YEEBO LCD Limited

LCM Specialist

SPECIFICATION
FOR
LCD MODULE

MODULE NO: YB-TG320480S05A-N-A0

Doc.Version:02

Customer Approval:

☐ Accept	☐ Reject

YEEBO	NAME	SIGNATURE	DATE
Prepare	Electronic Engineer		2014.3.12
Check	Mechanical Engineer		2014-03-12
Verify			2014.3.12
Approval			2014.3.12

☐APPROVAL FOR SPECIFICATIONS ONLY

■APPROVAL FOR SPECIFICATIONS AND SAMPLE

WIMRD005-02-C

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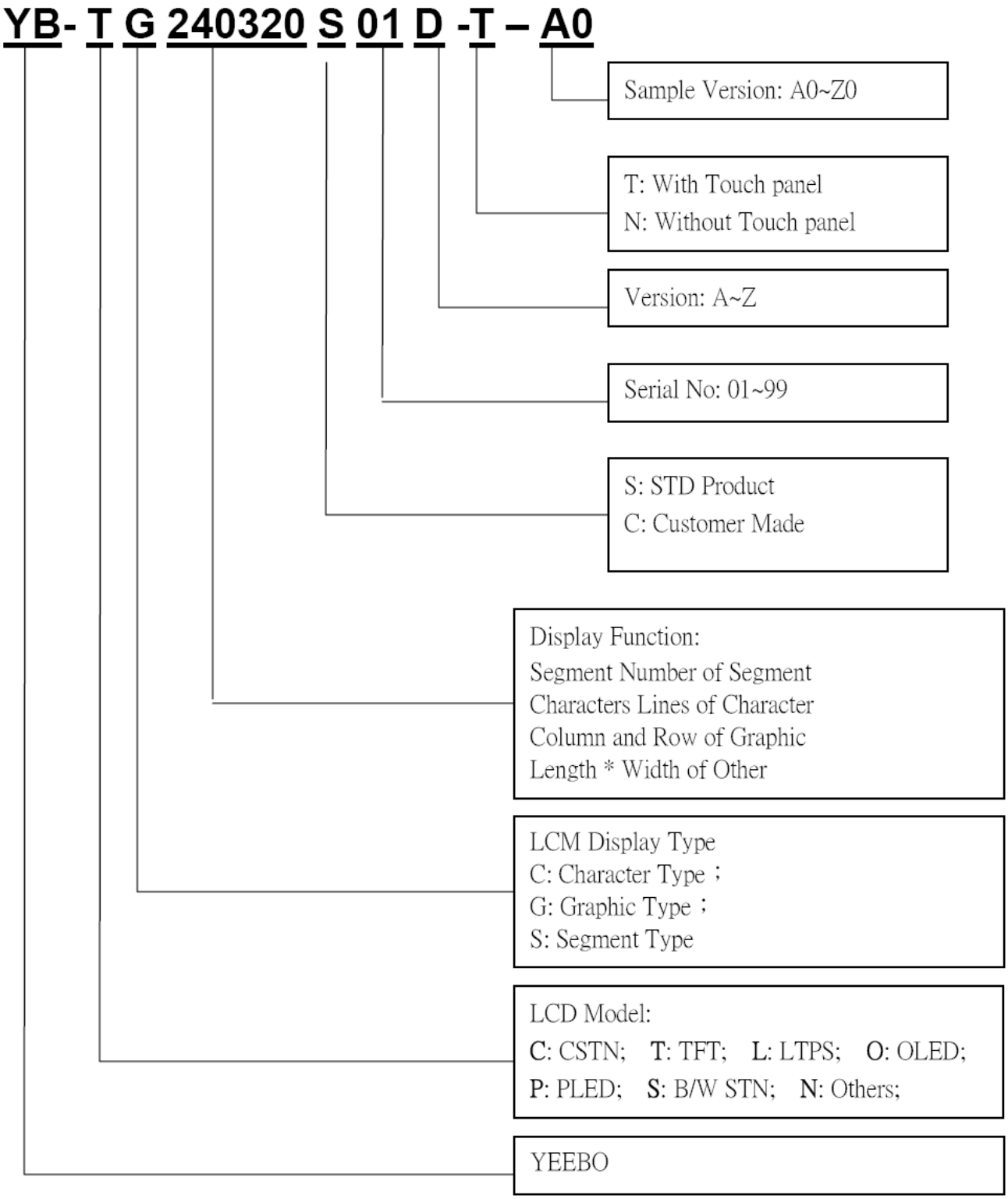
1. Revision History

Sample Version	DOC. Version	DATE	DESCRIPTION		CHANGED BY
A0	00	2013-11-22	SPEC ONLY	First issue	Gavin/Aiching
A0	01	2014-01-07	SPEC ONLY	Modify: 1.LCM drawing (P.5) 2.Pin Assignment (P.13) 3.Block Diagram (P.15)	Gavin/Aiching
A0	02	2014-03-12	FULL SPEC	First Sample	Gavin/Aiching

