SPECIFICATION

CUSTOMER :

MODULE NO.:   **WF32DSLAJDNN0#**

APPROVED BY: (FOR CUSTOMER USE ONLY)	
	PCB VERSION: **DATA:**

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: **2020/12/29**			

TFT Display Inspection Specification: https://www.winstar.com.tw/technology/download.html

Precaution in use of TFT module: https://www.winstar.com.tw/technology/download/declaration.html

Winstar Display Co., LTD

華凌光電股份有限公司

MODLE NO：

RECORDS OF REVISION			DOC. FIRST ISSUE		
VERSION	DATE	REVISED PAGE NO.	SUMMARY		
0	2020/12/29		First issue		

Contents

1.Module Classification Information

W	F	32	D	S	L	A	J	D	N	N	0	#
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬

①	Brand：WINSTAR DISPLAY CORPORATION	
②	Display Type：F→TFT Type, J→Custom TFT	
③	Display Size：3.2" TFT	
④	Model serials no.	
⑤	Backlight Type：	F→CCFL, White / S→LED, High Light White / T→LED, White / Z→Nichia LED, White

⑥	LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction	A→Transmissive, N.T, IPS TFT C→Transmissive, N. T, 6:00 ; F→Transmissive, N.T,12:00 ; I→Transmissive, W. T, 6:00 K→Transflective, W.T,12:00 L→Transmissive, W.T,12:00 N→Transmissive, Super W.T, 6:00	Q→Transmissive, Super W.T, 12:00 R→Transmissive, Super W.T, O-TFT V→Transmissive, Super W.T, VA TFT W→Transmissive, Super W.T, IPS TFT X→Transmissive, W.T, VA TFT Y→Transmissive, W.T, IPS TFT Z→Transmissive, W.T, O-TFT

⑦	A：TFT LCD B：TFT+SCREW HOLES+CONTROL BOARD C：TFT+ SCREW HOLES +A/D BOARD D：TFT+ SCREW HOLES +A/D BOARD+CONTROL BOARD E：TFT+ SCREW HOLES +POWER　BOARD	F：TFT+CONTROL　BOARD G：TFT+ SCREW HOLES H：TFT+D/V　BOARD I：TFT+ SCREW HOLES +D/V BOARD J：TFT+POWER BD

⑧ Resolution:

A	128160	B	320234	C	320240	D	480234	E	480272	F	640480
G	800480	H	1024600	I	320480	J	240320	K	800600	L	240400
M	1024768	N	128128	P	1280800	Q	480800	R	640320	S	480128
T	800320	U	8001280	V	176220	W	1280398	X	1024250	Y	1920720
Z	800200	2	1024324	3	7201280	4	19201200	5	1366768	6	1280320

⑨	D: Digital　　L：LVDS　　M:MIPI					

⑩ Interface:

N	Without control board	A	8Bit	B	16Bit	H	HDMI
I	I2C Interface	R	RS232	S	SPI Interface	U	USB

⑪ TS:

N	Without TS		T	Resistive touch panel		C	Capacitive touch panel (G-F-F)
G	Capacitive touch panel (G-G)				C1	Capacitive touch panel (G-F-F)+OCA	
C2	Capacitive touch panel (G-F-F)+OCR				G1	Capacitive touch panel (G-G)+OCA	
G2	Capacitive touch panel (G-G)+OCR				B	CTP+GG+USB	

⑫	Version:　　X:Raspberry pi	
⑬	Special Code	#:Fit in with ROHS directive regulations

2.Summary

TFT 3.2"is a TN transmissive type color active matrix TFT liquid crystal display that use amorphous silicon TFT as switching devices. This module is a composed of a TFT_LCD module, It is usually designed for industrial application and this module follows RoHs.

3.General Specifications

Item	Dimension	Unit
Size	3.2	inch
Dot Matrix	240x RGBx 320(TFT)	dots
Module dimension	55.04 (W) x 77.6 (H) x 2.55(D)	mm
Active area	48.6 x 64.8	mm
Pixel pitch	0.2025 x 0.2025	mm
LCD type	TFT, Normally White, Transmissive	
View Direction	6 o'clock	
Gray Scale Inversion Direction	12 o'clock	
Aspect Ratio	Portrait	
Driver IC	ILI9341 or Equivalent	
Interface	80 MCU 8bit /9bit/16bit/18bit/SPI(3 Wire/4 Wire)	
Backlight Type	LED,Normally White	
With /Without TP	Without TP	
Surface	Anti-Glare	

*Color tone slight changed by temperature and driving voltage.

