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Xunrui Shenzhen Optoelectronics Technology Co., Ltd.

Product Specification

Customer: _____

Model Name: H070BWS50E3511-CT24

Date: 2022.03.03

Version: V1.0

Preliminary Specification

Final Specification

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by



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2 General Specifications

	Feature	Spec
Characteristics	Size	7 inch
	Resolution	1024(horizontal)*600(Vertical)
	Interface	24-bit RGB
	Connect type	Connector
	Color Depth	16.7M
	Technology type	a-Si
	Display Spec. Pixel pitch (mm)	0.1506 x 0.1432
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally White
	Driver IC	-
	Surface Treatment	HC
Viewing Direction	12 O'clock	
Mechanical	LCM+CTP (W x H x D) (mm)	164.9*100*5.35
	Active Area(mm)	154.21*85.92
	With /Without TSP	With TSP
	Weight (g)	TBD
	LED Numbers	27 LEDs

Note 1: Viewing direction is follow the data which measured by optics equipment.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%



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3 Input/Output Terminals

No.	Symbol	Description
1,2	LEDA	LED Anode
3,4	LEDK	LED Cathode
5	GND	Power Ground
6	NC	NO connection
7	DVDD	Power for Digital Circuit
8	MODE	DE/SYNC mode select
9	DE	Data Enable
10	VS	Vertical sync signal
11	HS	Horizontal sync Signal
12	B7	Blue data(MSB)
13	B6	Blue data
14	B5	Blue data
15	B4	Blue data
16	B3	Blue data
17	B2	Blue data
18	B1	Blue data
19	B0	Blue data(LSB)
20	G7	Green data(MSB)
21	G6	Green data
22	G5	Green data
23	G4	Green data
24	G3	Green data
25	G2	Green data
26	G1	Green data
27	G0	Green data (LSB)
28	R7	Red Data(MSB)
29	R6	Red Data
30	R5	Red Data
31	R4	Red Data



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32	R3	Red Data
33	R2	Red Data
34	R1	Red Data
35	R0	Red Data(LSB)
36	GND	Power Ground
37	DCLK	Pixel clock
38	GND	Power Ground
39	L/R	Left/right selection
40	U/D	up/down selection
41	VGH	Gate ON Voltage
42	VGL	Gate OFF Voltage
43	AVDD	Power for Analog Circuit
44	RESET	Global reset pin
45	NC	NO connection
46	NC	NO connection
47	DITHB	Dithering function
48	GND	Power Ground
49	NC	NO connection
50	NC	NO connection

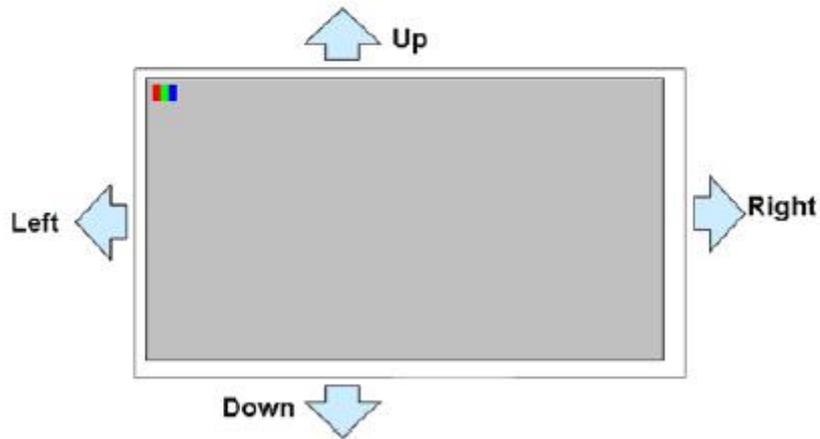


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【Note1】 SHLR : left or right setting
UPDN : up or down setting

UPDN	SHLR	FUNCTION
0	1	Normal Display
0	0	Inverse Left and Right
1	1	Inverse Up and Down
1	0	Inverse Left and Right Inverse Up and Down





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4 Absolute Maximum Ratings

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Item	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	DVDD	-0.3	3.96	V	-
Analog Supply Voltage	AVDD	-0.5	14.85	V	-
Gate On Voltage	VGH	-0.3	40	V	-
Gate Off Voltage	VGL	-20	0.3	V	-
Gate On-Gate Off Voltage	VGH-VGL	12	40	V	-
Operating Temperature	Topa	-20	70	°C	Note1
Storage Temperature	Tstg	-30	80	°C	Note1

