☐Preliminary Specification
■Final Specification

SPECIFICATION

Product Model: PV07061Y0140N

DESIGNED	CHECKED	Approved
研发部 2023.05.20 Well	研发部 2023.05.20 Tom	研发部 2023.05.20 Mike

Ok

NG, Problem survey

Approved By_____

Revision Record

REV NO.	REV DATE	CONTENTS	Note
V0	**2023.05.20**	NEW ISSUE	

Table of Contents

1. Scope

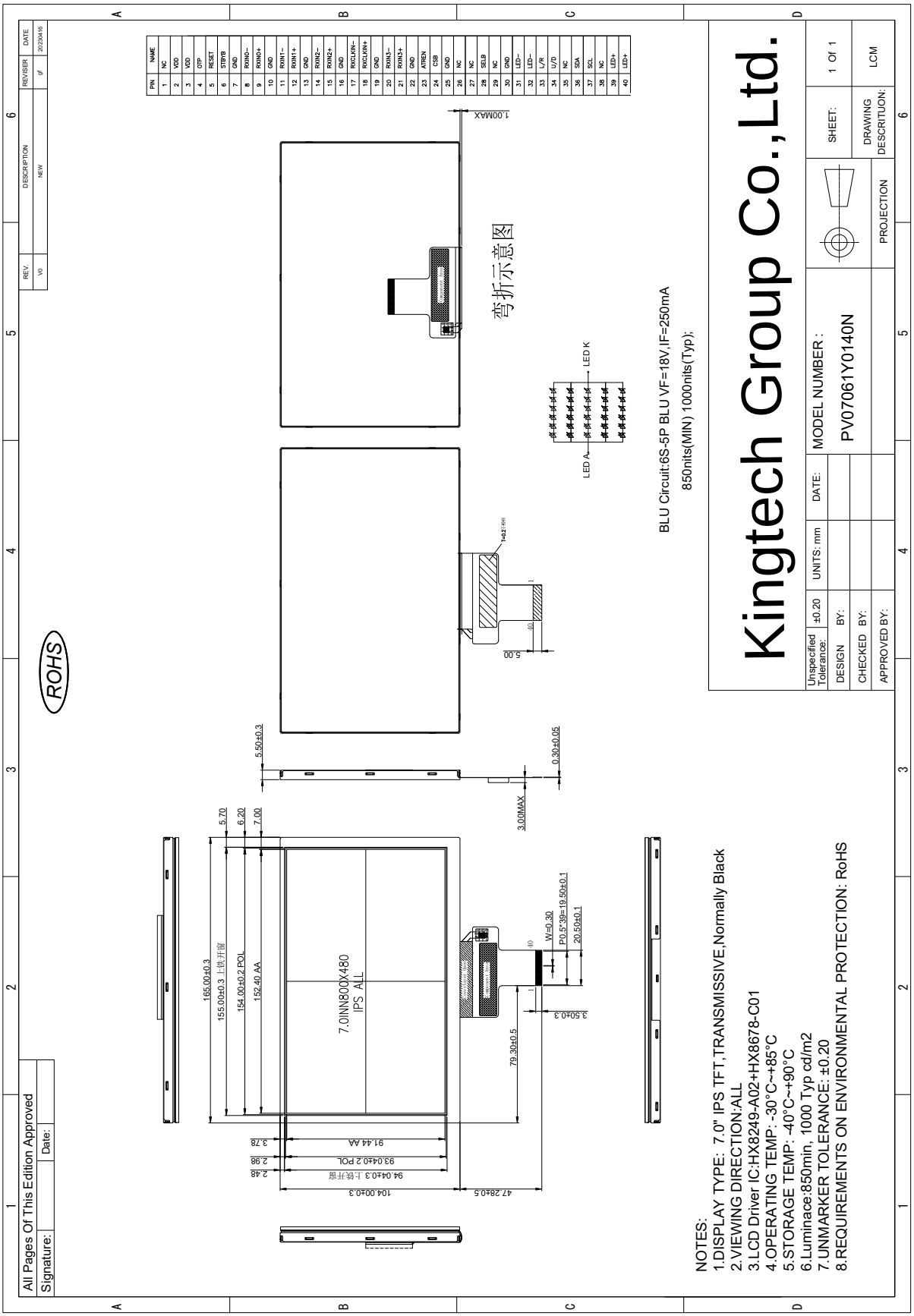
This specification defines general provisions as well as inspection standards for TFT module supplied by Kingtech Group Co.,Ltd.

If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution.

2. General Information

TITEM	STANDARD VALUES	UNITS
LCD type	7.0"TFT	--
Dot arrangement	800(RGB)×480	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally Black	-
Eyes Viewing Direction	80/80/80/80	
Module size	165.0(W)×104.0(H)×5.5(T)	mm
Active area	152.4 (W)×91.44H)	mm
Dot pitch	190.5(W)×190.5(H)	um
Interface	LVDS 8 bit or 6 bit	--
Operating temperature	-30 ~ +85	°C
Storage temperature	-40 ~ +90	°C
Back Light	30 White LED	--
Weight	TBD	g

