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.: WF43VSZAEDNG0#

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

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2019/01/30			

This TFT Display item is for Economical Version TFT LCM Inspection Specification:
https://www.winstar.com.tw/technology/download.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	2019/01/30		First issue

Contents

1.Module Classification Information

W	F	43	V	S	Z	A	E	D	N	G	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：4.3” 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 4.3” is a TN transmissive type color active matrix TFT liquid crystal display that use amorphous silicon TFT as switching devices. This module is a composed of a TFT_LCD module, It is usually designed for indusrial application and this module follows RoHs,

3.General Specifications

Item	Dimension	Unit
Size	4.3	inch
Dot Matrix	480 x RGBx272(TFT)	dots
Module dimension	105.5(W) x 67.2(H) x 4.6(D)	mm
Active area	95.04 x 53.856	mm
Dot pitch	0.066 x 0.198	mm
LCD type	TFT, Normally White, Transmissive	
Aspect Ratio	16:9	
TFT Driver IC	ST7282-G4-1L	
Interface	24-bit RGB	
Backlight Type	LED,Normally White	
CTP FW Version	3	
CTP IC	FT5426DQ8 or equivalent	
CTP Interface	I2C	
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	℃
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

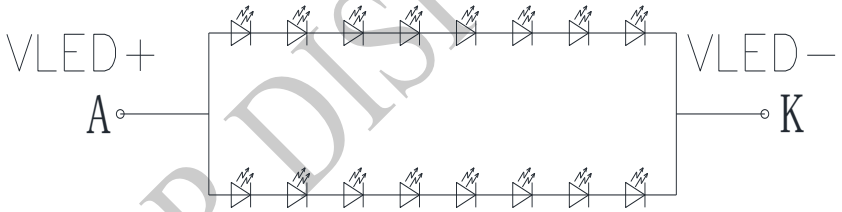
5.1. Operating conditions:

Item	Symbol	Min	Typ	Max	Unit
Supply Voltage For Logic	Vcc	3.1	3.3	3.5	V
Supply Voltage For Touch Logic	VDDT	2.8	—	3.3	V
Digital operation current	ICC		22	33	mA

5.2. LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	-	-	40	-	mA	-
Power Consumption	-	928	1024	1088	mW	-
LED voltage	VBL+	23.2	25.6	27.2	V	Note 1
LED Life Time	-	-	50,000	-	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



CIRCUIT DIAGRAM(8*2Dice)

Note 2 : Ta = 25 ℃

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	-	0.3VCC	V	
High level input voltage	V_{IH}	0.7VCC	-	VCC	V	

7.AC CHARATERISTICS

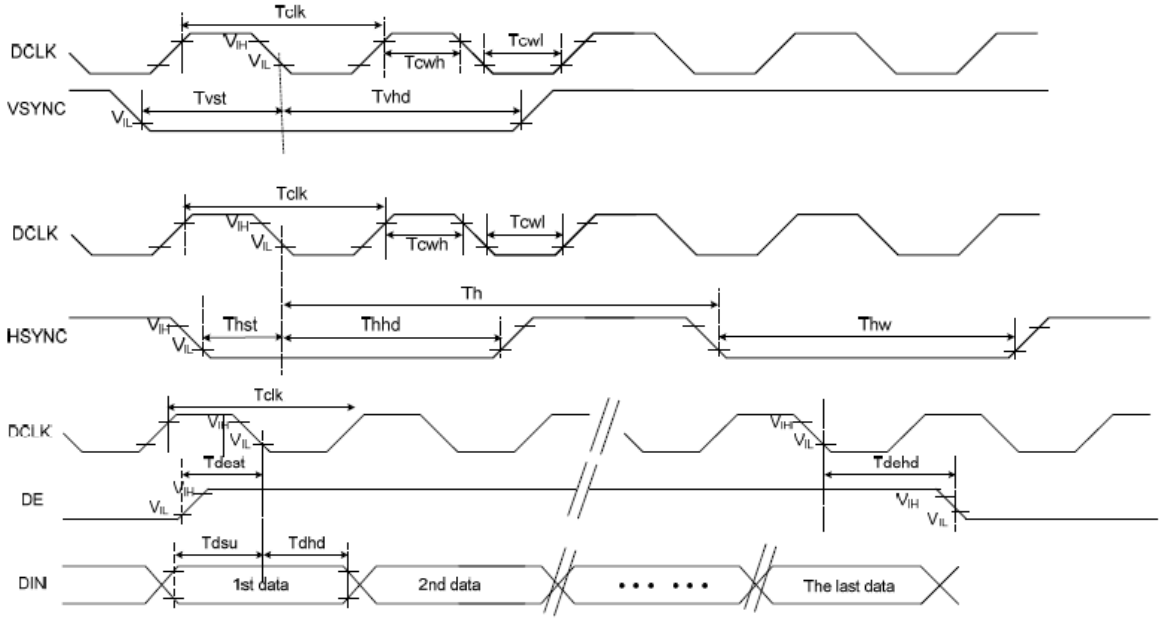
7.1. AC Characteristics

AC Electrical Characteristics (VCC= 3.3V, GND= 0V, TA=25°C)