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

5 Electrical Characteristics

5.1 Typical operation conditions

Ta=25°C						
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Digital Power Supply Voltage For LCD	DVDD	3	3.3	3.6	V	-
Analog Power Supply Voltage	AVDD	9.4	9.6	9.8	V	-
Gate On Power Supply Voltage	VGH	17	18	19	V	-
Gate Off Power Supply Voltage	VGL	-6.6	-6	-5.4	V	-
Logic Input Voltage	VIH	0.7*DVDD	-	DVDD	V	-
	VIL	GND	-	0.3*DVDD	V	



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5.2.1 Interface Timing

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
HS setup time	T_{hst}	8	-	-	ns	
HS hold time	T_{hhd}	8	-	-	ns	
VS setup time	T_{vst}	8	-	-	ns	
VS hold time	T_{vhd}	8	-	-	ns	
Data setup time	T_{dsu}	8	-	-	ns	
Data hole time	T_{dhd}	8	-	-	ns	
DE setup time	T_{esu}	8	-	-	ns	
DE hole time	T_{ehd}	8	-	-	ns	
DV _{DD} Power On Slew rate	T_{POR}	-	-	20	ms	From 0 to 90% DV _{DD}
RESET pulse width	T_{Rst}	1	-	-	ms	
DCLK cycle time	T_{coh}	20	-	-	ns	
DCLK pulse duty	T_{cvh}	40	50	60	%	



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ITEM	SYMBOL	CONDITION	MIN	TYPE	MAX	UNIT	NOTE
Gate On Power Current	IVGH	VGH = 18V	--	0.5	1	mA	Note1
Gate Off Power Current	IVGL	VGL = -6V	--	0.5	1	mA	Note1
Digital Power Current	IDVDD	DVDD = 3.3V	--	30	45	mA	Note1
Analog Power Current	IAVDD	AVDD = 9.6V	--	35	45	mA	Note1
Total Power Consumption	PC		--	447	604	mW	Note1

Note1: Typ. specification : Gray-level test Pattern

Max. specification : White test Pattern



256 gray pattern



White Pattern



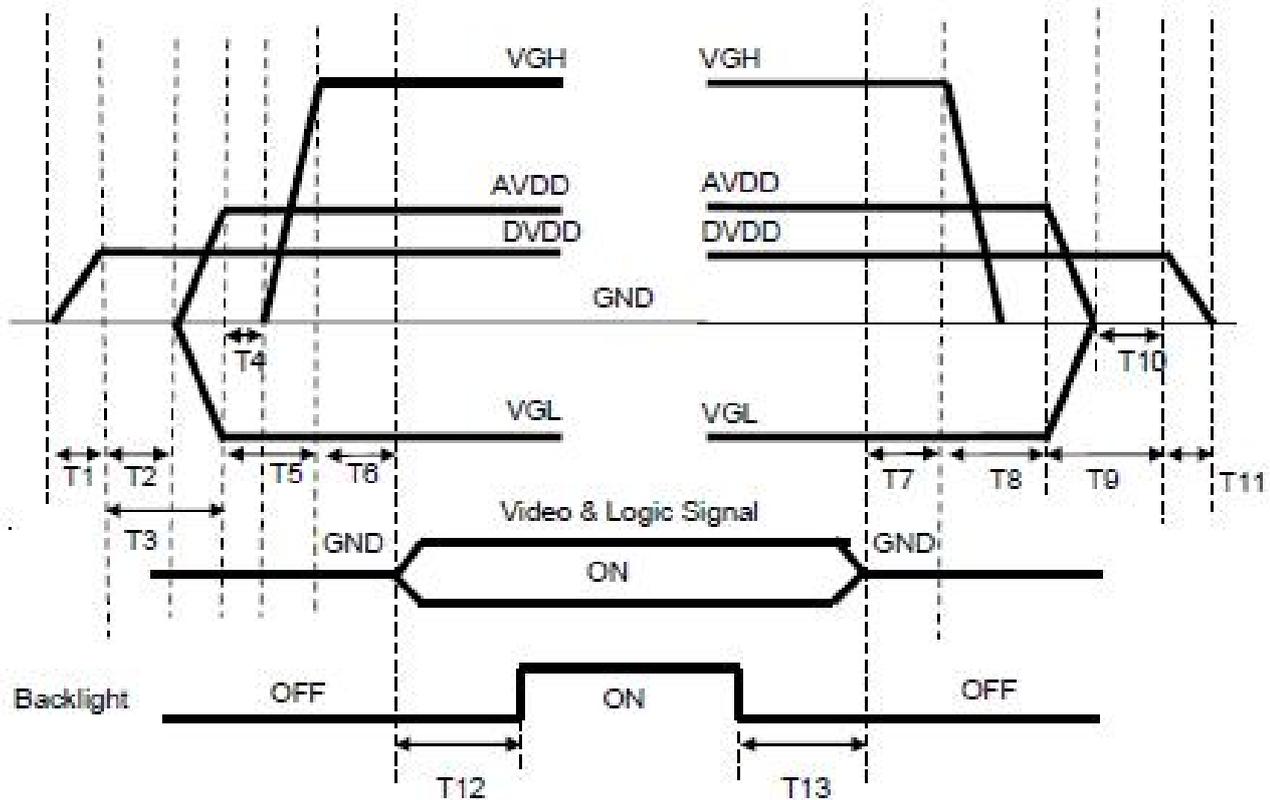
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5.2.2 power signal sequence

