PRODUCT SPECIFICATION

CDTECH Model: S101HWX96EP-FL102-AG

CUSTOMER Model: -

Description: 10.1 ” TFT-LCD Module with LENS

Version: 1.0

CDTECH	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE	2025.8.16	2025.8.16	2025.8.16

	SIGNATURE	DATE
CUSTOMER APPROVAL		

Record of Revisions

Version	Revise Date	Description	Page
1.0	2025-8-16	First Release	-

Contents

1. General Specifications

1.1 LCM General Information

Item	Specification	Unit
LCD Size	10.1	inch
Number of Pixels	1280 (H) RGB x 800 (V)	pixels
Display Mode	Normally Black	-
Viewing Direction	Free	-
Interface	LVDS	-
Display Colors	16.7M	colors
Outline Dimension	253 (H) x 164 (V) x 7.38 (D)	mm
Active Area	216.96 (H) x 135.60 (V)	mm
Pixel Pitch	0.1695 (H) x 0.1695 (V)	mm
Driver IC	EK79202	-
Operation Temperature	-30~80	℃
Storage Temperature	-30~80	℃

Note1:Requirements on environmental protection RoHS compliant.

2. Absolute Maximum Ratings

Item	Symbol	MIN.	MAX.	Unit	Note
Analog Supply voltage	VDD	-0.5	4.0	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

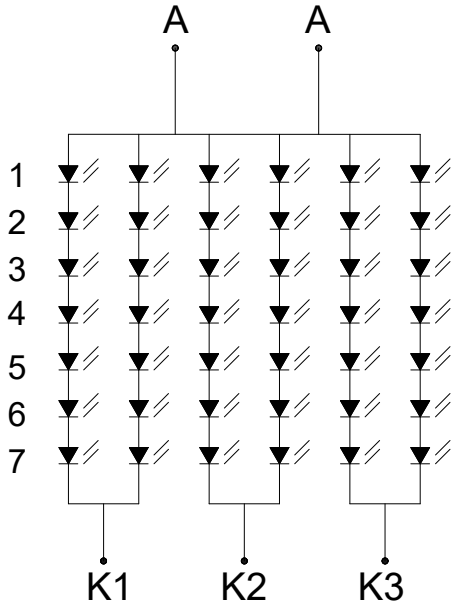
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	VDD	3.0	3.3	3.6	V	
Analog supply current	I_{VDD}	-	400	520	mA	VDD=3.3V (RED)
Logic input voltage	VIH	0.7*VDD	-	VDD	V	
	VIL	GND	-	0.3*VDD	V	

3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Driving Current	I_F	-	300	-	mA	
Driving Voltage	V_F	18.9	-	23.8	V	
Power consumption	W_{BL}	5.67	-	7.14	W	
LED Life-Time	N/A	-	50,000	-	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 :



4. Interface Pin Assignment

4.1 LCM Pin Assignment

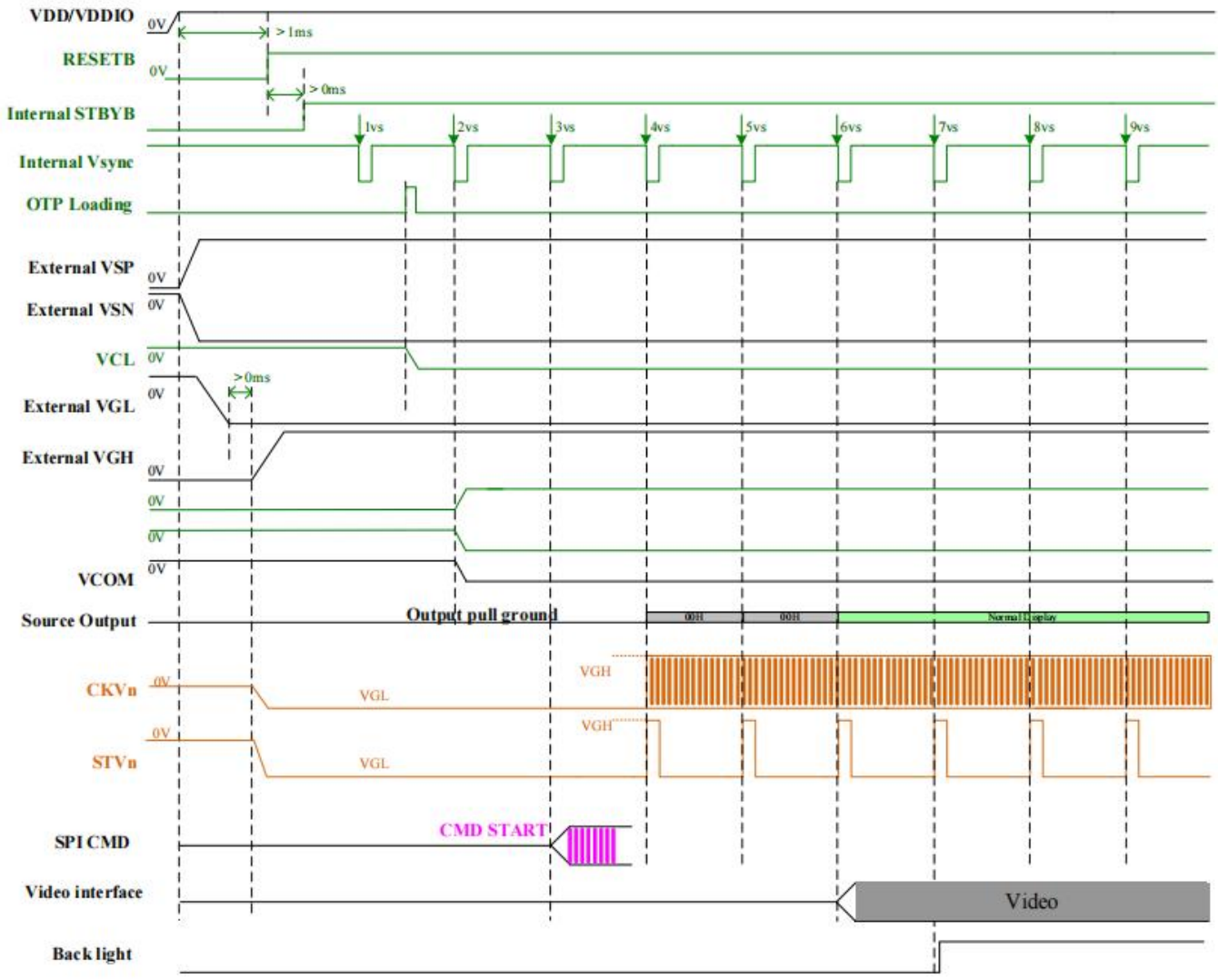
No.	Symbol	Description
1	GND	Ground
2	VDD 3.3V	Power supply （3.3V）
3	VDD 3.3V	Power supply （3.3V）
4	GND	Ground
5	RESET	Global reset pin
6	STBYB	Standby mode. Normally pull high. STBYB = L, timing controller, source driver will turn off, all output are High-Z. STBYB = H, normal operation. (Default)
7	GND	Ground
8	LVDS1D0N	- LVDS differential data input
9	LVDS1D0P	+ LVDS differential data input
10	GND	Ground
11	LVDSID1N	- LVDS differential data input
12	LVDSID1P	+ LVDS differential data input
13	GND	Ground
14	LVDS1D2N	- LVDS differential data input
15	LVDS1D2P	+ LVDS differential data input
16	GND	Ground
17	LVDSIDCLKN	-LVDS differential clock input
18	LVDS1DCLKP	+LVDS differential clock input
19	GND	Ground
20	LVDS1D3N	- LVDS differential data input
21	LVDS1D3P	+ LVDS differential data input
22	GND	Ground
23	GND	Ground

