



<b>Model Name</b>	IPS043B101S
<b>Description</b>	4.3" IPS TFT 480*272 (RGB) Without Touchscreen
<b>Date</b>	2019/7/5
<b>Version</b>	1.0

<b>Approved by/Date</b>	<b>Check by/Date</b>	<b>Prepared by/Date</b>
ZHP 2019/7/5	HZX 2019/7/5	Yigui.Han 2019/7/5

<b>Customer Approval</b>	
<b>Date</b>	

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## **1. Record of Revision**

## 2. General Specifications

	Feature	Spec
Characteristics	Size	4.3 inch
	Resolution	480(horizontal)*272(Vertical)
	Interface	RGB-24bit
	Connect type	Connector
	Display Colors	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.198*0.198
	Pixel Configuration	R.G.B-Stripe
	Display Mode	Normally Black
	LCD Driver IC	SC7283
Mechanical	Viewing Direction	Full view
	LCM (W x H x D) (mm)	105.50*67.20*2.95
	Active Area(mm)	95.04 x53.86
	Weight (g)	50
	LED Numbers	16 LEDs

Note 1: Requirements on Environmental Protection: RoHs

Note 2: LCM weight tolerance: +/- 5%

### 3. Input/Output Terminals

LCD PIN-MAP

No.	Symbol	Description
1	VLED-	Backlight LED Cathode
2	VLED+	Backlight LED Anode.
3	GND	Ground
4	VDD	Power supply
5~12	R0~R7	Data bus
13~20	G0~G7	Data bus
21~28	B0~B7	Data bus
29	GND	Ground
30	DCLK	Dot clock signal input. Latching input data at its rising edge.
31	DISP	Standby mode. Normally pulled high. DISP="1": Normally operation (Default) DISP="0": Timing controller, source driver will turn off ,all output are High-Z.
32	H SYNC	Horizontal sync input. Negative polarity.
33	V SYNC	Vertical sync input. Negative polarity..
34	DE	Data enable input. Active high to enable the input data bus under "DE Mode."
35	NC	No connect
36	GND	Ground
37	XR(NC)	The right side signal of TP
38	YD(NC)	The down side signal of TP
39	XL(NC)	The left side signal of TP
40	YU(NC)	The up side signal of TP

### 4. Absolute Maximum Rating

Item	Symbol	MIN	Typ	MAX	Unit	Remark
Supply Voltage	VDD	-0.5	-	5	V	-
Operating Temperature	TOPR	-30	-	85	°C	-
Storage Temperature	TSTG	-30	-	85	°C	

## 5. Electrical Characteristics

### 5.1 Driving TFT LCD Panel

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Supply Voltage		VDD	3.0	3.3	3.6	V	
Input Signal Voltage	Low Leve	VIL	GND	-	0.3x VDD	V	
	High Level	VIH	0.7x VDD	-	VDD	V	
Output Signal Voltage	Low Leve	VIL	GND	-	VDD+0.4	V	
	High Level	VIH	VDD-0.4	-	VDD	V	
(Panel+LSI) Power Consumption		Black Mode (60Hz)	-	74		nW	
		Standby	-	50	-	uW	

### 5.2 LED Driving Conditions

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I <sub>F</sub>	-	40	50	mA	
Forward Voltage	V <sub>F</sub>	22.4	25	27.6	V	
Backlight Power consumption	W <sub>BL</sub>	-	1.0	1.38	W	
LED Lifetime		-	30000	-	Hrs	

Note 1: Each LED: IF =20 mA, VF =3.2+/0.2V.

Note 2: Optical performance should be evaluated at Ta=25°C only.

Note 3: If LED is driven by high current, high ambient temperature & humidity condition. The life Time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

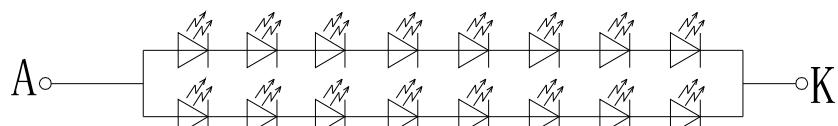
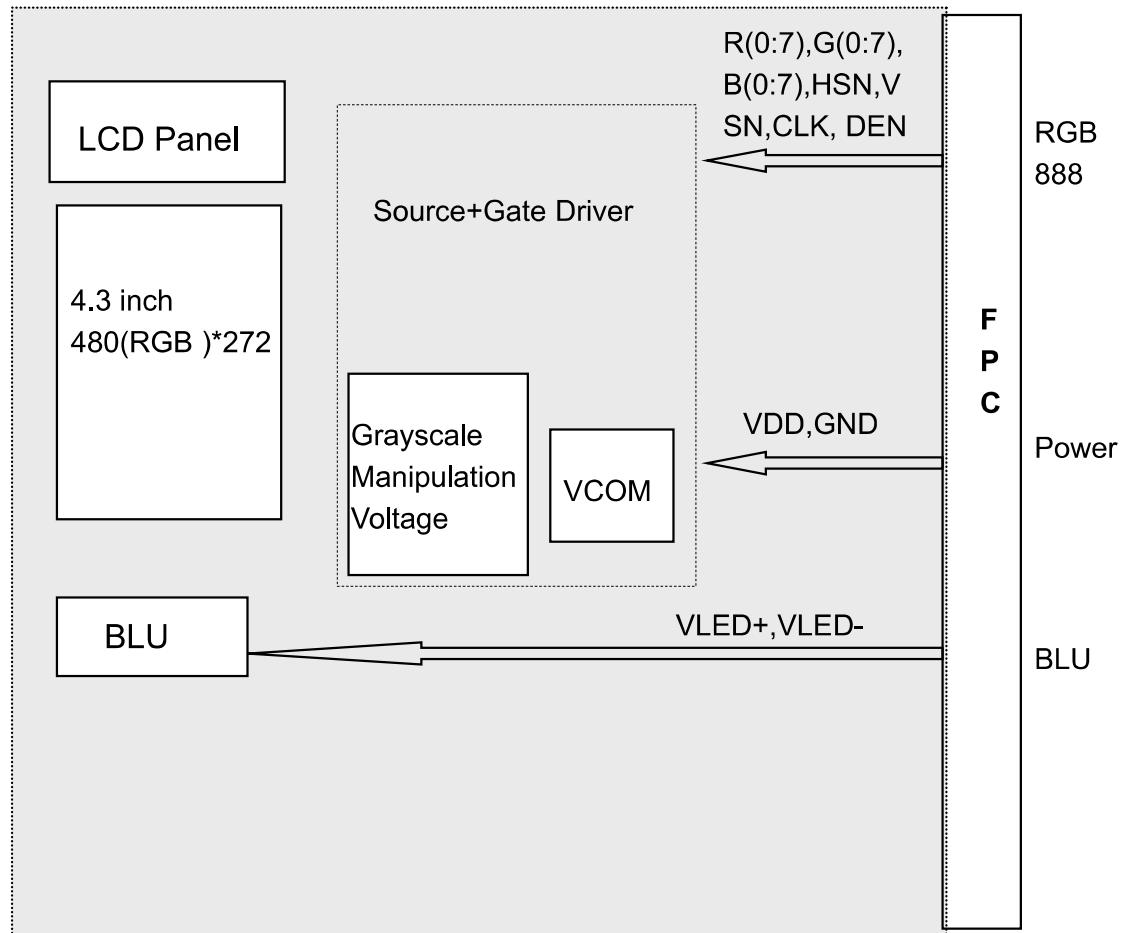


