

SPECIFICATION FOR CTP MODULE

MODULE NO: YB-TG320240C58A-C-A0

Doc.Version:02

Customer Approval:	
□ Accept	□ Reject

YEEBO	NAME	SIGNATURE	DATE
Prepare	Mechanical Engineer	李毅斌	2021-10-21
Check	Electronic Engineer	走春风	2021-10-22
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■ APPROVAL FOR SPECIFICATIONS ONLY

□ APPROVAL FOR SPECIFICATIONS AND SAMPLE

WIMRD005-02-D

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1. Revision History

Sample Version	DOC. Version	DATE		DESCRIPTION	CHANGED BY
A0	00	2021-07-24	Spec only	First issue	L.Y.B
A0	01	2021-10-21	Spec only	Modify backlight	L.Y.B
A0	02	2021-10-21	Spec only	Modify MODULE NO	L.Y.B



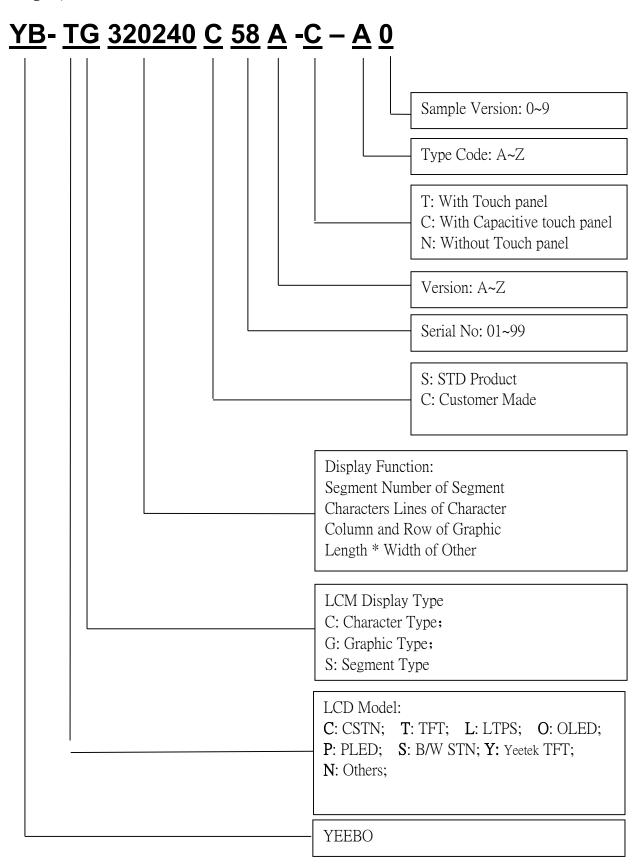
2. Table of Contents:

NO	CONTENTS	PAGE
1	Revision History	1
2	Table of Contents	2
3	Module Numbering System	3
4	General Specification	4
5	LCM drawing	5
6	Electrical Characteristics	6
7	Optical Characteristics	12
8	Interface Pin Assignment	14
9	Block Diagram	16
10	Backlight	17
11	Standard Specification for Reliability	18
12	Specification of Quality Assurance	20
13	Handling Precaution	25
14	Warranty	26
15	Guarantee	26



3. Module Numbering System:

(example)



