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SPECIFICATION

VXT104QXHA-03

☐ Preliminary Specification

☐ Final Specification

Approved By:
Date:

RECORD OF REVISION

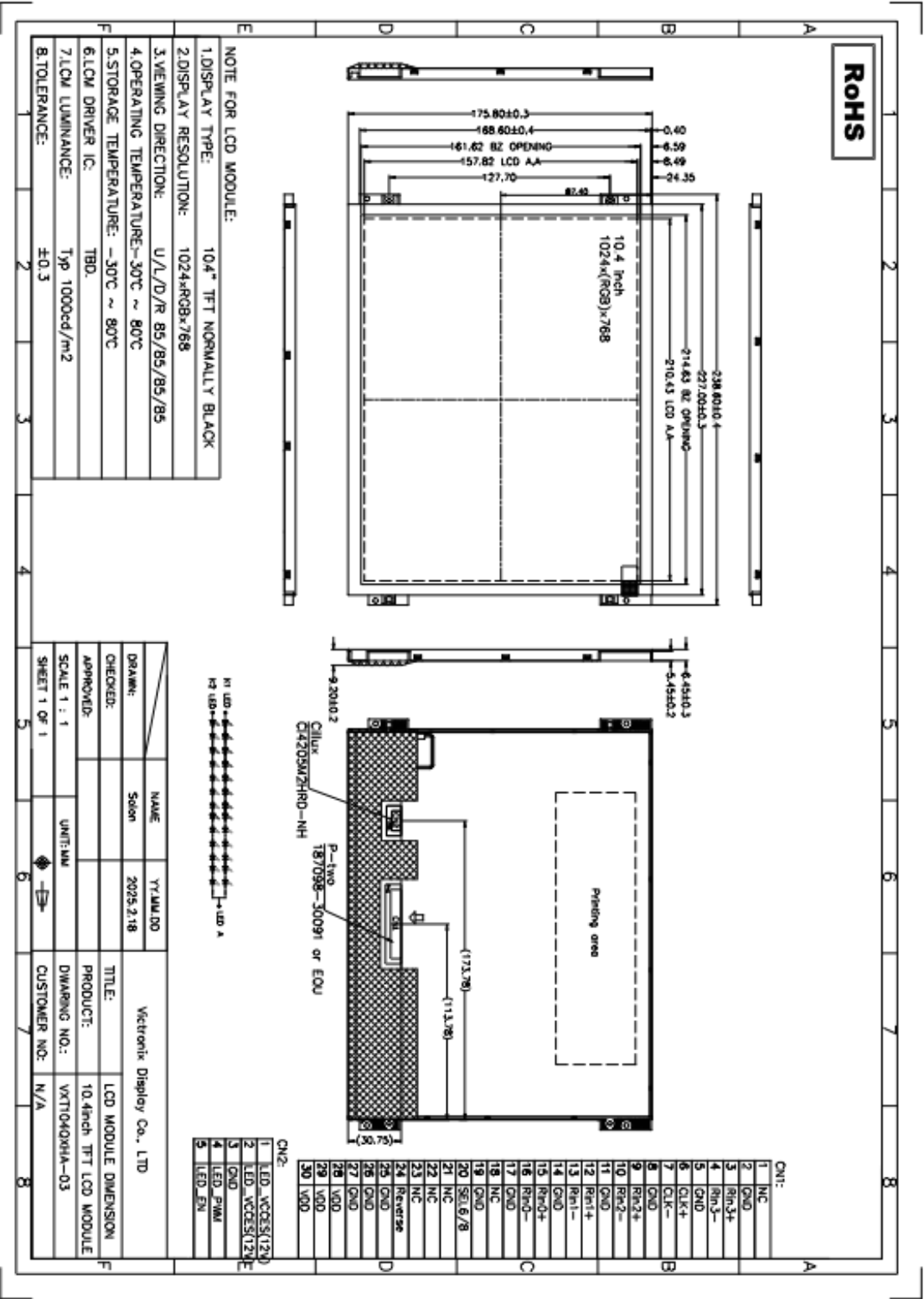| Rev No.	Rev Date	Page	Contents	Editor
V00	2025.1.8		New issue.	Solon

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1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied by Victronix. If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution.

2. General Specifications

2.1 LCD Parameter

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M		
Viewing Direction	ALL	O'Clock	
Grayscale inversion direction	-	O'Clock	
Operating temperature	-30~+80	℃	
Storage temperature	-30~+80	℃	
Module size	10.4	inch	
Active Area(W×H)	210.43x157.82	mm	
Number of Dots	1024x768	dots	
Power Supply Voltage	3.3	V	
Outline Dimensions	238.60x175.80x6.45 (9.20 Max)	mm	
Backlight	2x13-LEDs (white)	pcs	
Weight	---	g	
Interface	6/8 BIT LVDs	-	

3. Outline Drawing

NOTE FOR LCD MODULE:

1. DISPLAY TYPE: 10.4" TFT NORMALLY BLACK
2. DISPLAY RESOLUTION: 1024×RGB×768
3. VIEWING DIRECTION: U/L/D/R 85/85/85/85
4. OPERATING TEMPERATURE: −30℃ ~ 80℃
5. STORAGE TEMPERATURE: −30℃ ~ 80℃
6. LCM DRIVER IC: TBD.
7. LCM LUMINANCE: Typ 1000cd/m2
8. TOLERANCE: ±0.3

