

PRODUCT SPECIFICATION

MODEL: HK070R1130B01

DESIGNED	CHECKED	APPROVED

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REVISION STATUS

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V1.0	2018.12.13	-	First Issued.	Jason

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1. GENERAL DESCRIPTION

1.1 DESCRIPTION

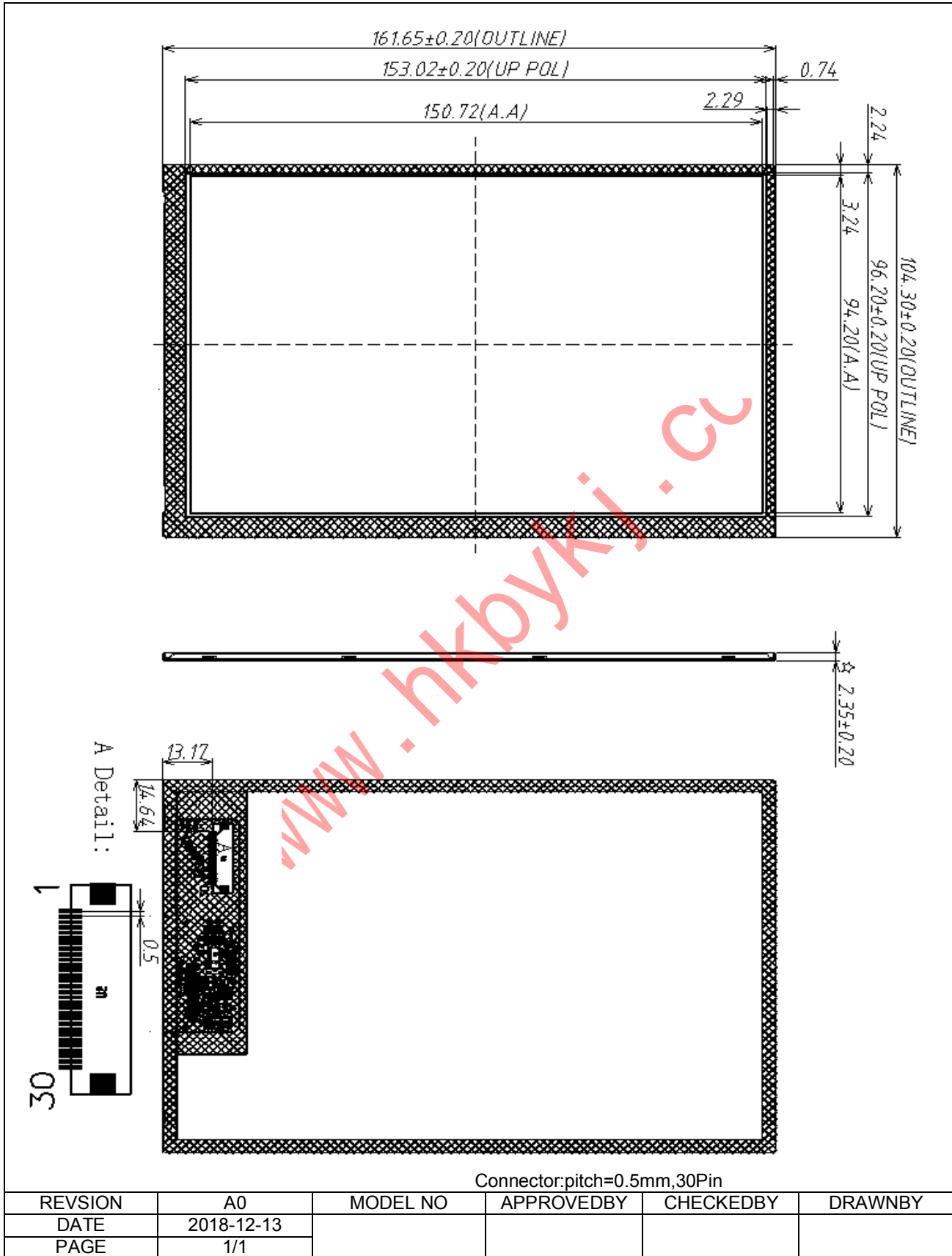
AINFULL Display model HK070R1130B01 is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, driver ICs and a backlight unit. The following table describes the features of this LCM.

