



# SPECIFICATION FOR LCD MODULE

MODULE NO:BG-12864A-FBWB-J-G-B01

Doc.Version:04

Customer Approval:

<input type="checkbox"/> Accept	<input type="checkbox"/> Reject
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YEEBO	NAME	SIGNATURE	DATE
Prepare	Electronic Engineer		2010-12-29
Check	Mechanical Engineer		2010-12-29
Verify			2010-12-29
Approval			

APPROVAL FOR SPECIFICATIONS ONLY

APPROVAL FOR SPECIFICATIONS AND SAMPLE

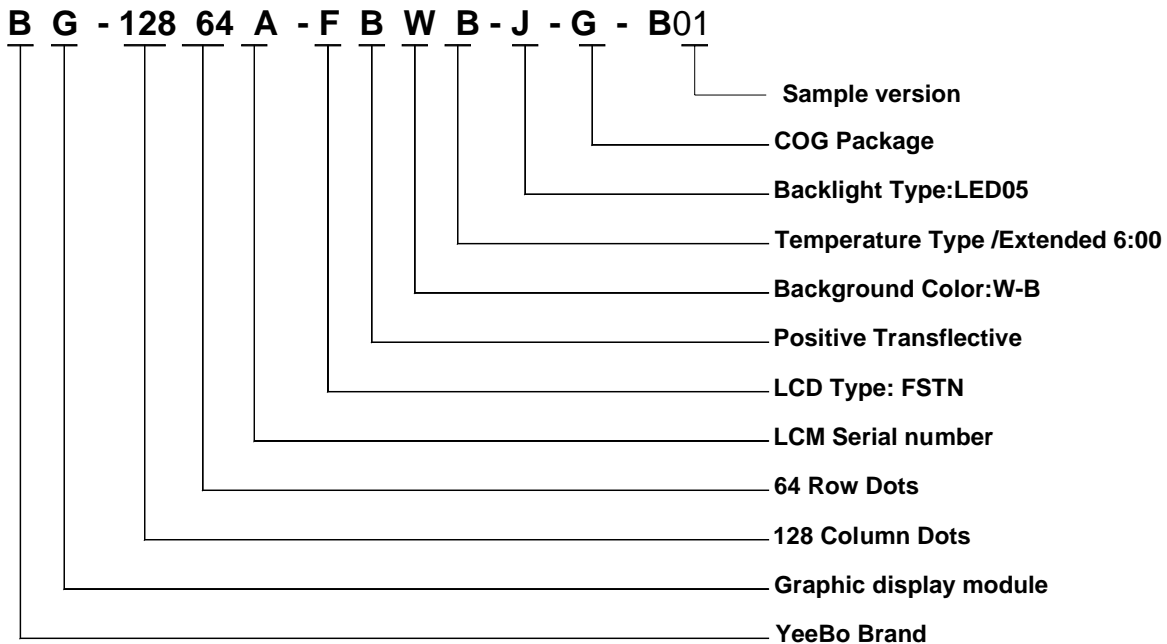




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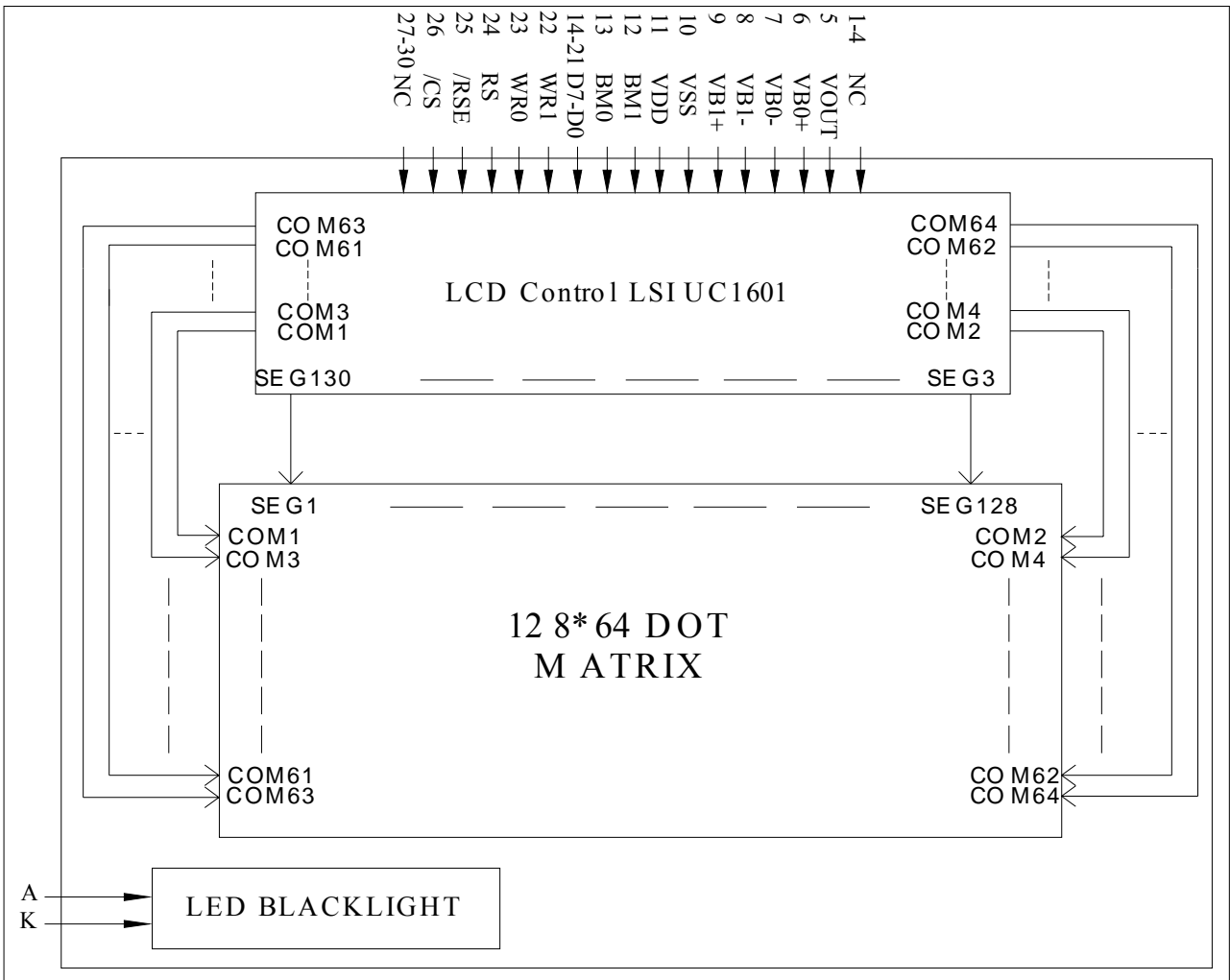
## 1. DESCRIBE TO THE PART NO:



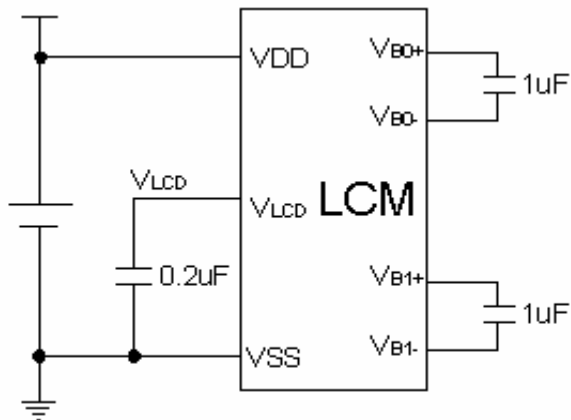
## 2. MECHANICAL SPECIFICATIONS

ITEM Nor	Minimal dimensions
Lcd mode	128*64 Dots Graphic
Module dimension	56.6(W)*44.2(H: not include the FPC)*7.65MAX (T)
Viewing area	50.6 (W) * 31.0(H)
Active area	46.562 (W)*27.682 (H)
Dot pitch	0.364(W) * 0.433(H)
Dot size	0.334(W) * 0.403(H)
Duty/bias	1/65duty, 1/9 bias
LCD FSTN/W	White-Black /Positive/Transflective
Viewing direction	6 o'clock

