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	2025/01/02	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

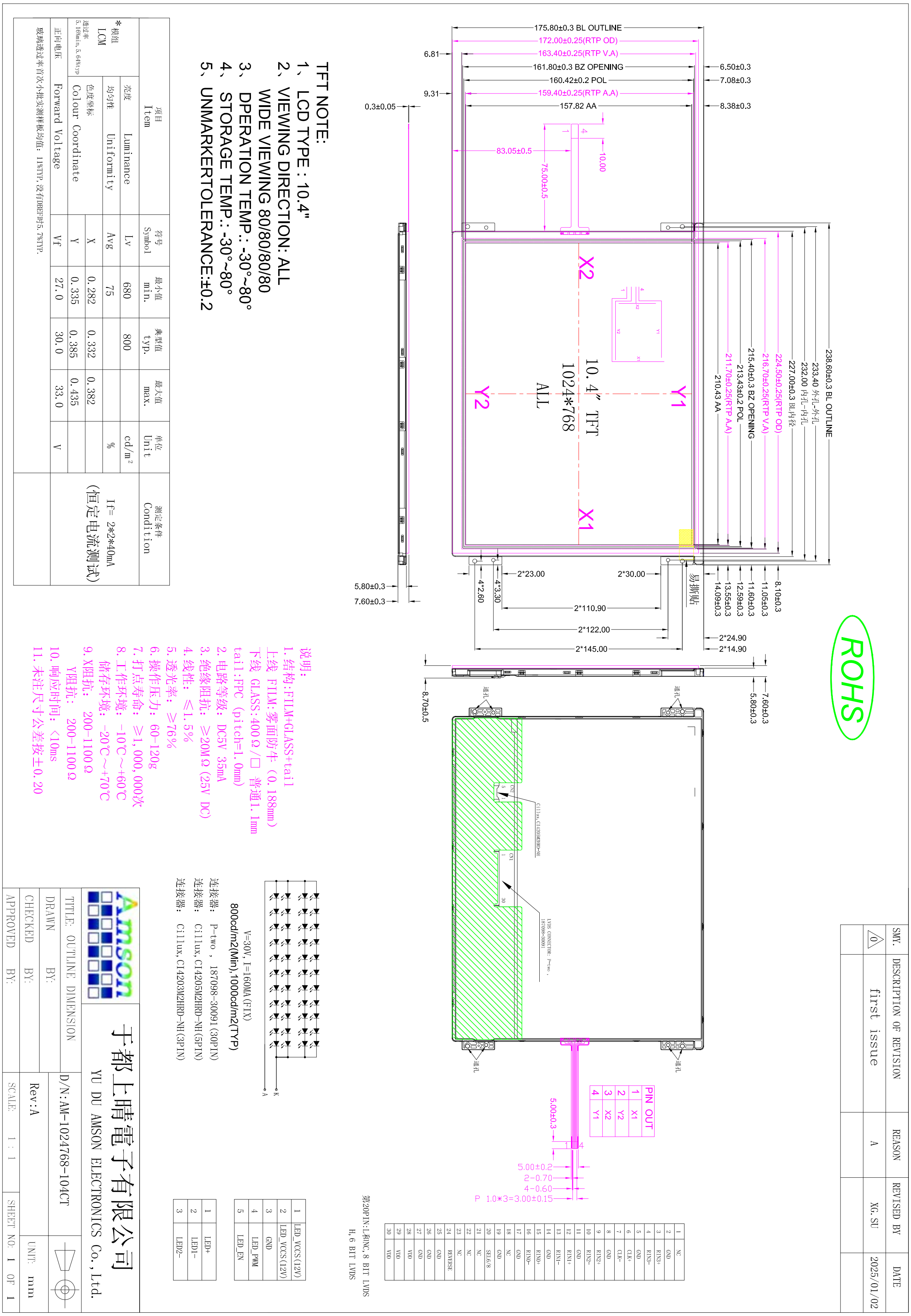
LCM

ITEM	STANDARD VALUES	UNITS
LCD type	10.4”TFT	--
Dot arrangement	1024×R.G.B.×768	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally Black	-
Viewing Direction	80/80/80/80	--
Module size	238.6(W)×175.8(H)×8.70(T)	mm
Active area	210.432(W)×157.824(H)	mm
Dot pitch	0.2055(W)×0.2055(H)	mm
Interface	LVDS 6/8 bit	--
Operating temperature	-30 ~ +80	°C
Storage temperature	-30 ~ +80	°C

RTP

ITEM	STANDARD VALUES	UNITS
RTP type	Film + Glass + FPC	--
Surface hardness	3H	--
Transmittance	≥76%	--
RTP size	224.5(W)×1720(H)×1.8(T)	mm
Active area	211.70(W)×159.40(H)	mm
Response Time	≤10ms	ms
Linearity	≤1.5%	%
Line writing life	1,000,000	times
Operation force	50~120g	g
Resistance	X:200Ω ~1100Ω Y:300Ω ~ 1100Ω	Ω

3. External Dimensions



项目 Item		符号 Symbol	最小值 min.	典型值 typ.	最大值 max.	单位 Unit	测定条件 Condition
*模组 LCM	亮度 Luminance	Lv	680	800		cd/m²	If= 2*2*40mA (恒定电流测试)
	均匀性 Uniformity	Avg	75			%	
透过率 5.16%min, 5.64%typ	色度坐标 Colour Coordinate	X	0.282	0.332	0.382		
		Y	0.335	0.385	0.435		
正向电压	Forward Voltage	Vf	27.0	30.0	33.0	V	
玻璃透过率首次小批实测样板均值：11%TYP,没有DBEF时5.7%TYP.							

