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	2019-05-16	NEW ISSUE	
B	2019-06-05	MODIFY CTP	
C	2019-10-31	MODIFY CTP	

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

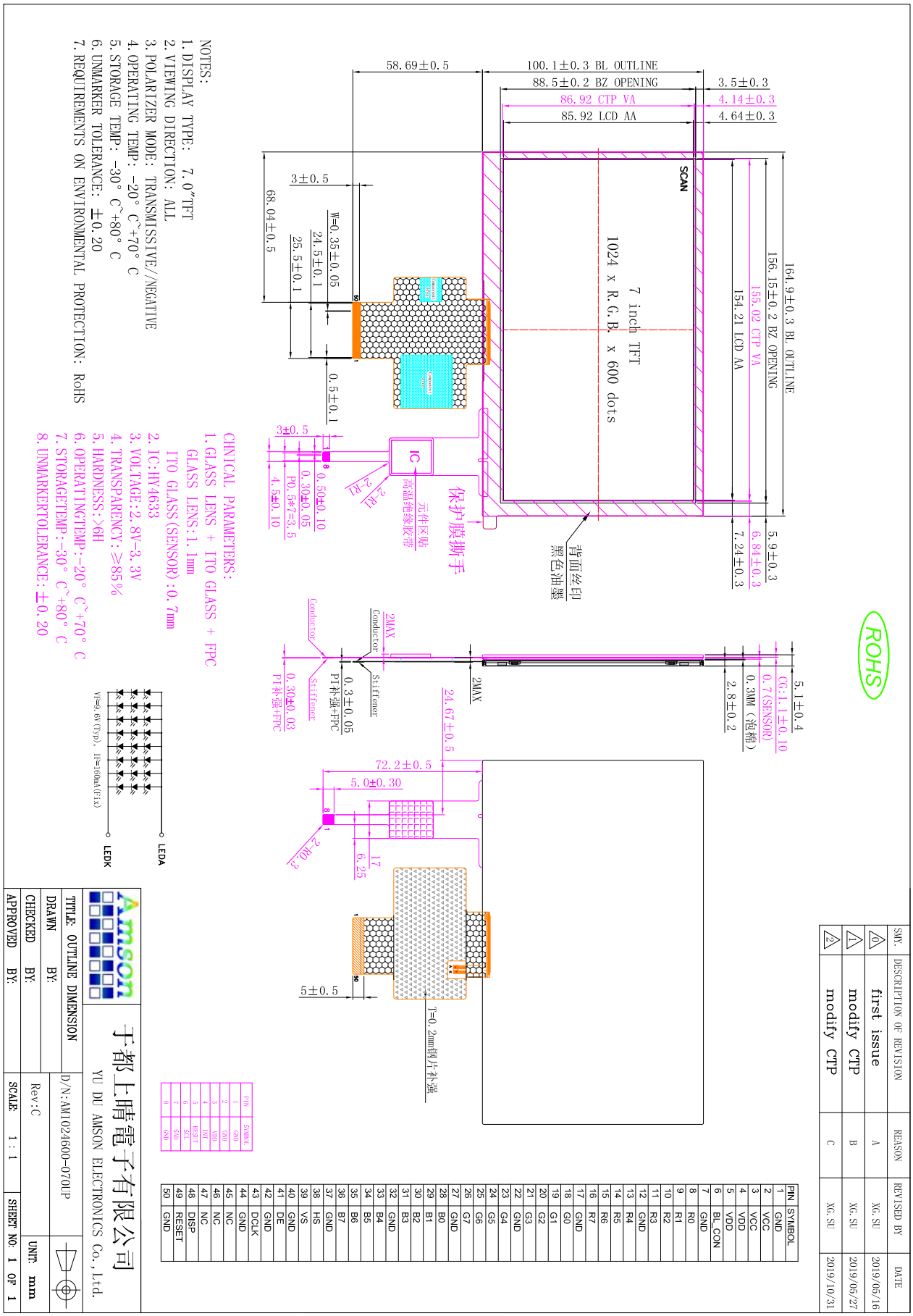
LCM

ITEM	STANDARD VALUES	UNITS
LCD type	7.0”TFT	--
Dot arrangement	1024(RGB)×600	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally Black , Transmissive	-
Gray Scale Inversion Direction	ALL	--
Eyes Viewing Direction	85/85/85/85	
Module size	164.90(W)×100.10 (H)×5.10 (T)	mm
Active area	154.21(W)×85.92(H)	mm
Dot pitch	0.1506(W)×0.1432(H)	mm
Interface	TTL	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Back Light	24White LED	--

CTP

ITEM	STANDARD VALUES	UNITS
CTP type	Cover Lens + sensor + FPC	--
IC	HY4633	
Surface hardness	6H	--
Transmittance	≥85％	--
CTP size	164.86(W)×99.96(H)×2.3(T)	mm
Active area	155.02(W)×86.92(H)	mm
Operating temperature	-20 ~ +70	
Storage temperature	-30 ~ +80	
CTP Interface	I^2C	

3. External Dimensions



PIN	SYMBOL
1	GND
2	VCC
3	VCC
4	VDD
5	VDD
6	BL_CON
7	GND
8	R0
9	R1
10	R2
11	R3
12	GND
13	R4
14	R5
15	R6
16	R7
17	GND
18	G0
19	G1
20	G2
21	G3
22	GND
23	G4
24	G5
25	G6
26	G7
27	GND
28	B0
29	B1
30	B2
31	B3
32	GND
33	B4
34	B5
35	B6
36	B7
37	GND
38	HS
39	VS
40	GND
41	DE
42	GND
43	DCLK
44	GND
45	NC
46	NC
47	NC
48	DISP
49	RESET
50	GND

PIN	SYMBOL
1	GND
2	VDD
3	SCL
4	SDA
5	INT
6	RESET
7	VDD
8	GND

SMY.	DESCRIPTION OF REVISION	REASON	REVISED BY	DATE
0	first issue	A	XG. SU	2019/05/16
1	modify CTP	B	XG. SU	2019/05/27
2	modify CTP	C	XG. SU	2019/10/31

