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.: WF70A6TIAGDNT0#

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

SALES BY	**APPROVED BY**	**CHECKED BY**	**PREPARED BY**
			葉虹蘭
ISSUED DATE: **2021/09/02**			

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

MODLE NO：

RECORDS OF REVISION			DOC. FIRST ISSUE
VERSION	DATE	REVISED PAGE NO.	**SUMMARY**
0	2021/09/02		First issue

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1.Module Classification Information

W	F	70	A6	T	I	A	G	D	N	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:		
⑨	D: Digital L：LVDS M:MIPI		
⑩	Interface:		
⑪	TS:		
⑫	Version: X:Raspberry pi		
⑬	Special Code	#:Fit in with ROHS directive regulations	

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

N	Without control board	A	8Bit	B	16Bit	H	HDMI
I	I2C Interface	R	RS232	S	SPI Interface	U	USB

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		

2.Summary

TFT 7.0”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 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	165.05(W) x 104.87(H) x 8.13(D)	mm
Active area	152.4 x 91.44	mm
Pixel pitch	0.1905 x 0.1905	mm
LCD type	TFT, Normally White, Transmissive	
View Direction	12 o'clock	
Gray Scale Inversion Direction	6 o'clock	
TFT Drive IC	HX8262+HX8678 or Equivalent	
TFT Interface	18-bit RGB	
Aspect Ratio	16:9	
Backlight Type	LED,Normally White	
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	℃
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:

Recommended Operation condition (GND=0V，Ta=25℃)

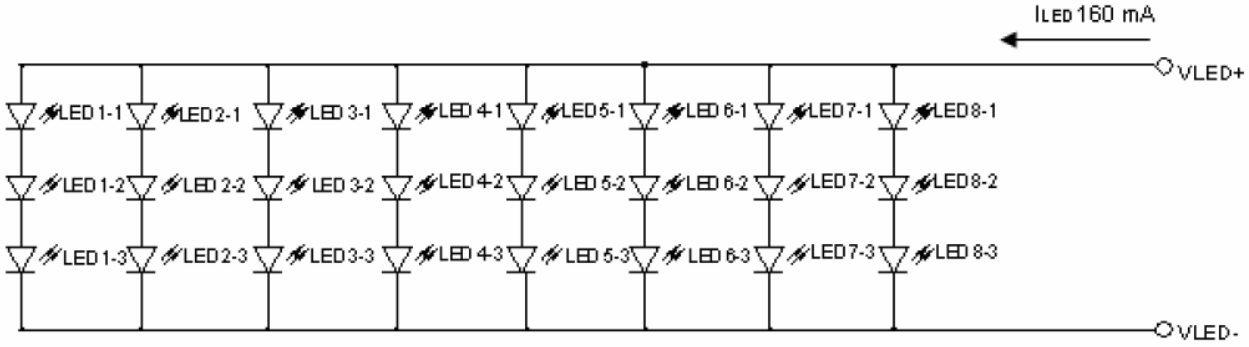
Item		Symbol	Min	Typ	Max	Unit	Remark
Power Supply Voltage		Vcc	3.0	3.3	3.6	V	
Power Supply Current		Icc		200	260	mA	black pattern
Input logic Voltage	High Level	VIH	0.7Vcc	-	Vcc	V	Note 1
	Low Level	VIL	0	-	0.3Vcc		

Note 1: DCLK, DE, R0~ R5, G0~ G5, B0~ B5.
Note 2 : This value is test for Vcc=3.3V , Ta=25 ℃ only

5.2. LED driving conditions

Item	Symbol	Min	Typ	Max	Unit	Remark
LED current	-	-	160	-	mA	-
Power Consumption	VBL+=9.8V		1568	-	mW	-
LED voltage	VBL+	8.4	-	11	V	Note 1
LED Life Time	-	-	50,000	-	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



