PRODUCT SPECIFICATION

KADI Model: KD121HXG11HD

CUSTOMER Model: -

Description: 12.1 ” TFT-LCD Module

Version: 1.0

KADI	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE	2025.9.8	2025.9.8	2025.9.8

	SIGNATURE	DATE
CUSTOMER APPROVAL		

Record of Revisions

Version	Revise Date	Description	Page
1.0	2025-9-8	First Release	-

Contents

1. General Specifications

1.1 LCM General Information

Item	Specification	Unit
LCD Size	12.1	inch
Number of Pixels	1024 (H) RGB x 768 (V)	pixels
Display Mode	Normally Black	-
Viewing Direction	Free	-
Interface	LVDS	-
Display Colors	16.7M	colors
Outline Dimension	260.50 (H) x 204.00 (V) x 7.20 (D)	mm
Active Area	245.76 (H) x 184.32 (V)	mm
Pixel Pitch	0.24 (H) x 0.24 (V)	mm
Driver IC	JD9168S	-
Operation Temperature	-30~70	℃
Storage Temperature	-40~80	℃

Note1:Requirements on environmental protection RoHS compliant.

2. Absolute Maximum Ratings

Item	Symbol	MIN.	MAX.	Unit	Note
Analog Supply voltage	VCC	-0.3	3.6	V	Note 1

Note 1:Permanent damage may occur to the LCD module if beyond this specification.
Functional operation should be restricted to the conditions described under normal operating conditions.

3. Elecrical Characteristics

3.1 Recommended Operating Condition for TFT LCD

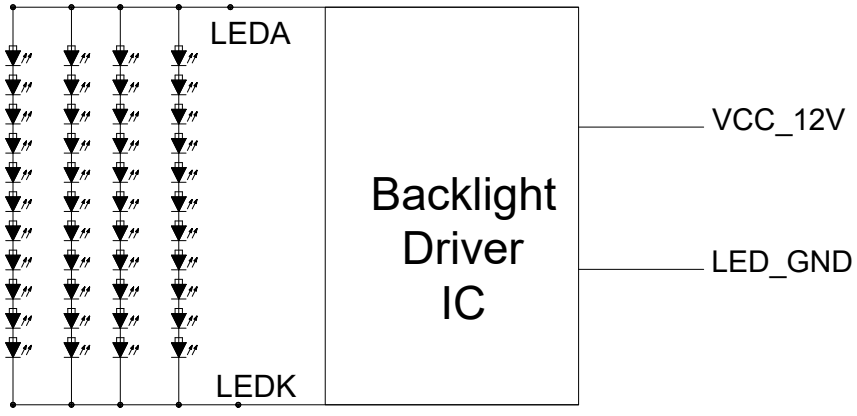
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	VCC	2.5	3.3	3.3	V	
Analog supply current	I_{VCC}	-	TBD	-	mA	VCC=3.3V
Logic input voltage	VIH	0.7*VCC	-	VCC	V	
	VIL	GND	-	0.3*VCC	V	

3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Driving Current	I_{BLU}	-	TBD	-	mA	@Vi = 12V (Duty 100%)
Driving Voltage	V_{BLU}	-	12	-	V	
Power consumption	W_{BLU}	-	TBD	-	W	@Vi = 12V (Duty 100%)
LED Life-Time	N/A	30,000	-	-	Hours	Ta=25℃ Note 1

Note 1:LED lifetime is defined as the module brightness decay 50% of original brightness at Ta=25 degree, typical current.

Note 2:LED circuit :



CIRCUIT DIAGRAM
VF =29.7~36.3V; IF=240mA

4. Interface Pin Assignment

4.1 CN1 Pin Assignment

No.	Symbol	Description
1	RX3+	Differential Data Input, CH3 (Positive)
2	RX3-	Differential Data Input, CH3 (Negative)
3	NC	NC
4	SEL68	LVDS 6/8 bit select function control, Low 6 bit Input Mode High 8bit Input Mode
5	GND	Ground
6	RXC+	Differential Clock Input (Positive)
7	RXC-	Differential Clock Input (Negative)
8	GND	Ground
9	RX2+	Differential Data Input , CH2 (Positive)
10	RX2-	Differential Data Input , CH2 (Negative)
11	GND	Ground
12	RX1+	Differential Data Input , CH1 (Positive)
13	RX1-	Differential Data Input, CH1 (Negative)
14	GND	Ground
15	RX0+	Differential Data Input, CH0 (Positive)
16	RX0-	Differential Data Input, CH0 (Negative)
17	re LR	Horizontal Reverse Scan Control, Low → Normal Mode. High → Horizontal Reverse Scan
18	re UD	Vertical Reverse Scan Control, Low → Normal Mode, High → Vertical Reverse Scan

19	VCC	Power supply
20	VCC	Power supply

4.2 CN2 Pin Assignment

No.	Symbol	Description
1	VBLU 12V	Converter input voltage
2	VBLU 12V	Converter input voltage
3	VBLU 12V	Converter input voltage
4	VBLU 12V	Converter input voltage
5	VGND	Converter ground
6	VGND	Converter ground
7	VGND	Converter ground
8	VGND	Converter ground
9	EN	Enable pin
10	ADJ	Backlight Adjust (PWM Dimming:100Hz-200Hz,.Hi:3.3V Lo: 0V)