TITLE: OUTLINE DIMENSION		D/N:AM1024600-070UP	
DRAWN BY:			
CHECKED BY:		Rev:C	UNIT: mm
APPROVED BY:		SCALE: 1:1	SHEET NO: 1 OF 1

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

4. Interface Description

TFT

PIN	PIN NAME	DESCRIPTION
1	GND	Power ground.
2，3	VDD	Supply Voltage
4，5	LED_VCC	BL VIN Voltage
6	BL_CON	Common Voltage.
7	GND	Power ground.
8~11	R0~R3	Red Data Input
12	GND	Power ground.
13~16	R4~R7	Red Data Input.
17	GND	Power ground.
18~21	G0~G3	Green Data Input
22	GND	Power ground.
23~26	G4~G7	Green Data Input.
27	GND	Power ground.
28~31	B0~B3	Blue Data Input
32	GND	Power ground.
33~36	B4~B7	Blue Data Input.
37	GND	Power ground.
38	HS	Horizontal sync input. Negative polarity.
39	VS	Vertical sync input. Negative polarity.
40	GND	Power ground.
41	DE	Data Enable signal.
42	GND	Power ground.
43	DCLK	Clock input.
44	GND	Power ground.
45~47	NC.	Not connect.
48	DISP	STANDBY MODE. NORMALLY PULLED HIGH. DISP=H,NORMAL OPERATION.(DEFAULT) DISP=L, TIMING ,CONTORLLER , SOURCE DRIVER WILL TURN OFF,ALL OUTPUT ARE HIGH-Z
49	RESET	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high.(R=10KΩ, C=1μF)
50	GND	Power ground.

CTP

PIN NO.	PIN NAME	
1,2,8	GND	CTP Power ground
3	TP_VCC	CTP Digital Power 3.3V.
4	INT	CTP interruption signal.
5	RESET	CTP reset pin. Active low to enter reset state.
6	SCL	CTP I^2C_clock.
7	SDA	CTP I^2C_data

5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Logic Supply Voltage	VDD	-0.5	5.0	V
Input Voltage	Vin	-0.3	VDD +0.3	V
Operating Temperature	TOP	-20	70	°C
Storage Temperature	TST	-30	80	°C
Storage Humidity	HD	20	90	%RH

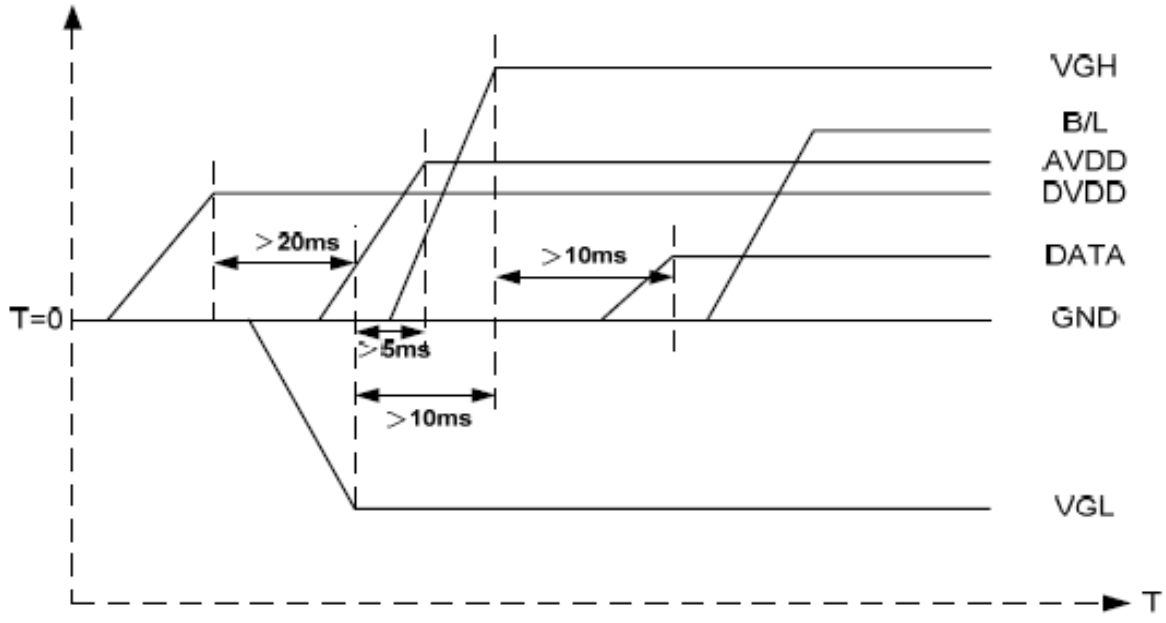
6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Logic Supply Voltage	VDD	3.0	3.3	3.6	V	-
Input High Voltage	V_{IH}	0.7VDD	-	VDD	V	-
Input Low Voltage	V_{IL}	GND	-	0.3 VDD	V	-
Output High Voltage	V_{OH}	VDD-0.4	-	VDD	V	-
Output Low Voltage	V_{OL}	GND	-	GND+0.4	V	-
I/O Leak Current	ILI	-1	-	1	uA	-
Supply Current	IDD	-	7.0	10	mA	-

