億 都 集 團
YEEBO GROUP

SPECIFICATION
FOR
LCD MODULE

MODULE NO: YB-YG19201080S01A-N-A0

Doc.Version:00

Customer Approval:

☐ Accept	☐ Reject

YEEBO	NAME	SIGNATURE	DATE
Prepare	Electronic Engineer	张子聪	2019/5/24
Check	Mechanical Engineer	郑某某	2019/5/24
Verify			
Approval		劉振榮	2019.05.24

■APPROVAL FOR SPECIFICATIONS ONLY
☐APPROVAL FOR SPECIFICATIONS AND SAMPLE

1. Revision History

Sample Version	DOC. Version	DATE	DESCRIPTION		CHANGED BY
A0	00	2019-05-24	SPEC ONLY	First issue	Alan/鄭昊煜

2. Table of Contents:

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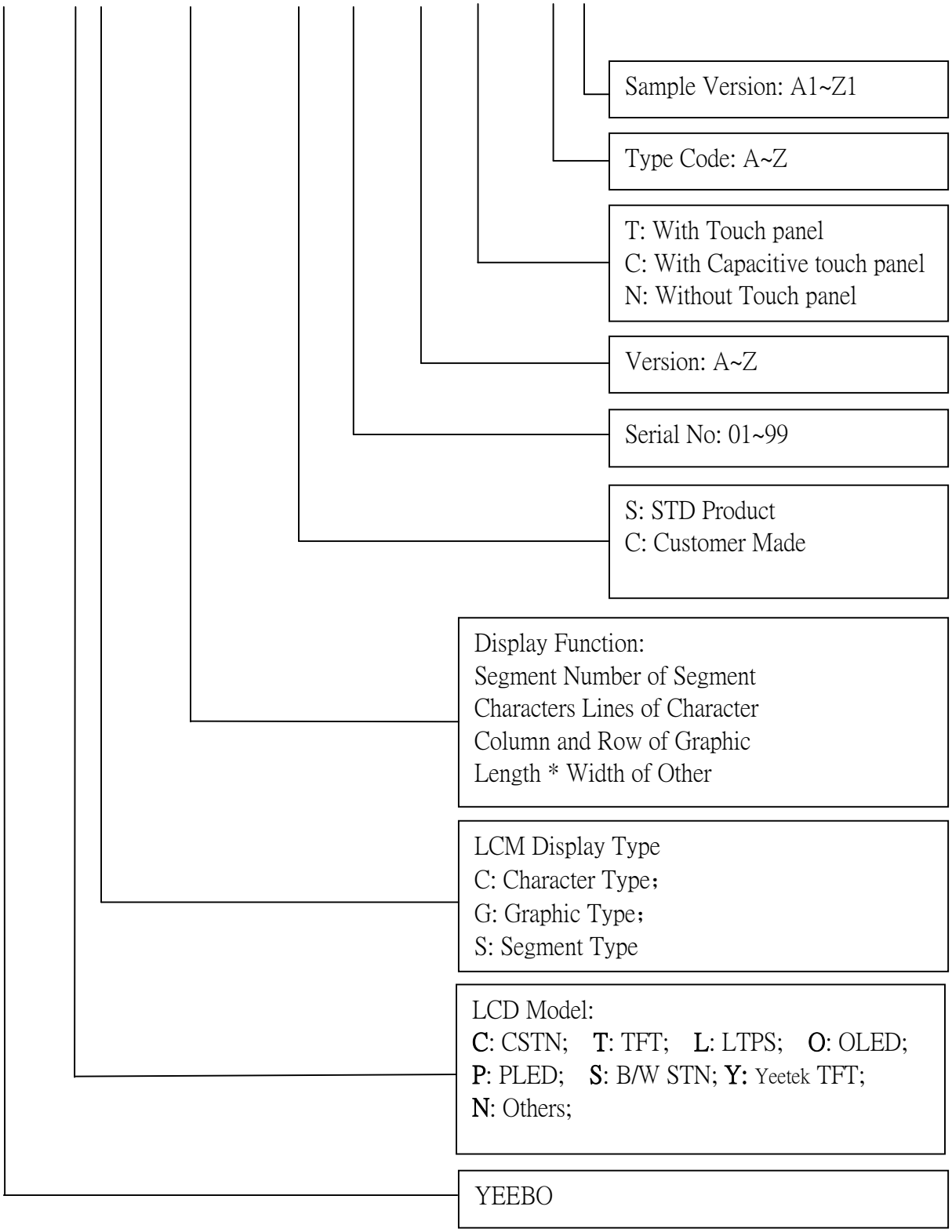
3. Module Numbering System:

(Example)