5. Interface Characteristics

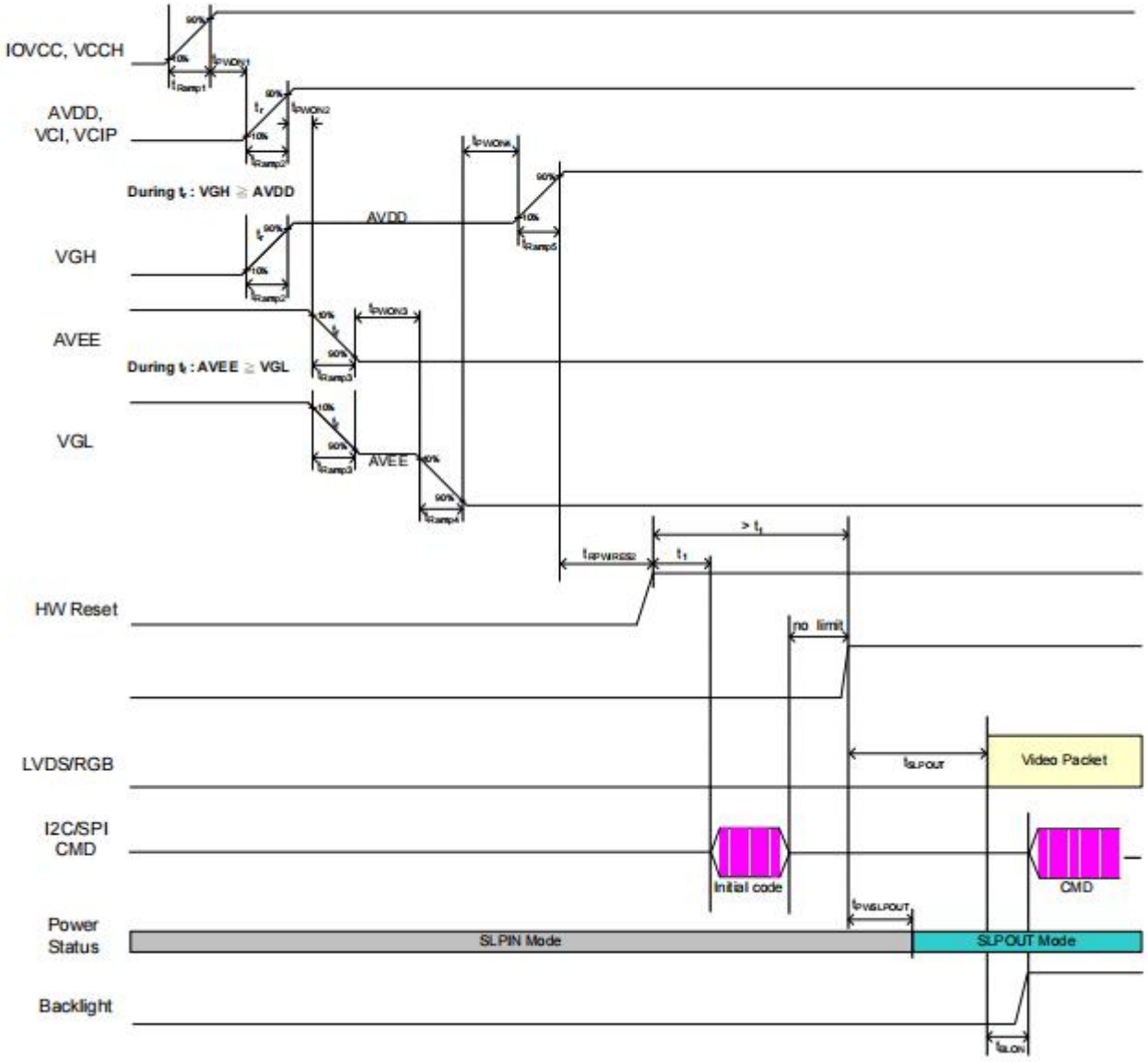
5.1 Power Sequence

Power on sequence

The power on sequence timing for different power input modes and interfaces are shown as below table.

Symbol	Value			Unit	Remark
	Min	Typ	Max		
t_{PWON1}	0	5	-	ms	
t_{PWON2}	0	5	-	ms	
t_{PWON3}	0	5		ms	
t_{PWON4}	0	5		ms	
t_{ramp1}	0.2	-	20	ms	IOVCC, VCCH
t_{ramp2}	0.2	-	20	ms	VCI, VCIP, AVDD
t_{ramp3}	0.2	-	20	ms	AVEE
t_{ramp4}	0.2	-	-	ms	VGL
t_{ramp5}	0.2	-	-	ms	VGH
$t_{RPWIRES1}$	10	-	-	ms	
$t_{RPWIRES2}$	1	-	-	ms	
t_{MIPI_LP11}	-	-	$t_{RPWIRES1}$	ms	
t_{RESETL}	20	-	-	μs	
t_1	5	-	-	ms	
t_{SLPOUT}	120	-	-	ms	
$t_{PWSLPOUT}$	-	45	-	ms	
t_{BLON}	2	-	-	VS	

5 power mode power on sequence – LVDS, RGB:

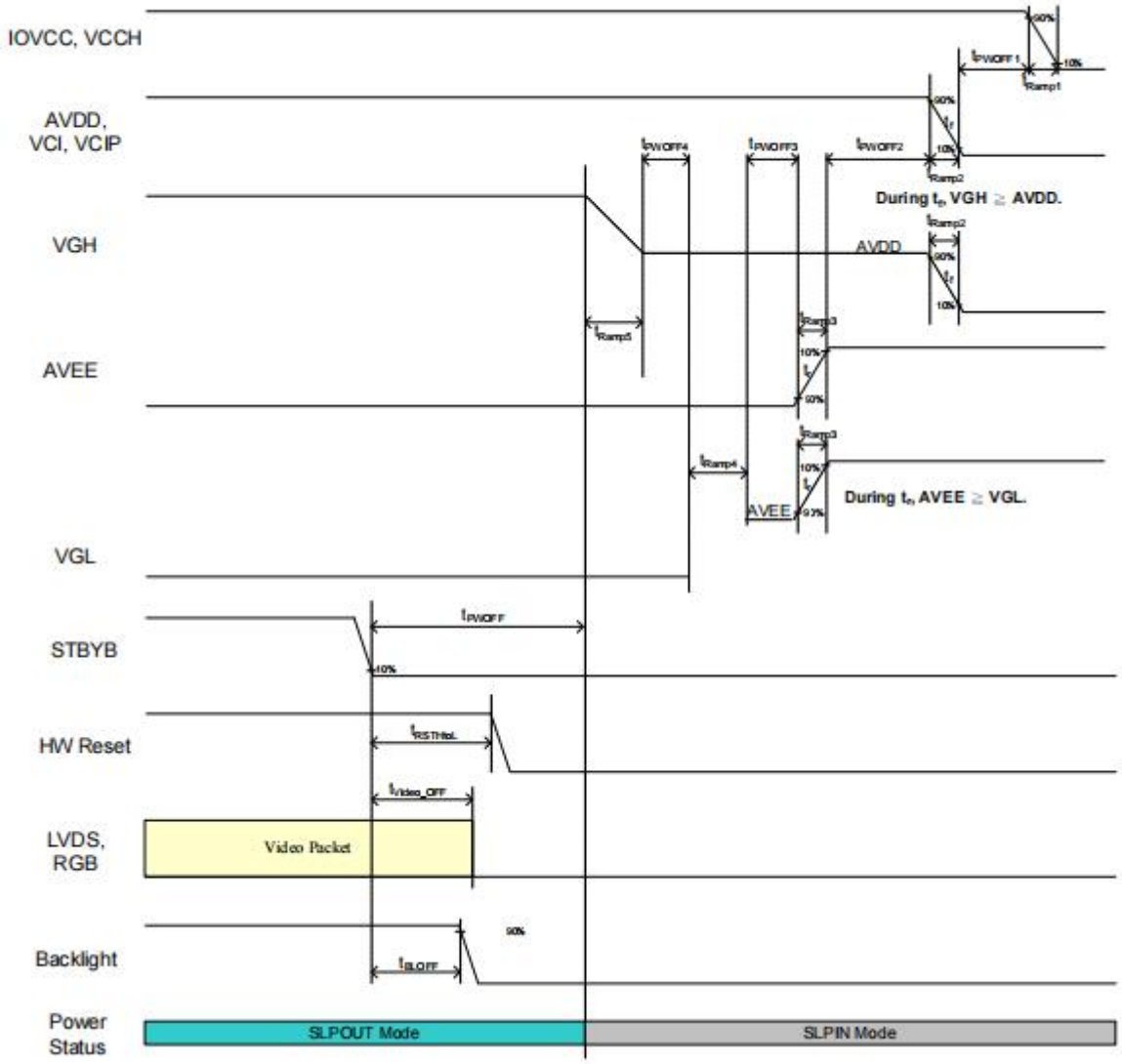


Power off sequence

The power off sequence timing for different power input modes and interfaces are shown as below table.

Symbol	Value			Unit	Remark
	Min	Typ	Max		
t_{PWOFF1}	0	5	-	ms	
t_{PWOFF2}	0	5	-	ms	
t_{PWOFF3}	0	5	-	ms	
t_{PWOFF4}	0	5	-	ms	
t_{ramp1}	0.2	-	20	ms	IOVCC, VCCH
t_{ramp2}	0.2	-	20	ms	VCI, VCIP, AVDD
t_{ramp3}	0.2	-	20	ms	AVEE
t_{ramp4}	0.2	-	-	ms	5Power: VGL
t_{ramp5}	0.2	-	-	ms	5Power: VGH
t_{PWOFF}	120	-	-	ms	
t_{MIPI_LP11}	0	-	t_{PWOFF}	ms	
$t_{DISPOFF}$	50	-	t_{PWOFF}	ms	
$t_{RSTHtoL}$	50	-	t_{PWOFF}	ms	
t_{Video_OFF}	0	-	t_{PWOFF}	ms	
t_{BLOFF}	0	-	-	ms	

5 power mode power off sequence – LVDS, RGB:



5.2 DC Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Differential input high threshold voltage	Rx_{VTH}	Rx_{VCM}=1.2V	+0.1	+0.2	+0.3	V
Differential input low threshold voltage	Rx_{VTL}		-0.3	-0.2	-0.1	V
Input voltage range (singled-end)	Rx_{VIN}		0.7	-	1.7	V
Differential input common mode voltage	Rx_{VCM}	|VID|=0.2	1	1.2	1.4	V
Differential input impedance	ZID		80	100	125	ohm
Differential input voltage	|VID|		0.2	-	0.6	V
Differential input leakage current	I_{LCLVDS}		-10	-	+10	uA
LVDS Digital Stand-by Current	I_{STLVDS}	Clock & all Functions are stopped	-	TBD	-	uA