1.2 FEATURES

No.	Item	Specification	Unit
1	Panel Size	7	inch
2	Number of Pixels	800 × 3(RGB) ×1280	pixels
3	Active Area	94.20(H) ×150.72(V)	mm
4	Pixel Pitch	0.11775(H) ×0.11775(V)	mm
5	Outline Dimension	104.30(H) × 161.65(V) × 2.35(D)	mm
6	Pixel arrangement	RGB Vertical stripe	-
7	Display Mode	IPS with Normally Black	-
8	Viewing Direction	ALL Viewing Direction	-
9	Display Color	16.7M	-
10	Surface Treatment	Anti-Glare and Hard-coating 3H	-
11	Interface	LVDS	-
12	Backlight	White LED	-
13	Drive IC	-	-
14	Operation Temperature	0~50	°C
15	Storage Temperature	-20~60	°C
16	Weight	97(Typ.)	g

2. MECHANICAL SPECIFICATION

Unit:mm



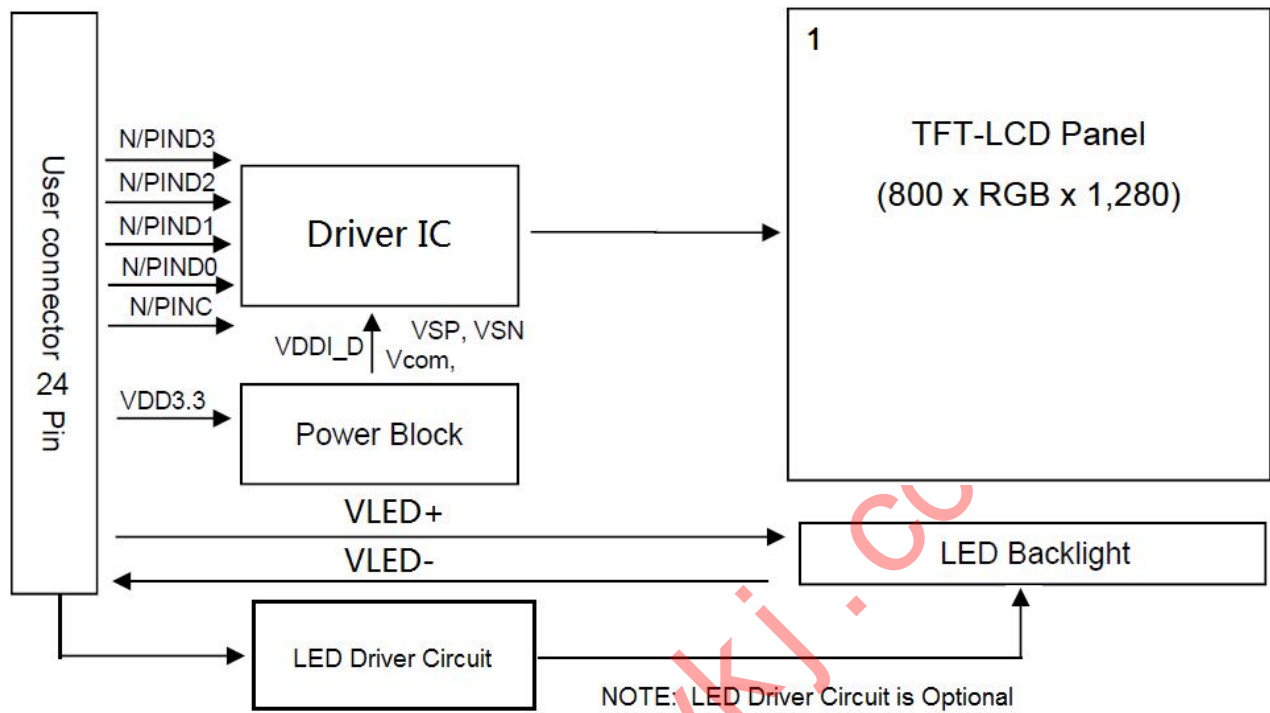
3. PIN DESCRIPTION

3.1 CN1 of FPC

Pin No.	Symbol	I/O	Function	Remark
1	VDD(3.3V)	P	Power supply VDD=3.3V	
2	VDD(3.3V)	P	Power supply VDD=3.3V	
3	LED_EN	I	Backlight Enable	
4	GND	P	Ground	
5	D0N	I	-LVDS differential data	
6	D0P	I	+LVDS differential data	
7	GND	P	Ground	
8	D1N	I	-LVDS differential data	
9	D1P	I	+LVDS differential data	
10	GND	P	Ground	
11	D2N	I	-LVDS differential data	
12	D2P	I	+LVDS differential data	
13	GND	P	Ground	
14	CLKN	I	-LVDS differential clock input	
15	CLKP	I	+LVDS differential clock input	
16	GND	P	Ground	
17	D3N	I	-LVDS differential data	
18	D3P	I	+LVDS differential data	
19	PWM	I	Pulse width Modulation for LED	
20	VLED	P	LED Driver Circuit Voltage(5~12V)	
21	GND	P	Ground	
22	NC	-	No connection	
23	NC	-	No connection	
24	NC	-	No connection	
25	NC	-	No connection	
26	GND	P	Ground	
27	NC(LED+)	-/P	No connection(LED+ is optional)	
28	NC(LED+)	-/P	No connection(LED+ is optional)	
29	NC(LED-)	-/P	No connection(LED- is optional)	
30	NC(LED-)	-/P	No connection(LED- is optional)	

