

- Tentative Specification
- Preliminary Specification
- Approval Specification

MODELNAME:YH050BH20

Version:CLA01

Customer: Common	
APPROVED BY	SIGNATURE
<u>Name / Title</u> Note	<hr style="border: none; border-top: 1px solid black;"/>
<hr style="border: none; border-top: 1px solid black;"/> Please return 1 copy for your confirmation with your signature and comments.	

Approved By	Checked By	Prepared By

Record of Revision

Version	Revise Date	Page	Content
A0	2024/09/13	All	Initial Release.

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1. General Information

1.1. LCM

No.	Item	Specification	Remark
01	LCD size	5.0 inch(Diagonal)	
02	Driver element	a-Si TFT active matrix	
03	Resolution	800 × 3(RGB) × 480	
04	Display mode	Normally Black, Transmissive	
05	Pixel pitch	0.045(W) × 0.135(H) mm	
06	Active area	108(W) × 64.8(H) mm	
07	Module size	121.0(W) × 78.8(H) × 6.70(D) mm	
08	Surface treatment	Anti-Glare	
09	LCD driver IC	ST7265	
10	Interface type	RGB	
11	Backlight power consumption	TBD W(Typ.)	
12	Panel power consumption	TBD W(Typ.)	

2. Pin Assignment

2.1. LCM PIN

Pin	Symbol	Description.
1~2	VDD	Power supply VDDIN=3.3V
3	EN(NC)	NC
4	GND	Ground
5	RXIN0N	0-LVDS differential data
6	RXIN0P	0+LVDS differential data
7	GND	Ground
8	RXIN1N	1-LVDS differential data
9	RXIN1P	1+LVDS differential data
10	GND	Ground
11	RXIN2N	2-LVDS differential data
12	RXIN2P	2+LVDS differential data
13	GND	Ground
14	RX_CLKN	-LVDS differential clock input
15	RX_CLKP	+LVDS differential clock input
16	GND	Ground
17	RXIN3N	3-LVDS differential clock input
18	RXIN3P	3+LVDS differential clock input
19	PWM	PWM EN demming range:200~200KHZ EN Input Low Voltag:<0.4v EN Input High Voltag:>1.4v
20	VLED	Power supply VLED=5~12V(Typ.)

3. Operation Specifications

3.1. Absolute Maximum Ratings

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power voltage	V_{DD}	-0.3	4.0	V	
LED Reverse Voltage	V_R	-	5	V	Each LED
LED Forward Current	I_F	-	60	mA	

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.

3.1.1. Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V_{DD}	3.1	3.3	3.6	V	
Input logic high voltage	V_{IH}	$0.7V_{DD}$	-	V_{DD}	V	
Input logic low voltage	V_{IL}	0	-	$0.3V_{DD}$	V	

3.1.2. Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	19.6	21	23.1	V	Note 1
Current for LED backlight	I_L	-	100	-	mA	
LED life time	-	30000	-	-	Hr	Note 2

Note1:

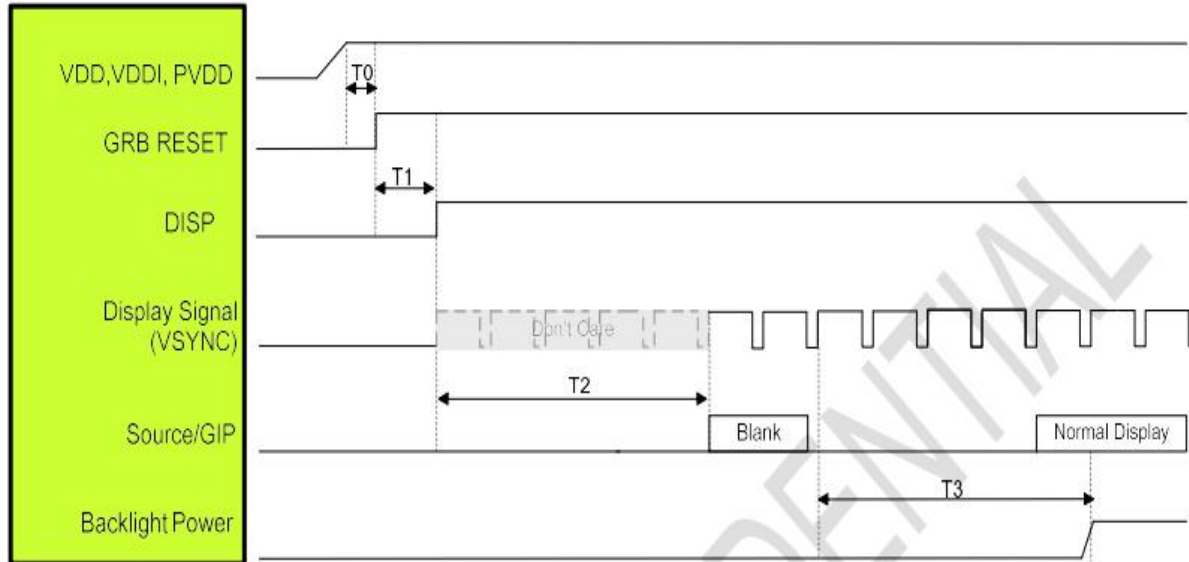
The LED Supply Voltage is defined by the number of LED at $T_a=25^\circ\text{C}$ and $I_L=100\text{mA}$.

Note2:

The "LED life time" is defined as the module brightness decrease to 50% original brightness at $T_a=25^\circ\text{C}$. The LED lifetime could be decreased if operating I_L is larger than 100mA.

3.2. Power Sequence

3.2.1. Power on

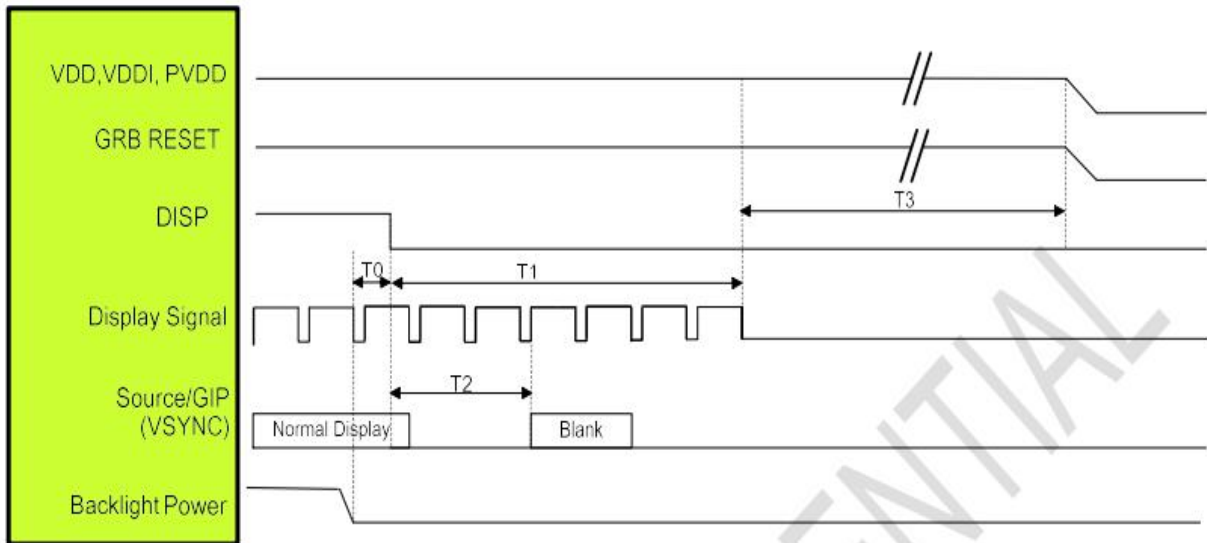


Symbol	Description	Time	Unit
T0	System power stability to GRB RESET signal	≥ 1	ms
T1	GRB RESET= "High" to DISP="High"	≥ 10	ms
T2	DISP="High" to Source/GIP scan blank	85	ms
T3	Display Signal input to Backlight power on (base on Display Signal Frame Rate 60Hz)	≥ 100	ms