RoHS

10.4 inch
1024×(RGB)×768

Printing area

DRAWN: Solen
CHECKED:
APPROVED:
SCALE 1 : 1
SHEET 1 OF 1
NAME: YY.MM.DD
2025.2.18
UNIT: MM
Victronix Display Co., LTD
TITLE: LCD MODULE DIMENSION
PRODUCT: 10.4inch TFT LCD MODULE
DRAWING NO.: VXT1040XHA-03
CUSTOMER NO.: N/A

CN1:
1	NC
2	GND
3	Rin3+
4	Rin3-
5	GND
6	CLK+
7	CLK-
8	GND
9	Rin2+
10	Rin2-
11	GND
12	Rin1+
13	Rin1-
14	GND
15	Rin0+
16	Rin0-
17	GND
18	NC
19	NC
20	SEL 6/8
21	NC
22	NC
23	NC
24	Reverse
25	GND
26	GND
27	GND
28	VDD
29	VDD
30	VDD

CN2:
1	LED_VCCES(12V)
2	LED_VCCES(12V)
3	GND
4	LED_PWM
5	LED_EN

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4.Interface Description

4.1 LCD interface：P-two 187098-30091 or EQU

Pin No.	Symbol	I/O	Function
1	NC	-	No Connection
2	GND	P	Ground
3	Rin3+	I	Positive LVDS differential data pair1
4	Rin3-	I	Negative LVDS differential data pair1
5	GND	P	Ground
6	CLK+	I	Positive LVDS differential clock pair
7	CLK-	I	Negative LVDS differential clock pair
8	GND	P	Ground
9	Rin2+	I	Positive LVDS differential data pair1
10	Rin2-	I	Negative LVDS differential data pair1
11	GND	P	Ground
12	Rin1+	I	Positive LVDS differential data pair1
13	Rin1-	I	Negative LVDS differential data pair1
14	GND	P	Ground
15	Rin0+	I	Positive LVDS differential data pair1
16	Rin0-	I	Negative LVDS differential data pair1
17	GND	P	Ground
18	NC	-	No Connection
19	GND	P	Ground
20	SELB6/8	I	Selection for 6 bits/8bit LVDS data input Low or NC : 8 bit input mode High : 6 bit input mode
21-23	NC		No Connection
24	Reverse	I	Reverse panel function (Display rotation)
25-27	GND	P	Ground
28-30	VDD	P	Analog or digital supply voltage

4.2 Backlight interface：Cillux CI4205M2HRD-NH

Pin No.	Symbol	I/O	Function
1	LED_VSSC	P	12V input
2	GND	P	12V input
3	GND	P	Ground
4	LED_PWM	I	PWM
5	LED_EN	I	Converter power IC Enable (Active High)

/

5. Absolute Maximum Ratings(Ta=25℃)

5.1 Electrical Absolute Maximum Ratings.(Vss=0V ,Ta=25℃)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	-0.3	3.8	V	1，2

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.

2. $V_{DD} > V_{SS}$ must be maintained.

5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-30℃	80℃	-30℃	80℃	1,2
Humidity	-	-	-	-	3

1. The response time will become lower when operated at low temperature.

2. Background color changes slightly depending on ambient temperature.

   The phenomenon is reversible.

3. Ta<=40℃:85%RH MAX.

   Ta>=40℃:Absolute humidity must be lower than the humidity of 85%RH at 40℃.

6. Electrical Specifications and Instruction Code

6.1 Electrical characteristics(Vss=0V ,Ta=25℃)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		VDD	Ta=25℃	3.0	3.3	3.6	V	
Input voltage	'H'	V_{IH}	V_{DD}=3.3V	$0.7V_{DD}$	-	V_{DD}	V	
	'L'	V_{IL}	V_{DD}=3.3V	0	-	$0.3V_{DD}$	V	

Note: If one of the above items is exceeded its maximum limitation momentarily, the quality of the product may be degraded. Absolute maximum limitation, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the recommend range.

7. Timing Characteristics

7.1 POWER ON/OFF SEQUENCE

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

Symbol	Value Min.	Value Max.	Unit
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
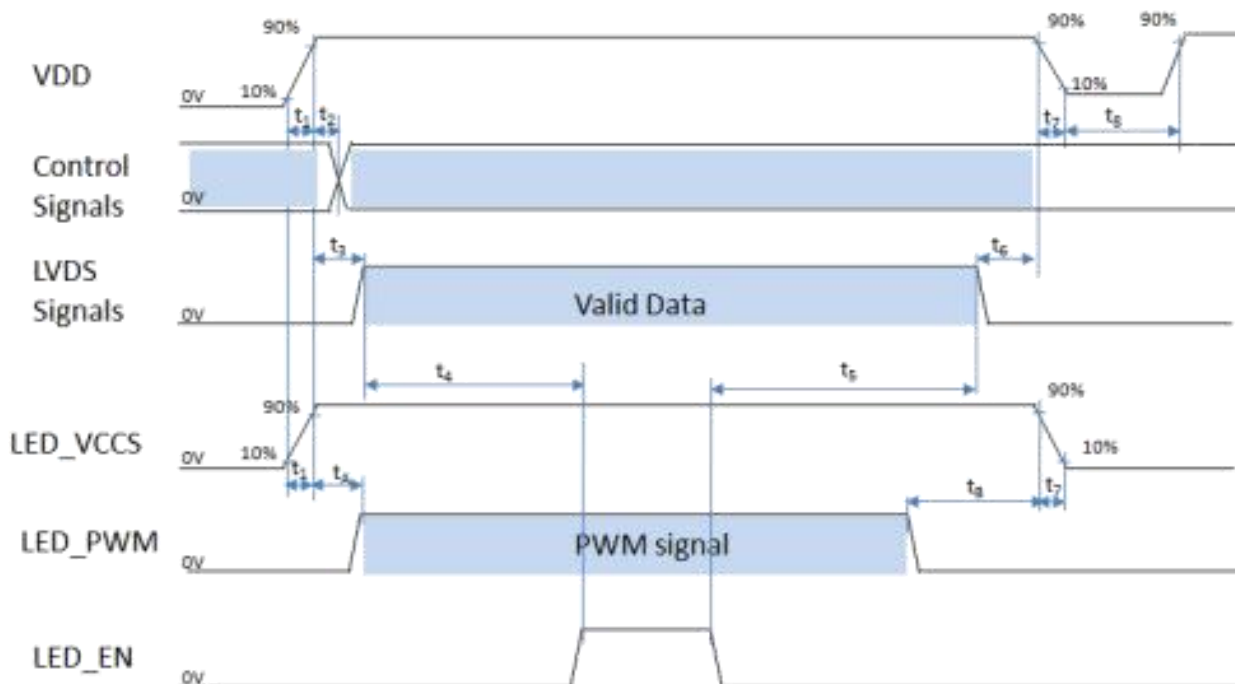
Note 1: Please don't plug the interface cable of on when system is turned on.

