YEEBO Limited
CTP Specialist

SPECIFICATION
FOR
CTP MODULE

MODULE NO: YB-TG800480S28B-C-A

Doc.Version:00

Customer Approval:

☐ Accept ▫ Reject

YEEBO	NAME	SIGNATURE	DATE
Prepare	Mechanical Engineer		2019-03-27
Check	Electronic Engineer		2019-03-27
Verify			2019-03-28
Approval			2019/3/28

☐APPROVAL FOR SPECIFICATIONS ONLY

■ APPROVAL FOR SPECIFICATIONS AN SAMPLE

WIMRD005-02-C

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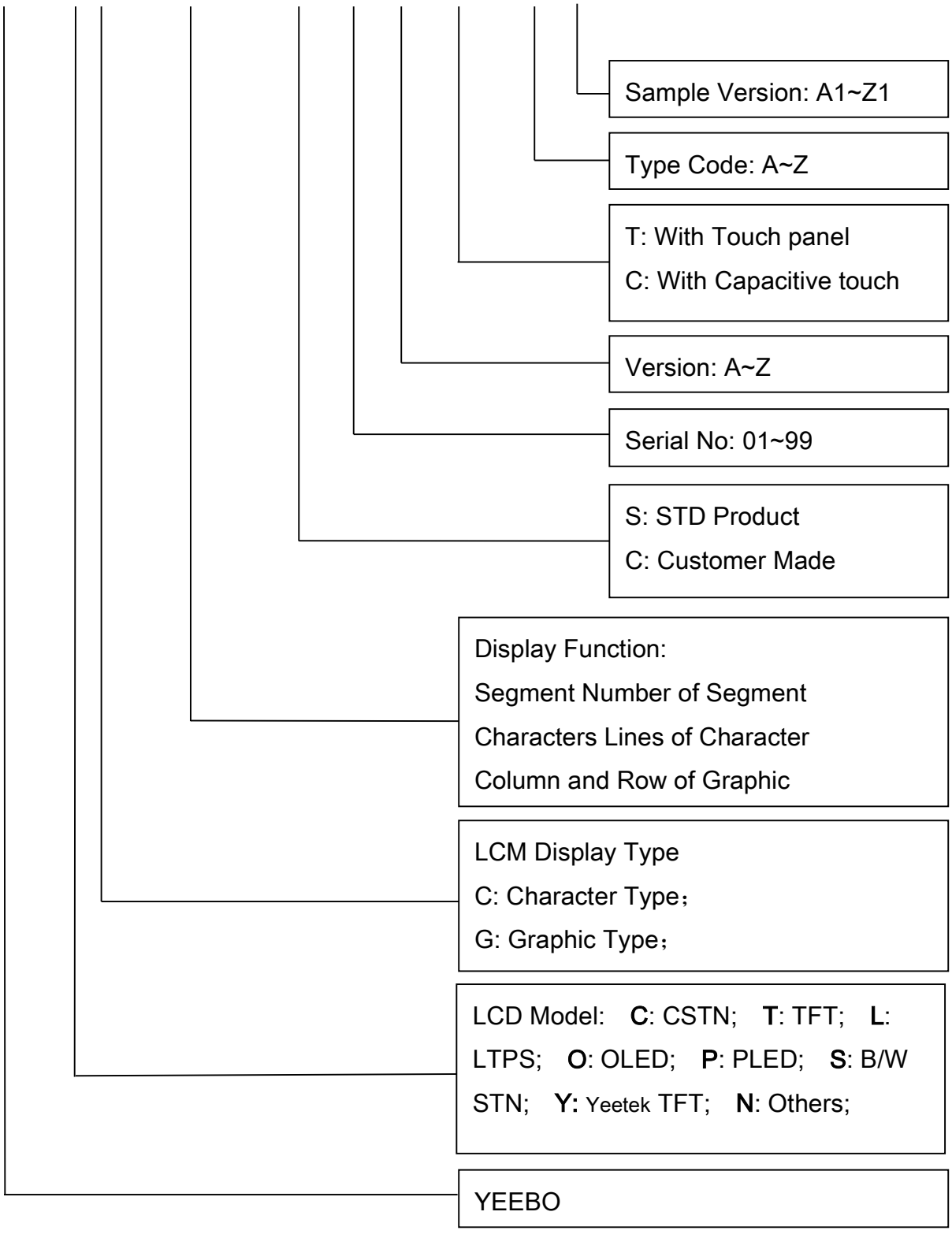
1. Revision History

Sample Version	DOC. Version	DATE	DESCRIPTION		CHANGED BY
A0	00	2019-03-27	FULL SPEC	The first time	zhouxiong

