






# SPECIFICATION

**Product Model: PV08013Y0140N**

DESIGNED	CHECKED	Approved
		

## Approval by Customer:

Ok

NG, Problem survey

Approved By \_\_\_\_\_



# Revision Record

REV NO.	REV DATE	CONTENTS	Note
V0	2020.08.07	NEW ISSUE	



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## 1. Scope

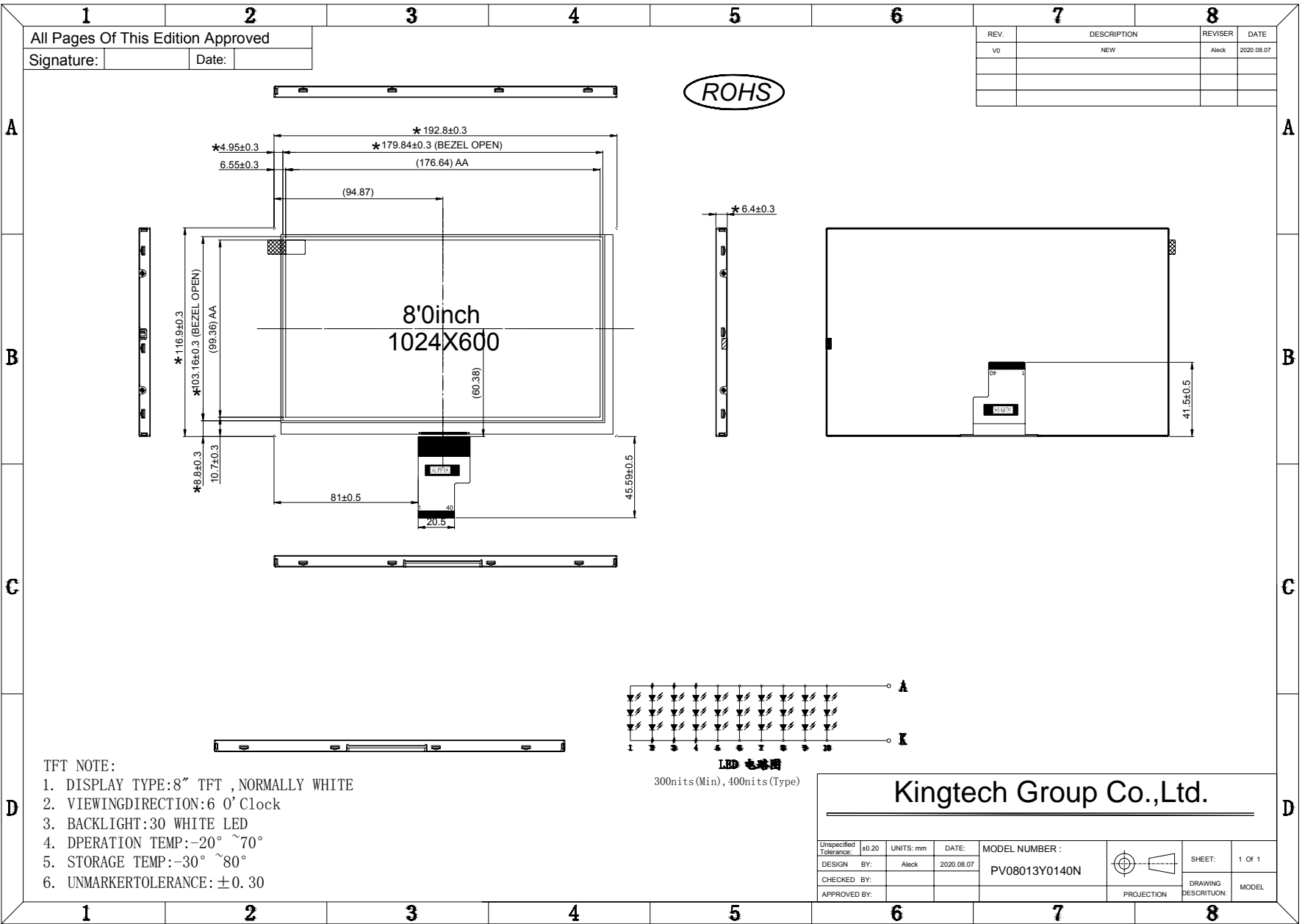
This specification defines general provisions as well as inspection standards for TFT module supplied by Kingtech Group.

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

## 2. General Information

No.	Item	Specification	Remark
1	LCD size	8.0 inch(Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1024 x 3(RGB) x 600	
4	Display mode	Normally White	
5	Dot pitch	0.1725(W) x 0.1656(H)	
6	Active area	176.64(W) x 99.36(H)mm	
7	Module size	192.8(W) x 116.9(H) x 6.4(D)mm	Note 1
8	Surface treatment	ANTI-Glare	
9	Color arrangement	RGB-stripe	
10	View Direction(Gray Inversion)	6:00 O' Clock	
11	Interface	LVDS interface	
12	Backlight power consumption	2.61W (Typ.)	
13	Panel power consumption	TBD W(Typ)	
14	Weight	TBD (Typ)	

Note 1: Refer to Mechanical Drawing.



3. External Dimensions





## 4. Interface Description

PIN	PIN NAME	DESCRIPTION	REMARK
1	VCOM	Common Voltage	
2	VDD	Power Voltage for digital circuit	
3	VDD	Power Voltage for digital circuit	
4	NC	No connection	
5	Reset	Global reset pin	
6	STBYB	Standby mode, Normally pulled high STBYB = "1", normal operation STBYB = "0", timing controller, source <b>driver will turn off, all output are High-Z</b>	
7	GND	Power Ground	
8	RXIN0-	- LVDS differential data input	
9	RXIN0+	+ LVDS differential data input	
10	GND	Power Ground	
11	RXIN1-	- LVDS differential data input	
12	RXIN1+	+ LVDS differential data input	
13	GND	Power Ground	
14	RXIN2-	- LVDS differential data input	
15	RXIN2+	+ LVDS differential data input	
16	GND	Power Ground	
17	RXCLKIN-	- LVDS differential clock input	
18	RXCLKIN+	+ LVDS differential clock input	
19	GND	Power Ground	
20	RXIN3-	- LVDS differential data input	
21	RXIN3+	+ LVDS differential data input	
22	GND	Power Ground	
23,24	NC	No connection	
25	GND	Power Ground	
26	NC	No connection	
27	DIMO	Backlight CABC controller signal output	
28	SELB	6bit/8bit mode select	Note1
29	AVDD	Power for Analog Circuit	
30	GND	Power Ground	
31,32	LED-	LED Cathode	
33	L/R	Horizontal inversion	Note3
34	U/D	Vertical inversion	Note3
35	VGL	Gate OFF Voltage	
36	CABCEN1	CABC H/W enable	Note2
37	CABCEN0	CABC H/W enable	Note2
38	VGH	Gate ON Voltage	
39,40	LED+	LED Anode	



Note 1: Global reset pin. Active Low to enter Reset State. Suggest to connecting with an RC reset circuit for stability. Normally pull high.