### 3.BLOCKDIAGRAM



### 4.POWER SUPPLY



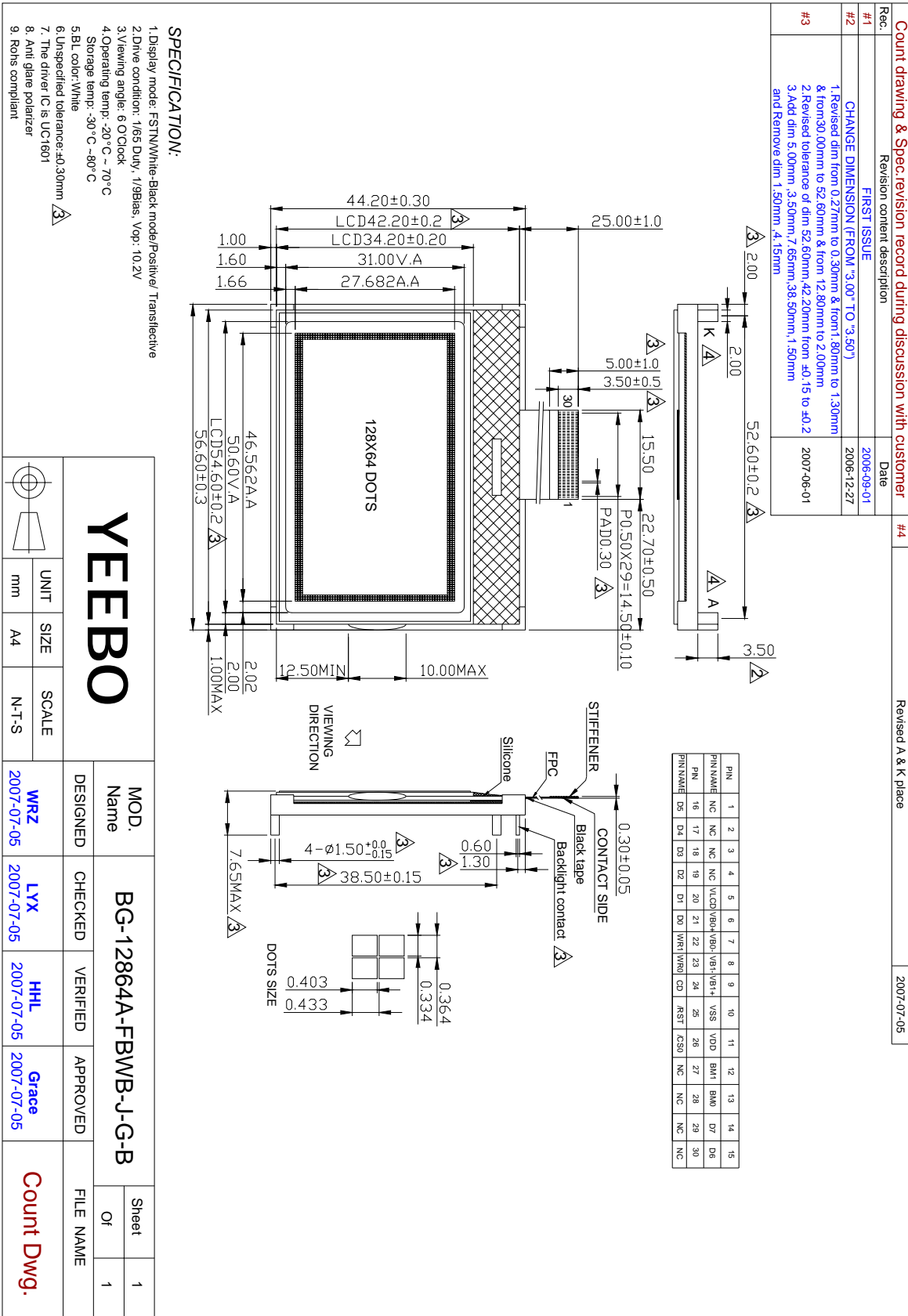
$V_{DD}-V_0$ =Operating voltage for LCD

NOTE: C1=1.0~ 4.7 uF(X5R/X7R)

C2=0.1~4.7 uF (X5R/X7R)



## 5. Dimensional Outline



UNIT	SIZE	SCALE
mm	A4	N-T-S

MOD. Name	DESIGNED	CHECKED	VERIFIED	APPROVED	FILE NAME
WRZ	LYX	HHL	Grace		Count Dwg.

MOD. Name	DESIGNED	CHECKED	VERIFIED	APPROVED	FILE NAME
WRZ	LYX	HHL	Grace		Count Dwg.

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WRZ	LYX	HHL	Grace		Count Dwg.

MOD. Name	DESIGNED	CHECKED	VERIFIED	APPROVED	FILE NAME
WRZ	LYX	HHL	Grace		Count Dwg.

## 6. PIN DESCRIPTION

Pin no.	Symbol	Function
1 NC		NO Connection
2 NC		NO Connection
3 NC		NO Connection
4 NC		NO Connection
5	Vlcd	Power supply for LCD drive circuit
6	VB0+	LCD bias Voltages.
7	VB0-	LCD bias Voltages.
8	VB1-	LCD bias Voltages.
9	VB1+	LCD bias Voltages.
10 VSS		Ground
11	VDD	Power supply for Logic circuit and LCD
12	BM1	Host Interface set function
13	BM0	Host Interface set function
14	D7	Display data signal
15	D6	
16	D5	
17	D4	
18 D3/	SDA	
19	D2	
20	D1	
21 D0/	SCK	
22	WR1	Read/write enable signal
23	WR0	Read/write select signal
24	CD	Signal to select registers
25 R	ST	Reset signal
26	/CS	Chip select signal
27 NC		NO Connection
28 NC		NO Connection
29 NC		NO Connection
30 NC		NO Connection

## 7. MAXIMUM ABSOLUTE LIMIT (T=25°C)

Item Sym	bol	Standard value	Unit
Power supply voltage for logic	$V_{DD-0}$	.3~+4.0	V
LCD driving voltage	$V_{LCD-0}$	3~+12.0	
Input voltage	$V_I$	$V_{SS}-0.4 \sim V_{DD}+0.3$ V	
Operating temperature	$T_{opr}$	-20~+70	°C
Storage temperature	$T_{stg}$	-30~+80	°C

Note: Voltage greater than above may damage the module  
All voltages are specified relative to  $V_{SS}=0V$

## 8. ELECTRICAL CHARACTERISTICS.

### 8-1-1 DC Characteristics ( $V_{DD}=+3V$ , $V_{SS}=0V$ , $T_a=25^{\circ}C$ )

Item Sym	bol	Min	Type	Max	Unit	Test condition
Operating voltage	$V_{DD}$	2.7	3.0	3.3	V	-
Supply current	$I_{DD}$	-	-	1	mA	During display
Input voltage	$V_{IL}$ VSS	-	-	0.2VDD	V	-
	$V_{IH}$ 0.	8VDD	-	$V_{DD}$	V	
Output voltage	$V_{OL}$	VSS	-	0.2VDD	V	-
	$V_{OH}$ 0.	8VDD	-	VDD	V	-
Input leakage current	$I_{LKG}$ -		-	1.5	$\mu A$	$V_{IN}=0$ or $V_{DD}$
LCD driving voltage	$V_{LCD}$ 10		10.2	10.4	V	-

### 8-1-2 .Backlight Specifications Absolute maximum rating( $T_a=25^{\circ}C$ )

Item	Symbol	Min	Typ	Max	Unit	Condition
Forward voltage	$V_f$	2.9	3.1	3.3	V	$I_f=30mA$
Reverse Current	$I_r$	-	-	100	$\mu A$	$V_r=5V$
Power Dissipation	$P_d$	-	-	100	mw	$I_f=30mA$
Chromaticity Coordinates	X 0.	27	0.29	0.31	---	$I_f=30mA$
	Y	0.28	0.30	0.32	---	
Luminance	$L_v$	50	-	-	$Cd/m^2$	$I_f=30mA$
Luminance with the LCD	$L_v$	5 -		-	$Cd/m^2$	$I_f=30mA$



## 8-2 AC Characteristics

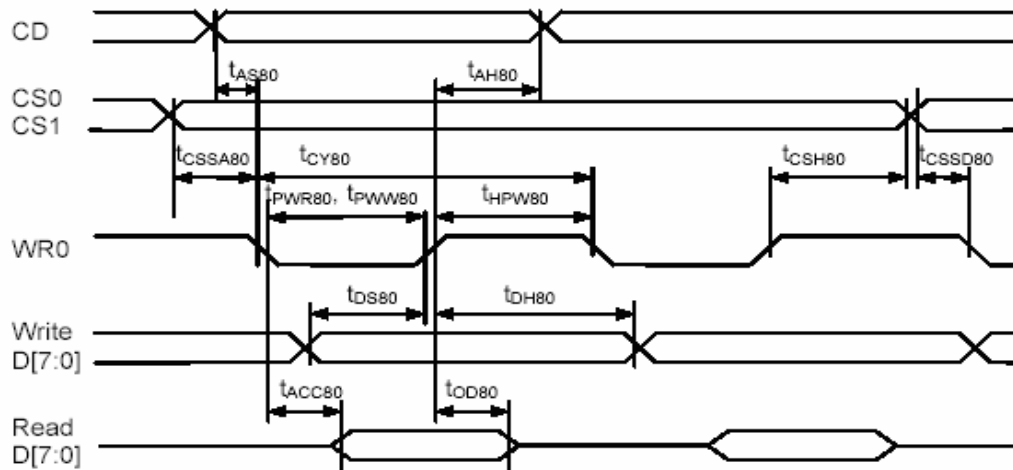


FIGURE 13: Parallel Bus Timing Characteristics (for 8080 MCU)

( $2.5V \leq V_{DD} < 3.3V$ ,  $T_a = 25^\circ C$ )

Symbol	Signal	Description	Condition	Min.	Max.	Units
$t_{AS80}$	CD	Address setup time		0	–	nS
$t_{AH80}$		Address hold time		40	–	nS
$t_{CY80}$		System cycle time		135	–	nS
$t_{PWR80}$	WR1	Pulse width (read)		65	–	nS
$t_{PWW80}$	WR0	Pulse width (write)		65	–	nS
$t_{HPW80}$	WR0, WR1	High pulse width		65	–	nS
$t_{DS80}$	D0~D7	Data setup time		30	–	nS
$t_{DH80}$		Data hold time		20	–	nS
$t_{ACC80}$		Read access time	$C_L = 100pF$	–	50	nS
$t_{OD80}$		Output disable time		10	50	nS
$t_{CSSA80}$	CS1/CS0	Chip select setup time		10		nS
$t_{CSSD80}$				10		nS
$t_{CSH80}$				20		nS

( $2.4V \leq V_{DD} < 2.5V$ ,  $T_a = 25^\circ C$ )

Symbol	Signal	Description	Condition	Min.	Max.	Units
$t_{AS80}$	CD	Address setup time		0	–	nS
$t_{AH80}$		Address hold time		60	–	nS
$t_{CY80}$		System cycle time		280	–	nS
$t_{PWR80}$	WR1	Pulse width (read)		95	–	nS
$t_{PWW80}$	WR0	Pulse width (write)		95	–	nS
$t_{HPW80}$	WR0, WR1	High pulse width		95	–	nS
$t_{DS80}$	D0~D7	Data setup time		30	–	nS
$t_{DH80}$		Data hold time		30	–	nS
$t_{ACC80}$		Read access time	$C_L = 100pF$	–	50	nS
$t_{OD80}$		Output disable time		10	50	nS
$t_{CSSA80}$	CS1/CS0	Chip select setup time		10		nS
$t_{CSSD80}$				10		nS
$t_{CSH80}$				20		nS

