Specification

TFT-LCD module

Module(型号)：	ZSX070-B5021-A
Customer（客户）：	
Customer P/N（客户型号）：	

Approved by（批准）：	
Qualified（合格）：	**Unqualified（不合格）：**

PREPARED	CHECKED	APPROVED

Revision history

Date	Version	Revise record	Page	Design by
2015-0-10	A00	Original version		

Total: 22 Pages

TABLE OF Contents

1. General Description

ZSX070-B5021-A is a 1024RGB*600 dots matrix TFT LCD module. The LCM can be easily accessed by micro-controller.

2. Features

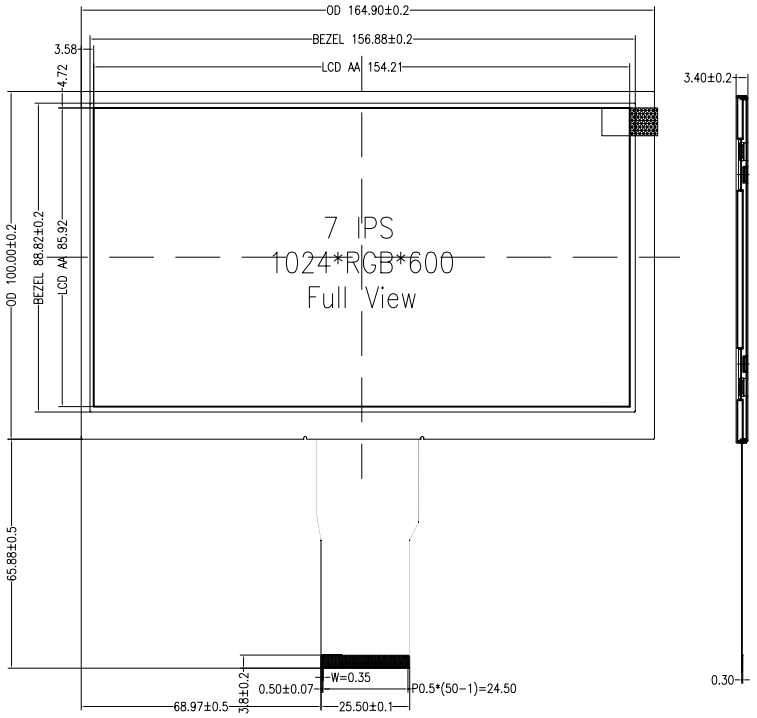
Display Mode	Trans-missive
	a-TFT
Display Format	Graphic 1024RGB*600 Dot-matrix
Input Data	Parallel RGB 24-bit
Viewing Direction	Full View
Driver	EK79001+EK73215

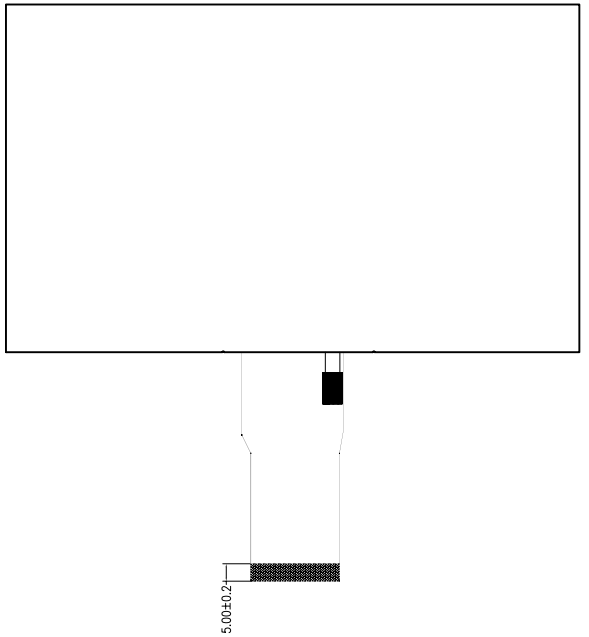
3. Mechanical Specification

Item	Specifications	Unit
Dimensional outli	165(H)*100(V)*3.5(D)	mm
Resolution	1024(H) * 3(RGB) x 600(V)	pixels
LCD Active area	154.21x85.92	mm
Pixel Pitch (mm)	0.1926(W)x 0.179(H)	mm

