SPECIFICATION
FOR
LCD MODULE
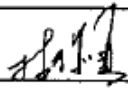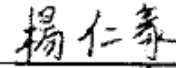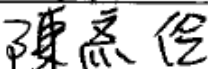## MODULE NO: YB-TG128160S12B-N-A0

Doc.Version:01

Customer Approval:

☐ Accept   ☐ Reject

YEEBO	NAME	SIGNATURE	DATE
Prepare	Electronic Engineer		2016.05.04
Check	Mechanical Engineer		2016.05.04
Verify			2016.5.4
Approval			2016.5.4

☐ APPROVAL FOR SPECIFICATIONS ONLY

■APPROVAL FOR SPECIFICATIONS AND SAMPLE

WIMRD005-02-D

Sample Version	DOC. Version	DATE	DESCRIPTION		CHANGED BY
A0	00	2016-03-21	SPEC ONLY	First issue	Shien / YANG
A0	01	2016-05-04	FULL SPEC	First Sample	Shien / YANG

2. Table of Contents:

3. Module Numbering System:

(Example)

YB- T G 240320 S 01 D -T – A0

Sample Version: A0~Z0

T: With Resistive Touch panel
C: With Capacitive Touch panel
N: Without Touch panel

Version: A~Z

Serial No: 01~99

S: STD Product
C: Customer Made

Display Function:
Segment Number of Segment
Characters Lines of Character
Column and Row of Graphic
Length * Width of Other

LCM Display Type
C: Character Type；
G: Graphic Type；
GB: Graphic Black/White Type；(For E-paper)
GC: Graphic Color Type；(For E-paper)
S: Segment Type

LCD Model:
C: CSTN;   T: TFT;   L: LTPS;   O: OLED;
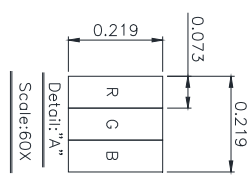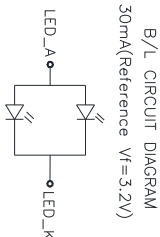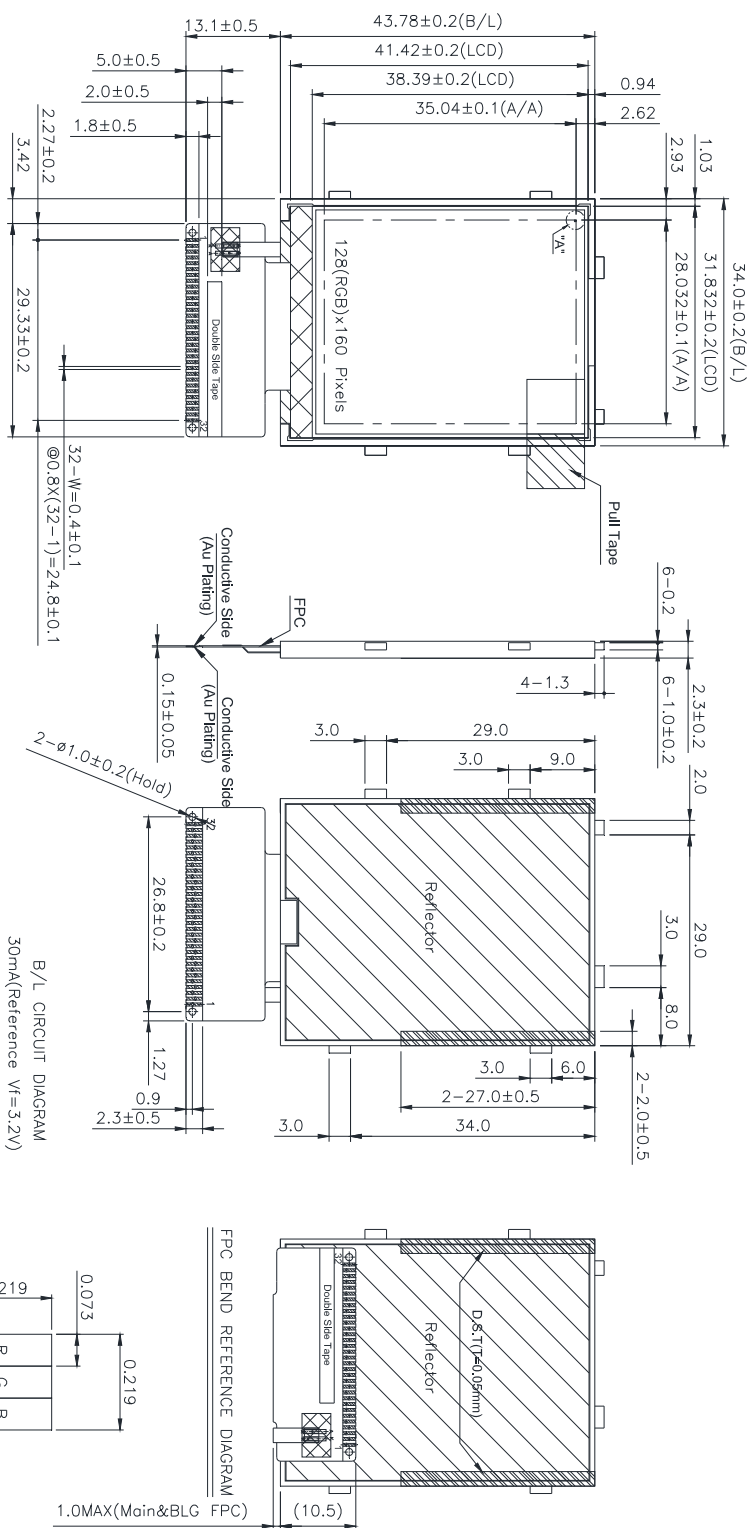P: PLED;   S: B/W STN;   E: E-paper ;
Y: Yeetek;   N: Others;

YEEBO

4. General Specification:

ITEM	CONTENTS
Module Size	34.0 (W) *43.78(H) * 2.3(T) mm
Module Size(With FPC)	34.0 (W) * 56.88(H) * 2.3(T) mm
Display Size(Diagonal)	1.77 inch
Display Format	128(RGB)* 160 Pixels
Active Area	28.032(W) * 35.04 (H) mm
Pixel Pitch	0.219 * 0.219 mm
LCD Type	TFT (262K)/ Transmissive / NW
View Angle (Gray inversion)	12 O'clock
The Best View Angle	6 O'clock
Controller IC	ST7735S
Weight	5.6g

5. LCM drawing:

Specification:
1. Display mode: 1.77" TFT(262k)/Normally White/Transmissive
2. Drive condition: VDD=2.8V
3. Gray Scale Inversion Direction:12 O'clock
   The Best Viewing Direction: 6 O'clock
4. Operating temperature: -20°C to +70°C
   Storage temperature: -30°C to +80°C
5. Drive IC is: ST7735S
6. Backlight color: White(LEDX2)
7. Unspecified tolerance: ±0.30mm
8. ROHS compliant

Count drawing & Spec.revision record during discussion with customer
Rec.
Revision content description
Date
#1
FIRST ISSUE
2016-03-22

B/L CIRCUIT DIAGRAM
30mA(Reference Vf=3.2V)
LED_A
LED_K

YEEBO

UNIT mm
SIZE A4
SCALE N-T-S

MOD. Name   YB-TG128160S12B-N-A

DESIGNED 楊仁豪 2016-03-22
CHECKED
VERIFIED
APPROVED

Count Dwg.