Note 2: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	R/L	
GND	V <sub>CC</sub>	Up to down, left to right
V <sub>CC</sub>	GND	Down to up, right to left
GND	GND	Up to down, right to left
V <sub>CC</sub>	V <sub>CC</sub>	Down to up, left to right

Note1: If LVDS input data is 6 bits ,SELB must be set to High;  
If LVDS input data is 8 bits ,SELB must be set to

Low. Note2: When CABC\_EN="00", CABC OFF.

When CABC\_EN="01", user interface image. When CABC\_EN="10", still picture.

When CABC\_EN="11", moving image.

When CABC off, don't connect DIMO, else connect it to backlight. Note3: When L/R="0", set right to left scan direction.

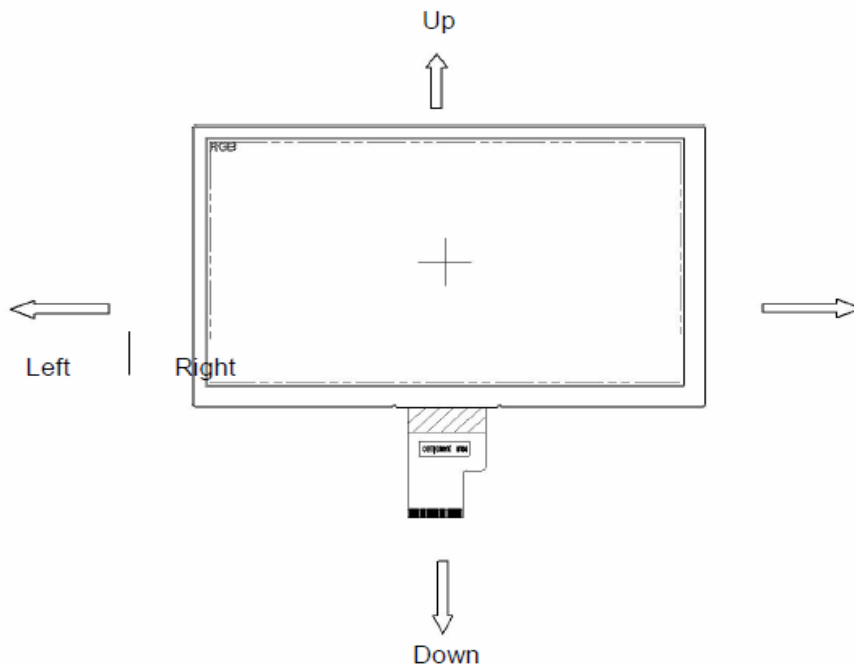
When L/R="1", set left to right scan direction.

When U/D="0", set top to bottom scan direction.

When U/D="1", set bottom to top scan direction.

Note: Definition of scanning direction.

Refer to the figure as below:





### 5. Absolute Maximum Ratings

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	V <sub>DD</sub>	-0.3	5.0	V	
	AV <sub>DD</sub>	6.5	13.5	V	
	V <sub>GH</sub>	-0.3	42	V	
	V <sub>GL</sub>	-20.0	0.3	V	
	V <sub>GH</sub> -V <sub>GL</sub>	-	40.0	V	
Operation Temperature Storage Temperature	T <sub>OP</sub>	-20	70	°C	
	T <sub>ST</sub>	-30	80	°C	
LED Reverse Voltage	V <sub>R</sub>	-	3	V	each LED
LED Forward Current	I <sub>F</sub>	-	60	mA	each LED

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

### 6. DC Characteristics

(GND=AV<sub>SS</sub>=0V, Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V <sub>DD</sub>	3.0	3.3	3.6	V	Note 2
	AV <sub>DD</sub>	10.8	11	11.2	V	
	V <sub>GH</sub>	19.7	20	20.3	V	
	V <sub>GL</sub>	-6.5	-6.8	-7.1	V	
Input signal voltage	V <sub>COM</sub>	2.7	(3.7)	4.7	V	Note 3
Input logic high voltage	V <sub>IH</sub>	0.7V <sub>CC</sub>	-	V <sub>CC</sub>	V	Note 4
Input logic low voltage	V <sub>IL</sub>	0	-	0.3V <sub>CC</sub>	V	

Note 1: Be sure to apply VCC and VGL to the LCD first, and then apply VGH.

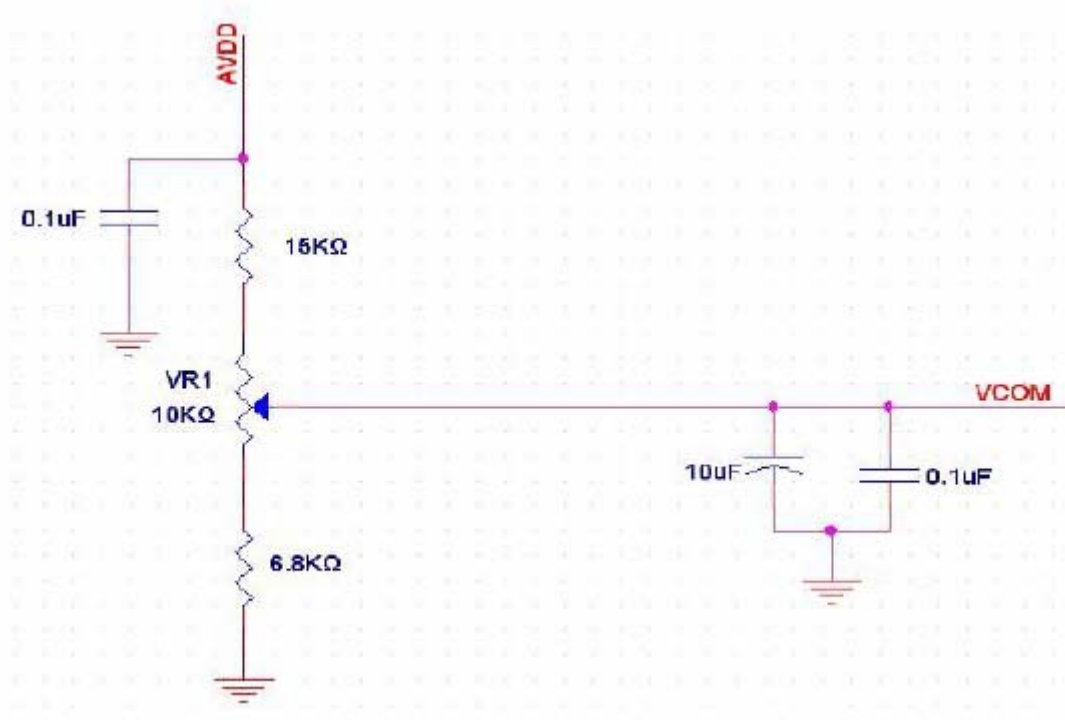
Note 2: VCC setting should match the signals output voltage (refer to Note 3) of customer's system board .