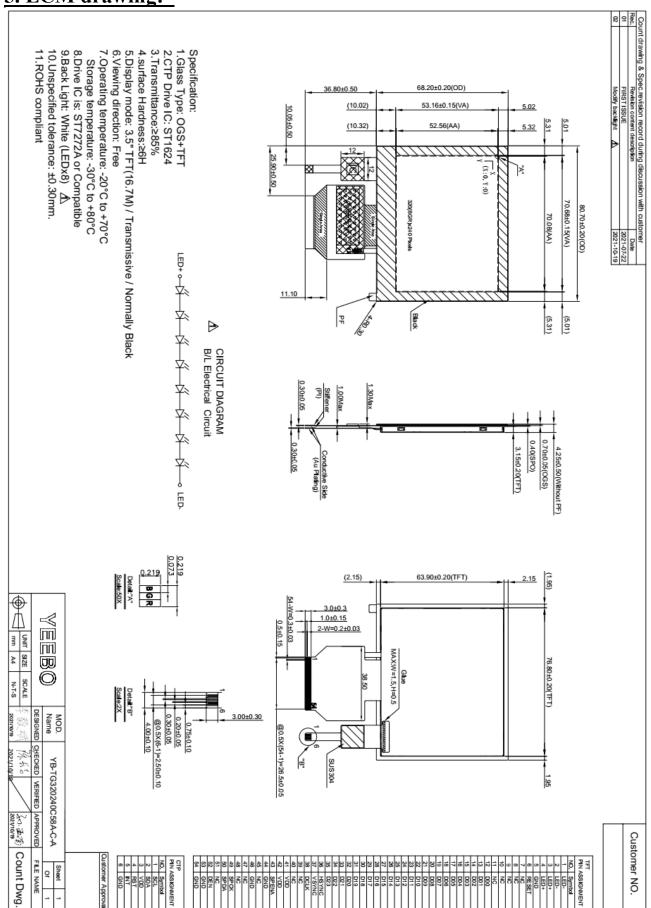


4. General Specification:

ITEM	CONTENTS
Structure	OGS+TFT
Assembly Module Size(mm)	80.70 (W) * 68.20 (H) * 4.25 (T)
Display Size(Diagonal)	3.5 inch
Display Format	320(RGB)*240 Pixels
View Area of TP Sensor(mm)	70.68(W) * 53.16(H)
Active Area(mm)	70.08(W) * 52.56 (H)
Pixel Pitch(mm)	0.219(H) *0.219 (V)
LCD Type	TFT(16.7M) / Transmissive / Normally Black
View Angle	FREE
TFT Controller IC	ST7272A
CTP IC	ST1624
Transmittance	≥85%
Hardness	≥6H
Weight(g)	TBD
Firmware	TBD
Test Configuration	TBD



5. LCM drawing:



Module P/N: YB-TG320240C58A-C-A0



6. Electrical Characteristics

6-1 Absolute Maximum Ratings

6-1-1 Absolute Maximum Ratings (TFT) (Ta=25°C VSS=0V)

Item	Symbol	Min.	Туре	Max.	Unit	Remark
Power Supply Voltage	VDD-VSS	-0.3	-	+4.0	Volt	Note1
Operating Temperature	Topr	-20	-	+70	$^{\circ}\!\mathbb{C}$	-
Storage Temperature	Tstg	-30	-	+80	$^{\circ}\!\mathbb{C}$	-

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

6-1-2 Absolute Maximum Ratings (TP) (Ta=25°C)

Parameter	Symbol	Min.	Max.	Unit
VDD	V_{VDD}	-0.3	+6	v
IOVDD	V _{IOVDD}	-0.3	+6 🕢	V
Operating Ambient Temperature	T _A	-20	+80	ક
Storage Temperature	Ts	-40	+125	ာင

*Note: Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. All the ranges are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied or intended. Exposed to the absolute maximum rating conditions for extended periods may affect device reliability.



6-2 Operating Conditions

6-2-1 Operating Conditions (TFT)

(Ta=25°C)

Item	Symbol	Condition	Min.	Тур.	Max.	Unit
Power Supply	VDD.VSS	-	3.0	3.3	3.6	Volt
Innut Valtage	V_{IH}	-	0.7 *VDD	1	VDD	V
Input Voltage	V_{IL}	-	0	-	0.3*VDD	V
Power Supply Current for LCM	IDD	VDD=3.3V	-	28.8	38.7	mA

6-2-2 Operating Conditions (TP)

(Ta=25°C)

