



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.: **WF70C4TIFGDBT0#**

APPROVED BY: (FOR CUSTOMER USE ONLY)	 PCB VERSION: DATA:
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SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			周园园
ISSUED DATE: 2022/10/13			

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	2022/10/13		First issue

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1.Module Classification Information

W F 70 C4 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 : 7.0” 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									

2.Summary

TFT 7.0" is a TN transmissive type color active matrix TFT liquid crystal display that uses amorphous silicon TFT as switching devices. This module is 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	7.0	inch
Dot Matrix	800 x RGBx480(TFT)	dots
Module dimension	165.0(W)x 104.6(H) x 9.83(D)MAX	mm
Active area	152.4 x 91.44	mm
Pixel pitch	0.1905x 0.1905	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(16bit Parallel)	
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

5. Electrical Characteristics

5.1. Operating conditions:

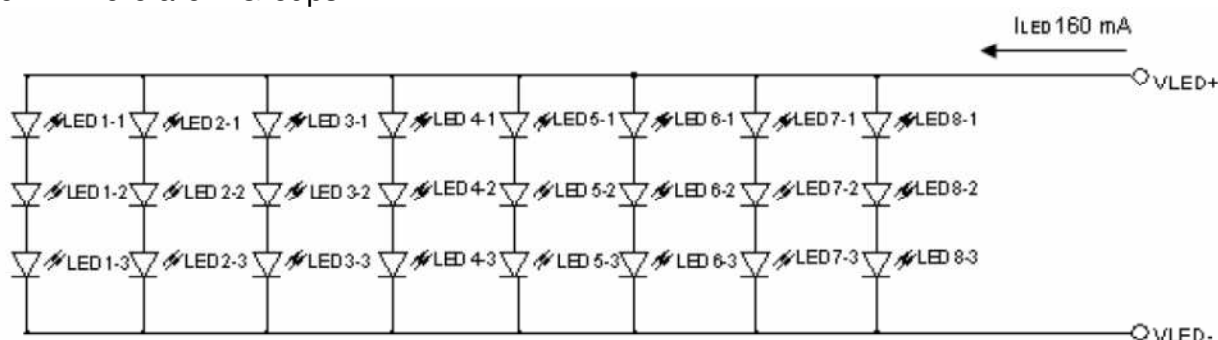
Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For LCM	VDD	-	3.0	3.3	3.6	V
Supply Current For LCM	IDD	Black Pattern	—	200	300	mA

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	-	-	160	200	mA	
Power Consumption	VBL+=9.8V	-	1568	-	mW	
LED voltage	VBL+	8.4	9.8	11	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

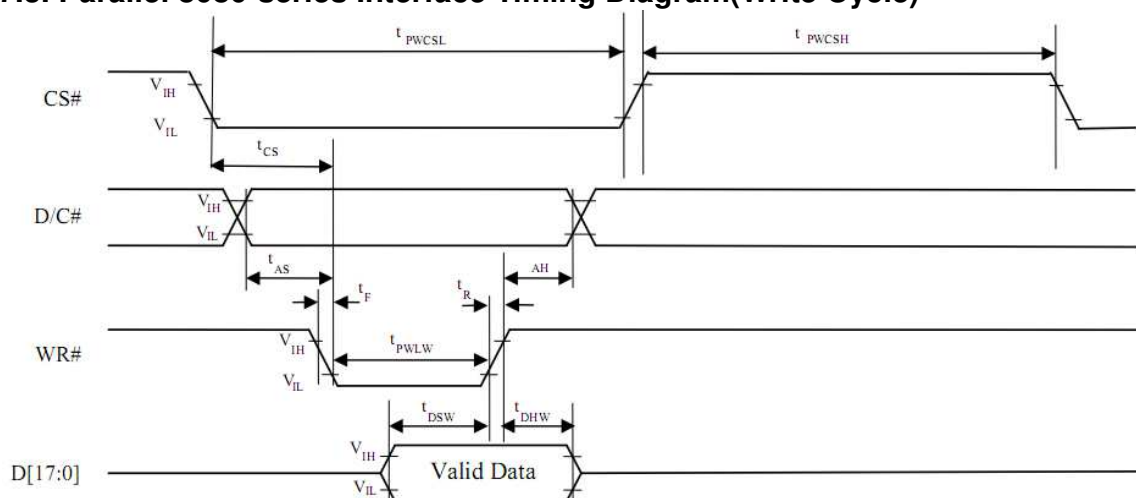
7.1. 8080 Mode

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#.

