



Doc.No.: AFY480272A0-4.3N6NTN-R

REV : A0

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EFFECTIVE DATE : 2013-01-29

# SPECIFICATION OF LCD MODULE

MODULE NO: AFY480272A0-4.3N6NTN-R

Customer Approval:

Accept

Reject

FUTURE FOCUS	SIGNATURE	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		



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Sample Version	Doc. Version	DATE	DESCRIPTION	CHECKED BY
0001	A0	2013-01-29	First Release	

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## NUMBER SYSTEM INTRODUCTION:

AFY480272A0-4.3N6NTN-R:

AF: Orient Display TFT;

Y: JAZZ TFT;

480272: Length \* width pixel;

A0: Product Version;

4.3: Diagonal Dimension;

N: LCD Mode (N: TN; I: IPS; V: VA)

6: Viewing Direction (6-> 6:00; 12->12:00; Unavailable for IPS and VA);

N: Temperature Range (N: Normal; W: Wide);

T: Polarizer (T:Transmissive; F:Transflective);

N: Luminance (N: Normal <300 nit; M: Middle >=300 & <600 nit;

H: High >=600 nit);

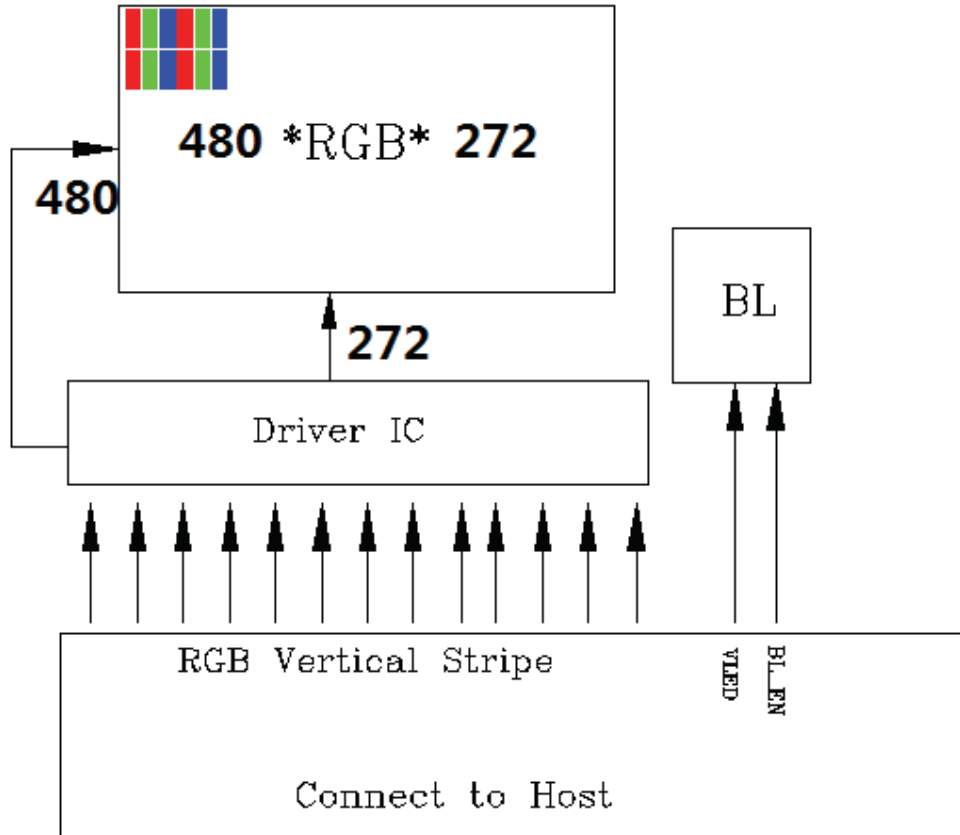
R: TP Option (R: Resistive TP; C: Capacitive TP; N: Without TP);

