Voltage	V_{IL}	0	-	0.2VDD	V	Digital input pins
Output High Voltage	V_{OH}	0.9VDD	-	-	V	Digital output pins
Output Low Voltage	V_{OL}	0	-	0.1VDD	V	Digital output pins
Logic Input Current	I_{IL}/I_{IH}	-1	-	1	uA	-

7. Timing Characteristics
7.1 Reset Timing Characteristics
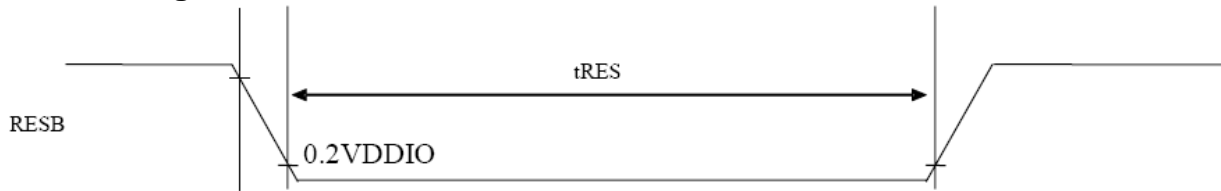
Symbol	Parameter	Min	Typ	Max	Unit
t_{RES}	Reset pulse duration	15	-	-	us

7.2 Parallel 6800 Interface Timing Characteristics
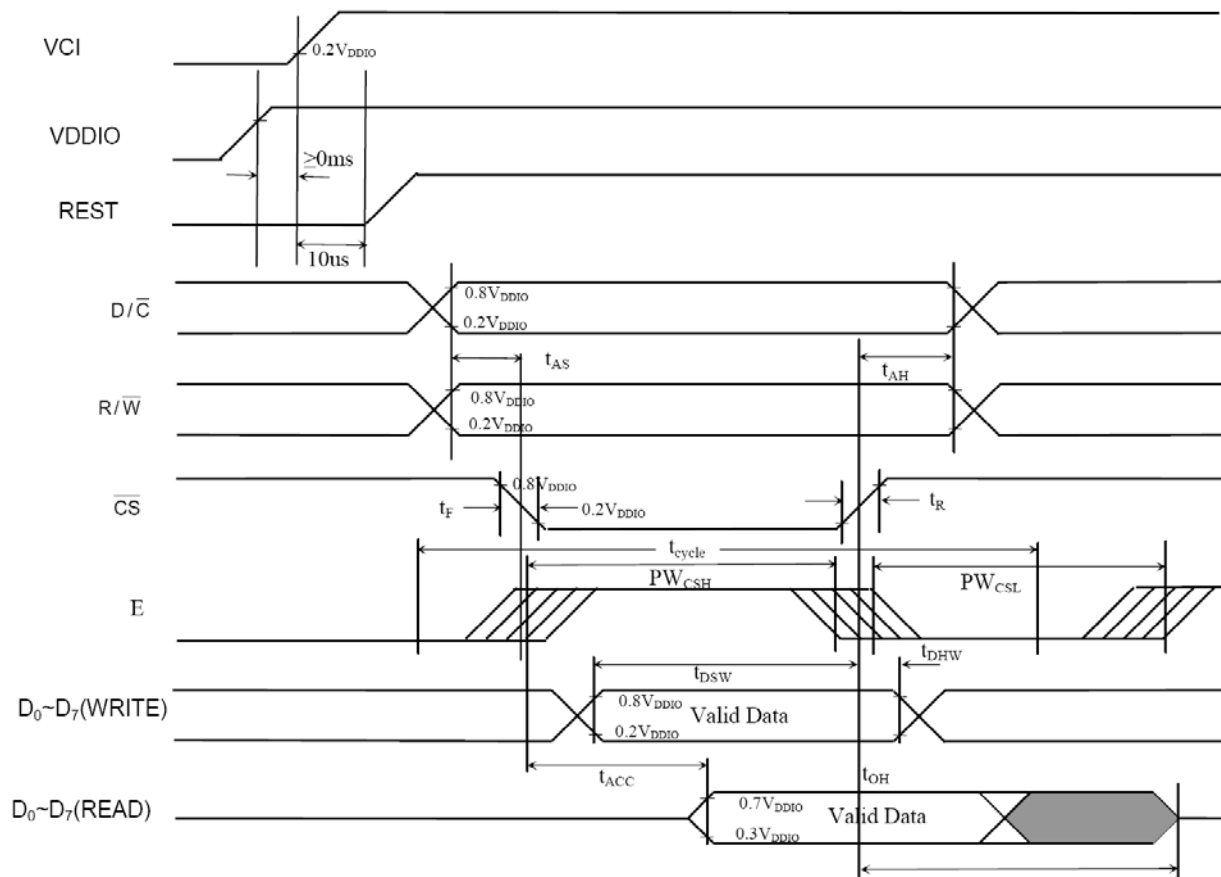
Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time (write cycle)	75	-	-	ns
t_{cycle}	Clock Cycle Time (read cycle) (Based on VOL/VOH = 0.3*VDDIO/0.7*VDDIO)	450	-	-	ns
t_{AS}	Address Setup Time ($R/\overline{W}$)	0	-	-	ns
t_{AH}	Address Hold Time ($R/\overline{W}$)	0	-	-	ns
t_{DSW}	Data Setup Time (D0~D7, WRITE)	5	-	-	ns
t_{DHW}	Data Hold Time (D0~D7, WRITE))	5	-	-	ns
t_{ACC}	Data Access Time (D0~D7, READ)	250	-	-	ns
t_{OH}	Output Hold time (D0~D7, READ)	100	-	-	ns
PW_{CSL}	Pulse width /CS low (write cycle)	40	-	-	ns
PW_{CSH}	Pulse width /CS high (write cycle)	25	-	-	ns
PW_{CSL}	Pulse width /CS low (read cycle)	500	-	-	ns
PW_{CSH}	Pulse width /CS high (read cycle)	500	-	-	ns
t_R	Rise time	-	-	4	ns
t_F	Fall time	-	-	4	ns