Power On : DVDD→AVDD/VGL →VGH →Video & Logic Signal→Backlight

Power Off : Backlight→Video & Logic Signal→ VGH→AVDD/VGL→DVDD



$0 < T1 \leq 10\text{ms}$
 $T2 > 0\text{ms}$
 $T3 > 20\text{ms}$
 $T4 > 0\text{ms}$
 $T5 > 10\text{ms}$
 $0 < T8 \leq 10\text{ms}$
 $T12 \geq 200\text{ms}$

$T7 > 0\text{ms}$
 $T8 > 0\text{ms}$
 $T9 > 0\text{ms}$
 $T10 > 0\text{ms}$
 $0 < T11 \leq 10\text{ms}$
 $T13 \geq 200\text{ms}$



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5.4 Timing characteristics of input signals

Input timing table

	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
DE MODE	Dot Clock	1/tCLK	45	51.2	57	MHz	
	DCLK Pulse Duty	Tcwh	40	50	60	%	
	Horizontal Total Time	tH	1324	1344	1364	tCLK	
	Horizontal Effective Time	tHA		1024		tCLK	
	Horizontal Blank Time	tHB	300	320	340	tCLK	
	Vertical Total Time	tV	625	635	645	tH	
	Vertical Effective Time	tVA		600		tH	
	Vertical Blank Time	tVB	25	35	45	tH	
SYNC MODE	Horizontal Total Time	TH	1324	1344	1364	tCLK	
	Horizontal Pulse Width	Thpw		20	-	tCLK	thb + thpw = 160DCLK is fixed
	Horizontal Back Porch	Thb		140	-	tCLK	
	Horizontal Front Porch	Thfp	140	160	180	tCLK	
	Horizontal Effective Time	THA		1024		tCLK	
	Vertical Total Time	TV	625	635	645	tH	
	Vertical Pulse Width	Tvpw		3	-	th	tvpw + tvb = 23th is fixed
	Vertical Back Porch	Tvb	-	20	-	th	
	Vertical Front Porch	Tvfp	2	12	22	th	
Vertical Valid	Tvd		600		th		

