



# 深圳市勋瑞光电科技有限公司

Xunrui photoelectric technology (shenzhen) CO.,LTD.



CERT. No. QAC0946535  
(ISO9001)



CERT. No. HKG002005  
(ISO14001)

## Product Specification

**Customer:** \_\_\_\_\_

**Model Name:**                     **H101IWS50E 3501**                    

**Date:** \_\_\_\_\_

**Version:** \_\_\_\_\_

Preliminary Specification

Final Specification

### For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by





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## 1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied

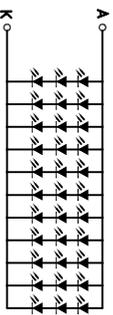
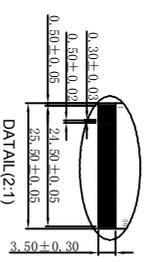
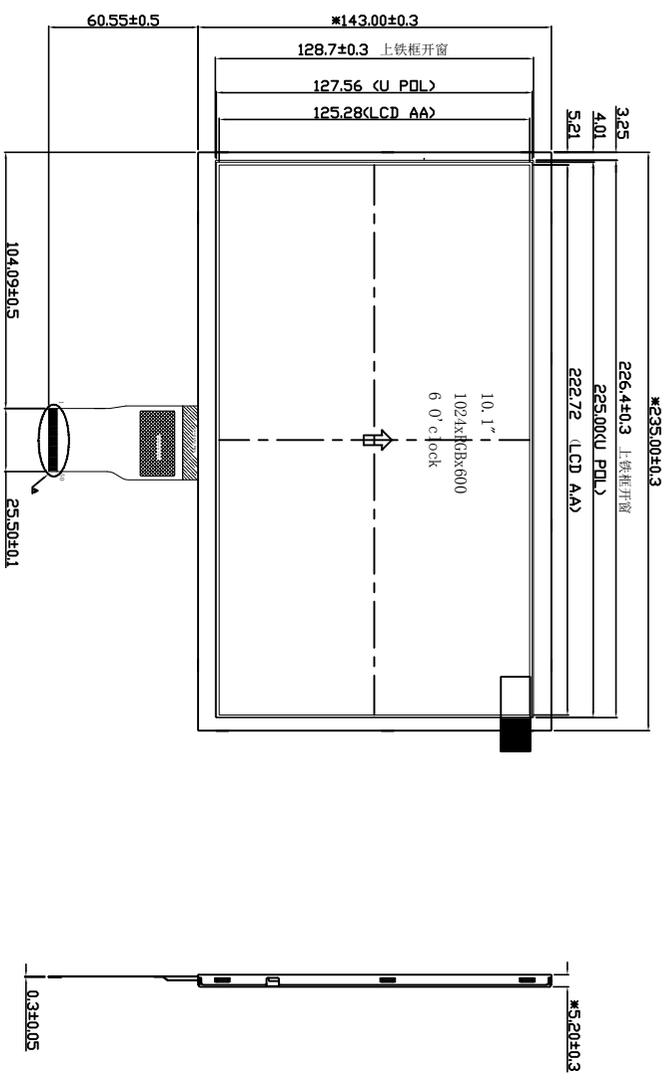
If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution

## 2. General Information

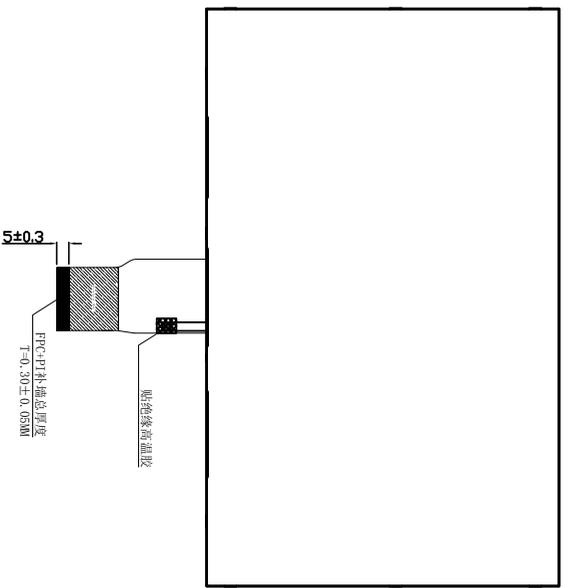
ITEM	STANDARD VALUES	UNITS
LCD type	10.1" TFT	--
Dot arrangement	1024×3 (RGB)×600	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally White	--
Viewing Direction	6 O' Clock	--
Module size	235(W)×143(H)×5.2(T)	mm
Active area	222.72(W)×125.28(H)	mm
Dot pitch	0.2175(W)×0.2088(H)	mm
Interface	RGB Interface	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Module Weight	--	g

## 3. External Dimensions

REV.	DATE	MODIFICATION
V0	2021.08.29	Final Issue



BL CIRCUIT DIAGRAM  
9.6V (TYP), 220mA



PIN	ASSIGN
1	LED
2	LED
3	LED
4	LED
5	GND
6	VCC
7	D0/D1
8	M0/D0
9	HE
10	VS
11	HS
12	H7
13	H6
14	H5
15	H4
16	H3
17	H2
18	H1
19	B0
20	G7
21	G6
22	G5
23	G4
24	G3
25	G2
26	G1
27	G0
28	H7
29	H6
30	H5
31	H4
32	H3
33	H2
34	H1
35	B0
36	CN
37	NC
38	CN
39	L/I
40	V/A
41	V/A
42	V/A
43	V/A
44	RES
45	NC
46	VDD
47	D11
48	CN
49	NC
50	NC