Note 3: Typical Vcom is only a reference value, it must be optimized according to each LCM. Please use VR and base on below application circuit.

Note 4: RESET, STBYB, SELB, L/R, U/D, CABCE0, CABCE1.



**Current Consumption**

(GND=AVSS=0V)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I <sub>GH</sub>	-	0.25	1.0	mA	V <sub>GH</sub> =20V
	I <sub>GL</sub>	-	0.25	1.0	mA	V <sub>GL</sub> = -6.8V
	I <sub>DD</sub>	-	38	60	mA	DV <sub>DD</sub> =3.3V
	I <sub>AVDD</sub>	-	20	30	mA	AV <sub>DD</sub> =11V

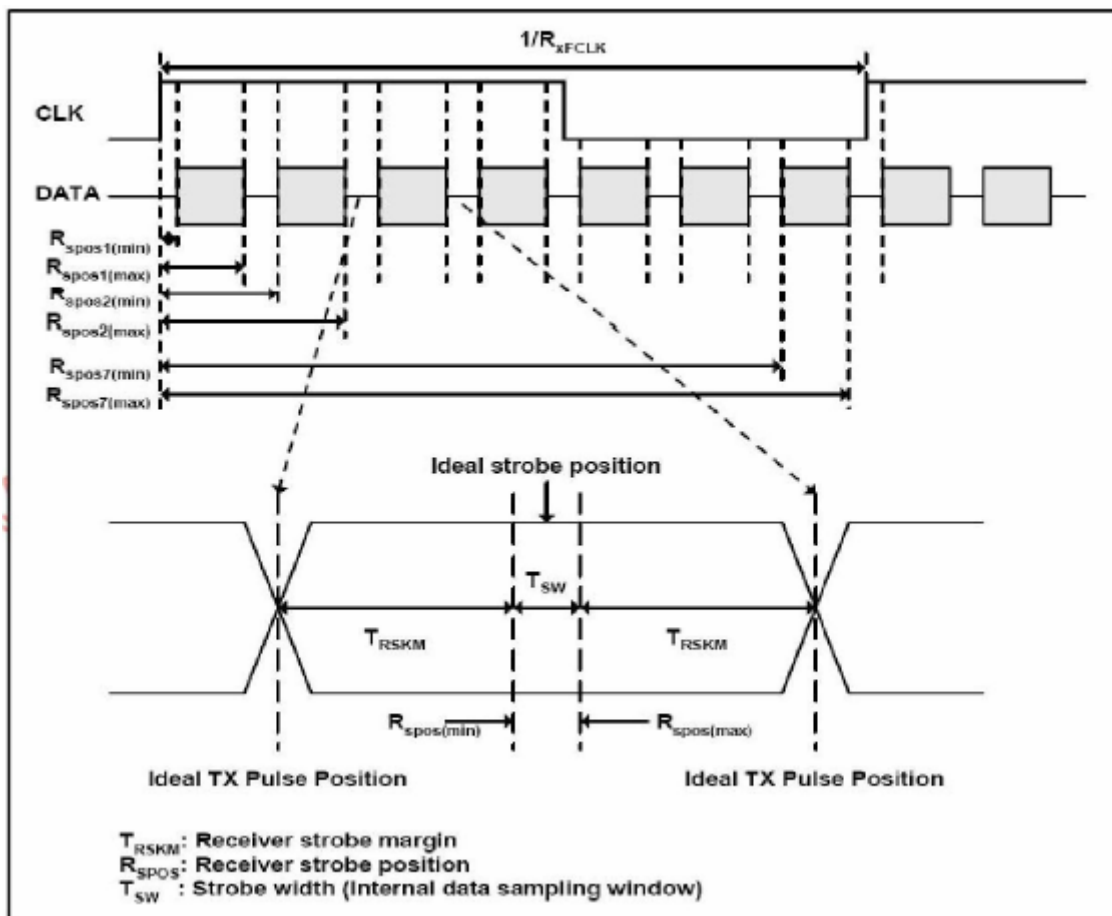
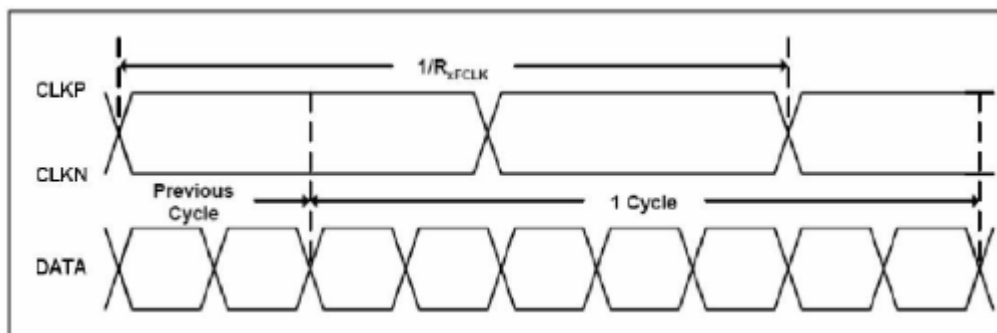


## 7. Timing Characteristics

### 7.1 AC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock frequency	R <sub>x</sub> FCLK	20	-	71	MHz	
Input data skew margin	T <sub>RSKM</sub>	500	-	-	ps	
Clock high time	T <sub>LVCH</sub>	-	4/(7* R <sub>x</sub> FCLK)	-	ns	
Clock low time	T <sub>LVCL</sub>	-	3/(7* R <sub>x</sub> FCLK)	-	ns	

