TFT DISPLAY SPECIFICATION

WINSTAR Display Co.,Ltd.

華凌光電股份有限公司

Winstar Display Co., LTD
華凌光電股份有限公司
WEB: https://www.winstar.com.tw E-mail: sales@winstar.com.tw

SPECIFICATION

CUSTOMER : _____

MODULE NO.: WF0840ASWAMLNB0#

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

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2025/02/04			

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

Winstar Display Co., LTD 華凌光電股份有限公司	MODLE NO：
RECORDS OF REVISION	**DOC. FIRST ISSUE**

VERSION	DATE	REVISED PAGE NO.	**SUMMARY**
0	2022/03/16		First issue
A	2022/07/19		Modify Reliability
B	2025/02/04		Modify Reliability

Contents

1.Module Classification Information

W	F	0840	A	S	W	A	M	L	N	B	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：8.4” 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 8.4” is color TFT-LCD (Thin Film Transistor Liquid Crystal Display) ODF cell. The 8.4” screen produces a high-resolution image that is composed of 1024*BGR*768 pixel elements in a stripe arrangement.

3.General Specifications

Item	Dimension	Unit
Screen Diagonal	8.4	inch
Number of Pixels	1024 x 3(BGR) x 768	dots
Module dimension	199.5 x 149.0 x 14.3	mm
Active area	170.8032 (H) x 128.1024(V)	mm
Pixel pitch	0.1668 × 0.1668	mm
Display Mode	Normally Black , Transmissive	
Viewing Angle	80/80/80/80	
TFT Drive IC	ST5821AH+ST5084AA or Equivalent	
TFT Interface	LVDS	
Backlight Type	LED,Normally White	
Aspect Ratio	4:3	
Side screw torque	Typ:0.9 Max:1.3 (Unit,Kgf-cm)	
CTP IC	EXC81W32 or equivalent	
CTP Interface	USB (I2C available)	
CTP FW Version	00_T1_M03	
CTP Resolution	16384x16384	
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	-30	—	+80	℃
Storage Temperature	TST	-30	—	+80	℃

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

1. Temp. ≦60℃, 90% RH MAX. Temp.＞60℃, Absolute humidity shall be less than 90% RH at 60℃

5.Electrical Characteristics

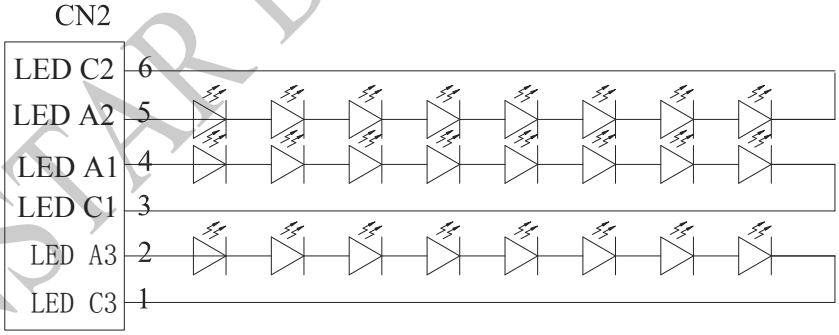
5.1. Operating conditions:

Item		Symbol	Min	Typ	Max	Unit	Remark
Supply Voltage For Logic		V_{DD}	3.0	3.3	3.6	V	—
Power Supply For Current		V_{DD}=3.3V	—	330	495	mA	—
Input Voltage	H level	V_{IH}	$0.7V_{DD}$	—	V_{DD}	V	SC.MODE
	L Level	V_{IL}	GND	—	$0.3V_{DD}$	V	
Supply CTP		USB_VDD 5V	4.4	5.0	5.5	V	USB type
		$I_{VDD\ 5V}$	—	45	68	mA	
		VDDT	2.8	3.3	3.5	V	I2C type
		I_{VDDT}	—	45	68	mA	

5.2. Backlight Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply voltage of white LED backlight	VLED	21.6	24.0	27.2	V	Note 1
Current for LED backlight	ILED	—	90*3	—	mA	
LED life time	—	—	100,000	—	Hr	Note 3

Note 1 : There are 1 Groups LED



CIRCUIT DIAGRAM (8X3 =24 DICES)

Note 2 : Ta = 25 ℃
Note 3 : Brightness to be decreased to 50% of the initial value
Note 4 : The single LED lamp case

