



# SPECIFICATION FOR LCD MODULE

MODULE NO: YB-TG240320S25A-N-A1

Doc.Version:03

Customer Approval:

Accept	<input type="checkbox"/> Reject
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APPROVAL FOR SPECIFICATIONS ONLY

APPROVAL FOR SPECIFICATIONS AND SAMPLE

WIMRD005-02-C





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

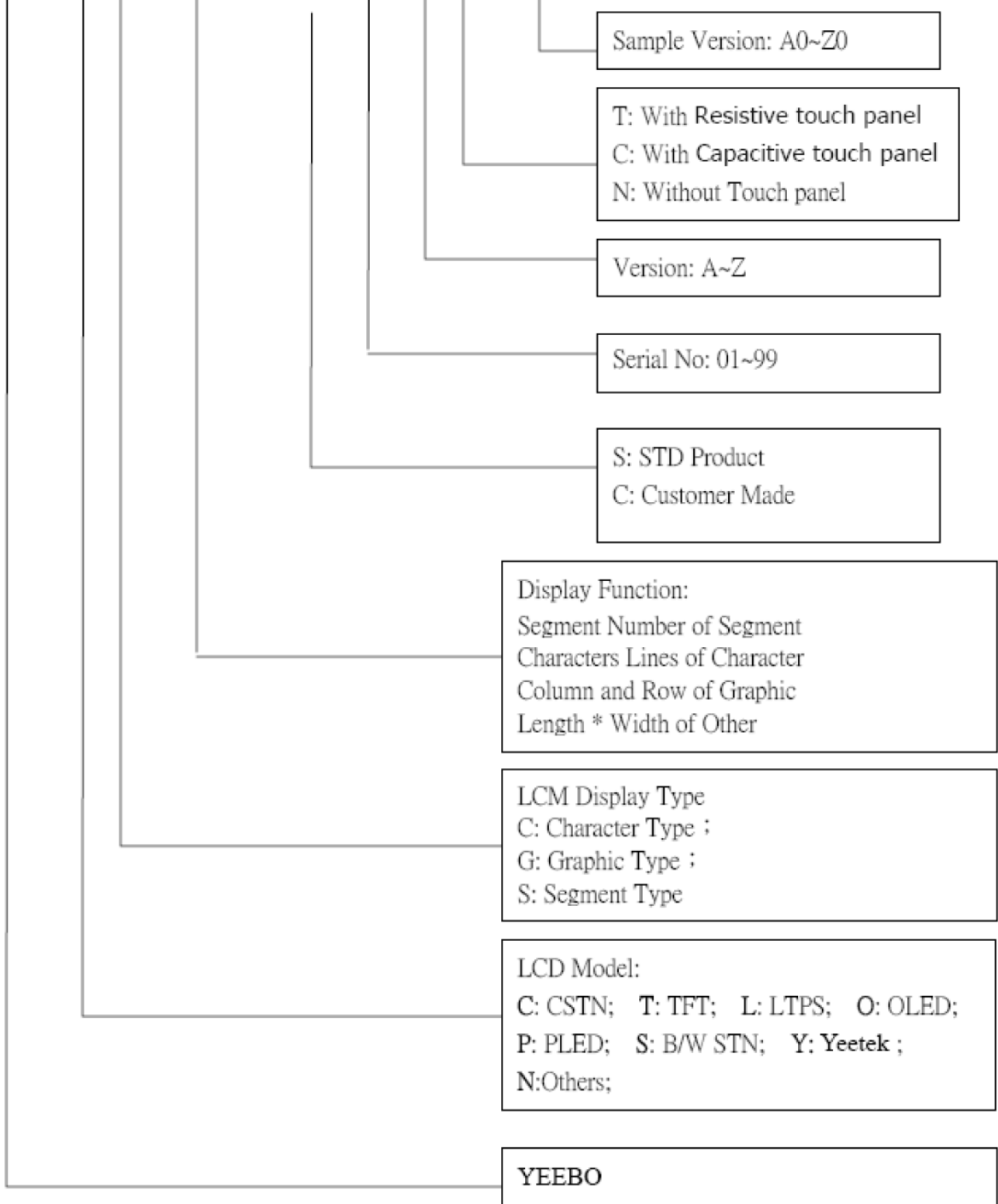
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### 3. Module Numbering System:

(Example)