FPC BEND REFERENCE DIAGRAM
1.0MAX(Main&BLG FPC)

Detail:"A"
Scale:60X
R G B
0.219 0.073 0.219

PIN ASSIGNMENT	
No:	Symbol
1	LEDK
2	LEDA
3	VDD
4	VSS
5	/CS
6	D/C(SCL)
7	RD
8	W/R(D/C)
9	RESET
10	DO(SDI)
11	D1
12	D2
13	D3
14	D4
15	D5
16	D6
17	D7
18	D8
19	D9
20	D10
21	D11
22	D12
23	D13
24	D14
25	D15
26	D16
27	D17
28	SPI4W
29	P68
30	IM2
31	IM1
32	IM0

Sheet 1 Of 1
FILE NAME

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	-	+4.8	Volt	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	3.3	Volt
TFT Gate ON Voltage	VGH		-	11.5	-	Volt
TFT Gate OFF Voltage	VGL		-	-7.5	-	Volt
TFT Common Voltage	VCOM		-1.5	-	3.5	Volt
Input Voltage	V_{IH}	-	$0.7 * V_{DDI}$	-	V_{DDI}	V
	V_{IL}	-	V_{SS}	-	$0.3 * V_{DDI}$	V
Power Supply Current for LCM	I_{DD}	V_{DD}=2.8V	-	2.1	3.1	mA

6-3 Timing Characteristics
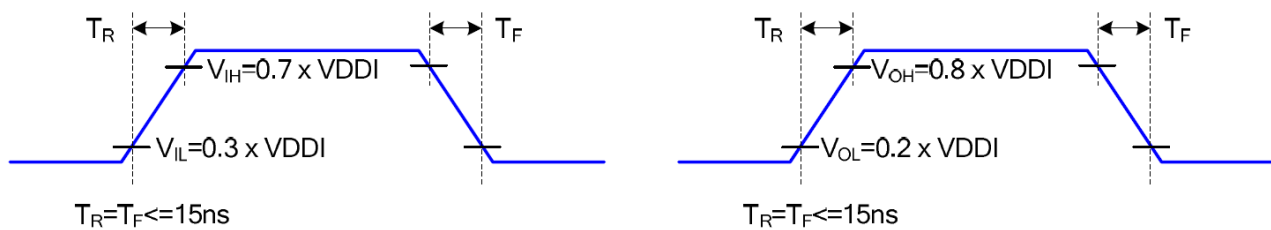Parallel Interface: 18, 16, 9 or 8-bit Bus (8080 Series MCU Interface)
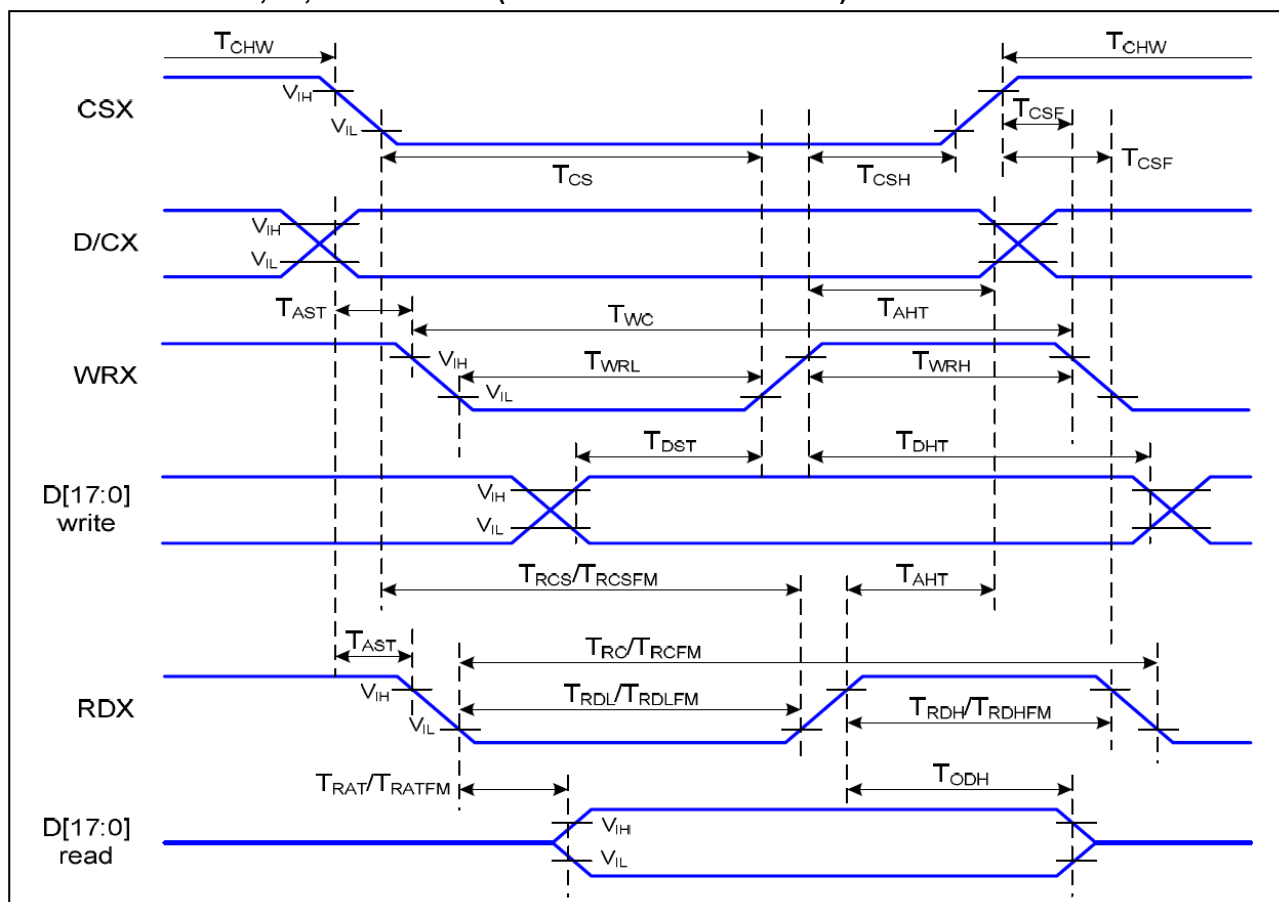
Timing Characteristics (8080 Ceries MCU Interface)
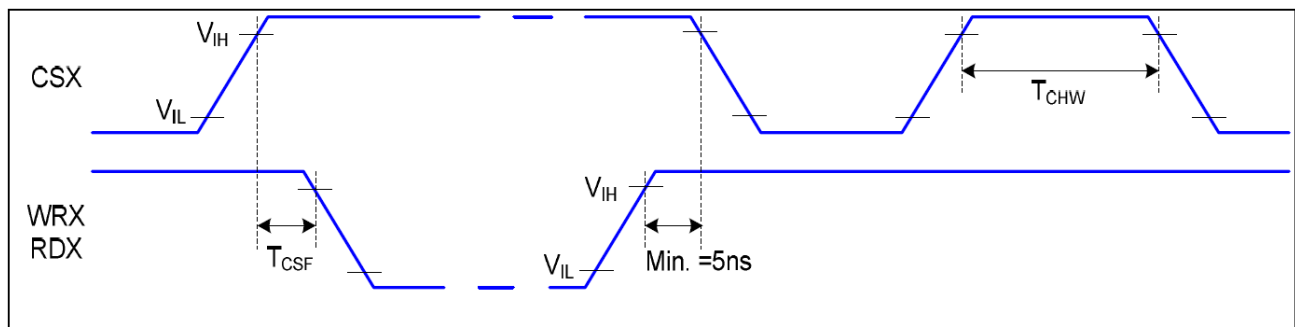
Ta=25 ℃, VDDI=1.65~3.7V, VDD=2.5~4.8V