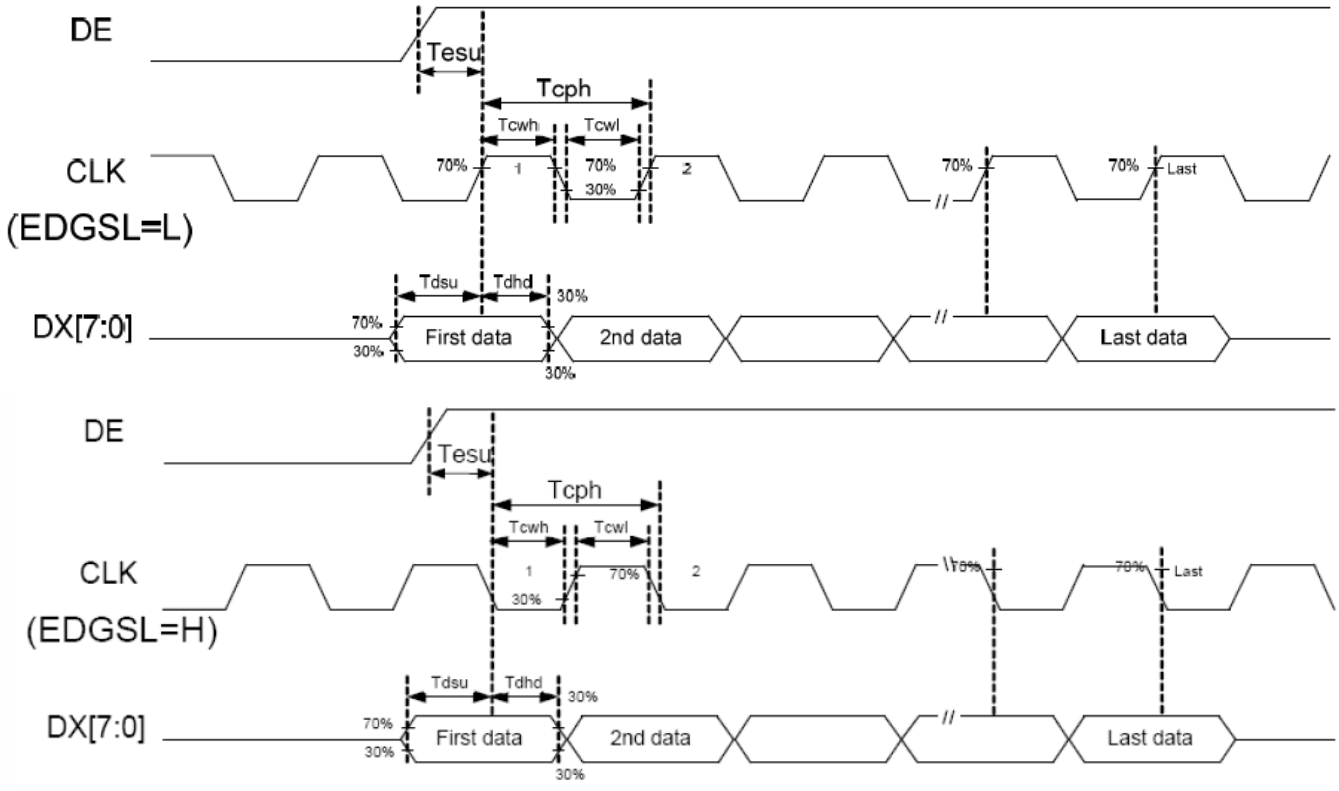
Note 2 : Ta = 25 ℃
Note 3 : Brightness to be decreased to 50% of the initial value
Note 4 : The single LED lamp case

