



PECIFICATION FOR LCD MODULE

MODULE NO: YB-TG480272C52A-C-A0

Doc.Version:00

Customer Approval:

☐ Accept

☐ Reject

YEEBO	NAME	SIGNATURE	DATE
Prepare	Electronic Engineer	袁江敏	2019/8/13
Check	Mechanical Engineer	王广盛	2019/8/13
Verify		陈长吉	2019/8/13
Approval		Sumray	2019/8/13

■ APPROVAL FOR SPECIFICATIONS ONLY

☐ APPROVAL FOR SPECIFICATIONS AND SAMPLE

WIMRD005-02-D

1. Revision History

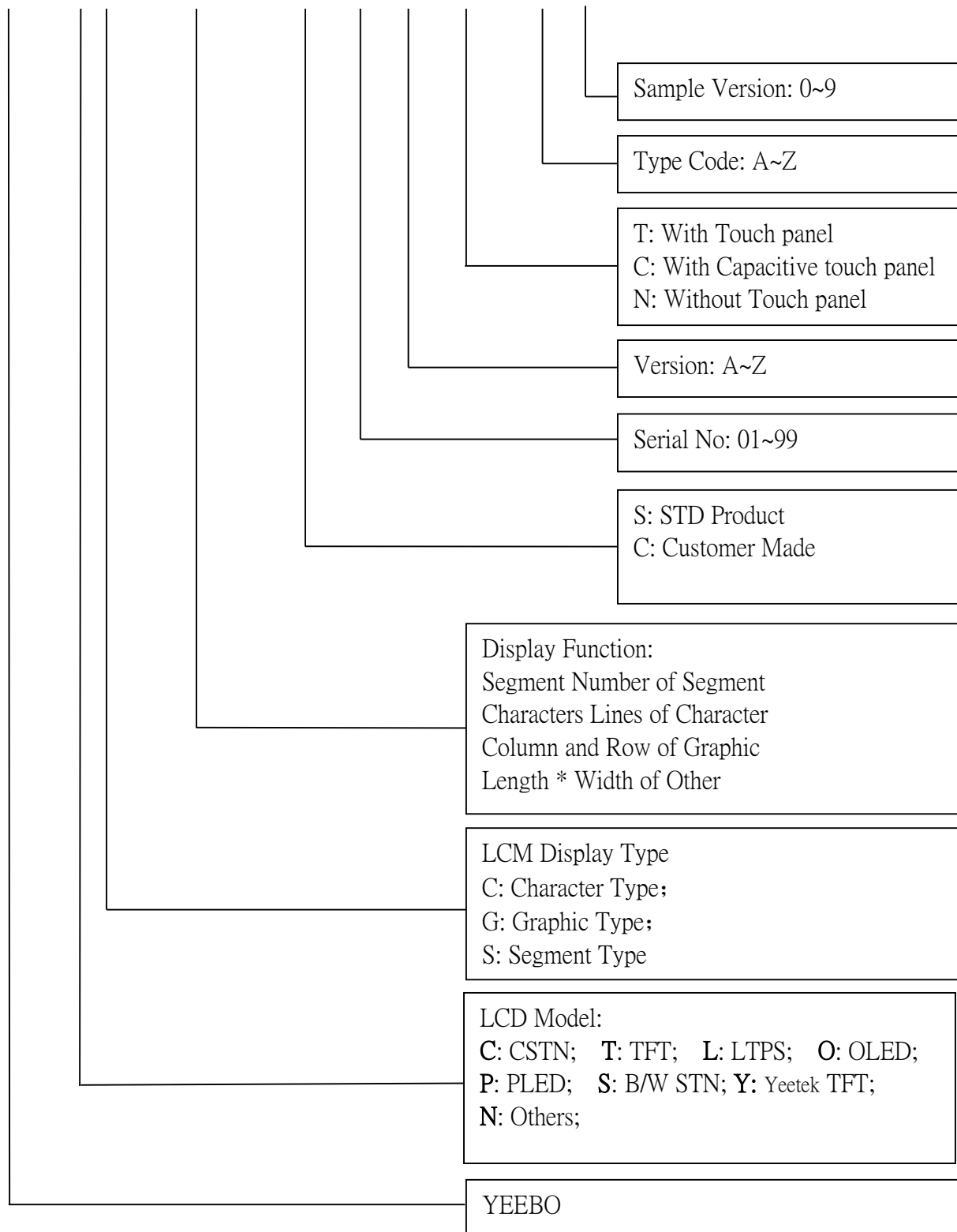
[illegible]

2. Table of Contents:

NO	CONTENTS	PAGE
1	Revision History	1
2	Table of Contents	2
3	Module Numbering System	3
4	General Specification	4
5	LCM drawing	5
6	Electrical Characteristics	6
7	Optical Characteristics	10
8	Interface Pin Assignment	12
9	Block Diagram	13
10	Backlight	14
11	Standard Specification for Reliability	15
12	Specification of Quality Assurance	17
13	Handling Precaution	23
14	Guarantee	23