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	TAST	Address Setup Ttime	0		ns	-
	TAHT	Address Hold Time (Write/Read)	10		ns	
CSX	TCHW	Chip Select "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	
	TCSH	Chip Select Hold Time	10		ns	
WRX	TWC	Write Cycle	66		ns	
	TWRH	Control Pulse "H" Duration	15		ns	
	TWRL	Control Pulse "L" Duration	15		ns	
RDX (ID)	TRC	Read Cycle (ID)	160		ns	When Read ID Data
	TRDH	Control Pulse "H" Duration (ID)	90		ns	
	TRDL	Control Pulse "L" Duration (ID)	45		ns	

|						
RDX (FM)	TRCFM	Read Cycle (FM)	450		ns	When Read from Frame Memory
	TRDHFM	Control Pulse "H" Duration (FM)	90		ns	
	TRDLFM	Control Pulse "L" Duration (FM)	355		ns	
D[17:0]	TDST	Data Setup Time	10		ns	For CL=30pF
	TDHT	Data Hold Time	10		ns	
	TRAT	Read Access Time (ID)		40	ns	
	TRATFM	Read Access Time (FM)		340	ns	
	TODH	Output Disable Time	20	80	ns	

Rising And Falling Timing for Input And Output Signal

Chip Selection (CSX) Timing
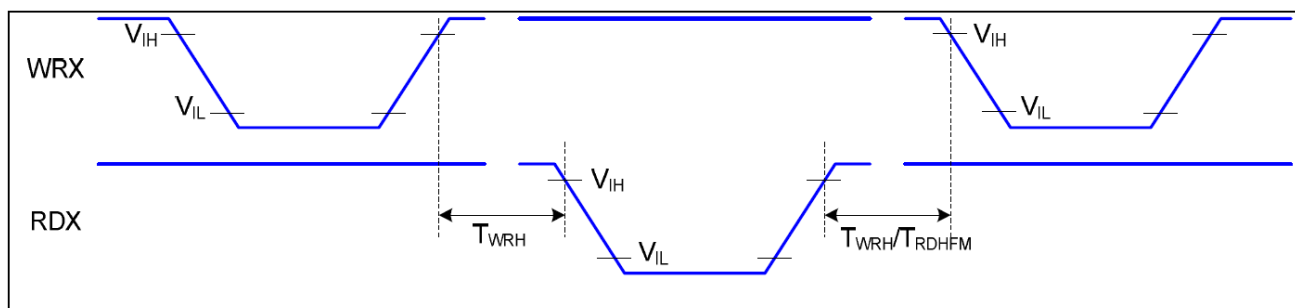
Write-to-Read And Read-to-Write Timing

Parallel Interface : 18, 16, 9 or 8-bit Bus (6800 Series MCU Interface)
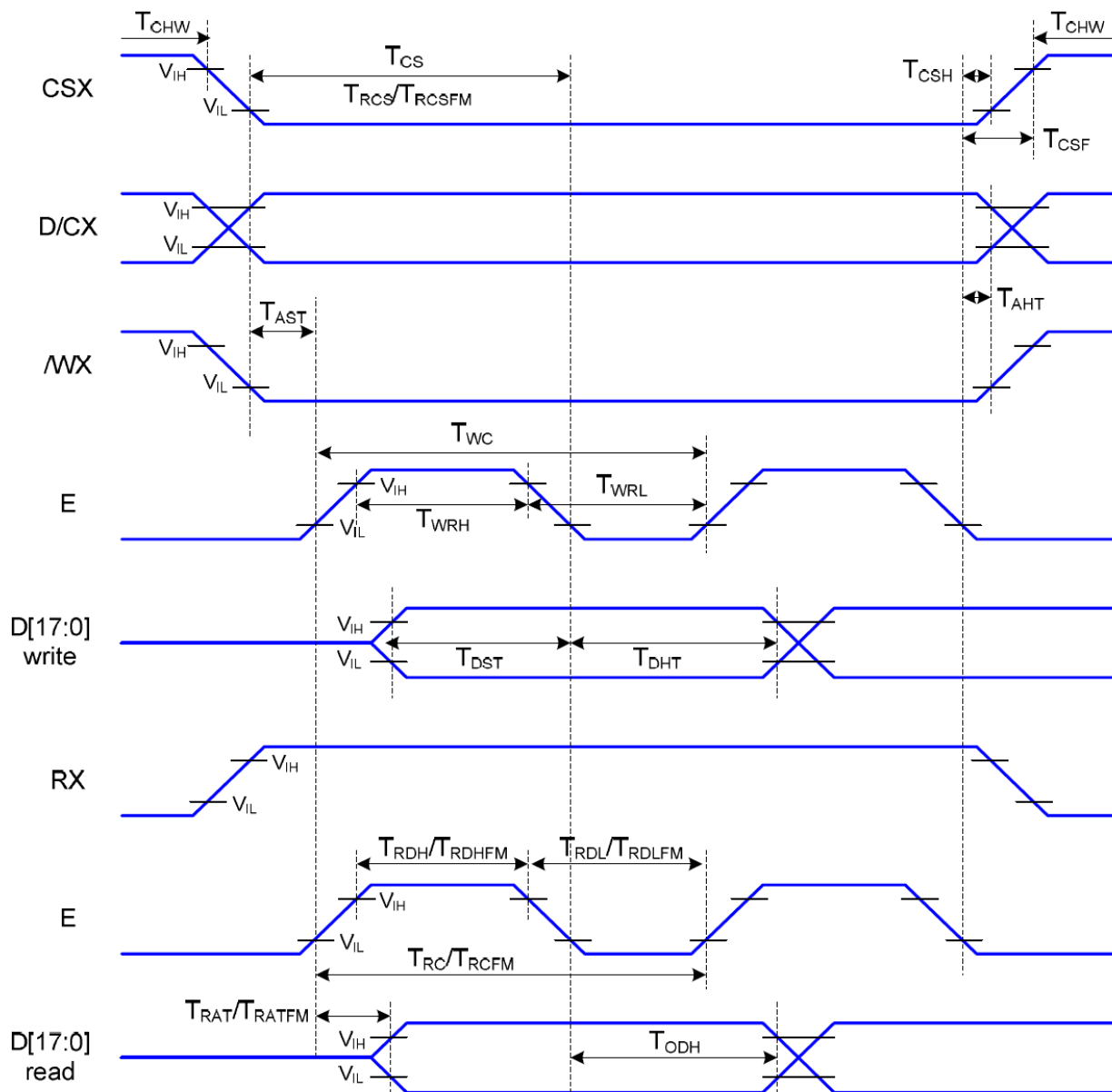
Timing Characteristics (6800-Series MCU Interface)