Figure: LED connection of backlight(Constant Current)

### 5.3 Block Diagram



## 6. Interface Timing

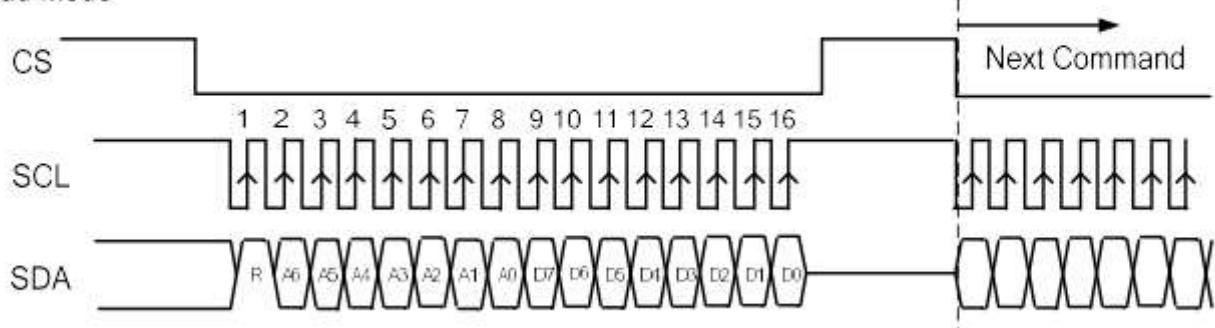
### 6.1 3-wire Serial Interface

R/W: Read/Write mode control bit.

