



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.: **WF70C3TYAB4MNC10#**

<p>APPROVED BY: (FOR CUSTOMER USE ONLY)</p>	<p>PCB VERSION: _____ DATA: _____</p>
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SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			周园园
ISSUED DATE: 2023/04/24			

Precaution in use of TFT module: <https://www.winstar.com.tw/technology/download/declaration.html>

MODLE NO :

RECORDS OF REVISION			DOC. FIRST ISSUE
VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2022/10/21		First issue
A	2023/03/15		Add Inspection Specification
B	2023/04/24		Modify Static electricity test & Contour Drawing Modify bending area.

Contents

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2.Summary

3.General Specifications

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1.Module Classification Information

W F 70 C3 T Y A B4 M N C 1 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	A4	240240	B4	2801424						
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 IPS 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.

3.General Specification

Item	Dimension	Unit
Size	7.0	inch
Dot Matrix	280 x RGBx1424(TFT)	dots
Module dimension	43.3(H) x 201.0(V) x 5.23(D)	mm
Active area	33.60 (H) x170.88(V)	mm
Pixel pitch	0.12(H) x 0.12(V)	mm
LCD type	TFT, Normally Black, Transmissive	
Viewing Angle	80/80/80/80	
Aspect Ratio	1:5	
Driver IC	OTA7290B or equivalent	
Interface	4-Lanes MIPI	
CTP Driver IC	FT5446IDQQ or equivalent	
CTP Resolution	X:1424 , Y:280	
CTP FW Version	V03	
Backlight Type	LED, Normally White	
With /Without TP	With CTP	
Surface	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. 60°C, 90% RH MAX. Temp. > 60°C, Absolute humidity shall be less than 90% RH at 60°C

5. Electrical Characteristics

5.1. TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	VCC	3.0	3.3	3.6	V	
Analog supply current	ICC	-	102	120	mA	VCC=3.3V
Logic input voltage	VIH	0.7*VCC	-	VCC	V	
	VIL	GND	-	0.3*VCC	V	

5.2. Touch panel

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power supply voltage	VDD	-	3.3	-	V	
Power supply current	IDD	-	15	-	mA	VDD=3.3V
Logic input voltage	VIH	0.7*VDD	-	VDD	V	
	VIL	GND	-	0.3*VDD	V	

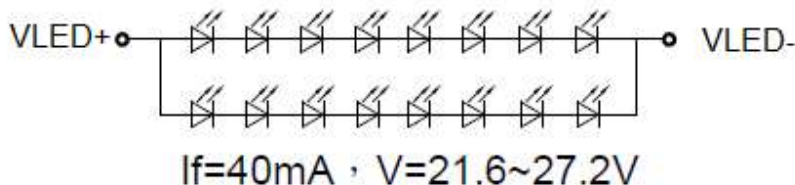
5.3. Backlight Driving Conditions

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	IF	--	40	--	mA	Ta=25°C
LED Voltage	VF	21.6	24	27.2	Volt	Ta=25°C
LED Life-Time	N/A	15,000	--	--	Hour	Ta=25°C Note (2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 oC, typical IL value indicated in the above table until the brightness becomes less than 50%

Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C. and LED typical current. The LED lifetime could be decreased if operating IF is larger than LED typical current. The constant current driving method is suggested.

Note (3) LED light bar circuit :

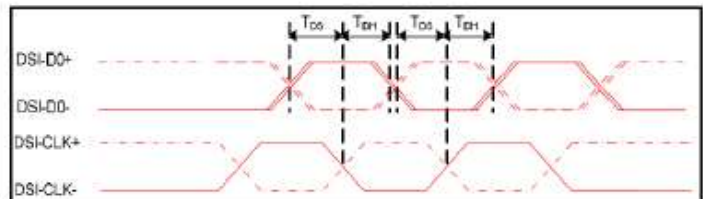
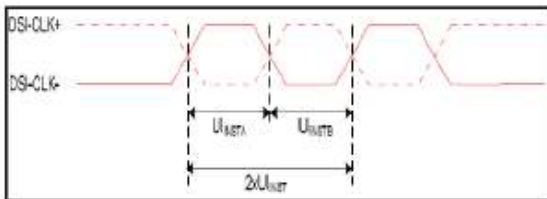


