TFT DISPLAY SPECIFICATION

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
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SPECIFICATION

CUSTOMER : _____

MODULE NO.: WFN0300A3T0YASNN000

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

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2025/04/22			

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

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MODLE NO：

RECORDS OF REVISION			DOC. FIRST ISSUE
VERSION	DATE	REVISED PAGE NO.	**SUMMARY**
0	2025/04/22		First issue

Contents

1.Module Classification Information

W	F	N	0300	A3	T	0Y	A	S	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：3.0” 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.Summary

WFN0300 is 3.0” Mono TFT-LCD (Thin Film Transistor Liquid Crystal Display) ODF cell. The 3.0” screen produces a high-resolution image that is composed of 120 (W) x 320 (H) pixel elements in a stripe arrangement.

3.General Specifications

Item	Dimension	Unit
Size	3.0	inch
Dot Matrix	320 x Mono x 120(TFT)	dots
Module dimension	86.347 (W) x 35.89 (H) x 7.2(D) Max	mm
Active area	72.0 (W) x 27.0 (H)	mm
Pixel pitch	0.225 x 0.225	mm
LCD type	TFT, Normally Black, Transmissive	
Viewing Angle(L/R/U/D)	80°/80°/80°/80°	
Driver IC	ST7512 or Equivalent	
TFT Interface	SPI (3 line)	
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:

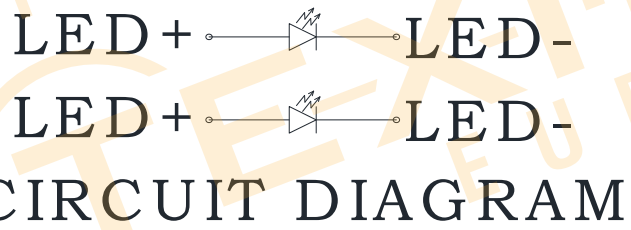
Item	Symbol	Condition	Min	Type	Max	Unit
Power supply voltage	VCC		3.0	3.3	3.6	V
Input high voltage	Vih		0.8VCC	-	VCC	V
Input low voltage	Vil		GND	-	0.2VCC	V
Output high voltage	Voh	IOL=-1.0mA	0.8 VCC	-	VCC	V
Output low voltage	Vol	IOL =1.0mA	GND	-	0.2 VCC	V
Current consumption	I_{CC}	-	-	10	15	mA

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

5.2. LED driving conditions

Parameter	Symbol	Min	Typ	Max	Unit	Remark
LED current	—	—	2*20		mA	—
LED voltage	LED+	1.6	2.65	3.4	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

TFT LCD characteristic

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr+Tf	θ=0°、Φ=0°	-	35	-	ms	Note 3
Contrast ratio		CR	At optimized viewing angle	500	1000	-	-	Note 4
Color Chromaticity	White	Wx	θ=0°、Φ=0	0.27	0.31	0.35		Note 2,6,7
		Wy		0.29	0.33	0.37		
Viewing angle	Hor.	ΘR	CR≧10	-	80	-	Deg.	Note 1
		ΘL		-	80	-		
	Ver.	ΦT		-	80	-		
		ΦB		-	80	-		
Brightness		-	-	350	450	-	cd/m^2	Center of display
Uniformity		(U)	-	75	-	-	%	Note 5

Ta=25±2℃,

Note 1: Definition of viewing angle range

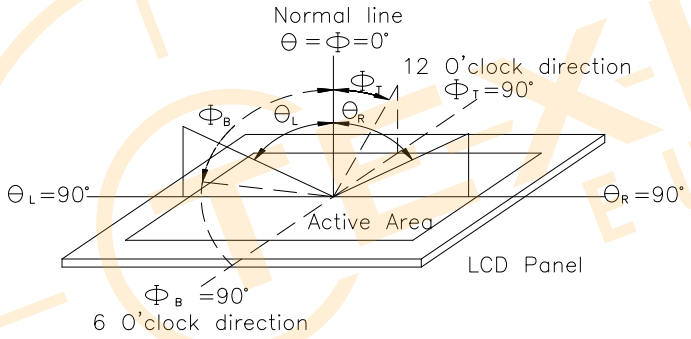


Fig.6.1. Definition of viewing angle

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.

