



Winstar Display Co., LTD

華凌光電股份有限公司



WEB: <http://www.winstar.com.tw>

E-mail: winstar@winstar.com.tw

SPECIFICATION

CUSTOMER : _____

MODULE NO.: WF35LTIBCDBNO#010

<p>APPROVED BY: (FOR CUSTOMER USE ONLY)</p>	<p>PCB VERSION: _____</p> <p>DATA: _____</p>
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SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2014/12/11			

TFT Display Inspection Specification: <http://www.winstar.com.tw/service.php>

RECORDS OF REVISION

DOC. FIRST ISSUE

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2013/09/29		First issue
A	2014/12/11		Add size & Surface. Modify Pixel Data Format & Block Diagram

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1. Module Classification Information

W F 35 L T I B C D B N 0 #010
 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 : 3.5" TFT						
④	Model serials no.						
⑤	Backlight Type :	F→CCFL, White S→LED, High Light White			T→LED, White		
⑥	LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction	C→Transmissive, N. T, 6:00 ; I→Transmissive, W. T, 6:00 F→Transmissive, N.T,12:00 ; L→Transmissive, W.T,12:00 Z→Transmissive, W.T, Wide Viewing Angle for O-FILM Y→Transmissive, W.T, Wide View					
⑦	A : TFT LCD B : TFT+FR+CONTROL BOARD C : TFT+FR+A/D BOARD D : TFT+FR+A/D BOARD+CONTROL BOARD E : TFT+FR+POWER BOARD F : TFT+CONTROL BOARD			G : TFT+FR H : TFT+D/V BOARD I : TFT+FR+D/V BOARD J : TFT+POWER BD			
⑧	Solution:						
	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	P :1280800
⑨	D: Digital L : LVDS						
⑩	Interface : N : without control board A : 8Bit B : 16Bit						
⑪	TS : N : Without TS T : resistive touch panel C : capacitive touch panel						
⑫	Version						
⑬	Special Code	#:Fit in with ROHS directive regulations 01 : Sales code 0 : Version 6800 Interface					

2. Summary

This technical specification applies to 3.45' color TFT-LCD panel. The 3.45' color TFT-LCD panel is designed for camcorder, digital camera application and other electronic products which require high quality flat panel displays. This module follows RoHS.

3. General Specifications

Item	Dimension	Unit
Size	3.5	inch
Dot Matrix	320 x RGBx240(TFT)	dots
Module dimension	93.50(W) x 66.44(H) x 7.3(D)	mm
Active area	70.08 x 52.56	mm
Dot pitch	0.073 x 0.219	mm
LCD type	TFT, Normally White, Transmissive	
View Direction	12 o'clock	
Gray Scale Inversion Direction	6 o'clock	
Backlight Type	LED, Normally White	
Controller IC	SSD1963	
Interface	Digital 6800 family MPU	
With /Without TP	Without TP	
Surface	Anti-Glare	

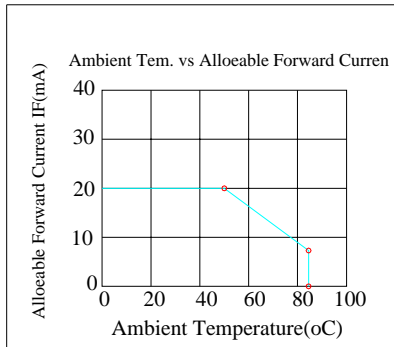
*Color tone slight changed by temperature and driving voltage.

4. Absolute Maximum Ratings

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

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

- 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



5. Electrical Characteristics

5.1. Operating conditions:

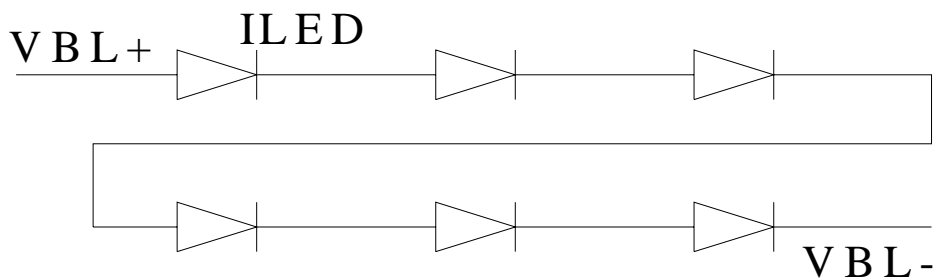
Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Supply Voltage For LCM	VDD	-	3.0	3.3	3.6	V	-
Supply Current For LCM	IDD	-	-	310	470	mA	Note1
Power Consumption	-	-	-	1020	1690	mW	

