SPECIFICATION

Customer:	
Model Name:	TI070IP400
SPEC NO.:	
Date:	2024.07.26
Version:	V02

■ Preliminary Specification
□ Final Specification

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by
		李长林

Record of Revision

Version	Revise Date	Page	Content
V02	2024.07.26	5	Add 40th pin Description

Contents

1. General Specifications

No.	Item	Specification	Unit
1	LCD size	7.0	inch
2	Pixel pitch	26.25(H)X 78.75(V)	um
3	Active area	94.5 (H) x 151.2 (V)	mm
4	Module size(FOB)	98.76 (H)X161.06(V)X 2.76(T)	mm
5	Number of pixel	1200 RGB(H)X 1920 (V)	pixels
6	Number of colors	16.7M	colors
7	Interface	MIPI	
8	Display mode	Normally Black	
9	Pixel arrangement	RGB Vertical stripe	
10	Surface Treatment	AG	
11	NTSC	77	%
12	Brightness	N/A	cd/m2
13	Backlight power consumption	400	W
14	Panel power consumption	TBD	W
15	Module Weight	TBD	g

Note 1: Refer to Mechanical Drawing.

2..Pin Assignment

Pin No.	Symbol	Description	Remark
1	TE	Tearing Effect	
2	VPP	No Connection	
3	TP-RST	TP reset (High 1.8V)	
4	TP-INT	Interrupt request to the host signal for TP	
5	TP-I2C-SDA	I2C data bus for TP	
6	TP-I2C-SCL	I2C clock bus for TP	
7	GND	Ground	
8	TP-VDD	Power supply for TP	
9	TP-IOVCC/NC	No connection	
10	LCM-RST	LCM Global reset(High 1.8V)	
11	LCD-PWM	Content adaptive brightness control function	
12	LCD-IOVCC	Power supply for LCD 1.8V	
13	LCD-IOVCC	Power supply for LCD 1.8V	
14	GND	Ground	
15	LCD-VDD	Power supply for LCD 3.3V	
16	LCD-VDD	Power supply for LCD 3.3V	
17	GND	Ground	
18	D3N	MIPI differential data input (Negative)	
19	D3P	MIPI differential data input (Positive)	
20	GND	Ground	
21	D0N	MIPI differential data input (Negative)	
22	D0P	MIPI differential data input (Positive)	
23	GND	Ground	
24	CLKN	MIPI differential clock input (Negative)	
25	CLKP	MIPI differential clock input (Positive)	
26	GND	Ground	
27	D1N	MIPI differential data input (Negative)	
28	D1P	MIPI differential data input (Positive)	
29	GND	Ground	
30	D2N	MIPI differential data input (Negative)	
31	D2P	MIPI differential data input (Positive)	
32	GND	Ground	
33	NC	No connection	
34	FB1/K	Backlight Cathode CH1	
35	FB2/K	Backlight Cathode CH2	
36	FB3/K	Backlight Cathode CH3	
37	NC	No Connection	
38	VLED/A	Backlight Anode	
39	VLED/A	Backlight Anode	
40	NC	NC	

3. Operation Specifications

3.1.1. Absolute Maximum Ratings

The following are maximum values which，if exceeded，may cause faulty operation or damage to the unit.

Item	Symbol	Values		Unit
		Min.	Max.	
Power Voltage	LCD-IOVCC	-0.3	1.95	V
	LCD-VDD	-0.3	3.6	
Input Signal Voltage	V_I	-0.3	LCD-IOVCC	V
Operation Temperature	T_{OP}	-20	70	℃
Storage Temperature	T_{ST}	-30	80	℃

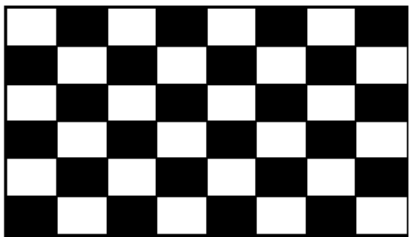
Note: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed. There is a risk of permanent damage to the product.

3.1.2. Typical Operation Conditions

Item	Symbol	Values			Unit
		Min.	Typ.	Max.	
Power Voltage	LCD-IOVCC	1.65	1.8	1.95	V
	LCD-VDD	3.0	3.3	3.6	
Current Consumption	I_{VDD}	-	TBD	-	mA
Power Consumption	P_{VDD}	-	TBD	-	W
Power Consumption	P_{LED}	-	N/A	-	W

Note :1. The measuring position is the connector of LCM and the test conditions are under 25℃, Frame Rate=60Hz

2. The specified current and power consumption are under the VCC = 3.3V , 25℃, Frame Rate=60Hz condition and Mosaic pattern