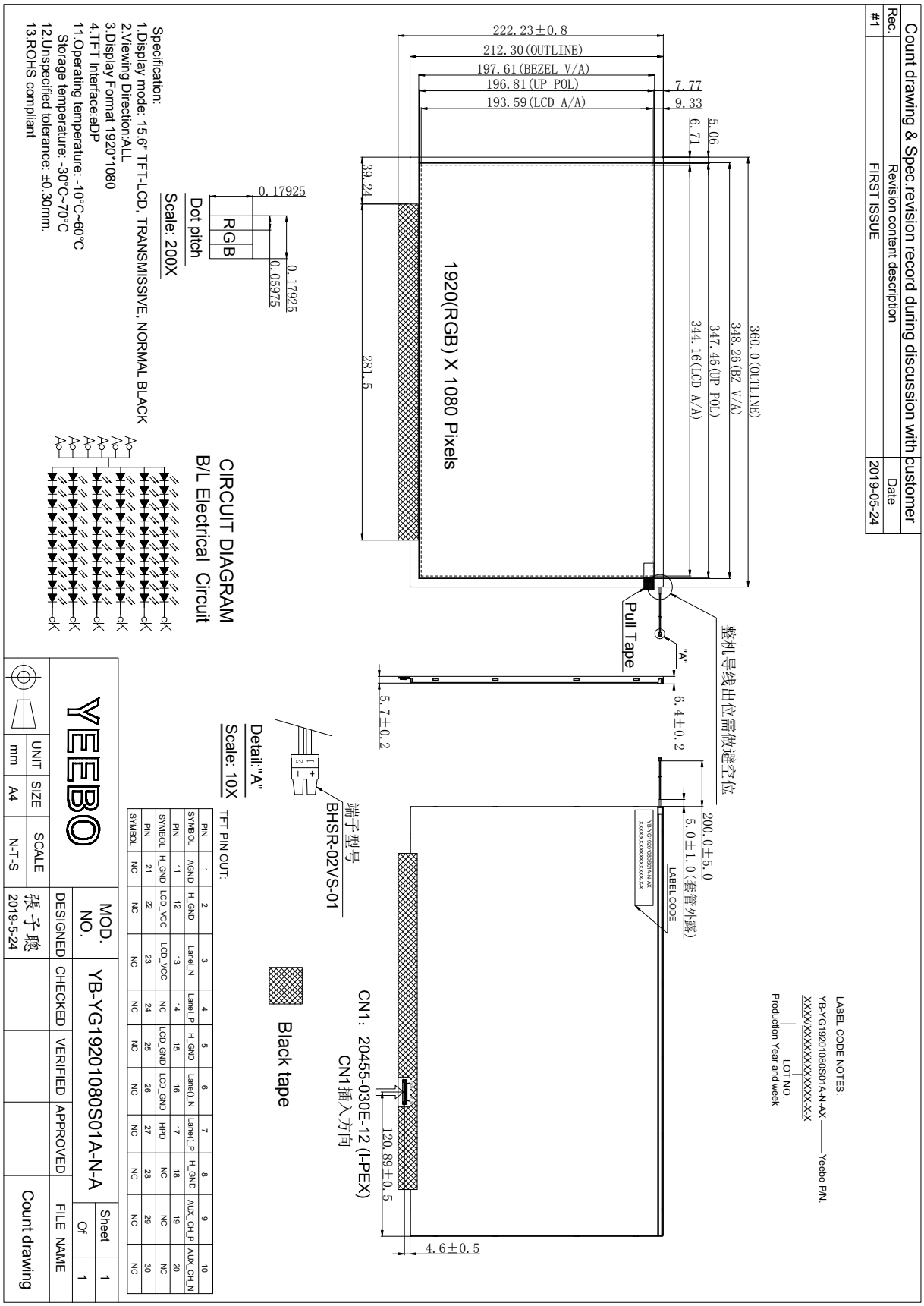
YB- YG 19201080 S 01 A -N – A0



4. General Specification:

ITEM	CONTENTS
Assembly Module Size	360.00(W) * 222.23(H) * 6.4(T) mm
Display Size(Diagonal)	15.6 inch
Display Format	1920(RGB)*1080 Pixels
Active Area	344.16(W) * 193.59(H) mm
Pixel Pitch	0.17925 * 0.17925 mm
LCD Type	Normally black, Transmissive
TFT Surface treatment	Anti-Glare
Color arrangement	RGB-stripe
TFT interface	EDP
LCM power consumption	9.1W
View Direction	ALL
Weight(g)	TBD

5. LCM drawing:



6.Interface Pin Assignment

6-1. TFT FPC Connector is used for the module electronics interface. The recommended model is 20455-030E-76 (I-PEX) manufactured by Hirose.