**YB-TG240320S01D-T-A0**



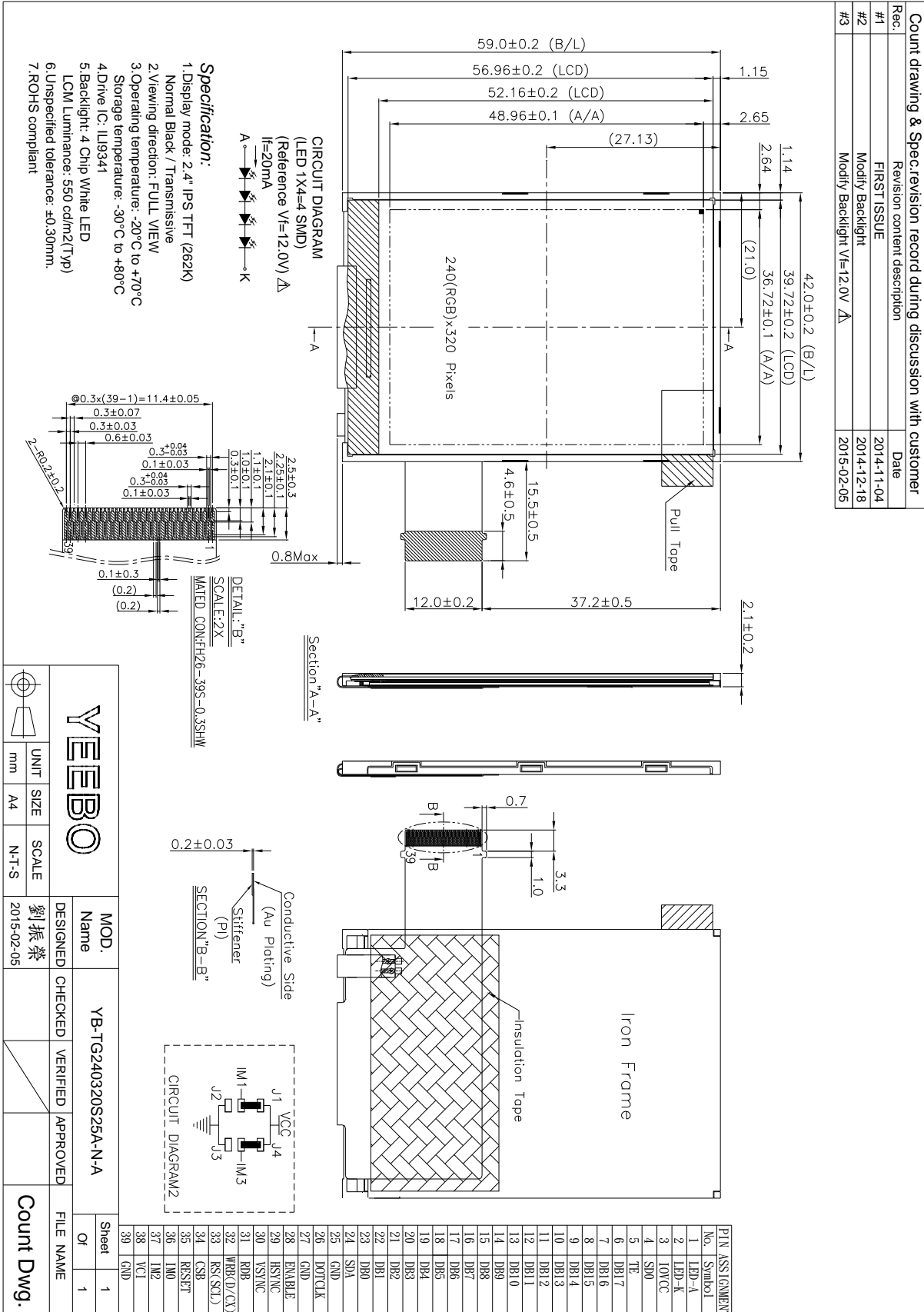


#### **4. General Specification:**

ITEM	CONTENTS
Module Size	42.0 (W) * 59.0 (H) * 2.1 (T) mm
Module Size(With FPC)	57.5 (W) * 59.0 (H) * 2.1 (T) mm
Display Size(Diagonal)	2.4 inch
Display Format	240(RGB)*320 Pixels
Active Area	36.72(W) * 48.96 (H) mm
Pixel Pitch	0.153 * 0.153 mm
LCD Type	TFT (262K) / Transmissive / Normally Black
View Angle	Free
Controller IC	ILI9341
Weight	10.8g



# 5. LCM drawing:



## 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	Volt	Note1
Supply Voltage(Logic)	IOV <sub>CC</sub>	-0.3	-	+4.6	Volt	Note1
Operating Temperature	T <sub>opr</sub>	-20	-	+70	°C	-
Storage Temperature	T <sub>stg</sub>	-30	-	+80	°C	-

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

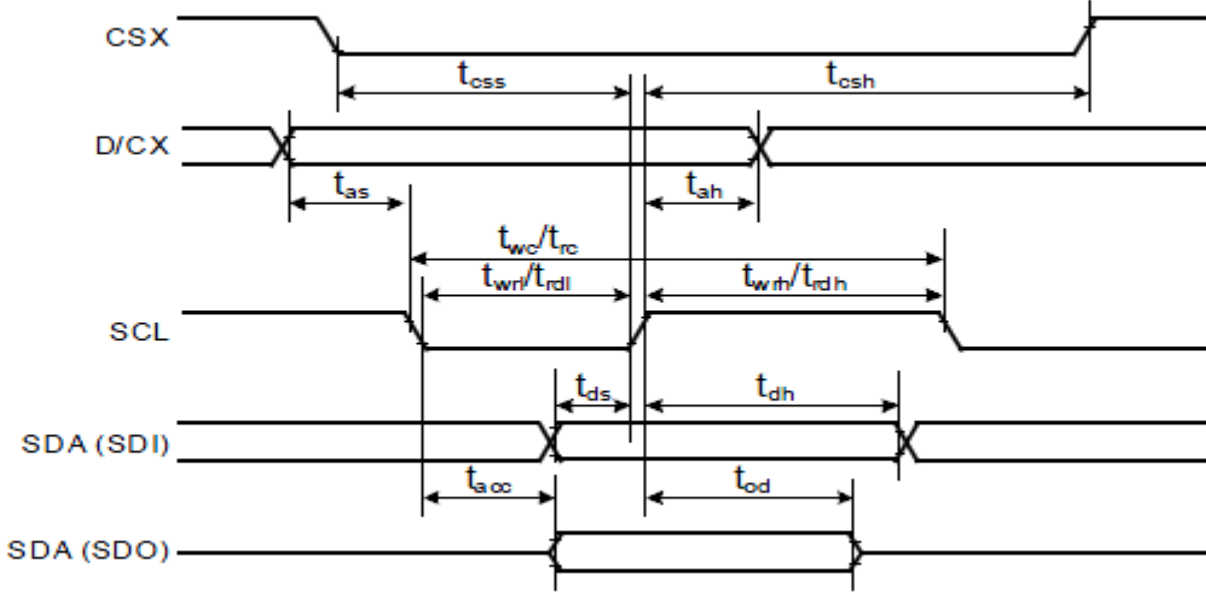
### 6-2 Operating Conditions

(Ta=25°C )