## 1. GENERAL SPECIFICATIONS

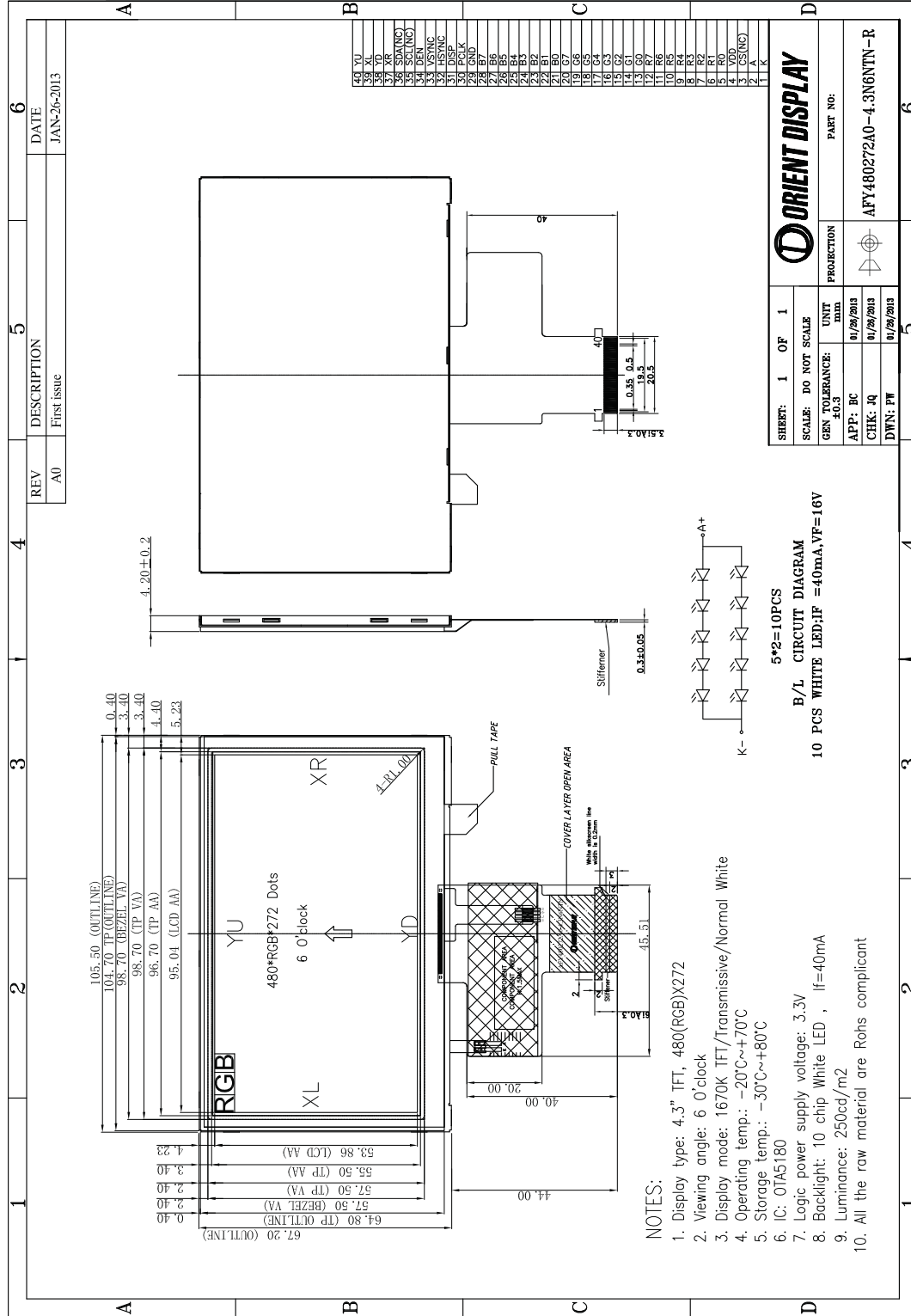
ITEM	SPECIFICATION	UNIT
OUTLINE DIMENSIONS	105.5 (W) X67.2 (H) X4.2 (D)	mm
DISPLAY SIZE	4.3	inch
DOT PITCH	0.198mmX0.198mm	mm
NUMBER OF DOTS	480* (RGB) *272	-
DRIVER IC	OTA5180A	-
LCD TYPE	TFT(16.7M) TRANSMISSIVE	-
INTERFACE	RGB 24BITS	-
BACKLIGHT TYPE	LED White	-
VIEWING DIRECTION	6 O'clock	-
GRAY SCALE INVERSION DIRECTION	6 O'clock	-

\*See attached drawing for details.

## 2. BLOCK DIAGRAM



### 3. DIMENSIONAL OUTLINE



#### 4. PIN DESCRIPTION

NO.	PIN NAME	Type	Description
1	LED-	P	Power supply for LED (Cathode)
2	LED+	P	Power supply for LED (Anode)
3	CS (NC)	-	No connection
4	VDD	P	Power voltage
5	R0	I	RED data signal(LSB)
6	R1	I	RED data signal
7	R2	I	RED data signal
8	R3	I	RED data signal
9	R4	I	RED data signal
10	R5	I	RED data signal
11	R6	I	RED data signal
12	R7	I	RED data signal(MSB)
13	G0	I	GREEN data signal(LSB)
14	G1	I	GREEN data signal
15	G2	I	GREEN data signal
16	G3	I	GREEN data signal
17	G4	I	GREEN data signal
18	G5	I	GREEN data signal
19	G6	I	GREEN data signal
20	G7	I	GREEN data signal(MSB)
21	B0	I	BLUE data signal(LSB)
22	B1	I	BLUE data signal
23	B2	I	BLUE data signal
24	B3	I	BLUE data signal
25	B4	I	BLUE data signal
26	B5	I	BLUE data signal
27	B6	I	BLUE data signal
28	B7	I	BLUE data signal(MSB)
29	GND	I	Ground(0V)
30	DOTCLK	I	Pixel clock signal
31	DISP	I	Display on/ off
32	HSYNC	I	Horizontal synchronizing signal
33	VSYNC	I	Vertical synchronizing signal
34	DE	I	Data enable
35	SCL (NC)	-	No connection
36	SDA (NC)	-	No connection
37	XR	-	TP: X right
38	YD	-	TP: Y bottom
39	XL	-	TP: X left
40	YU	-	TP: Y top