2. Table of Contents:

3. Module Numbering System:

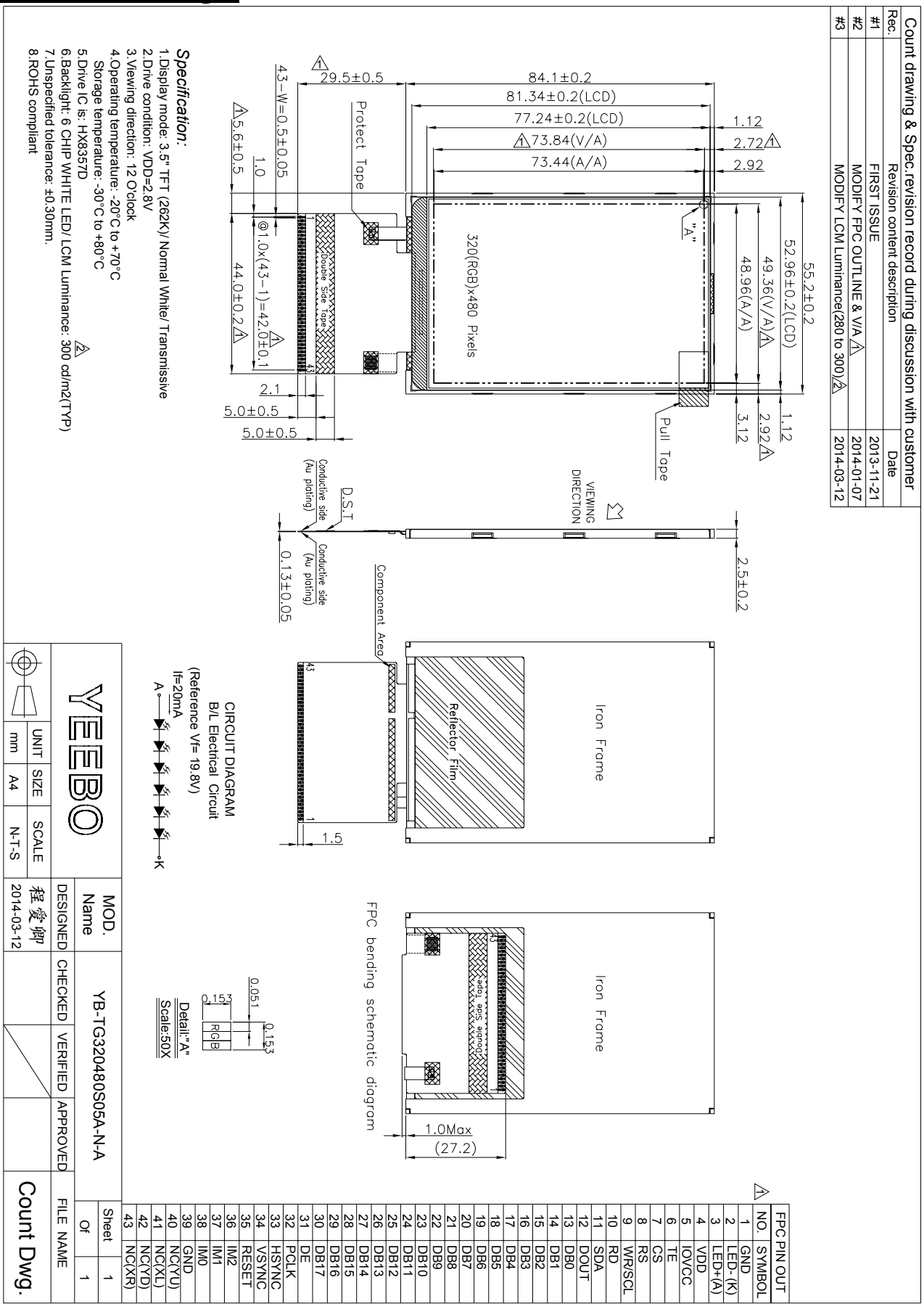
(Example)



4. General Specification:

ITEM	CONTENTS
Module Size	55.2(W) * 84.1(H) * 2.5(T) mm
Module Size(With FPC)	55.2(W) * 113.6(H) * 2.5(T) mm
Display Size(Diagonal)	3.5 inch
Display Format	320(RGB) * 480 Pixels
Active Area	48.96(W) * 73.44(H) mm
Pixel Pitch	0.153 * 0.153 mm
LCD Type	TFT(262K) / Transmissive/ NW
View Angle	12 O'clock
Controller IC	HX8357D
Weight	20.5g

5. LCM drawing:



6. Electrical Characteristics

6-1 Absolute Maximum Ratings (Ta=25℃ VSS=0V)

Item	Symbol	Min.	Type	Max.	Unit	Remark
Supply Voltage	V_{DD}	-0.3	-	+4.6	V	Note1
Supply Voltage(Logic)	V_{DDI}	-0.3		+4.6		Note1
Logic Input Voltage Range	V_{IN}	0.5		$I_{OVCC+0.5}$	V	Note1
Operating Temperature	Topr	-20	-	+70	℃	-
Storage Temperature	Tstg	-30	-	+80	℃	-

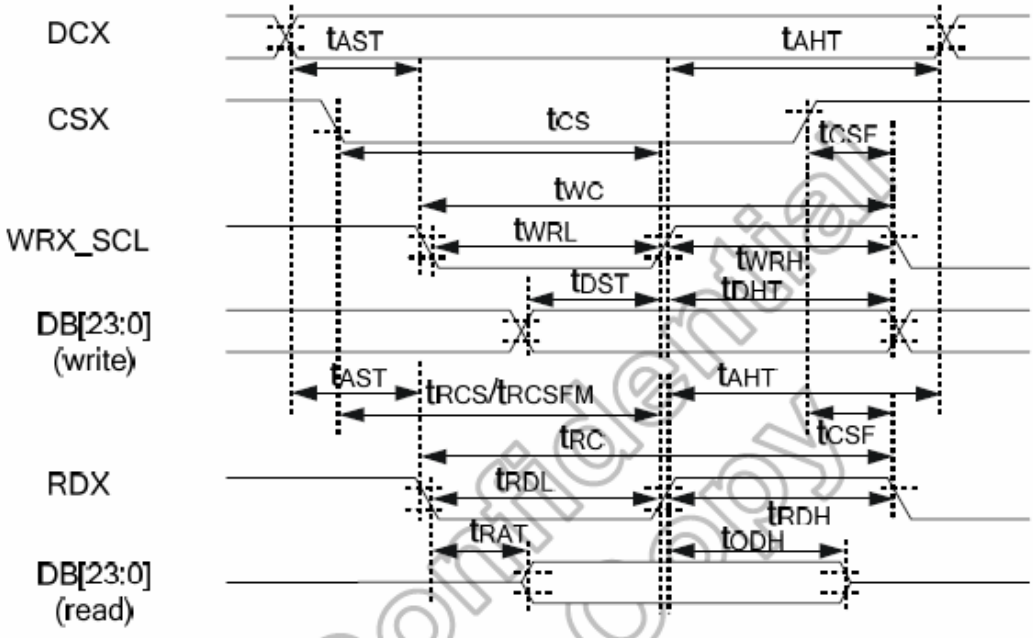
Note1: Absolute maximum rating is the limit value beyond which the IC maybe broken. They do not assure operations.