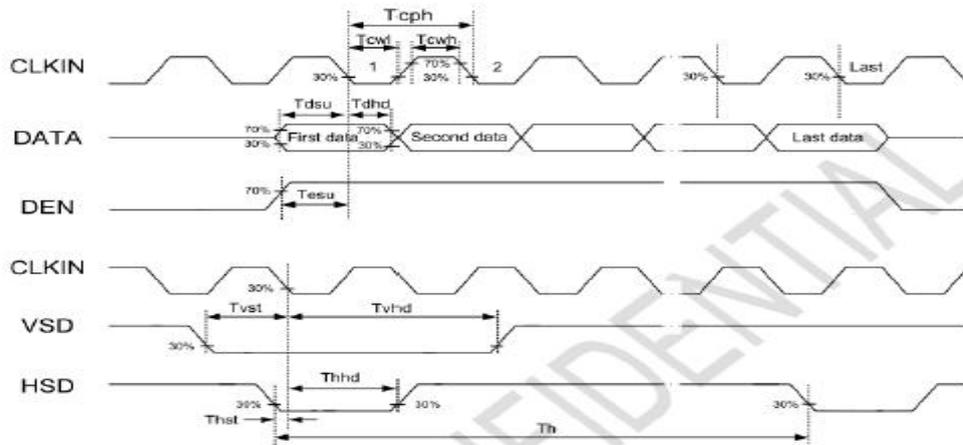
Input Clock and Data Timing Diagram



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Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
DVDD Power On Slew Rate	TPOR	-	-	20	ms	From 0V to 90% DVDD
RSTB Pulse Width	TRst	50	-	-	us	DCLK=65MHz
DCLK Cycle Time	Tcph	14	-	-	ns	
DCLK Pulse Duty	Tcwh	40	50	60	%	
VSD Setup Time	Tvst	5	-	-	ns	
VSD Hold Time	Tvhd	5	-	-	ns	
HSD Setup Time	Thst	5	-	-	ns	
HSD Hold Time	Thhd	5	-	-	ns	
Data Setup Time	Tdsu	5	-	-	ns	D0[7:0],D1[7:0],D2[7:0] to DCLK
Data Hold Time	Tdhd	5	-	-	ns	D0[7:0],D1[7:0],D2[7:0] to DCLK
DEN Setup Time	Tesu	5	-	-	ns	
DEN Hold Time	Tehd	5	-	-	ns	