2. Table of Contents:

3. Module Numbering System:

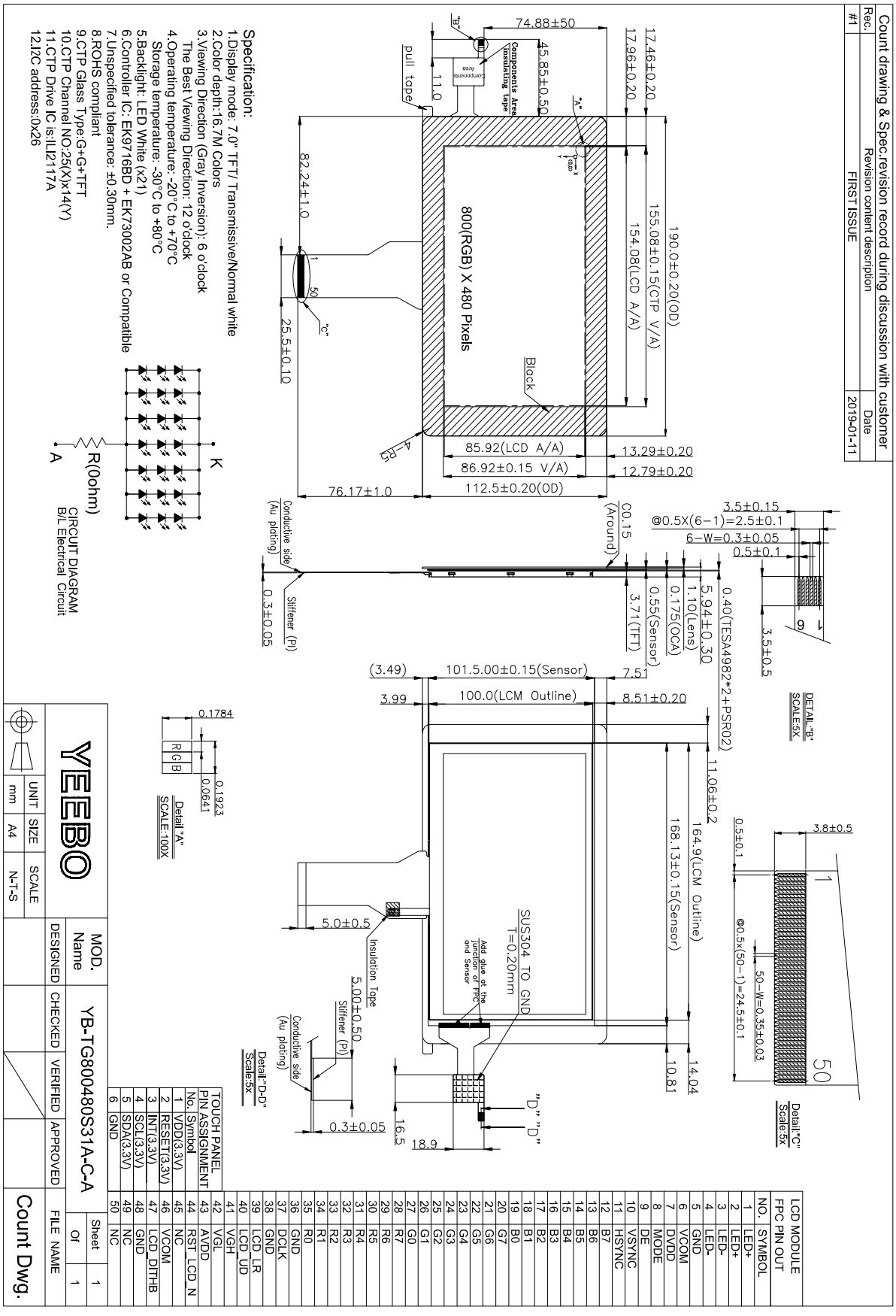
YB- TG 1204600 S 09 A -C – A A0



4. General Specification:

ITEM	CONTENTS
Module Size	190.00(W) * 112.50(H) * 5.94(T) mm
Display Size(Diagonal)	7inch
Display Format	800(RGB)* 480 Pixels
Pixel Pitch	0.1923 (H)mm*0.184(V) mm
LCD Type	TFT(16.7M Colors)/ Transmissive/Normal White
Active Area	154.08(W)*85.92(H)mm
View Angle (Gray Inversion)	6 O’clock
The Best Viewing Direction	12 O’clock
Drive IC	EK9716BD & EK73002AB or Compatible
CTP IC	ILI2117A
Weight(g)	≈211.57
Fireware	9037_20190320.bin
Test Configuration	autoSettings.ini

5. LCM drawing:



6. Electrical Characteristics

6-1 Absolute Maximum Ratings

TFT IC Parameter (EK9716BD &EK73002AB) **(Ta=25℃ VSS=0V)**

Item	Symbol	Min.	Type	Max.	Unit	Remark
Power Supply voltage	DVDD	-0.3		5.0	Volt	
	VDDA	-0.5	-	13.5	Volt	
	VGH	-0.3		42	Volt	
	VGL	VGG-42		-0.3	Volt	
	VGH-VGL	-0.3	-	40	Volt	DVDD =3.3V
Operating Temperature	Topr	-20	-	+70	℃	
Storage Temperature	Tstg	-30	-	+80	℃	

6-2 Operating Conditions

6-2-1 TFT IC Parameter (EK9716BD &EK73002AB) **(Ta=25℃)**

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply voltage	VDD	-	3.1	3.3	3.5	Volt
	AVDD	-	10.1	10.3	10.5	Volt
	VCOM	-	3.2	3.38	3.5	Volt
	VGH		17.8	18.0	18.2	Volt
	VGL	-	-7.8	-8.0	-8.2	Volt
Level Input Voltage (Digital signal)	VIH	-	0.7*VDD	-	VDD	Volt
	VIL	-	GND	-	0.3*VDD	Volt
	VOH	-	VDD-0.4	-	VDD	Volt
	VOL	-	GND	-	GND+0.4	Volt
Power Supply Current for LCM	DVDD_IDD	DVDD=3.3V	-	82.3	123.5	mA
	AVDD_IDD	AVDD=10.3V	-	10.2	15.3	mA

6-2-2 TP Operating Conditions (Ta=25℃)

Table 5-2: Power Supply

Item	Symbol	Min	Typ.	Max	Unit
System power supply voltage	VDD	2.8		3.3	V
Ambient operating temperature	T_A	-40		85	℃
Junction Temperature	T_J			125	℃

Table 5-3: DC Characteristics (T_{opr} = 25℃)

Item	Symbol	Min	Typ.	Max	Unit
Input Voltage, High 1	$(V_{IH1})^1$	1			V
Input Voltage, High 2	$(V_{IH2})^2$	1.3			V
Input Voltage, Low	(V_{IL})			0.5	V
Output Voltage, High 1	$(V_{OH1})^3$		See Note3		V
Output Voltage, High 2	$(V_{OH2})^4$	V_{VDD} - 0.1			V
Output Voltage, Low	(V_{OL})			0.1	V

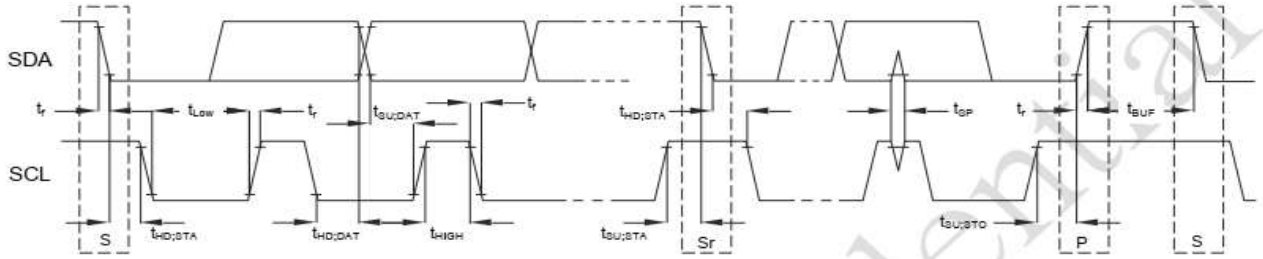
Specifications are subjected to change without notice.