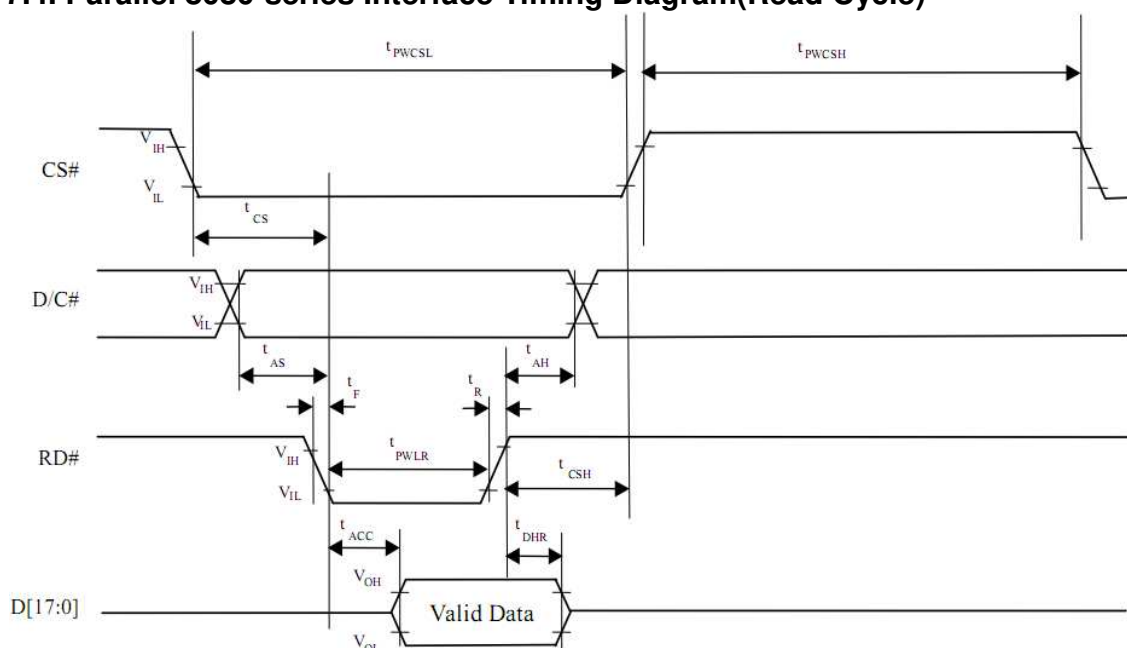
7.2. 8080 Mode Write Cycle

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)



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+ Tf	$\theta=0^{\circ}$ 、 $\Phi=0^{\circ}$		25	50	.ms	Note 3
Contrast ratio		CR	At optimized viewing angle	700	1000	-	-	Note 4
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.	ΘR	$CR\geq 10$	60	70	-	Deg.	Note 1
		ΘL		60	70	-		
	Ver.	ΦT		50	60	-		
		ΦB		60	70	-		
Brightness		-	-	250	350	-	cd/m ²	Center of display
Uniformity		(U)	-	70	-	-	%	Note 5

Ta=25±2℃, ILED = 160mA

Note 1: Definition of viewing angle range

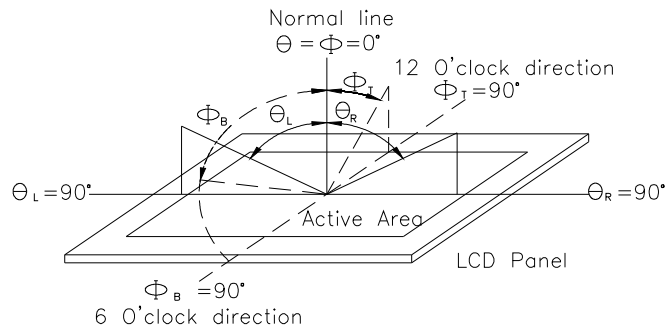


Fig.8.1. Definition of viewing angle

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.

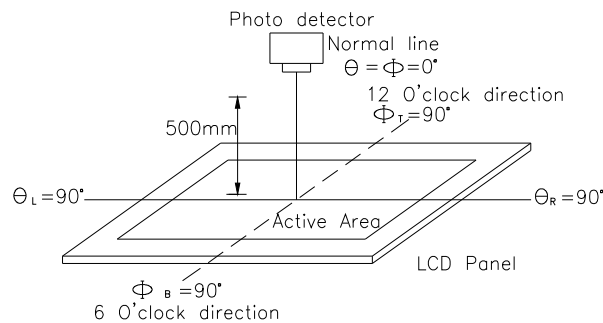
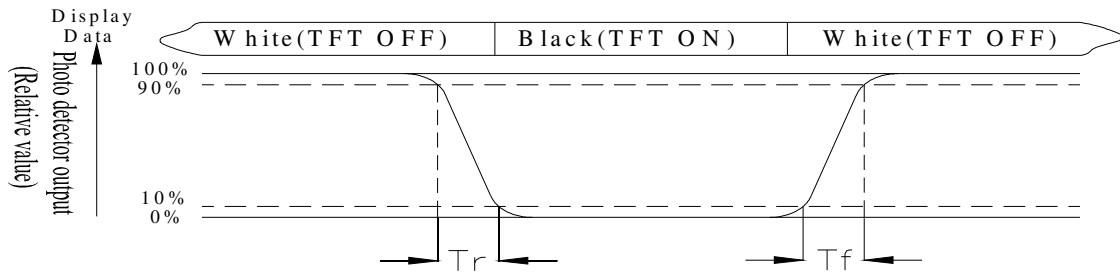


Fig. 8.2. Optical measurement system setup

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, 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: 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) = $L_{\min}/L_{\max} \times 100\%$