Reversion	Dispcription	Date	Signed

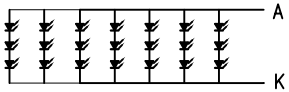
1	LED+
2	LED+
3	LED−
4	LED−
5	GND
6	VCOM
7	DVDD
8	MODE
9	DE
10	VSD
11	HSD
12	B7
13	B6
14	B5
15	B4
16	B3
17	B2
18	B1
19	B0
20	G7
21	G6
22	G5
23	G4
24	G3
25	G2
26	G1
27	G0
28	R7
29	R6
30	R5
31	R4
32	R3
33	R2
34	R1
35	R0
36	GND
37	DCLK
38	GND
39	SHLR
40	UPDN
41	VDDG
42	VEEG
43	AVDD
44	RSTB
45	NC
46	VCOM
47	DITH
48	GND
49	NC
50	NC





NOTES:

1. DISPLAY TYPE: TFT/Normally Black/transmisstive
2. OPERATING VOLTAGE: 3.3V
3. OPERATING TEMPERATURE: −20°C~70°C
4. STORAGE TEMPERATURE: −30°C~80°C
5. VIEWING DIRECTION: Full View
6. POLARIZER TYPE: transmisstive
7. UNMARKED TOLERANCE: ±0.2



I=140mA

LED电路图 (3*7)

Custumer Ref.	Model No.		Drawing Title	---		Characteristics
---	Approve		Material	Unmarked Tolerance	Unit	Scale / Page
Part No.	Checked			±0.2	mm	1:1 / of
---	Draw		Date	14-09-25	Rev	A0
Drawing No.						
---						

5. Maximum Ratings

ITEM	Symbol	Min	Max	Uint	Note
Digital Supply Voltage	VDD	-0.5	5	V	
Analog Supply Voltage	AVDD	-0.5	15	V	
Gate On Voltage	VDDG	-0.3	+42	V	
Gate Off Voltage	VEEG	-20	+0.3	V	
Gate On - Gate Off Voltage	VDDG-VEEG	12	40	V	
Operation Temperature	Top	-20	70	℃	Note 1
Stotage Temperature	Tstg	-30	80	℃	Note 1

Note1：If users use the product out off the environmemtal operation range（temperature and humidity）, it will have visual quality concerns.

6. Electrical Characteristics

Recommended Operating Condition

ITEM	Symbol	Min	TYP	Max	Uint	Note
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	
Analog Supply Voltage	AVDD	9.4	9.6	10.2	V	
Gate On Voltage	VDDG	16	18	21		
Gate Off Voltage	VEEG	-8.0	-7.1	-6.1	V	
Common Electrode Driving Signal	VCOM	2.7	3.0	3.6	V	

Note1：Please adjust VCOM to make the flicker level be minimum.

7. Backlight Characteristic

Item	Symbol	Min	Typical	Max	Unit
LED module Forward voltage	V_F	-	9.6V	-	V
LED module current	IF		140		mA
L/G Surface Luminance ★1	L_S		200		Cd/m^3
LCM Surface brightness uniform ★2	L_D		80		%

★ 1Test condition is:

(a) Center point on active area.