Notes:

1. **V_{IH1} includes pins CHIP_EN, SDA, SCL, INT**
2. **V_{IH2} includes pin EXT_CLK**
3. **V_{OH1} is for INT output voltage level which is programmable by registers. Typical values are 1.2V/1.5V/1.8V/V_{VDD}.**
4. **V_{OH2} refers to other digital pins.**

6-3 Timing Characteristics

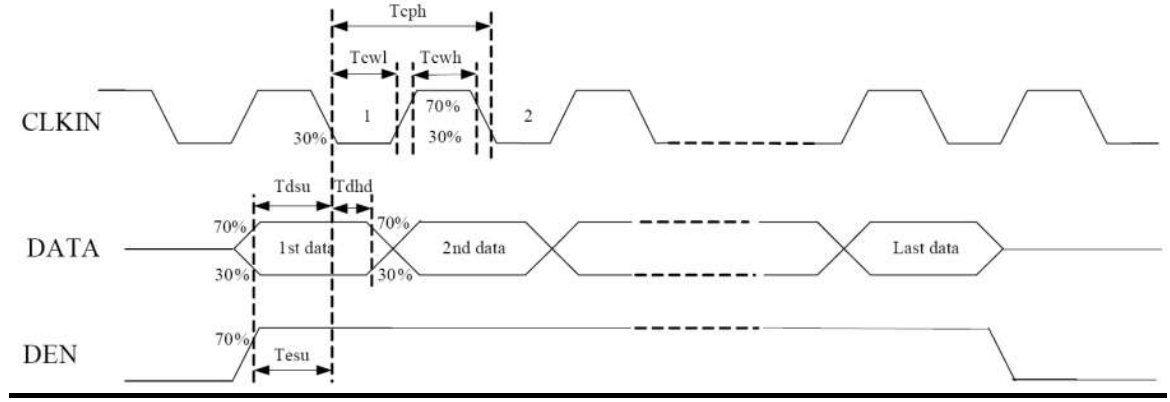
6-3-1 TP I²C interface



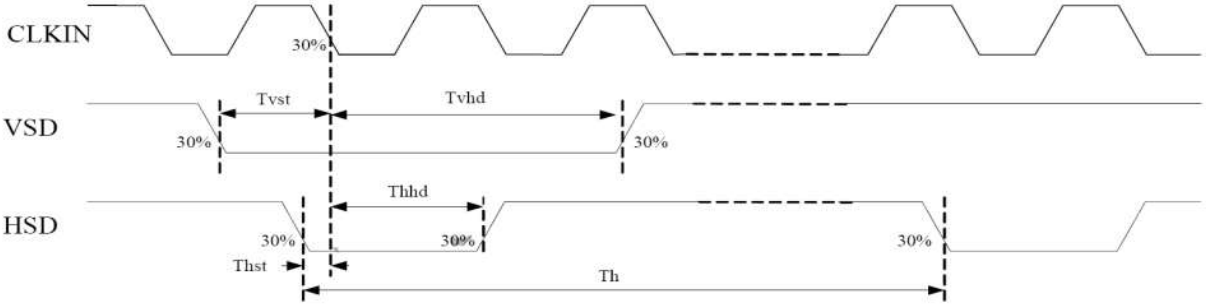
Symbol	Parameter	100KHz			400KHz		
		Min	Max	Unit	Min	Max	Unit
f_{SCL}	SCL clock frequency	0	100	kHz	0	400	KHz
$t_{HD;STA}$	Hold time (repeated) START condition. After this period, the first clock pulse is generated	4.0	–	μs	0.6	–	μs
t_{LOW}	LOW period of the SCL clock	4.7	–	μs	1.3	–	μs
t_{HIGH}	HIGH period of the SCL clock	4.0	–	μs	0.6	–	μs
$t_{SU;STA}$	Set-up time for a repeated START condition	4.7	–	μs	0.6	–	μs
$t_{HD;DAT}$	Data hold time	0	3.45	μs	0	0.9	μs
$t_{SU;DAT}$	Data set-up time	250	–	ns	100	–	ns
t_r	Rise time of both SDA and SCL signals	–	1000	ns	–	300	ns
t_f	Fall time of both SDA and SCL signals	–	300	ns	–	300	ns
$t_{SU;STO}$	Set-up time for STOP condition	4.0	–	μs	0.6	–	μs
t_{BUF}	Bus free time between a STOP and START condition	4.7	–	μs	1.3	–	μs

6-3-2 TFT Data Input Timing

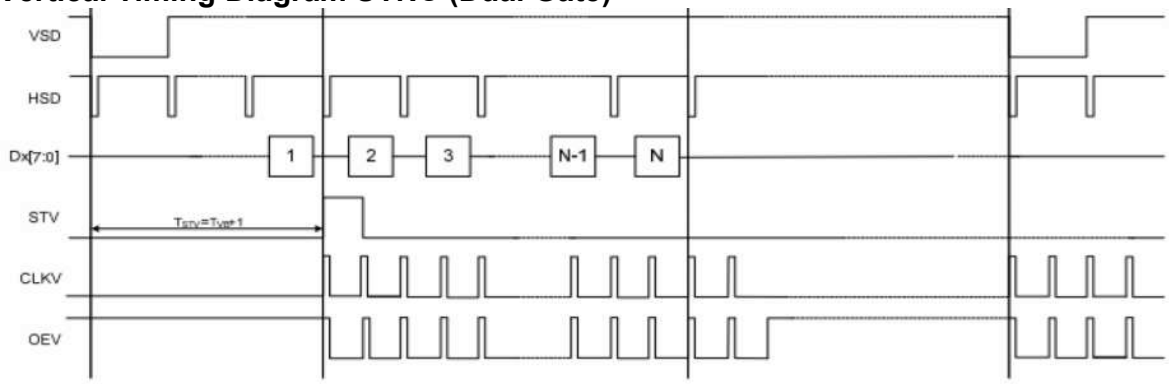
DE MODE (MODE=H)