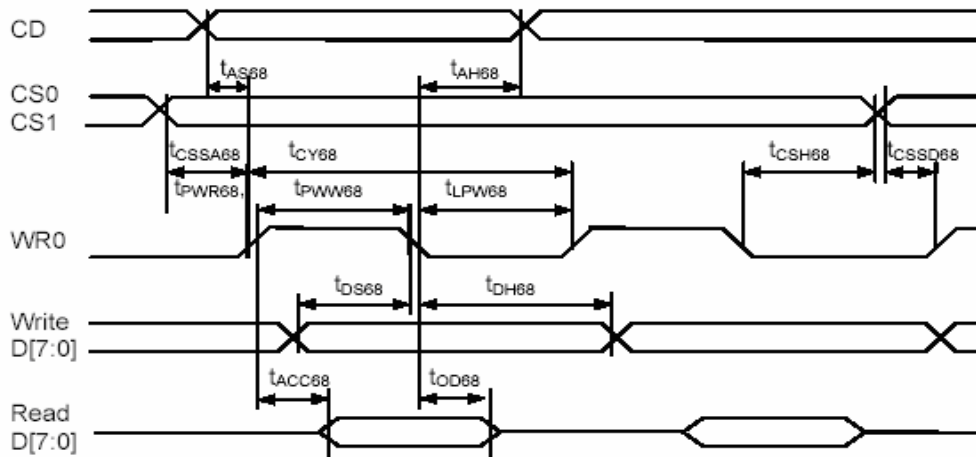


FIGURE 14: Parallel Bus Timing Characteristics (for 6800 MCU)

( $2.5V \leq V_{DD} < 3.3V$ ,  $T_a = 25^\circ C$ )

Symbol	Signal	Description	Condition	Min.	Max.	Units
$t_{AS68}$	CD	Address setup time		0	–	nS
$t_{AH68}$		Address hold time		40	–	nS
$t_{CY68}$		System cycle time		135	–	nS
$t_{PWR68}$	WR1	Pulse width (read)		65	–	nS
$t_{PWW68}$		Pulse width (write)		65	–	nS
$t_{LPW68}$		Low pulse width		65	–	nS
$t_{DS68}$	D0~D7	Data setup time		30	–	nS
$t_{DH68}$		Data hold time		15	–	nS
$t_{ACC68}$		Read access time	$C_L = 100pF$	–	50	nS
$t_{OD68}$		Output disable time		10	50	nS
$t_{CSSA68}$	CS1/CS0	Chip select setup time		10		nS
$t_{CSSD68}$				10		nS
$t_{CSH68}$				20		nS

( $2.4V \leq V_{DD} < 2.5V$ ,  $T_a = 25^\circ C$ )

Symbol	Signal	Description	Condition	Min.	Max.	Units
$t_{AS68}$	CD	Address setup time		0	–	nS
$t_{AH68}$		Address hold time		60	–	nS
$t_{CY68}$		System cycle time		200	–	nS
$t_{PWR68}$	WR1	Pulse width (read)		95	–	nS
$t_{PWW68}$		Pulse width (write)		95	–	nS
$t_{LPW68}$		Low pulse width		95	–	nS
$t_{DS68}$	D0~D7	Data setup time		30	–	nS
$t_{DH68}$		Data hold time		30	–	nS
$t_{ACC68}$		Read access time	$C_L = 100pF$	–	50	nS
$t_{OD68}$		Output disable time		10	50	nS
$t_{CSSA68}$	CS1/CS0	Chip select setup time		10		nS
$t_{CSSD68}$				10		nS
$t_{CSH68}$				20		nS

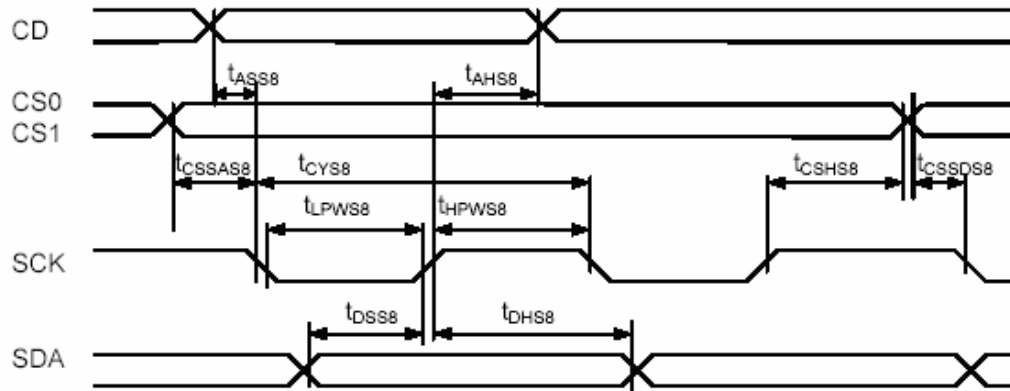


FIGURE 15: Serial Bus Timing Characteristics (for S8)

( $2.5V \leq V_{DD} < 3.3V$ ,  $T_a = 25^\circ C$ )

Symbol	Signal	Description	Condition	Min.	Max.	Units
t <sub>ASS8</sub>	CD	Address setup time		0	–	nS
t <sub>AHS8</sub>		Address hold time		40	–	nS
t <sub>CYS8</sub>	SCK	System cycle time		135	–	nS
t <sub>LPWS8</sub>		Low pulse width		65	–	nS
t <sub>HPWS8</sub>		High pulse width		65	–	nS
t <sub>DSS8</sub>	SDA	Data setup time		30	–	nS
t <sub>DHS8</sub>		Data hold time		15	–	nS
t <sub>CSSAS8</sub>	CS1/CS0	Chip select setup time		10		nS
t <sub>CSSDS8</sub>				10		
t <sub>CSHS8</sub>				20		

( $2.4V \leq V_{DD} < 2.5V$ ,  $T_a = 25^\circ C$ )

Symbol	Signal	Description	Condition	Min.	Max.	Units
t <sub>ASS8</sub>	CD	Address setup time		0	–	nS
t <sub>AHS8</sub>		Address hold time		60	–	nS
t <sub>CYS8</sub>	SCK	System cycle time		200	–	nS
t <sub>LPWS8</sub>		Low pulse width		95	–	nS
t <sub>HPWS8</sub>		High pulse width		95	–	nS
t <sub>DSS8</sub>	SDA	Data setup time		30	–	nS
t <sub>DHS8</sub>		Data hold time		25	–	nS
t <sub>CSSAS8</sub>	CS1/CS0	Chip select setup time		10		nS
t <sub>CSSDS8</sub>				10		
t <sub>CSHS8</sub>				20		

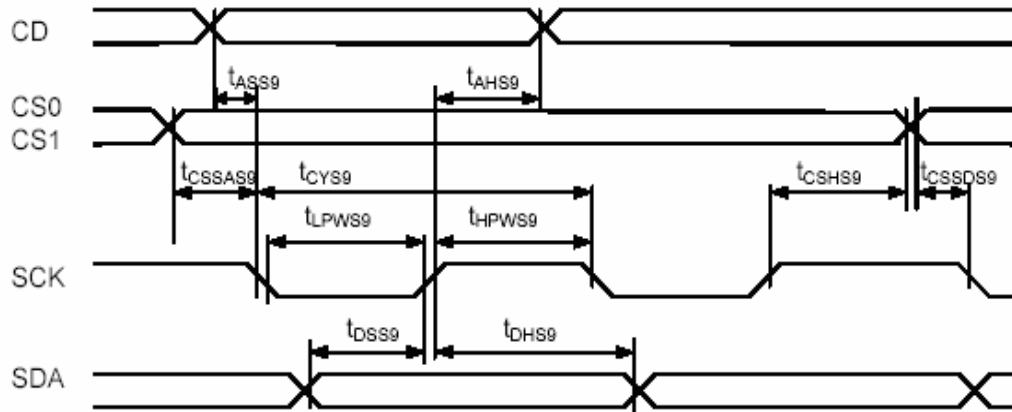


FIGURE 16: Serial Bus Timing Characteristics (for S9)

( $2.5V \leq V_{DD} < 3.3V$ ,  $T_a = 25^\circ C$ )

Symbol	Signal	Description	Condition	Min.	Max.	Units
$t_{ASS9}$	CD	Address setup time		0	–	nS
$t_{AHS9}$		Address hold time		40	–	nS
$t_{cys9}$	SCK	System cycle time		135	–	nS
$t_{LPWS9}$		Low pulse width		65	–	nS
$t_{HPWS9}$		High pulse width		65	–	nS
$t_{DSS9}$	SDA	Data setup time		30	–	nS
$t_{DHS9}$		Data hold time		15	–	nS
$t_{cSSAS9}$	CS1/CS0	Chip select setup time		10		nS
$t_{cSSDS9}$				10		
$t_{cSHS9}$				20		

( $2.4V \leq V_{DD} < 2.5V$ ,  $T_a = 25^\circ C$ )

Symbol	Signal	Description	Condition	Min.	Max.	Units
$t_{ASS9}$	CD	Address setup time		0	–	nS
$t_{AHS9}$		Address hold time		60	–	nS
$t_{cys9}$	SCK	System cycle time		200	–	nS
$t_{LPWS9}$		Low pulse width		95	–	nS
$t_{HPWS9}$		High pulse width		95	–	nS
$t_{DSS9}$	SDA	Data setup time		30	–	nS
$t_{DHS9}$		Data hold time		20	–	nS
$t_{cSSAS9}$	CS1/CS0	Chip select setup time		10		nS
$t_{cSSDS9}$				10		
$t_{cSHS9}$				20		