6. Interface Characteristics

6.1. DC characteristics for interface

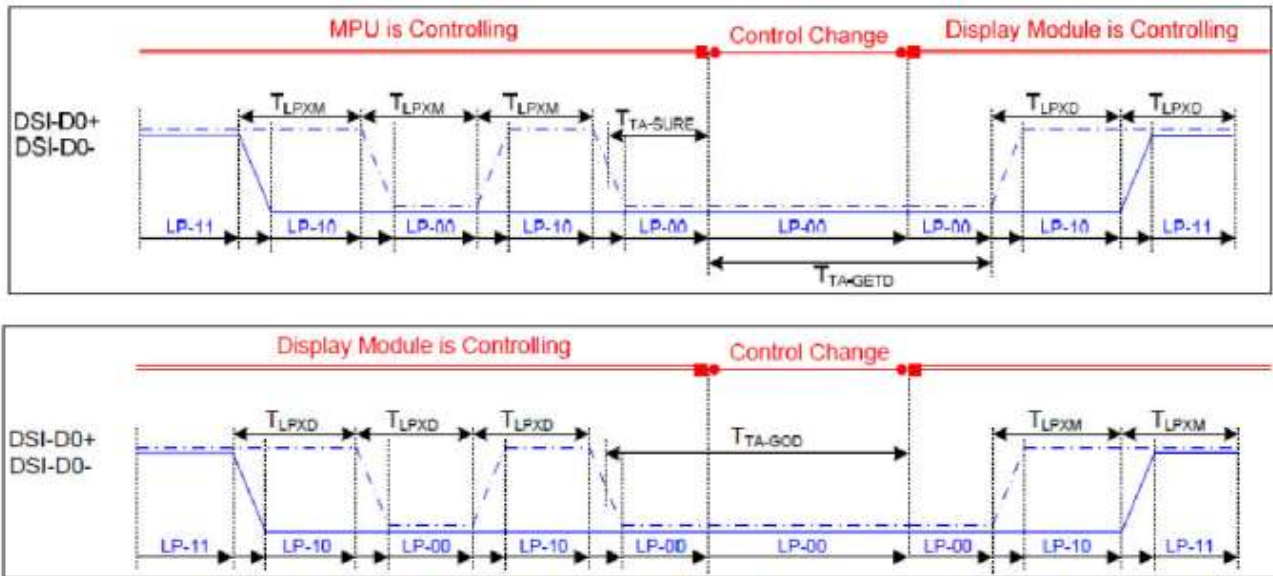
Parameter	Symbol	Condition	Specification			Unit
Input Common Mode Voltage for Clock	V_{CMCLK}	CLKP/N Note 2, Note 3	70	-	330	mV
Input Common Mode Voltage for Data	V_{CMDATA}	DnP/N Note 2, Note 3, Note 5	70	-	330	mV
Common Mode Ripple for Clock Equal or Less than 450MHz	$V_{CMRCLKL450}$	CLKP/N Note 4	-50	-	50	mV
Common Mode Ripple for Data Equal or Less than 450MHz	$V_{CMRDATAL450}$	DnP/N Note 4, Note 5	-50	-	50	mV
Common Mode Ripple for Clock More than 450MHz (peak sine wave)	$V_{CMRCLKH450}$	CLKP/N	-	-	100	mV
Common Mode Ripple for Data More than 450MHz (peak sine wave)	$V_{CMRDATH450}$	DnP/N Note 5	-	-	100	mV
Differential Input Low Level Threshold Voltage for Clock	V_{THCLK-}	CLKP/N	-70	-	-	mV
Differential Input Low Level Threshold Voltage for Data	$V_{THDATA-}$	DnP/N Note 5	-70	-	-	mV
Differential Input High Level Threshold Voltage for Clock	V_{THCLK+}	CLKP/N	-	-	70	mV
Differential Input High Level Threshold Voltage for Data	$V_{THDATA+}$	DnP/N Note 5	-	-	70	mV
Single-ended Input Low Voltage	V_{ILHS}	CLKP/N, DnP/N Note 3, Note 5	-40	-	-	mV
Single-ended Input High Voltage	V_{IHHS}	CLKP/N, DnP/N Note 3, Note 5	-	-	460	mV
Differential Termination Resistor	R_{TERM}	CLKP/N, DnP/N Note 5	80	100	125	Ω
Single-ended Threshold Voltage for Termination Enable	V_{TERMEN}	CLKP/N, DnP/N Note 5	-	-	450	mV
Termination Capacitor	C_{TERM}	CLKP/N, DnP/N Note 5, Note 6	-	-	60	pF

6.2. AC characteristics for interface DSI HS mode



Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-CLK+/-	$2xU_{INSTA}$	Double UI instantaneous	4	25	ns	
DSI-CLK+/-	U_{INSTA} U_{INSTB}	UI instantaneous halves	2	12.5	ns	$UI = U_{INSTA} = U_{INSTB}$
DSI-Dn+/-	t_{DS}	Data to clock setup time	0.15	-	UI	
DSI-Dn+/-	t_{DH}	Data to clock hold time	0.15	-	UI	

DSI LP mode



6.3. Input timings for interface

Item	Symbol	Value			Unit
		Min.	Typ.	Max.	
HS low pulse width	HS		1		DCK
Horizontal back porch	HBP		60		DCK
Horizontal front porch	HFP		80		DCK
Horizontal blanking period	HBLK		NA		DCK
Horizontal active area	HDISP	-	280	-	DCK
Pixel Clock	PCLK		36		MHz
Vertical low pulse width	VS		1		Line
Vertical back porch	VBP		25		Line
Vertical front porch	VFP		35		Line
Vertical blanking period	VBK		NA		Line
Vertical active area	-	-	1424	-	Line
Vertical Refresh rate	VRR	-	60	-	Hz

7. Optical Characteristics

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	Tr+Tf	$\theta=0^\circ$ 、 $\Phi=0^\circ$	-	30	40	.ms	Note 3	
Contrast ratio	CR	At optimized viewing angle	800	1000	-	-	Note 4	
Color Chromaticity	White	Wx	$\theta=0^\circ$ 、 $\Phi=0$	0.29	0.32	0.35	-	Note 2,5,6
		Wy		0.31	0.34	0.37	-	
Viewing angle	Hor.	Θ_R	$CR \geq 10$	-	80	-	Deg.	Note 1
		Θ_L		-	80	-		
	Ver.	Φ_T		-	80	-		
		Φ_B		-	80	-		
Brightness	-	-	400	500	-	cd/m ²	Center of display	
Uniformity	(U)	-	75	80	-	%	Note 5	

Ta=25±2°C,

Note 1: Definition of viewing angle range

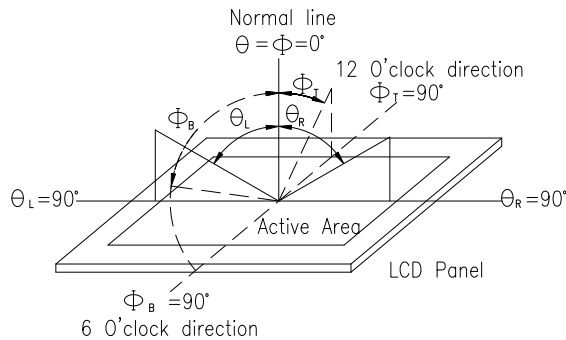


Fig. 7.1. Definition of viewing angle

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.