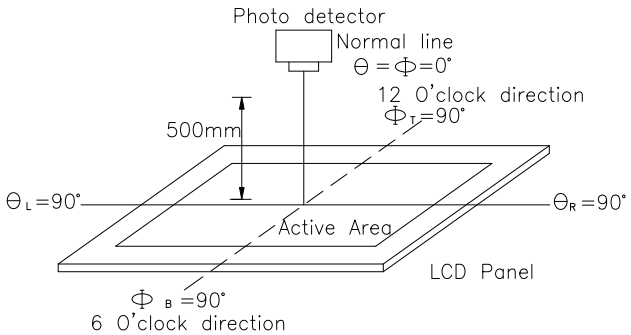
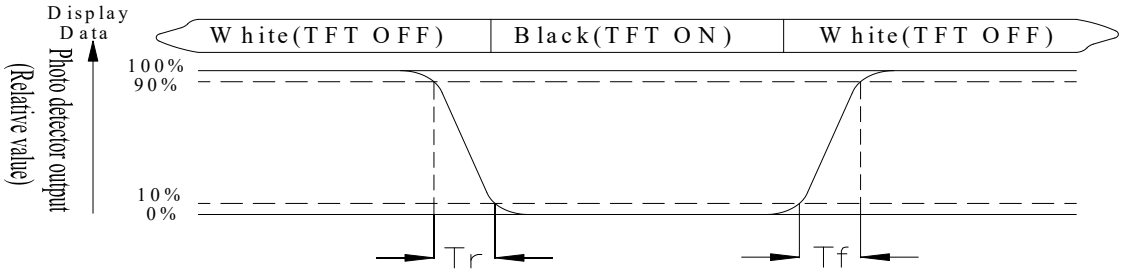


Fig. 6.2. Optical measurement system setup

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

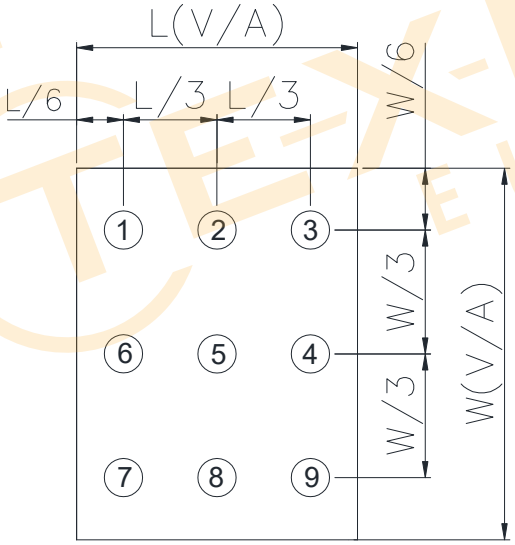


Fig6.3. Definition of uniformity

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.