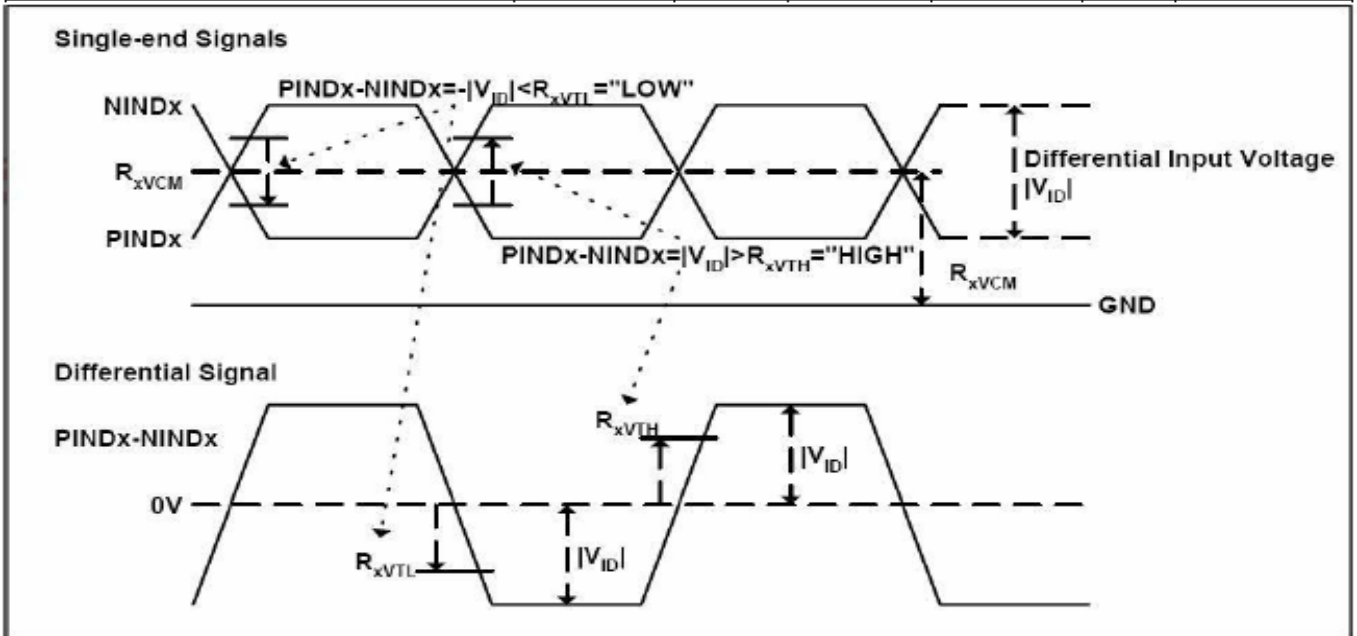
### 7.2 Input Clock and Data Timing Diagram





### 7.3 DC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Differential input high Threshold voltage	$R_{xVTH}$	-	-	+0.1	V	$R_{xVCM}=1.2V$
Differential input low Threshold voltage	$R_{xVTL}$	-0.1	-	-	V	
Input voltage range (singled-end)	$R_{xVIN}$	0	-	2.4	V	
Differential input common mode voltage	$R_{xVCM}$	$ V_{ID} /2$	-	$2.4- V_{ID} /2$	V	
Differential voltage	$ V_{ID} $	0.2	-	0.6	V	
Differential input leakage current	$R_{xIIZ}$	-10	-	+10	$\mu A$	

