BOE MODEL NO :**JH123N00500**

1. GENERAL DESCRIPTION

1.1 DESCRIPTION

JH123N00500 is a transmissive type color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD module (TFT-LCD panel, driver IC and FPC), a back-light unit and. The resolution of 720*1920 pixels and can display up to 16.7M colors.

1.2 GENERAL INFORMATION

Items	Specification	Unit	Note
Display mode	Normally Black	-	-
LCM outline size	310.00(L) x 128.00(W) x 6.2(T)	mm	Note (1)(2)
Active area	109.512 (H) x 292.032 (V)	mm	-
Number of pixels	720*1920	pixels	-
Pixel arrangement	RGB stripe	-	-
Display color	16.7M	color	-
Viewing direction	ALL	-	-
Controller / Driver	HX83102E	-	-
Data interface	MIPI-4L	-	
Backlight	6 White LEDs In Series 8 Parallels	-	
Weight	TBD	g	

Notes:

(1) Touch panel and back-light unit are included.

(2) FPC no included. (Refer to the module outline dimension for further information). Please see module specification drawing in Page14 for more details.

2. ELECTRICAL CHARACTERISTICS

2.1 LCM DC CHARACTERISTICS

(Ta=25±2°C)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage 1		-		-	V	
Power Supply Voltage 2	IOVCC	-	1.8	-	V	
Power Supply Voltage 3	AVDD-	9	10.4	12	V	
Power Supply Voltage 4	-	-	-	-	V	
Power Supply Voltage 5	-	-	-	-	V	
Current Consumption	I_{DD}	-	40	-	mA	Normal mode
	$I_{DD-SLEEP}$		2		mA	Sleep mode
Input voltage “L” Level	V_{IL}	GND	-	0.3VDD1	V	DVDD=3.0~3.6
Input voltage “H” Level	V_{IH}	0.7VDD1	-	VDD1	V	
Output voltage “L” Level	V_{oL}	0	-	0.2VDD1	V	I_{OL}=1mA
Output voltage “H” Level	V_{oH}	0.8VDD1	-	VDD1	V	I_{OH}=-1mA

2.2 BACK-LIGHT UNIT CHARACTERISTICS

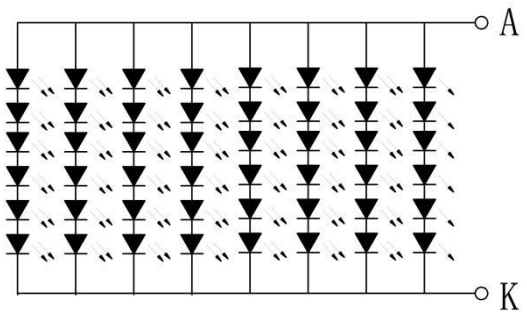
The back-light system is an edge-lighting type with48 white LEDs. The characteristics of the back-light are shown in the following tables.

(Ta=25±2°C)

Characteristics	Symbol	Condition	Min.	Type	Max.	Unit	Notes
Forward Voltage	Vf	I_L=170mA	-	18	-	V	-
LED life time	-	I_L=170mA	20,000	30,000	--	Hr	Note 1

Note:

(1) The “LED life time” is defined as the module brightness decrease to 50% of original brightness at I_L=170mA. The LED life time could be decreased if operating I_L is larger than 170mA.



Backlight circuit diagram shown in below:

3. OPTICAL CHARACTERISTICS

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room.

Measuring equipment: BM-5AS, BM-7, EZ-Contrast.