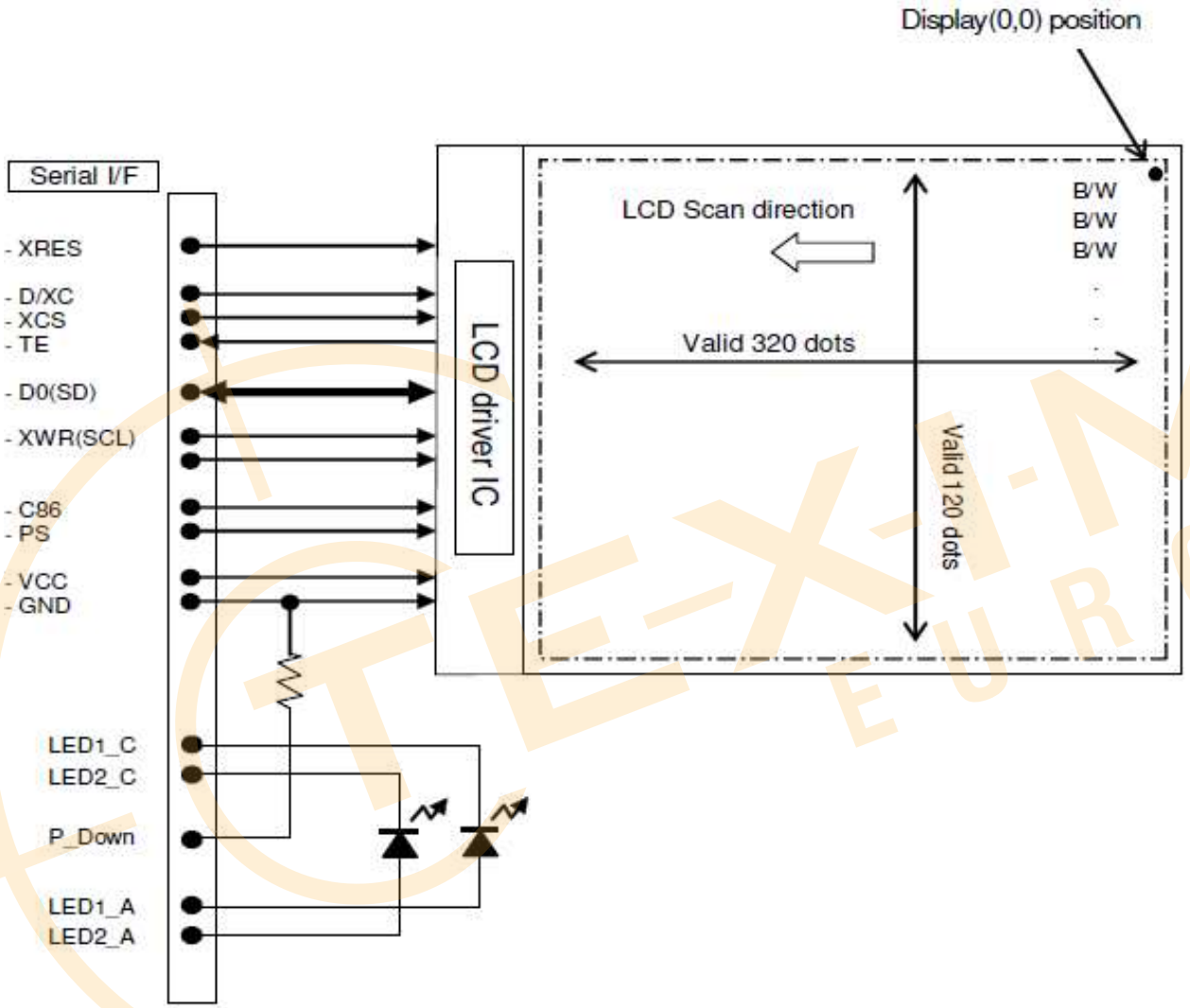
7.Interface

LCM PIN Definition

NO	Symbol	Function	I/O
1	GND	GND	—
2	GND	GND	—
3	RSTB	Reset input pin. Active when it is low. This pin is effective when RSTEN pin is “H”. Initialization is executed when this pin is set to “L”. SWRESET command must be required after initialization.	I
4	NC	NC	—
5	CSB	Chip select input pin. Interface access is enabled when CSB is “L” in parallel, SPI interface. When CSB is non-active (CSB=“H”), D[7:0] pins are high impedance	I
6	VSYNCO	Vertical synchronization signal output pin.	O
7	NC	NC	—
8	NC	NC	—
9	NC	NC	—
10	NC	NC	—
11	NC	NC	—
12	NC	NC	—
13	NC	NC	—
14	SDA	Serial interface : Serial data input / output	I/O
15	SCL	Serial interface : connecting the SCL signal	I
16	GND	GND	—
17	NC	NC	I
18	C86	Serial interface: “L” 3wire 9bit serial interface Please do not change input level for this terminal while operating”	—
19	NC	NC	—
20	VCC	Power supply	P
21	VCC	Power supply	P
22	GND	GND	—
23	NC	NC	—
24	LED1_C	LED cathode 1	P
25	LED2_C	LED cathode 2	P