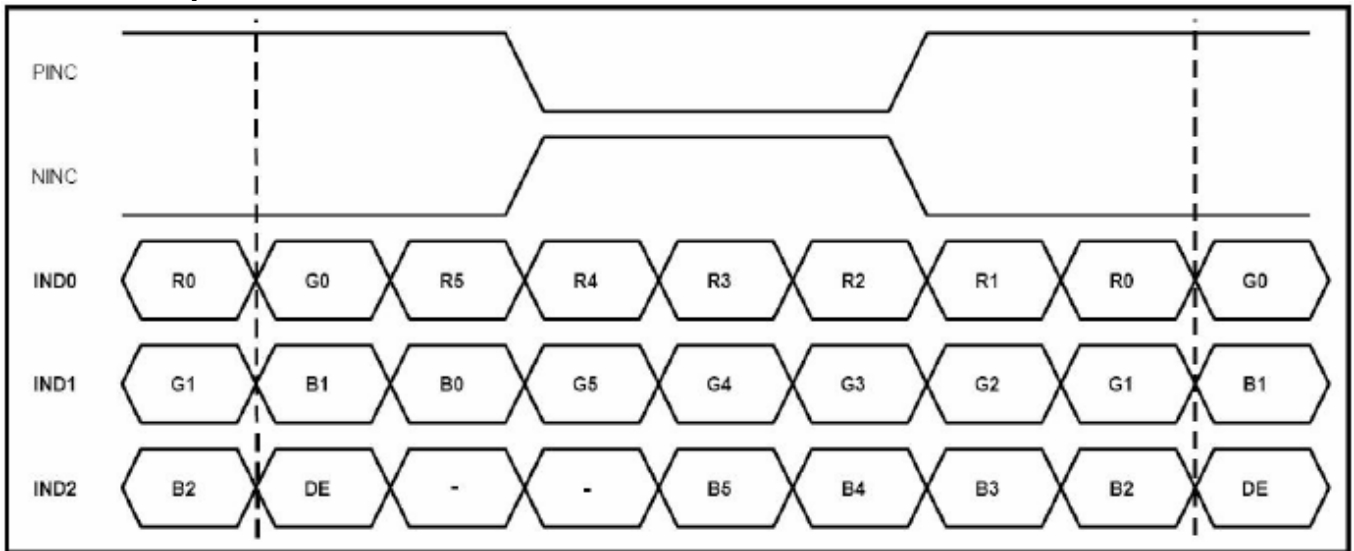


### 7.4 Timing

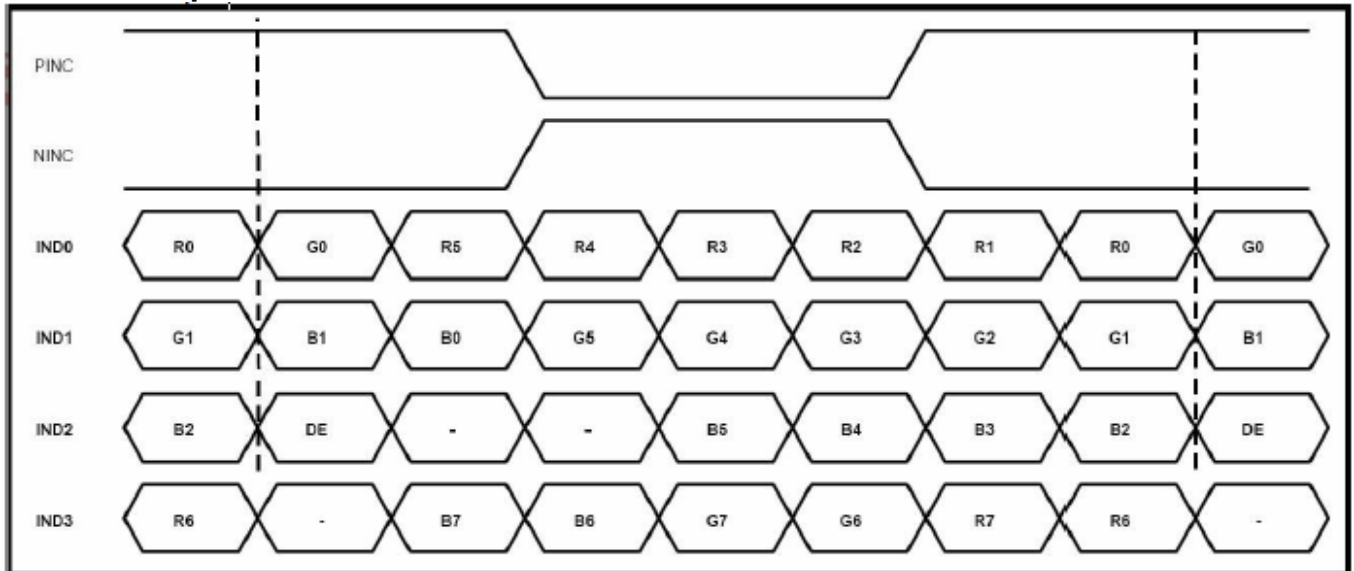
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	fclk	40.8	51.2	67.2	MHz	Frame rate =60Hz
Horizontal display area	thd	1024			DCLK	
HS period time	th	1114	1344	1400	DCLK	
HS Blanking	thb	90	320	376	DCLK	
Vertical display area	Thb+thfp	600			H	
VS period time	tv	610	635	800	H	
VS Blanking	Tvb+tvfp	10	35	200	H	



**6bit LVDS input**



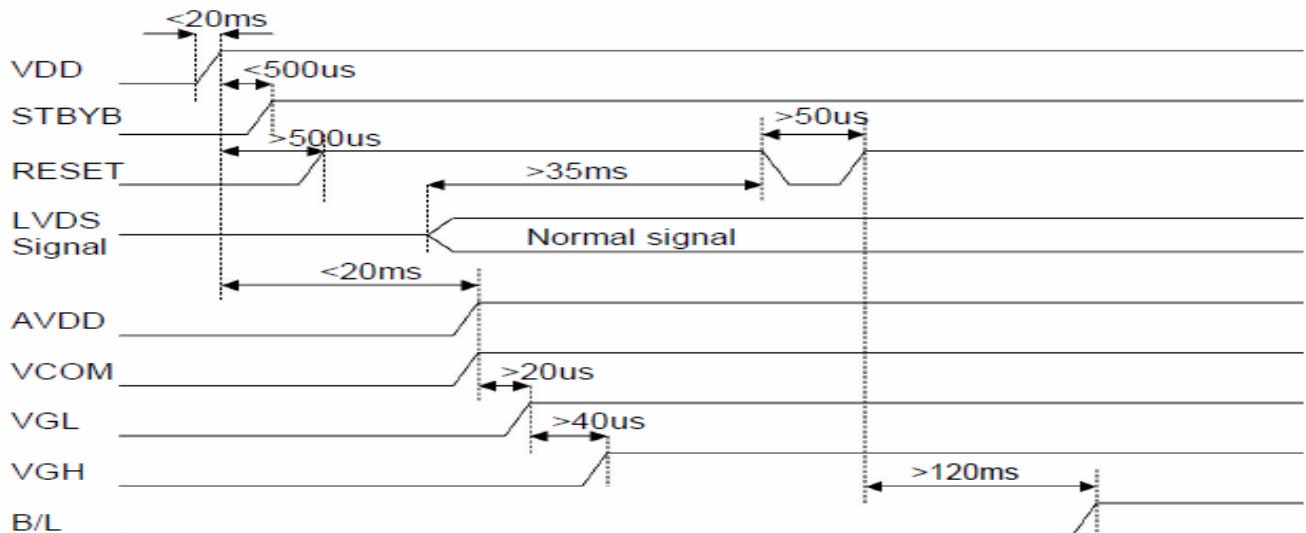
**8bit LVDS input**



Note: Support DE timing mode only, SYNC mode not supported.

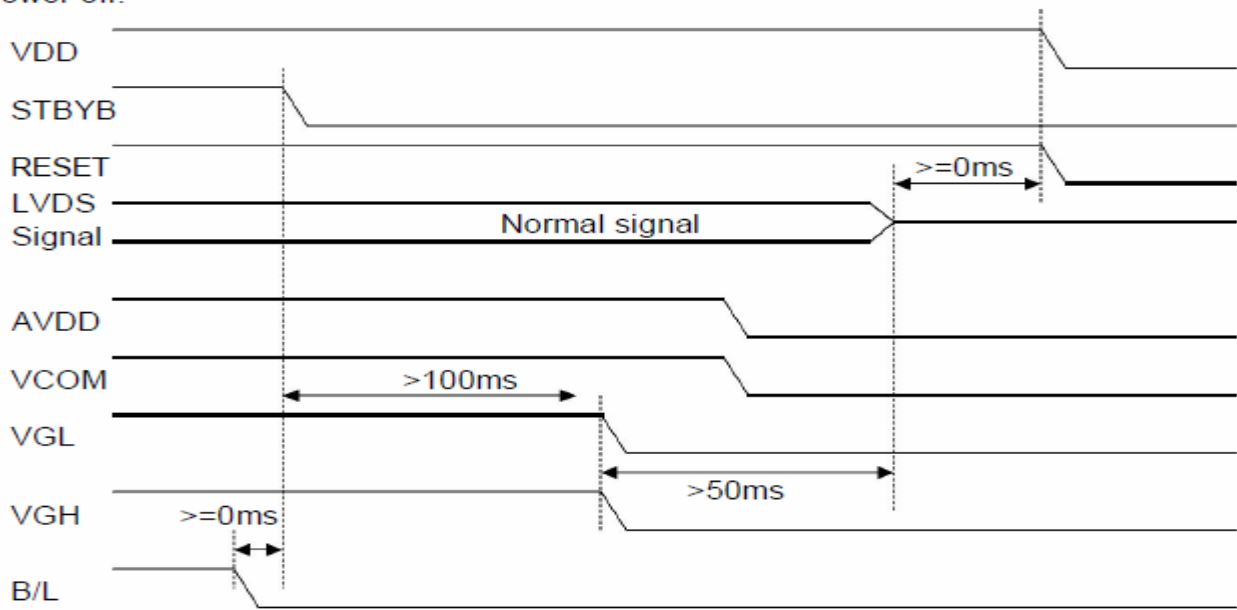
**7.5 Power ON/OFF SEQUENCE**

a. Power on:

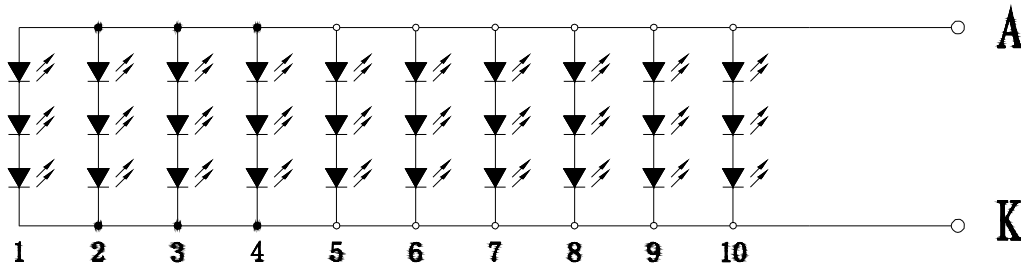




b. Power off:



### 8. Backlight Characteristic



Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	-	8.7	9.6	V	If=400mA
Supply Current	If	-	200	-	mA	
Luminous Intensity for LCM	-	300	400	-	cd/m <sup>2</sup>	If=400mA
Uniformity for LCM	-	75	-	-	%	If=400mA
Life Time	-	20000	-	-	Hr	If=400mA
Backlight Color	White					

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and IL = 400mA.

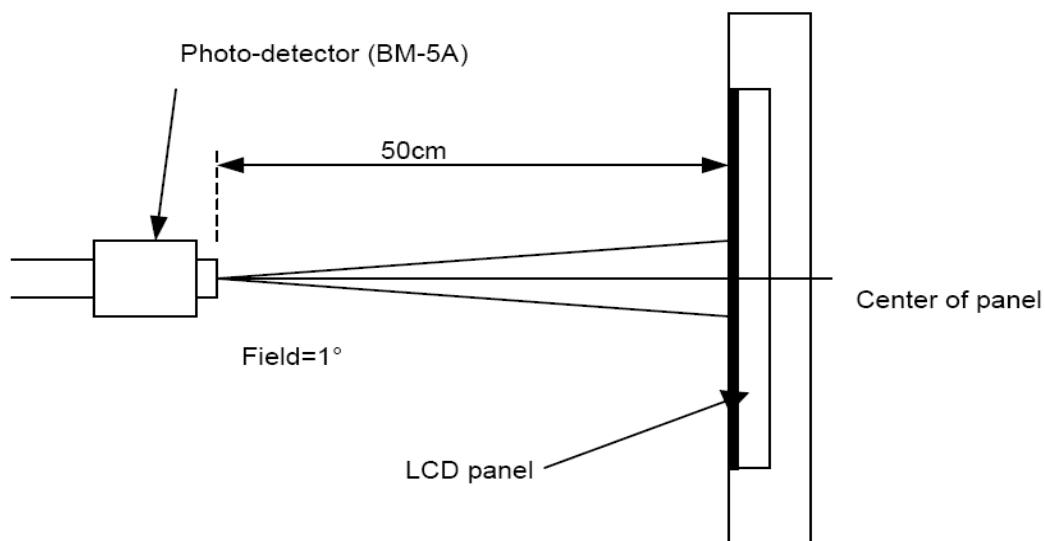
Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL =400mA. The LED lifetime could be decreased if operating IL is larger than 400mA.



### 9. Optical Characteristics

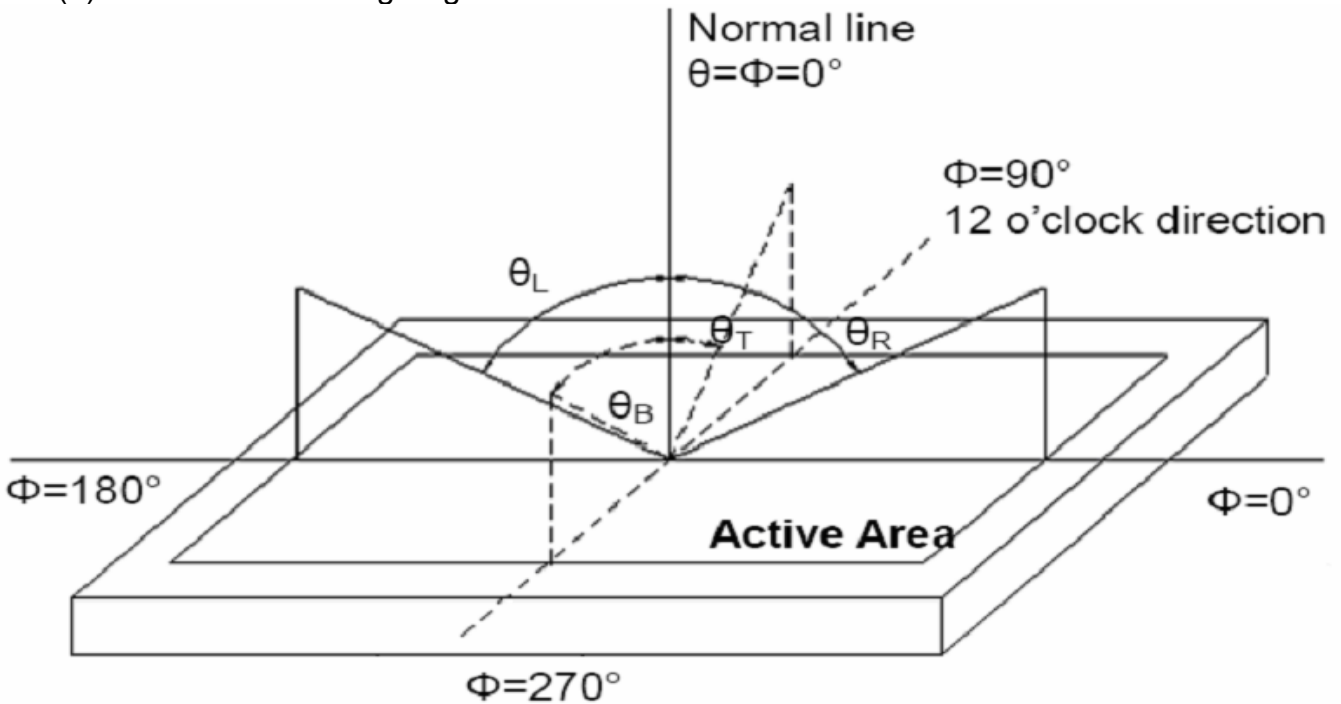
Item	Conditions	Min.	Typ.	Max.	Unit	Note	
Viewing Angle (CR>10)	Horizontal	$\theta_L$	-	75	-	degree	(1),(2),(6)
		$\theta_R$	-	75	-		
	Vertical	$\theta_T$	-	70	-		
		$\theta_B$	-	75	-		
Center Luminance of White	Lc	350	400	-	cd/m <sup>2</sup>		
Contrast Ratio	Center	500	600	-	-	(1),(3),(6)	
Response Time	Rising	-	10	20	ms	(1),(4),(6)	
	Falling	-	20	30			
CF Color Chromaticity (CIE1931)	Red x	Typ. -0.05	TBD	Typ. +0.05	-	(1), (6)	
	Red y		TBD		-		
	Green x		TBD		-		
	Green y		TBD		-		
	Blue x		TBD		-		
	Blue y		TBD		-		
	White x		TBD		-		
	White y		TBD		-		