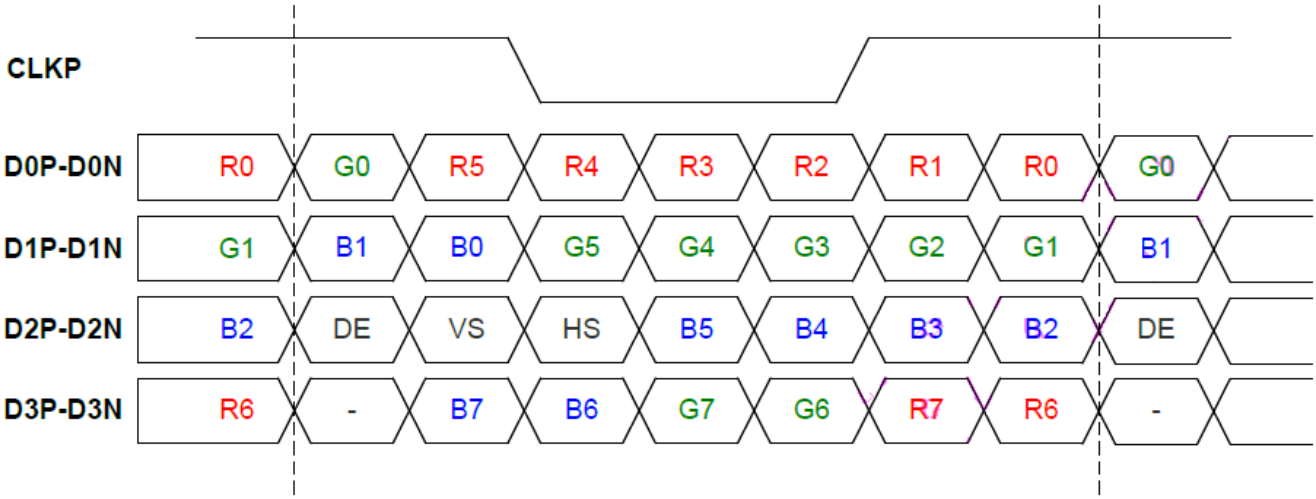
6.Timing characteristics

6.1. LVDS Video timing

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
CLK frequency	t_{CLK}	48.4	52.4	61.5	Mhz	
Horizontal blanking time	t_{HBT}	20	56	180	t_{CLK}	t_{HBP} + t_{HFP}
Horizontal back porch	t_{HBP}	5	5	180- t_{HFP}	t_{CLK}	
Horizontal display area	t_{HD}	1024	1024	1024	t_{CLK}	
Horizontal front porch	t_{HFP}	15	51	175	t_{CLK}	
Horizontal period	t_H	1044	1080	1204	t_{CLK}	
Horizontal pulse width	t_{HPW}	1	1	256	t_{CLK}	
Vertical blanking time	t_{VBT}	5	40	83	t_H	t_{VBP} + t_{VFP}
Vertical back porch	t_{VBP}	2	2	83- t_{VFP}	t_H	
Vertical display area	t_{VD}	768	768	768	t_H	
Vertical front porch	t_{VFP}	3	38	81	t_H	
Vertical period	t_V	773	808	851	t_H	
Vertical pulse width	t_{VPW}	1	1	128	t_H	

6.2. TCON mode LVDS interface data mapping

VESA data mapping



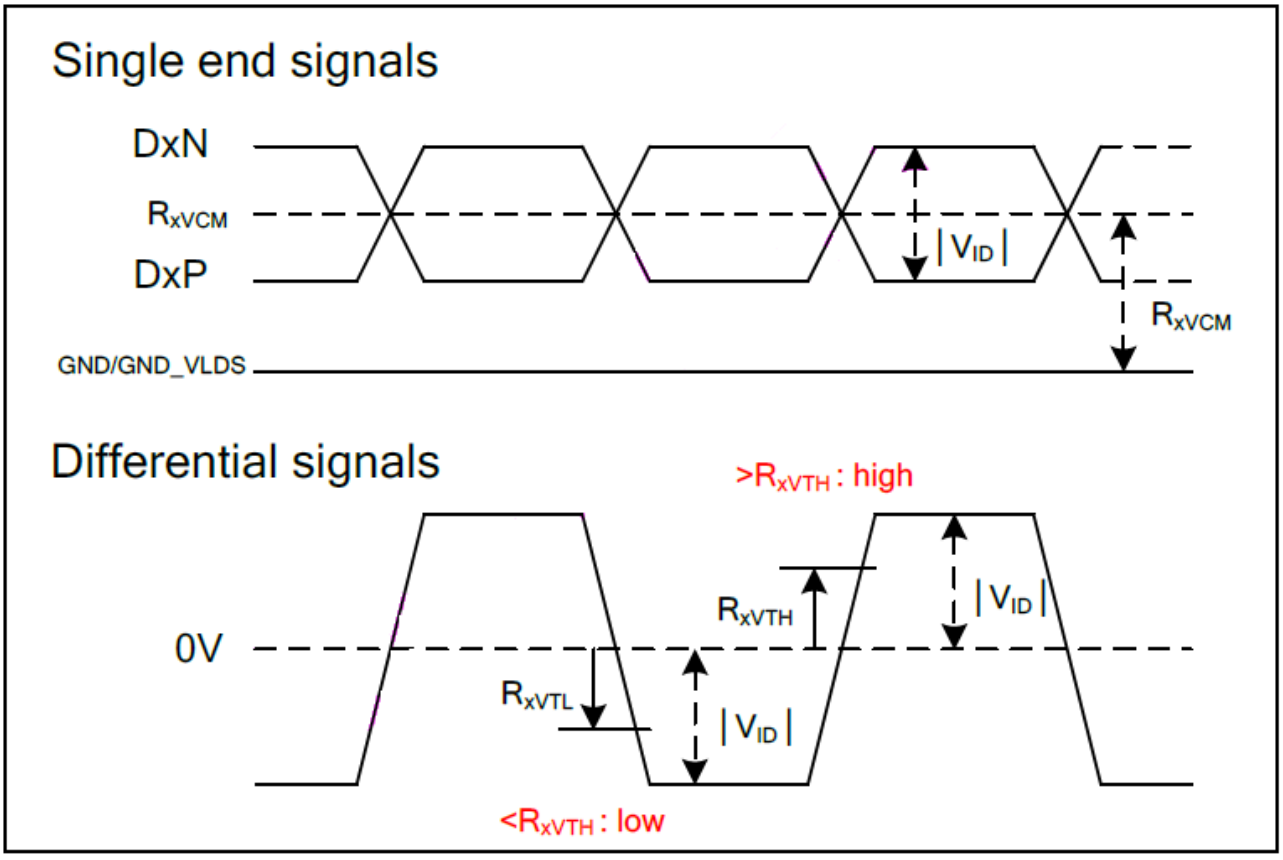
Note 1 : for 6 bit mode, MSB are R/G/B[5] and R/G/B[0] are LSB
Note 2 : for 8 bit mode, MSB are R/G/B[7] and R/G/B[0] are LSB

6.3. LVDS receiver characteristic

(Receiver Differential Input：D0P~D3P, D0N~D3N, CLKP, CLKN)

(VDD=VDD_LVDS=3.0~3.6V, GND=GND_LVDS=0V, TA=-40~95℃)