3. Module Numbering System: (example)

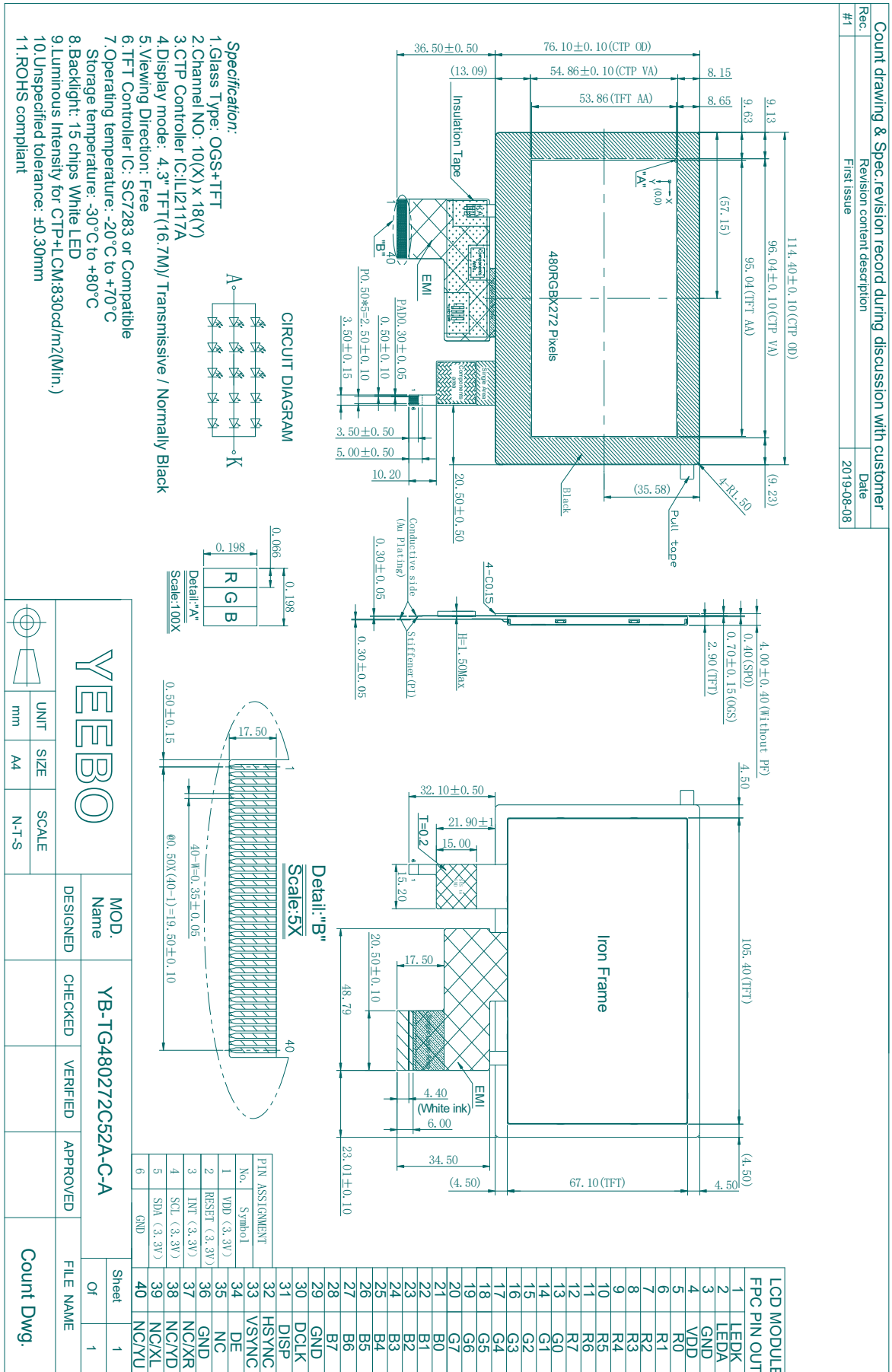
YB- TG 800480 S 25 A -C – A 1



4. General Specification:

ITEM	CONTENTS
Module Size	114.40(W) * 76.10(H) * 4.00(T) mm
Display Size(Diagonal)	4.3 inch
Display Format	480(RGB)* 272 Pixels
Active Area	95.04(W) * 53.856(H) mm
View Area	96.04(W) * 54.856(H) mm
Pixel Pitch	0.198*0.198 mm
LCD Type	TFT(16.7M) / Transmissive/Normally Black
The Viewing Direction:	Free
Controller IC	SC7283
CTP IC	ILI2117A
Weight	TBD
CTP Interface	I ² C
Fireware	TBD
Test Configuration	TBD

5. LCM drawing:



6. Electrical Characteristics

6-1 Absolute Maximum Ratings

6-1-1 Absolute Maximum Ratings (TFT)

(Ta=25°C VSS=0V)

Item	Symbol	Min.	Type	Max.	Unit	Remark
Power Supply voltage	VDD	-0.5	-	+4.0	Volt	
Operating Temperature	Topr	-20	-	70	°C	
Storage Temperature	Tstg	-30	-	80	°C	

Note1: Absolute maximum rating is the limit value beyond which the IC maybe broken.
They do not assure operations.