3. External Dimensions



4. Interface Description

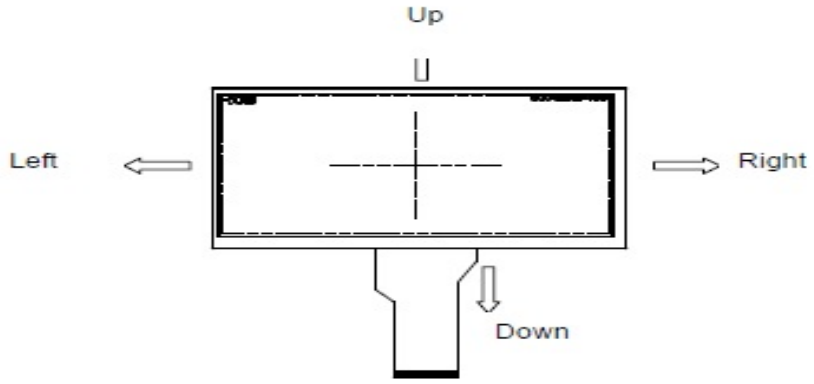
PIN	PIN NAME	DESCRIPTION	Remark
1	NC	No connection	
2-3	VDD	Power Voltage for digital circuit	
4	OTP	No connection	
5	RESET	Reset pin. The chip is in reset state when RESETB=0.	
6	STBYB	Standby mode setting pin. The chip is in standby mode when STBYB=0.	
7	GND	Ground	
8	RXIN0-	-LVDS differential data input	
9	RXIN0+	+LVDS differential data input	
10	GND	Ground	
11	RXIN1-	-LVDS differential data input	
12	RXIN1+	+LVDS differential data input	
13	GND	Ground	
14	RXIN2-	-LVDS differential data input	
15	RXIN2+	+LVDS differential data input	
16	GND	Ground	
17	RXCLKIN-	-LVDS differential clock input	
18	RXCLKIN+	+LVDS differential clock input	
19	GND	Ground	
20	RXIN3-	-LVDS differential data input	
21	RXIN3+	-LVDS differential data input	
22	GND	Ground	
23	ATREN	No connector (programming by factory）	
24	CSB	No connector (programming by factory）	
25	GND	Ground	
26-27	NC	No connection	
28	SELB	Selection for 6 bit/8bit LVDS data input Low: 6bit input mode High or NC: 8bit input mode	Internal pull Hi
29	NC	No connection	
30	GND	Ground	
31-32	LED-	LED Cathode	
33	L/R	Horizontal inversion	Internal pull Hi
34	U/D	Vertical inversion	Internal pull Hi
35	NC	No connection	
36	SDA	No connector (programming by factory）	
37	SCL	No connector (programming by factory）	
38	NC	No connection	
39-40	LED+	LED Anode	

Note:

1. L/R：left or right setting
   U/D：up or down setting

L/R	U/D	Data shifting
VDD	GND	Left → Right，Up → Down(default)
GND	GND	Right → Left，Up → Down
VDD	VDD	Left → Right，Down → Up
GND	VDD	Right → Left，Down → Up

Definition of scanning direction:



5. Absolute Maximum Ratings

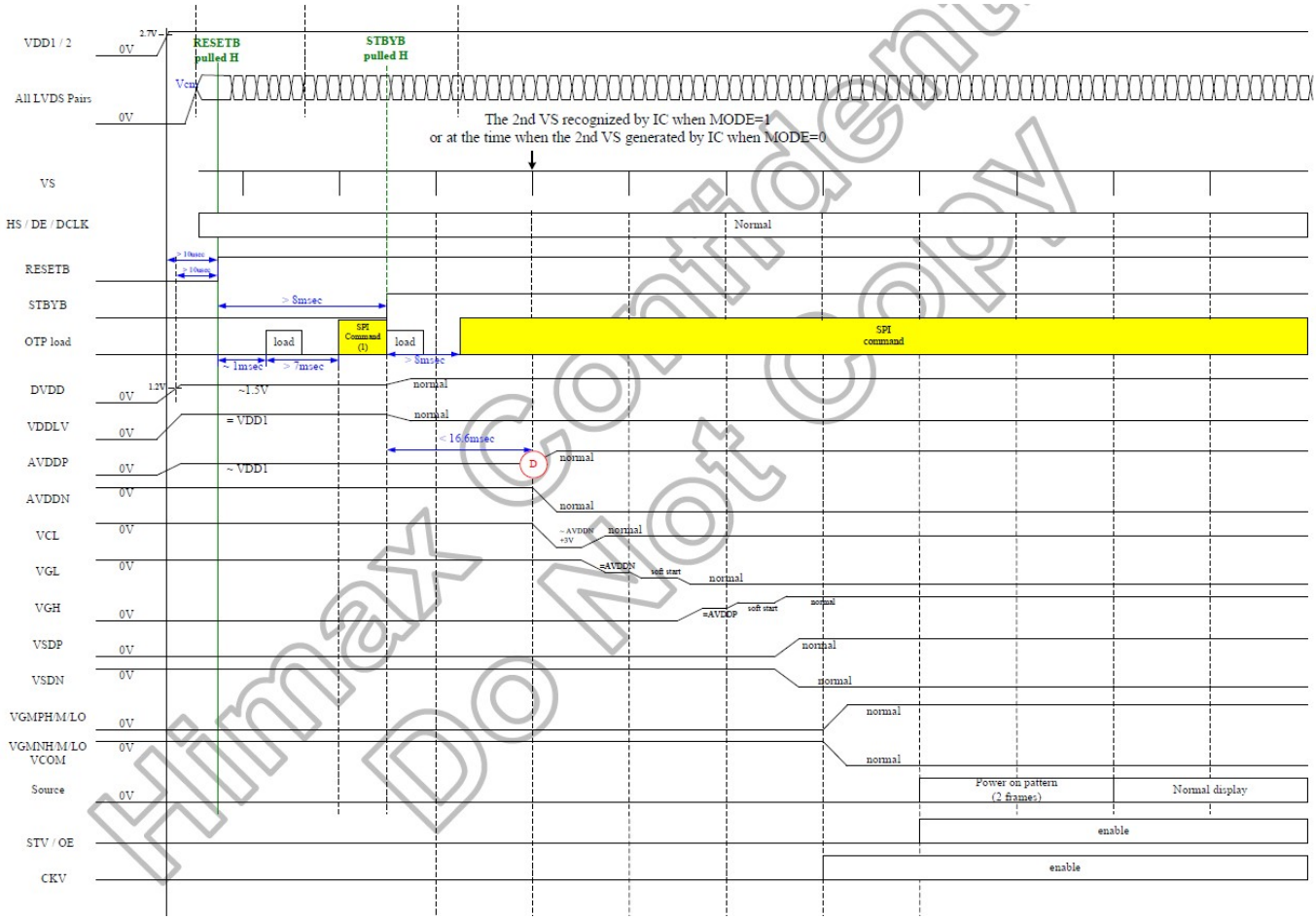
Item	Symbol	Min.	Max.	Unit
Logic Supply Voltage	VDD	-0.5	5	V
Operating Temperature	TOP	-30	85	°C
Storage Temperature	TST	-40	90	°C