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

5.2. LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	-	-	20	-	mA	-
Power Consumption	-	348	384	408	mW	-
LED voltage	VBL+	17.4	19.2	20.4	V	Note 1
LED Life Time	-	-	50,000	-	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



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	

7. Interface timing

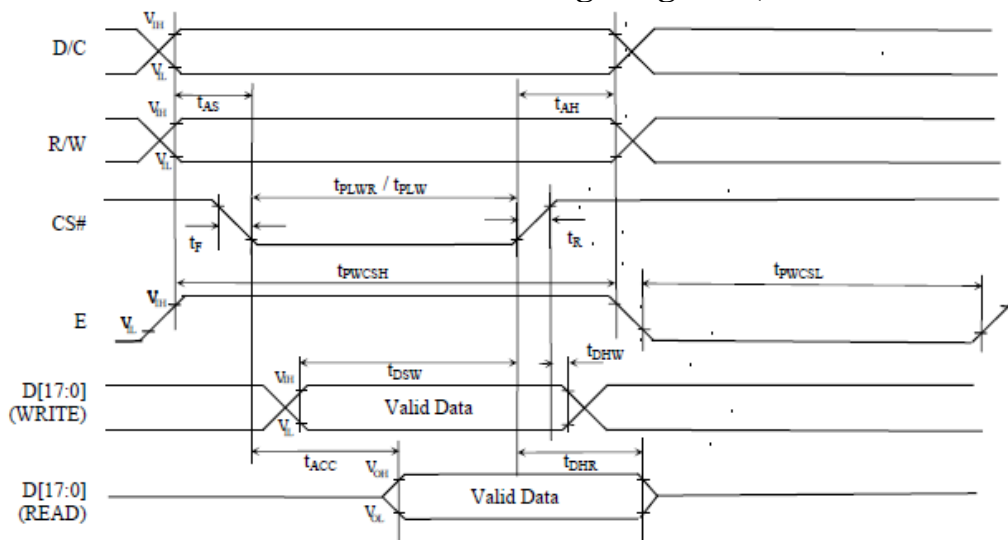
7.1. 6800 Mode

The 6800 mode MCU interface consist of CS#, D/C#, E, R/W#, Data bus. This interface supports both fixed E and clock E scheme to define a read/write cycle. If the E signal is kept high and used as enable signal, the CS# signal acts as a bus clock, the data or command will be latched into the system at the rising edge of CS#. If the user wants to use the E pin as the clock pin, the CS# pin then need to be fixed to logic 0 to select the chip. Then the falling edge of the E signal will latch the data or command.

