TFT DISPLAY SPECIFICATION

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WINSTAR Display Co.,Ltd.

華凌光電股份有限公司

Winstar Display Co., LTD
華凌光電股份有限公司
WEB: https://www.winstar.com.tw E-mail: sales@winstar.com.tw

SPECIFICATION

CUSTOMER : _____

MODULE NO.: WFN0500A2T08ADNN000

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

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2025/04/07			

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	2025/04/07		First issue

Contents

1.Module Classification Information

W	F	N	0500	A2	T	08	A	D	N	N	0	00
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	N: Normal　E：EFD　M：MIP
④	Display Size：5.0” TFT
⑤	Model serials no.

⑥ Backlight Type：

F：	CCFL, White	T：	LED, White
S：	LED, High Light White	Z：	Nichia LED, White
N：	With out Backlight	A：	Front Light

⑦ LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction

Operating Temperature	Normal temperature				Super Wide temperature					
LCD tape	TN		IPS	VA	TN				IPS	VA
View angle	6H	12H			6H	12H	O-Film	OD-Film		
Reflective	AA	-	-	AT	AN	-	-	-	AW	AV
Transflective	0B	0E	-	02	0M	0P	-	-	08	04
Transmissive	0C	0F	0A	0T	0N	0Q	0R	0S	0W	0V

Operating Temperature	Wide temperature									
LCD tape	TN								IPS	VA
View angle	6H	12H	2H	3H	9H	O-Film	OD-Film	All View		
Reflective	AG	AJ	AB	-	-	-	-	05	AY	AX
Transflective	0H	0K	-	0G	0D	0U	-	-	07	03
Transmissive	0I	0L	-	-	-	0Z	0J	-	0Y	0X

⑧

A：	TFT LCD	G：	TFT+ Screw holes
B：	TFT+ Screw holes+ Control board	H：	TFT+ D/V board
C：	TFT+ Screw holes + A/D board	I：	TFT+ Screw holes +D/V board
D：	TFT+ Screw holes + A/D board + Control board	J：	TFT+ Power board
E：	TFT+ Screw holes + Power board	Z：	TFT+ Power board (Embedded)
F：	TFT+ Control board		

⑨

A：Analog	B：6-bits parallel	D：Digital	E：eDP
L：LVDS	M：MIPI	S：SPI	

⑩ Interface:

A：8Bit	B：16Bit	E：eDP	H：HDMI	I：I2C Interface	M：MIPI
N：Without Control board	P：DP	R：RS232	S：SPI	U：USB	

⑪ TS:

A：	CTP + Optical bonding	B：	CTP + USB	C：	CTP
D：	CTP + USB + Optical bonding	E：	RTP + Optical bonding	F：	CG + Optical bonding
H：	CTP + Only G-sensor	J：	CTP + Only G-sensor + USB	L：	CTP+ Hover Touch
N：	Without TS	Q：	in-cell	R：	on-cell
T：	RTP	U：	CG	V：	in-cell + CG
W：	on-cell + CG				

⑫	Version:
⑬	Serial No.: Serial number (00~99)

2.General Specifications

Item	Dimension	Unit
Size	5.0	inch
Dot Matrix	800 x RGB x 480 (TFT)	dots
Module dimension	120.8 x 75.9 x 2.73	mm
Active area	108.0 x 64.8	mm
Pixel pitch	0.135 X 0.135	mm
LCD type	TFT, Normally Black, Transflective	
Viewing Angle range: U/D/L/R	Trans： Typ. 60/60/60/50 Ref： Typ. 70/60/70/60	
Driver IC	JD9165	
TFT Interface	RGB 24bits	
Backlight Type	LED ,Normally White	
With /Without TP	Without TP	
Surface	Glare	

*Color tone slight changed by temperature and driving voltage.