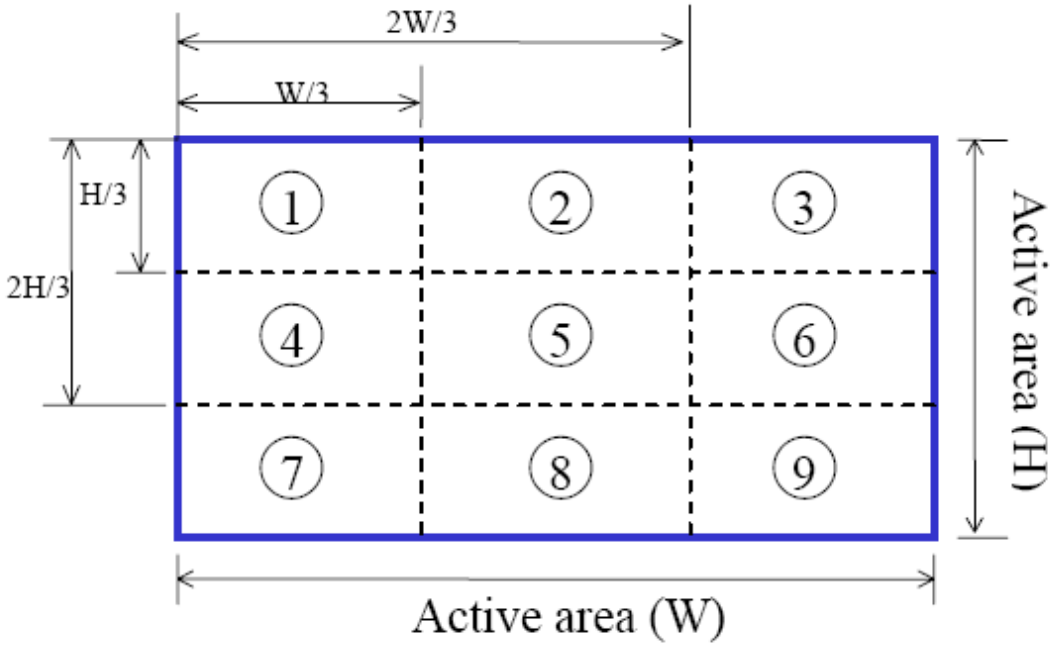
(b) Best Contrast.

★2Uniform measure condition:

(1)Measure 9 point. Measure location show below;

(2)Uniform=(Min. brightness /Max. brightness)*100%

(3)Best Contrast.


2W/3
W/3
H/3
2H/3
1
2
3
4
5
6
7
8
9
Active area (H)
Active area (W)