7.3 Parallel 8080 Interface Timing Characteristics
Write Cycle
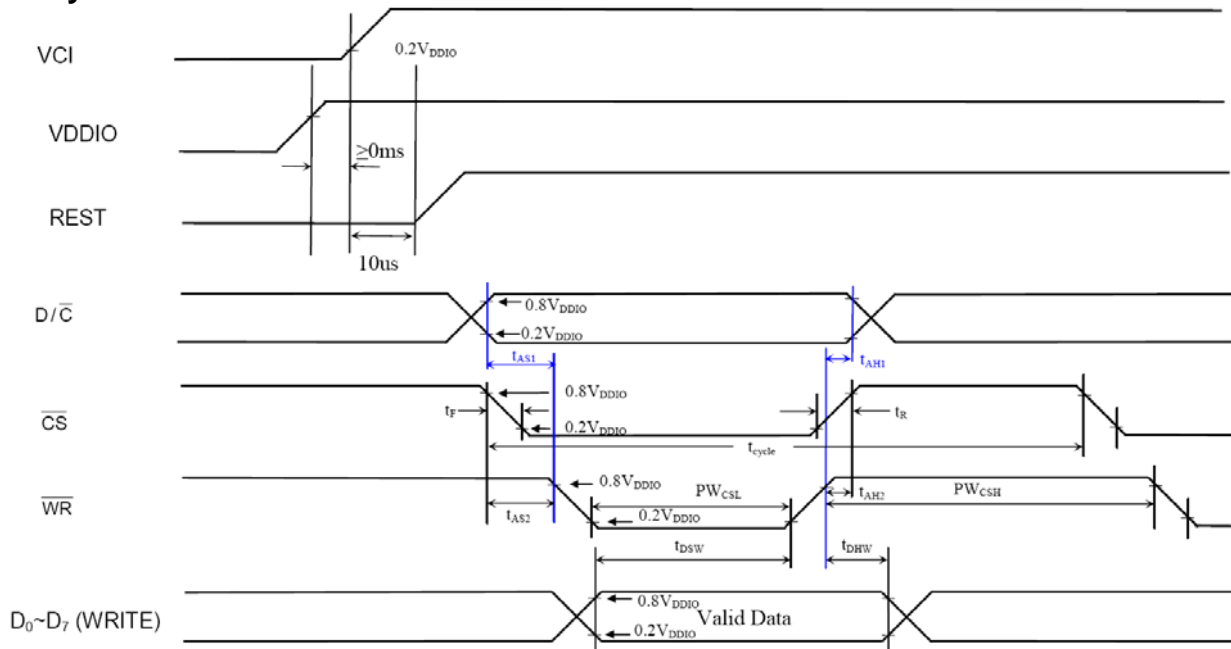
Read Cycle
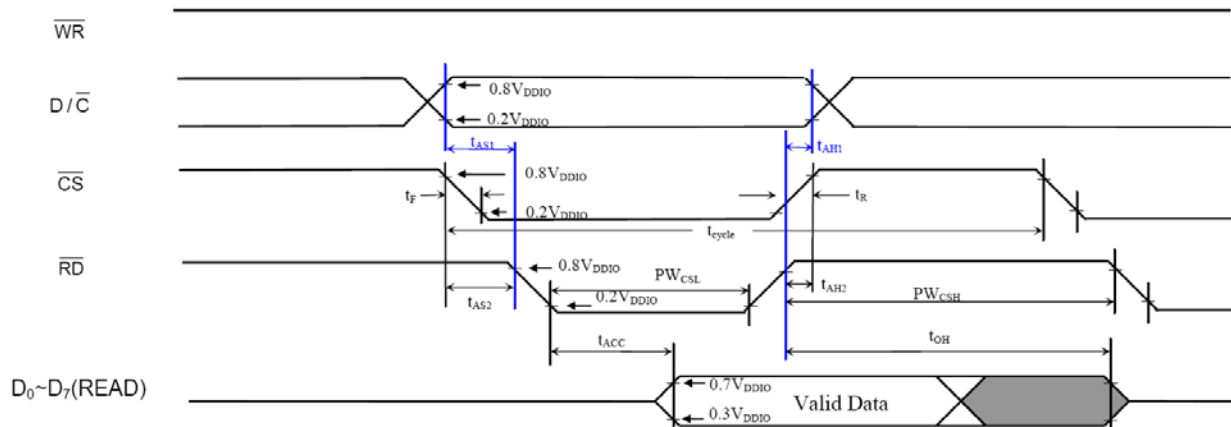
Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time (write cycle)	75	-	-	ns
t_{cycle}	Clock Cycle Time (read cycle) (Based on VOL/VOH = 0.3*VDDIO/0.7*VDDIO)	450	-	-	ns
t_{AS1}	Address Setup Time between ($R/\overline{W}$) and $D/\overline{C}$	0	-	-	ns
t_{AH1}	Address Hold Time between ($R/\overline{W}$) and $D/\overline{C}$	0	-	-	ns
t_{AS2}	Address Setup Time between ($R/\overline{W}$) and $\overline{CS}$	0	-	-	ns
t_{AH2}	Address Hold Time between ($R/\overline{W}$) and $\overline{CS}$	0	-	-	ns
t_{DSW}	Data Setup Time (D0~D7, WRITE)	5	-	-	ns
t_{DHW}	Data Hold Time (D0~D7, WRITE))	5	-	-	ns
t_{ACC}	Data Access Time (D0~D7, READ)	250	-	-	ns
t_{OH}	Output Hold time (D0~D7, READ)	100	-	-	ns
PW_{CSL}	Pulse width /CS low (write cycle)	40	-	-	ns
PW_{CSH}	Pulse width /CS high (write cycle)	25	-	-	ns
PW_{CSL}	Pulse width /CS low (read cycle)	500	-	-	ns
PW_{CSH}	Pulse width /CS high (read cycle)	500	-	-	ns
t_R	Rise time	-	-	4	ns
t_F	Fall time	-	-	4	ns