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.

7.2 Timing Characteristics

7.2.1 AC 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	

7.2.2 Input clock and data timing diagram

T_{RSKM}: Receiver strobe margin
R_{SPOS}: Receiver strobe position
T_{SW} : Strobe width (Internal data sampling window)
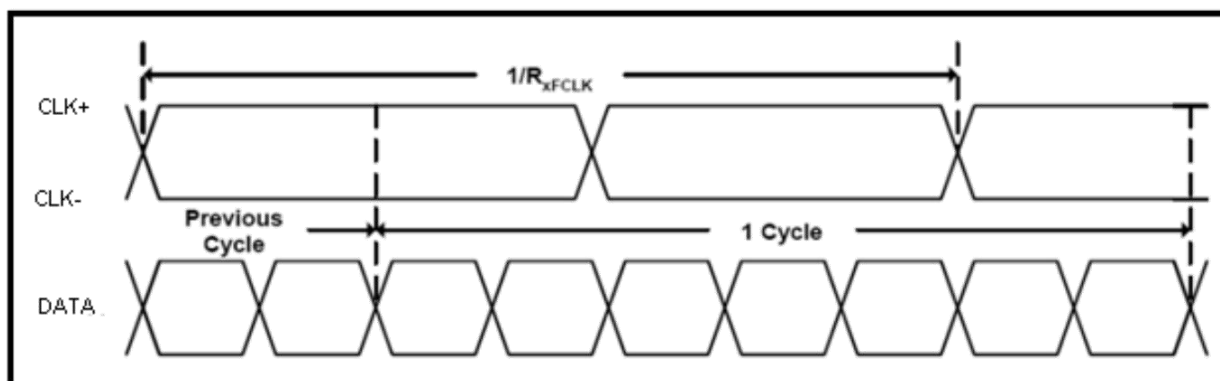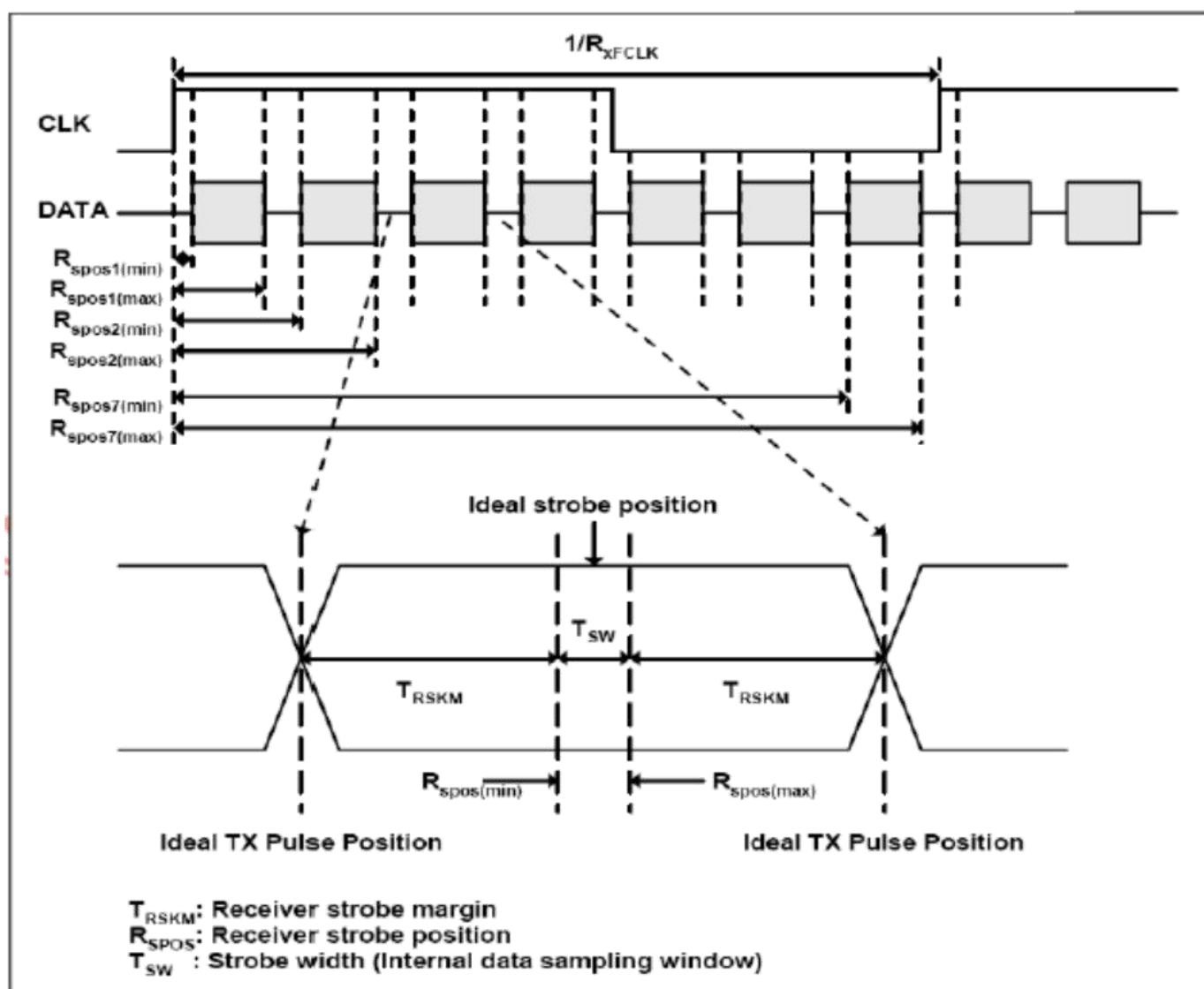
7.2.3 DC electrical characteristics