4.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20	—	+70	℃
Storage Temperature	TST	-30	—	+80	℃

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above
1. Temp. 60℃, 90% RH MAX. Temp.＞60℃, Absolute humidity shall be less than 90% RH at 60℃

5.Electrical Characteristics

5.1. Operating conditions:

Item	Symbol	Condition	Min	Type	Max	Unit
Power supply voltage	VCI		2.5	2.8	3.3	V
Power supply voltage	IOVCC		1.65	2.8	3.3	V
Input high voltage	Vih		0.7IOVCC	-	IOVCC	V
Input low voltage	Vil		GND	-	0.3IOVCC	V
Output high voltage	Voh	IOL=-1.0mA	0.8 IOVCC	-	IOVCC	V
Output low voltage	Vol	IOL =1.0mA	GND	-	0.2 IOVCC	V
Current consumption	I$_{VCI}$	-	-	5.5	8.25	mA

This value is test for VDD=3.3V , Ta=25 ℃ only

5.2. LED driving conditions

Parameter	Symbol	Min	Typ	Max	Unit	Remark
LED current	—	—	120	—	mA	—
LED voltage	VLED+	5.5	6.0	6.5	V	Note 1
LED Life Time	—	—	50000	—	Hr	Note 2,3

Note 1 : There are 1 Groups LED

Note 2 : Ta = 25°C
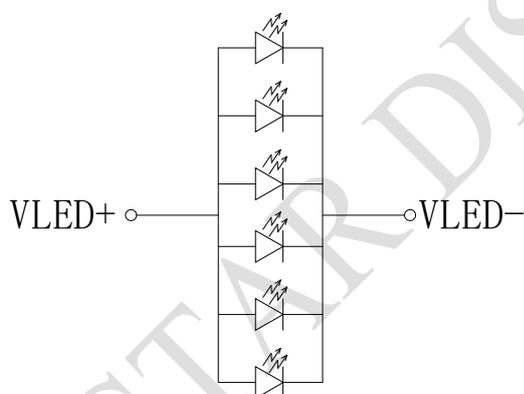
CIRCUIT DIAGRAM

Note 3 : Brightness to be decreased to 50% of the initial value

6.Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr	θ=0°、Φ=0°	-	4	8	.ms	Note 3
		Tf		-	12	24	.ms	
Contrast ratio		CR	At optimized viewing angle	400	500	-	-	Note 4
Color Chromaticity	White	Wx	θ=0°、Φ=0	0.26	0.31	0.36		Note 2,6,7
		Wy		0.28	0.33	0.38		
Viewing angle (Gray Scale Inversion Direction)	Hor.	ΘR	CR　10	35	45	-	Deg.	Note 1
		ΘL		35	45	-		
	Ver.	ΦT		35	45	-		
		ΦB		10	20	-		
Brightness		-	-	900	1000	-	cd/m^2	Center of display
Uniformity		(U)	-	75	-	-	%	Note 5

Ta=25±2℃

Note 1: Definition of viewing angle range
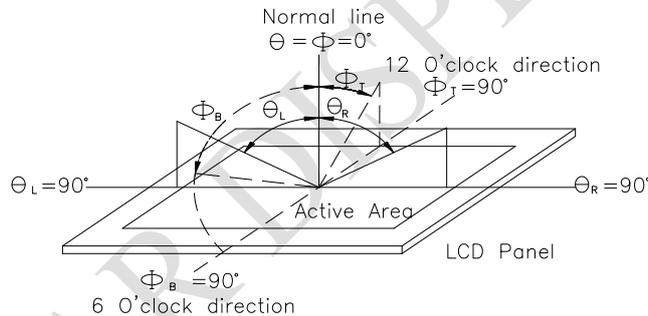
Fig 6.1. Definition of viewing angle

