



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.: WF102QTIFGDBT0#

<p>APPROVED BY:</p> <p>(FOR CUSTOMER USE ONLY)</p>	<p>PCB VERSION: _____</p> <p>DATA: _____</p>
---	--

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2017/01/03			



RECORDS OF REVISION

DOC. FIRST ISSUE

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2014/02/24		First issue
A	2014/10/15		Add size & Surface. Modify Pixel Data Format & Block Diagram & Static electricity test.
B	2015/04/27		Modify Reliability.
C	2016/01/21		Modify Static electricity test
D	2016/04/11		Modify contour drawing
E	2016/08/10		Modify Vibration test.
F	2016/10/05		Modify Summary Add Aspect Ratio
G	2017/01/03		Add Touch Panel Information.

Contents

1.Module Classification Information

2.Summary

3.General Specification

4.Absolute Maximum Ratings

5.Electrical Characteristics

6.DC Characteristics

7.Interface Timing Characteristics

8.Optical Characteristics

9.Interface

10.Block Diagram

11.Reliability

12.Touch Panel Information

13.Contour Drawing

14.Package Specification

15.Initial Code For Reference

1.Module Classification Information

W F 102 Q T I F G D B T 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 : 10.2" 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									

--	--	--

WINSTAR DISPLAY Co., Ltd.

2.Summary

TFT 10.2" 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.

WINSTAR DISPLAY Co., Ltd.

3. General Specifications

Item	Dimension	Unit
Size	10.2	inch
Dot Matrix	800 RGB x 480	dots
Module dimension	235.0 (H) x145.8 (V) x 12.2 (D)	mm
Active area	222.0(W) × 132.48(H)	mm
Dot pitch	0.0925(W) × 0.276(H)	mm
LCD type	TFT, Normally White, Transmissive	
View Direction	12 o'clock	
Gray Scale Inversion Direction	6 o'clock	
Aspect Ratio	16:9	
Backlight Type	LED, Normally White	
Controller IC	SSD1963	
Interface	Digital 8080 family MPU 8bit/16bit	
With /Without TP	With RTP	
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	°C
Storage Temperature	TST	-30	—	+80	°C

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. $\leq 60^{\circ}\text{C}$, 90% RH MAX. Temp. $> 60^{\circ}\text{C}$, Absolute humidity shall be less than 90% RH at 60°C

WINSTAR DISPLAY Co., Ltd.

5. Electrical Characteristics

5.1. Operating conditions: (CON2.Pin1=GND, Pin2=VDD)

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Supply Voltage For LCM	VDD	—	3.0	3.1	3.3	V	—
Supply Current For LCM	IDD	—	—	160	225	mA	Note1

Note 1 : This value is test for VDD=3.3V , Ta=25°C only

5.2. Backlight driving conditions (CON2.Pin33,34=VLED-, Pin35,36=VLED+)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Operation Current For LED Driver	VLED=5V	500	—	750	mA	Note 1,2
Power Consumption	VLED=5V	2500	—	3750	mW	Note 1,2
Supply Voltage For LED Driver	VLED+	—	5	—	V	—
LED Life Time	—	20,000	—	—	Hr	Note 2,3,4

Note 1 : Base on VLED= 5V for the back light driver IC specification

Note 2 : Ta = 25 °C

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

Note 4 : The single LED lamp case

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	

WINSTAR DISPLAY Co., Ltd.