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



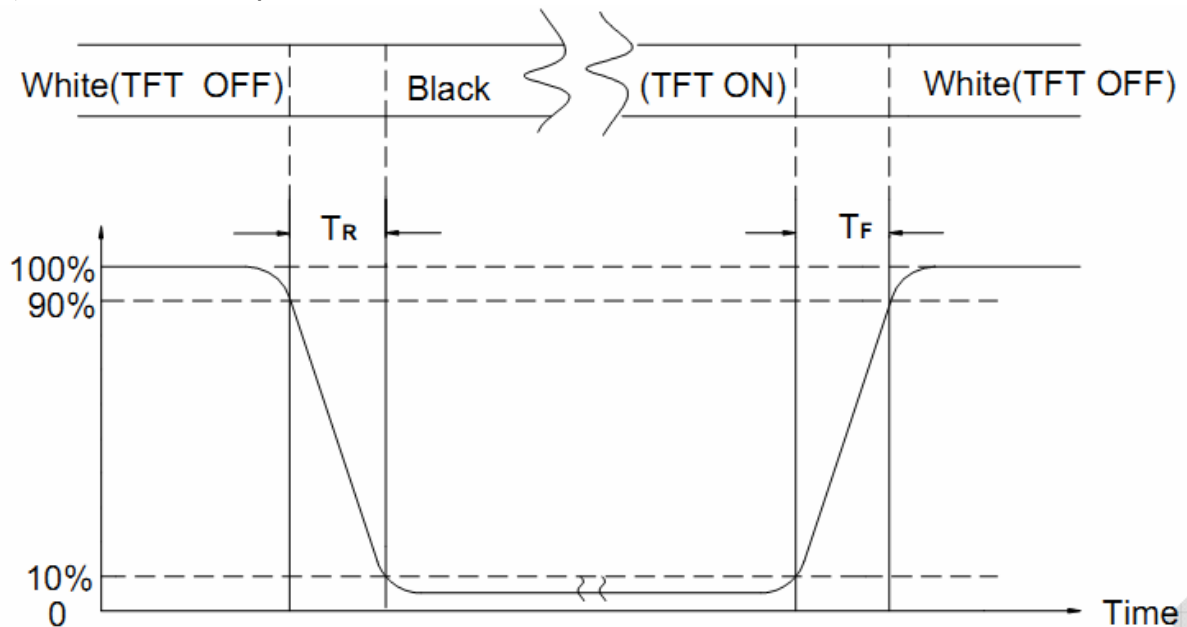
Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

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)

$$\text{Transmittance} = \text{Center Luminance of LCD} / \text{Center Luminance of Back Light} \times 100\%$$

Note (6) Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD



**10. Reliability Test Conditions and Methods**

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	80°C±2°C×96Hours	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.
②	Low Temperature Storage	-30°C±2°C×96Hours	
③	High Temperature Operating	70°C±2°C×96Hours	
④	Low Temperature Operating	-20°C±2°C×96Hours	
⑤	Temperature Cycle(Storage)	-30°C ↔ 25°C ↔ 80°C (30min) (5min) (30min) 1cycle Total 10cycle	
⑥	Damp Proof Test (Storage)	50°C±5°C×90%RH×96Hours	

**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, 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.
- 5, Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.





**11. Inspection Standard**

11.1. QUALITY :

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

11.1.1. THE METHOD OF PRESERVING GOODS

AFTER DELIVERY OF GOODS FROM AMSON TO PURCHASER. PURCHASER SHALL CONTROL THE LCM AT -10 °C TO 40°C ,AND IT MIGHT BE DESIRABLE TO KEEP AT THE NORMAL ROOM TEMPERATURE AND HUMIDITY UNTIL INCOMING INSPECTION OR THROWING INTO PROCESS LINE.

11.1.2. INCOMING INSPECTION

(A) THE METHOD OF INSPECTION

IF PURCHASER MAKE AN INCOMING INSPECTION , A SAMPLING PLAN SHALL BE APPLIED ON THE CONDITION THAT QUALITY OF ONE DELIVERY SHALL BE REGARDED AS ONE LOT.

(B) THE STANDARD OF QUALITY

ISO-2859-1 (SAME AS MIL-STD-105E) , LEVEL II SINGLE PLAN.

CLASS	AQL(%)
CRITICAL	0.4 %
MAJOR	0.65 %
MINOR	1.5 %
TOTAL	1.5 %

EVERY ITEM SHALL BE INSPECTED ACCORDING TO THE CLASS.

(C) MEASURE

IF AS THE RESULT OF ABOVE RECEIVING INSPECTION , A LOT OUT IS DISCOVERED. PURCHASER SHALL BE INFORM SELLER OF IT WITHIN SEVEN DAYS. BUT FIRST SHIPMENT WITHIN FOURTEEN DAYS.

11.1.3. WARRANTY POLICY

AMSON WILL PROVIDE ONE-YEAR WARRANTY FOR THE PRODUCTS ONLY IF UNDER SPECIFICATION OPERATING CONDITIONS. AMSON WILL REPLACE NEW PRODUCTS FOR THESE DEFECT PRODUCTS WHICH UNDER WARRANTY PERIOD AND BELONG TO THE RESPONSIBILITY OF AMSON.

11.2. CHECKING CONDITION

11.2.1.CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.

11.2.2.CHECKER SHALL SEE OVER 300±25 mm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.