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
System operation timing						
VCC power source slew time	TPOR	-	-	20	Ms	From 0V to 99% VCC
GRB pulse width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
Input/ Output timing						
CLK pulse duty	Tcw	40	50	60	%	
Hsync width	Thw	2	-	-	DCLK	
Hsync period	Th	55	60	65	us	
Vsync setup time	Tvst	12	-	-	ns	
Vsync hold time	Tvhd	12	-	-	ns	
Hsync setup time	Thst	12	-	-	ns	
Hsync hold time	Thhd	12	-	-	ns	
Data setup time	Tdsu	12	-	-	ns	
Data hold time	Tdhd	12	-	-	ns	
DE setup time	Tdest	10	-	-	ns	
DE setup time	Tdehd	10	-	-	ns	

7.2. AC Timing Diagram

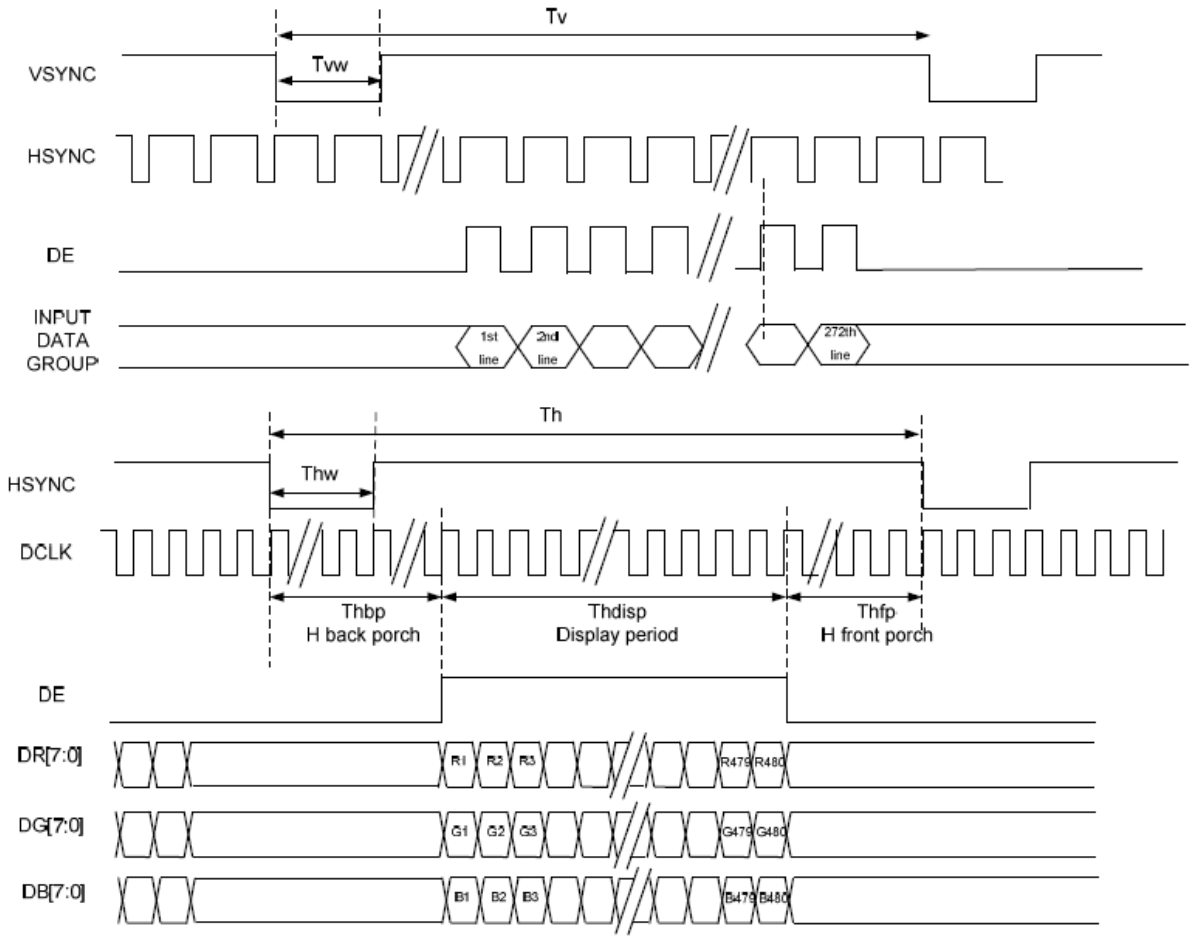
Clock and Data Input Timing Diagram



7.3. **Parallel 24-bit RGB Timing Table**

Item		Symbol	Min	Typ	Max	Unit	Remark
CLK frequency		Fclk	8	9	12	MHz	
DCLK Period		Tclk	83	111	125	ns	
HSYNC	Period Time	Th	485	531	598	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	3	43	43	DCLK	By H_Blanking setting
	Front Porch	Thfp	2	8	75	DCLK	
	Pulse Width	Thw	2	4	75	DCLK	
VSYNC	Period Time	Tv	276	292	321	H	
	Display Period	Tvdisp		272		H	
	Back Porch	Tvbp	2	12	12	H	By V_Blanking setting
	Front Porch	Tvfp	2	8	37	H	
	Pulse Width	Tvw	2	4	37	H	

