



**SPECIFICATION
FOR
LCD MODULE**

Customer : _____
Product Model: YH070SS4003
Sample code: _____

Designed by	Checked by	Approved by

Final Approval by Customer

<input type="checkbox"/> LCM Machinery OK Checked By _____ <input type="checkbox"/> LCM Display OK Checked By _____	<input type="checkbox"/> LCM OK <input type="checkbox"/> NG , Problem survey: Approved By _____
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※The specification of “TBD” should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.



Product Specifications

Customer	Standard Module
Model Name	YH058HD6001
Description	TFT LCD Module 5.8"WVGA 800(RGB)x320Dots
Date	2016/07/20
Revision	V1.0

Customer Approval	
Date	
The above signature represents that the product specifications, testing regulation, and warranty in the specifications are accepted	

Engineering			
Check	Date	Prepared	Date



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2 General Specifications

Feature		Spec
Characteristics	Size	5.8 inch□
	Resolution	800(horizontal)*320(Vertical)□
	Class Maker	IVO
	Interface	24bit- RGB
	Connect type	Connector
	Color Depth	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.1719 x 0.1609
	Pixel Configuration	R.G.B. Vertical Stripe□
	Display Mode	Normally White
	Driver IC	HX8264+HX8678
	Luminance	400 nits
	Viewing Direction	TBD
	Gray Scale Inversion Direction	TBD
Mechanical	LCM (W x H x D) (mm)	154.4*63.34*3.7
	Active Area(mm)	137.52 x51.49
	With /Without TSP	Without
	Weight (g)	TBD
	LED Numbers	24 LEDs (3S8P)

Note 1: Viewing direction for best image quality is different from TFT definition, there is a 180 degree shift.

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	AGND	System Ground
2	AVDD	Analog power
3	DVDD	Power supply for logic operation
4~11	R0~R7	Data bus
12~19	G0~G7	Data bus
20~27	B0~B7	Data bus
28	DOTCLK	Pixel clock signal
29	DE	Data Enable
30	HSD	Horizontal Sync signal
31	VSD	Vertical Sync signal
32	MODE	DE/SYNC mode select. Normally pull high H: DE mode. L: HSD/VSD mode
33	RSTB	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=47K Ω , C=1 μ)
34	STBYB	Standby mode, normally pull high STBYB="1", normal operation STBYB="0", timing control, source driver will turn off, all output are high-Z
35	SHLR	Left or Right Display Control
36	DVDD	Digital Power
37	UPDN	Up / Down Display Control
38	GND	Digital Ground
39	AGND	Analog Ground
40	AVDD	Analog Power
41	VCOM	Common Voltage
42	DITH	Dithering setting DITH="H" 6bit resolution(last 2 bit of input data truncated) (default setting) DITH="L" 8bit resolution



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43,44	NC	Not connect
45	V10	Gamma correction voltage reference
46	V9	Gamma correction voltage reference
47	V8	Gamma correction voltage reference
48	V7	Gamma correction voltage reference
49	V6	Gamma correction voltage reference
50	V5	Gamma correction voltage reference
51	V4	Gamma correction voltage reference
52	V3	Gamma correction voltage reference
53	V2	Gamma correction voltage reference
54	V1	Gamma correction voltage reference
55	NC	Not connect
56	VDDG	Positive Power for TFT
57	DVDD	Digital Power
58	VEEG	Negative Power for TFT
59	GND	Digital Ground
60	NC	Not connect