Ta=25 ℃, VDDI=1.65~3.7V, VDD=2.5~4.8V

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	T_{AST}	Address Setup Time	0		ns	-
	T_{AHT}	Address Hold Time (Write/Read)	10		ns	
CSX	T_{CHW}	Chip Select "H" Pulse Width	0		ns	-
	T_{CS}	Chip Select Setup Time (Write)	15		ns	
	T_{RCS}	Chip Select Setup Time (Read ID)	45		ns	
	T_{RCSFM}	Chip Select Setup Time (Read FM)	355		ns	
	T_{CSF}	Chip Select wait Time (Write/Read)	10		ns	
	T_{CSH}	Chip Select Hold Time	10		ns	
WRX	T_{WC}	Write Cycle	66		ns	
	T_{WRH}	Control Pulse "H" Duration	15		ns	
	T_{WRL}	Control Pulse "L" Duration	15		ns	

RDX (ID)	T$_{RC}$	Read Cycle (ID)	160		ns	When Read ID Data
	T$_{RDH}$	Control Pulse "H" Duration (ID)	90		ns	
	T$_{RDL}$	Control Pulse "L" Duration (ID)	45		ns	
RDX (FM)	T$_{RCFM}$	Read Cycle (FM)	450		ns	When Read From Frame Memory
	T$_{RDHFM}$	Control Pulse "H" Duration (FM)	90		ns	
	T$_{RDLFM}$	Control Pulse "L" Duration (FM)	355		ns	
D[17:0]	T$_{DST}$	Data Setup Time	10		ns	For Maximum CL=30pF For Minimum CL=8pF
	T$_{DHT}$	Data Hold Time	10		ns	
	T$_{ODH}$	Output Disable Time	20	80	ns	

Serial Interface (3-line Serial)
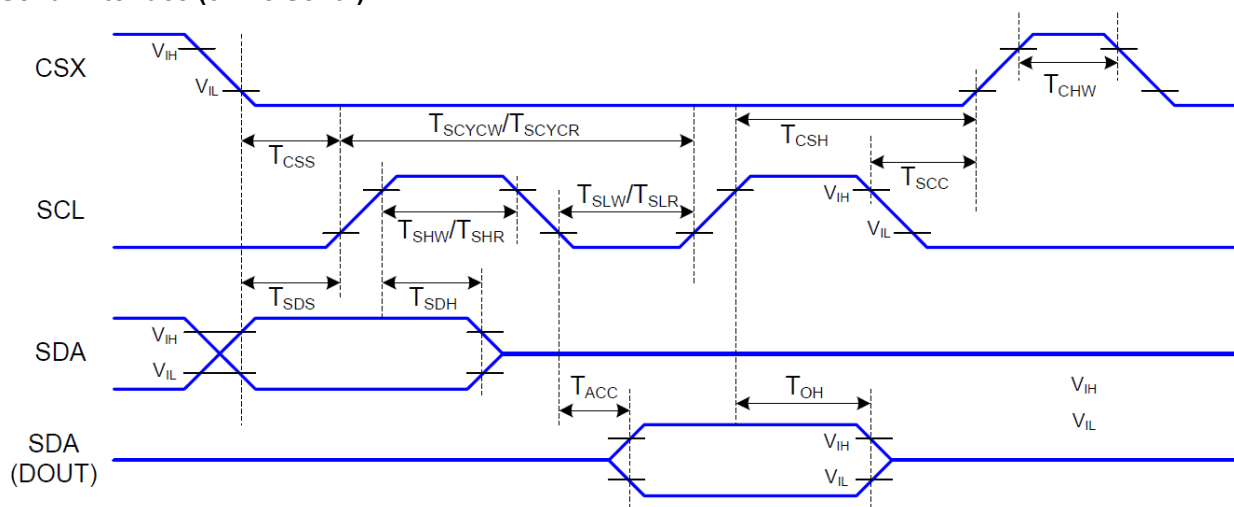
3-line Serial Interface Timing

Ta=25 ℃, VDDI=1.65~3.7V, VDD=2.5~4.8V

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	TCSS	Chip Select Setup Time (Write)	15		ns	
	TCSH	Chip Select Hold Time (Write)	15		ns	
	TCSS	Chip Select Setup Time (Read)	60		ns	
	TSCC	Chip Select Hold Time (Read)	65		ns	
	TCHW	Chip Select "H" pulse width	40		ns	
SCL	TSCYCW	Serial Clock Cycle (Write)	66		ns	
	TSHW	SCL "H" Pulse Width (Write)	15		ns	
	TSLW	SCL "L" Pulse Width (Write)	15		ns	
	TSCYCR	Serial Clock Cycle (Read)	150		ns	
	TSHR	SCL "H" Pulse Width (Read)	60		ns	
	TSLR	SCL "L" Pulse Width (Read)	60		ns	
SDA (DIN) (DOUT)	TSDS	Data Setup Time	10		ns	For Maximum CL=30pF For Minimum CL=8pF
	TSDH	Data Hold Time	10		ns	
	TACC	Access Time	10	50	ns	
	TOH	Output Disable Time	15	50	ns	