6.AC CHARATERISTICS

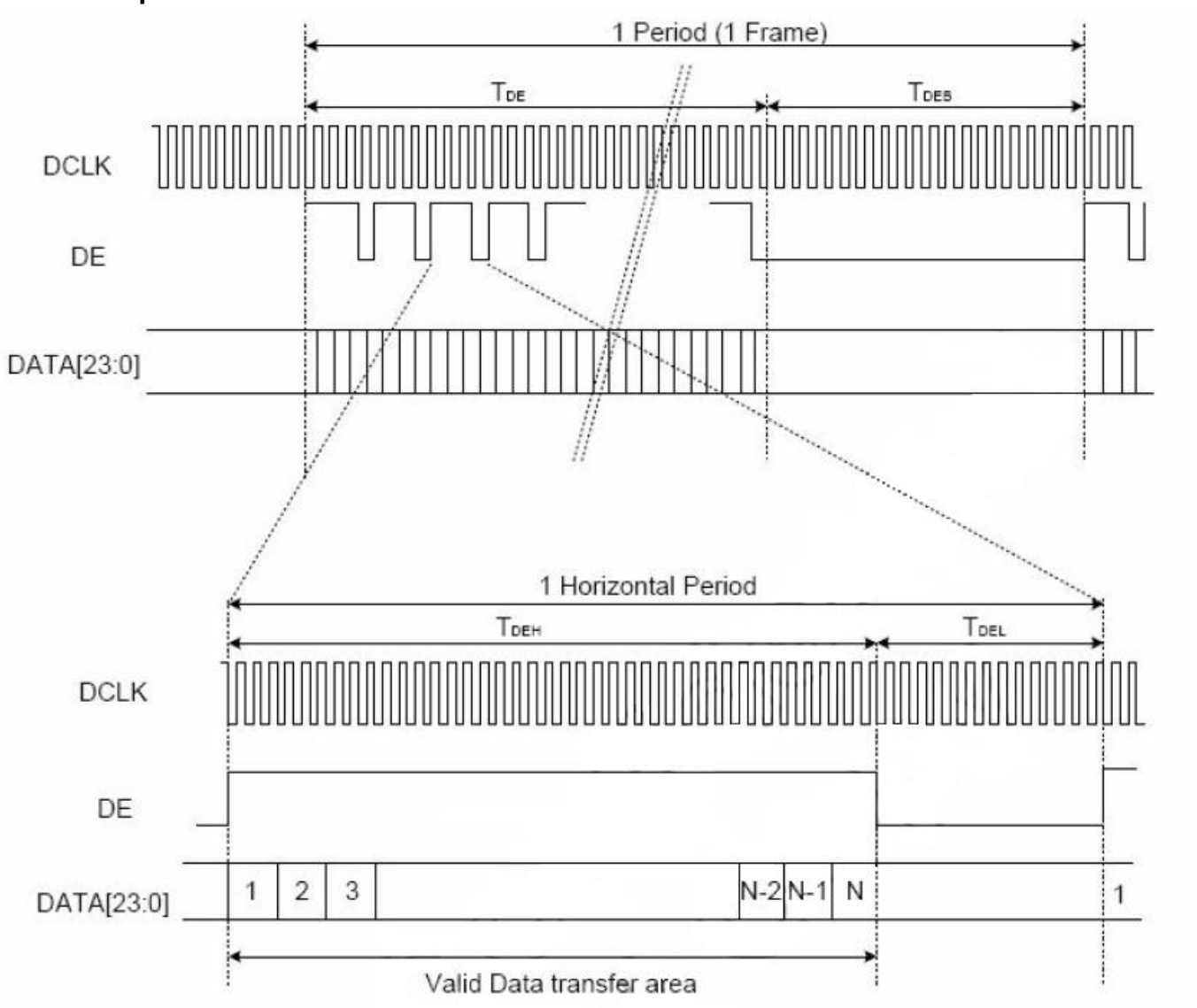
6.1. AC Electrical CHARATERISTICS

Signal	Symbol	Min	Typ	Max	Unit
Data setup time	Tdsu	6	-	-	ns
Data hole time	Tdhd	6	-	-	ns
DE setup time	Tesu	6	-	-	ns
CLK frequency	FCPH	22.78	33.26	36.59	MHz
CLK period	TCPH		30.06		ns
CLK pulse duty	TCWH	40	50	60	%
DE period	TDEH+TDEL	1000	1056	1200	TCPH
DE pulse width	TDEH	-	800	-	TCPH
DE frame blanking	TDEB	10	45	110	TDEH+TDEL
DE frame width	TDE	-	480	-	TDEH+TDEL