26	NC	NC	—
27	NC	NC	—
28	LED1_A	LED anode 1	P
29	LED2_A	LED anode 2	P
30	NC	NC	—

8.Block Diagram



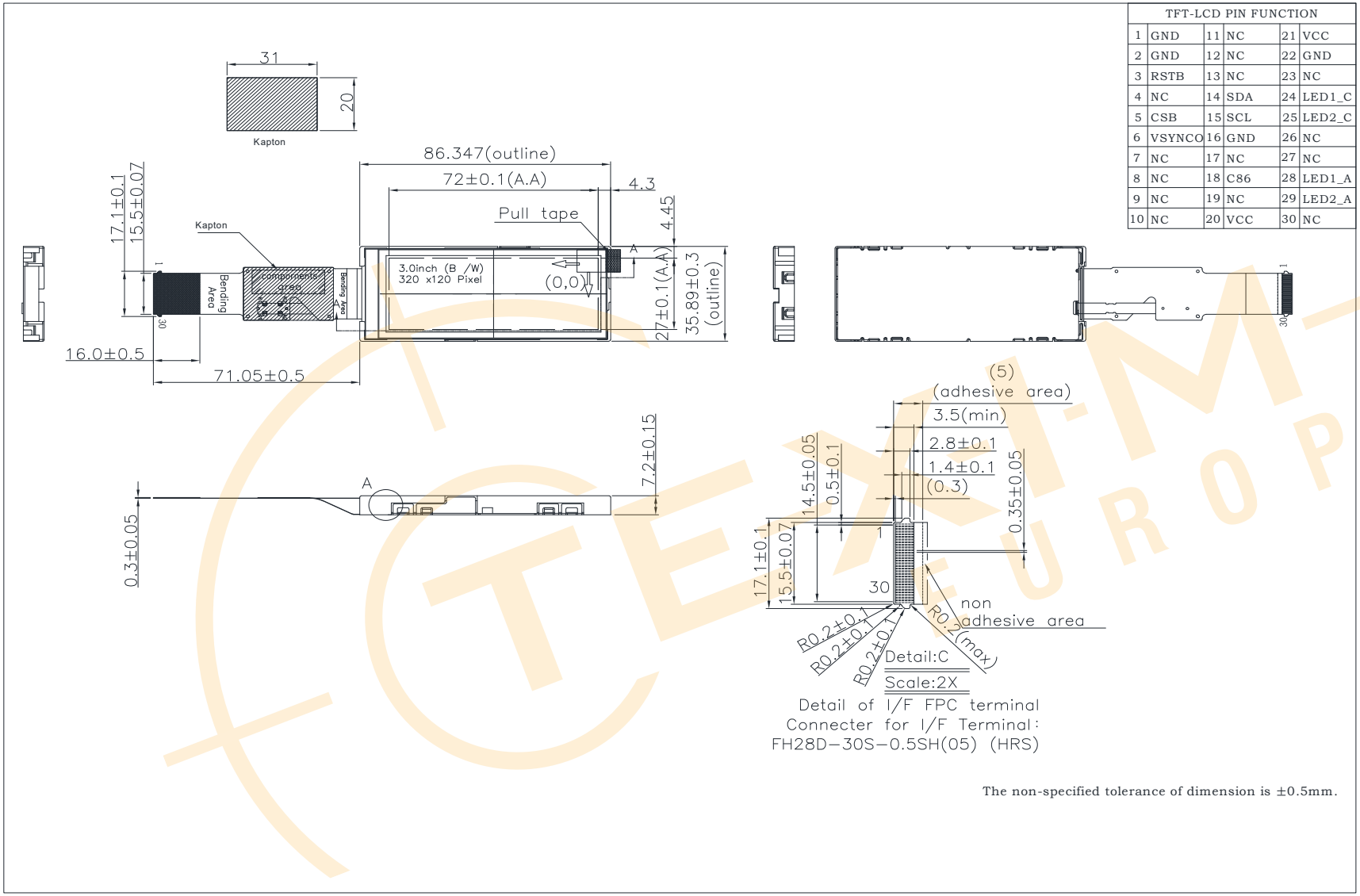
9.Reliability

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℃ 240hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30℃ 240hrs	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℃ 240hrs	2
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20℃ 240hrs	1,2
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 storage -30℃ 25℃ 80℃ 30min 5min 30min 1 cycle	-30℃/80℃ 10 cycles	2
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=±6KV(contact), ±8KV(air), RS=330Ω CS=150pF 10 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

10.Contour Drawing



TFT-LCD PIN FUNCTION					
1	GND	11	NC	21	VCC
2	GND	12	NC	22	GND
3	RSTB	13	NC	23	NC
4	NC	14	SDA	24	LED1_C
5	CSB	15	SCL	25	LED2_C
6	VSYNC	16	GND	26	NC
7	NC	17	NC	27	NC
8	NC	18	C86	28	LED1_A
9	NC	19	NC	29	LED2_A
10	NC	20	VCC	30	NC

The non-specified tolerance of dimension is ±0.5mm.