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	
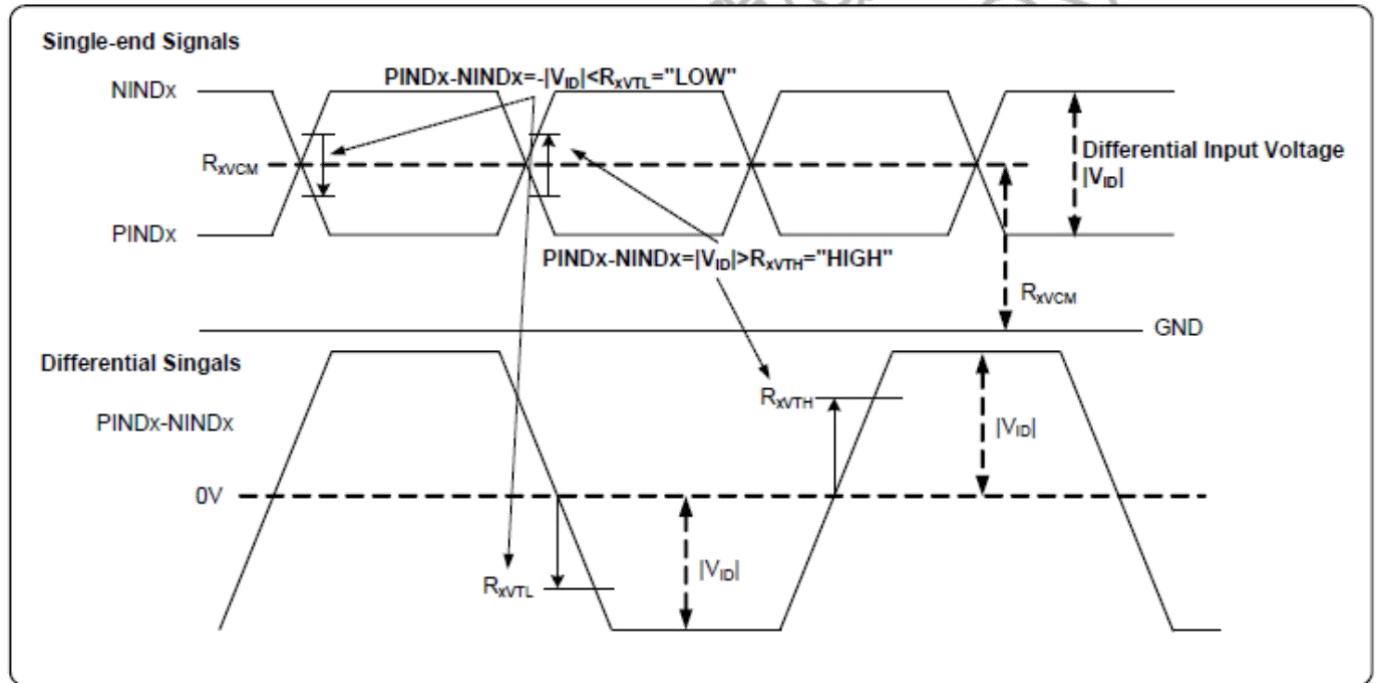
7.2.4 Data Timing

