

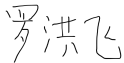
PRODUCT SPECIFICATION

CDTECH Model: **S070BWS48HD-DC160**

CUSTOMER Model: **-**

Description: **7.0 " TFT-LCD Module with CTP**

Version: **1.0**

CDTECH	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE	2024.4.23	2024.4.23	2024.4.23

CUSTOMER APPROVAL	SIGNATURE	DATE

[illegible]



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1. General Specifications

1.1 LCM General Information

Item	Specification	Unit
LCD Size	7.0	inch
Number of Pixels	1024 (H) RGB x 600 (V)	pixels
Display Mode	Normally Black	-
Viewing Direction	Free	o' clock
Interface	RGB	-
Display Colors	16.7M	colors
Outline Dimension	165.00 (H) x 100.00 (V) x 7.72 (D)	mm
Active Area	154.21 (H) x 85.92 (V)	mm
Pixel Pitch	0.1505 (H) x 0.1432 (V)	mm
Driver IC	HX8282+HX8696	-
Operation Temperature	-20~70	°C
Storage Temperature	-30~80	°C

1.2 Touch Panel Information

Item	Specification
Touch Structure	G+G
Bonding Type with LCM	Perimeter Bonding
Driver IC	MXT640T
Interface	I ² C
Touch Count Max	5 Points
Surface treatment	-
Surface hardness	6H
I2C slave address	0x4A
Origin of coordinate	Top Left Corner

Note1: Requirements on environmental protection RoHS compliant.

2. Absolute Maximum Ratings

Item	Symbol	MIN.	MAX.	Unit	Note
Analog Supply voltage	VDD	-0.3	3.96	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. Electrical Characteristics

3.1 Recommended Operating Condition for TFT LCD

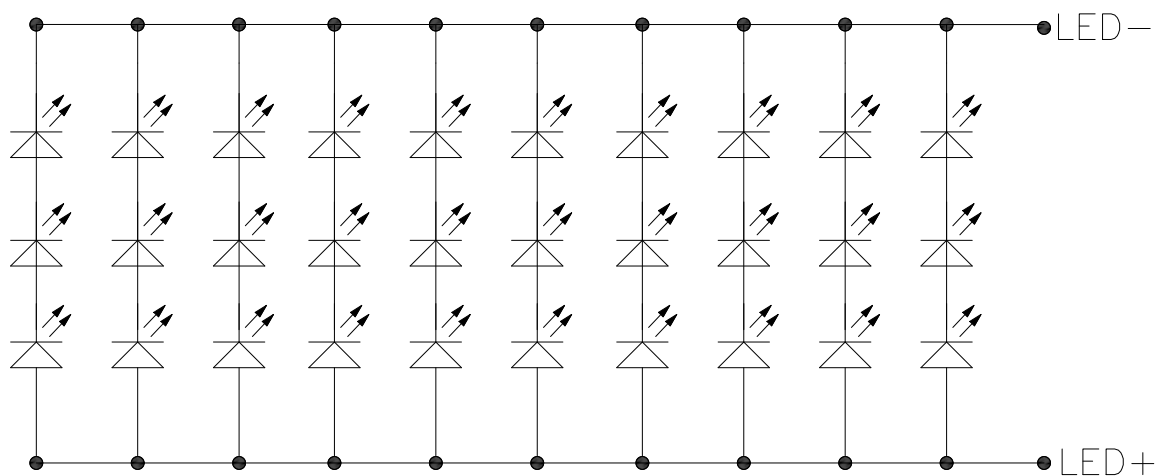
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power supply for LCD	DVDD	3.0	3.3	3.6	V	
	AVDD	9.0	9.8	10.5	V	
	VGH	16.0	18.0	20	V	
	VGL	-7.5	-6.0	-5.0	V	
	VCOM	2.9	3.25	3.5	V	
Logic input voltage	VIH	0.7*DVDD	-	DVDD	V	
	VIL	GND	-	0.3*DVDD	V	

3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Driving Current	I _F	-	200	-	mA	
Driving Voltage	V _F	8.1	-	10.2	V	
Power consumption	W _{BL}	1.62	-	2.04	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 :



3.3 Touch Panel

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply voltage	VDD	-	3.3	-	V	
Analog supply current	I_{VDD}	-	TBD	-	mA	VDD=3.3V
Input high-level voltage	V_{IH}	$0.7 \cdot VDD$	-	VDD	V	
Input low -level voltage	V_{IL}	GND	-	$0.3 \cdot VDD$	V	

4. Interface Pin Assignment

4.1 LCM Pin Assignment

No.	Symbol	Description
1	LED+	Power for LED backlight (Anode)
2	LED+	Power for LED backlight (Anode)
3	LED-	Power for LED backlight (Cathode)
4	LED-	Power for LED backlight (Cathode)
5	GND	Ground
6	VCOM	Common Voltage
7	DVDD	Power supply
8	MODE	DE / SYNC mode select under TTL mode. Normally pull high H : DE mode L : HSD/VSD mode
9	DE	Data enable input. Active high to enable the input data bus under “DE Mode”
10	VS	Vertical sync input. Negative polarity
11	HS	Horizontal sync input. Negative polarity
12-19	B7-B0	Data bus
20-27	G7-G0	Data bus
28-35	R7-R0	Data bus
36	GND	Ground
37	DCLK	Dot clock signal input. Latching input data at its rising edge
38	GND	Ground
39	L/R	Horizontal inversion, Normally pull high
40	U/D	Vertical inversion, Normally pull low
41	VGH	Gate on Voltage
42	VGL	Gate off Voltage
43	AVDD	Power for Analog Circuit
44	RESET	Global reset pin
45	NC	No connection
46	VCOM	Common Voltage
47	DITHB	Dithering function enable control
48	GND	Ground
49	NC	No connection

50	NC	No connection
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4.2 Touch FPC Pin Assignment

No.	Symbol	Description
1	GND	Ground
2	VDD	Power supply for CTP
3	SDA	I2C data input and output for CTP
4	SCL	I2C clock input for CTP
5	RESET	Reset Pin for CTP
6	INT	Interrupt signal for CTP
7	Test_NC	No connection
8	VSS_GND	Ground

