

LCD MODULE SPECIFICATION

Customer: _____

Model Name: TY101MH40IG001-36A

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For Customer's Acceptance

Approved by	Comment

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深圳市泰于创新技术有限公司

Record of Revision

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1. General Specifications

No.	Item	Specification	Remark
1	LCD size	10.1 inch	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1280 × (RGB) × 800	
4	Display mode	Normally Black	
5	Dot pitch	0.1695 (H) x 0.1695 (V) mm	
6	Active area	216.96(W) × 135.6(H) mm	
7	Module size	229.0(W) × 148.71(H) × 2.5(D) mm	Note 1
8	View direction	ALL	O'Clock
9	Surface treatment	Anti-Glare	
10	Color arrangement	RGB-stripe	
11	Interface	LVDS	
12	Lcm power consumption	2.3W	TYP
13	Drive IC	EK79202B	

Note 1: Refer to Mechanical Drawing.

2. Pin Assignment

FPC Connector is used for the module electronics interface. The recommended model is F62240-H1210A manufactured by Hirose.

Pin No.	Symbol	I/O	Function	Remark
1	NC	-	Not connect	
2-3	VDD	p	Digital power	
4	CS	I	Serial communication enables.	
5	SCL	I	Serial communication clock input.	
6	SDA	I	Serial communication data input	
7	GND	p	Ground	
8	RXIN0N	I	-LVDS differential data input	
9	RXIN0P	I	+LVDS differential data input	
10	GND	p	Ground	
11	RXIIN1N	I	-LVDS differential data input	
12	RXIN1P	I	+LVDS differential data input	
13	GND	p	Ground	
14	RXIN2N	I	-LVDS differential data input	
15	RXIN2P	I	+LVDS differential data input	
16	GND	p	Ground	
17	RXINCN	I	-LVDS Differential Clock Input	
18	RXINCP	I	+LVDS Differential Clock Input	
19	GND	p	Ground	
20	RXIN3N	I	-LVDS differential data input	
21	RXIN3P	I	+LVDS differential data input	
22	GND	p	Ground	
23-24	NC	-	Not connect	
25	GND	p	Ground	
26-27	NC	-	Not connect	
28	GND	p	Ground	
29-30	NC	-	Not connect	
31-33	LED-	P	LED Cathode	
34-37	NC	-	Not connect	
38-40	LED+	P	LED Anode	

I: input; O: output; P: Power or Ground(0V).

3. Operation Specifications

3.1. Typical Operation Conditions

Test condition: GND=0V, T_A=25 °C

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V _{DD}	3.0	3.3	3.6	V	
Input logic high voltage	V _{IH}	0.8 V _{DD}	-	V _{DD}	V	
Input logic low voltage	V _{IL}	0		0.2 V _{DD}	V	

3.2. Current Consumption

Current for LED Driver

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_L	16.8	18.0	20.4	V	Note 1
Current for LED Backlight	I_L	-	120	-	mA	
LED life time	-	20,000	-	-	Hr	Note 2

Note1: $V_L=18.0V$, $I_L=120mA$ (Backlight circuit: 6 series connection, 6 parallel connection), the ambient temperature is $25^{\circ}C$.