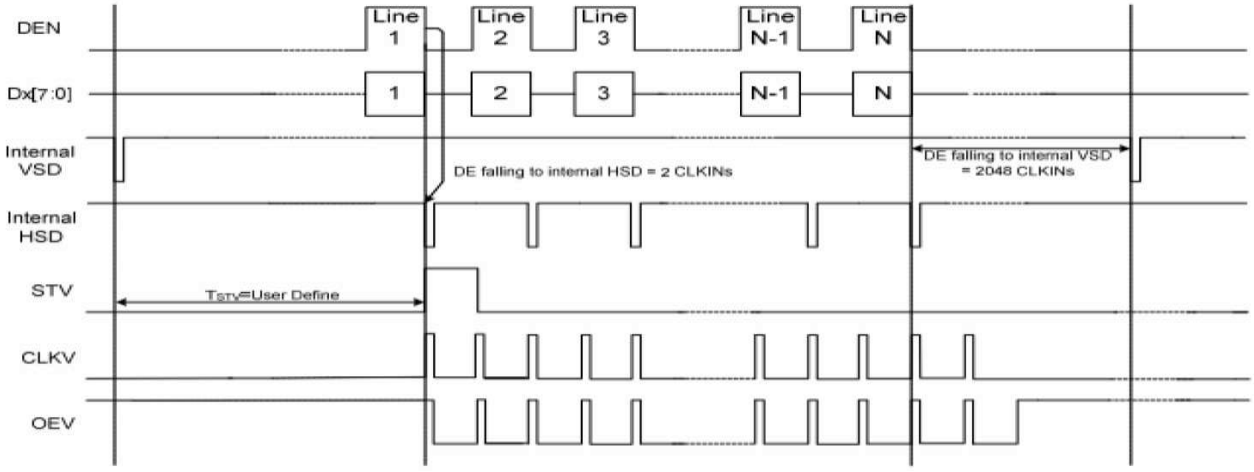
SYNC MODE(MODE=L)



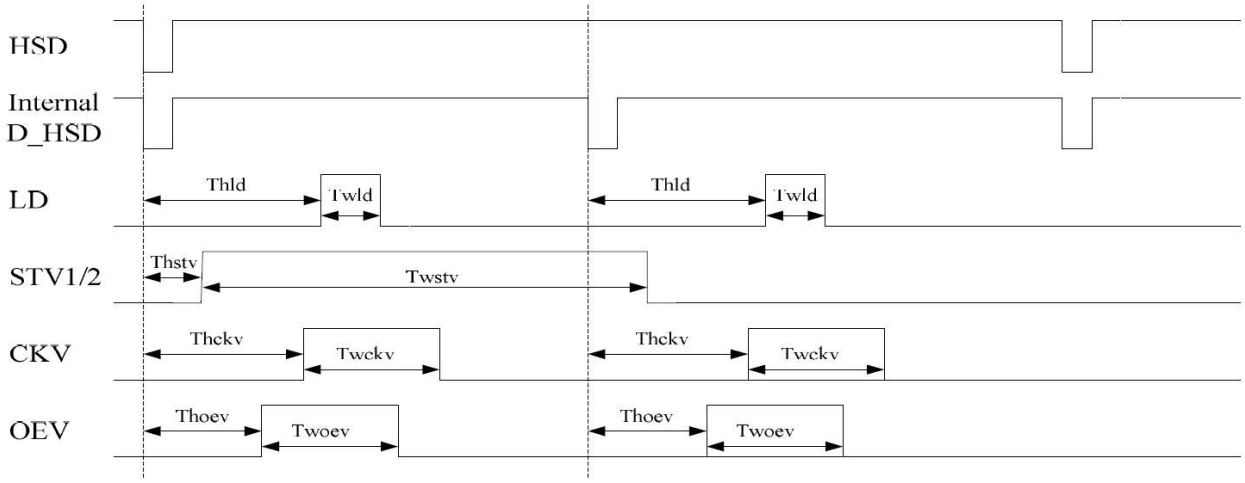
Vertical Timing Diagram SYNC (Dual Gate)



Vertical Timing Diagram DE (Dual Gate)



Gate output Timing Diagram (Dual Gate)



6-3-3 AC Electrical Characteristics (VDD =3.0~3.6V, VDDA=6.5~13.5V, AGND=DGND=0V, TA= -20~85≧)

Parameter	Symbol	Value			Unit	Note
Horizontal display area	thd	800			DCLK	
DCLK frequency	fclk	Min.	Typ.	Max		
		20	33.3	50	MHz	
1 Horizontal Line	th	908	928	1088	DCLK	thb+thpw=88 DCLK is fixed.
HSD pulse width	thpw	1	48	87		
HSD Back Porch (Blanking)	thb	87	40	1		
HSD Front Porch	thfp	20	40	200		

Horizontal input timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Vertical display area	tvd		480		H	
VSD period time	tv	517	525	712	H	tvpw+tvb=32H is fixed
VSD pulse width	tvpw	1	1	3	H	
VSD Back Porch (Blanking)	tvb	31	31	29	H	
VSD Front Porch	tvfp	5	13	200	H	

Vertical input timing

6-3-4 AC Electrical Characteristics

LVDS mode

Parameter	Symbol	Min	Typ.	Max	Unit	Conditions
Clock frequency	RxFCLK	26.2		71	MHz	
Input data skew margin	TRSKM	500			ps	|VID|=400mv RxVCM=1.2V RxFCLK=71MHz
Clock high time	TLVCH		4/(7x RxFCLK)		ns	
Clock low time	TLVCL		3/(7xRxFCLK)		ns	
VSD setup time	TenPLL			150	us	

7. Optical Characteristics:

Item		Symbol	Conditions	Specifications			Unit	Note
				Min	Typ	Max		
Transmittance		T(%)	-	5.2	5.7	-	-	-
Contrast Ratio		CR	θ=0 Normal Viewing angle	350	500	-		(1) (2)
Response time		TR+TF	-	-	25	-	ms	(1) (3)
Viewing angle	Hor.	Θx+	CR≧10	60	70	-	deg.	-
		Θx-		60	70	-		
	Ver.	Θy+		40	50	-		
		Θy-		50	60	-		