7.4. SYNC-DE Mode Timing Diagram



8.Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr	θ=0°、Φ=0°	-	25	30	ms	Note 3
		Tf						
Contrast ratio		CR	At optimized viewing angle	300	500	-	-	Note 4
Color Chromaticity	White	Wx	θ=0°、Φ=0	0.26	0.31	0.36	-	Note 2,6,7
		Wy		0.28	0.33	0.38	-	
Viewing angle	Hor.	ΘR	CR≧10	-	75	-	Deg.	Note 1
		ΘL		-	75	-		
	Ver.	ΦT		-	75	-		
		ΦB		-	75	-		
Brightness		-	-	500	600	-	cd/m2	Center of display
Uniformity		(U)	-	75	-	-	%	Note5

Ta=25±2℃

Note 1: Definition of viewing angle range

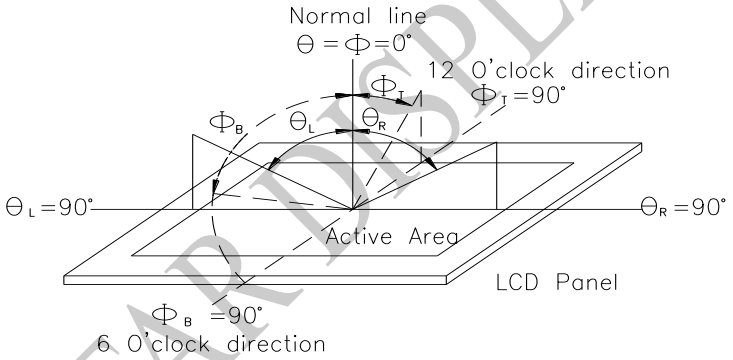


Fig. 8.1. Definition of viewing angle

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.

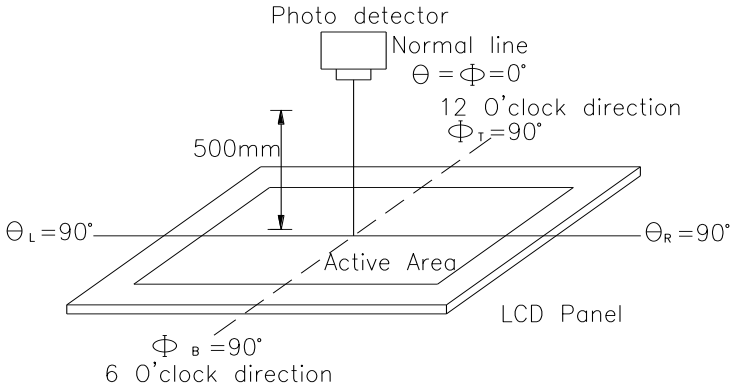
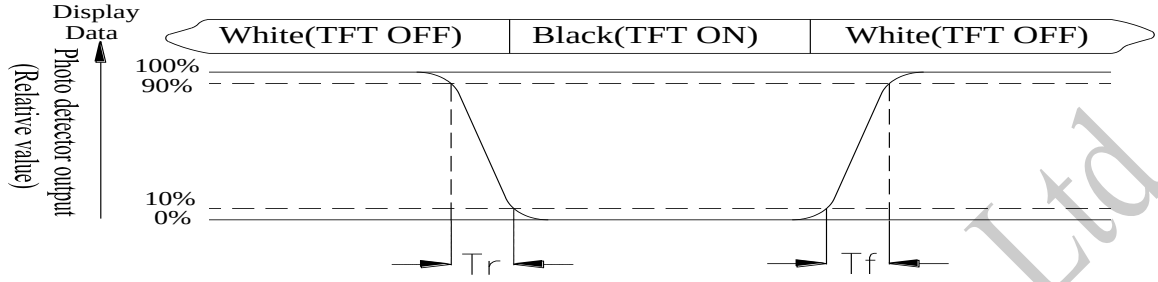


Fig. 8.2. Optical measurement system setup

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, 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