Note:

- When DISP pull "H" or "L", IC will execute the internal power on or power off procedures. Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.
- RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]
- LVDS interface Display signal: DCLK P/N; RX[3:0] P/N

3.2.2. Power off



Symbol	Description	Time	Unit
T0	Backlight Power off to DISP="Low"	≥1	ms
T1	DISP="Low" to IC internal voltage discharge complete	100	ms
T2	DISP="Low" to Source/GIP scan blank (base on Display Signal Frame Rate 60Hz)	≤50	ms
T3	IC internal voltage discharge is completed to VDD/VDDI/PVDD off	>0	ms

Note:

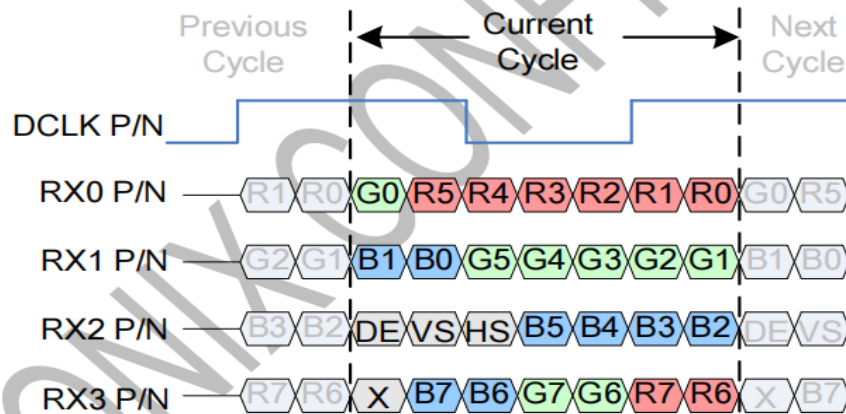
1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures .Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.
2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]
- 3: LVDS interface Display signal: DCLK P/N; RX[3:0] P/N

3.3. Timing Characteristics

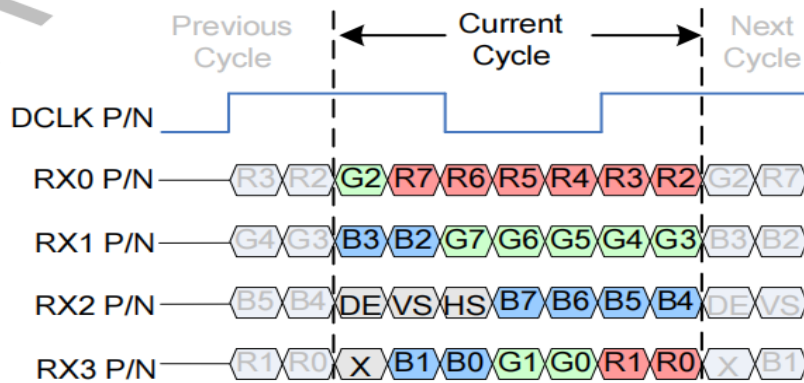
Pin Name RGB (LVDS)	LVDS 3 lane	LVDS 4 Lane
DCLKN	RXCLKN	RXCLKN
DCLKP	RXCLKP	RXCLKP
DB0	RX0P	RX0P
DB1	RX0N	RX0N
DB2	RX1P	RX1P
DB3	RX1N	RX1N
DB4	RX2P	RX2P
DB5	RX2N	RX2N
DB6	-	RX3P
DB7	-	RX3N

Note: Symbol "-" means reserve pin and should fix to "L" by DGND.