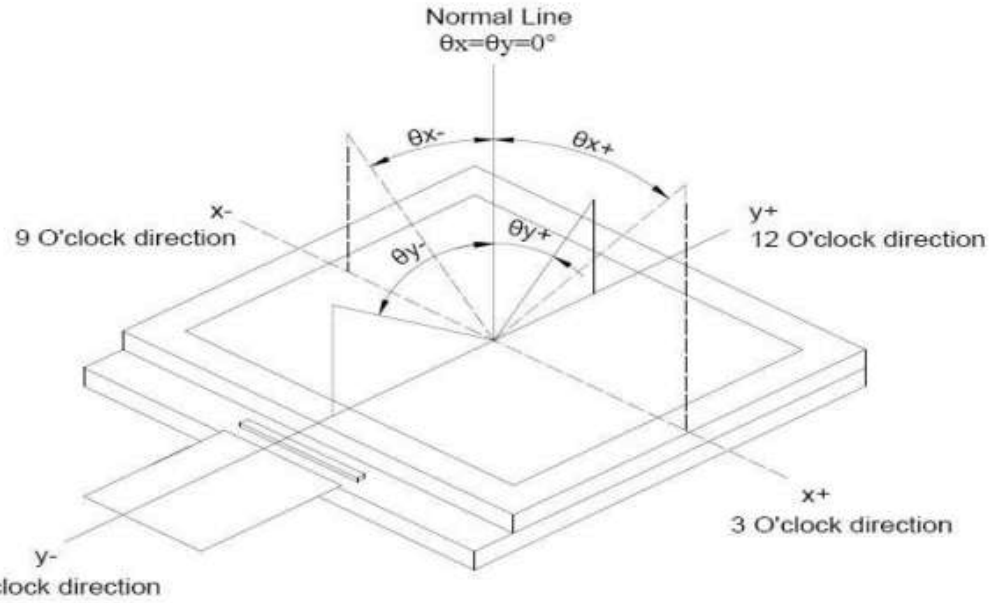
Measuring Condition

1. Measuring surrounding: dark room
2. Ambient temperature: 25±2℃
3. 30 min. Warm-up time.

Color of CIE Coordinate:

Item		Symbol	Condition	Min.	Typ.	Max.
Chromaticity Coordinates (Transmissive)	Red	x	θ = φ = 0° LED Backlight Color Degree	0.518	0.568	0.618
		y		0.275	0.325	0.375
	Green	x		0.313	0.363	0.413
		y		0.529	0.579	0.629
	Blue	x		0.102	0.152	0.202
		y		0.064	0.114	0.164
	White	x		0.250	0.300	0.350
		y		0.281	0.331	0.381

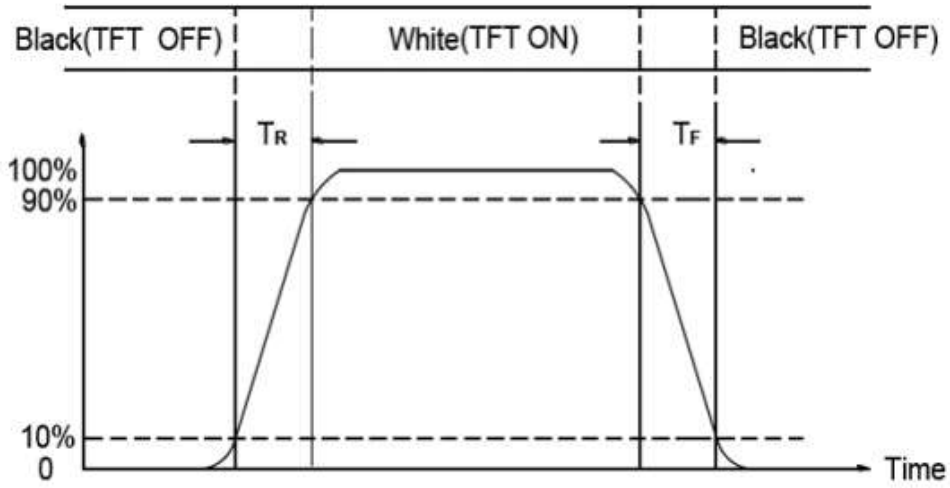
Note (1) Definition of Viewing Angle :



Note (2) Definition of Contrast Ratio(CR) :
measured at the center point of panel