5. Interface Characteristics

5.1 Power On/Off Sequence

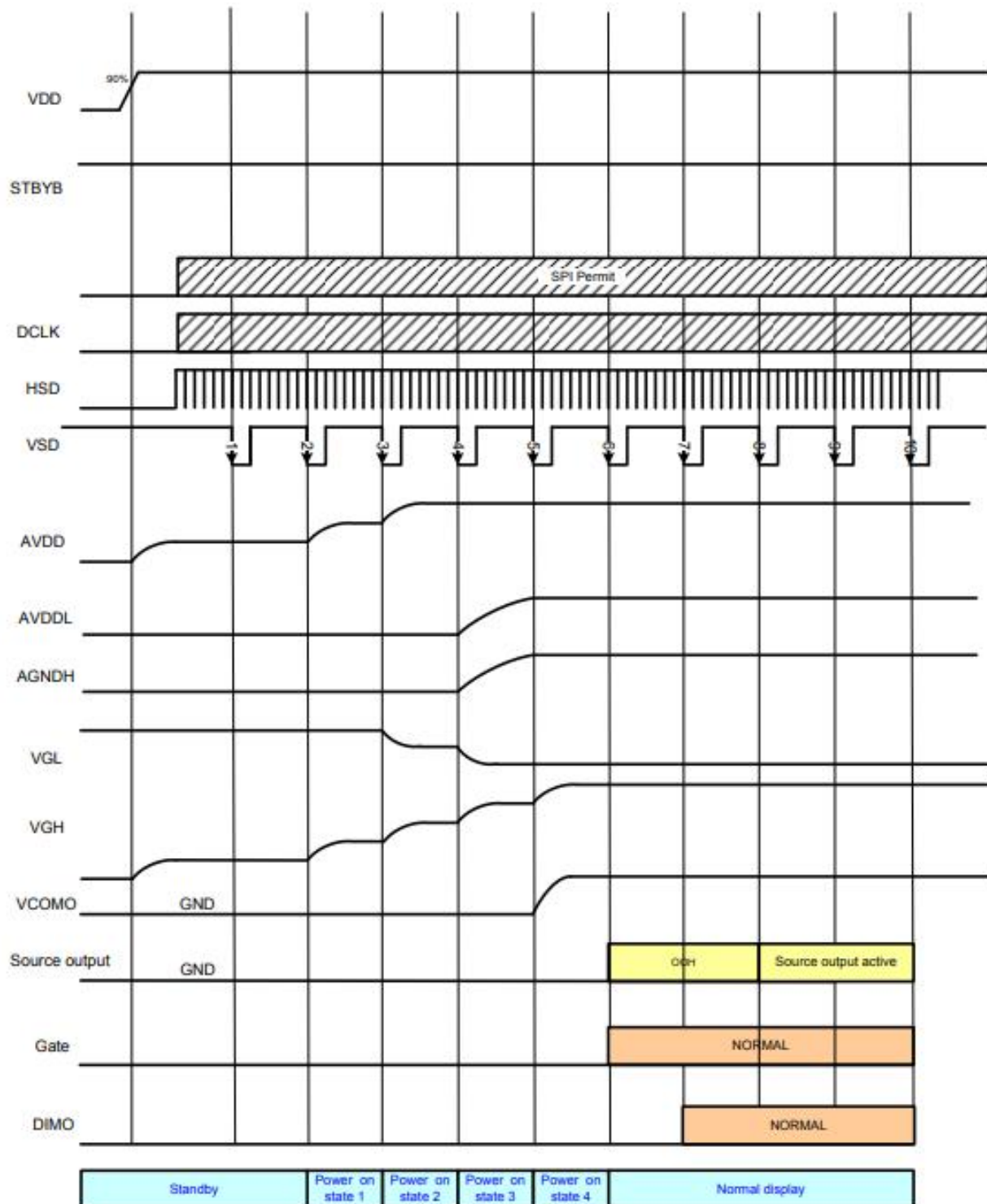
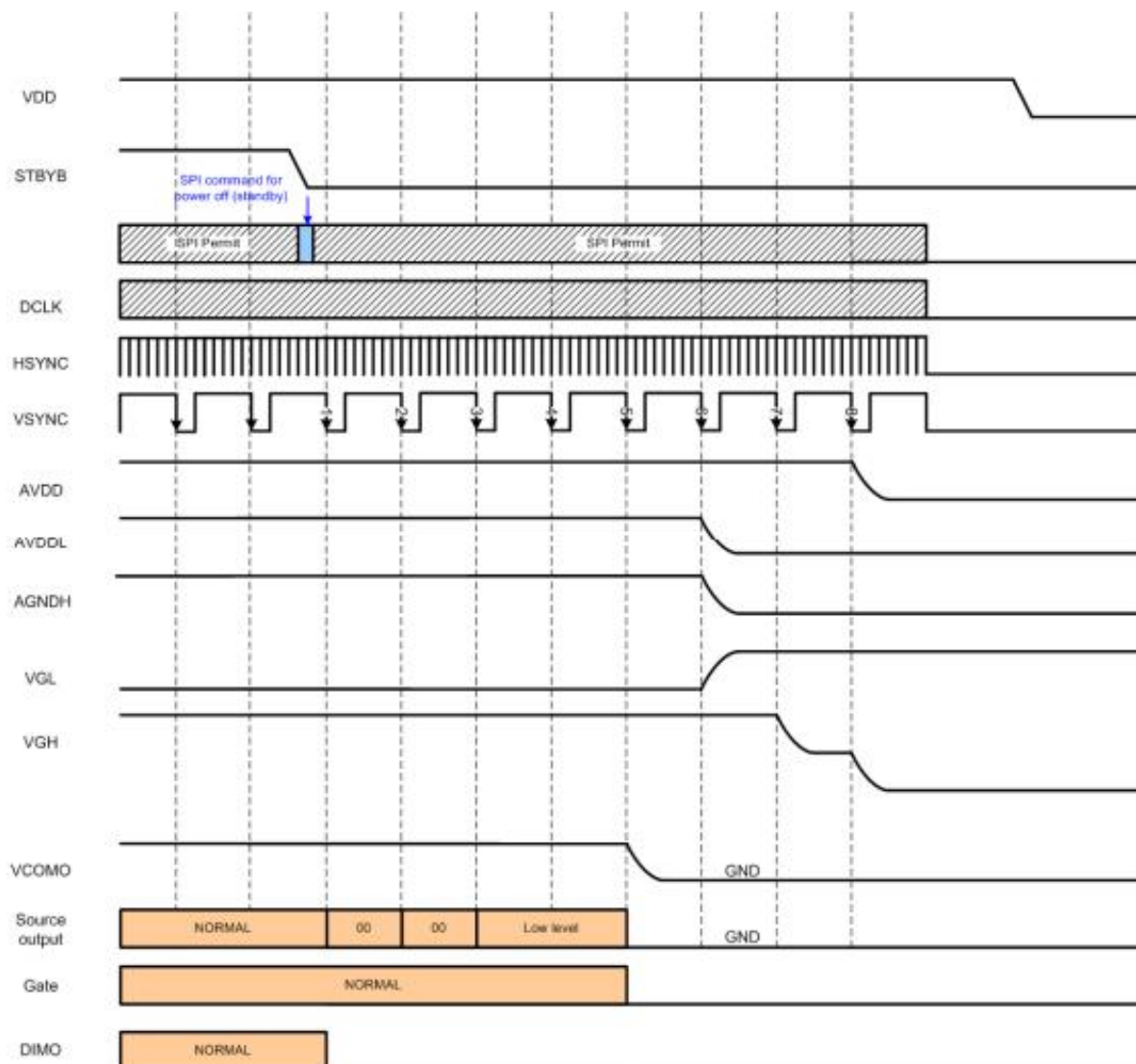