6.2. Input Clock and Data Timing Diagram



6.3. Data input format



7.Optical Characteristics

TFT LCD characteristic

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr	θ=0°、Φ=0°	-	5	10	.ms	Note 3
		Tf		-	11	16	.ms	
Contrast ratio		CR	At optimized viewing angle	250	400	-	-	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 (Gray Scale Inversion Direction)	Hor.	ΘR	CR≧10	65	70	-	Deg.	Note 1
		ΘL		65	70	-		
	Ver.	ΦT		55	60	-		
		ΦB		55	60	-		
Brightness		-	-	200	300	-	cd/m2	Center of display
Uniformity		(U)	-	70	-	-	%	Note 5

Ta=25±2℃, ILED = 160mA

Note 1: Definition of viewing angle range

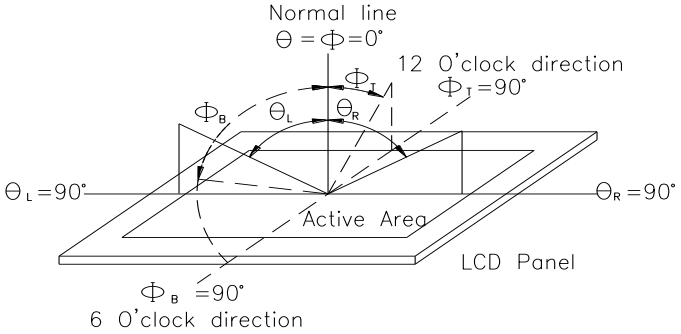


Fig.7.1. Definition of viewing angle

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-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

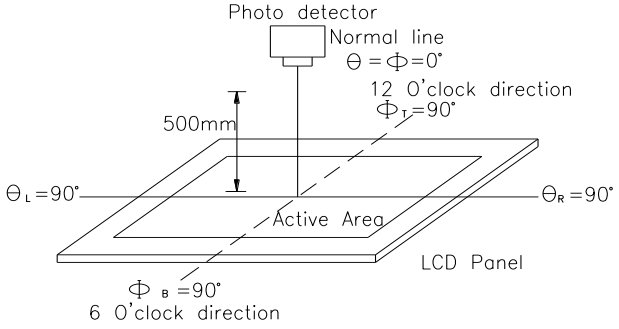
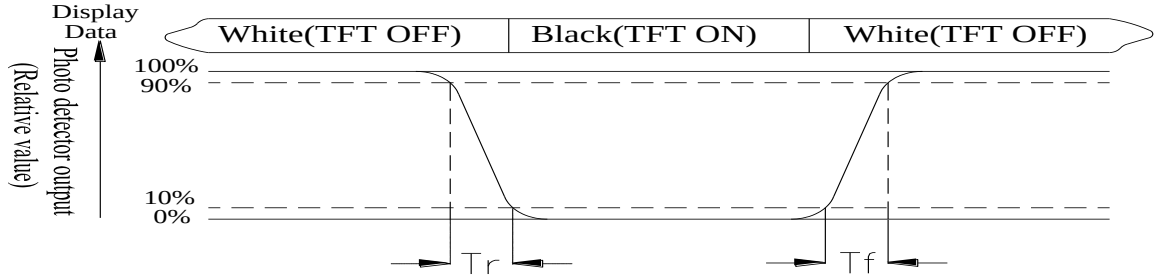


