



# SPECIFICATION FOR LCD MODULE

MODULE NO: YB-TG19201080S02A-N-A0

Doc.Version:00

Customer Approval:

Accept

Reject

YEEBO	NAME	SIGNATURE	DATE
Prepare	Electronic Engineer		2019.02.18
Check	Mechanical Engineer		2019-02-18
Verify			2019-02-18
Approval			2019.2.18

APPROVAL FOR SPECIFICATIONS ONLY

APPROVAL FOR SPECIFICATIONS AND SAMPLE

WIMRD005-02-C



## **1. Revision History**

<b>Sample Version</b>	<b>DOC. Version</b>	<b>DATE</b>	<b>DESCRIPTION</b>		<b>CHANGED BY</b>
A0	00	2018-02-18	SPEC Only	First issue	Shien / CFJ



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

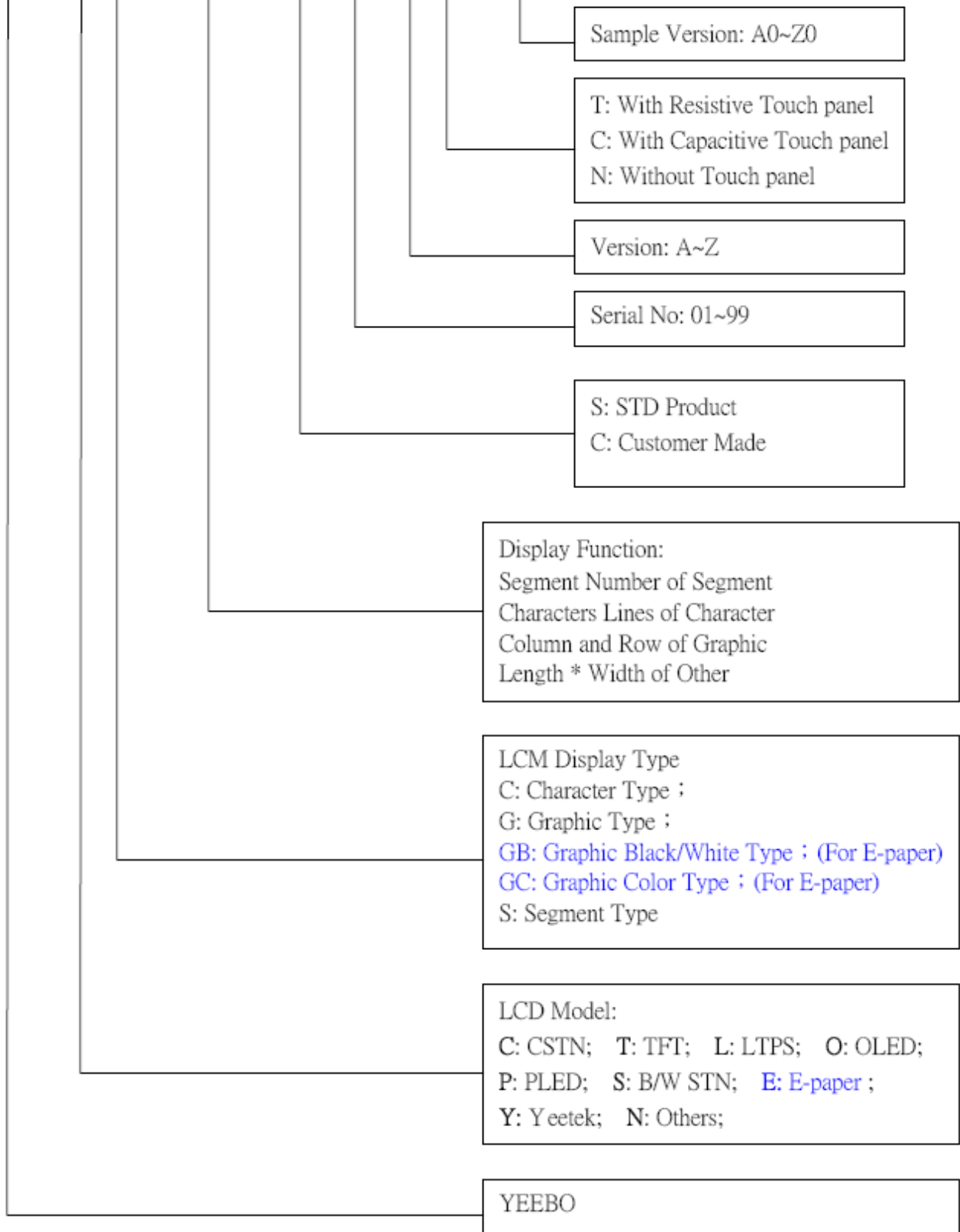
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### 3. Module Numbering System:

(Example)

**YB-TG240320S01D-T-A0**





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

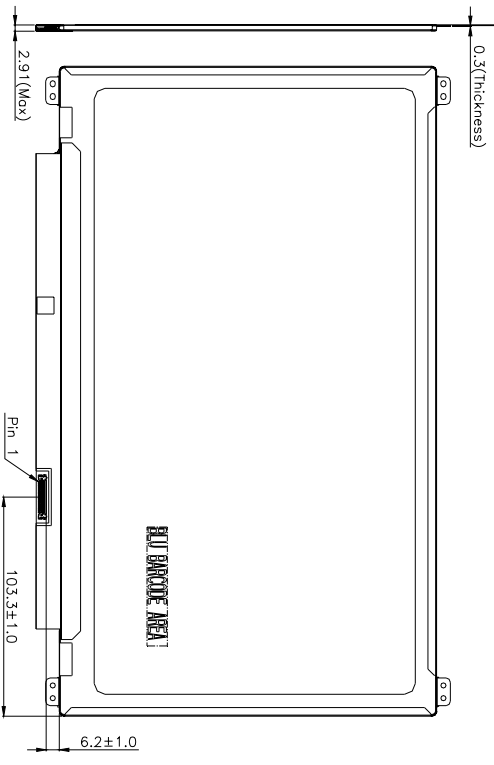
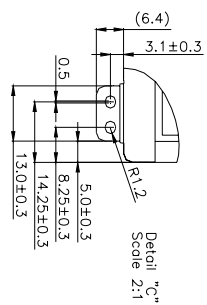
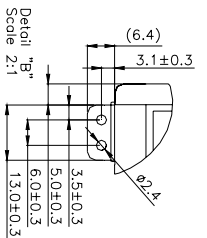
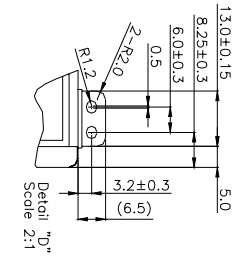
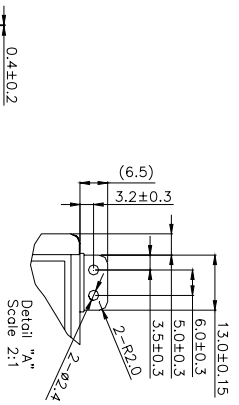
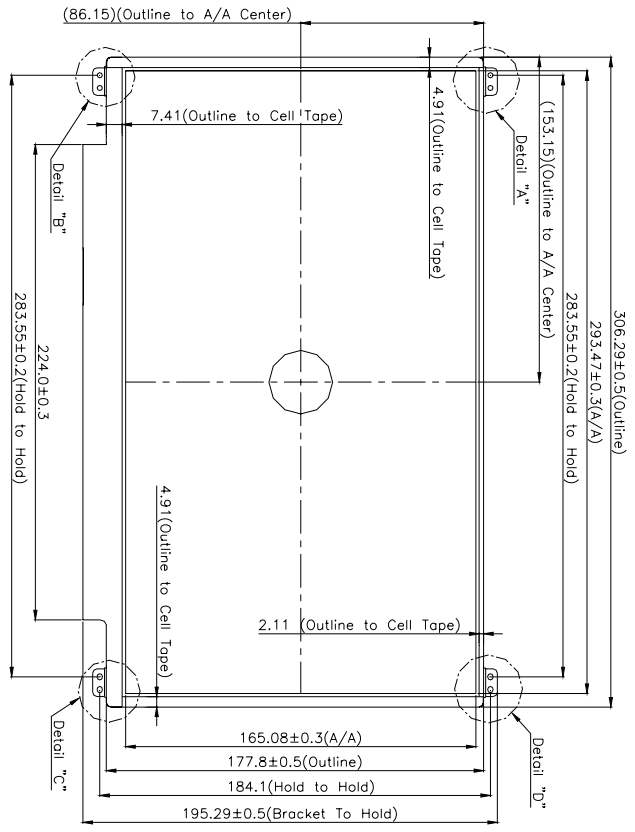
ITEM	CONTENTS
Module Size	306.29(W) * 177.8(H) * 2.91(T) mm
Module Size(With PCB)	306.29(W) * 195.29 (H) * 2.91 (T) mm
Display Size(Diagonal)	13.3 inch
Display Format	1920*3(RGB)*1080 Pixels
Active Area	293.47(W) * 165.08(H) mm
Pixel Pitch	0.1529 * 0.1529 mm
LCD Type	TFT(262K) / Transmissive / Normal Black / Anti-Glare
View Direction	Free
Interface	2 Lane eDP 1.2
Weight	TBD