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black}}$$

Note (3) Definition of Response Time : Sum of TR and TF



8. Interface Pin Assignment:

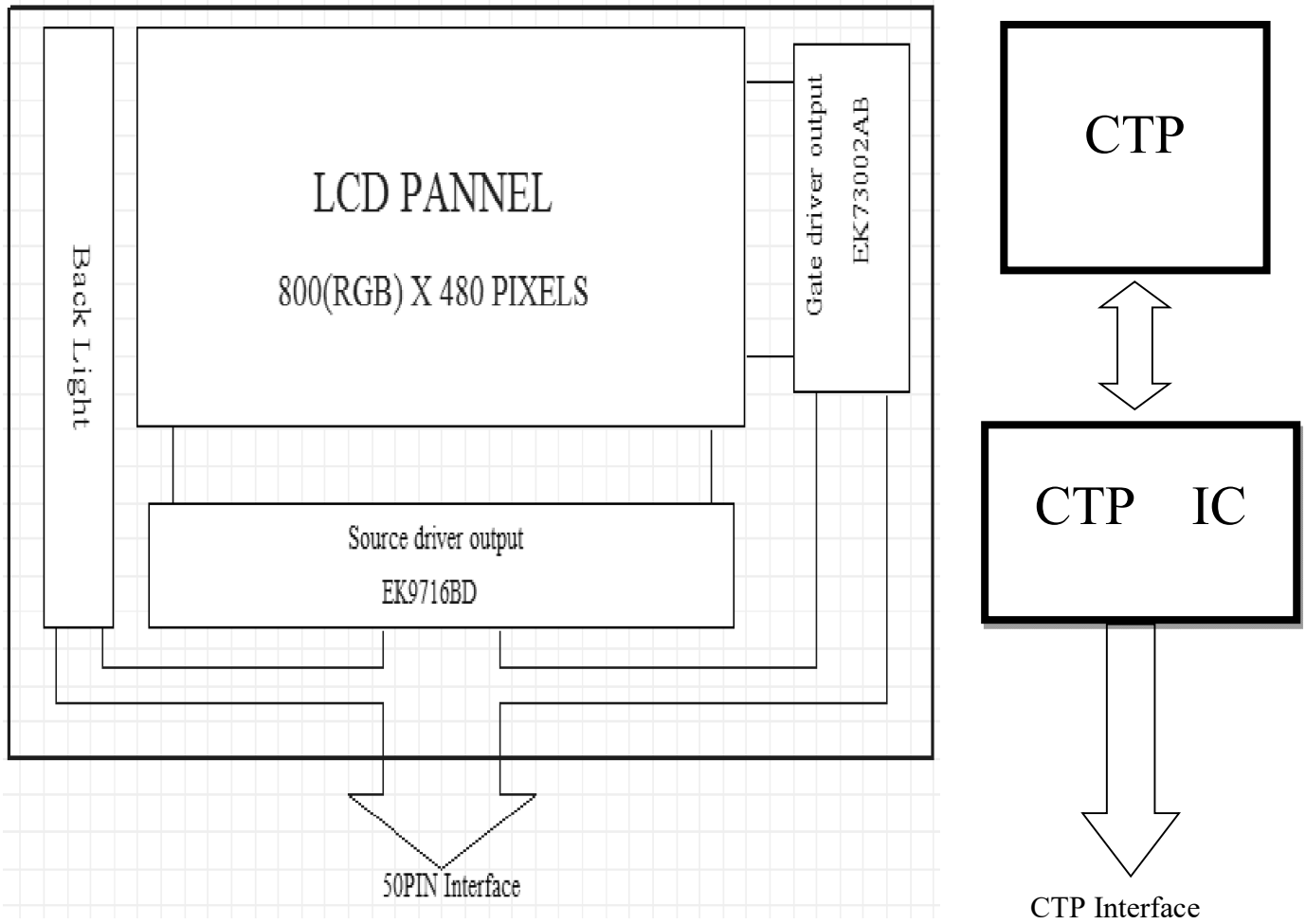
8-1 LCM FPC Interface

No.	Symbol	Function
1~2	LED+	Power for LED backlight (Anode)
3~4	LED-	Power for LED backlight (Cathode)
5	GND	Power ground
6	VCOM	Common voltage input.
7	DVDD	Power supply.
8	MODE	DE/SYNC mode select. Normally pull high H:DE mode. L:HSD/VSD mode
9	DE	Data Enable signal
10	VSYNC	Vertical sync input. Negative polarity
11	HSYNC	Horizontal sync input. Negative polarity
12~19	B7~B0	Blue Data Input
20~27	G7~G0	Green Data Input
28~35	R7~R0	Red Data Input
36	GND	Power ground
37	DCLK	Data clock Input
38	GND	Power ground
39	LCD_LR	Left or Right Display Control
40	LCD_UD	Up / Down Display Control
41	VGH	Positive Power for TFT.
42	VGL	Negative Power for TFT.
43	AVDD	Analog Power input.
44	RST_LCD_N	Global reset pin. Active Low to enter Reset State. (Normally pull high.) Suggest to connecting with an RC reset circuit for stability.
45	NC	No connection
46	VCOM	Common voltage input.
47	LCD_DITHB	Dithering function enable control. (Normally pull high) DITHB = “1”, Disable internal dithering function DITHB = “0”, Enable internal dithering function
48	GND	Power ground
49	NC	No connection
50	NC	No connection

8-2：Pin Description:

No.	Symbol	I/O	Function
1	VDD	P	Voltage for digital circuit
2	RST	I/O	System reset signal input, active low
3	INT	I/O	Indicate coordinate data ready
4	SCL	I/O	I^2C Serial Clock Power
5	SDA	I/O	I2C Serial Data
6	GND	P	Power Ground

9.Block Diagram:



10. Backlight:

1. Standard Lamp Styles (Edge Lighting Type):
The LED chips are distributed over the edge light area of the illumination unit, which gives the less power consumption:

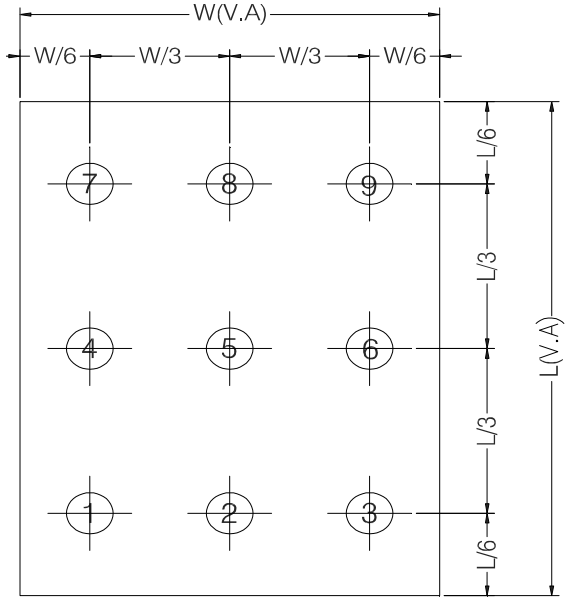
2. The Main Advantages of the LED Backlight are as following:
2.1 The brightness of the backlight can simply be adjusted.
By a resistor or a potentiometer.

3. Data About LED Backlight: (Ta=25°)

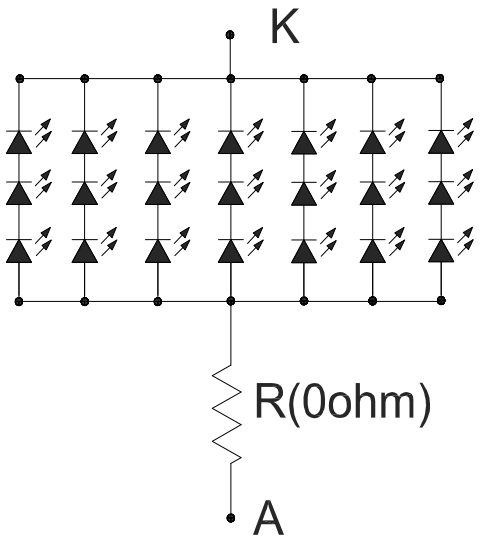
PARAMETER	Sym.	Min.	Typ.	Max.	Unit	Test Condition	Note
Supply Current	I	-	140	-	mA	V=9.6V	
Supply Voltage	V	8.7	9.6	10.2	V	If=140mA	
Reverse Voltage	VR	-	-	5.0	V	-	
Luminous Intensity for LCM+CTP	IV	255	290	-	Cd/m2	If=140mA	2
Uniformity for LCM	-	70	-	-	%		3
Life Time	-	20000	50000	-	Hr.		4
Color	White						

NOTE:
1. Backlight Only
2. Average Luminous Intensity of P1-P9
3. Uniformity = Min/Max * 100%
4. LED life time defined as follow: the final brightness is at 50% of original brightness

Measured Method: (X*Y: Light Area)



Internal Circuit Diagram



Using aperture of 1°,distance 50cm.

