TFT DISPLAY SPECIFICATION

WINSTAR Display Co.,Ltd.
華凌光電股份有限公司

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華凌光電股份有限公司

SPECIFICATION

CUSTOMER :

MODULE NO.: **WF39DTLFSDHN0#**

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

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: **2022/07/07**			

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 A	2020/09/29 2022/07/07		First issue Modify Interface	

Contents

1.Module Classification Information

W	F	39	D	T	L	F	S	D	H	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：3.9" TFT
④	Model serials no.

⑤	Backlight Type：	F→CCFL, White	T→LED, White
		S→LED, High Light White	Z→Nichia LED, White

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

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

⑩	N	Without control board	A	8Bit	B	16Bit	H	HDMI
	I	I2C Interface	R	RS232	S	SPI Interface	U	USB

⑪ TS:

⑪	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 3.9" 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	3.9	inch
Dot Matrix	480x128 x RGB	dots
Module dimension	105.5 x 42.25 x 12.45 (Max)	mm
Active area	95.04 x 25.34	mm
Pixel pitch	0.198(H) x 0.198(V) mm	mm
LCD type	TFT, Normally White, Transmissive	
View Direction	6 o'clock	
Gray Scale Inversion Direction	12 o'clock	
Aspect Ratio	Bar Type	
Backlight Type	LED, Normally White	
Controller IC	TFP401	
Interface	HDMI(only for DVI)	
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	Typ	Max	Unit	Remark
Supply Voltage For LCM	VDD	—	—	5	—	V	—
Supply Current For LCM	IDD	—	—	250	400	mA	Note 1
LED life time	—	—	—	50,000	—	Hr	Note 2

Note 1 : This value is test for VDD =5.0V , Ta=25℃ only

Note 2 : Display with Raspberry pi the driver power is over USB , first make sure you have a 2A power supply, with a good quality USB cable, a thin wire power cable is no good. Make sure its 24AWG or smaller, shorter USB cables are better too.

Note3: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL =40mA. The LED lifetime could be decreased if operating IL is lager than 40mA

6.DC CHARATERISTICS

Parameter	Symbol	Rating			Unit	Condition
		Min	Typ	Max		
Low level input voltage	V_{IL}	0	-	0.3VDD	V	
High level input voltage	V_{IH}	0.7VDD	-	VDD	V	

7.Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr	$\theta=0°$、$\Phi=0°$	-	10	-	ms	Note 3
		Tf		-	15	-		
Contrast ratio		CR	At optimized viewing angle	-	500	-	-	Note 4
Color Chromaticity	White	Wx	$\theta=0°$、$\Phi=0$	0.269	0.319	0.369	-	Note 2,6,7
		Wy		0.273	0.323	0.373	-	
Viewing angle (Gray Scale Inversion Direction)	Hor.	ΘR	CR$\geqq$10	-	65	-	Deg.	Note 1
		ΘL		-	65	-		
	Ver.	ΦT		-	65	-		
		ΦB		-	50	-		
Brightness		-	-	400	500	-	cd/m^2	Center of display
Uniformity		(U)	-	75	-	-	%	Note 5

Ta=25±2℃, ILED=40mA

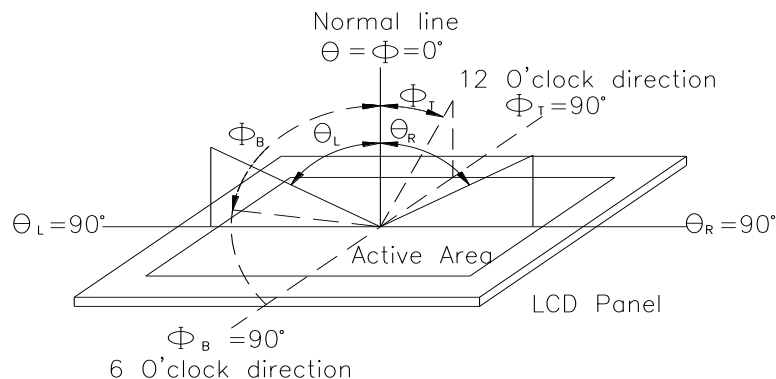Note 1: Definition of viewing angle range