Note: I: input, O: output, P: Power

## 5. ELECTRICAL CHARACTERISTICS

### 5.1 Absolute Maximum Ratings

Item	Symbol	Values		Unit	Remark
		Min	Max		
Power Supply for Pump	VDD	-0.3	4.5	V	

Note: Stresses beyond those given in the Absolute Maximum Rating table may cause operational errors or damage to the device. For normal operational conditions see AC/DC Electrical Characteristics

### 5.2 DC Characteristics

#### 5.2.1 Operating Conditions

Item	Symbol	Values			Unit	Conditions
		Min	Typ	Max		
Charge Pump Supply Voltage	PVDD	3	3.3	3.6	V	PWR_SEL=H
Digital Supply Voltage	VDD	3	3.3	3.6	V	PWR_SEL=H
Digital Interface Supply	VDDIO	1.65	1.8	VDD	V	
Digital Input Voltage	Di	0	-	VDDIO	V	
OTP Supply Voltage	V_OTP	7.4	7.5	7.6	V	
VCOM AC Voltage	VCOMH- VCOML	3.46	-	6.2	V	

#### 5.2.2 DC Characteristics for Digital Circuit

Item	Symbol	Values			Unit	Conditions
		Min	Typ	Max		
Low Level Input Voltage	Vil	GND	-	0.3xVDDIO	v	
High Level Input Voltage	Vih	0.7xVDDIO	-	VDDIO	uA	
High Level Output Voltage	Voh	VDDIO-0.4	-	VDDIO	ohm	
Low Level Output Voltage	Vol	GND	-	GND+0.4	uA	
Input Leakage Current	Iil			±1.0		
Pull High/Low Resistor	Rp	-	100K	-	ohm	



### 5.2.3 DC Characteristics for Analog Circuit

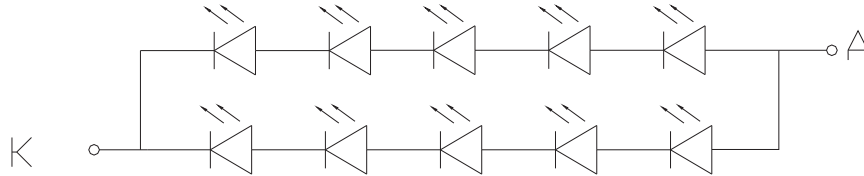
VDDIO=1.8V, VDD = 3.3V, AVDD = 6V, AGND = 0V, TA = -20°C to 80°C

Item	Symbol	Values			Unit	Conditions
		Min	Typ	Max		
Analog Supply Voltage	VDD2		5		V	
Positive High-voltage power	VGH	9	15	16	V	No Load. By VGH_SEL setting.
Negative High-voltage power	VGL	-11	-10	-7	V	No Load. By VGL_SEL setting.
VCOMH Output Level	VCOMH	3.26		5.8	V	By VCOMH setting.
VCOML Output Level	VCOML	-2		-0.2	V	By VCOML setting
Output Voltage Deviation	Vod	-	±20	±35	mV	VO = 0.15V ~ 0.5V, 3.45V~3.8V
		-	±15	±20		VO = 0.5V ~ 3.45V
Output Dynamic Range	Vdr	0.2	-	5.3		MVA Mode
		0.15		4.8		TN Mode
VCOM Low Level Output Current	IOLFRP		-10		mA	VCOM AC output = 0.5V
VCOM High Level Output Current	IOHFRP		-10		mA	VCOM AC output = 5.7V
Analog Standby Current	Ilast	-	-	20	uA	
Analog Operation Current	IDD	-	5.0	-	mA	Without panel loading

### 5.3 DC Backlight Unit

Item	Symbol	Min	Typ	Max	Unit	Remark
Average luminous Intensity	Iv		250		cd/m2	IF=40mA
Chromaticity Coordinates	X	0.234	0.284	0.334		IF=40mA
	Y	0.273	0.323	0.373		IF=40mA
Forward Voltage	VF		16.0	17.0	V	IF=40mA
Reverse Current	IR			50	µA	VR=20V, 1LED
Luminous Tolerance	IV-M	80			%	(MIN/MAX)×100
Power Dissipation	Pd		640		mW	
Peak Forward Current	I <sub>fp</sub>		100		mA	
Reverse Voltage	VR		5		V	