Serial Interface (4-line Serial)
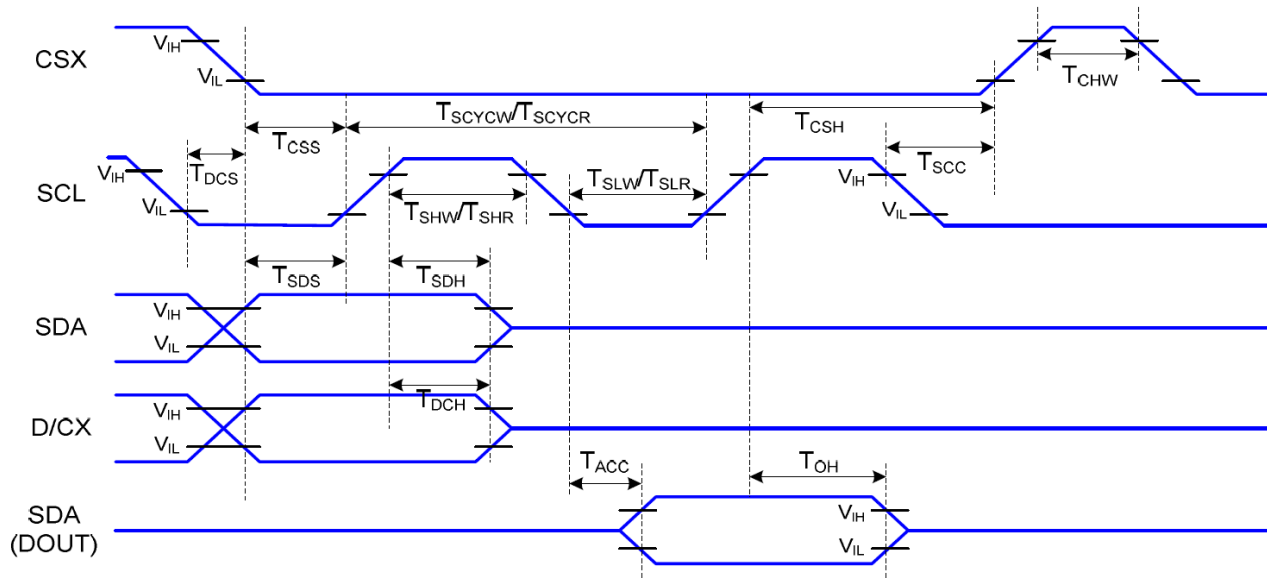
4-line Serial Interface Timing

Ta=25 ℃, VDDI=1.65~3.7V, VDD=2.5~4.8V

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	TCSS	Chip Select Setup Time (Write)	45		ns	
	TCSH	Chip Select Hold Time (Write)	45		ns	
	TCSS	Chip Select Setup Time (Read)	60		ns	
	TSCC	Chip Select Hold Time (Read)	65		ns	
	TCHW	Chip Select "H" Pulse Width	40		ns	
SCL	TSCYCW	Serial Clock Cycle (Write)	66		ns	-Write Command & Data Ram
	TSHW	SCL "H" Pulse Width (Write)	15		ns	
	TSLW	SCL "L" Pulse Width (Write)	15		ns	
	TSCYCR	Serial Clock Cycle (Read)	150		ns	-Read Command & Data Ram
	TSHR	SCL "H" Pulse Width (Read)	60		ns	
	TSLR	SCL "L" Pulse Width (Read)	60		ns	
D/CX	TDCS	D/CX Setup Time	10		ns	
	TDCH	D/CX Hold Time	10		ns	
SDA (DIN) (DOUT)	TSDS	Data Setup Time	10		ns	For Maximum CL=30pF For Minimum CL=8pF
	TSDH	Data Hold Time	10		ns	
	TACC	Access Time	10	50	ns	
	TOH	Output Disable Time	15	50	ns	

7. Optical Characteristics:

Item		Symbol	Conditions	Specifications			Unit	Note
				Min	Typ	Max		
Transmittance (Without PL)		T(%)	-	-	6.9	-	-	-
Contrast Ratio		CR	Θ=0 Normal Viewing angle	-	500	-		(1) (2)
Response time		TR+TF	-	-	16	-	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.
Chromaticity Coordinates (Transmissive)	Red	x	θ = φ = 0° LED Backlight Color Degree	0.5482	0.5982	0.6482
		y		0.3008	0.3508	0.4008
	Green	x		0.2793	0.3293	0.3793
		y		0.5651	0.6151	0.6651
	Blue	x		0.0995	0.1495	0.1995
		y		0.0068	0.0568	0.1068
	White	x		0.224	0.274	0.324
		y		0.2474	0.2974	0.3474

Note (1) Definition of Viewing Angle :
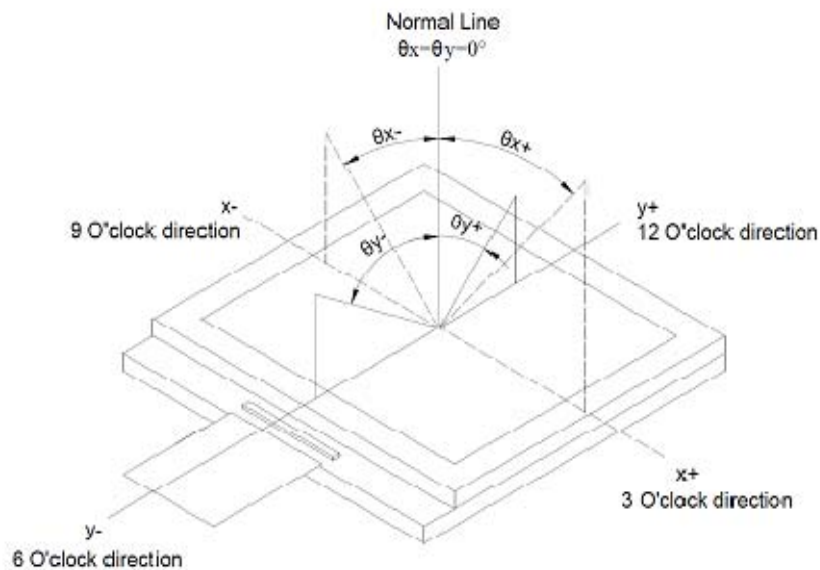
Note (2) Definition of Contrast Ratio(CR) :
　　　　measured at the center point of panel