3.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-30	—	+85	℃
Storage Temperature	TST	-30	—	+85	℃

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℃

4.Electrical Characteristics

4.1. Operating conditions

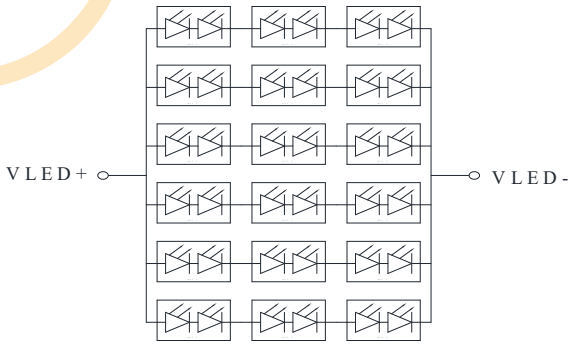
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power Supply Voltage	VDD	3.0	3.3	3.6	V	-
Power Supply Current	IDD	-	30	-	mA	Note1
Logic Input High Voltage	V_{IH}	0.7VDD	-	VDD	V	-
Logic Input Low Voltage	V_{IL}	0	-	0.3VDD	V	-
Panel Power Consumption	PVDD	-	0.099	-	W	Note1
Module Power Consumption	PLCM	-	1.719	-	W	Note1,2

(Ta=+25°C,GND=0V)
Note1:Measurement Conditions (Video Mode): Full Screen Red Pattern,VDD=3.3V,60Hz Refresh. Note2: PLCM= PVDD+ PBL，About PBL information, inference to 5.2 Back Light Driving Section.

LED driving conditions

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED current	-	-	90	-	mA	-
LED voltage	VLED+	16.8	18	19.2	V	Note 1
Backlight Power consumption	PLED	-	1.62	-	W	
LED Life Time	-	25,000	-	-	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



Backlight Circuit

Note 2 : Ta = 25 ℃
Note 3 : Brightness to be decreased to 50% of the initial value
Note 4 : The single LED lamp case

5.Timing Characteristics

(Ta=+25°C,GND=0V)

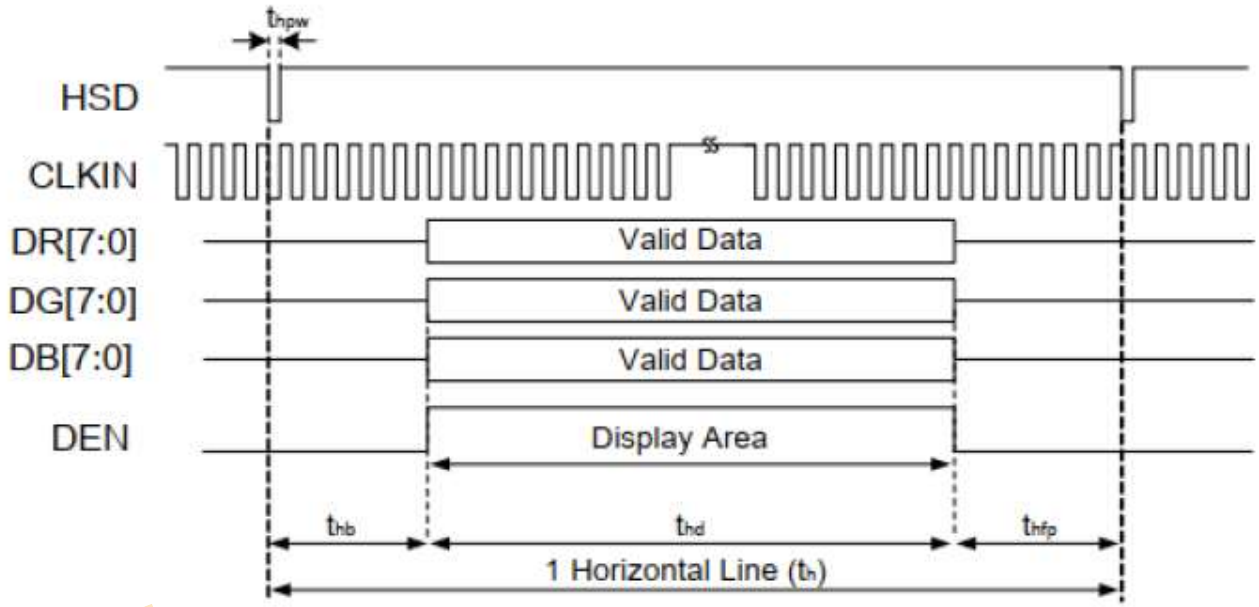
Fig1 24-bit parallel RGB mode horizontal/vertical input timing