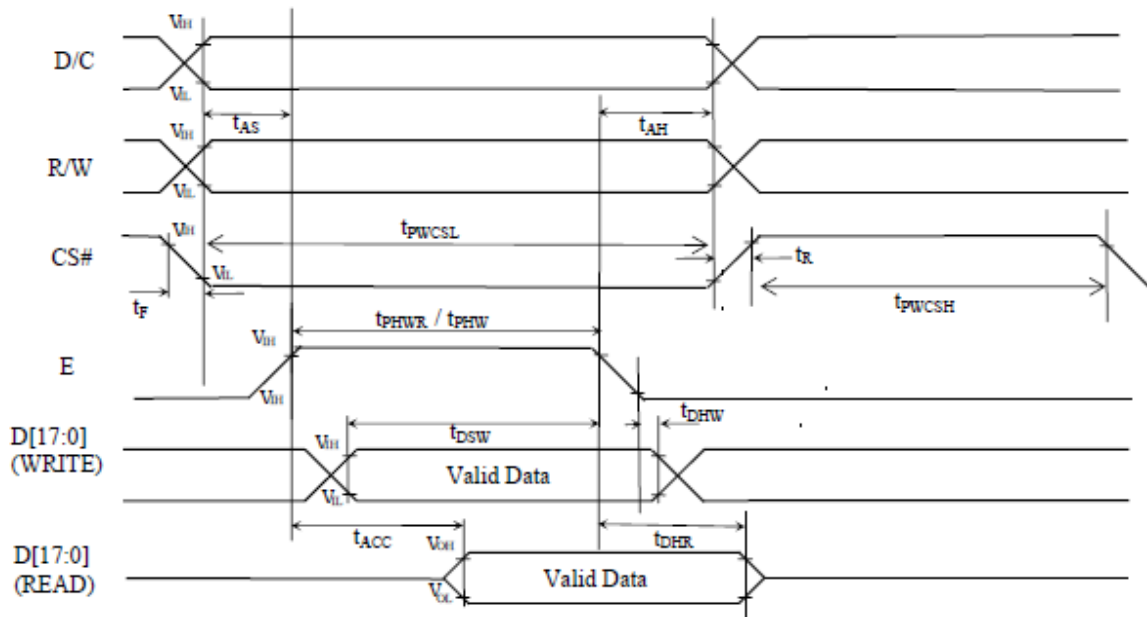
7.2. 6800 Mode Write Cycle

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	13	1.5* tMCLK	—	ns
	Read	30	3.5* tMCLK	—	ns
tPWCSL	Control Pulse Low Width Write (next write cycle)	13	1.5* tMCLK	—	ns
	Write (next read cycle)	80	9* tMCLK	—	
	Read	80	9* tMCLK	—	
tAS	Address Setup Time	2	—	—	ns
tAH	Address Hold Time	2	—	—	ns
tDSW	Write Data Setup Time	4	—	—	ns
tDHW	Write Data Hold Time	1	—	—	ns
tPLW	Write Low Time	14	—	—	ns
tPHW	Write High Time	14	—	—	ns
tPWLR	Read Low Time	38	—	—	ns
tACC	Data Access Time	32	—	—	ns
tDHR	Output Hold time	1	—	—	ns
tR	Rise Time	—	—	0.5	ns
tF	Fall Time	—	—	0.5	ns

7.3. Parallel 6800-series Interface Timing Diagram (Use CS# as Clock)



7.4. Parallel 6800-series Interface Timing Diagram (Use E as Clock)



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

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	Tr	$\theta = 0^\circ \cdot \Phi = 0^\circ$	-	10	-	ms	Note 3,5	
	Tf		-	15	-	ms		
Contrast ratio	CR	At optimized viewing angle	300	350	-	-	Note 4,5	
Color Chromaticity	White	$\theta = 0^\circ \cdot \Phi = 0^\circ$	Wx	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	-	55	-	Deg.	Note 1
		ΘL		-	55	-		
	Ver.	ΦT		-	45	-		
		ΦB		-	50	-		
Brightness	-	-	350	420	-	cd/m ²	Center of display	

Ta=25±2°C, IL=20mA

Note 1: Definition of viewing angle range

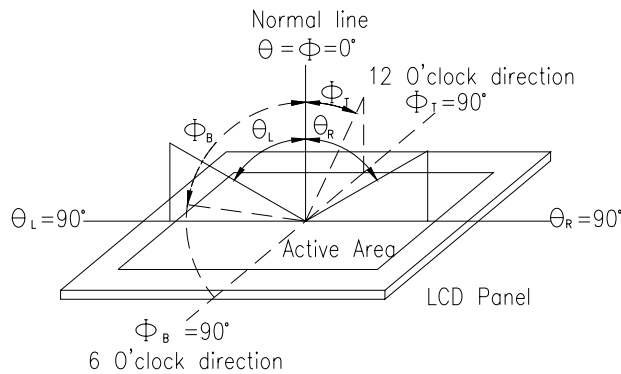


Fig. 8.1. Definition of viewing angle

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.