Parameter	Symbol	Min.	Тур.	Max.	Unit	Condition
VDD	V_{VDD}	2.7		3.6)y	
IOVDD	V _{IOVDD}	1.6	16	3.6	v	
Operating Current	I _{NML}	-	16	24	mA	15TX, 9RX
Idle Current	I _{IDLE}	-	5.9	8.9	mA	15TX, 9RX, scan rate=20Hz
Power Down Current	I _{PD}	-<\	-	20	uA	
Input High Voltage	VIH	0.85*I OVDD		-	٧	
Input Low Voltage	Yı		-	0.15*I OVDD	٧	
Input Pull Up Resistor	Rpu	50	-	60	KOhm	
Output Driving Current/	J DRV	6	-	-	mA	V _{OH} = IOVDD x 0.8
Output Sinking Current	Isink	10	-	-	mA	V _{OL} = IOVDD x 0.2
Low Voltage Reset	V _{LVR}	-	-	2.3	٧	

Module P/N: YB-TG320240C58A-C-A0

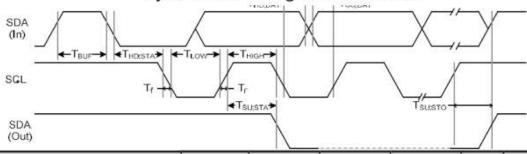
7



6-3 Timing Characteristics

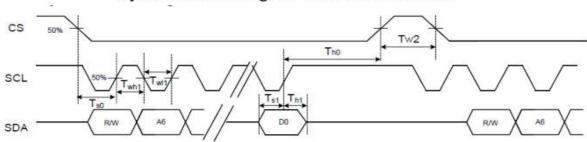
6-3-1 Timing Characteristics (TFT)

System Bus Timing for I₂C Interface



Item	Symbol	Min.	Тур.	Max.	Unit	Conditions
SCL Clock Frequency	FSCL		5	400	KHz	
SCL Clock Low Period	TLOW	1300	-	-	ns	
SCL Clock High Period	THIGH	600	2	=	ns	
Signal Rise Time	Tr	20+0.1Cb	9	300	ns	
Signal Fall Time	Tf	20+0.1Cb	â	300	ns	
Start Condition Setup Time	TSU;STA	600	8		ns	
Start Condition Hold Time	THD;STA	600	*	-	ns	
Data Setup Time	TSU;DAT	100	÷	-	ns	
Data Hold Time	THD;DAT	0	≦	900	ns	
Setup Time for STOP Condition	TSU;STO	600	-	-	ns	
Bus Free Time Between a STOP and START	TBUF	100	¥	-	ns	
Capacitive load represented by each bus line		Сь		400	pF	

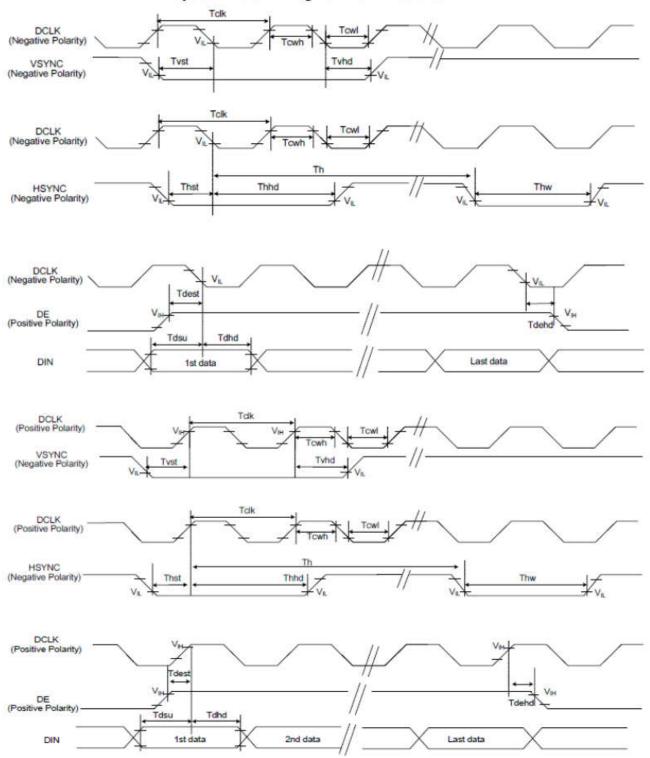
System Bus Timing for 3-Wire SPI Interface