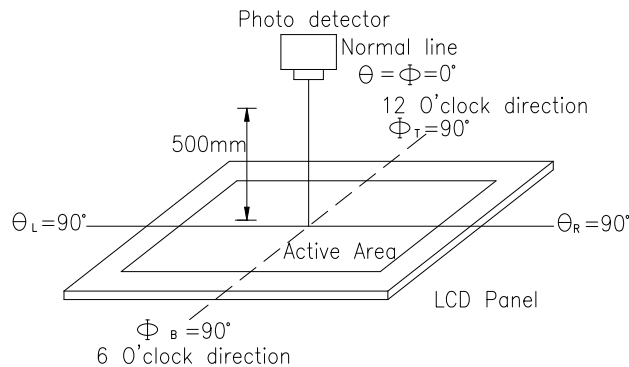
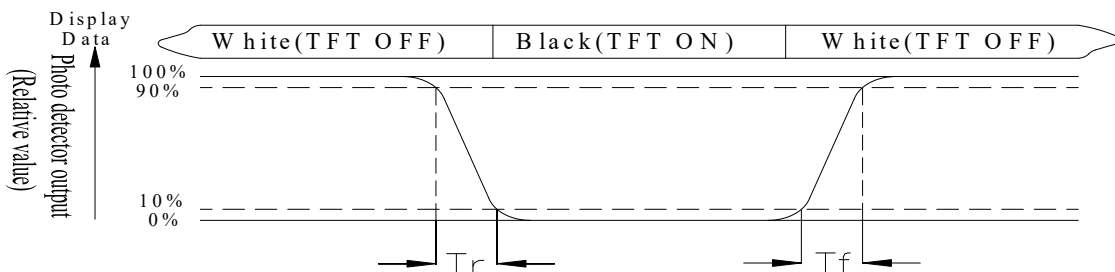


Fig. 7.2. Optical measurement system setup

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

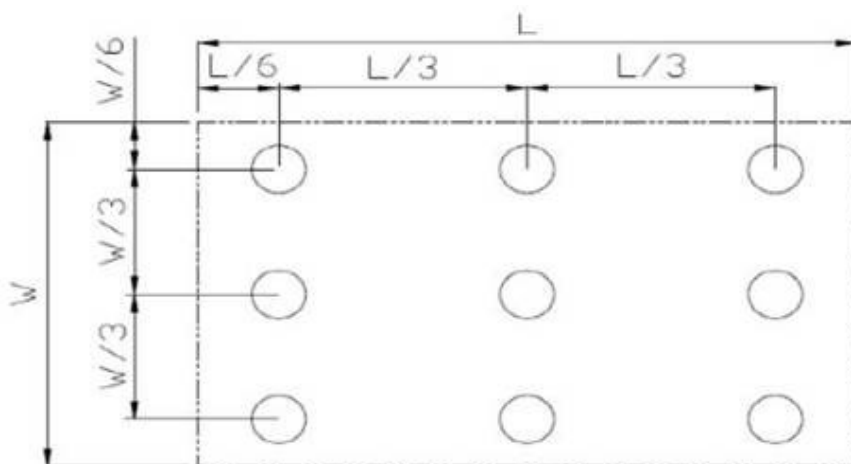


Fig 7.3. Definition of uniformity

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.

8.Interface

8.1. LCM PIN Definition

NO.	Symbol	Description
1	GND	Ground
2	D3N	Negative polarity of low voltage differential data signal
3	D3P	Positive polarity of low voltage differential data signal
4	GND	Ground
5	D2N	Negative polarity of low voltage differential data signal
6	D2P	Positive polarity of low voltage differential data signal
7	GND	Ground
8	CLKN	Negative polarity of low voltage differential clock signal
9	CLKP	Positive polarity of low voltage differential clock signal
10	GND	Ground
11	D1N	Negative polarity of low voltage differential data signal
12	D1P	Positive polarity of low voltage differential data signal
13	GND	Ground
14	D0N	Negative polarity of low voltage differential data signal
15	D0P	Positive polarity of low voltage differential data signal
16-17	GND	Ground
18	TE	Tearing effect output pin to synchronize to frame writing. If not used, open this pin
19	RESET	Reset signal pin
20	GND	Ground
21-23	VCC	Power supply
24	GND	Ground
25-26	NC	Not connect
27-28	VLED-	LED cathode
29-30	VLED+	LED anode

8.2. Touch FPC Pin Assignment

NO.	Symbol	Description
1	GND	Ground
2	INT	Interrupt request to the host
3	RST	Wakeup request from the host
4	SDA	I2C data input and output
5	SCL	I2C clock input
6	VDD	Power supply