7.4 SPI Timing Characteristics

3-wire SPI write display data

4-wire SPI write display data
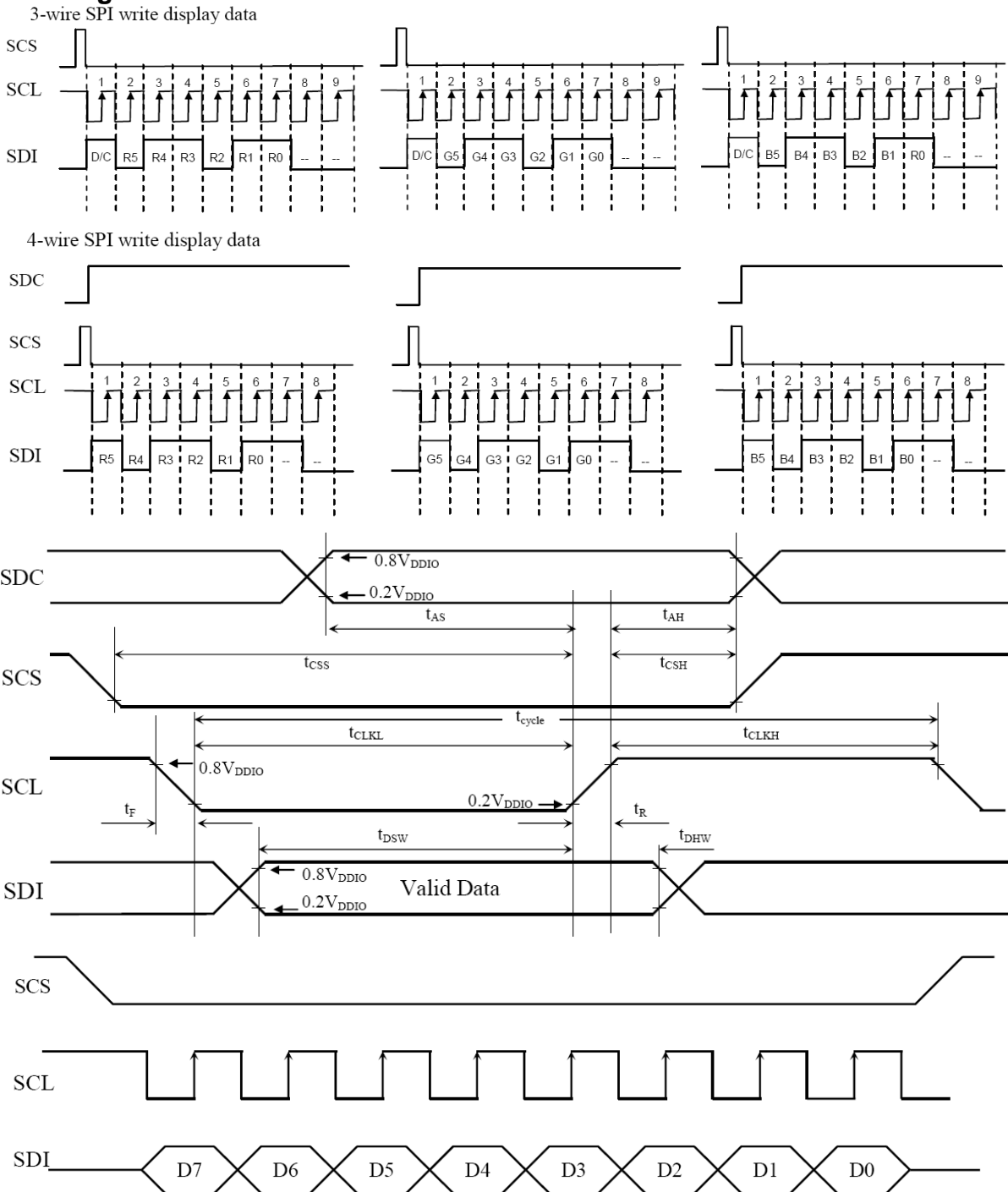
Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	77	-	-	ns
f_{CLK}	Serial Clock Cycle Time SPI Clock tolerance = +/- 2 ppm	-	-	15	MHz
t_{AS}	Register select Setup Time	4	-	-	ns
t_{AH}	Register select Hold Time	5	-	-	ns
t_{CSS}	Chip Select Setup Time	2	-	-	ns
t_{CSH}	Chip Select Hold Time	10	-	-	ns
t_{DSW}	Write Data Setup Time	5	-	-	ns
t_{OHW}	Write Data Hold Time	10	-	-	ns
t_{CLKL}	Clock Low Time	38	-	-	ns
t_{CLKH}	Clock High Time	38	-	-	ns
t_R	Rise time	-	-	4	ns