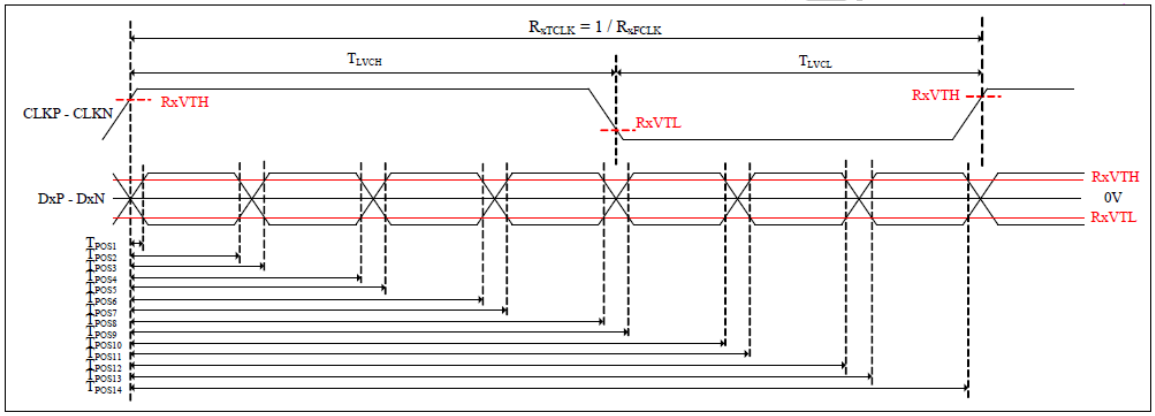
Parameter	Symbol	Min	Typ.	Max.	Unit	Conditions
Differential input high threshold voltage	R_{xVTH}			0.1	V	R_{xVCM} = 1.2V
Differential input low threshold voltage	R_{xVTL}	-0.1			V	
Input voltage range (singled-end)	R_{xVIN}	0		VDD-1.0	V	
Differential input common mode voltage	R_{xVCM}	0.6	1.2	2.4-| V_{ID} | /2	V	
Differential input voltage	| V_{ID} |	0.2	0.4	0.6	V	
Differential input leakage current	RV_{xliz}	-10		10	uA	
LVDS Digital Operating Current	I_{VDD_LVDS}	-	25	35	mA	F_{CLK}=65 MHz , VDD_LVDS=3.3V Data pattern=55/H → AA/H (loop)
LVDS Digital Stand-by Current	I_{STBD_LVDS}	-	10	50	uA	RSTB=0 or STBYB=0 All functions are stopped CLKx & D0x connect to GND

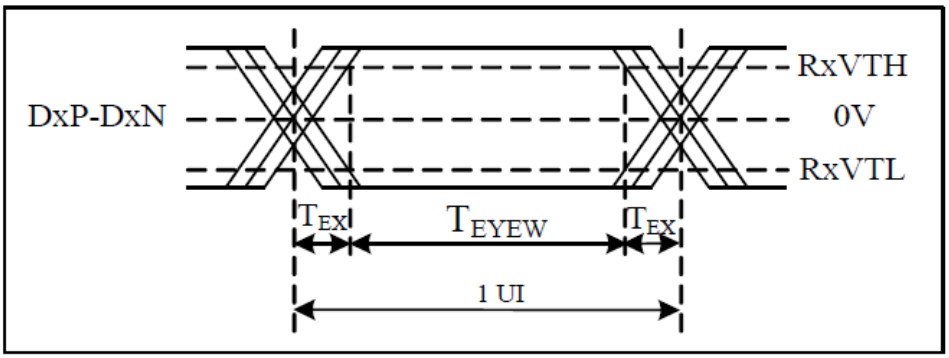


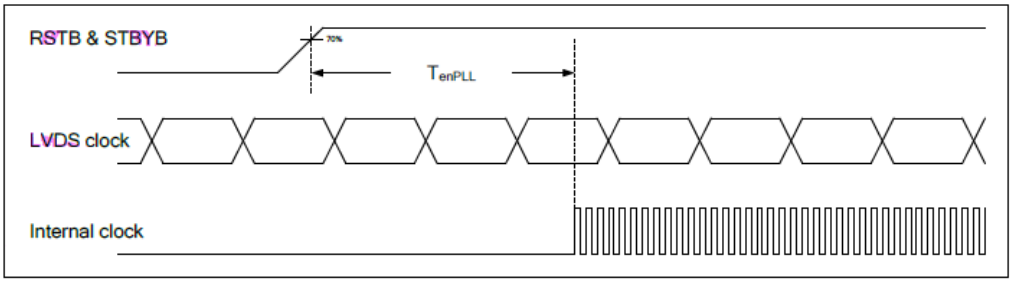
LVDS AC characteristic

(VDD=VDD_LVDS=3.0~3.6V, GND=GND_LVDS=0V, TA=-40~95℃)

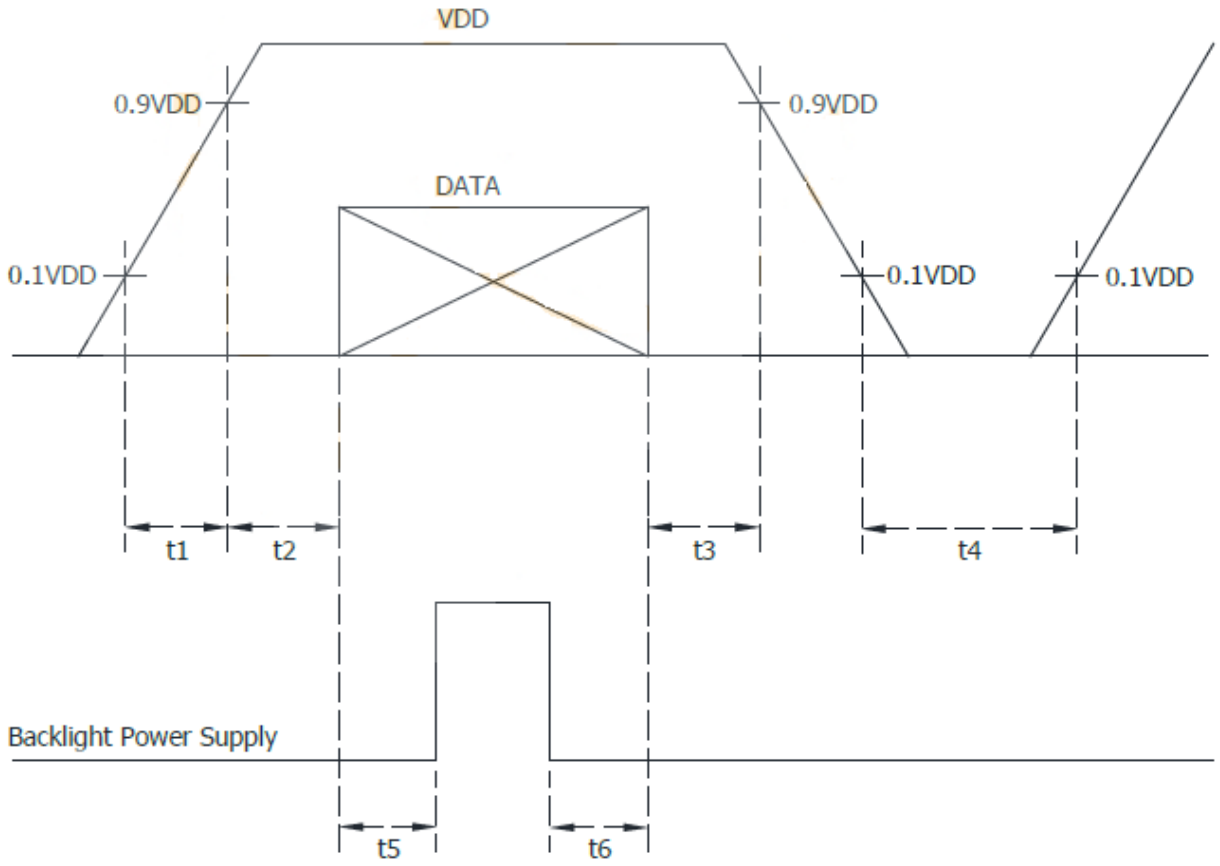
Parameter	Symbol	Min	Typ.	Max.	Unit	Conditions
Clock Frequency	R_{xFCLK}	20		80	MHz	
Clock Period	R_{xTCLK}	12.5		50	ns	
1 data bit time	UI	-	1/7	-	R_{xTCLK}	
Clock high time	T_{LVCH}		4		UI	
Clock low time	T_{LVCL}		3		UI	
Position 1	T_{POS1}	-0.25	0	0.25	UI	
Position 2	T_{POS2}	0.75	-	1.25	UI	
Position 3	T_{POS3}	0.75	1	1.25	UI	
Position 4	T_{POS4}	1.75	-	2.25	UI	
Position 5	T_{POS5}	1.75	2	2.25	UI	
Position 6	T_{POS6}	2.75	-	3.25	UI	
Position 7	T_{POS7}	2.75	3	3.25	UI	
Position 8	T_{POS8}	3.75	-	4.25	UI	
Position 9	T_{POS9}	3.75	4	4.25	UI	
Position 10	T_{POS10}	4.75	-	5.25	UI	
Position 11	T_{POS11}	4.75	5	5.25	UI	
Position 12	T_{POS12}	5.75	-	6.25	UI	
Position 13	T_{POS13}	5.75	6	6.25	UI	
Position 14	T_{POS14}	6.75	-	7.25	UI	
Input eye width	T_{EYEW}	0.5	-	-	UI	
Input eye border	T_{EX}	-	-	0.25	UI	
PLL wake-up time	TenPLL			150	us	