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

Note (3) Definition of Response Time : Sum of TR and TF
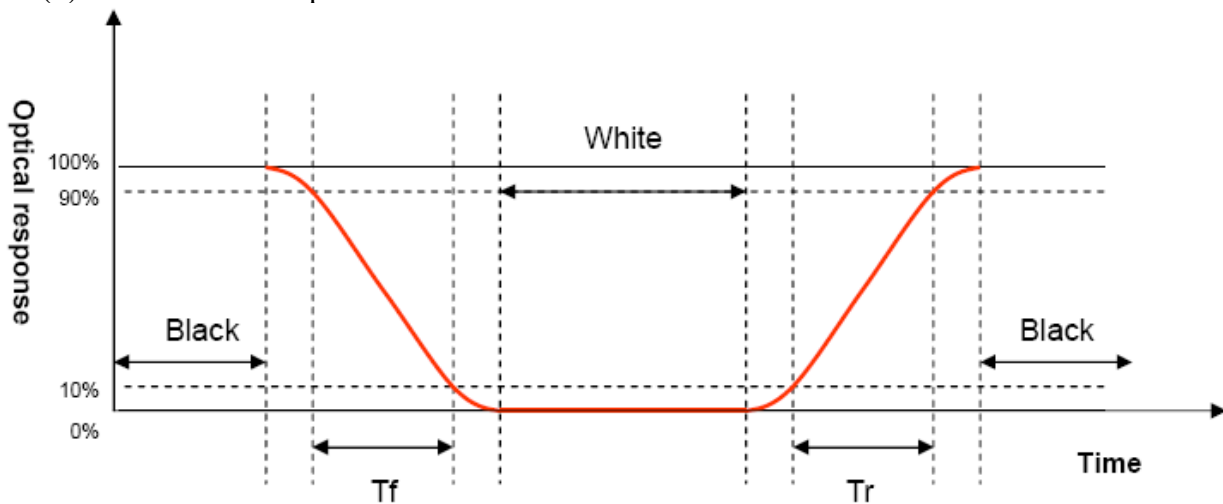
8. Interface Pin Assignment:

8-1 LCM FPC Interface

No.	Symbol	Function
1	LEDK	Backlight light power supply-
2	LEDA	Backlight light power supply+
3	VDD	Power Supply
4	VSS	Ground.
5	/CS	Chip Selection
6	D/C(SCL)	D/CX='1': Display Data or Parameter. D/CX='0': Command Data. Serial Interface, this is used as SCL. not used, VDD or VSS
7	RD	Read Enable in 8080 MCU Parallel Interface. not used, VDD or VSS
8	W/R(DC)	Write Enable in MCU Parallel Interface. In 4-line SPI, this pin is used as D/CX (data/ command selection). not used, VDD or VSS
9	RESET	This signal will reset the device Signal is active low.
10~27	D0~D17	D[17:0] are used as MCU parallel interface data bus. D0 is the serial input/output signal in serial interface mode. In serial interface, VDD or VSS
28	SPI4W	SPI4W='0', 3-line SPI Enable. SPI4W='1', 4-line SPI Enable.
29	P68	P68='1', Select 6800 MCU Parallel Interface. P68='0', Select 8080 MCU Parallel Interface.
30	IM2	IM2='1', Parallel Interface IM2='0', Serial Interface
31~32	IM1~IM0	MCU Parallel Interface Type Selection <table><tr><th>IM1</th><th>IM0</th><th>Parallel Interface</th></tr><tr><td>0</td><td>0</td><td>MCU 8-bit Parallel</td></tr><tr><td>0</td><td>1</td><td>MCU 16-bit Parallel</td></tr><tr><td>1</td><td>0</td><td>MCU 9-bit Parallel</td></tr><tr><td>1</td><td>1</td><td>MCU 18-bit Parallel</td></tr></table>

9. Block Diagram:

```
┌─────────────────────────────────────────────────────────────┐
│  ┌──────┐      ┌──────────────────────────────────────┐      │
│  │      │      │                                       │      │
│  │ Back │  ⇨   │         LCD PANNEL                    │  ⇦   │
│  │ Light│      │      128(BGR) X 160 PIXELS            │      │
│  │      │      │                                       │      │
│  │      │      └──────────────┬───────────────────────┘      │
│  │      │                     ⇧                              │
│  │      │      ┌──────────────────────────────────────┐      │
│  │      │      │            ST7735S                    │      │
│  └──────┘      └──────────────────┬───────────────────┘      │
│                                   │                          │
└───────────────────────────────────┼──────────────────────────┘
                                     ⇩
                            32 PIN Interface
```
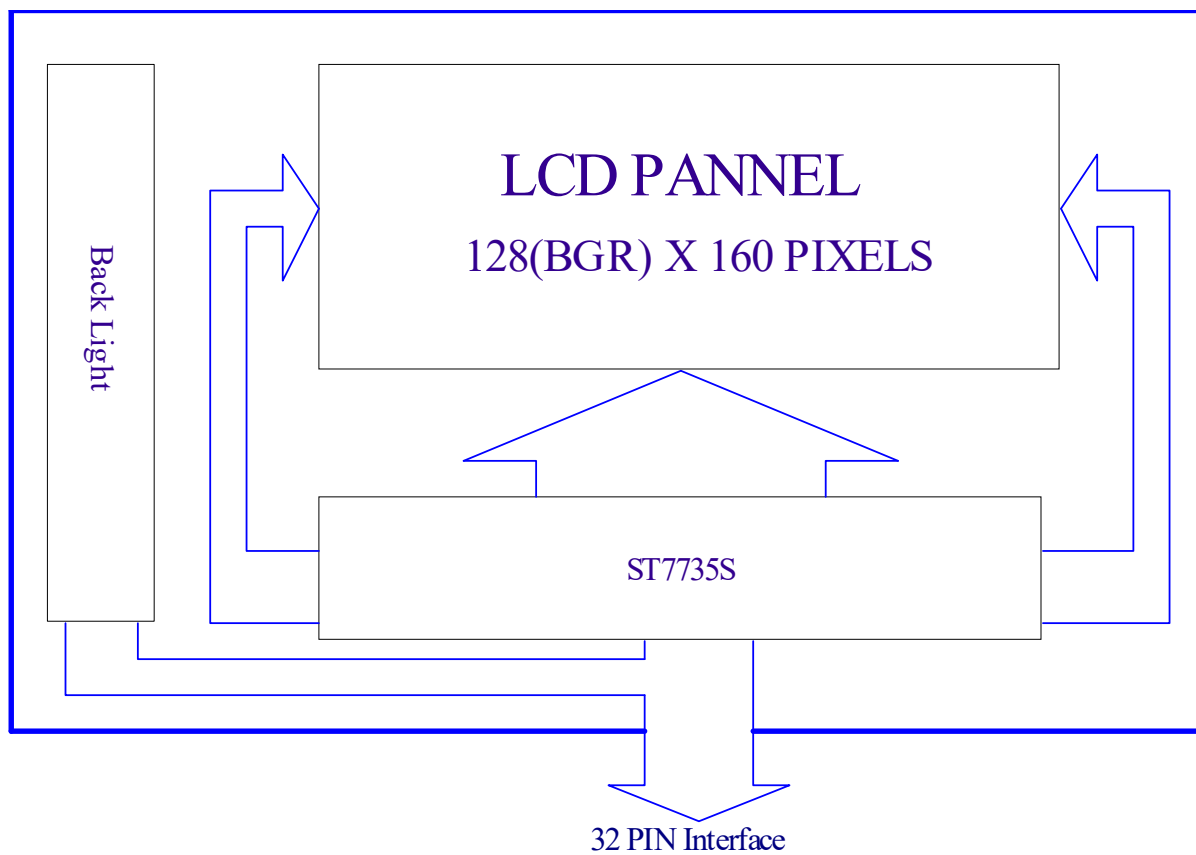
10. Backlight:

1. Standard Lamp Styles (Edge Lighting Type):
   The LED chips are distributed over the edge light area of the
   illumination unit, which gives the less power consumption:

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

3. Data About LED Backlight: (Ta=25℃)

PARAMETER	Sym.	Min.	Typ.	Max.	Unit	Test Condition	Note
Supply Current	I		30		mA	V=3.2V	
Supply Voltage	V	2.9	3.2	3.5	V	If=30mA	
Reverse Voltage	VR	-	-	5.0	V	-	
Luminous Intensity for LCM	IV	150	250	-	Cd/m^2	If=30mA	2
Uniformity for LCM	-	70	-	-	%		3
Life Time	-	-	50000	-	Hr.		4
Color	White						

NOTE:
1. Backlight Only
2. Average Luminous Intensity of P1-P9
3. Uniformity = Min/Max * 100%
4. LED life time defined as follows: The final brightness is at 50% of original brightness

Measured Method: (X*Y: Light Area)   **Internal Circuit Diagram**
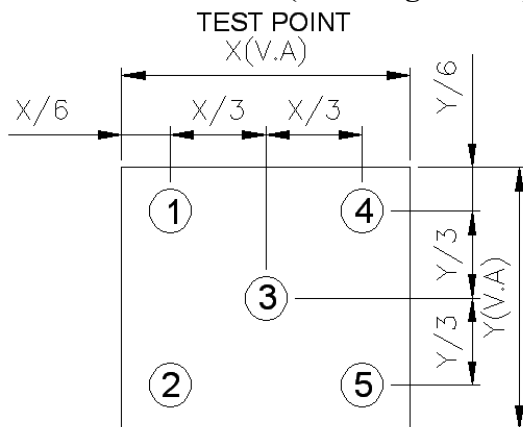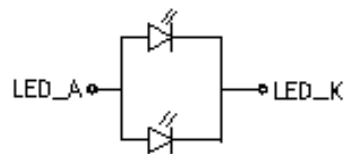
(Effective spatial Distribution)
Hole Diameter ø3 mm; 1 to 9 per Position Measured Luminous

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
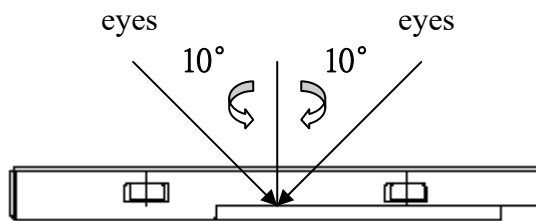
      (iv) Definition of area:
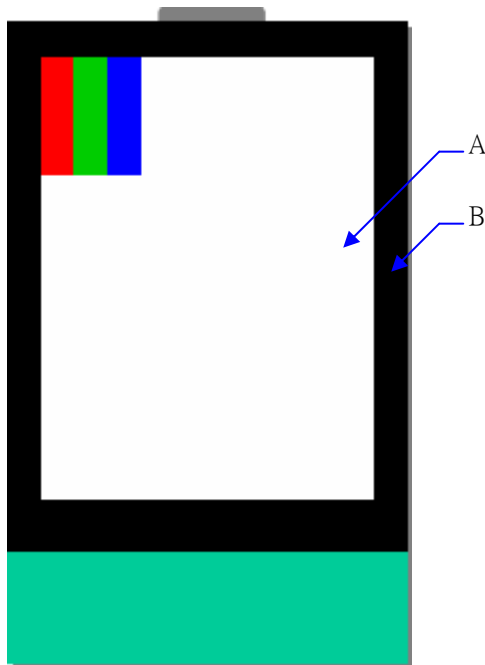
A. Area: Viewing area.

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

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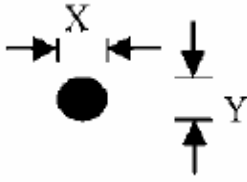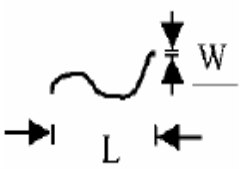
  (i) It will accord to the AQL when the standard can not be described.
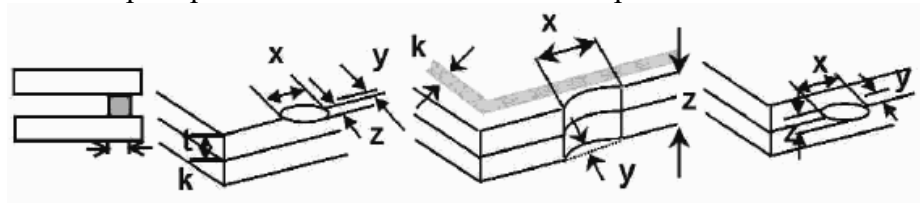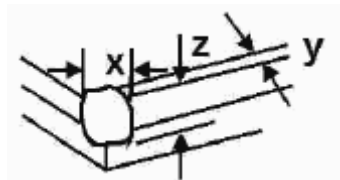
  (ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
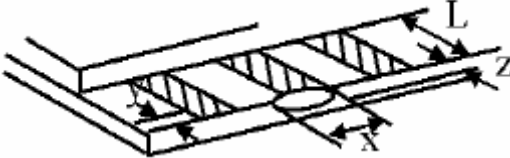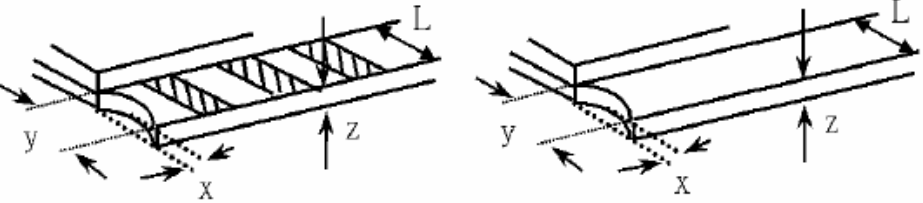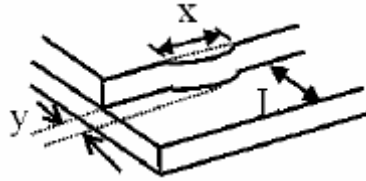
  (iii) Must add new item on time when it is necessary.