# 5. LCM drawing:

Rec. #1	Revision content description FIRST ISSUE	Date 2019-02-18
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Count drawing & Spec revision record during discussion with customer



- Specification:**
1. Display type: 13.3" TFT(262K) / Transmissive / Normal Black / Anti-Glare
  2. Pixel H x V: 1920(RGB) x 1080
  3. Pixel Pitch: 0.1529 x 0.1529
  4. Viewing Direction: Free
  5. Backlight: White LED(LED=24mA)
  6. Operating temperature: 0°C ~ +50°C
  7. Storage temperature: -20°C ~ +60°C
  7. TOLERANCE UNLESS :±0.3
  8. RoHS Compliant

		MOD. Name	YB-TG19201280S02A-N-A
		DESIGNED	張豐章
UNIT	mm	SCALE	N-T-S
SIZE	A4	CHECKED	
SCALE		VERIFIED	
DESIGNED	張豐章	APPROVED	
FILE NAME	Count Dwg.		

Sheet	1
Of	1
TFT FPC PIN OUT	
1	NC Reserved
2	GND
3	Lane1_N
4	Lane1_P
5	GND
6	Lane0_N
7	Lane0_P
8	GND
9	AUX_CH_P
10	AUX_CH_N
11	GND
12	VCC
13	VCC
14	LCD Shift (red or NC)
15	GND
16	GND
17	HPD
18	BL_GND
19	BL_GND
20	BL_GND
21	BL_GND
22	BL_ENABLE
23	BL_PWM1
24	H_SYNC or NC
25	NC Reserved
26	VLED
27	VLED
28	VLED
29	VLED
30	NC



## 6. Electrical Characteristics

### 6-1 Absolute Maximum Ratings

(Ta=25°C VSS=0V)

Item	Symbol	Min.	Type	Max.	Unit	Remark
Power Supply voltage	VCC	-0.3	-	4.0	Volt	
Operating Temperature	Topr	0	-	+50	°C	
Operating Humidity	Hopr	5		+95	%RH	(1)(2)(3)
Storage Temperature	Tstg	-20	-	+60	°C	
Storage Humidity	Hstg	5		+95	%RH	

Note :

- (1) Maximum Wet-Bulb temperature should be 39 degree C and no condensation.
- (2) When you apply the LCD module for OA system. Please make sure to keep the temperature of LCD module is less than 50°C
- (3) Storage / Operating temperature

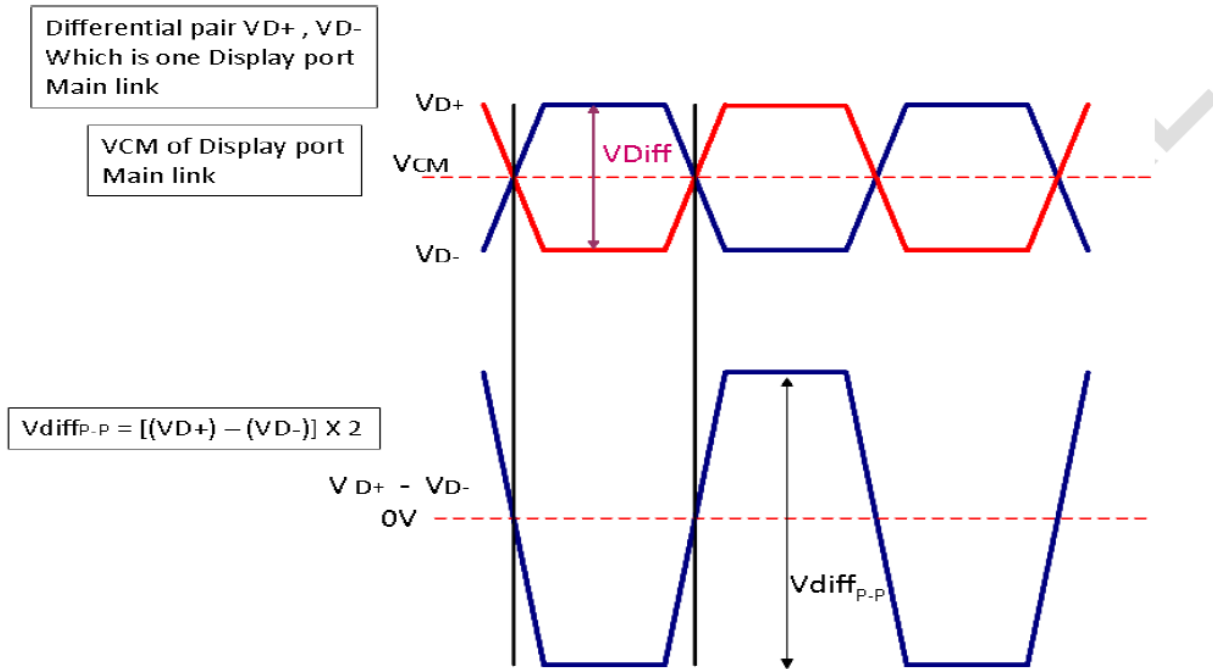
### 6-2 Operating Conditions

(Ta=25°C )

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power Supply voltage	VDD	3.0	3.3	3.6	Volt	
Power Supply Current	IDD	-	TBD	-	mA	
Inrush Current	IRush					
LCD Ripple Voltage	VDDrp	-	-	100	mV	