深圳市勋瑞光电科技有限公司

MODEL NAME: TFT Display Module  
PART NO.: H1011MS50E3501

INTERFACE	RGB Interface PPC Connector
VIEWING DIRECTION	6' o'clock
Gray Scale DIRECTION	12' o'clock
PROJECTION	3RD ANGLE
TOLERANCE UNLESS SPECIFIED	±0.
SCALE	1:1

- NOTES:
1. DISPLAY TYPE: 10.1 INCH TFT /Baik
  2. BACKLIGHT: 33 CHIP WHITE LED, IN PARALLEL
  3. OPERATING TEMP: -10°C~+50°C
  4. STORAGE TEMP: -20°C~+60°C
  5. RESOLUTION: 1024\*RGB\*600
  6. LCD IC: Source IC: EK79001HM +Gate IC: EK73215BCGA
  7. Luminous intensity (9 AVG): 350cd/ m<sup>2</sup> (Typ)
  8. (\*) Reference dimension. \*\* \* critical dimension
  9. RoHS Compliant



#### 4. Interface Description

No.	Symbol	I/O	Function
1~2	LEDA	P	LED Anode
3~4	LEDK	P	LED Cathode
5	GND	P	Ground
6	VCOM(NC)	P	Common voltage
7	DVDD	P	Digital power
8	MODE	I	DE/SYNC mode select MODE=H: DE mode( normally pull high) MODE=L: HSD/VSD mode
9	DE	I	Data enable signal
10	VS	I	Vertical sync input.Negative polarity
11	HS	I	Horizontal sync input.Negative polarity
12~19	B7~B0	I	Blue data Input
20~27	G7~G0	I	Green data Input
28~35	R7~R0	I	Red data Input
36	GND	P	Ground
37	DCLK	I	Clock input
38	GND	P	Ground
39	L/R	I	Source right or left sequence control SHLR=H: right shift, Left → Right(Default) SHLR=L: left right, Right → Left
40	U/D	I	Gate up or down scan control UPDN=H: up shift, Down → Up UPDN=L: down shift, Up → Down(Default)
41	VGH	P	Positive power for TFT
42	VGL	P	Negative power for TFT
43	AVDD	P	Power for Analog Circuit
44	RESET	I	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=10K , C=1μF)
45	NC	-	Not connect
46	VCOM(NC)	P	Common voltage
47	DITHB	I	Dithering function
48	GND	P	Ground
49~50	NC	-	Not connect

I : input , O : output , P : Power



## 5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Digital Supply Voltage	DVDD	-0.3	4.8	V
Analog Supply Voltage	AVDD	6.5	13.5	V
Gate On Voltage	VGH	-0.3	40.0	V
Gate Off Voltage	VGL	-20.0	0.3	V
Gate On- Gate Off Voltage	VGH-VGL	-	40.0	V
Operating Temperature	T <sub>OP</sub>	-20	70	°C
Storage Temperature	T <sub>ST</sub>	-30	80	°C
Storage Humidity	HD	20	90	%RH

## 6. DC Characteristics

### Operating Conditions

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Digital Supply Voltage	DVDD	3.0	3.3	3.6	V	-
Analog Supply Voltage	AVDD	9.0	9.7	11.0	V	-
Gate On Voltage	VGH	-	17.0	-	V	-
Gate Off Voltage	VGL	-	-10	-	V	-
Common Voltage	VCOM	3.3	3.65	4.1	V	-
Logic Input Voltage	V <sub>IH</sub>	0.7DVDD	-	DVDD	V	-
	V <sub>IL</sub>	GND	-	0.3DVDD	V	-