9. Reliability

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

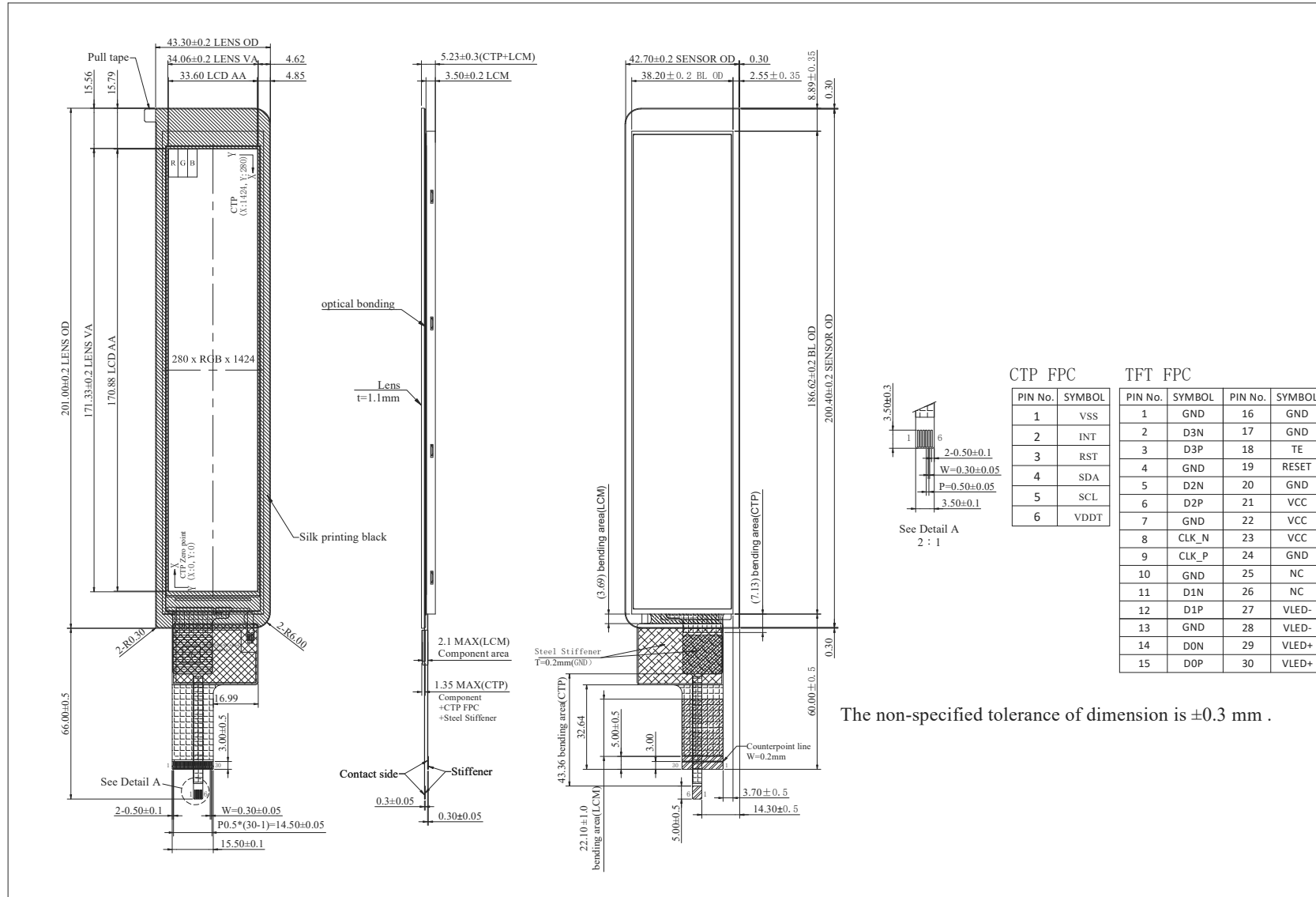
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature 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="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 : 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 finished product housing.	VS=±6KV(contact), ±8KV(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.

10. Contour Drawing



CTP FPC

PIN No.	SYMBOL
1	VSS
2	INT
3	RST
4	SDA
5	SCL
6	VDDT

TFT FPC

PIN No.	SYMBOL	PIN No.	SYMBOL
1	GND	16	GND
2	D3N	17	GND
3	D3P	18	TE
4	GND	19	RESET
5	D2N	20	GND
6	D2P	21	VCC
7	GND	22	VCC
8	CLK_N	23	VCC
9	CLK_P	24	GND
10	GND	25	NC
11	D1N	26	NC
12	D1P	27	VLED-
13	GND	28	VLED-
14	D0N	29	VLED+
15	D0P	30	VLED+

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

11. Inspection Specification

11.1. Purpose:

This Incoming Inspection Standards shall be apply to TFT-LCD Module +Touch Module.

11.2. Appearance Specification:

1. Inspection Environment Conditions

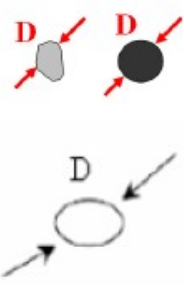
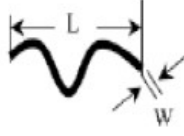
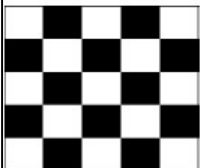
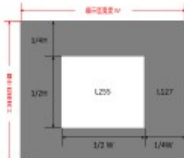
1. Temperature: $25 \pm 5^{\circ}\text{C}$.
2. Humidity: $60 \pm 10\%$ RH.
3. Illumination: exterior is 1000 ± 200 Lux picture quality is 500 ± 50 Lux
4. Inspection Viewing distance: 35 ± 5 cm.
5. Inspection View angle: Viewing angle is normal to the LCD panel.