Figure 8.1: Power on timing sequence



Note: (1) Low level=3FH, when NBW=L. (Normally white)
 (2) Low level=00H, when NBW=H. (Normally black)

Figure 8.2: Power off timing sequence

5.2 TTL mode AC electrical characteristics

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
VDD power on slew rate	T_{POR}	From 0V to 90% VDD	-	-	20	ms
GRB pulse width	T_{GRB}	-	50	-	-	μ s
DCLK cycle time	T_{cph}	-	14	-	-	ns
DCLK pulse duty	T_{cwh}	-	40	50	60	%
VSD setup time	T_{vst}	-	5	-	-	ns
VSD hold time	T_{vhd}	-	5	-	-	ns
HSD setup time	T_{hst}	-	5	-	-	ns
HSD hold time	T_{hhd}	-	5	-	-	ns
Data setup time	T_{dsu}	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
Data hold time	T_{dhd}	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
DE setup time	T_{esu}	-	5	-	-	ns
DE hold time	T_{ehd}	-	5	-	-	ns
Output stable time	T_{sst}	10% to 90% target voltage. CL=90pF, R=10K Ω (Cascade)	-	-	6	μ s
		Dual gate			3	

Table 10.1: TTL mode AC electrical characteristics

5.3 Parallel RGB input timing table

DE mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	40.8	51.2	67.2	MHz
Horizontal display area	thd	1024			DCLK
HSD period	th	1114	1344	1400	DCLK
HSD blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd	600			T _H
VSD period	tv	610	635	800	T _H
VSD blanking	tvbp+tvfp	10	35	200	T _H

Table 10.4: DE mode (1024x600)

HV mode

• Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	44.9	51.2	63	MHz
Horizontal display area	thd	1024			DCLK
HSD period	th	1200	1344	1400	DCLK
HSD pulse Width	thpw	1	-	140	DCLK
HSD back porch	thbp	160			DCLK
HSD front porch	thfp	16	160	216	DCLK

Table 10.5: HV mode horizontal timing (1024x600)

• Vertical timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	600			T _H
VSD period	tv	624	635	750	T _H
VSD pulse width	tvpw	1	-	20	T _H
VSD back porch	tvbp	23			T _H
VSD front porch	tvfp	1	12	127	T _H

Table 10.6: HV mode vertical timing (1024x600)