**NOTE1: VCOM** 电压根据客户主板实际效果而定



## 7. Timing Characteristics

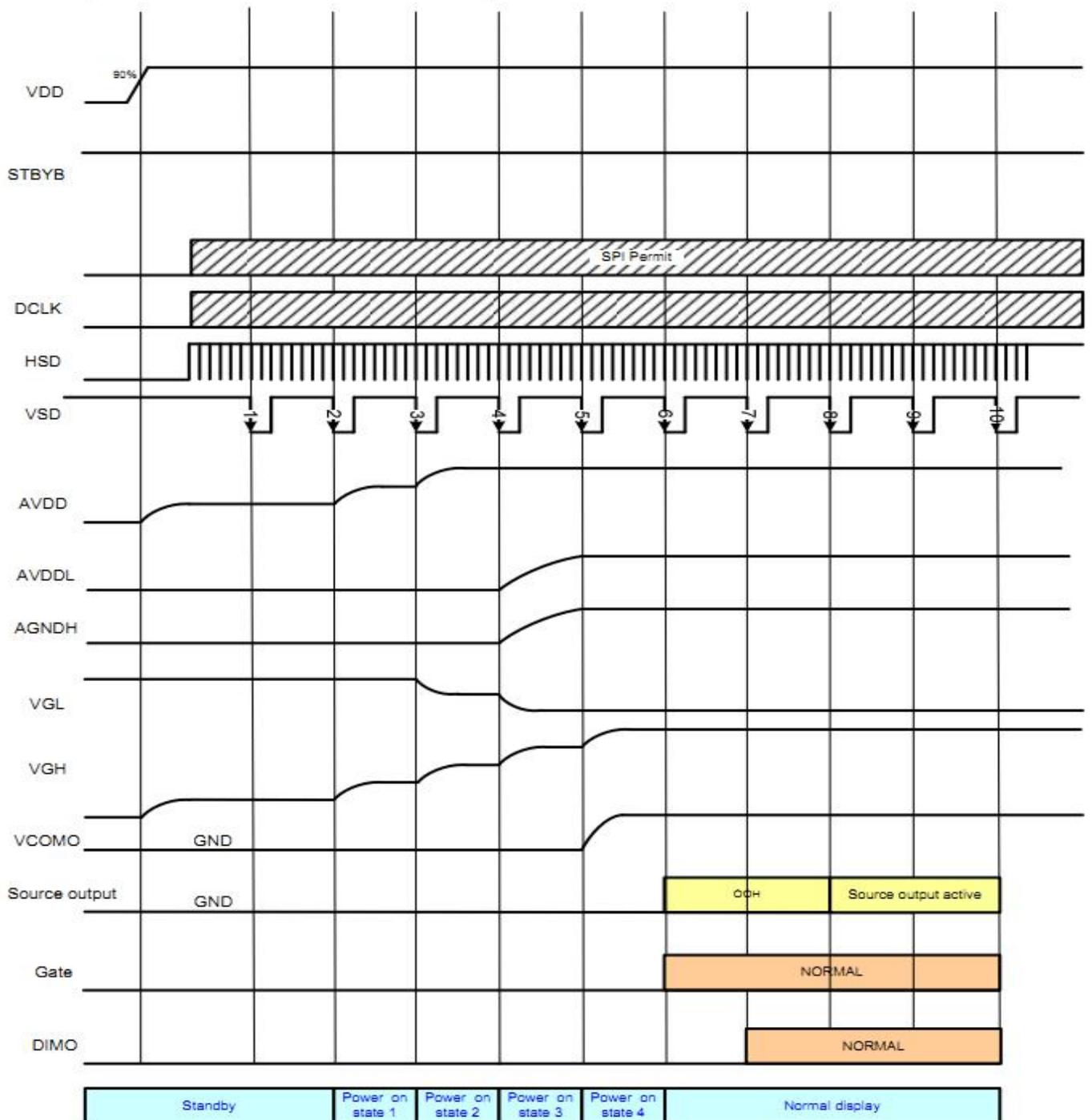
### 7.1 POWER ON/OFF SEQUENCE

To prevent the device damage from latch up, the power on/off sequence shown below must be followed.

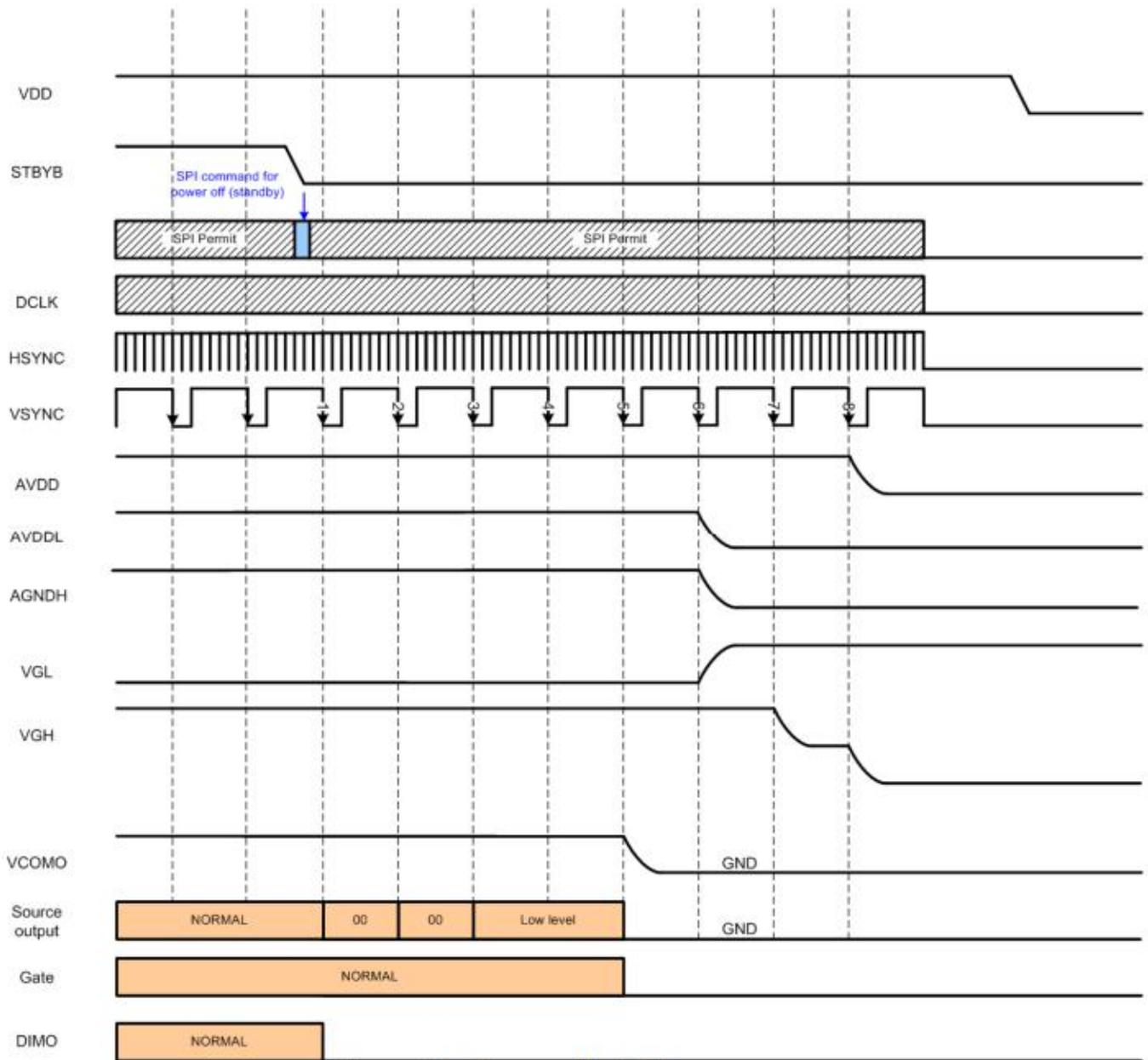
Power on: VDD, GND \_ AVDD, AGND \_ V1 to V14