4. Interface Description

4.1TFT LCD MODULE

CN1

PIN	PIN NAME	DESCRIPTION	Remark
1	NC	Reserved as BIST function for INX test	Note 1
2	GND	Ground	
3	RIN 3+	Positive LVDS differential data input (+)	
4	RIN 3-	Negative LVDS differential data input (-)	
5	GND	Ground	
6	CLK+	Positive LVDS differential data input (+)	
7	CLK-	Negative LVDS differential data input (-)	
8	GND	Ground	
9	RIN 2+	Positive LVDS differential data input (+)	
10	RIN 2-	Negative LVDS differential data input (-)	
11	GND	Ground	
12	RIN 1+	Positive LVDS differential data input (+)	
13	RIN 1-	Negative LVDS differential data input (-)	
14	GND	Ground	
15	RIN0 +	Positive LVDS differential data input (+)	
16	RIN0 -	Negative LVDS differential data input (-)	
17	GND	Ground	
18	NC	No connection	
19	GND	Ground	
20	SEL6/8	Selection for 6 bits/8bit LVDS data input Low or NC : 8 bit input mode High : 6 bit input mode	Note 2
21	NC	Reversed as EE_WP for OTP function	Note 3
22	NC	Reversed as EE_SDA for OTP function	Note 3
23	NC	Reversed as EE_SCL for OTP function	Note 3
24	REVERSE	Reverse panel function (Display rotation)	Note 4
25-27	GND	Ground	
28-30	VDD	Power supply: + 3.3V	

Connector:Input LVDS CONN,30pins, P-two , 187098-30091

Note:

1. Pin1 is reversed as BIST function for test, don’t connect signal to this pin, keep floating.
2. SEL6/8 is used for selecting 6bit/8bit LVDS data input, L or NC: 8bit; High:6bit.
3. Pin21,22,23 are used as SPI interface for OTP function, don’t connect any signal to these pin, and don’t short them, keep floating.

4. Reverse pin is used for selecting scanning direction.

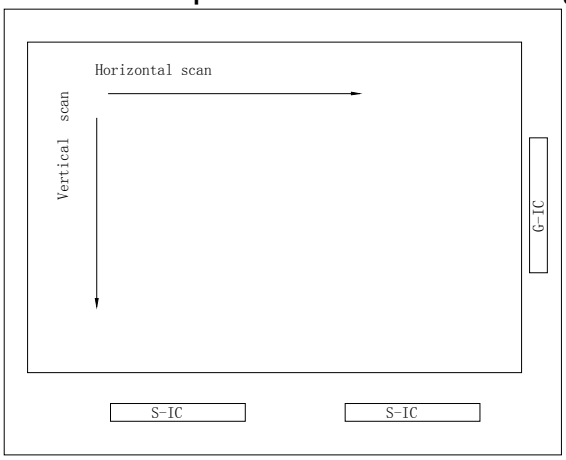


Fig. 1 Normal scan (Pin24, Reverse = Low or NC)

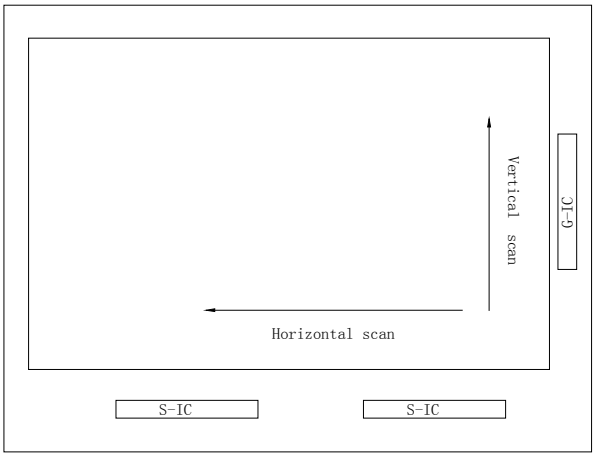


Fig. 2 Reverse scan (Pin24, Reverse = High)

4.2 BACKLIGHT CONVERTER (Converter connector pin)

CN2

PIN	PIN NAME	DESCRIPTION
1	LED_VCCS	12V input
2	LED_VCCS	12V input
3	GND	Ground
4	LED_PWM	PWM
5	LED_EN	Converter power IC Enable (Active High)

Connector: Input BL power CONN,5pins, Cillux,CI4205M2HRD-NH

4.3 BACKLIGHT LED PIN

CN3

PIN	PIN NAME	DESCRIPTION
1	LED+	Red wire
2	LED1-	White wire
3	LED2-	White wire

Connector: Output BL power CONN, 3pins, Cillux,CI4203M2HRD-NH

4.4 RTP PIN:

No.	Symbol	I/O	Function
1	Y1		Touch panel coordinate PIN
2	X2		Touch panel coordinate PIN
3	Y2		Touch panel coordinate PIN
4	X1		Touch panel coordinate PIN

5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Remark
Digital Supply Voltage	VDD	-0.3	4.0	V	
VIN Voltage	VLED	-0.3	50	V	
Operating Temperature	TOP	-30	80	°C	
Storage Temperature	TST	-30	80	°C	

6. DC Characteristics

6.1 Parameter

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VDD	3.0	3.3	3.6	V	
	LED_VCCS	11	12	13	V	
Input logic high voltage	V_{IH}	0.7VDD	-	VDD	V	1
Input logic low voltage	V_{IL}	0	-	0.3VDD	V	
Current for Power	I_{VDD}		385	424	mA	VDD =3.3V@frame 60 Hz, White pattern
	I_{LED_VCCS}	-	0.52	-	A	100% PWM Duty @ VLED+ =33V, ILED=80mA*2
LED_EN Control Level	BL On	3.0	-	5	V	
	BL Off	0	-	0.3	V	
LED_PWM Control Level	PWM High Level	3.0	-	5	V	
	PWM Low Level	0	-	0.3	V	
LED_PWM Control Frequency	f_{PWM}	1K	-	20K	Hz	2

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Digital Supply Voltage	VDD	2.75	3.3	3.6	V	
VIN Voltage	LED_VCCS	-0.3	-	25	V	
Input logic high voltage	V_{IH}	0.7*VDD	-	VDD	V	
Input logic low voltage	V_{IL}	GND	-	0.3*VDD	V	

Note 1: Including signal: SEL6/8 & Reverse
Note 2: LED_PWM duty >10%.