6. Operating Conditions

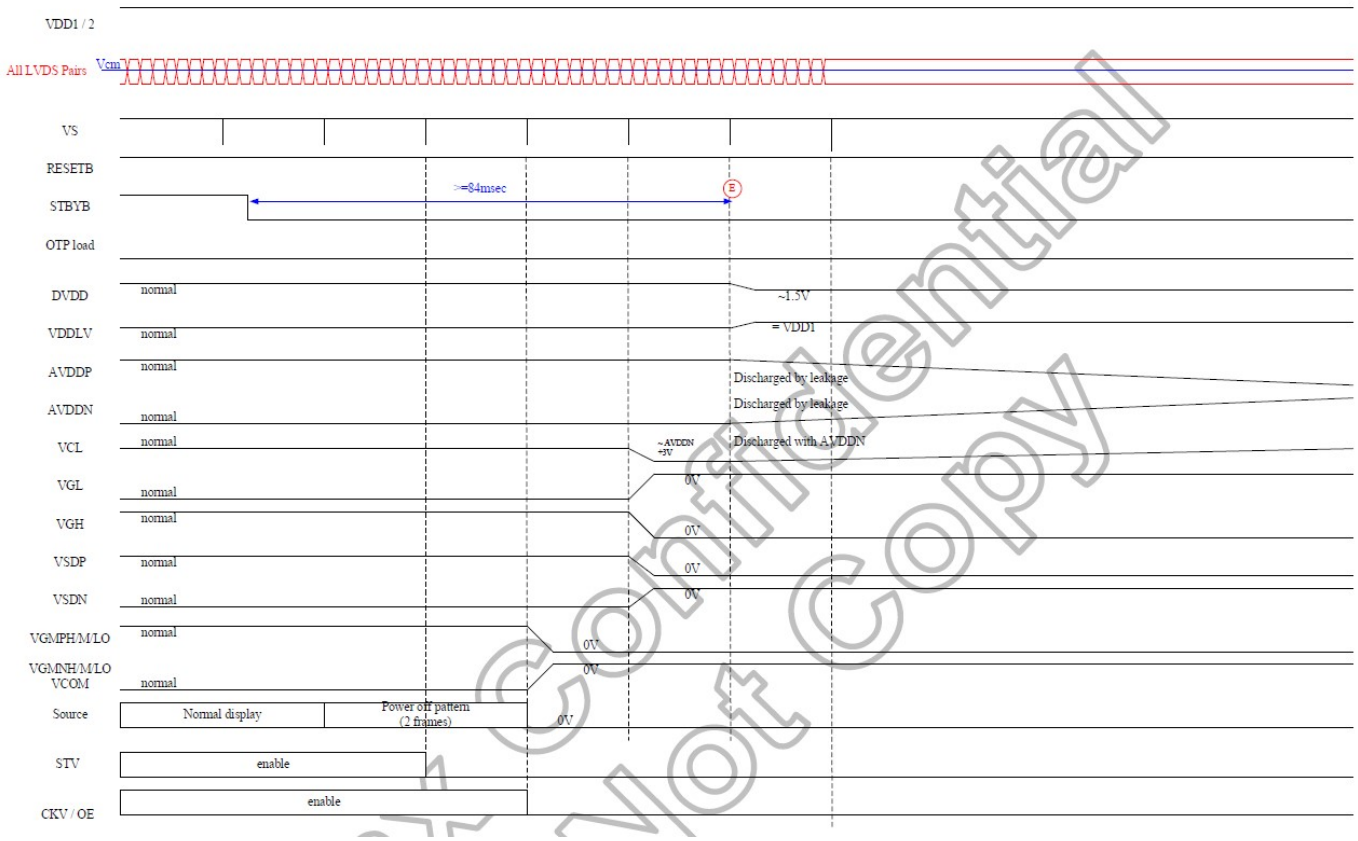
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power Voltage	VDD	3.0	3.3	3.6	V	
Input logic high voltage	VIH	0.7*VDD	-	VDD+0.3	V	
Input logic low voltage	VIL	GND-0.3	-	0.3*VCC	V	
Current for Power	IDD	-	100	160	mA	VDD=3.3V