7. Interface timing

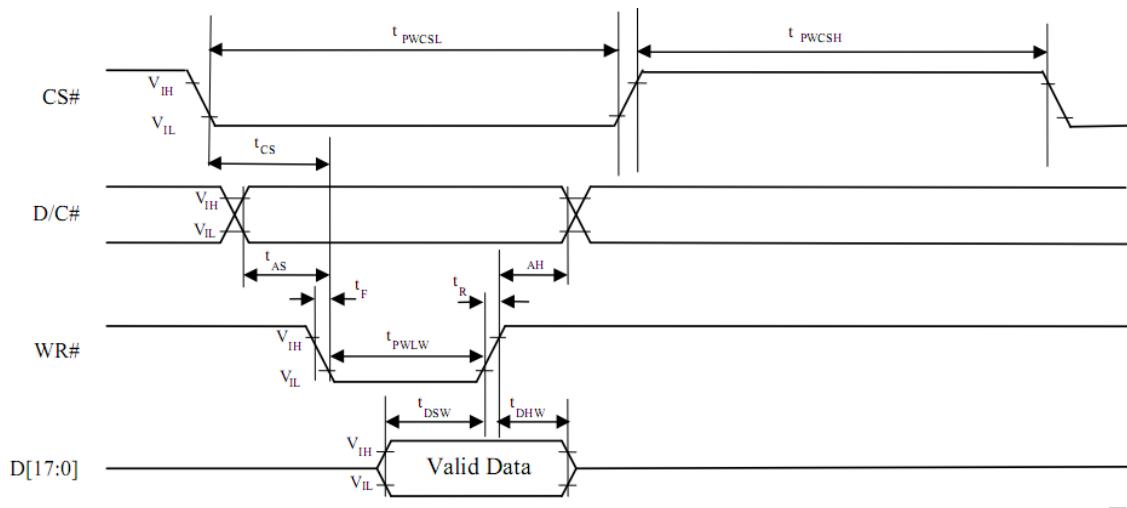
7.1. 8080 Mode

The 8080 mode MCU interface consist of CS#, D/C#, RD#, WR#, DATA BUS. This interface use WR# to define a write cycle and RD# for read cycle. If the WR# goes low when the CS# signal is low, the data or command will be latched into the system at the rising edge of WR#. Similarly, the read cycle will start when RD# goes low and end at the rising edge of RD#.

7.2. 8080 Mode Write Cycle

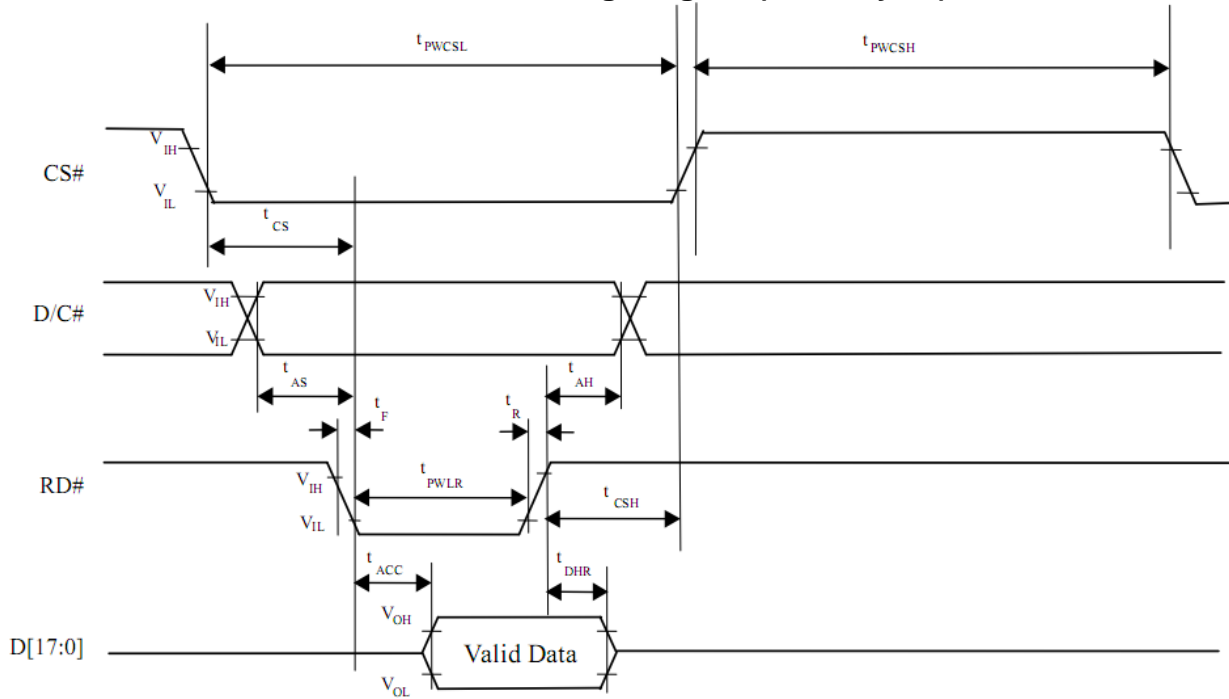
Symbol	Parameter	Min	Typ	Max	Unit
fMCLK	System Clock Frequency	1	-	110	MHz
tMCLK	System Clock Period	1/fMCLK	-	-	ns
tPWCSH	Control Pulse High Width Write Read	13 30	1.5* tMCLK 3.5* tMCLK	-	ns
tPWCSL	Control Pulse Low Width Write (next write cycle) Write (next read cycle) Read	13 80 80	1.5* tMCLK 9* tMCLK 9* tMCLK	-	ns
tAS	Address Setup Time	1	-	-	ns
tAH	Address Hold Time	2	-	-	ns
tDSW	Write Data Setup Time	4			ns
tDHW	Write Data Hold Time	1	-	-	ns
tPWLW	Write Low Time	12			ns
tDHR	Read Data Hold Time	1	-	-	ns
tACC	Access Time	32			ns
tPWLR	Read Low Time	36	-	-	ns
tR	Rise Time	-		0.5	ns
tF	Fall Time	-		0.5	ns
tCS	Chip select setup time	2		-	ns
tCSH	Chip select hold time to read signal	3		-	ns

7.3. Parallel 8080-series Interface Timing Diagram(Write Cycle)



WINSTAR DISPLAY Co., Ltd.