Pin No.	Symbol	I/O	Function	Remark
1	NC	-	No connect	
2	H_GND	P	High Speed Ground	
3	Lane1_N	I	Complement Signal Link Lane 1	
4	Lane1_P	I	True Signal Link Lane 1	
5	H_GND	P	High Speed Ground	
6	Lane0_N	I	Complement Signal Link Lane 0	
7	Lane0_P	I	True Signal Link Lane 0	
8	H_GND	P	High Speed Ground	
9	AUX_CH_P	I	True Signal Auxiliary Channel	
10	AUX_CH_N	I	Complement Signal Auxiliary Channel	
11	H_GND	P	High Speed Ground	
12-13	LCD_VCC	P	LCD logic and driver power(3.3V)	
14	NC	-	No connect	
15-16	LCD_GND	P	LCD logic and driver ground	
17	HPD	I	HPD Signal	
18-30	NC	-	No connect	

I: input; O: output; P: Power or Ground(0V).

Note:

7.Typical Operation Conditions

Test condition: GND=0V, T_A=25 °C

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	LCD_VCC	3.0	3.3	3.6	V	
Current for Driver	LCD_VCC	-	TBD	-	MA	
Voltage for LED Backlight	V_L	24.0	28.0	33.0	V	Note 1
Crrent for LED Backlight	I_L	-	220	-	mA	
LED life time	-	50,000	-	-	Hr	Note 2

Note1: V_L=28V, I_L=220mA (Backlight circuit: 10series connection, 6 parallel connection), the ambient temperature is 25℃.

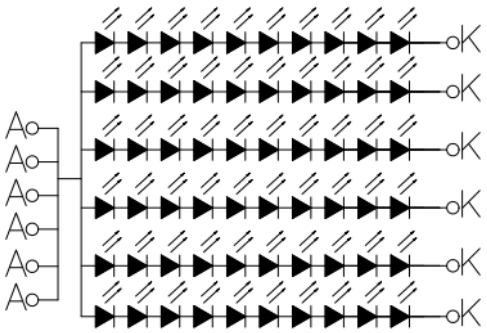


Fig. 3-1 LED test circuit diagram

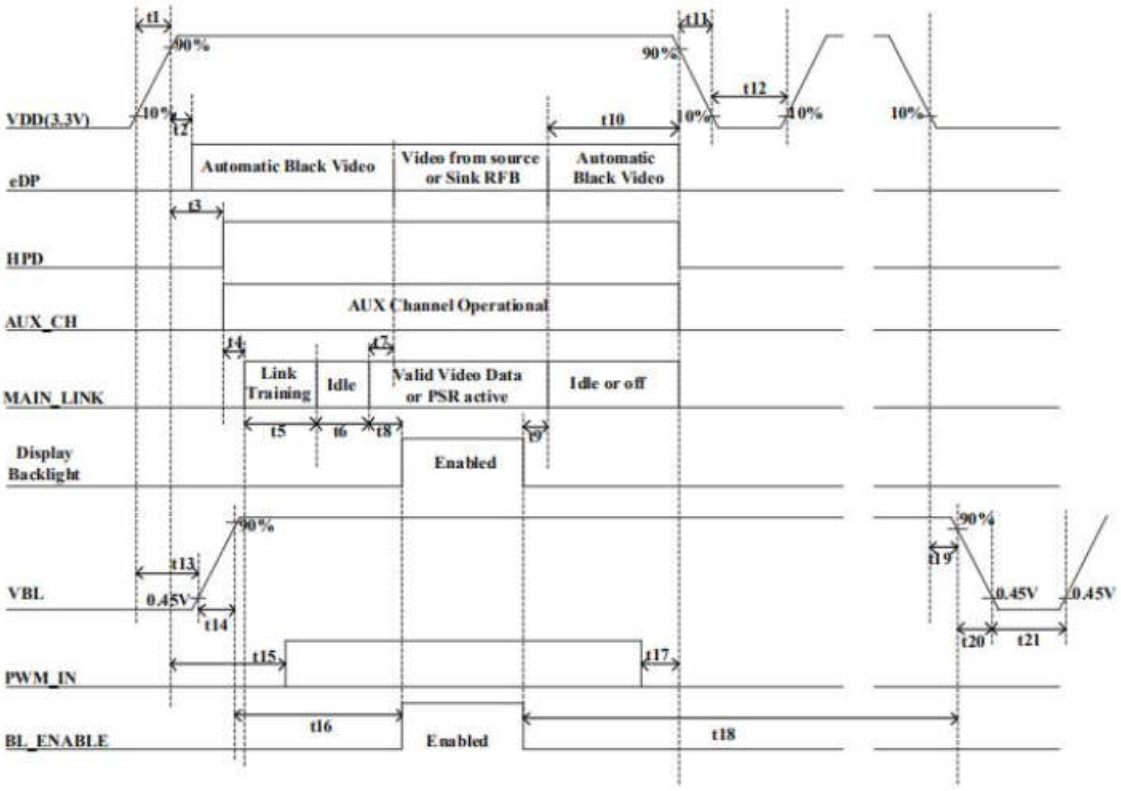
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I_L =220mA . The LED lifetime could be decreased if operating I_L is larger than 320 mA.