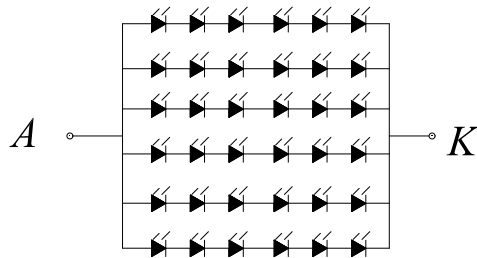
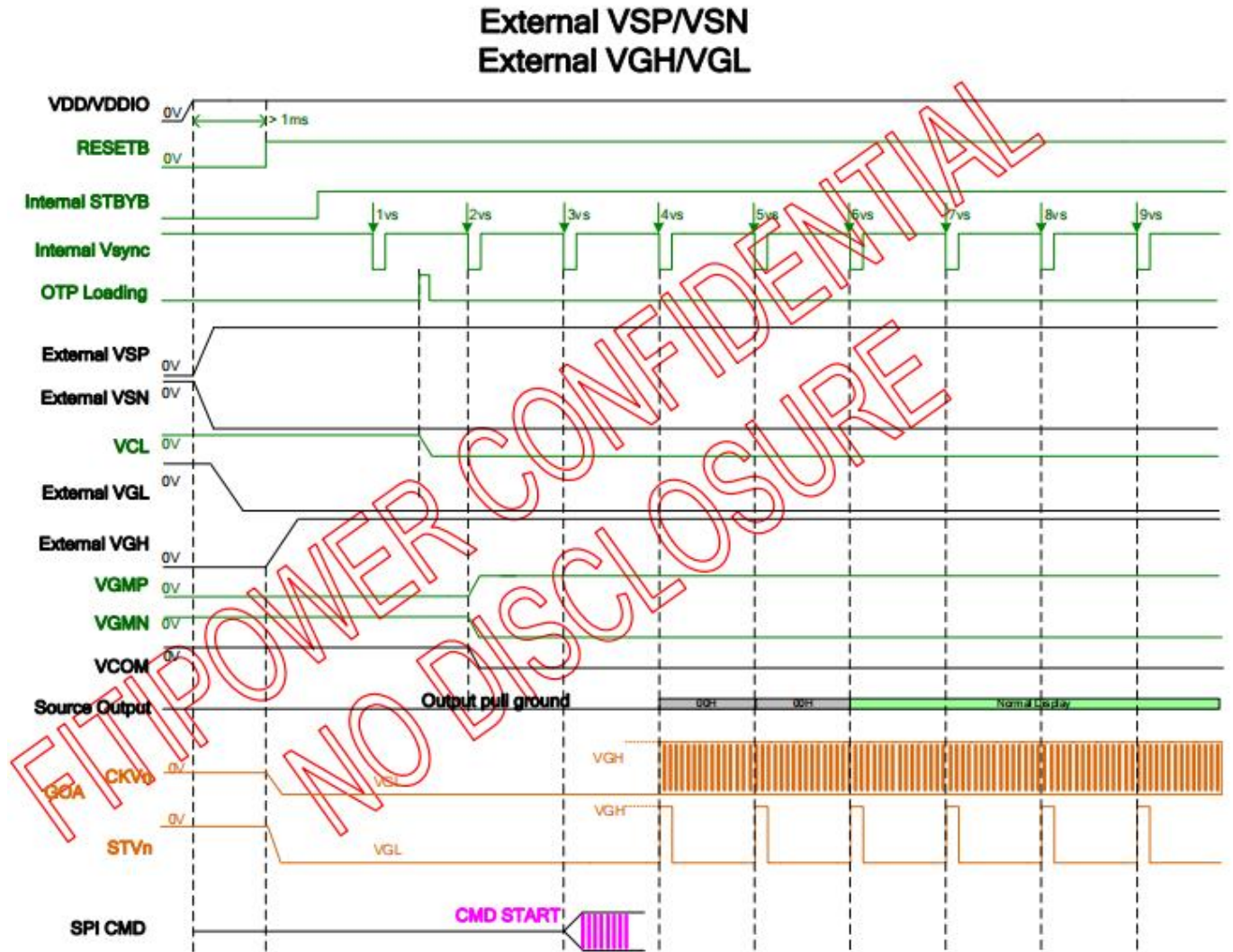


Fig. 3-1 LED test circuit diagram

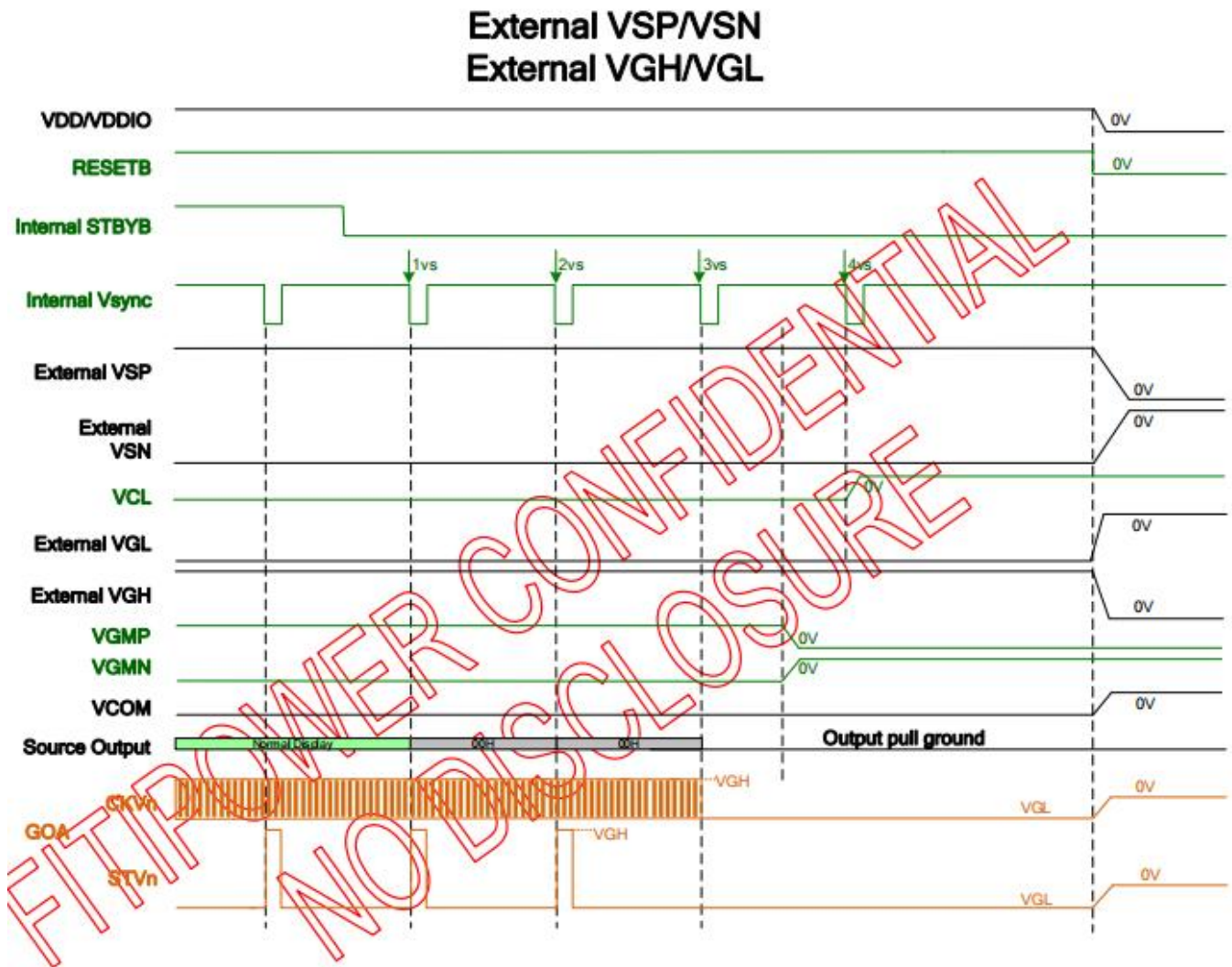
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at $T_a=25^{\circ}C$ and 1/2 rated current. The LED lifetime could be decreased if operating I_L is larger than 120 mA.