6.4. Power Sequence



1.5ms < t1 < 3ms ; t2 > 100ms
t3 > 100ms ; t4 > 200ms
t5 > 500ms ; t6 > 500ms
DATA : LVDS, MODE ,SC

7.Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr+ Tf	θ=0°、Φ=0°	-	25	35	.ms	Note 3
Contrast ratio		CR	At optimized viewing angle	800	1000	-	-	Note 4
Color Chromaticity	White	Wx	θ=0°、Φ=0	0.244	0.294	0.344	-	Note 2,6,7
		Wy		0.257	0.307	0.357	-	
Viewing angle	Hor.	ΘR	CR≧10	-	80	-	Deg.	Note 1
		ΘL		-	80	-		
	Ver.	ΦT		-	80	-		
		ΦB		-	80	-		
Brightness		-	-	700	800	-	cd/m^2	Center of display
Uniformity		(U)	-	70	-	-	%	Note 5

Ta=25±2℃

Note 1: Definition of viewing angle range

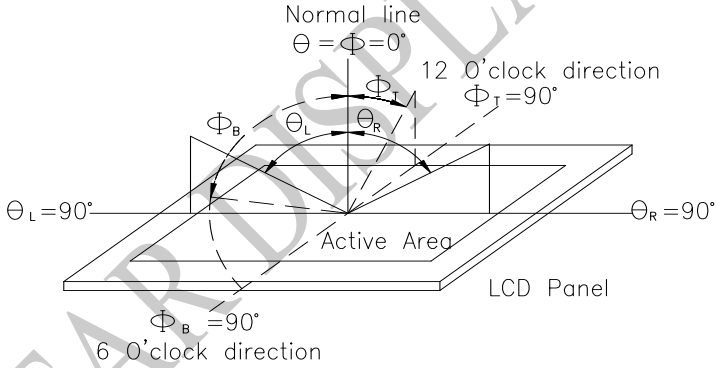


Fig. 7.1. Definition of viewing angle

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.

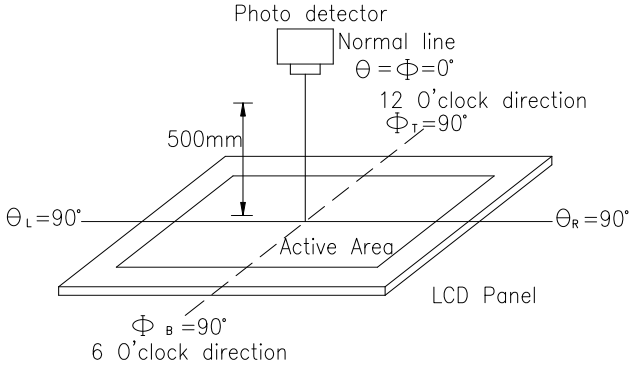
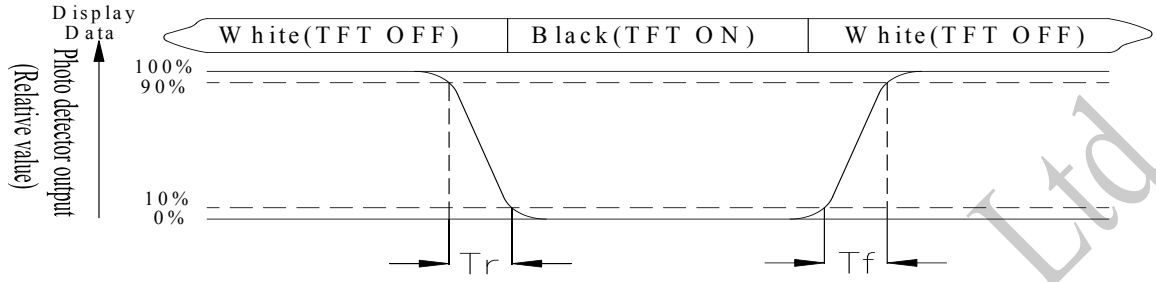