  c. Standard of inspection: (Unit: mm)

12-6. Inspection specification
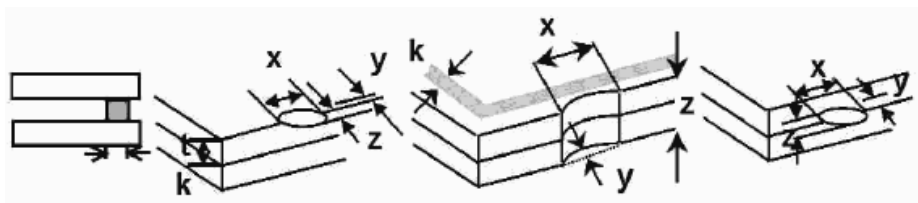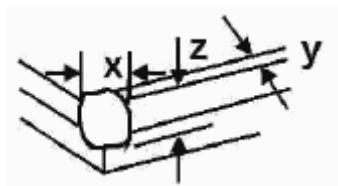
NO	Item	Criterion	AQL
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Mixed product 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 $\leqq$ 0.25mm, no more than Five spots. 2.2 Densely spaced: No more than three spots within 3mm.	2.5
03	LCD and Touch Panel black spots, white spots, contamination (non – display)	3.1 Round type: As following drawing $\Phi = (X+Y) / 2$ | Size(mm)	Acceptable Q'ty
---	---
$\Phi \leqq 0.10$	Accept no dense
$0.10 < \Phi \leqq 0.20$	2
$0.20 < \Phi \leqq 0.25$	2
$0.25 < \Phi \leqq 0.30$	1
$0.30 < \Phi$	0 | * Densely spaced: No more than two spots within 3mm. 3.2 Line type: (As following drawing) | Length(mm)	Width(mm)	Acceptable Q'ty
---	---	---
---	$W \leqq 0.02$	Accept no dense
$L \leqq 3.0$	$0.02 < W \leqq 0.05$	2
$L \leqq 2.5$	$0.03 < W \leqq 0.08$	
---	$0.08 < W$	Rejection | * Densely spaced: No more than two lines within 3mm.	2.5 2.5
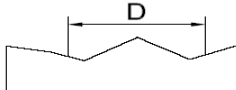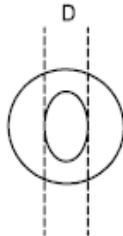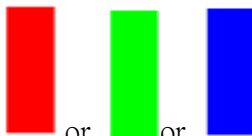
NO	Item	Criterion	AQL
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction | Size Φ(mm)	Acceptable Q'ty
Φ≦0.20	Accept no dense
0.20< Φ≦0.50	3
0.50< Φ≦1.00	2
1.00< Φ	0
Total Q'ty	3		2.5
05	Scratches	Follow NO.3 -2 Line Type.	
06	Chipped glass	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:	2.5

z: Chip thickness	y: Chip width	x: Chip length
$Z \leqq 1/2t$	Not over viewing area	$x \leqq 1/8a$
$1/2t< z \leqq 2t$	Not exceed 1/3k	$x \leqq 1/8a$

⊙ Unit: mm

⊙ If there are 2 or more chips, x is the total length of each chip

6.1.2 Corner crack:

z: Chip thickness	y: Chip width	x: Chip length
$Z \leqq 1/2t$	Not over viewing area	$x \leqq 1/8a$
$1/2t< z \leqq 2t$	Not exceed 1/3k	$x \leqq 1/8a$

⊙ Unit: mm

⊙ If there are 2 or more chips, x is the total length of each chip

NO	Item	Criterion	AQL
07	Glass crack	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: 7.2.2 Non-conductive portion: ⊙ 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	2.5

7.2.1 table:

y: Chip width	x: Chip length	z: Chip thickness
$y \leqq 0.5mm$	$x \leqq 1/8a$	$0 < z \leqq t$

7.2.2 table:

y: Chip width	x: Chip length	z: Chip thickness
$y \leqq L$	$x \leqq 1/8a$	$0 < z \leqq t$

7.2.3 table:

y: width	x: length
$y \leqq 1/3L$	$X \leqq a$

NO	Item	Criterion	AQL
08	Cracked glass	The LCD with extensive crack is not acceptable.	2.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color is wrong.	2.5 2.5 0.65
10	Bezel	Bezel must comply with product specifications.	2.5
11	PCB、COB	11.1 COB seal may not have pinholes larger than 0.2mm or contamination. 11.2 COB seal surface may not have pinholes through to the IC. 11.3 The height of the COB should not exceed the height indicated in the assembly diagram. 11.4 There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places. 11.5 Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts. 11.6 The jumper on the PCB should conform to the product characteristic chart.	2.5 2.5 2.5 2.5 0.65 0.65
12	FPC	12.1 FPC terminal damage $\leqq$ 1/2 FPC terminal width and can not affect the function , we judge accept. 12.2 FPC alignment hole damage $\leqq$ 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	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: ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip 14.1.2 Corner crack: ⊙Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip	2.5

14.1.1 table:

z: Chip thickness	y: Chip width	x: Chip length
$Z \leqq t$	$\leqq 1/2$ k and not over viewing area	$x \leqq 1/8a$

14.1.2 table:

z: Chip thickness	y: Chip width	x: Chip length
$z \leqq t$	$\leqq 1/2$ k and not over viewing area	$x \leqq 1/8a$

NO	Item	Criterion	AQL
15	Touch Panel(Fish eye、dent and bubble on film)	<table><tr><td>SIZE(mm)</td><td>Acceptable Q'ty</td></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>	2.5
16	Touch Panel Newton ring	Newton ring dimension ≦ 1/2 touch panel area and not affect font and line distortion(≦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. 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.	0.65 0.65 0.65 0.65
20	Definition of Pixel	Pixel : Group of Three Sub-pixels (Red, Green ,Blue): Dot : Red or Green or Blue or or Dot : Any sub-pixel Bright Dot Defects Dots (sub-pixels) on display which is bright in the picture and visible at Black Pattern.	

Dark Dot Defects

Dots(sub-pixels) on display which is dark in the picture and visible at Red/Green/Black/White Pattern.

Neighbour Dot Defects

Two or three neighbour dots (dot: sub-pixel) cluster(R&G,G&B,B&R,or R&G&B).Dot Defects Inspection Criteria

NOTE : Dot out of VA can be ignored.

Items	Inspection Criteria	
	Details	Allowed quantity
Bright Dot	Not Neighbour Dot	2
Dark Dot	Not Neighbour Dot	3
Total acceptable Qty		5

● Size of dot defect is larger than half of one sub-pixel.

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 $25\pm10℃$, and in a relative humidity of $50\pm10\%RH$. 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 $280\pm10℃$ 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.