7. Timing Characteristics

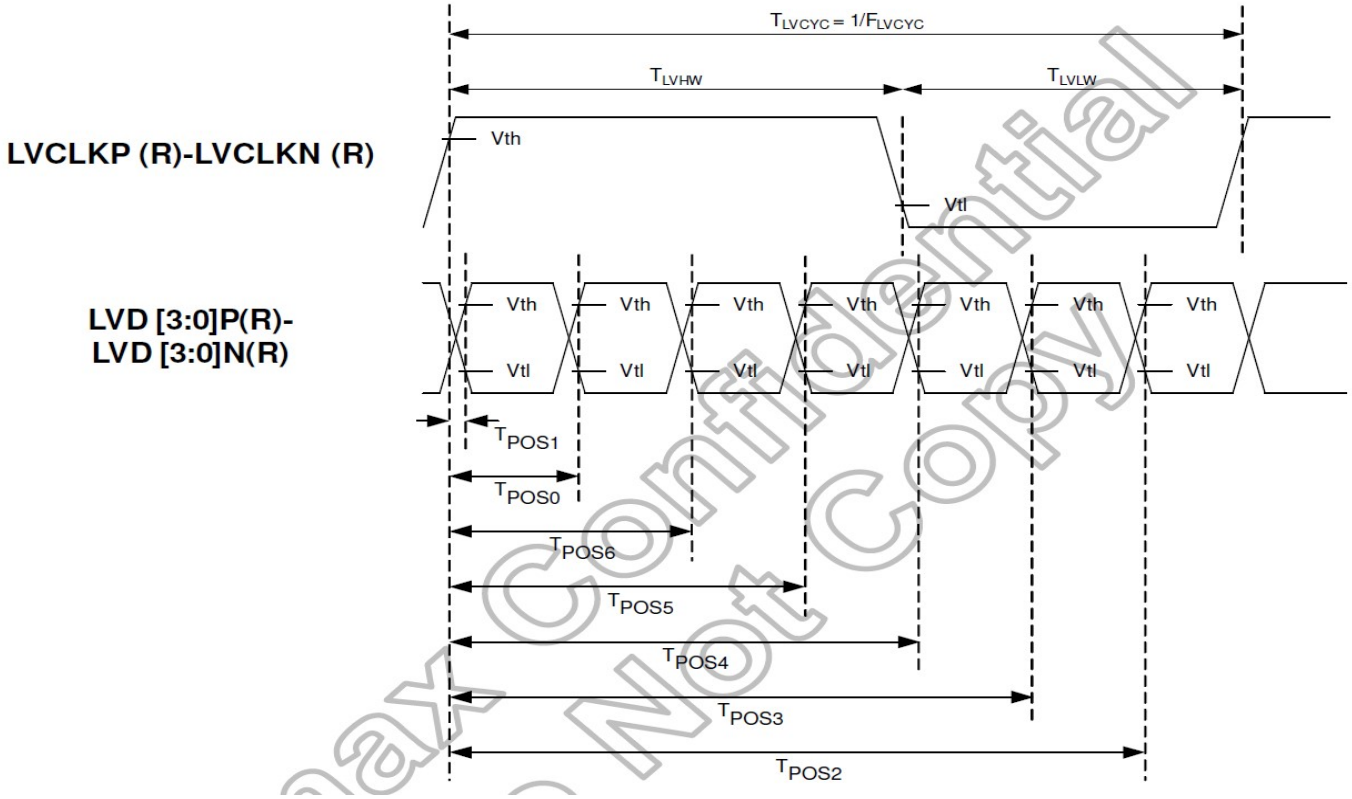
7.1 Power on sequence



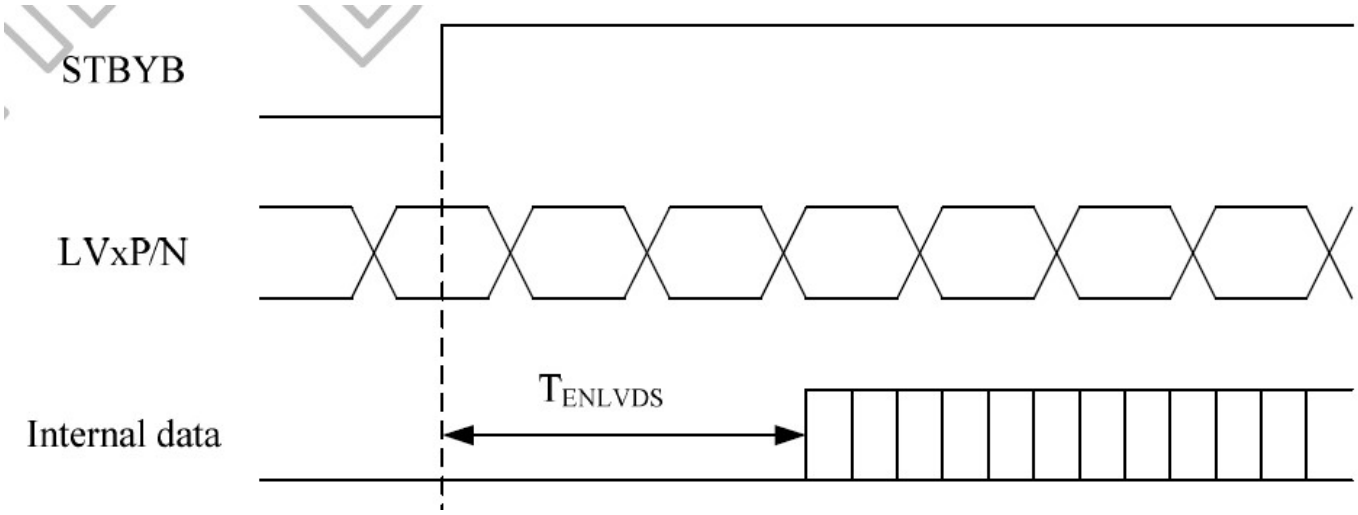
7.2 Power off sequence



7.3 LVDS interface

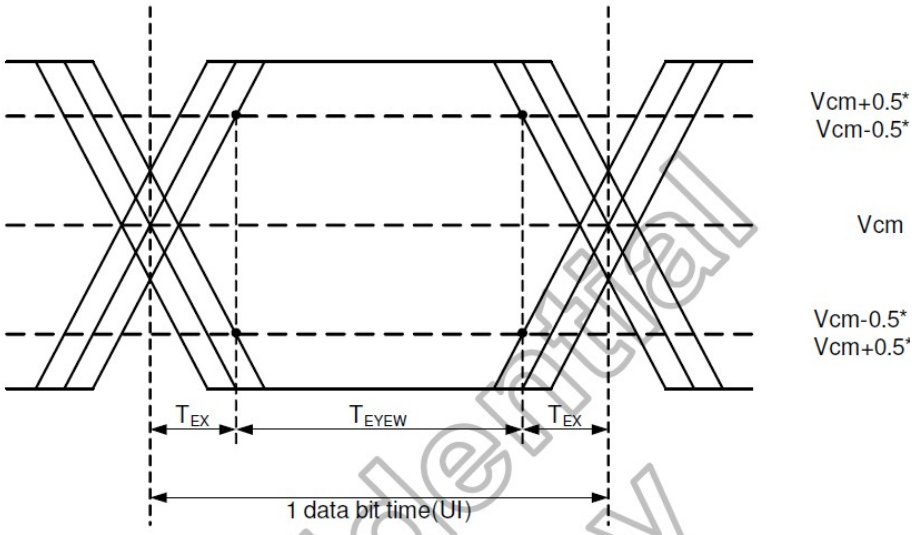


LVDS input timing

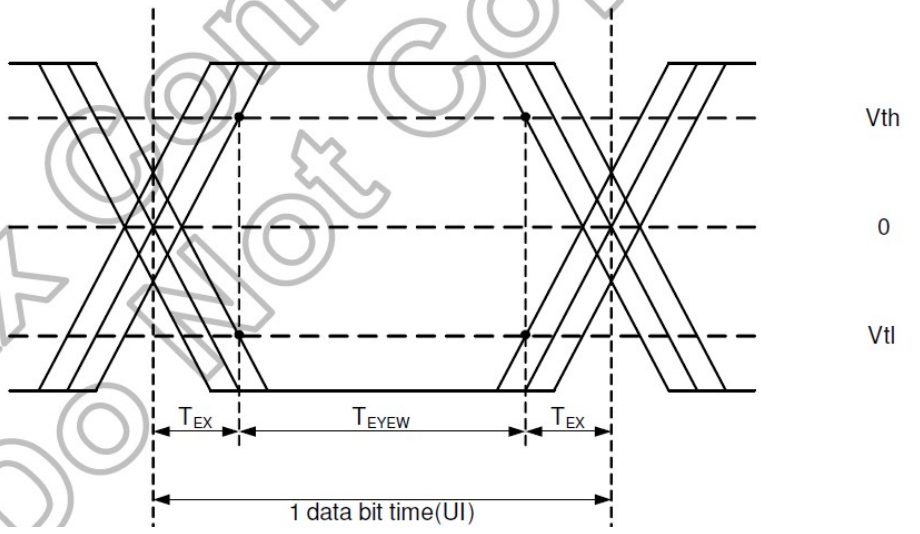


LVDS wake up time

Single-ended:
LVD [3:0]P,
LVD [3:0]N



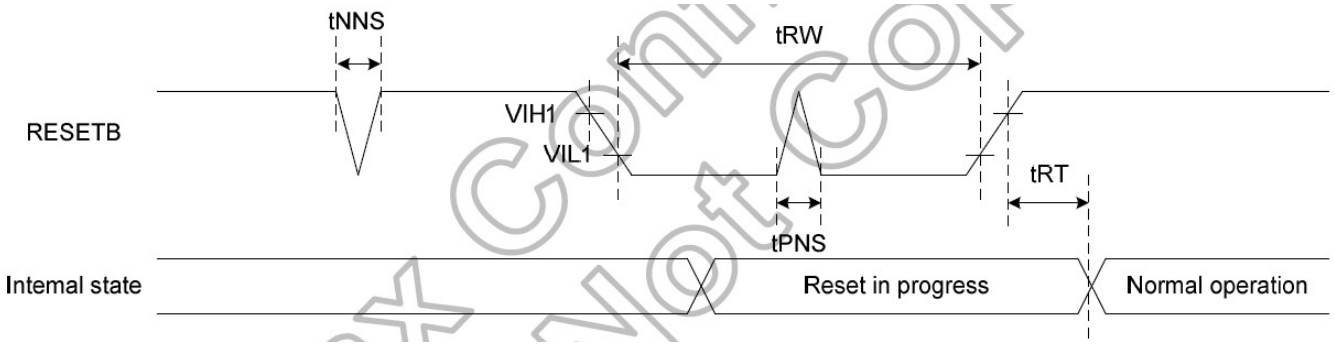
Differential:
LVD [3:0]P-LVD [3:0]N



LVDS input eye diagram

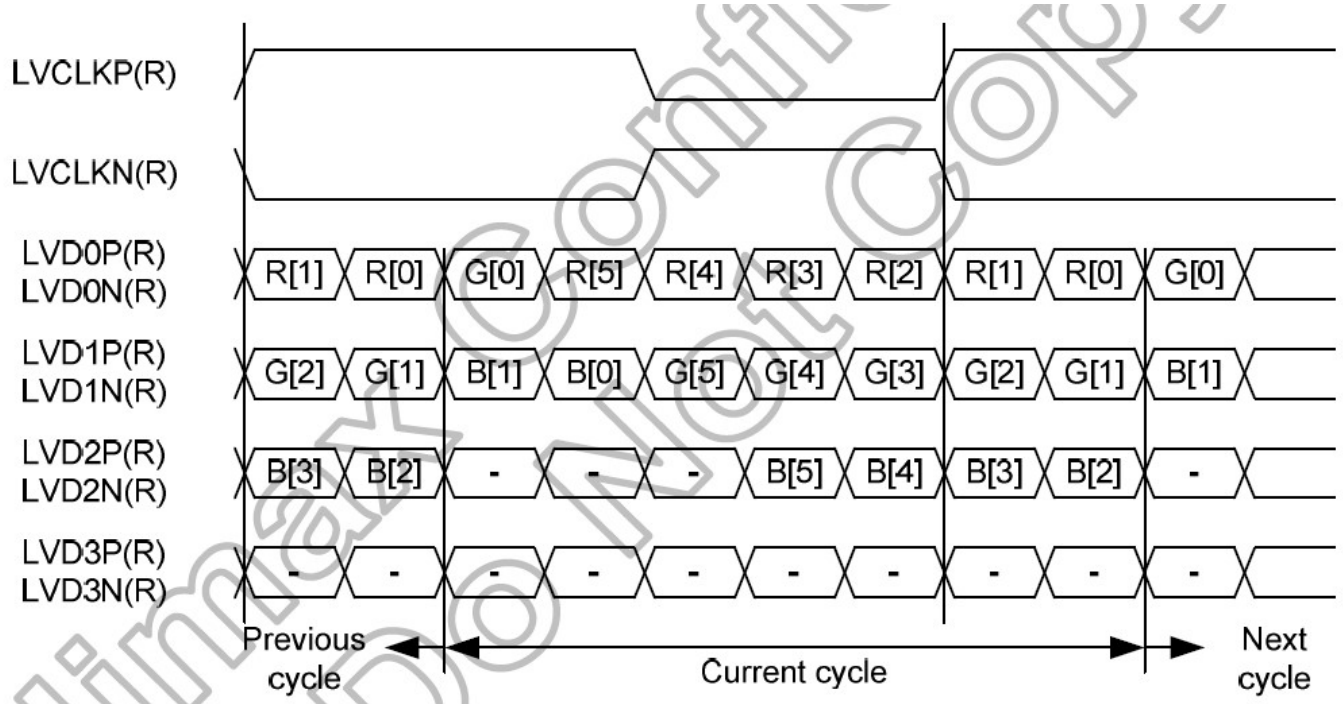
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Clock frequency	FLVCYC	10	-	85	MHz
Clock period	TLVCYC	11.76	-	100	nsec
1 data bit time	UI	-	1/7	-	TLVCYC
Clock high time	LVHW	2.9	4	4.1	UI
Clock low time	LVLW	2.9	3	4.1	UI
Position 1	TPOS1	-0.2	0	0.2	UI
Position 0	TPOS0	0.8	1	1.2	UI
Position 6	TPOS6	1.8	2	2.2	UI
Position 5	TPOS5	2.8	3	3.2	UI
Position 4	TPOS4	3.8	4	4.2	UI
Position 3	TPOS3	4.8	5	5.2	UI
Position 2	TPOS2	5.8	6	6.2	UI
Input eye width	TEYEW	0.6	-	-	UI
Input eye border	TEX	-	-	0.2	UI
LVDS wake up time	TENLVDS	-	-	150	μs