t_F	Fall time	-	-	4	ns

7.5 RGB Timing Characteristics
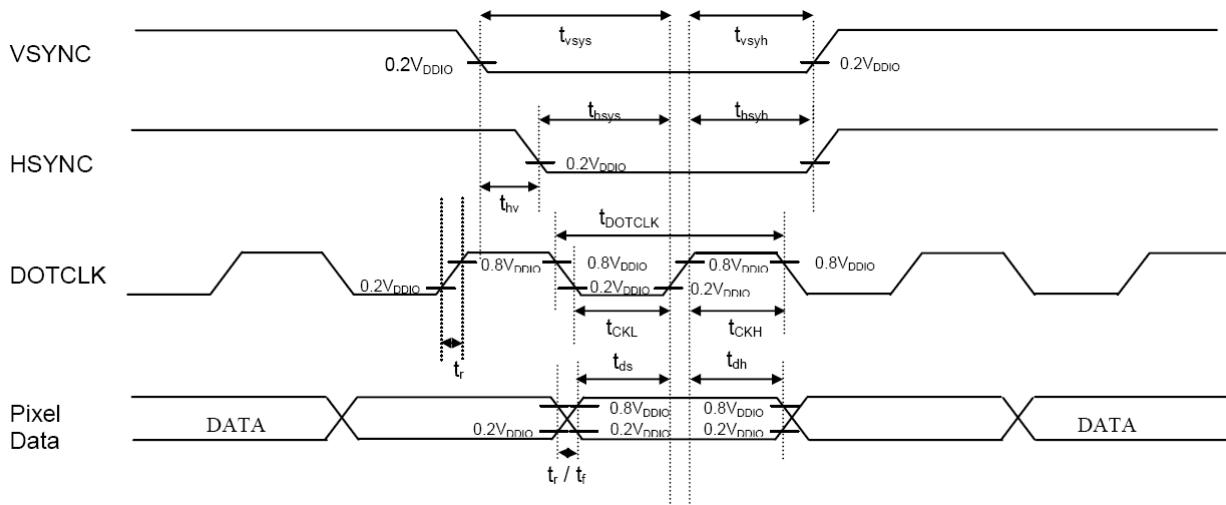
Symbol	Parameter	Min	Typ	Max	Unit
f_{DOTCLK}	DOTCLK Frequency (70Hz frame rate)	1	5.5	8.2	MHz
t_{DOTCLK}	DOTCLK Period	122	182	1000	ns
t_{VSYS}	Vertical Sync Setup Time	20	-	-	ns
t_{VSYH}	Vertical Sync Hold Time	20	-	-	ns
t_{HSYS}	Horizontal Sync Setup Time	20	-	-	ns
t_{HSYH}	Horizontal Sync Hold Time	20	-	-	ns
t_{HV}	Phase difference of Sync Signal Falling Edge	0	-	320	t_{DOTCLK}
t_{CLK}	DOTCLK Low Period	61	-	-	ns
t_{CKH}	DOTCLK High Period	61	-	-	ns
t_{DS}	Data Setup Time	25	-	-	ns
t_{DH}	Data hold Time	25	-	-	ns