5.4 Data input format

• Vertical timing

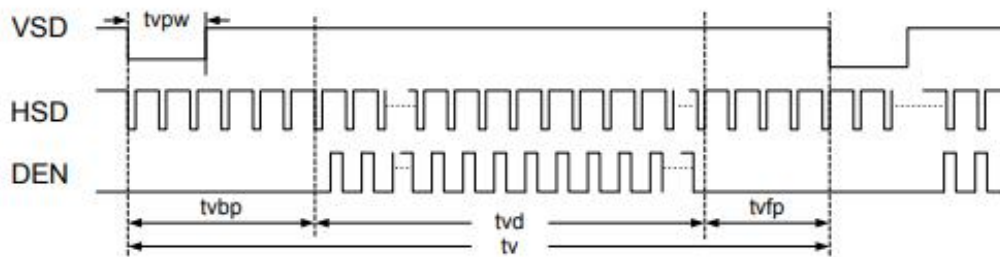


Figure 10.2: Vertical input timing diagram

• Horizontal timing

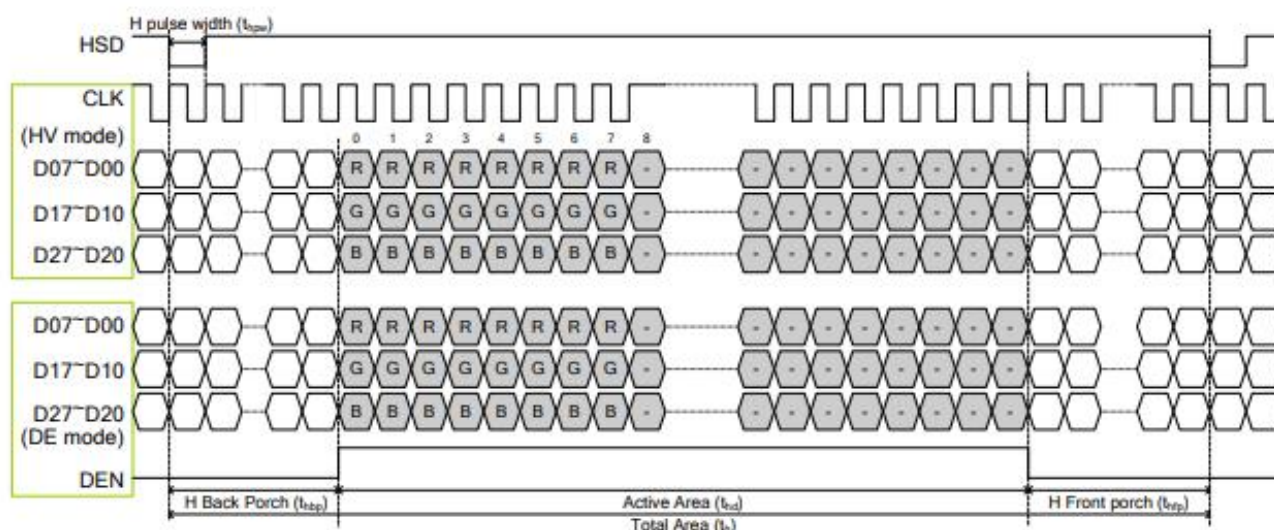


Figure 10.3: Horizontal input timing diagram

5.5 Output timing table

Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max.	
CLKIN frequency	Fclk	VDD=3.0V~3.6V	-	65	71	MHz
CLKIN cycle time	Tclk	-	14.1	15.4	-	ns
CLKIN pulse duty	Tcwh	Tclk	40	50	60	%
Time from HSD to source output	Thso	-	64			CLKIN
Time from HSD to LD	Thld	-	64			CLKIN
Time from HSD to STV	Thstv	-	2			CLKIN
Time from HSD to CKV	Thckv	-	20			CLKIN
Time from HSD to OEV	Thoev	-	4			CLKIN
LD pulse width	Twld	-	10			CLKIN
CKV pulse width	Twckv	-	66			CLKIN
OEV pulse width	Twoev	-	74			CLKIN

