



**WINSTAR Display Co.,Ltd.**  
**華凌光電股份有限公司**



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## SPECIFICATION

**CUSTOMER :** \_\_\_\_\_

**MODULE NO.:** WF43STVAEDNNO#000

<p><b>APPROVED BY:</b></p> <p>( FOR CUSTOMER USE ONLY )</p>	<p><b>PCB VERSION:</b> _____</p> <p><b>DATA:</b> _____</p>
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SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			周园园
<b>ISSUED DATE: 2019/03/08</b>			



**RECORDS OF REVISION**

**DOC. FIRST ISSUE**

VERSION	DATE	REVISED PAGE NO.	<b>SUMMARY</b>
0	2019/03/08		First issue

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# 1.Module Classification Information

W F 43 S T V A E D N N 0 #000  
 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 00:Sales code 0:Version									

## **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**

<b>Item</b>	<b>Dimension</b>	<b>Unit</b>
Size	4.3	inch
Dot Matrix	480 x RGBx272(TFT)	dots
Module dimension	105.5 x 67.2 x 3.85	mm
Active area	95.04 x 53.856	mm
Dot pitch	0.066 x 0.198	mm
LCD type	TFT, Normally Black, Transmissive	
View Direction	Wide View	
Aspect Ratio	16:9	
Backlight Type	LED, Normally White	
With /Without TP	Without TP	
Surface	Anti-Glare	

\*Color tone slight changed by temperature and driving voltage.

# **Absolute Maximum Ratings**

<b>Item</b>	<b>Symbol</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Unit</b>
Operating Temperature	TOP	-40	—	+80	°C
Storage Temperature	TST	-40	—	+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  $60^{\circ}\text{C}$



# 5. Electrical Characteristics

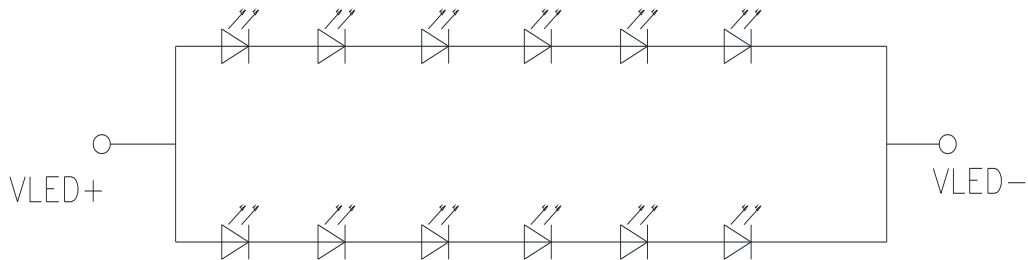
## 5.1. Operating conditions:

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	VCC	—	3.0	3.3	3.6	V
Digital operation current	ICC	-		17	25	mA

## 5.2. LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current		-	40	-	mA	
Power Consumption		-	-	-	mW	
LED voltage	VLED+	17.0	18.6	21.0	V	Note 1
LED Life Time		-	50,000	-	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



