



YEEBO LCD Limited

LCM Specialist

# SPECIFICATION FOR LCD MODULE

MODULE NO: YB-TG240320S27A-C-A

Doc.Version:00

Customer Approval:

☐ Accept

☐ Reject

YEEBO	NAME	SIGNATURE	DATE
Prepare	Electronic Engineer	卢家伦	2017.3.29
Check	Mechanical Engineer	陈如	2017.3.29
Verify			
Approval		卢家伦	2017.3.29

☐ APPROVAL FOR SPECIFICATIONS ONLY

☒ APPROVAL FOR SPECIFICATIONS AND SAMPLE

Add: 7/F., On Dak Industrial Building, 2-6 Wah Sing Street, Kwai Chung, H.K.

Tel: +852-2945-6800 ; +852-2945-6885

Fax: +852-2481-0019

## 1. Revision History

[illegible]



## **2. Table of Contents:**

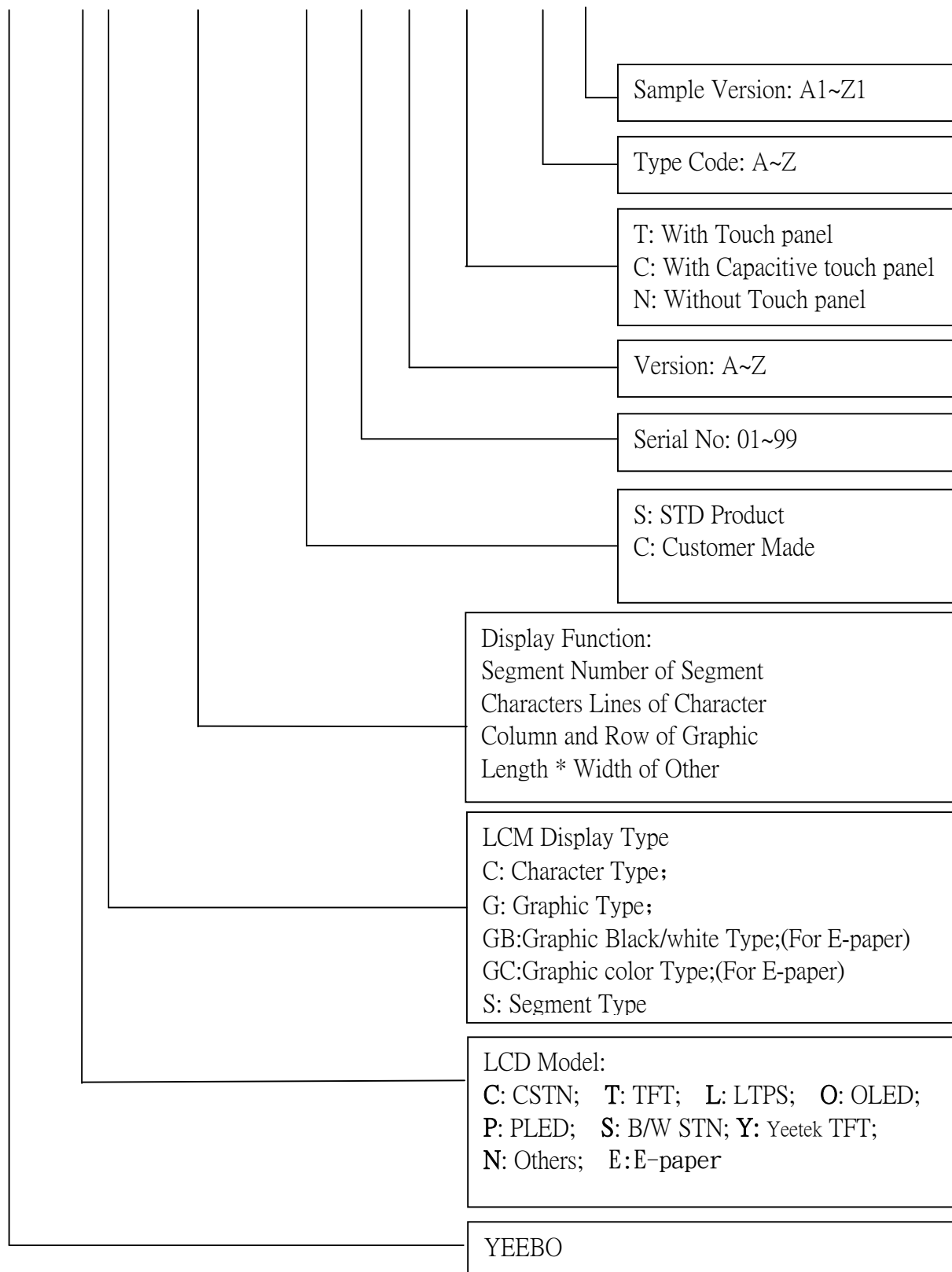
<b>NO</b>	<b>CONTENTS</b>	<b>PAGE</b>
1	Revision History	1
2	Table of Contents	2
3	Module Numbering System	3
4	General Specification	4
5	LCM drawing	5
6	Electrical Characteristics	6
7	Optical Characteristics	10
8	Interface Pin Assignment	12
9	Block Diagram	14
10	Backlight	15
11	Standard Specification for Reliability	16
12	Specification of Quality Assurance	18
13	Handling Precaution	26
14	Guarantee	26



### 3. Module Numbering System:

(Example)