【Note1】 Mating connector: HIROSE, FH28-60S-0.5SH, 60pin,pitch = 0.5mm

【Note2】 SHLR: left or right setting

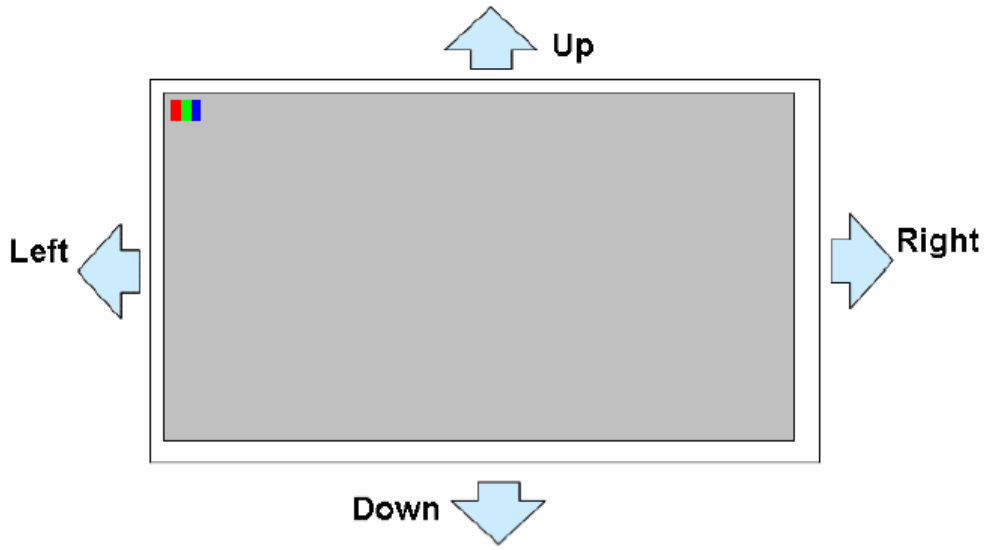
UPDN: up or down setting

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.



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4. Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	V _{DD}	-0.5	5.0	V	
Operating Temperature	T _{OPR}	-30	85	°C	
Storage Temperature	T _{STG}	-40	85	°C	

5. Electrical Characteristics

5.1 Typical operation conditions

T_a=25°C

Item	Symbol	Min.	Typ.	Max.	Unit.	Note.
Digital Supply Voltage	DVDD	3	3.3	3.6	V	
Analog Supply Voltage	AVDD	9.0	9.2	9.4	V	
Gate On Voltage	VDDG	17	18	19	V	
Gate Off Voltage	VEEG	-6.6	-6	-5.4	V	
Common Voltage	VCOM	3.8	4	4.2	V	Note1
Gamma Voltage	VR 1	-	9.01	-	V	
	VR 2	-	7.22	-	V	
	VR 3	-	6.88	-	V	
	VR 4	-	6.57	-	V	
	VR 5	-	5.525	-	V	
	VR 6	-	3.925	-	V	
	VR 7	-	2.854	-	V	
	VR 8	-	2.484	-	V	
	VR 9	-	2.04	-	V	
	VR 10	-	0.21	-	V	
Logic Input Voltage	VIH	0.7DVDD	-	DVDD	V	
	VIL	GND	-	0.3DVDD	V	

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



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5.2 Current consumption

Item	Symbol	Condition	Min.	Typ.	Max.	Unit.	Note.
Gate on Current	IVDDG	VDDG =18 V	-	0.5	1	mA	Note1
Gate off Current	IVEEG	VEEG= -6 V	-	0.5	1	mA	Note1
Digital Current	IDVDD	DVDD = 3.3V	-	10	15	mA	Note1
Analog Current	IAVDD	AVDD = 9.2 V	-	30	35	mA	Note1
Total Power Consumption	PC		-	321	396	mW	Note1

Note1: Typ. specification : Gray-level test Pattern
 Max. specification : Black test Pattern



(a)Gray-level Pattern



(b)Black Pattern

5.3 Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	160	200	mA	
Forward Voltage	V_F	-	9.6	10.5	V	
Backlight Power consumption	W_{BL}	-	1.53	2.1	W	
LED Lifetime		20000			Hrs	

Note 1: Each LED : $I_F = 20\text{ mA}$, $V_F = 3.2\text{V}$.

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.