Fig. 7.2. Optical measurement system setup

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, Tr, is the time between photo detector output intensity changed from 90%to 10%. And fall time, Tf, is the time between photo detector output intensity changed from 10%to 90%



Note 4: Definition of contrast ratio:
The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.
Luminance Uniformity (U) = Lmin/Lmax x100%
L = Active area length
W = Active area width

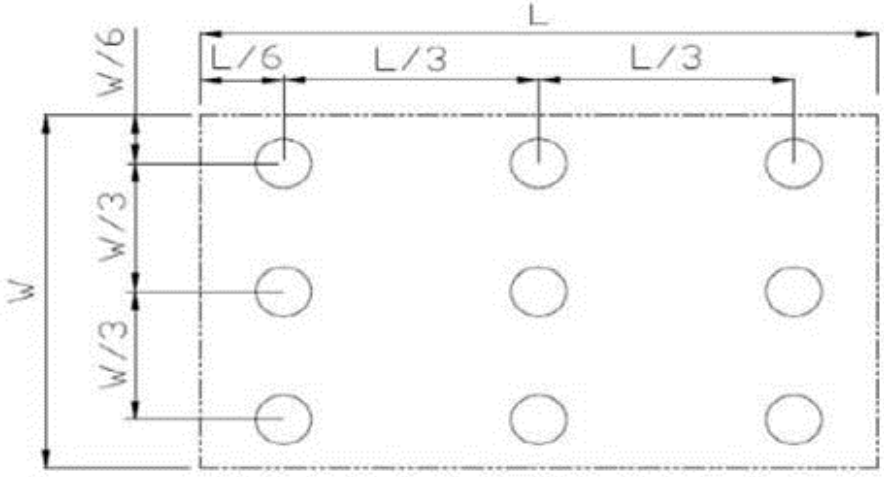


Fig7.3. Definition of uniformity

Note 6: Definition of color chromaticity (CIE 1931)
Color coordinates measured at the center point of LCD

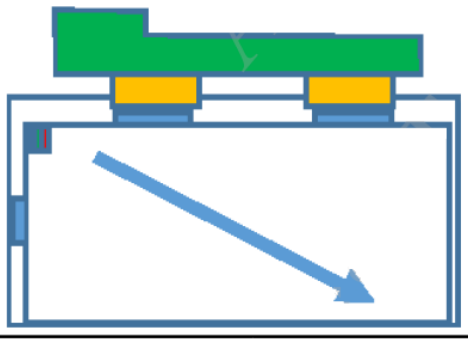
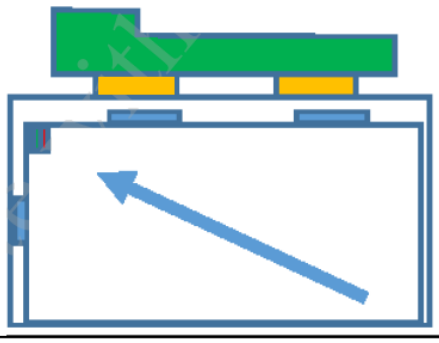
Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

8.Interface

8.1. LCM PIN Definition

Pin No.	Symbol	Function	Remark
1	VDD	Power supply	
2	VDD	Power supply	
3	GND	Ground	
4	GND	Ground	
5	Link0-	0- LVDS differential data input **(D0N)**	
6	Link0+	0+ LVDS differential data input **(D0P)**	
7	GND	Ground	
8	Link1-	1- LVDS differential data input **(D1N)**	
9	Link1+	1+ LVDS differential data input **(D1P)**	
10	GND	Ground	
11	Link2-	2- LVDS differential data input **(D2N)**	
12	Link2+	2+ LVDS differential data input **(D2P)**	
13	GND	Ground	
14	CLKIN-	- LVDS differential clock input **(CLKN)**	
15	CLKIN+	+ LVDS differential clock input **(CLKP)**	
16	GND	Ground	
17	Link3-	3- LVDS differential data input **(D3N)**	
18	Link3+	3+ LVDS differential data input **(D3P)**	
19	MODE	Bit 6/8:Low(6 Bit);High(8 Bit)	
20	SC	Scan direction selector (Low: Normal ;High: Reverse)	

*Scan direction selector(SC):

SC : Low	SC : High
	

8.2. CN2

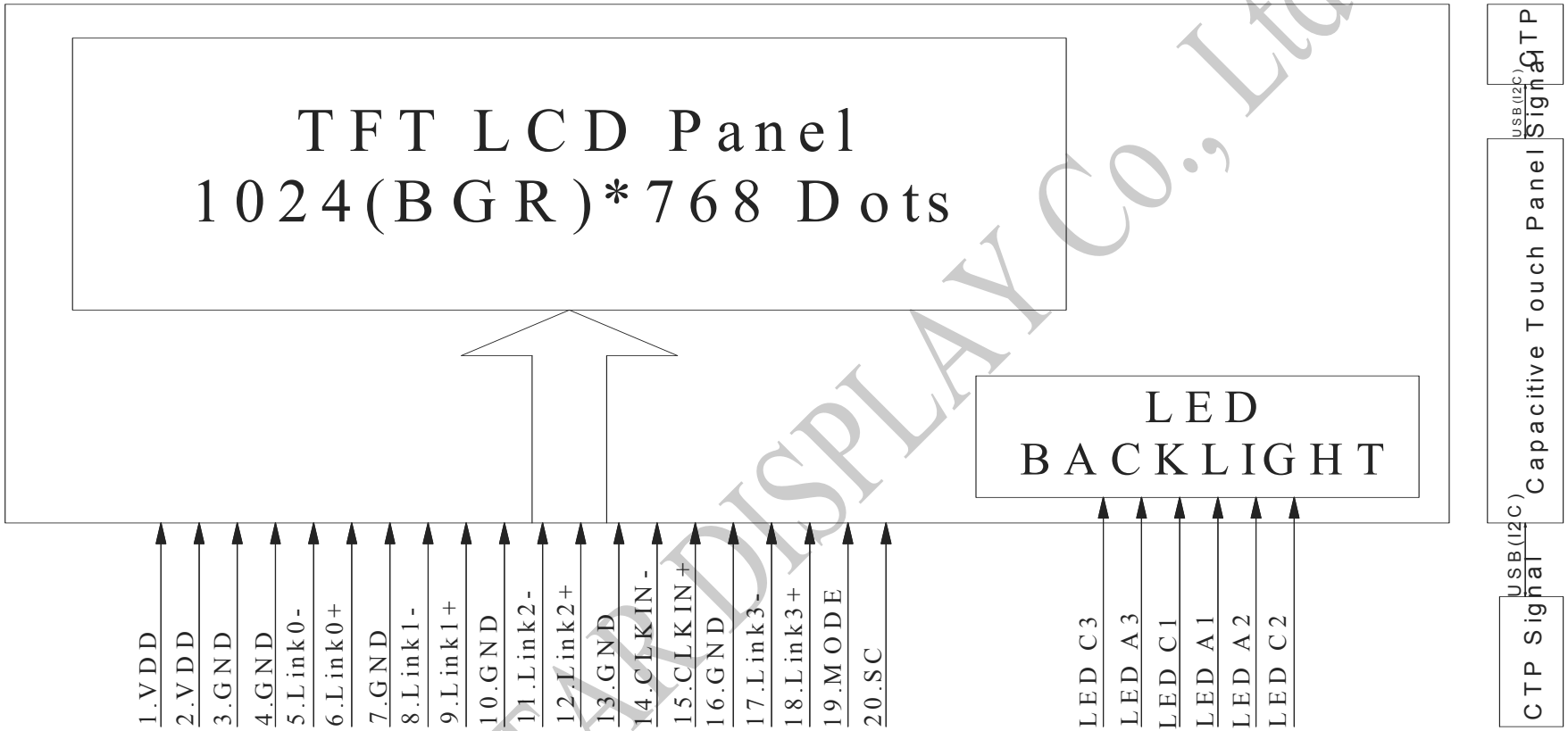
Pin No.	Symbol	Function	Remark
1	LED C3	LED_ Cathode 3	
2	LED A3	LED_ Anode 3	
3	LED C1	LED_ Cathode 1	
4	LED A1	LED_ Anode 1	
5	LED A2	LED_ Anode 2	
6	LED C2	LED_ Cathode 2	