Item	Symbol	Min.	Тур.	Max.	Unit	Conditions
CS Input Setup Time	Ts0	50	72	(4)	ns	
Serial Data Input Setup Time	Ts1	50	U.S.	# 1 8	ns	
CS Input Hold Time	Th0	50		(I=0)	ns	
Serial Data Input Hold Time	Th1	50	9720	946	ns	
SCL Write Pulse High Width	Twh1	50	7/28	(2)	ns	
SCL Write Pulse Low Width	Twl1	50	0.51	850	ns	
SCL Read Pulse High Width	Trh1	300			ns	
SCL Read Pulse Low Width	Trl1	300			ns	
CS Pulse High Width	Tw2	400	021	120	ns	



System Bus Timing for RGB Interface





ltem	Symbol	Min.	Тур.	Max.	Unit	Conditions
CLK Pulse Duty	Tclk	40	50	60	%	
HSYNC Width	Thw	2	-	-	DCLK	
VSYNC Setup Time	Tvst	12		100	ns	
VSYNC Hold Time	Tvhd	12	250		ns	
HSYNC Setup Time	Thst	12	-	-	ns	
HSYNC Hold Time	Thhd	12	-	-	ns	
Data Setup Time	Tdsu	12	-	14,1	ns	
Data Hold Time	Tdhd	12	-	-	ns	
DE Setup Time	Tdest	12	-	-	ns	
DE Hold Time	Tdehd	12	121	121	ns	



6-3-2 Timing Characteristics (TP)

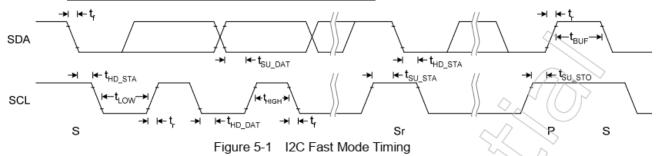


Table 5-3 I2C Fast Mode Timing Characteristic

Conditions: VDD = 3.3V, GND = 0V, T_A = 25°C

Symbol	Parameter		Unit		
Syllibol	raidilletei	Min.	Тур.	Max.	Offic
f _{SCL}	SCL clock frequency	0	1	400	kHz
t_{LOW}	Low period of the SCL clock	1,3	LJF -	-	us
t _{HIGH}	High period of the SCL clock	0.6	П	-	us
t_f	Signal falling time		-	300	ns
t _r	Signal rising time		-	300	ns
t _{su_sta}	Set up time for a repeated START condition	0.6	-	-	us
t _{HD_STA}	Hold time (repeated) START condition. After this period, the first clock pulse is generated	0.6	-	-	us
t _{SU_DAT}	Data set up time	100	-	-	ns
t _{HD DAT}	Data hold time	0	-	0.9	us
t _{su_sto}	Set up time for STOP condition	0.6	-	-	us
t _{BUF}	Bus free time between a STOP and START condition	1.3	-	-	us
C _b	Capacitive load for each bus line	-	-	400	pF



7. Optical Characteristics:

14	_	Cll	C1:4:	Spe	cification	ons	TI24	Note
Item	1	Symbol	Conditions	Min Typ Max	Unit	Note		
Transmit (With 1		T(%)	-	-	6.2	-	-	-
			⊕ =0					
Contrast	Ratio	CR	Normal	-	- 800 -	(1	(1) (2)	
			Viewing angle					
Response time		TR+TF	-	-	30	40	ms	(1) (3)
	⊢ Hor ⊢	Өх+		-	80	-	deg.	
Viewing		Өх-	OD > 10	-	80	-		
angle	Ver.	Өу+	CR≧10	_	80	-		-
	vei.	Өу-		-	80	-		

Measuring Condition

1. Measuring surrounding: dark room

2. Ambient temperature: 25±2°C

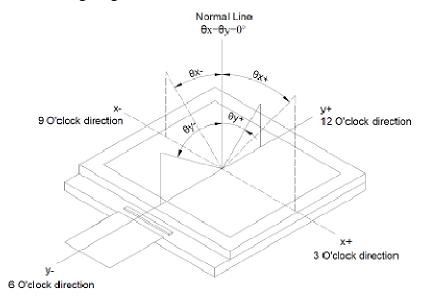
3. 30 min. Warm-up time.