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply voltage	V <sub>CI</sub>	-	2.6	2.8	3.0	Volt
Supply voltage for I/O	IOV <sub>CC</sub>	-	1.65	2.8	3.0	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	-	12.0	1.0	mA

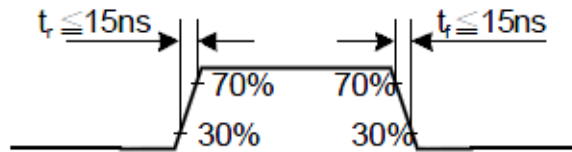
### 6-3 Timing Characteristics

#### 6-3.1 Display Serial Interface Timing Characteristics (4-line SPI system)



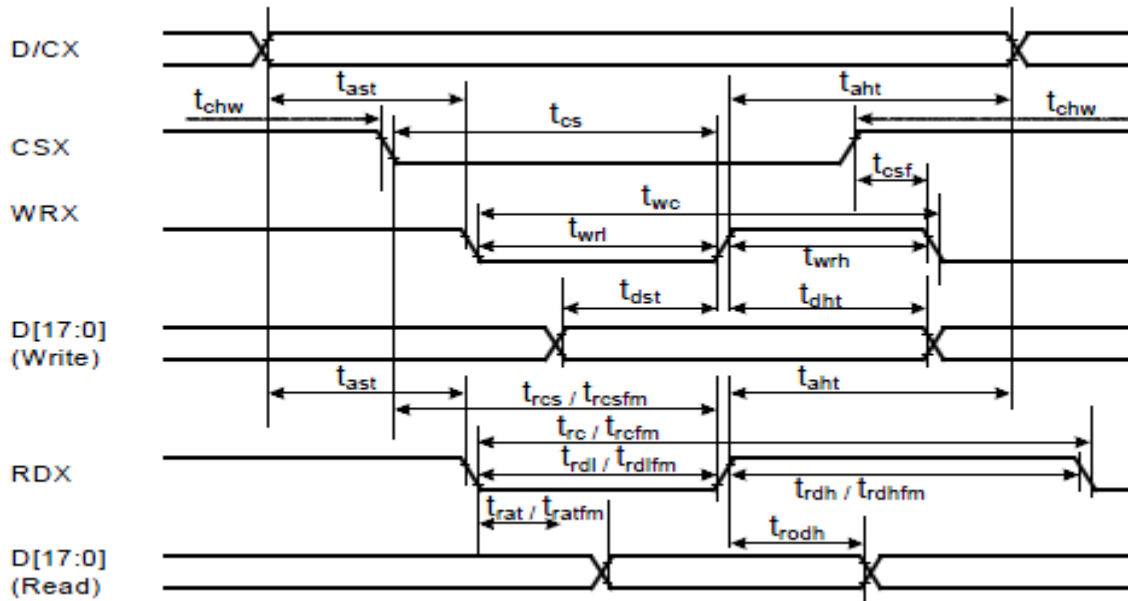
Signal	Symbol	Parameter	min	max	Unit	Description
CSX	$t_{css}$	Chip select time (Write)	40	-	ns	
	$t_{csh}$	Chip select hold time (Read)	40	-	ns	
SCL	$t_{wc}$	Serial clock cycle (Write)	100	-	ns	
	$t_{wrh}$	SCL "H" pulse width (Write)	40	-	ns	
	$t_{wrl}$	SCL "L" pulse width (Write)	40	-	ns	
	$t_{rc}$	Serial clock cycle (Read)	150	-	ns	
	$t_{rdh}$	SCL "H" pulse width (Read)	60	-	ns	
	$t_{rdl}$	SCL "L" pulse width (Read)	60	-	ns	
D/CX	$t_{as}$	D/CX setup time	10	-		
	$t_{ah}$	D/CX hold time (Write / Read)	10	-		
SDA / SDI (Input)	$t_{ds}$	Data setup time (Write)	30	-	ns	
	$t_{dh}$	Data hold time (Write)	30	-	ns	
SDA / SDO (Output)	$t_{acc}$	Access time (Read)	10	-	ns	For maximum CL=30pF
	$t_{od}$	Output disable time (Read)	10	50	ns	For minimum CL=8pF

Note:  $T_a = 25\text{ }^\circ\text{C}$ ,  $V_{DDI}=1.65\text{V to }3.3\text{V}$ ,  $V_{CI}=2.5\text{V to }3.3\text{V}$ ,  $AGND=VSS=0\text{V}$