L = Active area length

W = Active area width

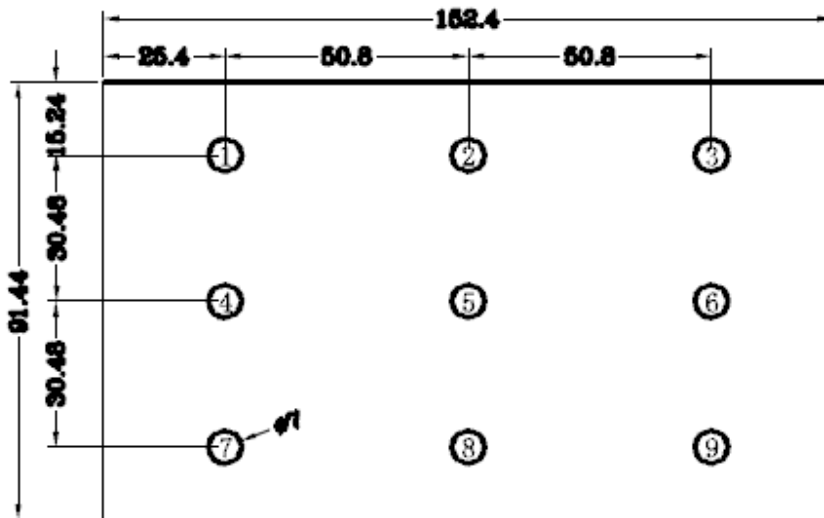


Fig8.3. Definition of uniformity

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	Symbol	Description	Remark
1	VDD	Power Supply : +3.3V	
2	VDD	Power Supply : +3.3V	
3	DB0	Data bus	
4	DB1	Data bus	
5	DB2	Data bus	
6	DB3	Data bus	
7	DB4	Data bus	
8	DB5	Data bus	
9	DB6	Data bus	
10	DB7	Data bus	
11	DB8	Data bus	
12	DB9	Data bus	
13	DB10	Data bus	
14	DB11	Data bus	
15	DB12	Data bus	
16	DB13	Data bus	
17	DB14	Data bus	
18	DB15	Data bus	
19	CS	Chip select	
20	D/C	Data/Command select	
21	RD	Read strobe signal	
22	WR	Write strobe signal	
23	NC	No connect	
24	RST	Hardware reset	
25	NC	No connect	
26	NC	No connect	
27	NC	No connect	
28	NC	No connect	
29	NC	No connect	
30	NC	No connect	

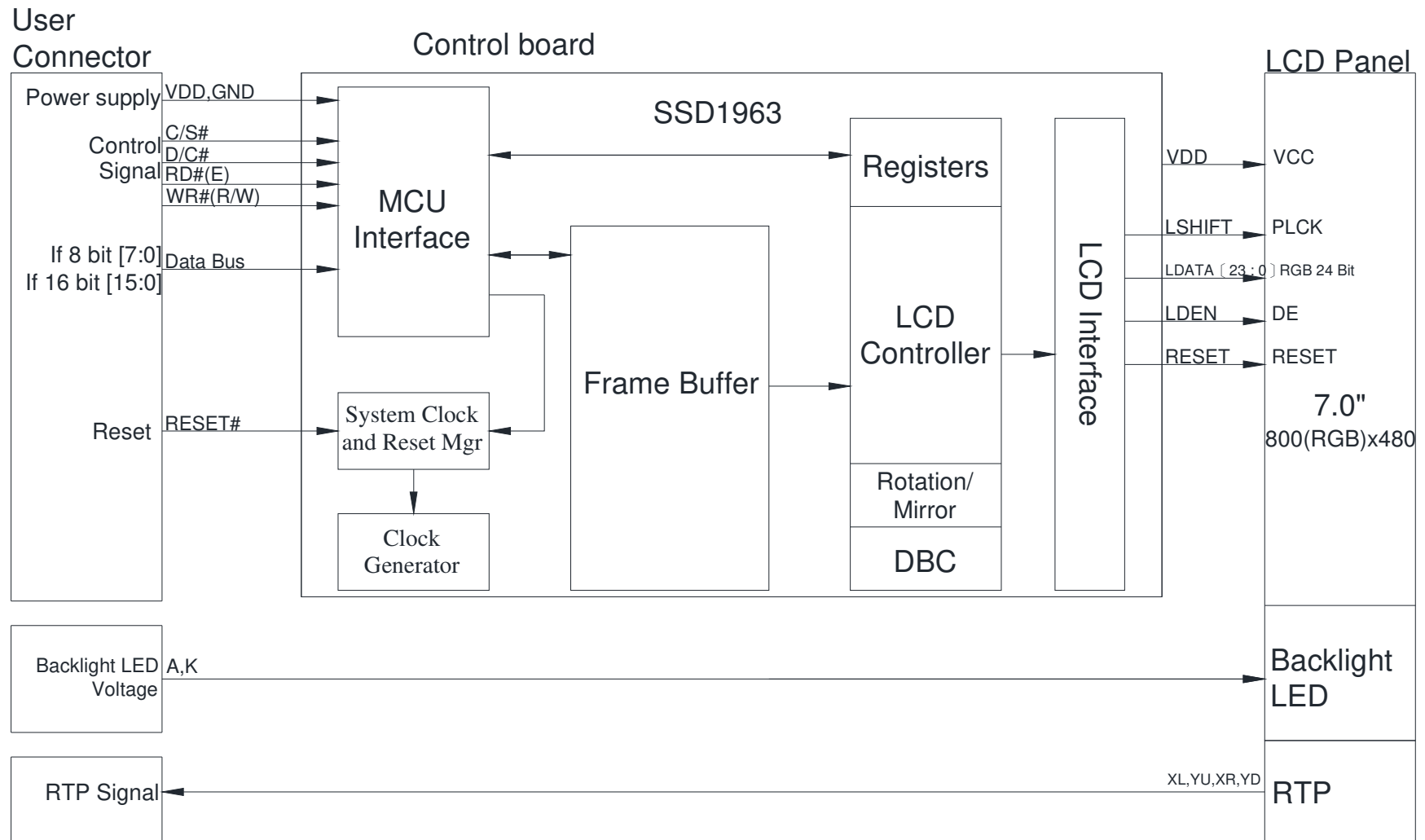
31	GND	Power Ground	
32	GND	Power Ground	

9.2. Backlight Driving Part

Pin No.	Symbol	Description
1	VLED+	Red, LED_ Anode
2	VLED-	White, LED_ Cathode

Note: The backlight interface connector is a model SM02B-BHSS-1-TB manufactured by JST or equivalent. The matching connector part number is BHSR-20VS-1 manufactured by JST or equivalent.