24-bit parallel RGB Input Timing	Symbol	800RGBX480			Unit
		Min	Typ	Max	
DCLK Frequency	r_{xfclk}	29	32.4	37.6	MHZ
Horizontal Display Area	t_{hd}		800		DCLK
HS Pulse width	t_{hpw}	4	24	HBP-1	DCLK
HS Back Porch	t_{hbp}	62	160	200	DCLK
HS Front Porch	t_{hfp}	38	40	100	DCLK
1 Horizontal Line	t_h	900	1000	1100	DCLK
Vertical Display Area	t_{vd}	480			THT
VS Pulse Width	t_{vpw}	2	2	VBP-1	THT
VS Back Porch	T_{vbp}	12	23	35	THT
VS Front Porch	t_{vfp}	12	37	55	THT
1 Vertical field	T_v	504	540	570	THT
fRAME Rate	-		60		Hz

Time sequence as shown in the above figure, displaying 128 lines in the upper part

6.Timing Diagram

6.1. Horizontal timing



6.2. Vertical timing

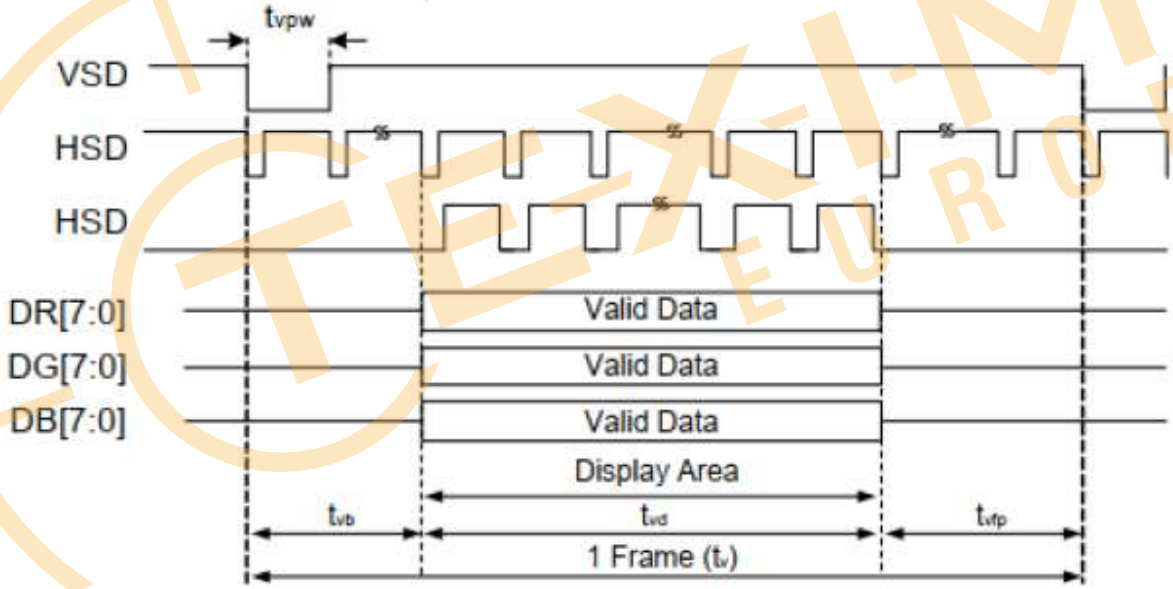


Fig 2：24-bit parallel RGB mode horizontal/vertical input timing

7.Power On/Off Sequence

7.1. Power On Sequence

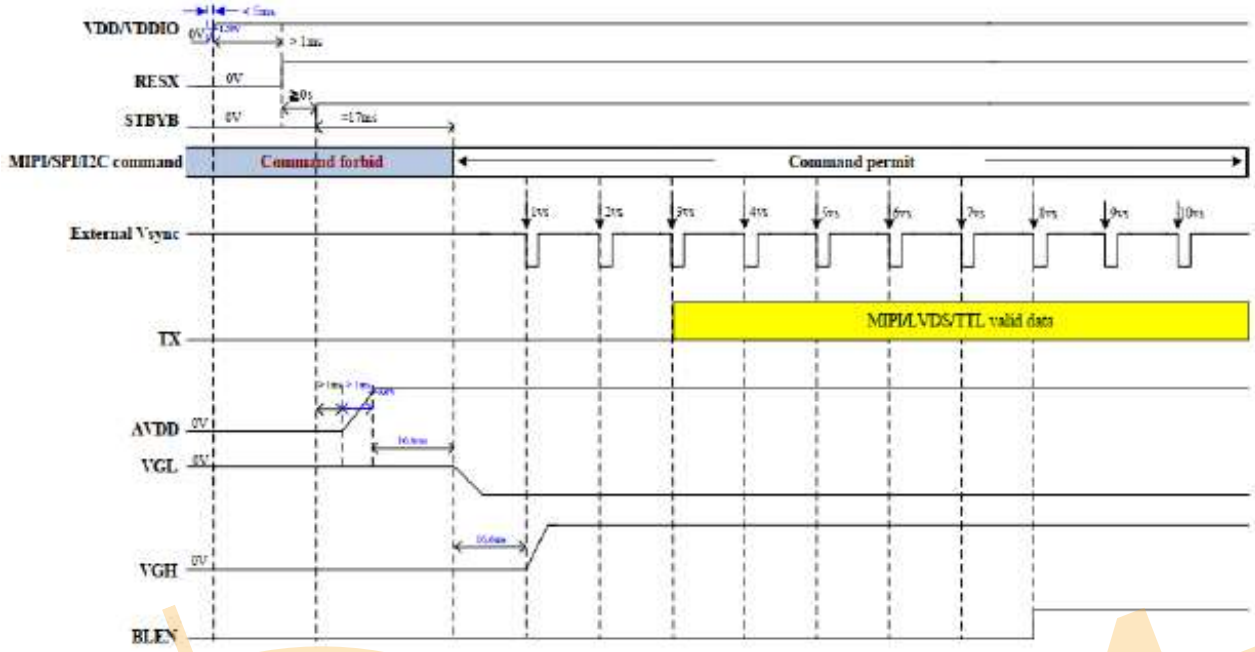


Fig3. Power On timing chart

7.2. Power Off Sequence

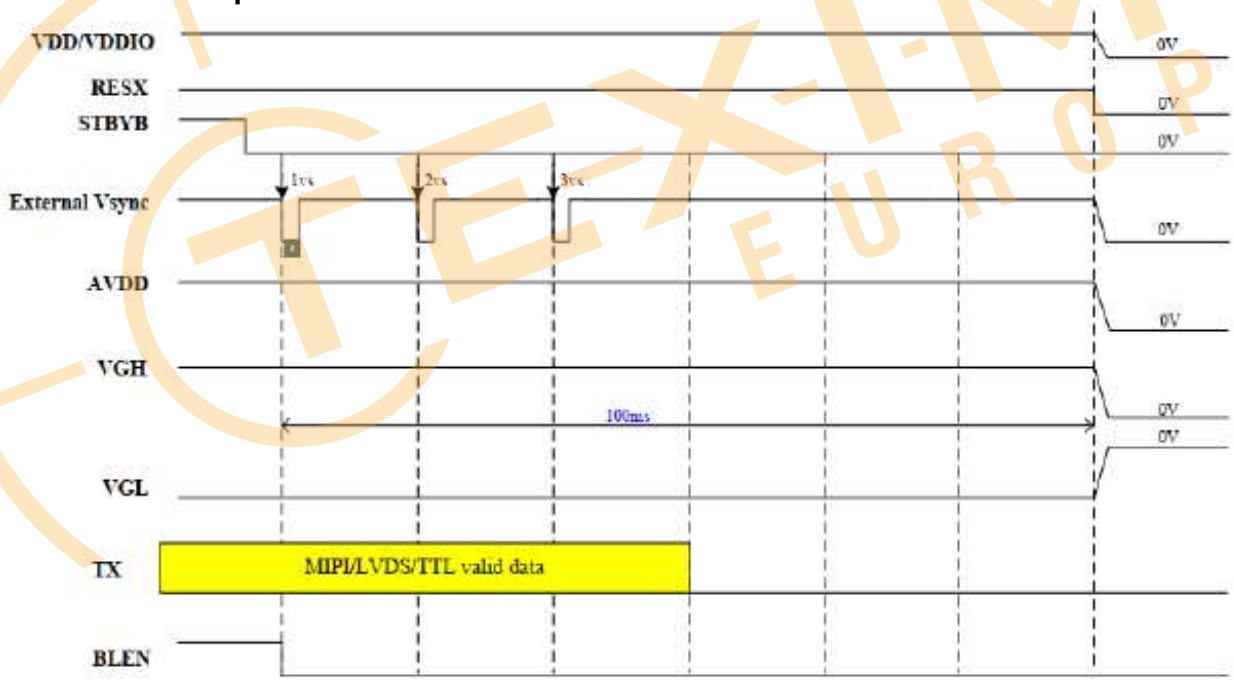


Fig4. Power Off timing chart

GRB RESET is internal reset, power on automatic reset.