Note1: I/O definition:I: input, O: output, P: Power, -:No connection

4. BLOCK DIAGRAM



5. ELECTRICAL CHARACTERISTICS

5.1 ABSOLUTE MAXIMUM RATINGS

AGND=GND=0V, Ta = 25 °C

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power input	VDD	-0.3	3.6	V	
VSP voltage	VSP	-0.3	6.5	V	
VSN voltage	VSN	-6.5	0.3	V	

5.2 RECOMMENDED OPERATING CONDITION

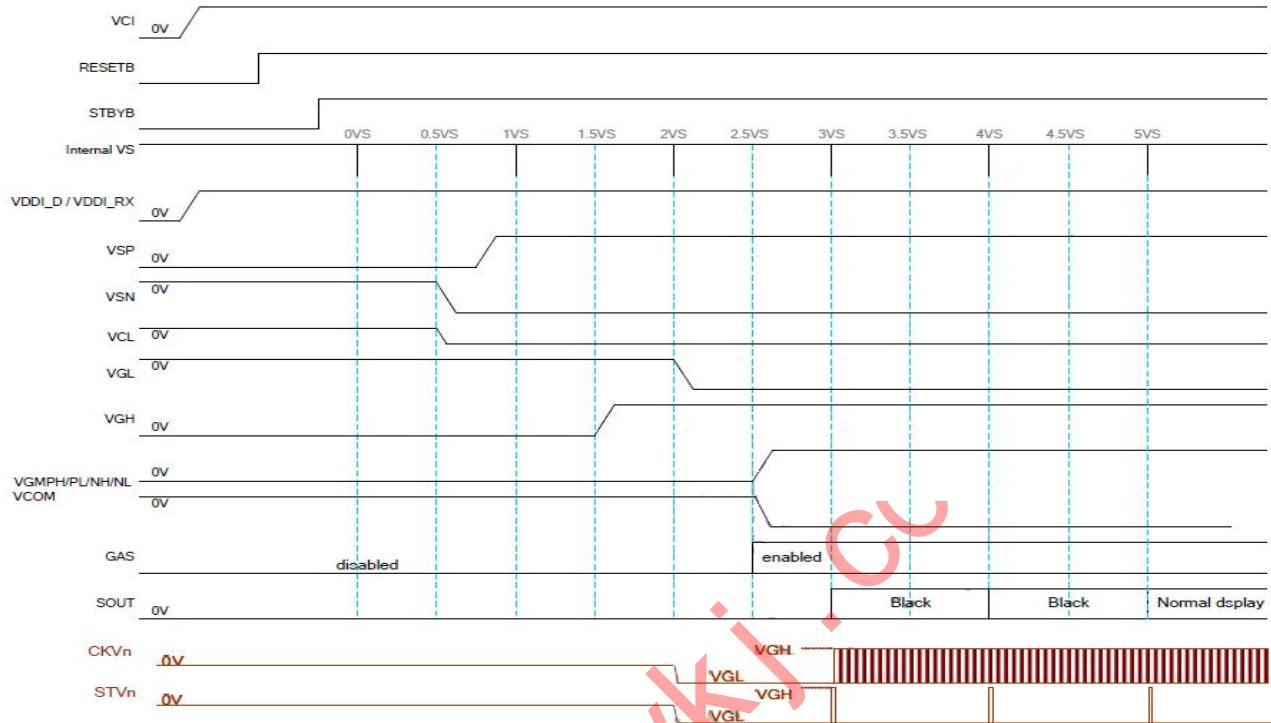
AGND=GND=0V, Ta = 25°C

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power input	VDD	2.6	3.3	3.6	V	
VSP voltage	VSP	4.5	-	6	V	
VSN voltage	VSN	-6	-	-4.5	V	
VLED voltage	VLED	5	-	12	V	