### 6-3 Signal Electrical Characteristics

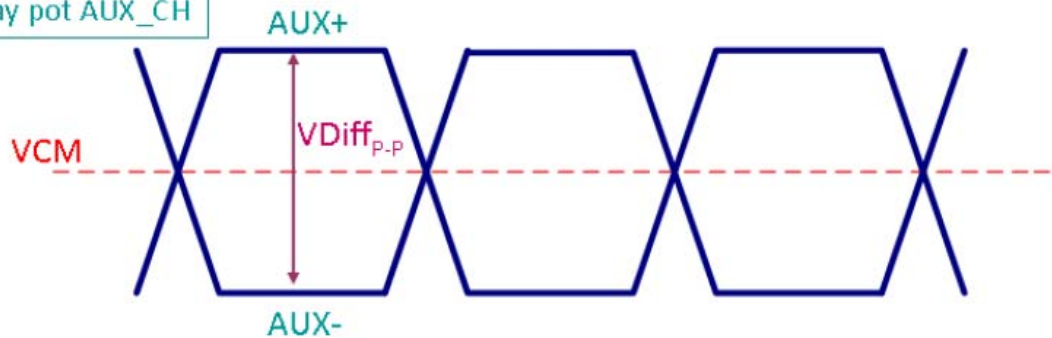
#### 6-3-1 Display Port main link signal:



Display port main link					
		Min	Typ	Max	unit
VCM	RX input DC Common Mode Voltage		0		V
VDiff <sub>P-P</sub>	Peak-to-peak Voltage at a receiving Device	150		1320	mV

#### 6-3-2 Display Port AUX\_CH signal:

Differential AUX+, AUX-  
Which is Display port AUX\_CH



Display port AUX_CH					
		Min	Typ	Max	unit
VCM	AUX DC Common Mode Voltage		0		V
VDiff <sub>P-P</sub>	AUX Peak-to-peak Voltage at a receiving Device	270		800	mV

#### 6-3-3 Display Port VHPD signal:

Display port VHPD					
		Min	Typ	Max	unit
VHPD	HPD Voltage	2.25	-	3.6	V



## 6-4 Interface Timing

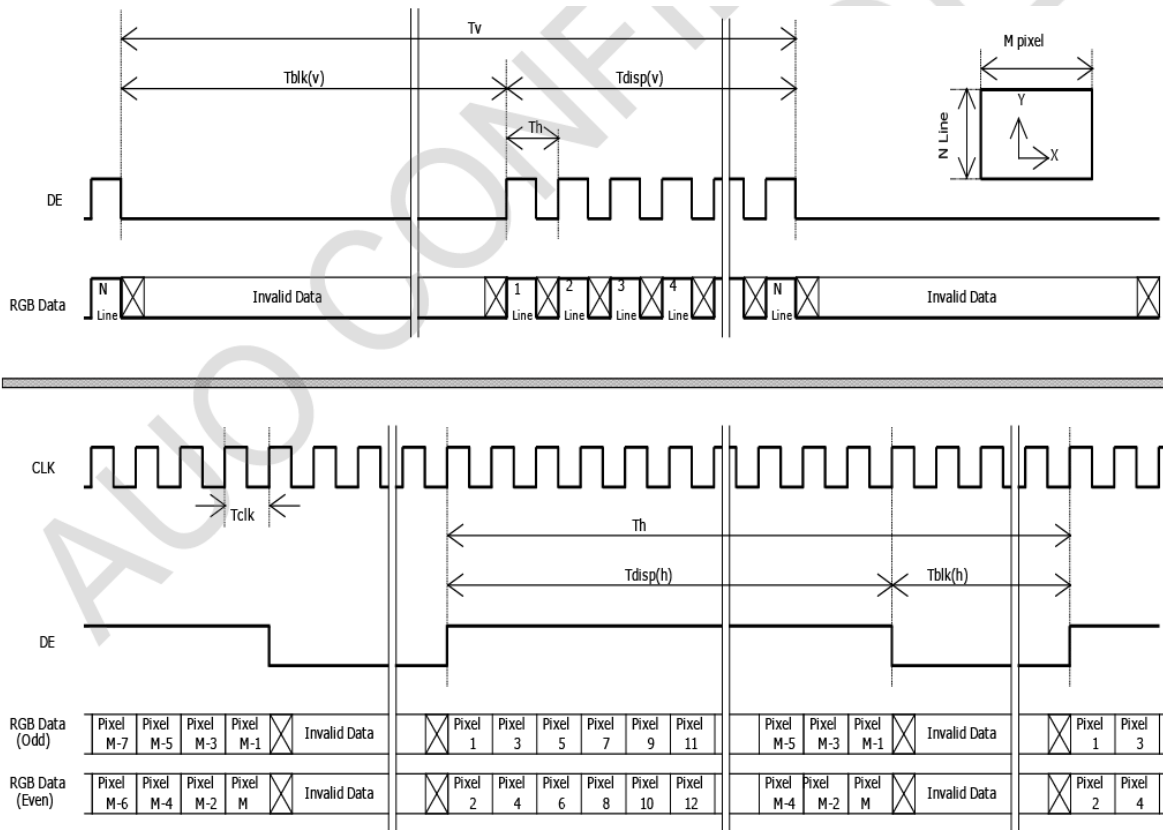
### 6-4-1 Timing Characteristics

Basically, interface timings should match the 1920x1080 /60Hz manufacturing guide line timing.

Parameter	Symbol	Min.	Typ.	Max.	Unit	
Frame Rate	-		60	-	Hz	
Clock frequency	$1/T_{\text{Clock}}$	66.6	72	80	MHz	
Vertical Section	Period	$T_V$	1090	1116	1080+A	$T_{\text{Line}}$
	Active	$T_{VD}$	1080			
	Blanking	$T_{VB}$	10	36	A	
Horizontal Section	Period	$T_H$	1000	1052	960+B	$T_{\text{Clock}}$
	Active	$T_{HD}$	960			
	Blanking	$T_{HB}$	40	92	B	

Note 1 : The above is as optimized setting

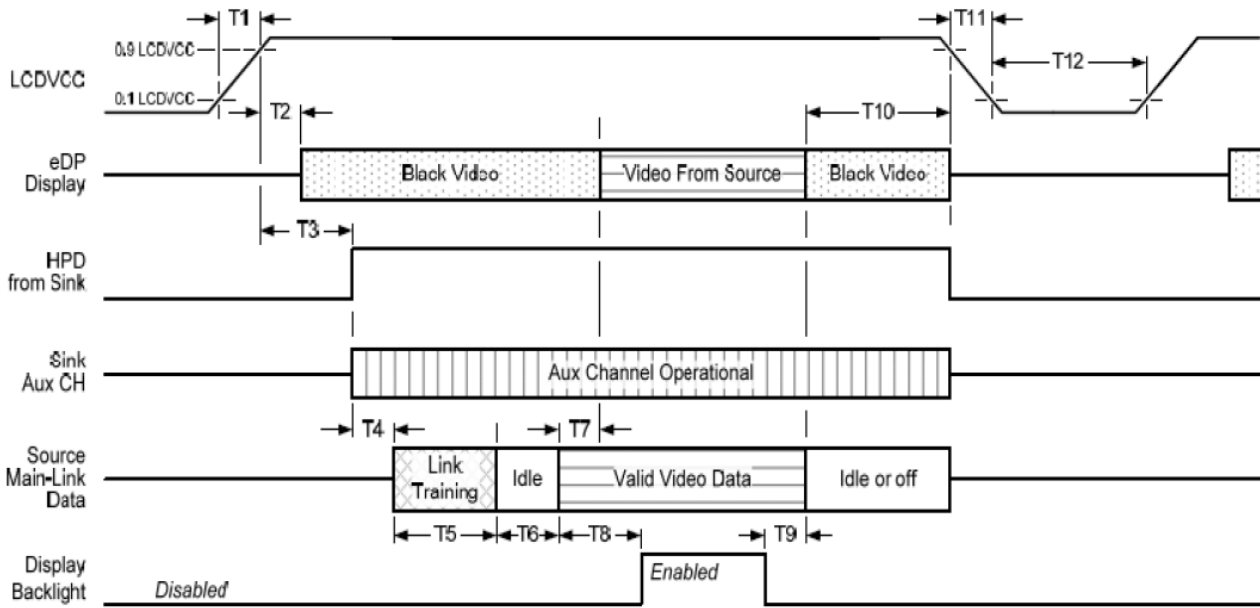
Note 2 : The maximum clock frequency =  $(1920+B) \cdot (1080+A) \cdot 60 < 149.1 \text{ MHz}$