3.3. PowerSequence

Power on:



Power off:

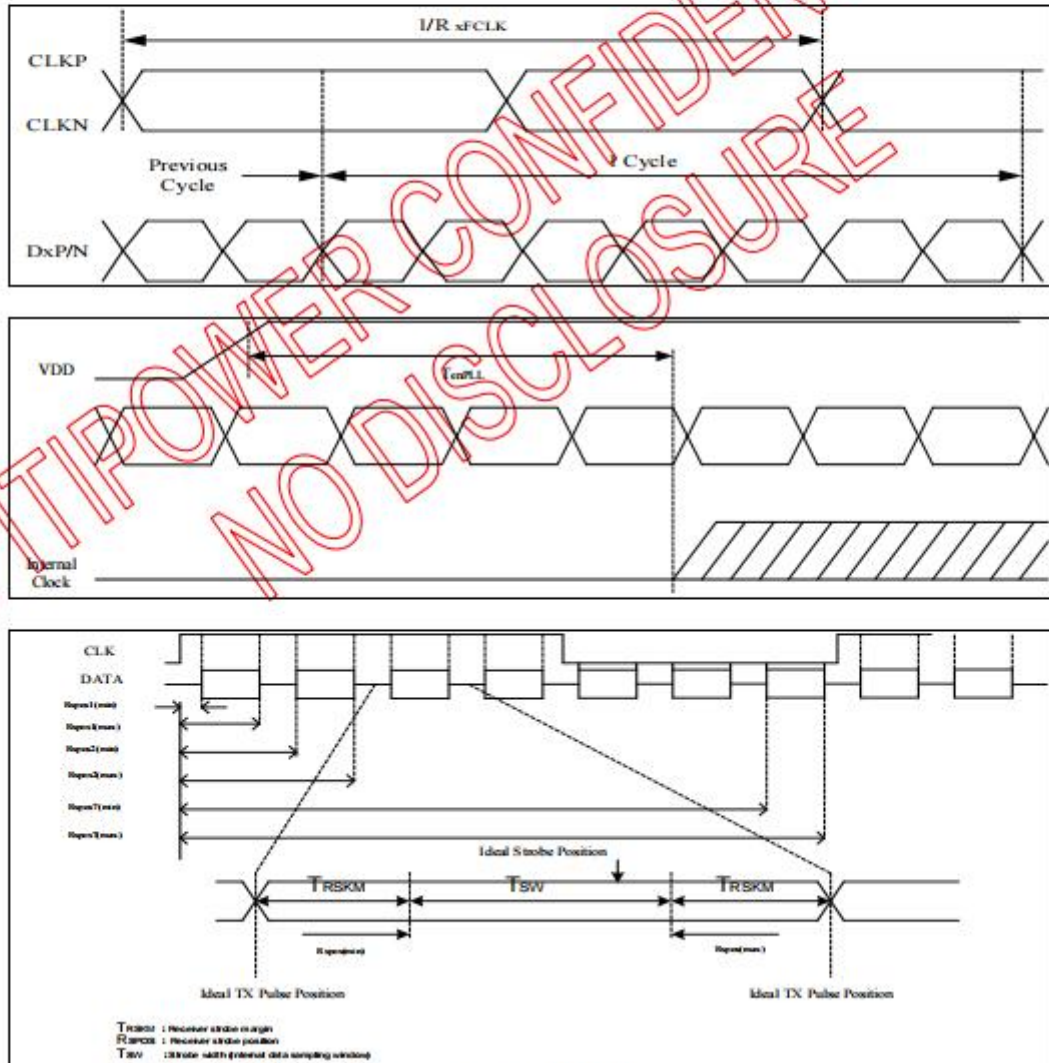


3.4. Signal Timing Characteristics

3.4.1. AC Electrical Characteristics

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	R_{xFCLK}	30	-	TBD	MHz	Refer to input timing table for each display resolution
Input data skew margin	T_{RSKM}	500	-	-	ps	$ VID = 200mV$ $RxVCM = 1.2V$ $RxFCLK = 81MHz$
Clock high time	T_{LVCH}	-	$4/(7 * R_{xFCLK})$	-	ns	
Clock low time	T_{LVCL}	-	$3/(7 * R_{xFCLK})$	-	ns	
PLL wake-up time	T_{enPLL}	-	-	150	us	