3.1.3. Backlight Driving Conditions

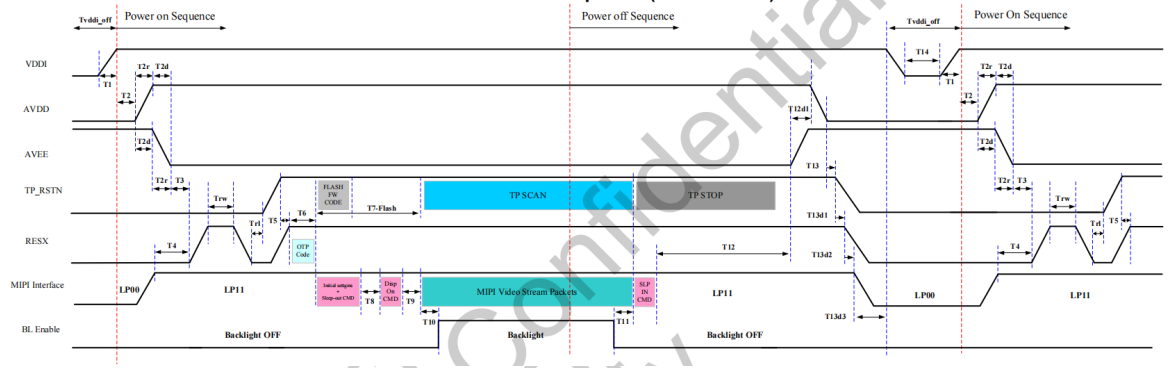
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V_L	8.4	9	10.2	V	Note 1
Current for LED backlight	I_L	-	140	-	mA	
LED life time	-	20,000	-	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25 ℃ and IL=140mA

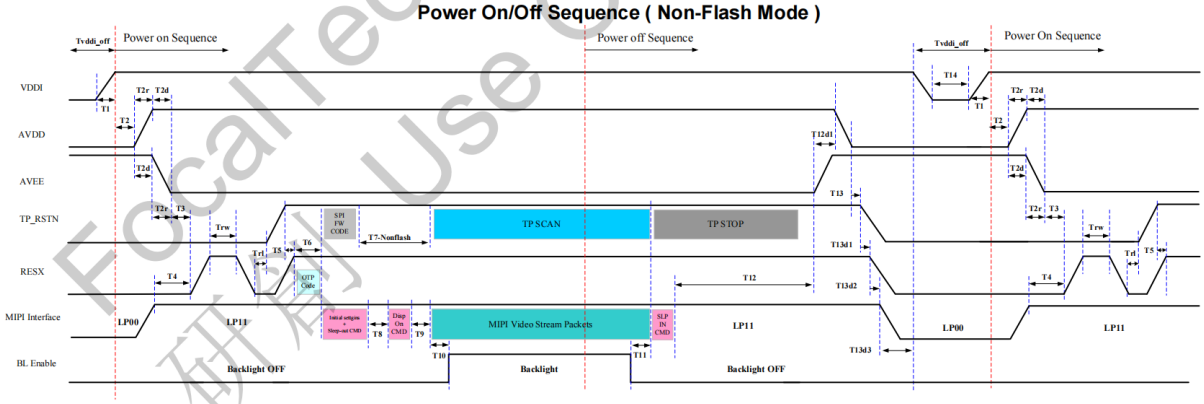
Note 2: The " LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25 ℃ and IL=140mA.The LED lifetime could be decreased if operating IL is lager than 140mA.

3.2. Power On/Off Sequence

Power On/Off Sequence (Flash Mode)



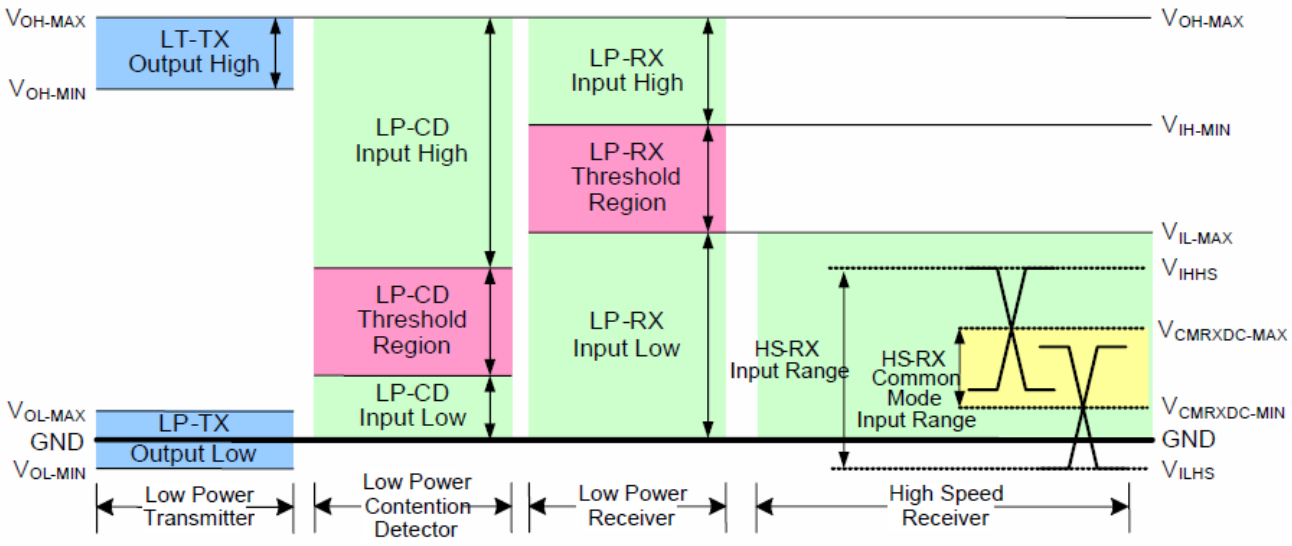
Power On/Off Sequence (Non-Flash Mode)