## 6-5 Power ON/OFF Sequence

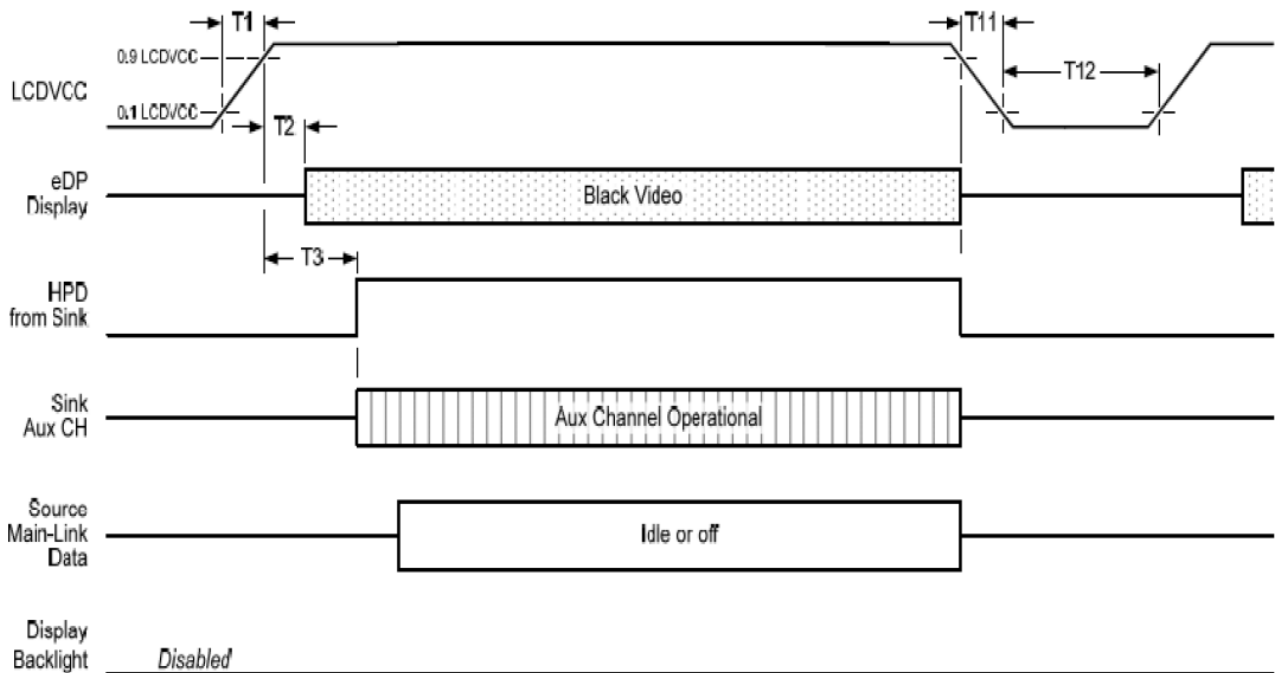
Power on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.

### Display Port panel power sequence:



### Display port interface power up/down sequence, normal system operation

### Display Port AUX\_CH transaction only:



### Display port interface power up/down sequence, AUX\_CH transaction only



Display Port panel power sequence timing parameter:

Timing parameter	Description	Reqd. by	Limits			Notes
			Min.	Typ.	Max.	
T1	power rail rise time, 10% to 90%	source	0.5ms		10ms	
T2	delay from LCDVDD to black video generation	sink	0ms		200ms	prevents display noise until valid video data is received from the source
T3	delay from LCDVDD to HPD high	sink	0ms		200ms	sink AUX_CH must be operational upon HPD high.
T4	delay from HPD high to link training initialization	source				allows for source to read link capability and initialize.
T5	link training duration	source				dependant on source link to read training protocol.
T6	link idle	source				Min accounts for required BS-Idle pattern. Max allows for source frame synchronization.
T7	delay from valid video data from source to video on display	sink	0ms		50ms	max allows sink validate video data and timing.
T8	delay from valid video data from source to backlight enable	source				source must assure display video is stable.
T9	delay from backlight disable to end of valid video data	source				source must assure backlight is no longer illuminated.
T10	delay from end of valid video data from source to power off	source	0ms		500ms	
T11	power rail fall time, 90% to 10%	source			10ms	
T12	power off time	source	500ms			

**Note1:** The sink must include the ability to generate black video autonomously. The sink must automatically enable black video under the following conditions:

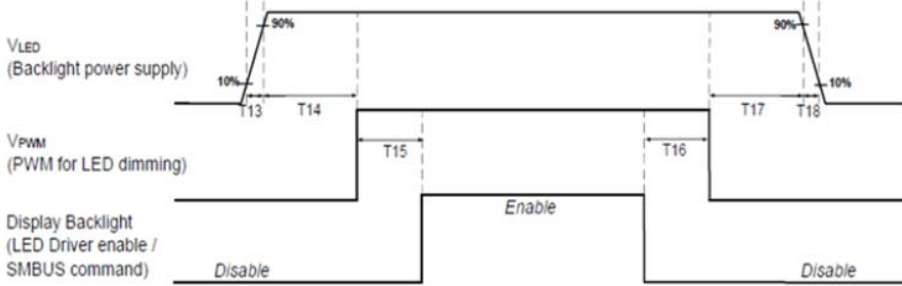
-upon LCDVDD power on (within T2 max)-when the "Novideostream\_Flag" (VB-ID Bit 3) is received from the source (at the end of T9).

-when no main link data, or invalid video data, is received from the source. Black video must be displayed within 64ms (typ) from the start of either condition. Video data can be deemed invalid based on MSA and timing information, for example.

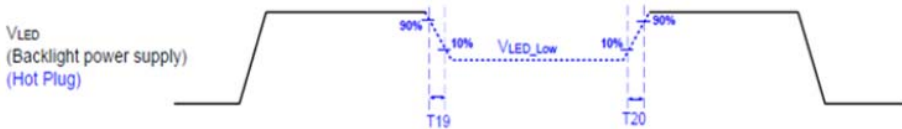
**Note 2:** The sink may implement the ability to disable the black video function, as described in Note 1, above, for system development and debugging purpose.