Table 13.1: LVDS mode AC electrical characteristics



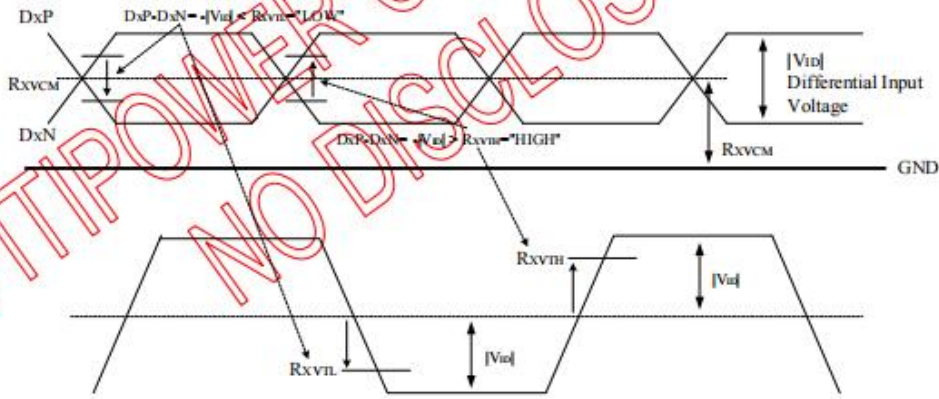
3.4.2. DC Electrical Characteristics

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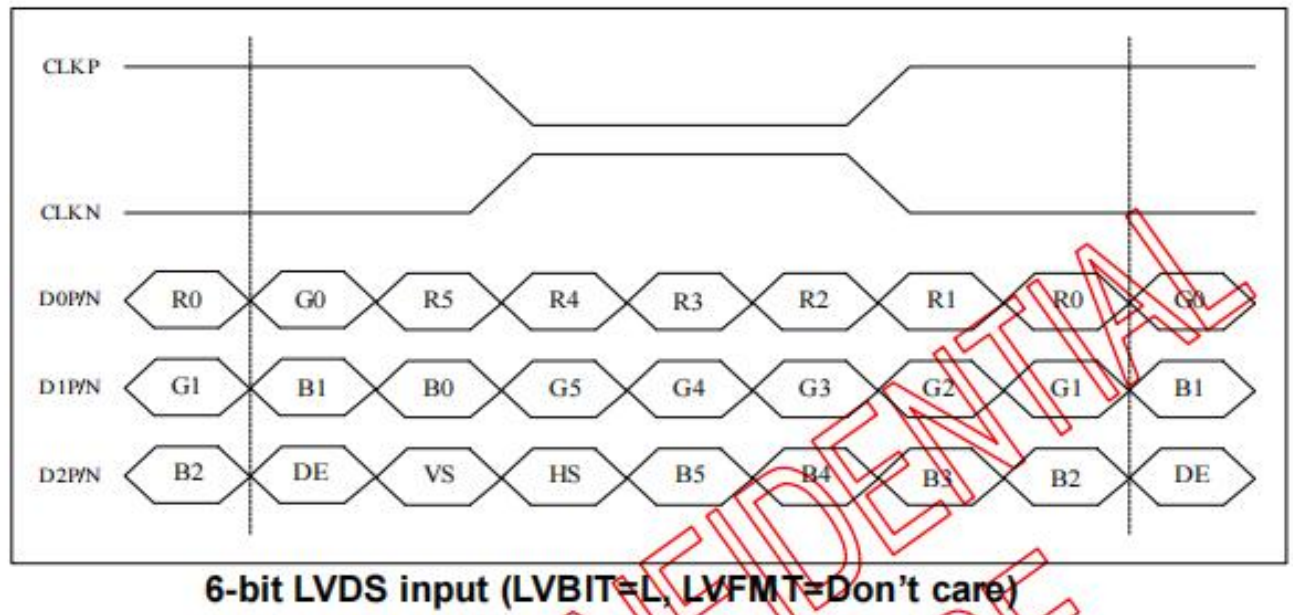
(VDD=VDDIO=VDDIF=2.3 to 3.6V, VSS=VSSA=VSS_IF=0V, TA=-20 to +85°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	R_{XVTH}	+0.1	0.2	0.3	V	$R_{XVCM}=1.2V$
Differential input low threshold voltage	R_{XVTL}	-0.3	-0.2	-0.1	V	
Input voltage range (singled-end)	R_{XVIN}	0.7	-	1.7	V	
Differential input common mode voltage	R_{XVCM}	1	1.2	1.4	V	$ V_{ID} =0.2$
Differential input impedance	Z_{ID}	80	100	125	ohm	
Differential input voltage	$ V_{ID} $	0.2	-	0.6	V	
Differential input leakage current	I_{LCLVDS}	-10	-	+10	uA	
LVDS Digital Operating Current	I_{VDDMPI}	-	15	20	mA	$F_{CLK}=80MHz$, VDD=3.3V, Input pattern: 55h->Aah->55h->Aah
LVDS Digital Stand-by Current	I_{STMPI}	-	-	250	uA	Clock & all Functions are stopped