<table>
<tr><td>24</td><td>NC</td><td>No connection</td></tr>
<tr><td>25</td><td>NC</td><td>No connection</td></tr>
<tr><td>26</td><td>NC</td><td>No connection</td></tr>
<tr><td>27</td><td>NC</td><td>No connection</td></tr>
<tr><td>28</td><td>BIST</td><td>Normal Operation/BIST pattern select. Normally pull high.<table><tr><th>BIST</th><th>Function</th></tr><tr><td>H</td><td>Normal operation (default)</td></tr><tr><td>L</td><td>BIST mode</td></tr></table></td></tr>
<tr><td>29</td><td>NC</td><td>No connection</td></tr>
<tr><td>30</td><td>SDI (NC)</td><td>No connection</td></tr>
<tr><td>31</td><td>SCL(NC)</td><td>No connection</td></tr>
<tr><td>32</td><td>CS (NC)</td><td>No connection</td></tr>
<tr><td>33</td><td>GND</td><td>Ground</td></tr>
<tr><td>34</td><td>NC (NTC1)</td><td>No connection (Thermistor pin1)</td></tr>
<tr><td>35</td><td>LED_A</td><td>Power for LED backlight (Anode)</td></tr>
<tr><td>36</td><td>LED_A</td><td>Power for LED backlight (Anode)</td></tr>
<tr><td>37</td><td>NC(NTC2)</td><td>No connection (Thermistor pin2)</td></tr>
<tr><td>38</td><td>LED_K1</td><td>Power for LED backlight (Cathode)</td></tr>
<tr><td>39</td><td>LED_K2</td><td>Power for LED backlight (Cathode)</td></tr>
<tr><td>40</td><td>LED_K3</td><td>Power for LED backlight (Cathode)</td></tr>
</table>