6.2 BL power output

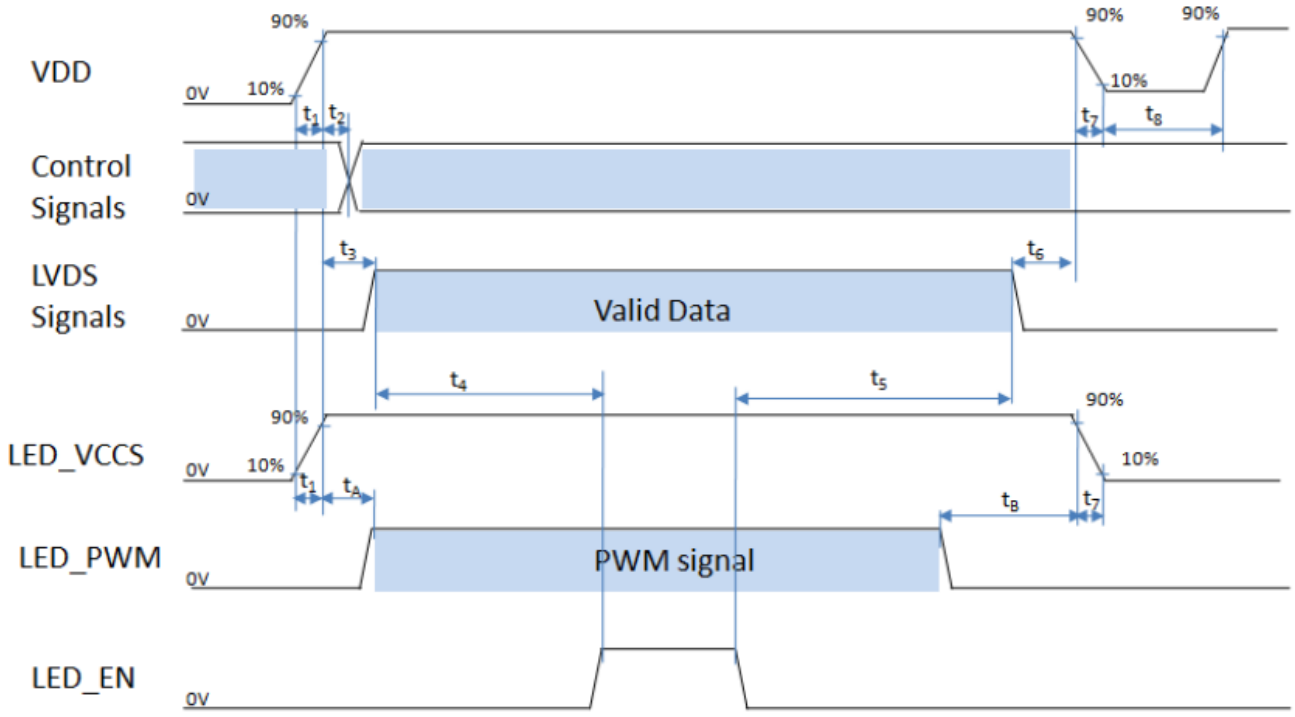
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_{led}	27	30	33	V	1
Current for LED backlight	I_{led}		160		mA	2

Note 1: output power LED+ OVP is 40V.
Note 2: Set BL feedback 2 channels, each channel feedback current is 80mA

6.3 Power sequence

The power sequence specifications are shown as the following table and diagram.

Symbol	Value		Unit
	Min.	Max.	
t_1	1	20	ms
t_2	1	5	ms
t_3	10	50	ms
t_4	200	500	ms
t_5	200	500	ms
t_6	50	200	ms
t_7	0	20	ms
t_8	500	-	ms
t_A	0	50	ms
t_B	0	50	ms



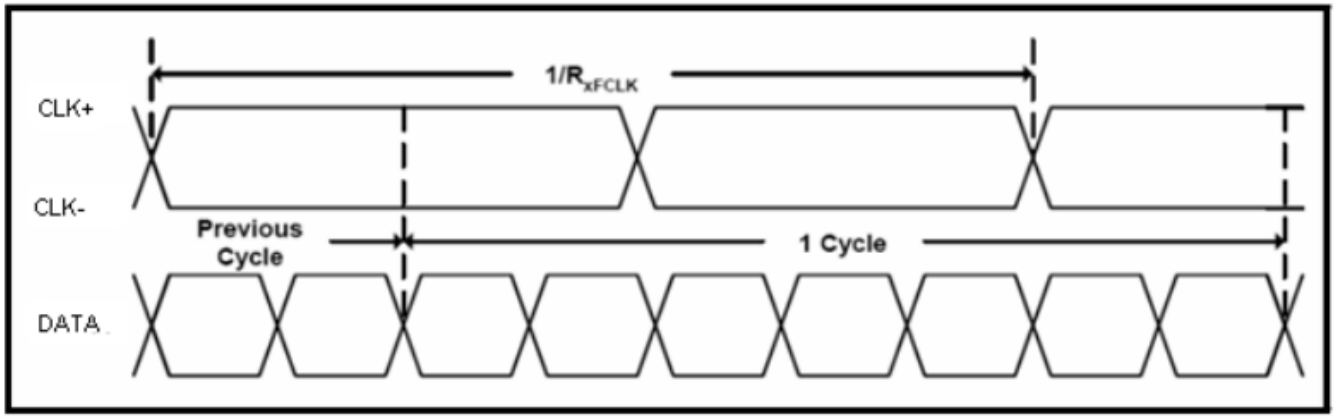
Note 1: Please don't plug the interface cable of on when system is turned on.
Note 2: Please avoid floating state of the interface signal during signal invalid period.
Note 3: It is recommended that the backlight power must be turned on after the power supply for LCD and the interface signal is valid.
Note 4: Control signals include SEL6/8 & Reverse.