7. Timing Characteristics

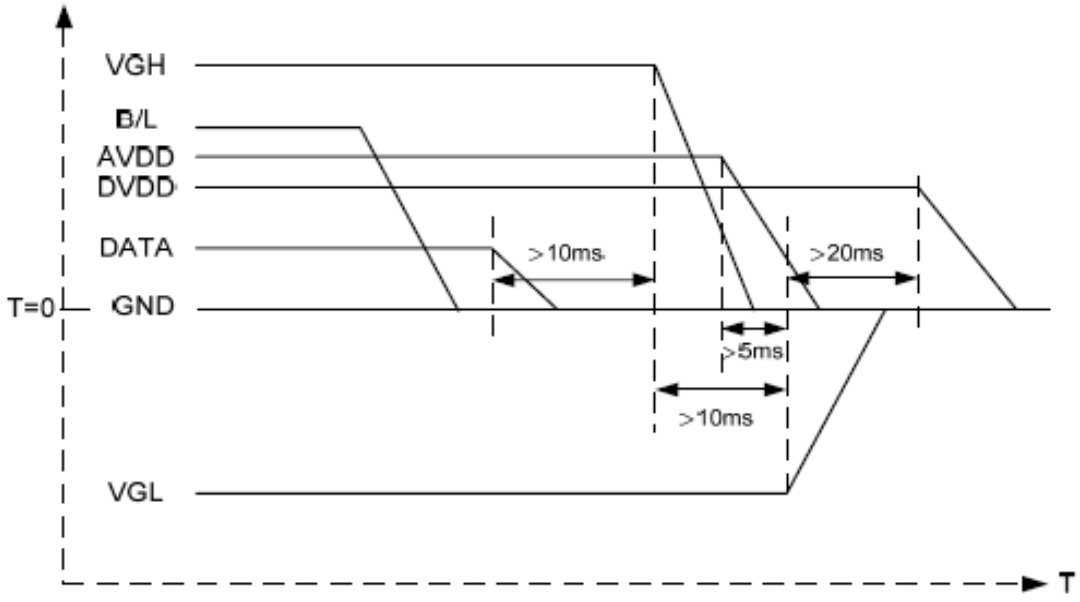
7.1 Power Sequence

a. Power on:



DV_{DD}→VGL→VGH→Data→B/L

b. Power off:

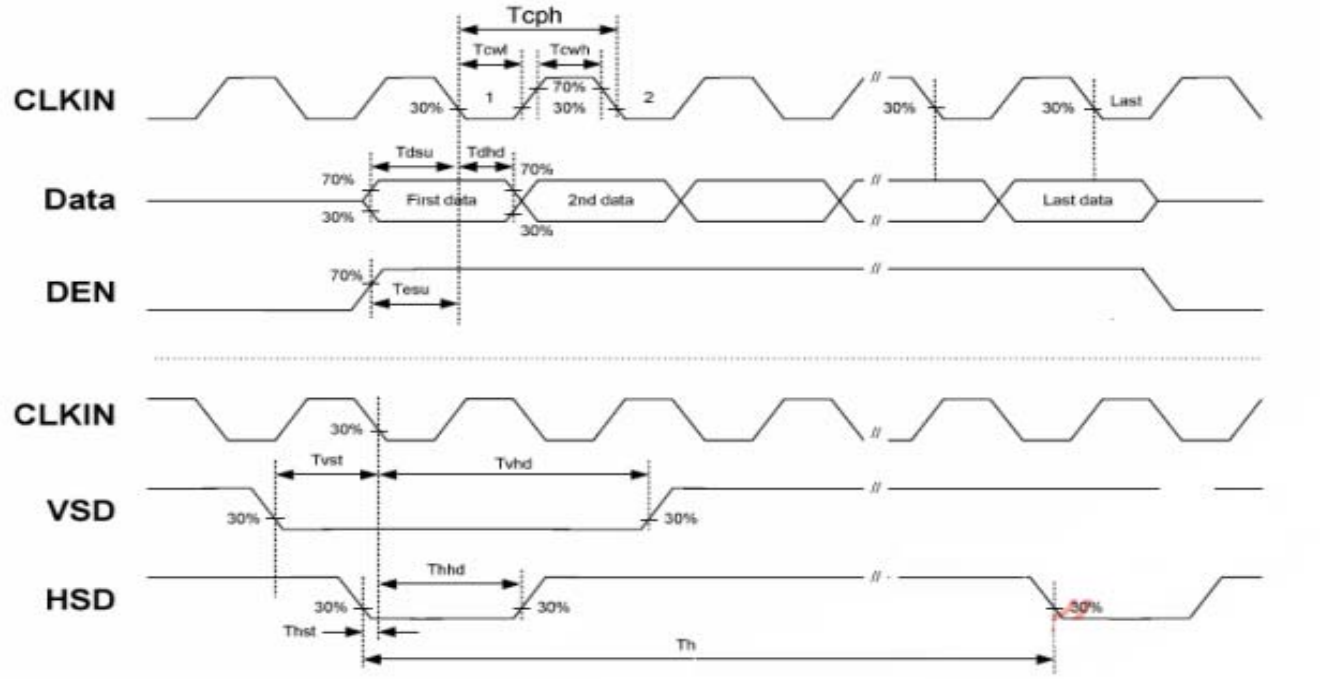


B/L→Data→VGH→VGL→DV_{DD}

Note: Data include R0~R7, B0~B7, GO~G7, U/D, L/R, DCLK, HS,VS,DE.