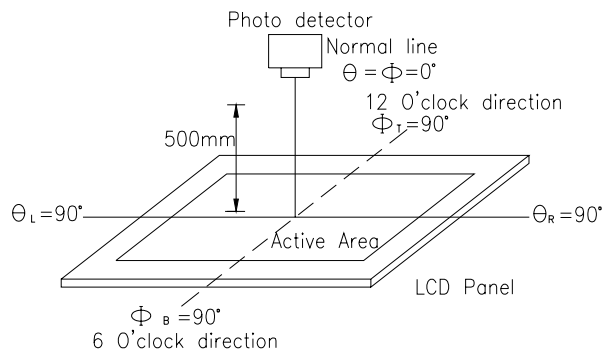
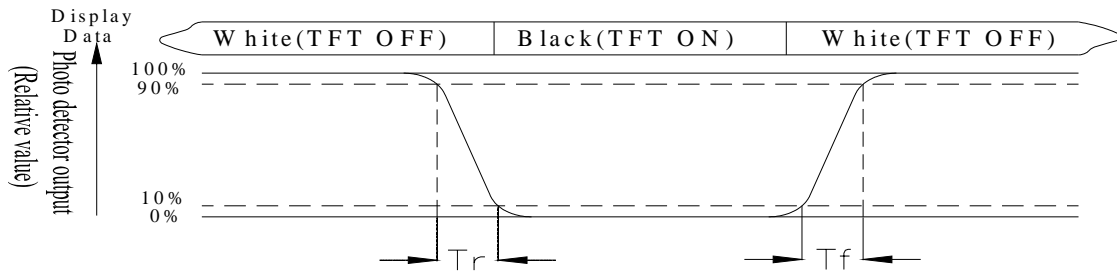


Fig. 8.2. Optical measurement system setup

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

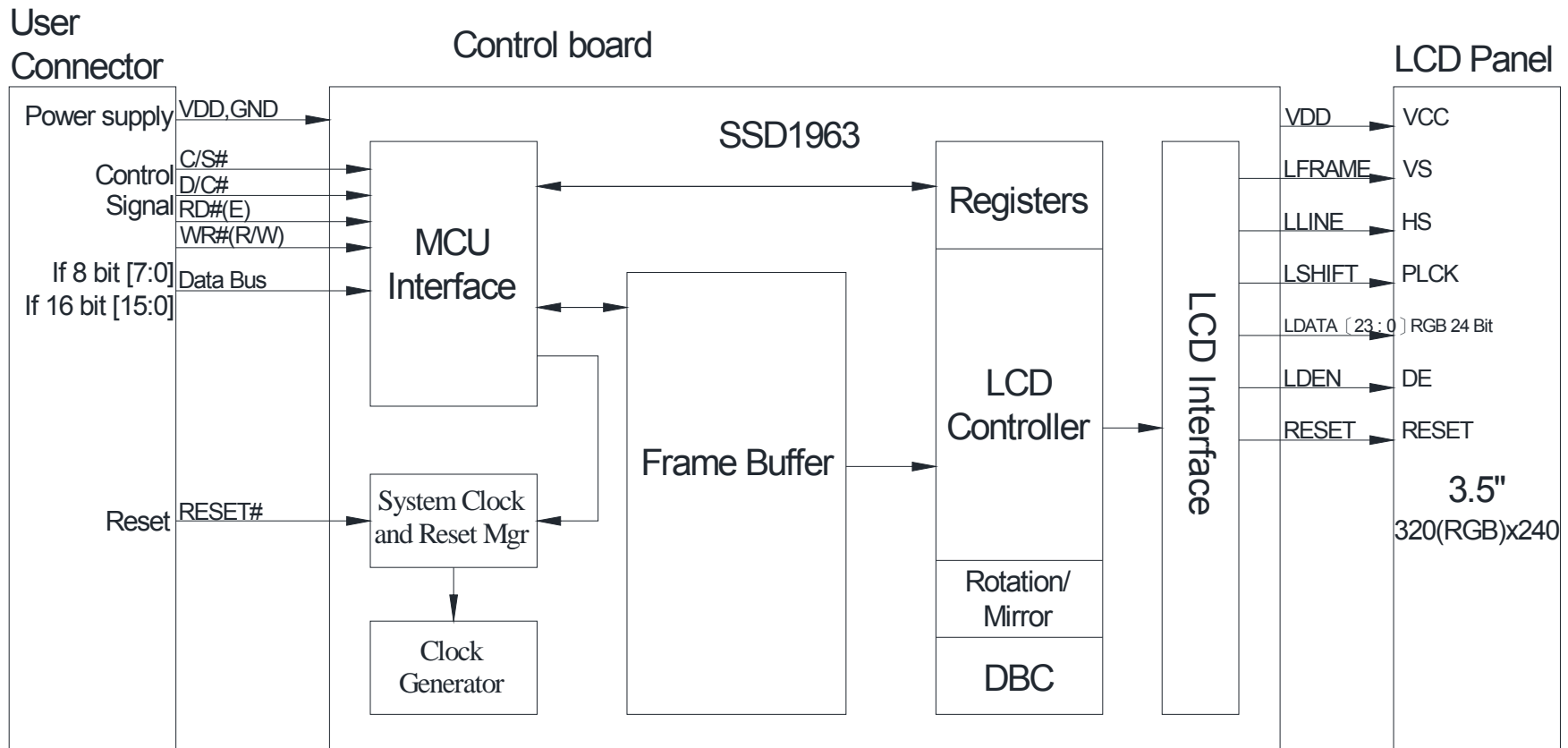
Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