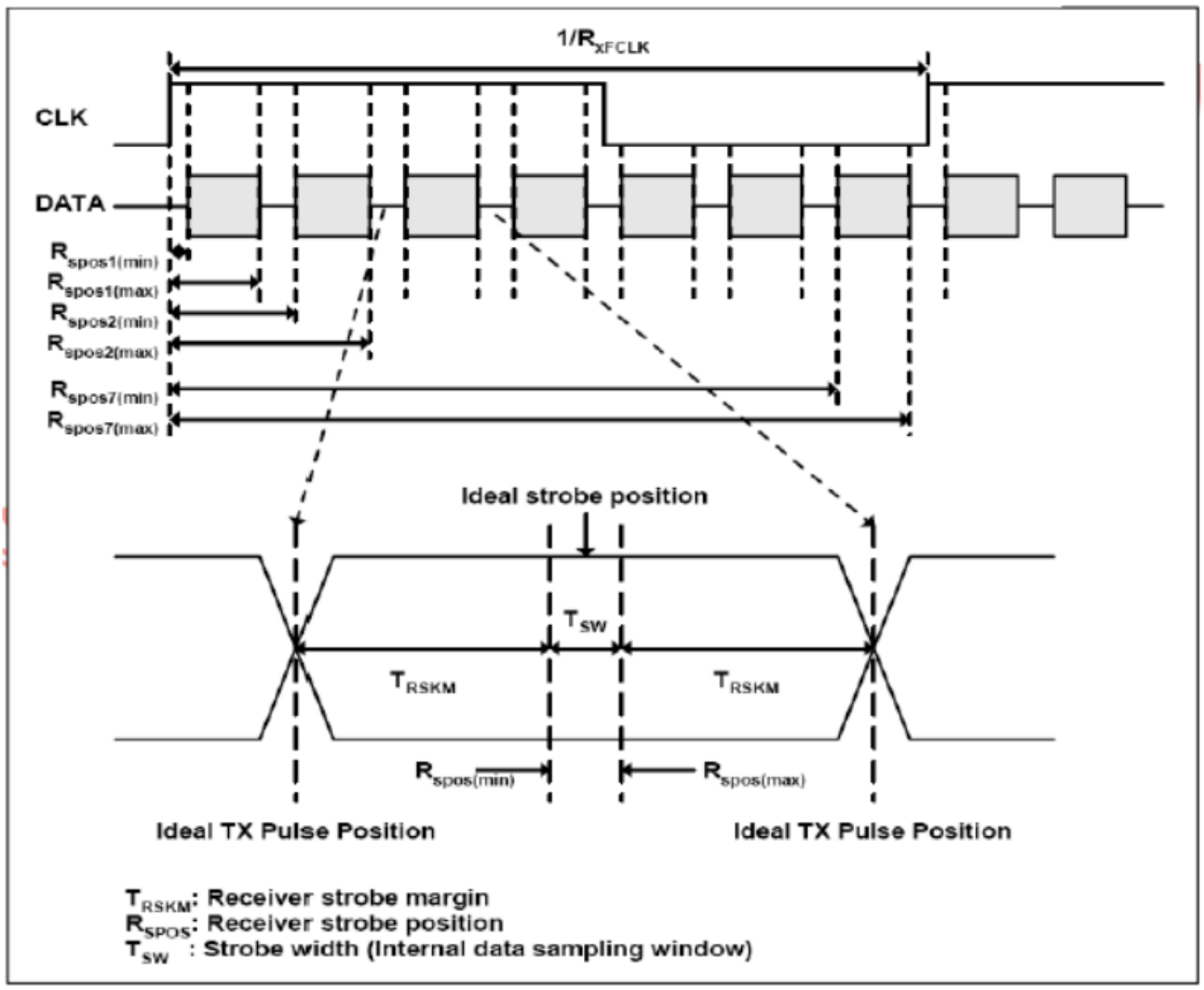
7. LVDS SIGNAL TIMING CHARACTERISTICS

7.1AC Electrical characteristics

Parameter	Symbol	Min	Typ	Max	Units	Condition
Clock frequency	RxFCLK	26.2	51.2	71	MHz	
Input data skew margin	TRSKM	500	500	1/(2*RxFCLK)	ps	Typical value for 1024*600 resolution
Clock high time	TLVCH		4/(7xRxFCLK)		ns	|VID|=400mv RxVCM=1.2V RxFCLK=71MHz VDD_LVDS=3.3V
Clock low time	TLVCL		3/(7xRxFCLK)		ns	
VSD setup time	TenPLL	0	TenPLL	150	us	