Table 11.3: LVDS DC characteristic

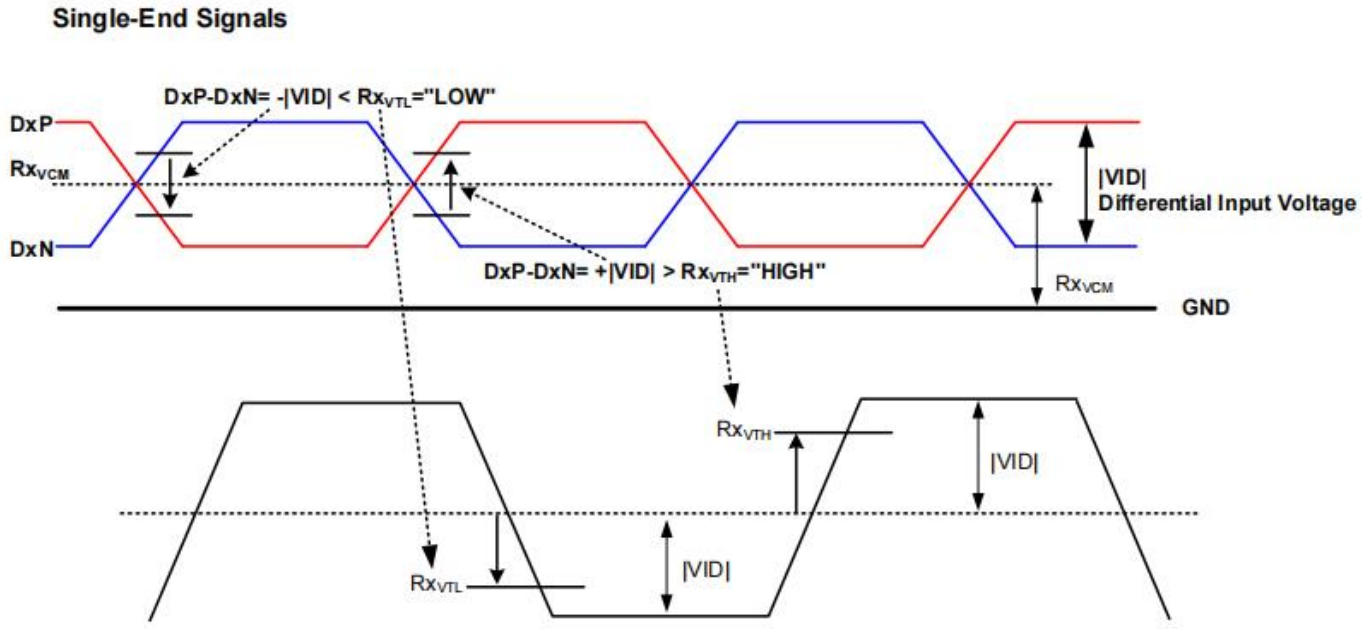


Figure 11.1: LVDS input timings

5.3 AC Characteristics

Reset input timings

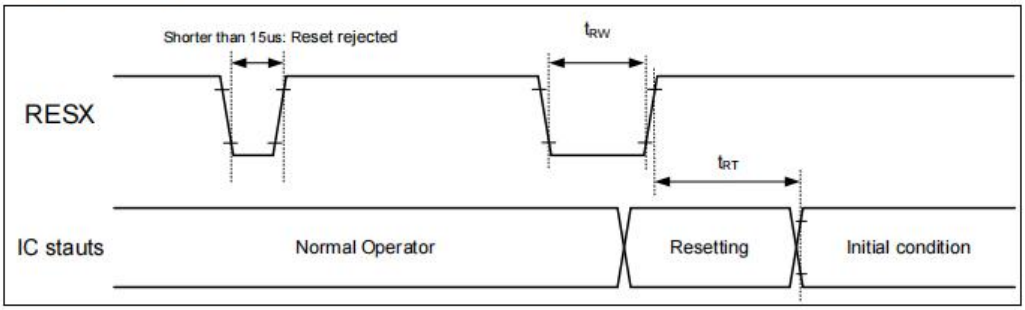


Figure 11.2: Reset input timings

Symbol	Parameter	Related pins	Min.	Max.	Unit
t_{RW}	Reset "L" pulse width(2)	RESX	20	-	µs
t_{RT}	Reset complete time(3)	-	-	5(5)	ms
		-	-	120(6) (7) (8)	ms

Note:

(1) The reset complete time also required time for loading ID bytes from OTP to registers. This loading is done every time when there is HW reset complete time (t_{RT}) within 5 ms after a rising edge of RESX.

(2) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 15 µs	Reset Rejected
Longer than 20 µs	Reset
Between 15 µs and 20 µs	Reset Start

(3) During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode) and then returns to Default condition for HW reset.

(4) Spike Rejection also applies during a valid reset pulse as shown below:

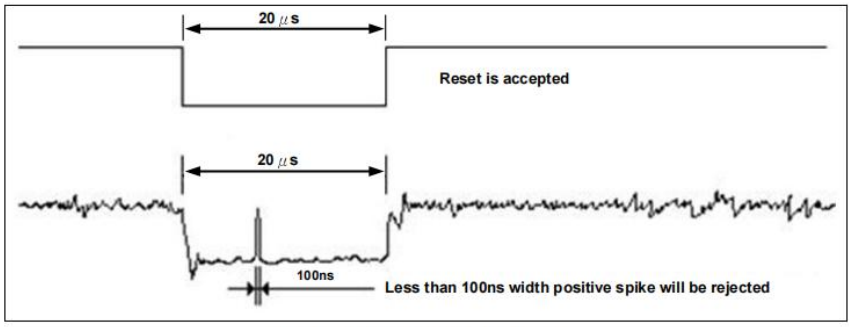


Table 11.4: Reset timings

(5) When Reset is applied during Sleep In Mode.
(6) When Reset is applied during Sleep Out Mode.
(7) It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

(8) After Sleep Out command, it is necessary to wait 120msec then send RESX.