9.Interface

9.1. LCM PIN Definition

Pin	Symbol	Function	Remark
1	GND	System ground pin of the IC. Connect to system ground.	
2	VDD	Power Supply : +3.3V	
3	BL_E	Backlight control signal , H: On \ L :Off	
4	D/C	Data/Command select	
5	R/W#	R/W#: 6800 family MPU interface when L: Write, H: Read	
6	E	E: 6800 family MPU interface Enable 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	
16	DB9	Data bus	
17	DB10	Data bus	
18	DB11	Data bus	
19	DB12	Data bus	
20	DB13	Data bus	
21	DB14	Data bus	
22	DB15	Data bus	
23	NC	No connect	
24	NC	No connect	
25	CS	Chip select	
26	RST	Hardware reset	
27	NC	No connect	
28	NC	No connect	
29	NC	No connect	
30	NC	No connect	
31	NC	No connect	
32	NC	No connect	

10. Block Diagram



11. Reliability

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

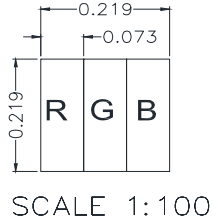
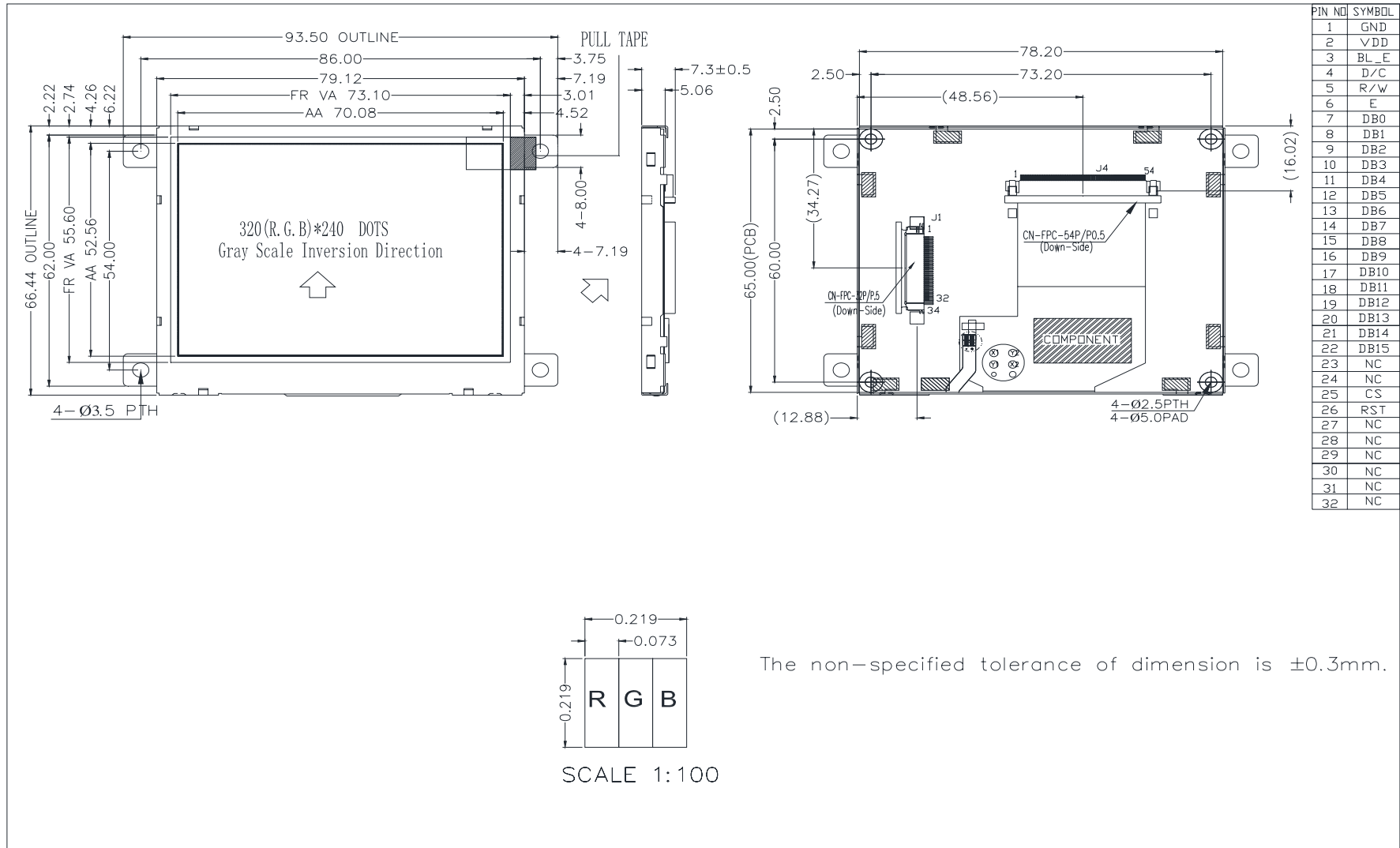
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature 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 For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.	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="text-align: center;">-20°C 25°C 70°C</p> <p style="text-align: center;">30min 5min 30min</p> <p style="text-align: center;">1 cycle</p> </div>	-20°C/70°C 10 cycles	—
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 15mm 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=800V, RS=1.5kΩ CS=100pF 1 time	—

Note1: No dew condensation to be observed.