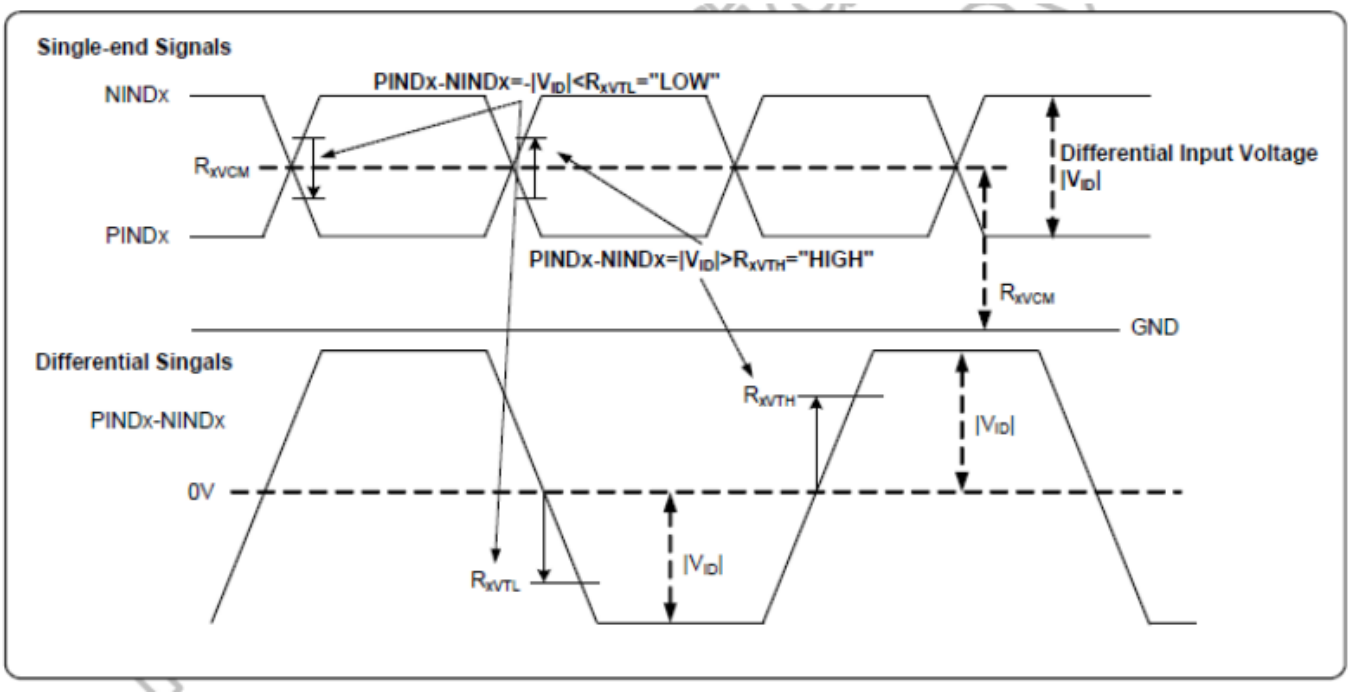
7.2 Input clock and data timing diagram





7.3 DC electrical characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	R_{xVTH}	-	-	+100	mV	R_{XVCM}=1.2V
LVDS Differential input low Threshold voltage	R_{xVTL}	-100	-	-	mV	
Input Voltage range (Singled-end)	R_{xVIN}	0	-	VDD-1.2+ $\|V_{ID}\|/2$	V	
LVDS Differential input common mode voltage	R_{xVCM}	$\|V_{ID}\|/2$	-	VDD-1.2	V	
LVDS Differential voltage	$\|V_{ID}\|$	0.2	-	0.6	V	