## 9. Instruction Description

The following is a list of host commands supported by UC1601

C/D: 0: Control, 1: Data  
W/R: 0: Write Cycle, 1: Read Cycle

# Useful Data bits  
- Don't Care

	Command	C/D	W/R	D7	D6	D5	D4	D3	D2	D1	D0	Action	Default
1	Write Data Byte	1	0	#	#	#	#	#	#	#	#	Write 1 byte	N/A
2	Read Data Byte	1	1	#	#	#	#	#	#	#	#	Read 1 byte	N/A
3	Get Status	0	1	-	MX	MY	RS	WA	DE	-	-	N/A	
4	Set Column Address LSB	0	0	0	0	0	0	#	#	#	#	Set CA [3:0]	0
	Set Column Address MSB	0	0	0	0	0	1	#	#	#	#	Set CA [7:4]	0
5	Set Multiplexing Rate	0	0	0	0	1	0	0	0	#	#	Set MR [1:0]	11b: 65
6	Set Temp. Compensation	0	0	0	0	1	0	0	1	#	#	Set TC[1:0]	00b: -0.05%/°C
7	Set Panel Loading	0	0	0	0	1	0	1	0	0	#	Set PC[0]	0b: < 15nF
8	Set Pump Control	0	0	0	0	1	0	1	1	#	#	Set PC[2:1]	11b
9	Set Adv. Program Control (double byte command)	0	0	0	0	1	1	0	0	0	R	Set APC[R][7:0], R = 0, or 1	N/A
10	Set Scroll Line	0	0	0	1	#	#	#	#	#	#	Set SL[5:0]	0
11	Set Page Address	0	0	1	0	1	1	#	#	#	#	Set PA[3:0]	0
12	Set V <sub>BIAS</sub> Potentiometer (double-byte command)	0	0	1	0	0	0	0	0	0	1	Set PM[7:0]	C0H
13	Set RAM Address Control	0	0	1	0	0	0	1	#	#	#	Set AC[2:0]	001b
14	Set Frame Rate	0	0	1	0	1	0	0	0	0	#	Set LC[3]	0b
15	Set All-Pixel-ON	0	0	1	0	1	0	0	1	0	#	Set DC[1]	0
16	Set Inverse Display	0	0	1	0	1	0	0	1	1	#	Set DC[0]	0
17	Set Display Enable	0	0	1	0	1	0	1	1	1	#	Set DC[2]	0
18	Set LCD Mapping Control	0	0	1	1	0	0	0	#	#	0	Set LC[2:1]	0
19	System Reset	0	0	1	1	1	0	0	0	1	0	System Reset	N/A
20	NOP	0	0	1	1	1	0	0	0	1	1	No operation	N/A
21	Set Test Control (double byte command)	0	0	1	1	1	0	0	1	TT	TT	For testing only. Do not use.	N/A
22	Set LCD Bias Ratio	0	0	1	1	1	0	1	0	#	#	Set BR[1:0]	11b: 9
23	Reset Cursor Update Mode	0	0	1	1	1	0	1	1	1	0	AC[3]=0, CA=CR	N/A
24	Set Cursor Update Mode	0	0	1	1	1	0	1	1	1	1	AC[3]=1, CR=CA	N/A

\* Other than commands listed above, all other bit patterns result in NOP (No Operation).

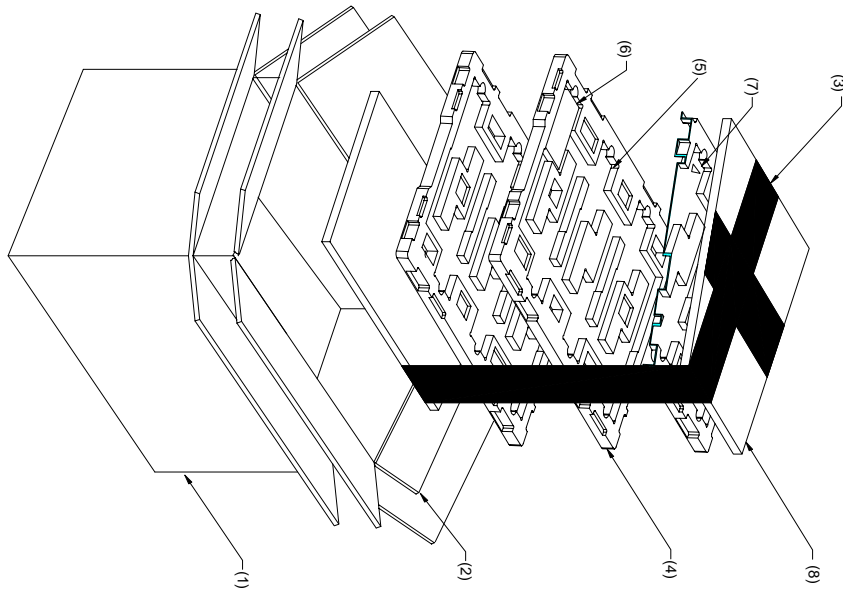
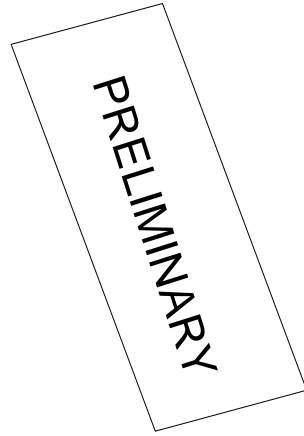
# 10. Package Specifications

NO.	ITEM	PART NO.	SPEC	UNIT	QTY PER	REMARK
1	CARTON	PK-CARTON-A	400*300*285	PCS	1	
2	SUB-CARTON	PK-SUB-CARTON-A	375*270*280	PCS	1	
3	ADHESIVE TAP		1	m	1	⊥ SHAPE
4	PSPK TRAY	BG-12864A-PSPK-B	360*255*17	PCS	19	ESD 10 <sup>-6</sup> ---10 <sup>-10</sup> "
5	PEARL PAD	BG-12864A-PP-B	306.5*233.7*2.0	PCS	18	ESD 10 <sup>-6</sup> ---10 <sup>-10</sup> "
6	MODULE	BG-12864A-FBWB-J-G-B	56.6*69.2*7.65	PCS	360	BE CAREFUL IN PUT
7	DRYER		1g	PCS	8	
8	PAPER BOARD	PK-PBA	360*255*6	PCS	2	

**Specification:**

One sub-carton contains 19 layers padings, 20modules in each PSPK tray, or 18 layers, 8 packet of dryers is put on the upper top of 19 th PSPK tray. A stiff board is put on bottom and top side to stiffen the padings and it is adhered together with adhesive tape. The sub-carton are placed into the outside carton.

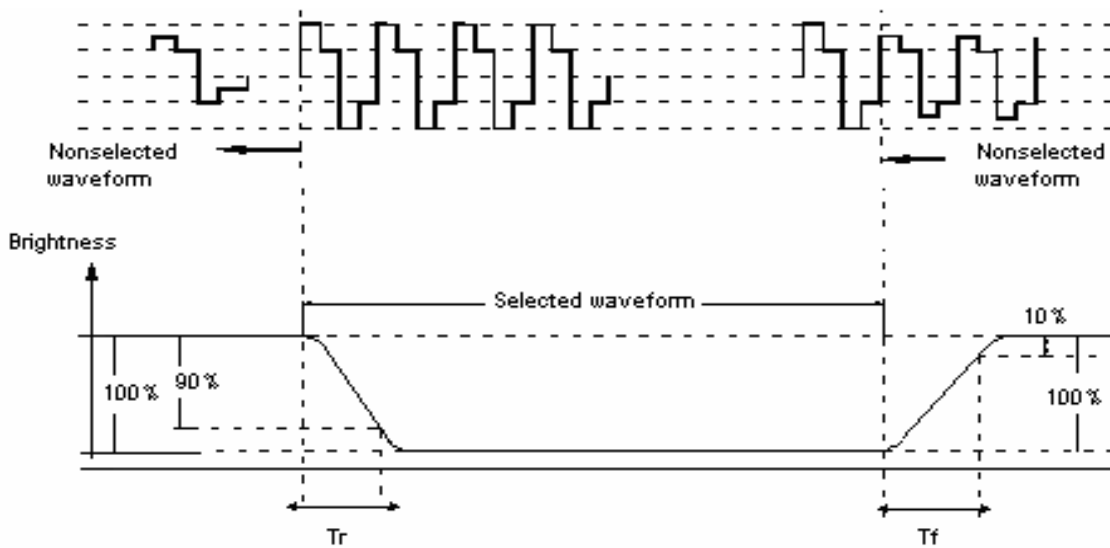
One carton can contain 18\*20\*360 modules.



## 11. ELECTRO-OPTICAL CHARACTERISTICS

NO	ITEM		Symbol	Temp°C	Rating			Unit	
					Min	Typ	Max		
1	Response	Rise time	Tr	25	N/A	65	300	Ms	
	time	Fall time	Tf						
2	Operating Frequency		Ff	25		64			Hz
3	Contrast Rate		Cr	25	2	5.5	-		-
4	Viewing Direction		6 O'CLOCK						
5	Viewing Angle Cr • 2	12H =90°	$\theta 1$	25		30		Deg	
		6H =270°	$\theta 2$			35			
		3H =0°	$\theta 3$			35			
		9H =180°	$\theta 4$			35			
6	Current Consumption		Is	25		9	12	$\mu A$	
7	Capacitance		C	25	4.1			nF	

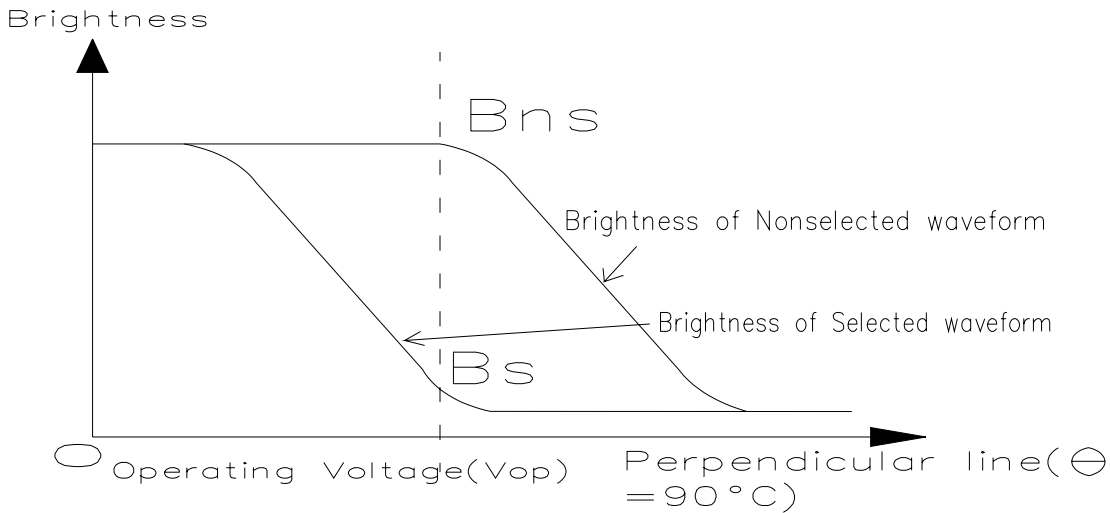
### Response Time



### Measuring Condition:

1. Driving waveform: 1/N Duty, 1/a Bias selected waveform.
2. Driving Frequency: Typical value in Individual specification.
3. Operating Voltage: LCD driving voltage getting maximum contrast rate.
4. Measuring Angle: See Individual Specification.
5. Measuring Temperature: See Individual Specification.