**Note 3:** The sink must support AUX\_CH polling by the source immediately following LCDVDD power on without causing damage to the sink device (the source can re-try if the sink is not ready). The sink must be able to respond to an AUX\_CH transaction with the time specified within T3 max.

### Display Port panel B/L power sequence timing parameter



Note : When the adapter is hot plugged, the backlight power supply sequence is shown as below.



	Min (ms)	Max (ms)
T13	0.2	10
T14	0	-
T15	0	-
T16	0	-
T17	0	-
T18	0.2	10
T19	1 <sup>*</sup>	-
T20	1 <sup>*</sup>	-

Seamless change:  $T19/T20 = 5 \times T_{PWM}^*$

$*T_{PWM} = 1/PWM \text{ Frequency}$

Note 1 : If T14, T15, T16, T17 < 10ms , The display garbage may occur. We suggest T14, T15, T16, T17 > 10ms to avoid the display garbage.

Note 2 : If T13 or T18 < 0.5ms , the inrush current may cause the damage of fuse. If T13 or T18 < 0.5ms , the inrush current I<sub>zt</sub> is under typical melt of fuse Spec. , there is no mentioned problem.



## 7. Optical Characteristics:

Item	Symbol	Conditions	Specifications			Unit	Remark	
			Min	Typ	Max			
Contrast Ratio	CR	Normal $\theta > \Phi > 1 \pm$	700	800	-		Note 3	
Response time	Rising +Falling				27	35	ms	Note 2
NTSC	-	-	-	45	-	%	Note 1	
Viewing angle (CR $\geq$ 10) B/L ON	Hor.	$\theta_L$	$\Phi=180^\circ$ (9 o'clock)	75	85	-	deg.	Note 1
		$\theta_R$	$\Phi=0^\circ$ (3 o'clock)	75	85	-		
	Ver.	$\theta_T$	$\Phi=90^\circ$ (12 o'clock)	75	85	-		
		$\theta_B$	$\Phi=270^\circ$ (6 o'clock)	75	85	-		

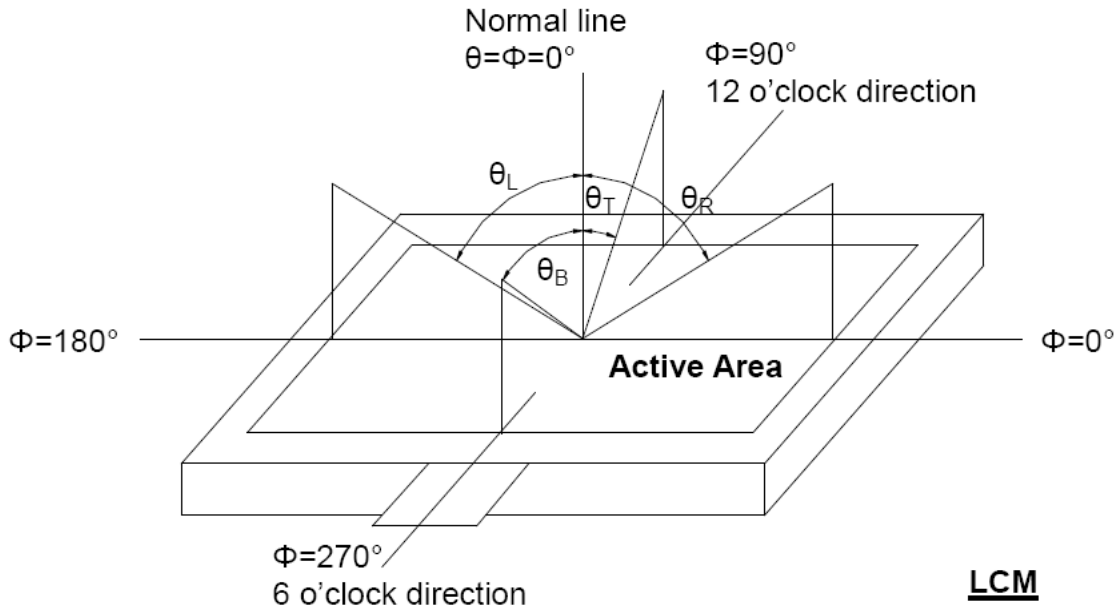
### Measuring Condition

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	Min.	Typ.	Max.	
Chromaticity Coordinates (Transmissive)	Red	x	0.541	0.571	0.601
		y	0.315	0.345	0.375
	Green	x	0.316	0.346	0.376
		y	0.541	0.571	0.601
	Blue	x	0.128	0.158	0.188
		y	0.09	0.12	0.15
	White	x	0.283	0.313	0.343
		y	0.299	0.329	0.359

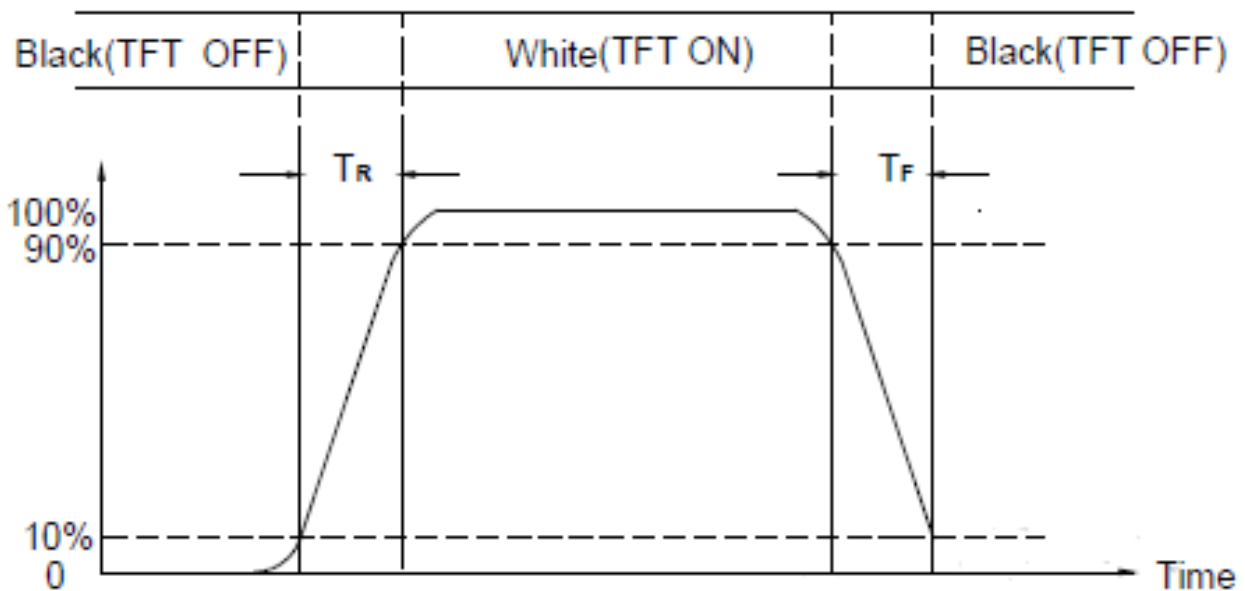
Note 1: Definition of viewing angle range!



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 (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.!



Note 3 :

Definition of contrast ratio!

!!!!