(Ta=25±2°C)

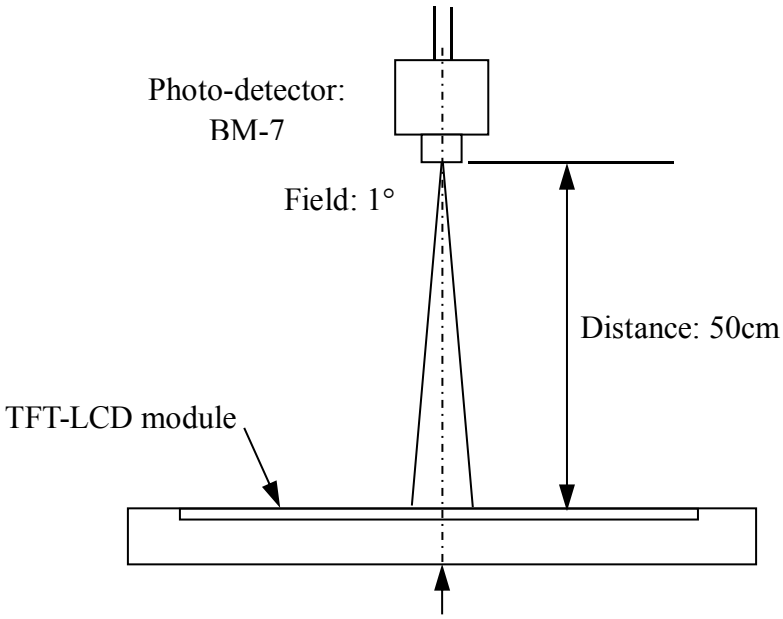
Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center point)		C/R	-	800	1200	-	-	BM-7 Note(2)
Luminance of white (Center point)		L_w	B/L on	-	**600**	-	cd/m^2	BM-7
Luminance uniformity		U_W	θ = 0. Normal viewing angle B/L On Note(1)	80	-	-	%	BM-7 Note(3)
Response Time		Tr + Tf		-	45	-	ms	BM-5AS Note(4)
Color Chromaticity (CIE 1931)	White	W_X		-0.02	0.295	+0.02	-	BM-7 Note(5)
		W_X		-0.02	0.314	+0.02		
	Red	R_X		-0.02	0.641	+0.02		
		R_Y		-0.02	0.323	+0.02		
	Green	G_X		-0.02	0.294	+0.02		
		G_y		-0.02	0.599	+0.02		
	Blue	B_X		-0.02	0.148	+0.02		
		B_Y		-0.02	0.067	+0.02		
Viewing Angle	Hor.	θ_L	C/R≥10	-	85	-	Deg	EZ Contrast Note(6)
		θ_R		-	85	-		
	Ver.	θ_u		-	85	-		
		θ_D		-	85	-		
Optima View Direction			ALL					Note(7)

* This condition will be changed by the evaluation circumstance. If product is exposed to high temperatures for extended time, there is a possibility of the polarizer film damage which could degrade the optical characteristics.

Notes:

(1) Test Equipment Setup: After stabilizing and leaving the panel alone at a given temperature for 30min, the measurement should be executed. Measurement should be executed in a stable,

windless, and dark room 30min after lighting the back-light. This should be measured in the center of screen.



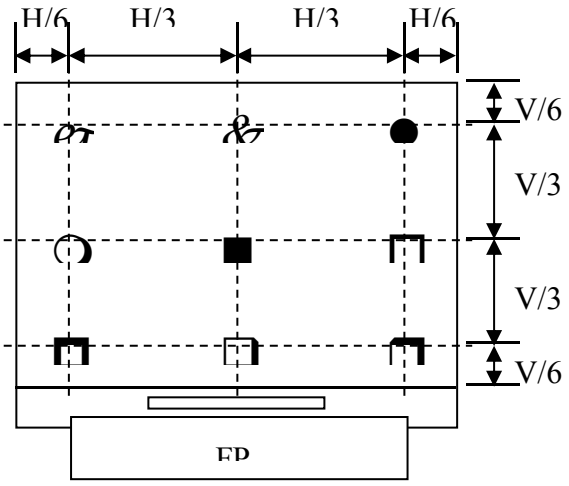
The Center of the screen

(2) Definition of Contrast Ratio (CR):

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance measured when LCD on the “white” state}}{\text{Luminance measured when LCD on the “black” state}}$$