### Contrast Ratio Definition



$$\text{Contrast Ratio (Cr)} = \frac{\text{Brightness of non-selected waveform (Bns)}}{\text{Brightness of selected waveform (Bs)}}$$

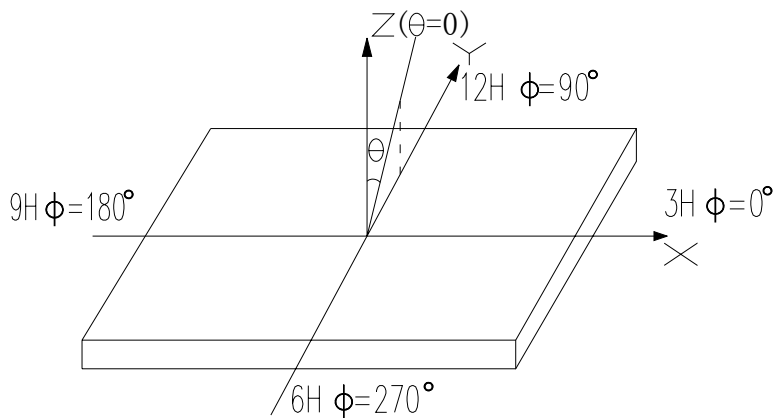
**Viewing Angle**

$\theta$ : Angle between Viewer Direction and Normal.

$$(-90^\circ \leq \theta \leq 90^\circ)$$

$\phi$ : Angle between Projection of Viewer Direction to X-Y plane and Y axis.

$$(0^\circ \leq \phi \leq 360^\circ)$$



**Measuring Condition**

1. Driving Voltage: Same as  $V_{lcd}$ .
2. Driving Frequency: Same as Frame Frequency



## 12 QUALITY SPECIFICATION

### 12-1. Specification of quality assurance

#### 12-1-1. Purpose

Standardize the Quality Assurance of LCD module products supply to purchaser by YEEBO CORPORATION (Supplier).

#### 12-1-2. Type of Quality Test

a. Inspection:

Before delivering, the supplier should take the following tests, and affirm the quality of product.

b. Electro-Optical Characteristics:

Test the product according to the individual specification.

c. Test of Appearance Characteristics:

Check the product according to the individual specification.

d. Test of Reliability Characteristics:

e. Delivery Test:

Before delivering, the supplier should take the delivery test.

( ) Test method: According to ISO 2859-1. General Inspection Level take a single time.

( ) The defects classify of AQL as following:

Major defect: AQL = 0.65%

Minor defect: AQL = 2.5%

Total defects: AQL = 0.65%

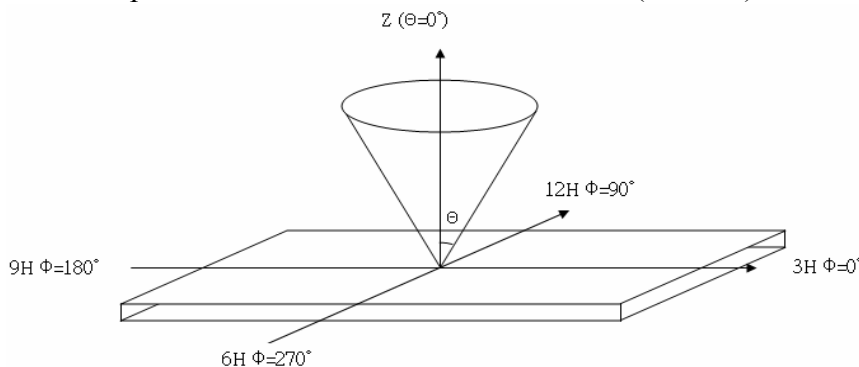
#### 12-1-3. Standard of Product Appearance Inspection

a. Conditions of appearance inspection :

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

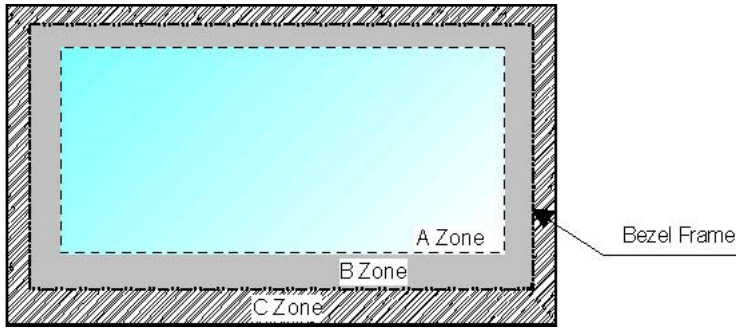
( ) When inspecting the model of transmissive product must add the reflective plate.

( ) The inspection direction is 30° off vertical line ( $\Theta \cong 30^\circ$ ).



( ) Temperature: 25±5 Hum idity: 60±10%RH

( ) Definition of Applicable Zones:

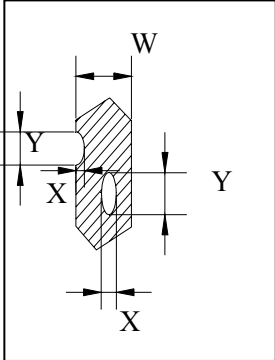
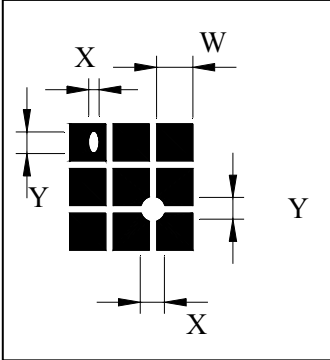
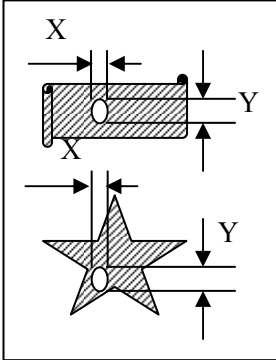
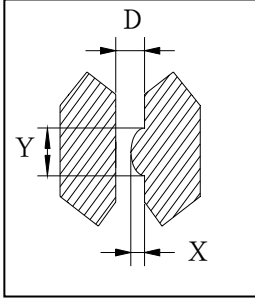
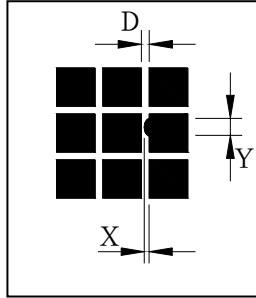
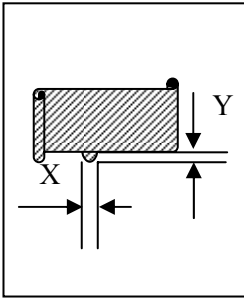


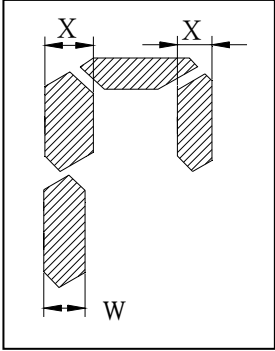
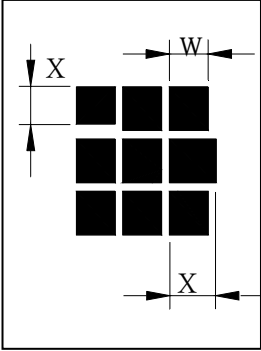
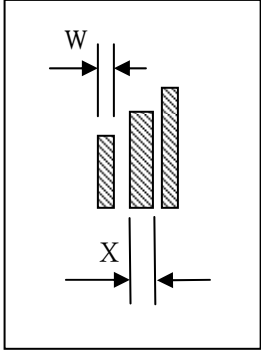
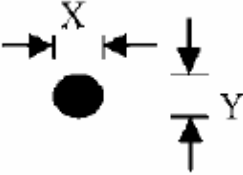
A Zone : Active display area  
 B Zone : Area from outside of "A Zone" to validity viewing area  
 C Zone : Rest parts  
 A Zone + B Zone = Validity viewing area

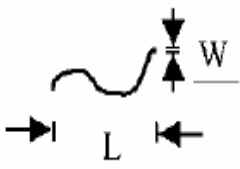
b. Unit of inspection : mm

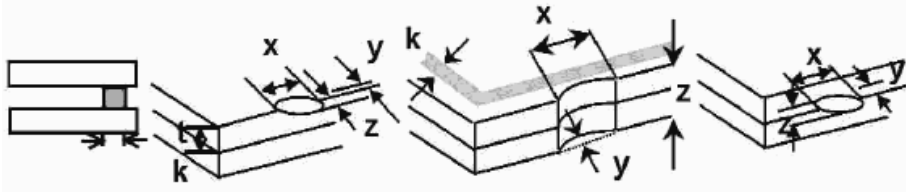
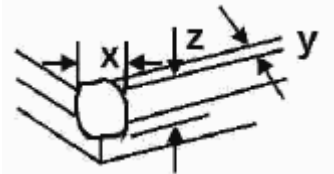
**12-1-4. Defect Inspection Specification**