7.4 Reset timing

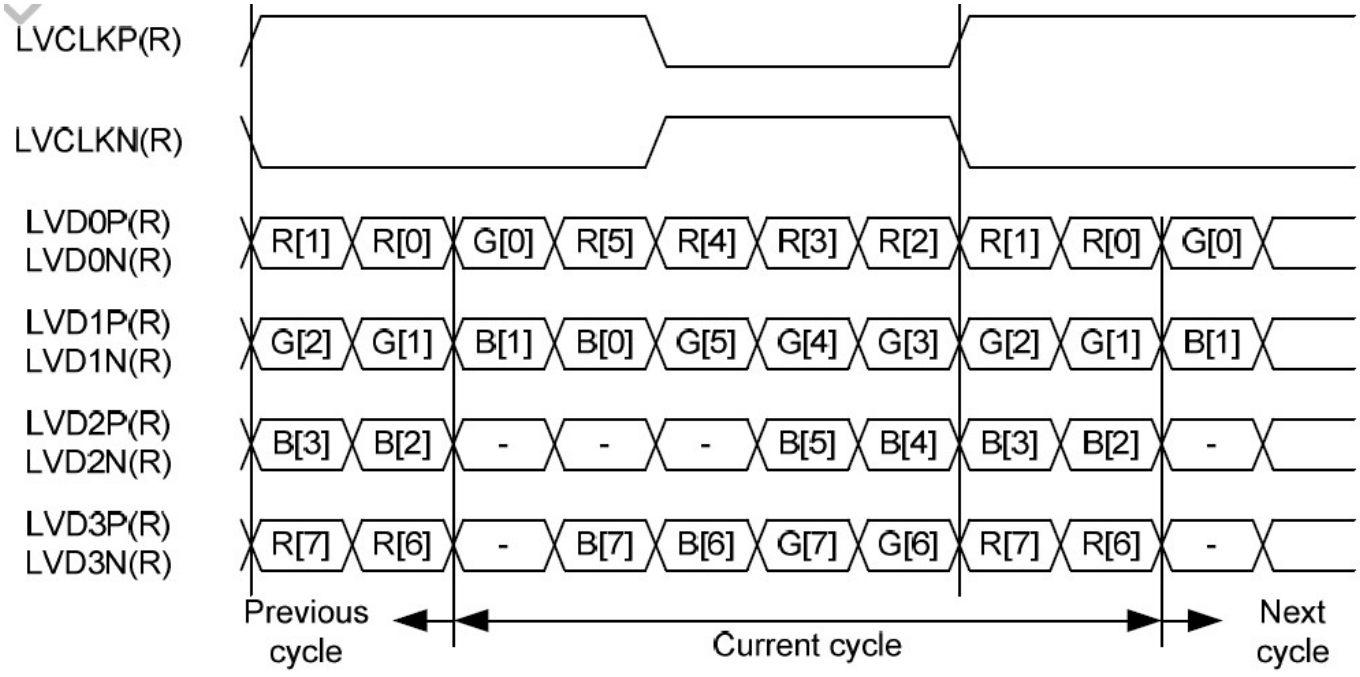


Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Reset pulse width	tRW	10	-	-	μs
Reset complete time	tRT	-	-	5	μs
Positive spike noise width	tPNS	-	-	100	ns
Negative spike noise width	tNNS	-	-	100	ns

7.5 Data Input Format

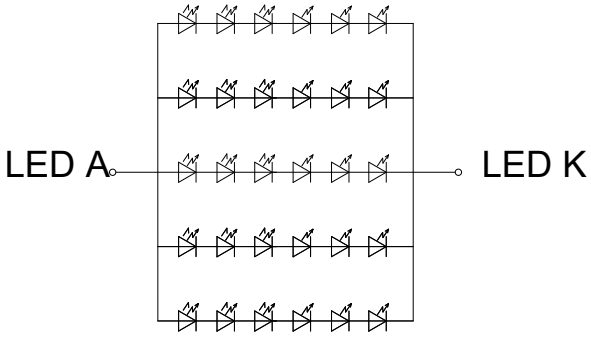


LVDS 6-bit (SELB = “L”)



LVDS 8-bit (SELB = “H”)

8. Backlight Characteristics



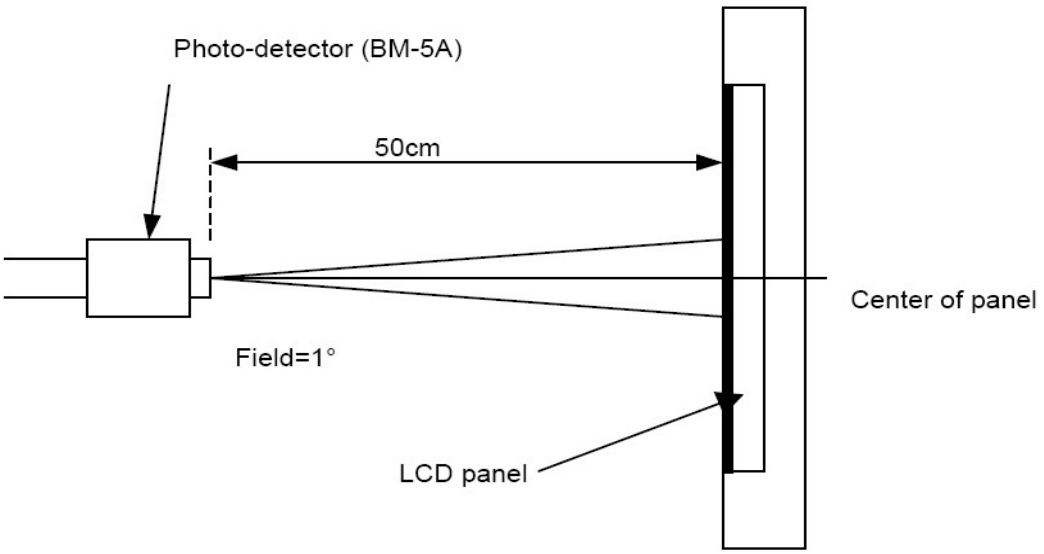
Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	VF	16.7	18	19.6	V	IF=250mA
Supply Current	IF	-	250	-	mA	-
Luminous Intensity for LCM	-	850	1000	-	cd/m^2	IF=250mA
Uniformity for LCM	-	80	-	-	%	IF=250mA
Life Time	-	50000	-	-	Hr	IF=250mA
Backlight Color	White					