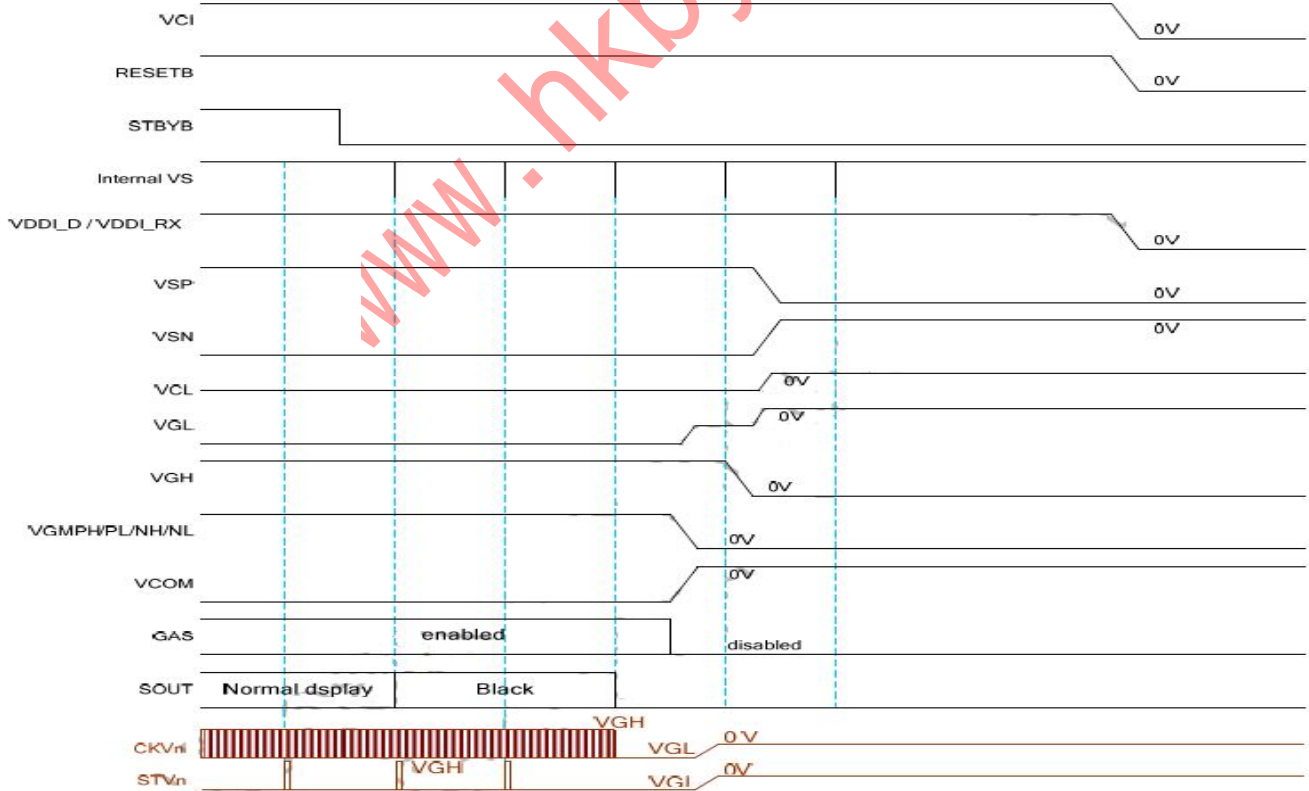
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5.3 POWER SEQUENCE

5.3.1 Power on sequence



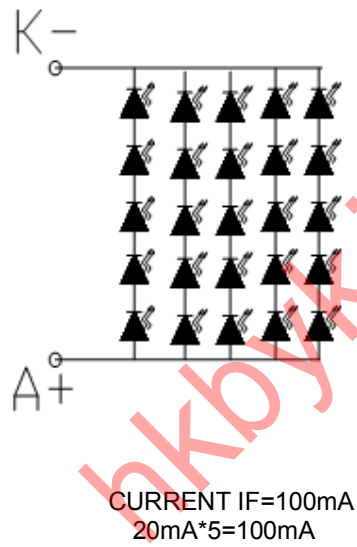
5.3.2 Power off sequence



5.4 BACKLIGHT UNIT

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Forward voltage	V _F	14.5	15	16	V	I _F =20mA/1-chip
Forward current	I _f	-	100	-	mA	