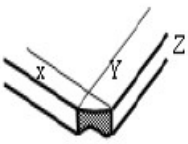
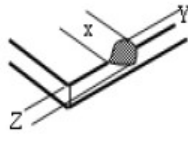
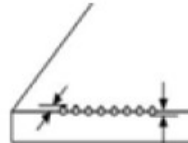
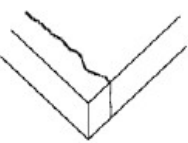

2. Visual inspection criteria

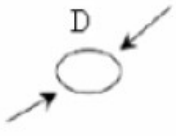

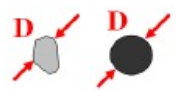
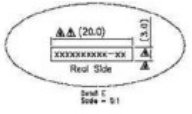
Defect type		Criteria
Electrical defect	Area	ALL
	Bright Dots (Note 2)	$N \leq 0$
	Dark Dots (Note 3)	$N \leq 4$
	Bright Dot- 2 Adjacent (Note 4)	$N \leq 0$
	Dark Dots- 2 Adjacent (Note 5)	$N \leq 0$
	Dark or Bright Dots- 3 and More Adjacent (Note 6)	$N \leq 0$
	Total Dark/ Bright Dots	$N \leq 4$
	Minimum Distance Between Bright Dots(Note)	N/A
	Minimum Distance Between Dark Dots (Note 7)	≥ 5 mm
	Minimum Distance Between Dark Dots- 2 Adjacent	N/A
	Minimum Distance Between Dark And Bright Dots	N/A
	Mura & Leak(Note 11)	ND5%

3 Appearance Specification:

Picture quality inspection:

Item	Appearance Specification	Paradigm
Circular (lack & White Spot/Bubble/Dent / Foreign Material) (Can't wipe)	1. Active Area: <ul style="list-style-type: none"> • $D < 0.15\text{mm}$: Ignored • $0.15\text{mm} \leq D \leq 0.25\text{mm}$, $N \leq 4$ (Minimum Distance $\geq 10\text{mm}$) • $0.25\text{mm} \leq D \leq 0.4\text{mm}$, $N \leq 3$ (Minimum Distance $\geq 10\text{mm}$) • $D > 0.4\text{mm}$: Not Allowed 2. Non Active Area: <ul style="list-style-type: none"> • Front Side (Cover Lens side): Same as Active Area. • Rear Side (Sensor Side): Ignored 	
Linear (Scratch/ Foreign Material/ Dirty/ yarn)	1. Active Area: <ul style="list-style-type: none"> • $W \leq 0.05\text{mm}$: Ignored • $0.05\text{mm} < W \leq 0.07\text{mm}$, $L \leq 7\text{mm}$ $N \leq 4$; Distance $\geq 15\text{mm}$. • $0.07\text{mm} < W \leq 0.1\text{mm}$, $L \leq 8\text{mm}$ $N \leq 3$; Distance $\geq 15\text{mm}$. • $W > 0.1\text{mm}$, $L > 8\text{mm}$: Not Allowed 2. Non Active Area: <ul style="list-style-type: none"> • Front Side (Cover Lens side): Same as Active Area. • Rear Side (Sensor Side): Ignore. But cannot cause tracing broken and BM light leakage. 	
Image Sticking	Light on 5x5 checkerboard for 3 seconds , switch to L127 screen disappears within 1 second without image residue.	
Crosstalk	Judgment according to the Mura judgment specification.	

Cosmetic inspection:		
Corner Chipping	1. Front side: Not Allowed 2. Rear Side: <ul style="list-style-type: none"> • $Y \leq 0.1\text{mm}$, X Length disregard: Ignored • $Y < 0.5\text{mm}$, $X < 0.5\text{mm}$, $Z < 1/2t$ (Glass thickness): OK • No impact on function. (When the four corners are R , they are not judged by the corner Chipping specifications , please judge by the edge chipping specifications.)	
Edge Chipping	1. Front side: Not Allowed 2. Rear Side: <ul style="list-style-type: none"> • $Y \leq 0.1\text{mm}$, X Length disregard: Ignored. • $Y < 0.3\text{mm}$, $X < 0.3\text{mm}$, $Z < 1/2t$ (Glass thickness): OK • No impact on function. 	
Continuous Chipping	Continuity chipping at the edge $D \leq 0.15\text{mm}$: Allowed	
Crack	Not allowed	
Edge Protruding	Not allowed	

	<p>Light leakage of dot type (Pin Holes):</p> <ul style="list-style-type: none"> • $D \leq 0.1\text{mm}$, N Ignored: OK • $0.1\text{mm} < D \leq 0.2\text{mm}$, $N \leq 3$, Distance of two defects $\geq 20\text{mm}$: OK • $D > 0.2\text{mm}$: Not Allowed • Pin holes from OD within $W < 0.2\text{mm}$ range: OK • Translucent or IR ink area and outward 10mm: Not Allowed 	
Ink / BM Area	<p>Light leakage of ink saw edge: (Judging from the front, measuring from trough to crest)</p> <ol style="list-style-type: none"> 1). Visual Area , $S \leq 0.15\text{mm}$: OK 2). Logo & ICON & translucent area , $S \leq 0.1\text{mm}$: OK 3). Product outline dimension(O.D) edge ink light leakage: <ul style="list-style-type: none"> • $S \leq 0.1\text{ mm}$: Ignored • $S > 0.1\text{ mm}$, $L < 10\text{ mm}$, $N \leq 5$: Allowed to ink re-work • $S > 0.1\text{ mm}$, $L > 10\text{ mm}$ or $N > 5$: NG • Ink re-work: <p>The length after re-work $\leq 10\text{ mm}$, No light leakage and color difference from the front: OK</p> 	
	<p>The ink re-work of light leakage:</p> <ol style="list-style-type: none"> 1). The thickness of ink re-work $\leq 0.015\text{mm}$: Allowed 2). The point of ink re-work: $D \leq 2.5\text{mm}$, $N \leq 5$: Allowed 3). The line of ink re-work: $W \leq 2.5\text{mm}$, $L \leq 20\text{mm}$, $N \leq 3$: Allowed 4). After ink re-work can't affect the front appearance specification color difference and affixing process. 	
	<p>The foreign material of Logo / ICON / Translucent area:</p> <ol style="list-style-type: none"> 1). $D \leq 0.10\text{mm}$, N Ignored: OK 2). $0.10\text{mm} < D \leq 0.15\text{mm}$, $N \leq 1$: OK 3). $D > 0.15\text{mm}$: Not Allowed 	
	<p>Logo / Translucent Area / ICON:</p> <ol style="list-style-type: none"> 1). Printing disconnection: NG 2). Printing color error: NG 	
	<p>Part number printing: Peeling to unable to recognize: Not Allowed</p>	
Residue of Peelable glue	<ol style="list-style-type: none"> 1. Active Area: Residue Not Allowed 2. Non Active Area: Ignored (Can be removed) 	
Pad	<p>Pad 、 Metal trace corrosion: Not Allowed</p>	