10. Block Diagram



11. Reliability

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

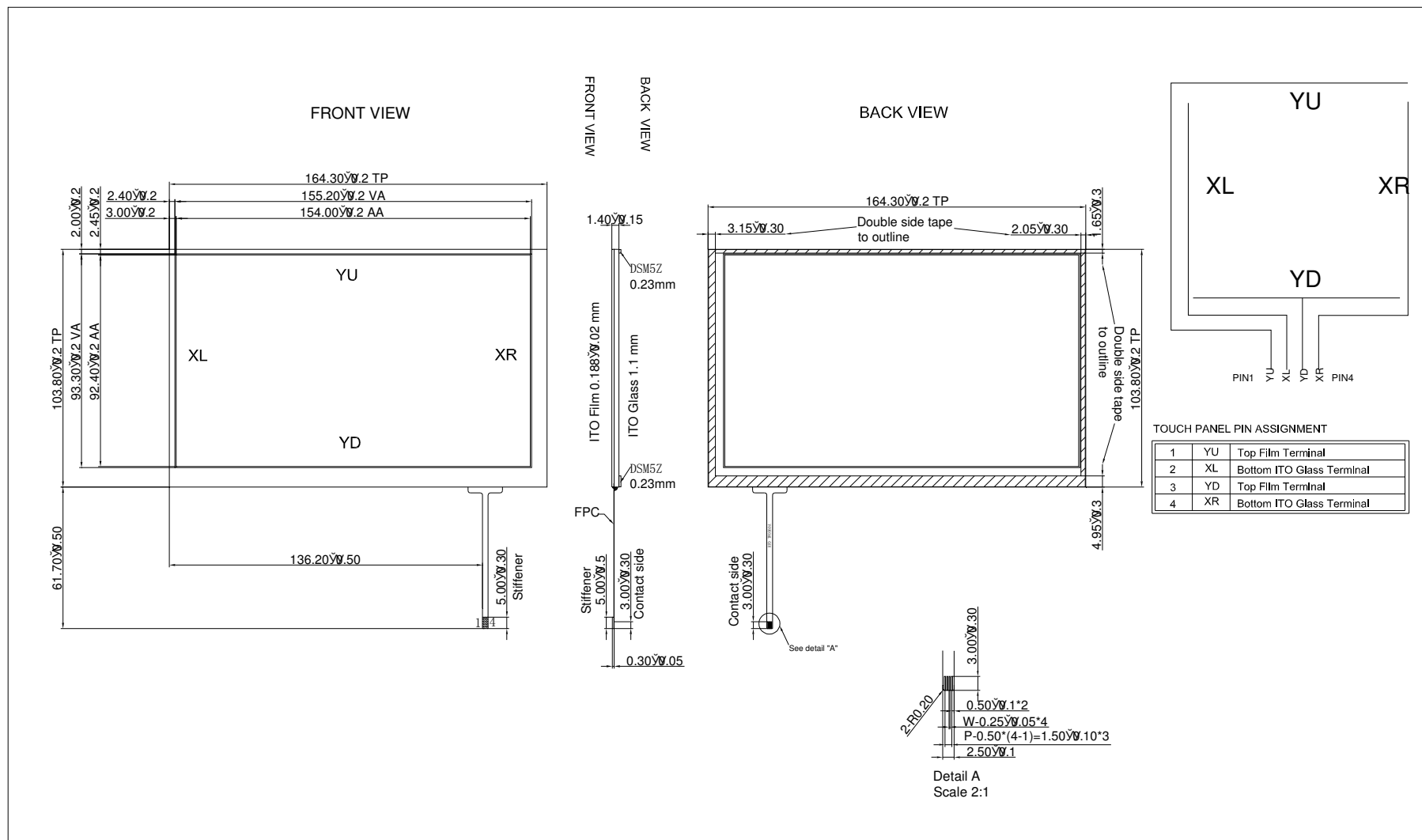
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature 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 -20°C 25°C 70°C 30min 5min 30min 1 cycle	-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.	TBD	—

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.