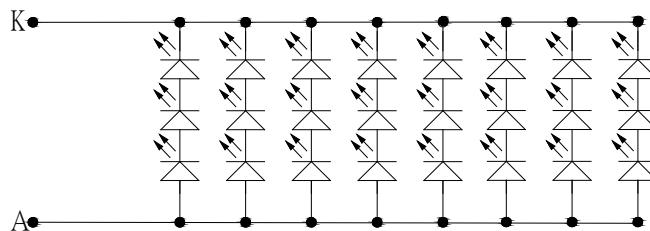
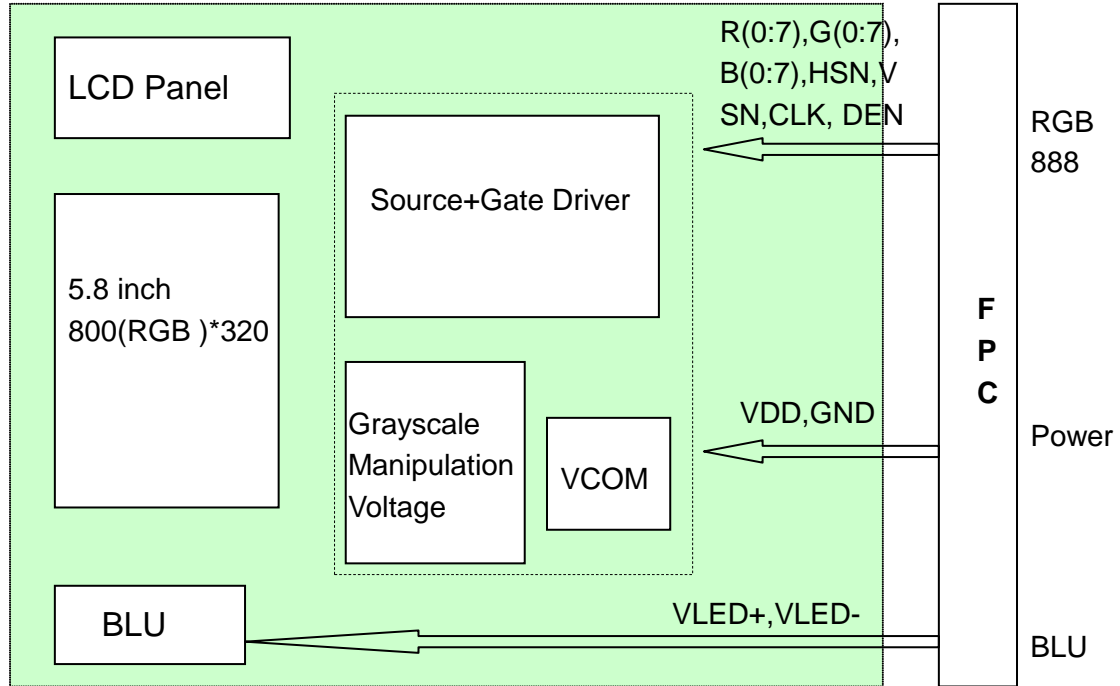