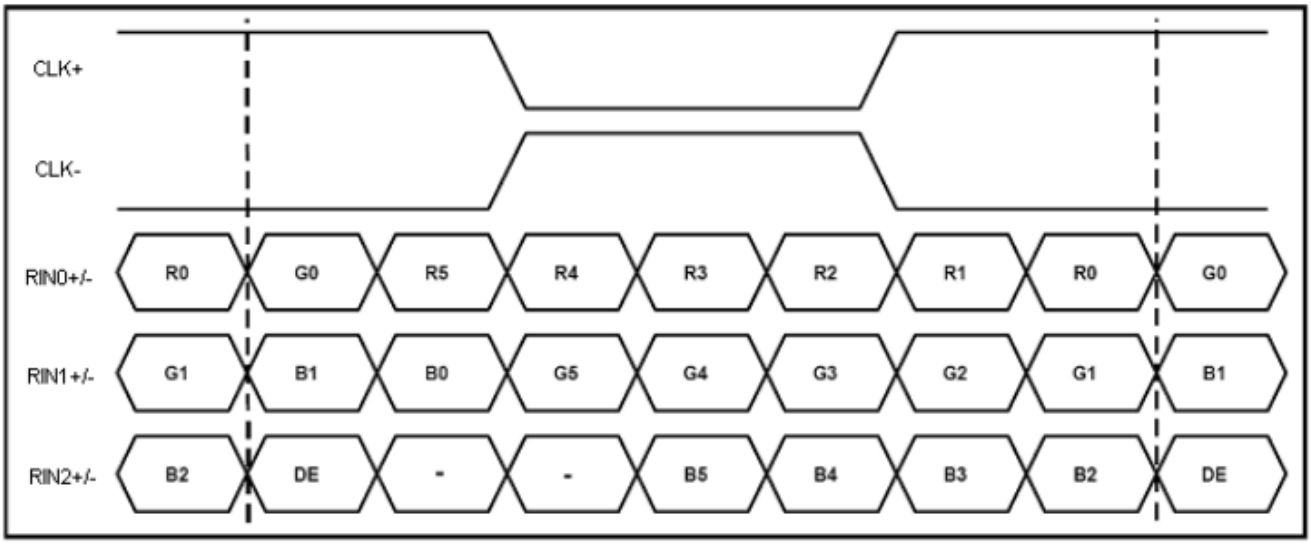


7.4 data timing

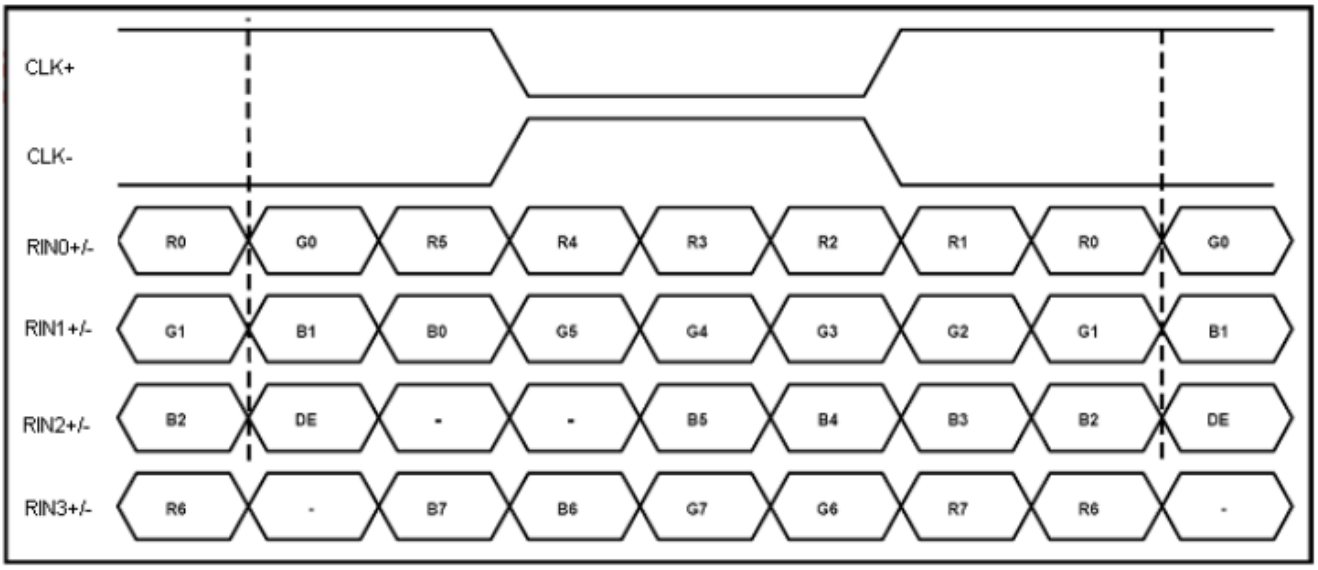
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	52	65	71	MHz
Horizontal display area	thd		1024		DCLK
HSD period	th	1114	1344	1400	DCLK
HSD blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd		768		T_H
VSD period	tv	778	806	845	T_H
VSD blanking	tvbp+tvfp	10	38	77	T_H

7.5 LVDS data input format

SEL6/8 = “High” for 6 bits LVDS Input



SEL6/8 = “Low” or “NC” for 8 bits LVDS Input



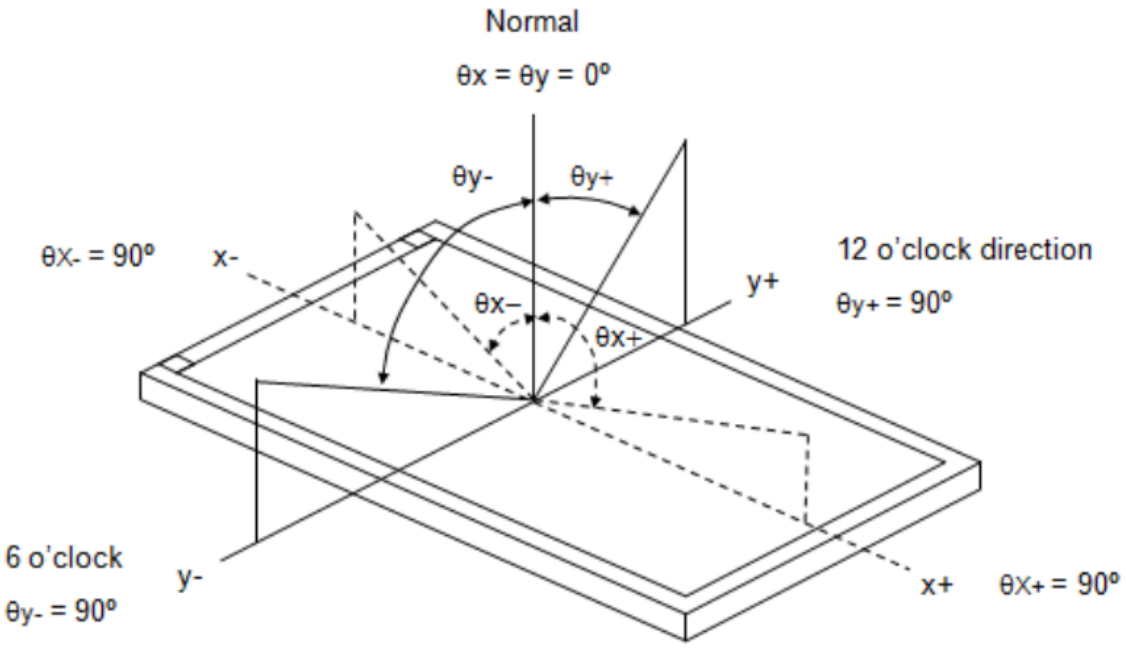
8. Backlight Characteristic

Item		Symbol	MIN	TYP	MAX	UNIT	NOTE
Backlight Power		LED_VCCS	-0.3	12	25	V	Ta = 25°C
Backlight Power		ILED_VCCS	-	0.5	0.8	A	LED_VCCS=12V
EN Signal Voltage	VIH	LED_EN	3.0		5.0	V	
	VIL		GND		0.3	V	
Luminous Intensity for LCM	VIH	LED_PWM	3.0		5.0	V	
	VIL		GND		0.3	V	
PWM Frequency		LED_PWM	1K	-	20K	Hz	
Lifetime			50000	-	-	Hr	
Color		White					
Average Brightness		-	680	800	-	Cd/cm2	
Luminance uniformity		-	75	-	-	%	