7.4. Parallel 8080-series Interface Timing Diagram(Read Cycle)



7.5. Pixel Data Format

Interface	Cycle	D[15]	D[14]	D[13]	D[12]	D[11]	D[10]	D[9]	D[8]	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
16 bits (565 format)	1 st	R5	R4	R3	R2	R1	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1
16 bits	1 st	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0
	2 nd	B7	B6	B5	B4	B3	B2	B1	B0	R7	R6	R5	R4	R3	R2	R1	R0
	3 rd	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
8 bits	1 st									R7	R6	R5	R4	R3	R2	R1	R0
	2 nd									G7	G6	G5	G4	G3	G2	G1	G0
	3 rd									B7	B6	B5	B4	B3	B2	B1	B0

8. Optical Characteristics

TFT LCD characteristic

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	Tr	$\theta=0^\circ$ 、 $\phi=0^\circ$	-	15	30	ms	Note 3,5	
	Tf		-	20	40	ms		
Contrast ratio	CR	At optimized viewing angle	250	300	-	-	Note 4,5	
Color Chromaticity	White	Wx	$\theta=0^\circ$ 、 $\phi=0$	0.26	0.31	0.36	-	Note 2,6,7
		Wy		0.28	0.33	0.38	-	
Viewing angle (Gray Scale Inversion Direction)	Hor.	Θ_R	$CR \geq 10$	55	65	-	Deg.	Note 1
		Θ_L		55	65	-		
	Ver.	Φ_T		35	45	-		
		Φ_B		55	65	-		
Brightness	-	-	200	250	-	cd/m ²	Center of display	

Ta=25±2°C, VLED / ILED= 5V / 500mA

Note 1: Definition of viewing angle range

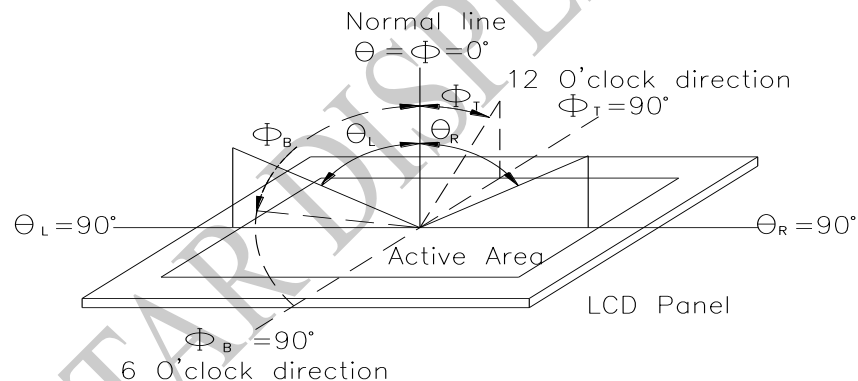


Fig.8.1. Definition of viewing angle

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-7 or BM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

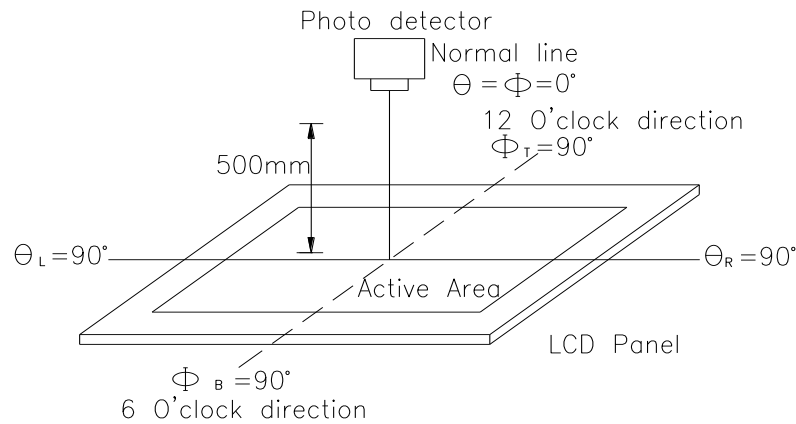
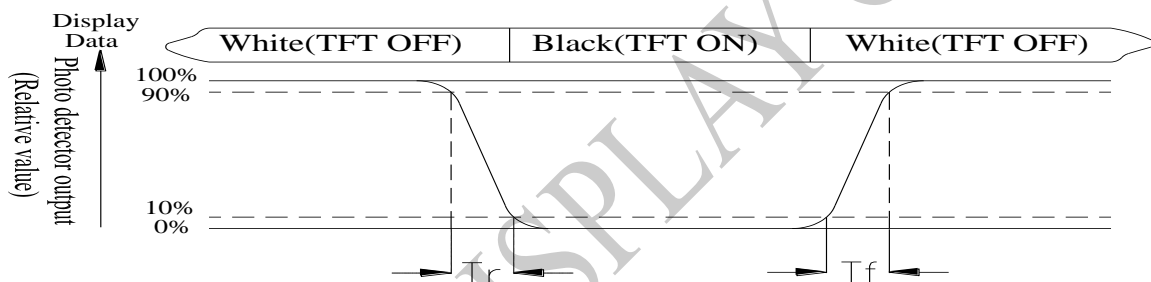