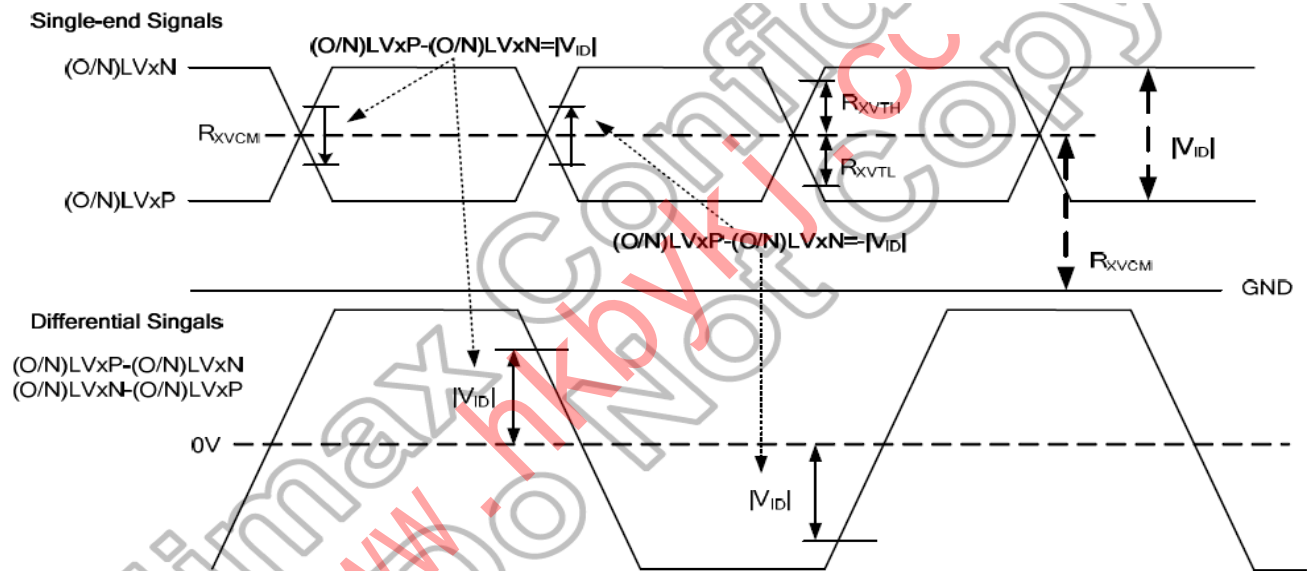
5.5.1 Internal Circuit Diagram



6. INPUT SIGNAL CHARACTERISTICS

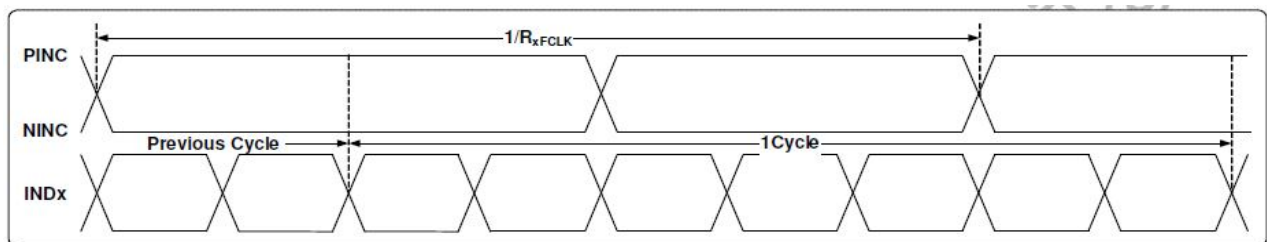
6.1. LVDS mode DC electrical characteristics

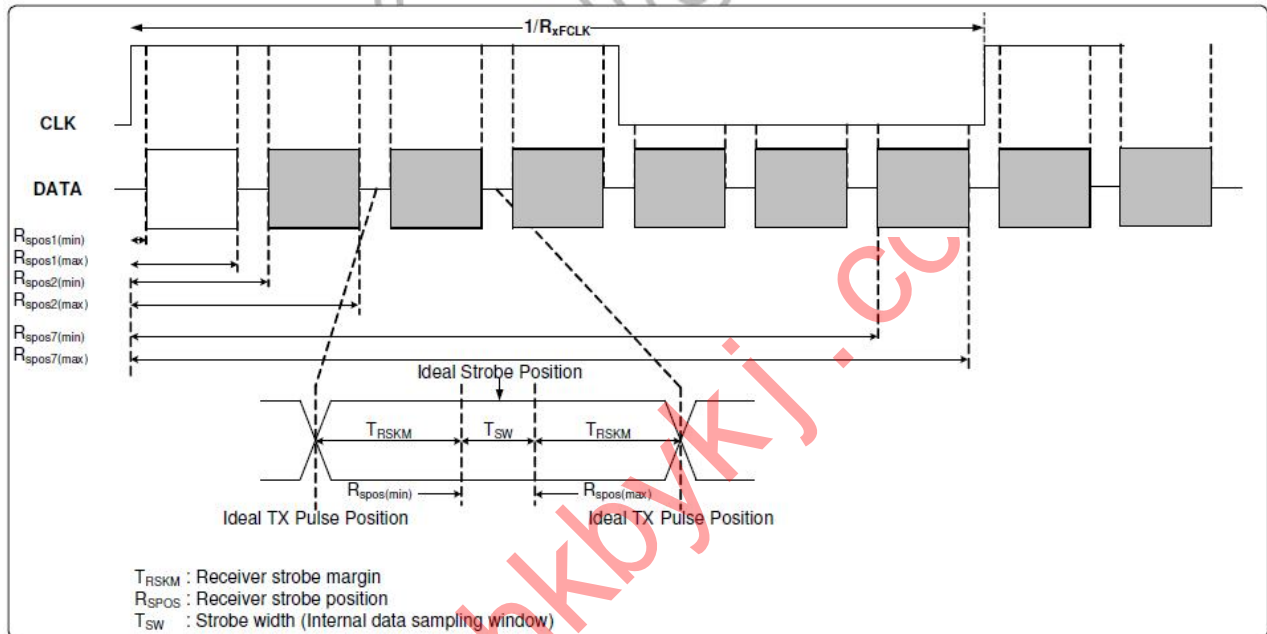
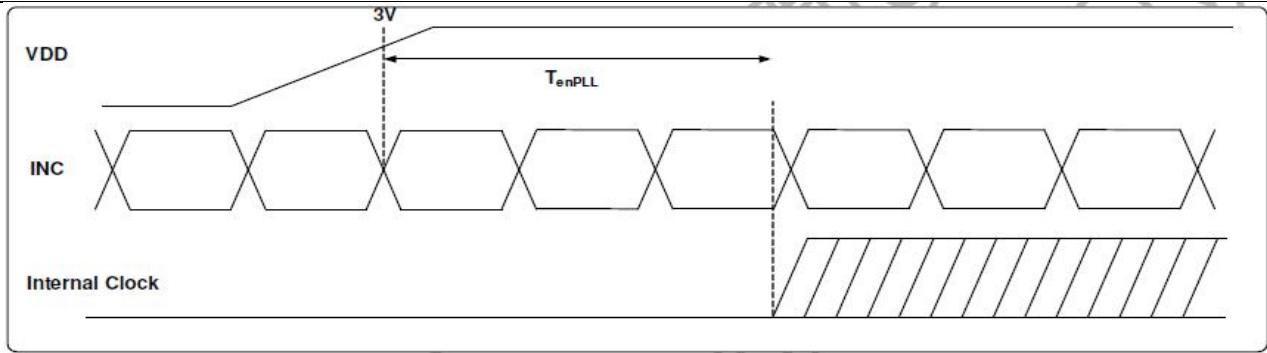
Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold	R_{XVTH}	+0.1	-		V	$R_{XVCM}=1.2V$
Differential input low threshold voltage	R_{XVTL}	-	-	-0.1	V	-
Input voltage range(singled-end)	R_{XVIN}	$0.7- V_{ID} /2$	-	$1.4+ V_{ID} /2$	V	-
Differential input common Mode voltage	R_{XVCM}	0.7	-	1.4	V	-
Differential input voltage	$ V_{ID} $	0.2		0.6	V	-
Differential input leakage current	R_{VxIz}	-10	-	+10	μA	-
LVDS digital operating current	I_{ddlvds}	-	15	30	mA	Fclk=65MHz VDD=3.3V
LVDS digital stand-by current	I_{stlvds}	-	10	50	μA	Clock & all Functions are stopped