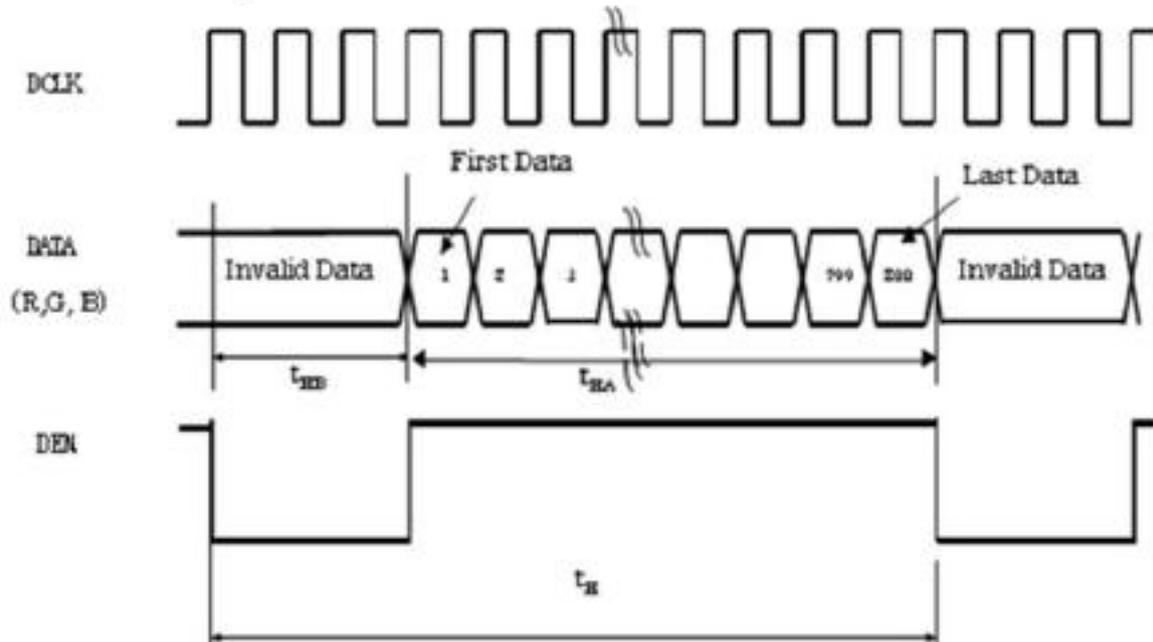
DE MODE



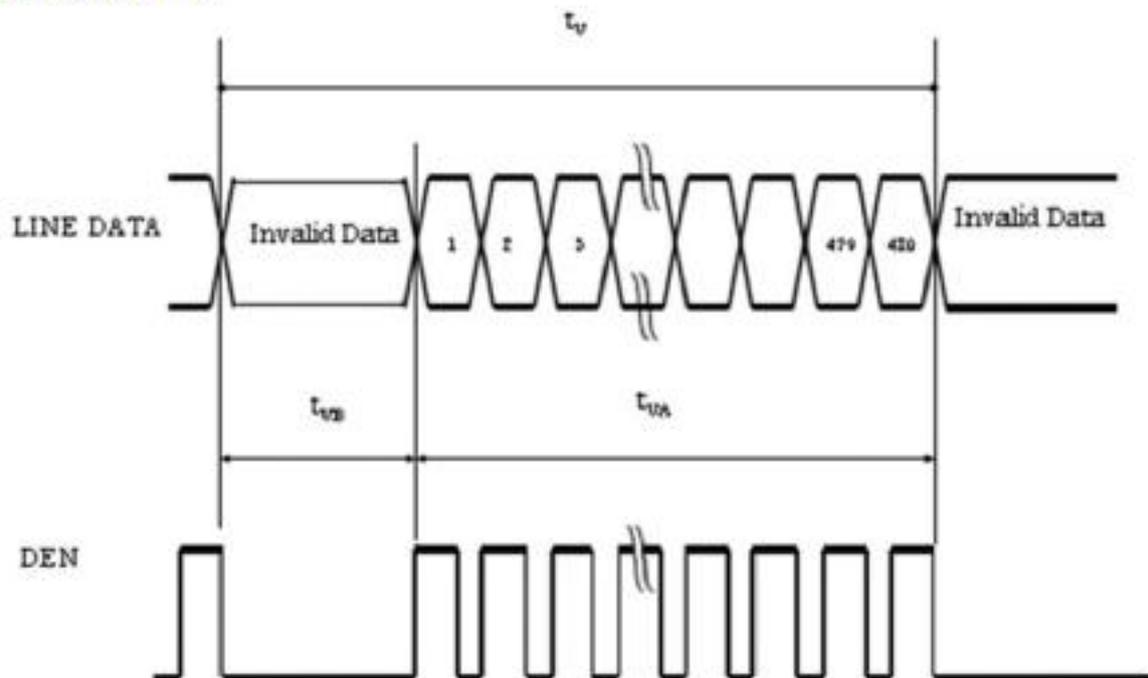
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Horizontal timing :



Vertical timing :