8 Electrical Characteristics

8.1Operating Conditions

Ta=+25℃

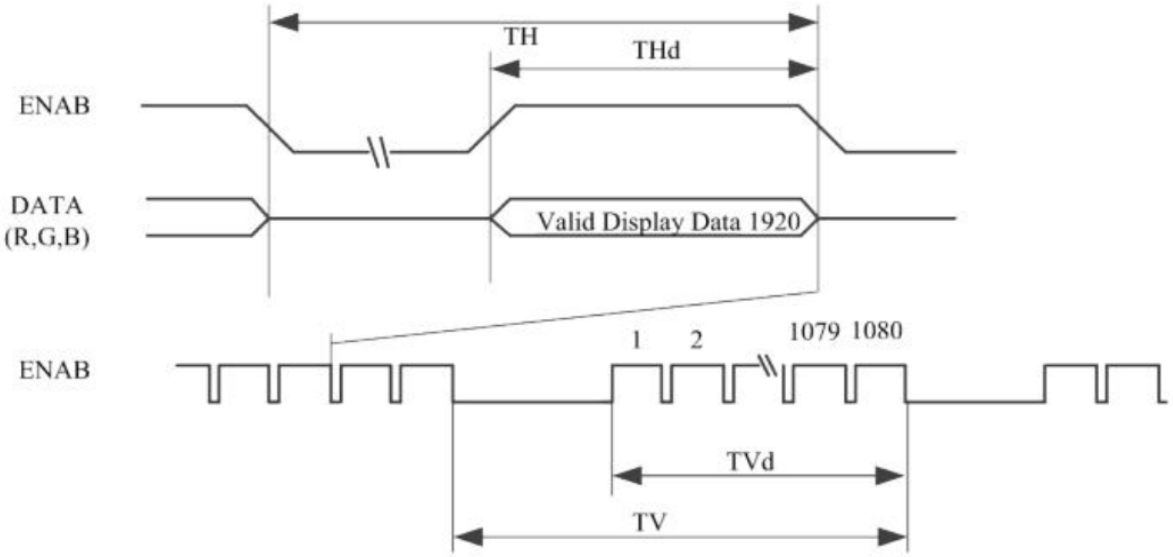
DC Electrical Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
+3.3V supply voltage	VDD	+3.0	+3.3	+3.6	V	[Note 5-2-1]
Current dissipation	IDD	-	-	-	mA	[Note 5-2-2]
Permissible input ripple voltage	V_{RP}	-	-	100	mVp-p	VDD=+3.3V
eDP AUX Channel Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Unit Interval for AUX channel	UI_{AUX}	0.4	0.5	0.6	μS	
Peak-to-peak voltage at TP1	$V_{AUX-DIFF-pp}$	0.32	-	1.36	V	
AUX DC Common mode Voltage	$V_{AUX-DC-CM}$	0	-	2.0	V	
AUX Short current limit	I_{AUX_SHORT}	-	-	90	mA	
AUX CH terminationDCresistor	R_{AUX_TERM}	-	100	-	Ω	Differential input
AUX AC coupling capacitor	C_{AUX}	75	-	200	nF	
Number of pre-charge pulses	Pre-charge pulses	10	-	16		
eDP Main Link Receiver Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Link clock down spreading	Down_Spread_Amplitude	0		0.5	%	
Differential Peak-to-peak Input Voltage at Rx package pins	$V_{RX-DIFFp-p}$	90	-	1200	mV	
Differential Return Loss at 1.35GHz at Rx package pins	$RL_{RX-DIFF}$	9	-	-	dB	
Differential termination resistance	$R_{RX-TERM}$	-	100	-	Ω	
RX short circuit Current Limit	$I_{RX-SHORT}$	-	-	50	mA	
Lane Intra-pair Skew at RX package pins	$T_{RX-SKEW-INTRA-PAIR-High-Bit-Rate}$	-	-	50	ps	



Symbol	Min	Max	Unit	Note
t1	0.5	10	ms	
t2	0	200	ms	
t3	0	100	ms	
t4	-	-	ms	
t5	-	-	ms	
t6	-	-	ms	
t7	0	50	ms	
t8	-	-	ms	
t9	-	-	ms	
t10	0	500	ms	
t11	1	50	ms	[Note 5-2-3]
t12	500	-	ms	
t13	-	-	ms	
t14	0.5	10	ms	
t15	100	-	ms	
t16	0	-	ms	
t17	0	-	ms	
t18	-	-	ms	
t19	-	-	ms	
t20	0.1	-	ms	
t21	100	-	ms	