Note 2 :  $T_a = 25\text{ }^\circ\text{C}$

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

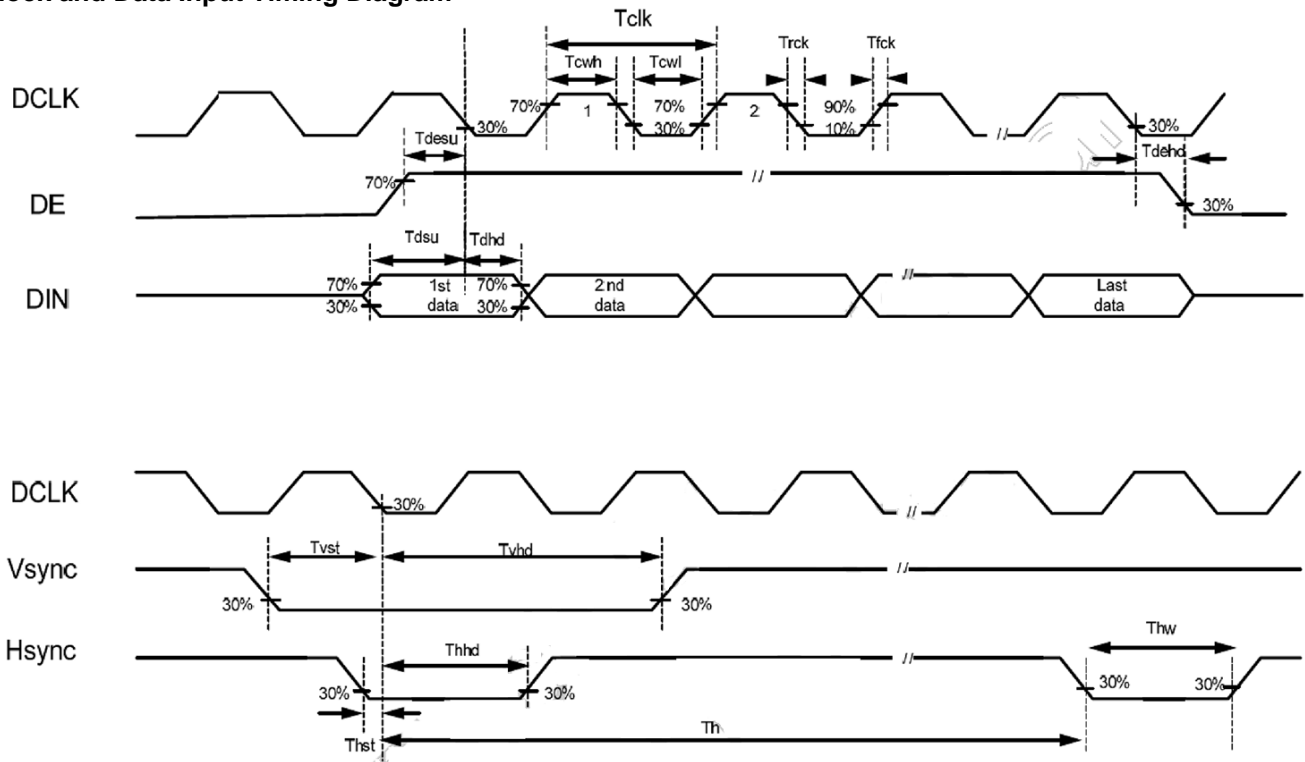
# 7.AC CHARACTERISTICS

## 7.1. AC CHARACTERISTICS

V<sub>CC</sub> = 3.3V

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK pulse duty	T <sub>cw</sub>	40	50	60	%	
Hsync width	T <sub>hw</sub>	1.0	—	—	DCLK	
Hsync period	T <sub>h</sub>	55	60	65	us	
Vsync setup time	T <sub>vst</sub>	12	—	—	ns	
Vsync hold time	T <sub>vhd</sub>	12	—	—	ns	
Hsync setup time	T <sub>hst</sub>	12	—	—	ns	
Hsync hold time	T <sub>hhd</sub>	12	—	—	ns	
Data set-up time	T <sub>dsu</sub>	12	—	—	ns	
Data hold time	T <sub>dhd</sub>	12	—	—	ns	
DE set-up time	T <sub>desu</sub>	12	—	—	ns	
DE hold time	T <sub>dehd</sub>	12	—	—	ns	
SD output stable time	T <sub>st</sub>	—	10	12	us	
GD output rise and fall time	T <sub>gst</sub>	—	500	1000	ns	
<b>Serial communication</b>						
Delay between CSB and Vsync	T <sub>cv</sub>	1			us	
CS input setup time	T <sub>s0</sub>	50			ns	
Serial data input setup time	T <sub>s1</sub>	50			ns	
CS input hold time	T <sub>h0</sub>	50			ns	
Serial data input hold time	T <sub>h1</sub>	50			ns	
SCL pulse high width	T <sub>wh1</sub>	50			ns	
SCL pulse low width	T <sub>wl1</sub>	50			ns	
CS pulse high width	T <sub>w2</sub>	400			ns	