### 5.3.1 Internal Circuit Diagram

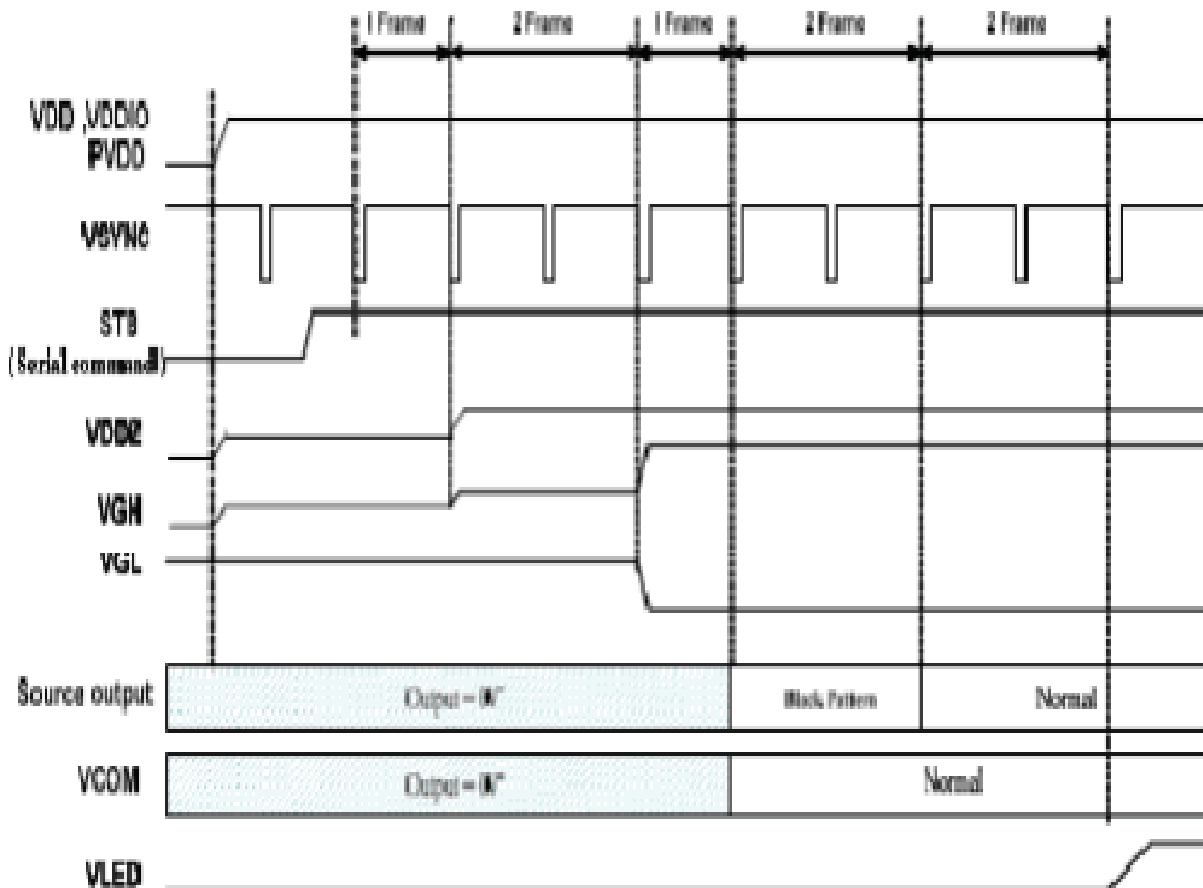


### B/L CIRCUIT DIAGRAM

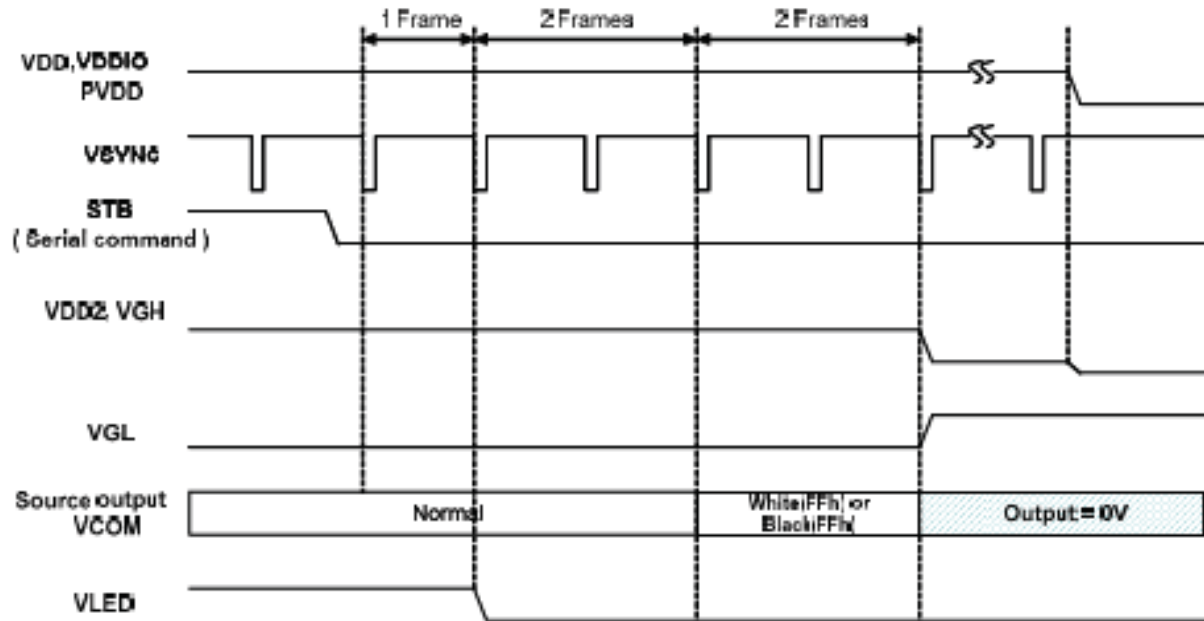
10 PCS WHITE LED;  $I_F = 40\text{mA}$ ,  $V_F = 16\text{V}$