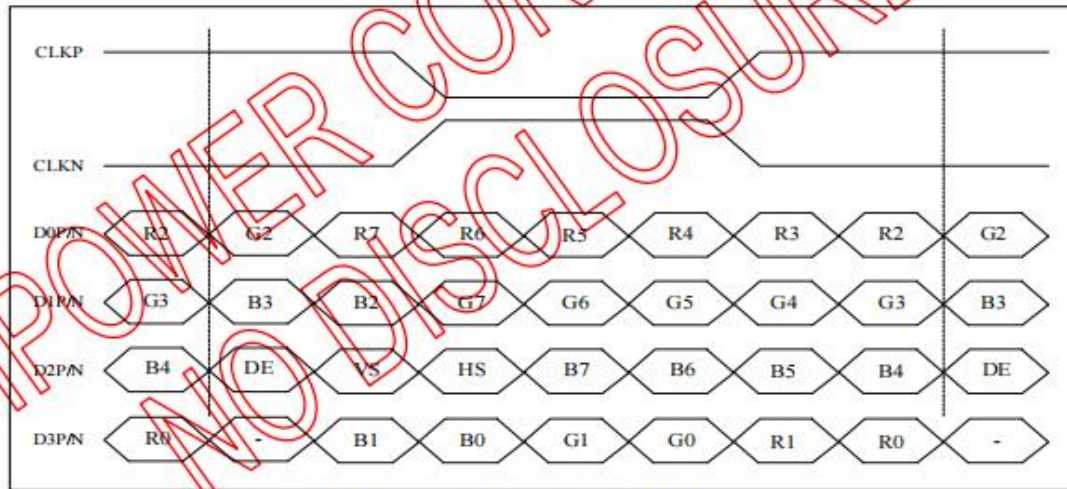
Single-end Signals



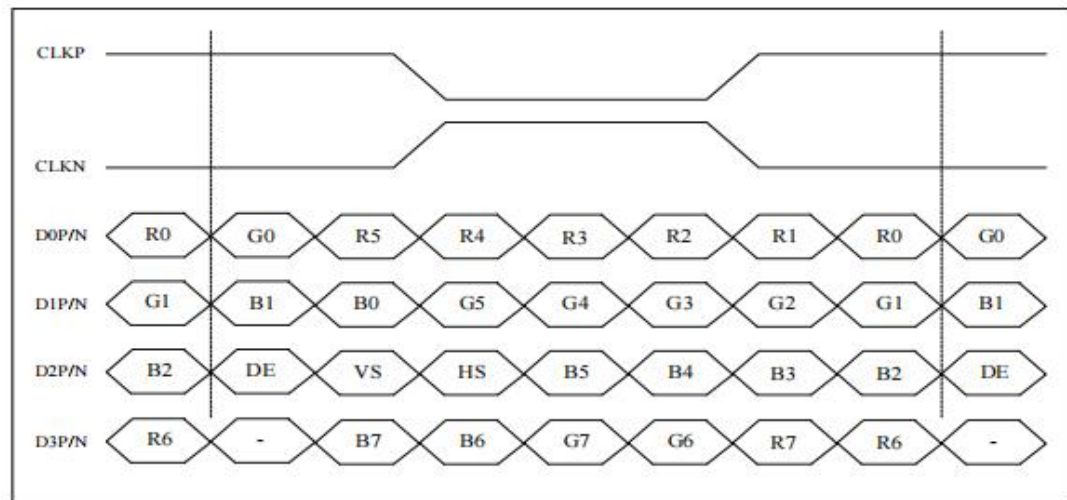
JIEDA format



VESA format



8-bit LVDS input (LVBIT=H, LVFMT=L)



8-bit LVDS input(LVBIT=H, LVFMT=H)

4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR \geq 10)	θ_L	$\Phi=180^\circ$ (9 o'clock)	70	80	-	degree	Note 1
	θ_R	$\Phi=0^\circ$ (3 o'clock)	70	80	-		
	θ_T	$\Phi=90^\circ$ (12 o'clock)	70	80	-		
	θ_B	$\Phi=270^\circ$ (6 o'clock)	70	80	-		
Response time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	10	15	msec	Note 3
	T_{OFF}		-	15	25	msec	Note 3
Contrast ratio	CR		800	1000	-	-	Note 4
Color chromaticity	W_X		-	0.290	-	-	Note 2 Note 5 Note 6
	W_Y		-	0.300	-	-	
NTSC			45	50	-	%	
Luminance	L		300	320	-	cd/m ²	Note 6
Luminance uniformity	Y_U		70	80	-		Note 7

The test systems refer to Note 2.