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

7.2.5 LVDS data input format

SEL6/8 = "High" for 6 bits LVDS Input
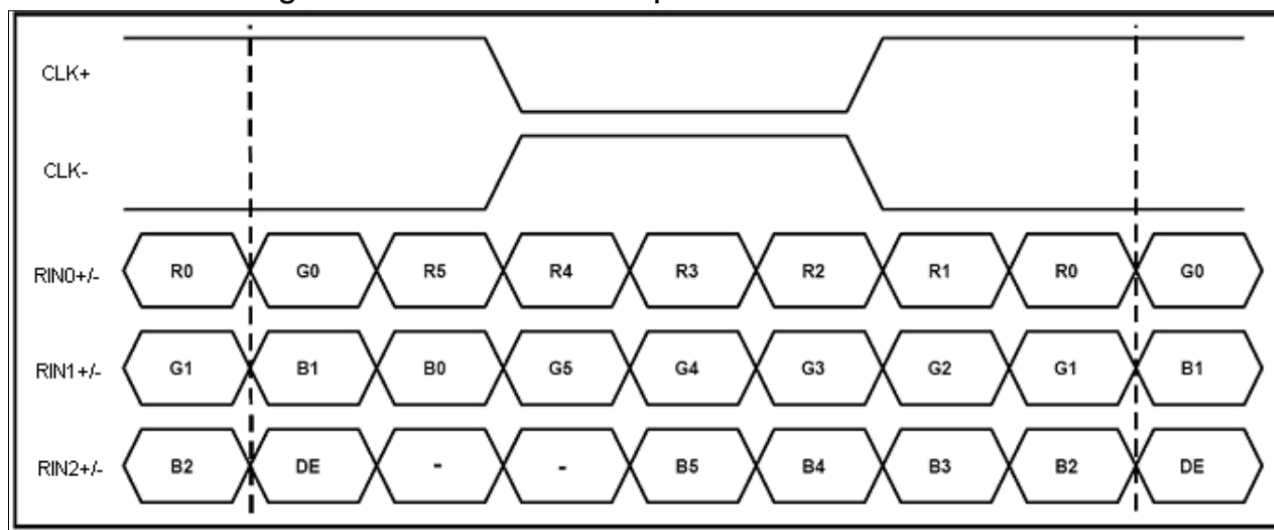
SEL6/8 = "Low" or "NC" for 8 bits LVDS Input
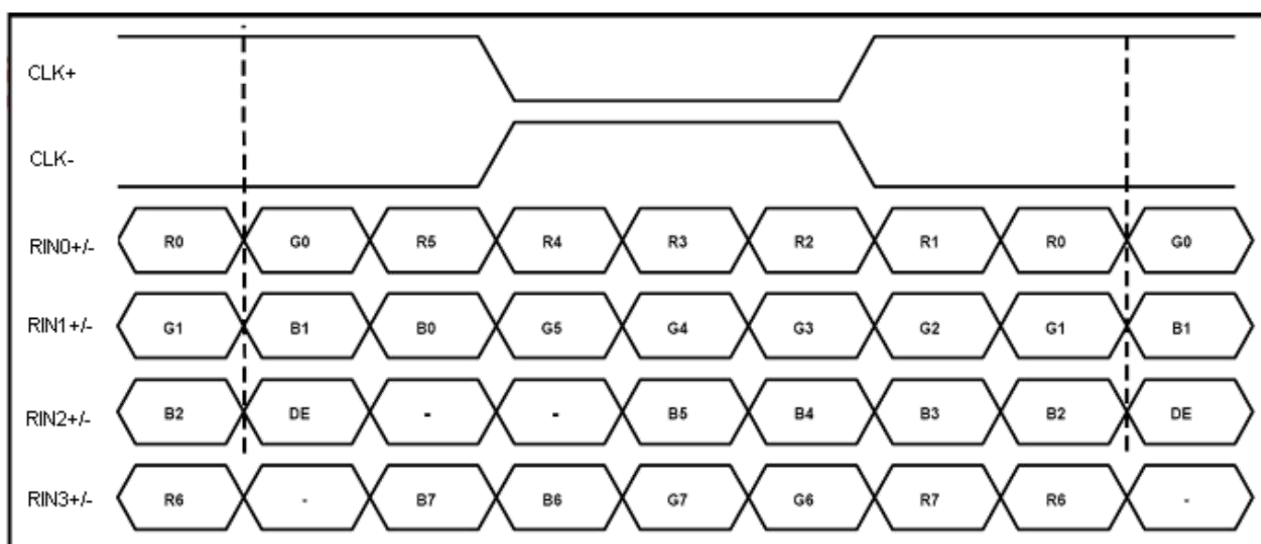
8.0 Backlight Characteristic

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Supply Voltage	Vf	9.0	12.0	13.2	V	Note 1
Supply Current	If	-	TBD	-	mA	Note 2
Power dissipation	P_{BL}	-	TBD	-	W	
Life Time	-	-	50000	-	Hr	Note 3,4
PWM Control Frequency	F_{PDIM}	100	-	30K	Hz	Note 5

Dimming Ratio (PWM Duty)		DR	1-	-	100	%	Note 5
Backlight On-off	High	BLEN	1.6	-	5.0	V	
	Low		0	-	0.8	V	
PWM Control Level	High	V_{PDIM}	1.6	-	5.0	V	
	Low		0	-	0.8	V	
Backlight Color		White					

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and If =300mA.

Note 2: LED current is measured by utilizing a high frequency current meter as shown below:
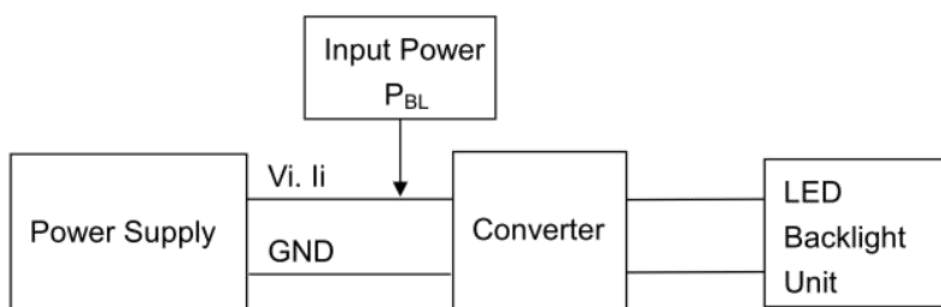
Note 3: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and If =300mA. The LED lifetime could be decreased if operating If is larger than 300mA.