FT8206 Power On / Off Sequence Timing					
Parameter	Description	Min	Typ	Max	ms
T1	Rise time from 0.1*VDDI to 0.9*VDDI	0		5	ms
T2	AVDD power up after VDDI power on	3			ms
T2d	AVEE power up after AVDD power up	0			ms
T2r	Rise time from 0.1*AVDD to 0.9*AVDD Rise time from 0.1*AVEE to 0.9*AVEE	0.1		5	ms
T3	RESX reset release time after AVDD/AVEE power on	5			ms
T4	MIPI signals start (Hi-Z/GND to LP11) to RESX rising edge	0			ms
T5	TP Reset release to LCD Reset release	0			ms
T6	FLASH/OTP Settings download finished after RESX released MIPI may start to send Initial Settings + Sleep-out CMD SPI/Flash may start to send FW code			35	ms
T7-Nonflash	SPI FW Code download finish to TP SCAN Start (Non-flash mode)			200	ms
T7-Flash	Flash FW Code download start to TP SCAN Start (Flash mode)			280	ms
T8	Sleep-out CMD to Display-On CMD		120		ms
T9	Display-On CMD to MIPI Video Stream On time	10			ms
T10	MIPI Video Stream On time to Backlight On time	100			ms
T11	Backlight Off time to MIPI Video Stream Off time	100			ms
T12	AVEE power down after Sleep-In CMD	150			ms
T12d1	AVDD power down after AVEE power down	0			ms
T13	TP_RSTN falling edge after AVDD power down	0			ms
T13d1	In Power Off Sequence, TP_RSTN falling edge to RESX falling edge	0			ms
T13d2	In Power Off Sequence, RESX falling edge to MIPI interface power down	0			ms
T13d3	In Power Off Sequence, MIPI Interface power down to VDDI power down	3			ms
T14	VDDI rise again after VDDI power down (0.1*VDDI)	50			ms
T15	RESX falling edge (Exit from DSTB Mode) to RESX rising edge	5		120	ms
Trl	2nd RESX reset low width to TP_RSTN rising	5			ms
Trw	RESX high level width before 2nd RESX reset	5		10	ms

3.3 Timing Characteristics

3.3.1 MIPI DC Characteristics



MIPI signaling and contention voltage levels

DC characteristics for MIPI LP mode

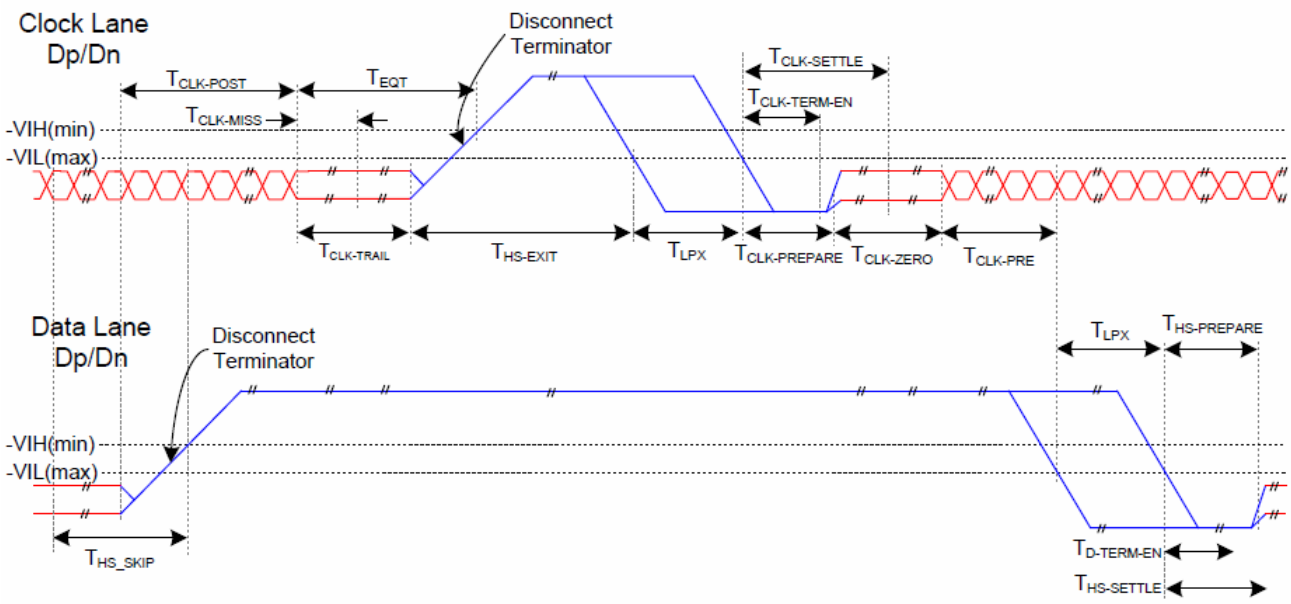
Parameter	Symbol	Spec. Min.	Typ.	Max.	Unit
Logic 1 input voltage	V_{IH}	880	-	-	mV
Logic 0 input voltage	V_{IL}	0	-	550	mV
Logic 1 output voltage	V_{OH}	1.1	1.2	1.3	V
Logic 0 output voltage	V_{OL}	-50	-	50	mV