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Note 1: Definition of viewing angle range

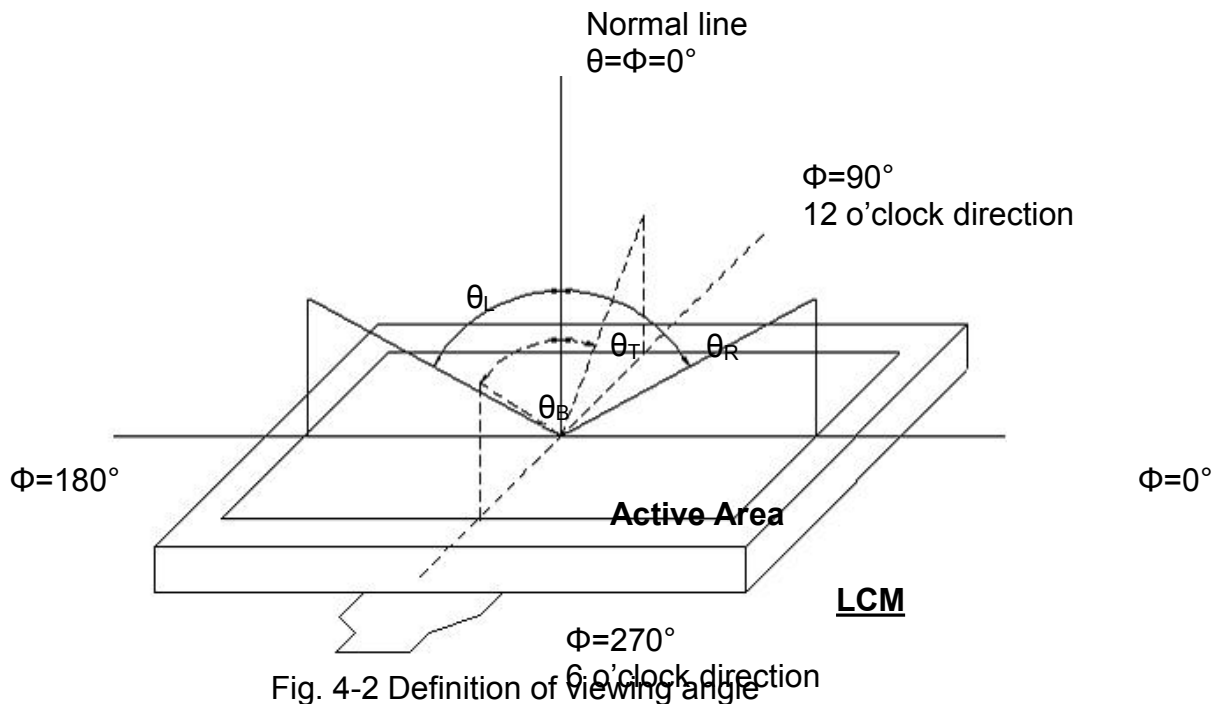


Fig. 4-2 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm, Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/ Field of view: 1° /Height: 500mm.) or CA-210.

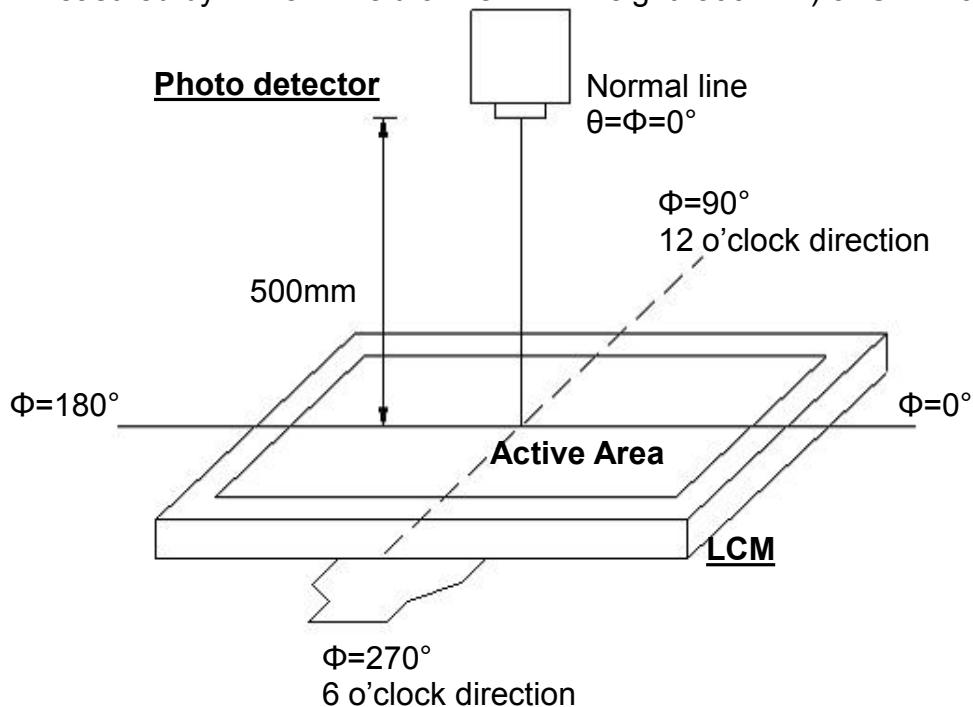


Fig. 4-3 Optical measurement system setup

Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between

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“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%.