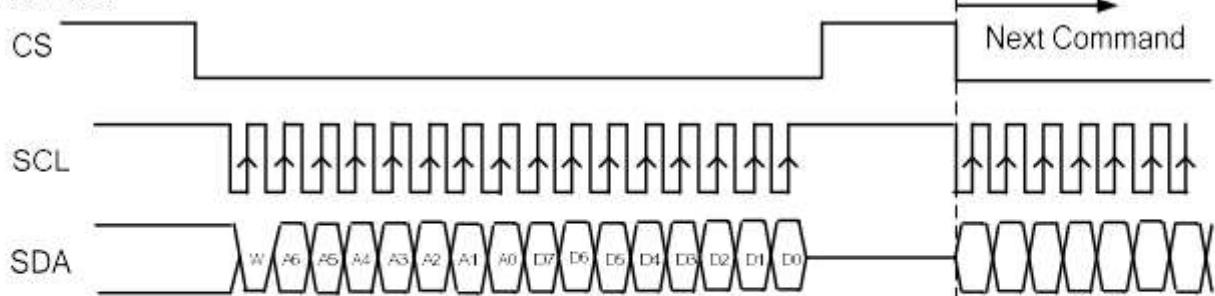
R/W=1: Read mode

R/W=0: Write mode

Read Mode



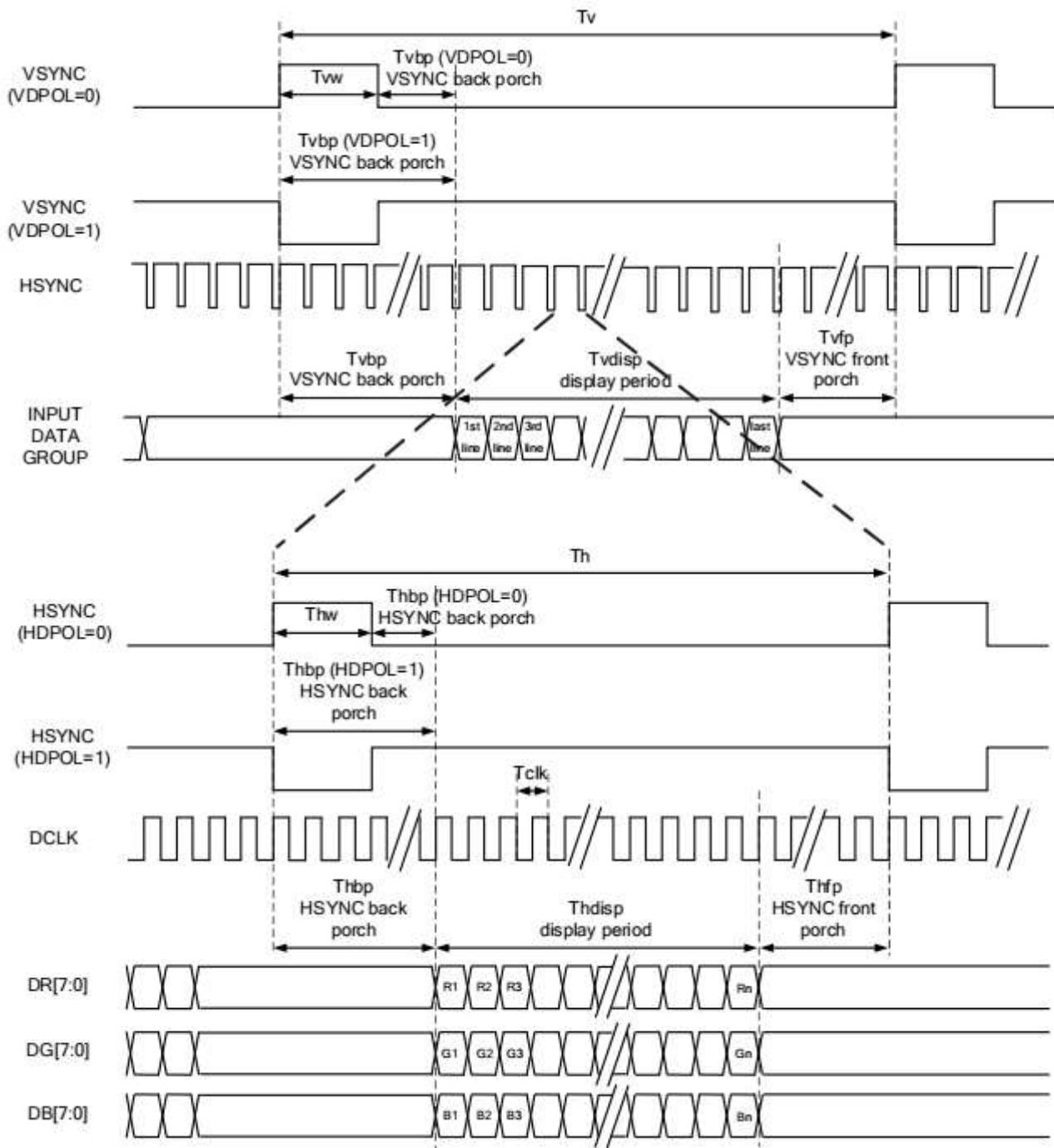
Write Mode



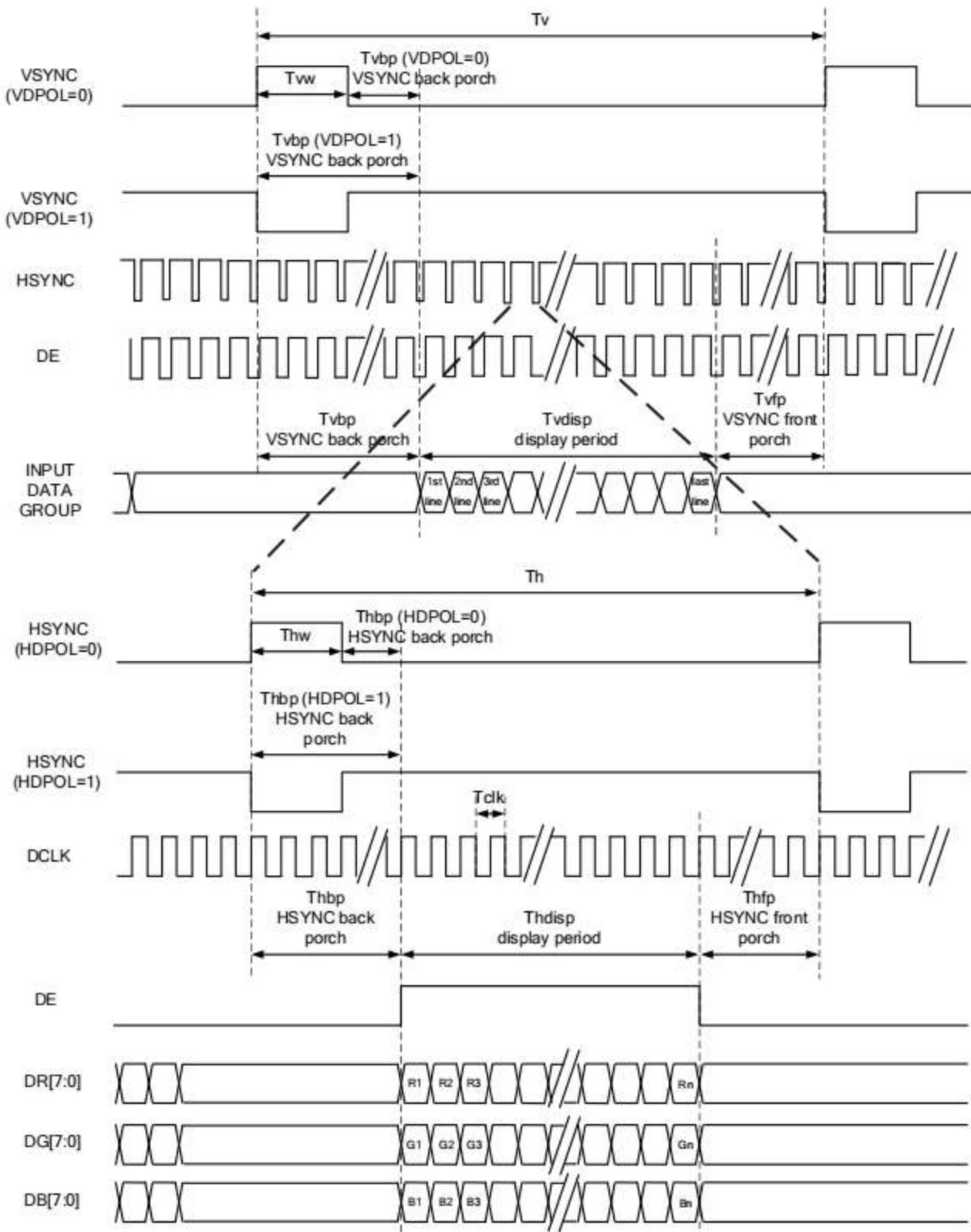
- Each serial command consists of 16 bits of data which is loaded one bit a time at the rising edge of serial clock SCL.
- Command loading operation starts from the falling edge of CS and is completed at the next rising edge of CS.
- The serial control block is operational after power on reset, but commands are established by the VSYNC signal. If command is transferred multiple times for the same register, the last command before the VSYNC signal is valid.
- If less than 16 bits of SCL are input while CS is low, the transferred data is ignored.
- If 16 bits or more of SCL are input while CS is low, the previous 16 bits of transferred data before then rising edge of CS pulse are valid data.
- Serial block operates with the SCL clock
- Serial data can be accepted in the power save mode.
- After power on reset or GRB reset, it is required 100ms delay to begin SPI communication.