8. Module Function Description

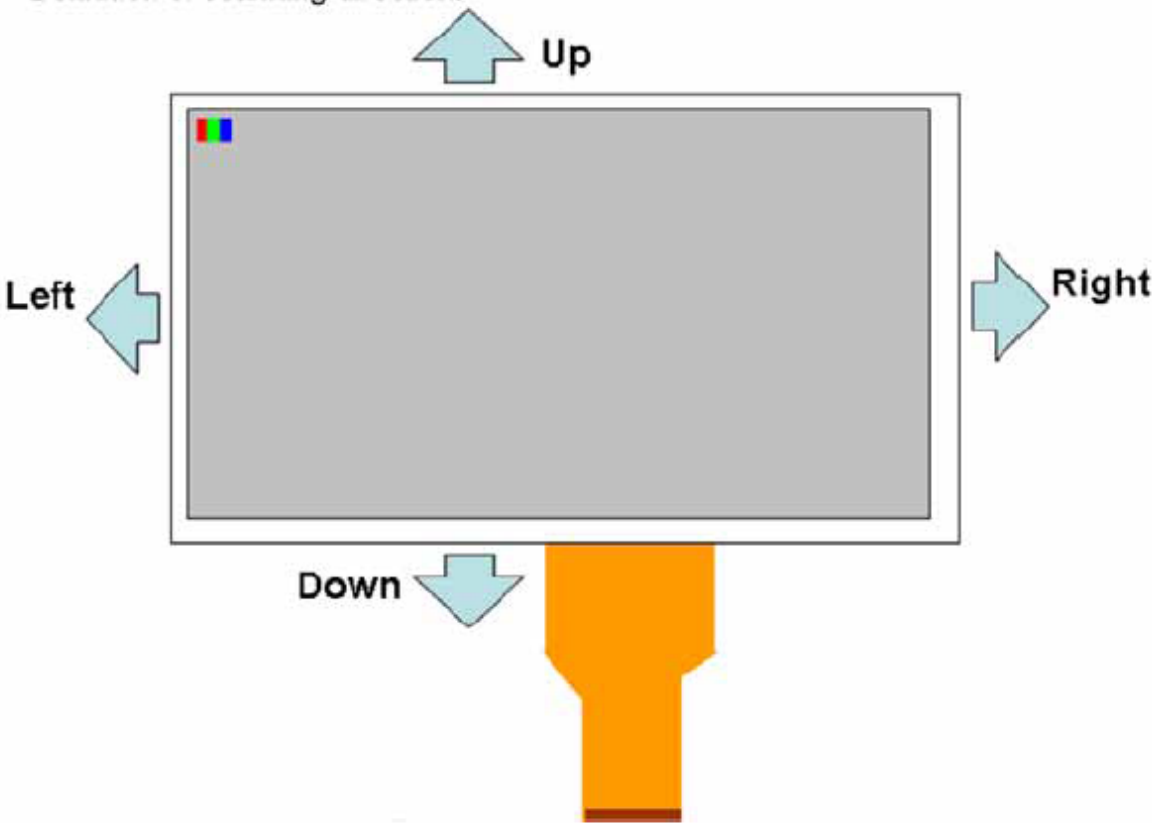
8.1 Pin Descriptions

Pin.No	*Symbol*	*Function*
1,2	*VLED+*	*Power for LED backlight (Anode)*
3,4	*VLED-*	*Power for LED backlight (Cathode)*
5	*GND*	*Power ground*
6	*VCOM*	*Common Voltage*
7	*DVDD*	*Digital Power*
8	*MODE*	*DE/SYNC mode select. Normally pull high* *H: DE mode. L: HSD/VSD mode*
9:	*DE*	*Data Enable signal.*
10	*VSD*	*Vertical sync input. Negative polarity*
11	*HSD*	*Horizontal sync input. Negative polarity*
12-19	*B7-R0*	*Blue Data*
20-27	*G7-G0*	*Green Data*
28-35	*R7-R0*	*Red Data*
36	*GND*	*Ground*
37	*DCLK*	*Clock signal*
38	*GND*	*Display on/off*
39	*SHLR*	*Left or Right Display Control*
40	*UPDN*	*Up / Down Display Control*
41	*VDDG*	*Positive Power for TFT*
42	*VEEG*	*Negative Power for TFT*
43	*AVDD*	*Analog Power*
44	*RSTB*	*Global reset pin. Active low to enter reset state.* *Suggest to connecting with an RC reset circuit for stability.* *Normally pull high. (R=10K Ω， C=1 μ F)*
45	*NC*	*Not connect*
46	*VCOM*	*Common Voltage*
47	*DITH*	*Dithering setting* *DITH=＂H＂ 6bit resolution(last 2 bit of input data truncated)* *DITH=＂L＂ 8bit resolution(default setting)*
48	*GND*	*Power ground*
49	*NC*	*Not connect*
50	*NC*	*Not connect*

【Note1】SHLR：left or right setting
UPDN：up or down setting

SHLR	UPDN	Data shifting
DVDD	GND	Left→Right，Up→Down(default)
GND	GND	Right→Left，Up→Down
DVDD	DVDD	Left→Right，Down→Up
GND	DVDD	Right→Left，Down→Up

Definition of scanning direction.



8.2 Timing characteristics(RGB input mode).

DE mode

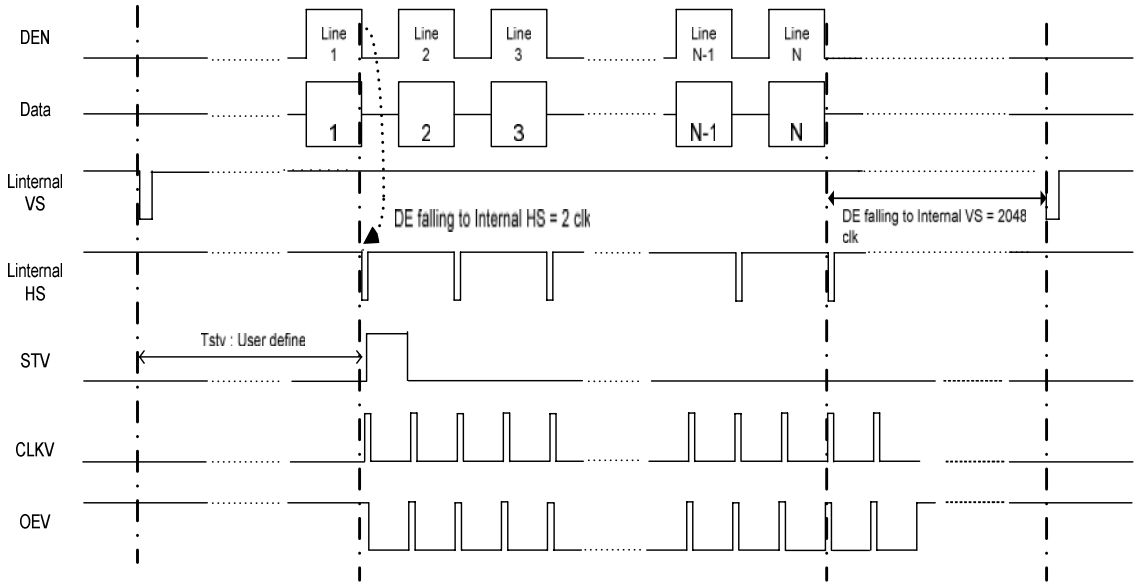
DE mode					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	40.8	51.2	67.2	Mhz
Horizontal display area	thd		1024		DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd		600		H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	35	200	H