Power off: V1 to V14 \_ AVDD, AGND\_ VDD, GND

### Power on/off control



Power on timing sequence



**Power off timing sequence**



## 7.2 INPUT SIGNAL TIMING

### 7.2.1 DC electrical characteristics

#### TTL mode DC electrical characteristics

(VDD=3.0~3.6V, AVDD=6.5~13.5V, GND=AGND=0V, TA=-20°C~+85°C)

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Power supply voltage	VDD	3.0	-	3.6	V	-
Power supply voltage	AVDD	6.5	-	13.5	V	-
Power supply voltage	AVDDL	6.5	-	13.5	V	Full range application
		-	V8+0.1	-	V	Half AVDD application
Power supply voltage	AGNDH	0			V	Full range application
		-	V7-0.1	-	V	Half AVDD application
AVDD regulate output	AVDDG	8.9	9	9.1	V	AVDD=10V, VDD=3.3V, with Resistor loading $\geq 30K$ Ohm, and Capacitor loading $\geq 4.7\mu F$
Low level input voltage	V <sub>IL</sub>	0	-	0.3VDD	V	For digital circuit
High level input voltage	V <sub>IH</sub>	0.7VDD	-	VDD	V	For digital circuit
Output low voltage	V <sub>OL</sub>	-	-	GND+0.4	V	I <sub>OL</sub> =400 $\mu$ A
Output high voltage	V <sub>OH</sub>	VDD-0.4	-	-	V	I <sub>OH</sub> =400 $\mu$ A
Pull low/high resistance	R <sub>i</sub>	200	250	300	k $\Omega$	For the digital input pin @VDD=3.3V
Input leakage current	I <sub>i</sub>	-	-	$\pm 1$	$\mu$ A	For digital circuit
Digital Operation current	I <sub>dd</sub>	-	12	20	mA	Fclk=50MHz, LD=48KHz, VDD=3.3V, No load
Digital stand-by current	I <sub>st1</sub>	-	10	50	$\mu$ A	Clock & all functions are stopped
Analog Operating current	I <sub>dda</sub>	-	8	10	mA	No load, Fclk=50MHz, LD=48KHz @ AVDD=10V, V1=8V, V14=0.4V
Analog Stand-by current	I <sub>st2</sub>	-	10	50	$\mu$ A	No load, clock & all functions are stopped
Input level of V1~V7	V <sub>ref1</sub>	0.4AVDD	-	AVDD-0.1	V	Gamma correction voltage input
Input level of V8~V14	V <sub>ref2</sub>	0.1	-	0.6AVDD	V	Gamma correction voltage input
Output Voltage deviation	V <sub>od1</sub>	-	$\pm 20$	$\pm 35$	mV	V <sub>o</sub> =AGND+0.1V~AGND+0.5V & V <sub>o</sub> =AVDD-0.5V~AVDD-0.1V
Output Voltage deviation	V <sub>od2</sub>	-	$\pm 15$	$\pm 20$	mV	V <sub>o</sub> =AGND+0.5V~AVDD-0.5V
Output Voltage Offset between Chips	V <sub>oc</sub>	-	-	$\pm 20$	mV	V <sub>o</sub> =AGND+0.5V~AVDD-0.5V
Dynamic Range of Output	V <sub>dr</sub>	0.1	-	AVDD-0.1	V	SO1~SO1200
Sinking Current of Outputs	I <sub>OLy</sub>	80	-	-	$\mu$ A	SO1~SO1200; V <sub>o</sub> =0.1V vs. 1.0V, AVDD=13.5V
Driving Current of Outputs	I <sub>OHy</sub>	80	-	-	$\mu$ A	SO1~SO1200; V <sub>o</sub> =0.1V vs. 12.5V, AVDD=13.5V
Resistance of Gamma Table	R <sub>g</sub>	0.7*R <sub>n</sub>	1.0*R <sub>n</sub>	1.3*R <sub>n</sub>	$\Omega$	R <sub>n</sub> : Internal gamma resistor



## 7.2.2AC ELECTRICAL CHARACTERISTICS

### LVDS mode AC electrical characteristics

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
VDD Power On Slew rate	$T_{POR}$	-	-	20	ms	From 0V to 90% VDD
GRB pulse width	$T_{GRB}$	50	-	-	$\mu$ s	-
DCLK cycle time	$T_{cph}$	14	-	-	ns	-
DCLK pulse duty	$T_{cwh}$	40	50	60	%	-
VSD setup time	$T_{vst}$	5	-	-	ns	-
VSD hold time	$T_{vhd}$	5	-	-	ns	-
HSD setup time	$T_{hst}$	5	-	-	ns	-
HSD hold time	$T_{hhd}$	5	-	-	ns	-
Data set-up time	$T_{dsu}$	5	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to DCLK
Data hold time	$T_{dhd}$	5	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to DCLK
DE setup time	$T_{esu}$	5	-	-	ns	-
DE hold time	$T_{ehd}$	5	-	-	ns	-
Output stable time	$T_{sst}$	-	-	6	$\mu$ s	10% to 90% target voltage. CL=90pF, R=10K ohm (Cascade) Dual gate
				3		