## 6.2 RGB Interface

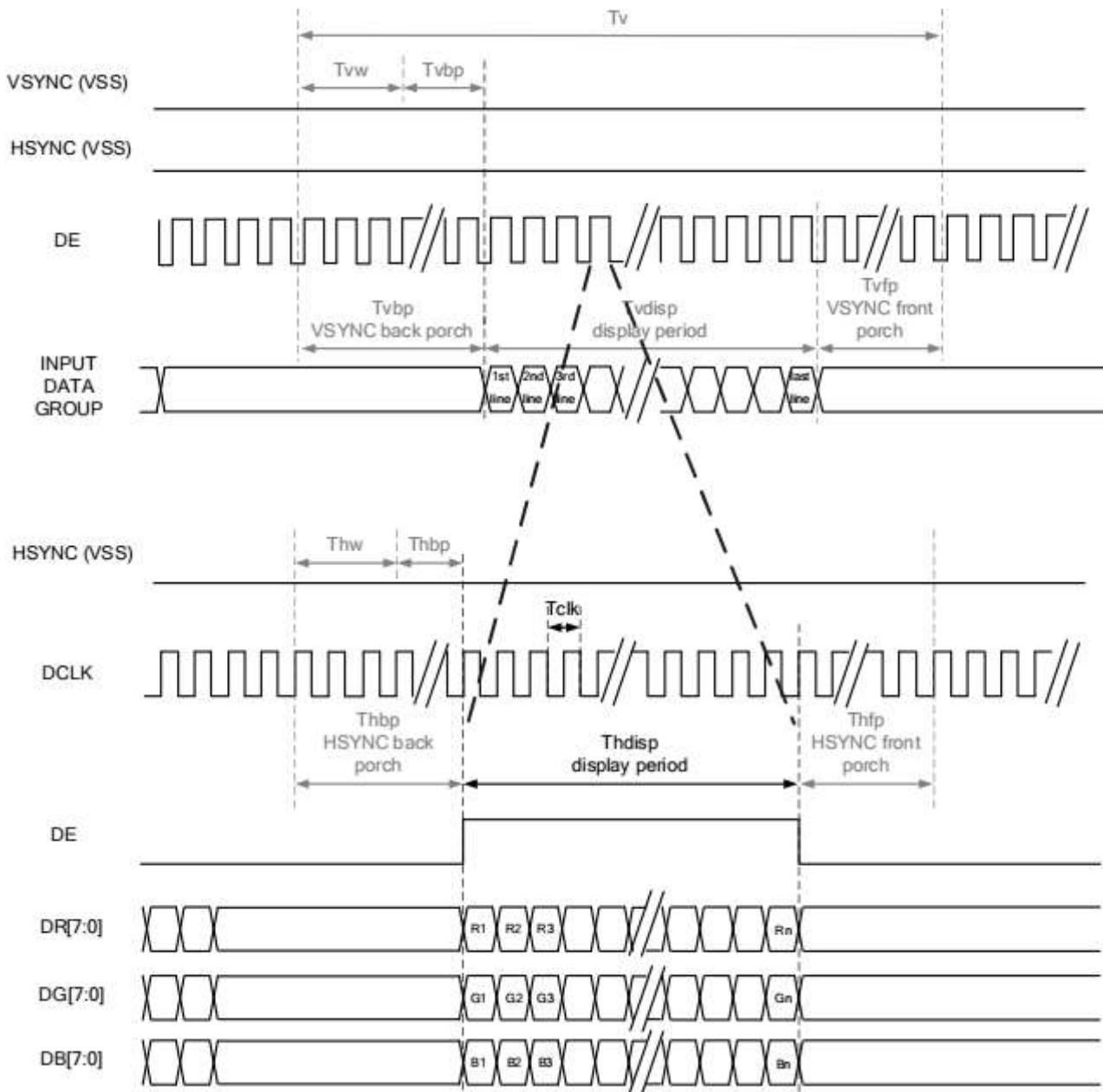
### 6.2.1 SYNC Mode



## 6.2.2 SYNC-DE Mode



### 6.2.3 DE Mode



RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

Note: "Input" means these signals are driven by host side.

## 6.2.4 Parallel 24 bit RGB Input Timing Table

Parallel 24-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

480RGB X 272 Resolution Timing Table						
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK 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
	Front Porch	Thfp	2	8	75	DCLK
	Pulse Width	Thw	2	4	43	DCLK
VSYNC	Period Time	Tv	276	292	321	HSYNC
	Display Period	Tvdisp		272		HSYNC
	Back Porch	Tvbp	2	12	12	HSYNC
	Front Porch	Tvfp	2	8	37	HSYNC
	Pulse Width	Tvw	2	4	12	HSYNC

Note: It is necessary to keep  $Tvbp = 12$  and  $Thbp = 43$  in sync mode. DE mode is unnecessary to keep it.

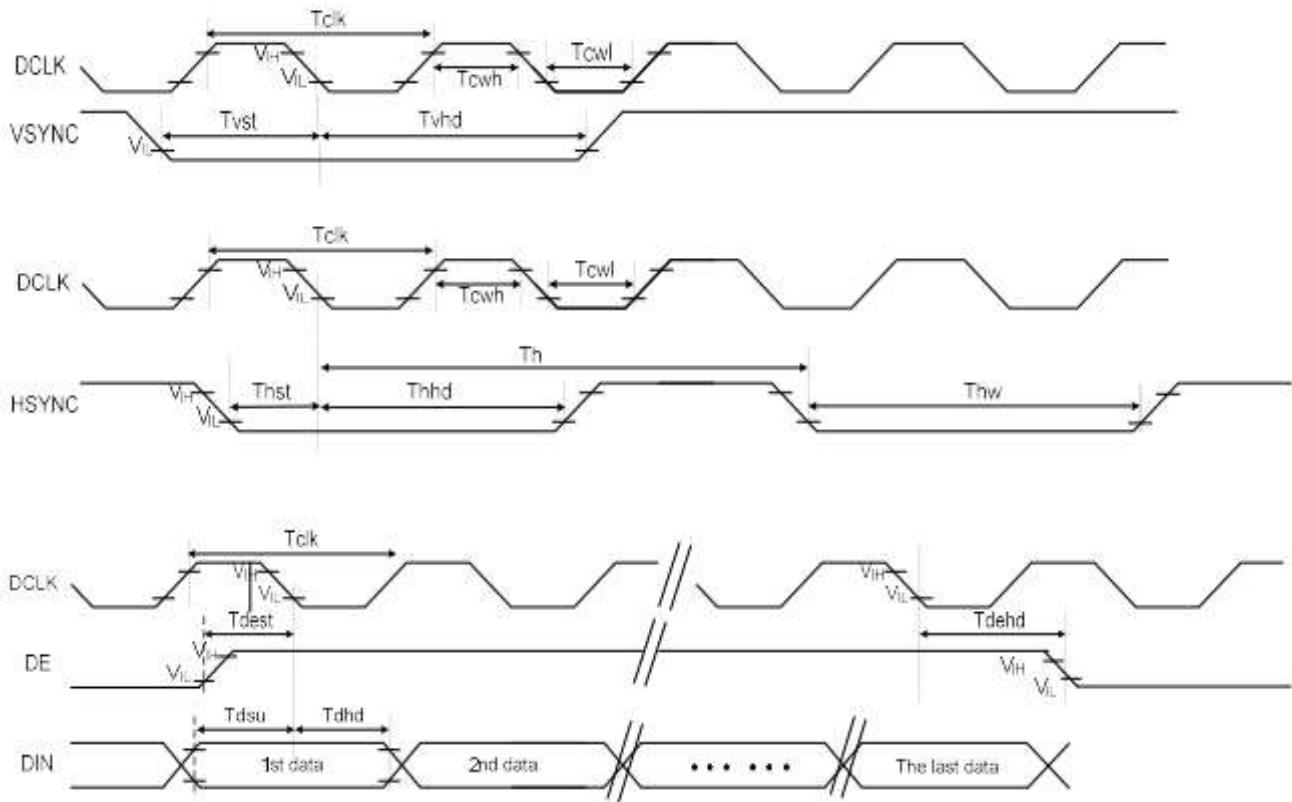
## 6.2.5 Serial 8 bit RGB Input Timing Table

Serial 8-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

480RGB X 272 Resolution Timing Table						
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency	Fclk	24	27	30	MHz	
DCLK Period	Tclk	33	37	42	ns	
HSYNC	Period Time	Th	1445	1491	1558	DCLK
	Display Period	Thdisp		1440		DCLK
	Back Porch	Thbp	3	43	43	DCLK
	Front Porch	Thfp	2	8	75	DCLK
	Pulse Width	Thw	2	4	43	DCLK
VSYNC	Period Time	Tv	276	292	321	HSYNC
	Display Period	Tvdisp		272		HSYNC
	Back Porch	Tvbp	2	12	12	HSYNC
	Front Porch	Tvfp	2	8	37	HSYNC
	Pulse Width	Tvw	2	4	12	HSYNC