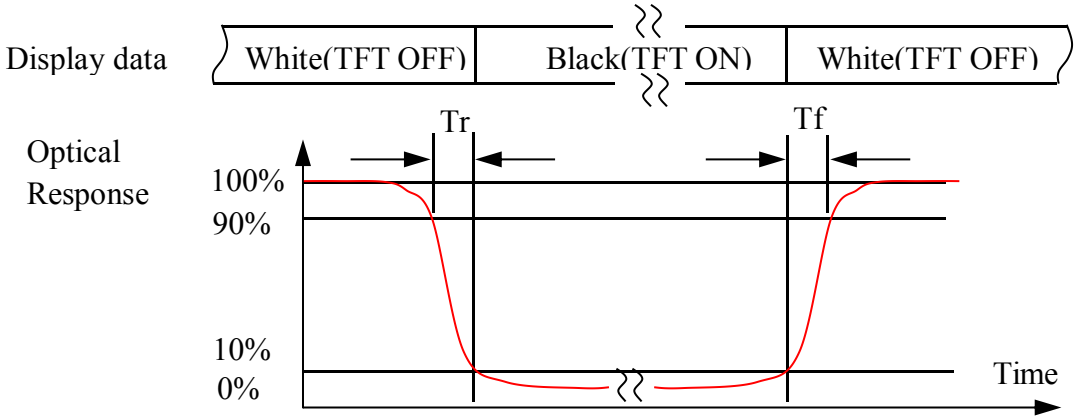
(3) Definition of Luminance Uniformity: Active area is divided into 9 measuring areas (Shown in below), every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity} = \frac{\text{Min Luminance of white among 9-points}}{\text{Max Luminance of white among 9-points}} \text{ x100\%}$$

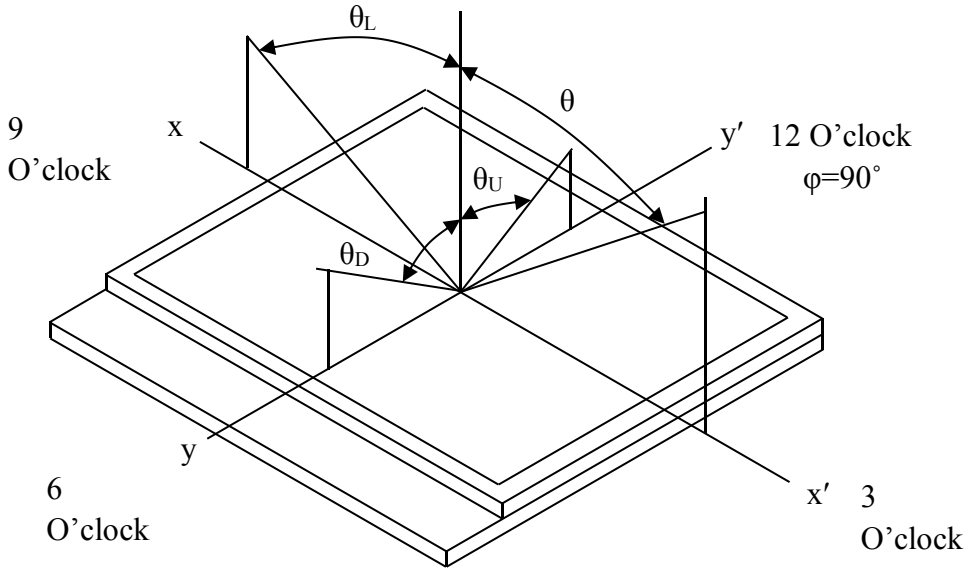


The spot locations for luminance measurement

(4) Definition of Response time: Sum of Tr and Tf.