7.6 Power Up Sequence for RGB mode
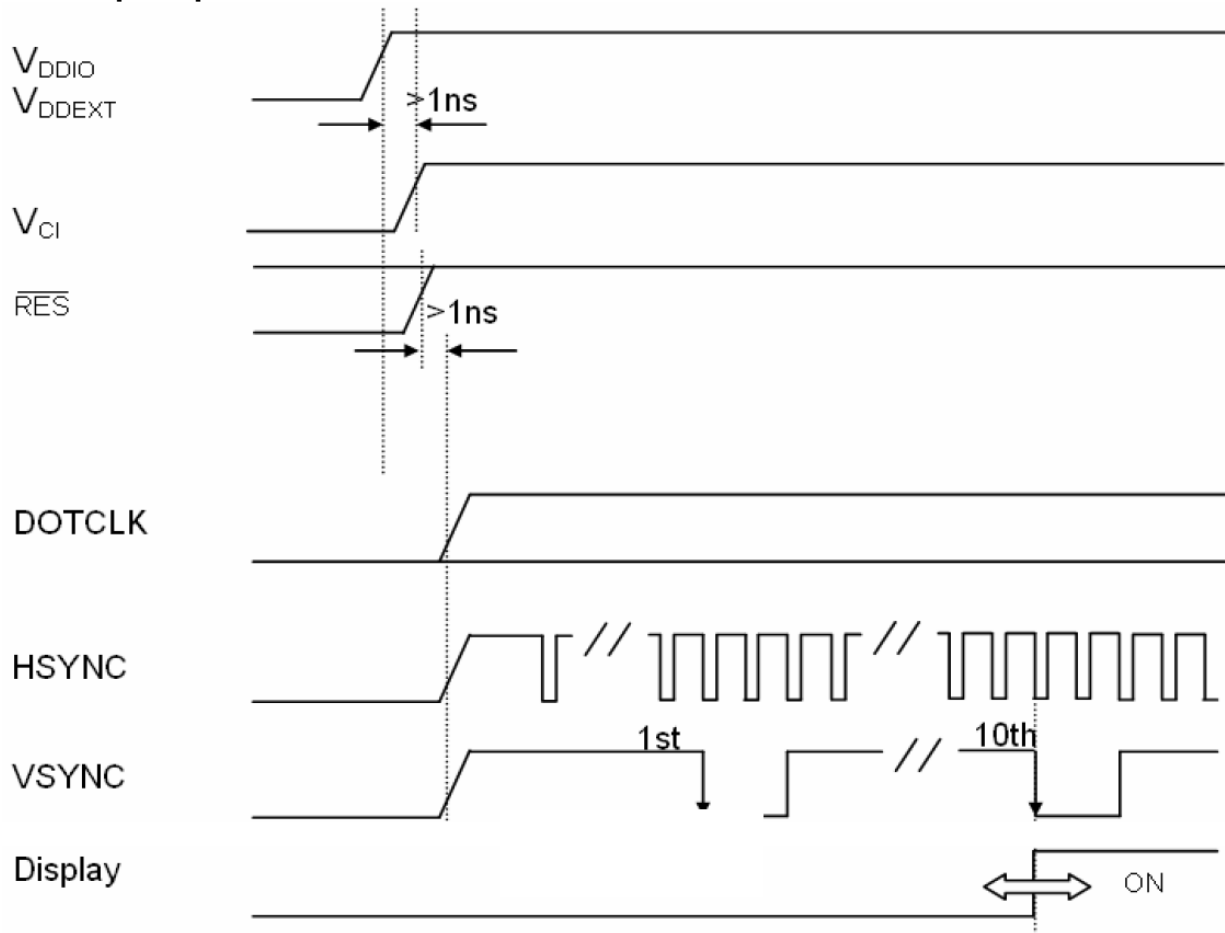
8. Backlight Characteristics

BL Circuit Diagram:

LEDA ———▶|—— ▶|—— ▶|—— ▶|—— ▶|—— ▶|—— LEDK

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	17.0	18.0	19.8	V	If=20mA
Supply Current	If	--	20	25	mA	--
Luminous Intensity for LCM	--	450	550	--	Cd/m^2	If=20mA
Uniformity for LCM	--	80	--	--	％	If=20mA
Life Time	--	--	50000	--	Hr	If=20mA
Backlight Color	White					

9. Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	-	45	-	degree	(1),(2),(6)
		θR	-	45	-		
	Vertical	θT	-	45	-		
		θB	-	25	-		
Contrast Ratio	Center		150	300	-	-	(1),(3),(6)
Response Time	Rising		-	35	50	ms	(1),(4),(6)
	Falling						
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			TBD		-	
	White y			TBD		-	
NTSC			-	58.	-	%	(1),(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.
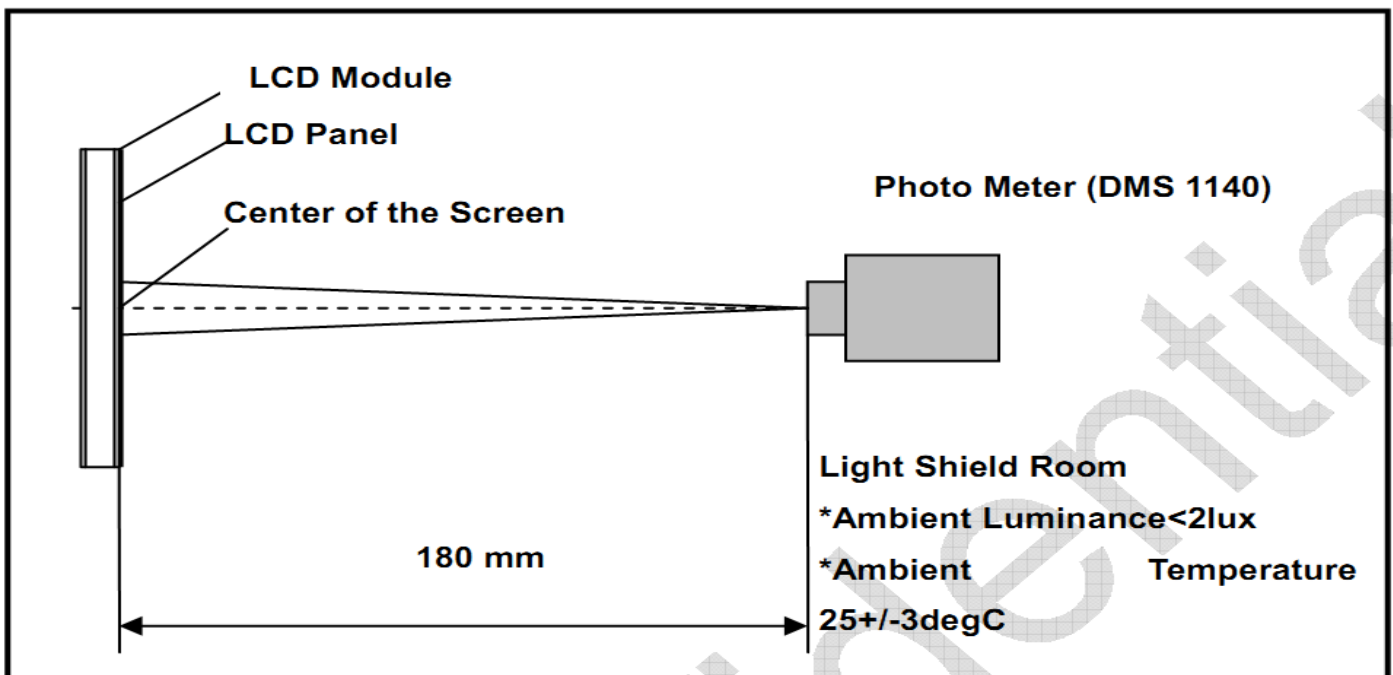
Note (2) Definition of Viewing Angle
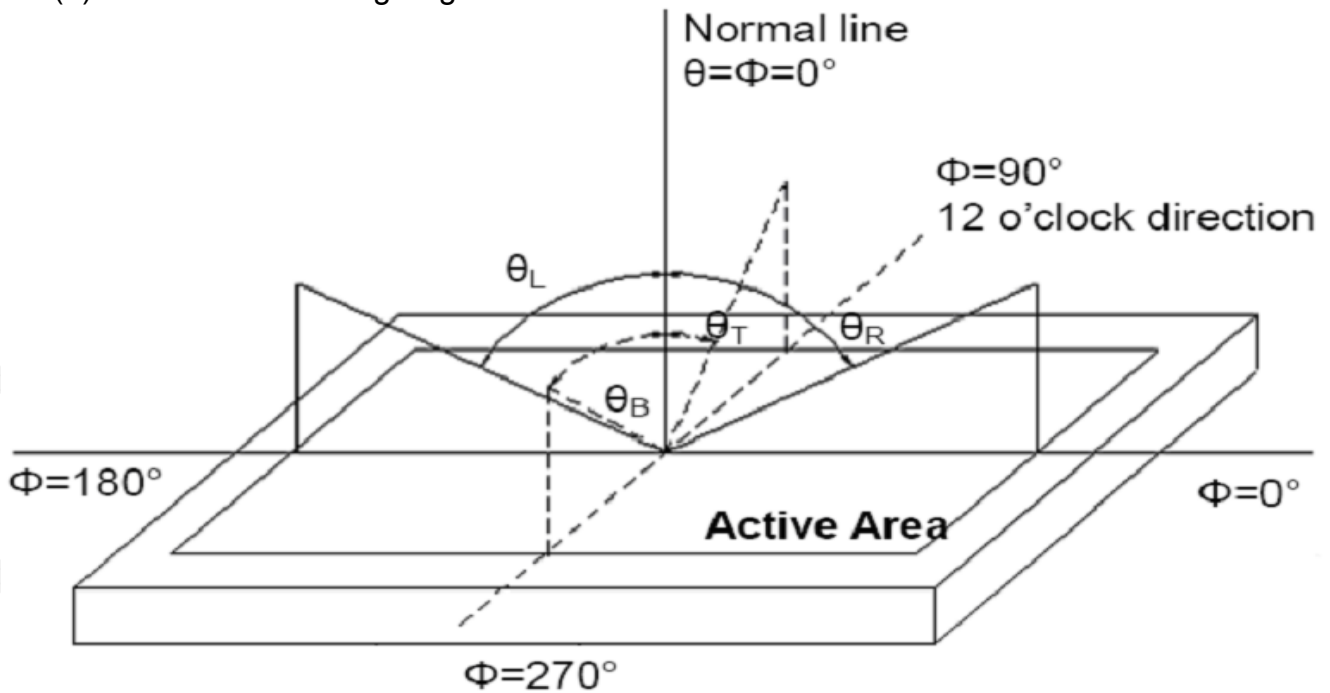
Note (3) Definition of Contrast Ratio (CR)