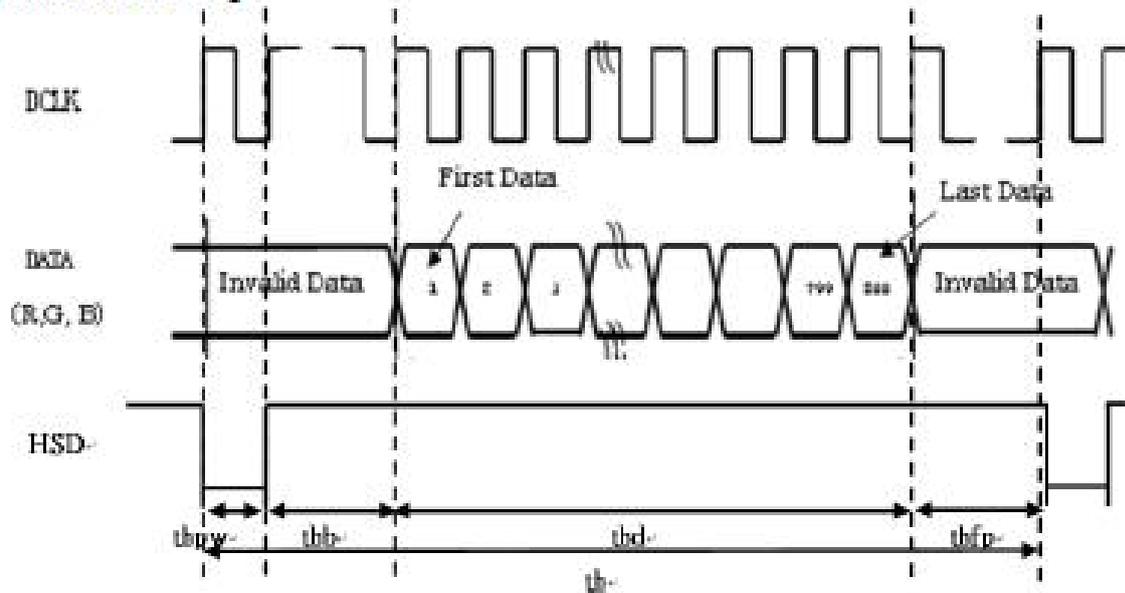


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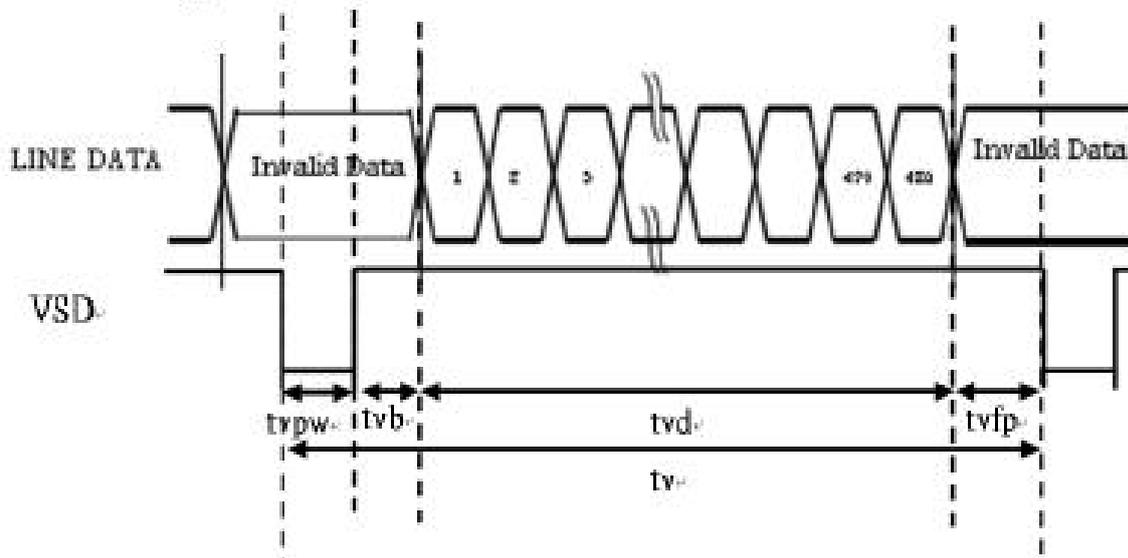
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SYNC Mode

Horizontal timing :



Vertical timing :



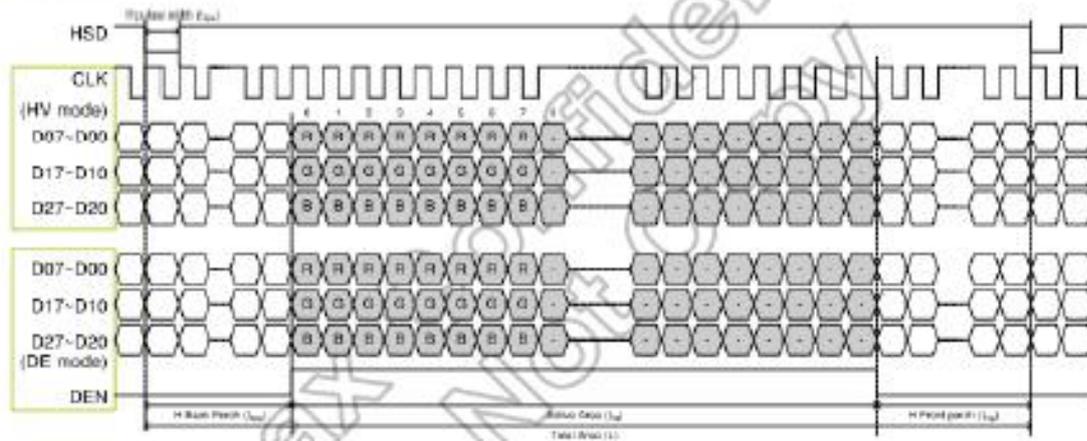


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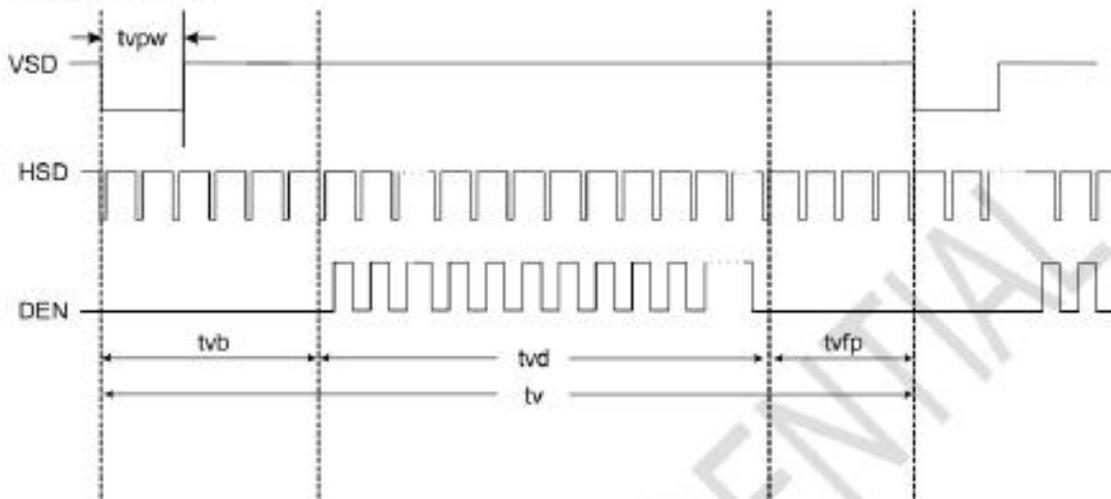
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Data input format

Horizontal timing :



Vertical timing :





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5.4 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	180	-	mA	
Forward Voltage	V_F	8.4	9.3	10.2	V	
colour temperature			-		K(kelvin)	
Backlight Power consumption	W_{BL}	-	TBD	-	W	

Note 1: Each LED : $I_F = 20$ mA, $V_F = 3.1$ V.