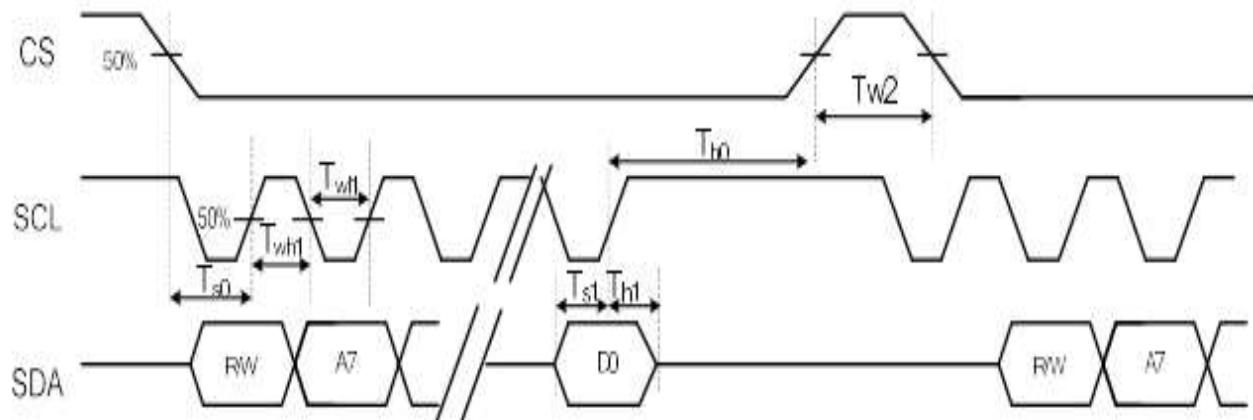
Note: It is necessary to keep  $Tvbp = 12$  and  $Thbp = 43$  in sync mode. DE mode is unnecessary to keep it.

## 6.3 System Bus Timing for RGB Interface



Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Pulse Duty	$T_{cw}$	40	50	60	%	
HSYNC Width	$T_{hw}$	2	-	-	DCLK	
HSYNC Period	$T_h$	55	60	65	us	
VSYNC Setup Time	$T_{vst}$	12	-	-	ns	
VSYNC Hold Time	$T_{vh}$	12	-	-	ns	
HSYNC Setup Time	$T_{hst}$	12	-	-	ns	
HSYNC Hold Time	$T_{hh}$	12	-	-	ns	
Data Setup Time	$T_{dsu}$	12	-	-	ns	
Data Hold Time	$T_{dhd}$	12	-	-	ns	
DE Setup Time	$T_{dest}$	12	-	-	ns	
DE Hold Time	$T_{dehd}$	12	-	-	ns	

## 6.4 System Bus Timing for 3-Wire SPI Interface



Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CS Input Setup Time	Ts0	50	-	-	ns	
Serial Data Input Setup Time	Ts1	50	-	-	ns	
CS Input Hold Time	Th0	50	-	-	ns	
Serial Data Input Hold Time	Th1	50	-	-	ns	
SCL Write Pulse High Width	Twh1	50	-	-	ns	
SCL Write Pulse Low Width	Twl1	50	-	-	ns	
SCL Read Pulse High Width	Trh1	300	-	-	ns	
SCL Read Pulse Low Width	Trl1	300	-	-	ns	
CS Pulse High Width	Tw2	400	-	-	ns	

## 7. Optical Characteristics

Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	Note	
Response time	Tr+Tf	-	-	30	40	ms	FIG.1	Note4	
Contrast Ratio	CR		600	800	-	-	FIG.2	Note1	
Surface luminance	LV	$\theta = 0^\circ$	900	1000	-	cd/m <sup>2</sup>	FIG.2	Note2	
Luminance uniformity	Yu	$\theta = 0^\circ$	75	80	-	%	FIG.2	Note3	
NTSC	-	$\theta = 0^\circ$	-	50	-	%	FIG.2	Note5	
Viewing angle	$\theta_T$	Center $CR \geq 10$	-	80	-	deg	FIG.3	Note6	
	$\theta_B$		-	80	-	deg	FIG.3		
	$\theta_L$		-	80	-	deg	FIG.3		
	$\theta_R$		-	80	-	deg	FIG.3		
Chromaticity	Red	$\theta = 0^\circ$	0.579	0.629	0.679	-	FIG.2 CIE1931	Note5	
			0.276	0.326	0.376	-			
	Green		0.287	0.337	0.387	-			
			0.496	0.546	0.596	-			
	Blue	$\phi = 0^\circ$	0.086	0.136	0.186	-			
			0.093	0.143	0.193	-			
	White		0.274	0.324	0.374	-			
			0.298	0.348	0.398	-			

## **Note1. Definition of contrast ratio**

Contrast ratio(Cr) is defined mathematically by the following formula. For more information see FIG.2.

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

For contrast ratio, Surface Luminance, Luminance uniformity and CIE, the testing data is base on TOPCON's BM-5 or BM-7 photo detector or compatible.

## **Note2. Definition of surface luminance.**

Surface luminance is the luminance with all pixels displaying white. For more information see FIG.2.

$L_v$  = Average Surface Luminance with all white pixels( $P_1, P_2, P_3, \dots, P_n$ )

## **Note3. Definition of luminance uniformity**

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance. For more information see FIG.2.

$$Y_U = \frac{\text{Minimum surface luminance with all white pixels } (P_1, P_2, P_3, \dots, P_n)}{\text{Maximum surface luminance with all white pixels } (P_1, P_2, P_3, \dots, P_n)}$$

## **Note4. 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%.

For additional information see FIG1.

## **Note5. Definition of color chromaticity (CIE1931)**

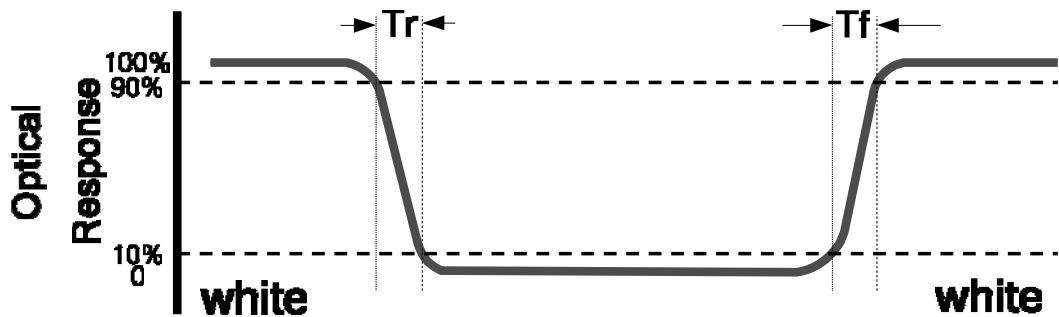
CIE (x,y) chromaticity, The x,y value is determined by screen active area center position P5. For more information see FIG.2.