7.2 AC Electrical Characteristics

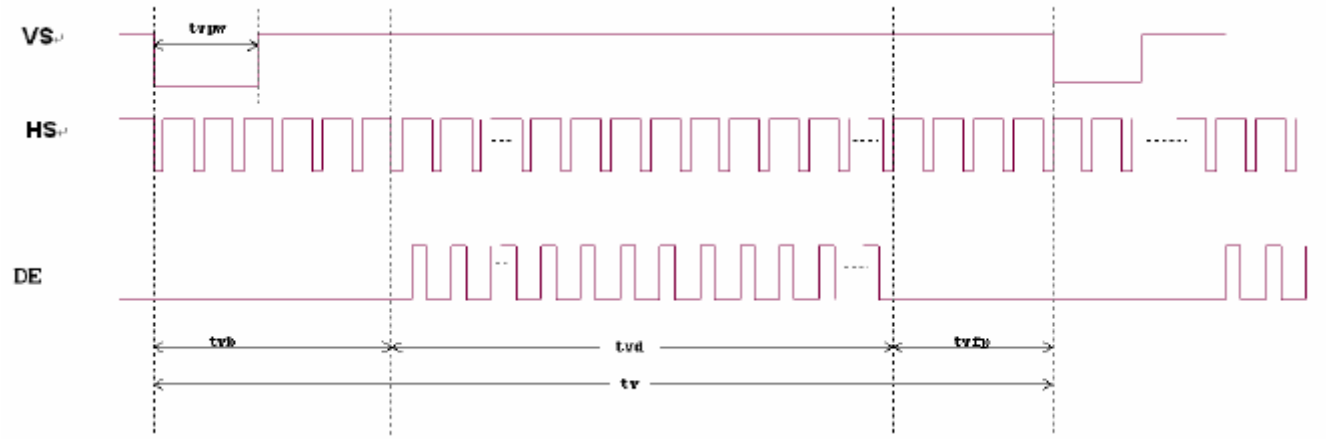
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
HS setup time	T_{hst}	8	-	-	ns	
HS hold time	T_{hhd}	8	-	-	ns	
VS setup time	T_{vst}	8	-	-	ns	
VS hold time	T_{vhd}	8	-	-	ns	
Data setup time	T_{dsu}	8	-	-	ns	
Data hole time	T_{dhd}	8	-	-	ns	
DE setup time	T_{esu}	8	-	-	ns	
DE hole time	T_{ehd}	8	-	-	ns	
DV_{DD} Power On Slew rate	T_{POR}	-	-	20	ms	From 0 to 90% DV_{DD}
RESET pulse width	T_{Rst}	1	-	-	ms	
DCLK cycle time	T_{coh}	20	-	-	ns	
DCLK pulse duty	T_{cwh}	40	50	60	%	



7.3 Data Input Format

Horizontal input timing diagram

Vertial input timing diaqram



7.4 Timing

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

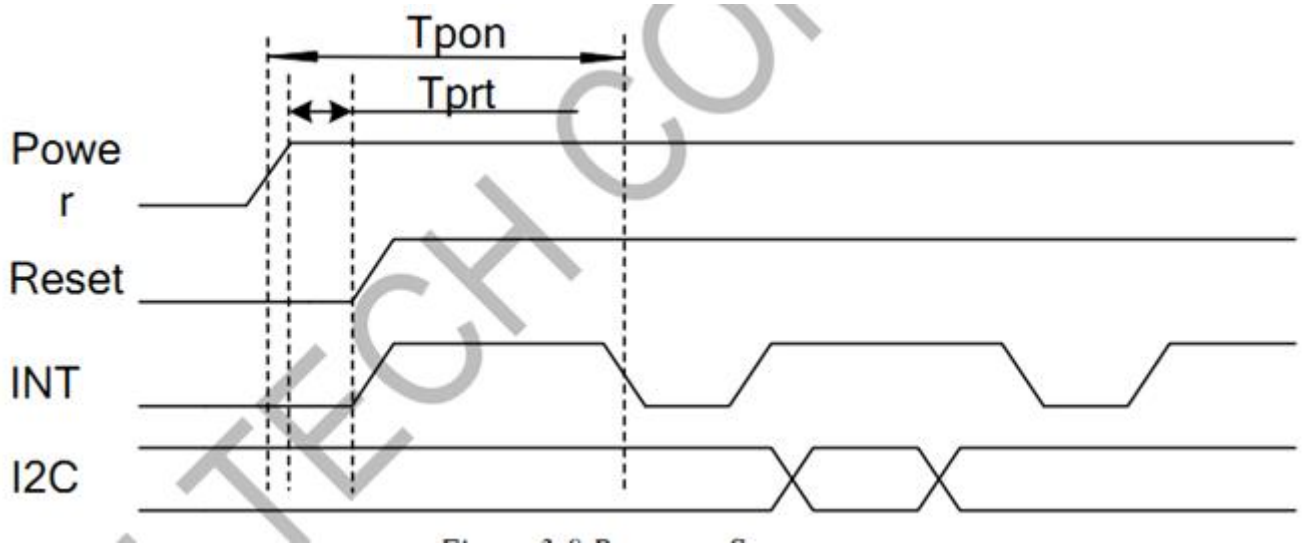
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1	-	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