8.Optical Characteristics

(Transmissive)

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr+ Tf	θ=0°、Φ=0°	-	20	25	.ms	Note 3
Contrast ratio		CR	At optimized viewing angle	-	60	-	-	Note 4
Color Chromaticity	White	Wx	θ=0°、Φ=0	0.27	0.30	0.33	-	Note 2,5,6
		Wy		0.28	0.31	0.34	-	
Viewing angle (Gray Scale Inversion Direction)	Hor.	ΘR	CR>2	-	50	-	Deg.	Note 1
		ΘL		-	60	-		
	Ver.	ΦT		-	60	-		
		ΦB		-	60	-		
Brightness		-	-	180	200	-	cd/m2	Center of display
Uniformity		(U)	-	75	80	-	%	Note 5

(Reflective)

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Contrast ratio		CR	At optimized viewing angle	-	7	-	-	Note 4
Color Chromaticity	White	Wx	θ=0°、Φ=0	0.284	0.314	0.344	-	Note 2,5,6
		Wy		0.332	0.362	0.392	-	
Viewing angle (Gray Scale Inversion Direction)	Hor.	ΘR	CR>2	-	60	-	Deg.	Note 1
		ΘL		-	70	-		
	Ver.	ΦT		-	70	-		
		ΦB		-	60	-		

Ta=25±2℃,

Note 1: Definition of viewing angle range

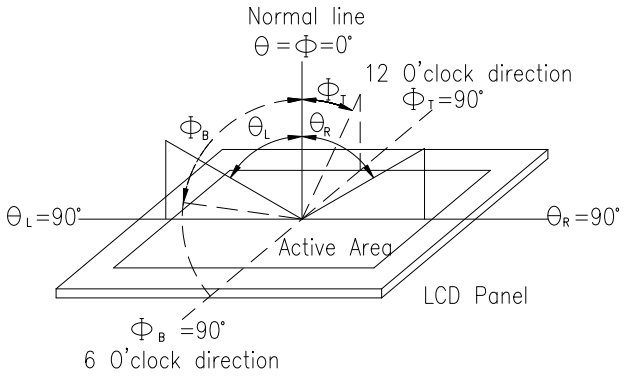


Fig. 8.1. Definition of viewing angle

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.

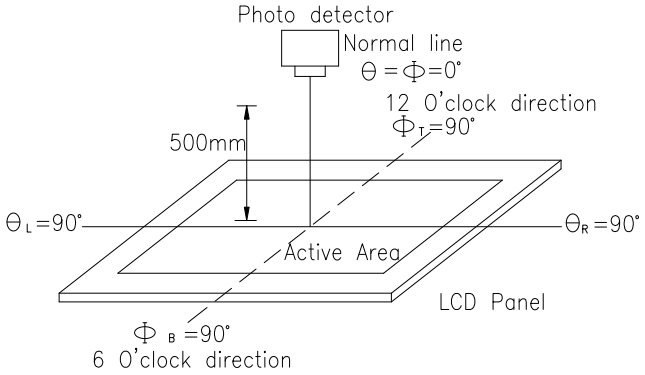
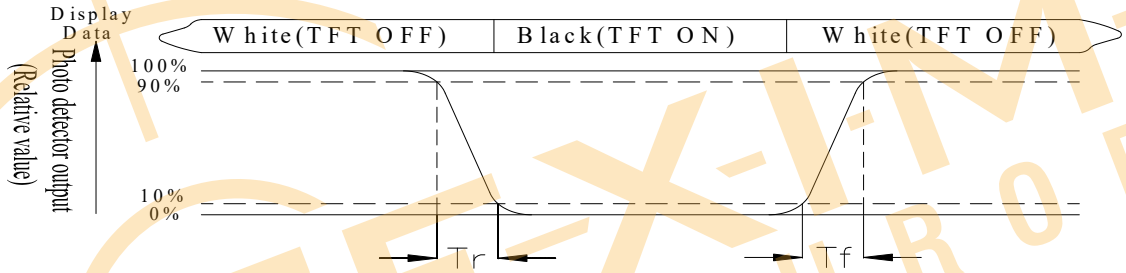