6-1-2 Absolute Maximum Ratings (TP)

(Ta=25°C VSS=0V)

Item	Symbol	Min	Typ	Max	Unit
System power supply voltage	VDD			3.6	V
High voltage power supply	V _{PVDD_CP}		3.6	3.7	V
Analog input voltage	V _{INANA}			VDD	V
Digital input voltage	V _{INDIG}			5	V
Storage temperature	T _{STG}	-40		150	°C

Notes: Stresses above those listed in Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and does not imply functional operation of the device. Exposure to absolute maximum ratings for extended periods may affect device reliability.

6-2 Operating Conditions

6-2-1 Operating Conditions (TFT)

(Ta=25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply voltage	VDD	-	3.0	3.3	3.6	Volt
Level Input Voltage	V _{IH}	-	0.7*VDD	-	VDD	Volt
	V _{IL}	-	GND	-	0.3*VDD	Volt
Power Supply Current for LCM	IDD	-	-	TBD	-	mA

Note1:GND=0V

6-2-2 Operating Conditions (TP)

(Ta=25°C)

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	°C
Junction Temperature	T _J			125	°C

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

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

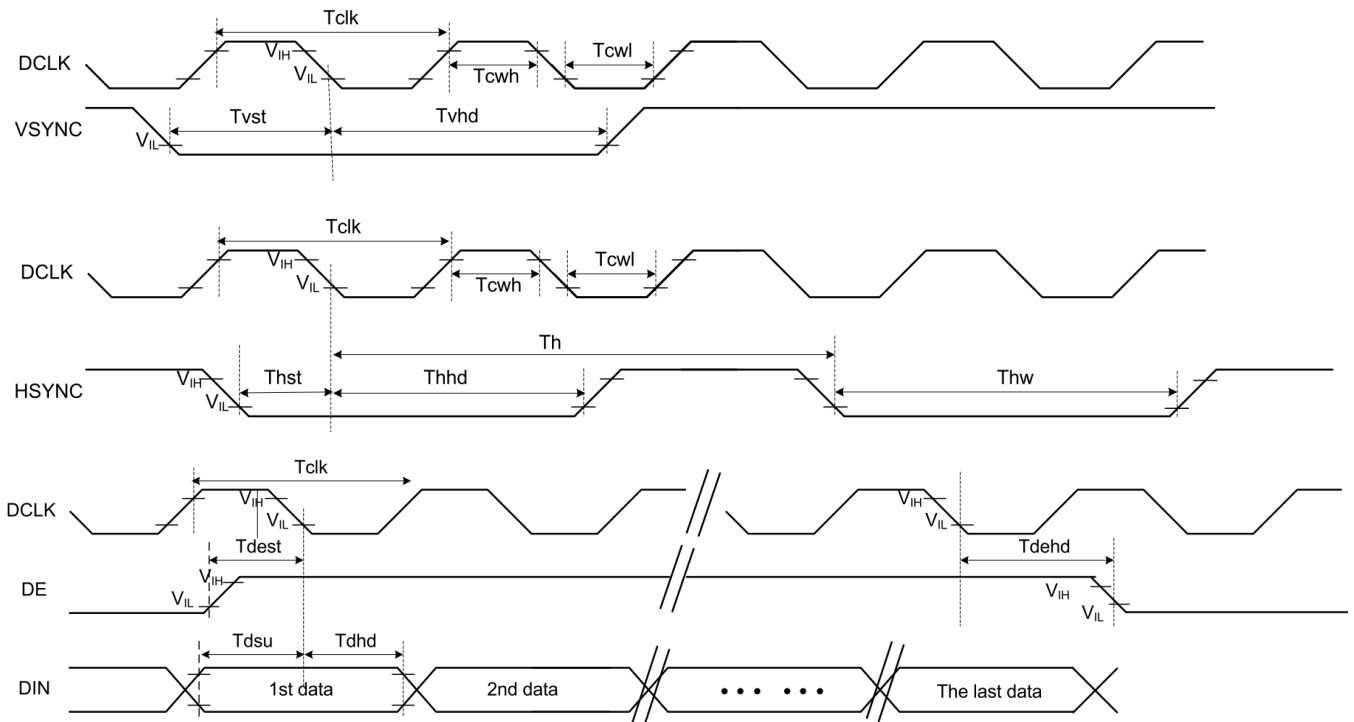
Specifications are subjected to change without notice.

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 Clock and data input timing diagram (TFT)



6-3-2 Clock and data input timing diagram (TP)