HV mode(1)

HV mode Horizontal input timing						
Parameter		Symbol	Value			Unit
Horizontal display area		thd	1024			DCLK
DCLK frequency@ Frame rate=60hz		fclk	Min.	Typ.	Max.	
			44.9	51.2	63	Mhz
1 Horizontal Line		th	1200	1344	1400	DCLK
HSYNC pulse width	Min.	thpw	1			
	Typ.		—			
	Max.		140			
HSYNC back porch		thbp	160	160	160	
HSYNC front porch		thfp	16	160	216	

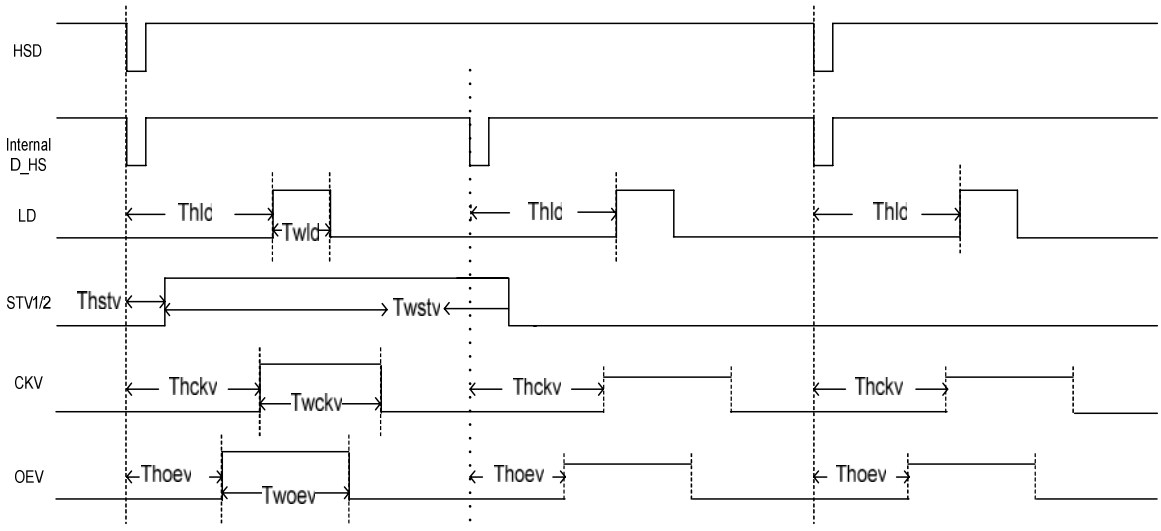
HV mode(2)

Vertical input timing					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd		600		H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tvpw	1	—	20	H
VSYNC back porch	tvb	23	23	23	H
VSYNC front porch	tvfp	1	12	127	H