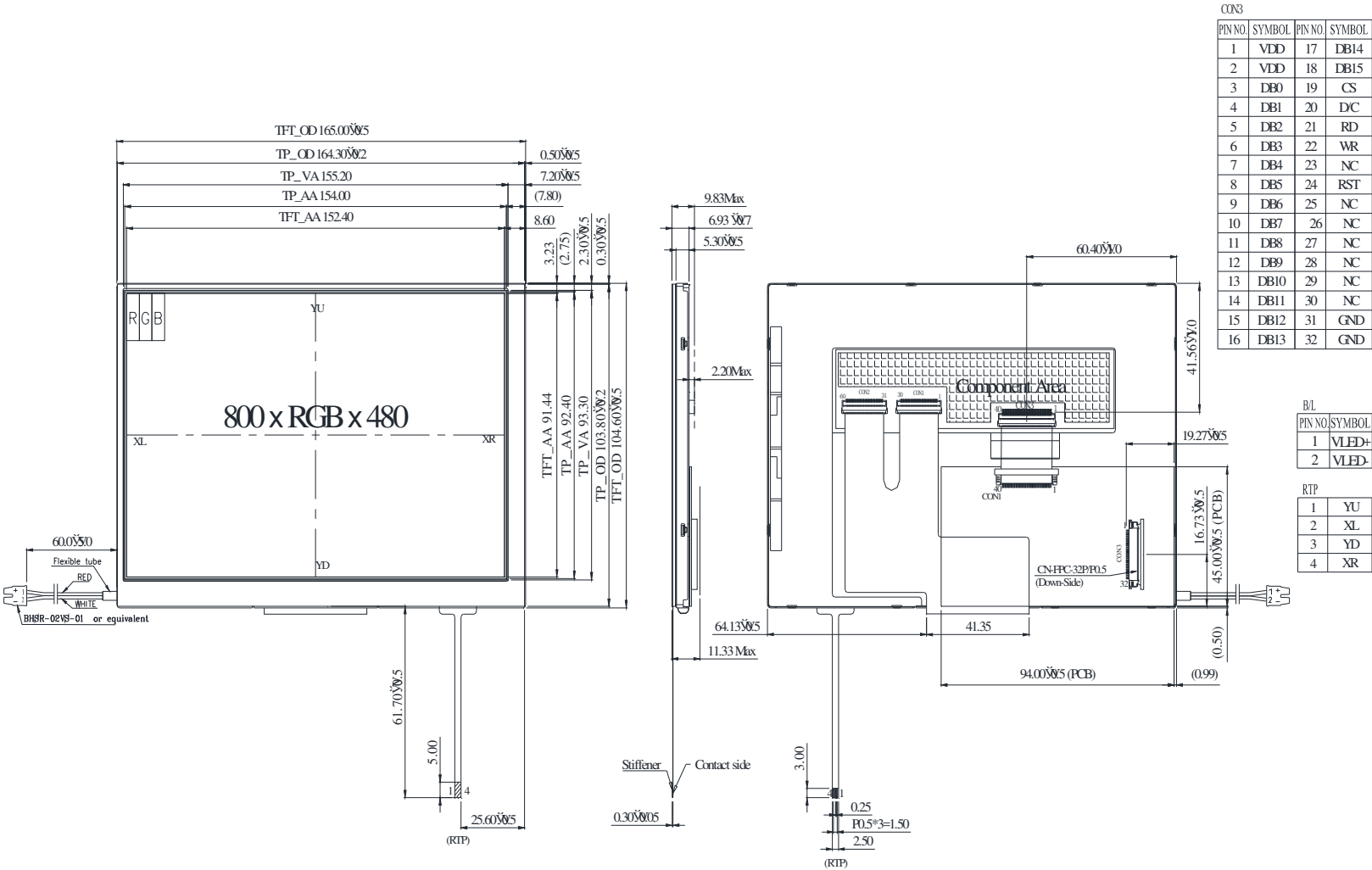
12.Touch Panel Information



12.1. Resistance Touch Panel General Specifications

Item	Description
Driving condition	DC5V
Operating force	60~150g
Linearity max	$\leq \pm 1.5\%$
Insulating resistance	$> 20\text{M}\Omega$, 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	200~1200 Ω
Y resistance	100~800 Ω

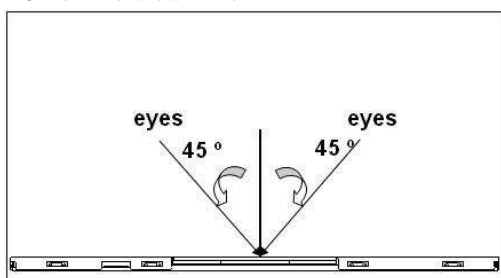
13.Contour Drawing



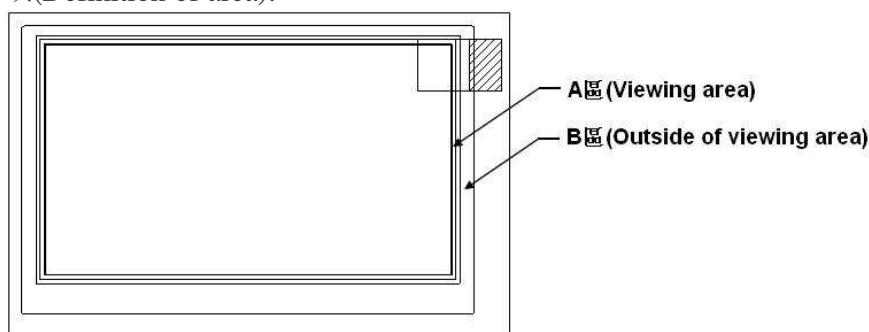
The non-specified tolerance of dimension is ±0.3 mm.

14.檢驗規範(Inspection Specification)

1. 範圍(Scope)：適用於本公司 TFT-LCD 模塊(The document shall be applied to TFT-LCD Module)
2. 檢驗標準(Inspection Standard)：MIL-STD-105E 正常單次抽樣水平 II(MIL-STD-105E Table Normal Inspection Single Sampling Level II)
3. 缺陷水平(Defect Level)：主要缺陷 AQL：0.65;次要缺陷 AQL：2.5(Major Defect AQL:0.65;Minor Defect AQL:2.5)
4. 檢驗條件(Test conditions):
 - (1)溫度(Temperature)：15°C~25°C；溼度(Humidity)：55 ±15%
 - (2)外觀檢驗(Visual inspection)：光照強度：500 Lux 以上;檢查距離：20cm~30cm (Illumination：More than 500 Lux; Inspection Distance: 20cm~30cm)
 - (3)電性檢驗(Electrical inspection)：光照強度：100Lux~300Lux;檢查距離：20cm~30cm(Illumination：100Lux~300Lux; Inspection Distance: 20cm~30cm)
 - (4)目視角度(Visual angle)：檢查目視的角度是法線方法的 45 °(The test direction is base on about around 45° of Vertical line)