11. Standard Specification for Reliability:

11–1. Standard Specifications for Reliability of (LCD+CTP) Module

No	Item	Description
01	High temperature operation	The sample should be allowed to stand at 40℃ for 96 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
02	Low temperature operation	The sample should be allowed to stand at -10℃ for 96 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
03	High temperature storage	The sample should be allowed to stand at 60℃ for 120 hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 2 hours.
04	Low temperature storage	The sample should be allowed to stand at -20℃ for 96 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours.
05	Moisture storage	The sample should be allowed to stand at 60℃,90%RH MAX for 240 hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours.
06	Thermal shock storage	The sample should be allowed to stand the following 10 cycles : -20℃ for 30 minutes → normal temperature for 5 minutes → +60℃ for 30 minutes → normal temperature for 5 minutes, as one cycle.
07	Packing vibration	Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm Sweep time: 12 min X,Y,Z 2 hours for each direction.
08	Packing drop test	According to ISTA 1A 2001.

*Sample size for each test item is 3~5pcs

11 - 2. Testing Conditions and Inspection Criteria

For the final test the testing sample must be stored at room temperature for 24 hours, after the tests listed in Table 11.2, Standard specifications for Reliability have been executed in order to ensure stability.

No	Item	Test Model	In section Criteria
01	Current Consumption	Refer To Specification	The current consumption should conform to the product specification.
02	Contrast	Refer To Specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
03	Appearance	Visual inspection	Defect free.

11-3. MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (25±5℃), normal humidity (50±10% RH), and in area not exposed to direct sun light.

12. Specification of Quality Assurance:

12-1. Pupose

This standard for Quality Assurance should affirm the quality of LCD module products to supply to purchaser by YEEBO CORPORATION (Supplier).

12-2. Standard for Quality Test

a. Inspection:

Before delivering, the supplier should take the following tests, and affirm the quality of product.

b. Electro-Optical Characteristics:

According to the individual specification to test the product.

c. Test of Appearance Characteristics:

According to the individual specification to test the product.

d. Test of Reliability Characteristics:

According to the definition of reliability on the specification for testing products.

e. Delivery Test:

Before delivering, the supplier should take the delivery test.

(i) Test method: According to MIL-STD105E.General Inspection Level Ⅱ take a single time.

(ii) The defects classify of AQL as following:

Major defect: AQL = 0.65%

Minor defect: AQL = 2.5%

Total defects: AQL = 2.5%

12-3. Non- conforming Analysis & Deal With Manners

a. Non- conforming Analysis:

(i) Purchaser should supply the detail data of non- conforming sample and the non-conforming.

(ii) After accepting the detail data from purchaser, the analysis of non- conforming should be finished in two weeks.

(iii) If supplier can not finish analysis on time, must announce purchaser before 3 days.

b. Disposition of non- conforming:

(i) If find any product defect of supplier during assembly time, supplier must change the good product for every defect after recognition.

(ii) Both supplier and customer should analyze the reason and discuss the disposition of non- conforming when the reason of nonconforming is not sure.

12-4. Agreement items

Both sides should discuss together when the following problems happen.

a. There is any problem of standard of quality assurance, and both sides should think that must be modified.
b. There is any argument item which does not record in the standard of quality assurance.
c. Any other special problem.

12-5. Standard of The Product Appearance Test

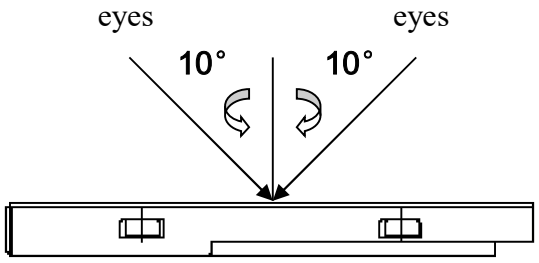
a. Manner of appearance test:

(i) The test must be under 20W × 2 or 40W fluorescent light, and the distance of view must be at 30±5cm.

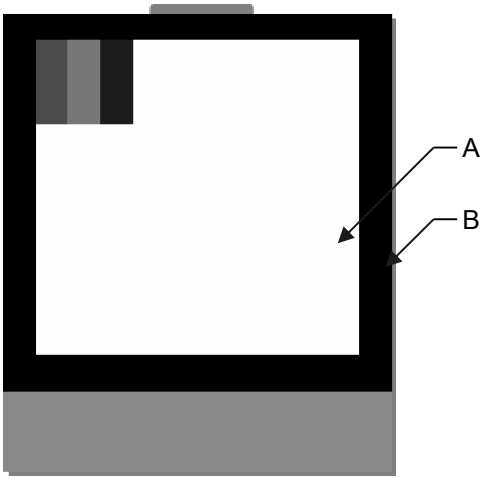
(ii) When test the model of transmissive product must add the reflective plate.

(iii)The test direction is base on around 10° of vertical line.

(iiii)Temperature: 25±5℃ Humidity: 60±10%RH



(iv) Definition of area:



A. Area: Viewing area.
B. Area: Out of viewing area.
(Outside viewing area)

b. Basic principle:

(i) It will accord to the AQL when the standard can not be described.
(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
(iii) Must add new item on time when it is necessary.

c. Standard of inspection: (Unit: mm)

12-6. Inspection specification

Item	Specification Unit : mm	AQL
Electrical Testing	1.1 Open 1.2 Short 1.3 T/P failure 1.4 Missing vertical, horizontal segment, segment contrast defect. 1.5 Missing character, dot or icon. 1.6 Display malfunction. 1.7 No function or no display. 1.8 Current consumption exceeds product specifications. 1.9 LCD viewing angle defect. 1.10 Mixed product types. 1.11 Flicker	0.65

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<tr><td>0.5<D≤0.8</td><td>2</td></tr>
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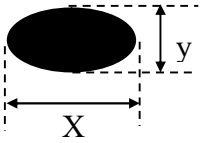

D=(x+y)/2
1.Product’s front side checked according to this specification, back side ignored, but light leakage is not allowed.
2.Printing ink peel off is not allowed.