## 7.2.3TTL mode data input format

### Vertical timing

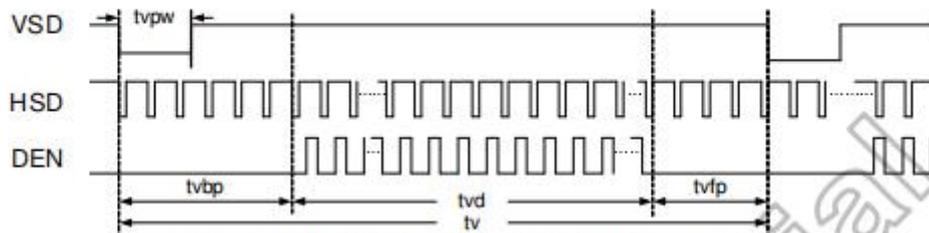
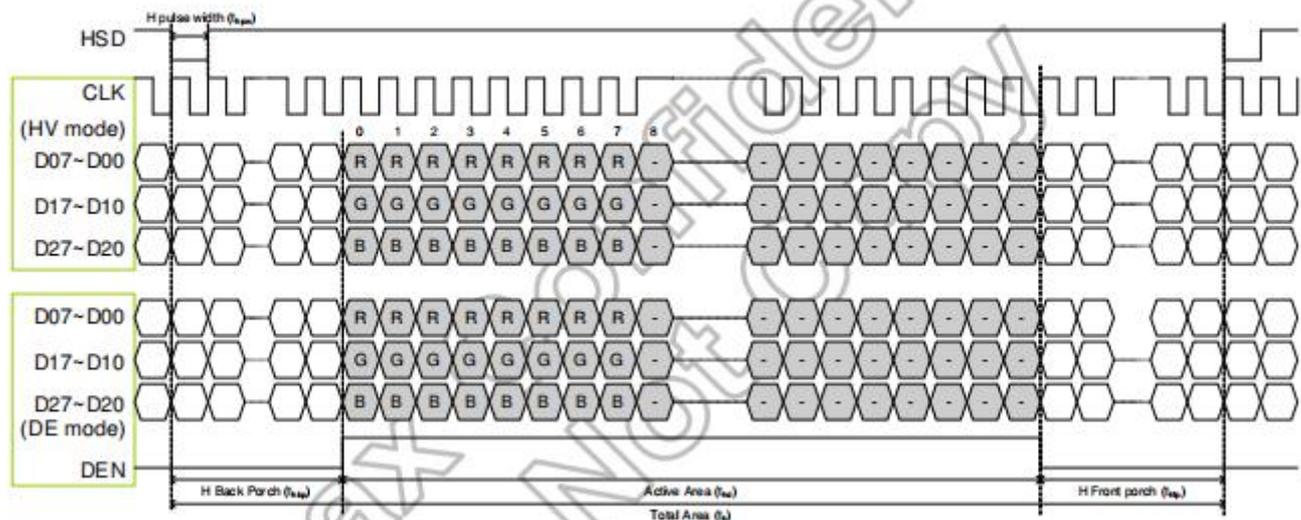


Figure 10.2: Vertical input timing diagram

### Horizontal timing





## 7.3 PARALLEL RGB INPUT TIMING TABLE

Resolution:1024x600

- DE mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	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	600			T <sub>H</sub>
VSD Period	tv	610	635	800	T <sub>H</sub>
VSD Blanking	tvbp+ tvfp	10	35	200	T <sub>H</sub>

- HV mode

### Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	44.9	51.2	63	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1	-	140	DCLK
HSD Back Porch	thbp	160			DCLK
HSD Front Porch	thfp	16	160	216	DCLK

### Vertical Timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd	600			T <sub>H</sub>
VSD Period	tv	624	635	750	T <sub>H</sub>
VSD Pulse Width	tvpw	1	-	20	T <sub>H</sub>
VSD Back Porch	tvbp	23			T <sub>H</sub>
VSD Front Porch	tvfp	1	12	127	T <sub>H</sub>