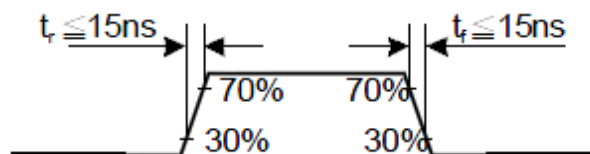


### 6-3.2 Display Parallel 18/16/9/8-bit Interface Timing Characteristics (8080-II system)

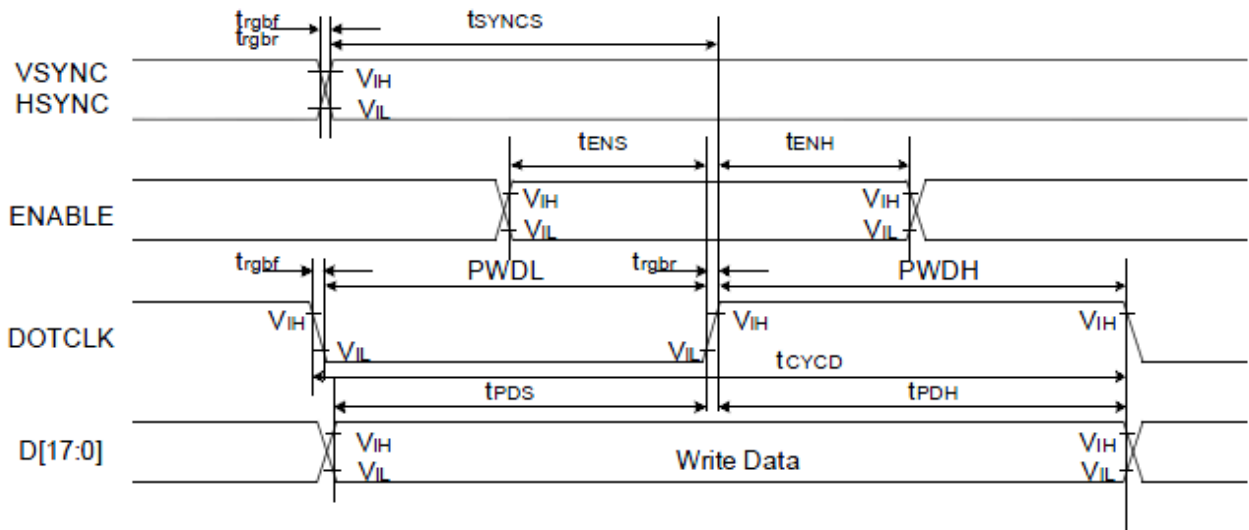


Signal	Symbol	Parameter	min	max	Unit	Description
DCX	tast	Address setup time	0	-	ns	
	taht	Address hold time (Write/Read)	0	-	ns	
CSX	tchw	CSX "H" pulse width	0	-	ns	
	tcs	Chip Select setup time (Write)	15	-	ns	
	trcs	Chip Select setup time (Read ID)	45	-	ns	
	trcsfm	Chip Select setup time (Read FM)	355	-	ns	
	tcsf	Chip Select Wait time (Write/Read)	10	-	ns	
WRX	twc	Write cycle	66	-	ns	
	twrh	Write Control pulse H duration	15	-	ns	
	twrl	Write Control pulse L duration	15	-	ns	
RDX (FM)	trcfm	Read Cycle (FM)	450	-	ns	
	trdhfm	Read Control H duration (FM)	90	-	ns	
	trdlfm	Read Control L duration (FM)	355	-	ns	
RDX (ID)	trc	Read cycle (ID)	160	-	ns	
	trdh	Read Control pulse H duration	90	-	ns	
	trdl	Read Control pulse L duration	45	-	ns	
D[17:0], D[17:10]&D[8:1], D[17:10], D[17:9]	tdst	Write data setup time	10	-	ns	For maximum CL=30pF For minimum CL=8pF
	tdht	Write data hold time	10	-	ns	
	trat	Read access time	-	40	ns	
	tratfm	Read access time	-	340	ns	
	trod	Read output disable time	20	80	ns	

Note:  $T_a = -30$  to  $70$  °C,  $V_{DDI} = 1.65V$  to  $3.3V$ ,  $V_{CI} = 2.5V$  to  $3.3V$ ,  $V_{SS} = 0V$ .

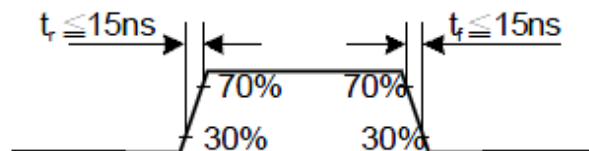


### 6-3.3 Parallel 18/16/6-bit RGB Interface Timing Characteristics



Signal	Symbol	Parameter	min	max	Unit	Description	
VSYNC / HSYNC	$t_{synCS}$	VSYNC/HSYNC setup time	15	-	ns	18/16-bit bus RGB interface mode	
	$t_{synCH}$	VSYNC/HSYNC hold time	15	-	ns		
DE	$t_{ENS}$	DE setup time	15	-	ns		
	$t_{ENH}$	DE hold time	15	-	ns		
D[17:0]	$t_{POS}$	Data setup time	15	-	ns		
	$t_{PDH}$	Data hold time	15	-	ns		
DOTCLK	PWDH	DOTCLK high-level period	15	-	ns		
	PWDL	DOTCLK low-level period	15	-	ns		
	$t_{cyCD}$	DOTCLK cycle time	100	-	ns		
	$t_{rgbr}, t_{rgbf}$	DOTCLK, HSYNC, VSYNC rise/fall time	-	15	ns		
VSYNC / HSYNC	$t_{synCS}$	VSYNC/HSYNC setup time	15	-	ns		6-bit bus RGB interface mode
	$t_{synCH}$	VSYNC/HSYNC hold time	15	-	ns		
DE	$t_{ENS}$	DE setup time	15	-	ns		
	$t_{ENH}$	DE hold time	15	-	ns		
D[17:0]	$t_{POS}$	Data setup time	15	-	ns		
	$t_{PDH}$	Data hold time	15	-	ns		
DOTCLK	PWDH	DOTCLK high-level pulse period	15	-	ns		
	PWDL	DOTCLK low-level pulse period	15	-	ns		
	$t_{cyCD}$	DOTCLK cycle time	50	-	ns		
	$t_{rgbr}, t_{rgbf}$	DOTCLK, HSYNC, VSYNC rise/fall time	-	15	ns		