Note 2: Optical performance should be evaluated at $T_a = 25^\circ\text{C}$ 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.



6 Optical Characteristics

Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	
Viewing angles	θ_T	Center CR \geq 10	-	80	-	Degree.	Note2	
	θ_B		-	80	-			
	θ_L		-	60	-			
	θ_R		-	70	-			
Contrast Ratio	CR	$\Theta = 0$	-	700	800	-	Note1, Note3	
Response Time	T_r+T_f	25°C	-	25	40	ms	Note1, Note4	
Chromaticity	White	Backlight is on	X_W	0.270	0.290	0.310	-	Note1, Note5
			Y_W	0.311	0.331	0.351	-	
	Red		X_R	0.612	0.632	0.652	-	
			Y_R	0.291	0.311	0.331	-	
	Green		X_G	0.277	0.297	0.317	-	
			Y_G	0.516	0.536	0.556	-	
	Blue		X_B	0.120	0.140	0.160	-	
			Y_B	0.134	0.154	0.174	-	
Uniformity	U		-	50	-	%	Note1, Note6	
Luminance LCM+CTP	L		300	350			Note1, Note7	

Test Conditions:

1. $V_{DD}=3.3V$, the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

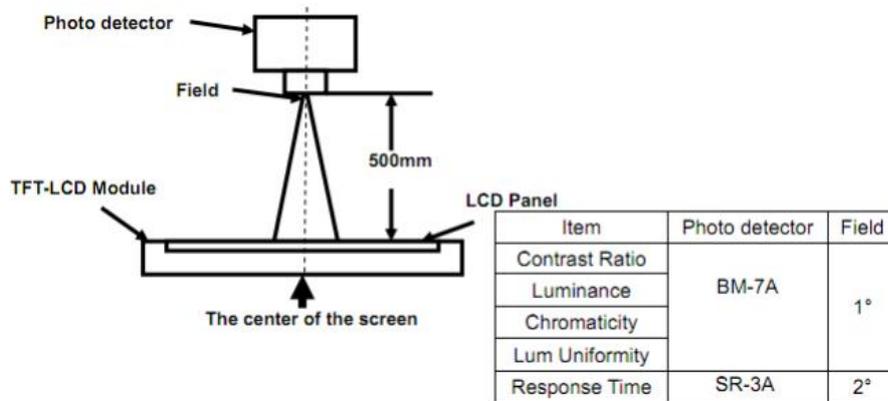
Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



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Note 2: Definition of viewing angle range and measurement system.
viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