### 5.4 POWER SEQUENCE

#### Power On Sequence



### Power Off Sequence



#### Note:

- When normally-black LC is used, please send black pattern to discharge the panel.
- When normally-white LC is applied, please send white pattern to discharge the pane

## 6. INPUT SIGNAL TIMING

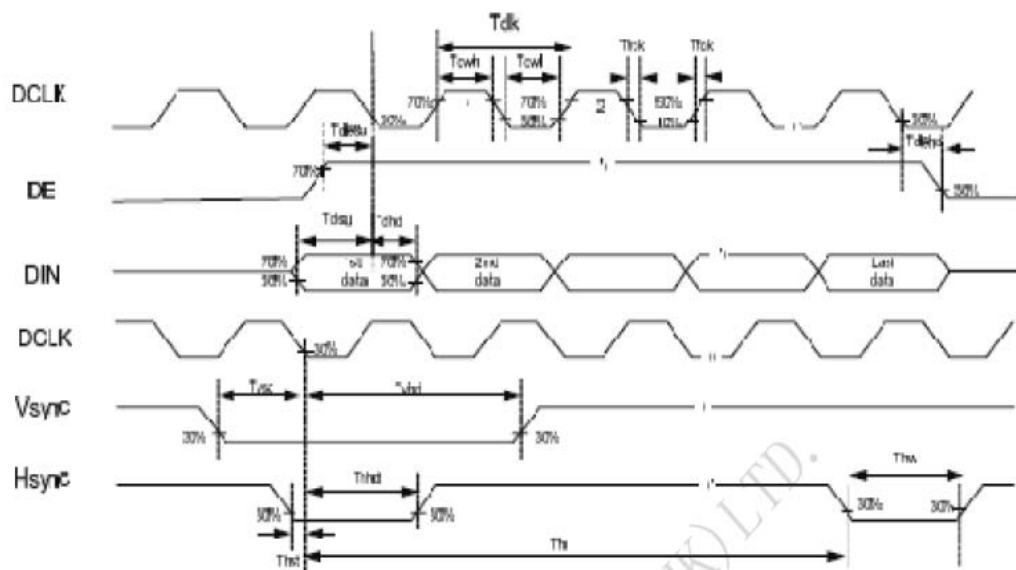
### 6.1 AC Characteristics

VDDIO=1.8V, VDD = 3.3V, AVDD = 6V, AGND = 0V, TA = -20°C to 80°C

Item	Symbol	Min	Typ	Max	Unit	Note
CLK pulse duty	Tcw	40	50	60	%	
Hsync width	Thw	1.0	-	-	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 set-up time	Tdsu	12	-	-	ns	
Data hold time	Tdhd	12	-	-	ns	
DE set-up time	Tdesu	12	-	-	ns	
DE hold time	Tdehd	12	-	-	ns	
SD output stable time	Tst	-	10	12	us	
GD output rise and fall time	Tgst	-	500	1000	ns	