8.2Signal Timing Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Clock	Frequency	$1/T_C$	132.0	138.5	140.0	MHz	[Note 6-1-1]
Data enable signal	Horizontal period	TH	2020	2080	2400	clock	
				15.02		μs	
	Horizontal period (High)	THd	-	1920	-	clock	
	Vertical period	TV	1090	1111	1200	line	
			-	16.685	-	ms	
	Vertical period (High)	TVd	-	1080	-	line	


TH
THd
ENAB
DATA
(R,G,B)
Valid Display Data 1920
ENAB
1
2
1079
1080
TVd
TV

9. Optical Specifications

Item		Symbol	Conditions	Specifications			Unit	Note
				Min	Typ	Max		
Contrast Ratio		CR	θ=0 Normal Viewing angle	700	1000	-		(1) (2)
Response time		TR+TF	-	-	25	35	ms	(1) (3)
Viewing angle	Hor.	Θx+	CR≧10		89	-	deg.	-
		Θx-			89	-		
	Ver.	Θy+			89	-		
		Θy-			89	-		
Luminance		L	θ=0 Normal Viewing angle	550	650	-	cd/m²	Note 6
Luminance uniformity		YU		70	-	-	%	Note 7

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	-	TBD	-
		y		-	TBD	-
	Green	x		-	TBD	-
		y		-	TBD	-
	Blue	x		-	TBD	-
		y		-	TBD	-
	White	x		-	TBD	-
		y		-	TBD	-