Figure : LED connection of backlight



5.4 Block Diagram

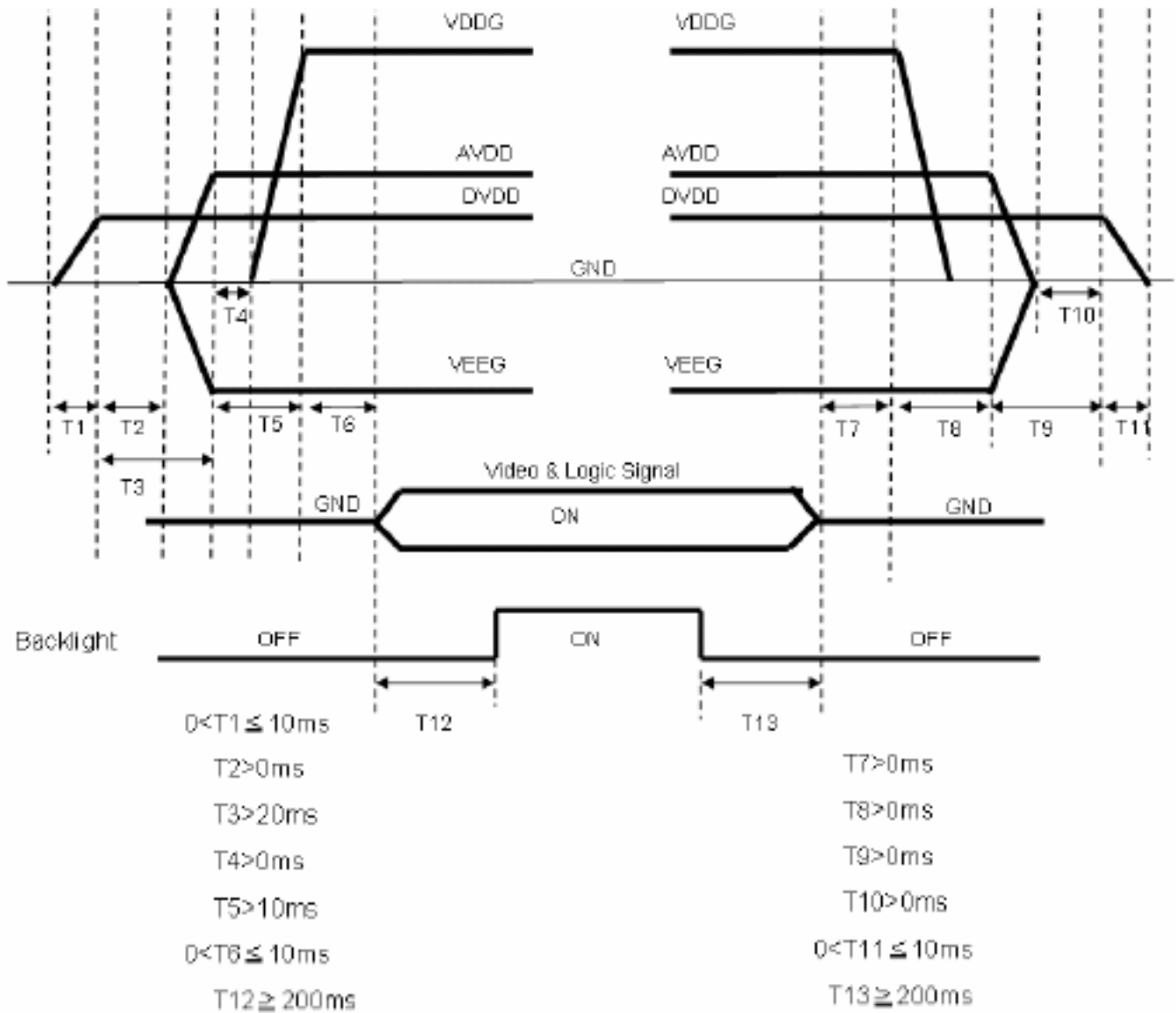




6 Interface Timing

6.1 Power、Signal sequence

Power On : DVDD→AVDD/VEEG→VDDG→Video & Logic Signal→Backlight
 Power Off : Backlight→ Video & Logic Signal→VDDG→AVDD/VEEG→DVDD





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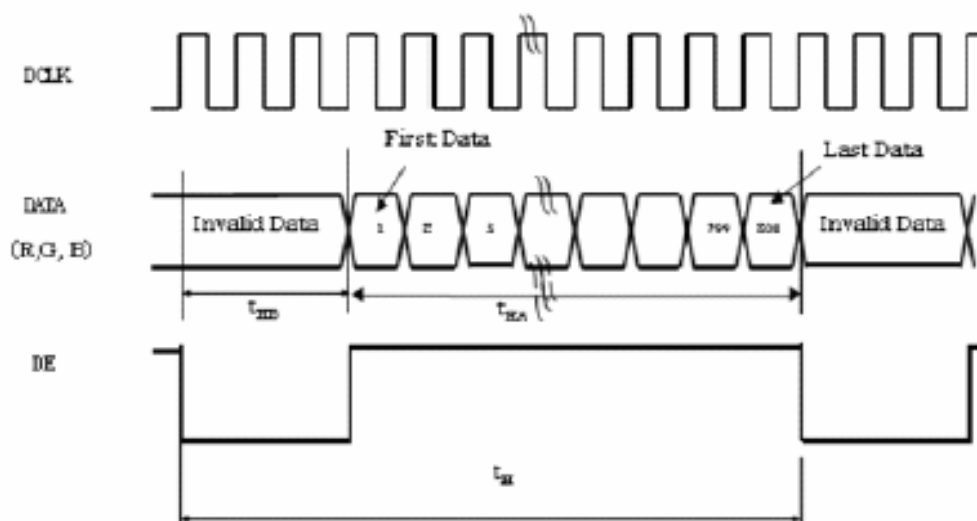
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6.2 Timing characteristics of input signals