**YB- TG 240320 S 27 A -C - A A1**



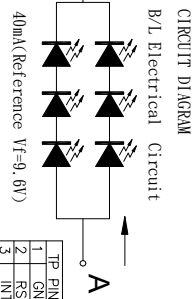
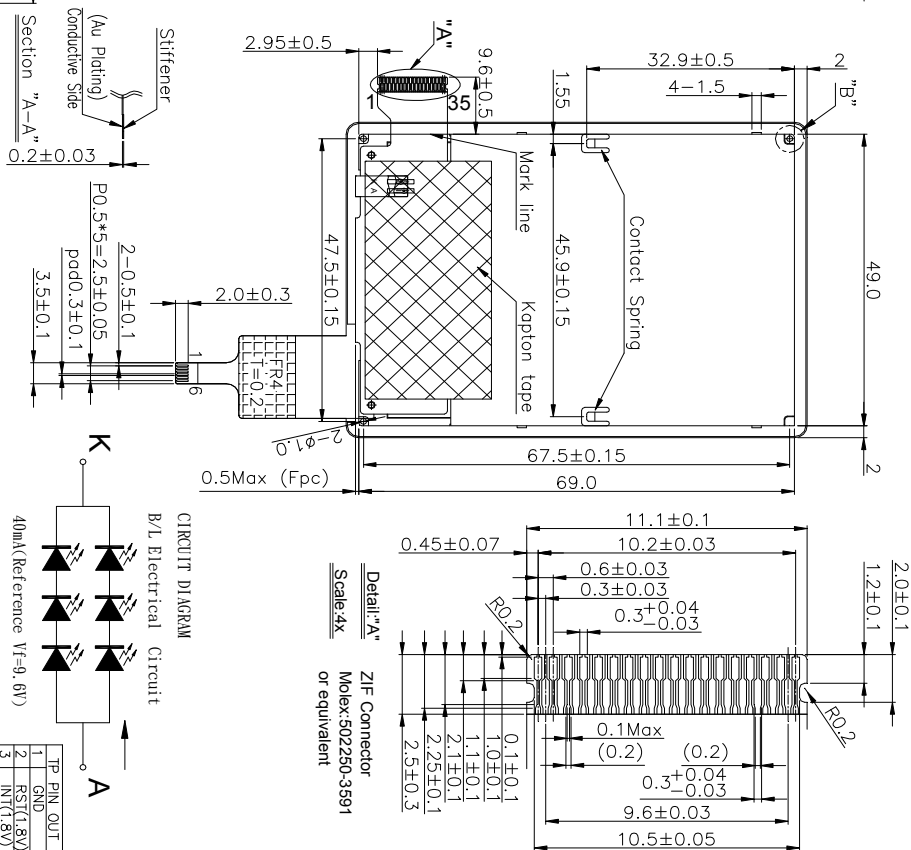
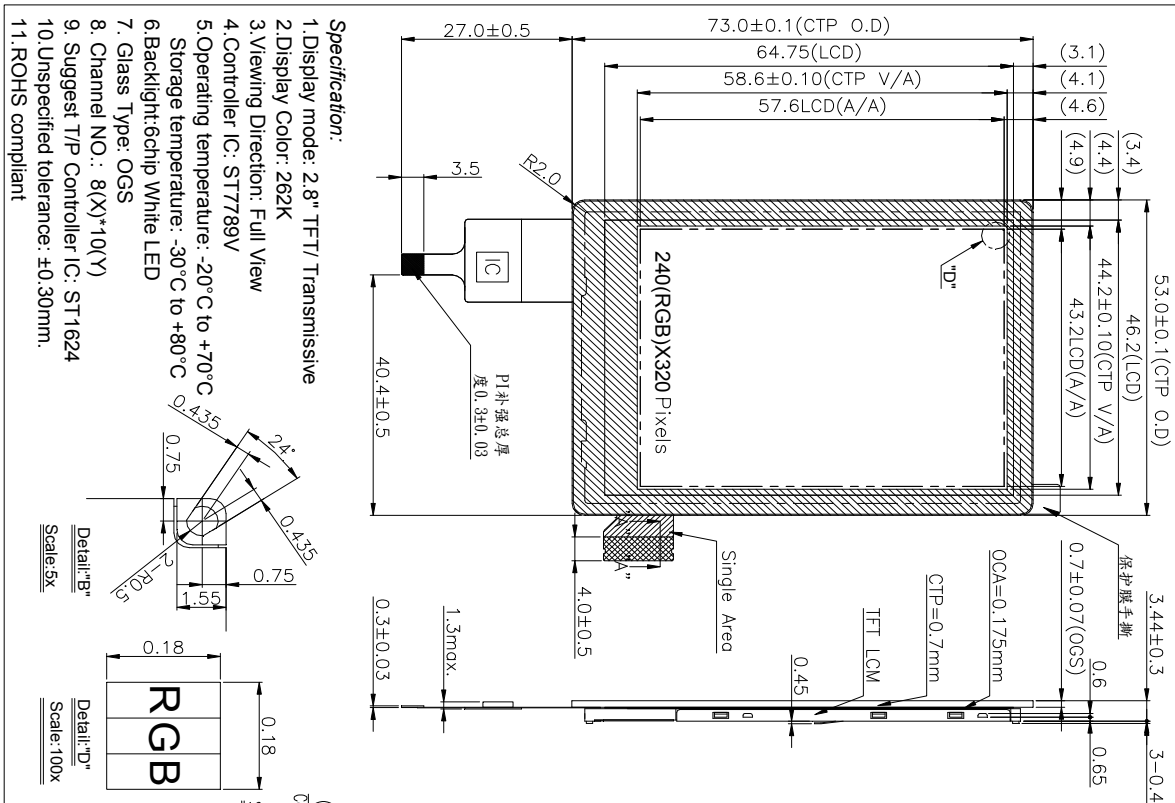


#### **4. General Specification:**

ITEM	CONTENTS
Module Size	53.0 (W) * 73.0 (H) * 3.44 (T) mm
Display Size(Diagonal)	2.8 inch
Display Format	240(RGB)*320 Pixels
View Area	44.2(W) * 58.6 (H) mm
Pixel Pitch	0.18* 0.18 mm
LCD Type	TFT (262K) / Transmissive / Normally Black
View Direction	Free
Controller IC	ST7789V
CTP IC	ST1624
Weight	≈21.2g

## 5. LCM drawing:

Count drawing & Spec. revision record during discussion with customer	Rec.	Revision content description	Date
#1	FIRST ISSUE		2016-12-10



TP PIN OUT	1	2	3	4	5	6
GND	RST(1.8V)	INT(1.8V)	SDA(1.8V)	SCL(1.8V)	VCC(2.8V)	GND

Detail "A"

ZIF Connector

Molex: 502250-3591

or equivalent

Scale: 4x

YEEBO				MOD. Name	YB-TG240320S27A-C-A	Sheet	1
UNIT	SIZE	SCALE	DESIGNED	CHECKED	VERIFIED	APPROVED	FILE NAME
mm	A4	N-T-S	蔡模豐				Count Dwg.
			2016-12-10				

## 6. Electrical Characteristics

### 6-1 Absolute Maximum Ratings

(Ta=25°C VSS=0V)

Item	Symbol	Min.	Type	Max.	Unit	Remark
Supply Voltage	V <sub>CI</sub>	-0.3	-	+4.6	V	Note1
Supply Voltage(Logic)	IOV <sub>CC</sub>	-0.3		+4.6		Note1
Logic Input Voltage Range	V <sub>IN</sub>	0.5		IOV <sub>CC</sub> +0.5	V	Note1
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.