Note:  $T_a = -30$  to  $70$  °C,  $V_{DDI} = 1.65V$  to  $3.3V$ ,  $V_{CI} = 2.5V$  to  $3.3V$ ,  $AGND = VSS = 0V$





## 7. Optical Characteristics:

Item	Symbol	Conditions	Specifications			Unit	Note	
			Min	Typ	Max			
Transmittance (With PL)	T(%)	-	-	4.65	-	-	-	
Contrast Ratio	CR	$\Theta=0$ Normal Viewing angle	-	800	-		(1) (2)	
Response time	TR+TF	-	-	35	-	ms	(1) (3)	
Viewing angle	Hor	$\Theta_{x+}$	$CR \geq 10$	-	80	-	deg.	-
		$\Theta_{x-}$		-	80	-		
	Ver	$\Theta_{y+}$		-	80	-		
		$\Theta_{y-}$		-	80	-		

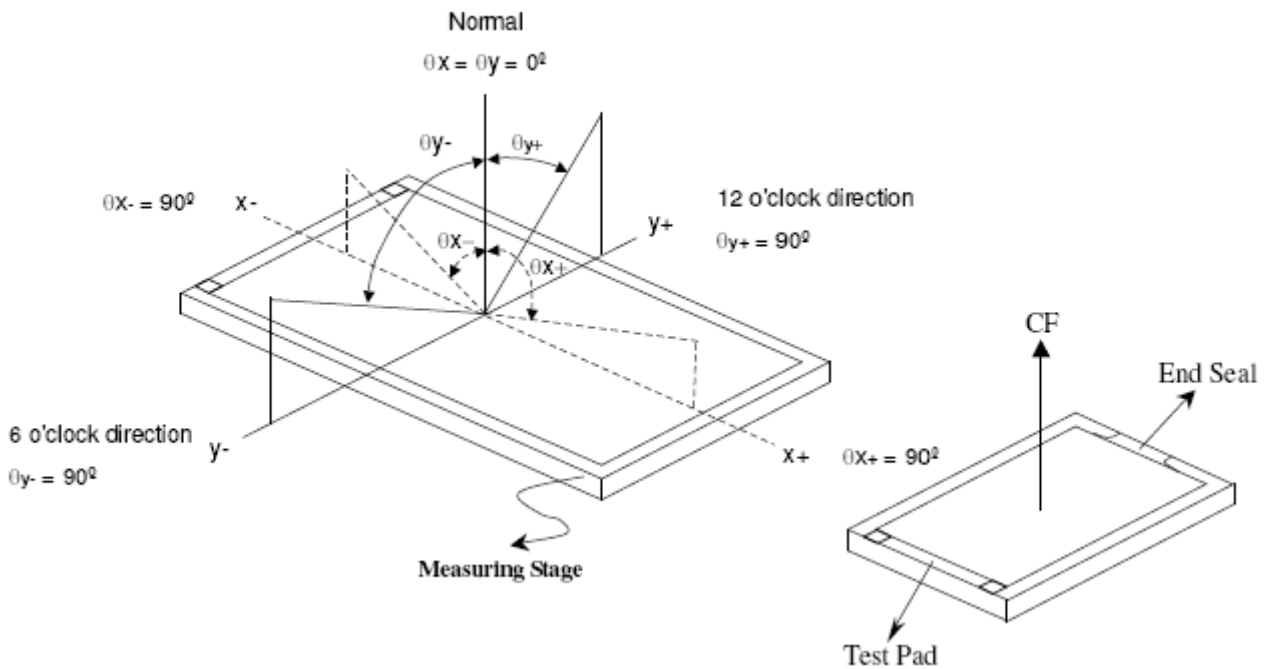
### Measuring Condition

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.	Brightness	
Chromaticity Coordinates (Transmissive)	Red	x	0.597	0.647	0.697	100 cd/m <sup>2</sup>	
		y	0.267	0.317	0.367		
	Green	x	LED Backlight Color Degree x=0.3 y=0.3 Brightness =7000 cd/m <sup>2</sup>	0.265	0.315	0.365	450 cd/m <sup>2</sup>
		y		0.532	0.582	0.632	
	Blue	x		0.090	0.140	0.190	35 cd/m <sup>2</sup>
		y		0.038	0.088	0.138	
	White	x		0.260	0.310	0.360	550 cd/m <sup>2</sup>
		y		0.286	0.336	0.386	

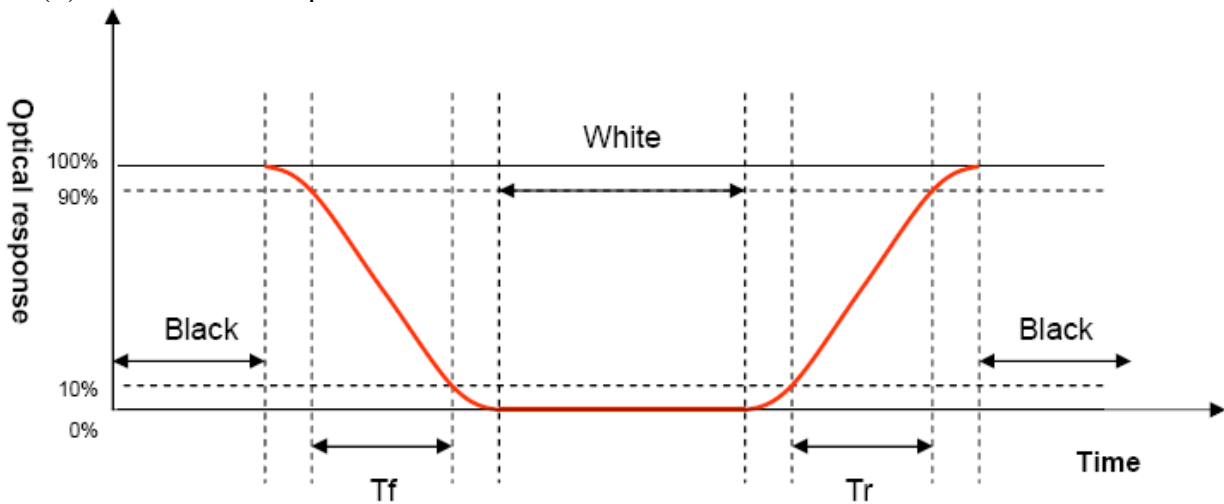
Note (1) Definition of Viewing Angle :