- (5)定義區域(Definition of area):



5. 象素定義 (Pixel Definition):

R	G	B	R	G	B	R	G	B			Dot Defect
R	G	B	R	G	B	R	G	B			Adjacent Dot Defect
R	G	B	R	G	B	R	G	B			Cluster

註 1：如果像素或部分子像素缺陷超過受影響像素或子像素面積的 50%，則視為 1 個缺陷。
請參考 NO.11 為允許數量和亮點大小判斷標準。

Note 1: If pixel or partial sub-pixel defects exceed 50% of the affected pixel or sub-pixel area, it shall be considered as 1 defect. please refer to NO.11 for the allowable quantity and bright dot Size judgment standards.

註 2：在 2 秒的檢查時間內，通過 5% ND 濾光片不應有明顯的不均勻。

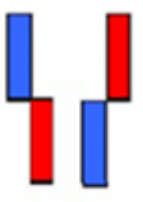
Note 2: There should be no distinct non-uniformity visible through 5% ND Filter within 2 sec inspection times.

註 3：Mura 和亮點通過 5% ND 濾光片檢查。

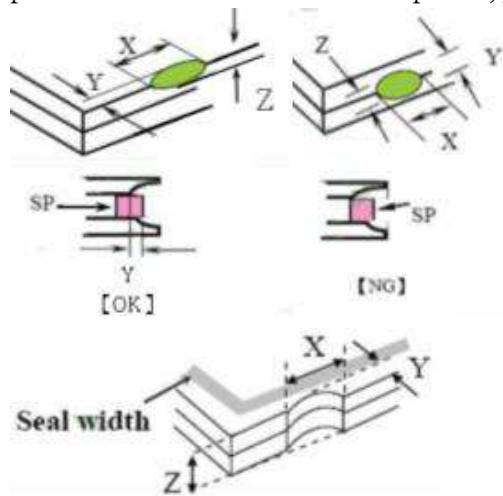
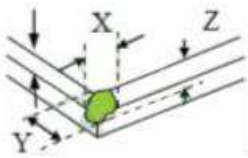
Note 3: Mura and bright dot inspected through 5% transmission ND Filter as following.

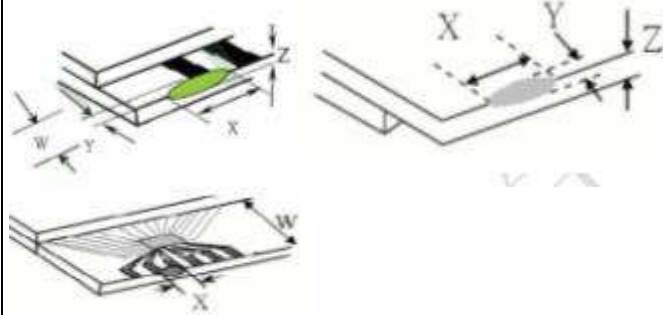
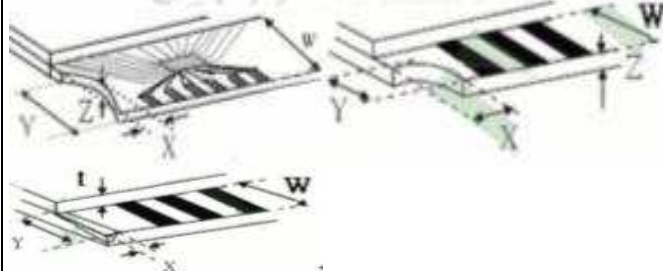
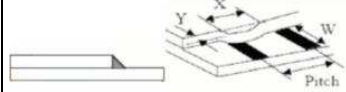
註 4：相鄰 2 個亮點排列的判斷標準如下，請參考 NO.11 為允許數量和亮點大小判斷標準。

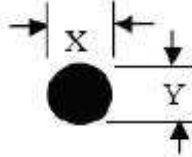
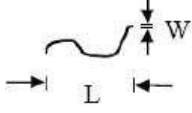
Note 4: The judging criteria for the arrangement of 2 adjacent bright dots are as follows, please refer to NO.11 for the allowable quantity and bright dot size judgment standards.

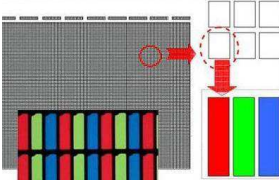
2 dot adjacent is OK	2 dot adjacent vertical is NG	2 dot adjacent slant is NG
		