Fig. 8.2. Optical measurement system setup

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, T_r , is the time between photo detector output intensity changed from 90% to 10%. And fall time, T_f , 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: White $V_i = V_{i50} \pm 1.5V$

Black $V_i = V_{i50} \pm 2.0V$

“±” means that the analog input signal swings in phase with VCOM signal.

“±” means that the analog input signal swings out of phase with VCOM signal.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

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 (CON2)

Pin	Symbol	Function	Remark
1	GND	System ground pin of the IC .Connect to system ground.	
2	VDD	Power Supply : +3.3V	
3	BLE	Backlight control signal , H: On \ L: Off	
4	D/C	Data/Command select	
5	WR	Write strobe signal	
6	RD	Read strobe signal	
7	DB0	Data bus	
8	DB1	Data bus	
9	DB2	Data bus	
10	DB3	Data bus	
11	DB4	Data bus	
12	DB5	Data bus	
13	DB6	Data bus	
14	DB7	Data bus	
15	DB8	Data bus (When select 8bits Mode, this pin is NC)	Note1
16	DB9	Data bus (When select 8bits Mode, this pin is NC)	Note1
17	DB10	Data bus (When select 8bits Mode, this pin is NC)	Note1
18	DB11	Data bus (When select 8bits Mode, this pin is NC)	Note1
19	DB12	Data bus (When select 8bits Mode, this pin is NC)	Note1
20	DB13	Data bus (When select 8bits Mode, this pin is NC)	Note1
21	DB14	Data bus (When select 8bits Mode, this pin is NC)	Note1
22	DB15	Data bus (When select 8bits Mode, this pin is NC)	Note1
23	NC	No connect	
24	NC	No connect	
25	CS	Chip select	
26	RST	Hardware reset	
27	L/R	Left / right selection; Default L/R=H	Note 2,3
28	U/D	Up/down selection; ; Default U/D=L	Note 2,3
29	XL	Left electrode	
30	YU	Top electrode	

31	XR	Right electrode	
32	YD	Bottom electrode	
33	VLED-	Power for LED Driver IC(GND)	
34	VLED-	Power for LED Driver IC(GND)	
35	VLED+	Power for LED Driver IC(+5V)	
36	VLED+	Power for LED Driver IC(+5V)	

Note1: When select 8bit mode, DB0~DB7 be used, DB8~DB15 no connect
When select 16bit mode, DB0~DB15 be used

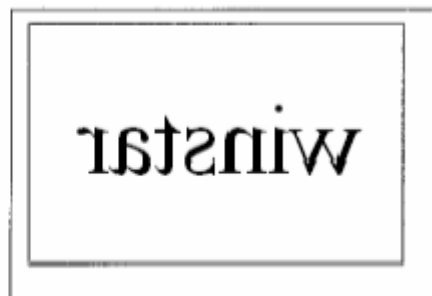
Note 2: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	VDD	Up to down, left to right
VDD	GND	Down to up, right to left
GND	GND	Up to down, right to left
VDD	VDD	Down to up, left to right

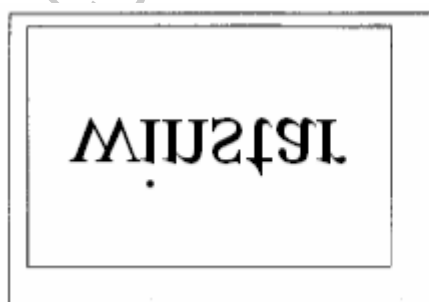
Note 3: Definition of scanning direction. Refer to the figure as below:



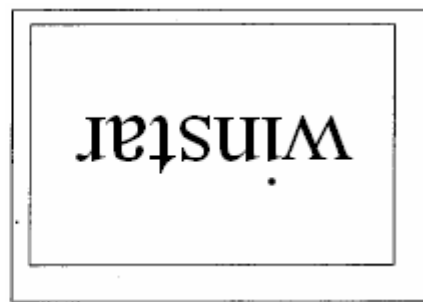
U/D=L, L/R=H



U/D=L, L/R=L

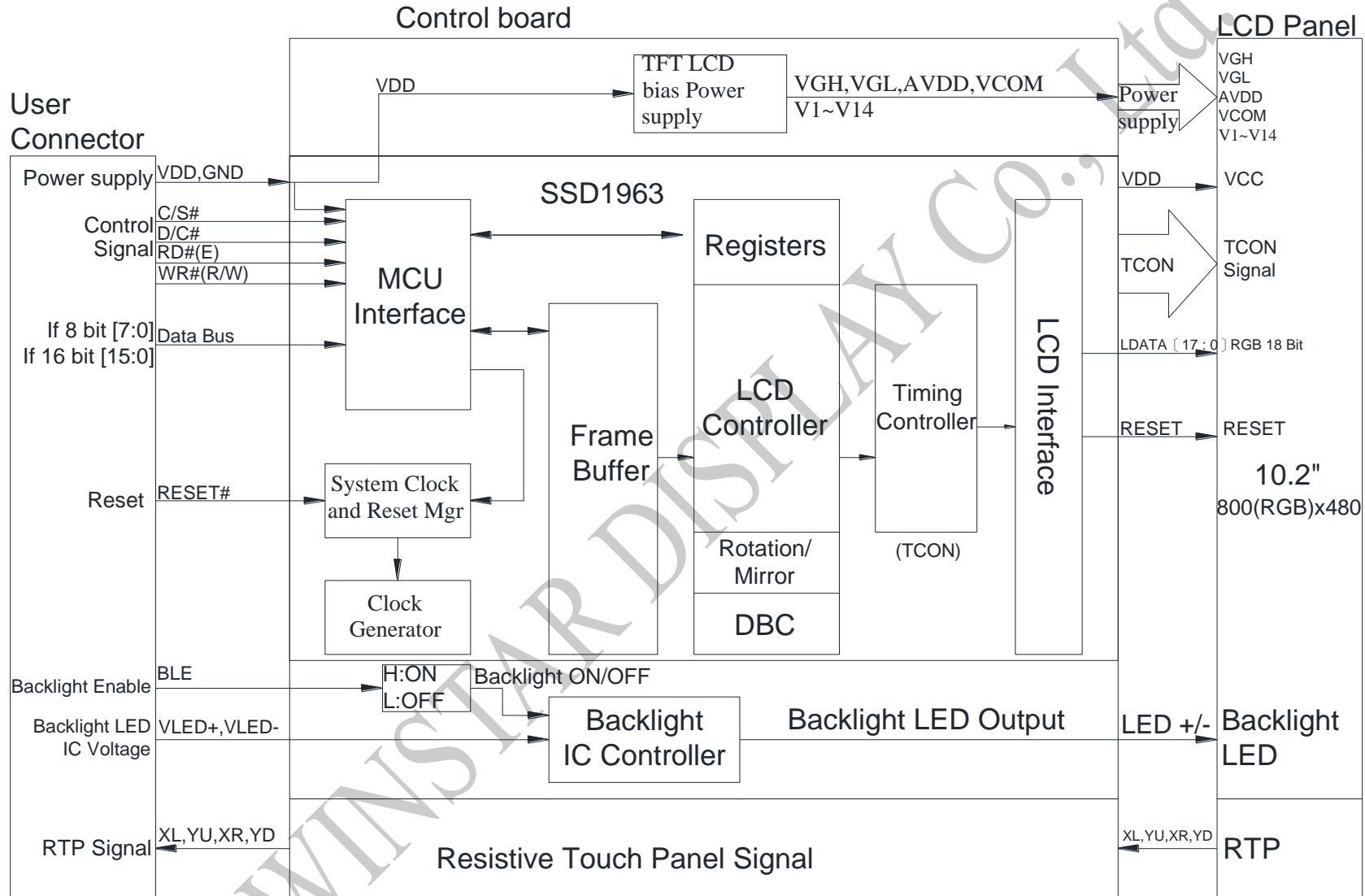


U/D=H, L/R=H



U/D=H, L/R=L

10. Block Diagram



11. Reliability

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

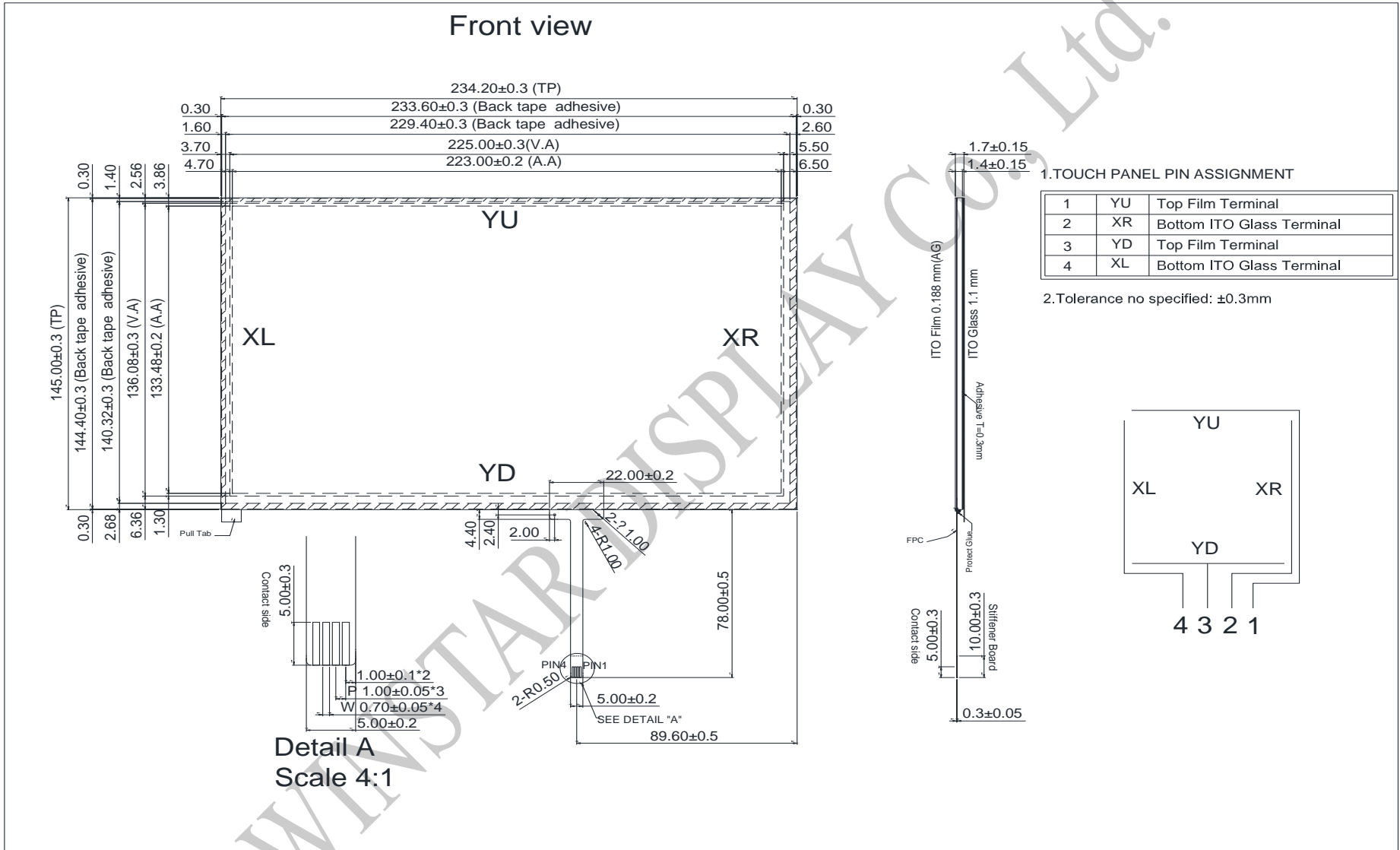
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 200hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60 °C, 90%RH max	60°C, 