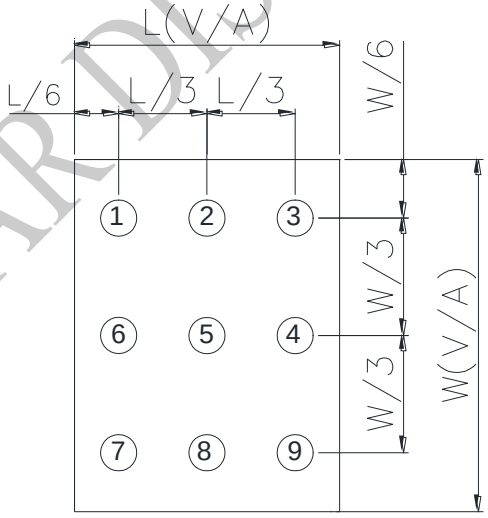


Fig.8.3. Definition of uniformity

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

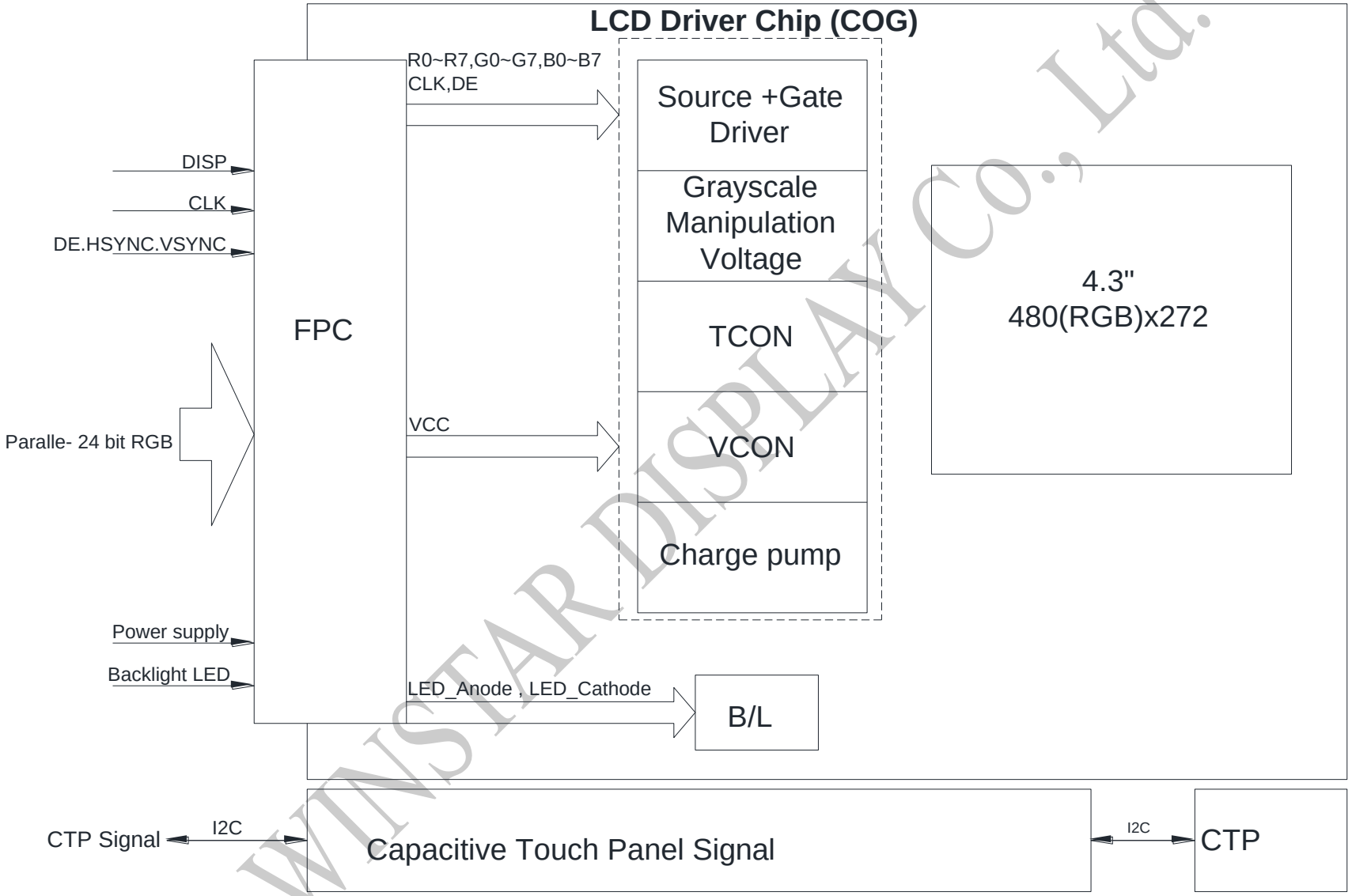
Pin	Symbol	Function	Remark
1	VLED-	Power for LED backlight cathode	
2	VLED+	Power for LED backlight anode	
3	GND	Power ground	
4	VCC	Power voltage	
5	R0	Red data (LSB)	
6	R1	Red data	
7	R2	Red data	
8	R3	Red data	
9	R4	Red data	
10	R5	Red data	
11	R6	Red data	
12	R7	Red data (MSB)	
13	G0	Green data (LSB)	
14	G1	Green data	
15	G2	Green data	
16	G3	Green data	
17	G4	Green data	
18	G5	Green data	
19	G6	Green data	
20	G7	Green data (MSB)	
21	B0	Blue data (LSB)	
22	B1	Blue data	
23	B2	Blue data	
24	B3	Blue data	
25	B4	Blue data	
26	B5	Blue data	
27	B6	Blue data	
28	B7	Blue data (MSB)	
29	GND	Power ground	
30	CLK	Pixel clock	

31	DISP	Display on/off	
32	HSYNC	Horizontal sync signal; negative polarity	
33	VSYNC	Vertical sync signal; negative polarity	
34	DE	Data Enable	
35	NC	No connection	
36	GND	Power ground	
37	NC	No connection	
38	NC	No connection	
39	NC	No connection	
40	NC	No connection	