9. Optical Characteristics

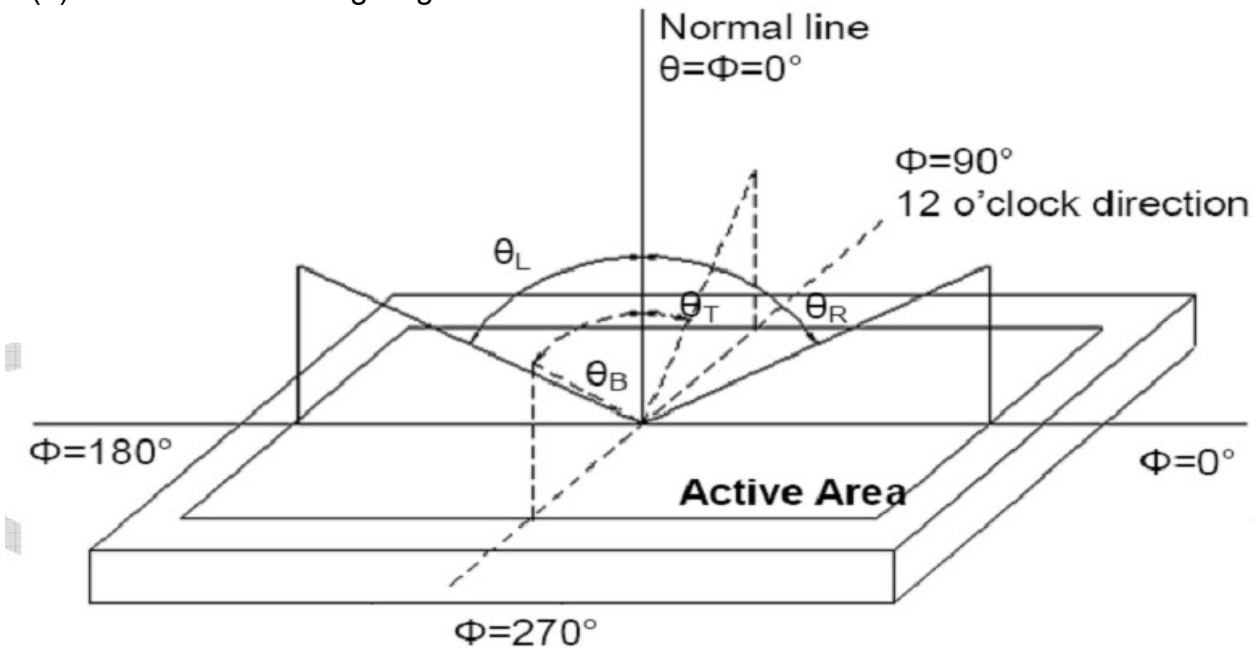
Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θ_L	-	80	-	degree	(1),(2),(6)
		θ_R	-	80	-		
	Vertical	θ_T	-	80	-		
		θ_B	-	80	-		
Contrast Ratio	Center		800	1000	-	-	(1),(3),(6)
Response Time	Tr+Tf		-	25	35	ms	(1),(4),(6)
CF Color Chromaticity (CIE1931)	Red x		Typ. -0.05	0.63	Typ. +0.05	-	(1), (6)
	Red y			0.36		-	
	Green x			0.30		-	
	Green y			0.64		-	
	Blue x			0.13		-	
	Blue y			0.06		-	
	White x			0.30		-	
	White y			0.34		-	

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



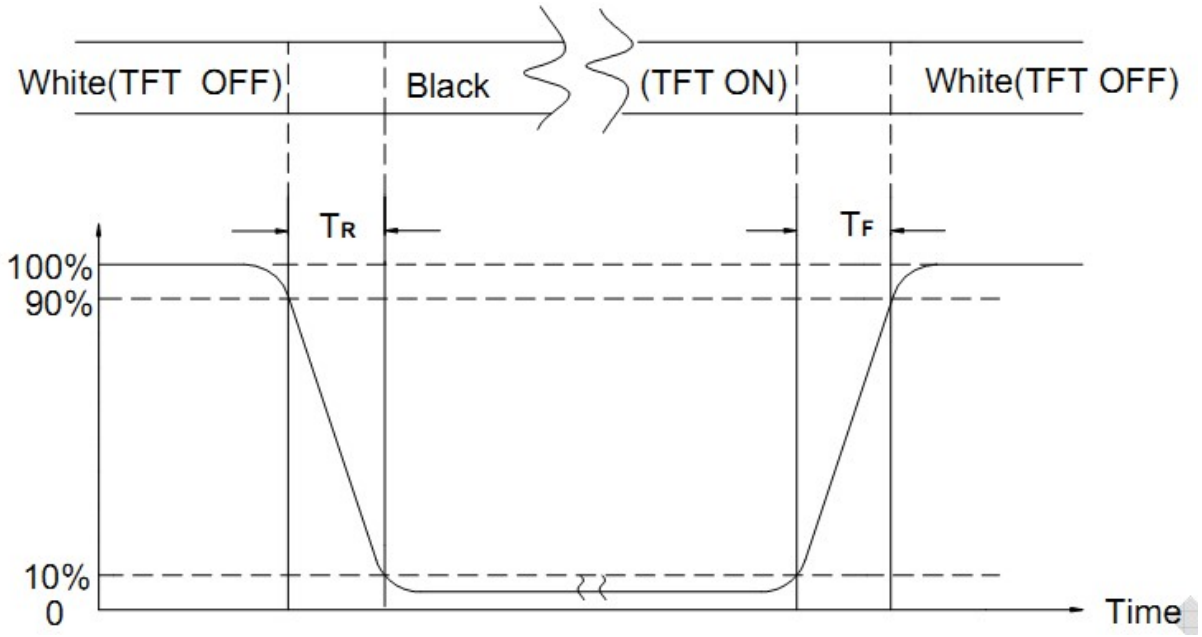
Note (3) Definition of Contrast Ratio (CR)