90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation <div style="text-align: center;"> <p style="margin: 0;">-20°C 25°C 70°C</p> <p style="margin: 0;">30min 5min 30min</p> <p style="margin: 0;">1 cycle</p> </div>	-20°C/70°C 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.

12.Touch Panel Information

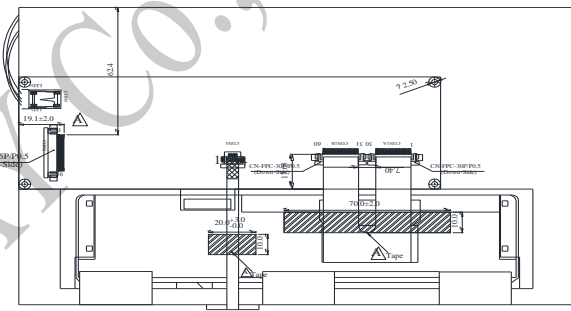
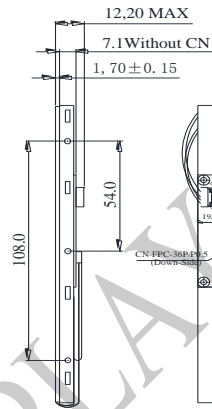
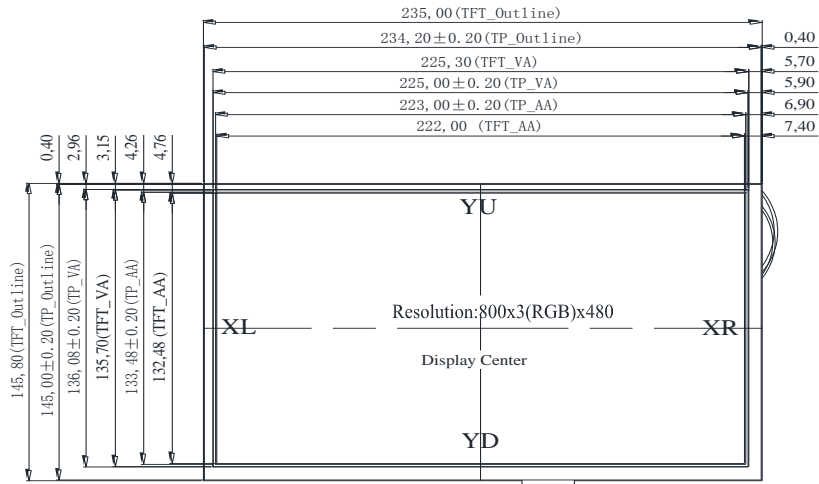