### 11.3. INSPECTION PLAN :

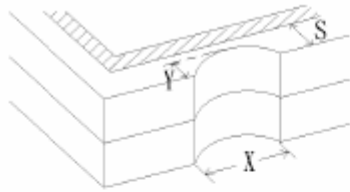
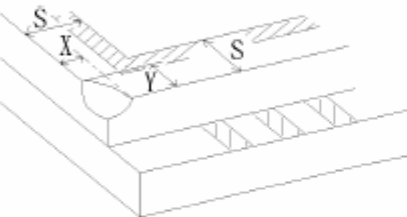
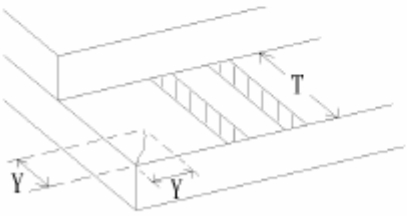
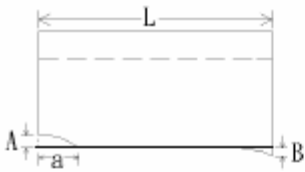
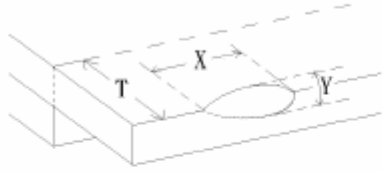
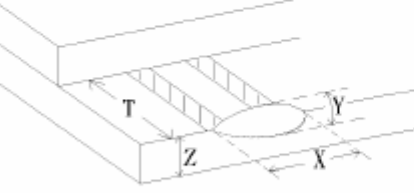
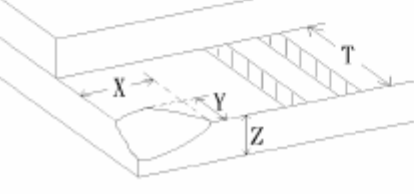
CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED.....REJECTED QUANTITY SHORT OR OVER.....REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE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



## 11.4. STANDARD OF VISUAL INSPECTION

NO.	CLASS	ITEM	JUDGEMENT																				
11.4.1	MINOR	BLACK AND WHITE SPOT FOREIGN MATERIEL DUST IN THE CELL BLEMISH SCRATCH	<p>(A) ROUND TYPE: <span style="float:right">unit : mm.</span></p> <table border="1"> <thead> <tr> <th>DIAMETER (mm.)</th> <th>ACCEPTABLE Q'TY</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.2</math></td> <td>DISREGARD</td> </tr> <tr> <td><math>0.2 &lt; \Phi \leq 0.4</math></td> <td>3 (Distance&gt;5mm)</td> </tr> <tr> <td><math>0.4 &lt; \Phi</math></td> <td>0</td> </tr> </tbody> </table> <p>NOTE: <math>\Phi = (\text{LENGTH} + \text{WIDTH}) / 2</math></p> <p>(B) LINEAR TYPE: <span style="float:right">unit : mm.</span></p> <table border="1"> <thead> <tr> <th>LENGTH</th> <th>WIDTH</th> <th>ACCEPTABLE Q'TY</th> </tr> </thead> <tbody> <tr> <td>-----</td> <td><math>W \leq 0.05</math></td> <td>DISREGARD</td> </tr> <tr> <td><math>L \leq 5.0</math></td> <td><math>0.05 &lt; W \leq 0.08</math></td> <td>3 (Distance&gt;5mm)</td> </tr> <tr> <td>-----</td> <td><math>0.08 &lt; W</math></td> <td>FOLLOW ROUND TYPE</td> </tr> </tbody> </table>	DIAMETER (mm.)	ACCEPTABLE Q'TY	$\Phi \leq 0.2$	DISREGARD	$0.2 < \Phi \leq 0.4$	3 (Distance>5mm)	$0.4 < \Phi$	0	LENGTH	WIDTH	ACCEPTABLE Q'TY	-----	$W \leq 0.05$	DISREGARD	$L \leq 5.0$	$0.05 < W \leq 0.08$	3 (Distance>5mm)	-----	$0.08 < W$	FOLLOW ROUND TYPE
DIAMETER (mm.)	ACCEPTABLE Q'TY																						
$\Phi \leq 0.2$	DISREGARD																						
$0.2 < \Phi \leq 0.4$	3 (Distance>5mm)																						
$0.4 < \Phi$	0																						
LENGTH	WIDTH	ACCEPTABLE Q'TY																					
-----	$W \leq 0.05$	DISREGARD																					
$L \leq 5.0$	$0.05 < W \leq 0.08$	3 (Distance>5mm)																					
-----	$0.08 < W$	FOLLOW ROUND TYPE																					
11.4.2	MINOR	BUBBLE IN POLARIZER DENT ON POLARIZER	<p style="text-align:right">unit : mm.</p> <table border="1"> <thead> <tr> <th>DIAMETER</th> <th>ACCEPTABLE Q'TY</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.3</math></td> <td>DISREGARD</td> </tr> <tr> <td><math>0.3 &lt; \Phi \leq 0.6</math></td> <td>3 (Distance&gt;7mm)</td> </tr> <tr> <td><math>0.6 &lt; \Phi</math></td> <td>0</td> </tr> </tbody> </table> <p style="text-align:center">x</p>	DIAMETER	ACCEPTABLE Q'TY	$\Phi \leq 0.3$	DISREGARD	$0.3 < \Phi \leq 0.6$	3 (Distance>7mm)	$0.6 < \Phi$	0												
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11.4.3	MINOR	Dot Defect	<table border="1"> <thead> <tr> <th>Items</th> <th>ACC. Q'TY</th> </tr> </thead> <tbody> <tr> <td>Bright dot</td> <td><math>N \leq 5</math></td> </tr> <tr> <td>Dark dot</td> <td><math>N \leq 5</math></td> </tr> </tbody> </table> <p>Pixel Define :</p> <p>Note 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.</p> <p>Note 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.</p> <p>Note 3: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green ,blue pattern.</p>	Items	ACC. Q'TY	Bright dot	$N \leq 5$	Dark dot	$N \leq 5$														
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Bright dot	$N \leq 5$																						
Dark dot	$N \leq 5$																						



NO.	CLASS	ITEM	JUDGEMENT
11.4.4	MINOR	LCD GLASS CHIPPING	 $Y > S$ Reject
11.4.5	MINOR	LCD GLASS CHIPPING	 $X \text{ or } Y > S$ Reject
11.4.6	MAJOR	LCD GLASS GLASS CRACK	 $Y > (1/2) T$ Reject
11.4.7	MAJOR	LCD GLASS SCRIBE DEFECT	 <ol style="list-style-type: none"> <li><math>a &gt; L/3</math>, <math>A &gt; 1.5\text{mm}</math>. Reject</li> <li>B : ACCORDING TO DIMENSION</li> </ol>
11.4.8	MINOR	LCD GLASS CHIPPING ( ON THE TERMINAL AREA )	 $\Phi = (x+y)/2 > 2.5 \text{ mm}$ Reject
11.4.9	MINOR	LCD GLASS CHIPPING ( ON THE TERMINAL SURFACE )	 $Y > (1/3) T$ Reject
11.4.10	MINOR	LCD GLASS CHIPPING	 $Y > T$ Reject



## 12. Handling Precautions

### 12.1 Mounting method

The LCD panel of Kingtech TFT module consists of two thin glass plates with polarizers which easily be damaged. And since the module is 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 happens 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 uses C-MOS LSI drivers, so we recommend 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 than the limit causes 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 than the operating temperature range and on the other hand at higher temperature LCD's show 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 Kingtech 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