DC characteristics for MIPI HS mode

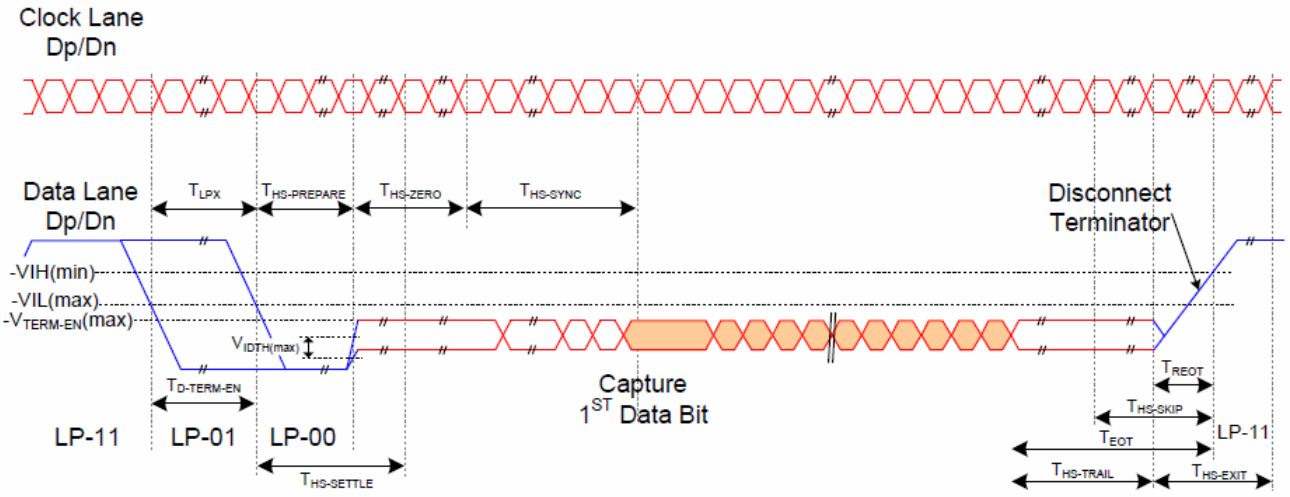
Parameter	Symbol	Spec. Min.	Typ.	Max.	Unit
Common-mode voltage HS Receive mode	V_{CMRXDC}	70	-	330	mV
Differential input high threshold(1)	V_{IDTH}	-	-	70	mV
Differential input low threshold(1)	V_{IDTL}	-70	-	-	mV
Single-ended input high voltage	V_{IHHS}	-	-	460	mV
Single-ended input low voltage	V_{ILHS}	-40	-	-	mV
Differential input impedance	Z_{ID}	80	100	125	Ω
HS transmit differential voltage (VDP-VDN)	|VOD|	140	200	270	mV

Note: (1) V_{IDTH} and V_{IDTL} only for reference, related to power and ground noise, this spec need to check on panel performance to fine tune