Table 11.1: Parallel 24-bit RGB mode

5.6 Timing diagram

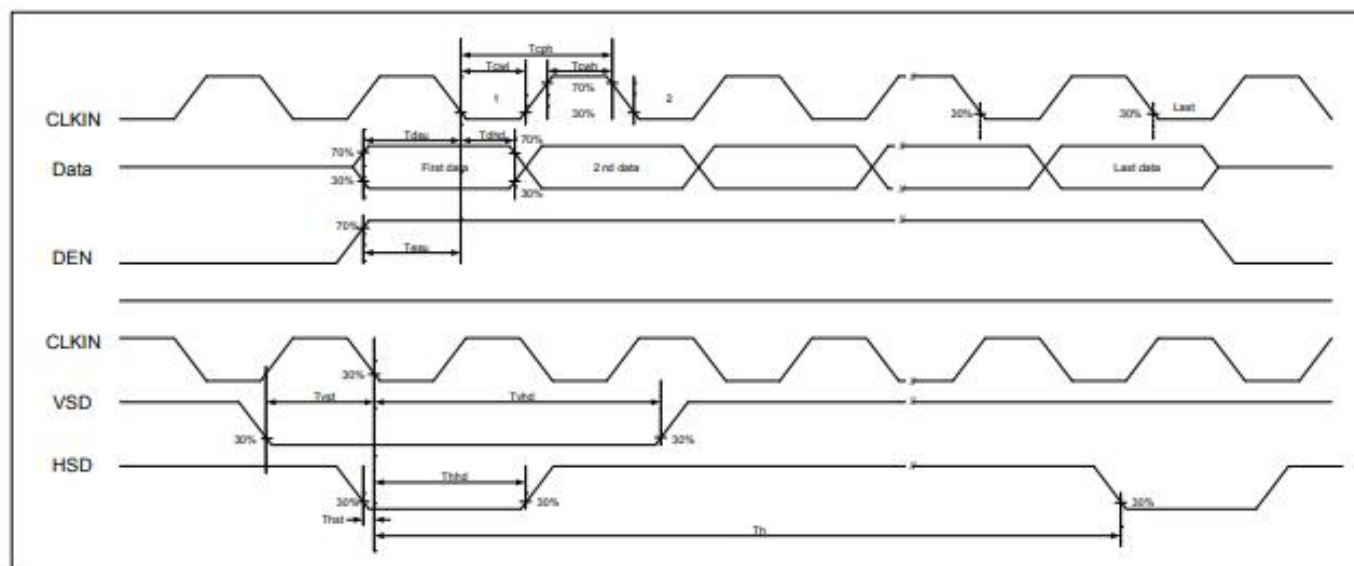


Figure 11.1: Input clock and data timing diagram

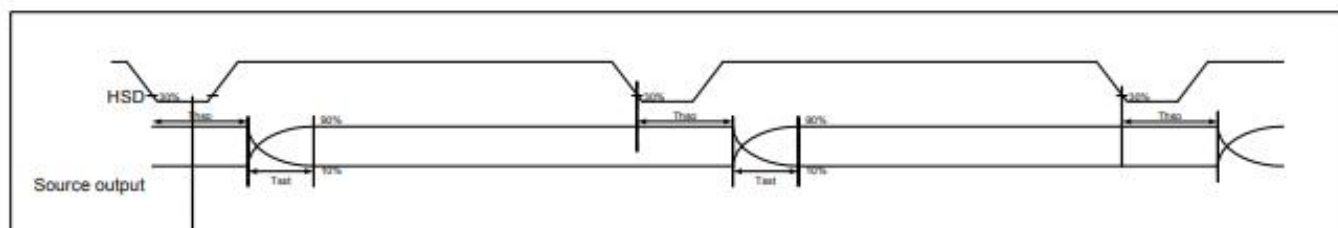


Figure 11.2: Source output timing diagram

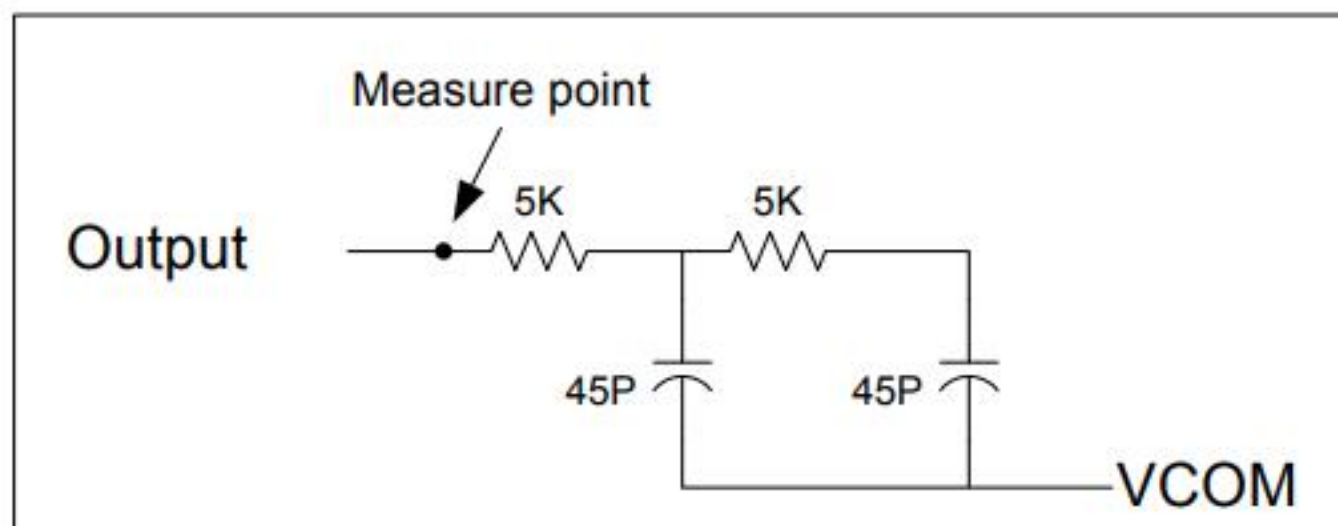


Figure 11.3: Output load condition

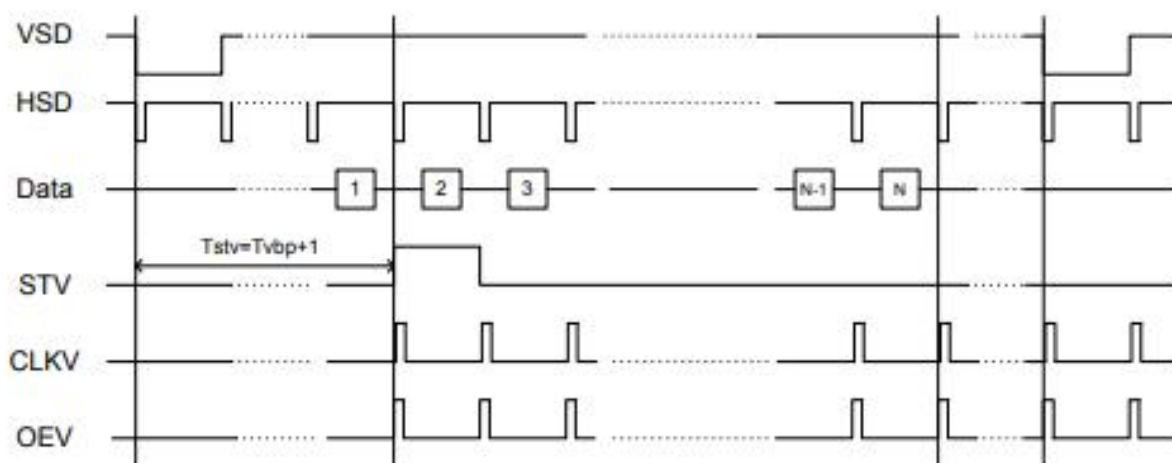


Figure 11.4: Vertical timing diagram HV (Cascade)

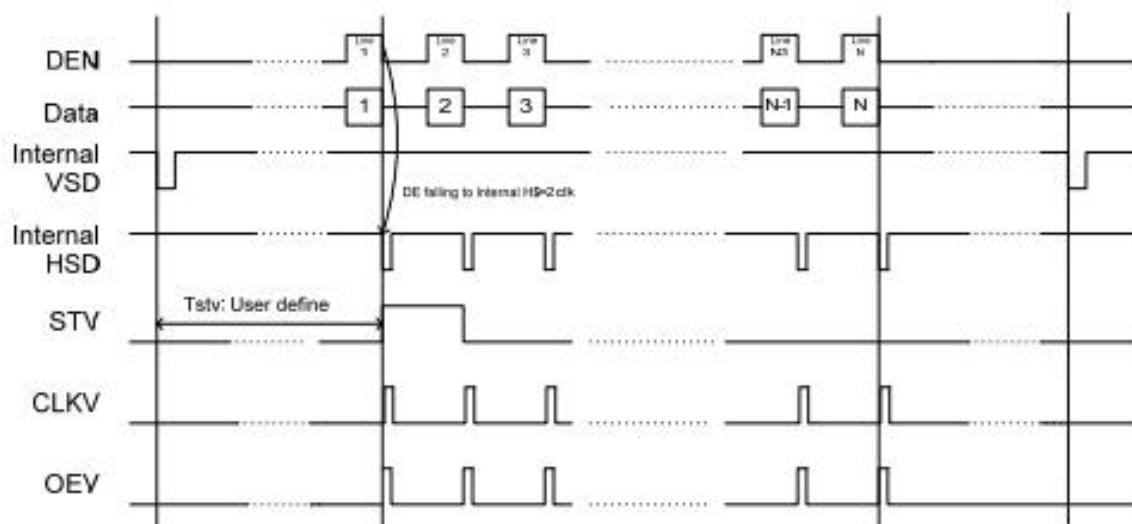


Figure 11.5: Vertical timing diagram DE (Cascade)