9. Optical Characteristics

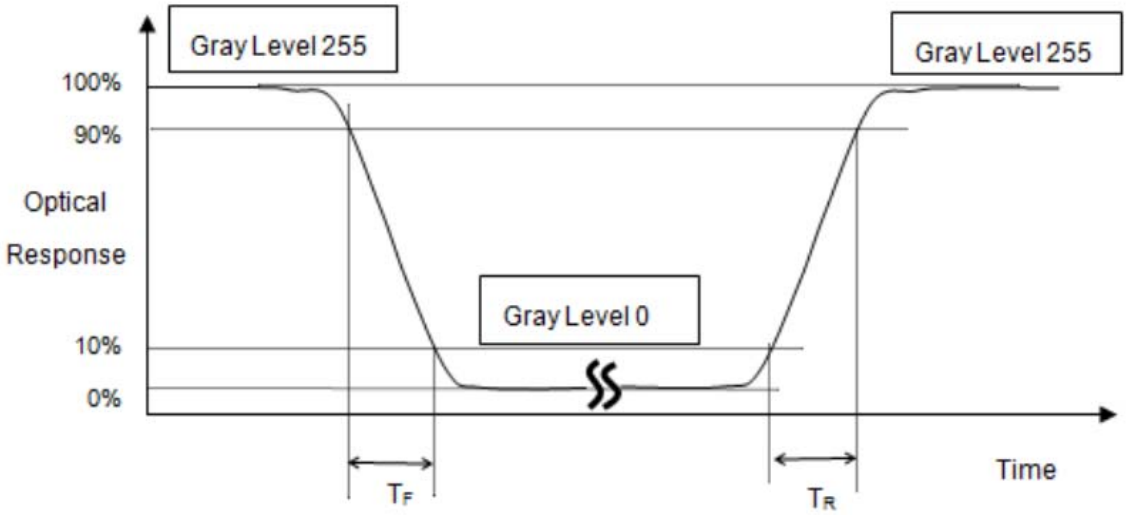
Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θ_L	80	-	-	degree	(1)
		θ_R	80	-	-		
	Vertical	θ_T	80	-	-		
		θ_B	80	-	-		
Contrast Ratio	Center		700	1000	-	-	(2)
Response Time	Rising		-	14	19	ms	(3)
	Falling			11	16	ms	
CF Color Chromaticity (CIE1931)	Red x		TYP. −0.05	0.651	TYP. +0.05	-	(4)
	Red y			0.345		-	
	Green x			0.315		-	
	Green y			0.611		-	
	Blue x			0.145		-	
	Blue y			0.093		-	
	White x			0.326		-	
	White y			0.383		-	

Note (1)Definition of Viewing Angle (θx, θy):
Viewing angles are measured by BM5A

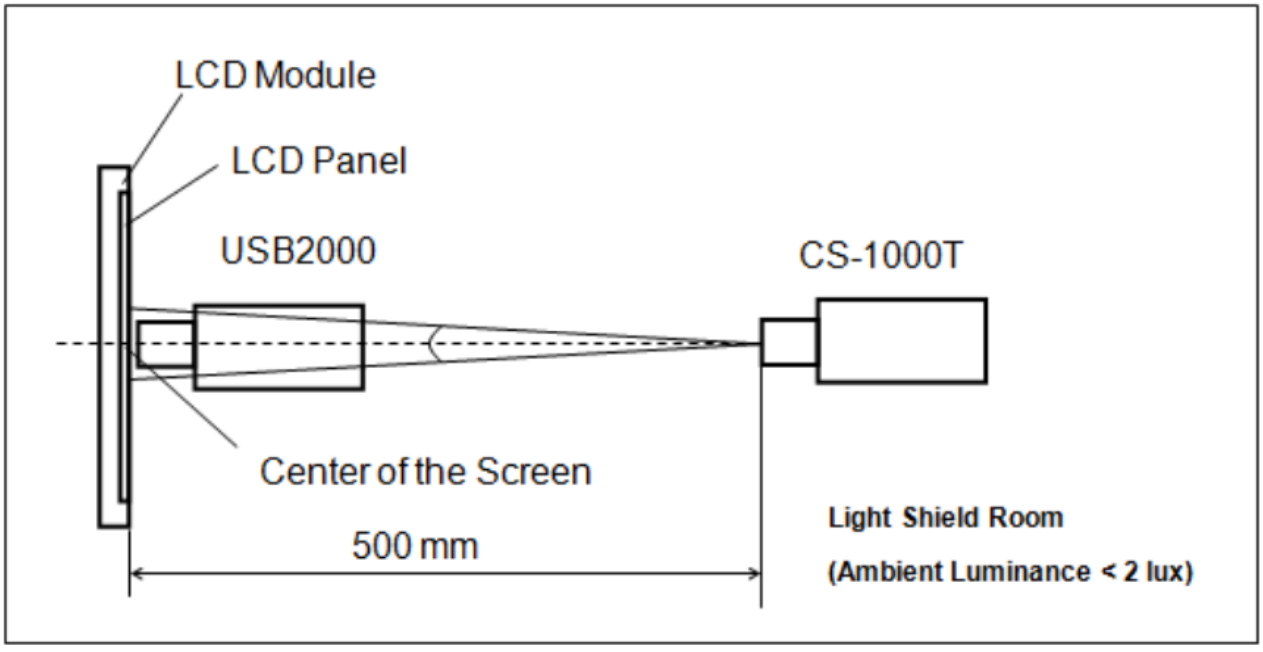


Note (2) Definition of Contrast Ratio (CR):
The contrast ratio can be calculated by the following expression.
Contrast Ratio (CR) = L255 / L0
L255: Luminance of gray level 255
L 0: Luminance of gray level 0
CR = CR (5), where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in