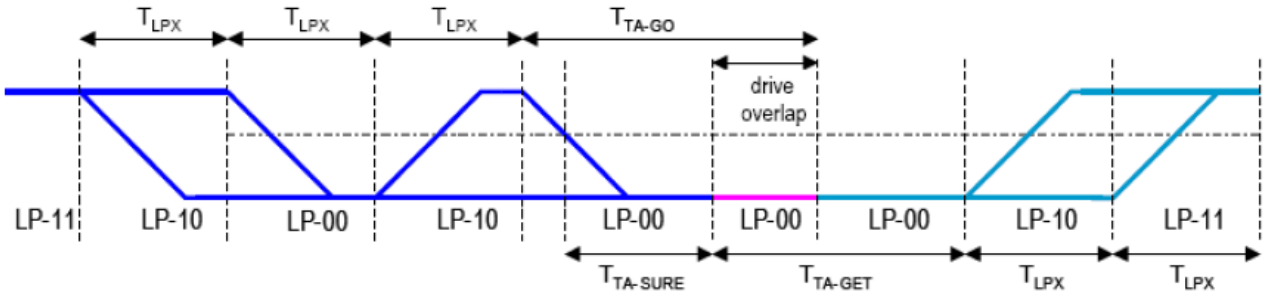
3.3.2 MIPI AC Characteristics



Switching the clock lane between clock transmission and low-power mode

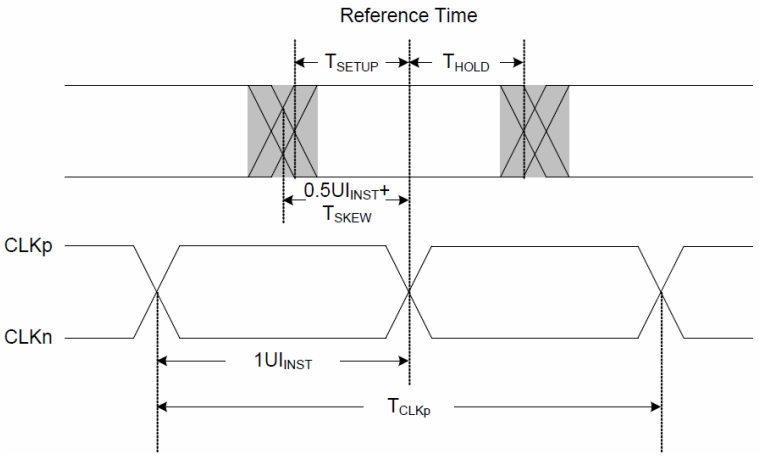


Timing of high-speed data transmission in bursts



Turnaround Procedure

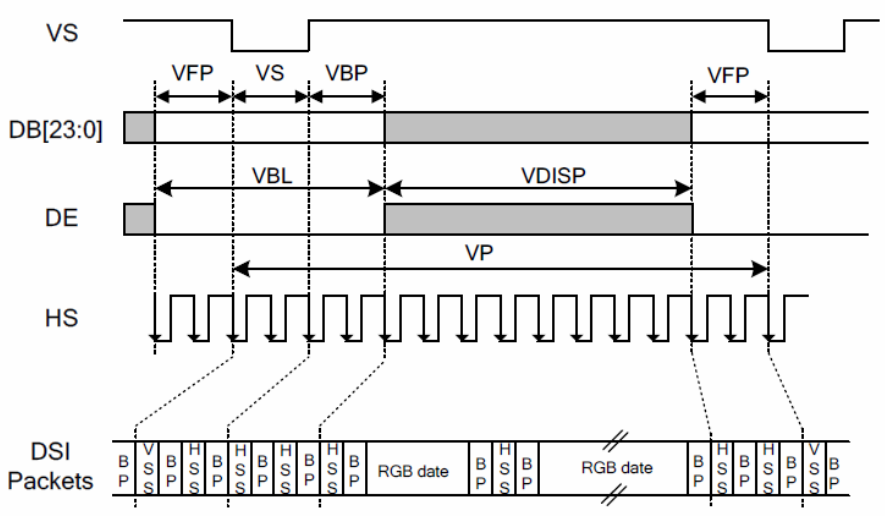
3.3.3 MIPI data-clock timing specification



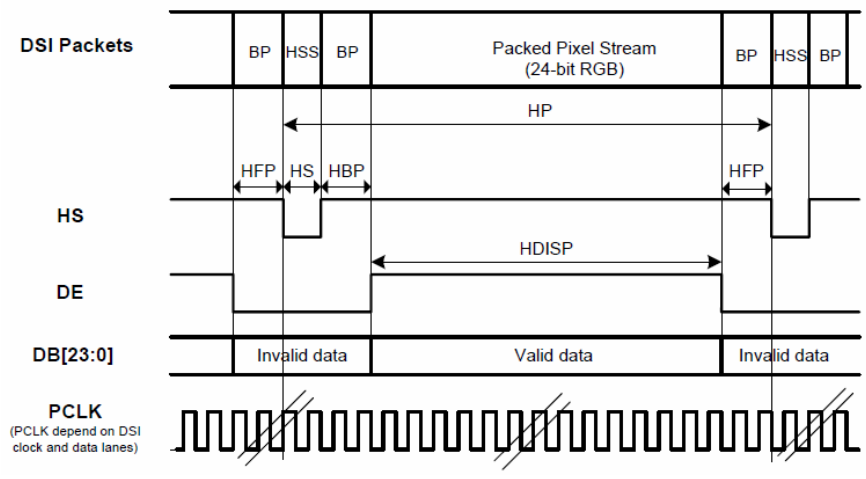
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
UI instantaneous	UI_{INST}	1.0	-	12.5(1)	ns
Data to clock setup time	T_{SETUP}	0.15(2)	-	-	UI_{INST}
Data to clock hold time	T_{HOLD}	0.15(2)	-	-	UI_{INST}