12.1. Resistance Touch Panel General Specifications

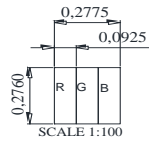
Item	Description
Driving condition	DC5V
Operating force	50~120g
Linearity max	$\leq \pm 1.5\%$
Insulating resistance	$> 20M\Omega$, 25V(DC)
Light transparence	70%
Structure type	ITO Film/ITO Glass(F/G)
Surface Hardness	3H typ
Pen Hitting Durability (with the silicon rubber)	$> 1000,000$ times
X resistance	350~1100 Ω
Y resistance	100~750 Ω

WINSTAR DISPLAY Co., Ltd.

13. Contour Drawing



PIN NO.	SYMBOL
1	GND
2	VDD
3	BL_E
4	D/C
5	WR
6	RD
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	DB8
16	DB9
17	DB10
18	DB11
19	DB12
20	DB13
21	DB14
22	DB15
23	NC
24	NC
25	CS
26	RESET
27	LR
28	UD
29	XL
30	YU
31	XR
32	YD
33	VLED-
34	VLED-
35	VLED+
36	VLED+



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

14.PACKAGE SPECIFICATION

LCM Model WF102QTIFGDBT0#	LCM 包裝規格書 LCM Packaging Specifications	Approve	Check	Contact
Drawing NO.		DATE 2/6/14'	初版 2/6/14'	版次Ver 0

1.包裝材料規格表 (Packaging Material) :(per carton)

NO.	Item	Model	Dimensions	Quantity
1	成品 (LCM)	WF102QTIFGDBT0#		30
2	TRAY 盤 (2)	PKCA1XXXXXXXXXX0288	315*265mm	30
3	BP01 內盒 (3)Product Box	PK3Y1XXXXXXXXXX0001	332*280*100mm	6
4	泡棉(4)Foam	-	-	6
5	外紙箱(5)Carton	PK4X1XXXXXXXXXX0000	565*340*320mm	1
6				
7				
8				
9				

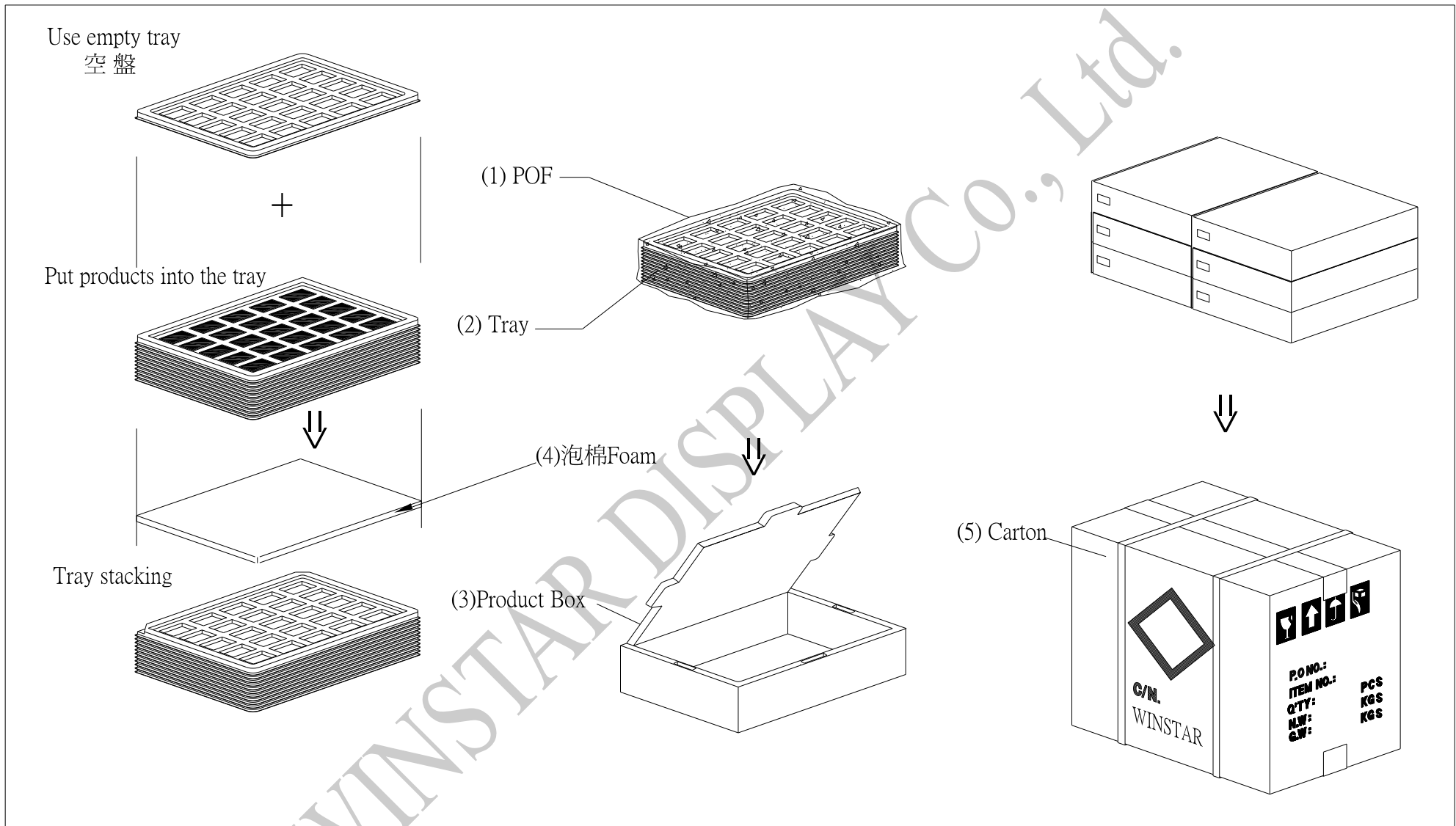
2.單箱數量規格表(Packaging Specifications and Quantity) :