6-2 Operating Conditions (Ta=25℃)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply voltage	V_{DD}	-	2.6	2.8	3.0	Volt
Input Voltage	V_{IH}	-	0.7 * I_{OVCC}	-	I_{OVCC}	V
	V_{IL}	-	V_{SS}	-	0.3* I_{OVCC}	V
Power Supply Current for LCM	I_{DD}	V_{DD}=2.8V	-	14.2	21.5	mA

6-3 Timing Characteristics

DBI Type B interface characteristic



DBI Type B interface characteristics

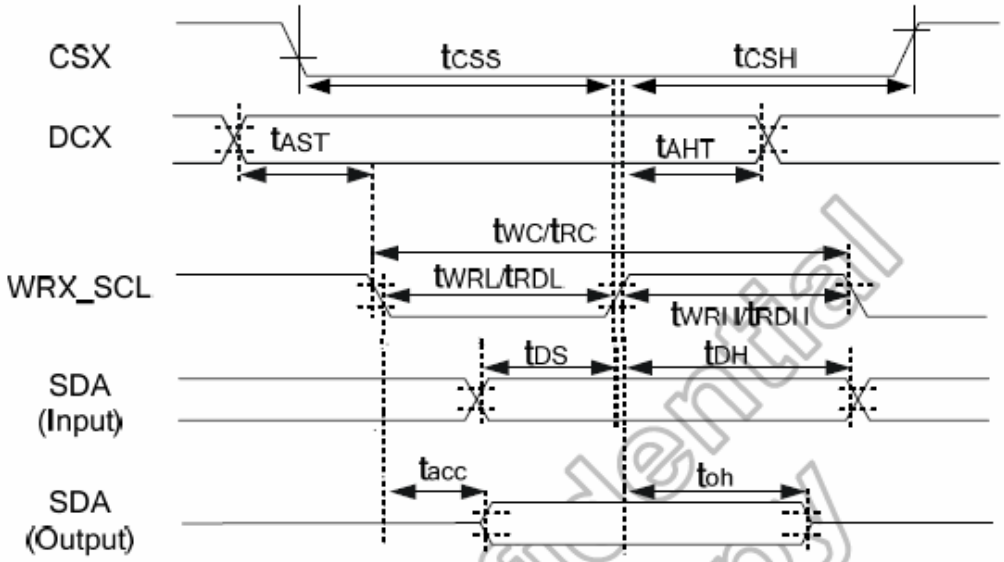
(VSSA=0V, IOVCC=1.8V, VCI=2.8V, T_A=25℃)

Signal	Symbol	Parameter	Min.	Max.	Unit	Description
DCX	t_{AST}	Address setup time	0	-	ns	-
	t_{AHT}	Address hold time (Write/Read)	10	-		
CSX	t_{CS}	Chip select setup time (Write)	10	-	ns	-
	t_{RCS}	Chip select setup time (Read register)	45	-		
	t_{RCSFM}	Chip select setup time (GRAM)	355	-		
	t_{CSF}	Chip select wait time (Write/Read)	10	-		
WRX_SCL	t_{WC}	Write cycle (write register)	50	-	ns	-
	t_{WC}	Write cycle (write GRAM@SLPOUT)	47	-		
	t_{WC}	Write cycle (write GRAM@SLPIN)	100	-		
	t_{WRH}	Control pulse "H" duration	15	-		
	t_{WRL}	Control pulse "L" duration	15	-		
RDX	t_{RC}	Read cycle (read register)	160	-	ns	-
	t_{RC}	Read cycle (GRAM)	450	-		
	t_{RDH}	Control pulse "H" duration	90	-		
	t_{RDL}	Control pulse "L" duration(read register)	35	-		
	t_{RDL}	Control pulse "L" duration(GRAM)	345	-		
DB[23:0]	t_{DST}	Data setup time	10	-	ns	For maximum C_L=30pF For minimum C_L=8pF
	t_{DHT}	Data hold time	10	-		
	t_{RAT}	Read access time(read register)	-	40		
	t_{RAT}	Read access time(GRAM)	-	340		
	t_{ODH}	Output disable time	20	80		

Note: The input signal rise time and fall time (tr, tf) is specified at 15 ns or less.
Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

DBI Type B interface characteristics

DBI Type C interface characteristics



DBI Type C interface characteristics

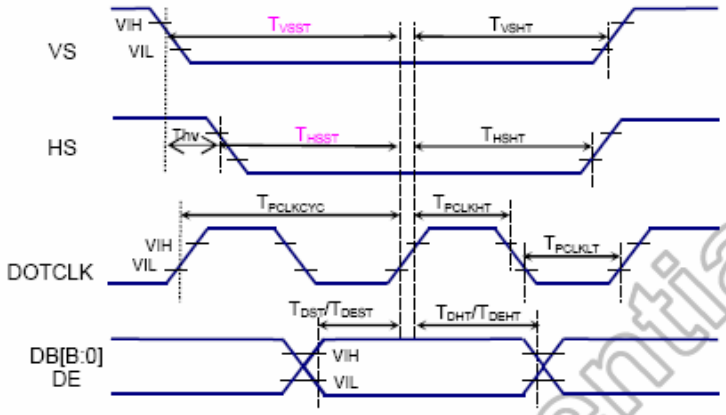
(VSSA=0V, IOVCC=1.8V, VCI=2.8V, T_A = 25℃)

Signal	Symbol	Parameter	Min.	Max.	Unit	Description
CSX	tCSS tCSS tCSH tCSH	Chip select setup time (Write) Chip select setup time (Read) Chip select hold time (Write) Chip select hold time (Read)	15 60 15 65	- - - -	ns	-
DCX	tAST tAHT	Address setup time Address hold time (Write/Read)	0 10	- -	ns	-
WRX_SCL (Write)	tWC tWRH tWRL	Write cycle Control pulse "H" duration Control pulse "L" duration	66 15 15	- - -	ns	-
WRX_SCL (Read)	tRC tRDH tRDL	Read cycle Control pulse "H" duration Control pulse "L" duration	150 60 60	- - -	ns	-
SDA (Input)	tDS tDH	Data setup time Data hold time	10 10	- -	ns	For maximum CL=30pF For minimum CL=8pF
SDA (Output)	tACC tOH	Read access time Output disable time	10 15	50 50	ns	

Note: The input signal rise time and fall time (tr, tf) is specified at 15 ns or less.
Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

DBI Type C interface characteristics

DPI interface characteristics



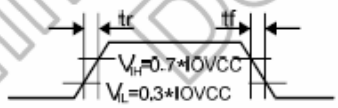
(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.5V to 3.3V, T_A = -30 to 70℃)

Item	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Pixel low pulse width	T_{CLKLT}	-	15	-	-	ns
Pixel high pulse width	T_{CLKHT}	-	15	-	-	ns
Vertical Sync. Set-up time	T_{VSST}	-	15	-	-	ns
Vertical Sync. Hold time	T_{VSHT}	-	15	-	-	ns
Horizontal Sync. Set-up time	T_{HSST}	-	15	-	-	ns
Horizontal Sync. Hold time	T_{HSHT}	-	15	-	-	ns
Data Enable set-up time	T_{DEST}	-	15	-	-	ns
Data Enable hold time	T_{DEHT}	-	15	-	-	ns
Data set-up time	T_{DST}	-	15	-	-	ns
Data hold time	T_{DHT}	-	15	-	-	ns
Phase difference of sync signal falling edge	Thv	-	0	-	320	Dotclk

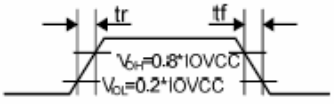
Note: The input signal rise time and fall time (tr, tf) is specified at 15 ns or less.