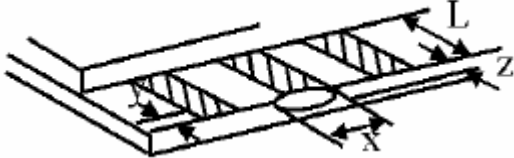
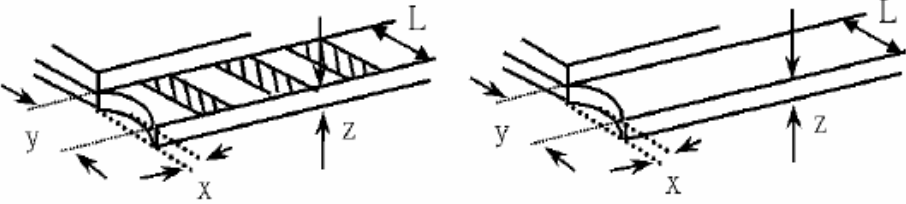
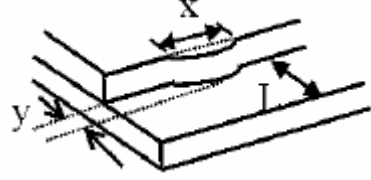
NO	Item	Criterion	AQL												
01	Electrical Testing	1.1 Missing line. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect.	0.65												
02	Black or White spots or Bright spots or Color spots on LCD (Display "ON")	$\Phi = (X+Y) / 2$ <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Size(mm)</th> <th>Acceptable</th> <th>Q'ty</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.15</math></td> <td>Accept</td> <td>no dense</td> </tr> <tr> <td><math>0.15 &lt; \Phi \leq 0.3</math></td> <td></td> <td>5</td> </tr> <tr> <td><math>0.3 &lt; \Phi</math></td> <td></td> <td>0</td> </tr> </tbody> </table> <p>* For "Accept no Dense", no more than five spots within 5mm.                      * The distance between two defects should more than 5mm.                      * Spot during display switching is considered as acceptable.</p>	Size(mm)	Acceptable	Q'ty	$\Phi \leq 0.15$	Accept	no dense	$0.15 < \Phi \leq 0.3$		5	$0.3 < \Phi$		0	2.5
Size(mm)	Acceptable	Q'ty													
$\Phi \leq 0.15$	Accept	no dense													
$0.15 < \Phi \leq 0.3$		5													
$0.3 < \Phi$		0													

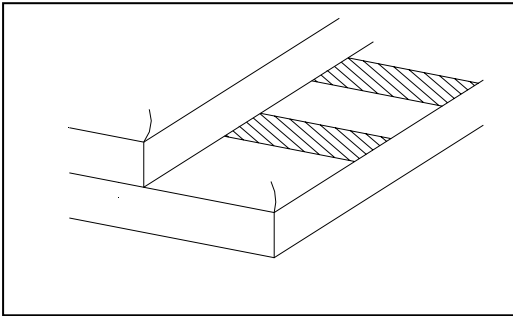
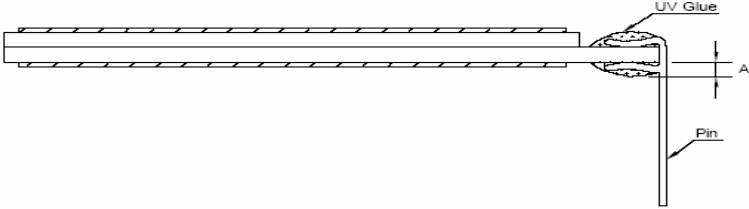
NO	Item	Criterion	AQL												
03	Pin Hole or Distortion	<p>3.1 Pin Hole:</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Segment</p>  </div> <div style="text-align: center;"> <p>Dot Matrix</p>  </div> <div style="text-align: center;"> <p>Pattern</p>  </div> </div> <p style="text-align: center;"><math>\varnothing = (X+Y)/2</math></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Wide (W)</th> <th>Dimension (<math>\varnothing</math>)</th> <th>Acceptable Number</th> </tr> </thead> <tbody> <tr> <td>-----</td> <td><math>\varnothing &lt; 0.10</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>W \leq 0.4 \varnothing</math></td> <td><math>\leq 0.15</math> and <math>X \leq 1/2W</math></td> <td>2</td> </tr> <tr> <td><math>W &gt; 0.4 \varnothing</math></td> <td><math>\leq 0.20</math> and <math>X \leq 1/3W</math></td> <td>2</td> </tr> </tbody> </table> <p>* For “Accept no Dense”, no more than 3 spots within 5mm. * Shall not more than 2 defects and the distance between two defects should more than 10mm.</p>	Wide (W)	Dimension ( $\varnothing$ )	Acceptable Number	-----	$\varnothing < 0.10$	Accept no dense	$W \leq 0.4 \varnothing$	$\leq 0.15$ and $X \leq 1/2W$	2	$W > 0.4 \varnothing$	$\leq 0.20$ and $X \leq 1/3W$	2	2.5
		Wide (W)	Dimension ( $\varnothing$ )	Acceptable Number											
-----	$\varnothing < 0.10$	Accept no dense													
$W \leq 0.4 \varnothing$	$\leq 0.15$ and $X \leq 1/2W$	2													
$W > 0.4 \varnothing$	$\leq 0.20$ and $X \leq 1/3W$	2													
<p>3.2 Distortion ( Dot Shape)</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Segment</p>  </div> <div style="text-align: center;"> <p>Dot Matrix</p>  </div> <div style="text-align: center;"> <p>Pattern</p>  </div> </div> <p style="text-align: center;"><math>\varnothing = (X+Y)/2</math></p> <p>D: Space</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Size (<math>\varnothing</math>)</th> <th>Acceptable Qty</th> </tr> </thead> <tbody> <tr> <td><math>\varnothing &lt; 0.10</math></td> <td>Disregard</td> </tr> <tr> <td><math>\varnothing \leq 0.20</math> and <math>X \leq 1/2D</math></td> <td>2</td> </tr> <tr> <td><math>\varnothing &gt; 0.20</math> or <math>X &gt; 1/2D</math></td> <td>0</td> </tr> </tbody> </table> <p style="text-align: center;">IF <math>Y &gt; 0.5</math> , follow Item 3.3-</p>	Size ( $\varnothing$ )	Acceptable Qty	$\varnothing < 0.10$	Disregard	$\varnothing \leq 0.20$ and $X \leq 1/2D$	2	$\varnothing > 0.20$ or $X > 1/2D$	0	2.5						
Size ( $\varnothing$ )	Acceptable Qty														
$\varnothing < 0.10$	Disregard														
$\varnothing \leq 0.20$ and $X \leq 1/2D$	2														
$\varnothing > 0.20$ or $X > 1/2D$	0														

NO	Item	Criterion	AQL												
03	Pin Hole or Distortion	<p>3.3 Distortion (Thick or Thin):</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Segment</p>  </div> <div style="text-align: center;"> <p>Dot Matrix</p>  </div> <div style="text-align: center;"> <p>Pattern</p>  </div> </div> <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Wide(W)</th> <th>Distortion Wide (X)</th> <th>Acceptable Qty</th> </tr> </thead> <tbody> <tr> <td>-----  </td> <td><math>X - W \leq 0.10</math></td> <td>Disregard</td> </tr> <tr> <td><math>W \leq 4\text{mm}</math></td> <td><math> X - W  \leq 0.20</math> and <math>X \geq 1/2W</math></td> <td>2</td> </tr> <tr> <td><math>W &gt; 4\text{mm}</math>  </td> <td><math>X - W \leq 0.30</math></td> <td>2</td> </tr> </tbody> </table> <p>* Total defects shall not exceed 3. * Distortion thickness cannot over 1/2 width of dot gap.</p>	Wide(W)	Distortion Wide (X)	Acceptable Qty	-----	$X - W \leq 0.10$	Disregard	$W \leq 4\text{mm}$	$ X - W  \leq 0.20$ and $X \geq 1/2W$	2	$W > 4\text{mm}$	$X - W \leq 0.30$	2	2.5
Wide(W)	Distortion Wide (X)	Acceptable Qty													
-----	$X - W \leq 0.10$	Disregard													
$W \leq 4\text{mm}$	$ X - W  \leq 0.20$ and $X \geq 1/2W$	2													
$W > 4\text{mm}$	$X - W \leq 0.30$	2													
04	LCD and Touch Panel black spots, white spots, contamination (Display "OFF")	<p>4.1 Round type: As following drawing <math>\Phi = (X+Y) / 2</math></p> <div style="display: flex; align-items: center;">  <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Size(mm)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.1</math></td> <td>Accept no dense</td> </tr> <tr> <td><math>0.1 &lt; \Phi \leq 0.2</math></td> <td>3</td> </tr> <tr> <td><math>0.2 &lt; \Phi \leq 0.25</math></td> <td>2</td> </tr> <tr> <td><math>0.25 &lt; \Phi \leq 0.35</math></td> <td>1</td> </tr> <tr> <td><math>0.35 &lt; \Phi</math></td> <td>0</td> </tr> </tbody> </table> </div> <p>* For "Accept no Dense", no more than five spots within 5mm. * The distance between two defects should more than 5mm. * Outside of the V.A. is disregard.</p>	Size(mm)	Acceptable Q'ty	$\Phi \leq 0.1$	Accept no dense	$0.1 < \Phi \leq 0.2$	3	$0.2 < \Phi \leq 0.25$	2	$0.25 < \Phi \leq 0.35$	1	$0.35 < \Phi$	0	2.5
Size(mm)	Acceptable Q'ty														
$\Phi \leq 0.1$	Accept no dense														
$0.1 < \Phi \leq 0.2$	3														
$0.2 < \Phi \leq 0.25$	2														
$0.25 < \Phi \leq 0.35$	1														
$0.35 < \Phi$	0														