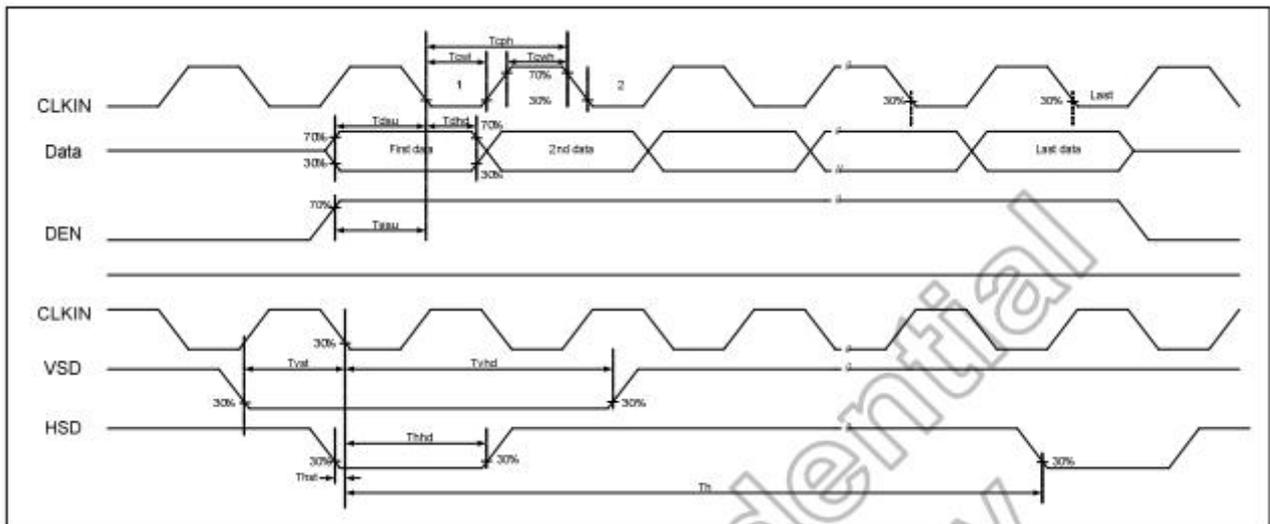
## 7.4 TIMING DIAGRAM

### Output Timing Table

Parallel 24-bit RGB mode

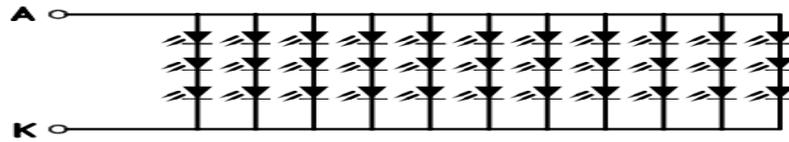
Parameter	Symbol	Spec.			Unit	Conditions
		Min.	Typ.	Max.		
CLKIN Frequency	Fclk	-	65	71	MHz	VDD=3.0V~3.6V
CLKIN Cycle Time	Tclk	14.1	15.4	-	ns	-
CLKIN Pulse Duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso	64			CLKIN	-
Time from HSD to LD	Thld	64			CLKIN	-
Time from HSD to STV	Thstv	2			CLKIN	-
Time from HSD to CKV	Thckv	20			CLKIN	-
Time from HSD to OEV	Thoev	4			CLKIN	-
LD Pulse Width	Twld	10			CLKIN	-
CKV Pulse Width	Twckv	66			CLKIN	-
OEV Pulse Width	Twoev	74			CLKIN	-

### Input Clock and Data Timing Diagram





## 8. Backlight Characteristics



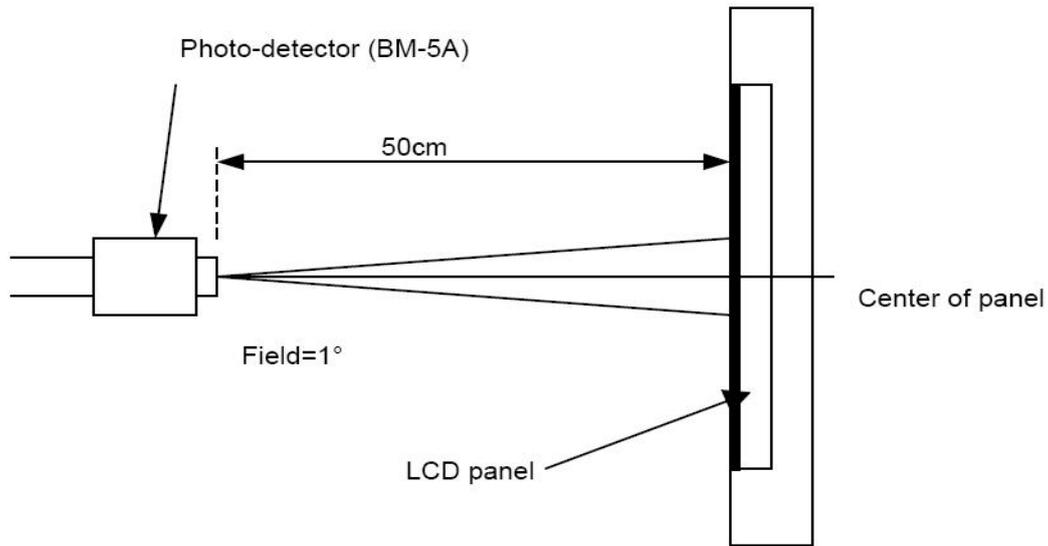
BL CIRCUIT DIAGRAM  
9. 6V (TYP) , 220mA

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	8.4	9.6	10.2	V	If=220mA
Supply Current	If	-	220	-	mA	If=220mA
Luminous Intensity for LCM	-	-	350	-	cd/m <sup>2</sup>	If=220mA
Uniformity for LCM	-	75	80	-	%	If=220mA
Life Time	-	20000	-	-	Hr	If=220mA