Fig. 7.2. Optical measurement system setup

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

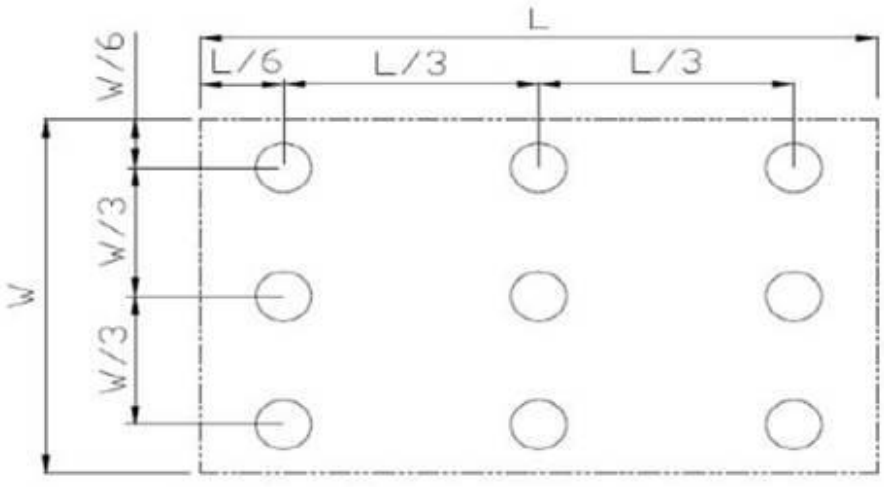


Fig7.3. Definition of uniformity

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	Symbol	Function	Remark
1	GND	Power Ground	
2	GND	Power Ground	
3	NC	Not Connect	
4	Vcc	Power Supply for Digital Circuit	
5	Vcc	Power Supply for Digital Circuit	
6	Vcc	Power Supply for Digital Circuit	
7	Vcc	Power Supply for Digital Circuit	
8	NC	Not Connect	
9	DE	Data Enable	
10	GND	Power Ground	
11	GND	Power Ground	
12	GND	Power Ground	
13	B5	Blue Data 5 (MSB)	
14	B4	Blue Data 4	
15	B3	Blue Data 3	
16	GND	Power Ground	
17	B2	Blue Data 2	
18	B1	Blue Data 1	
19	B0	Blue Data 0 (LSB)	
20	GND	Power Ground	
21	G5	Green Data 5 (MSB)	
22	G4	Green Data 4	
23	G3	Green Data 3	
24	GND	Power Ground	
25	G2	Green Data 2	
26	G1	Green Data 1	
27	G0	Green Data 0(LSB)	
28	GND	Power Ground	
29	R5	Red Data 5 (MSB)	
30	R4	Red Data 4	