LVDS electronic characteristics

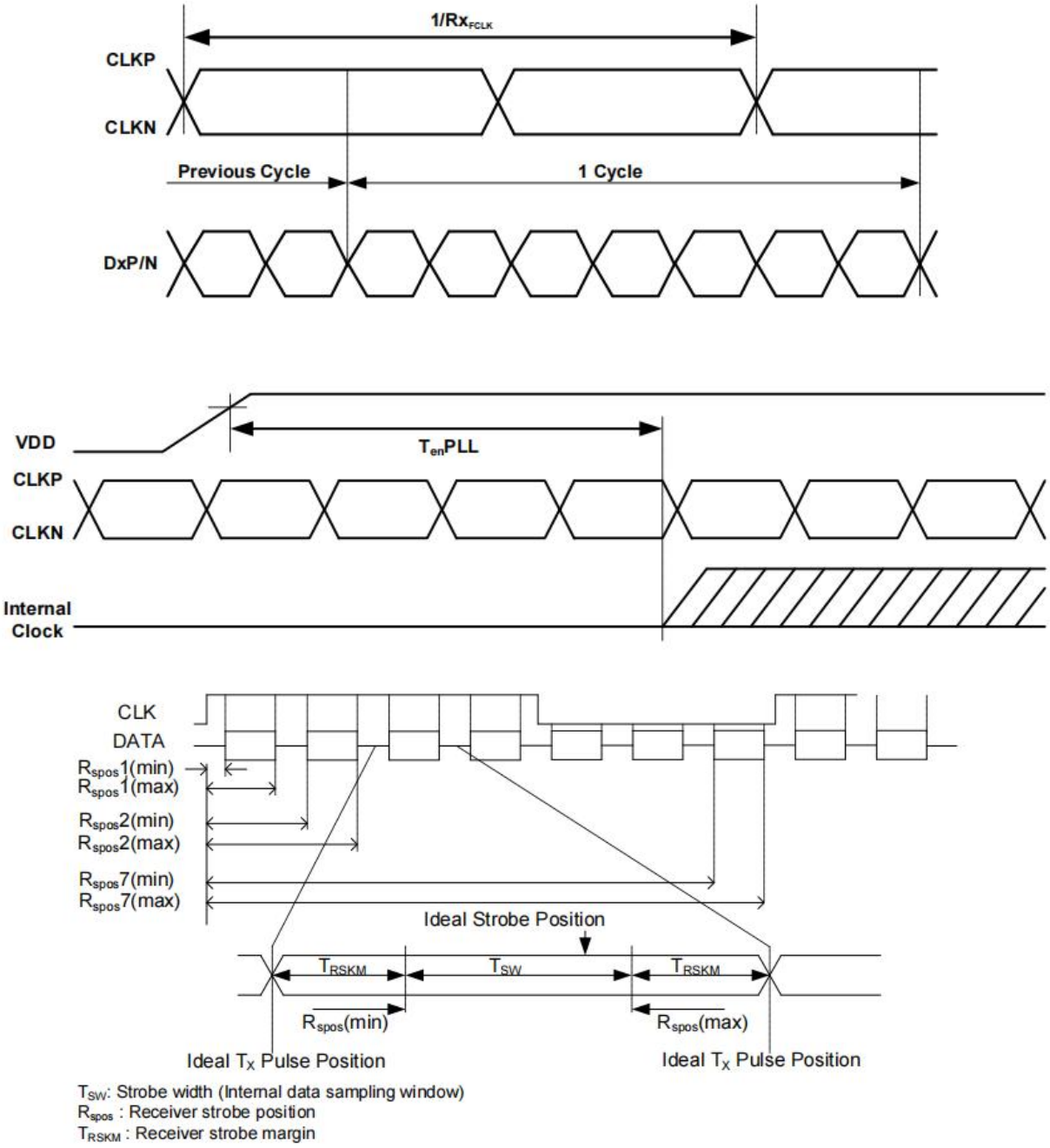


Figure 11.4: LVDS AC characteristics

Signal	Symbol	Min.	Typ	Max.	Unit	Description
Clock frequency	Rx_{FCLK}	30	-	75	MHz	-
Input data skew margin	T_{RSKM}	500	-	-	ps	|VID| = 200mV RxVCM = 1.2V @Rx_{FCLK}=75MHz
Clock high time	T_{LVCH}	-	4/(7x Rx_{FCLK})	-	ns	-
Clock low time	T_{LVCL}	-	3/(7xRx_{FCLK})	-	ns	-
PLL wake-up time	T_{en}PLL	-	-	150	us	-

Table 11.6: LVDS AC characteristics

5.4 LVDS interface

LVDS Data format

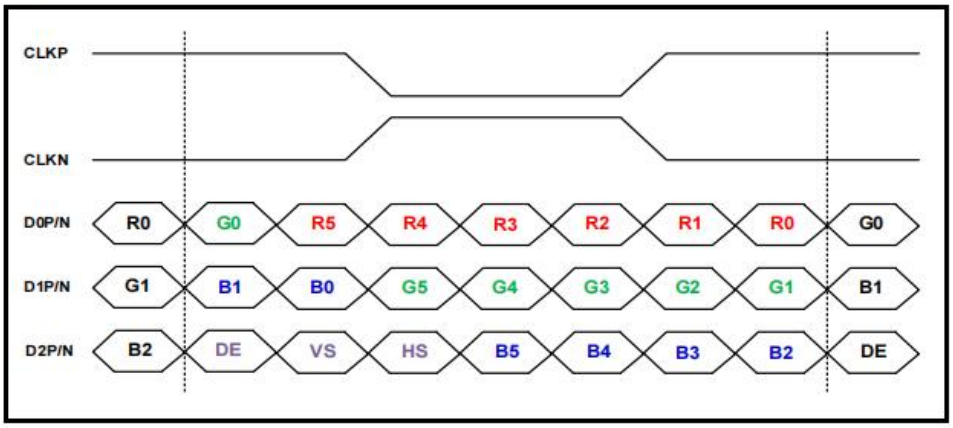


Figure 7.10: 6-bit LVDS input (IM[1:0]=01, LANSEL[1:0]=10, LVFMT=Don't care)