Fig. 8.2. Optical measurement system setup

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

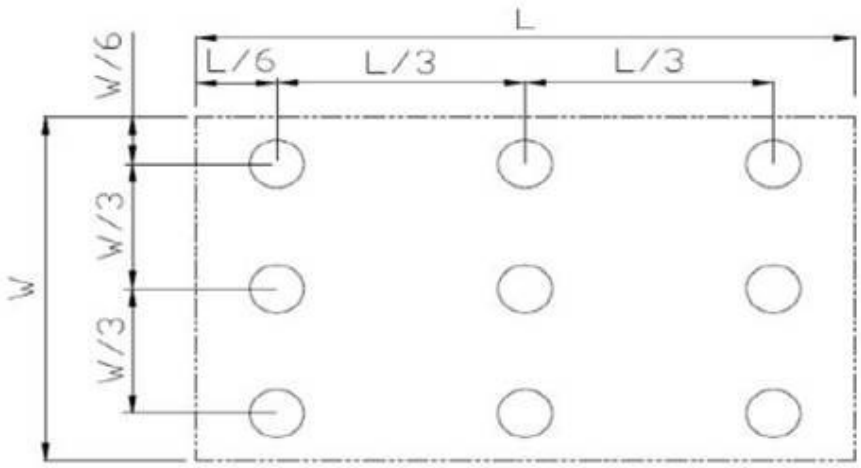


Fig8.3. Definition of uniformity

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.

9.Interface

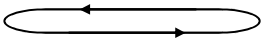
9.1. LCM PIN Definition

Pin No.	Symbo l	I/O	Description
1	VLED-	P	Power supply for backlight cathode
2	VLED+	P	Power supply for backlight anode
3	GND	P	Power Ground
4	VDD	P	Power supply to the internal logic power regulator(3.3V)
5-12	R0-R7	I	Red data input.
13-20	G0-G7	I	Green data input.
21-28	B0-B7	I	Blue data input.
29	GND	P	Power Ground
30	PCLK	I	Pixel clock input pin, Negative polarity
31	DISP	I	Standby mode. Normally pulled high.
32	HSYNC	I	Horizontal sync signal, Negative polarity
33	VSYNC	I	Vertical sync signal, Negative polarity
34	DE	I	Data input enable. Display access is enabled when DE is “H”
35	NC	-	Dummy
36	GND	P	Power Ground
37	NC	-	Dummy
38	NC	-	Dummy
39	NC	-	Dummy
40	NC	-	Dummy