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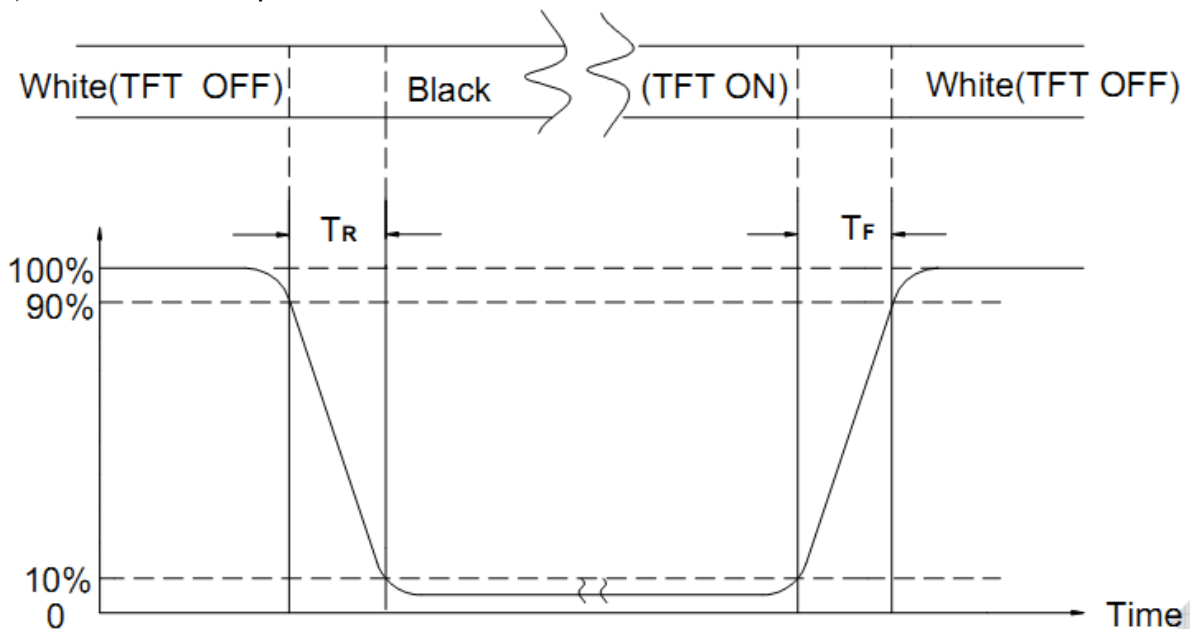
Note (5) Definition of Transmittance (Module is without signal input)