5. 檢驗標準(Inspection Standard)：

項次 (No)	檢驗項目(Inspection item)	檢驗標準(Inspection Standard)	缺陷等級 (Defect Level)									
1	PACKING &INDICATE	1.1.不可有混入其他型號產品的現象(Mixde product types). 1.2.不可有產品漏工序的現象(The part number is inconsistent with work order of production). 1.3.不可有部件裝反方向的現象(Assembled in inverse direction). 1.4.不可有數量與實際要求不一致的現象(The quantity is inconsistent with work order of production).	主缺 (Maj)									
2	尺寸(Size)	产品尺寸和结构必须符合结构图(Product size and structure must meet the structure diagram)	主缺 (Maj)									
3	玻璃裂纹(The crack of glass)	符號(Symbols): X:破裂長度(Symbols) Y:破裂寬度(The width of crack). Z:破裂厚度(The thickness of crack). W:出電極區 寬度(Terminal length) T:玻璃厚度(The thickness of glass). a:LCD 側面長度(LCD side length). 3.1.一般玻璃破損(General glass chip): 3.1.1.玻璃表面或上、下玻璃組合縫隙之間破損(Chip on panel surface and crack between panels);  <table border="1"><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤a</td><td>裂紋進入 VA 區(Crack can't enter viewing area)</td><td>≤1/2t</td></tr><tr><td>≤a</td><td>裂紋超過 SP 一半的寬度(Crack can't exceed the half of SP width)</td><td>1/2t < Z ≤2t</td></tr></table> 3.1.2.邊角破損(Corner crack)： 	X	Y	Z	≤a	裂紋進入 VA 區(Crack can't enter viewing area)	≤1/2t	≤a	裂紋超過 SP 一半的寬度(Crack can't exceed the half of SP width)	1/2t < Z ≤2t	次缺 (Min)
X	Y	Z										
≤a	裂紋進入 VA 區(Crack can't enter viewing area)	≤1/2t										
≤a	裂紋超過 SP 一半的寬度(Crack can't exceed the half of SP width)	1/2t < Z ≤2t										

項次 (No)	檢驗項目 (Inspection item)	檢驗標準 (Inspection Standard)	缺陷等級 (Defect Level)												
3	玻璃裂纹(The crack of glass)	<table> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>$\leq 1/5a$</td> <td>裂紋進入 VA 區(Crack can't enter viewing area)</td> <td>$\leq 1/2t$</td> </tr> <tr> <td>$\leq 1/5a$</td> <td>裂紋超過 SP 一半的寬度(Crack can't exceed the half of SP width)</td> <td>$1/2t < Z \leq 2t$</td> </tr> </table>	X	Y	Z	$\leq 1/5a$	裂紋進入 VA 區(Crack can't enter viewing area)	$\leq 1/2t$	$\leq 1/5a$	裂紋超過 SP 一半的寬度(Crack can't exceed the half of SP width)	$1/2t < Z \leq 2t$	次缺 (Min)			
		X	Y	Z											
		$\leq 1/5a$	裂紋進入 VA 區(Crack can't enter viewing area)	$\leq 1/2t$											
		$\leq 1/5a$	裂紋超過 SP 一半的寬度(Crack can't exceed the half of SP width)	$1/2t < Z \leq 2t$											
		3.2.出电极端破损(Protrusion over terminal): 3.2.1.电极垫上破损(Chip on electrode pad):  <table> <tr> <td>位置(Position)</td> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>正面(Front)</td> <td>$\leq a$</td> <td>$\leq 1/2W$</td> <td>$\leq t$</td> </tr> <tr> <td>背面(Back)</td> <td>$\leq a$</td> <td>$\leq W$</td> <td>$\leq 1/2t$</td> </tr> </table>	位置(Position)	X	Y	Z	正面(Front)	$\leq a$	$\leq 1/2W$	$\leq t$	背面(Back)		$\leq a$	$\leq W$	$\leq 1/2t$
		位置(Position)	X	Y	Z										
		正面(Front)	$\leq a$	$\leq 1/2W$	$\leq t$										
		背面(Back)	$\leq a$	$\leq W$	$\leq 1/2t$										
		3.2.2.出電極端非電極破損(Non-conductive portion):  <table> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>$\leq 1/3a$</td> <td>$\leq W$</td> <td>$\leq t$</td> </tr> </table>	X	Y	Z	$\leq 1/3a$	$\leq W$	$\leq t$							
		X	Y	Z											
$\leq 1/3a$	$\leq W$	$\leq t$													
備註(Note): 如果破碎部分触及 ITO 電極則不可超過 ITO 電極寬度的 1/3，且必須進行通電測試，不可影響顯示效果 (If the chipped area touches the ITO terminal,over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications).															
3.2.3.玻璃破損(Glass remain) :  <table> <tr> <td>X</td> <td>Y</td> <td>Z</td> </tr> <tr> <td>$\leq a$</td> <td>$\leq 1/3W$</td> <td>$\leq t$</td> </tr> </table>	X	Y	Z	$\leq a$	$\leq 1/3W$	$\leq t$									
X	Y	Z													
$\leq a$	$\leq 1/3W$	$\leq t$													

項次 (No)	檢驗項目(Inspection item)	檢驗標準(Inspection Standard)			缺陷等級 (Defect Level)	
4	黑點、白點異物 (Black or white dot)Round type 	4.1 Round type:			次缺 (Min)	
		尺寸 (Size)	判定標準(Judging standard)			允收數量 (Acceptance(Q'ty))
		Non-display:				
		7.0"	D ≤0.30mm			忽略不計(Ignore)
			0.30mm < D ≤ 0.5mm Distance ≥0.5mm			N ≤4
		Display :				
		7.0"	D ≤ 0.25mm			忽略不計(Ignore)
			0.25mm < D ≤0.5mm			N ≤4
			D > 0.5mm			N ≤0
5	刮痕、線狀異物 (scratch、 contamination) Line type 	5.2 Line type: (display):			次缺 (Min)	
		尺寸 (Size)	判定標準(Judging standard)			允收數量 (Acceptance(Q'ty))
		7.0"	W	L		忽略不計(Ignore)
			W ≤ 0.01mm	—		
			0.01mm < W ≤ 0.05mm	L ≤ 5mm		N ≤4
			W > 0.05mm	L > 5mm		N ≤0
		Non-display				
		7.0"	W	L		忽略不計(Ignore)
			W ≤ 0.01mm	—		
			0.07mm < W ≤ 0.1mm	L ≤ 5mm		N ≤4
6	POL 氣泡(Polarizer Bubble)	視區(area)	判定標準(Judging standard)	允收數量 (Acceptance(Q'ty))	次缺 (Min)	
		A 區(Viewing area)	D < 0.3 mm	忽略不計(Ignore)		
			0.3mm < D ≤0.5mm	N ≤4		
			Distance ≥0.5mm			