6.2. LVDS mode AC electrical characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency	R_{XFCLK}	20	-	85	MHz	$R_{XVCM}=1.2V$
Input data skew margin	T_{RSKM}	500	-	-	ps	$ V_{ID} =400mV$ $R_{XVCM}=1.2V$ $R_{XFCLK}=71MHz$
Clock high time	T_{LVCH}	-	$4/(7 \cdot R_{XFCLK})$	-	ns	-
Clock low time	T_{LVCL}	-	$3/(7 \cdot R_{XFCLK})$	-	ns	-
PLL wake-up time	T_{RMPLL}	-	-	150	μs	-





Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Modulation frequency	SSC _{MF}	23	-	93	KHZ	RxVCM=1.2V
Modulation rate	SSC _{MR}	-	-	±3	%	LVDS clock=71MHz center spread

6.3 Reset Timing Characteristics

When RESETB of reset pin equals to Low, it will be in the condition of reset.

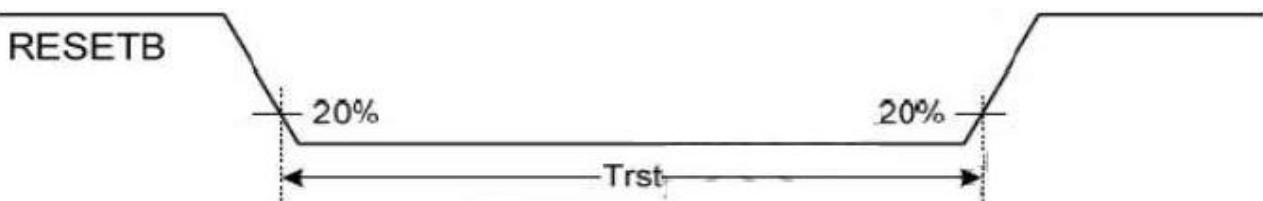
When it is in the condition of reset, it will make the device recover the initial set.

However, in order to avoid the reset noise cause reset, there is a mechanism to judge about whether the reset is needed or not.

The closed interval of Low can be shown as the following.

(VDDI_D=1.7V~1.9V, VSS=0V)

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Reset low pulse width	Trst	-	20	-	-	us



7. OPTICAL CHARACTERISTICS

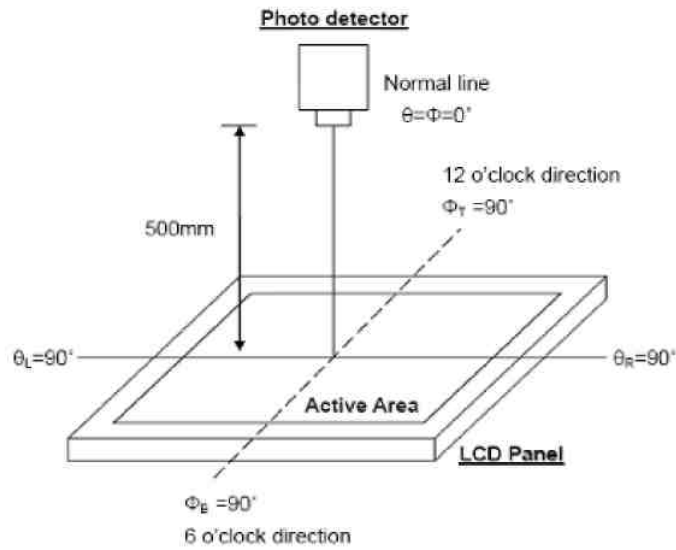
Light source :c-light(with normal polarizer)