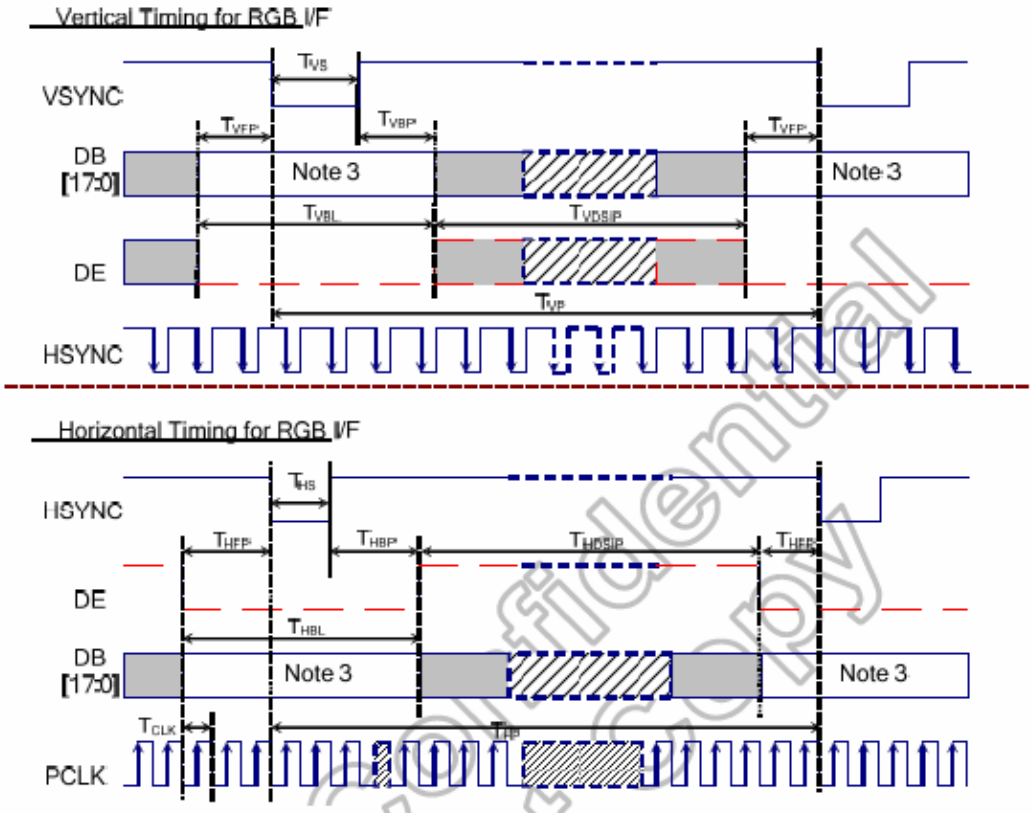
DPI interface characteristics-1

Input Signal Slope



Output Signal Slope





General timings for RGB I/F-2

Item	Symbol	Condition	Specification			Unit
			Min.	Typ.	Max.	
Vertical Timing						
Vertical cycle period	T_{VP}	-	486	-	-	HS
Vertical low pulse width	T_{VS}	-	2	-	-	HS
Vertical front porch	T_{VFP}	-	2	-	-	HS
Vertical back porch	T_{VBP}	-	2	-	-	HS
Vertical blanking period	T_{VBL}	$T_{VS} + T_{VBP} + T_{VFP}$	6	-	-	HS
Vertical active area	T_{VDISP}	-	-	480	-	HS
			-		-	HS
			-		-	HS
Vertical refresh rate	T_{VRR}	Frame rate	50	60	70	Hz
Horizontal Timing						
Horizontal cycle period	T_{HP}	-	335	-	-	DOTCLK
Horizontal low pulse width	T_{HS}	-	5	-	-	DOTCLK
Horizontal front porch	T_{HFP}	-	5	-	-	DOTCLK
Horizontal back porch	T_{HBP}	-	5	-	-	DOTCLK
Horizontal blanking period	T_{HBL}	$T_{HS} + T_{HBP} + T_{HFP}$	15	-	-	DOTCLK
Horizontal active area	T_{HDISP}	-	-	320	-	DOTCLK
Pixel clock cycle TVRR=60Hz	f_{CLKCYC}	-	9	-	-	MHz

Note: (1) IOVCC=1.65 to 3.3V, VCI=2.3 to 3.3V, VSSA=VSSD=0V, Ta=-30 to 70℃ (to +85℃ no damage)
(2) Data lines can be set to "High" or "Low" during blanking time – Don't care.
(3) HP is multiples of PCLK.