7.5 CTP Timing Characteristics

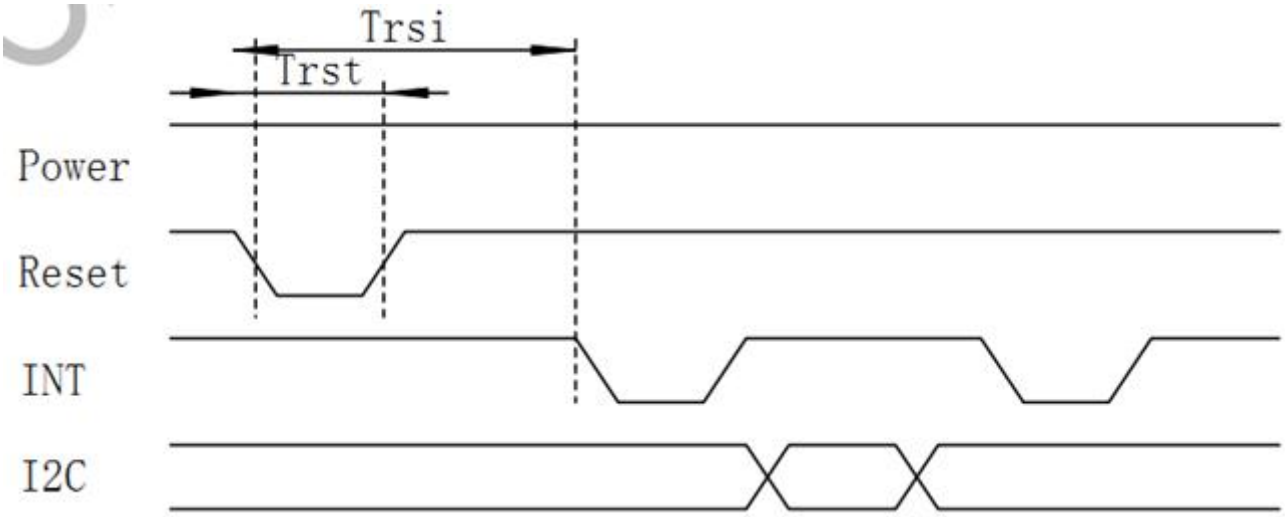
7.5.1 IIC communication timing

Parameter	Min	Max	Unit
SCL frequency	10	400	KHz
Bus free time between a STOP and START condition	4.7	\	us
Hold time (repeated) START condition	4.0	\	us
Data setup time	250	\	ns
Setup time for a repeated START condition	4.7	\	us
Setup Time for STOP condition	4.0	\	us

7.5.2 IIC Timing Chart

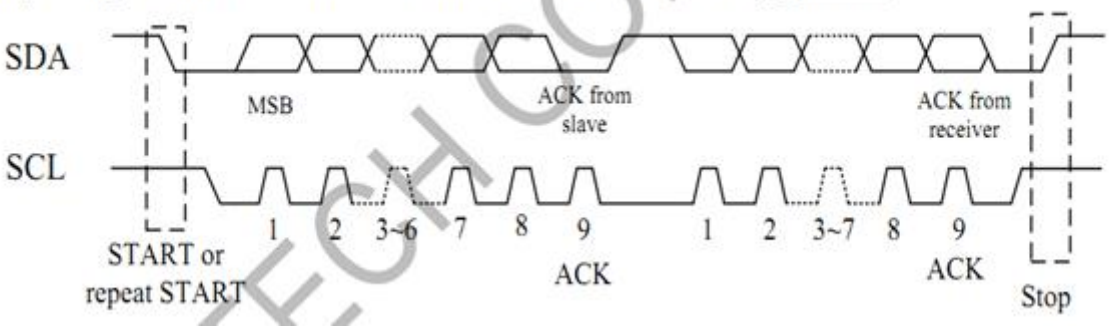


Power on Sequence



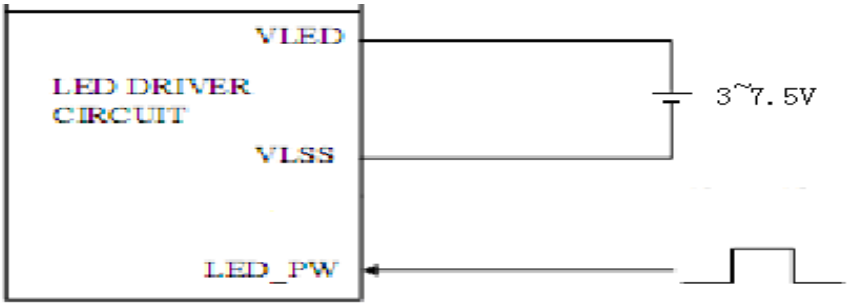
Power on Sequence

The I2C is always configured in the Slave mode. The data transfer format is shown in Figure 2-4.

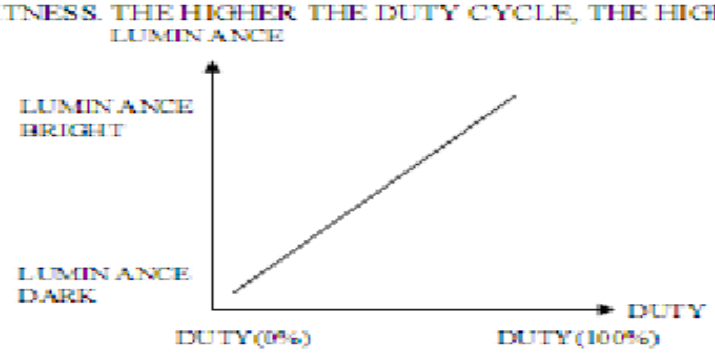


I2C Serial Data transfer format

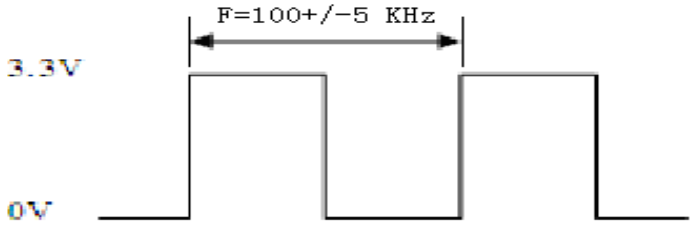
8. Backlight Characteristic



NOTE (1) : ADJUST THE PWM SIGNAL IN ORDER TO CONTROL LED BACKLIGHTS BRIGHTNESS. THE HIGHER THE DUTY CYCLE, THE HIGHER THE BRIGHTNESS