Note 1: Definition of viewing angle range

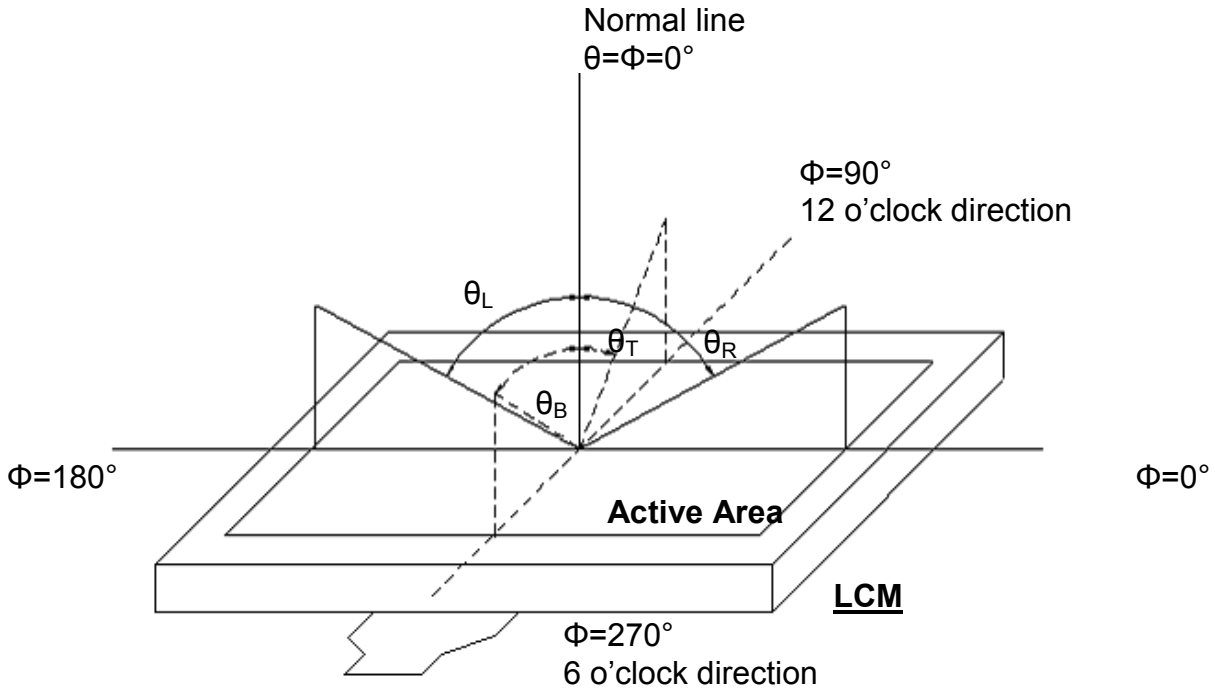


Fig. 4-2 Definition of viewing angle

Note 2: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

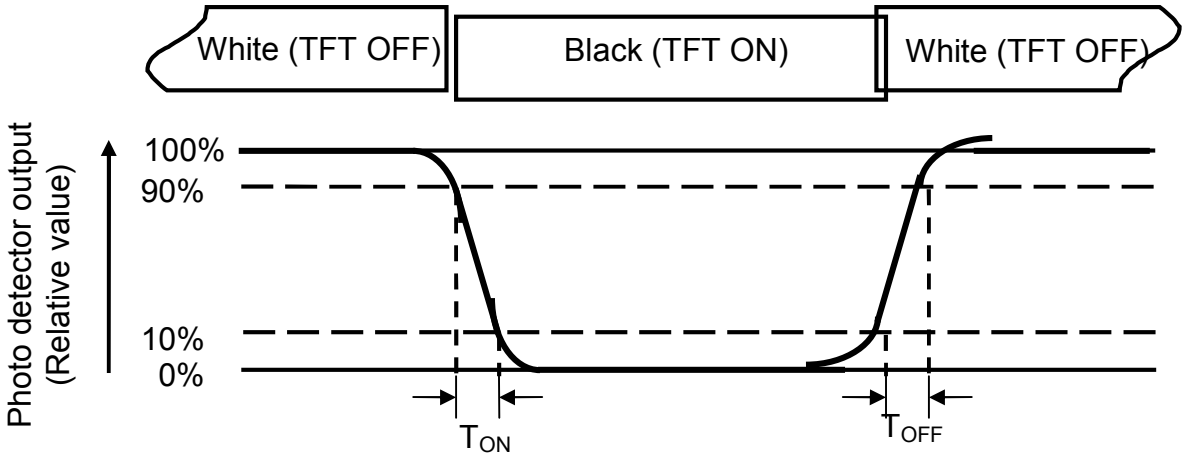


Fig. 4-3 Definition of response time

Note 3: Definition of contrast ratio

Note 4: Definition of optical measurement system.
The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm, Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/ Field of view: 1° /Height: 500mm.) or CA-210.