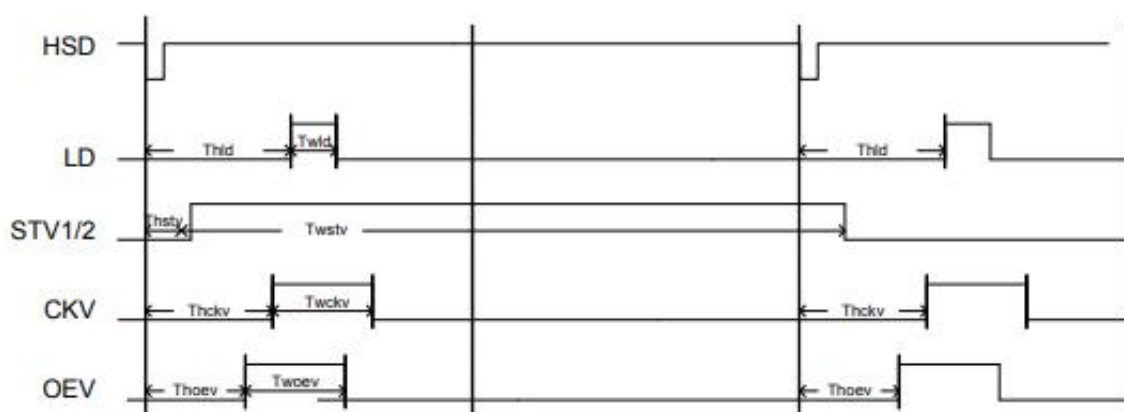


Figure 11.6: Gate output timing diagram (Cascade)

6. Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR≥10) B/L ON	θ_T	$\Phi=90^\circ$ (12 o'clock)	-	85	-	deg	Note2
	θ_B	$\Phi=270^\circ$ (6 o'clock)	-	85	-	deg	Note2
	θ_L	$\Phi=180^\circ$ (9 o'clock)	-	85	-	deg	Note2
	θ_R	$\Phi=0^\circ$ (3 o'clock)	-	85	-	deg	Note2
Response Time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	15	20	msec	Note4
	T_{OFF}		-	15	20	msec	Note4
Contrast Ratio	CR		-	800	-	-	Note1 Note3
Color Chromaticity	W_X		0.260	0.290	0.320	-	Note1 Note5
	W_Y		0.282	0.312	0.342	-	Note1 Note5
Luminance	L		350	400	-	cd/m ²	Note1 Note7
Luminance Uniformity	Y_U		75	80	-	%	Note1 Note6
NTSC	-		-	50	-	%	-

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.

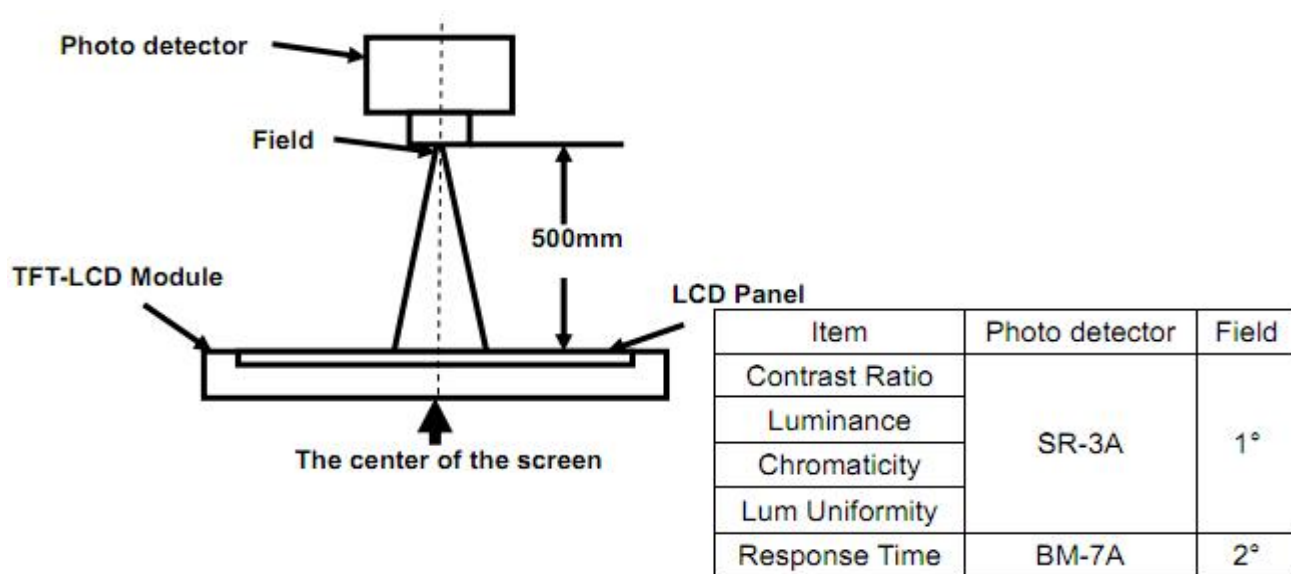


Fig 1

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).