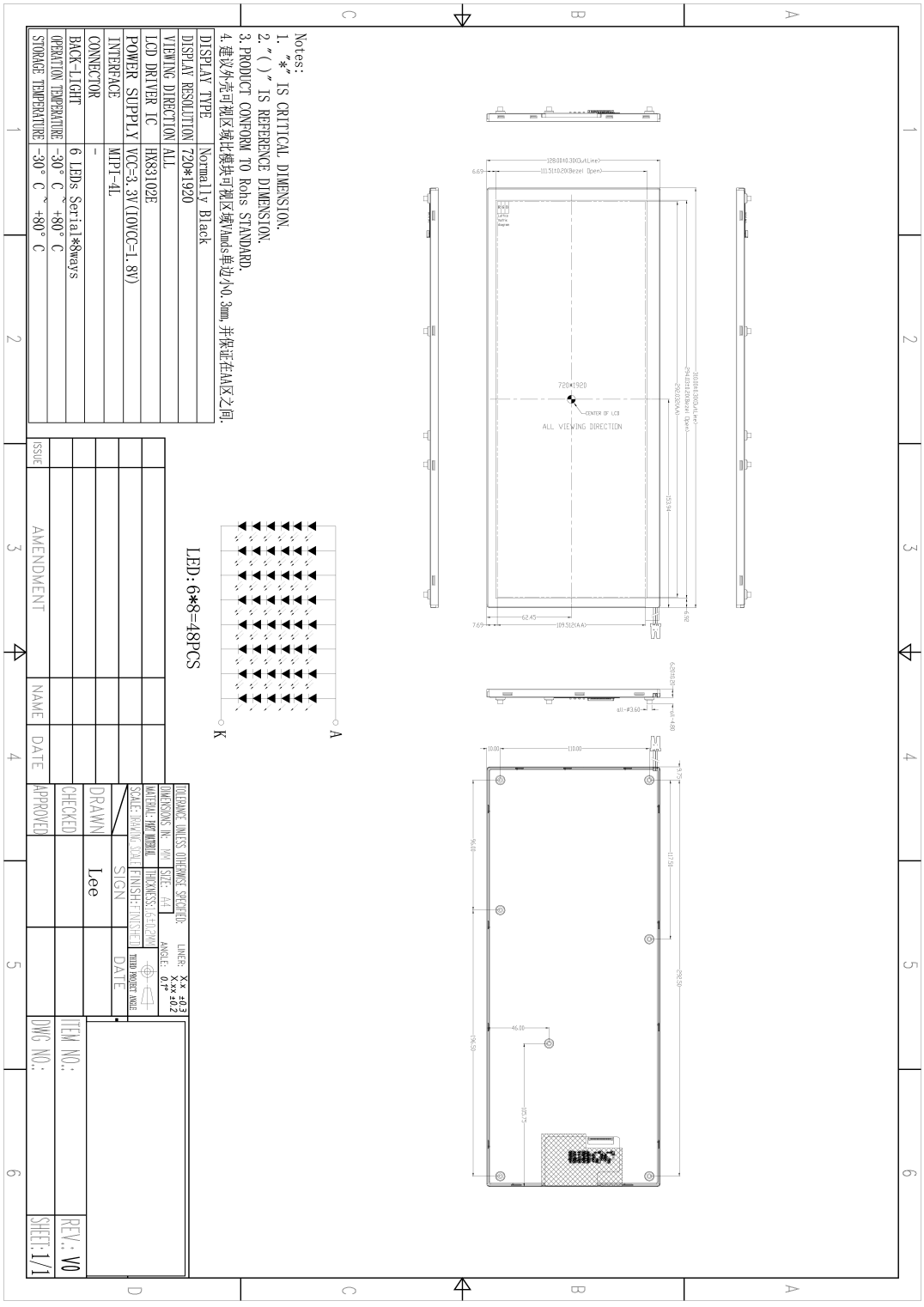
(5) Definition of Viewing Angle: The viewing angle range that the CR≥10.



(6) Definition of Color Chromaticity (CIE 1931)
Color coordinate of white & red, green, blue at center point.

(7) The different Rubbing Direction will cause the different optima view direction.