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

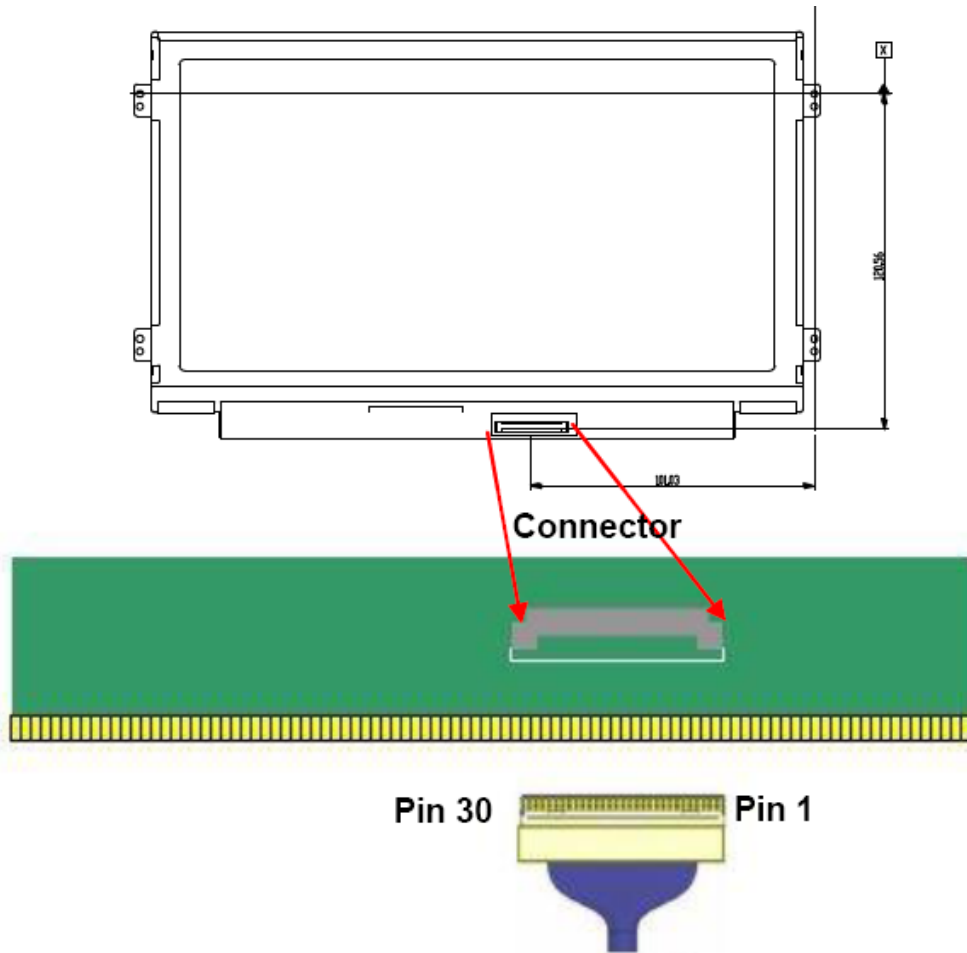
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## 8. Interface Pin Assignment:

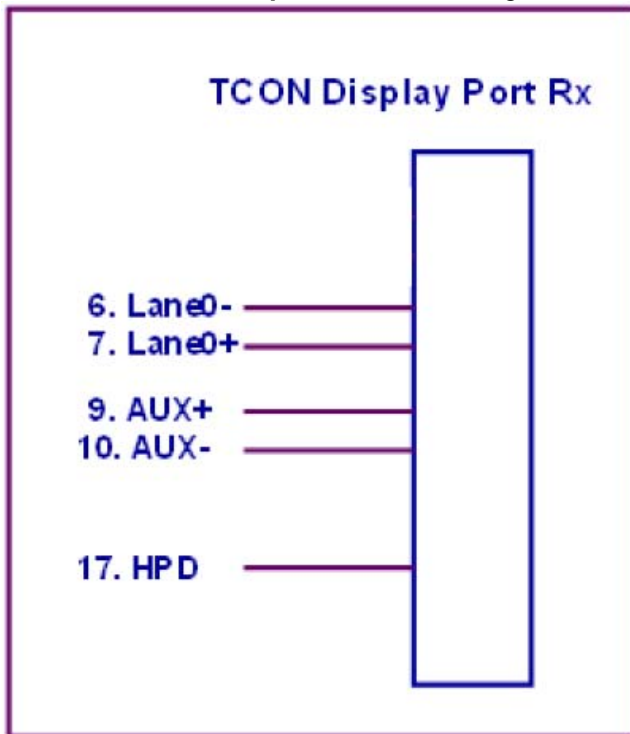
### 8-1 LCM FPC Interface\_

Pin	Symbol	Description
1	NC Reserved	Reserved for LCD supplier
2	GND	High Speed Ground
3	Lane1_N	Complement Signal Link Lane 1
4	Lane1_P	True Signal Link Lane 1
5	GND	High Speed Ground
6	Lane0_N	Complement Signal Link Lane 0
7	Lane0_P	True Signal Link Lane 0
8	GND	High Speed Ground
9	AUX_CH_P	True Signal Auxiliary Channel
10	AUX_CH_N	Complement Signal Auxiliary Channel
11	GND	High Speed Ground
12	VCC	LCD logic
13	VCC	LCD logic
14	LCD Self Test or NC	LCD Panel Self Test Enable (Optional)
15	GND	LCD logic and driver ground
16	GND	LCD logic and driver ground
17	HPD	HPD signal pin
18	BL_GND	LED Backlight ground
19	BL_GND	LED Backlight ground
20	BL_GND	LED Backlight ground
21	BL_GND	LED Backlight ground
22	BL ENABLE	LED Backlight control on/off control
23	BL PWM	System PWM signal input for dimming
24	H_SYNC or NC	H_SYNC function(Optional) or NC
25	NC Reserved	Reserved for LCD supplier
26	VLED	LED Backlight Power (5-21V)
27	VLED	LED Backlight Power (5-21V)
28	VLED	LED Backlight Power (5-21V)
29	VLED	LED Backlight Power (5-21V)
30	NC	NC



**Note1:** Start from right side.

**Note2:** Input signals shall be low or High-impedance state when VDD is off.  
Internal circuit of **eDP inputs** are as following.