NOTE (2) : PWM SIGNAL=0~3.3V，OPERATION FREQUENCY：100+/-5 KHz

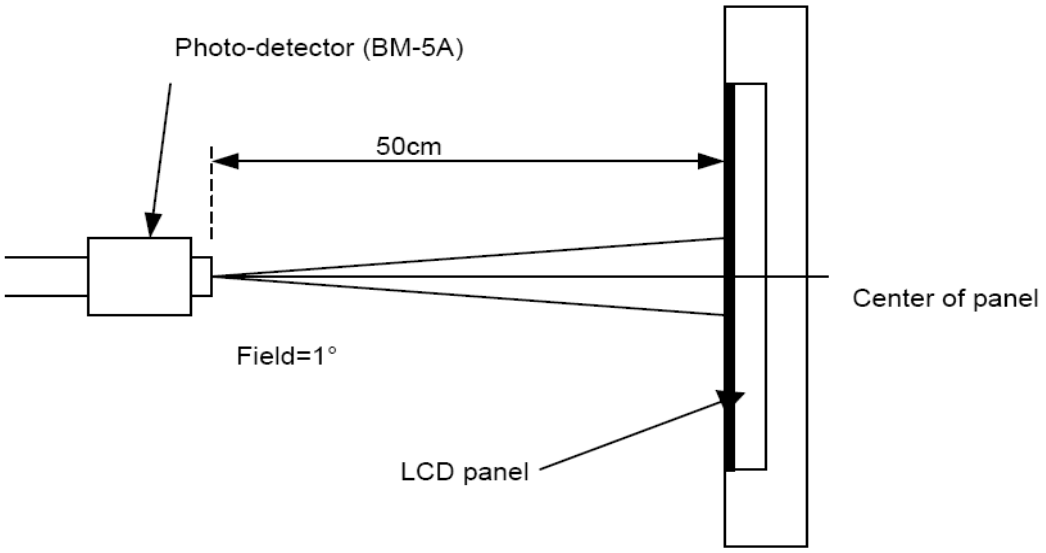


Item		Symbol	MIN	TYP	MAX	UNIT	NOTE
Backlight Power		LED_VCC	3	5	7.5	V	Ta = 25°C
Backlight Power		ILED_VCC	-	(0.5)	(0.7)	A	LED_VCC=5V
EN Signal Voltage	VIH	BL_CON	1.2			V	
	VIL		GND		0.4	V	
Lifetime			30000	-	-	Hr	
Color		White					
Average Brightness		-	300	380	-	Cd/cm2	
Luminance uniformity		-	--	80	-	%	

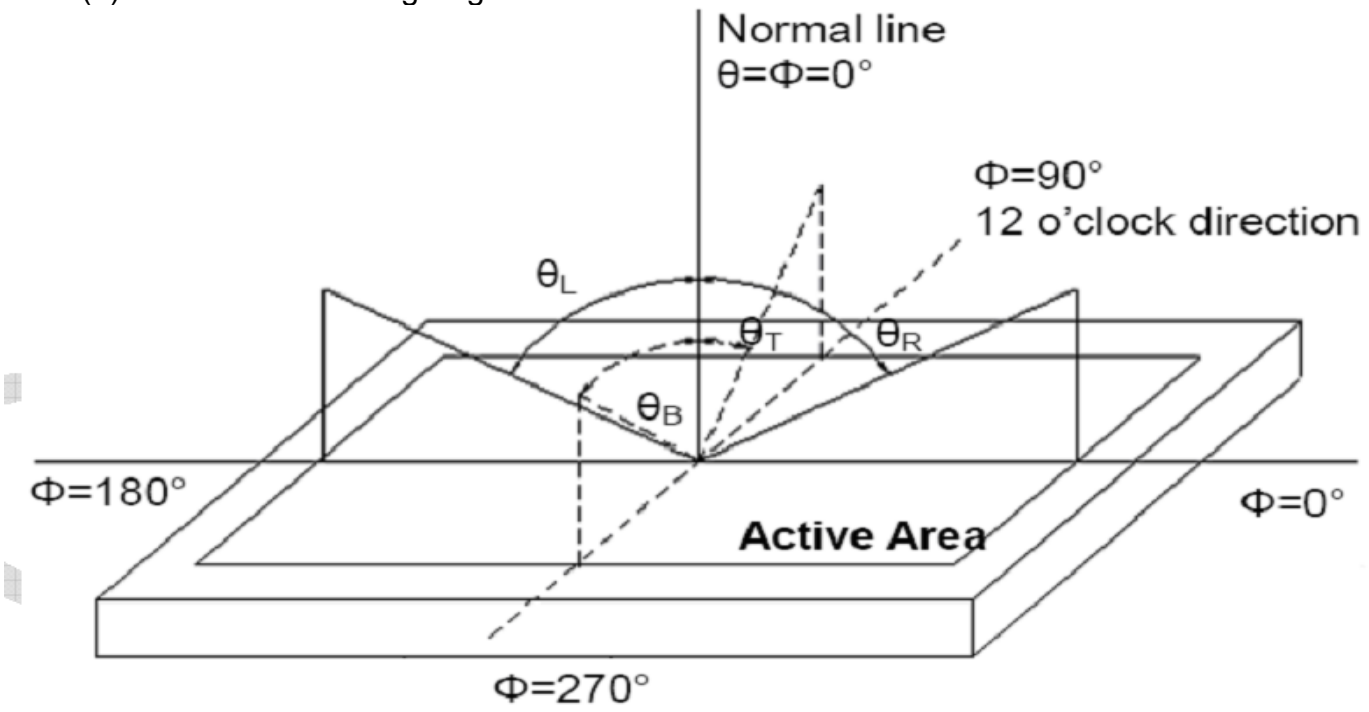
9. Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θ_L	80	85	-	degree	(1),(2),(6)
		θ_R	80	85	-		
	Vertical	θ_T	80	85	-		
		θ_B	80	85	-		
Contrast Ratio	Center		600	800	-	-	(1),(3),(6)
Response Time	Rising + Falling		-	25	-	ms	(1),(4),(6)
CF Color Chromaticity (CIE1931)	Red x		Typ. -005	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		-	