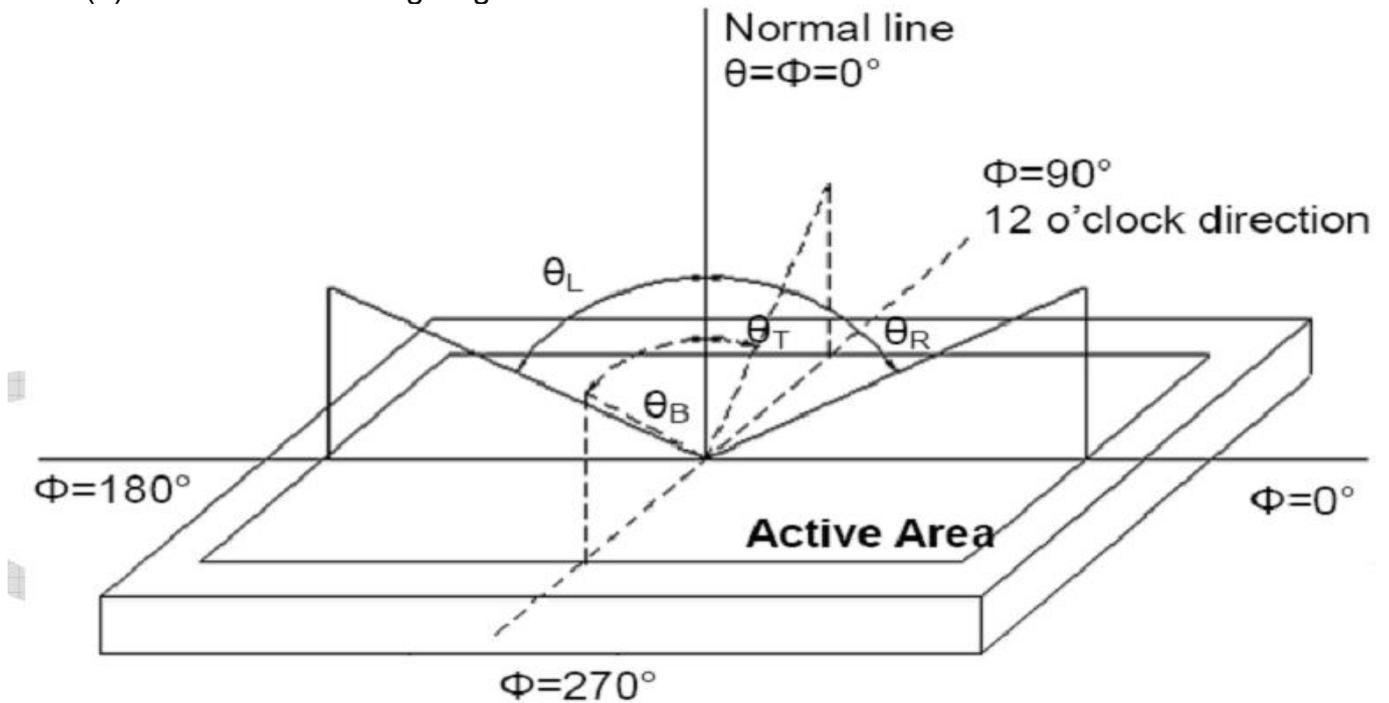
## 9. Optical Characteristics

Item	Conditions	Min.	Typ.	Max.	Unit	Note	
Viewing Angle (CR>10)	Horizontal	$\theta_L$	60	75	-	degree	(1),(2),(6)
		$\theta_R$	60	75	-		
	Vertical	$\theta_T$	55	70	-		
		$\theta_B$	45	70	-		
Contrast Ratio	Center	600	800	-	-	(1),(3),(6)	
Transmittance	Tr	5.0	5.5	-	%	Base on BLU Light Note (7))	
Response Time	Rising + Falling	25	35	-	ms	(1),(4),(6)	
CF Color Chromaticity (CIE1931)	Red x	Typ. -0.05	0.608	Typ. +0.05	-	(1), (6)	
	Red y		0.330		-		
	Green x		0.298		-		
	Green y		0.562		-		
	Blue x		0.145		-		
	Blue y		0.163		-		
	White x		0.304		-		
	White y		0.339		-		

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)

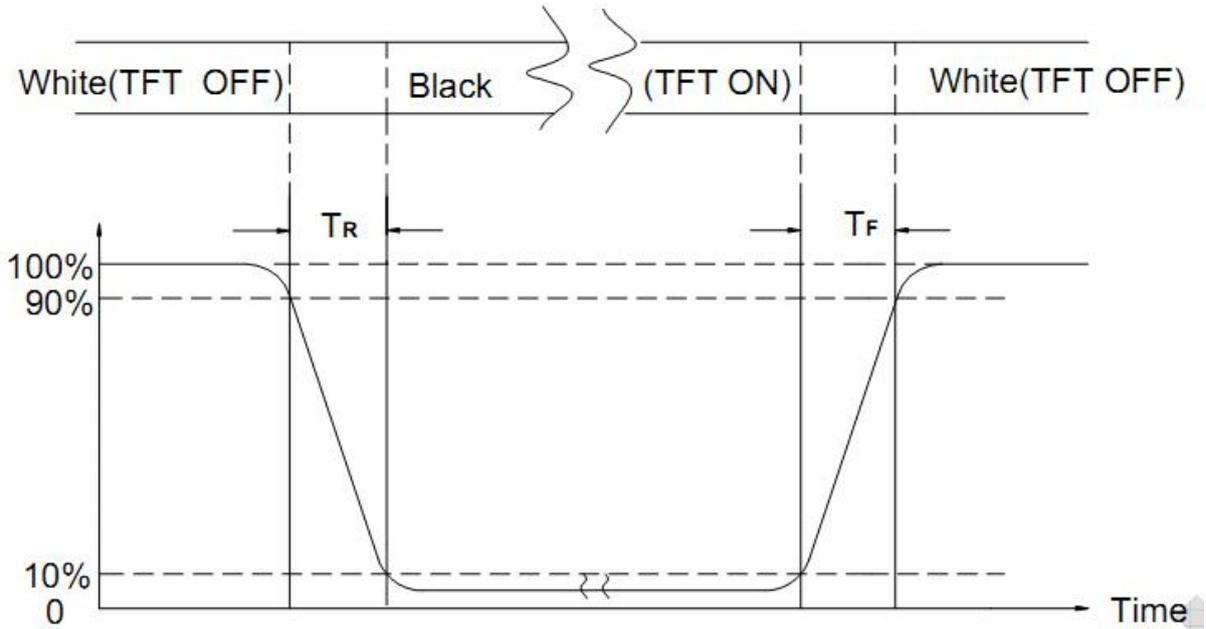
The contrast ratio can be calculated by the following expression

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

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)

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





## 11. Inspection Standard

### 11.1. QUALITY :

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

#### 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 YUXIANG TO PURCHASER. PURCHASER SHALL CONTROL THE LCM AT -10 TO 40 ,AND IT MIGHT BE DESIRABLE TO KEEP AT THE NORMAL ROOM TEMPERATURE AND HUMIDITY UNTIL INCOMING INSPECTION OR THROWING INTO PROCESS LINE.

#### 11.1.3. INCOMING INSPECTION

##### (A) THE METHOD OF INSPECTION

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

##### (B) THE STANDARD OF QUALITY

ISO-2859-1 (SAME AS MIL-STD-105E ) ,LEVEL:II

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

EVERY ITEM SHALL BE INSPECTED ACCORDING TO THE CLASS.