## 9. Backlight Characteristics:

### 9-1 LED driver Input and Output Specification

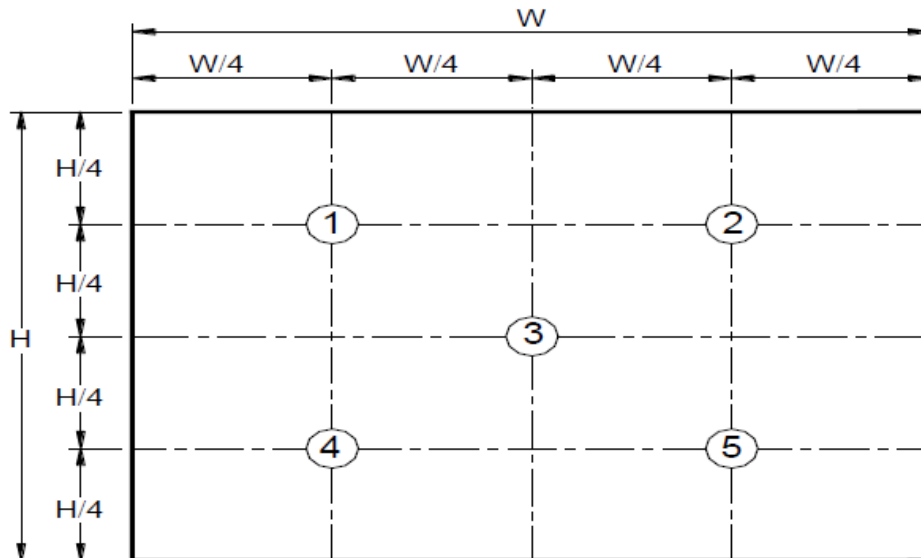
(Ta=25°C)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED input Voltage	V <sub>LED</sub>	(5)	(12)	(21)	V	1
PWM Signal Voltage	V <sub>PWM_EN</sub>	High	(2.2)	-	(5.5)	V
		Low	(0)	-	(0.6)	
LED Enable Voltage	V <sub>LED_EN</sub>	High	(2.2)	-	(5.5)	V
		Low	(0)	-	(0.6)	
Input PWM Frequency	FPWM	(0.2)	-	(10)	KHz	
PWM Duty Ratio	Duty	1		100	%	
Luminous Intensity for LCM	I <sub>v</sub>	325	410	-	cd/m <sup>2</sup>	2
Uniformity for LCM	-	70	-	-	%	3
Life Time	-	15000	-	-	Hr.	4

NOTE:

1. Operating temperature 25°C , humidity 50%.
2. Average Luminous Intensity of P1-P5
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)**



Using aperture of 2°, distance 50cm.



## 10. Standard Specification for Reliability .:

### 10-1. Standard Specifications for Reliability of LCD Module

No	Item	Description
01	High temperature operation	The sample should be allowed to stand at 50°C 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 0°C 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 60°C 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 -20°C 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°C, 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°C for 30 minutes → normal temperature for 5 minutes → +60°C 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



## 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 10.2, 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.

## 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 ( $25\pm 5^{\circ}\text{C}$ ), normal humidity ( $50\pm 10\%$ RH), and in area not exposed to direct sun light.
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## 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

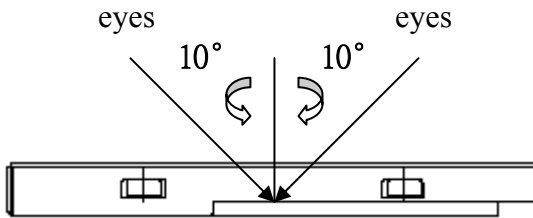
a. Manner of appearance test:

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

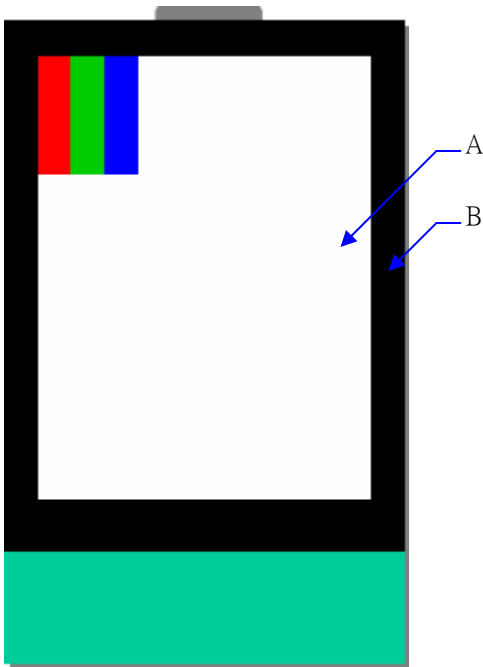
(ii) When test the model of transmissive product must add the reflective plate.

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

(iiii) Temperature: 25±5°C 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.

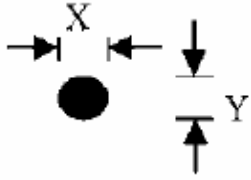
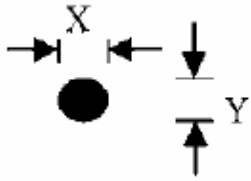
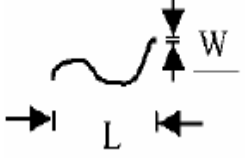
(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

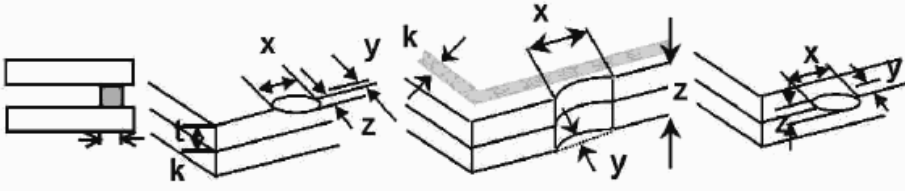
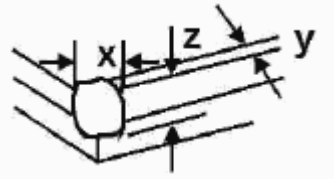
(iii) Must add new item on time when it is necessary.

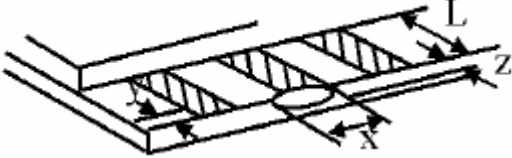
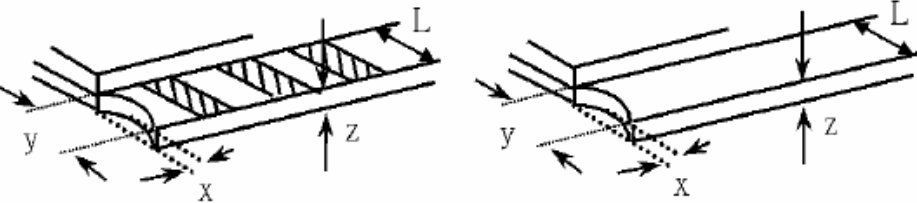
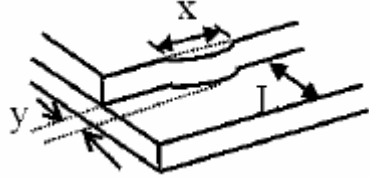
c. Standard of inspection: (Unit: mm)