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



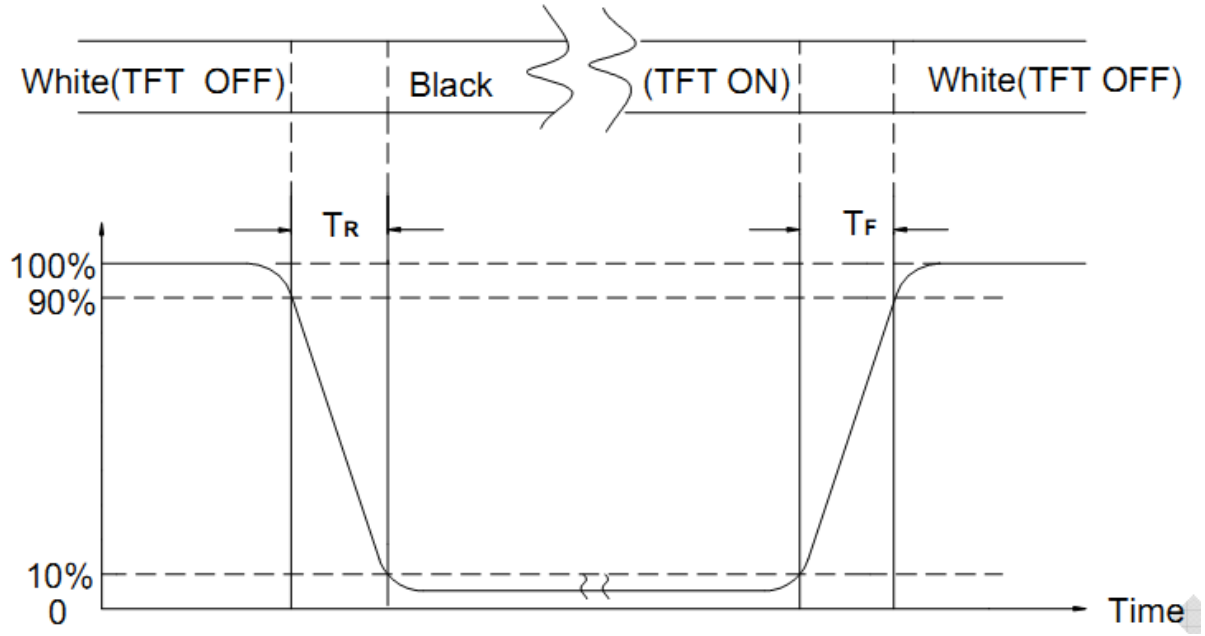
Note (3) Definition of Contrast Ratio (CR)

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

<table>
<tr><th>NO.</th><th>TEST ITEMS</th><th>TEST CONDITION</th></tr>
<tr><td>①</td><td>High Temperature Storage</td><td>Keep in 80°C ±5℃ 240 hrs
Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td>②</td><td>Low Temperature Storage</td><td>Keep in -30°C ±5℃ 240 hrs
Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td>③</td><td>High Temperature / High Humidity Storage Test</td><td>Keep in 60 ℃ / 90% R.H duration for 240 hrs
Surrounding temperature, then storage at normal condition 4hrs.
(Excluding the polarizer)</td></tr>
<tr><td>④</td><td>Temperature Cycling Storage Test</td><td>-30°C → +25℃ → 80°C → +25℃
(30mins) (5mins) (30mins) (5mins)
30 Cycle
Surrounding temperature, then storage at normal condition 4hrs.</td></tr>
<tr><td rowspan="2">⑤</td><td rowspan="2">ESD Test</td><td>Air Discharge:
Apply 2 KV with 5 times
Discharge for each polarity +/-</td><td>Contact Discharge:
Apply 250 V with 5 times
discharge for each polarity +/-</td></tr>
<tr><td colspan="2">1. Temperature ambiance : 15℃～35℃
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%)</td></tr>
<tr><td>⑥</td><td>Vibration Test (Packaged)</td><td colspan="2">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 2 Hrs</td></tr>
<tr><td>⑦</td><td>Drop Test (Packaged)</td><td colspan="2">
<table>
<tr><th>Packing Weight (Kg)</th><th>Drop Height (cm)</th></tr>
<tr><td>0 ~ 45.4</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</td></tr>
</table>

11. Inspection Standard

11.1. QUALITY :

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

11.1.1. INSPECTIONTOOLS AND INSTRUMENTS

Vernier calipers, film scales, multimeter, magnifying eyepiece, ND5%, luminance meter and so on.

11.1.2. 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.

11.1.3. 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.

11.1.4. 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.

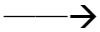
11.2.2.CHECKER SHALL SEE OVER 300±25 mm. WITH BARE EYES FAR FROM SAMPLE

11.2.3. Ambient Illumination:

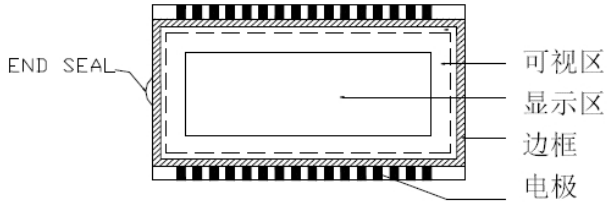
0 ~30 Lux for functional inspection

500 ~ 1200 Lux for external appearance inspection.

11.2.4. TEST AREA:



11.2.5. Inspection should be carried out with rope electrostatic ring and static finger cover (both hands except small fingers must be worn)



11.2.6. The inspector may make a visual inspection or a comparative examination with a film ruler and a magnifying eyepiece. Individual defects shall be determined according to the limited samples.

11.2.7. Functional testing uses electrical testing fixtures or test fixtures required by customers.

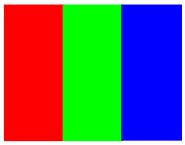
11.2.8. the ion fan should be used when testing.

11.2.9. the principle of judgment

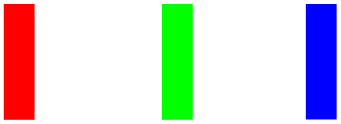
11.3.1 If the defect outside the visual area does not affect the assembly and display, it will be judged as a good product.

11.3.2 Poor definition

Pixel:
A combination of three sub-pixels (Red + Green + Blue).



Dot:
Any of the sub-pixels (Red or Green or Blue).



Bright and dark dots:
A point pixel (sub-pixel: R, G, B pixels) is lit or turned off during the display function test.

Highlights:
Usually considered to be shown on a black screen.