5.4 AC Characteristics of the SDA and SCL on I²C interface

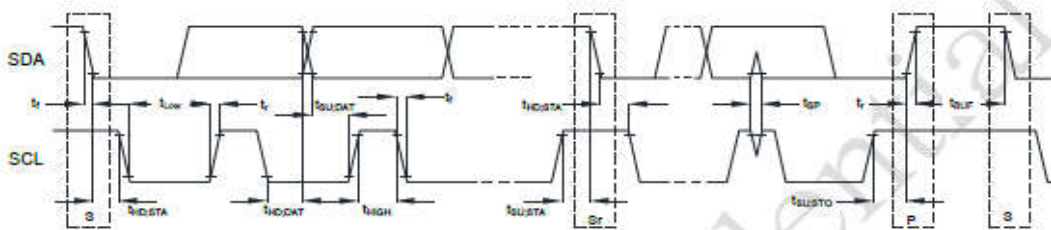


Figure 5-1: The timing of I²C Interface

Table 5-5: Characteristics of the SDA and SCL bus lines

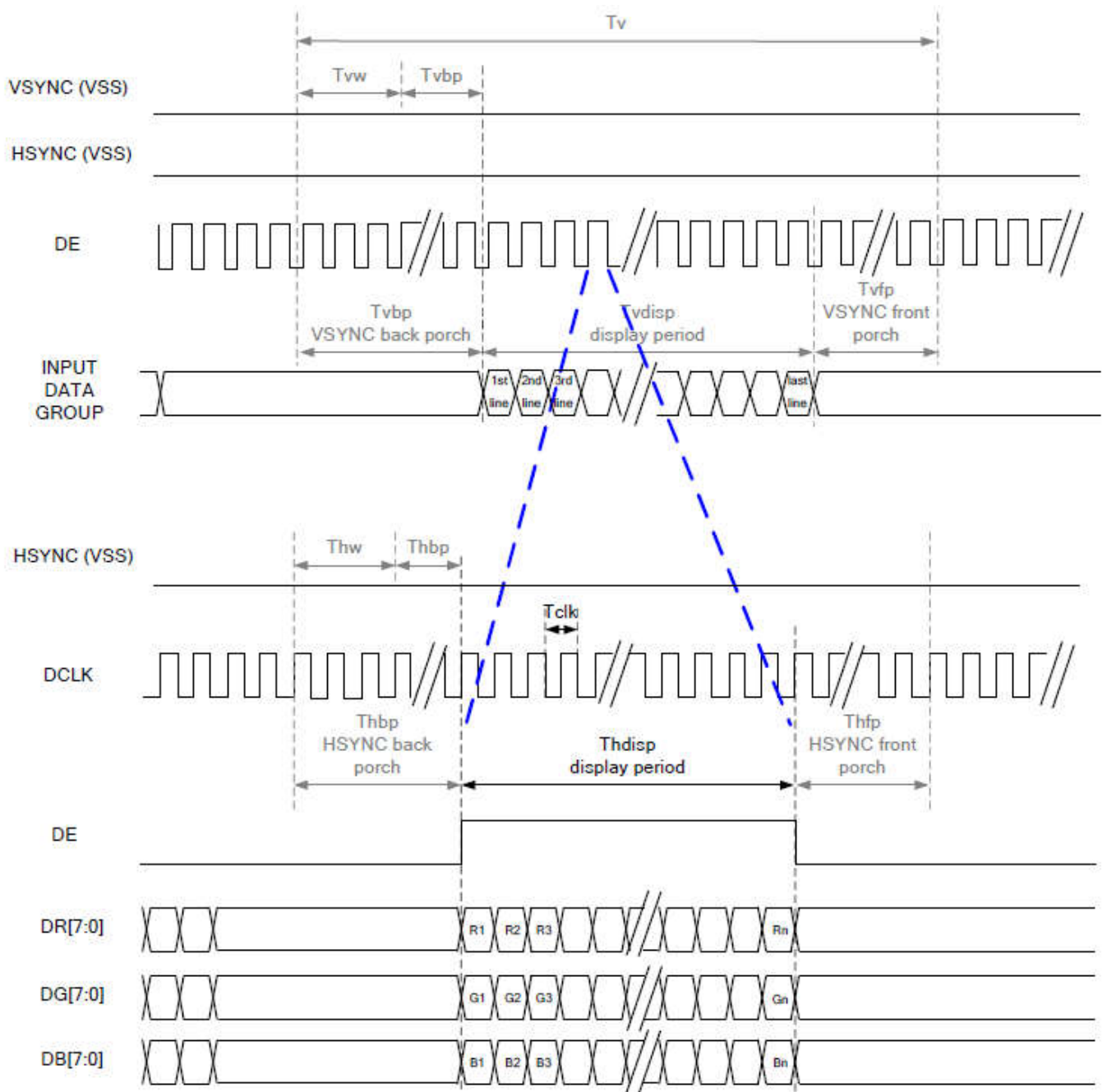
Symbol	Parameter	100KHz			400KHz		
		Min	Max	Unit	Min	Max	Unit
f_{SCL}	SCL clock frequency	0	100	kHz	0	400	KHz
$t_{HD,STA}$	Hold time (repeated) START condition. After this period, the first clock pulse is generated	4.0	—	μs	0.6	—	μs
t_{LOW}	LOW period of the SCL clock	4.7	—	μs	1.3	—	μs
t_{HIGH}	HIGH 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

6-4 RGB input timing table

480RGB X 272 Resolution Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	8	9	12	MHz	
DCLK Period		Tclk	83	111	125	ns	
HSYNC	Period Time	Th	485	531	598	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	3	43	43	DCLK	By H_BLANKING setting
	Front Porch	Thfp	2	8	75	DCLK	
	Pulse Width	Thw	2	4	43	DCLK	
VSYNC	Period Time	Tv	276	292	321	HSYNC	
	Display Period	Tvdisp		272		HSYNC	
	Back Porch	Tvbp	2	12	12	HSYNC	By V_BLANKING setting
	Front Porch	Tvfp	2	8	37	HSYNC	
	Pulse Width	Tvw	2	4	12	HSYNC	

Note: It is necessary to keep Tvbp =12 and Thbp =43 in sync mode. DE mode is unnecessary to keep it.