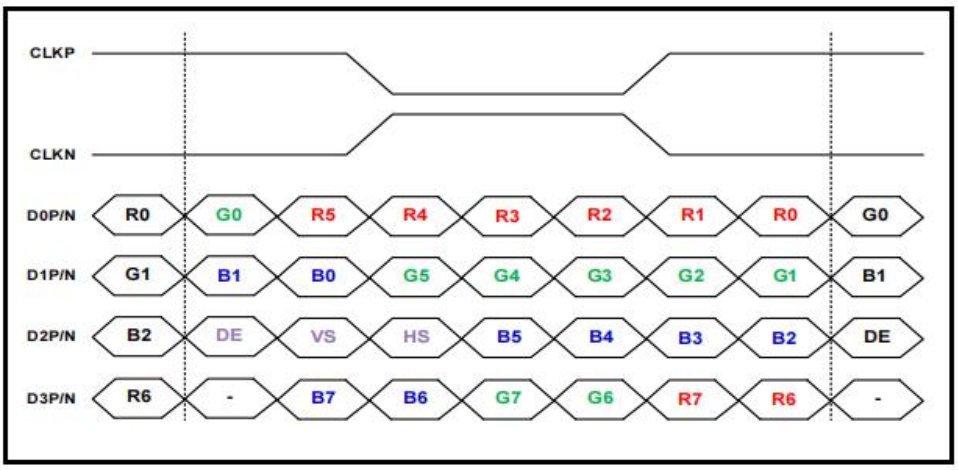


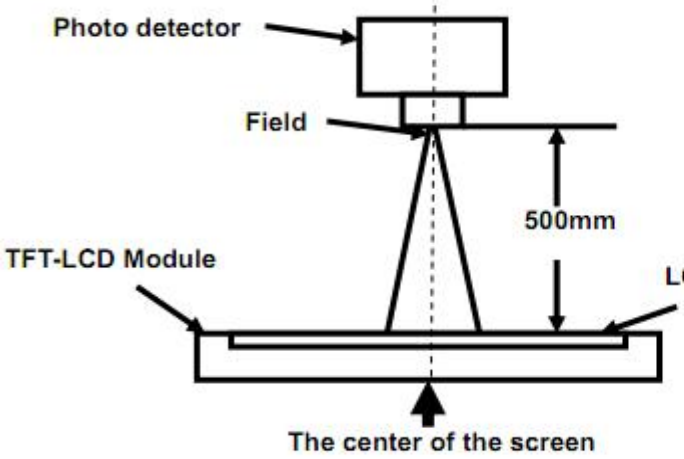
Figure 7.12: 8-bit LVDS input (IM[1:0]=01, LANSEL[1:0]=11, LVFMT=0(VESA))

6. Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR≥10) B/L ON	θ_T	Φ=90°(12 o'clock)	75	85	-	deg	Note2
	θ_B	Φ=270°(6 o'clock)	75	85	-	deg	Note2
	θ_L	Φ=180°(9 o'clock)	75	85	-	deg	Note2
	θ_R	Φ=0°(3 o'clock)	75	85	-	deg	Note2
Response Time	T_{ON}	Normal θ=Φ=0°	-	12	15	msec	Note4
	T_{OFF}		-	12	15	msec	Note4
Contrast Ratio	CR		1000	1200	-	-	Note1 Note3
Color Chromaticity	W_X		TBD	TBD	TBD	-	Note1 Note5
	W_Y		TBD	TBD	TBD	-	Note1 Note5
Luminance	L		450	500	-	cd/m²	Note1 Note7
Luminance Uniformity	Y_U		70	80	-	%	Note1 Note6
NTSC	-		65	70	-	%	-

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.



Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

Fig 1

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).

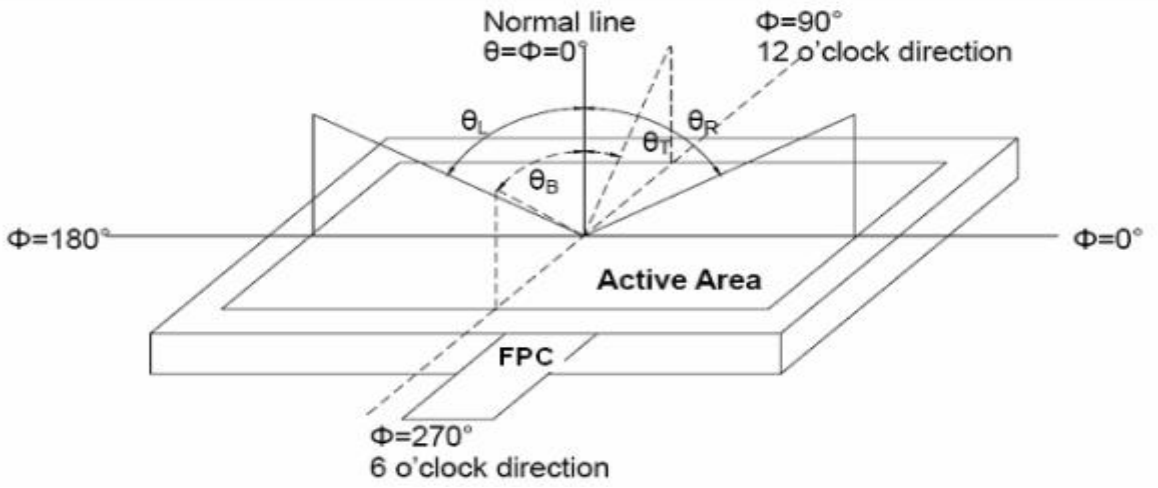


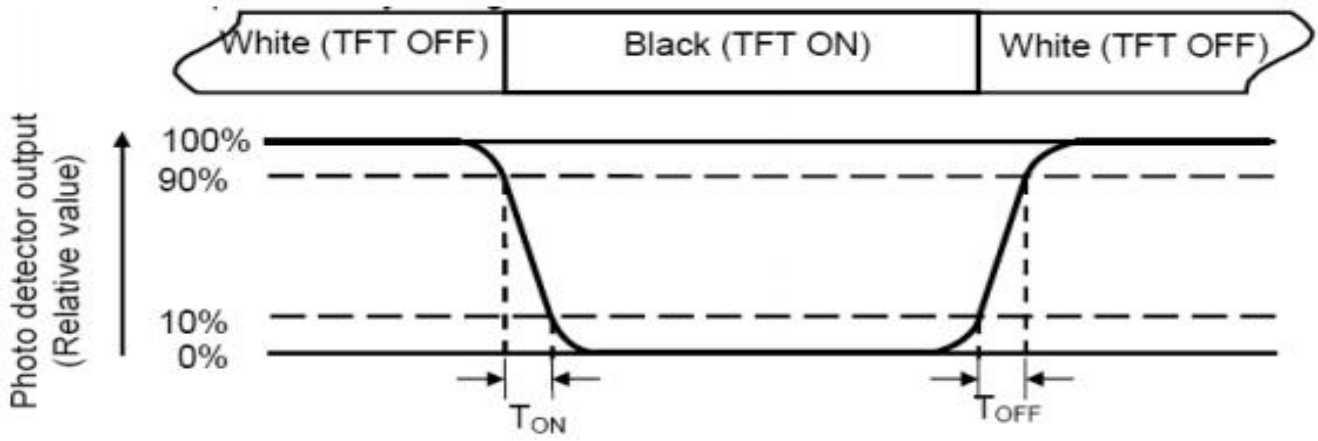
Fig 2 Definition of viewing angle

Note 3: Definition of contrast ratio

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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%.



Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance.For more information see FIG.3-a/b

Note 7:Surface luminance is the luminance with all pixels displaying white.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3, ...,Pn)

For more information see FIG.3-a/b

Note 8:

H,V : Active area(see Figure b)

Light spot size ⌀ =5mm(BM-5) or ⌀ =7.7mm (BM-7)50cm distance or compatible distance from the LCD surface to detector lens. test spot position : see Figure b.

measurement instrument : TOPCON's luminance meter SR-3A or BM-7 or compatible (see Figure 1).

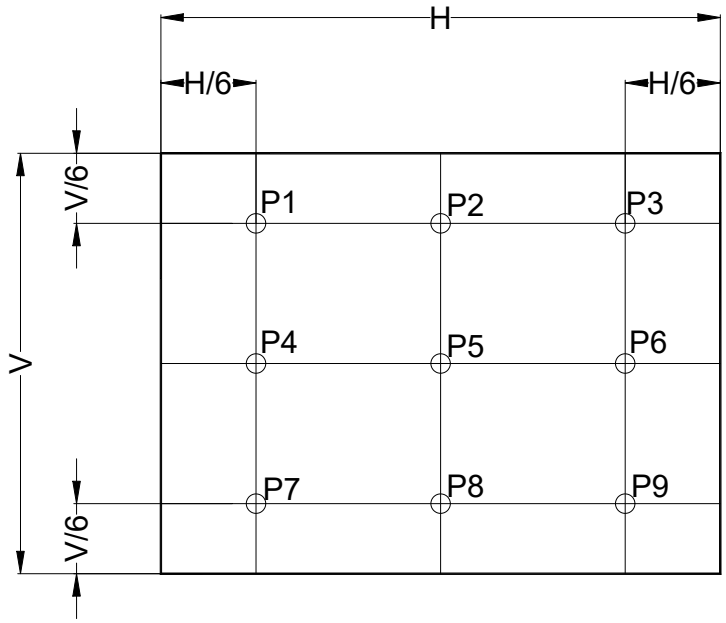


Fig. 3-b Definition of points

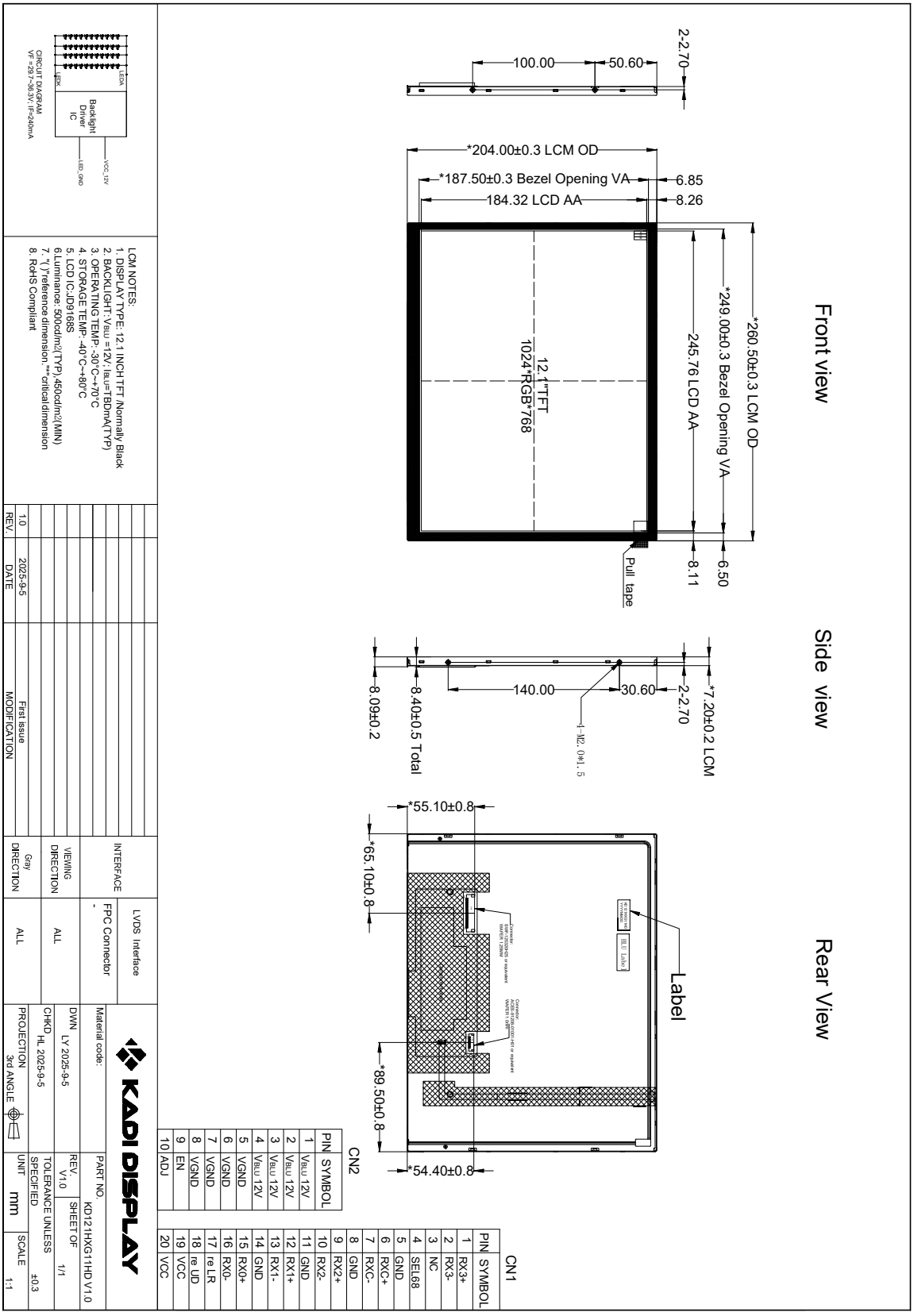
7. Reliability Test Items

Test Item	Test Conditions	
High Temperature Storage	Ta= +80℃	96hrs
Low Temperature Storage	Ta= -40℃	96hrs
High Temperature Operation	Ta= +70℃	96hrs
Low Temperature Operation	Ta= -30℃	96hrs
High Temperature and Humidity Storage	Ta= +60℃, 90% RH	96hrs
Thermal Shock (Non-operation)	-30℃/30 min ~ +80℃/30 min for 20 cycles Start with cold temperature end with high temperature	
Electro Static Discharge	Contact = ± 4 kV, class B Air = ± 8 kV, class B R=330Ω,C=150pF	
Vibration	Sweep: 10Hz~55Hz~10Hz Stroke: 1.5mm 2 hrs for each direction of X .Y. Z.	
Mechanical Shock	60G 6ms,±X,±Y,±Z 3 times for each direction	