Note: (1) This value corresponds to a minimum 80 Mbps data rate.
(2) Total SETUP and HOLD window for receiver of 0.3* UI_{INST}

3.3.4 Timings for DSI video mode



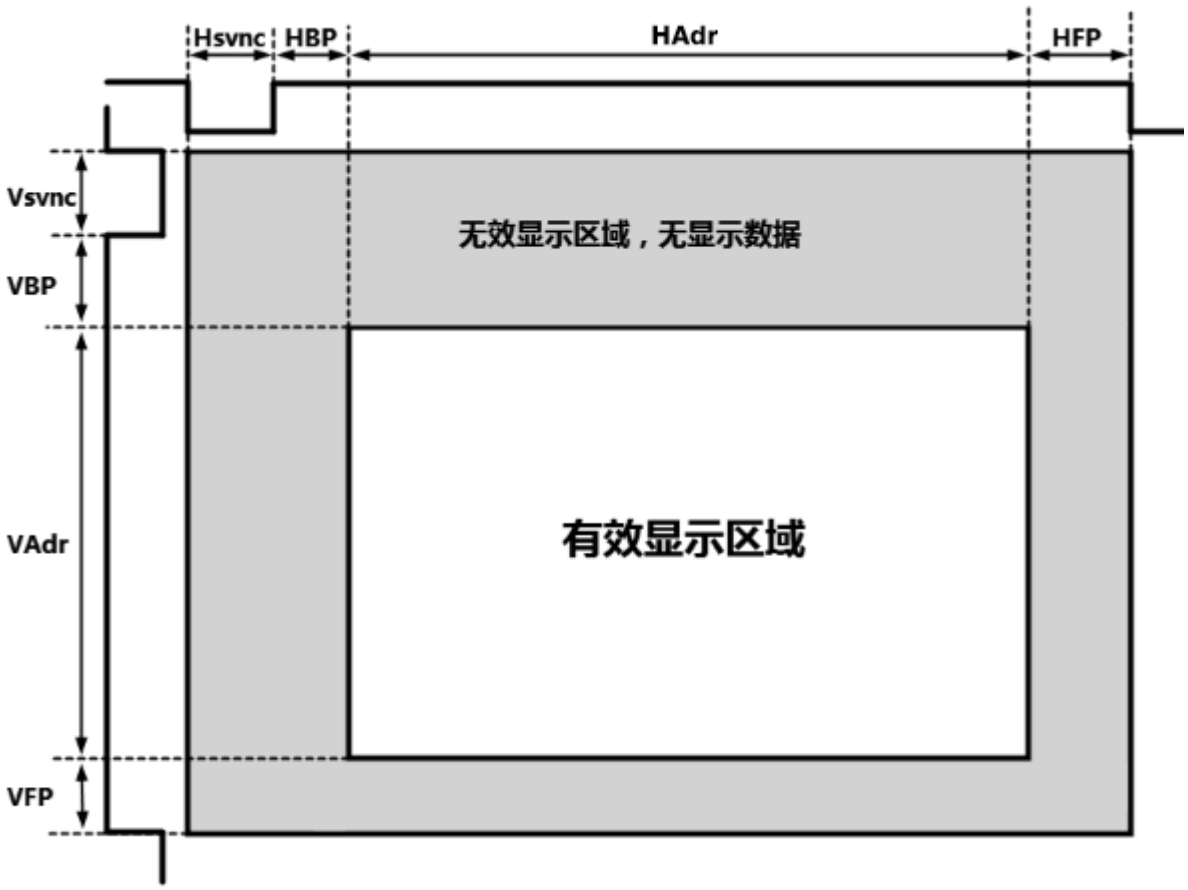
Vertical timings for DPI I/F



Horizontal timing for DSI video mode I/F

3.3.5 Timing Setting Table

Parameter		Symbol	Min.	Typ.	Max.	Unit
Frame Rate		/	-	60	-	Hz
Clock frequency		1/Tclock	-	159	-	MHz
Horizontal Section	Period	Th	-	1200	-	Tclock
	Active	THAdr	1248			
	Blanking	THBP	-	18	-	
		THFP	-	20	-	
		THsync	-	10	-	
Vertical Section	Period	Tv	-	1920	-	Tline
	Active	TVAdr	2124			
	Blanking	TVBP	-	32	-	
		TVFP	-	168	-	
		TVsync	-	4	-	



4.Optical specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180° (9 o'clock)	-	80	-	degree	Note 1
	θ_R	Φ=0° (3 o'clock)	-	80	-		
	θ_T	Φ=90° (12 o'clock)	-	80	-		
	θ_B	Φ=270° (6 o'clock)	-	80	-		
Response time Rise+Fall	T_{RT}	Normal θ=Φ=0°	-	25	30	msec	Note 3
Contrast ratio	CR		-	1200	-	-	Note 4
Color chromaticity	W_X		0.275	0.295	0.315	-	Note 2
	W_Y		0.284	0.304	0.324	-	Note 5
NTSC	Ratio		72	77	-	%	Note 6
Luminance	L		320	400	-	cd/㎡	Note 6
Luminance uniformity	Y_U	9 AVG	-	80	-	%	Note 6-7