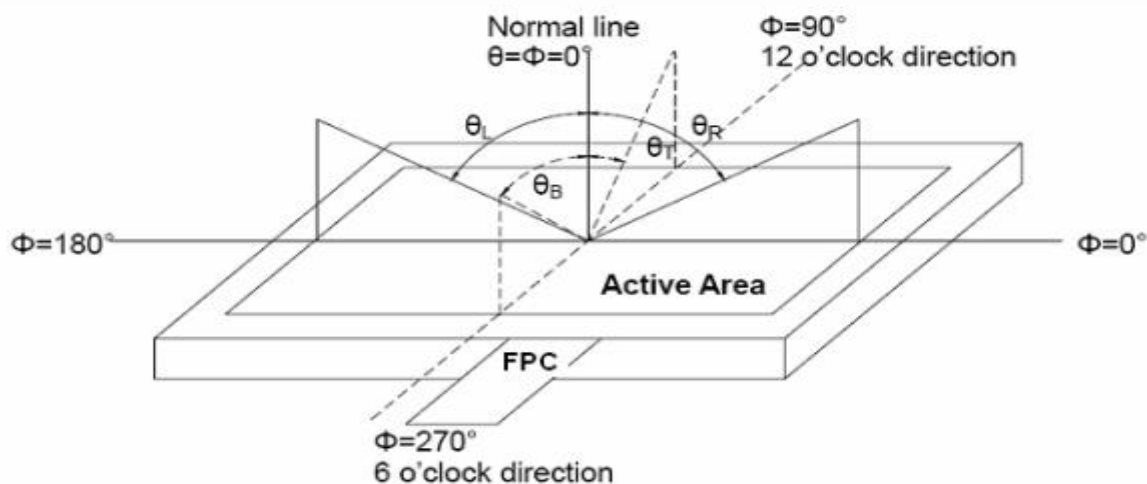


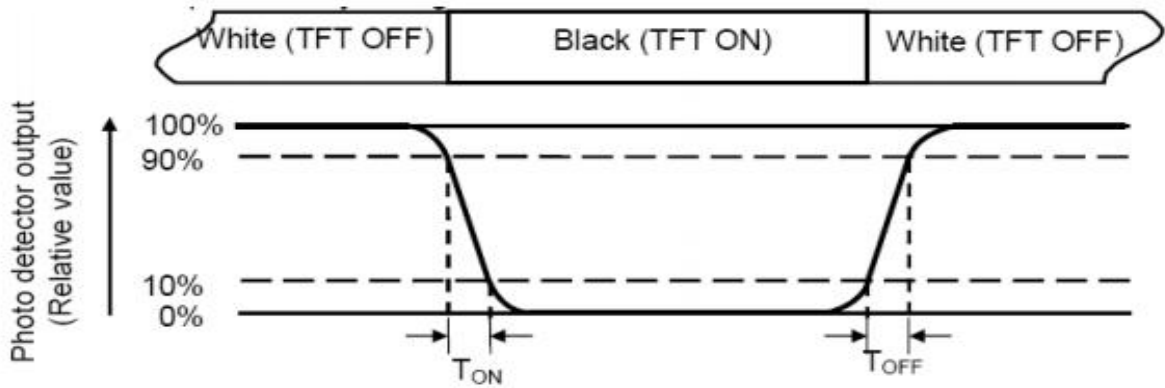
Fig 2 Definition of viewing angle

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 (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%.



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.

L_v = Average Surface Luminance with all white pixels ($P_1, P_2, P_3, \dots, P_n$)

For more information see FIG.3-a/b

Note 8: Size : $S \leq 5"$ (see Figure a) A : 5 mm B : 5 mm. H, V : Active area

Light spot size $\varnothing = 5\text{mm}$ (BM-5) or $\varnothing = 7.7\text{mm}$ (BM-7) 50cm distance or test spot position : see Figure a.

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

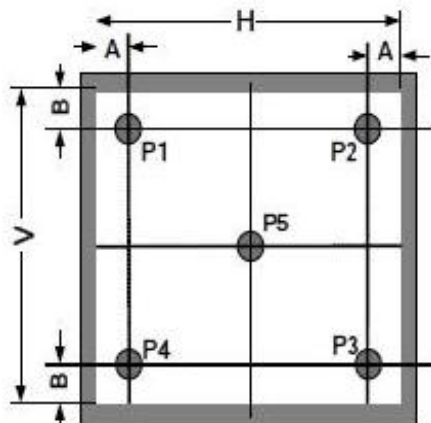


Fig. 3-a Definition of points

$5'' < S \leq 12.3''$ (see Figure b) . H,V : Active area

Light spot size $\varnothing = 5\text{mm}$ (BM-5) or $\varnothing = 7.7\text{mm}$ (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).