Note (3) Definition of Response Time (TR, TF):



Note (4)Measurement Setup:
The LCD assembly should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



10. Reliability Test Conditions and Methods

NO.	TEST ITEMS	TEST CONDITION
①	High Temperature Storage	Keep in 80°C 96 hrs Surrounding temperature, then storage at normal condition 4hrs.
②	Low Temperature Storage	Keep in -30°C ±5℃ 96 hrs Surrounding temperature, then storage at normal condition 4hrs.
③	High Temperature Operating Test	80℃*96Hrs
④	Low Temperature Operating Test	-30℃*96Hrs
⑤	High Temperature / High Humidity Operating Test	60 ℃ / 90% R.H ， 96 hrs.
⑥	High Temperature / High Humidity Storage Test	Keep in 60 ℃ / 90% R.H duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs.
⑦	Temperature Cycling Storage Test	-30°C → +25℃ → 80°C → +25℃ (30mins) (5mins) (30mins) (5mins) 30 Cycle Surrounding temperature, then storage at normal condition 4hrs.
⑧	ESD Test	Air Discharge: Apply 6 KV with 5 times Discharge for each polarity +/- / Contact Discharge: Apply 250 V with 5 times discharge for each polarity +/- 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%)
⑨	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 2 Hrs
⑩	Drop Test (Packaged)	Packing Weight (Kg) / Drop Height (cm) 0 ~ 45 4 / 122 45.4 ~ 90.8 / 76 90.8 ~ 454 / 61 Over 454 / 46 Drop Direction :※1 corner / 3 edges / 6 sides each 1time

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:

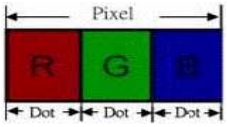
Functional detection in 600nits backlight environment

Appearance detection in 800~1000 Lux external environment

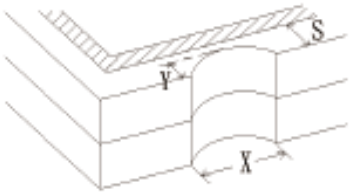
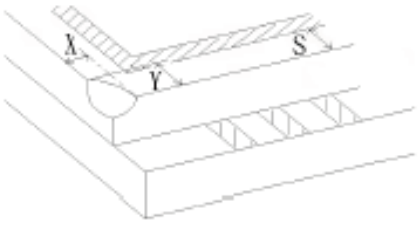
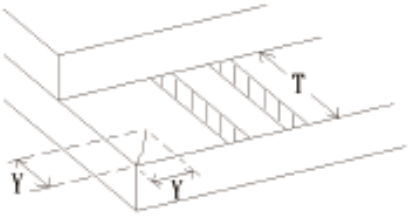
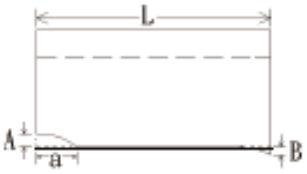
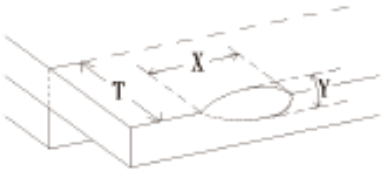
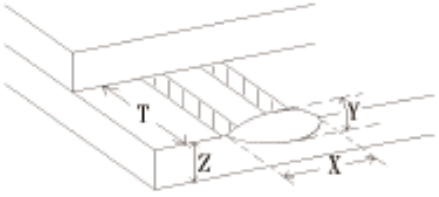
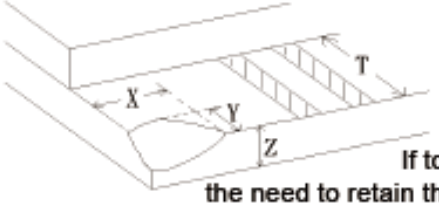
11.3. INSPECTION PLAN :

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

<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>∅≤0.2</td><td>Disregard ≥ 1mm</td></tr>
<tr><td>0.2 < ∅ ≤ 0.5</td><td>3 (Distance ≥ 15mm)</td></tr>
<tr><td>0.5< ∅</td><td>0</td></tr>
</table>
NOTE: ∅=(LENGTH*WIDTH)/2

(S) LINEAR TYPE: unit: mm
<table>
<tr><th>LENGTH</th><th>WIDTH</th><th>ACCEPTABLE QTY</th></tr>
<tr><td>……</td><td>W≤ 0.05</td><td>Disregard ≥ 1mm</td></tr>
<tr><td>L ≤4.0</td><td>0.05 < W ≤ 0.07</td><td>3 (Distanced ≥ 15mm</td></tr>
<tr><td>……</td><td>0.07 < 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>∅<0.2</td><td>Disregard ≥ 1mm</td></tr>
<tr><td>0.2<∅≤ 0.5</td><td>2(Distance≥ 15mm)</td></tr>
<tr><td>0.5<∅</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 ≤2(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.
Definition:<1/2 dot and visible by 5% ND filter
2. Bright dot: Dots appear bright and unchanged in size m which LCD panel is displaying under black pattern.
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 through 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 which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to AMSON TFT , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

14. Packing Method

TBD