Item	Symbol	Condition	Values			Unit	Remark	
			Min.	Typ.	Max.			
Viewing angle	Θ_U	$CR \cong 10$	80	85	-	degree	Note2	
	Θ_D		80	85	-			
	Θ_L		80	85	-			
	Θ_R		80	85	-			
Response time	$T_{ON}+T_{OFF}$	$\theta=\phi=0^\circ$ Normal viewing angle	-	25	50	ms	Note1 Note3	
Contrast ratio	CR		600	800	-	-	Note1 Note4	
Luminance	L		280	300	-	cd/m ²		
Luminance uniformity	YU		75	-	-	%		
Color chromaticity (CIE1931)	White		WX	0.266	0.296	0.326		Note1 Note5
			WY	0.292	0.322	0.352		
	Red	RX	-	-	-			
		RY	-	-	-			
	Green	GX	-	-	-			
		GY	-	-	-			
Blue	BX	-	-	-				
	BY	-	-	-				
NTSC				60%				

Test Conditions:

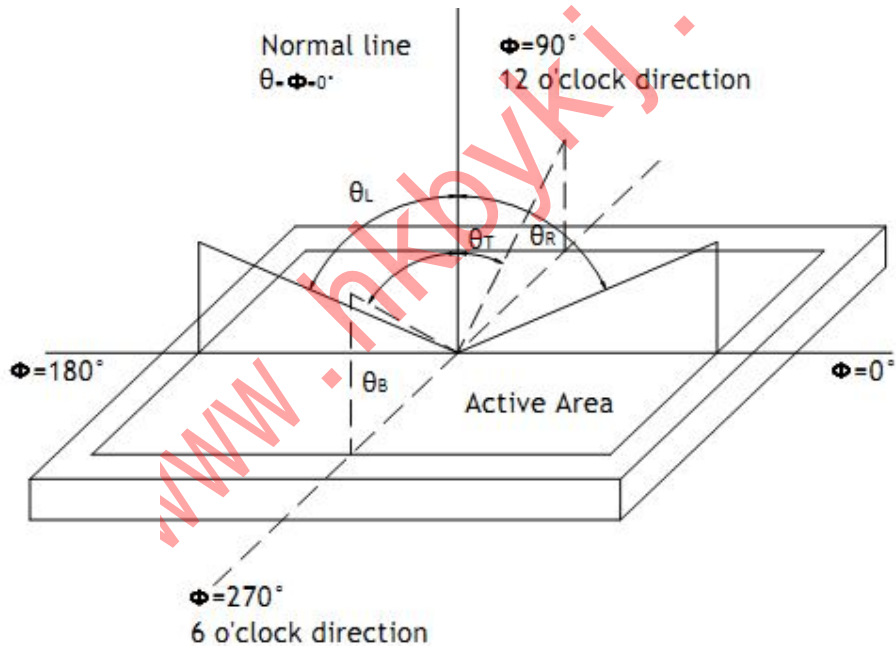
- 1.Measuring surrounding:dark room
- 2.The ambient temperature is $25\pm 2^\circ\text{C}$.
- 3.The test systems refer to Note1 and Note2.

Note1: Definition of optical measurement system



Note2: Definition of viewing angle range and measurement system

Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80).



Note3: 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%.

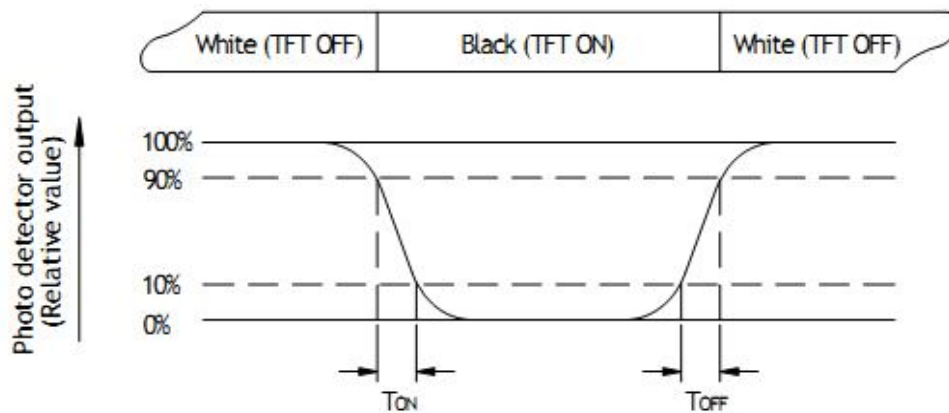


Fig. 6-3 Definition of response time

Note4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the Whitestate}}{\text{Luminance measured when LCD on the Blackstate}}$$

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

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

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

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note6: All input terminals LCD panel must be ground while measuring the center area of the panel.