Note 2: Test equipment setup:
After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.
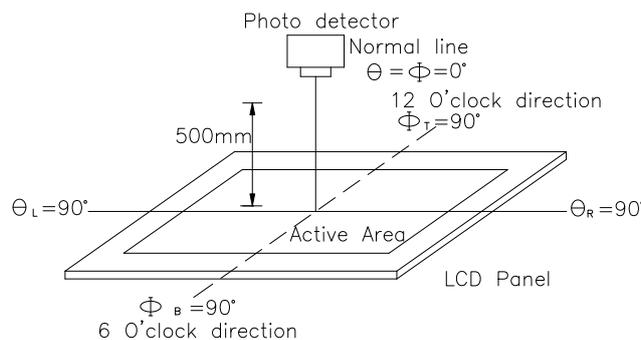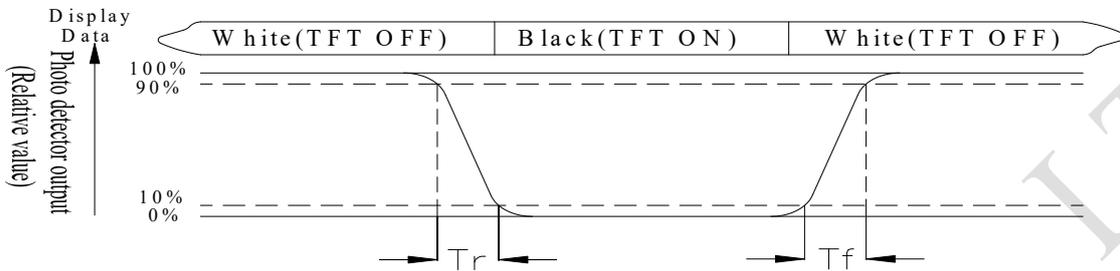

Fig 6.2. Optical measurement system setup

Note 3: Definition of Response time:
The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time, Tr, is the time between photo detector output intensity changed from 90%to 10%. And fall time, Tf, is the time between photo detector output intensity changed from 10%to 90%

Note 4: Definition of contrast ratio:
The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.
Luminance Uniformity (U) = Lmin/Lmax x100%
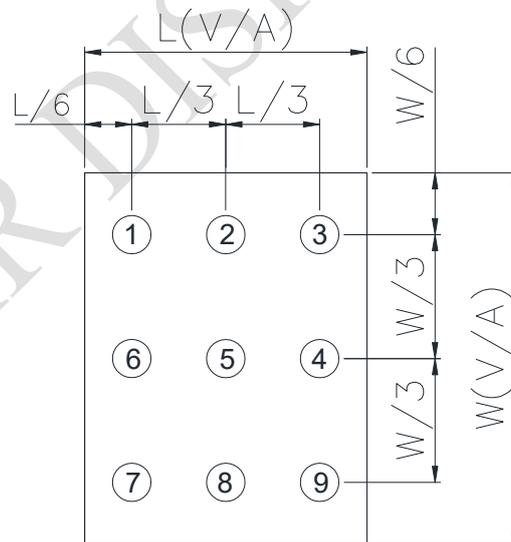L = Active area length
W = Active area width