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





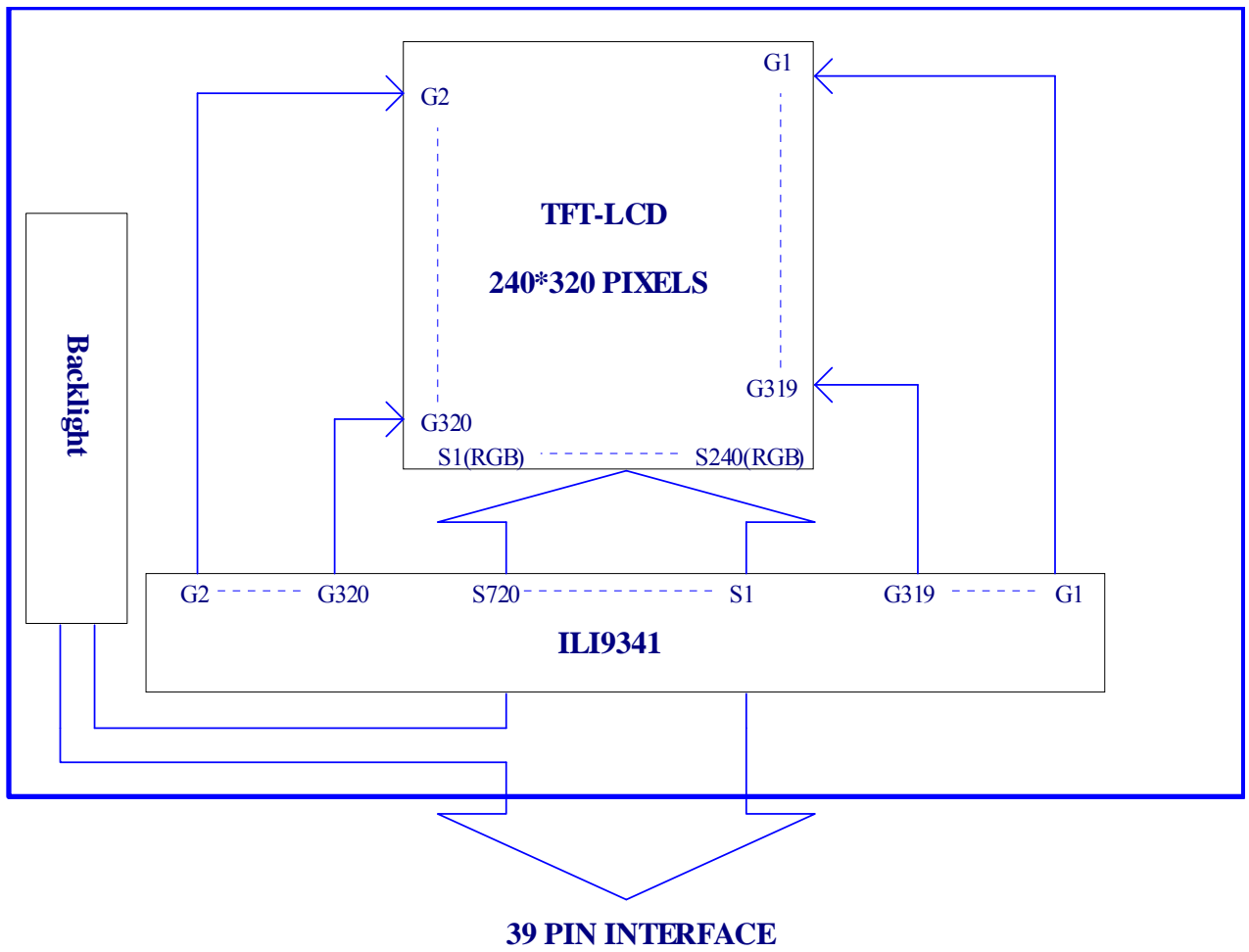
## **8. Interface Pin Assignment:**

No.	Symbol	Function
1	LED_A	LED power anode
2	LED_K	LED power cathode
3	IOVCC	Digital power supply
4	SDO	Serial data output signal
5	TE	Tearing effect output pin (No connection)
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	DB7	Data bus
17	DB6	Data bus
18	DB5	Data bus
19	DB4	Data bus
20	DB3	Data bus
21	DB2	Data bus
22	DB1	Data bus
23	DB0	Data bus
24	SDA	Serial data input signal
25	GND	Ground
26	DOTCLK	Pixel clock signal in RGB I/F mode
27	GND	Ground