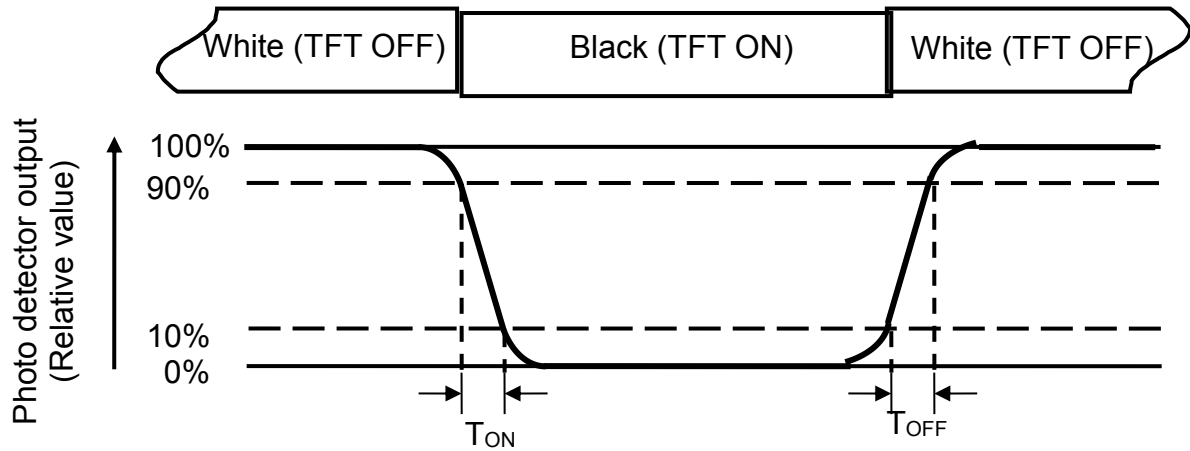


Fig. 4-4 Definition of response time

Note 4: Definition of contrast ratio

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

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is $I_L=120\text{mA}$.

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Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas(Refer to Fig. 4-4).

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

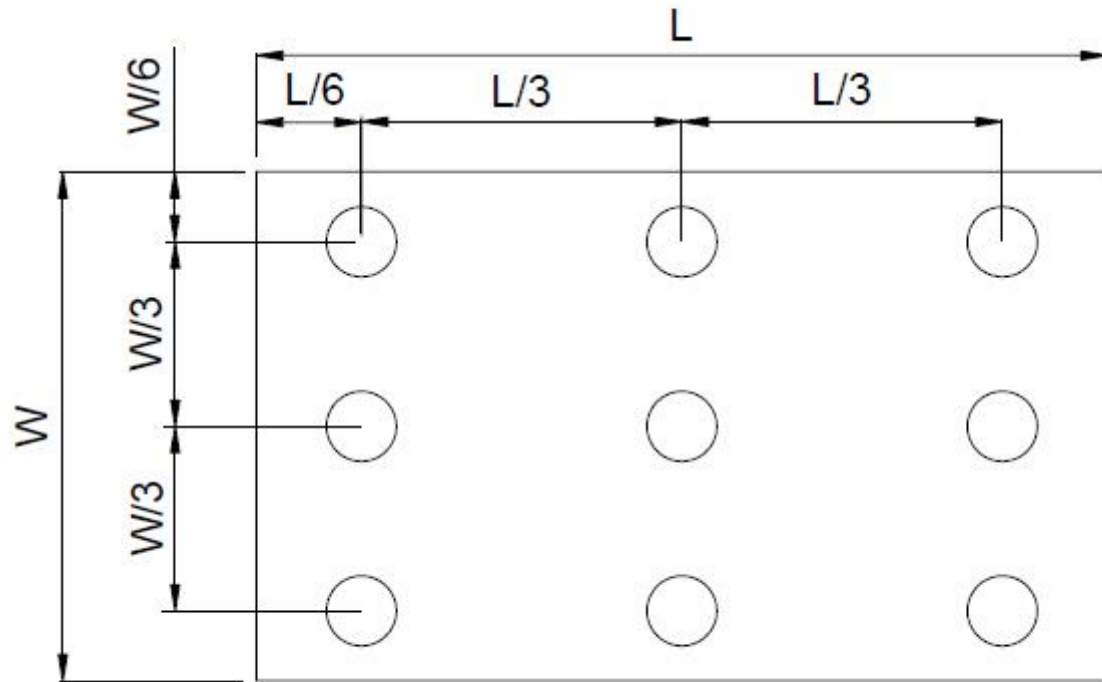


Fig. 4-4 Definition of measuring points

B_{MAX}: The measured maximum luminance of all measurement position.

B_{MIN}: The measured minimum luminance of all measurement position.