### 6-2 Operating Conditions

(Ta=25°C )

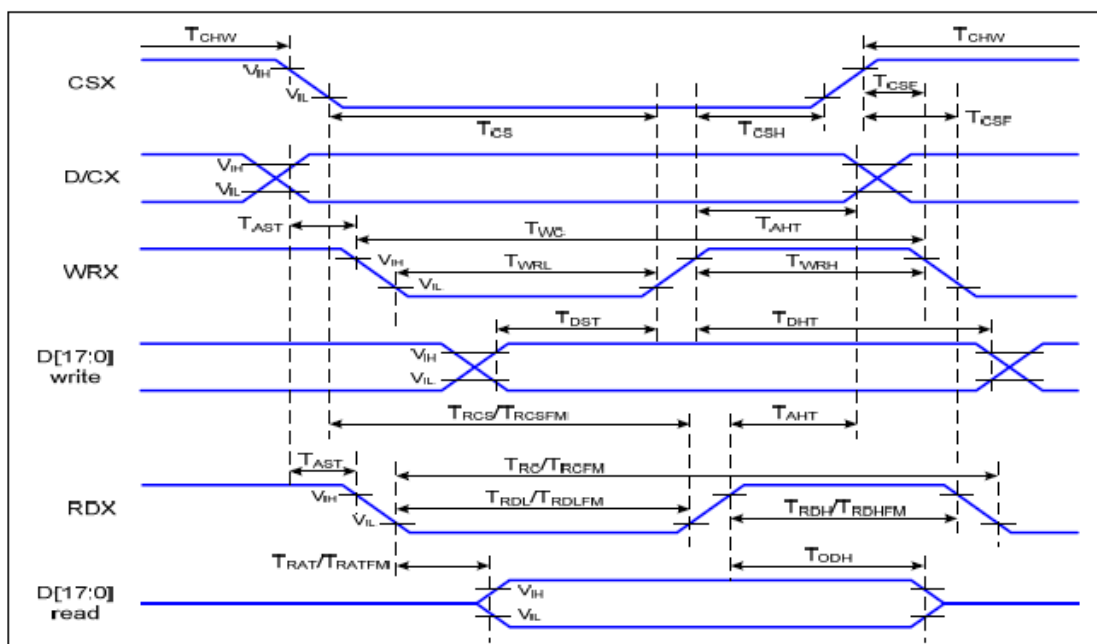
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply voltage	V <sub>CI</sub>	-	2.6	2.8	3.3	Volt
Supply voltage for I/O	IOV <sub>CC</sub>	-	1.65	2.8	3.3	Volt
Input Voltage	V <sub>IH</sub>	-	0.7 IOV <sub>CC</sub>	-	IOV <sub>CC</sub>	V
	V <sub>IL</sub>	-	V <sub>SS</sub>	-	0.3 IOV <sub>CC</sub>	V
Power Supply Current for LCM	I <sub>CC</sub>	V <sub>CI</sub> =2.8V	-	9.25	13.8	mA

### 6-3 Touch Panel Controller ST1624

Item	Symbol	Min.	Typ.	Max.	Unit
Power Supply	VDD	2.7	-	3.6	Volt

## 6-4 Timing Characteristics

### 6-4-1 8080 Series MCU Parallel Interface Characteristics: 18/16/9/8-bit Bus



Parallel Interface Timing Characteristics (8080-Series MCU Interface)

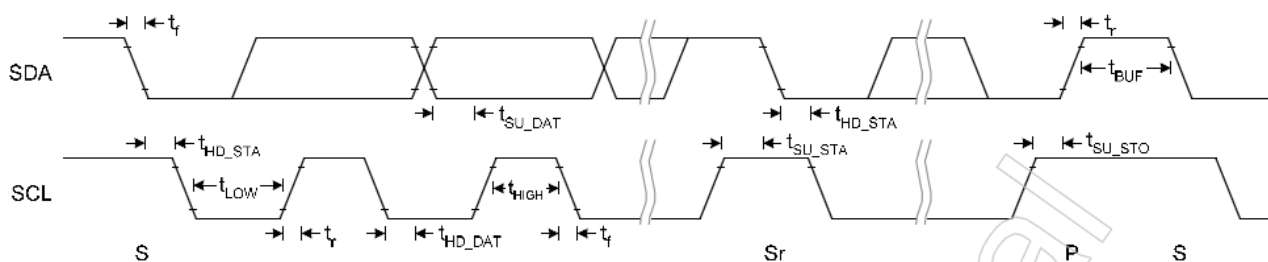
VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta= -30 to 70 °C

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	T <sub>AST</sub>	Address setup time	0		ns	
	T <sub>AHT</sub>	Address hold time (Write/Read)	10		ns	
CSX	T <sub>CHW</sub>	Chip select "H" pulse width	0		ns	
	T <sub>CS</sub>	Chip select setup time (Write)	15		ns	
	T <sub>RCS</sub>	Chip select setup time (Read ID)	45		ns	
	T <sub>RCSFM</sub>	Chip select setup time (Read FM)	355		ns	
	T <sub>CSF</sub>	Chip select wait time (Write/Read)	10		ns	
	T <sub>CSH</sub>	Chip select hold time	10		ns	
WRX	T <sub>WC</sub>	Write cycle	66		ns	
	T <sub>WRH</sub>	Control pulse "H" duration	15		ns	
	T <sub>WRL</sub>	Control pulse "L" duration	15		ns	
RDX (ID)	T <sub>RC</sub>	Read cycle (ID)	160		ns	When read ID data
	T <sub>RDH</sub>	Control pulse "H" duration (ID)	90		ns	
	T <sub>RDL</sub>	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	T <sub>RCFM</sub>	Read cycle (FM)	450		ns	When read from frame memory
	T <sub>RDHFM</sub>	Control pulse "H" duration (FM)	90		ns	
	T <sub>RDLFM</sub>	Control pulse "L" duration (FM)	355		ns	
D[17:0]	T <sub>DST</sub>	Data setup time	10		ns	For CL=30pF



	$T_{DHT}$	Data hold time	10		ns
	$T_{RAT}$	Read access time (ID)		40	ns
	$T_{RATFM}$	Read access time (FM)		340	ns
	$T_{ODH}$	Output disable time	20	80	ns