CTP PIN Definition

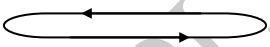
Pin	Symbol	Function	Remark
1	VSS	Ground for analog circuit	
2	VDDT	Power Supply : +3.0V	
3	SCL	I2C clock input	
4	NC	No connect	
5	SDA	I2C data input and output	
6	NC	No connect	
7	/RST	External Reset, Low is active	
8	NC	No connect	
9	/INT	External interrupt to the host	
10	VSS	Ground for analog circuit	

10.Block Diagram



11.Reliability

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

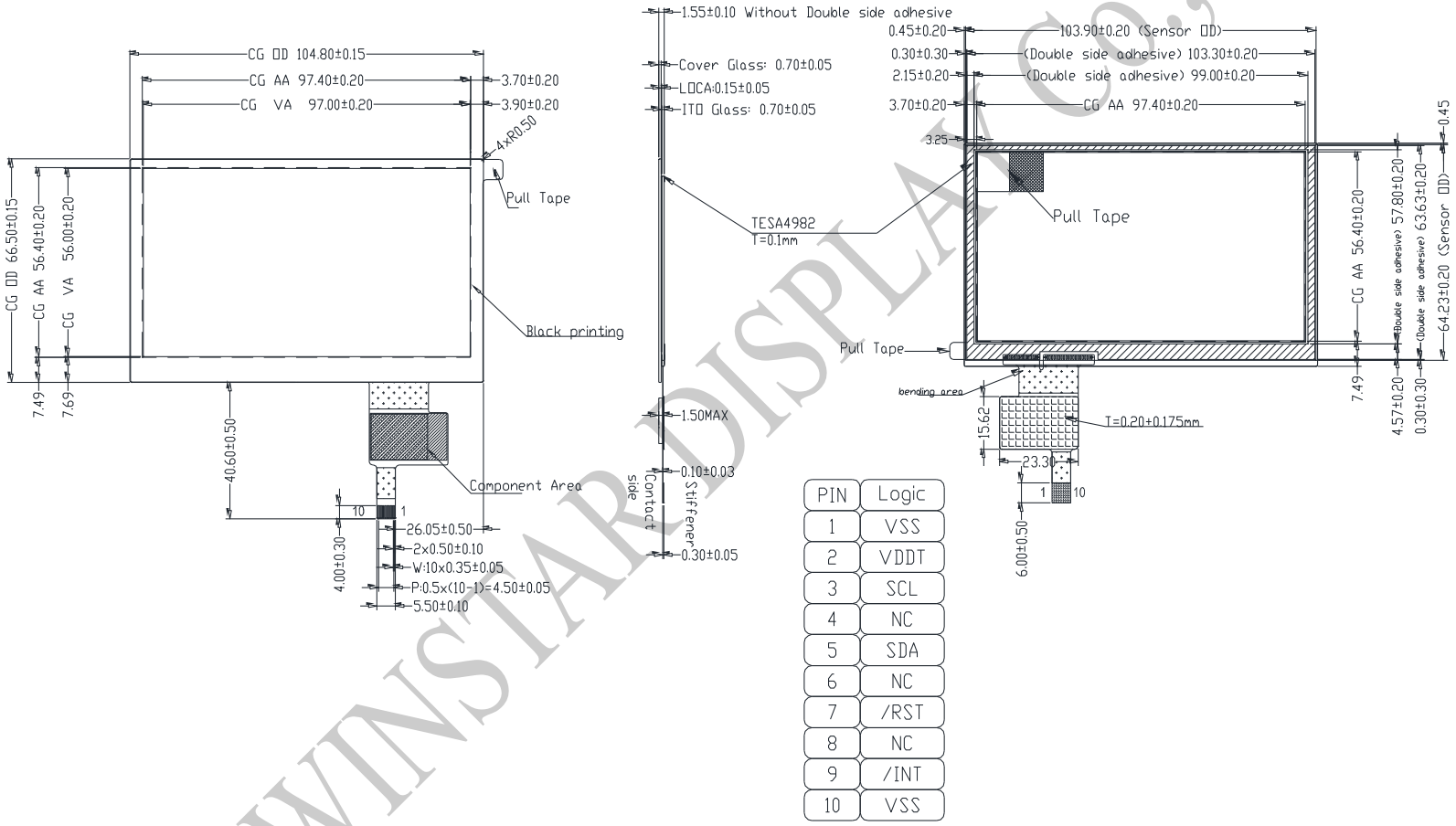
Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80℃ 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30℃ 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70℃ 200hrs	——
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20℃ 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60 ℃,90%RH max	60℃,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation -20℃ 25℃ 70℃  30min 5min 30min 1 cycle	-20℃/70℃ 10 cycles	——
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=±600V(contact), ±800v(air), RS=330Ω CS=150pF 10 times	——

Note1: No dew condensation to be observed.