5. Reliability Test Items

Item	Test Conditions	Criterion
High Temperature Storage	Ta = 80℃ 96hrs	A,B,C,D,E
Low Temperature Storage	Ta = -40℃ 96hrs	A,B,C,D,E
High Temperature Operation	Ts = 70℃ 96hrs	A,B,C,D,E
Low Temperature Operation	Ta = -30℃ 96hrs	A,B,C,D,E
Operate at High Temperature and Humidity	+60℃, 90%RH 96hrs	A,B,C,D,E
Thermal Shock(non operation)	-10℃/30 min ~ +50℃/30 min for a total 30 cycles, Start with cold temperature and end with high temperature.	A,B,C,D,E
Vibration Test	Sweep:10Hz~55Hz~10Hz 2G 2 hours for each direction of X. Y. Z. (6 hours for total)	A,B,C,D,E
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)	A,B,C,D,E
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	A,B,C,D,E
Electro Static Discharge	Contact=+/-4KV, Air=+/-8KV,(R=330R,C=150pF), 1 sec,5point,10times/point;	A,B,C,D,E

※Criterion:

A.LCM each function is OK,.

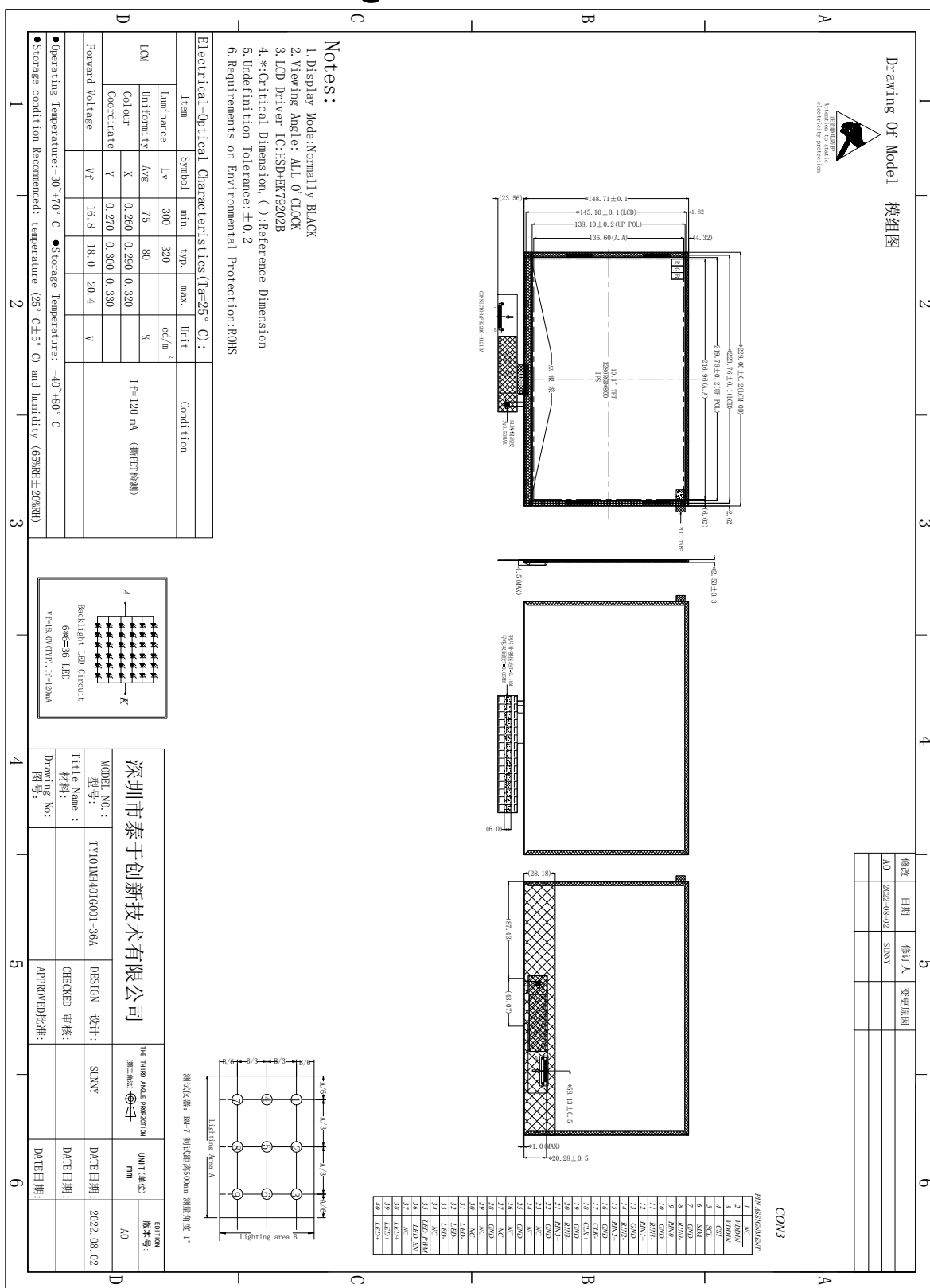
B.LCM appearance inspection without abnormalities (Including scratch, damage, corrosion and serious deformation)

C.LCM brightness above the Min. value of Spec.

D. Luminance uniformity above the Min. value of Spec.

E. Color chromaticity within tolerance range

6. Mechanical Drawing



7. Package Drawing

TBD

8. General Precautions

8.1. 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.

8.2. 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.

8.3. 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.

8.4. 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.

8.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.

2. Only use a soft cloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.