Color of CIE Coordinate:

Item		Symbol	Condition	Min.	Тур.	Max.
Chromaticity Coordinates (Transmissive)	Red	X		TBD	0.630	TBD
		у		TBD	0.352	TBD
	Green	X	$\theta = \phi = 0$ °	TBD	0.375	TBD
		у	LED Backlight	TBD	0.579	TBD
	Blue	X	Color Degree	TBD	0.142	TBD
		y		TBD	0.110	TBD
	****	X		TBD	0.326	TBD
	White	у		TBD	0.345	TBD



Note (1) Definition of Viewing Angle:

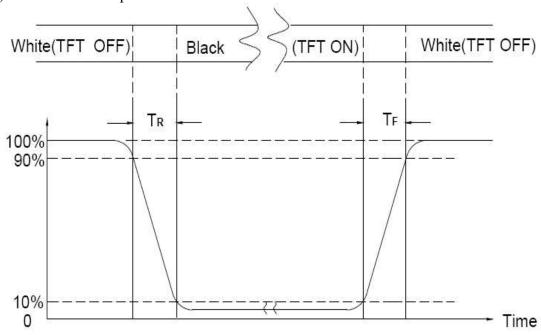


Note (2) Definition of Contrast Ratio(CR): measured at the center point of panel

Contrast ratio (CR)= Photo detector output when LCD is at "White" state

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 Interface Pin Assignment(TFT)

No.	Symbol	Function
1~2	LED-	Backlight LED Cathode input pin.
3~4	LED+	Backlight LED Anode input pin.
5	GND	Ground.
6	RESET	System reset pin.
7	NC	No connector.
8	NC	
9	NC	Dummy.
10	NC	Dummy.
11	NC	
12~35	D00~D23	Data Bus.
36	HSYNC	Horizontal Synchronous signal.
37	VSYNC	Vertical Synchronous signal.
38	DCLK	Data clock.
39~40	NC	No connector.
41~42	VDD	Power supply.
43	SPENA	Chip select for serial port use.
44	GND	Ground.
45	NC	No connector.
46	GND	Ground.
47,48	NC	No connector.
49	SPCK	Serial port Clock.
50	SPDA	Serial port Data input/output
51	NC	No connector.
52	DEN	Data enable signal.
53~54	GND	Ground.

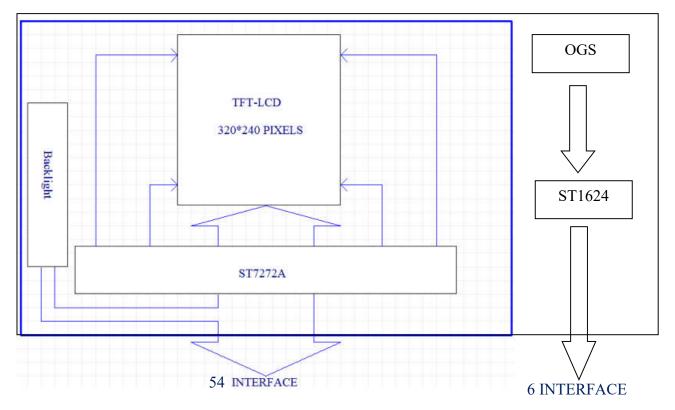


8-2 Interface Pin Assignment(TP)

No.	Symbol	Function
1	SCL	CTP serial clock pin for I ² C interface
2	SDA	CTP serial date pin for I ² C interface
3	VDD	Power
4	RESET	CTP reset
5	INT	CTP interrupt singnal
6	GND	Ground