### 6.2 AC Timing Diagram

Clock and Data Input Timing Diagram

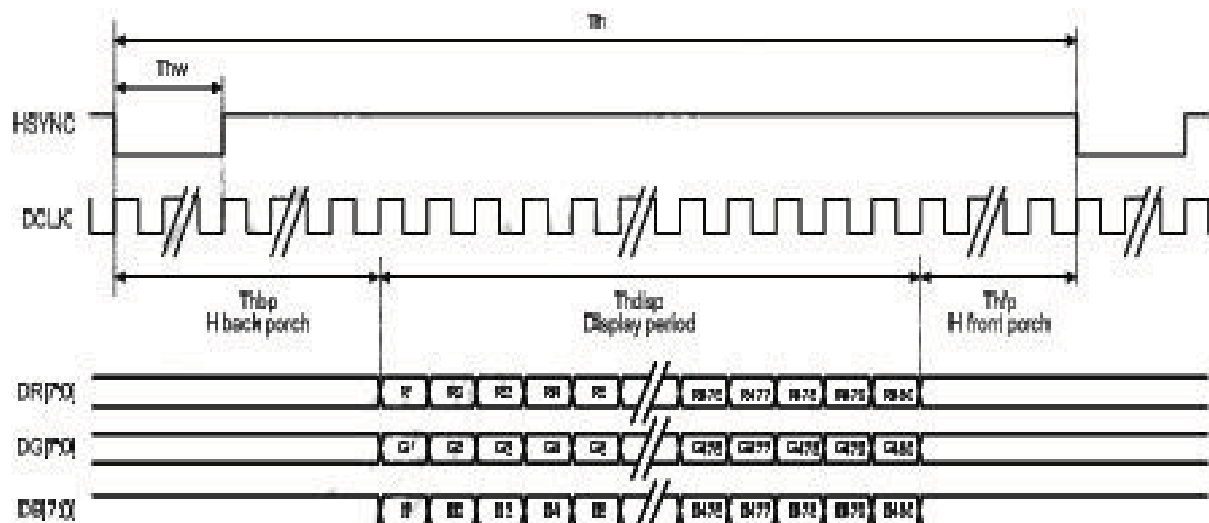


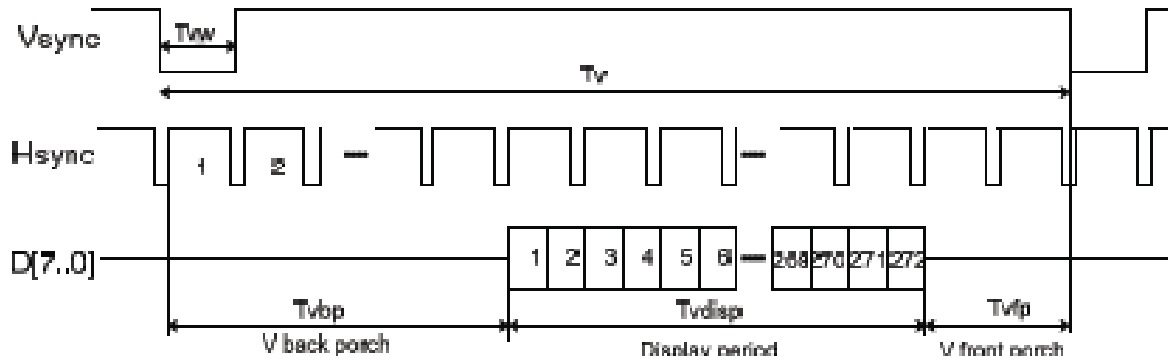
### 6.3 Parallel RGB Data Format

#### 6.3.1 Parallel RGB Input Timing Table

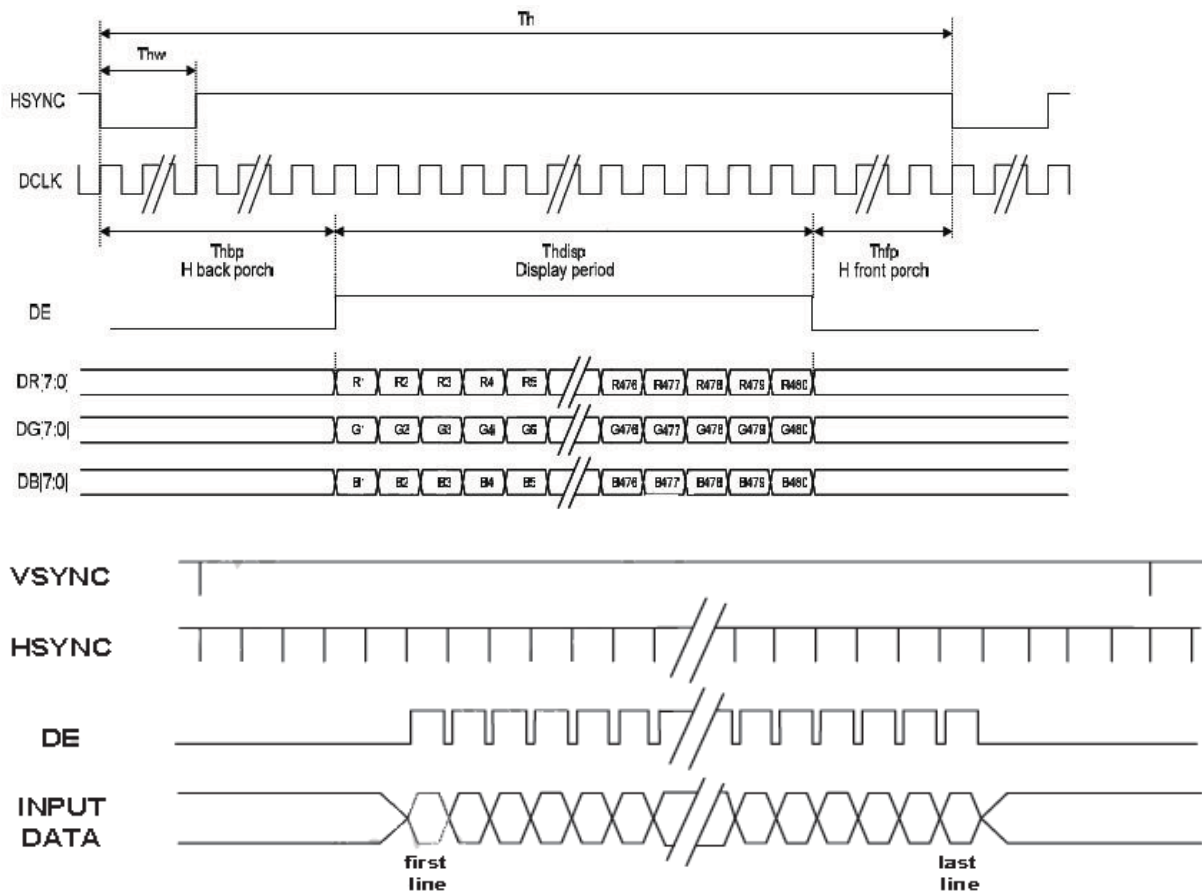
Item	Symbol	Min	Typ	Max	Unit	Note	
DCLK Frequency	Fclk	5	9	12	MHz		
DCLK Period	Tclk	83	110	200	ns		
Hsync	Period Time	Th	490	531	605	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	8	43		DCLK	By H_BLANKING Setting
	Front Porch	Thfp	2	8		DCLK	
	Pulse Width	Thw	1			DCLK	
Vsync	Period Time	Tv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