6-5 DE mode timing diagram



RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

7. Optical Characteristics:

Item		Symbol	Conditions	Specifications			Unit	Note
				Min	Typ	Max		
Transmittance		T(%)	-	-	6.6	-	-	-
Contrast Ratio		CR	$\Theta = 0$ Normal Viewing angle	640	800	-	-	(1) (2)
Response time		TR+TF	-	-	30	40	ms	(1) (3)
Viewing angle	Hor.	Θ_{x+}	$CR \geq 10$	-	80	-	deg.	-
		Θ_{x-}		-	80	-		
	Ver.	Θ_{y+}		-	80	-		
		Θ_{y-}		-	80	-		

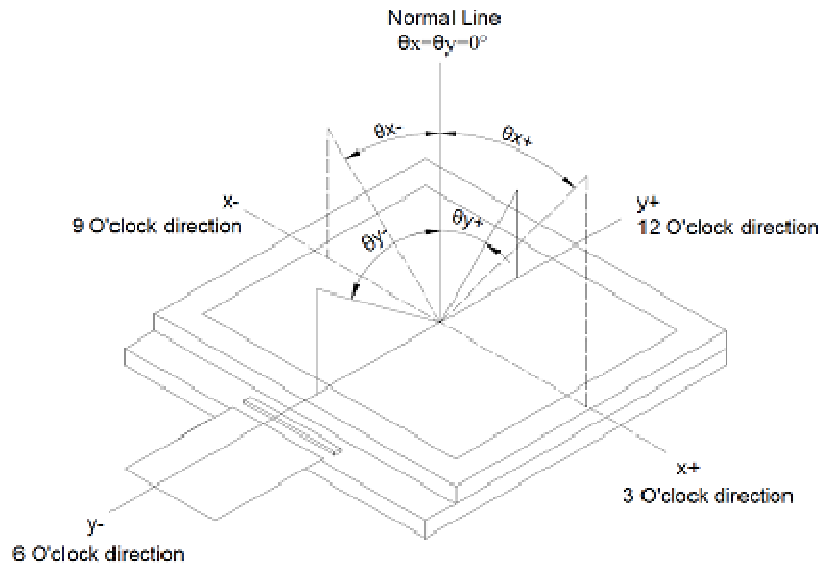
Measuring Condition

1. Measuring surrounding: dark room
2. Ambient temperature: $25 \pm 2^{\circ}\text{C}$
3. 30 min. Warm-up time.

Color of CIE Coordinate:

Item		Symbol	Condition	Min.	Typ.	Max.
Chromaticity Coordinates (Transmissive)	Red	x	$\theta = 0^{\circ}$ Backlight Color Degree	0.563	0.613	0.663
		y		0.302	0.352	0.402
	Green	x		0.337	0.387	0.437
		y		0.510	0.560	0.610
	Blue	x		0.095	0.145	0.195
		y		0.073	0.123	0.173
	White	x		0.290	0.340	0.390
		y		0.310	0.360	0.410

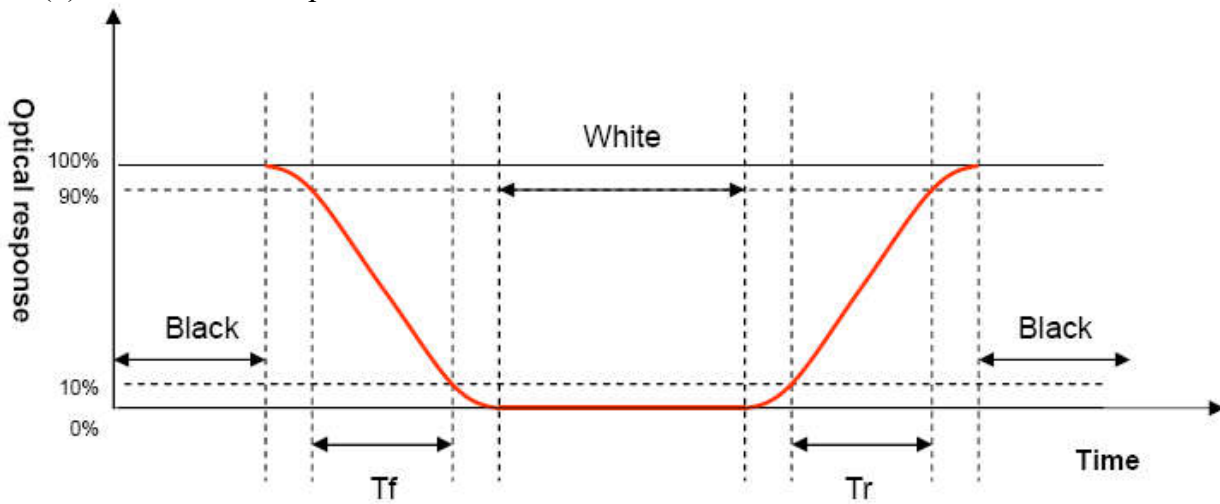
Note (1) Definition of Viewing Angle :