Note 1: Definition of viewing angle range

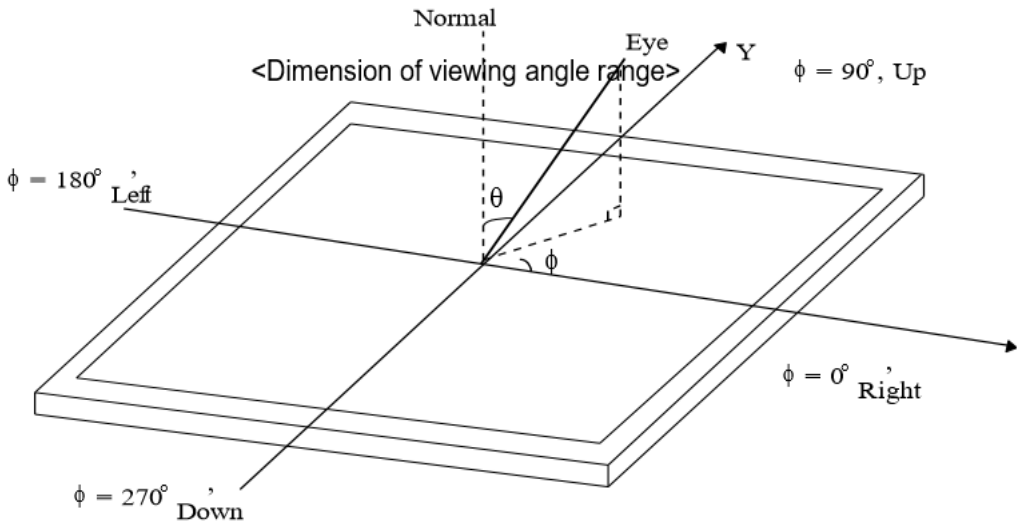


Fig. 4-1 Definition of viewing angle

Note 2: 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. (Viewing angle is measured by ELDIM-EZ contrast/Height :1.2mm ,Response time is measured by Photo detector TOPCON BM-5A, other items are measured by BM-7A/Field of view: 1° /Height: 500mm.)

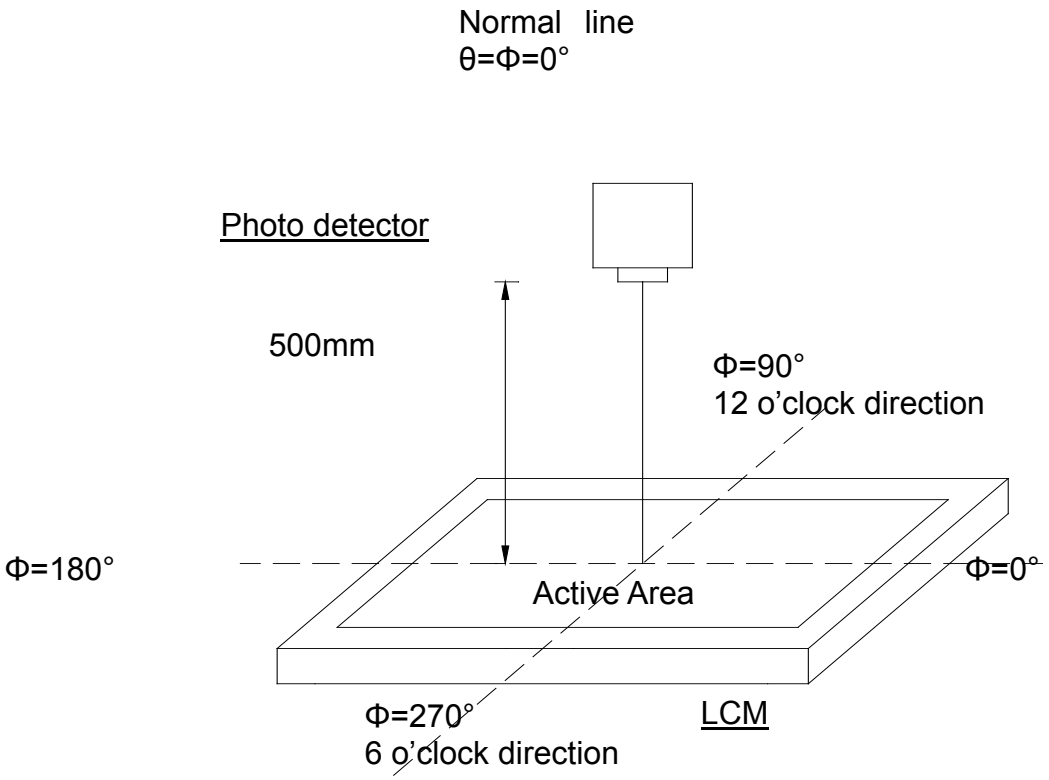


Fig. 4-2 Optical measurement system setup

Note 3: 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%.