9. Block Diagram:





10. Backlight:

- 1. Standard Lamp Styles (Edge Lighting Type):
 The LED chips are distributed over the edge light area of the illumination unit, which gives the less power consumption:
- 2. The Main Advantages of the LED Backlight are as following:
 - 2.1 The brightness of the backlight can simply be adjusted. By a resistor or a potentiometer.
- 3. Data About LED Backlight:

(1a 25 C)

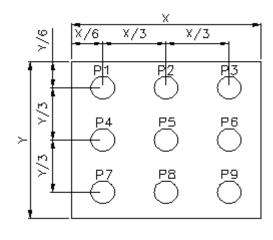
PARAMETER	Sym.	Min.	Тур.	Max.	Unit	Test Condition	Note
Supply Current	I 20 m		mA	V=25.6V			
Supply Voltage	V	21.6	25.6	27.2	V		
Luminous Intensity	IV	425	510	-	cd/m ²	If=20mA	2
Uniformity	-	70	-	-	%	11-20IIIA	3
Life Time	-	50000	-	-	Hr.		4
Color	White						

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)

Using aperture of 1°, distance 50cm



11. Standard Specification for Reliability: 11–1. Standard Specifications for Reliability of (LCD+CTP) Module

No	Item	Description
01	High temperature operation	The sample should be allowed to stand at 70°C for 120 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
02	Low temperature operation	The sample should be allowed to stand at -20°C for 120 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
03	High temperature storage	The sample should be allowed to stand at 80°C for 240 hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 2 hours.
04	Low temperature storage	The sample should be allowed to stand at -30°C for 240 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours.
05	Moisture storage	The sample should be allowed to stand at 60°C,90%RH MAX for 240 hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours.
06	Thermal shock storage	The sample should be allowed to stand the following 10 cycles: -30° C for 30 minutes \rightarrow normal temperature for 5 minutes \rightarrow +80°C for 30 minutes \rightarrow normal temperature for 5 minutes, as one cycle.
07	Packing vibration	Frequency range: 10Hz ~ 55Hz Amplitude of vibration: 1.5mm X,Y,Z 2 hours for each direction. Sweep time: 12 min
08	Packing drop test	According to ISTA 1A 2001.
09	Electrical Static	Air: $\pm 4KV \ 150 pF/330\Omega \ 5$ times
	Discharge	Contact: $\pm 2KV \ 150pF/330\Omega \ 5$ 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 10-1, Standard specifications for Reliability have been executed in order to ensure stability.

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

11-3. MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (25 \pm 5 $^{\circ}$ C), normal humidity (50 \pm 10% RH), and in area not exposed to direct sun light.
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12. Specification of Quality Assurance:

12-1. Purpose

This standard for Quality Assurance should affirm the quality of LCD module products to supply to purchaser by YEEBO CORPORATION (Supplier).

12-2. Standard for Quality Test

a. Inspection:

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

b. Electro-Optical Characteristics:

According to the individual specification to test the product.

c. Test of Appearance Characteristics:

According to the individual specification to test the product.

d. Test of Reliability Characteristics:

According to the definition of reliability on the specification for testing products.

e. Delivery Test:

Before delivering, the supplier should take the delivery test.

- (i) Test method: According to ISO2859-1.General Inspection Level

 ☐ 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

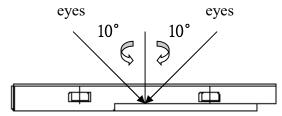
Both sides should discuss together when the following problems happen.

- 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.