	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
DCLK	Dot Clock	$1/t_{CLK}$	26	30	35	MHz	
	DCLK pulse duty	T_{cwh}	40	50	60	%	
DE	Setup Time	T_{esu}	8	-	-	ns	
	Hold time	T_{ehd}	8	-	-	ns	
	Horizontal Period	t_H	908	928	1000	t_{CLK}	
	Horizontal Valid	t_{HA}	800				
	Horizontal Blank	t_{HB}	108	128	200	t_{CLK}	
	Vertical Period	t_V	515	525	700	t_H	
	Vertical Valid	t_{VA}	480				
SYNC	Vertical Blank	t_{VB}	35	45	220	t_H	
	HSYNC Setup Time	T_{hst}	8	-	-	ns	
	HSYNC Hold Time	T_{hhd}	8	-	-	ns	
	VSYNC Setup Time	T_{vst}	8	-	-	ns	
	VSYNC Hold Time	T_{vhd}	8	-	-	ns	
	Horizontal Period	t_H	908	928	1000	t_{CLK}	
	Horizontal Pulse Width	t_{HPW}	-	48	-	t_{CLK}	$t_{HB} + t_{HPW} = 88DCLK$ is fixed
	Horizontal Back Porch	t_{HB}	-	40	-	t_{CLK}	
	Horizontal Front Porch	t_{HFP}	20	40	112	t_{CLK}	
	Horizontal Valid	t_{HD}	800				
	Vertical Period	t_V	515	525	700	t_H	
	Vertical Pulse Width	t_{VPW}	-	3	-	t_H	$t_{VPW} + t_{VB} = 32t_H$ is fixed
	Vertical Back Porch	t_{VB}	-	29	-	t_H	
	Vertical Front Porch	t_{VFP}	3	13	188	t_H	
Vertical Valid	t_{VD}	480					
DATA	Setup Time	T_{dsu}	8	-	-	ns	
	Hold Time	T_{dhd}	8	-	-	ns	

DE mode

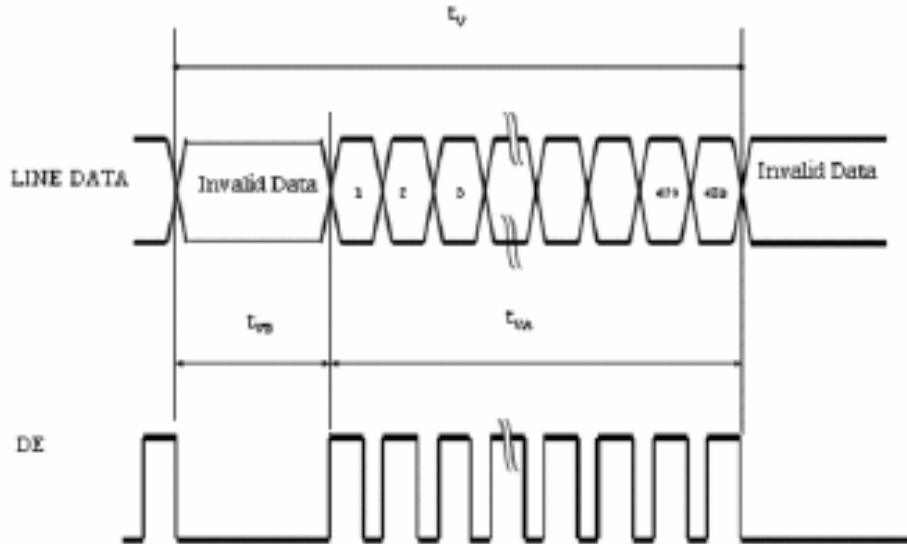
Horizontal timing :