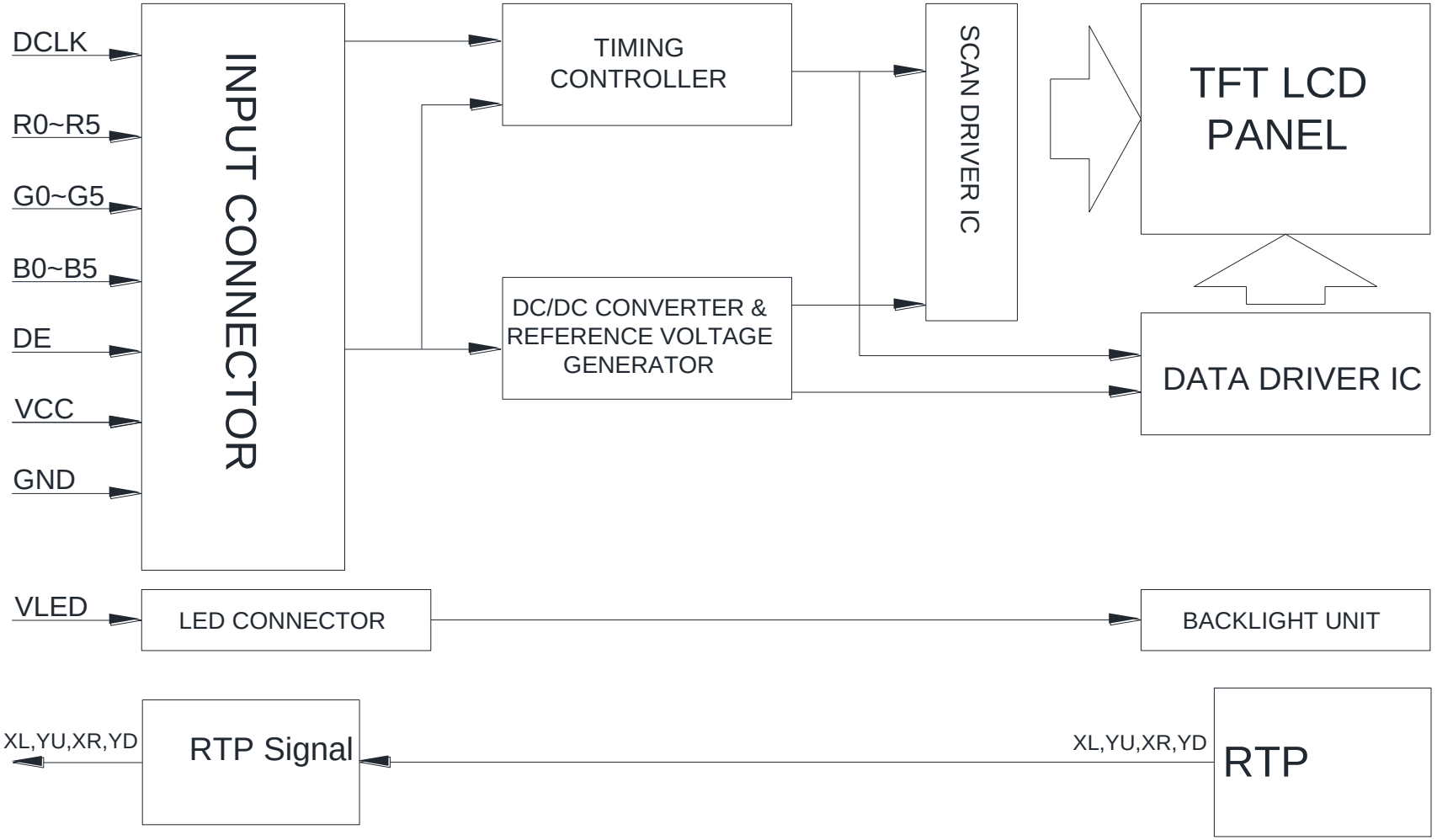
31	R3	Red Data 3	
32	GND	Power Ground	
33	R2	Red Data 2	
34	R1	Red Data 1	
35	R0	Red Data 0(LSB)	
36	GND	Power Ground	
37	GND	Power Ground	
38	DCLK	Clock Signals ; Latch Data at the Falling Edge	
39	GND	Power Ground	
40	GND	Power Ground	

8.2. Backlight Driving Part

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

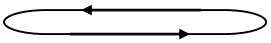
Note: The backlight interface connector is a model SM02B-BHSS-1-TB manufactured by JST or equivalent. The matching connector part number is BHSR-20VS-1 manufactured by JST or equivalent.