5. Interface Characteristics

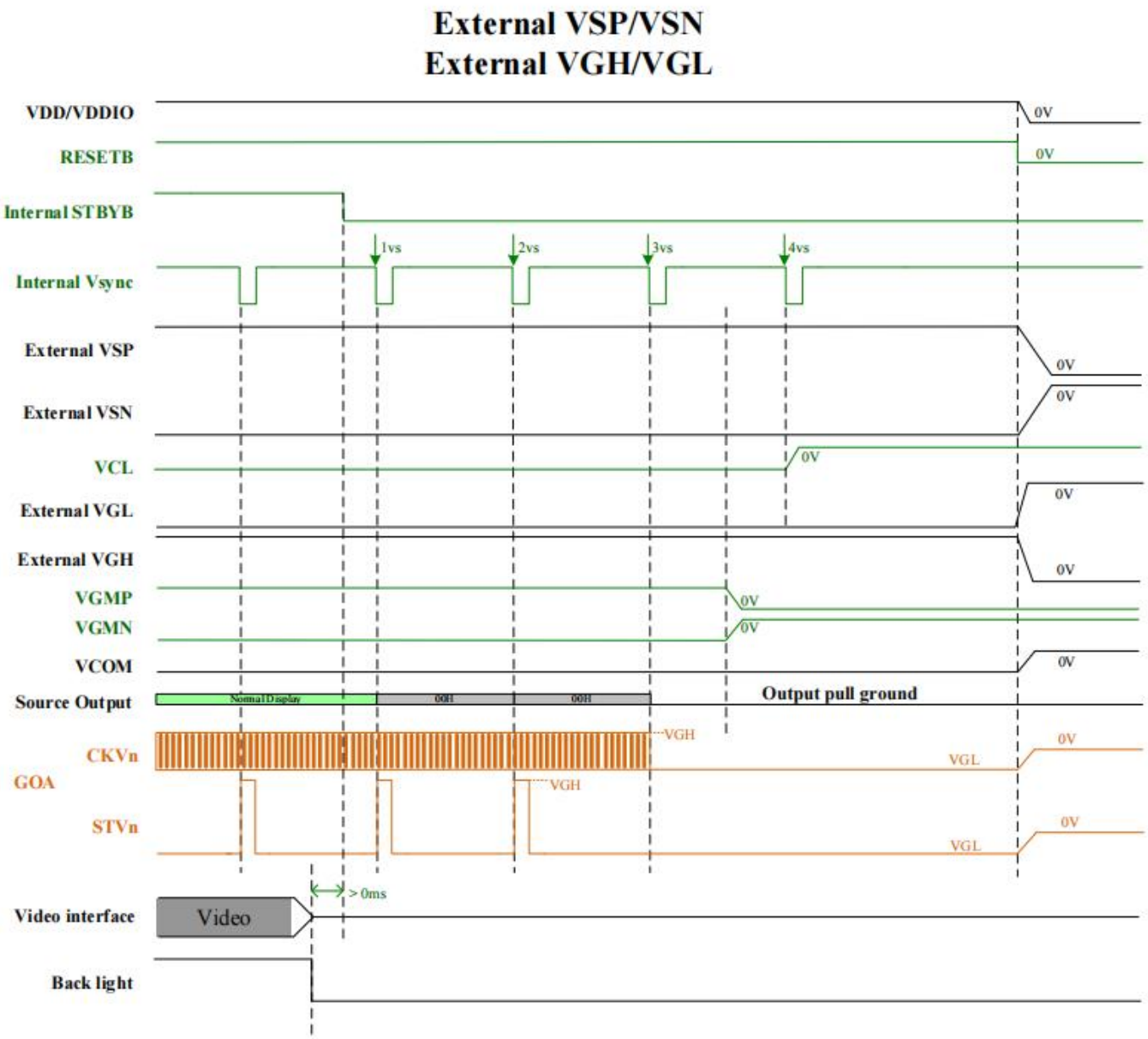
5.1 Power ON/OFF Sequence

5.1.1 Power on sequence



Note: Before Power on process is have to check all power input of external that is Gnd.

5.1.2 Power off sequence

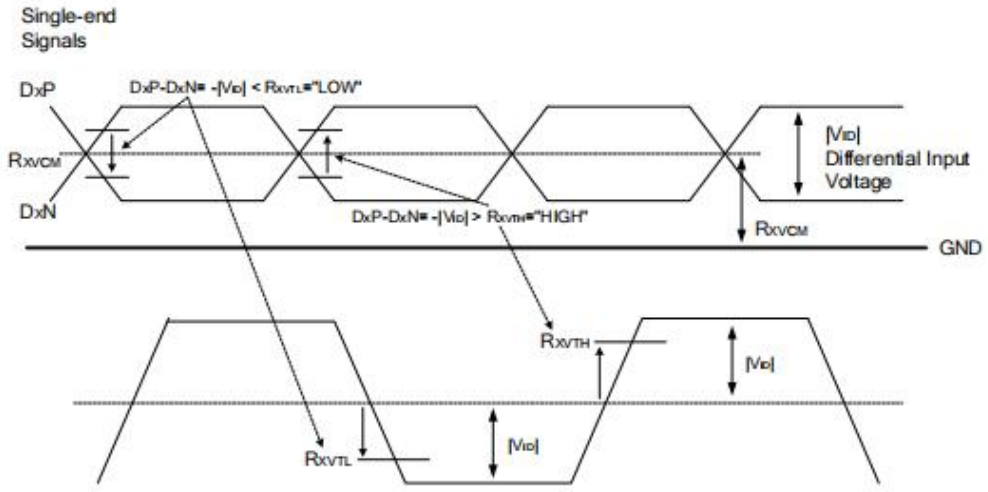


5.2 DC Characteristics

Parameter		Symbol	Spec.			Unit	Note
			Min.	Typ.	Max.		
Input high level voltage		VIH	0.8 x VDDIO		VDDIO	V	
Input low level voltage		VIL	VSS		0.2 x VDDIO	V	
Input Leakage Current		Ileak	(-1)		(+1)	μA	
Output high level voltage		VOH	0.8 x VDDIO		VDDIO	V	
Output low level voltage		VOL	VSS		0.2 x VDDIO	V	
VGH_REG output voltage		VGH_REG	9	16	22	V	
VGL_REG output voltage		VGL_REG	-15	-10	-4.5		
VGMP output voltage		VGMP	3.5	4.24	5.8	V	
VGMN output voltage		VGMN	-5.8	-4.64	-3.5	V	
VGL output voltage		VGL	-17	-12	-6	V	
VGH output voltage		VGH	11	18	24	V	
VCL output voltage		VCL	-3	-2.8	-2.1	V	
VCOM output voltage		VCOM	-2.405	-1.5	-0.5	V	
Input terminal resistance		ZID		100		ohm	
Source output level deviation	Graycode = 0 ~ 14 Graycode = 241 ~ 255			TBD		mV	
	Graycode = 15 ~ 31 Graycode = 208 ~ 240			TBD		mV	
	Graycode = 32 ~ 207			TBD		mV	
Source output offset deviation	Graycode = 0 ~ 14 Graycode = 241 ~ 255	-		TBD		mV	
	Graycode = 15 ~ 31 Graycode = 208 ~ 240	-		TBD		mV	
	Graycode = 32 ~ 207	-		TBD		mV	
Current consumption	Analog Operating	IAOP		TBD		mA	
	Analog Stand-by	IAST		TBD		mA	
Rush current		Ivddpeak		TBD		mA	