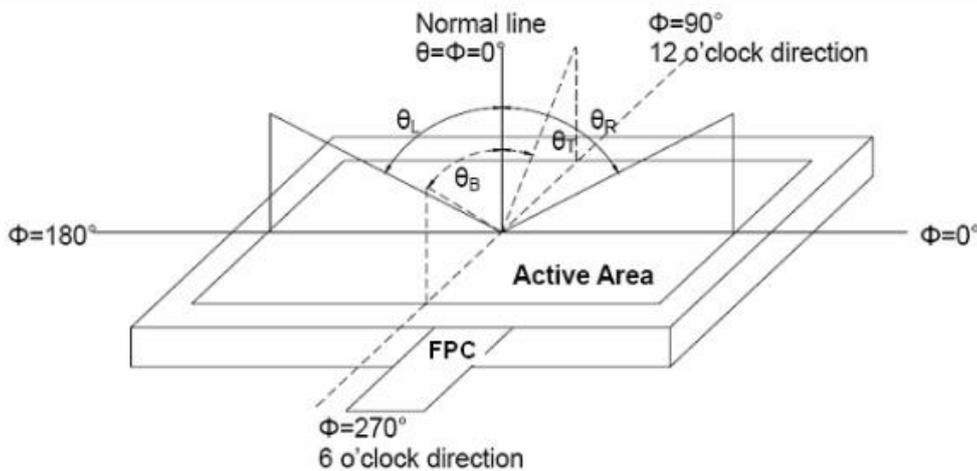


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

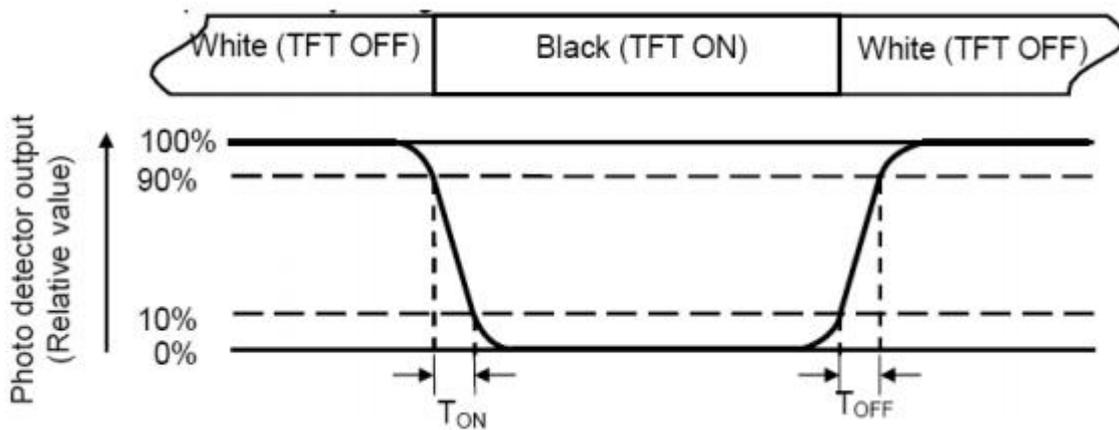
Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



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Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

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

L-----Active area length W----- Active area width

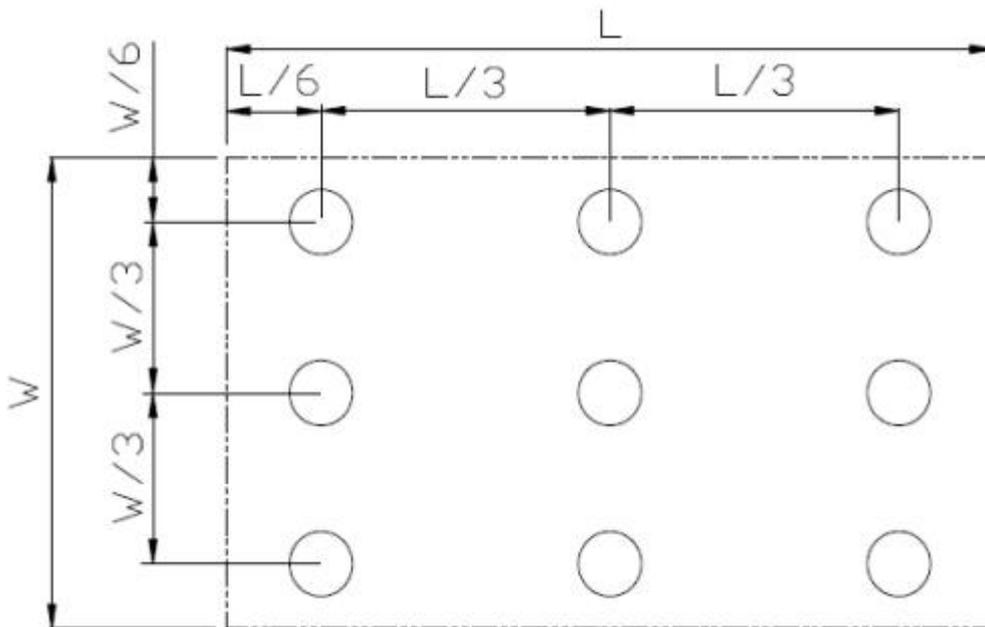


Fig. 2 Definition of uniformity

L_{max} : The measured maximum luminance of all measurement position.

L_{min} : The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :

Measure the luminance of white state at center point.



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7 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Opeartion	T _s = +50°C, 96hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Opeartion	T _a = -10°C, 96hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	T _a = +60°C, 96hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	T _a = -20°C, 96hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	T _a = +50°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, 20 Cycle	Start with cold temperature,end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Discharge (Opeartion) 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. T_s is the temperature of panel's surface.

2. T_a is the ambient temperature of sample.



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9 Packing

TBD



10. Precautions For Use of LCD modules

10.1 Handling Precautions

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

10.1.2. 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.

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

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

10.1.5. 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
- Ketone
- Aromatic solvents

10.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

10.1.8.4. 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.

10.2 Storage Precautions

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

10.2.2. 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%

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

10.3 Transportation Precautions

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