Note 4: LED light bar circuit:

Note 5:Lower frequency causes the flicker or the image breaking of motion picture. Depending on the PDIM signal integrity (jitter etc.), the flicker may be visible. Please evaluate in advance.

9. Optical Characteristics

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp		If=300mA	-	1000	-	Cd/m²	1
Uniformity	⊿Bp			70	80	-	%	1,2
Viewing Angle	3:00		Cr≥10	-	85	-	Deg	1,2
	6:00			-	85	-		
	9:00			-	85	-		
	12:00			-	85	-		
Contrast Ratio	Cr		θ=0° Φ=0°	800	1000	-	-	3,4
Response Time	T_r+T_f			-	25	35	ms	4,5
Color of CIE Coordinate	W	x	θ=0° Φ=0°	Typ-0.05	TBD	Typ+0.05	-	1,6
		y			TBD		-	
	R	x			TBD		-	
		y			TBD		-	
	G	x			TBD		-	
		y			TBD		-	
	B	x			TBD		-	
		y			TBD		-	
NTSC Ratio	S			55	61.2	-	%	

*The parameter is slightly changed by temperature, driving voltage and materiel

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment CA310 Measuring condition:-Measuring surroundings: Dark room.-Measuring temperature: Ta=25℃.-Adjust operating voltage to get optimum contrast at the center of the display.

The measured value is more than 5 minutes at the center point of the LCD panel, and the backlight is turned on at the same time.
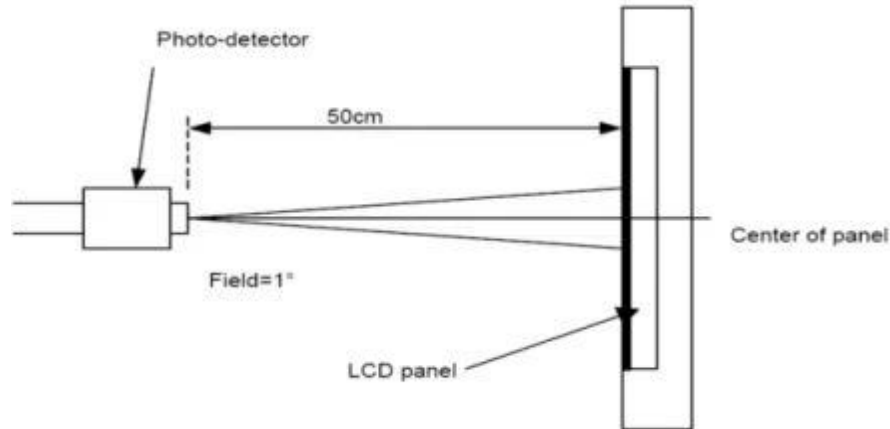
Note 2: The luminance uniformity is calculated by using following formula.

$\triangle Bp = Bp$ (Min.) $/ Bp$ (Max.)×100 (%);Bp (Max.) = Maximum brightness in 9 measured spots Bp (Min.) = Minimum brightness in 9 measured spots.
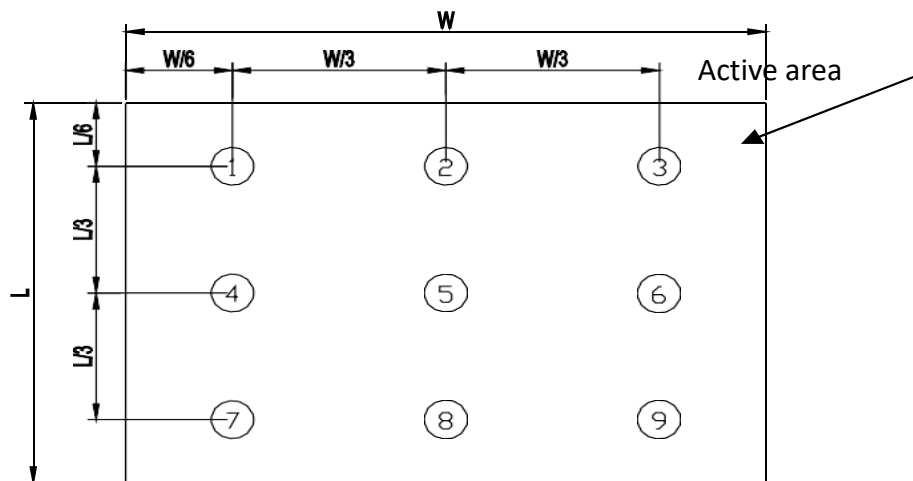
Note 3: The definition of viewing angle:Refer to the graph below marked by θ and Φ
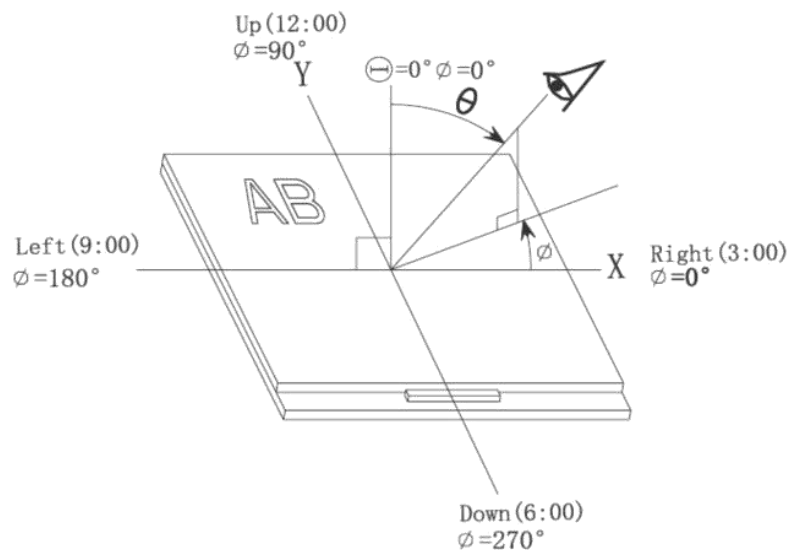
Note 4: Definition of contrast ratio Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface.Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state.
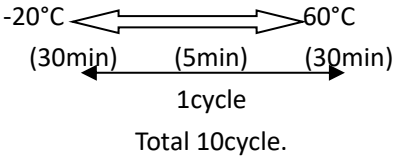
$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