9.Block Diagram



10.Reliability

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

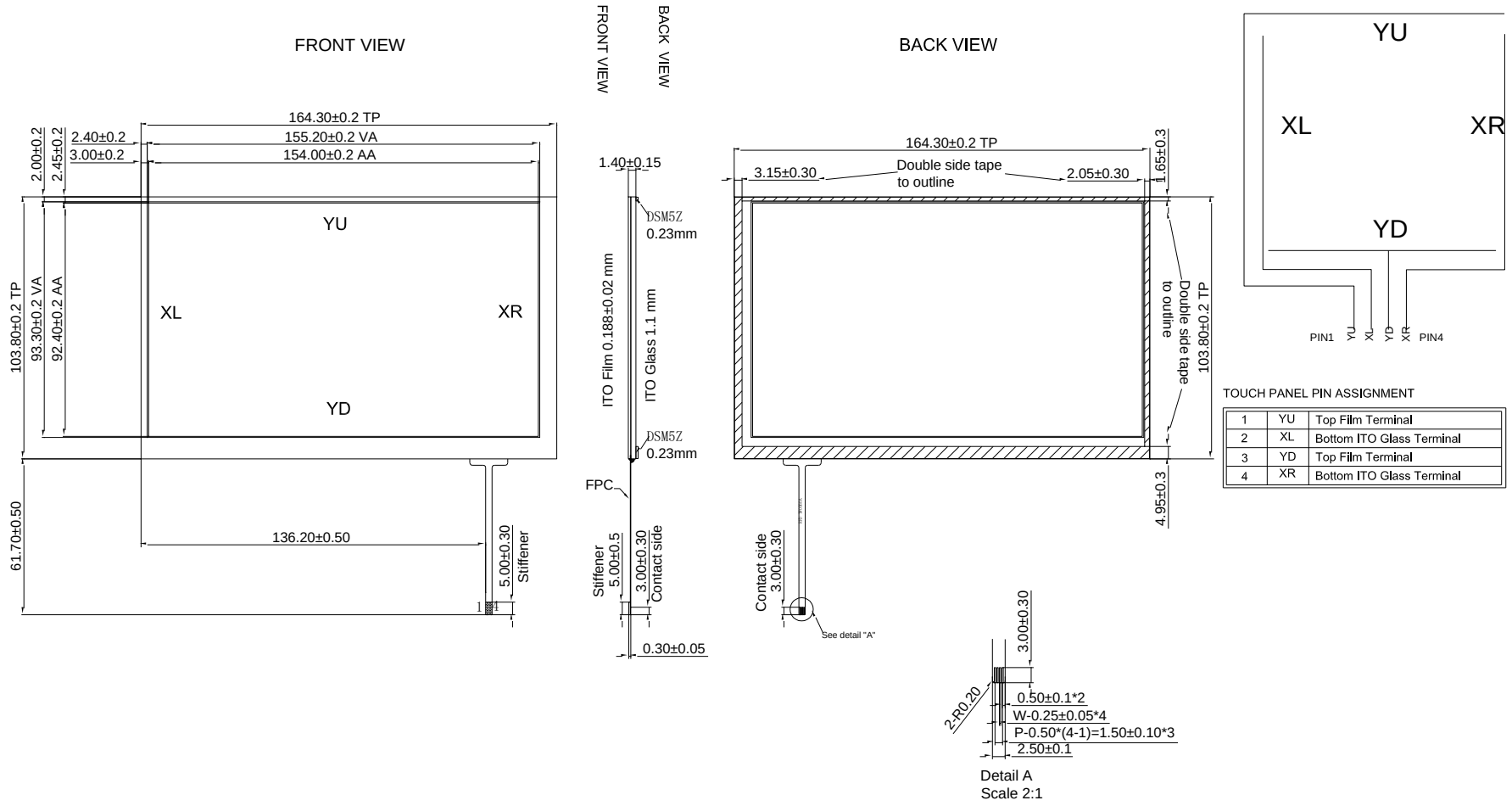
Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80℃ 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30℃ 200hrs	1,2
High 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.