## 6-4-2 Touch panel controller ST1624

**I2C Interface**

Symbol	Parameter	Rating			Unit
		Min.	Typ.	Max.	
$f_{SCL}$	SCL clock frequency	0	-	400	kHz
$t_{LOW}$	Low period of the SCL clock	1.3	-	-	us
$t_{HIGH}$	High period of the SCL clock	0.6	-	-	us
$t_f$	Signal falling time	-	-	300	ns
$t_r$	Signal rising time	-	-	300	ns
$t_{SU\_STA}$	Set up time for a repeated START condition	0.6	-	-	us
$t_{HD\_STA}$	Hold time (repeated) START condition. After this period, the first clock pulse is generated	0.6	-	-	us
$t_{SU\_DAT}$	Data set up time	100	-	-	ns
$t_{HD\_DAT}$	Data hold time	0	-	0.9	us
$t_{SU\_STO}$	Set up time for STOP condition	0.6	-	-	us
$t_{BUF}$	Bus free time between a STOP and START condition	1.3	-	-	us
$C_b$	Capacitive load for each bus line	-	-	400	pF

## 7. Optical Characteristics:

Item		Symbol	Conditions	Specifications			Unit	Note
				Min	Typ	Max		
Transmittance (With PL)		T(%)	—	-	3.9	-	-	-
Contrast Ratio		CR	$\Theta=0$ Normal Viewing angle	-	800	-		(1) (2)
Response time		TR+TF	—	-	30	-	ms	(1) (3)
Viewing angle	Hor	$\Theta_{x+}$	$CR \geq 10$	-	80	-	deg.	-
		$\Theta_{x-}$		-	80	-		
	Ver	$\Theta_{y+}$		-	80	-		
		$\Theta_{y-}$		-	80	-		

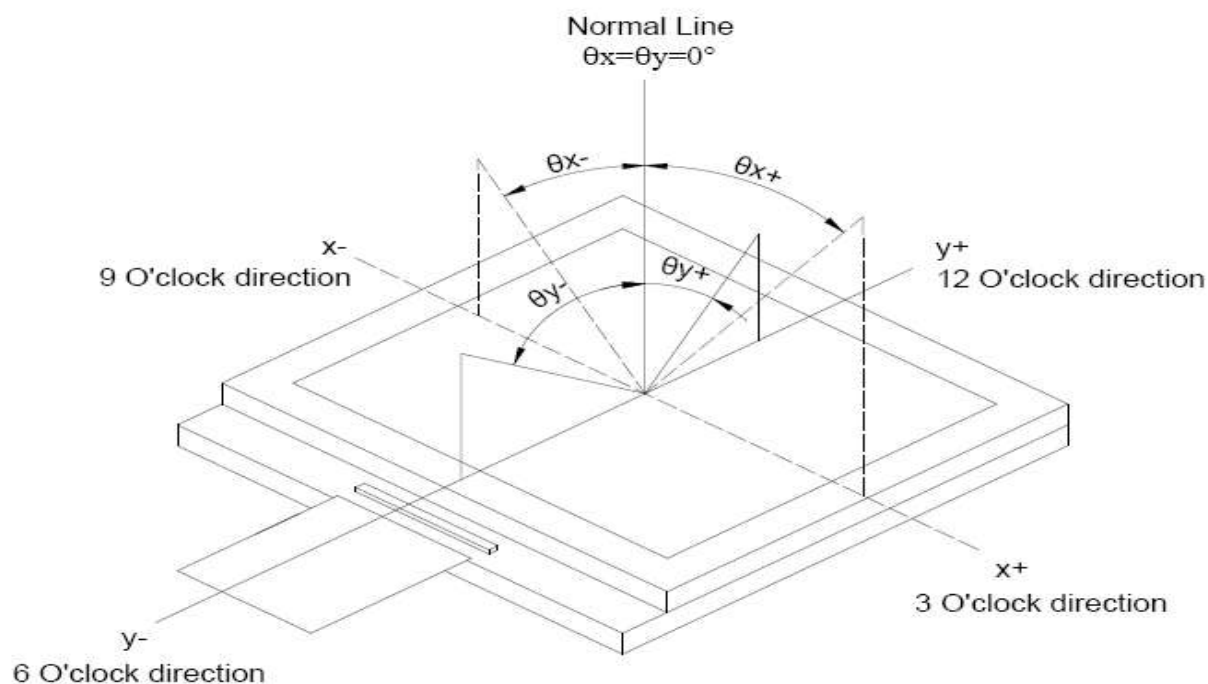
### Measuring Condition

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	$\theta = \phi = 0^\circ$ LED Backlight	0.5801	0.6301	0.6801
		y		0.2825	0.3325	0.3825
	Green	x		0.2668	0.3168	0.3668
		y		0.5660	0.6160	0.6660
	Blue	x		0.0948	0.1448	0.1948
		y		0.0187	0.0687	0.1187
	White	x		0.2396	0.2896	0.3396
		y		0.2574	0.3074	0.3574

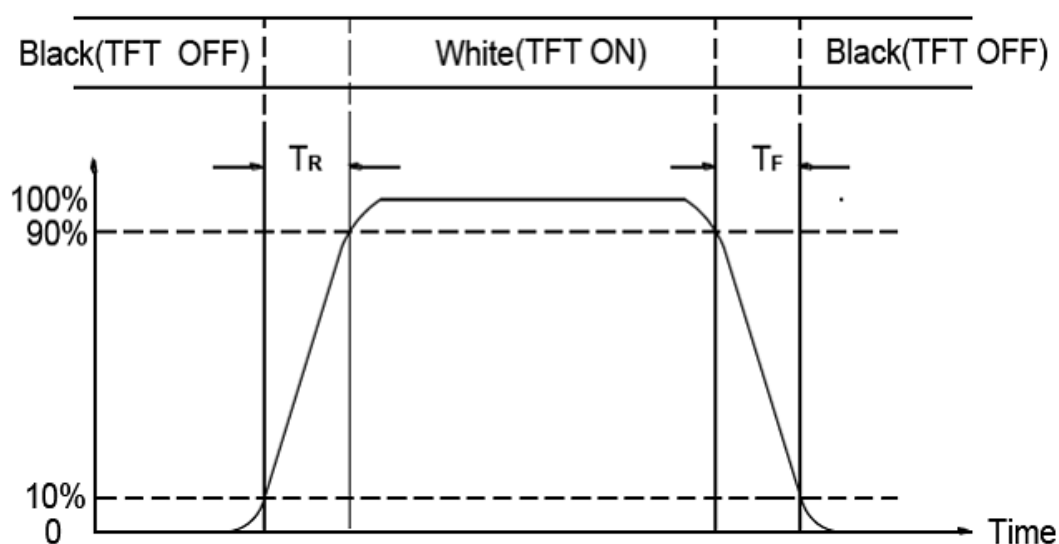
Note (1) Definition of Viewing Angle :