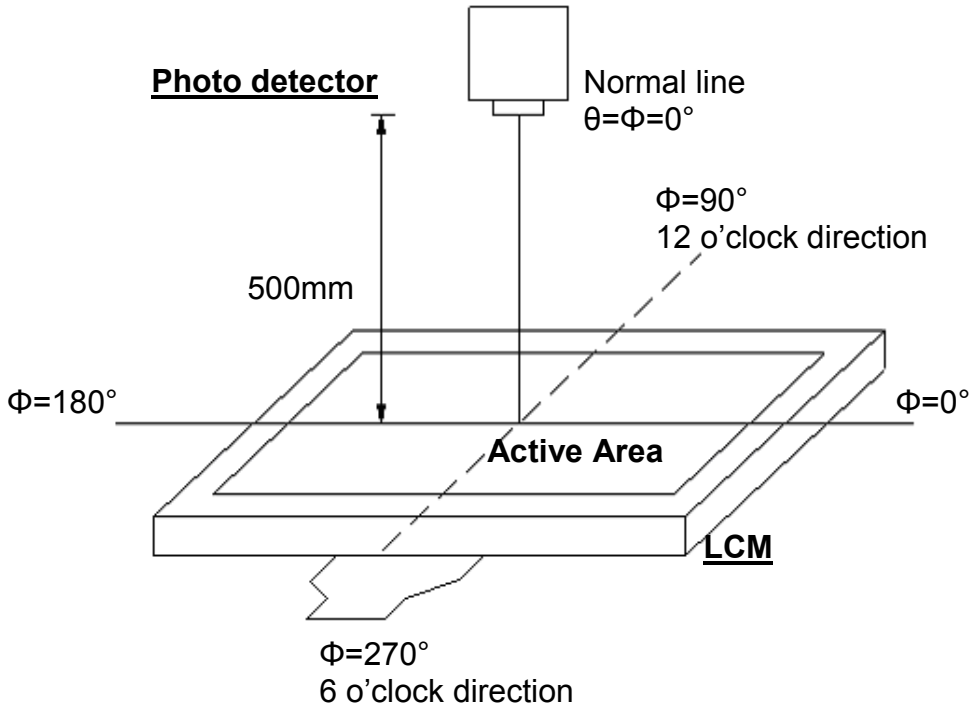


Fig. 4-4 Optical measurement system setup

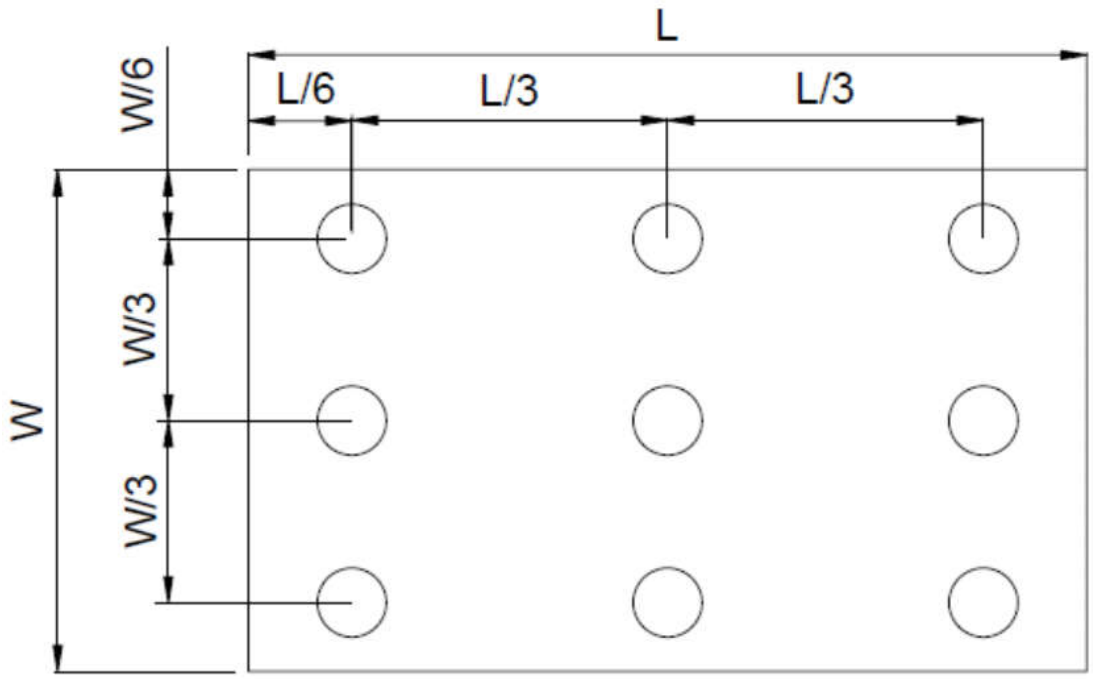
Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is I_L=200mA .

Note 7: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas(Refer to Fig. 4-5).
Every measuring point is placed at the center of each measuring area.

$$Luminance\ \ Uniformity\ (Yu) = \frac{B_{min}}{B_{max}}$$

L-------Active area length W----- Active area width



B_{MAX}: The measured maximum luminance of all measurement position.
B_{MIN}: The measured minimum luminance of all measurement position.

10.Reliability Test Items

10–1. Standard Specifications for Reliability of LCD Module

No	Item	Description
01	High temperature operation	The sample should be allowed to stand at 60℃ for 120 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 120 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 70℃ for 240 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 -30℃ for 240 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 50℃, 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 : 0℃ 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	Electro Static Discharge	Contact=+/-4KV, Air=+/-8KV,(R=330R,C=150pF), 1 sec,9point,10times/point;

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

10 - 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 10-1, 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.

10- 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.

11. Specification of Quality Assurance:

11-1. Purpose

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

11-2. 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 ISO2859-1. 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

11-3. 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.

11-4. 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.

11-5. Standard of The Product Appearance Test

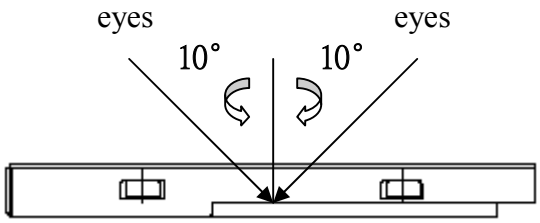
a. Manner of appearance test:

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

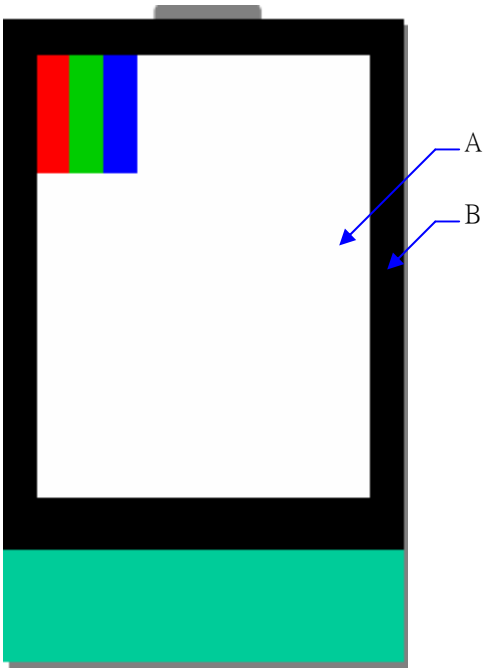
(ii) When test the model of transmissive product must add the reflective plate.