Fig 6.3. Definition of uniformity

Note 6: Definition of color chromaticity (CIE 1931)
Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.
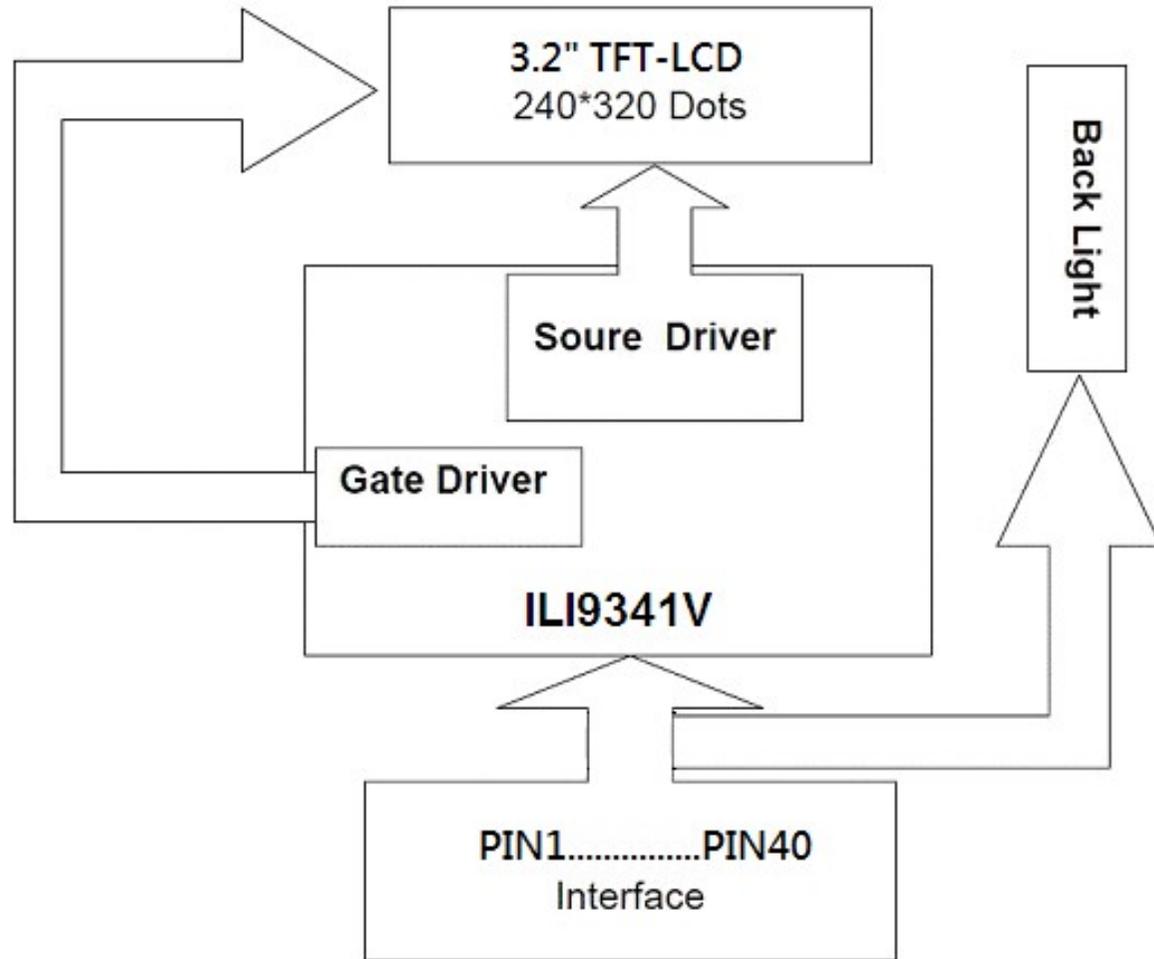
7.Interface

LCM PIN Definition

NO	Symbol	Function	I/O
1	NC	No connection	—
2	NC	No connection	—
3	NC	No connection	—
4	NC	No connection	—
5	VCI	Power supply(TYP: 2.8V).	P
6	IOVCC	Power supply(TYP:1.8V/2.8V).	P
7	R5	18-bit parallel bi-directional data bus for MCU system and RGB interface mode Fix to VSS level when not in use	I/O
8	R4		
9	R3		
10	R2		
11	R1		
12	R0		
13	G5		
14	G4		
15	G3		
16	G2		
17	G1		
18	G0		
19	B5		
20	B4		
21	B3		
22	B2		
23	B1		
24	B0		
25	SDA	Serial data input/output	I/O
26	DOTCLK	Data enable signal in RGB interface.	I
27	DE	A data ENABLE signal in RGB I/F mode	I
28	HSYNC	Horizontal synchronizing signal in RGB interface	I
29	VSYNC	Vertical synchronizing signal in RGB interface	I
30	NRD	Read enable pin I80 parallel bus system interface	I

31	NWR_DNC	NWR Write enable pin I80 parallel bus system interface DNC Command/parameter or display data selection pin in serial bus system interface	I
32	DNC_SCL	DNC Command/parameter or display data selection pin in parallel interface SCL Serial data clock in serial bus system Interface	I
33	NCS	Chip select signal	I
34	NRESET	System Reset	I

<table>
<tr><td>35</td><td>IM0</td><td rowspan="3">System interface select:</td><td rowspan="3">I</td></tr>
<tr><td>36</td><td>IM1</td></tr>
<tr><td>37</td><td>IM2</td></tr>
</table>

System interface select:

IM2	IM1	IM0	MCU-Interface Mode	DB Pin in use Register/Content	DB Pin in use GRAM
0	0	0	80 MCU 8-bit bus interface I	D[7:0]	D[7:0]
0	0	1	80 MCU 16-bit bus interface I	D[7:0]	D[15:0]
0	1	0	80 MCU 9-bit bus interface I	D[7:0]	D[8:0]
0	1	1	80 MCU 18-bit bus interface I	D[7:0]	D[17:0]
1	0	1	3-wire 9-bit data serial interface I	SDA: In/OUT	
1	1	0	4-wire 8-bit data serial interface I	SDA: In/OUT	