NO	Item	Criterion	AQL																				
04	LCD and Touch Panel black spots, white spots, contamination (Display "OFF")	<p>4.2 Line type: (As following drawing)</p>  <table border="1" data-bbox="683 414 1311 685"> <thead> <tr> <th>Length(mm)</th> <th>Width(mm)</th> <th>Acceptable</th> <th>Q'ty</th> </tr> </thead> <tbody> <tr> <td>---</td> <td><math>W \leq 0.02</math></td> <td>Accept no dense</td> <td></td> </tr> <tr> <td><math>L \leq 3</math></td> <td><math>0.02 &lt; W \leq 0.05</math></td> <td></td> <td>2</td> </tr> <tr> <td><math>L \leq 2</math></td> <td><math>0.05 &lt; W \leq 0.08</math></td> <td></td> <td>1</td> </tr> <tr> <td>---</td> <td><math>0.08 &lt; W</math></td> <td>Rejection</td> <td></td> </tr> </tbody> </table> <p>* For "Accept no Dense", no more than 2 lines within 5mm. * The distance between two defects should more than 5mm. * Outside of the V.A. is disregard.</p>	Length(mm)	Width(mm)	Acceptable	Q'ty	---	$W \leq 0.02$	Accept no dense		$L \leq 3$	$0.02 < W \leq 0.05$		2	$L \leq 2$	$0.05 < W \leq 0.08$		1	---	$0.08 < W$	Rejection		2.5
Length(mm)	Width(mm)	Acceptable	Q'ty																				
---	$W \leq 0.02$	Accept no dense																					
$L \leq 3$	$0.02 < W \leq 0.05$		2																				
$L \leq 2$	$0.05 < W \leq 0.08$		1																				
---	$0.08 < W$	Rejection																					
05	Polarizer bubbles	<table border="1" data-bbox="531 976 1179 1220"> <thead> <tr> <th>Size <math>\Phi</math>(mm)</th> <th>Acceptable</th> <th>Q'ty</th> </tr> </thead> <tbody> <tr> <td><math>\Phi \leq 0.20</math></td> <td>Accept no dense</td> <td></td> </tr> <tr> <td><math>0.20 &lt; \Phi \leq 0.50</math></td> <td></td> <td>3</td> </tr> <tr> <td><math>0.50 &lt; \Phi \leq 1.00</math></td> <td></td> <td>2</td> </tr> <tr> <td><math>1.00 &lt; \Phi</math></td> <td></td> <td>0</td> </tr> <tr> <td>Total Q'ty</td> <td></td> <td>3</td> </tr> </tbody> </table> <p>* For "Accept no Dense", no more than 2 bubbles within 5mm. * The distance between two defects should more than 5mm. * Outside of the V.A. is disregard.</p>	Size $\Phi$ (mm)	Acceptable	Q'ty	$\Phi \leq 0.20$	Accept no dense		$0.20 < \Phi \leq 0.50$		3	$0.50 < \Phi \leq 1.00$		2	$1.00 < \Phi$		0	Total Q'ty		3	2.5		
Size $\Phi$ (mm)	Acceptable	Q'ty																					
$\Phi \leq 0.20$	Accept no dense																						
$0.20 < \Phi \leq 0.50$		3																					
$0.50 < \Phi \leq 1.00$		2																					
$1.00 < \Phi$		0																					
Total Q'ty		3																					
06	Polarizer Scratches/Puncture	Follow Item 4.	2.5																				
07	Polarizer dirt	Dirt on polarizer which can be clean or blow away is acceptable.	2.5																				

NO	Item	Criterion	AQL																		
08	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>8.1 General glass chip:</p> <p>8.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="400 775 1222 931"> <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>8.1.2 Corner crack:</p>  <table border="1" data-bbox="400 1335 1222 1491"> <thead> <tr> <th>z: Chip thickness</th> <th>y: Chip width</th> <th>x: Chip length</th> </tr> </thead> <tbody> <tr> <td><math>Z \leq 1/2t</math></td> <td>Not over viewing area</td> <td><math>x \leq 1/8a</math></td> </tr> <tr> <td><math>1/2t &lt; z \leq 2t</math></td> <td>Not exceed 1/3k</td> <td><math>x \leq 1/8a</math></td> </tr> </tbody> </table> <p>⊙ Unit: mm  ⊙ If there are 2 or more chips, x is the total length of each chip</p>	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	2.5
z: Chip thickness	y: Chip width	x: Chip length																			
$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$																			
$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$																			
z: Chip thickness	y: Chip width	x: Chip length																			
$Z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$																			
$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$																			

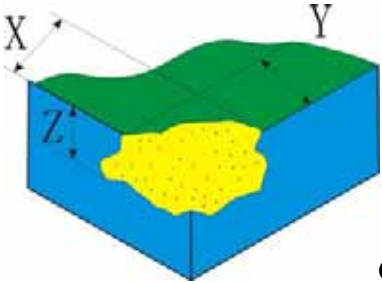
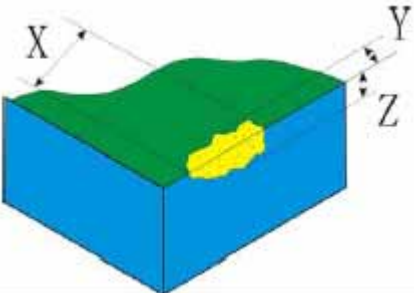
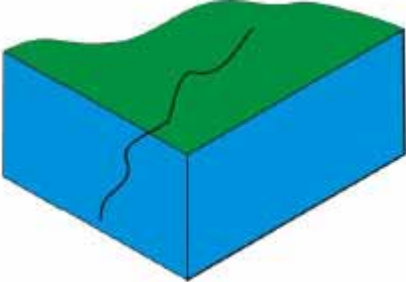
NO	Item	Criterion	AQL																
09	Glass crack	<p>Symbols:            x: Chip length    y: Chip width    z: Chip thickness            k: Seal width    t : Glass thickness    a: LCD side length            L: Electrode pad length</p> <p>9.1 Protrusion over terminal:            9.1.1 Chip on electrode pad:</p>  <table border="1" data-bbox="517 689 1193 835"> <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>9.1.2            Non-conductive portion:</p>  <table border="1" data-bbox="517 1205 1193 1350"> <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.</p> <p>⊙ Heatseal alignment mark must not be damaged.</p> <p>9.1.3 Substrate protuberance and internal crack</p>  <table border="1" data-bbox="858 1641 1294 1787"> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td><math>y \leq 1/3L</math></td> <td><math>X \leq a</math></td> </tr> </table>	y: Chip width	x: Chip length	z: Chip thickness	$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$	y: Chip width	x: Chip length	z: Chip thickness	$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$	y: width	x: length	$y \leq 1/3L$	$X \leq a$	2.5
y: Chip width	x: Chip length	z: Chip thickness																	
$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$																	
y: Chip width	x: Chip length	z: Chip thickness																	
$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$																	
y: width	x: length																		
$y \leq 1/3L$	$X \leq a$																		

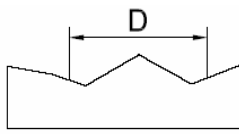
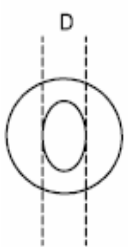
NO	Item	Criterion	AQL
10	Progressive crack line	 <p>10.1 Crack is crack line extend to inner edge . 10.2 Crack round epoxy frame will be rejected. 10.3 Crack on the terminal will be rejected: <math>Z=T</math> length <math>&gt;1\text{mm}</math> or <math>Z&lt;T</math> length <math>&gt;2\text{mm}</math> 10.4 Crack at ITO will be rejected.</p>	2.5
11	PIN	<p>11.1 PIN slant not per specification. If the specification does not describe this item, the slant of PIN to ITO pad must <math>\leq 0.25\text{mm}</math>. 11.2 The UV glue of PIN cannot higher than upper polarizer. 11.3 The UV glue height of A shall be <math>\leq 2\text{mm}</math></p>  <p>11.4 The terminal of PIN cannot have UV glue. 11.5 Damage of PIN such as scratch affect customer soldering. 11.6 The inclination tolerance of PIN <math>\leq \pm 5^\circ</math> unless otherwise stated. 11.7 Pin type not according to specification sheet. 11.8 LCD pin loose or missing pins.</p>	2.5