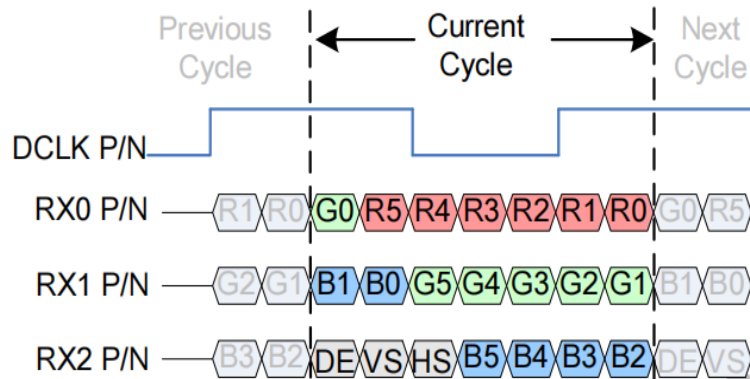
4 Lane VESA Data Format Color Bit Map



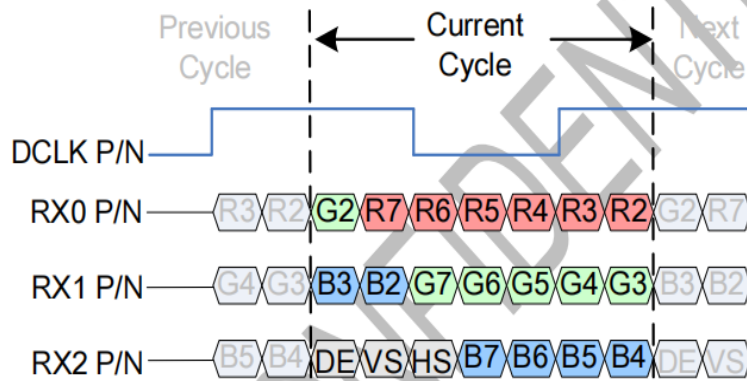
4 Lane JEIDA Data Format Color Bit Map



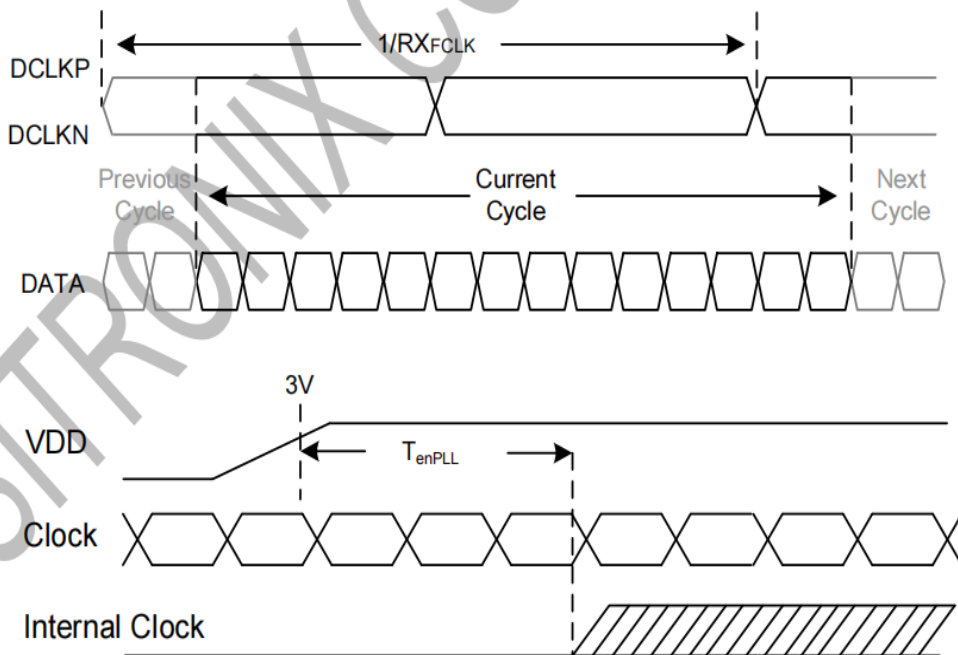
3 Lane VESA Mode Color Bit Map

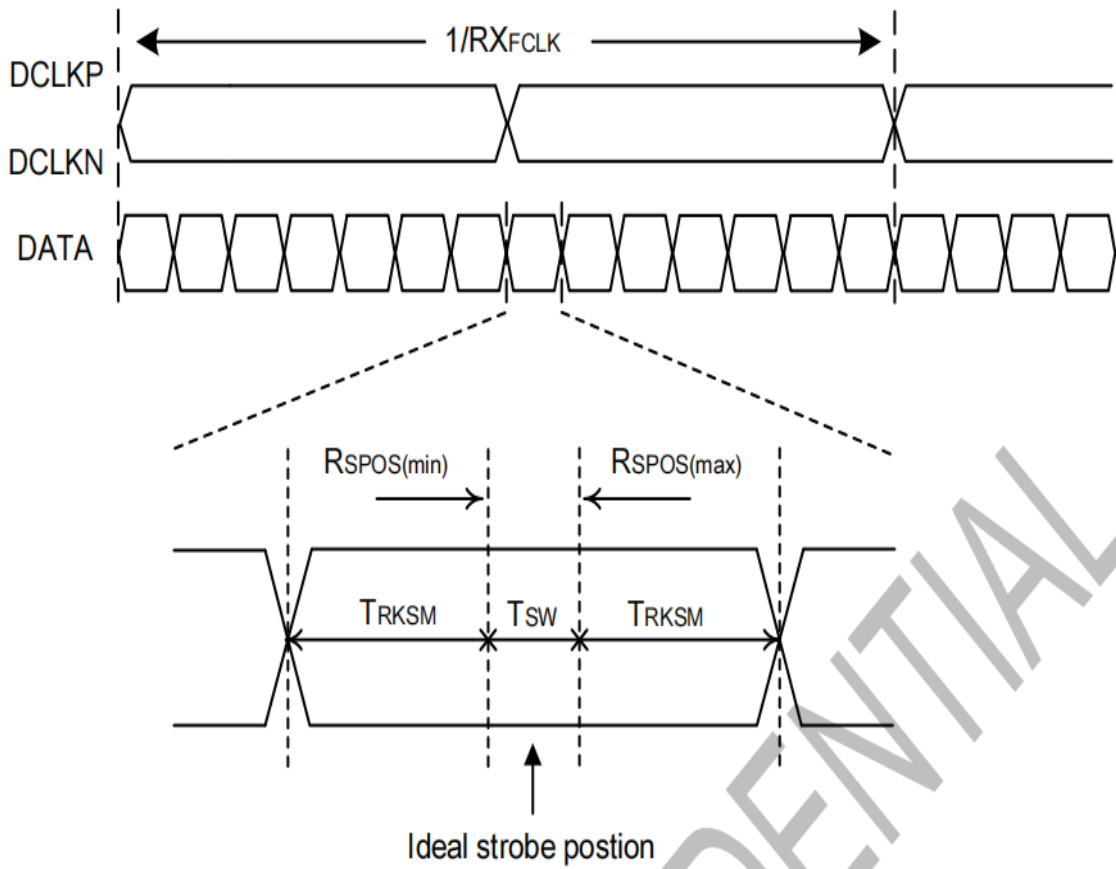


3 Lane JEIDA Mode Color Bit Map



LVDS Input Timing Table





RR_{KSM} : Receiver strobe margin
 RS_{POS} : Receiver strobe position
 T_{SW} : Strobe width (internal DATA sampling window)

LVDS Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Clock Frequency	RX_{FCLK}	23	25	27	MHz	
Input Data Skew Margin	T_{RSKM}	400			ps	
Clock High Time	T_{LVCH}	$4/(7 \times RX_{FCLK})$			ns	
Clock Low Time	T_{LVCL}	$5/(7 \times RX_{FCLK})$			ns	
PLL Wake-up Time	T_{enPLL}			150	μs	
LVDS Spread Spectrum Clocking (SSC) Tolerance of LVDS Receiver						
Modulation Frequency	SSC_{MF}			100	KHz	
Modulation Rate	SSC_{MR}			+/-3	%	

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

Parallel 24-bit RGB Interface Timing Table						
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency	Fclk	23	25	27	MHz	
HSYNC	Period Time	Th	-	816	896	DCLK
	Display Period	Thdisp	800			DCLK
	Back Porch	Thbp	-	8	48	DCLK
	Front Porch	Thfp	-	8	48	DCLK
	Pulse Width	Thw	-	4	8	DCLK
VSYNC	Period Time	Tv	-	496	504	HSYNC
	Display Period	Tvdisp	400			HSYNC
	Back Porch	Tvbp	-	8	12	HSYNC
	Front Porch	Tvfp	-	8	12	HSYNC
	Pulse Width	Tvw	-	4	8	HSYNC