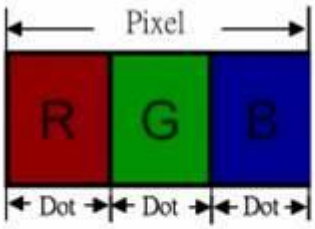
Dark spots:
They are generally considered to be shown on R, G, B solid colors or white images.

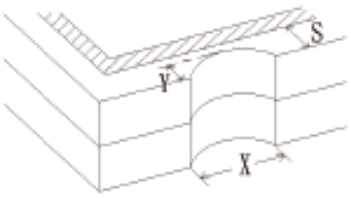
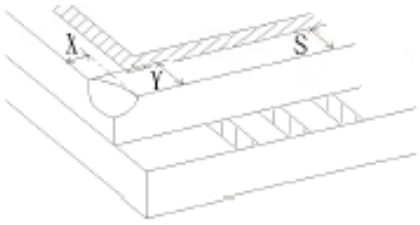
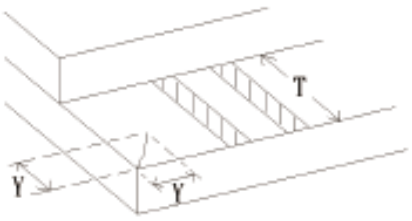
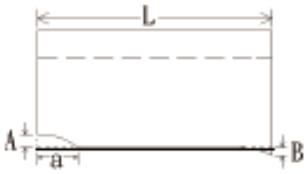
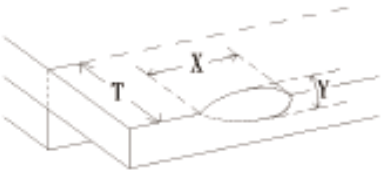
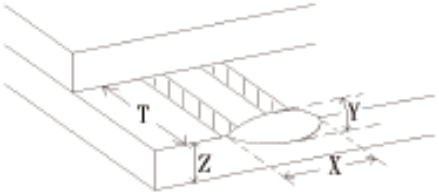
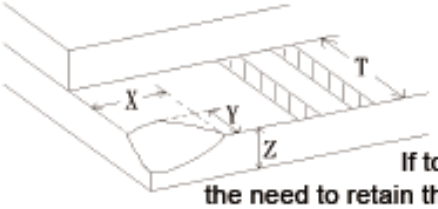
Neighborhood:
Two or three adjacent point pixels (dot: sub-pixel) connected together (R, G or G, B or B, R or RGB).

11.3. INSPECTION PLAN :

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

11.4. STANDARD OF VISUAL INSPECTION

<table>
<tr><th>NO.</th><th>CLASS</th><th>ITEM</th><th>JUDGEMENT</th></tr>
<tr><td>11.4.1</td><td>MINOR</td><td>BLACK AND WHITE SPOT
FOREIGN MATERIEL
DUST IN THE CELL
BLEMISH
SCRATCH</td><td>(A) ROUND TYPE: unit : mm.
<table><tr><th>DIAMETER (mm.)</th><th>ACCEPTABLE Q'TY</th></tr><tr><td>Φ ≦ 0.15</td><td>Distance≥1mm</td></tr><tr><td>0.15 < Φ ≦ 0.4</td><td>3 (Distance>15mm)</td></tr><tr><td>0.4 < Φ</td><td>0</td></tr></table>NOTE: Φ=(LENGTH+WIDTH)/2
(B) LINEAR TYPE: unit : mm.
<table><tr><th>LENGTH</th><th>WIDTH</th><th>ACCEPTABLE Q'TY</th></tr><tr><td>------</td><td>W ≦0.03</td><td>Distance≥1mm</td></tr><tr><td>L ≦ 4.0</td><td>0.03 < W ≦0.05</td><td>3 (Distance>15mm)</td></tr><tr><td>------</td><td>0.05 < W</td><td>FOLLOW ROUND TYPE</td></tr></table></td></tr>
<tr><td>11.4.2</td><td>MINOR</td><td>BUBBLE IN POLARIZER
DENT ON POLARIZER</td><td>unit : mm.
<table><tr><th>DIAMETER</th><th>ACCEPTABLE Q'TY</th></tr><tr><td>Φ ≦ 0.2</td><td>Distance≥1mm</td></tr><tr><td>0.2 < Φ ≦ 0.5</td><td>3 (Distance>15mm)</td></tr><tr><td>0.5 < Φ</td><td>0</td></tr></table></td></tr>
<tr><td>11.4.3</td><td>MINOR</td><td>Dot Defect</td><td><table><tr><th>Items</th><th>ACC. Q'TY</th></tr><tr><td>Bright dot</td><td>N≦2 (Distance≥15mm)</td></tr><tr><td>Dark dot</td><td>N≦3 (Distance≥15mm)</td></tr></table>Pixel Define :
 
Note 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot. Definittion:<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.</td></tr>
<tr><td>11.4.4</td><td>MINOR</td><td>Mura</td><td>Not visible thriugh 5% ND filter in 50% gray or judge by limit sample if necessary</td></tr>
</table>

NO.	CLASS	ITEM	JUDGEMENT
11.4.5	MINOR	LCD GLASS CHIPPING	 X ≥ 3mm Y > S Reject
11.4.6	MINOR	LCD GLASS CHIPPING	 X or Y > S Reject
11.4.7	MAJOR	LCD GLASS GLASS CRACK	 Continuous burst NG Reject
11.4.8	MAJOR	LCD GLASS SCRIBE DEFECT	 ACCORDING TO DIMENSION
11.4.9	MINOR	LCD GLASS CHIPPING (ON THE TERMINAL AREA)	 Y<1/2Z Y ≥ 0.5mm Reject X ≥ 3mm
11.4.10	MINOR	LCD GLASS CHIPPING (ON THE TERMINAL SURFACE)	 Y<1/2Z Y ≥ 0.5mm Reject X ≥ 3mm
11.4.11	MINOR	LCD GLASS CHIPPING	 X ≥ 3mm Y ≥ T Reject If touch the electrode lines, the need to retain the two-thirds electrode lines

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