Package Drop Test	Height: 60 cm 1 corner, 3 edges, 6 surfaces	

Notes: The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:

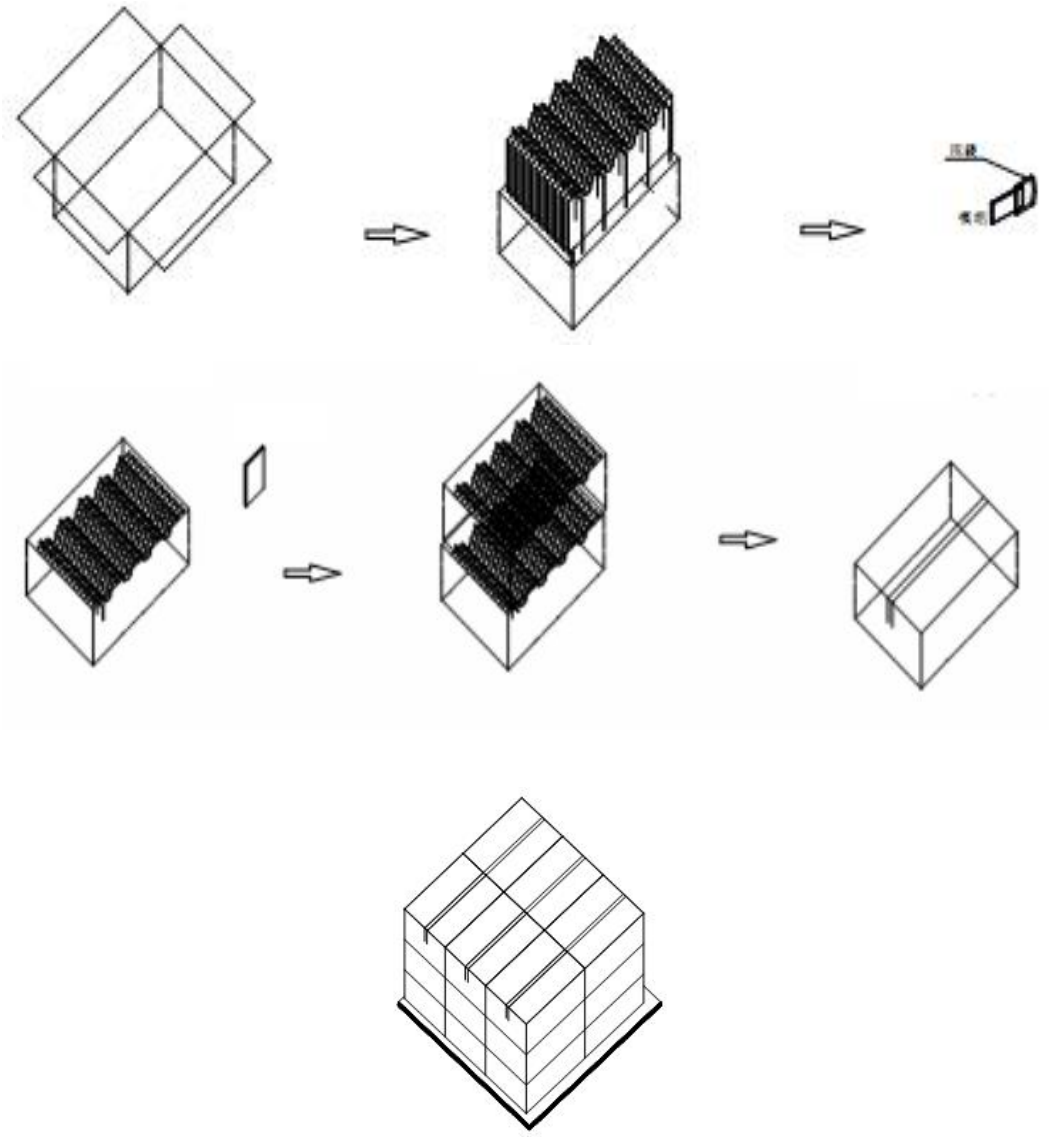
1). Air bubble in the LCD
2). Seal leak or Glass crack
3). Non display or abnormal display
4). Brightness reduction >50%

8. Mechanical Drawing



9. Packing

Packing Method



10. Precautions for Use of LCD modules

10.1 Handling Precautions

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

10.1.2. 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.

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

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

10.1.5. 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
- Ketene
- Aromatic solvents

10.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

10.1.8.4. 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.

10.2 Storage Precautions

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

10.2.2.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℃ ~40℃ Relatively humidity: ≤80%

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

10.3 Transportation Precautions

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

10.4 Packaging instructions

When the customers using trays, they have to stack the adjacent trays in a 180° staggered to prevent pressure that could cause product damage.