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

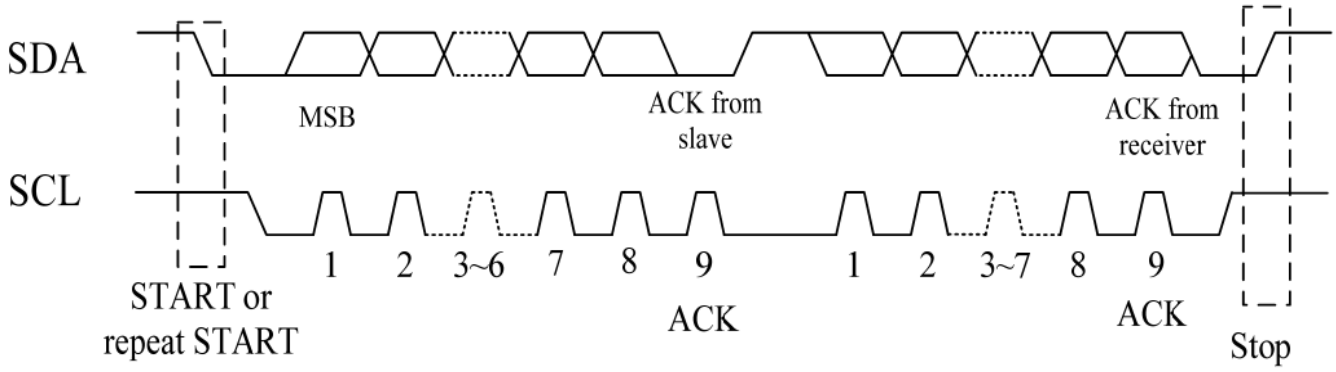
Note3: The packing have to including into the vibration testing.

12.Touch Panel Information

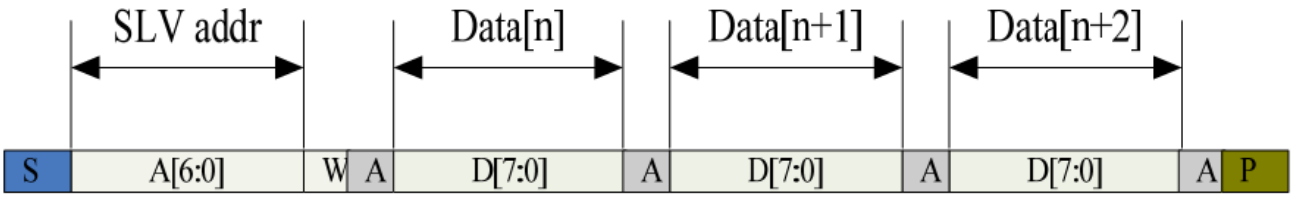


PIN	Logic
1	VSS
2	VDDT
3	SCL
4	NC
5	SDA
6	NC
7	/RST
8	NC
9	/INT
10	VSS

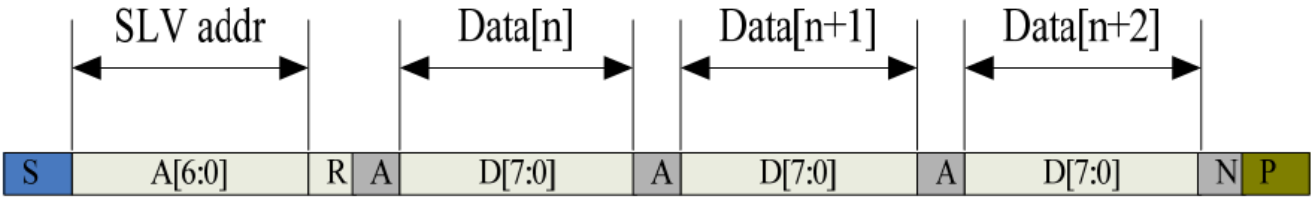
12.1. CTP I2C Timing:



I2C Serial Data Transfer Format



I2C master write, slave read



I2C master read, slave write

Mnemonics	Description
S	I2C Start or I2C Restart
A[6:0]	Slave address
R/W	READ/WRITE bit, '1' for read, '0' for write
A(N)	ACK(NACK) bit
P	STOP: the indication of the end of a packet(if this bit is missing, S will indicate the end of the current packet and beginning of the next packet)

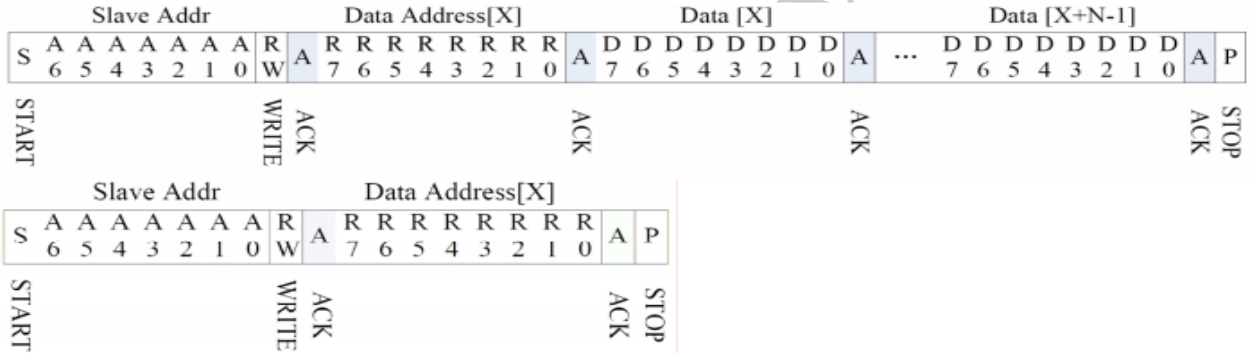
Lists the meanings of the mnemonics used in the above figures