##### (C) MEASURE

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

#### 11.1.4. WARRANTY POLICY

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

## 11.2. CHECKING CONDITION

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

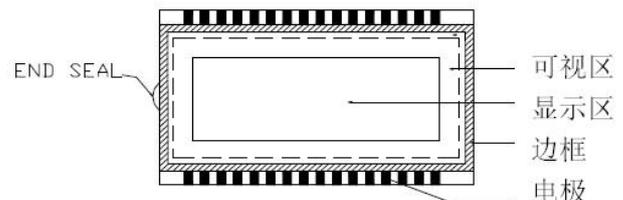
11.2.2. CHECKER SHALL SEE OVER 300±25 mm. WITH BARE EYES FAR FROM SAMPLE

11.2.3. Ambient Illumination:

0 ~30 Lux for functional inspection

500 ~ 1200 Lux for external appearance inspection.

11.2.4. TEST AREA:



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

11.2.6. The inspector may make a visual inspection or a comparative examination with a film



ruler and a magnifying eyepiece. Individual defects shall be determined according to the limited samples.

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

**11.2.8.** the ion fan should be used when testing.

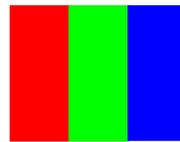
### **11.2.9. the principle of judgment**

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

11.3.2 Poor definition

Pixel:

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



**Dot:**

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



#### **Bright and dark dots:**

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

#### **Highlights:**

Usually considered to be shown on a black screen.

#### **Dark spots:**

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

#### **Neighborhood:**

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



11.3. INSPECTION PLAN :

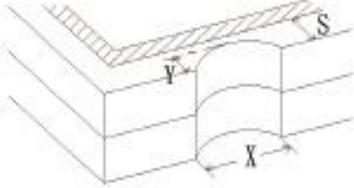
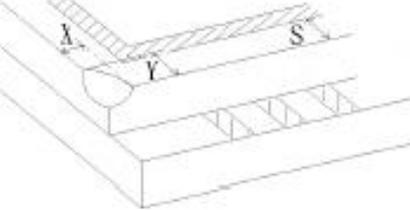
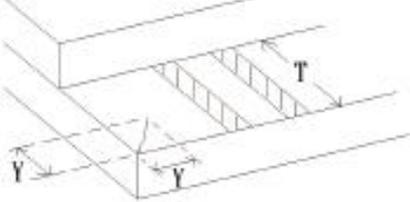
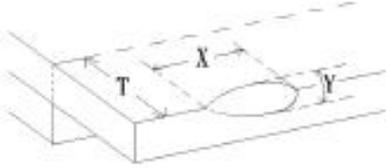
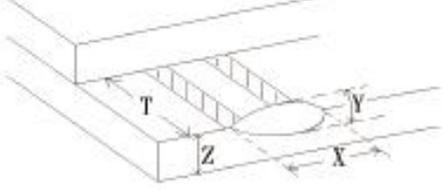
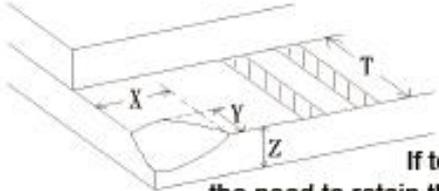
CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED.....REJECTED QUANTITY SHORT OR OVER.....REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE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



### 11.4. STANDARD OF VISUAL INSPECTION

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 0.15</math></td> <td>Distance&gt;1mm</td> </tr> <tr> <td><math>0.15 &lt; \Phi \leq 0.4</math></td> <td>3 (Distance&gt;15mm)</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 0.03</math></td> <td>Distance&gt;1mm</td> </tr> <tr> <td><math>L \leq 4.0</math></td> <td><math>0.03 &lt; W \leq 0.05</math></td> <td>3 (Distance&gt;15mm)</td> </tr> <tr> <td>-----</td> <td><math>0.05 &lt; W</math></td> <td>FOLLOW ROUND TYPE</td> </tr> </tbody> </table>	DIAMETER (mm.)	ACCEPTABLE Q'TY	$\Phi \leq 0.15$	Distance>1mm	$0.15 < \Phi \leq 0.4$	3 (Distance>15mm)	$0.4 < \Phi$	0	LENGTH	WIDTH	ACCEPTABLE Q'TY	-----	$W \leq 0.03$	Distance>1mm	$L \leq 4.0$	$0.03 < W \leq 0.05$	3 (Distance>15mm)	-----	$0.05 < W$	FOLLOW ROUND TYPE
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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 0.2</math></td> <td>Distance&gt;1mm</td> </tr> <tr> <td><math>0.2 &lt; \Phi \leq 0.5</math></td> <td>3 (Distance&gt;15mm)</td> </tr> <tr> <td><math>0.5 &lt; \Phi</math></td> <td>0</td> </tr> </tbody> </table>	DIAMETER	ACCEPTABLE Q'TY	$\Phi \leq 0.2$	Distance>1mm	$0.2 < \Phi \leq 0.5$	3 (Distance>15mm)	$0.5 < \Phi$	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 2</math> (Distance&gt;15mm)</td> </tr> <tr> <td>Dark dot</td> <td><math>N \leq 3</math> (Distance&gt;15mm)</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. Definition:&lt;1/2dot and visible by 5% ND filter <math>N \leq 5</math></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	$N \leq 2$ (Distance>15mm)	Dark dot	$N \leq 3$ (Distance>15mm)														
Items	ACC. Q'TY																						
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Dark dot	$N \leq 3$ (Distance>15mm)																						
11.4.4	MINOR	Mura	Not visible through 5% ND filter in 50% gray or judge by limit sample if necessary																				



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



## **12. Handling Precautions**

### **12.1 Mounting method**

TFT module consists of two thin glass plates with polarizes 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 directly 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 YUXIANG 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**