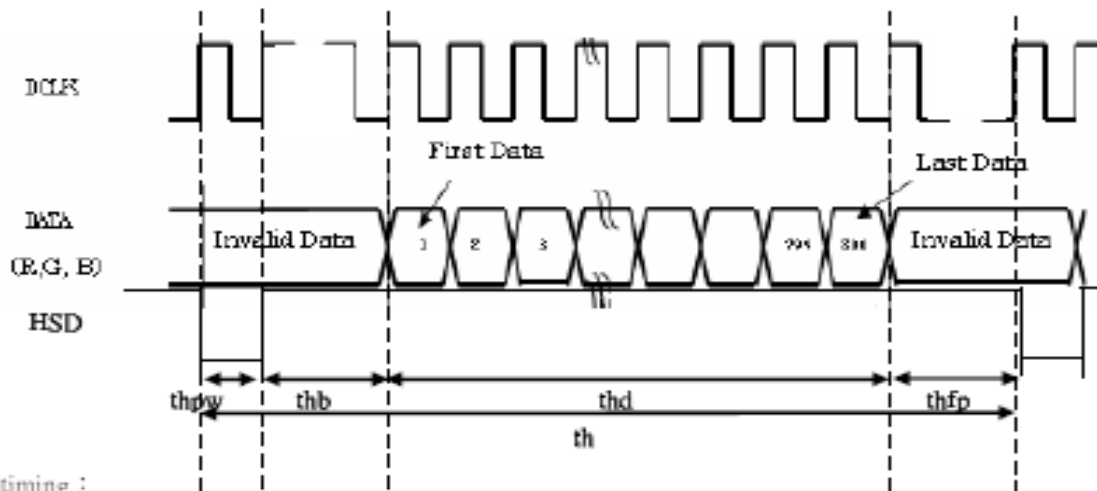
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Vertical timing :

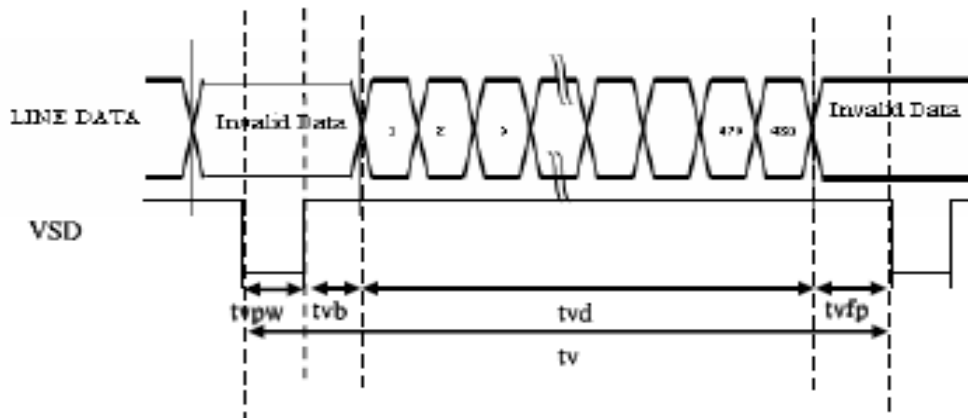


SYNC mode

Horizontal timing :



Vertical timing :





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7 Optical Characteristics

Items	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	
Viewing angles	θ_{Y+}	Center CR \geq 10	-	65	-	Degree.	Note2	
	θ_{Y-}		-	65	-			
	θ_{X-}		-	70	-			
	θ_{X+}		-	70	-			
Contrast Ratio	CR	$\Theta = 0$	480	600	-	-	Note1, Note3	
Response Time	T _{ON}	25° C	-	25	30	ms	Note1, Note4	
	T _{OFF}		-	35	40			
Chromaticity	White	Backlight is on	X _W	0.280	0.310	0.340	-	Note1, Note5
			Y _W	0.307	0.337	0.367	-	
	Red		X _R	0.596	0.626	0.656	-	
			Y _R	0.312	0.342	0.372	-	
	Green		X _G	0.273	0.303	0.333	-	
			Y _G	0.526	0.556	0.586	-	
	Blue		X _B	0.106	0.136	0.166	-	
			Y _B	0.109	0.139	0.169	-	
Uniformity	U		80	-	-	%	Note1, Note6	
NTSC				50		%	Note5	
Luminance	$\square\square\square\square$ $\square\square\square\square$ $\square\square\square L$		350	400			Note1, Note7	

Test Conditions:

1. IF= 20mA(one channel),the ambient temperature is 25° C.
2. The test systems refer to Note 1 and Note 2.

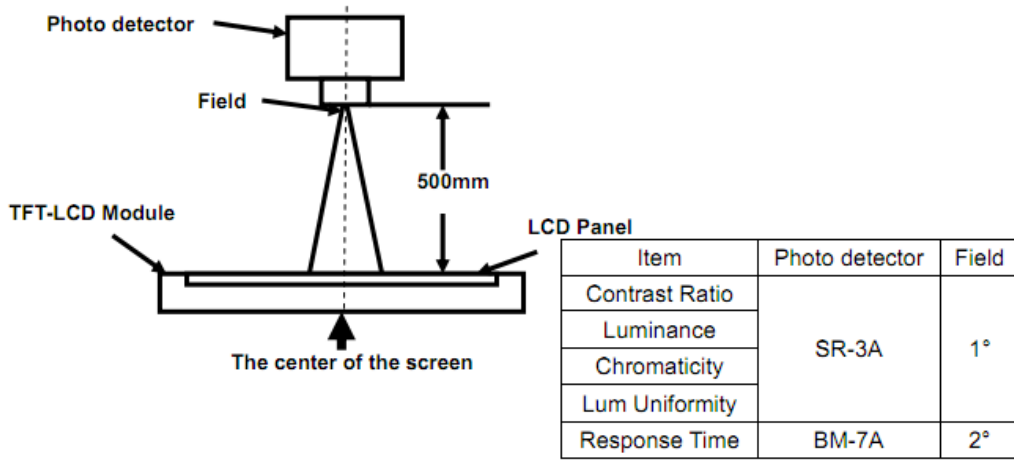
Note 1:Definition of optical measurement system.

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.

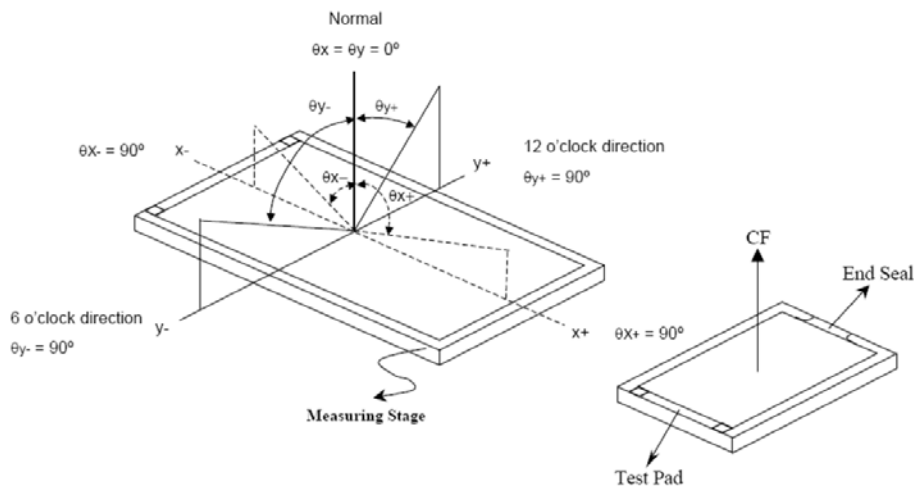


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Note 2: Definition of viewing angle range and measurement system.
viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).



Note 3: Definition of contrast ratio

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

“White state “:The state is that the LCD should driven by V_{white} .

“Black state”: The state is that the LCD should driven by V_{black} .