8.3. CTP PIN Definition

Pin	Symbol	Function	Remark
1	USB_VSS	System ground	
2	USB_VDD 5V	Power supply	
3	USB_D+	Data +	
4	USB_D-	Data -	
5	VSS	System ground	
6	SDA	I2C data input and output (Must be pulled high.)	
7	SCL	I2C clock input (Must be pulled high.)	
8	RST	External Reset, Low is active	
9	INT	External interrupt to the host	
10	VDDT 3.3	Power supply	

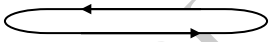
Note: Interface can support both USB and I2C,**USB is main function**
Note 2 : Connect USB_VSS(VSS) of CTP wtih TFT GND

9.Block Diagram



10.Reliability

Content of Reliability Test (Super Wide temperature, -30℃~80℃)

Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80℃ 240hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30℃ 240hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	80℃ 240hrs	2
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-30℃ 240hrs	1,2
High Temperature/ Humidity storage	The module should be allowed to stand at 40℃,90%RH max	40℃,90%RH 240hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of non-operation -30℃ 25℃ 80℃  1h ~ 1h 1 cycle	-30℃/80℃ 100 cycles	2
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=±6KV(contact), ±8KV(air), RS=330Ω CS=150pF 10 times	4

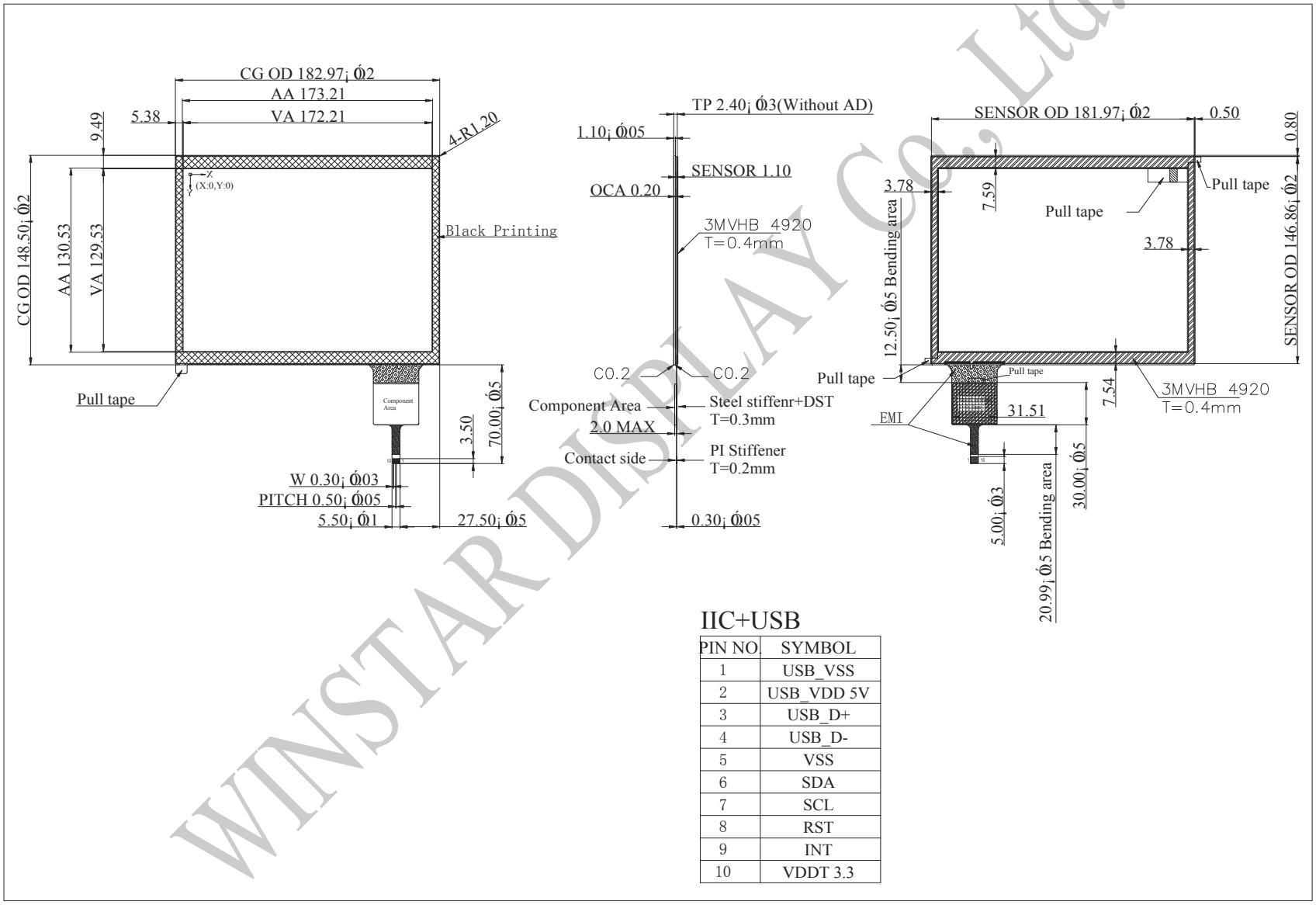
Note1: No dew condensation to be observed.