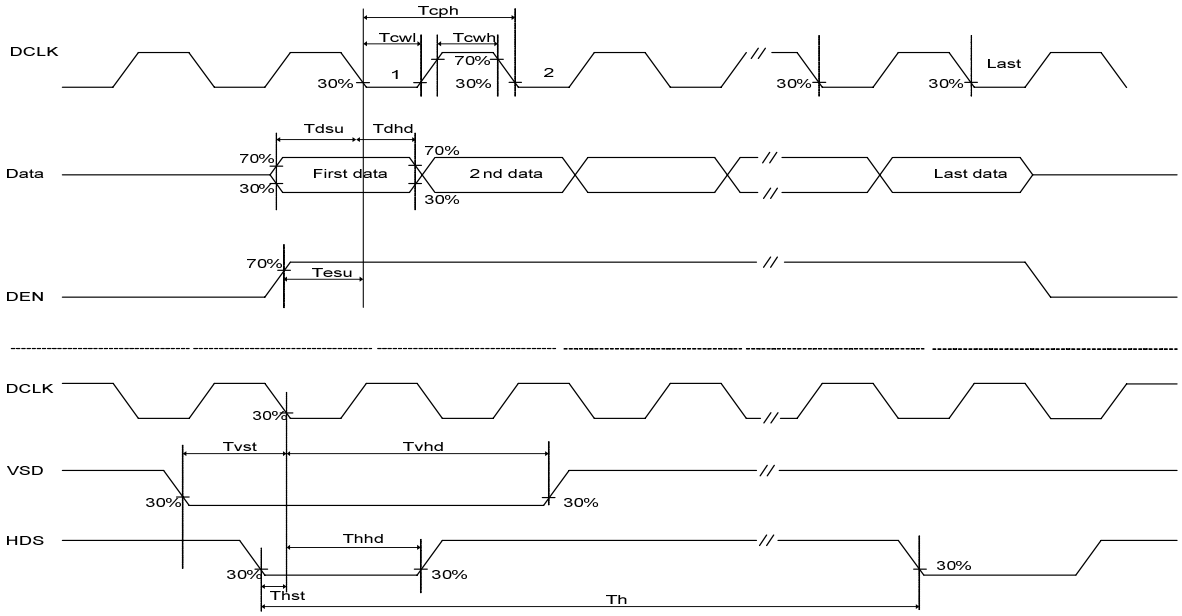


Vertical Timing Diagram DE mode(Dual Gate)

7.5.6. Gate output timing diagram(Dual Gate)



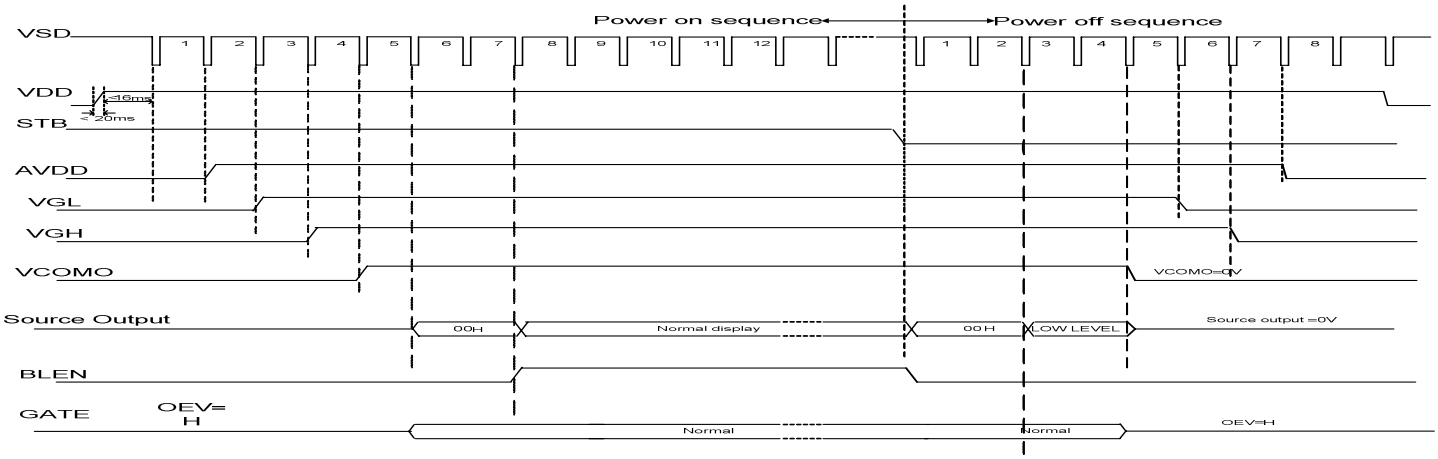
Gate output timing diagram(Dual Gate)