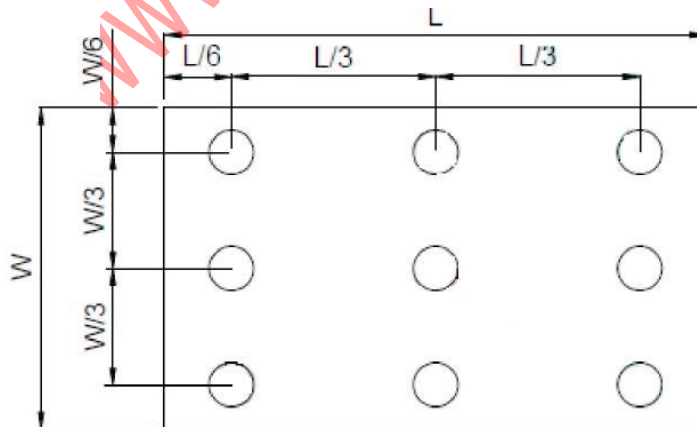
The LED driving condition is $I_L=20mA$ of which each LED module is 3 LED serial.

Note7: Definition of Luminance Uniformity

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

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

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



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

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

Note8: Definition of Luminance

Measure the luminance of white state at center point.

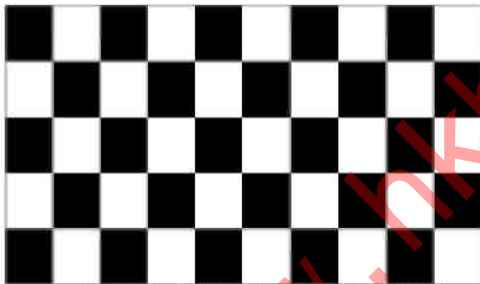
8. QUALITY ASSURANCE SYSTEM

8.1 TEMPERATURE AND HUMIDITY

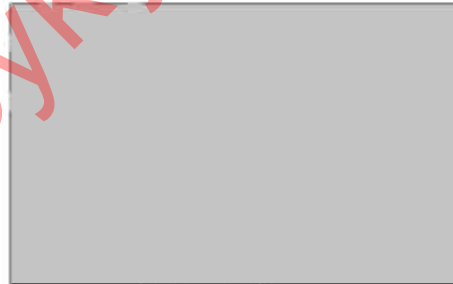
Test Item	Test Condition
High Temperature Storage	Ta=60°C; 240hrs
Low Temperature Storage	Ta=-20°C; 240hrs
High Temperature Operation	Ta=50°C ; 240hrs
Low Temperature Operation	Ta=0°C; 240hrs
High Temperature High Humidity Operation	Ta=50°C ; 90%RH ; 240hrs(no condensation)
Thermal Shock	-20°C(0.5hrs) ~ 60°C(0.5hrs) / 100 cycles
Image Sticking	25°C ; 2hrs Note1

Note1:Condition of image sticking test :25°C±2°C

Operation with test pattern sustained for 4hrs,then change to gray pattern immediately.after5 mins,the mura must be disappeared completely



(a) Test Pattern (chess board Pattern)



(b) Gray Pattern

8.2 VIBRATION & SHOCK

Test item	Conditions
Packing Shock (non-operation)	Shock level:980m/s ² Waveform:1/2 Sine wave,6msec ±X, ±Y ±Z,each axis 1 times
Packing Vibration (non-operation)	Frequency range:8 HZ~33.3HZ Stroke:1.0mm,sweep:10 HZ ~50 HZ x,y,z 2 hours for each direction

8.3 ESD

Test item	Conditions
Electro Static Discharge Test (non-operation)	150pF,330 Ω , Contact±4KV,Air : ±8KV Note 1
	200pF,0 Ω , ±200V Contact test.Note 2

Note1:LCD glass and metal bezel

Note2:IF connector pins

9. GENERAL PRECAUTION

9.1 SAFETY

- (1) Do not 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.

9.2 STORAGE CONDITIONS

- (1) Store the panel or module in a dark place where the temperature is $23\pm 5^{\circ}\text{C}$ and the humidity is below $50\pm 20\% \text{RH}$.
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.

9.3 HANDLING PRECAUTIONS

- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface.
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
- (6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.
- (9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
- (10) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur.
- (11) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

9.4 WARRANTY

- (1) The period is within twelve months since the date of shipping out under normal using and storage conditions.
- (2) Do not repaired or modified the LCM . It may cause function to lose efficacy , Starry does not warrant the LCM.
- (3) All process and material comply RoHS.

10. PACKAGE DRAWING

TBD

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