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  $T_R$  and  $T_F$



**8. Interface Pin Assignment:****8-1 LCD FPC Interface**

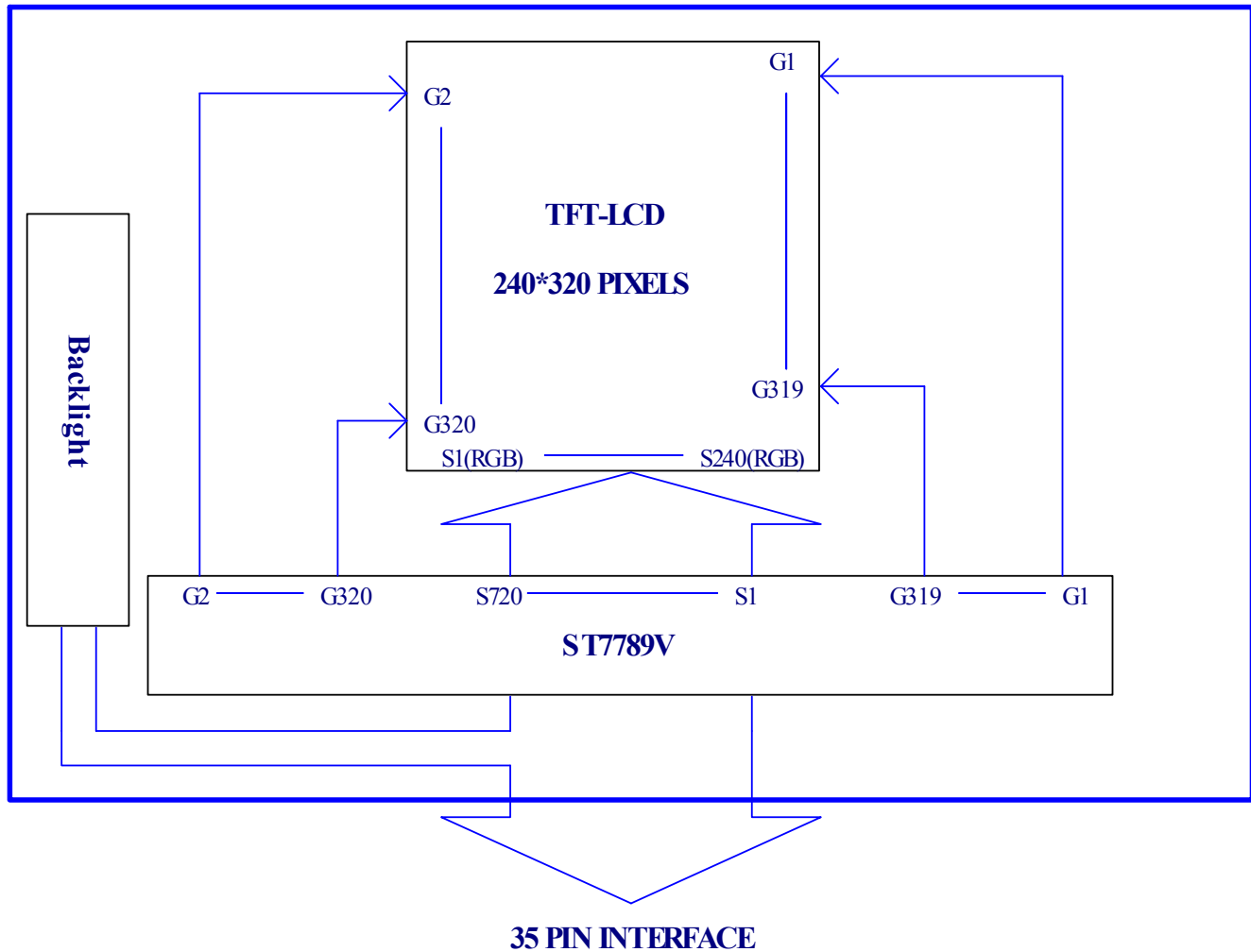
No.	Symbol	Function																							
1	GND	Ground																							
2	IM0	<div>Select MPU Interface mode</div> <table><tr><th>IM1</th><th>IM0</th><th>MCU-Interface Mode</th><th>DB Pin in use</th></tr><tr><td>0</td><td>0</td><td>80 MCU 16-bit bus interface II</td><td>D[17:10],D[8:1]</td></tr><tr><td>0</td><td>1</td><td>80 MCU 8-bit bus interface II</td><td>D[17:10]</td></tr><tr><td>1</td><td>0</td><td>80 MCU 18-bit bus interface II</td><td>D[17:0]</td></tr><tr><td>1</td><td>1</td><td>80 MCU 9-bit bus interface II</td><td>D[17:9]</td></tr></table>				IM1	IM0	MCU-Interface Mode	DB Pin in use	0	0	80 MCU 16-bit bus interface II	D[17:10],D[8:1]	0	1	80 MCU 8-bit bus interface II	D[17:10]	1	0	80 MCU 18-bit bus interface II	D[17:0]	1	1	80 MCU 9-bit bus interface II	D[17:9]
IM1	IM0					MCU-Interface Mode	DB Pin in use																		
0	0					80 MCU 16-bit bus interface II	D[17:10],D[8:1]																		
0	1					80 MCU 8-bit bus interface II	D[17:10]																		
1	0					80 MCU 18-bit bus interface II	D[17:0]																		
1	1	80 MCU 9-bit bus interface II	D[17:9]																						
3	IM1																								
4	TE	Tearing effect signal is used to MCU to frame memory writing																							
5	GND	Ground																							
6	DB17	Data bus																							
7	DB16	Data bus																							
8	DB15	Data bus																							
9	DB14	Data bus																							
10	DB13	Data bus																							
11	DB12	Data bus																							
12	DB11	Data bus																							
13	DB10	Data bus																							
14	DB9	Data bus																							
15	DB8	Data bus																							
16	IOVCC	Digital power supply																							
17	DB7	Data bus																							
18	DB6	Data bus																							
19	DB5	Data bus																							
20	DB4	Data bus																							
21	DB3	Data bus																							