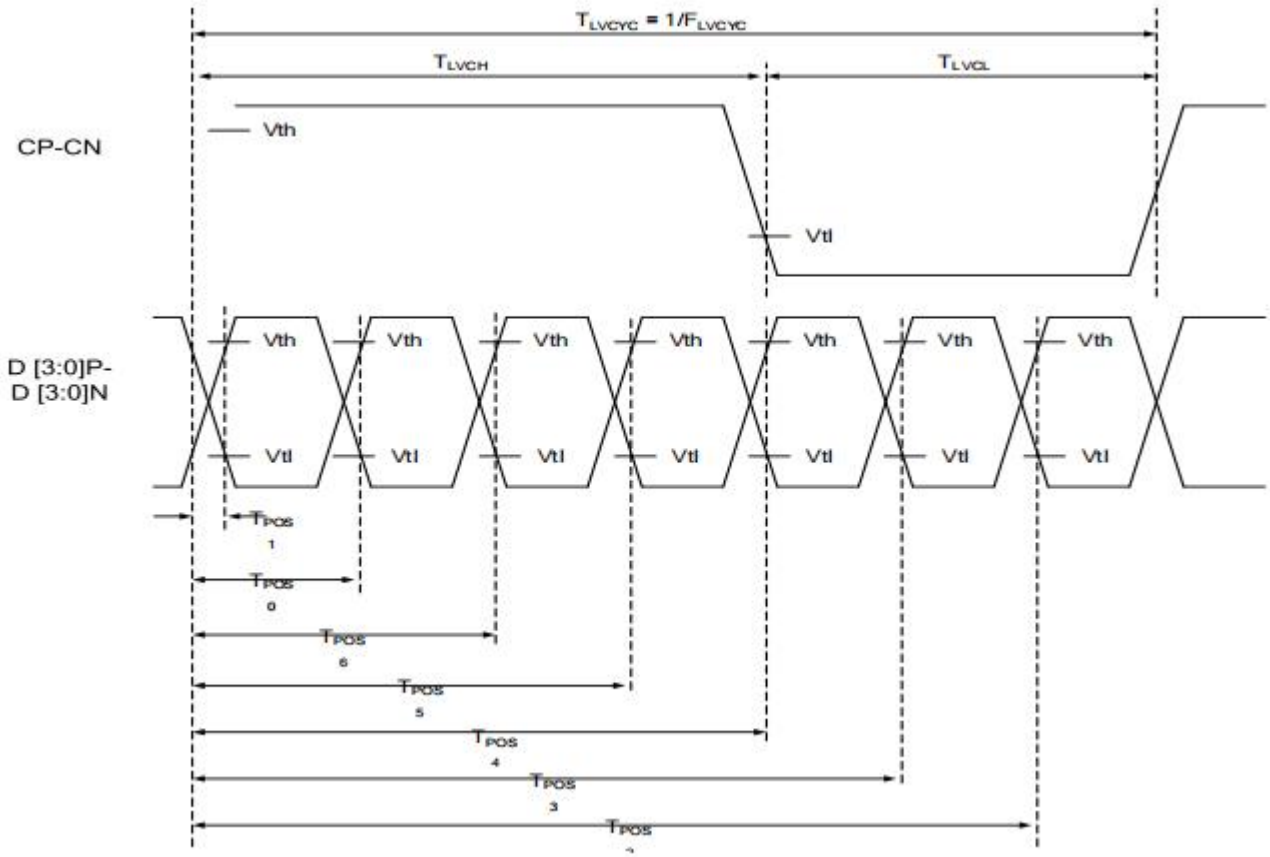
5.2.1 LVDS DC electrical characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	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	-	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_{VDD}	-	15	20	mA	F_{DCLK}=80MHz,VDD=3.3V, Input pattern: 55h->Aah->55h->Aah
LVDS Digital Stand-by Current	I_{ST}	-	-	250	uA	Clock & all Functions are stopped



LVDS signal characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock frequency	F_{LVCYC}	69.7		80.9	MHz
Clock period	T_{LVCYC}			-	ps
1 data bit time	UI	-	1/7	-	T_{LVCYC}
Clock high time	T_{LVCH}	3.9	4	4.1	UI
Clock low time	T_{LVCL}	2.9	3	3.1	UI
Position 1	T_{POS1}	-0.2	0	0.2	UI
Position 0	T_{POS0}	0.8	1	1.2	UI
Position 6	T_{POS6}	1.8	2	2.2	UI
Position 5	T_{POS5}	2.8	3	3.2	UI
Position 4	T_{POS4}	3.8	4	4.2	UI
Position 3	T_{POS3}	4.8	5	5.2	UI
Position 2	T_{POS2}	5.8	6	6.2	UI
Input eye width	T_{EYEW}	0.6	-	-	UI
Input eye border	T_{EX}	-	-	0.2	UI
LVDS wake up time	T_{ENLVDS}	-	-	150	us