Note 5: Definition of Response time The output signals of photo detector are measured when the input signals are changed from "white" to "black"(T_f) and from "black" to "white"(T_r), respectively. The response time is defined   as the time interval   between the 10% and 90% of amplitudes. Refer to figure as below.
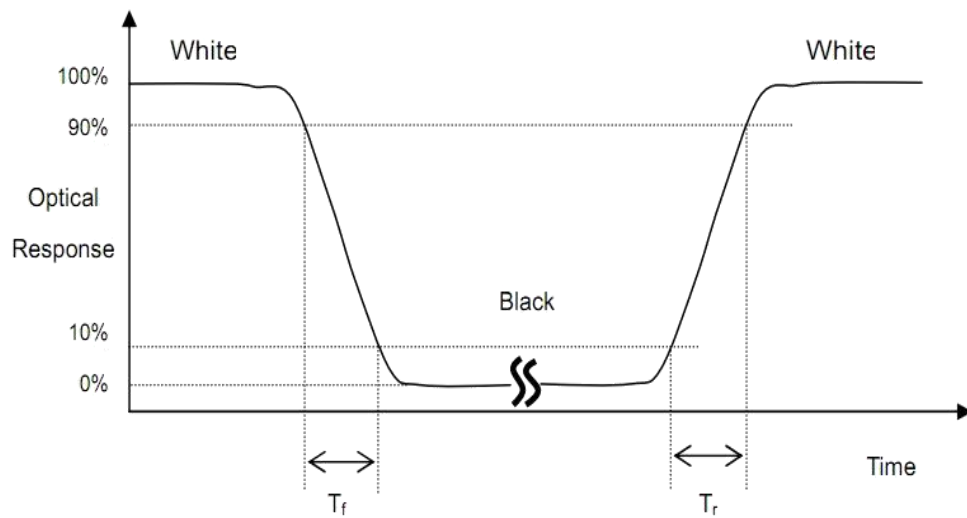
10. Reliability Test Conditions and Methods

No.	Test Items	Test Condition	Inspection After Test
①	High Temperature Storage	80°C±2°C×240Hours	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. 9.Brightness reduction more than 50%.
②	Low Temperature Storage	-30°C±2°C×240Hours	
③	High Temperature Operating	80°C±2°C×240Hours	
④	Low Temperature Operating	-30°C±2°C×240Hours	
⑤	Temperature Cycle(Storage)	-20°C ⟵⟶ 60°C (30min) (5min) (30min) 1cycle Total 10cycle.	
⑥	Damp Proof Test (Storage)	60°C±5°C×90%RH×240Hours	

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 Scope

Specifications contain
11.1.1 Display Quality Evaluation
11.1.2 Mechanics Specification

11.2 Sampling Plan

Unless there is other agreement, the sampling plan for incoming inspection shall follow MIL-STD-105E.
11.2.1 Lot size: Quantity per shipment as one lot (different model as different lot).
11.2.2 Sampling type: Normal inspection, single sampling.
11.2.3 Sampling level: Level II.
11.2.4 AQL: Acceptable Quality Level
Major defect: AQL=0.65
Minor defect: AQL=1.5