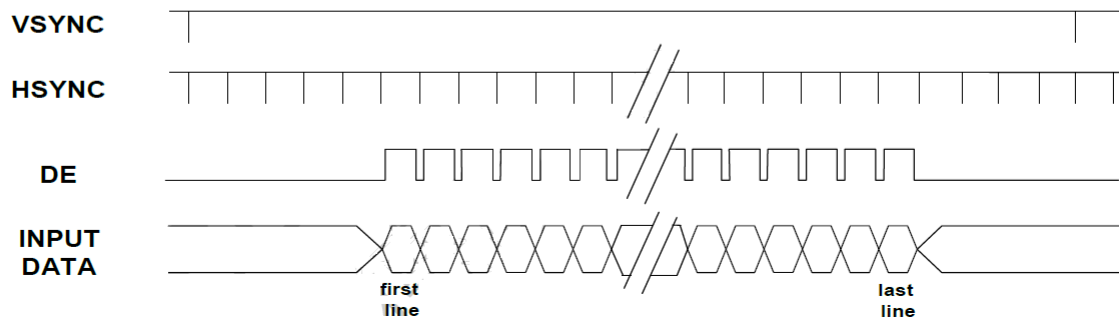
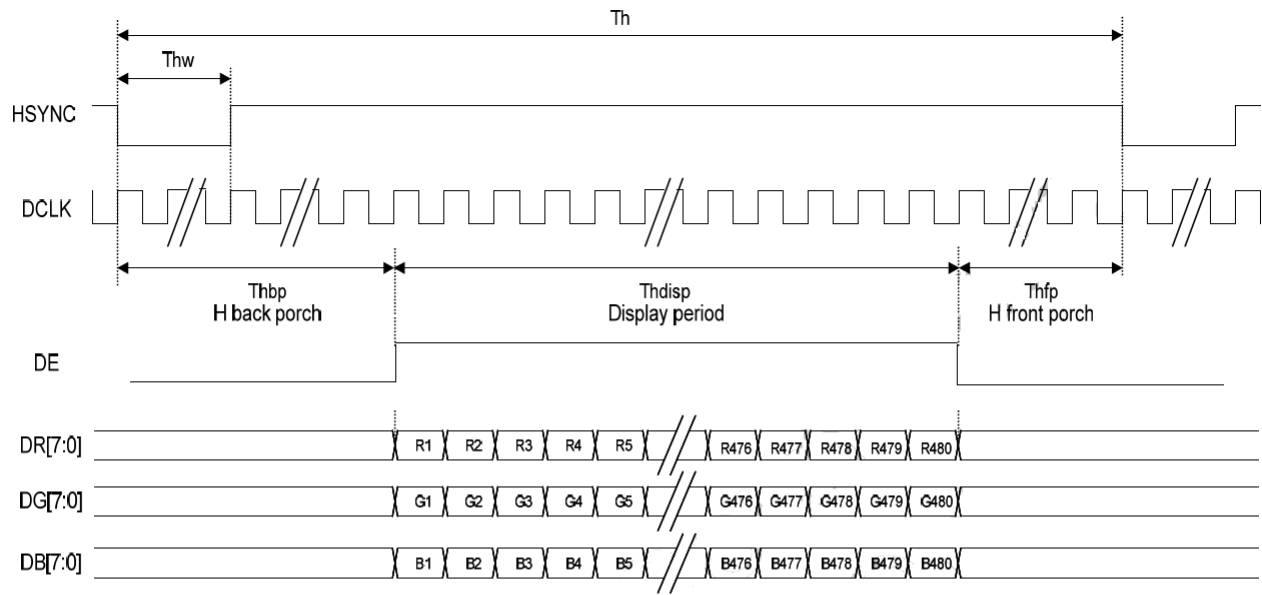
## 7.2. AC Timing Diagram Clock and Data Input Timing Diagram



## 7.3. SYNC-DE Parallel RGB Unput Timing Table

Item	Symbol	Min.	Typ.	Max.	Unit		
DCLK Frequency	Fclk	5	9	12	MHz		
DCLK Period	Tclk s	83	110	200	ns		
Hsync	Period Time	Th	490	531	605	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	8	43		DCLK	By H_BLANKING setting
	Front Porch	Thfp	2	8		DCLK	
	Pulse Width	Thw	1			DCLK	
Vsync	Period Time	Tv	275	288	335	H	
	Display Period	Tvdisp		272		H	
	Back Porch	Tvbp	2	12		H	By V_BLANKING setting
	Front Porch	Tvfp	1	4		H	
	Pulse Width	Tvw	1	10		H	

# SYNC-DE Mode Timing Diagram



# 8. Optical Characteristics

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	Tr+ Tf	$\theta=0^\circ$ 、 $\Phi=0^\circ$	-	35	-	.ms	Note 3	
Contrast ratio	CR	At optimized viewing angle	-	500	-	-	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.	$\Theta_R$	$CR \geq 10$	70	80	-	Deg.	Note 1
		$\Theta_L$		70	80	-		
	Ver.	$\Phi_T$		70	80	-		
		$\Phi_B$		70	80	-		
Brightness	-	-	500	600	-	cd/m <sup>2</sup>	Center of display	
Uniformity	(U)	-	75	-	-	%	Note5	