5.3 AC Characteristics

5.3.1 LVDS mode 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

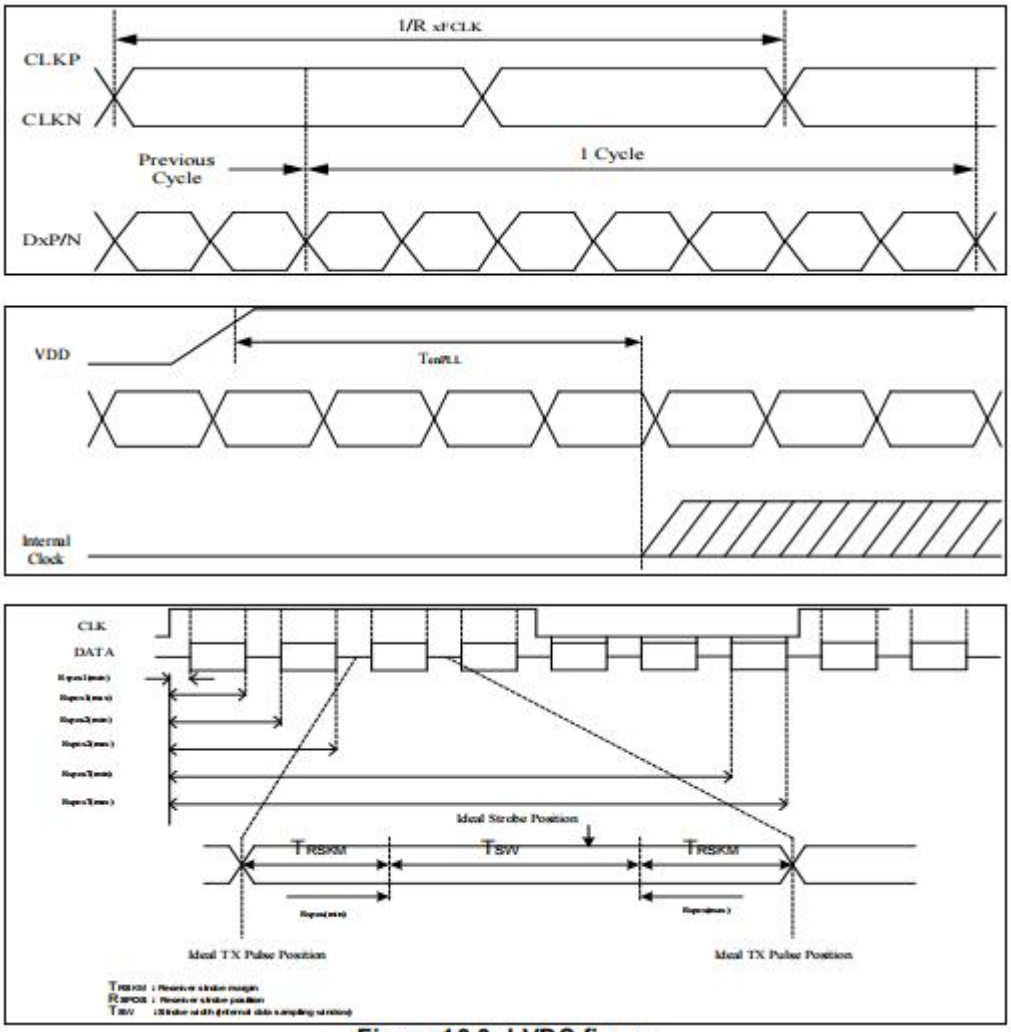


Figure 13.3: LVDS figure

5.4 Reset Timing

When RESETB of the 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.

(Test condition: VDDIO=2.3V~3.6V, VSS=0V, T_A=-30 ~+85)

Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max	
Reset low pulse width	Trst		20	-	-	μs

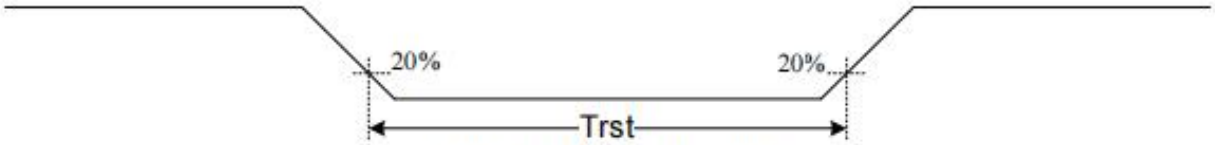
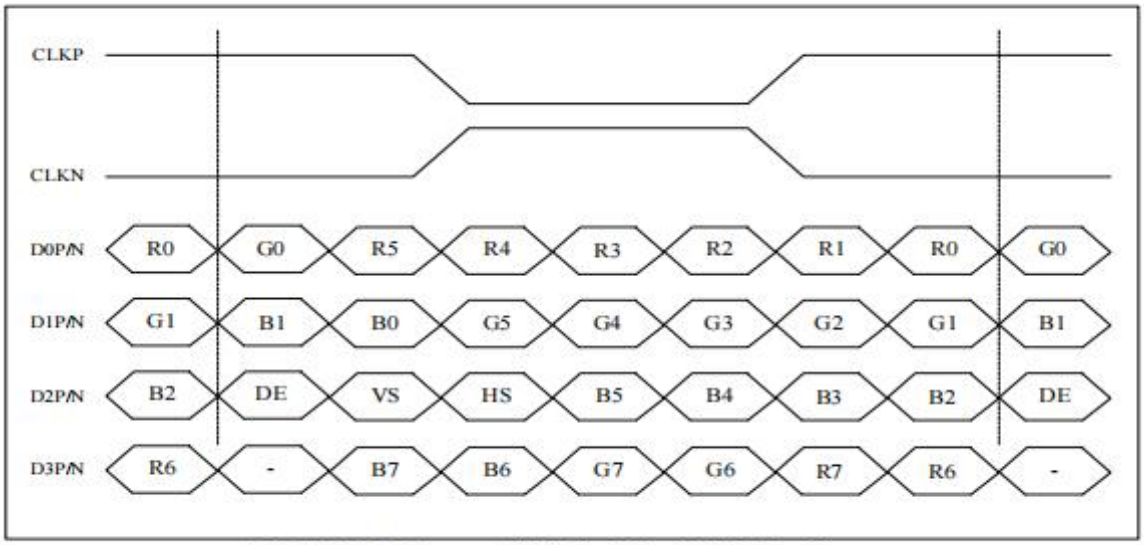