4. MODULE OUTLINE DIMENSION



5. MODULE INTERFACE DESCRIPTION

Terminal No.	Symbol	I/O	Function
1	NC	-	No Connection
2	IOVCC	P	Power supply for digital circuits
3	IOVCC	P	Power supply for digital circuits
4		P	
5	RESET	I	Device reset signa
6	NC	-	No Connection
7	GND	P	Ground
8	D0N	I/O	High speed interface data differential signal input/output pins.
9	D0P	I/O	High speed interface data differential signal input/output pins.
10	GND	P	Ground
11	D1N	I	High speed interface data differential signal input pins
12	D1P	I	High speed interface data differential signal input pins
13	GND	P	Ground
14	CLKN	I	High speed interface CLOCK differential signal input pins.
15	CLKP	I	High speed interface CLOCK differential signal input pins.
16	GND	P	Ground
17	D2N	I	High speed interface data differential signal input pins
18	D2P	I	High speed interface data differential signal input pins
19	GND	P	Ground
20	D3N	I	High speed interface data differential signal input pins
21	D3P	I	High speed interface data differential signal input pins
22	GND	P	Ground
23	NC	-	No Connection
24	AVDD	-	+9V-12V
25	NC	-	No Connection
26	NC	-	No Connection
27	NC	-	No Connection
28	NC	-	No Connection
29	NC	-	No Connection
30	GND	P	Ground

I/O: I: input, O: output, P: power

Remarks:

1) Mating Connector: 089K60-000100-G2-R (STARCONN)

2) UPDN and SHLR control function

6. REFERENCE APPLICATION CIRCUIT

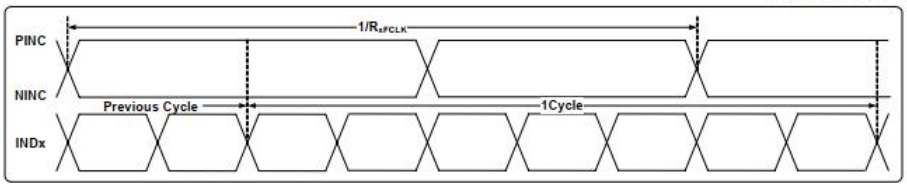
Please consult our technical department for detail information.

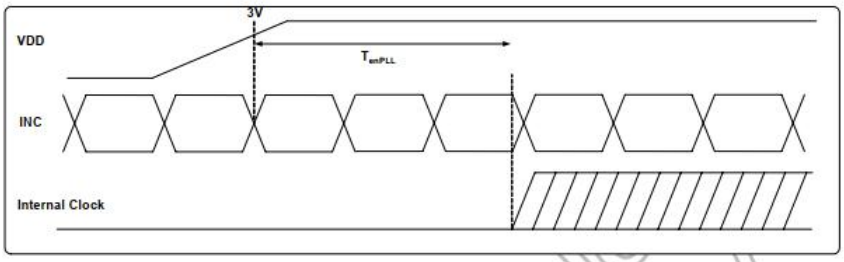
7. TIMINGS FOR MIPI Interface

7.1 Timing Waveform

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	R_{XFCLK}	20	-	71	MHz	-
Input data skew margin	T_{RSKM}	500	-	-	pS	$\lvert V_{ID} \rvert$=400mV R_{XVCM}=1.2V R_{XFCLK}=71MHz
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_{emPLL}	-	-	150	µs	-