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

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

Note4: Endurance test applying the electric stress to the finished product housing

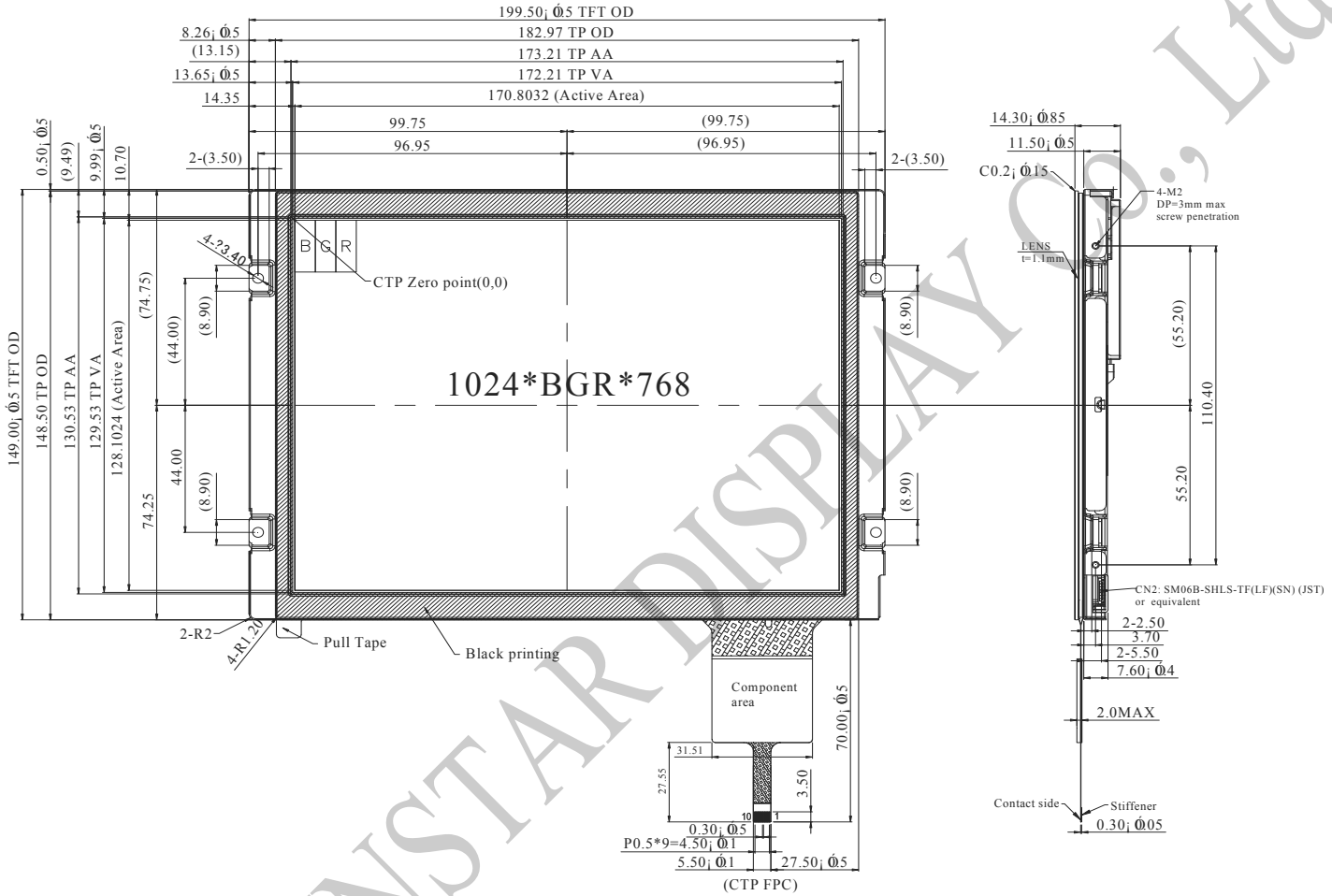
11.Touch Panel Information



IIC+USB

PIN NO.	SYMBOL
1	USB_VSS
2	USB_VDD 5V
3	USB_D+
4	USB_D-
5	VSS
6	SDA
7	SCL
8	RST
9	INT
10	VDDT 3.3

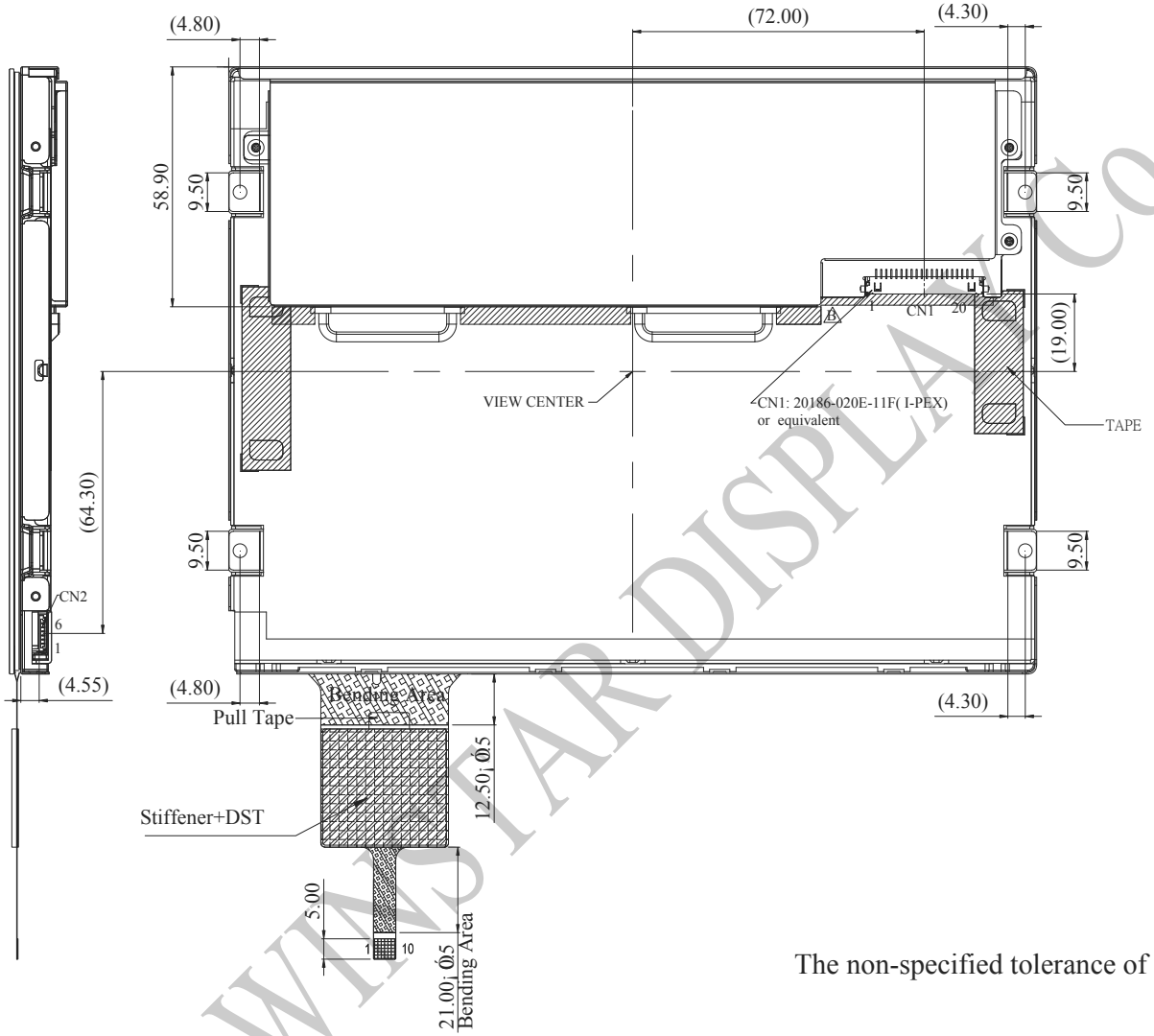
12.Contour Drawing



CTP FPC

PIN NO.	SYMBOL
1	USB_VSS
2	USB_VDD 5V
3	USB_D+
4	USB_D-
5	VSS
6	SDA
7	SCL
8	RST
9	INT
10	VDDT 3.3

The non-specified tolerance of dimension is ¡ Ó.5 mm .



CN2

Pin	Symbol
1	LED C3
2	LED A3
3	LED C1
4	LED A1
5	LED A2
6	LED C2

CN1

Pin	Symbol
1	VDD
2	VDD
3	GND
4	GND
5	Link0-
6	Link0+
7	GND
8	Link1-
9	Link1+
10	GND
11	Link2-
12	Link2+
13	GND
14	CLKIN-
15	CLKIN+
16	GND
17	Link3-
18	Link3+
19	MODE
20	SC

The non-specified tolerance of dimension is ¡ Ó5 mm .

winstar

LCM Sample Estimate Feedback Sheet

Module Number：_____

1、Panel Specification：

1.	Panel Type：	□ Pass	□ NG ,_____
2.	View Direction：	□ Pass	□ NG ,_____
3.	Numbers of Dots：	□ Pass	□ NG ,_____
4.	View Area：	□ Pass	□ NG ,_____
5.	Active Area：	□ Pass	□ NG ,_____
6.	Operating Temperature：	□ Pass	□ NG ,_____
7.	Storage Temperature：	□ Pass	□ NG ,_____
8.	Others：_____		

2、Mechanical

1.	PCB Size：	□ Pass	□ NG ,_____
2.	Frame Size：	□ Pass	□ NG ,_____
3.	Material of Frame：	□ Pass	□ NG ,_____