## **Note6. Definition of viewing angle**

Viewing angle is the angle at which the contrast ratio is greater than 10. Angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG.3.

For viewing angle and response time testing, the testing data is base on Autronic-Melchers' s ConoScope or DMS series Instruments or compatible.

**FIG.1.The definition of response Time**



**FIG.2. Measuring method for contrast ratio, surface luminance,**

**luminance uniformity, CIE (x,y) chromaticity**

Size : S≤5"(see Figure a) A : 5 mm B : 5 mm

H,V : Active area

Light spot size  $\varnothing=5\text{mm}$ (BM-5) or  $\varnothing=7.7\text{mm}$  (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure a.

measurement instrument : TOPCON's luminance meter BM-5 or

BM-7 or compatible (see Figure c).

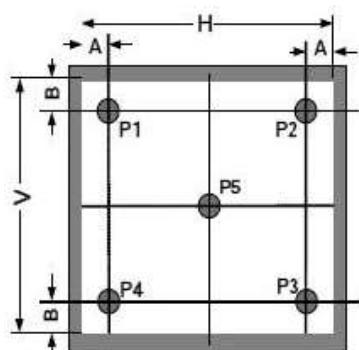


Figure a

Size : 5" < S≤12.3"(see Figure b) H,V : Active area

Light spot size  $\varnothing=5\text{mm}$ (BM-5) or  $\varnothing=7.7\text{mm}$  (BM-7)50cm distance or compatible distance from the LCD surface to detector lens.

test spot position : see Figure b.

measurement instrument : TOPCON's luminance meter BM-5 or

BM-7 or compatible (see Figure c).

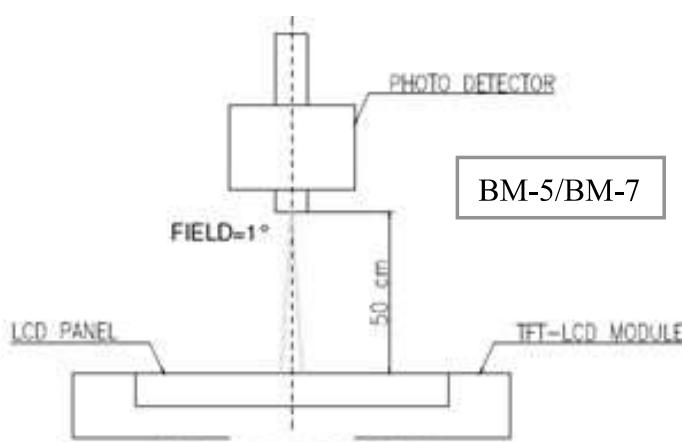


Figure c

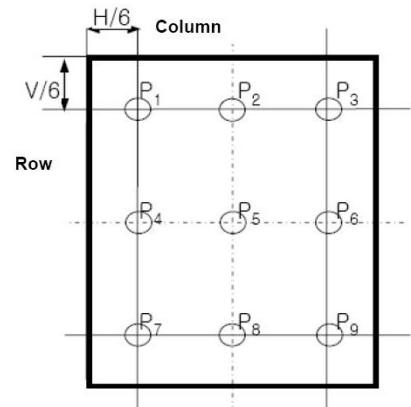
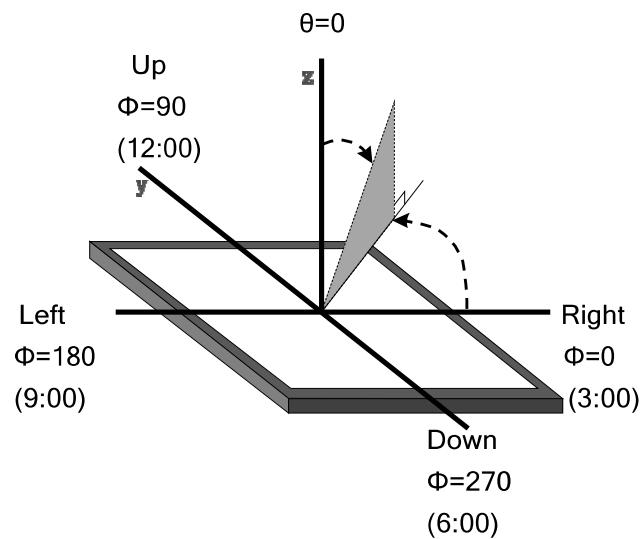


Figure b

**FIG.3.The definition of viewing angle**



## 8. Environmental / Reliability Tests

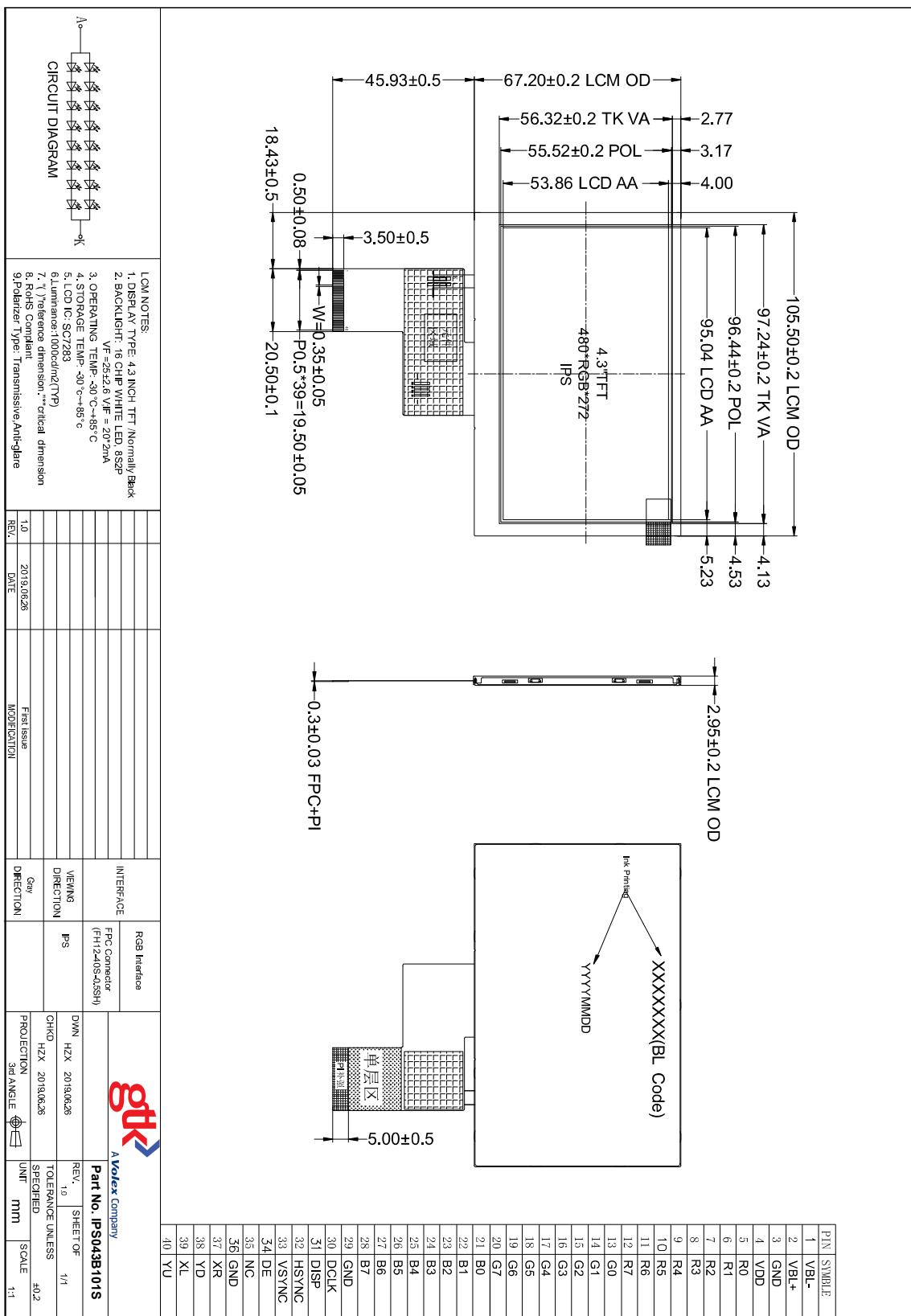
No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +85°C, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -30°C, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +85°C, 96hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30°C, 96hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60°C, 90% RH max,96 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-20°C 30 min ~ +60°C 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Discharge (Operation)	Static C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15°C ~ 35°C, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ± Y , ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 80 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