11.Initial Code For Reference

```
void WFN0300A3_Initial()
{

    SPI_RST = 1;
    delay_ms(10);
    SPI_RST = 0;
    delay_ms(50);
    SPI_RST = 1;
    delay_ms(100);

    SPI_WrCmd(0x5E);
    SPI_WriteData(0xA5);
    delay_ms(100);

    SPI_WrCmd(0x61);
    SPI_WriteData(0x8F);
    SPI_WriteData(0x44);
    SPI_WriteData(0x02);
    SPI_WriteData(0xA5);

    SPI_WrCmd(0x5A);
    SPI_WriteData(0x70);
    SPI_WriteData(0x21);
    SPI_WriteData(0xA5);
    SPI_WriteData(0xA5);

    SPI_WrCmd(0x71);
    SPI_WriteData(0x3F);
    SPI_WriteData(0x06);
    SPI_WriteData(0x0F);
    SPI_WriteData(0xA5);

    SPI_WrCmd(0x49);
    SPI_WriteData(0x0E);
    SPI_WriteData(0x00);
    SPI_WriteData(0x00);
    SPI_WriteData(0xA5);

    SPI_WrCmd(0x72);
    SPI_WriteData(0x1D);
    SPI_WriteData(0x1D);
    SPI_WriteData(0xA5);
    SPI_WriteData(0xA5);

    SPI_WrCmd(0x21);
    SPI_WriteData(0x01);
    SPI_WriteData(0xA5);
    SPI_WriteData(0xA5);
```

```
SPI_WriteData(0xA5);

SPI_WrCmd(0x23);
SPI_WriteData(0x00);
SPI_WriteData(0x3C);
SPI_WriteData(0x00);
SPI_WriteData(0xB3);

SPI_WrCmd(0x25);
SPI_WriteData(0x02);
SPI_WriteData(0xA5);
SPI_WriteData(0xA5);
SPI_WriteData(0xA5);

SPI_WrCmd(0x31);
SPI_WriteData(0x00);
SPI_WriteData(0xA5);
SPI_WriteData(0xA5);
SPI_WriteData(0xA5);

SPI_WrCmd(0x91);
SPI_WriteData(0x01);
SPI_WriteData(0x3F);
SPI_WriteData(0x00);
SPI_WriteData(0xEF);

SPI_WrCmd(0x92);
SPI_WriteData(0x32);
SPI_WriteData(0x02);
SPI_WriteData(0x00);
SPI_WriteData(0x01);

SPI_WrCmd(0x93);
SPI_WriteData(0x0A);
SPI_WriteData(0x2F);
SPI_WriteData(0x0F);
SPI_WriteData(0x2B);

SPI_WrCmd(0x81);
SPI_WriteData(0x04);
SPI_WriteData(0x0F);
SPI_WriteData(0x14);
SPI_WriteData(0x17);

SPI_WrCmd(0x82);
SPI_WriteData(0x19);
SPI_WriteData(0x1B);
SPI_WriteData(0x1D);
SPI_WriteData(0x1E);

SPI_WrCmd(0x83);
```

```
    SPI_WriteData(0x20);
    SPI_WriteData(0x22);
    SPI_WriteData(0x24);
    SPI_WriteData(0x26);

    SPI_WrCmd(0x84);
    SPI_WriteData(0x29);
    SPI_WriteData(0x2D);
    SPI_WriteData(0x32);
    SPI_WriteData(0x3F);

    SPI_WrCmd(0x89);
    SPI_WriteData(0x04);
    SPI_WriteData(0x0F);
    SPI_WriteData(0x14);
    SPI_WriteData(0x17);

    SPI_WrCmd(0x8A);
    SPI_WriteData(0x19);
    SPI_WriteData(0x1B);
    SPI_WriteData(0x1D);
    SPI_WriteData(0x1E);

    SPI_WrCmd(0x8B);
    SPI_WriteData(0x20);
    SPI_WriteData(0x22);
    SPI_WriteData(0x24);
    SPI_WriteData(0x26);

    SPI_WrCmd(0x8C);
    SPI_WriteData(0x29);
    SPI_WriteData(0x2D);
    SPI_WriteData(0x32);
    SPI_WriteData(0x3F);

    SPI_WrCmd(0x13);
    SPI_WriteData(0xA5);
    delay_ms(200);

    SPI_WrCmd(0x12);
    SPI_WriteData(0xA5);
    delay_ms(200);
}

void SetWindows()
{
    SPI_WrCmd(0x22);
    SPI_WriteData(0x00);
    SPI_WriteData(0x9F);
    SPI_WriteData(0x00);
    SPI_WriteData(0xA5);
```

```
    SPI_WrCmd(0x23);
    SPI_WriteData(0x00);
    SPI_WriteData(0x3C);
    SPI_WriteData(0x00);
    SPI_WriteData(0xB3);

    SPI_WrCmd(0x5C);
    SPI_WriteData(0x4A);
    SPI_WriteData(0xFF);
    SPI_WriteData(0xA5);
    SPI_WriteData(0xA5);

    SPI_WrCmd(0x3A);
    SPI_WriteData(0xA5);
    delay_ms(120);
}
```

winstar **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 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 , _____

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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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