Parameter	Unit	Min	Max
SCL frequency	KHz	0	400
Bus free time between a STOP and START condition	us	1.3	\
Hold time (repeated) ST ART condition	us	0.6	\
Data setup time	ns	100	\
Setup time for a repeated START condition	us	0.6	\
Setup time for STOP condition	us	0.6	\

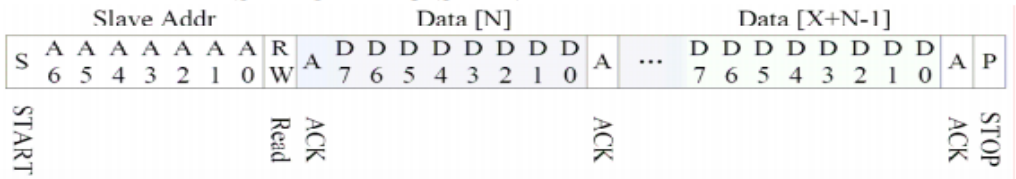
Interface Timing Characteristics

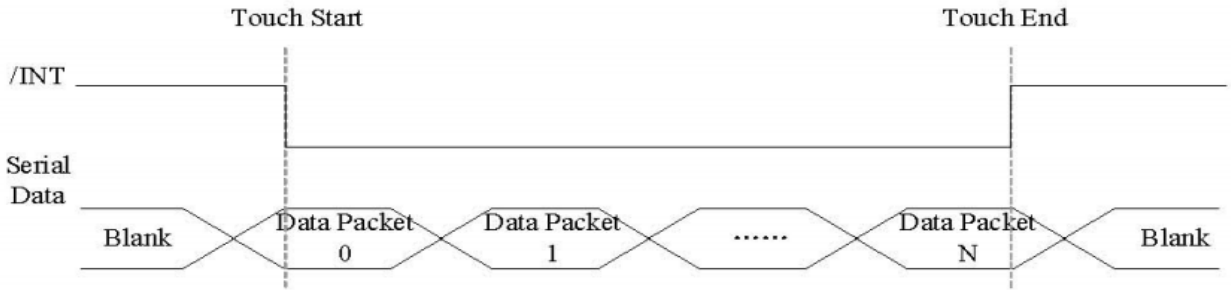
AS FOR STANDARD CTPM, HOST NEED TO USE BOTH INTERRUPT CONTROL SIGNAL AND SERIAL DATA INTERFACE TO GET THE TOUCH DATA.HERE IS THE TIMING TO GET TOUCH DATA.