Note: 1. Ts is the temperature of panel's surface.

2. Ta is the ambient temperature of sample.

3. The size of sample is 5pcs.

## 9. Mechanical Drawing



## **10. Packing**

**Packing Method**

**TBD**

## **11. TFT-LCD Module Inspection Criteria**

### **11.1 Scope**

The incoming inspection standards shall be applied to TFT – LCD Modules (hereinafter Called "Modules")

### **11.2 Incoming Inspection**

The customer shall inspect the modules within twenty calendar days of the delivery date (the “inspection period) at its own cost. The result of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to The seller, If the results of the inspecting from buyer does not send to the seller within twenty Calendar days of the delivery date. The modules shall be regards as acceptance. Should the customer fail to notify the seller within the inspection period, the buyers Right to reject the modules shall be lapsed and the modules shall be deemed to have Been accepted by the buyer

### **11.3 Inspection Sampling**

- 3.1. Lot size: Quantity per shipment lot per model
- 3.2. Sampling type: Normal inspection, Single sampling
- 3.3. Inspection level: II
- 3.4. Sampling table: MIL-STD-105E
- 3.5. Acceptable quality level (AQL )  
Major defect: AQL=0.65 Minor defect: AQL=1.00

### **11.4 Inspection Conditions**

#### **4.1 Ambient conditions:**

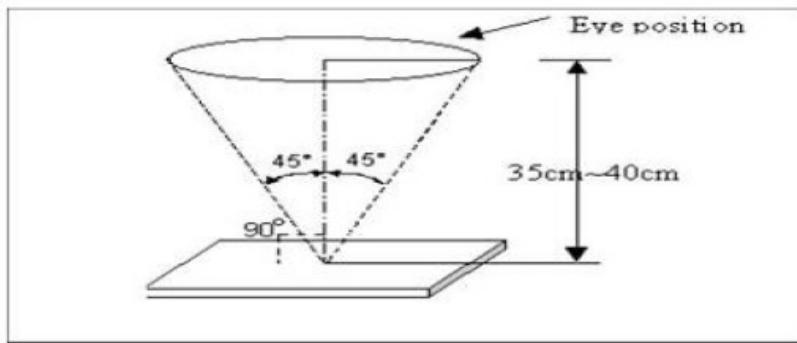
- a. Temperature: Room temperature  $25 \pm 5^\circ\text{C}$
- b. Humidity:  $(60 \pm 10) \% \text{RH}$
- c. Illumination: Single fluorescent lamp non-directive (300 to 700 Lux)

#### **4.2 Viewing distance**

The distance between the LCD and the inspector's eyes shall be at least  $35 \pm 5$  cm.

#### **4.3 Viewing Angle**

U/D:  $45^\circ / 45^\circ$ , L/R:  $45^\circ / 45^\circ$



## 11.5 Inspection Criteria

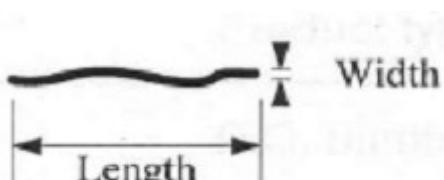
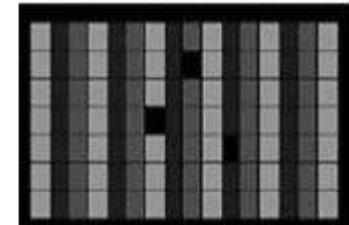
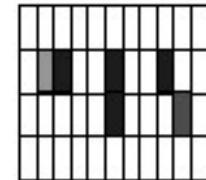
Defects are classified as major defects and minor defects according to the degree of Defectiveness defined herein.

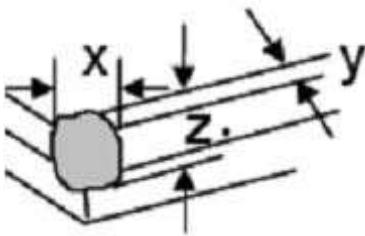
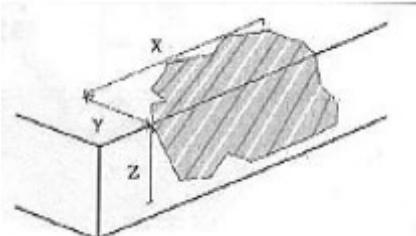
### 11.5.1 Major defect

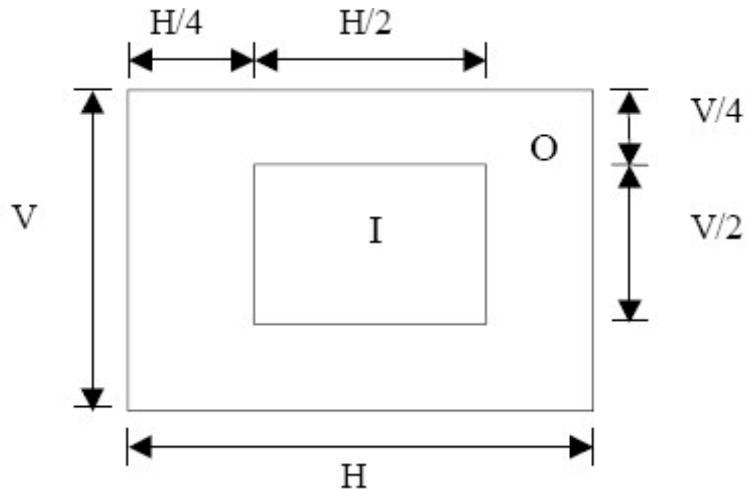
Item No	Items to be inspected	Inspection Standard
5.1.1	All functional defects	1) No display 2) Display abnormally 3) Short circuit 4) line defect
5.1.2	Missing	Missing function component
5.1.3	Crack	Glass Crack