Ta=25±2°C, IL=40mA

Note 1: Definition of viewing angle range

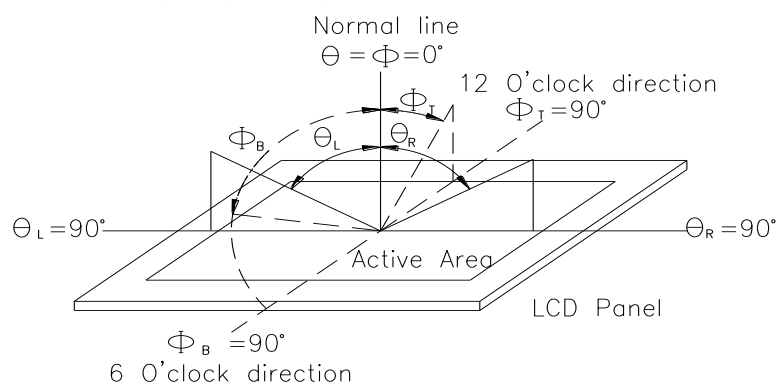


Fig. 8.1. Definition of viewing angle

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.

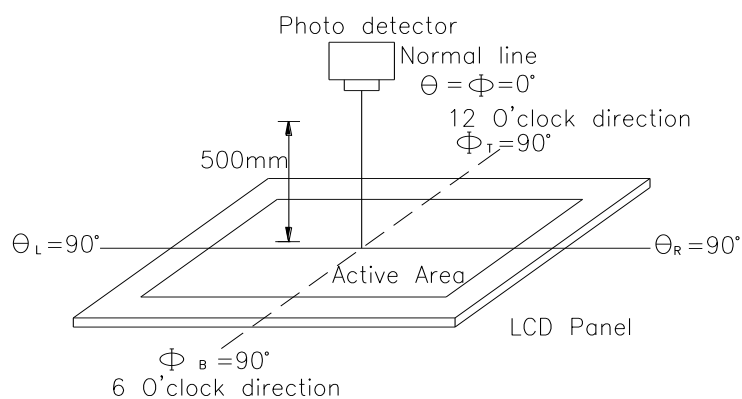
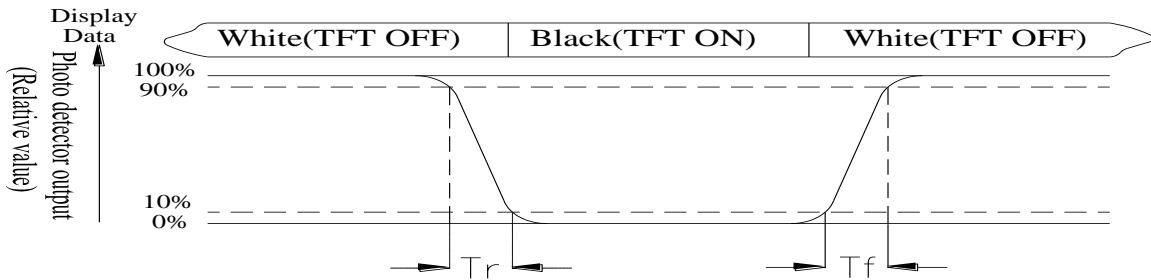