Peeling	1. Metal ITO peeling by visual inspection: Not Allowed 2. BM area: Allowed to re-work with ink pen.	
FPC	FPC Crack 、 broken 、 Dead-foil: Not Allowed	
Dirty	1.Cleanable dirty (Use clean room special wiper , dust-free clean cloth or dust-free cotton swab to take moderate solvent<such as: alcohol or Ethanol> and other effective cleaning method can wipe the dirty) 2.Cleanable don't account into defect. (Wipe time is ≤ 15 seconds) 3.The uncleanable dirty is visible from front side can judge as the circular & liner foreign material defect specification.	

D: diameter , N: number , W: horizontal width , L: vertical height

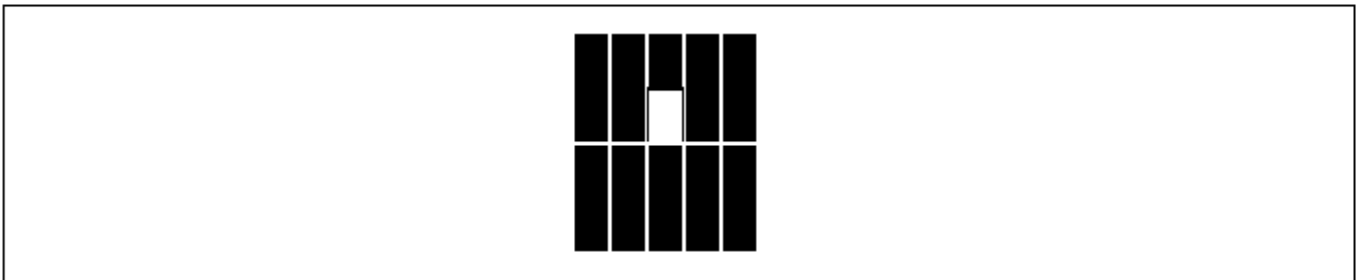
The defect that are not defined above and considered to be problem shall be reviewed and discussed by both parties.

Note (1).

- a. Every dot herein means sub-pixel(Each Red , Green , Blue Color).
- b. Damaged less than half size of sub-pixel is not counted as defect.
- c. Extraneous substances which can be wiped out are not considered as defect.
- d. Defects which is on the Black Matrix(Outside of Active Area) are not considered as defect.

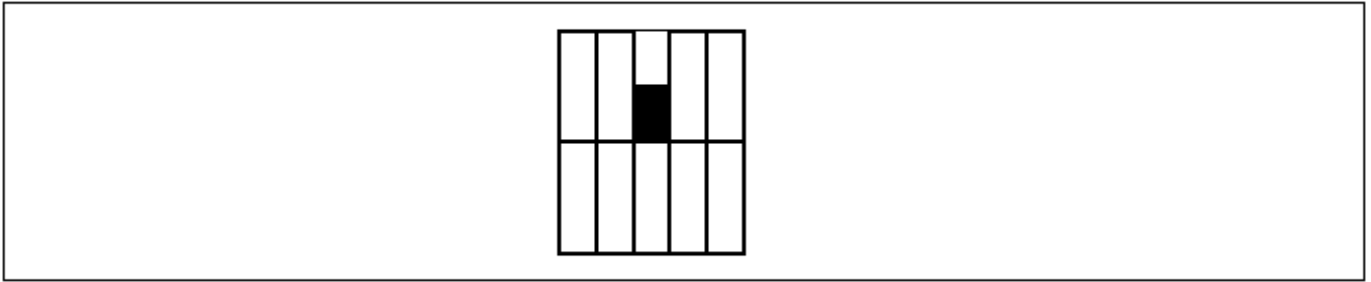
Note (2). Bright dot defect definition.

-bright area is more than 50% of one dot .All bright dot defect must be visible through 5% ND filter , the bright invisible with ND filter is no count.