11.Touch Panel Information



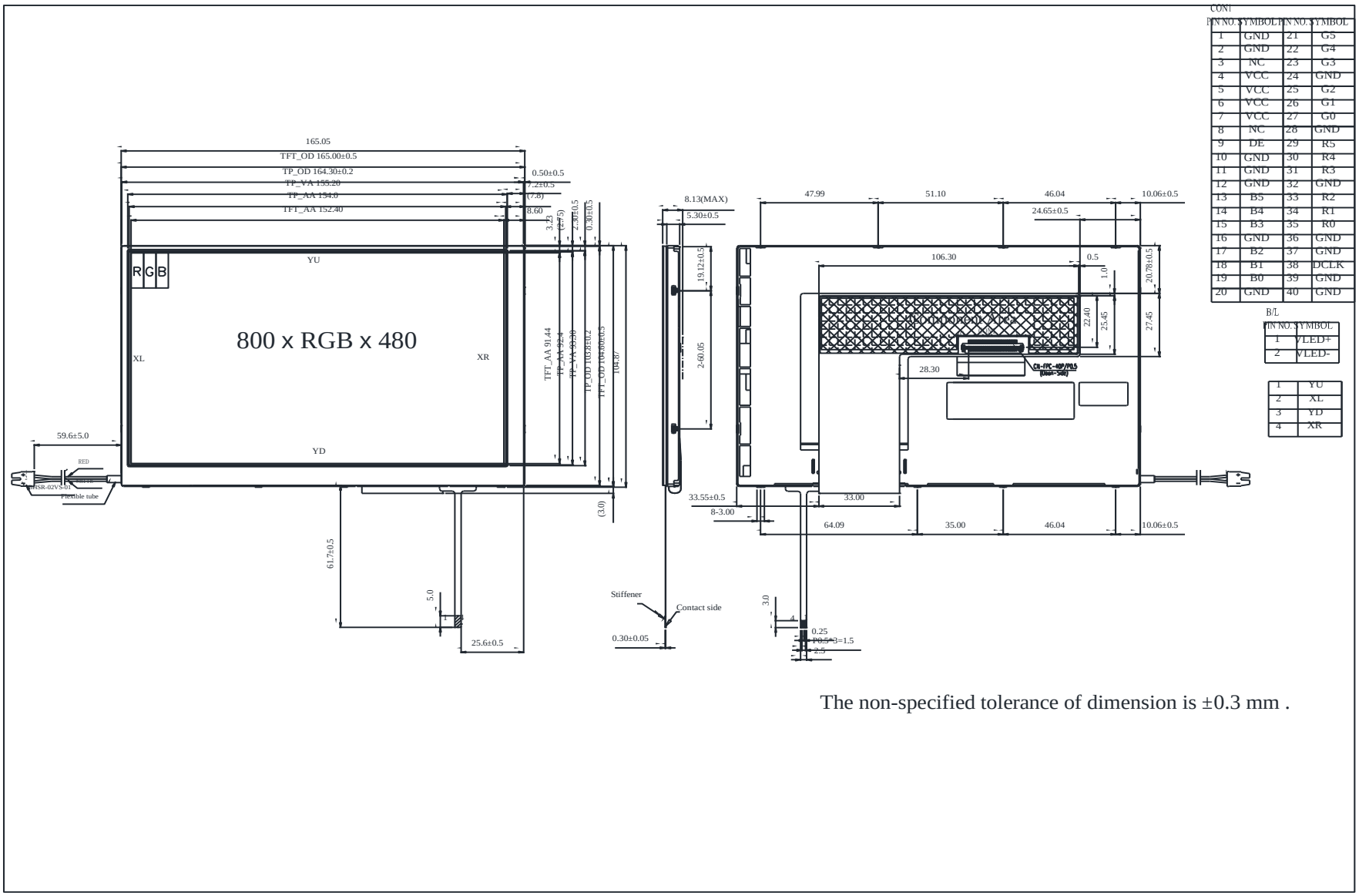
TOUCH PANEL PIN ASSIGNMENT

1	YU	Top Film Terminal
2	XL	Bottom ITO Glass Terminal
3	YD	Top Film Terminal
4	XR	Bottom ITO Glass Terminal

11.1. Resistance Touch Panel General Specifications

Item	Description
Driving condition	DC5V
Operating force	60~150g
Linearity max	≤±1.5%
Insulating resistance	＞20MΩ，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	200~1200Ω
Y resistance	100~800Ω

12.Contour Drawing



CON1

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

B/L

PIN NO.	SYMBOL
1	VLED+
2	VLED-

1	YU
2	XL
3	YD
4	XR

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

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

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：** / /