(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:

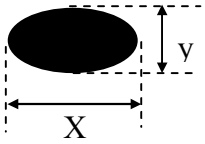
(i) It will accord to the AQL when the standard can not be described.

(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)

11-6. Inspection specification

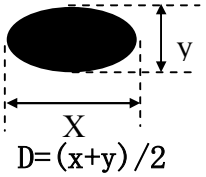
<table>
<tr><th>Item</th><th>Specification Unit : mm</th><th>AQL</th></tr>
<tr><td>Electrical Testing</td><td>1.1 Open
1.2 Short
1.3 T/P failure
1.4 Missing vertical, horizontal segment, segment contrast defect.
1.5 Missing character, dot or icon.
1.6 Display malfunction.
1.7 No function or no display.
1.8 Current consumption exceeds product specifications.
1.9 LCD viewing angle defect.
1.10 Mixed product types.
1.11 Flicker</td><td>0.65</td></tr>
<tr><td>explosion-proof film bubble/Concave and convex point/indentation / Contamination</td><td>
<table>
<tr><th>Product type</th><th>D</th><th>Acceptable numbers</th></tr>
<tr><td rowspan="4">LAD</td><td>≤0.3</td><td>ignored (No more than five spots within 5mm G)</td></tr>
<tr><td>0.3≤D≤0.5</td><td>4</td></tr>
<tr><td>0.5＜D≤1.0</td><td>2</td></tr>
<tr><td>1.0＜D≤1.5</td><td>2</td></tr>
<tr><td>D＞1.5</td><td>NG</td></tr>
</table>


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</td><td>2.5</td></tr>
</table>

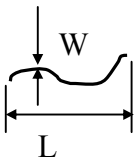
<table>
<tr>
<td>Black spots / White spots /Bright spots/ Color spots /polluted inside/ punctured</td>
<td>
<table>
<tr><th>Product type</th><th>D</th><th>Acceptable numbers</th></tr>
<tr><td rowspan="4">LAD</td><td>≤0.2</td><td>ignored (No more than five spots within 5mm)</td></tr>
<tr><td>0.2≤D≤0.4</td><td>3</td></tr>
<tr><td>0.4＜D≤0.8</td><td>2</td></tr>
<tr><td>D＞0.8</td><td>NG</td></tr>
</table>


1.Product’s front side checked according to this specification, back side ignored, but light leakage is not allowed.

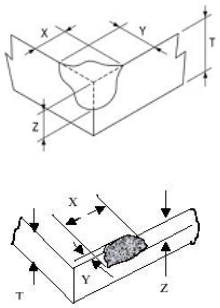
2.Printing ink peel off is not allowed.

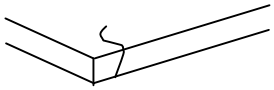
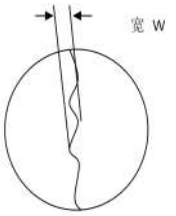
3、The particle will be ignored when it is removable by cleaning

* Densely spaced: No more than two spots within 10mm
</td>
<td>2.5</td>
</tr>
<tr>
<td>Linear Object: Fiber, scurf, scratches and other linear defects (not affecting function)</td>
<td>
<table>
<tr><th>Product type</th><th>W</th><th>L</th><th>Acceptable numbers</th></tr>
<tr><td rowspan="3">LAD</td><td>≤0.05</td><td>≤8</td><td>ignored No more than five lines within 5mm)</td></tr>
<tr><td>0.1＜W≤0.3</td><td>≤8</td><td>2</td></tr>
<tr><td>W〉0.3</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>Edge breakage can’ t affect visual effection (edge breakage can’ t cause damage to circuit); over lens have no visual damage
<table>
<tr><th>Product type</th><th>conditions</th><th>Acceptable numbers</th></tr>
<tr><td>LAD</td><td>X≤3.0mm, Y≤2.0mm, Z≤T</td><td>5</td></tr>
</table>


</td><td>2.5</td></tr>
<tr><td>Glass broken</td><td>Visual broken is NG, and there is no potential fault.
 </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>Some contentious defect judged according to samples
<table>
<tr><th>Product type</th><th>Conditions</th></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>

12. Handling Precaution:

12.1 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.

12.2-2 Storage

12.2-2-1 Store in ambient temperature of 25±5℃, and relative humidity of 50±10%RH. Do not expose to sunlight or fluorescent light.
12.2-2-2 Storage in a clean environment, free from dust, active gas, and solvent.
12.2-2-3 Store in anti-static electricity container.
12.2-2-4 Store without any physical load.

12.3Guarantee

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