### 11.5.2 Minor defect

Item No	Items to be inspected	Inspection standard								
5.2.1	Spot Defect Including Black spot White spot Pinhole Foreign particle Polarizer dirt	<p>For dark/white spot is defined</p> $\varphi = (x+y) / 2$ <table border="1"> <thead> <tr> <th>Size <math>\varphi</math>(mm)</th> <th>Acceptable Quantity</th> </tr> </thead> <tbody> <tr> <td><math>\varphi \leq 0.2</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.2 &lt; \varphi \leq 0.5</math></td> <td>3</td> </tr> <tr> <td><math>0.5 &lt; \varphi</math></td> <td>Not allowed</td> </tr> </tbody> </table>	Size $\varphi$ (mm)	Acceptable Quantity	$\varphi \leq 0.2$	Ignore	$0.2 < \varphi \leq 0.5$	3	$0.5 < \varphi$	Not allowed
Size $\varphi$ (mm)	Acceptable Quantity									
$\varphi \leq 0.2$	Ignore									
$0.2 < \varphi \leq 0.5$	3									
$0.5 < \varphi$	Not allowed									

		Define:																			
																					
5.2.2	Line Defect Including Black line White line Scratch	<table border="1"> <thead> <tr> <th>Width(mm) Length(mm)</th> <th>Acceptable Quantity</th> </tr> </thead> <tbody> <tr> <td><math>W \leq 0.05</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.05 &lt; W \leq 0.1</math> <math>L \leq 2.5</math></td> <td>3</td> </tr> <tr> <td><math>0.1 &lt; W</math>, or <math>L &gt; 2.5</math></td> <td>Not allowed</td> </tr> </tbody> </table>	Width(mm) Length(mm)	Acceptable Quantity	$W \leq 0.05$	Ignore	$0.05 < W \leq 0.1$ $L \leq 2.5$	3	$0.1 < W$ , or $L > 2.5$	Not allowed											
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5.2.3	Polarizer Dent/Bubble	<table border="1"> <thead> <tr> <th>Size<math>\phi</math>(mm)</th> <th>Acceptable Quantity</th> </tr> </thead> <tbody> <tr> <td><math>\phi \leq 0.2</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.2 &lt; \phi \leq 0.3</math></td> <td>2</td> </tr> <tr> <td><math>0.3 &lt; \phi \leq 0.5</math></td> <td>1</td> </tr> <tr> <td><math>0.5 &lt; \phi</math></td> <td>Not allowed</td> </tr> <tr> <td>Total QTY</td> <td>3</td> </tr> </tbody> </table>	Size $\phi$ (mm)	Acceptable Quantity	$\phi \leq 0.2$	Ignore	$0.2 < \phi \leq 0.3$	2	$0.3 < \phi \leq 0.5$	1	$0.5 < \phi$	Not allowed	Total QTY	3							
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5.2.4	Electrical Dot Defect	<p>Bright and Black dot define:</p>   <p>and</p>  <p>Two Adjacent Dot</p> <p>Inspection pattern: Full white, Full black, Red, green and blue screens</p> <table border="1"> <thead> <tr> <th rowspan="2">Item</th> <th colspan="3">Acceptable Quantity</th> </tr> <tr> <th>I</th> <th>O</th> <th>Note</th> </tr> </thead> <tbody> <tr> <td>Black dot defect</td> <td>2</td> <td></td> <td><math>\phi \leq 0.15</math></td> </tr> <tr> <td>Bright dot defect</td> <td>1</td> <td></td> <td><math>(5\text{mm} \leq \text{Distance})</math></td> </tr> <tr> <td>Total Dot</td> <td>1</td> <td></td> <td></td> </tr> </tbody> </table>	Item	Acceptable Quantity			I	O	Note	Black dot defect	2		$\phi \leq 0.15$	Bright dot defect	1		$(5\text{mm} \leq \text{Distance})$	Total Dot	1		
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5.2.5	Glass defect	 <p><b>1. Corner Fragment:</b></p>		
		<table border="1"> <thead> <tr> <th>Size(mm)</th><th>Acceptable Quantity</th></tr> </thead> <tbody> <tr> <td><math>X \leq 3\text{mm}</math> <math>Y \leq 1\text{mm}</math> <math>Z \leq T</math></td><td> <b>Ignore</b>            T: Glass thickness            X: Length            Y: Width            Z: thickness         </td></tr> </tbody> </table>	Size(mm)	Acceptable Quantity
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<p><b>2. Side Fragment:</b></p>  <table border="1"> <thead> <tr> <th>Size(mm)</th><th>Acceptable Quantity</th></tr> </thead> <tbody> <tr> <td><math>X \leq 5.0\text{mm}</math> <math>Y \leq 1\text{mm}</math> <math>Z \leq T</math></td><td>           T: Glass thickness            X: Length            Y: Width            Z: thickness         </td></tr> </tbody> </table>	Size(mm)	Acceptable Quantity	$X \leq 5.0\text{mm}$ $Y \leq 1\text{mm}$ $Z \leq T$	T: Glass thickness X: Length Y: Width Z: thickness
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### I area & O area

- Note:
- 1). Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area.
  - 2). The distance between two bright dot defects (red, green, blue, and white) should be larger than 15mm.
  - 3). The distance between black dot defects or black and bright dot defects should be more than 5mm apart.
  - 4). Polarizer bubble is defined as the bubble appears on active display area. The defect of polarizer bubble shall be ignored if the polarizer bubble appears on the outside of active display area.

## 11.6 Mechanics specification

As for the outside dimension, weight of the modules, please refer to product specification  
For more details

## **12. Precautions for Use of LCD modules**

### **12.1 Handling Precautions**

12.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

12.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

12.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

12.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

12.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketene
- Aromatic solvents

12.1.6. Do not attempt to disassemble the LCD Module.

12.1.7. If the logic circuit power is off, do not apply the input signals.

12.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

12.1.8.1. Be sure to ground the body when handling the LCD Modules.

12.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

12.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

12.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

### **12.2 Storage Precautions**

12.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

12.2.2. The LCD modules should be stored under the storage temperature range If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0°C ~ 40°C      Relatively humidity: ≤80%

12.2.3. The LCD modules should be stored in the room without acid, alkali and harmful gas.

### **12.3 Transportation Precautions**

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.