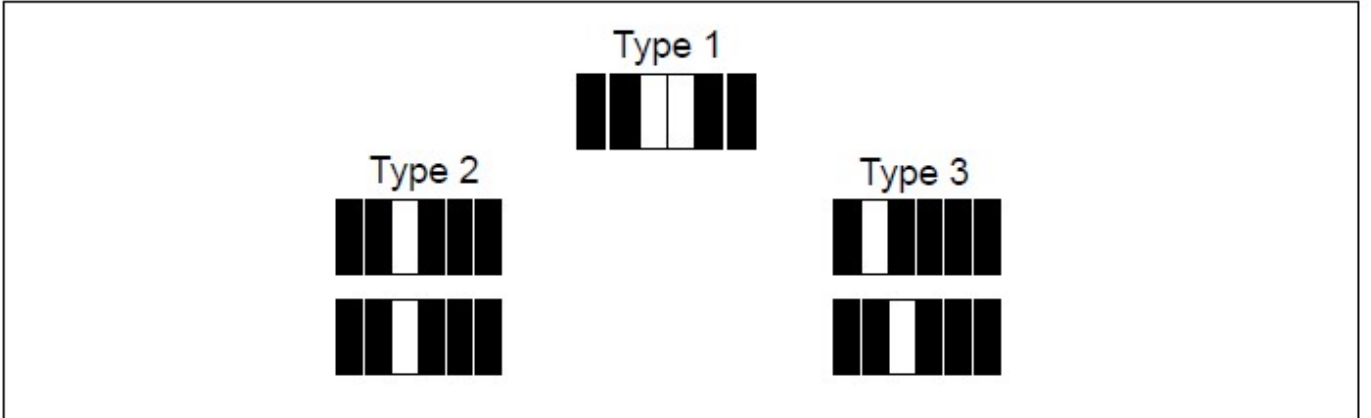


Note (3). Dark dot defect definition.

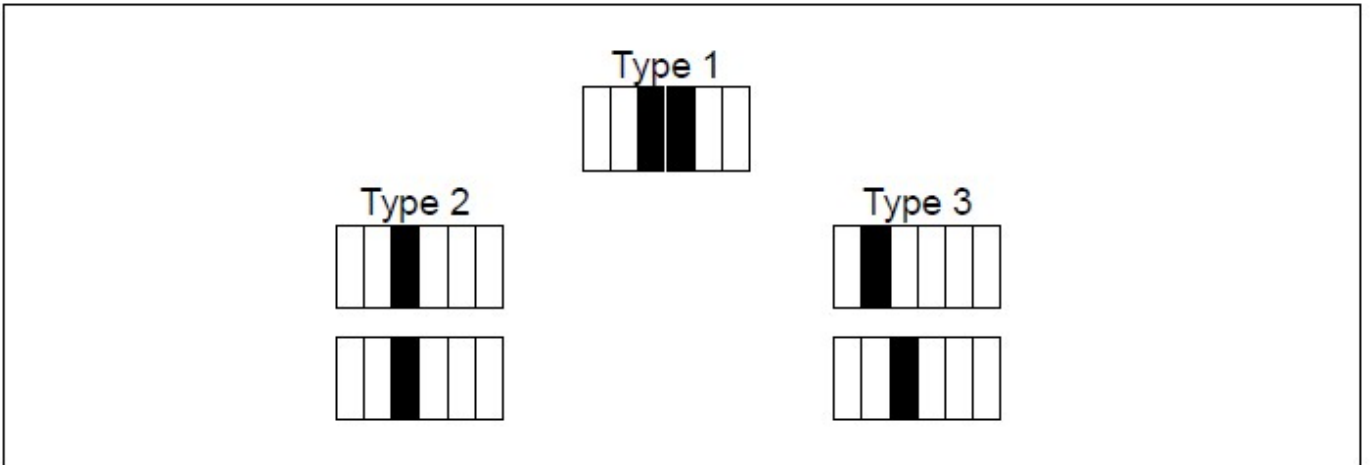
-Dark area is more than 50% of one dot. All dark dot defect must be visible through 5% ND filter. the dark invisible with ND filter is no count.



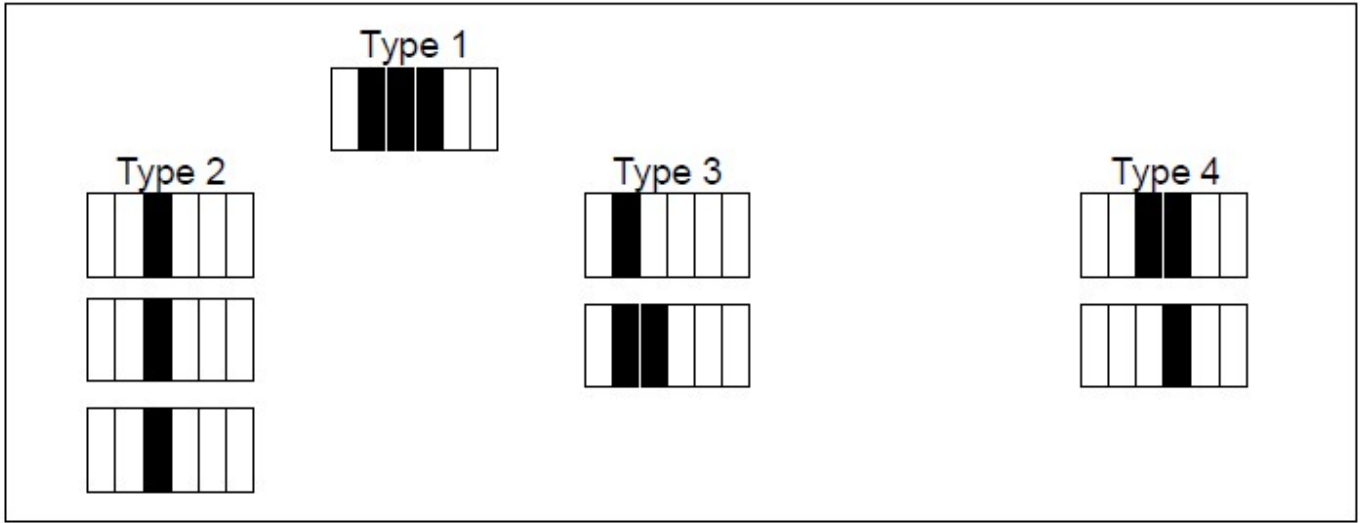
Note (4). Bright dot defect description.
 - Two adjacent