Figure 13.5: Reset timing

Figure 5.2.1: Reset timing

5.5 LVDS interface

5.5.1 Data input format for LVDS



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

5.5.2 Input Timing Table

For 1280RGBx800

Parameter		Symbol	Value			Unit
			Min.	Typ.	Max.	
DCLK frequency @Frame rate=60Hz (LVDS)		F_{DCLK}	68.2	72.4	78.5	MHz
HSYNC period time		T_H	1380	1440	1500	DCLK
Horizontal display area		T_{HD}		1280		DCLK
HSYNC pulse width	Min.	T_{HPW}		2		
	Typ.			-		
	Max.			40		
HSYNC back porch(with pulse width)		T_{HBP}	88	88	88	DCLK
HSYNC front porch		T_{HFP}	12	72	132	DCLK
VSYNC period time		T_V	824	838	872	H
Vertical display area		T_{VD}		800		H
VSYNC pulse width	Min.	T_{VPW}		2		H
	Typ.			-		
	Max.			20		
VSYNC back porch(with pulse width)		T_{VBP}	23	23	23	H
VSYNC front porch		T_{VFP}	1	15	49	H

For 1280RGBx800 DE mode

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60Hz (LVDS)	F_{DCLK}	68.2	72.4	78.5	MHz
Horizontal display area	T_{HD}		1280		DCLK
HSYNC period time	T_H	1380	1440	1500	DCLK
HSYNC blanking	$T_{HBP}+T_{HFP}$	100	160	220	DCLK
Vertical display area	T_{VD}		800		H
VSYNC period time	T_V	824	838	872	H
VSYNC blanking	$T_{VBP}+T_{VFP}$	24	38	72	H

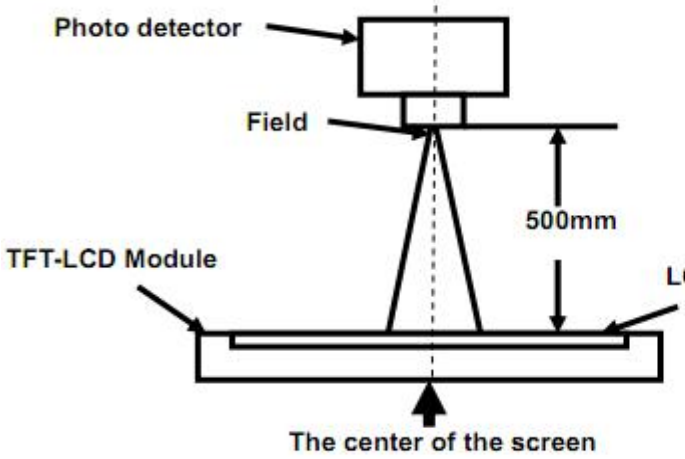
Note:Timing setting base on 60Hz,
Frequency can be adjusted according to needs, as long as it does not affect the display.

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)	70	80	-	deg	Note2
	θ_B	Φ=270°(6 o'clock)	70	80	-	deg	Note2
	θ_L	Φ=180°(9 o'clock)	70	80	-	deg	Note2
	θ_R	Φ=0°(3 o'clock)	70	80	-	deg	Note2
Response Time	T_{ON}	Normal θ=Φ=0°	-	12	14	msec	Note4
	T_{OFF}		-	12	14	msec	Note4
Contrast Ratio	CR		800	1000	-	-	Note1 Note3
Color Chromaticity	W_X		0.2708	0.3008	0.3308	-	Note1 Note5
	W_Y		0.3161	0.3461	0.3761	-	Note1 Note5
Luminance	L		1000	1200	-	cd/m²	Note1 Note7
Luminance Uniformity	Y_U		75	80	-	%	Note1 Note6
NTSC	-		60	65	-	%	-

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).