項次 (No)	檢驗項目(Inspection item)	檢驗標準(Inspection Standard)	缺陷等級 (Defect Level)																		
7	POL 折痕&分層(The folding and peeled off in polarizer)	偏光片不可有折痕和分層（脫膠）的現象(The folding and peeled off in polarizer are not acceptable). 距離邊緣 0.5mm 不管控(Distance from the edge of 0.5mm regardless of control)	次缺 (Min)																		
8	輝度及均勻性、色度 (Brightness and uniformity、Chroma)	應符合規範或圖紙要求規格(Shall be in accordance with the drawings and specification requirements specifications).	主缺 (Maj)																		
9	MURA	(5% ND Filter) Gray scale 灰階 50%																			
10	電性測試 (Electrical Testing)	1.顯示缺畫(Missing line character and icon). 2.無功能與無顯示(No function or no display). 3.顯示故障(Display malfunction). 4.LCD 視角缺陷(LCD viewing angle defect). 5.消耗電流超出規格(Current consumption exceeds product specifications).	主缺 (Maj)																		
11	亮點(相鄰亮點)、暗點 (Bright dot(Adjacent bright dot)、Dark dot)On-display Pixel: 3 dot in 1 pixel  亮點與連續亮點允收總數量及尺寸請參閱亮點判定標準 Please refer to the bright dot judgment standard for the total number and size of bright dot and adjacent bright dots allowed.	<table border="1"> <thead> <tr> <th>尺寸 (Size)</th><th>Item</th><th>判定標準(Judging standard)</th><th>允收數量 (Acceptance(Q'ty))</th></tr> </thead> <tbody> <tr> <td rowspan="5">7.0"</td><td rowspan="2">Bright dot</td><td>$D \leq 1/2 \text{ Pixel}$</td><td>忽略不計(Ignore)</td></tr> <tr> <td>$1/2 \text{ Pixel} < D \leq 1 \text{ Pixel}$</td><td>$N \leq 2$</td></tr> <tr> <td rowspan="2">Dark dot</td><td>$D \leq 1/2 \text{ Pixel}$</td><td>忽略不計(Ignore)</td></tr> <tr> <td>$1/2 \text{ Pixel} < D \leq 1 \text{ Pixel}$</td><td>$N \leq 3$</td></tr> <tr> <td colspan="2">Total</td><td>$N \leq 4$</td></tr> </tbody> </table>	尺寸 (Size)	Item	判定標準(Judging standard)	允收數量 (Acceptance(Q'ty))	7.0"	Bright dot	$D \leq 1/2 \text{ Pixel}$	忽略不計(Ignore)	$1/2 \text{ Pixel} < D \leq 1 \text{ Pixel}$	$N \leq 2$	Dark dot	$D \leq 1/2 \text{ Pixel}$	忽略不計(Ignore)	$1/2 \text{ Pixel} < D \leq 1 \text{ Pixel}$	$N \leq 3$	Total		$N \leq 4$	次缺 (Min)
尺寸 (Size)	Item	判定標準(Judging standard)	允收數量 (Acceptance(Q'ty))																		
7.0"	Bright dot	$D \leq 1/2 \text{ Pixel}$	忽略不計(Ignore)																		
		$1/2 \text{ Pixel} < D \leq 1 \text{ Pixel}$	$N \leq 2$																		
	Dark dot	$D \leq 1/2 \text{ Pixel}$	忽略不計(Ignore)																		
		$1/2 \text{ Pixel} < D \leq 1 \text{ Pixel}$	$N \leq 3$																		
	Total		$N \leq 4$																		

**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 , _____ |

>> **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 : ____ / ____ / ____

15.Initial Code For Reference

```
void Initial_code()
{
    Write_Command(0x01);    Delay_ms(10);
    Write_Command(0xE2);
    Write_Parameter(0x1D);
    Write_Parameter(0x02);
    Write_Parameter(0x54);    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(0x08);
    Write_Parameter(0x80);
    Write_Parameter(0x03);
    Write_Parameter(0x1F);
    Write_Parameter(0x01);
    Write_Parameter(0xDF);
    Write_Parameter(0x00);

    Write_Command(0xF0);
    Write_Parameter(0x00);
    Write_Command(0x3A);
    Write_Parameter(0x00);

    Write_Command(0xE6);
    Write_Parameter(0x05);
    Write_Parameter(0x53);
    Write_Parameter(0xF7);

    Write_Command(0xB4);
    Write_Parameter(0x20);
    Write_Parameter(0xAF);
    Write_Parameter(0x00);
    Write_Parameter(0xA3);
    Write_Parameter(0x07);
    Write_Parameter(0x00);
    Write_Parameter(0x00);
    Write_Parameter(0x00);
    Write_Parameter(0x00);

    Write_Command(0xB6);
    Write_Parameter(0x01);
    Write_Parameter(0xEF);
    Write_Parameter(0x00);
    Write_Parameter(0x04);
    Write_Parameter(0x01);
```

```
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(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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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 : / / _____