28	ENABLE	Data enable signal in RGB I/F mode																														
29	HSYNC	Horizontal sync. Signal in RGB I/F mode																														
30	VSYNC	Vertical sync. Signal in RGB I/F mode																														
31	RDB	Read signal in 80-series parallel interface																														
32	WRB	Write signal in 80-series parallel interface																														
33	RS	Data/Command select signal																														
34	CSB	CHip select signal																														
35	RESET	Reset signal																														
36	IM0 IM2	Select MCU Interface mode																														
		<table border="1"> <thead> <tr> <th rowspan="2">IM3</th> <th rowspan="2">IM2</th> <th rowspan="2">IM1</th> <th rowspan="2">IM0</th> <th rowspan="2">MCU-Interface Mode</th> <th colspan="2">DB Pin in use</th> </tr> <tr> <th>Register/content</th> <th>GRAM</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>1</td> <td>0</td> <td>80 MCU 18-bit bus Interface II</td> <td>D[8:1]</td> <td>D[17:0]</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>1</td> <td>80 MCU 9-bit bus Interface II</td> <td>D[17:10]</td> <td>D[17:9]</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>0</td> <td>4-wire 8-bit data serial Interface II</td> <td colspan="2">SDI: in SOO: out</td> </tr> </tbody> </table>	IM3	IM2	IM1	IM0	MCU-Interface Mode	DB Pin in use		Register/content	GRAM	1	0	1	0	80 MCU 18-bit bus Interface II	D[8:1]	D[17:0]	1	0	1	1	80 MCU 9-bit bus Interface II	D[17:10]	D[17:9]	1	1	1	0	4-wire 8-bit data serial Interface II	SDI: in SOO: out	
		IM3						IM2	IM1	IM0	MCU-Interface Mode	DB Pin in use																				
			Register/content	GRAM																												
1	0	1	0	80 MCU 18-bit bus Interface II	D[8:1]	D[17:0]																										
1	0	1	1	80 MCU 9-bit bus Interface II	D[17:10]	D[17:9]																										
1	1	1	0	4-wire 8-bit data serial Interface II	SDI: in SOO: out																											
37																																
38	VCI	Analog power supply																														
39	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:

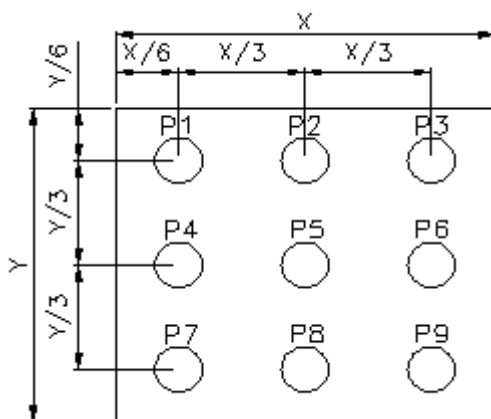
(Ta=25°C)

PARAMETER	Sym.	Min.	Typ.	Max.	Unit	Test Condition	Note
Supply Current	I	-	20	-	mA	V=12.0V	
Supply Voltage	V	11.0	12.0	13.2	V	If=20mA	
Reverse Voltage	VR	-	-	5	V	-	
Luminous Intensity for LCM	IV	450	550	-	Cd/m <sup>2</sup>	If=20mA	2
Uniformity for LCM	-	70	-	-	%	If=20mA	3
Life Time	-	-	50000	-	Hr.	If=20mA	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  $\varnothing$ 8 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°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 -20°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 80°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 -30°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 : -30°C for 30 minutes → normal temperature for 5 minutes → +80°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: ±4KV 150pF/330Ω 5 times
		Contact: ±2KV 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 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 ( $25\pm 5^{\circ}\text{C}$ ), 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 MIL-STD105E.General Inspection Level II take a single time.

(ii) The defects classify of AQL as following:

Major defect: AQL = 0.65

Minor defect: AQL = 2.5

Total defects: AQL = 2.5

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

#### a. Non- conforming Analysis:

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

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

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

#### b. Disposition of non- conforming:

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

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

### 12-4. Agreement items

Both sides should discuss together when the following problems happen.

a. There is any problem of standard of quality assurance, and both sides should think that must be modified.

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

c. Any other special problem.

12-5. Standard of The Product Appearance Test

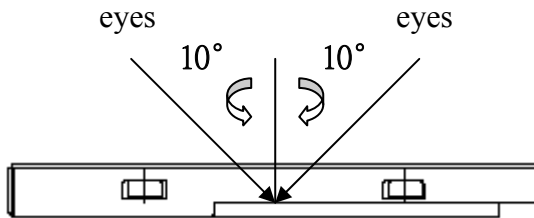
a. Manner of appearance test:

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

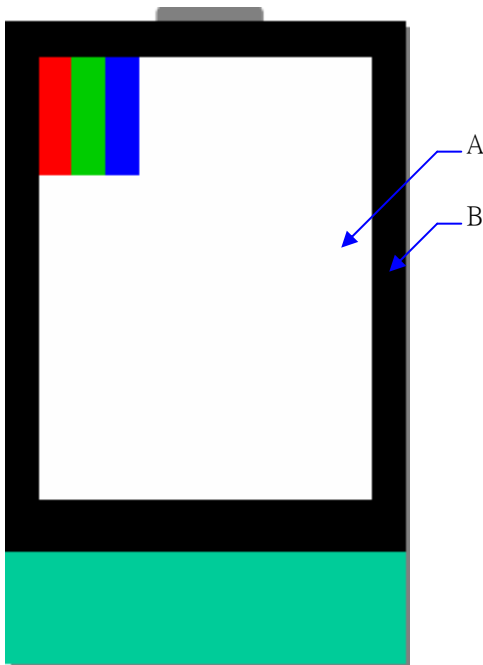
(ii) When test the model of transmissive product must add the reflective plate.

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

(iii) 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:

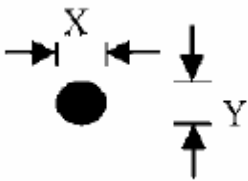
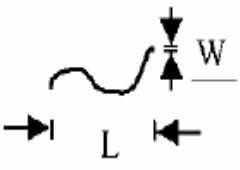
(i) It will accord to the AQL when the standard can not be described.