(1)LCM quantity per box : no per tray 1 x no of tray 5 = 5
 (2)Total LCM quantity in carton : quantity per box 5 x no of boxes 6 = 30

特 記 事 項 (REMARK)

1. Label Specifications :

MOOEL: LOT NO : QUANTITY: CHECK:



15.Initial Code For Reference

```
void Initial_SSD1963()
{
    Write_Command(0x01);
    Delay_ms(10);
    Write_Command(0xe0); //START PLL
    Write_Parameter(0x01);
    Delay_ms(50);
    Write_Command(0xe0); //START PLL
    Write_Parameter(0x03);
    Delay_ms(5);

    Write_Command(0xb0);
    Write_Parameter(0x08);
    Write_Parameter(0x80);
    Write_Parameter(0x03);
    Write_Parameter(0x1f);
    Write_Parameter(0x01);
    Write_Parameter(0xdf);
    Write_Parameter(0x2d);

    Write_Command(0xf0);
    Write_Parameter(0x03); //pixel data format, 0x03 is 16bit(565 format);0x00 is
for 8-bit

    //Set the MN of PLL
    Write_Command(0xe2);
    Write_Parameter(0x22);
    Write_Parameter(0x03);
    Write_Parameter(0x04);

    Write_Command(0xe6);
    Write_Parameter(0x03);
    Write_Parameter(0xff);
    Write_Parameter(0xff);

    //Set front porch and back porch
    Write_Command(0xb4);
    Write_Parameter(0x04);
    Write_Parameter(0x25);
    Write_Parameter(0x00);
    Write_Parameter(0x34);
    Write_Parameter(0x05);
    Write_Parameter(0x00);
    Write_Parameter(0x00);
    Write_Parameter(0x00);
    Write_Parameter(0x00);
}
```

Write_Command(0xb6);
Write_Parameter(0x02);
Write_Parameter(0x12);
Write_Parameter(0x00);
Write_Parameter(0x1d);
Write_Parameter(0x05);
Write_Parameter(0x00);
Write_Parameter(0x00);

Write_Command(0x2a);
Write_Parameter(0x00);
Write_Parameter(0x00);
Write_Parameter(0x03);
Write_Parameter(0x1f);

Write_Command(0x2b);
Write_Parameter(0x00);
Write_Parameter(0x00);
Write_Parameter(0x01);
Write_Parameter(0xdf);

Write_Command(0xb8);
Write_Parameter(0x0f);
Write_Parameter(0x01);
Write_Command(0xba);
Write_Parameter(0x01);

Write_Command(0x29);
Write_Command(0x2c);

}



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

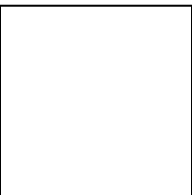
- 1. PCB Size : Pass NG , _____
- 2. Frame Size : Pass NG , _____
- 3. Material of Frame : Pass NG , _____
- 4. Connector Position : Pass NG , _____
- 5. Fix Hole Position : Pass NG , _____
- 6. Backlight Position : Pass NG , _____
- 7. Thickness of PCB : Pass NG , _____
- 8. Height of Frame to PCB : 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) : 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、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 : / / _____