38	GND	Ground	P
39	VLED+	Anode of LED backlight.	P
40	VLED-	Cathode of LED backlight.	P

8.Block Diagram

3.2" TFT-LCD
240*320 Dots

Back Light

Soure Driver

Gate Driver

ILI9341V

PIN1...............PIN40
Interface

9.Reliability

Content of Reliability Test (Wide temperature, -20℃~70℃)

Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80℃ 96hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30℃ 96hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70℃ 96hrs	――
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20℃ 96hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 40℃,90%RH max	40℃,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation -20℃　　25℃　　70℃ 30min　5min　30min 1 cycle	-20℃/70℃ 10 cycles	――
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=±600V(contact) ,±800v(air), RS=330Ω CS=150pF 10 times	――

Note1: No dew condensation to be observed.
Note2: The function test shall be conducted after 4 hours storage at the normal
　　　 Temperature and humidity after remove from the test chamber.
Note3: The packing have to including into the vibration testing.

10.Contour Drawing

NO.	SYMBOL
1	NC
2	NC
3	NC
4	NC
5	VCI
6	IOVCC
7	R5
8	R4
9	R3
10	R2
11	R1
12	R0
13	G5
14	G4
15	G3
16	G2
17	G1
18	G0
19	B5
20	B4
21	B3
22	B2
23	B1
24	B0
25	SDA
26	DOTCLK
27	DE
28	HSYNC
29	VSYNC
30	NRD
31	NWR_DNC
32	DNC_SCL
33	NCS
34	NRESET
35	IM0
36	IM1
37	IM2
38	GND
39	VLED+
40	VLED-
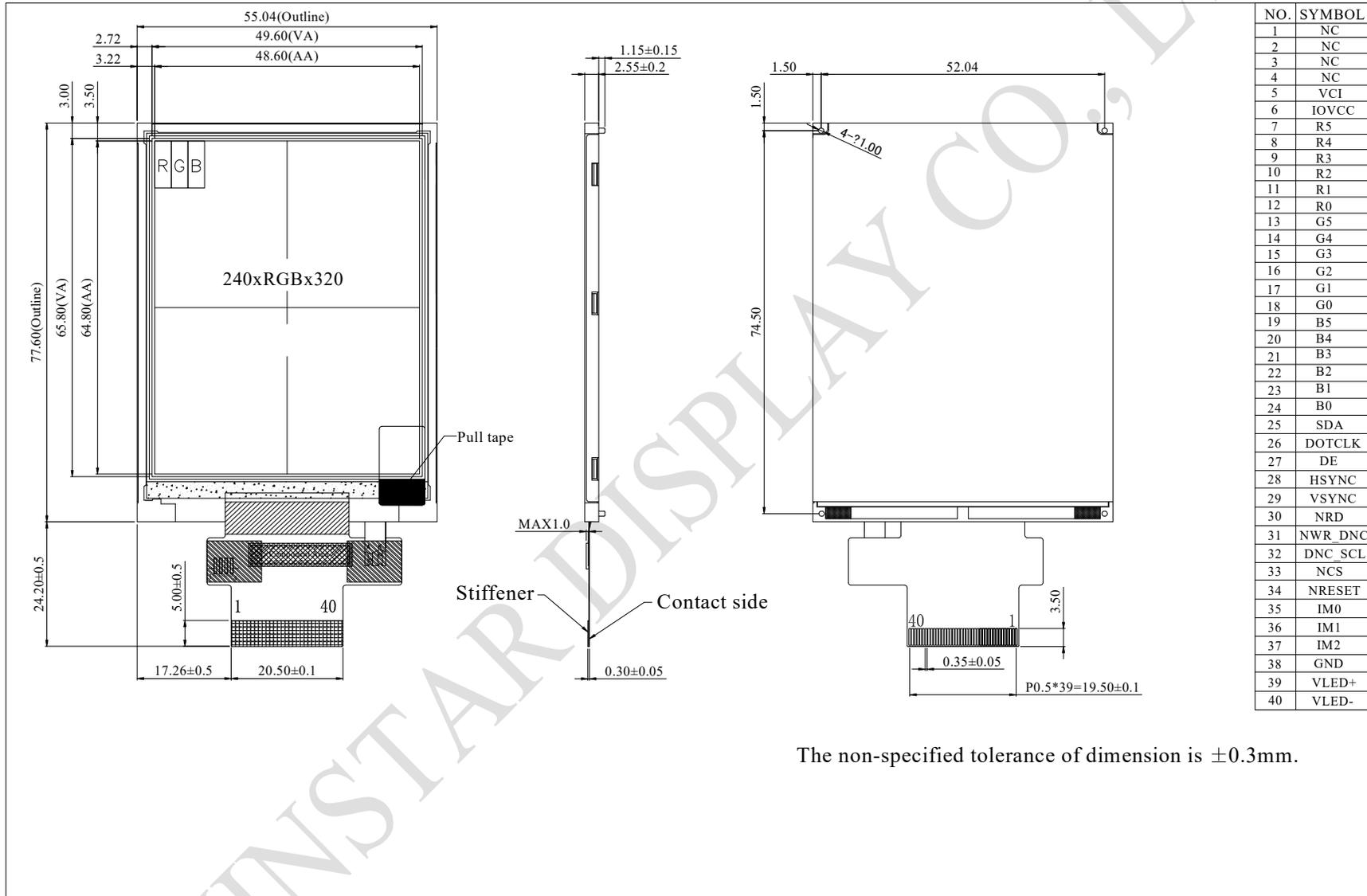
The non-specified tolerance of dimension is ±0.3mm.