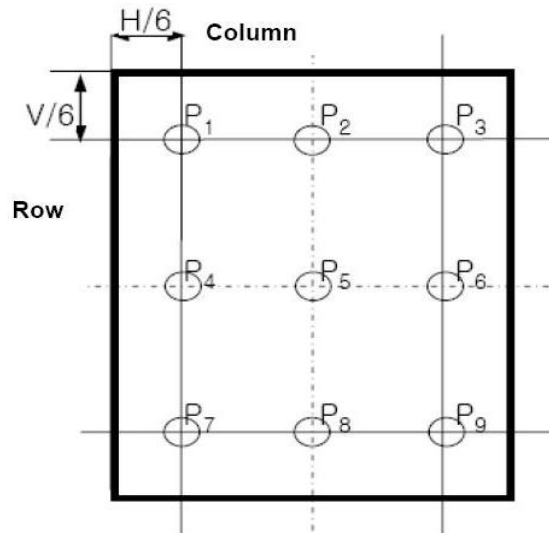


Fig. 3-b Definition of points

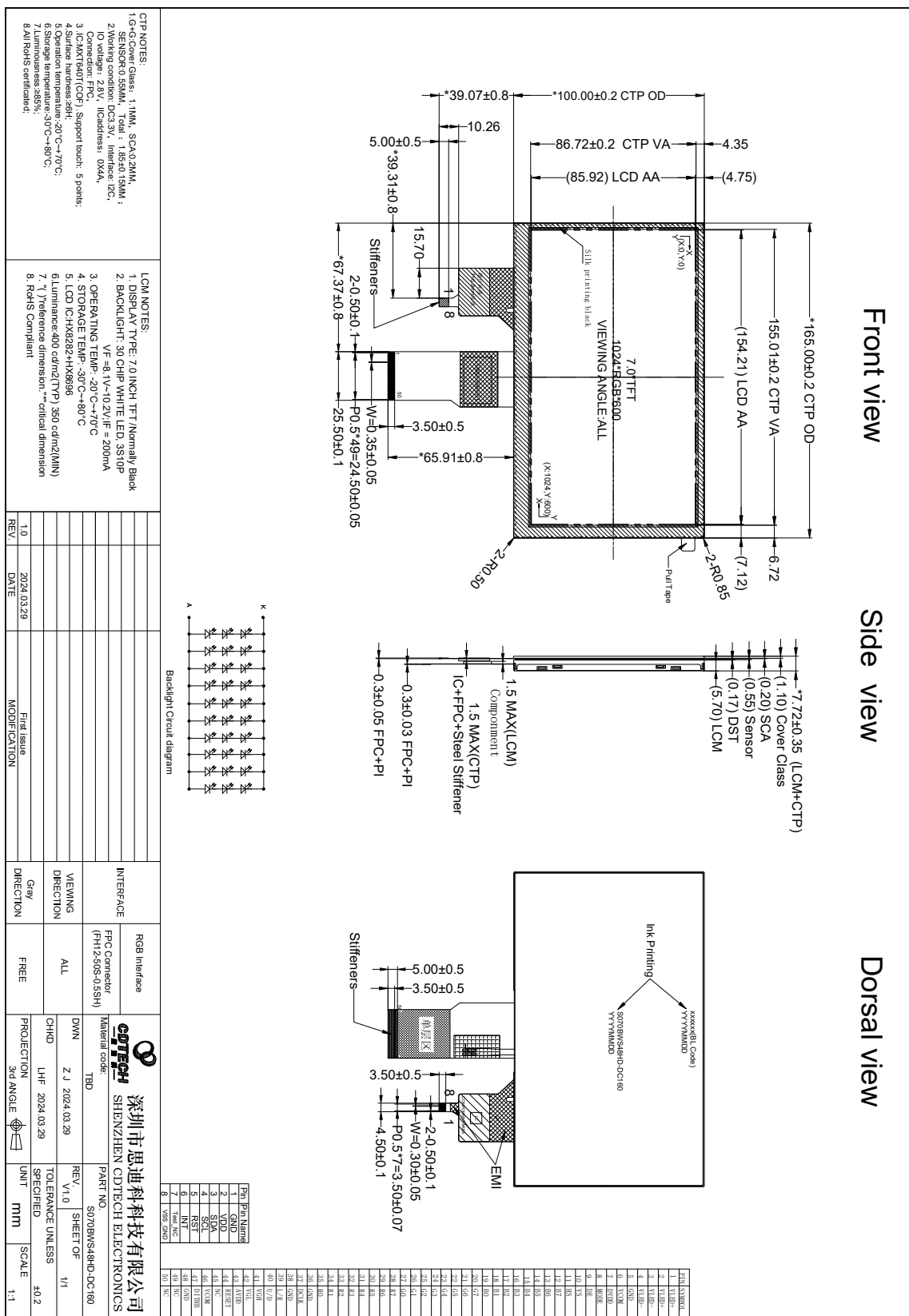
7. Reliability Test Items

Test Item	Test Conditions
High Temperature Storage	Ta= +80℃ 96hrs
Low Temperature Storage	Ta= -30℃ 96hrs
High Temperature Operation	Ta= +70℃ 96hrs
Low Temperature Operation	Ta= -20℃ 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:

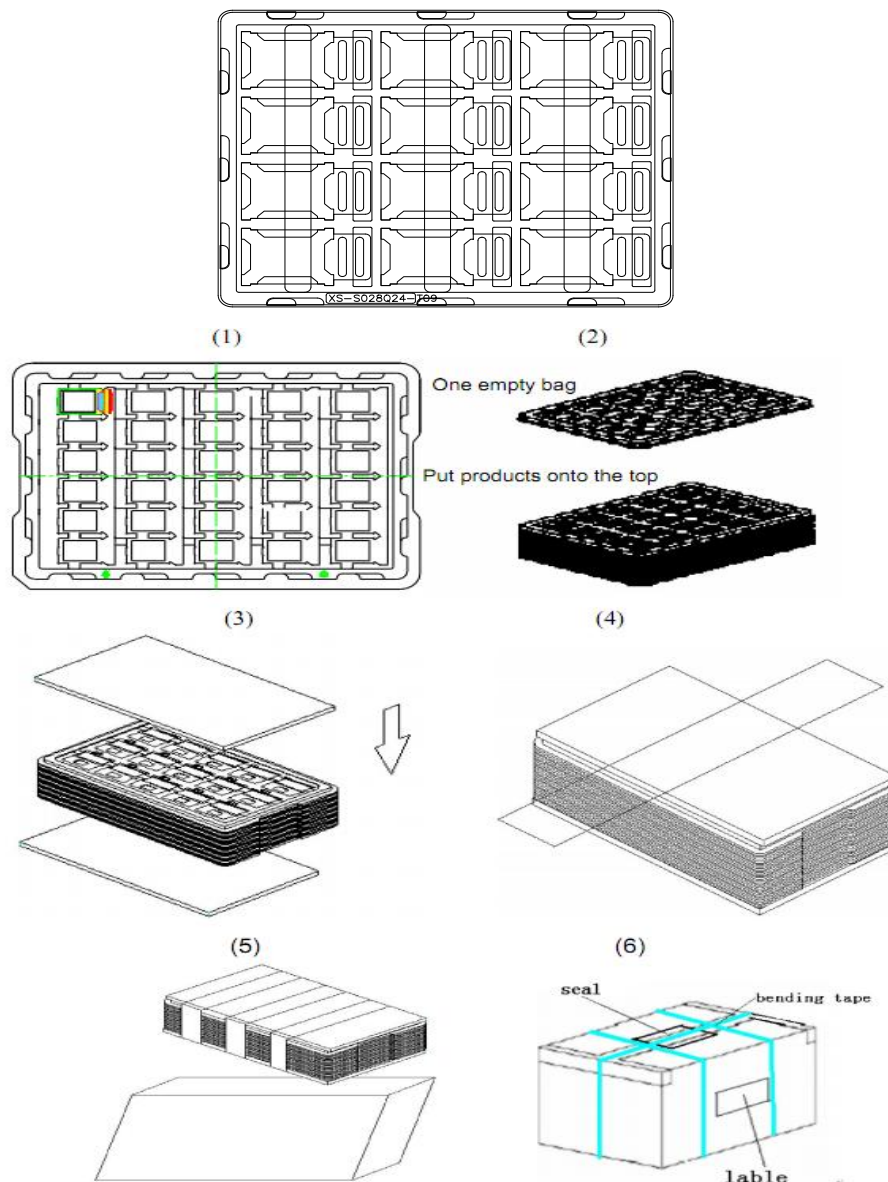
- 1). Air bubble in the LCD
- 2). Seal leak or Glass crack
- 3). Non display or abnormal display
- 4). Brightness reduction >50%

8. Mechanical Drawing



9. Packing

Packing Method



Steps:

1. Put module into tray cavity
2. Tray stacking
3. Put 1 cardboard under the tray stack and 1 cardboard above
4. Fix the cardboard to the tray stack with adhesive tape
5. Put the tray stack into carton
6. Carton sealing with adhesive tape

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.