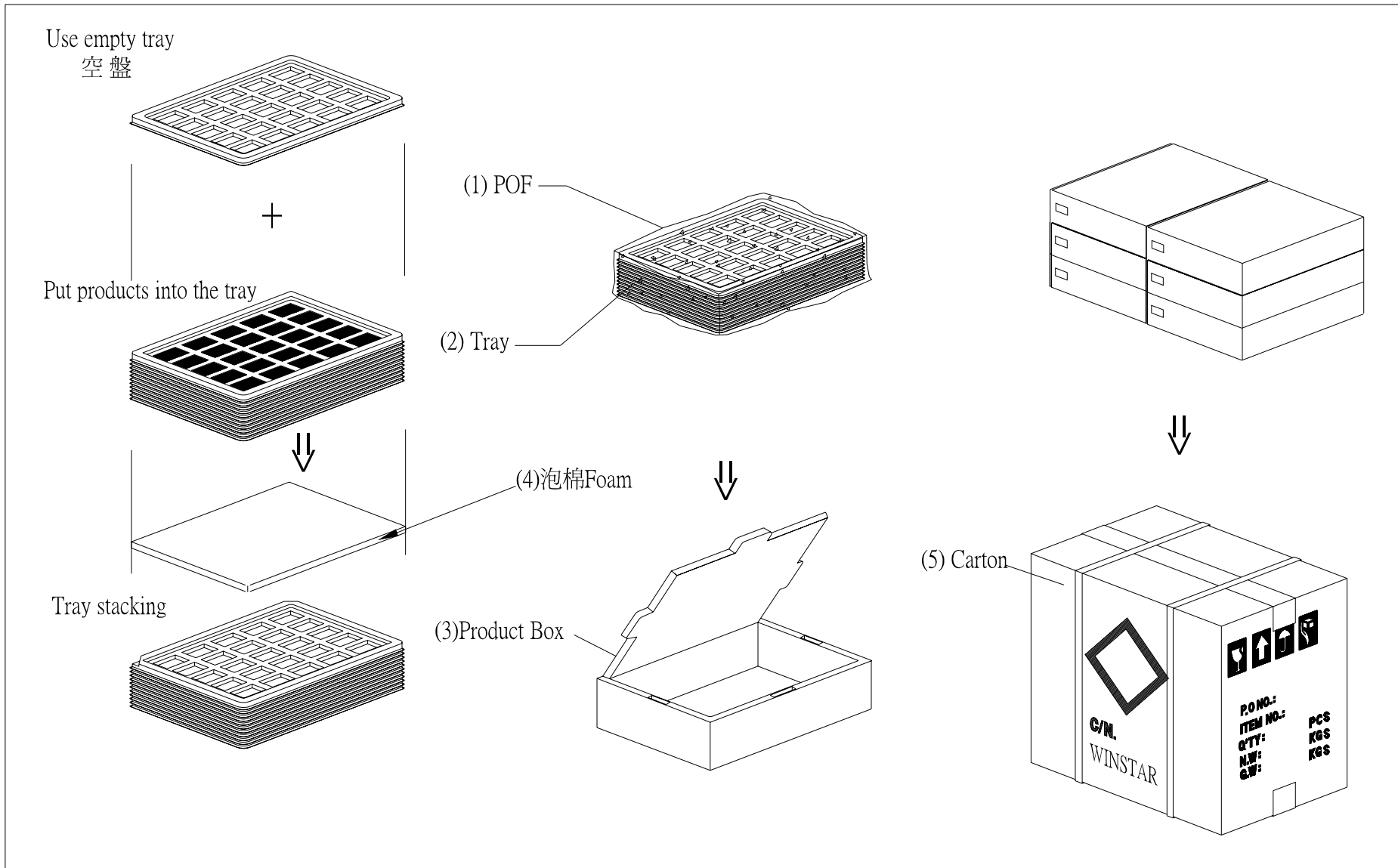
Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: The packing have to including into the vibration testing.

12. Contour Drawing



The non-specified tolerance of dimension is $\pm 0.3\text{mm}$.



14. Initial Code For Reference

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

    Write_Command(0xb0);
    Write_Parameter(0x0c);
    Write_Parameter(0x80);
    Write_Parameter(0x01);
    Write_Parameter(0x3f);
    Write_Parameter(0x00);
    Write_Parameter(0xef);
    Write_Parameter(0x00);

    Write_Command(0xf0);
    Write_Parameter(0x00);

    Write_Command(0xe2);
    Write_Parameter(0x1d);
    Write_Parameter(0x02);
    Write_Parameter(0x54);

    Write_Command(0xe6);
    Write_Parameter(0x00);
    Write_Parameter(0xdd);
    Write_Parameter(0xde);

    Write_Command(0xb4);
    Write_Parameter(0x01);
    Write_Parameter(0x98);
    Write_Parameter(0x00);
    Write_Parameter(0x44);
    Write_Parameter(0x14);
    Write_Parameter(0x00);
    Write_Parameter(0x00);
    Write_Parameter(0x00);

    Write_Command(0xb6);
    Write_Parameter(0x01);
    Write_Parameter(0x06);
    Write_Parameter(0x00);
}
```

Write_Parameter(0x12);
Write_Parameter(0x04);
Write_Parameter(0x00);
Write_Parameter(0x00);

Write_Command(0x2a);
Write_Parameter(0x00);
Write_Parameter(0x00);
Write_Parameter(0x01);
Write_Parameter(0x3f);

Write_Command(0x2b);
Write_Parameter(0x00);
Write_Parameter(0x00);
Write_Parameter(0x00);
Write_Parameter(0xef);

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

}



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 Specification :

- 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 : ____ / ____ / ____