4.	Connector Position：	□ Pass	□ NG ,_____
5.	Fix Hole Position：	□ Pass	□ NG ,_____
6.	Backlight Position：	□ Pass	□ NG ,_____
7.	Thickness of PCB：	□ Pass	□ NG ,_____
8.	Height of Frame to PCB：	□ Pass	□ NG ,_____
9.	Height of Module：	□ Pass	□ NG ,_____
10.	Others：	□ Pass	□ NG ,_____

3、Relative Hole Size：

1.	Pitch of Connector：	□ Pass	□ NG ,_____
2.	Hole size of Connector：	□ Pass	□ NG ,_____
3.	Mounting Hole size：	□ Pass	□ NG ,_____
4.	Mounting Hole Type：	□ Pass	□ NG ,_____
5.	Others：	□ Pass	□ NG ,_____

4、Backlight Specification：

1.	B/L Type：	□ Pass	□ NG ,_____
2.	B/L Color：	□ Pass	□ NG ,_____
3.	B/L Driving Voltage (Reference for LED Type)：	□ Pass	□ NG ,_____
4.	B/L Driving Current：	□ Pass	□ NG ,_____
5.	Brightness of B/L：	□ Pass	□ NG ,_____
6.	B/L Solder Method：	□ Pass	□ NG ,_____
7.	Others：	□ Pass	□ NG ,_____

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5、Electronic Characteristics of Module：

1.	Input Voltage：	□ Pass	□ NG ,_____
2.	Supply Current：	□ Pass	□ NG ,_____
3.	Driving Voltage for LCD：	□ Pass	□ NG ,_____
4.	Contrast for LCD：	□ Pass	□ NG ,_____
5.	B/L Driving Method：	□ Pass	□ NG ,_____
6.	Negative Voltage Output：	□ Pass	□ NG ,_____
7.	Interface Function：	□ Pass	□ NG ,_____
8.	LCD Uniformity：	□ Pass	□ NG ,_____
9.	ESD test：	□ Pass	□ NG ,_____
10.	Others：	□ Pass	□ NG ,_____

6、Summary：

Sales signature：_____

Customer Signature：_____ **Date：** / /