Fig. 8.2. Optical measurement system setup

**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.

$$\text{Luminance Uniformity (U)} = L_{\min}/L_{\max} \times 100\%$$

$L$  = Active area length

$W$  = Active area width

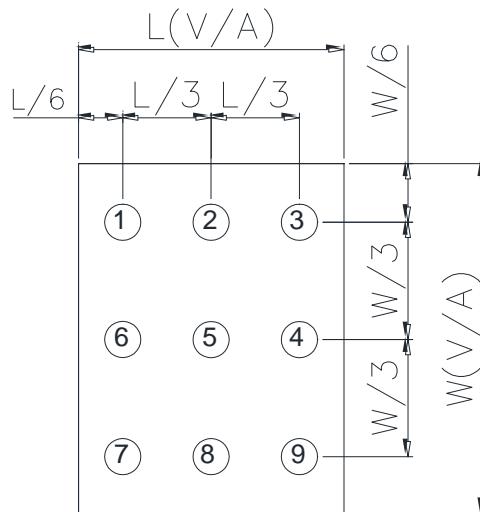


Fig.8.3. Definition of uniformity

**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

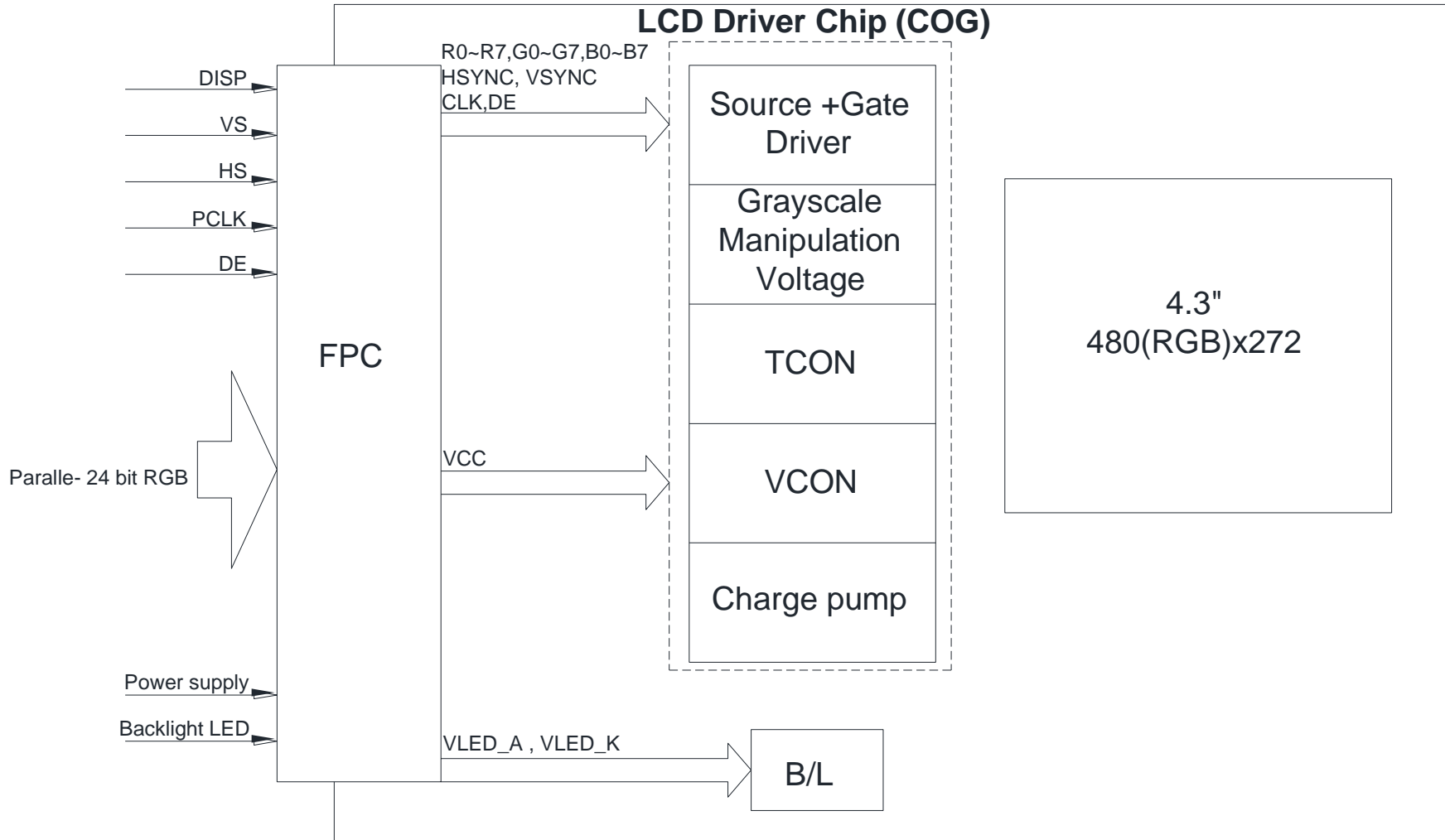
Pin	Symbol	Function	Remark
1	VLED_A	Power for LED backlight anode	
2	VLED_K	Power for LED backlight cathode	
3	VCC	Power voltage	
4	VCC	Power voltage	
5	R0	Red data (LSB)	
6	R1	Red data	
7	R2	Red data	
8	R3	Red data	
9	R4	Red data	
10	R5	Red data	
11	R6	Red data	
12	R7	Red data (MSB)	
13	GND	Power ground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