Fig. 7.1. 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.
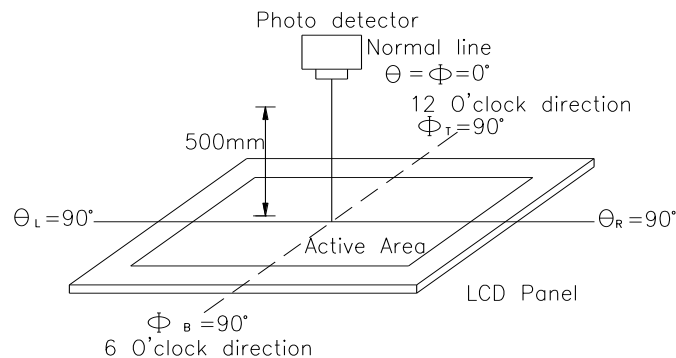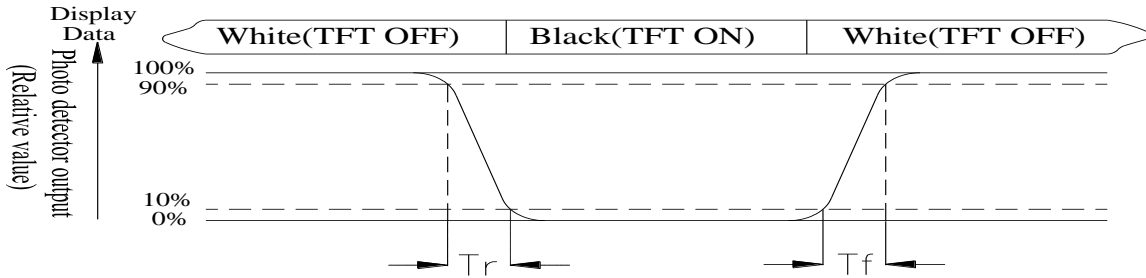

Fig. 7.2. Optical measurement system setup

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%
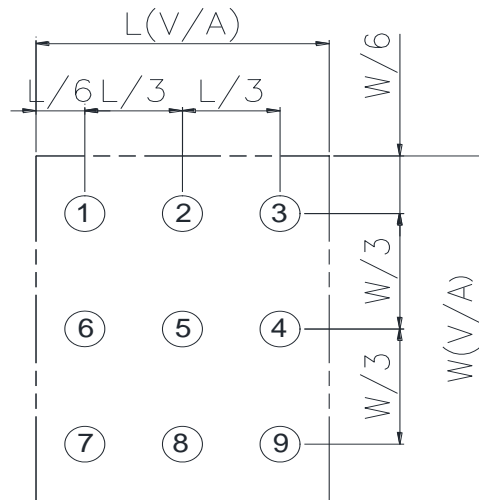L = Active area length
W = Active area width

Fig7.3. 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.

8.Interface

8.1. LCM PIN Definition
HDMI (only for DVI)

Pin No.	Symbol	I/O	Function	Remark
1	Rx2+	I	Channel-2 positive receiver input; low-voltage signal differential- input pair.	
2	GND	P	Ground	
3	Rx2-	I	Channel-2 negative receiver input; low-voltage signal differential- input pair.	
4	Rx1+	I	Channel-1 positive receiver input; low-voltage signal differential- input pair.	
5	GND	P	Ground	
6	Rx1-	I	Channel-1 negative receiver input; low-voltage signal differential- input pair.	
7	Rx0+	I	Channel-0 positive receiver input; low-voltage signal differential- input pair.	
8	GND	P	Ground	
9	Rx0-	I	Channel-0 negative receiver input; low-voltage signal differential- input pair.	
10	RxC+	I	Clock positive receiver input; low-voltage signal differential- input pair.	
11	GND	P	Ground	
12	RxC-	I	Clock negative receiver input; low-voltage signal differential- input pair.	
13-16	NC	-	No connection	
17	GND	P	Ground	
18	NC	-	No connection	
19	NC	-	No connection	

I: input, O: output, P: Power
Note 1: Only supports Raspberry Pi series
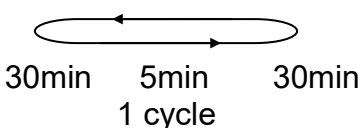
8.2. PW