DPI interface characteristics-2

7. Optical Characteristics:

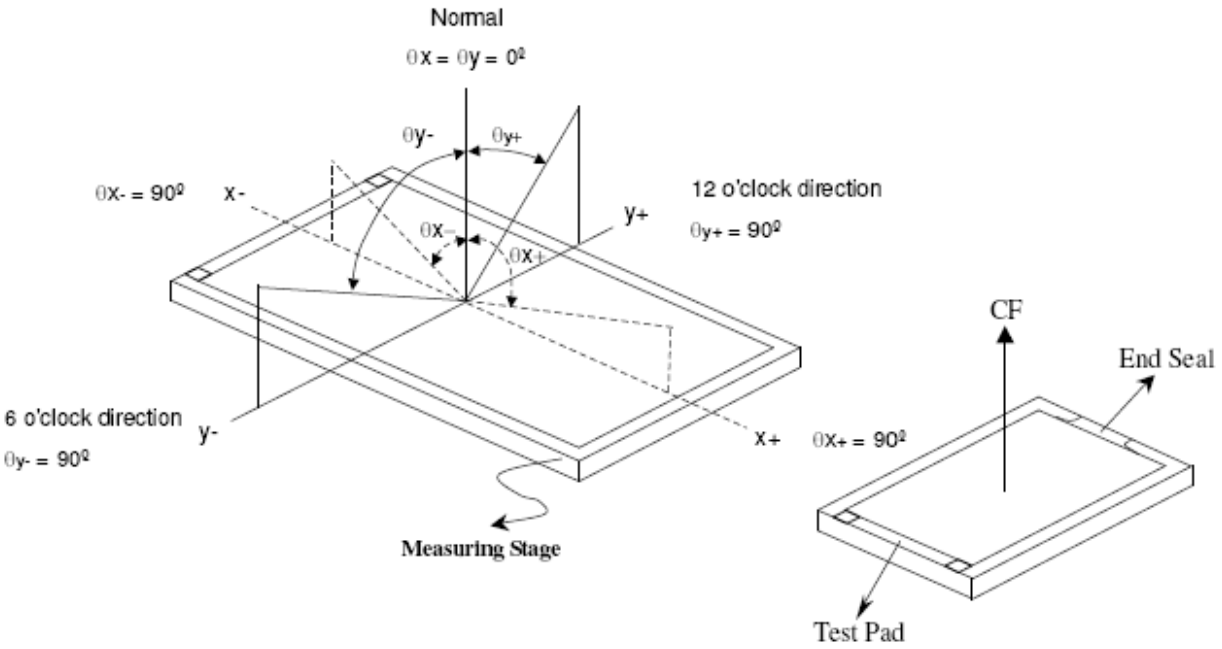
Item		Symbol	Conditions	Specifications			Unit	Note
				Min	Typ	Max		
Transmittance (With PL)		T(%)	–	-	5.5	-	-	-
Contrast Ratio		CR	Θ=0 Normal Viewing angle	-	500	-		(1) (2)
Response time		TR+TF	–	-	30	-	ms	(1) (3)
Viewing angle	Hor.	Θx+	CR≧10	-	70	-	deg.	-
		Θx-		-	70	-		
	Ver.	Θy+		-	70	-		
		Θy-		-	60	-		

Measuring Condition
1. Measuring surrounding: dark room
2. Ambient temperature: 25±2℃
3. 30 min. Warm-up time.

Color of CIE Coordinate:

Item		Symbol	Condition	Min.	Typ.	Max.	Brightness
Chromaticity Coordinates (Transmissive)	Red	x	θ = ϕ = 0° LED Backlight Color Degree x=0.29 y=0.29 Brightness =6500 cd/m²	0.632	0.637	0.642	60
		y		0.333	0.338	0.343	
	Green	x		0.284	0.289	0.294	190
		y		0.584	0.589	0.594	
	Blue	x		0.131	0.136	0.141	35
		y		0.138	0.143	0.148	
	White	x		0.295	0.300	0.305	300
		y		0.335	0.340	0.345	

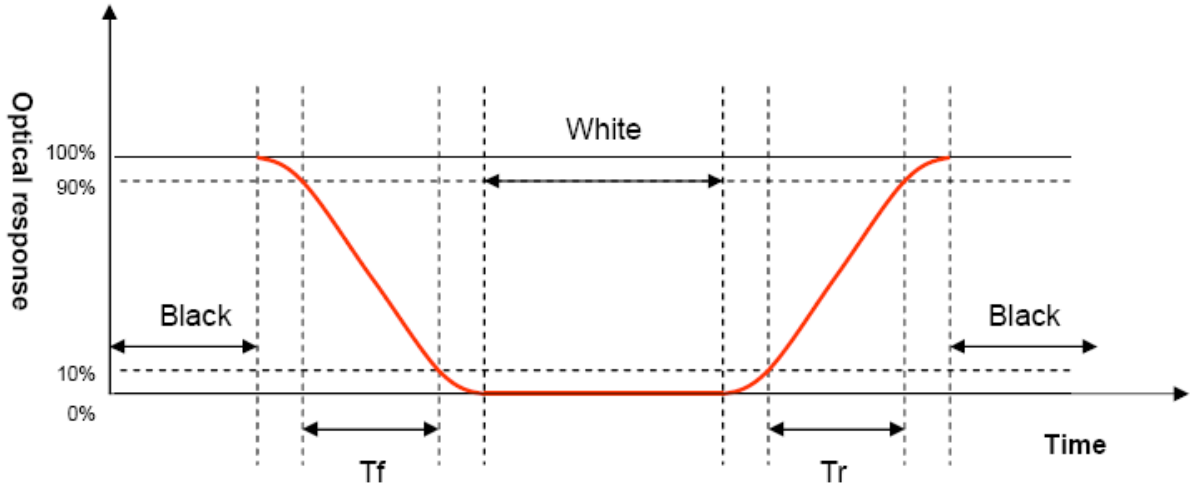
Note (1) Definition of Viewing Angle :