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

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

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



8. Interface Pin Assignment:

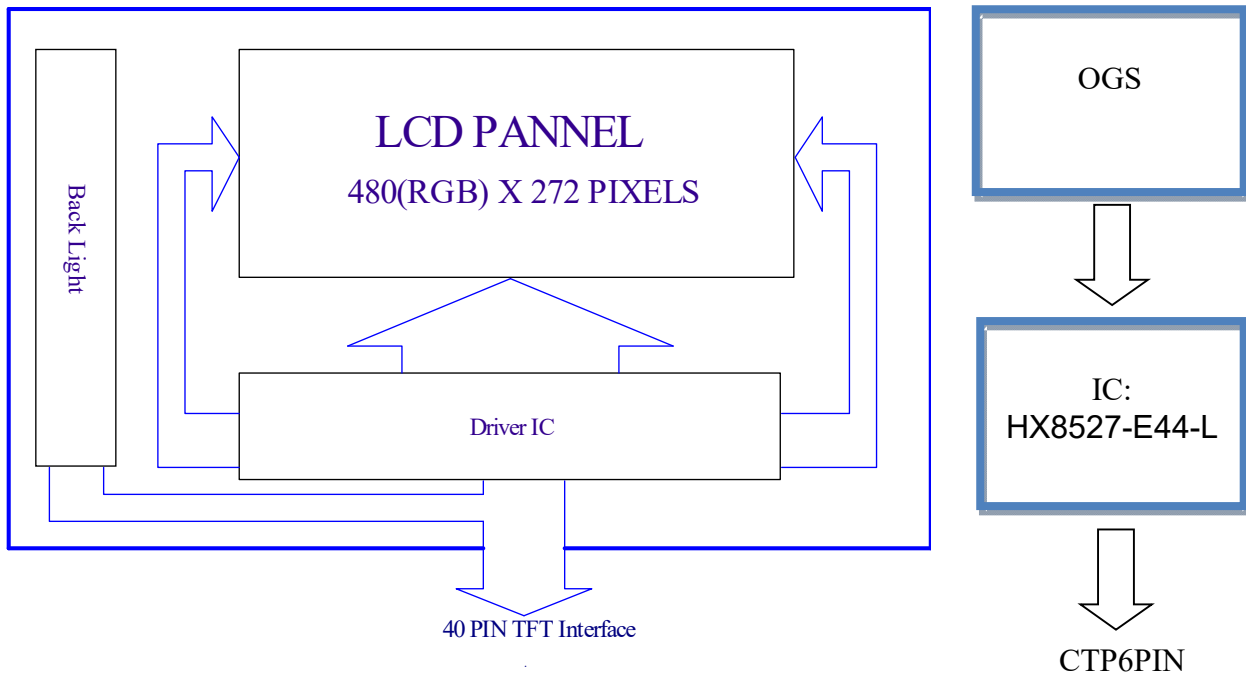
8-1 LCM FPC interface

No.	Symbol	Function
1	LEDK	Cathode of LED backlight
2	LEDA	Anode of LED backlight
3	GND	GND Power ground
4	VDD	Power voltage.
5~12	R0~ R7	Digital data input.R0(LSB),R7(MSB)
13~20	G0~ G7	Digital data input.G0(LSB),G7(MSB)
21~28	B0~ B7	Digital data input.B0(LSB),B7(MSB)
29	GND	Power ground
30	DCLK	Data clock signal input
31	DISP	Display on/off mode control. (a) DISP=L, standby mode. (b) DISP=H, normal display mode.
32	HSYNC	Horizontal sync signal input
33	VSNC	Vertical sync signal input
34	DE	Data enable input.
35	NC	No connection
36	GND	Power ground
37	NC/XR	No connection, reserve for TP interface.
38	NC/YD	No connection, reserve for TP interface.
39	NC/XL	No connection, reserve for TP interface.
40	NC/YU	No connection, reserve for TP interface.

8-2: CTP Pin Description:

No.	Symbol	Function
1	VDD3.3V	Power supply
2	RESET	System reset signal input, active low
3	INT	Indicate coordinate data ready
4	SCL	I2C Serial Clock
5	SDA	I2C Serial Data
6	GND	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	-	60	-	mA	-	
Supply Voltage	V	14.5	15.0	15.5	V	If=60mA	
Luminous Intensity for CTP+ LCM	Iv	830		-	Cd/m ²		2
Uniformity for LCM+CTP	-	70	-	-	%		3
Life Time	-	50000	-	-	Hr.		4
Color	White						

NOTE:

1. Backlight Only

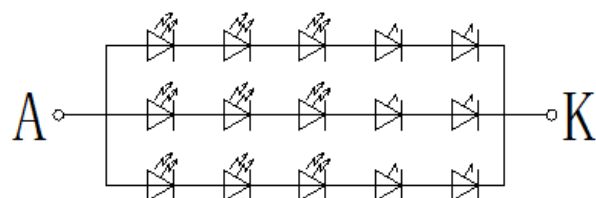
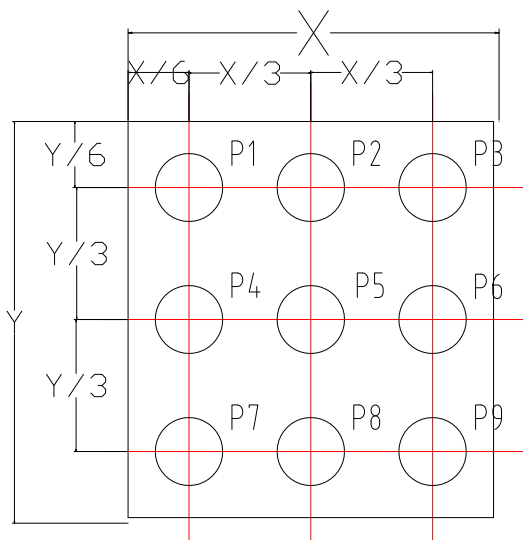
2. Average Luminous Intensity of P1-P9

3. Uniformity = Min/Max * 100%

4. LED life time defined as follows: The final brightness is at 50% of original brightness

Measured Method: (X*Y: Light Area)

Internal Circuit Diagram



(Effective spatial Distribution)

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 70℃ 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 -20℃ 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 80℃ 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 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 : -30℃ for 30 minutes → normal temperature for 5 minutes → +80℃ 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.
09	Electrical Static Discharge	Air: ±6KV 150pF/330Ω 5 times
		Contact: ±4KV 150pF/330Ω 5 time

*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 12.2, 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 ($25\pm 5^{\circ}\text{C}$), normal humidity ($50\pm 10\%$ RH), and in area not exposed to direct sun light.
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12. Specification of Quality Assurance:

12-1. Purpose

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 **ISO2859-1**.General Inspection Level II take a single time.

(ii) The defects classify of AQL as following:

Major defect: AQL = 0.40

Minor defect: AQL = 1.0

Total defects: AQL = 1.0

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.

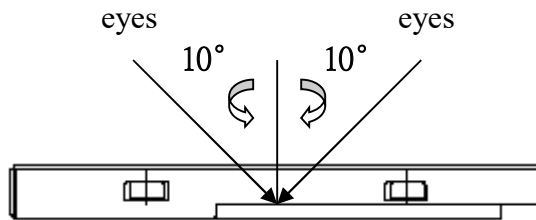
b. There is any argument item which does not record in the standard of quality assurance.

c. Any other special problem.

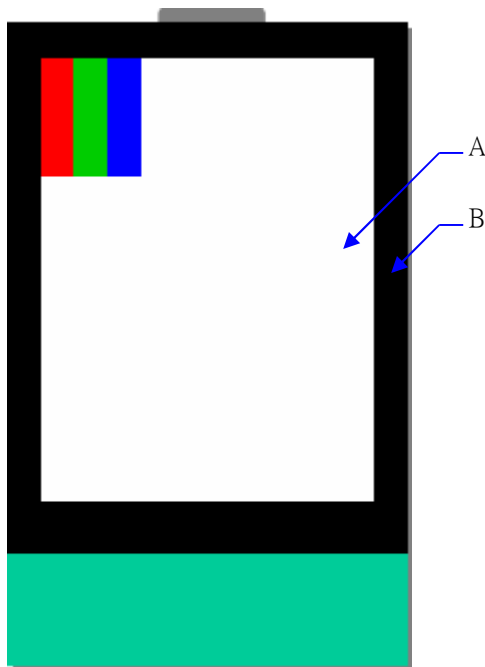
12-5. Standard of The Product Appearance Test

a. Manner of appearance test:

- (i) The test must be under $20W \times 2$ or $40W$ fluorescent light, and the distance of view must be at $30 \pm 5cm$.
- (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.
- (iii) Temperature: $25 \pm 5^\circ C$ Humidity: $60 \pm 10\% RH$



(iv) Definition of area:



A. Area: Viewing area.

B. Area: Out of viewing area.

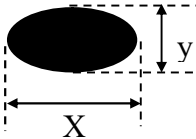
(Outside viewing area)

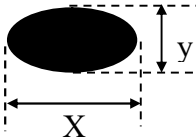
b. Basic principle:

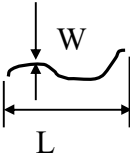
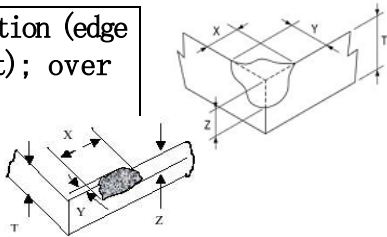
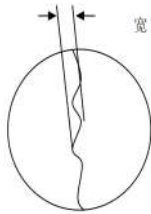
- (i) It will accord to the AQL when the standard can not be described.
- (ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
- (iii) Must add new item on time when it is necessary.