12.2. WRITE BYTES TO I2C SLAVE



READ X BYTES FROM I2C SLAVE





Address: 0x38

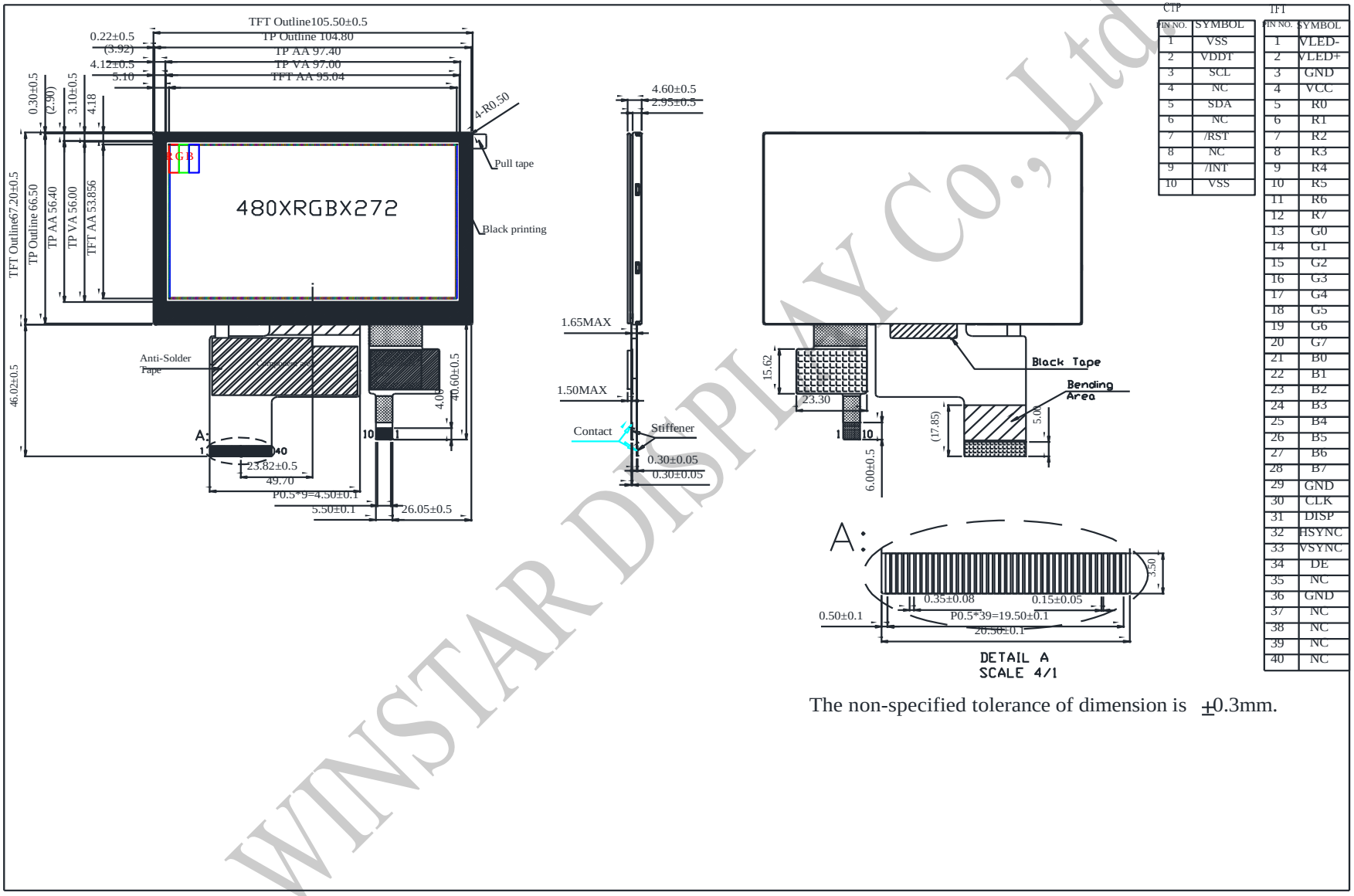
12.3. TOUCH DATA READ PROTOCOL

NAME	VALUE	DESCRIPTION
START CH	0X00	START COMMAND FOR CTPM TOUCH DATA PACKET,HOST MUST SEND CTPM A START CH COMMAND BEFORE READ TOUCH DATA
Lst READ BYTE～ LAST READ BYTE		TOUCH DATA PACKET SENT BY CTPM,EACH BYTE HAS 8-BIT DATA ,A TOUCH DATA PACKET CONSISTS OF N BYTE

Address	Name	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Host Access
00h	Devide__Mode		Device Model[2:0]							RW
01h										R
02h	TD__Status					Number of touch points[3:0]				R
03h	Touch1__XH	1st Event Flag				1st Touch X Position[11:8]				R
04h	Touch1__XL	1st Touch X Position[7:0]								R
05h	Touch1__YH	1st Touch ID[3:0]				1st Touch Y Position[11:8]				R
06h	Touch1__YL	1st Touch Y Position[7:0]								R
07h										R
08h										R
09h	Touch2__XH	2ndEvent Flag				2ndTouch X Position[11:8]				R
0Ah	Touch2__XL	2nd Touch X Position[7:0]								R
0Bh	Touch2__YH	2nd Touch ID[3:0]				2ndTouch Y Position[11:8]				R
0Ch	Touch2__YL	2nd Touch Y Position[7:0]								R
0Dh										R
oEh										R
0Fh	Touch3__XH	3rdEvent Flag				3rdTouch X Position[11:8]				R
10h	Touch3__XL	3rd Touch X Position[7:0]								R
11h	Touch3__YH	3rdTouch ID[3:0]				3rdTouch Y Position[11:8]				R
12h	Touch3__YL	3rd Touch Y Position[7:0]								R
13h										R
14h										R
15h	Touch4__XH	4thEvent Flag				4thTouch X Position[11:8]				R

16h	Touch4__XL	4th Touch X Position[7:0]		R
17h	Touch4__YH	4thTouch ID[3:0]	4thTouch Y Position[11:8]	R
18h	Touch4__YL	4th Touch Y Position[7:0]		R
19h				R
1Ah				R
1Bh	Touch5__XH	5thEvent Flag	5thTouch X Position[11:8]	R
1Ch	Touch5__XL	5th Touch X Position[7:0]		R
1Dh	Touch5__YH	5thTouch ID[3:0]	5thTouch Y Position[11:8]	R
1Eh	Touch5__YL	5th Touch Y Position[7:0]		R

13.Contour Drawing



CTP

PIN NO.	SYMBOL
1	VSS
2	VDDT
3	SCL
4	NC
5	SDA
6	NC
7	/RST
8	NC
9	/INT
10	VSS

TFT

PIN NO.	SYMBOL
1	VLED-
2	VLED+
3	GND
4	VCC
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	CLK
31	DISP
32	HSYNC
33	VSYNC
34	DE
35	NC
36	GND
37	NC
38	NC
39	NC
40	NC

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

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 ,_____

>> 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：** / /