Note: 1. The minimum blanking time depends on the GIP timing of the panel specification

2. To ensure the compatibility of different panels, it is recommended to use the typical setting.

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

4. Optical Specification

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	$\Phi=180^\circ$ (9 o'clock)	-	80	--	degree	Note 1
	θ_R	$\Phi=0^\circ$ (3 o'clock)	-	80	--		
	θ_T	$\Phi=90^\circ$ (12 o'clock)	-	80	--		
	θ_B	$\Phi=270^\circ$ (6 o'clock)	-	80	--		
Response time	T _{ON}	Normal $\theta=\Phi=0^\circ$	--	15	20	msec	Note 2
	T _{OFF}		--	15	20	msec	Note 2
Contrast ratio	CR		700	1000	--	--	
Color chromaticity	W _X		0.260	0.310	0.360	--	Note 4
	W _Y		0.280	0.330	0.380	--	Note 5
Luminance	L		500	550	--	cd/m ²	Note 5
Luminance uniformity	YU		70	75	--	%	Note 6
NTSC	-		55	60	-	%	

Test Conditions:

VDD=3.3V, IL=100mA (Backlight current), the ambient temperature is 25°C.

Note1:

Definition of viewing angle

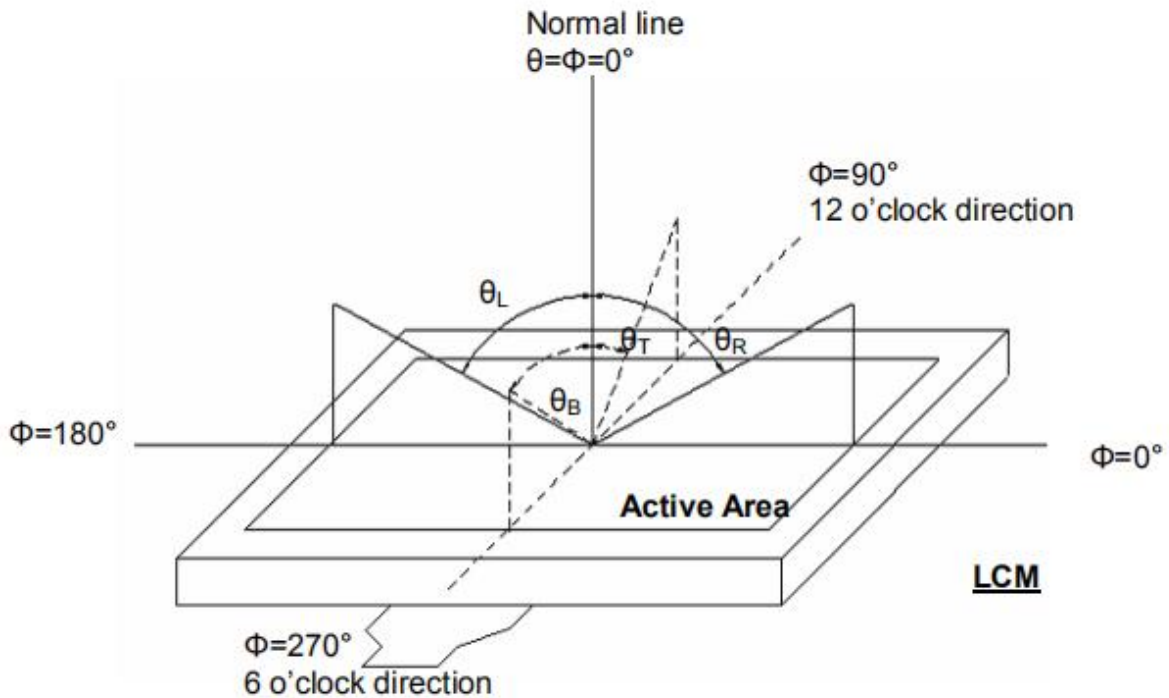


Fig. Definition of viewing angle

Note2:

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

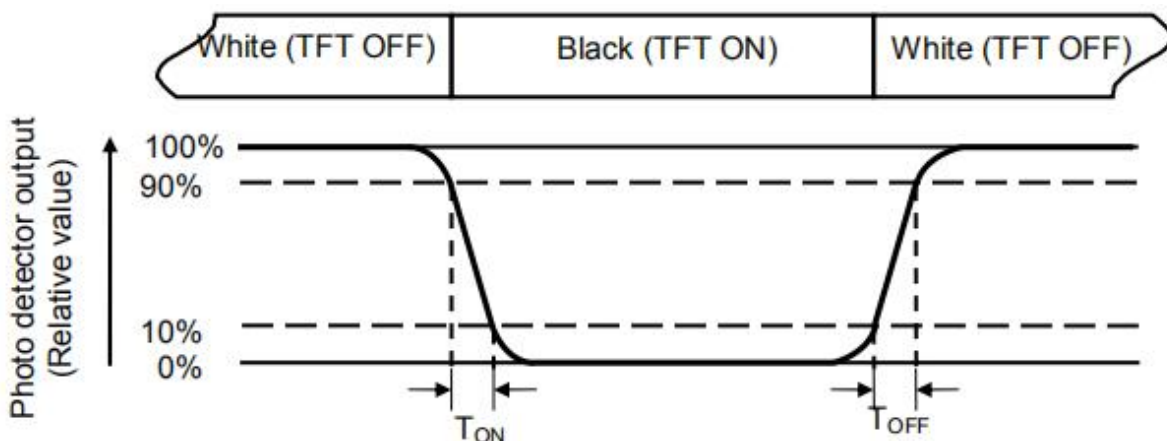


Fig. Definition of response time

Note3:

Definition of contrast ratio

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

Note4:

Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note5:

All input terminals LCD panel must be ground while measuring the center area of the panel.

The LED driving condition is IL=80mA on CA410.

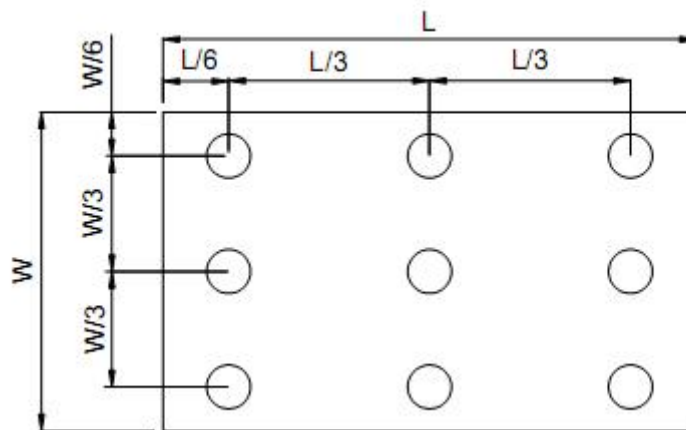
Note6:

Definition of Luminance Uniformity

Active area is divided into 9 measuring areas. Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$

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



Bmax: The measured maximum luminance of all measurement position.

Bmin::The measured minimum luminance of all measurement position.

5. Reliability Test Items

Item	Test Conditions	Remark
High Temperature Storage	85°C , 240hrs	Note 1, Note 4
Low Temperature Storage	-30°C , 240hrs	Note 1, Note 4
High Temperature Operation	85°C , 240hrs	Note 2, Note 4
Low Temperature Operation	-30°C , 240hrs	Note 1, Note 4
Operate at High Temperature and Humidity	60°C , 90%RH, 240hrs	Note 4
Thermal Shock	-30°C/30 min ~ +80°C/30 min for a total 100 cycles, Start with cold temperature and end with high temperature.	Note 4
Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

Note1:

Ta is the ambient temperature of samples.

Note2:

Ts is the temperature of panel's surface.

Note3:

In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note4:

Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

6. General Precautions

6.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

6.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

6.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

6.4. Storage

1. Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

6.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

7. Mechanical Drawing