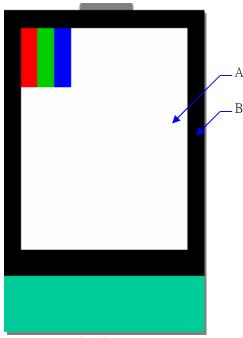


12-5. Standard of The Product Appearance Test

- a. Manner of appearance test:
- (i) The test must be under $20W \times 2$ or 40W fluorescent light, and the distance of view must be at $30\pm5cm$.
 - (ii) When test the model of transmissive product must add the reflective plate.
 - (iii)The test direction is base on around 10° of vertical line.
 - (iiii)Temperature: 25±5°C Humidity: 60±10%RH



(iv) Definition of area:



- A. Area: Viewing area.
- B. Area: Out of viewing area. (Outside viewing area)
- b. Basic principle:
- (i) It will accord to the AQL when the standard can not be described.
- (ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
- (iii) Must add new item on time when it is necessary.
- c. Standard of inspection: (Unit: mm)



12-6. Inspection specification

12-6. Inspection s	*			
Item		pecification	Unit : mm	AQL
Electrical Testing	1.5 Missing char 1.6 Display malf 1.7 No function of	or no display. umption exceeds product g angle defect. uct types.		0.65
explosion-proof film bubble/Concave and convex point/indentation / Contamination	ignored, but l 2. Printing ink 3. The particle	ight leakage is not allow peel off is not allowed.	is removable by cleaning	2.5



	D	Accepta	able numbers				
		ignore	d (No more		· V		
	≤ 0. 15	than five	e spots within		¥		
			5mm)		X		
	0. 15 <d≤0. 25<="" td=""><td></td><td>3</td><td></td><td>- /) /2</td><td></td></d≤0.>		3		- /) /2		
Black spots /	0. 25 <d≤0. 35<="" td=""><td></td><td>2</td><td></td><td>D=(x+y)/2</td><td></td></d≤0.>		2		D=(x+y)/2		
White spots	D>0.35		NG				
/Bright spots/ Color spots /polluted inside/ punctured	ignored, but light 2. Printing ink 3. The particle v	a's front side checked according to this specification, back side t light leakage is not allowed. It g ink peel off is not allowed. It ticle will be ignored when it is removable by cleaning spaced: No more than two spots within 10mm					
	W	L	Acceptable numb	ers			
Linear Object: Fiber, scurf, scratches and other linear defects (not affecting function)	 <0.05 0.05 W ≥ 0.15 The reverse side scratches from th 			nes m)	L nic circuit, cannot find the	2.5	
	* Densely spaced: No more than two lines within 10mm						
Glass edge chipping, edge breakage	Edge breakage can't affect visual effection (edge breakage can't cause damage to circuit); over lens have no visual damage conditions Acceptable numbers X < 1.0mm, Y < 1.0mm, Z < T 2						
Glass broken	Visual broken	is NG,	and there is	no pote		0.65	

Module P/N: YB-TG320240C58A-C-A0

Doc.Version:02

23



edges		Some contentious defect judged according to samples			
accord		Product type	Conditions	R. W	2.5
2. LO sawto		Same size	1, width below 0.2 inch (included) ignored, above 0.2 NG 2, Length not accounted		
Specific dimension		In accordance with product outline drawing or specification (key dimension) or engineering sample.			2.5
Glue overflow/Frame		1. Glue overflow exceed 0.2mm to the black frame is not allowed.			2.5
FPC	Bonding bubble/ Misalignm ent	FPC golden finger hot pressure's bubble or impurity diameter shall be below 1/2 of the pressed area, pressed deviation shall not exceed 1/2 of the silver line width, and 40X microscope cannot have obvious cracks.			0.65
	Folded mark (minor fault)	Linearity irreversibility folded mark and acute angle folded mark is NG.			2.5
	EMI FILM (minor fault)	Surface broken, scratched ≤ 0.3mm Surface broken below 5mm can be modified by print ink, after modified, the result shall be achieved to EMI			2.5



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°C, 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°C and less than 3 sec during Hand soldering.
- Rewiring: no more than 2 times.



14. 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 can not 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 within one year from YEEBO shipment.
- 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.

15. Guarantee:

Our products meet requirements of the environment.

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

Module P/N: YB-TG320240C58A-C-A0

26