NO	Item	Criterion	AQL														
12	Marking (Printing & Silkscreen)	<p>12.1 The marking pattern different from specification.</p> <p>12.2 Marking colour wrong or different from colour limit sample</p> <p>12.3 Marking line not consistence in thickness or broken line</p> <p>12.4 Marking position deviated. Base on tolerance specified and unspecified tolerance base on <math>\pm 0.20\text{mm}</math>. Marking line should not overlap with display unless otherwise specified.</p> <p>12.5 Marking Line Width Criteria:</p> <table border="1" data-bbox="545 629 1171 846"> <thead> <tr> <th data-bbox="545 629 842 734">W: Designed Width</th> <th data-bbox="847 629 1171 734">P: Actual Width</th> </tr> </thead> <tbody> <tr> <td data-bbox="545 734 842 790"><math>W \leq 0.40</math></td> <td data-bbox="847 734 1171 790"><math>-P  \leq 1/2W</math></td> </tr> <tr> <td data-bbox="545 790 842 846"><math>W &gt; 0.40</math></td> <td data-bbox="847 790 1171 846"><math> W-P  \leq 0.2</math></td> </tr> </tbody> </table> <p>Note: Unless otherwise specified.</p> <p>12.6 Marking Pinhole or Distortion:</p> <table border="1" data-bbox="545 952 1141 1162"> <thead> <tr> <th data-bbox="545 952 852 1003">Size Accepted</th> <th data-bbox="857 952 1141 1003">Qty</th> </tr> </thead> <tbody> <tr> <td data-bbox="545 1003 852 1055"><math>\varnothing &lt; 0.10</math></td> <td data-bbox="857 1003 1141 1055">Disregard</td> </tr> <tr> <td data-bbox="545 1055 852 1106"><math>0.10 &lt; \varnothing \leq 0.20</math></td> <td data-bbox="857 1055 1141 1106">2</td> </tr> <tr> <td data-bbox="545 1106 852 1162"><math>0.20 &lt; \varnothing</math></td> <td data-bbox="857 1106 1141 1162">0</td> </tr> </tbody> </table> <p>Note: The distance between two defects should be greater than 5mm</p> <p>12.7 Marking Black spot or Scratchs controlled base on inspection specification Item 4.</p> <p>12.8 Smear allowed: <math>\leq 0.20\text{mm}</math></p>	W: Designed Width	P: Actual Width	$W \leq 0.40$	$-P  \leq 1/2W$	$W > 0.40$	$ W-P  \leq 0.2$	Size Accepted	Qty	$\varnothing < 0.10$	Disregard	$0.10 < \varnothing \leq 0.20$	2	$0.20 < \varnothing$	0	2.5
W: Designed Width	P: Actual Width																
$W \leq 0.40$	$-P  \leq 1/2W$																
$W > 0.40$	$ W-P  \leq 0.2$																
Size Accepted	Qty																
$\varnothing < 0.10$	Disregard																
$0.10 < \varnothing \leq 0.20$	2																
$0.20 < \varnothing$	0																
13	Bezel	<p>Bezel not complies with product specifications.</p> <p>Note: Scratch or prick which does not affect customer assembly is considered as acceptable.</p>	2.5														
14	FPC	<p>14.1 FPC terminal damage <math>\leq 1/2</math> FPC terminal width and does not affect functional is considered acceptable.</p> <p>14.2 FPC alignment hole damage <math>\leq 1/2</math> alignment area and does not affect the functional and assembly of customer are considered acceptable.</p> <p>14.3 Foreign material or dirt on conductor pads which can be clean and does not affect functional is consider acceptable.</p>	2.5														

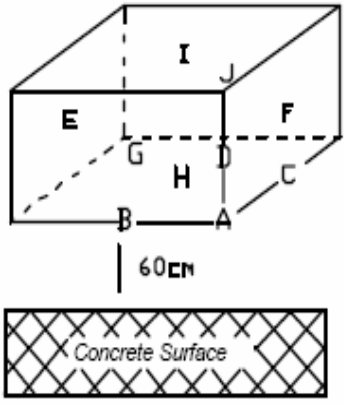
NO	Item	Criterion	AQL
15	SMT、COB	15.1 COB epoxy with pinholes larger than 0.5mm. 15.2 COB epoxy with exposed IC. 15.3 The height of the COB should not exceed the height indicated in the assembly diagram. 15.4 Epoxy encap exceed more than 3mm of the silkscreen printing 15.5 Wrong parts, missing parts or excess parts. 15.6 Jumper on the PCBA not conformed to the product characteristic chart. 15.7 PCBA cosmetic control based on latest IPC standard, IPC-A-610, acceptable limit of grade 2. 15.8 Cold solder joints, missing solder connections. 15.9 Short circuits in components on PCB or FPC. 15.10 Bezel loose assembly Note: Bend angle for bezel assembly should be within the range of 15° ~60°	2.5 0.65 2.5 2.5 0.65 0.65 2.5 0.65 0.65 0.65 2.5
16	Backlight	16.1 Spots or scratches that appear when backlight on to be reviewed using Item 4 standards. 16.2 Backlight unable to light-up.	2.5
17	TAB	<p style="color: blue;">Oxidation on pin surface that result solderability issue</p> Note: a) Solderability condition: 310°C ± 10°C, 3sec (hand solder) or 280°C ± 10°C, 3sec (DIP) b) Wrinkles on TAB pin but not broken is considered as acceptable.	2.5

NO	Item	Criterion	AQL
18	Touch Panel Chipped glass	<p>18.1 Chip And Crack            Corner crack: <math>X &lt; 3.0\text{mm}</math> and <math>Y &lt; 3.0\text{mm}</math> and <math>Z &lt; \text{GT}</math> ignored            18.1.1 Corner crack in the golden finger that seriously affects the product function.            18.1.2 Corner crack in the circuit that seriously affects product function .</p>  <p style="text-align: center;">GT : Glass Thickness</p> <p>18.2 Side crack: <math>X &lt; 4.0\text{mm}</math> and <math>Y &lt; 2.0\text{mm}</math> and <math>Z &lt; \text{GT}</math> ignored            18.2.1 Side crack in the golden finger that seriously affects the product function.            18.2.2 Side crack in the circuit that seriously affects product function</p>  <p>18.3 Progressive crack line.</p> 	2.5

NO	Item	Criterion	AQL										
19	Touch Panel(Fish eye、dent and bubble on film)	<table border="1" data-bbox="400 282 932 488"> <thead> <tr> <th>SIZE(mm)</th> <th>Acceptable Qty</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 Qty	$\Phi \leq 0.2$	Accept no dense	$0.2 < D \leq 0.4$	5	$0.4 < D \leq 0.5$	2	$0.5 < D$	0	2.5
SIZE(mm)	Acceptable Qty												
$\Phi \leq 0.2$	Accept no dense												
$0.2 < D \leq 0.4$	5												
$0.4 < D \leq 0.5$	2												
$0.5 < D$	0												
20	Touch Panel Newton ring	Newton ring dimension < 1/2 touch panel area and affect font and <b>line distortion</b> (<1.5%).	2.5										
21	Touch Panel Linearity	<b>Linearity</b> <2.0% .	2.5										
22	General appearance	<p>22.1 Product packaging not the same as the Specification 22.2 Product dimension and structure not conform to product specification sheet.</p> <p>Note:</p> <ul style="list-style-type: none"> <li>a) Wrinkles on protective ta pe or corner lifted <math>\leq 5\text{mm}</math> is considered acceptable.</li> <li>b) Dirt or scratches on protective film which does not transfer to polarizer is consider as acceptable</li> <li>c) Datecode position unless otherwise specified by custom er, Yeebo will decide for it.</li> <li>d) Datecode on module which is slight blur but still can be differentiated is considered as acceptable.</li> </ul>	2.5										

## 12-2 Standard Specification for Reliability

### 12-2 – 1. Standard Specifications for Reliability of LCD Module

Item	Description	
	Condition Ti	me (hrs)
High temp. (Storage)	80°C	240
High temp. (Operating)	70°C	240
Low temp. (Storage)	-30°C	240
Low temp. (Operating)	-200°C	240
High temp and high humidity .(Storage)	40°C/ 90%RH	240
Thermal shock (Storage)	-30°C → 20°C → 80°C → 20°C (30 min → 5 min → 30 min → 5 min)	10 cycles
Packing vibration	Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm Sweep time: 12 min X,Y,Z direction each 2 hours .	
Packing drop test	<p>To be measured after dropping from 60cm high on the concrete surface in packing state.</p>  <p>Dropping method:            Corner dropping :                A Corner : once            Edge dropping :                B,C,D edge : once            Face dropping:                E, F, G, H, I, J face :                once</p>	
Electrical Static Discharge	Air: ±6KV 150pF/330Ω 5 times Contact: ±4KV 150pF/330Ω 5 times	

\*Sample size for each test is 5pcs except Packing vibration & Packing drop test.



### 12-2 - 2. Testing Conditions and Inspection Criteria

For the final test the testing sample must be stored at room temperature for 4 hours, after the tests listed in Table 12.2-1, 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 ratio must be larger than 2.
03	Appearance	Visual inspection	Defect free.
04	ESD	Function test	After reset, no abnormalities in functions.

### 12-2 - 3. MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 100,000 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.
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**\*The half life of EL backlight is 1200hours Min.**

### 12-3.Warranty

This product has been manufactured to specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we will not take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

1. We cannot accept responsibility for any defect arise after additional process of the product (including disassembly and reassembly), after product delivery.
2. We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.
3. We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed your company's acceptance inspection procedures.
4. We cannot accept responsibility for industrial property, which may arise through the use of your product, with exception to those issues relating directly to the structure or method of manufacturing of our product one year from YEEBO production.
5. For Heatseal Product which required to heatseal by customer side, parts must be used within three



- months after delivery from factory.
6. For TAB Product which required to solder by customer side, parts must be used within three months after delivery from factory.
7. The liability of YB is limited to repair or replacement on the terms set forth below. YB will not be responsible for any subsequent or consequential events or injury or damage to any personnel or user including third party personnel and/or user. Unless otherwise agreed in writing between YB and the customer, YB will only replace or repair any of its LCD which is found defective electrically or visually when inspected in accordance with YB GENERAL LCD INSPECTION STANDARD.

## 12-4 Precautions in Use of LCM

### 12-4-1 Handling of LCM

- Do not give external shock.
- Do not apply excessive force on the surface.
- Liquid Crystal in LCD is hazardous substance. Do not swallow it and when contact to hand, skin, cloth etc. Wash it out thoroughly and immediately.
- Do not operate it above the absolute maximum rating.
- Do not 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 careful when peeling off this protective film as static electricity may be generated.

### 12-4-2 Storage

- Store in ambient temperature of  $25\pm 5$  , and relative humidity of  $50\pm 10\%$  RH. Do not 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.
- **Heat-seal must be stored at 25 °C or less and 50% R.H. or less in a sealed condition, and must be used within three months after delivery from our factory.**

### 12-4-3 Soldering

- Use only soldering irons with proper grounding and no leakage.
- Soldering: Not higher than  $310\pm 10$  and less than 3 sec during for hand soldering.
- Resoldering: no more than 2 times.

## 12-5 Guarantee

Our products meet requirements of the environment.

YEEBO ROHS requirement is based on European Union Directive 200295EC (ROHS) Requirements and Update.