22	DB2	Data bus
23	DB1	Data bus
24	DB0	Data bus
25	/CS	Chip select signal active low
26	RS	Display data/command selection pin in parallel interface. Display data(RS=1) / Command selection(RS=0)
27	WR	Write enable in MCU parallel interface
28	RD	Read enable in MCU parallel interface
29	/RESET	Reset signal active low
30	VCI	Analog power supply
31	GND	Ground
32	LED+	LED power supply(+)
33	GND	Ground
34	LED-	LED power supply(-)
35	GND	Ground

## 8-2 CTP FPC Interface

No.	Symbol	Function
1	GND	Ground
2	RST	System reset signal input, active low
3	INT	Indicate coordinate data ready
4	SDA	I2C Serial Data
5	SCL	I2C Serial Clock
6	VCC	Digital power supply

## 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°C)

PARAMETER	Sym.	Min.	Typ.	Max.	Unit	Test Condition	Note
Supply Current	I	-	40	-	mA	V=9.6V	
Supply Voltage	V	8.5	9.6	10.2	V	If=40mA	
Reverse Voltage	VR	-	-	5	V	-	
Luminous Intensity for LCM	IV	280	350	-	Cd/m <sup>2</sup>	If=40mA	2
Uniformity for LCM	-	70	-	-	%		3
Life Time	-	-	50000	-	Hr.		4
Color	White						

NOTE:

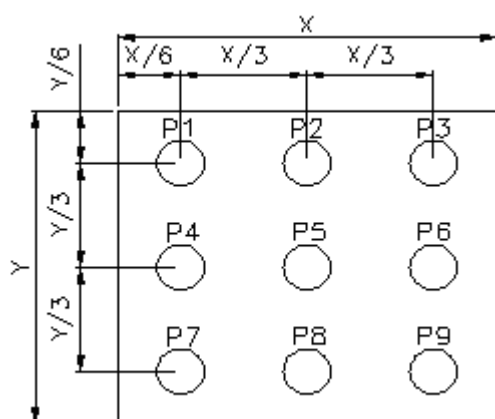
#### 1. Backlight Only

#### 2. Average Luminous Intensity of P1-P9

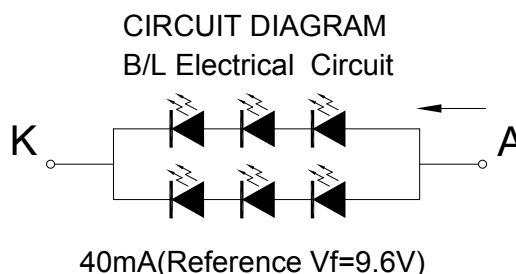
#### 3. Uniformity = Min/Max \* 100%

#### 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)

Hole Diameter  $\varnothing 3$  mm; 1 to 9 per Position Measured Luminous

**11. Standard Specification for Reliability:**

## 11-1. Standard Specifications for Reliability of LCD 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 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 -30℃ for 120 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 40℃, 90%RH MAX for 120 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.

\*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 11-1, 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.

## 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 ( $25\pm5^{\circ}\text{C}$ ), normal humidity ( $50\pm10\%$ RH), and in area not exposed to direct sun light.
------	---

## **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 = 0.65

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

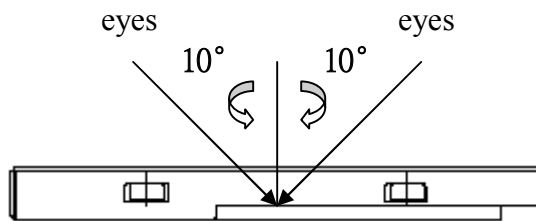
## a. Manner of appearance test:

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

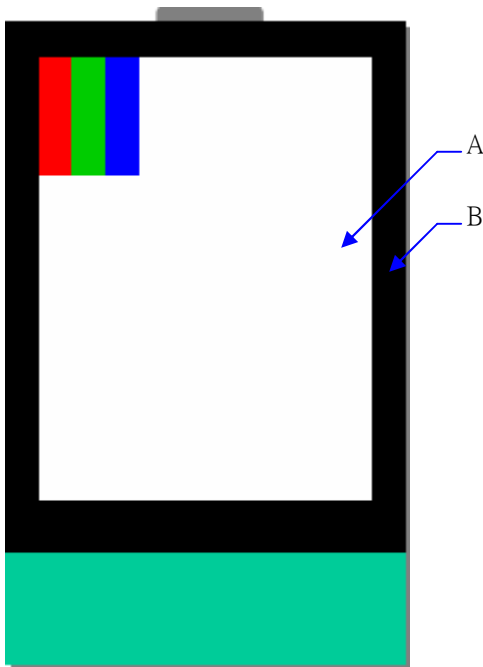
(ii) When test the model of transmissive product must add the reflective plate.

(iii) The test direction is base on around  $10^\circ$  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.

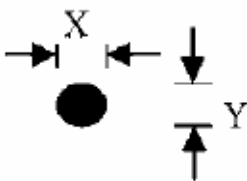
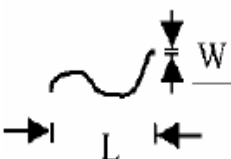
(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

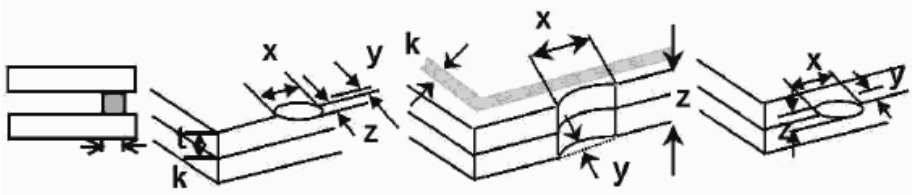
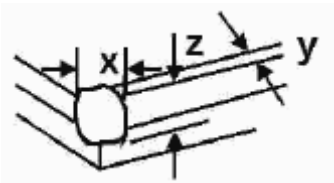
(iii) Must add new item on time when it is necessary.