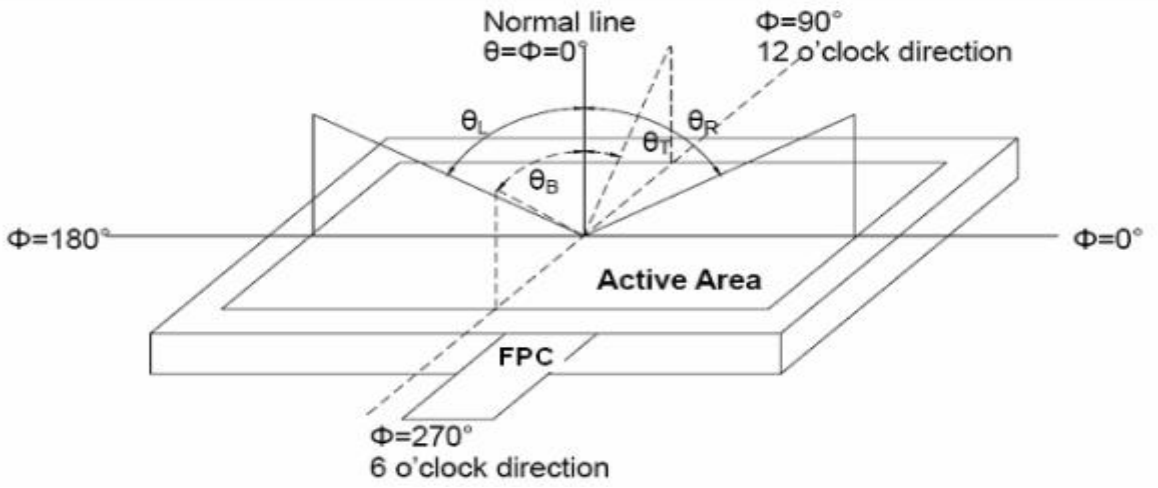


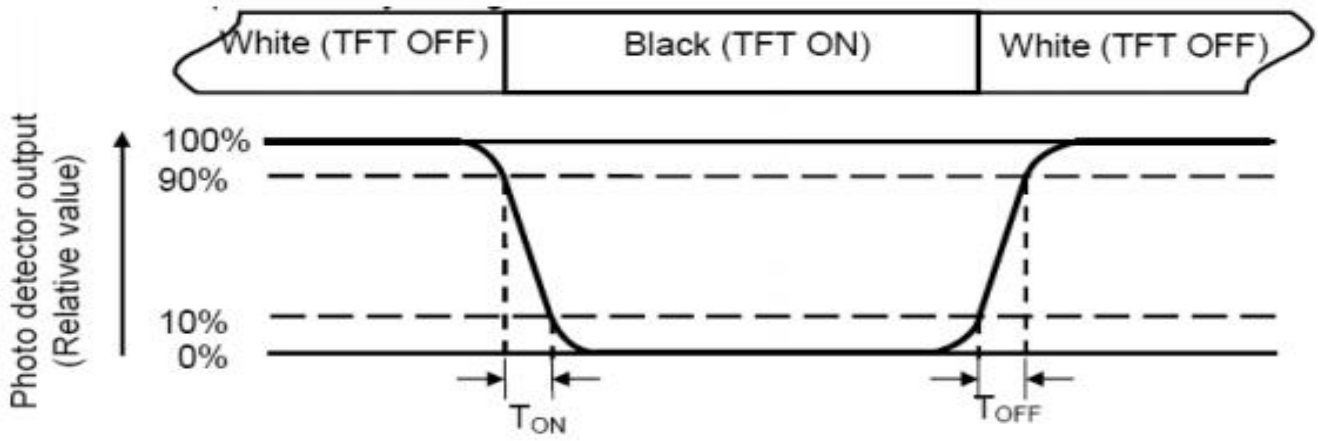
Fig 2 Definition of viewing angle

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).