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

# 10. Block Diagram

## LCD Panel



# 11. Reliability

Content of Reliability Test (Super Wide temperature, -40°C~80°C)

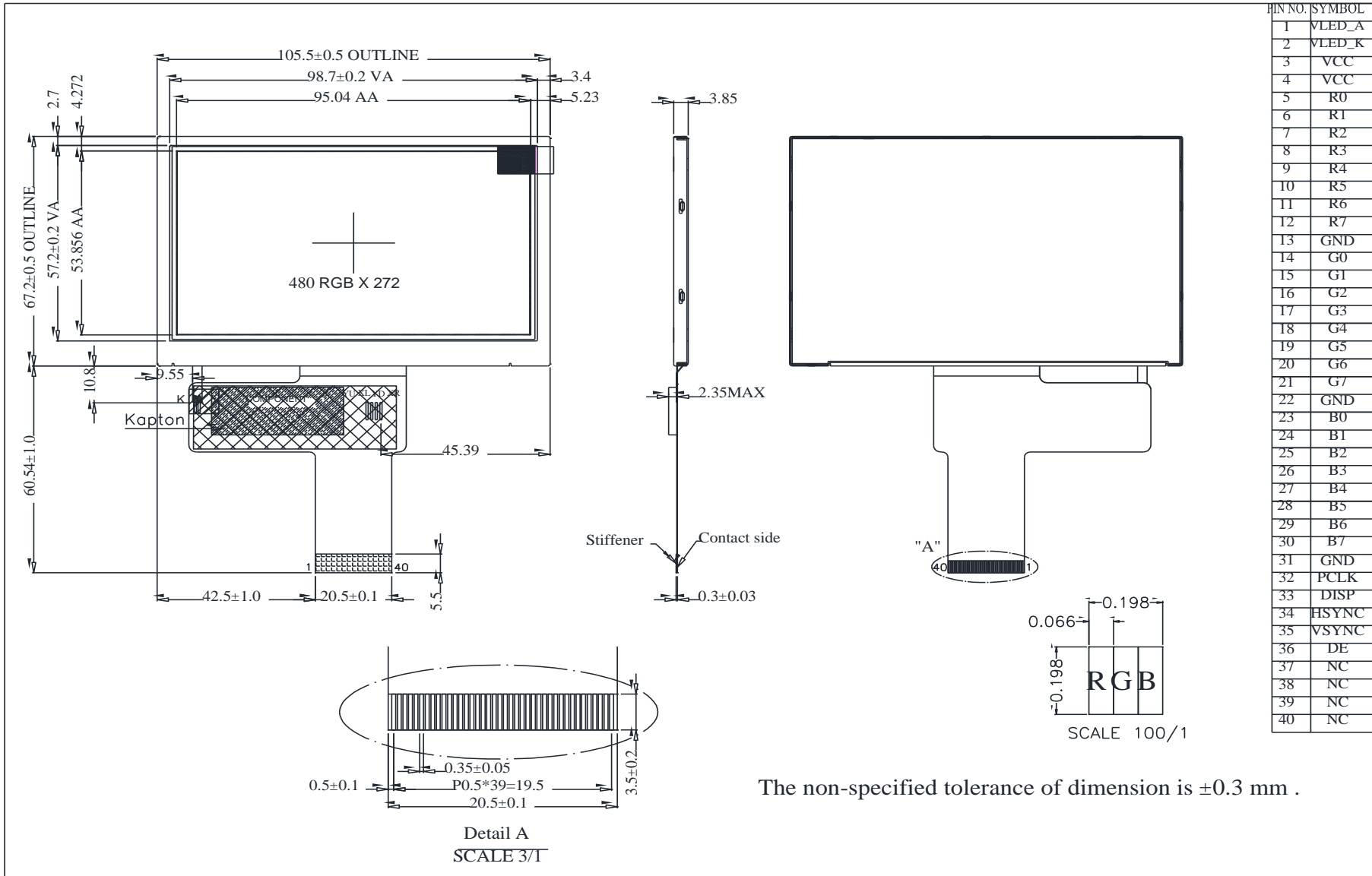
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 48hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-40°C 48hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	80°C 48hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-40°C 48hrs	1
High Temperature/ Humidity storage	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="margin: 0;">-40°C    25°C    80°C</p> <p style="margin: 0;">30min    5min    30min</p> <p style="margin: 0;">1 cycle</p> </div>	-30°C/80°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.	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. Contour Drawing





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 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** <<



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 :        /        /        \_\_\_\_\_