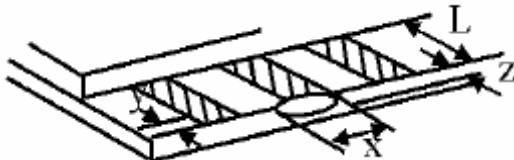
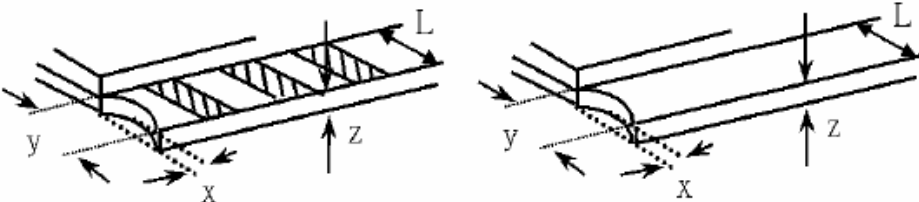
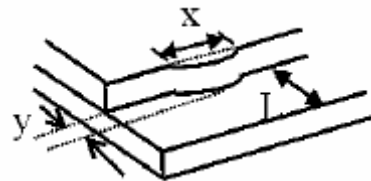
## c. Standard of inspection: (Unit: mm)

## 12-6. Inspection specification

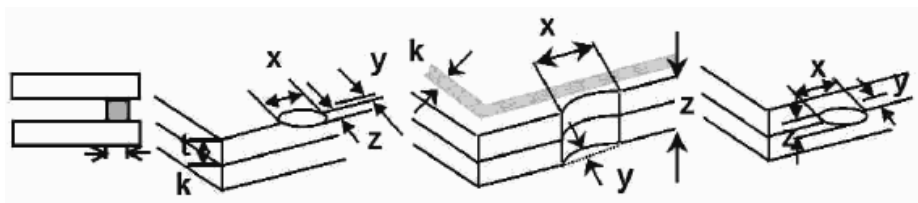
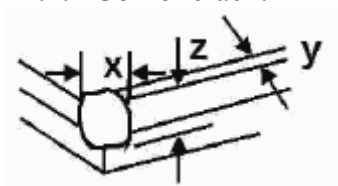
Defect out of viewing area can be neglected.

NO	Item	Criterion	AQL														
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Mixed product types. 1.8 Flicker	0.65														
02	Black or White spots or Bright spots or Color spots on LCD (Display only)	2.1 White and black or color spots on display ≤ 0.25mm, no more than Five spots. 2.2 Densely spaced: No more than three spots within 3mm.	2.5														
03	LCD and Touch Panel black spots, white spots, contamination (non – display)	3.1 Round type: As following drawing $\Phi = (X+Y) / 2$ <div></div> <table><tr><th>Size(mm)</th><th>Acceptable Q'ty</th></tr><tr><td><math>\Phi \leq 0.10</math></td><td>Accept no dense</td></tr><tr><td><math>0.10 &lt; \Phi \leq 0.20</math></td><td>2</td></tr><tr><td><math>0.20 &lt; \Phi \leq 0.25</math></td><td>2</td></tr><tr><td><math>0.25 &lt; \Phi \leq 0.30</math></td><td>1</td></tr><tr><td><math>0.30 &lt; \Phi</math></td><td>0</td></tr></table> <p>* Densely spaced: No more than two spots within 3mm.</p>	Size(mm)	Acceptable Q'ty	$\Phi \leq 0.10$	Accept no dense	$0.10 < \Phi \leq 0.20$	2	$0.20 < \Phi \leq 0.25$	2	$0.25 < \Phi \leq 0.30$	1	$0.30 < \Phi$	0	2.5		
		Size(mm)	Acceptable Q'ty														
$\Phi \leq 0.10$	Accept no dense																
$0.10 < \Phi \leq 0.20$	2																
$0.20 < \Phi \leq 0.25$	2																
$0.25 < \Phi \leq 0.30$	1																
$0.30 < \Phi$	0																
		3.2 Line type: (As following drawing) <div></div> <table><tr><th>Length(mm)</th><th>Width(mm)</th><th>Acceptable Q'ty</th></tr><tr><td>---</td><td><math>W \leq 0.05</math></td><td>Accept no dense</td></tr><tr><td><math>L \leq 3.0</math></td><td><math>0.05 &lt; W \leq 0.10</math></td><td rowspan="2">2</td></tr><tr><td><math>L \leq 2.5</math></td><td><math>0.10 &lt; W \leq 0.20</math></td></tr><tr><td>---</td><td><math>0.20 &lt; W</math></td><td>Rejection</td></tr></table> <p>* Densely spaced: No more than two lines within 3mm.</p>	Length(mm)	Width(mm)	Acceptable Q'ty	---	$W \leq 0.05$	Accept no dense	$L \leq 3.0$	$0.05 < W \leq 0.10$	2	$L \leq 2.5$	$0.10 < W \leq 0.20$	---	$0.20 < W$	Rejection	2.5
Length(mm)	Width(mm)	Acceptable Q'ty															
---	$W \leq 0.05$	Accept no dense															
$L \leq 3.0$	$0.05 < W \leq 0.10$	2															
$L \leq 2.5$	$0.10 < W \leq 0.20$																
---	$0.20 < W$	Rejection															

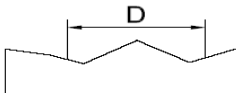

NO	Item	Criterion	AQL																		
04	Polarizer bubbles	<div><div>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction</div><table><tr><th>Size <math>\Phi</math>(mm)</th><th>Acceptable Q'ty</th></tr><tr><td><math>\Phi \leq 0.20</math></td><td>Accept no dense</td></tr><tr><td><math>0.20 &lt; \Phi \leq 0.50</math></td><td>3</td></tr><tr><td><math>0.50 &lt; \Phi \leq 1.00</math></td><td>2</td></tr><tr><td><math>1.00 &lt; \Phi</math></td><td>0</td></tr><tr><td>Total Q'ty</td><td>3</td></tr></table></div>	Size $\Phi$ (mm)	Acceptable Q'ty	$\Phi \leq 0.20$	Accept no dense	$0.20 < \Phi \leq 0.50$	3	$0.50 < \Phi \leq 1.00$	2	$1.00 < \Phi$	0	Total Q'ty	3	2.5						
Size $\Phi$ (mm)	Acceptable Q'ty																				
$\Phi \leq 0.20$	Accept no dense																				
$0.20 < \Phi \leq 0.50$	3																				
$0.50 < \Phi \leq 1.00$	2																				
$1.00 < \Phi$	0																				
Total Q'ty	3																				
05	Scratches	Follow NO.3 -2 Line Type.																			
06	Chipped glass	<div><div>Symbols: x: Chip length      y: Chip width      z: Chip thickness k: Seal width      t: Glass thickness      a: LCD side length L: Electrode pad length 6.1 General glass chip: 6.1.1 Chip on panel surface and crack between panels:</div><div></div><table><tr><th>z: Chip thickness</th><th>y: Chip width</th><th>x: Chip length</th></tr><tr><td><math>Z \leq 1/2t</math></td><td>Not over viewing area</td><td><math>x \leq 1/8a</math></td></tr><tr><td><math>1/2t &lt; z \leq 2t</math></td><td>Not exceed 1/3k</td><td><math>x \leq 1/8a</math></td></tr></table><div><div>⊙ Unit: mm</div><div>⊙ If there are 2 or more chips, x is the total length of each chip</div></div><div><div>6.1.2 Corner crack:</div><div></div><table><tr><th>z: Chip thickness</th><th>y: Chip width</th><th>x: Chip length</th></tr><tr><td><math>Z \leq 1/2t</math></td><td>Not over viewing area</td><td><math>x \leq 1/8a</math></td></tr><tr><td><math>1/2t &lt; z \leq 2t</math></td><td>Not exceed 1/3k</td><td><math>x \leq 1/8a</math></td></tr></table><div><div>⊙ Unit: mm</div><div>⊙ If there are 2 or more chips, x is the total length of each chip</div></div></div></div>	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	2.5
z: Chip thickness	y: Chip width	x: Chip length																			
$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$																			
$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$																			
z: Chip thickness	y: Chip width	x: Chip length																			
$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$																			
$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$																			