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

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

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



8. Interface Pin Assignment:

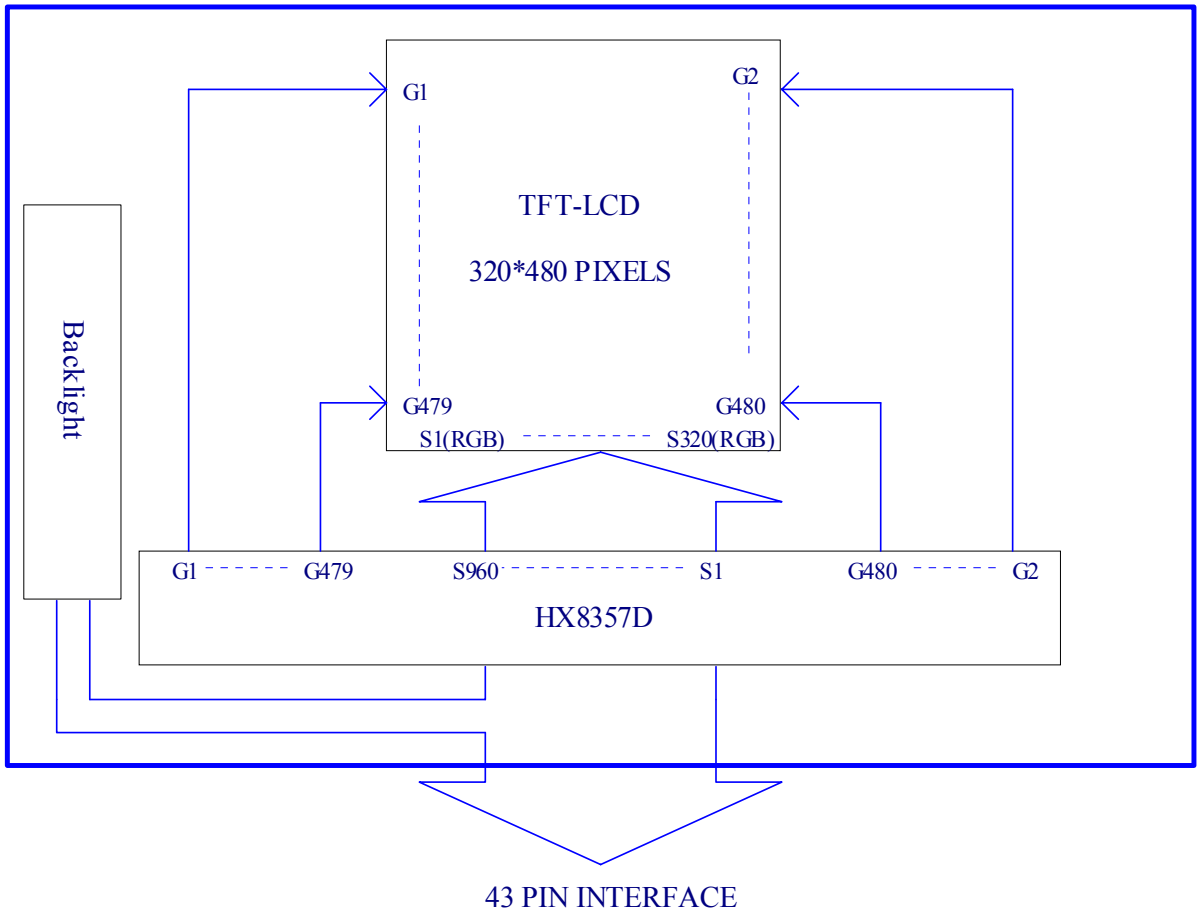
No.	Symbol	Function
1	GND	Power Ground.
2	LED- (K)	Cathode of LED Backlight.
3	LED+ (A)	Anode of LED Backlight.
4	VDD	Power Supply for Analog, Digital System and Booster Circuit.
5	IOVCC	Digital IO Pad power supply.
6	TE	Tearing effect output.
7	CS	Chip select signal.
8	RS	DBI Type-B , Type-C Option 3: Data / Command Select pin.
9	WR/SCL	DBI Type-B mode: Servers as a write signal and write data at the low level. DBI Type-C mode: it servers as SCL (Serial Clock)
10	RD	DBI Type-B: Servers as a read signal and read data at the low level.
11	SDA	Serial data input pin and output pin in serial bus system.
12	DOUT	Serial data output.
13	DB0	Data Bus .
14	DB1	
15	DB2	
16	DB3	
17	DB4	
18	DB5	
19	DB6	
20	DB7	
21	DB8	
22	DB9	
23	DB10	
24	DB11	
25	DB12	
26	DB13	

27	DB14	
28	DB15	
29	DB16	
30	DB17	
31	DE	A data ENABLE signal in DPI I/F mode.
32	PCLK	Data enable signal in DPI interface.
33	HSYNC	Horizontal synchronizing signal in DPI interface.
34	VSYNC	Vertical synchronizing signal in DPI interface.
35	RESET	Reset pin.
36	IM2	The interface mode select. Note1
37	IM1	
38	IM0	
39	GND	Power Ground.
40	NC(YU)	Open.
41	NC(XL)	Open.
42	NC(YD)	Open.
43	NC(XR)	Open.

Note 1:

IM2	IM1	IM0	Interface
0	0	0	DBI TYPE-B 18-bit/24-bit
0	0	1	DBI TYPE-B 9-bit
0	1	0	DBI TYPE-B 16-bit
0	1	1	DBI TYPE-B 8-bit
1	0	0	MIPI DSI (For HX8357-D01 only)
1	0	1	DPI/DBI TYPE-C Option 1
1	1	0	MIPI DSI (For HX8357-D01 only)
1	1	1	DPI/DBI TYPE-C Option 3

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:

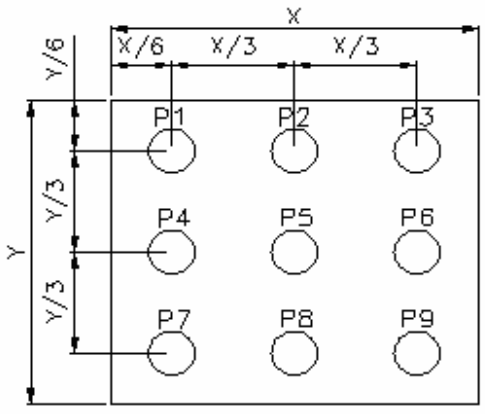
2. The Main Advantages of the LED Backlight are as following:
2.1 The brightness of the backlight can simply be adjusted.
By a resistor or a potentiometer.

3. Data About LED Backlight:

PARAMETER	Sym.	Min.	Typ.	Max.	Unit	Test Condition	Note
Supply Current	I	-	20	-	mA	V=19.8V	
Supply Voltage	V	18.0	19.8	20.4	V	If=20mA	
Reverse Voltage	VR	-	-	5.0	V	-	
Luminous Intensity for LCM	IV	220	300	-	cd/m^2	If=20mA	2
Uniformity for LCM	-	70	-	-	%	If=20mA	3
Life Time	-	20000	-	-	Hr.	If=20mA	4
Color	White						

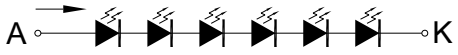
NOTE:
1. Backlight Only
2. Average Luminous Intensity of P1-P9
3. Uniformity = Min/Max * 100%
4. LED life time defined as follows: The final brightness is at 70% of original brightness

Measured Method: (X*Y: Light Area)



Internal Circuit Diagram

(Reference Vf= 19.8V)
If=20mA



(Effective spatial Distribution)
Hole Diameter ø3 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 240 hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 2 hours.
04	Low temperature storage	The sample should be allowed to stand at -30℃ for 240 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours.
05	Moisture storage	The sample should be allowed to stand at 60℃,90%RH MAX for 240 hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours.
06	Thermal shock storage	The sample should be allowed to stand the following 10 cycles : -30℃ for 30 minutes → normal temperature for 5 minutes → +80℃ for 30 minutes → normal temperature for 5 minutes, as one cycle.
07	Packing vibration	Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm Sweep time: 12 min X,Y,Z 2 hours for each direction.
08	Packing drop test	According to ISTA 1A 2001.
09	Electrical Static Discharge	Air: ±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 11.2, Standard specifications for Reliability have been executed in order to ensure stability.