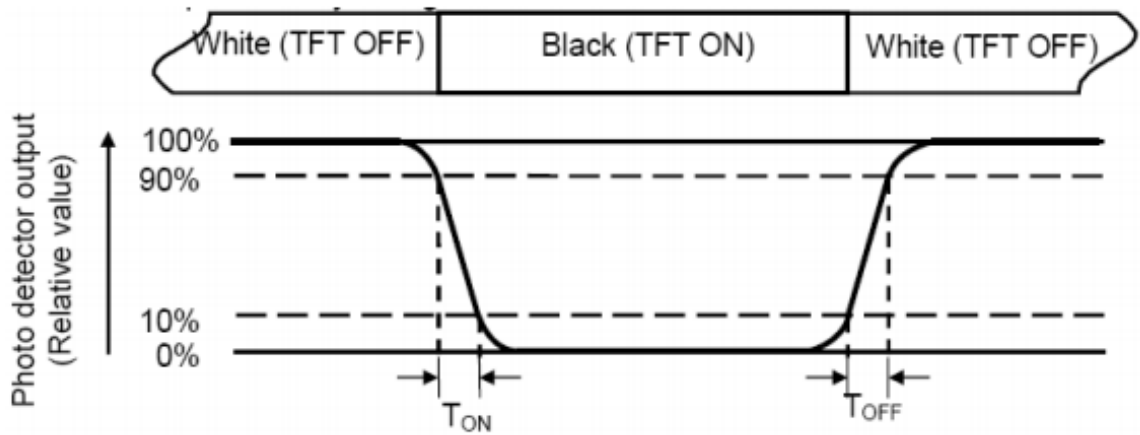
V_{white} : To be determined V_{black} : To be determined.

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.

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

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

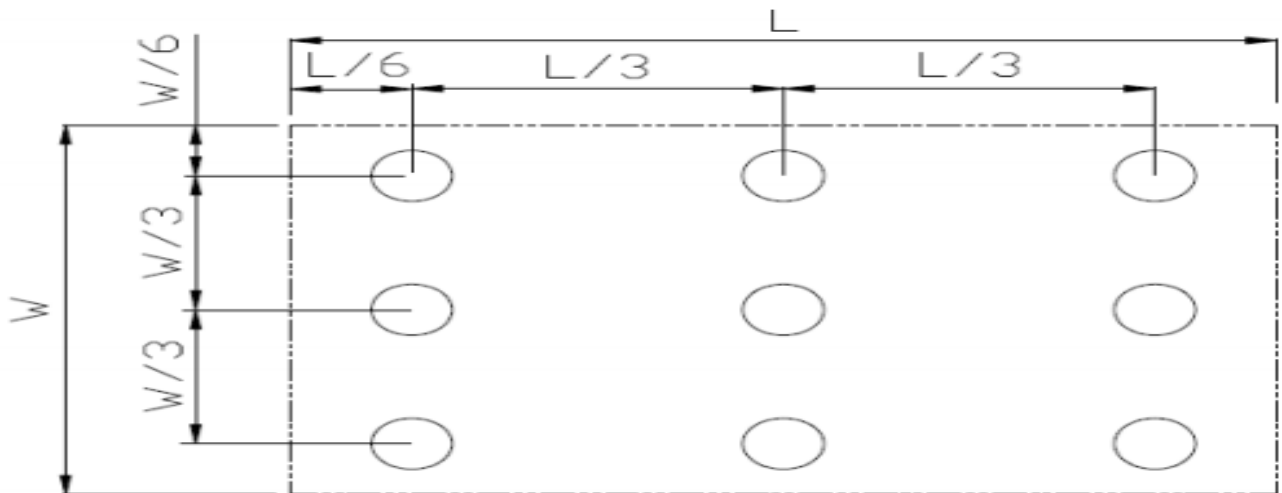


Fig. 2 Definition of uniformity

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.



8 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Opeartion	$T_s = +85^\circ\text{C}$, 240hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Opeartion	$T_a = -30^\circ\text{C}$, 240hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	$T_a = +85^\circ\text{C}$, 240hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	$T_a = -40^\circ\text{C}$, 240hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	$T_a = +60^\circ\text{C}$, 90% RH max, 160 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30°C 30 min ~ $+80^\circ\text{C}$ 30 min Change time: 5min, 30 Cycle	Start with cold temperature,end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Static Discharge (Opeartion)	$C=150\text{pF}$, $R=330\ \Omega$, 5 points/panel Air: $\pm 8\text{KV}$, 5 times; Contact: $\pm 4\text{KV}$, 5 times; (Environment: $15^\circ\text{C} \sim 35^\circ\text{C}$, 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, $\pm X$, $\pm Y$, $\pm Z$ 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.



11 Precautions For Use of LCD modules

11.1 Handling Precautions

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

11.1.2. 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.

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

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

11.1.5. 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

11.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

11.1.8.4. 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.

11.2 Storage Precautions

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

11.2.2. 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%

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

11.3 Transportation Precautions

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