NO	Item	Criterion	AQL																
07	Glass crack	<p>Symbols:  x: Chip length      y: Chip width      z: Chip thickness  k: Seal width      t: Glass thickness      a: LCD side length  L: Electrode pad length</p> <p>7.2 Protrusion over terminal:  7.2.1 Chip on electrode pad:</p>  <table border="1"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td><math>y \leq 0.5\text{mm}</math></td> <td><math>x \leq 1/8a</math></td> <td><math>0 &lt; z \leq t</math></td> </tr> </table> <p>7.2.2  Non-conductive portion:</p>  <table border="1"> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td><math>y \leq L</math></td> <td><math>x \leq 1/8a</math></td> <td><math>0 &lt; z \leq t</math></td> </tr> </table> <p>⊙ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.  ⊙ If the product will be heat sealed by the customer, the alignment mark must not be damaged.</p> <p>7.2.3 Substrate protuberance and internal crack</p>  <table border="1"> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td><math>y \leq 1/3L</math></td> <td><math>X \leq a</math></td> </tr> </table>	y: Chip width	x: Chip length	z: Chip thickness	$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$	y: Chip width	x: Chip length	z: Chip thickness	$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$	y: width	x: length	$y \leq 1/3L$	$X \leq a$	2.5
		y: Chip width	x: Chip length	z: Chip thickness															
		$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$															
y: Chip width	x: Chip length	z: Chip thickness																	
$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$																	
y: width	x: length																		
$y \leq 1/3L$	$X \leq a$																		

NO	Item	Criterion	AQL
08	Cracked glass	The LCD with extensive crack is not acceptable.	2.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color is wrong.	2.5 2.5 0.65
10	Bezel	Bezel must comply with product specifications.	2.5
11	PCB、COB	11.1 COB seal may not have pinholes larger than 0.2mm or contamination. 11.2 COB seal surface may not have pinholes through to the IC. 11.3 The height of the COB should not exceed the height indicated in the assembly diagram. 11.4 There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places. 11.5 Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts. 11.6 The jumper on the PCB should conform to the product characteristic chart.	2.5 2.5 2.5 2.5 0.65 0.65
12	FPC	12.1 FPC terminal damage $\leq$ 1/2 FPC terminal width and can not affect the function , we judge accept. 12.2 FPC alignment hole damage $\leq$ 1/2 alignment area and can not affect the function , we judge accept.	2.5 2.5
13	Soldering	13.1 No cold solder joints, missing solder connections, oxidation or icicle. 13.2 No short circuits in components on PCB or FPC.	2.5 0.65

NO	Item	Criterion	AQL												
14	Touch Panel Chipped glass	<p>Symbols: x: Chip length                      y: Chip width                      z: Chip thickness k: Seal width                      t: Touch Panel Total thickness    a: LCD side length L: Electrode pad length</p> <p>14.1 General glass chip: 14.1.1 Chip on panel surface and crack between panels:</p>  <table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td><math>Z \leq t</math></td><td><math>\leq 1/2 k</math> and not over viewing area</td><td><math>x \leq 1/8a</math></td></tr></table> <p>⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip</p> <p>14.1.2 Corner crack:</p>  <table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td><math>z \leq t</math></td><td><math>\leq 1/2 k</math> and not over viewing area</td><td><math>x \leq 1/8a</math></td></tr></table> <p>⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip</p>	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$	2.5
z: Chip thickness	y: Chip width	x: Chip length													
$Z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$													
z: Chip thickness	y: Chip width	x: Chip length													
$z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$													



NO	Item	Criterion	AQL										
15	Touch Panel(Fish eye、dent and bubble on film)	<table> <tr> <th>SIZE(mm)</th> <th>Acceptable Q'ty</th> </tr> <tr> <td><math>\Phi \leq 0.2</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>0.2 &lt; D \leq 0.4</math></td> <td>5</td> </tr> <tr> <td><math>0.4 &lt; D \leq 0.5</math></td> <td>2</td> </tr> <tr> <td><math>0.5 &lt; D</math></td> <td>0</td> </tr> </table>	SIZE(mm)	Acceptable Q'ty	$\Phi \leq 0.2$	Accept no dense	$0.2 < D \leq 0.4$	5	$0.4 < D \leq 0.5$	2	$0.5 < D$	0	<div>   </div>
		SIZE(mm)	Acceptable Q'ty										
		$\Phi \leq 0.2$	Accept no dense										
		$0.2 < D \leq 0.4$	5										
		$0.4 < D \leq 0.5$	2										
$0.5 < D$	0												
16	Touch Panel Newton ring	Newton ring dimension $\leq 1/2$ touch panel area and not affect font and line distortion( $\leq 2.5\%$ ) , it is acceptable.	2.5										
17	Touch Panel Linearity	Less than 2.5% is acceptable.	2.5										
18	LCD Ripple	Touch the touch panel , can not see the LCD ripple. Pen: R 1.0mm silicon rubber. Operation Force: 80g	2.5										
19	General appearance	19.1 Pin type must match type in specification sheet.	0.65										
		19.2 LCD pin loose or missing pins.	0.65										
		19.3 Product packaging must the same as specified on packaging specification sheet.	0.65										
		19.4 Product dimension and structure must conform to product specification sheet.	0.65										

## **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.