No	Item	Test Model	In section Criteria
01	Current Consumption	Refer To Specification	The current consumption should conform to the product specification.
02	Contrast	Refer To Specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
03	Appearance	Visual inspection	Defect free.

11- 3. MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (25±5℃), normal humidity (50±10% 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 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

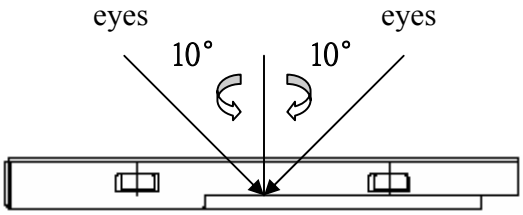
a. Manner of appearance test:

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

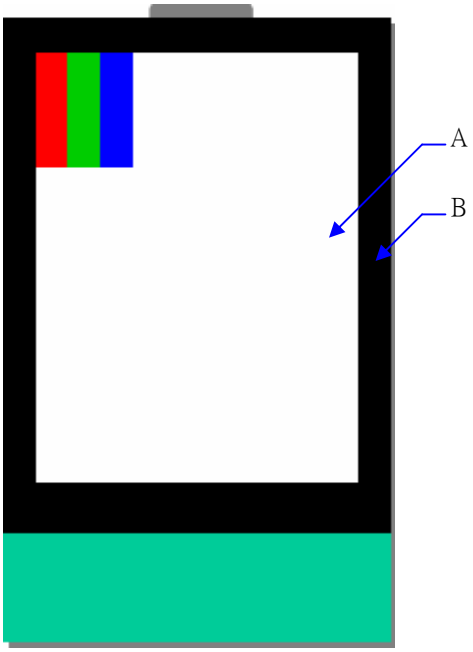
(ii) When test the model of transmissive product must add the reflective plate.

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

(iiii)Temperature: 25±5℃ Humidity: 60±10%RH



(iv) Definition of area:



A. Area: Viewing area.

B. Area: Out of viewing area.
(Outside viewing area)

b. Basic principle:

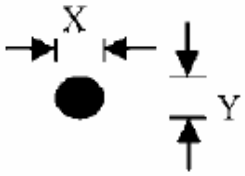
(i) It will accord to the AQL when the standard can not be described.

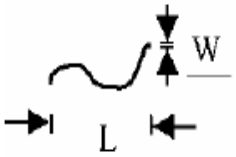
(ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.

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

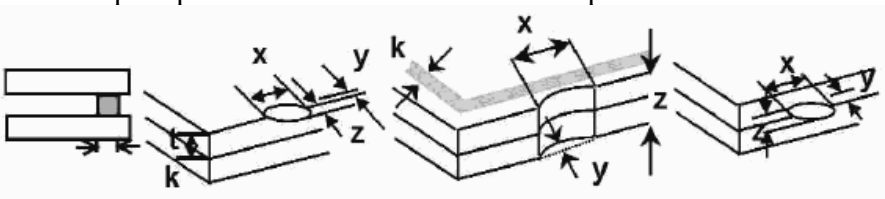
c. Standard of inspection: (Unit: mm)

12-6. Inspection specification

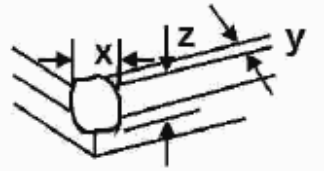
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>01</td><td>Electrical Testing</td><td>1.1 Missing vertical, horizontal segment, segment contrast defect.
1.2 Missing character, dot or icon.
1.3 Display malfunction.
1.4 No function or no display.
1.5 Current consumption exceeds product specifications.
1.6 LCD viewing angle defect.
1.7 Mixed product types.
1.8 Flicker</td><td>0.65</td></tr>
<tr><td>02</td><td>Black or White spots or Bright spots or Color spots on LCD (Display only)</td><td>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.</td><td>2.5</td></tr>
<tr><td rowspan="2">03</td><td rowspan="2">LCD and Touch Panel black spots, white spots, contamination (non – display)</td><td>3.1 Round type: As following drawing
Φ = (X+Y) / 2
 

<table>
<tr><th>Size(mm)</th><th>Acceptable Q'ty</th></tr>
<tr><td>Φ≦0.10</td><td>Accept no dense</td></tr>
<tr><td>0.10< Φ≦0.20</td><td>2</td></tr>
<tr><td>0.20< Φ≦0.25</td><td>2</td></tr>
<tr><td>0.25< Φ≦0.30</td><td>1</td></tr>
<tr><td>0.30< Φ</td><td>0</td></tr>
</table>
* Densely spaced: No more than two spots within 3mm.</td><td>2.5</td></tr>
<tr><td>3.2 Line type: (As following drawing)
 

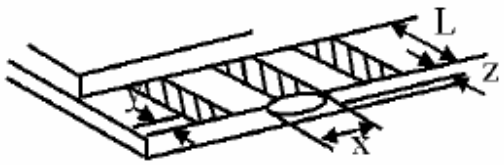
<table>
<tr><th>Length(mm)</th><th>Width(mm)</th><th>Acceptable Q'ty</th></tr>
<tr><td>---</td><td>W≦0.02</td><td>Accept no dense</td></tr>
<tr><td>L≦3.0</td><td>0.02<W≦0.05</td><td rowspan="2">2</td></tr>
<tr><td>L≦2.5</td><td>0.03<W≦0.08</td></tr>
<tr><td>---</td><td>0.08<W</td><td>Rejection</td></tr>
</table>
* Densely spaced: No more than two lines within 3mm.</td><td>2.5</td></tr>
</table>

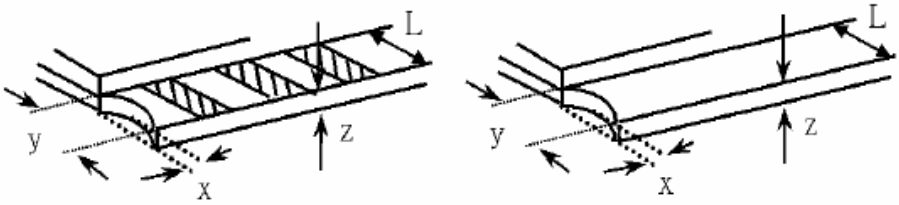
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>04</td><td>Polarizer bubbles</td><td>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction
<table>
<tr><td>Size Φ(mm)</td><td>Acceptable Q'ty</td></tr>
<tr><td>Φ≦0.20</td><td>Accept no dense</td></tr>
<tr><td>0.20< Φ≦0.50</td><td>3</td></tr>
<tr><td>0.50< Φ≦1.00</td><td>2</td></tr>
<tr><td>1.00< Φ</td><td>0</td></tr>
<tr><td>Total Q’ty</td><td>3</td></tr>
</table></td><td>2.5</td></tr>
<tr><td>05</td><td>Scratches</td><td>Follow NO.3 -2 Line Type.</td><td></td></tr>
<tr><td>06</td><td>Chipped glass</td><td>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:
 