11-6. Inspection specification

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	<b>0.65</b>													
02	Black or White spots or Bright spots or Color spots on LCD (Display only)	2.1 Dot dimension as below drawing: $\Phi = (X+Y) / 2$  <table border="1" data-bbox="790 772 1324 936"> <thead> <tr> <th>Size(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <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>5</td> </tr> <tr> <td><math>0.50 &lt; \Phi</math></td> <td>0</td> </tr> </tbody> </table> <p>2.2 Not visible through 5% ND filter</p> <p>* Densely spaced: No more than two spots within 3mm.</p>	Size(mm)	Acceptable Q'ty	$\Phi \leq 0.20$	Accept no dense	$0.20 < \Phi \leq 0.50$	5	$0.50 < \Phi$	0	<b>2.5</b>					
Size(mm)	Acceptable Q'ty															
$\Phi \leq 0.20$	Accept no dense															
$0.20 < \Phi \leq 0.50$	5															
$0.50 < \Phi$	0															
03	LCD and Touch Panel black spots, white spots, contamination (non – display)	3.1 Round type: As following drawing $\Phi = (X+Y) / 2$  <table border="1" data-bbox="790 1198 1324 1361"> <thead> <tr> <th>Size(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <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>5</td> </tr> <tr> <td><math>0.50 &lt; \Phi</math></td> <td>0</td> </tr> </tbody> </table> <p>* Densely spaced: No more than two spots within 3mm.</p>	Size(mm)	Acceptable Q'ty	$\Phi \leq 0.20$	Accept no dense	$0.20 < \Phi \leq 0.50$	5	$0.50 < \Phi$	0	<b>2.5</b>					
		Size(mm)	Acceptable Q'ty													
$\Phi \leq 0.20$	Accept no dense															
$0.20 < \Phi \leq 0.50$	5															
$0.50 < \Phi$	0															
3.2 Line type: (As following drawing)  <table border="1" data-bbox="694 1556 1324 1899"> <thead> <tr> <th>Length(mm)</th> <th>Width(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td><math>L \leq 10</math></td> <td><math>W \leq 0.1</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>L \leq 10.0</math></td> <td><math>0.1 &lt; W \leq 0.25</math></td> <td>4</td> </tr> <tr> <td><math>L &gt; 10</math></td> <td>----</td> <td>Rejection</td> </tr> <tr> <td>----</td> <td><math>0.25 &lt; W</math></td> <td>Rejection</td> </tr> </tbody> </table> <p>* Densely spaced: No more than two lines within 3mm.</p>	Length(mm)	Width(mm)	Acceptable Q'ty	$L \leq 10$	$W \leq 0.1$	Accept no dense	$L \leq 10.0$	$0.1 < W \leq 0.25$	4	$L > 10$	----	Rejection	----	$0.25 < W$	Rejection	<b>2.5</b>
Length(mm)	Width(mm)	Acceptable Q'ty														
$L \leq 10$	$W \leq 0.1$	Accept no dense														
$L \leq 10.0$	$0.1 < W \leq 0.25$	4														
$L > 10$	----	Rejection														
----	$0.25 < W$	Rejection														

NO	Item	Criterion	AQL																		
04	Polarizer bubbles	<p>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction</p> <table border="1"> <thead> <tr> <th>Size <math>\Phi</math>(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <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>4</td> </tr> <tr> <td><math>0.50 &lt; \Phi \leq 1.00</math></td> <td>3</td> </tr> <tr> <td><math>1.00 &lt; \Phi</math></td> <td>0</td> </tr> <tr> <td>Total Q'ty</td> <td>4</td> </tr> </tbody> </table>	Size $\Phi$ (mm)	Acceptable Q'ty	$\Phi \leq 0.20$	Accept no dense	$0.20 < \Phi \leq 0.50$	4	$0.50 < \Phi \leq 1.00$	3	$1.00 < \Phi$	0	Total Q'ty	4	2.5						
Size $\Phi$ (mm)	Acceptable Q'ty																				
$\Phi \leq 0.20$	Accept no dense																				
$0.20 < \Phi \leq 0.50$	4																				
$0.50 < \Phi \leq 1.00$	3																				
$1.00 < \Phi$	0																				
Total Q'ty	4																				
05	Scratches	Follow NO.3 -2 Line Type.																			
06	Mura	Not visible through 5% ND filter in 50% gray.	2.5																		
07	Chipped glass	<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>7.1 General glass chip:  7.1.1 Chip on panel surface and crack between panels:</p>  <table border="1"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>⊙ Unit: mm  ⊙ If there are 2 or more chips, x is the total length of each chip</p> <p>7.1.2 Corner crack:</p>  <table border="1"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <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> </tbody> </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	$Z \leq 1/2t$	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	$x \leq 1/8a$																			
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z: Chip thickness	y: Chip width	x: Chip length																			
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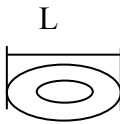
NO	Item	Criterion	AQL																
08	Glass crack	<p>Symbols:  x: Chip length                      y: Chip width                      z: Chip thickness  k: Seal width                      t: Glass thickness                      a: LCD side length  L: Electrode pad length</p> <p>8.1 Protrusion over terminal:  8.1.1 Chip on electrode pad:</p>  <table border="1" data-bbox="515 685 1203 842"> <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>8.1.2 Non-conductive portion:</p>  <table border="1" data-bbox="515 1202 1203 1359"> <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>8.1.3 Substrate protuberance and internal crack</p>  <table border="1" data-bbox="834 1675 1276 1832"> <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
09	Cracked glass	The LCD with extensive crack is not acceptable.	2.5
10	Backlight elements	10.1 Illumination source flickers when lit. 10.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 10.3 Backlight doesn't light or color is wrong.	2.5 2.5 0.65
11	Bezel	Bezel must comply with product specifications.	2.5
12	PCB、COB	12.1 COB seal may not have pinholes larger than 0.2mm or contamination. 12.2 COB seal surface may not have pinholes through to the IC. 12.3 The height of the COB should not exceed the height indicated in the assembly diagram. 12.4 There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places. 12.5 Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts. 12.6 The jumper on the PCB should conform to the product characteristic chart.	2.5 2.5 2.5 2.5 0.65 0.65
13	FPC	13.1 FPC terminal damage $\leq$ 1/2 FPC terminal width and can not affect the function , we judge accept. 13.2 FPC alignment hole damage $\leq$ 1/2 alignment area and can not affect the function , we judge accept.	2.5 2.5
14	Soldering	14.1 No cold solder joints, missing solder connections, oxidation or icicle. 14.2 No short circuits in components on PCB or FPC.	2.5 0.65

NO	Item	Criterion	AQL												
15	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>15.1 General glass chip:  15.1.1 Chip on panel surface and crack between panels:</p> <table border="1" data-bbox="371 801 1193 1019"> <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>15.1.2 Corner crack:</p> <table border="1" data-bbox="371 1397 1193 1615"> <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							
16	Touch Panel(Fish eye)	<table border="1"> <tr> <td>SIZE(mm)</td> <td>Acceptable Q'ty</td> </tr> <tr> <td><math>L \leq 1.0</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>L &gt; 1.0\text{mm}</math></td> <td>0</td> </tr> </table>	SIZE(mm)	Acceptable Q'ty	$L \leq 1.0$	Accept no dense	$L > 1.0\text{mm}$	0		2.5
		SIZE(mm)	Acceptable Q'ty							
		$L \leq 1.0$	Accept no dense							
$L > 1.0\text{mm}$	0									
Newton ring dimension $\leq 1/2$ touch panel area and not affect font and line distortion( $\leq 2.5\%$ ), it is acceptable.										
Less than 2.5% is acceptable.										
17	Touch Panel Newton ring	Touch the touch panel, can not see the LCD ripple. Pen: R 1.0mm silicon rubber. Operation Force: 10~100g	2.5							
18	Touch Panel Linearity	20.1 Pin type must match type in specification sheet. 20.2 LCD pin loose or missing pins. 20.3 Product packaging must the same as specified on packaging specification sheet. 20.4 Product dimension and structure must conform to product specification sheet.	0.65 0.65 0.65 0.65							
19	LCD Ripple									
20	General appearance									



## 12. Handling Precaution:

### 14-1 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 FPC 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.

### 12-2 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.

### 14-3 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.

## 13. Guarantee:

Our products meet requirements of the environment.

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