3.The particle will be ignored when it is removable by cleaning

* Densely spaced: No more than two spots within 10mm
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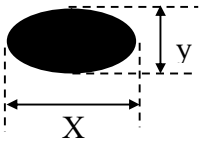

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* Densely spaced: No more than two spots within 10mm
</td>
<td>2.5</td>
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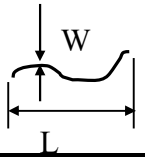
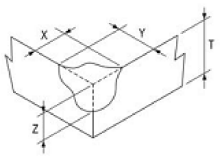
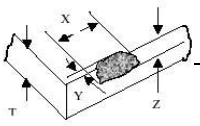
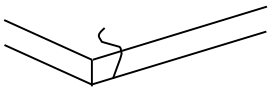
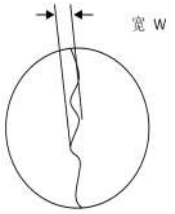
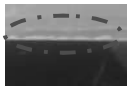
<td>
<table>
<tr><th>Product type</th><th>W</th><th>L</th><th>Acceptable numbers</th></tr>
<tr><td rowspan="3">MAD</td><td>≤0.05</td><td>≤6</td><td>ignored (No more than five lines within 5mm)</td></tr>
<tr><td>0.05<W≤0.25</td><td>≤6</td><td>2</td></tr>
<tr><td>W〉0.25</td><td></td><td>NG</td></tr>
</table>
*The reverse side scratches, not affect to the electronic circuit, cannot find the scratches from the front side is acceptable


* Densely spaced: No more than two lines within 10mm
</td>
<td>2.5</td>
</tr>
</table>

<table>
<tr><td>Glass edge chipping、edge breakage</td><td>
<table>
<tr><td colspan="3">Edge breakage can’t affect visual effection (edge breakage can’t cause damage to circuit); over lens have no visual damage</td></tr>
<tr><td>Product type</td><td>conditions</td><td>Acceptable numbers</td></tr>
<tr><td>MAD</td><td>X≤1.5mm, Y≤2mm, Z≤T</td><td>4</td></tr>
</table>


</td><td>2.5</td></tr>
<tr><td>Glass broken</td><td>Visual broken is NG, and there is no potential f
 </td><td>0.65</td></tr>
<tr><td>1. V/A printed edges sawtooth inspected according to this standard
2. LOGO’s sawtooth</td><td>
<table>
<tr><td colspan="2">Some contentious defect judged according to samples</td></tr>
<tr><td>Product type</td><td>Conditions</td></tr>
<tr><td>Same size</td><td>1、width below 0.2 inch（included） ignored，above 0.2 NG
2、Length not accounted</td></tr>
</table>


</td><td>2.5</td></tr>
<tr><td>Specific dimension</td><td>In accordance with product outline drawing or specification (key dimension) or engineering sample.</td><td>2.5</td></tr>
<tr><td>Glue overflow/Frame</td><td>1. Glue overflow exceed 0.2mm to the black frame is not allowed.
 </td><td>2.5</td></tr>
<tr><td rowspan="3">FPC</td><td>Bonding bubble/ Misalignment</td><td>FPC golden finger hot pressure’s bubble or impurity diameter shall be below 1/2 of the pressed area, pressed deviation shall not exceed 1/2 of the silver line width, and 40X microscope cannot have obvious cracks.</td><td>0.65</td></tr>
<tr><td>Folded mark （minor fault）</td><td>Linearity irreversibility folded mark and acute angle folded mark is NG.</td><td>2.5</td></tr>
<tr><td>EMI FILM （minor fault）</td><td>Surface broken, scratched≦0.3mm
Surface broken below 5mm can be modified by print ink, after modified, the result shall be achieved to EMI</td><td>2.5</td></tr>
</table>

13. Handling Precaution:

13.1 Warranty

This product has been manufactured to specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we will not take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

1. We cannot accept responsibility for any defect arise after additional process of the product (including disassembly and reassembly), after product delivery.
2. We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.
3. We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed your company's acceptance inspection procedures.
4. We cannot accept responsibility for industrial property, which may arise through the use of your product, with exception to those issues relating directly to the structure or method of manufacturing of our product 3months from YEEBO production.
5. The liability of YB is limited to repair or replacement on the terms set forth below. YB will not be responsible for any subsequent or consequential events or injury or damage to any personnel or user including third party personnel and/or user. Unless otherwise agreed in writing between YB and the customer, YB will only replace or repair any of its CTP which is found defective electrically or visually when inspected in accordance with YB GENERAL CTP INSPECTION STANDARD.

13.2. Precautions in Use of CTP Module

13.2-1. Handling of CTP Module

14.2-1-1 Please operate the capacitive touch panel by touch the panel surface with finger or electric pen

14.2-1-2 Store the products at the temperature and humidity mentioned in the specification in a good package do not expose the products under direct sunlight.

14.2-1-3 Do not hit the capacitive touch panel in strong force , or drop it down, it is made of glass and friable.

14.2-1-4 Put on finger coats , glovers or mask to protect the products from fingerprint of stain. Do not upload/unload the touch panel by holding the FPC cable. Do not bend the FPC cableoften or pull it hard when installing, as FPC cable is soft and connected to touch panel body.

14.2-1-5 Pay attention to the prevention from high voltage and static electricity.

13.2-2 Storage

14.2-2-1 Store in ambient temperature of 25±5℃, and relative humidity of 50±10%RH. Do not expose to sunlight or fluorescent light.

14.2-2-2 Storage in a clean environment, free from dust, active gas, and solvent.

14.2-2-3 Store in anti-static electricity container.

14.2-2-4 Store without any physical load.

14.2-2-5 Appearance,3months;Function,1year;within the validity, failed CTP can be replaced 1 to 1

13.3 Guarantee

Our products meet requirements of the environment.YEEBO ROHS requirement is based on European Union Directive 2011/65/EU (ROHS) Requirements and Update.