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×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.
	Low Temperature Storage	-30°C±2°C×200Hours	
	High Temperature Operating	70°C±2°C×120Hours	
	Low Temperature Operating	-20°C±2°C×120Hours	
	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×120Hours	
	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5M X,Y,Z direction for total 3hours (Packing Condition)	
	Drooping Test	Drop to the ground from 1M height one time every side of carton. (Packing Condition)	
	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
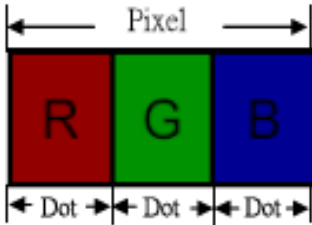
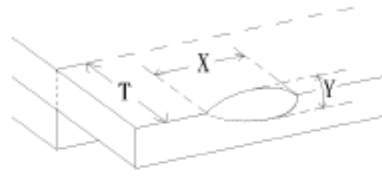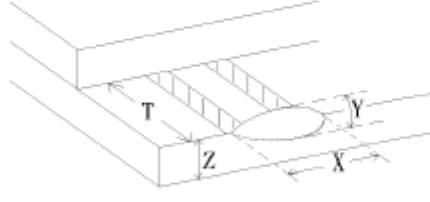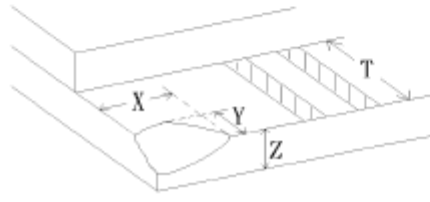11.2.1. CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.
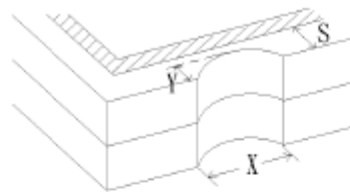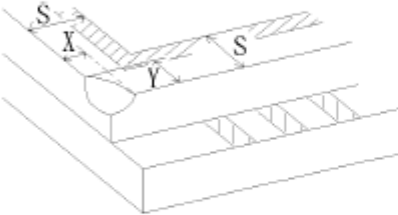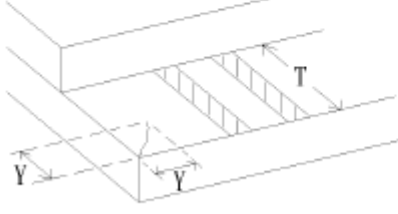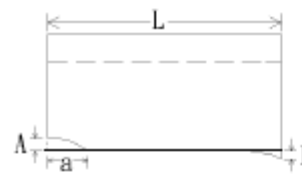
11.2.2. CHECKER SHALL SEE OVER 300±25 mm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

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

12.4. STANDARD OF VISUAL INSPECTION

NO.	CLASS	ITEM	JUDGEMENT
12.4.1	MINOR	BLACK AND WHITE SPOT FOREIGN MATERIEL DUST IN THE CELL BLEMISH SCRATCH	(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: Φ=(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 |
12.4.2	MINOR	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 |
12.4.3	MINOR	Dot Defect		Items	ACC. Q'TY	 | Bright dot | $N \leq 4$ (Distance>5mm) | | Dark dot | $N \leq 4$ (Distance>5mm) |

(A) ROUND TYPE: unit : mm.

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

NOTE: Φ=(LENGTH+WIDTH)/2

(B) LINEAR TYPE: unit : mm.

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

unit : mm.

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

Items	ACC. Q'TY
Bright dot	$N \leq 4$ (Distance>5mm)
Dark dot	$N \leq 4$ (Distance>5mm)

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

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 Precautions 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