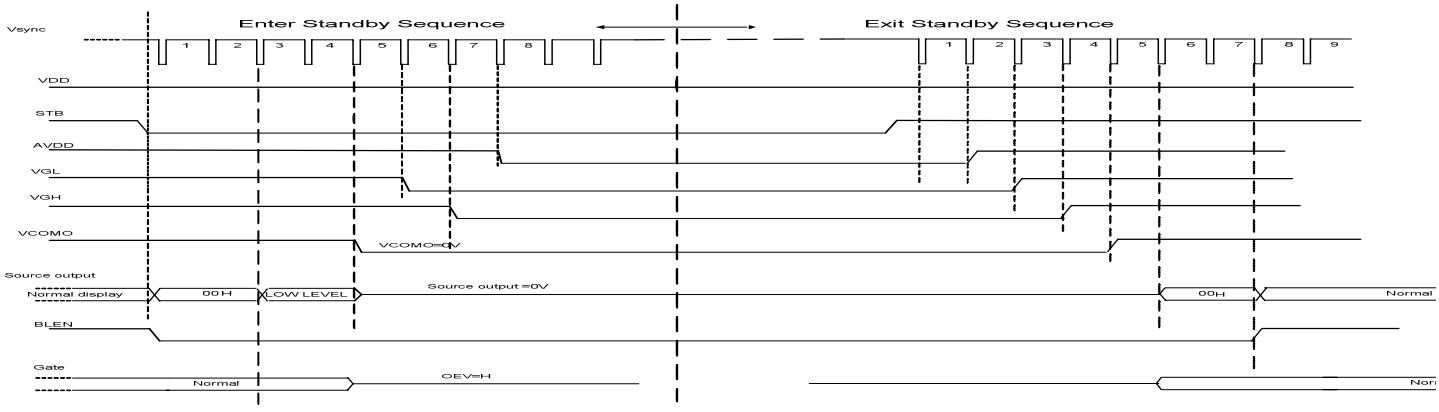
Parallel Input Clock and Data timing

8.3 POWER,SIGNAL SEQUENCE

Power-On/Off Timing Sequence



Power On/Off timing chart



Enter and Exit Standby Mode timing chart

Note: Low level=3Fh,when NBW=L(Normally white)
Low level=00h,when NBW=H(Normally black)

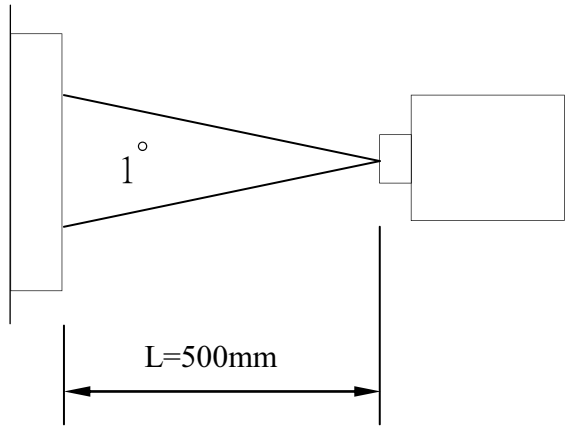
9.OPTICAL SPECIFICATION

(Taransmittance、contrast、RT、viewing angle results are using CPT LC+ EWV Polarizer+ CPT's BLU , reference only) (Note1，Note2)

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Transmittance		T		3.8	4.1		%	
Contrast Ratio		CR	*1)	600	800	--	--	Note 3
Response Time		Tr+ Tf	*3)	-	25	40	ms	Note 4
NTSC				45%	50%	--		
Viewing Angle	Left	ϕ	CR≧10	80	85			
	Right	ϕ		80	85			Note 5
	Upper	θ		80	85			
	Lower	θ		80	85			
Color Filter Chromacicity with C light	White	x	$\theta=\phi=0^\circ$	0.27	0.290	0.31		Note 6
		y		0.311	0.331	0.351		
	Red	x	$\theta=\phi=0^\circ$	0.612	0.632	0.652		
		y		0.291	0.311	0.331		
	Green	x	$\theta=\phi=0^\circ$	0.277	0.297	0.317		
		y		0.516	0.536	0.556		
	Blue	x	$\theta=\phi=0^\circ$	0.12	0.140	0.16		
		y		0.134	0.154	0.174		