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

Note (7) Transmittance is the Value with WV Polarizer and BLU

10. Reliability Test Conditions and Methods

NO.	Test Items	Test Condition
①	High Temperature Storage	Keep in 80°C±2°C×240Hrs Surrounding temperature, then storage at normal condition 4hrs.
②	Low Temperature Storage	Keep in -30°C±2°C×240Hrs Surrounding temperature, then storage at normal condition 4hrs.
③	High Temperature Operating Test	70°C±2°C×240Hrs
④	Low Temperature Operating Test	-20°C±2°C×240Hrs
⑤	High Temperature / High Humidity Storage Test	Keep in 60°C±5°C×90%RH×240Hrs Surrounding temperature, then storage at normal condition 4hrs.
⑥	Temperature Cycling Storage Test	-30°C → +25°C → 80°C → +25°C (30mins) (5mins) (30mins) (5mins) 30 Cycle Surrounding temperature, then storage at normal condition 4hrs.
⑦	ESD Test	Air Discharge: Apply 4 KV with 5 times Discharge for each polarity +/- Contact Discharge: Apply 2K V with 5 times discharge for each polarity +/- 1. Temperature ambiance : 15°C～35°C 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%)
⑧	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 2Hrs
⑨	Drop Test (Packaged)	Packing Weight (Kg) / Drop Height (cm): 0 ~ 45 — 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 Standards

11.1. Quality

The quality of goods supplied to purchaser shall come up to the following standards:

11.1.1. Inspection Tools 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 Kingtech to purchaser, purchaser shall keep the LCM at -10°C to 30°C, 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 methods of Inspection
If purchaser makes 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 inform seller of it within seven days. But first shipment within fourteen days.

11.1.4. Warranty Policy

Kingtech will provide one-year warranty for the products only if under Specification operating conditions. Kingtech will replace new products for these defect products which are under warranty period and belong to the responsibility of Kingtech.

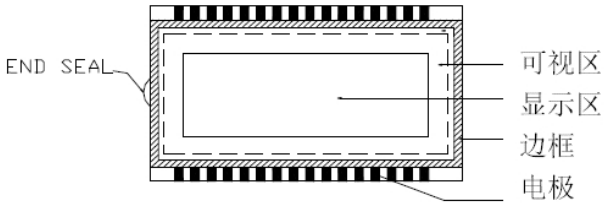
11.2. Checking Condition

11.2.1 Checking direction shall be in the 45 degree area to face the sample.

11.2.2 Inspector shall see from over 300±25mm with bare eyes far from the 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.

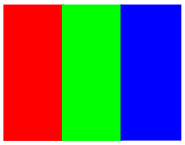
11.2.8 The ion fan should be used when testing.

11.2.9 The principle of judgement:

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

11.2.9.2 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.

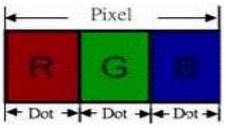
Highlights:
Usually considered to be shown on a black screen.

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

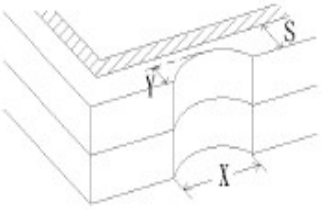
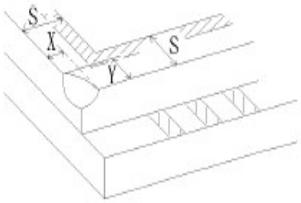
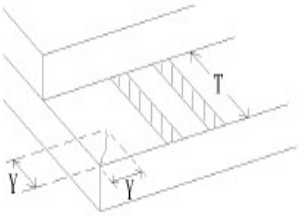
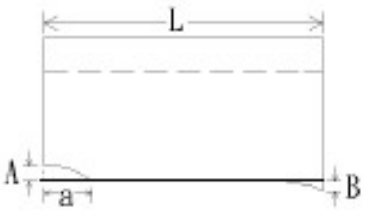
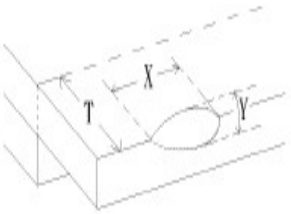
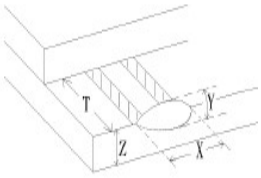
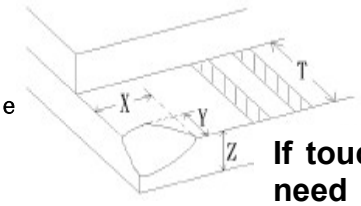
Neighborhood:
Two or three adjacent point pixels (dot: sub-pixel) connected together (R, G or G, B or B, R or RGB).

11.3 / 11.4 / 11.5 Inspection Plans:

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>Distances ≥ 1mm</td></tr>
<tr><td>0.2 < ∅ ≤ 0.3</td><td>3 (Distance ≥ 5mm)</td></tr>
<tr><td>0.3 < ∅ ≤ 0.4</td><td>2 (Distance ≥ 5mm)</td></tr>
<tr><td>0.4 < ∅</td><td>0</td></tr>
</table>
NOTE: ∅=(LENGTH*WIDTH)/2
(S) LINE TYPE: unit: mm
<table>
<tr><th>LEN</th><th>WIDTH</th><th>ACCEPTABLE QTY</th></tr>
<tr><td>…</td><td>W≤ 0.03</td><td>Distance≥ 1mm</td></tr>
<tr><td>L</td><td>0.03 < W ≤ 0.05</td><td>3 (Distanced ≥ 15mm)</td></tr>
<tr><td>…</td><td>0.05 < W</td><td>FOLLOW ROUND TYPE</td></tr>
</table>
NOTE: ∅=(LENGTH*WIDTH)/2</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>Distance≥ 1mm</td></tr>
<tr><td>0.2<∅≤ 0.3</td><td>4 (Distance≥ 15mm)</td></tr>
<tr><td>0.3<∅≤ 0.4</td><td>3 (Distance≥ 15mm)</td></tr>
<tr><td>0.4<∅</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 ≤1 (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 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	MINOR	LCD GLASS CRACK	 **Continuous burst NG** Reject
11.4.8	MINOR	**LCD GLASS SCRIBE DEFECT**	 **According to dimension**
11.4.9	MINOR	LCD GLASS CHIPPING (on the terminal area)	 **Y<1/2Z Y≥0.5mm X≥3mm** Reject
11.4.10	MINOR	LCD GLASS CHIPPING (on the terminal surface)	 **Y<1/2Z Y≥0.5mm X≥3mm** Reject
11.4.11	MINOR	LCD GLASS CHIPPING	 **X≥3mm Y>T** R **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 Kingtech module consists of two thin glass plates with polarizes which easily be damaged. And since the module is 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 both parties.

- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specification.
- When an inspection specification change or operating condition change in customer is reported to Kingtech, 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