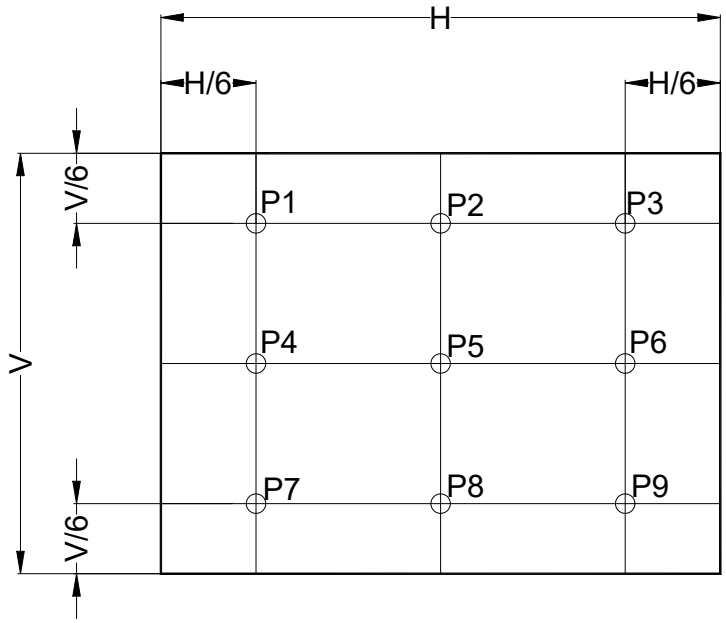


Fig. 3-b Definition of points

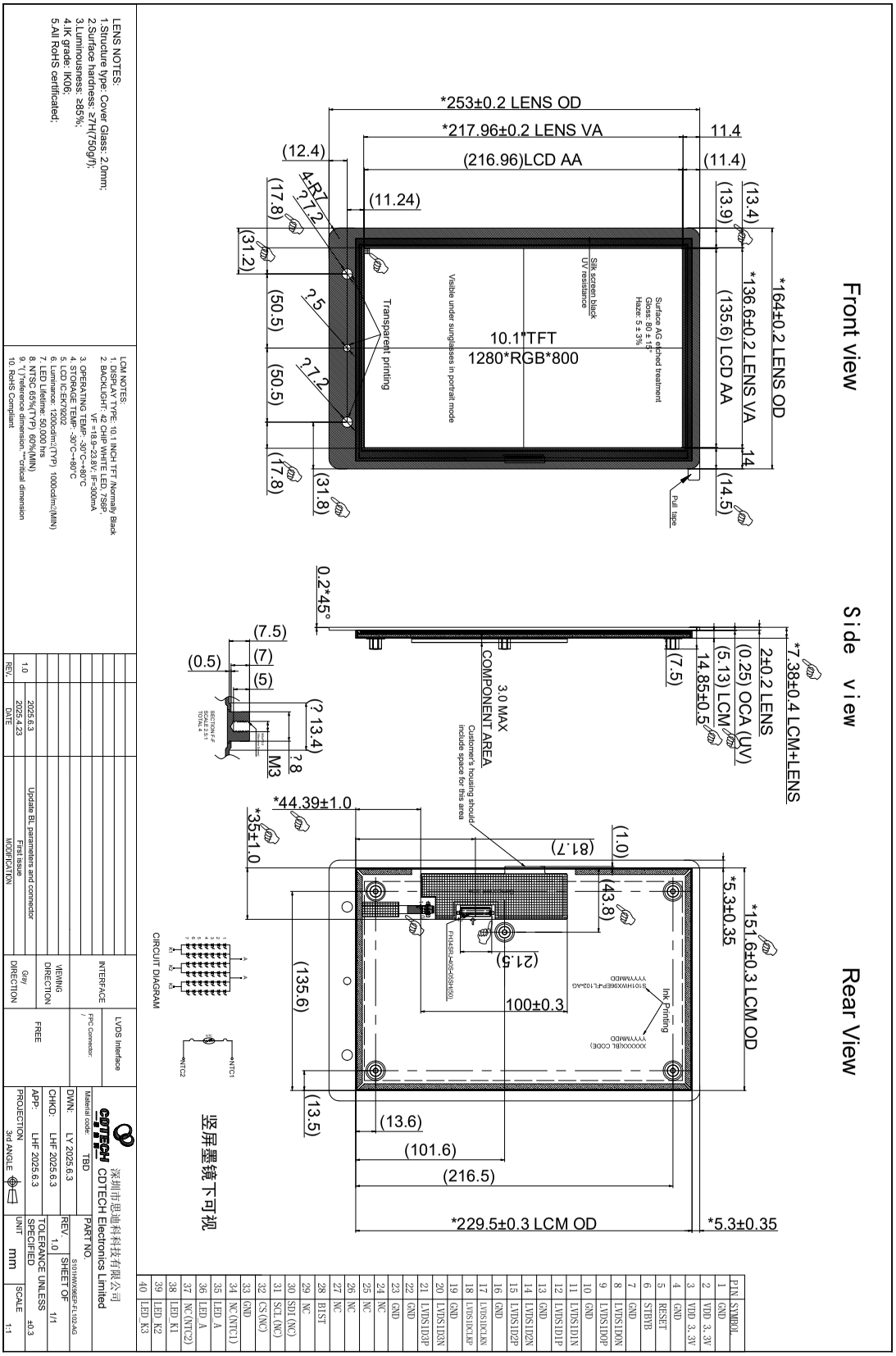
7. Reliability Test Items

Test Item	Test Conditions	
High Temperature Storage	Ta= +80℃	96hrs
Low Temperature Storage	Ta= -30℃	96hrs
High Temperature Operation	Ta= +80℃	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:

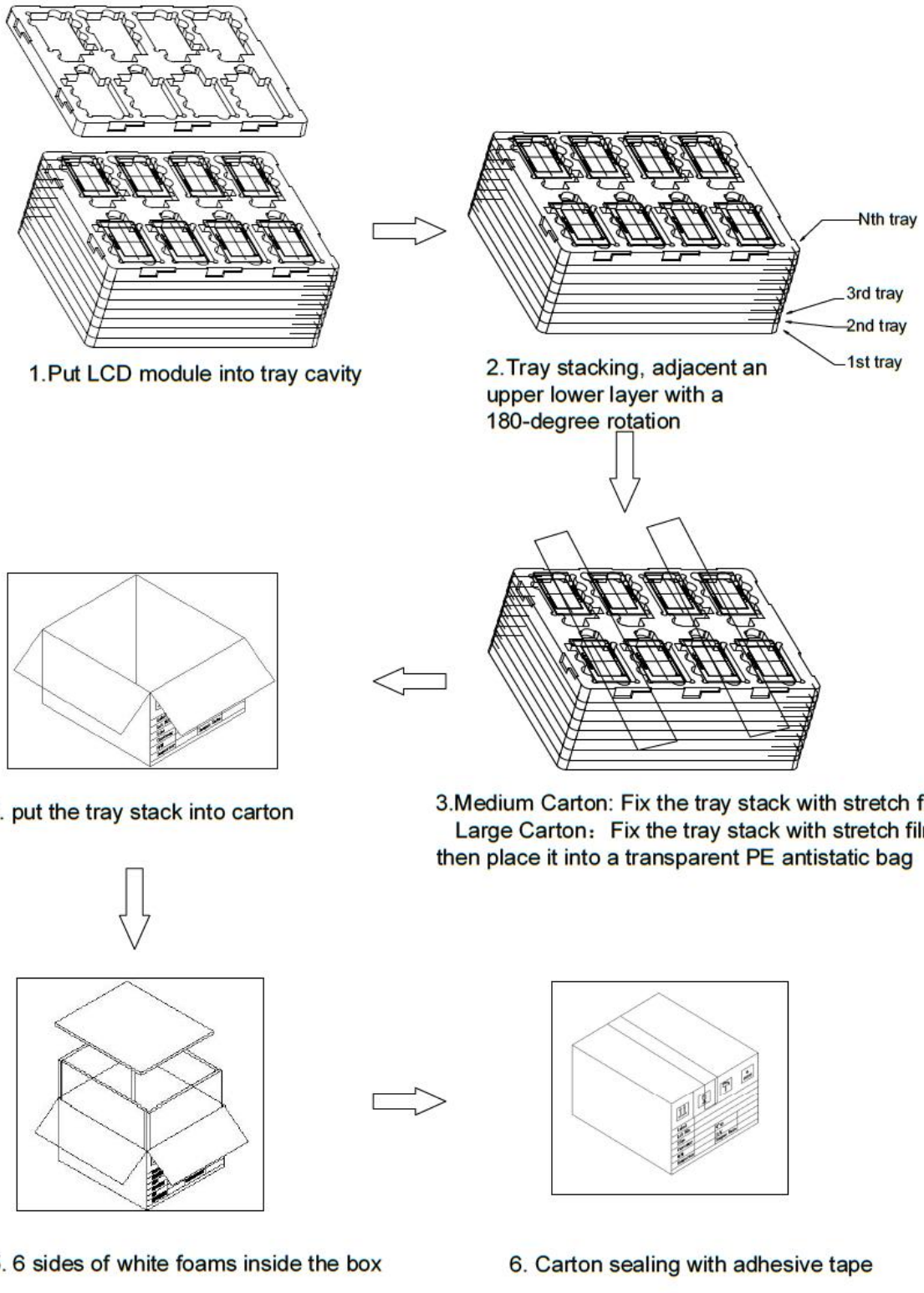
1). Air bubble in the LCD
2). Seal leak or Glass crack
3). Non display or abnormal display
4). Brightness reduction >50%

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.

11. Note

HSD recommends the following screen parameter settings:
a.Vsync:2,VBP:10,Vadr:800,VFP :2.
b.Hsync:2,HBP:88,Vadr:1280,HFP :72.