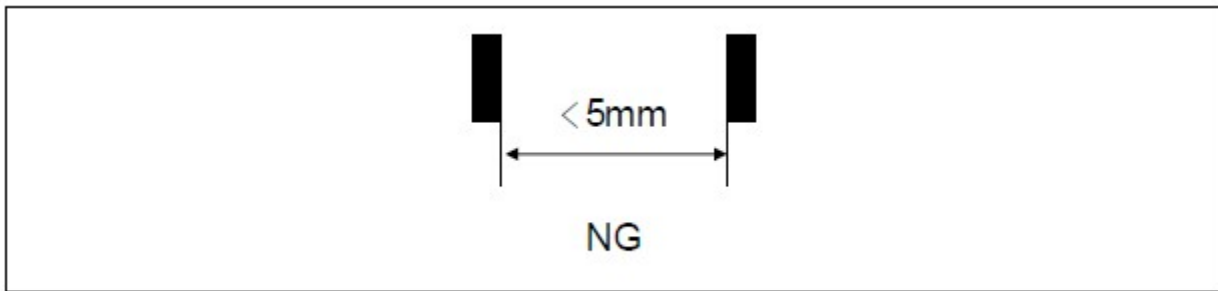
Note (5). Dark dot defect description.
 - Two adjacent



Note (6). Note (7) Dark dot defect description.
 - Three adjacent



Note (7). Minimum distance between dot defects.
 Dark dot to dark dot

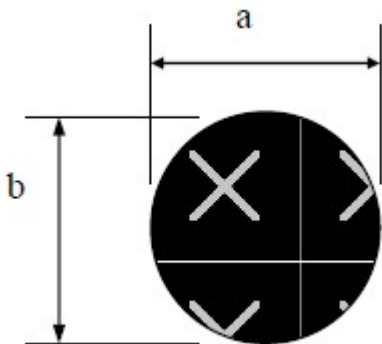


Note (8). linear foreign material is determined by following order

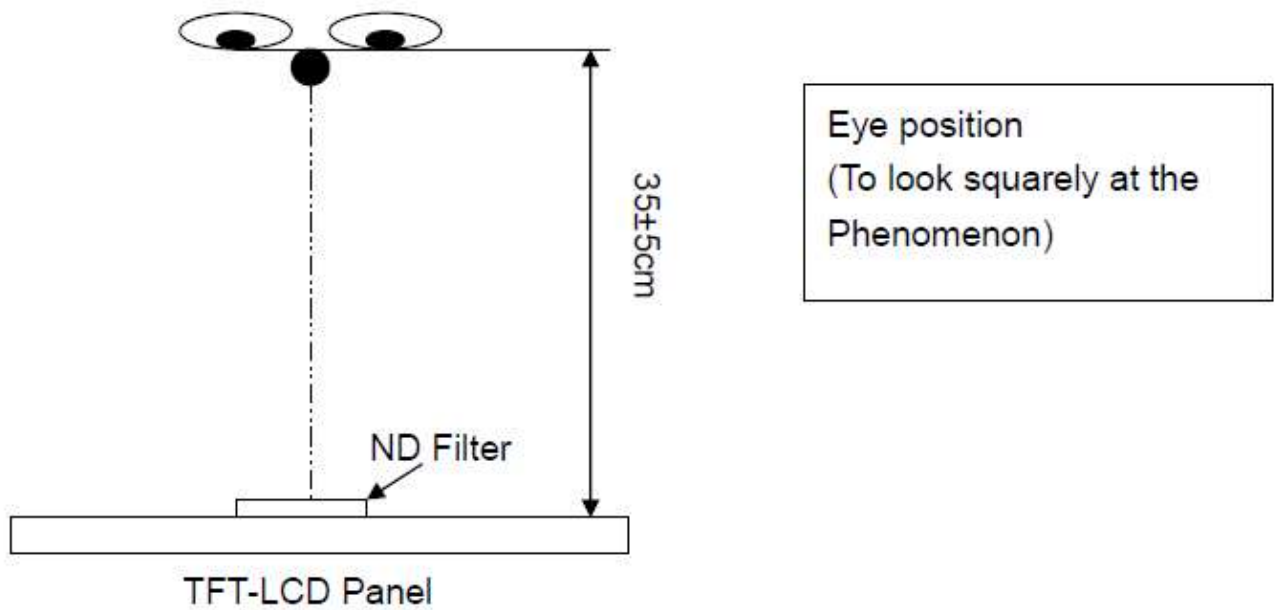
1. With ND filter , if invisible , no count.
2. If visible with ND filter , compare with the standard of size and quantity

Note (9). "Average Diameter" description

$$\text{Average Diameter} = (a+b)/2$$



Note (10). Bright dot, mura and leak are defined through transmission ND Filter as following.



Note (11). Cleaning method: Don't clean the panel back and forth. Using clean cloth with alcohol to clean panel, Switch to clean cloth moistened with acetone. Acetone doesn't be used at the ink zone.

Note (12). Take method: Only take from the side. Not touch surface.

Note (13). It always only checks the front side if definition is not clear.



Note (14). Life time and storage condition.

To prevent quality problem caused by external environment, this product should be stored below storage condition and Winstar 12 month.

Storage temperature range : 25±5°C

Storage humidity range: 50±20%RH



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 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 , _____

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Winstar Module Number : _____

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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 : / / _____