1、<u>Panel Specification</u>：

   1.   Panel Type：   □ Pass   □ NG , _____

   2.   View Direction：   □ Pass   □ NG , _____

   3.   Numbers of Dots：   □ Pass   □ NG , _____

   4.   View Area：   □ Pass   □ NG , _____

   5.   Active Area：   □ Pass   □ NG , _____

   6.   Operating Temperature：   □ Pass   □ NG , _____

   7.   Storage Temperature：   □ Pass   □ NG , _____

   8.   Others： _____

2、<u>Mechanical</u>

   1.   PCB Size：   □ Pass   □ NG , _____

   2.   Frame Size：   □ Pass   □ NG , _____

   3.   Material of Frame：   □ Pass   □ NG , _____

   4.   Connector Position：   □ Pass   □ NG , _____

   5.   Fix Hole Position：   □ Pass   □ NG , _____

   6.   Backlight Position：   □ Pass   □ NG , _____

   7.   Thickness of PCB：   □ Pass   □ NG , _____

   8.   Height of Frame to PCB：   □ Pass   □ NG , _____

   9.   Height of Module：   □ Pass   □ NG , _____

  10.   Others：   □ Pass   □ NG , _____

3、<u>Relative Hole Size</u>：

   1.   Pitch of Connector：   □ Pass   □ NG , _____

   2.   Hole size of Connector：   □ Pass   □ NG , _____

   3.   Mounting Hole size：   □ Pass   □ NG , _____

   4.   Mounting Hole Type：   □ Pass   □ NG , _____

   5.   Others：   □ Pass   □ NG , _____

4、<u>Backlight Specification</u>：

   1. B/L Type：   □ Pass   □ NG , _____

   2. B/L Color：   □ Pass   □ NG , _____

   3. B/L Driving Voltage (Reference for LED Type)：   □ Pass   □ NG , _____

   4. B/L Driving Current：   □ Pass   □ NG , _____

   5. Brightness of B/L：   □ Pass   □ NG , _____

   6. B/L Solder Method：   □ Pass   □ NG , _____

   7. Others：   □ Pass   □ NG , _____

Winstar   Module Number： _____   **Page: 2**

5、<u>Electronic Characteristics of Module</u>：

1. Input Voltage：   □ Pass   □ NG , _____
2. Supply Current：   □ Pass   □ NG , _____
3. Driving Voltage for LCD： □ Pass   □ NG , _____
4. Contrast for LCD：   □ Pass   □ NG , _____
5. B/L Driving Method：   □ Pass   □ NG , _____
6. Negative Voltage Output： □ Pass   □ NG , _____
7. Interface Function：   □ Pass   □ NG , _____
8. LCD Uniformity：   □ Pass   □ NG , _____
9. ESD test：   □ Pass   □ NG , _____
10. Others：   □ Pass   □ NG , _____

6、<u>Summary</u>：

Sales signature： _____
Customer Signature： _____   **Date**： ____ / ____ / ____