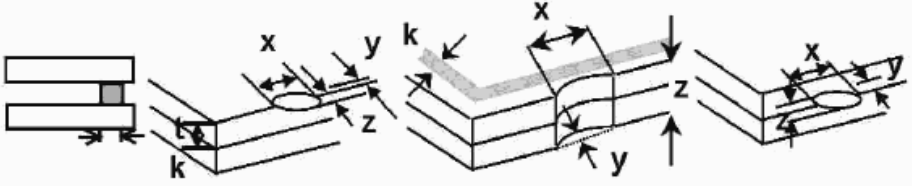
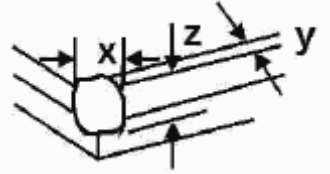
(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

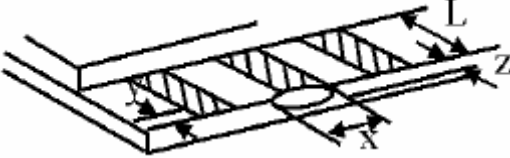
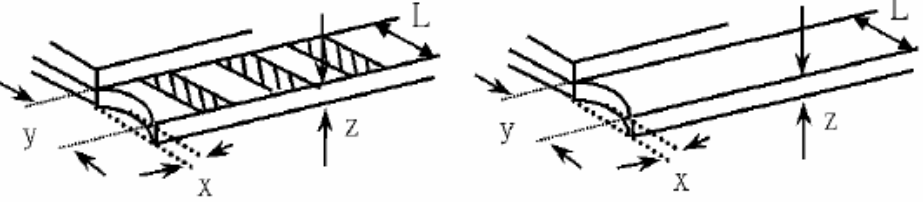
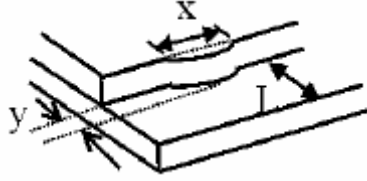
(iii) Must add new item on time when it is necessary.

c. Standard of inspection: (Unit: mm)

12-6. Inspection specification

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 $\leq 0.25\text{mm}$ , 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 $\Phi = (X+Y) / 2$  <table border="1" data-bbox="829 1008 1364 1265"> <thead> <tr> <th>Size(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <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> </tbody> </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												
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$0.30 < \Phi$	0														
3.2 Line type: (As following drawing)  <table border="1" data-bbox="694 1411 1364 1646"> <thead> <tr> <th>Length(mm)</th> <th>Width(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>---</td> <td><math>W \leq 0.02</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>L \leq 3.0</math></td> <td><math>0.02 &lt; W \leq 0.05</math></td> <td rowspan="2">2</td> </tr> <tr> <td><math>L \leq 2.5</math></td> <td><math>0.03 &lt; W \leq 0.08</math></td> </tr> <tr> <td>---</td> <td><math>0.08 &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	---	$W \leq 0.02$	Accept no dense	$L \leq 3.0$	$0.02 < W \leq 0.05$	2	$L \leq 2.5$	$0.03 < W \leq 0.08$	---	$0.08 < W$	Rejection	2.5
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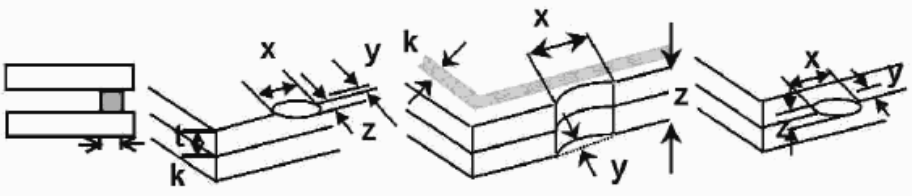
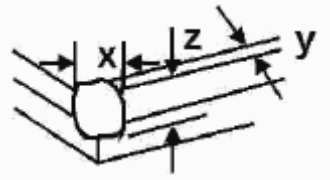
NO	Item	Criterion	AQL																		
04	Polarizer bubbles	<p>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction</p> <table border="1" data-bbox="868 293 1366 533"> <thead> <tr> <th>Size <math>\Phi</math>(mm)</th> <th>Acceptable Q'ty</th> </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>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> </tbody> </table>	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						
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05	Scratches	Follow NO.3 -2 Line Type.																			
06	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>6.1 General glass chip:  6.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="416 1048 1235 1205"> <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>6.1.2 Corner crack:</p>  <table border="1" data-bbox="416 1570 1235 1727"> <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
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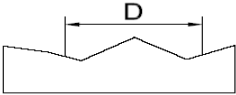
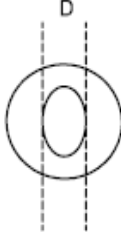
NO	Item	Criterion	AQL																
07	Glass crack	<p>Symbols:            x: Chip length      y: Chip width      z: Chip thickness            k: Seal width      t: Glass thickness      a: LCD side length            L: Electrode pad length</p> <p>7.2 Protrusion over terminal:            7.2.1 Chip on electrode pad:</p>  <table border="1" data-bbox="550 683 1220 828"> <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" data-bbox="550 1198 1220 1344"> <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" data-bbox="869 1668 1300 1814"> <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																	
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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 border="1" data-bbox="416 797 1235 1014"> <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 border="1" data-bbox="416 1391 1235 1608"> <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
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NO	Item	Criterion	AQL											
15	Touch Panel(Fish eye、dent and bubble on film)	<table border="1"> <thead> <tr> <th>SIZE(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <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> </tbody> </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	 	2.5
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		$\Phi \leq 0.2$	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.