#### 6.3.1 SYNC Mode Timing Diagram





### 6.3.2 SYNC-DE Mode Timing Diagram



### 6.4 Controller Information

IC: OTA5180A

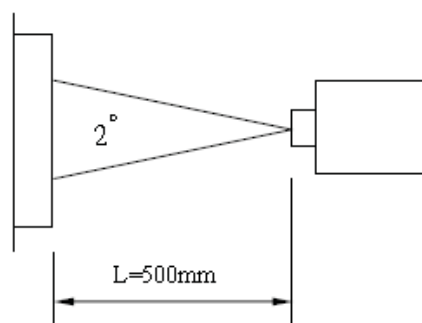
Please download IC specification at <http://www.orientdisplay.com/pdf/OTA5180A.pdf>

## 7. OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Contrast Ratio	CR	*1)		400	-	-	Note 3
Luminance	B			250		cd/m <sup>2</sup>	
Response Time	Tr+ Tf	*3)	-	30	45	ms	Note 4
Color Filter Chromaticity with C light	White	x	$\Theta=\phi=0^\circ$	0.234	0.284	0.334	Note 6
		y		0.273	0.323	0.373	
	Red	x	$\Theta=\phi=0^\circ$	0.515	0.565	0.615	
		y		0.284	0.334	0.384	
	Green	x	$\Theta=\phi=0^\circ$	0.286	0.336	0.386	
		y		0.520	0.570	0.620	
	Blue	x	$\Theta=\phi=0^\circ$	0.094	0.144	0.194	
		y		0.062	0.112	0.162	
View angle	Ver.	$\theta^{*2)}$	$CR \geq 10$	90	110	-	Note 5
				-	-	-	
	Hor.	$\psi^{*2)}$		110	130	-	
				-	-	-	

Note1: Ambient condition : 25°C±2°C , 60±10%RH , under 10 Lux in the darkroom.

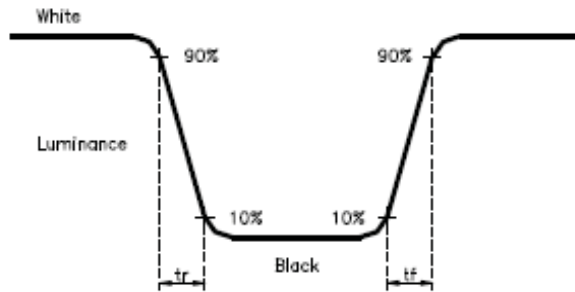
Note2: Measure device : BM-7 , viewing cone=1° , IL=20mA



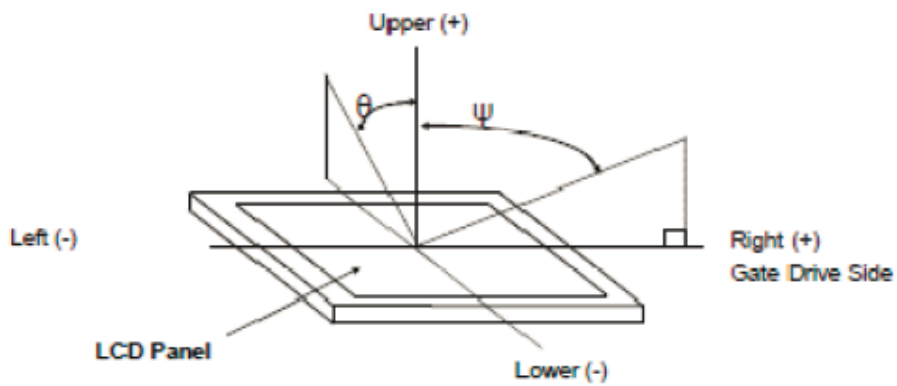
Note3: Definition of Contrast Ratio:

$$CR = \text{White Luminance (ON)} / \text{Black Luminance (OFF)}$$

Note4: Definition of response time : The response time is defined as the time interval between the 10% and 90% amplitudes.