Table 10.2: LVDS mode AC electrical characteristics





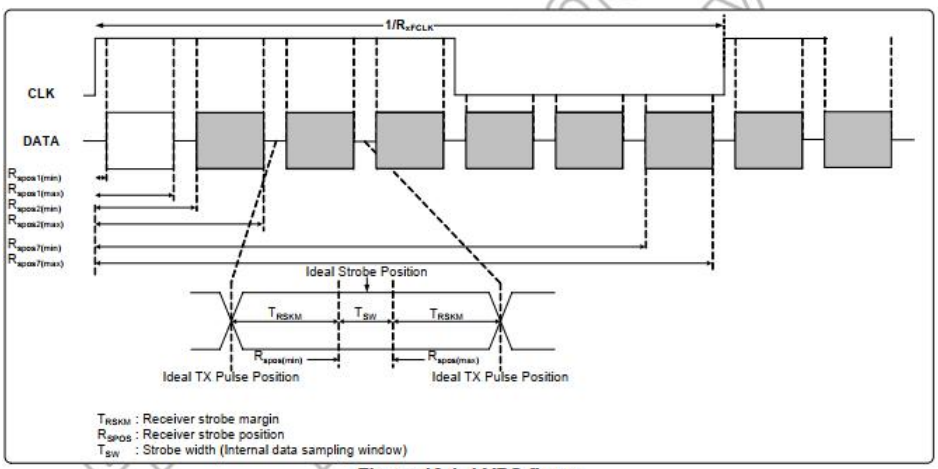


Figure 10.1: LVDS figure

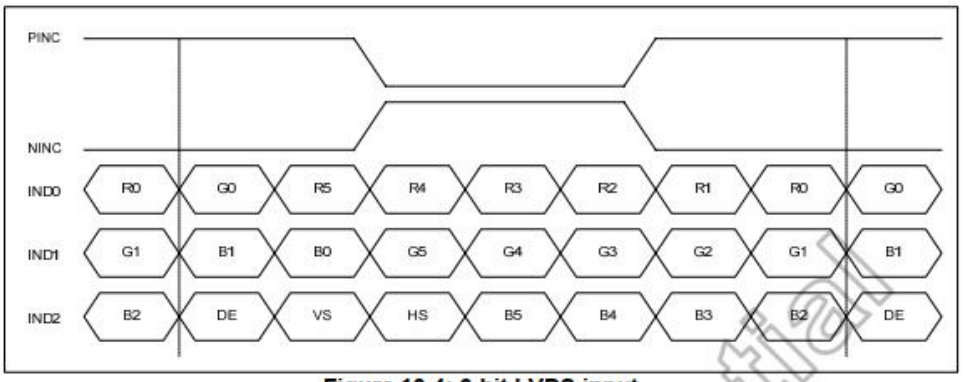


Figure 10.4: 6-bit LVDS input

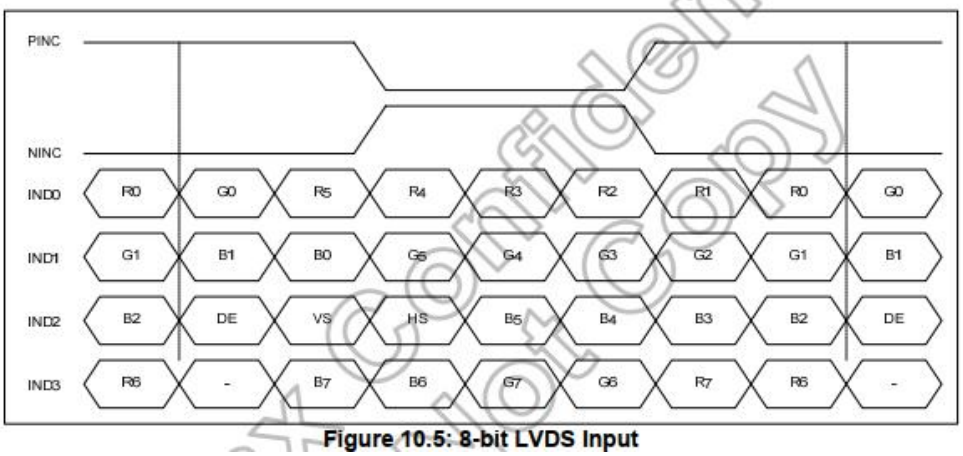


Figure 10.5: 8-bit LVDS Input

7.2 Power on/off

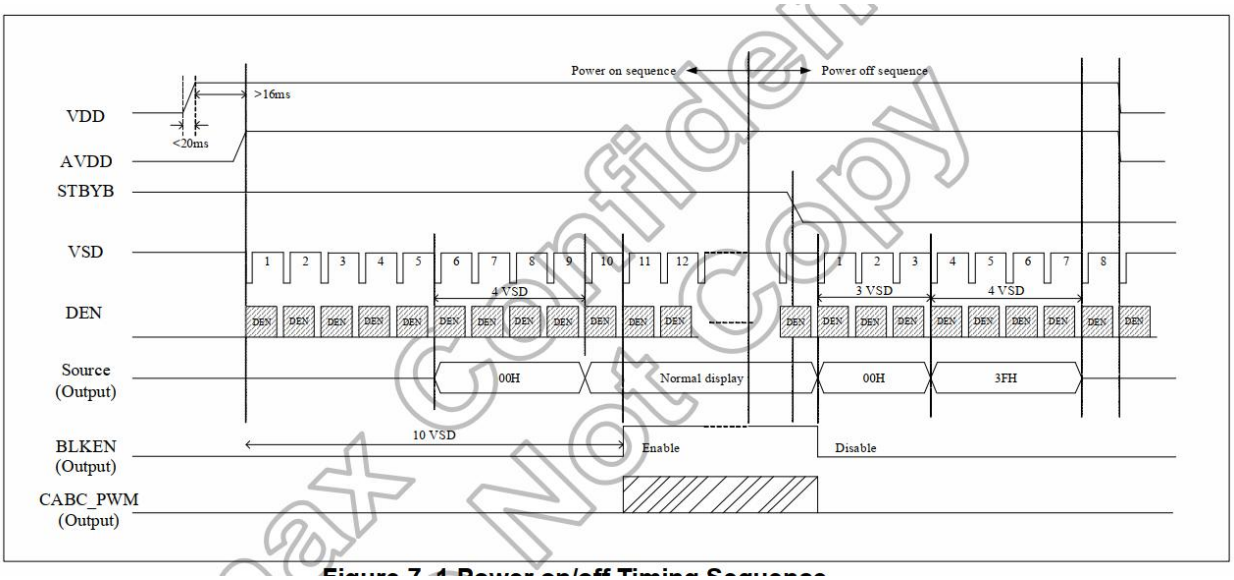


Figure 7-4 Power on/off Timing Sequence

8. RELIABILITY TEST CONDITIONS

No.	Test Item	Test Condition	Notes
1	High Temperature Storage	+80°C / 120H	Inspection after 2~4h storage at room temperature, the sample shall be free from defects: 1. Air bubble in the LCD; 2. Seal leak; 3. Non-display; 4. Missing segments; 5.Glass crack; 6. The surface shall be free from damage. 7. The electrical characteristics requirements shall be satisfied.
2	Low Temperature Storage	-30°C / 120H	
3	High Temperature Operating	+80°C / 120H	
4	Low Temperature Operating	-30°C / 120H	
5	Temperature Cycle	0±2°C∆25°C∆+50±2°C x 10cycles (30min) (5min) (30min)	
6	High Temperature /Humidity storage	50+5°C x 90%RH / 120H	
7	Vibration Test	Frequency: 10Hz~55Hz~10Hz Amplitude:1.5mm, 2 hours for each direction of X, Y, Z	
8	Packing Drop Test	Drop to the ground from 1m height, 1 corner, 3 edges, 6 surfaces.	
9	ESD test	Voltage:±8KV R: 330Ω C: 150pF Air discharge, 10time	
10	Image Sticking	25℃±2℃ Operation with test pattern sustained for 1 hrs(10x5). Change to gray pattern immediately. after 5 mins,the mura must be disappeared completely 。	

Remarks:

(1) The test samples should be applied to only one test item.

(2) Sample size for each test item is 5~10pcs.

(3) For High Temperature/Humidity storage test, pure water (resistance>10MΩ) should be used.

(4) In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.

(5) Failure judgment criterion: basic specification, electrical characteristic, mechanical characteristic, optical characteristic.

9. PACKING SPECIFICATION