I：Input；O：Output；P：Power

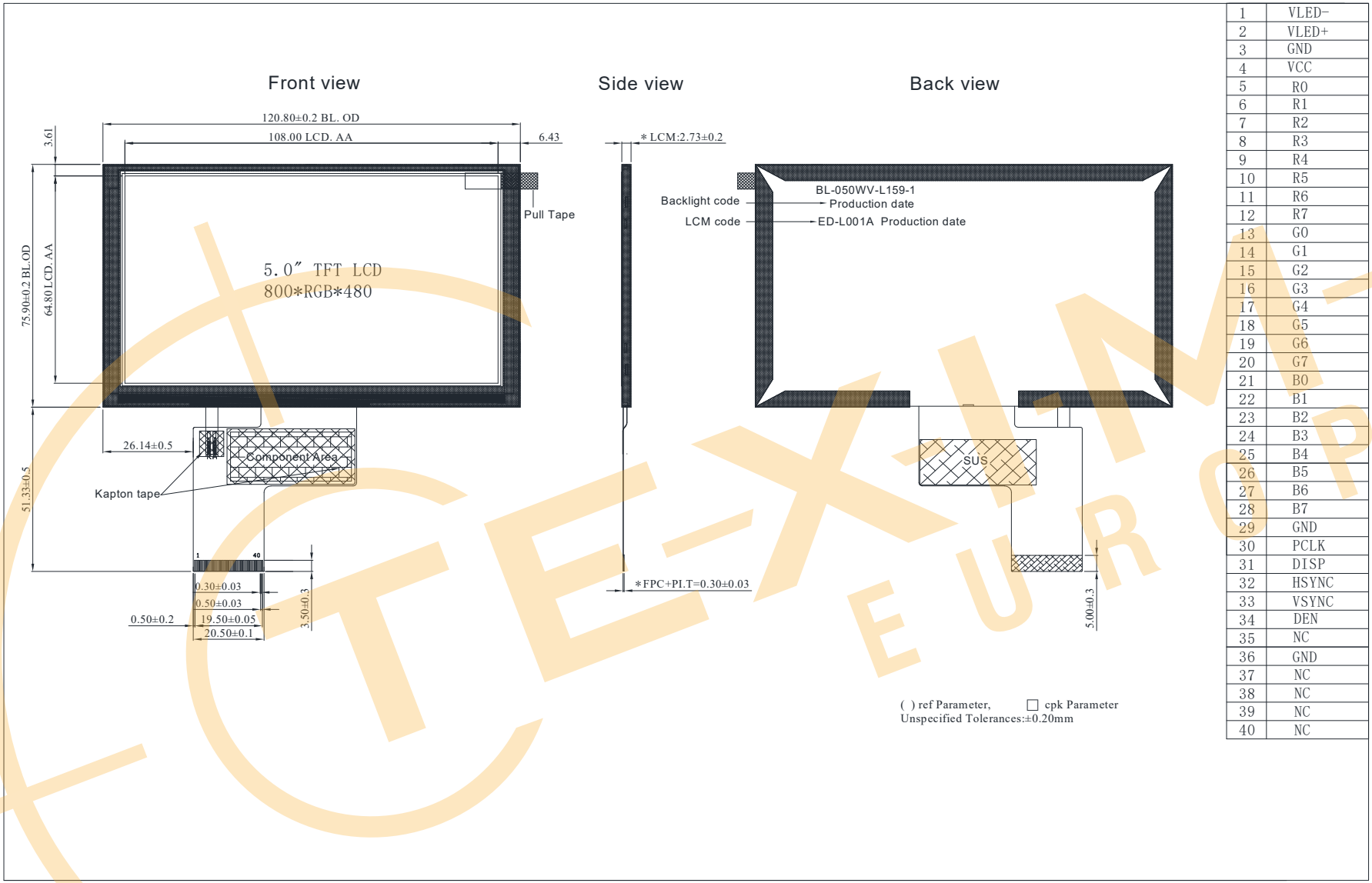
10.Reliability

Content of Reliability Test (Wide temperature, -30℃~85℃)

Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	85℃ 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.	85℃ 96hrs	2
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-30℃ 96hrs	1,2
High Temperature/ Humidity storage	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 storage -20℃ 25℃ 70℃  30min 5min 30min 1 cycle	-20℃/70℃ 30 cycles	2
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz 1hrs for each direction of X, Y, Z	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=±4KV(contact), ±6KV(air), RS=330Ω CS=150pF 5 times	4

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.
Note4: Endurance test applying the electric stress to the finished product housing

11.Contour Drawing



1	VLED-
2	VLED+
3	GND
4	VCC
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	PCLK
31	DISP
32	HSYNC
33	VSYNC
34	DEN
35	NC
36	GND
37	NC
38	NC
39	NC
40	NC

winstar

LCM Sample Estimate Feedback Sheet

Module Number： _____ **Page: 1**

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 Temperature：	□ 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 PCB：	□ 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 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 , _____

>> **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：** / /

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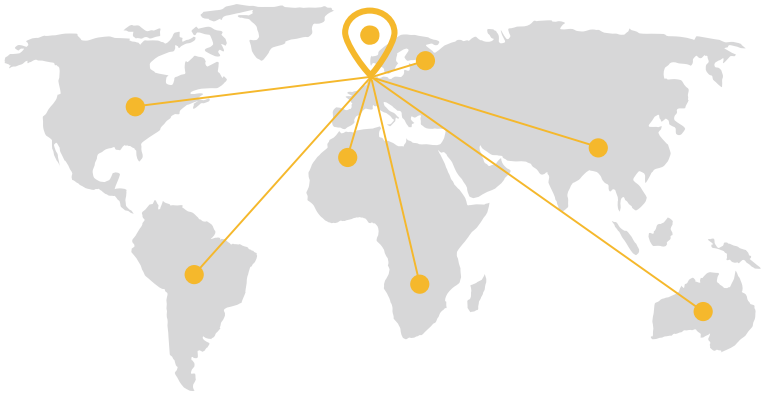

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