Pin No.	Symbol	I/O	Function	Remark
1	GND	P	Ground	
2	5V	P	Power Supply	

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℃ 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30℃ 200hrs	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℃ 200hrs	――
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20℃ 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60℃,90%RH max	60℃,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
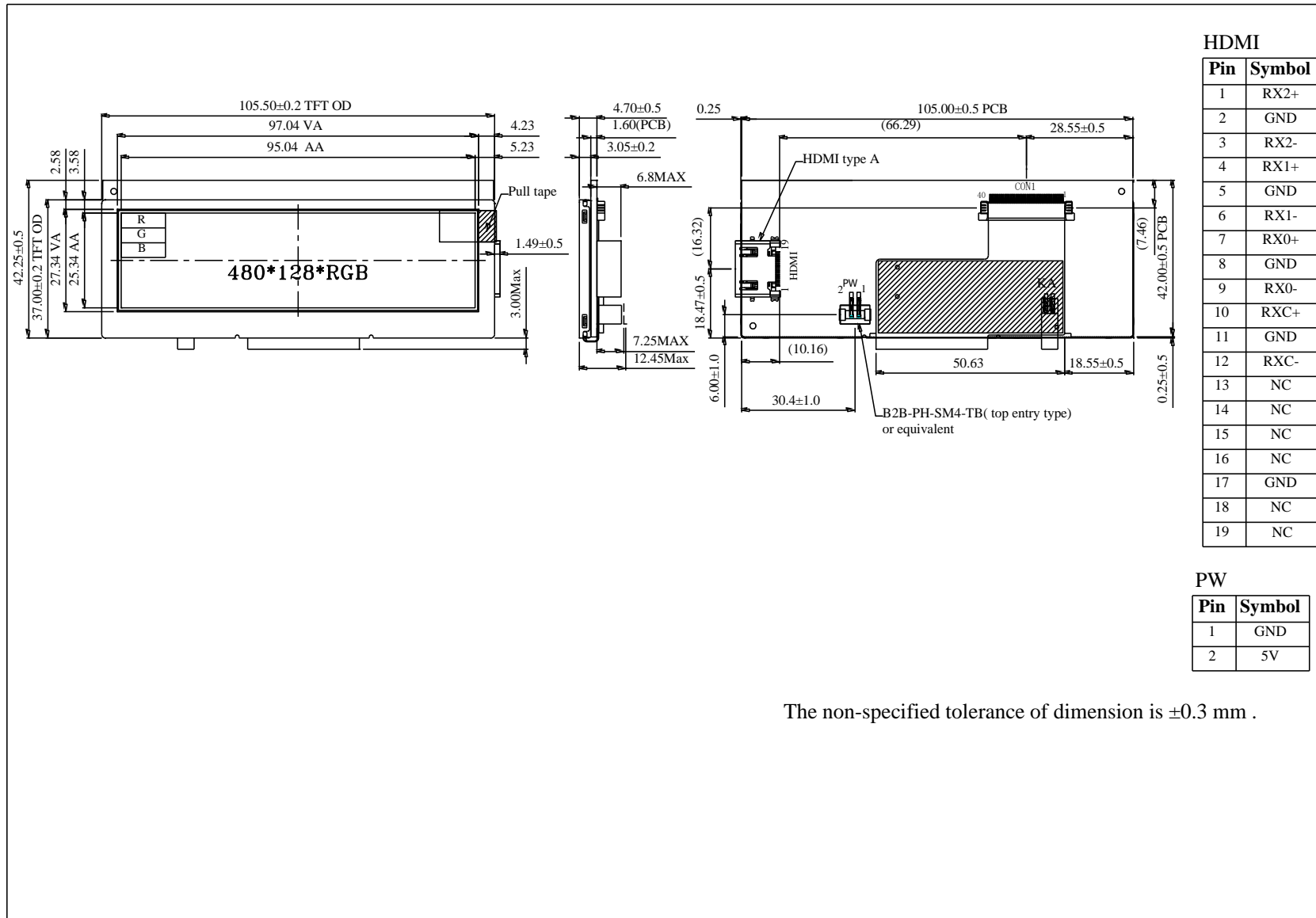
HDMI

Pin	Symbol
1	RX2+
2	GND
3	RX2-
4	RX1+
5	GND
6	RX1-
7	RX0+
8	GND
9	RX0-
10	RXC+
11	GND
12	RXC-
13	NC
14	NC
15	NC
16	NC
17	GND
18	NC
19	NC

PW

Pin	Symbol
1	GND
2	5V

The non-specified tolerance of dimension is ±0.3 mm .

LCM Sample Estimate Feedback Sheet

Module Number：_____

1、**Panel Specification**：

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   □ Pass   □ NG ,_____
7. Storage Temperature： □ Pass   □ NG ,_____
8. Others：_____

2、**Mechanical**

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

3、**Relative Hole Size**：

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、**Backlight Specification**：

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

＞＞ **Go to page 2** ＜＜

5、**Electronic Characteristics of Module**：

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、**Summary**：

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