Note5: Definition of viewing angle ( $\theta$  ,  $\psi$ ):



Definition of viewing angle

Note6: Light source: C light





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## **8. RELIABILITY**

Please download details at <http://www.orientdisplay.com/Reliability.html>

## **9. SPECIFICATION OF QUALITY ASSURANCE**

Please download details at <http://www.orientdisplay.com/Delivery-TFT.html>

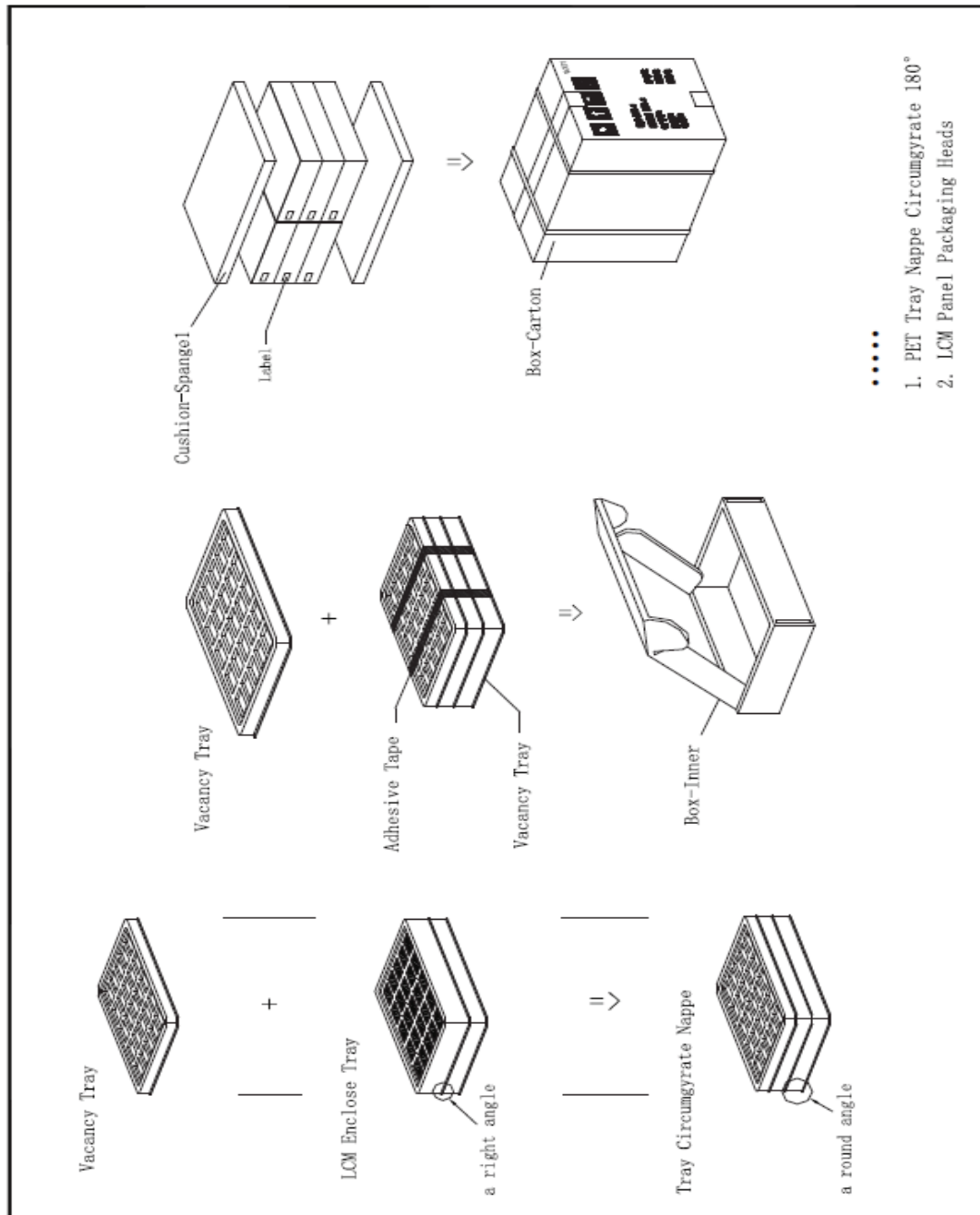
## **10. GENERAL PRECAUTIONS**

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## **11. LIMITED WARRANTY**

Please download details at <http://www.orientdisplay.com/Warranty.html>

## 12. PACKAGE



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