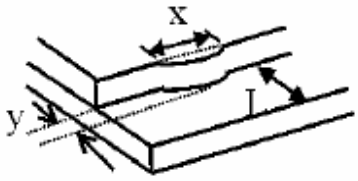
<table>
<tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr>
<tr><td>Z≦1/2t</td><td>Not over viewing area</td><td>x≦1/8a</td></tr>
<tr><td>1/2t< z≦2t</td><td>Not exceed 1/3k</td><td>x≦1/8a</td></tr>
</table>
⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip

6.1.2 Corner crack:
 

<table>
<tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr>
<tr><td>Z≦1/2t</td><td>Not over viewing area</td><td>x≦1/8a</td></tr>
<tr><td>1/2t< z≦2t</td><td>Not exceed 1/3k</td><td>x≦1/8a</td></tr>
</table>
⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip</td><td>2.5</td></tr>
</table>

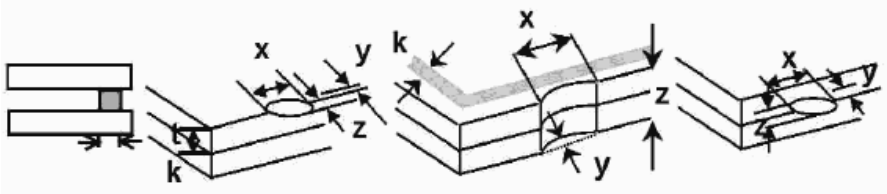
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>07</td><td>Glass crack</td><td>
Symbols:
x: Chip length y: Chip width z: Chip thickness
k: Seal width t: Glass thickness a: LCD side length
L: Electrode pad length
7.2 Protrusion over terminal:
7.2.1 Chip on electrode pad:


<table>
<tr><th>y: Chip width</th><th>x: Chip length</th><th>z: Chip thickness</th></tr>
<tr><td>y≦0.5mm</td><td>x≦1/8a</td><td>0< z≦t</td></tr>
</table>
7.2.2
Non-conductive portion:


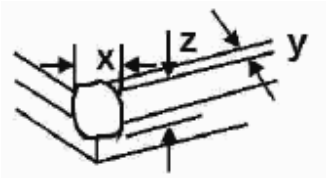
<table>
<tr><th>y: Chip width</th><th>x: Chip length</th><th>z: Chip thickness</th></tr>
<tr><td>y≦L</td><td>x≦1/8a</td><td>0< z≦t</td></tr>
</table>
⊙ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.
⊙ If the product will be heat sealed by the customer, the alignment mark must mot be damaged.
7.2.3 Substrate protuberance and internal crack


<table>
<tr><th>y: width</th><th>x: length</th></tr>
<tr><td>y≦1/3L</td><td>X≦a</td></tr>
</table>
</td><td>2.5</td></tr>
</table>

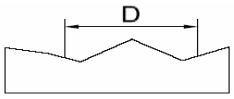
NO	Item	Criterion	AQL
08	Cracked glass	The LCD with extensive crack is not acceptable.	2.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color 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 ≦ 1/2 FPC terminal width and can not affect the function , we judge accept. 12.2 FPC alignment hole damage ≦ 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

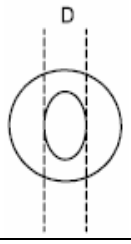
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>14</td><td>Touch Panel Chipped glass</td><td>
Symbols:
x: Chip length y: Chip width z: Chip thickness
k: Seal width t: Touch Panel Total thickness a: LCD side length
L: Electrode pad length
14.1 General glass chip:
14.1.1 Chip on panel surface and crack between panels:


<table>
<tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr>
<tr><td>Z≦t</td><td>≦1/2 k and not over viewing area</td><td>x≦1/8a</td></tr>
</table>
⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip

14.1.2 Corner crack:


<table>
<tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr>
<tr><td>z≦t</td><td>≦1/2 k and not over viewing area</td><td>x≦1/8a</td></tr>
</table>
⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip
</td><td>2.5</td></tr>
</table>

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>15</td><td>Touch Panel(Fish eye、dent and bubble on film)</td><td>
<table>
<tr><th>SIZE(mm)</th><th>Acceptable Q’ty</th></tr>
<tr><td>Φ≦0.2</td><td>Accept no dense</td></tr>
<tr><td>0.2< D ≦0.4</td><td>5</td></tr>
<tr><td>0.4< D ≦0.5</td><td>2</td></tr>
<tr><td>0.5< D</td><td>0</td></tr>
</table>




</td><td>2.5</td></tr>
<tr><td>16</td><td>Touch Panel Newton ring</td><td>Newton ring dimension ≦ 1/2 touch panel area and not affect font and line distortion(≦2.5%) , it is acceptable.</td><td>2.5</td></tr>
<tr><td>17</td><td>Touch Panel Linearity</td><td>Less than 2.5% is acceptable.</td><td>2.5</td></tr>
<tr><td>18</td><td>LCD Ripple</td><td>Touch the touch panel , can not see the LCD ripple.
Pen: R 1.0mm silicon rubber.
Operation Force: 80g</td><td>2.5</td></tr>
<tr><td>19</td><td>General appearance</td><td>19.1 Pin type must match type in specification sheet.
19.2 LCD pin loose or missing pins.
19.3 Product packaging must the same as specified on packaging specification sheet.
19.4 Product dimension and structure must conform to product specification sheet.</td><td>0.65
0.65
0.65
0.65</td></tr>
</table>

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±10℃, and in a relative humidity of 50±10%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±10℃ and less than 3 sec during Hand soldering.
- Rewiring: no more than 2 times.

14. Guarantee:

Our products could meet requirements of the environment.
YB's RoHS is introduce European Union Directive 2011/65/EU (ROHS)
Requirements and Update.