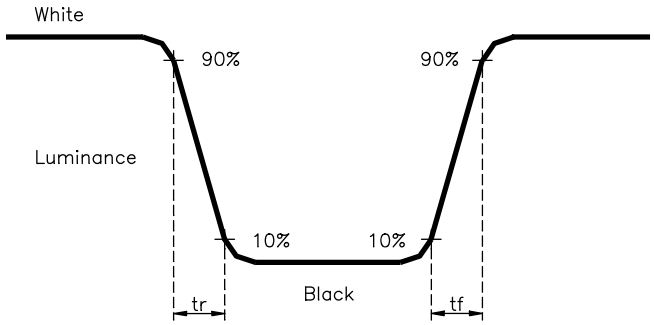
Note 1.Ambient condition：25℃±2℃，60±10%RH，under 10 Lunx in the darkroom。

Note 2.Measure device：BM-5A (TOPCON)，viewing cone=1°，I_L=20mA。

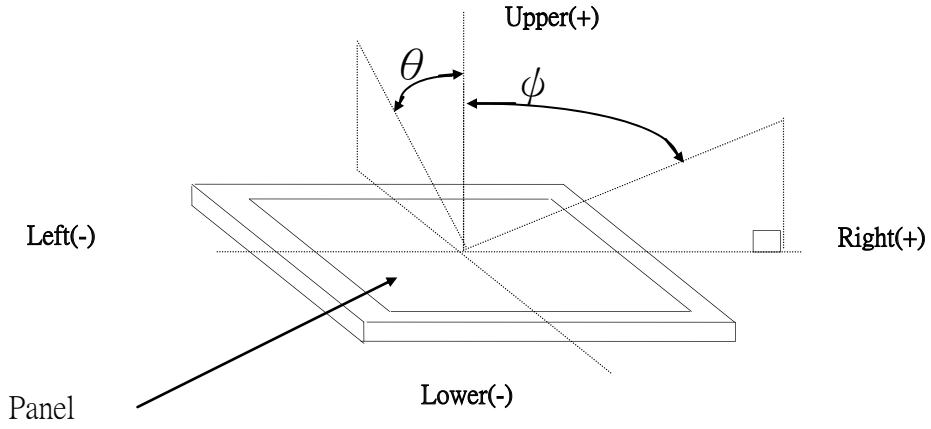


Note 3. Definition of Contrast Ratio：CR = White Luminance (ON) / Black Luminance (OFF)

Note 4. Definition of response time：The response time is defined as the time interval between the 10% and 90% amplitudes.



Note 5. Definition of view angle(θ，ψ)：



Note 6. Light source: C light.

10. Reliability

Test condition

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	70℃ ; 72hrs	
High Temperature Storage	80℃ ; 72hrs	
High Temperature High Humidity Operation	60℃ ; 90%RH ; 72hrs (No condensation)	
Low Temperature Operation	-20℃ ; 72hrs	
Low Temperature Storage	-30℃ ; 72hrs	

NOTE

1. All judgement of display are performed after temperature of panel return to room temperature.
2. Display function should be no change under normal operating condition.
3. Under no condensation of dew.
4. CPT only guarantee the above 5 test items, and without guarantee the others.

11. Precautions for using LCD modules.

11.1 Safety

(1)Do mot swallow any liquid crystal ,even if there is no proof that liquid crystal is poisonous.
(2)If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
(3)If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

11.2 Srorang Conditions

(4)Store the panel or module in a dark place where the temperature is 23±5℃and the humidity is below 45 ±20%RH.
(5)Store in anti-static electricity container.
(6)Store in clean environment, free from dust, active gas, and solvent.
(7)Do not place the module near organics solvents or corrosive gases.
(8))Do not crush, shake, or jolt the module.

11.3 Handling Precautions

(9)Avoid static electricity, which can damage the CMOS LSI.
(10)The polarizing plate of the display is very fragile, please handle if very carefully.
(11)Do not give external shock.
(12)DO mot apply excessive force on the surface.
(13)Bo not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
(14)Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
(15)Do not operate it above the absolute maximum rating.
(16)Do not remove the panel or frame from the module.

11.4 Warranty

The period is within twelve months since the date of shipping out under normal using and storage conditions.