d. 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												
explosion-proof film bubble/Concave and convex point/indentation / Contamination	<table><tr><th>D</th><th>Acceptable numbers</th></tr><tr><td>≤ 0.25</td><td>ignored (No more than five spots within 5mm)</td></tr><tr><td>$0.25 < D \leq 0.5$</td><td>3</td></tr><tr><td>$0.5 < D \leq 0.8$</td><td>2</td></tr><tr><td>$0.8 < D \leq 1.5$</td><td>1</td></tr><tr><td>$D > 1.5$</td><td>NG</td></tr></table> <p>1、 Product's front side checked according to this specification, back side ignored, but light leakage is not allowed.</p> <p>2、 Printing ink peel off is not allowed.</p> <p>3、 The particle will be ignored when it is removable by cleaning</p> <p>* Densely spaced: No more than two spots within 10mm</p>	D	Acceptable numbers	≤ 0.25	ignored (No more than five spots within 5mm)	$0.25 < D \leq 0.5$	3	$0.5 < D \leq 0.8$	2	$0.8 < D \leq 1.5$	1	$D > 1.5$	NG	 <p>$D = (x+y) / 2$</p>	2.5
D	Acceptable numbers														
≤ 0.25	ignored (No more than five spots within 5mm)														
$0.25 < D \leq 0.5$	3														
$0.5 < D \leq 0.8$	2														
$0.8 < D \leq 1.5$	1														
$D > 1.5$	NG														

	D	Acceptable numbers	 $D = (x+y) / 2$	
	≤ 0.15	ignored (No more than five spots within 5mm)		
	$0.15 < D \leq 0.3$	3		
	$0.3 < D \leq 0.5$	2		
	$D > 0.5$	NG		
Black spots / White spots /Bright spots/ Color spots /polluted inside/ punctured	1.Product's front side checked according to this specification, back side ignored, but light leakage is not allowed.			2.5
	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			

	W	L	Acceptable numbers					
	≤ 0.05	≤ 5	ignored (No more than five lines within 5mm)					
	$0.05 < W \leq 0.15$	≤ 5	2					
	$W > 0.15$		NG					
Linear Object: Fiber, scurf, scratches and other linear defects (not affecting function)	The reverse side scratches, not affect to the electronic circuit, cannot find the scratches from the front side is acceptable			2.5				
	* Densely spaced: No more than two lines within 10mm							
Glass edge chipping、edge breakage	<div>Edge breakage can't affect visual effect (edge breakage can't cause damage to circuit); over lens have no visual damage</div> <table><tr><th>conditions</th><th>Acceptable numbers</th></tr><tr><td>$X \leq 1.5\text{mm}, Y \leq 2\text{mm}, Z \leq T$</td><td>4</td></tr></table>		conditions	Acceptable numbers	$X \leq 1.5\text{mm}, Y \leq 2\text{mm}, Z \leq T$	4		2.5
conditions	Acceptable numbers							
$X \leq 1.5\text{mm}, Y \leq 2\text{mm}, Z \leq T$	4							
Glass broken	Visual broken is NG, and there is no potential fault.			0.65				
1. V/A printed edges sawtooth inspected according to this standard 2. LOGO's sawtooth	<div>Some contentious defect judged according to samples</div> <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>		Product type	Conditions	Same size	1、width below 0.2 inch (included) ignored, above 0.2 NG 2、Length not accounted		2.5
Product type	Conditions							
Same size	1、width below 0.2 inch (included) ignored, above 0.2 NG 2、Length not accounted							
Specific dimension	In accordance with product outline drawing or specification (key dimension) or engineering sample.			2.5				

Glue overflow/Frame		1. Glue overflow exceed 0.2mm to the black frame is not allowed. 	2.5
FPC	Bonding bubble/ Misalignm ent	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.	0.65
	Folded mark (minor fault)	Linearity irreversibility folded mark and acute angle folded mark is NG.	2.5
	EMI FILM (minor fault)	Surface broken, scratched $\leq 0.3\text{mm}$ Surface broken below 5mm can be modified by print ink, after modified, the result shall be achieved to EMI	2.5

13. Handling Precaution:

13-1 Handling of LCM

- Don't give external shock.
- Don't apply excessive force on the surface.
- Liquid in LCD is hazardous substance. Must not lick and swallow. when the liquid is attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.
- Don't operate it above the absolute maximum rating.
- Don't disassemble the LCM.
- The operators should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.
- The modules should be kept in antistatic bags or other containers resistant to static for storage.
- The module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

13-2 Storage

- Store in an ambient temperature of $25\pm 10^{\circ}\text{C}$, and in a relative humidity of $50\pm 10\%\text{RH}$. Don't expose to sunlight or fluorescent light.
- Storage in a clean environment, free from dust, active gas, and solvent.
- Store in anti-static electricity container.
- Store without any physical load.

13-3 Soldering

- Use only soldering irons with proper grounding and no leakage.
- Iron: No higher than $280\pm 10^{\circ}\text{C}$ and less than 3 sec during Hand soldering.
- Rewiring: no more than 2 times.

14. Guarantee:

Our products meet requirements of the environment.

YEEBO ROHS requirement is based on European Union Directive 2011/65/EU(ROHS) Requirements and Update.