11.3 Panel Inspection Condition

11.3.1 Environment:
Room Temperature: 25±5°C.
Humidity: 65±5% RH.
Illumination: 300 ~ 700 Lux.

11.3.2 Inspection Distance:
35±5 cm

11.3.3 Inspection Angle:
The vision of inspector should be perpendicular to the surface of the Module.
11.3.4 Inspection time：
Perceptibility Test Time: 20 seconds max.
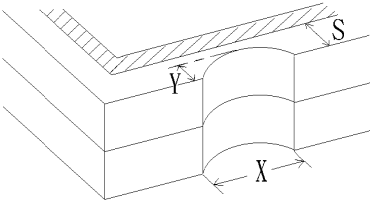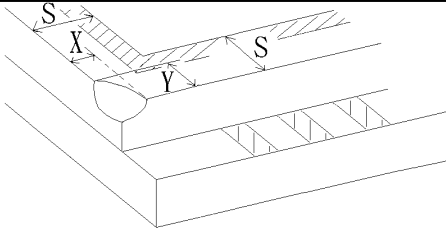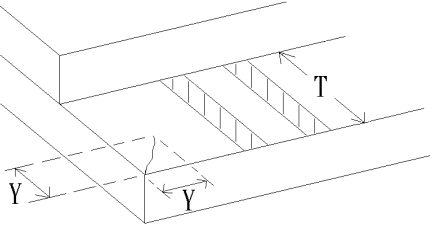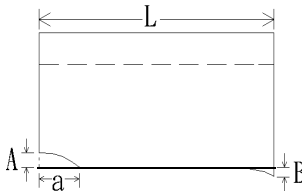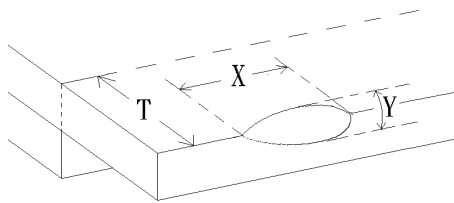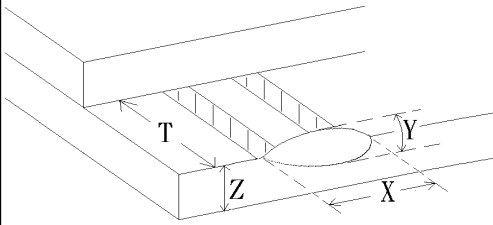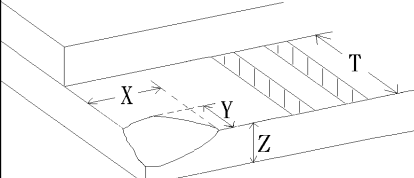
11.4 Inspection Plan

Class	Item	Judgment	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 Quantity short or over	Major
	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 visible in the viewing area…….Rejected.	Minor
	6. Blemish, black spot, white spot in the LCD and LCD glass cracks.	According to standard of visual inspection.(inside viewing area)	Minor
	7. Blemish, black spot, white spot and scratch on the polarizer.	According to standard of visual inspection.(inside viewing area)	Minor
	8. Bubble in polarizer.	According to standard of visual inspection.(inside viewing area)	Minor
	9. LCD's rainbow color.	Strong deviation color (or newton ring) of LCD…………………………….Rejected. Or according to limited sample.(if needed, and inside viewing area)	Minor
Electrical	10. Electrical and optical characteristics.(contrast Vop chromaticity….etc)	According to specification or drawing.(inside viewing area)	Major
	11. Missing line.	Missing dot line character	Major
	12.Short circuit. Wrong pattern display.	No display, wrong pattern display, current consumption. Out of specification	Major
	13. Dot defect.(for color and TFT)	According to standard of visual Inspection.	Minor

11.5 Standard Of Visual Inspection

NO.	CLASS	ITEM	JUDGMENT

11.5.1	Minor	Black and white spot. Foreign materiel. Dust. Blemish. Scratch.	(A) Round type: Unit: mm **Diameter (mm.) / Acceptable Q'ty** $\Phi \leqq 0.2$ — Disregard $0.2 < \Phi \leqq 0.5$ — 2(Distance>10mm) $0.50 < \Phi$ — 0 Note: Φ = (length+width)/2 (B) Linear type: Unit: mm **Length / Width (mm.) / Acceptable Q'ty** -- , $W \leqq 0.05$, Disregard $L \leqq 3.0$, $0.05 < W \leqq 0.1$, 2(Distance>10mm) -- , $0.1 < W$, Not allow

Detailed tables:

(A) Round type: Unit: mm

Diameter (mm.)	Acceptable Q'ty
$\Phi \leqq 0.2$	Disregard
$0.2 < \Phi \leqq 0.5$	2(Distance>10mm)
$0.50 < \Phi$	0

Note: Φ = (length+width)/2

(B) Linear type: Unit: mm

Length	Width (mm.)	Acceptable Q'ty
--	$W \leqq 0.05$	Disregard
$L \leqq 3.0$	$0.05 < W \leqq 0.1$	2(Distance>10mm)
--	$0.1 < W$	Not allow

11.5.2 Minor — Dent on polarizer.

Unit: mm.

Diameter	Acceptable Q'ty
$\Phi \leqq 0.2$	Disregard
$0.2 < \Phi \leqq 0.5$	2(Distance>10mm)
$0.50 < \Phi$	0

11.5.3 Minor — Bubble in polarizer.

Unit: mm.

Diameter	Acceptable Q'ty
$\Phi \leqq 0.2$	Disregard
$0.2 < \Phi \leqq 0.5$	2(Distance>10mm)
$0.50 < \Phi$	0

11.5.4 Minor — Dot defect

Items	Acceptable Q'ty
Bright dot	$N \leqq 3$
Dark dot	$N \leqq 3$
Total dot	$N \leqq 6$

Pixel define :

Dot   Dot   Dot

Note1: 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: The bright dot defect must be visible through 2% ND filter

Note 4: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue

11.5.5	Minor	LCD glass chipping.		Y>S Reject
11.5.6	Minor	LCD glass chipping.		X or Y>S Reject
11.5.7	Major	LCD glass crack.		Y>(1/2) T Reject
11.5.8	Major	LCD glass scribe defect.		1. a>L/3, A>1.5mm Reject 2. B : According to dimension
11.5.9	Minor	LCD glass chipping. (on the terminal area)		Φ = (x+y)/2>2.5mm Reject
11.5.10	Minor	LCD glass chipping. (on the terminal surface)		Y>(1/3)T Reject
11.5.11	Minor	LCD glass chipping.		Y>T Reject

12. Handling Precautions

12.1 Mounting method

The 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 sRXOent

[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 sRXOent:
- 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 sRXOent 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 (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 electro chemical 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 sRXOents 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 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.

- END