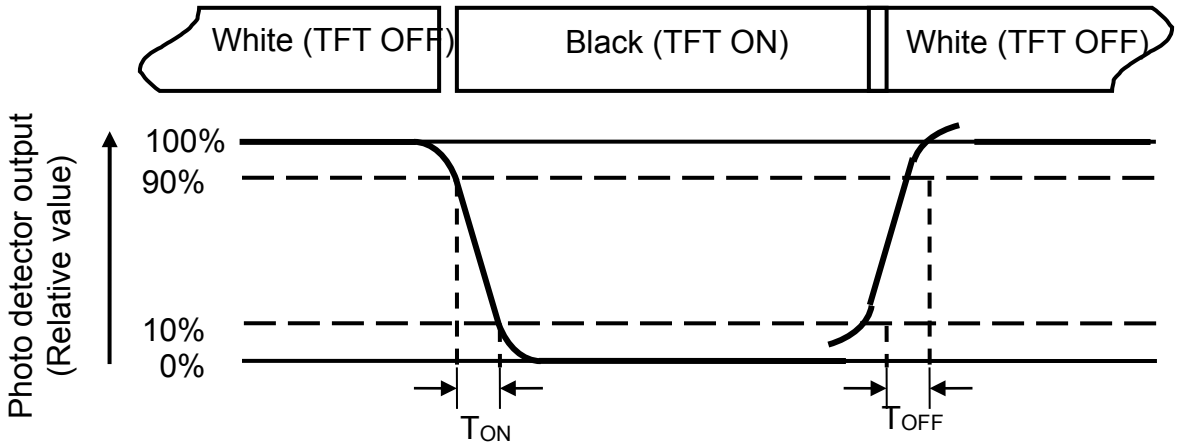


Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel.

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$Luminance\ \ Uniformity\,(Yu) = \frac{B_{min}}{B_{max}}$$

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

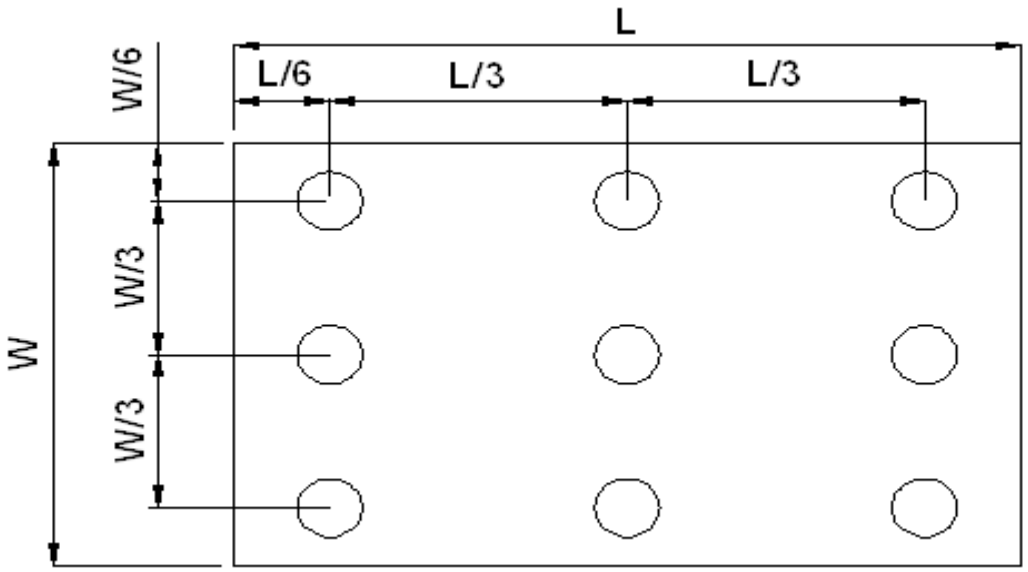


Fig. 4-4 Definition of measuring points

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

5. Reliability Test Items

Item	Test Conditions		Remark
High Temperature Storage	Ta =80℃	240hrs	
Low Temperature Storage	Ta = -30℃	240hrs	
High Temperature Operation	Ts = 70℃	240hrs	
Low Temperature Operation	Ta =-20℃	240hrs	
Operate at High Temperature and Humidity	60℃, 90%RH max.	240hrs	Operation
Thermal Shock	-20℃~+70℃ 100cycles	0.5Hrs/cycle	Non-operation
Electrostatic Discharge	Contact=±4KV, class B Air=±8KV, class B		

Note1: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note2: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

6.General Precautions

6.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

6.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the Ics.

6.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

6.4. Storage

1. Store the module in a dark room where must keep at 25±10℃ and 65% RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas
3. Store the module in an anti-electrostatic container or bag.

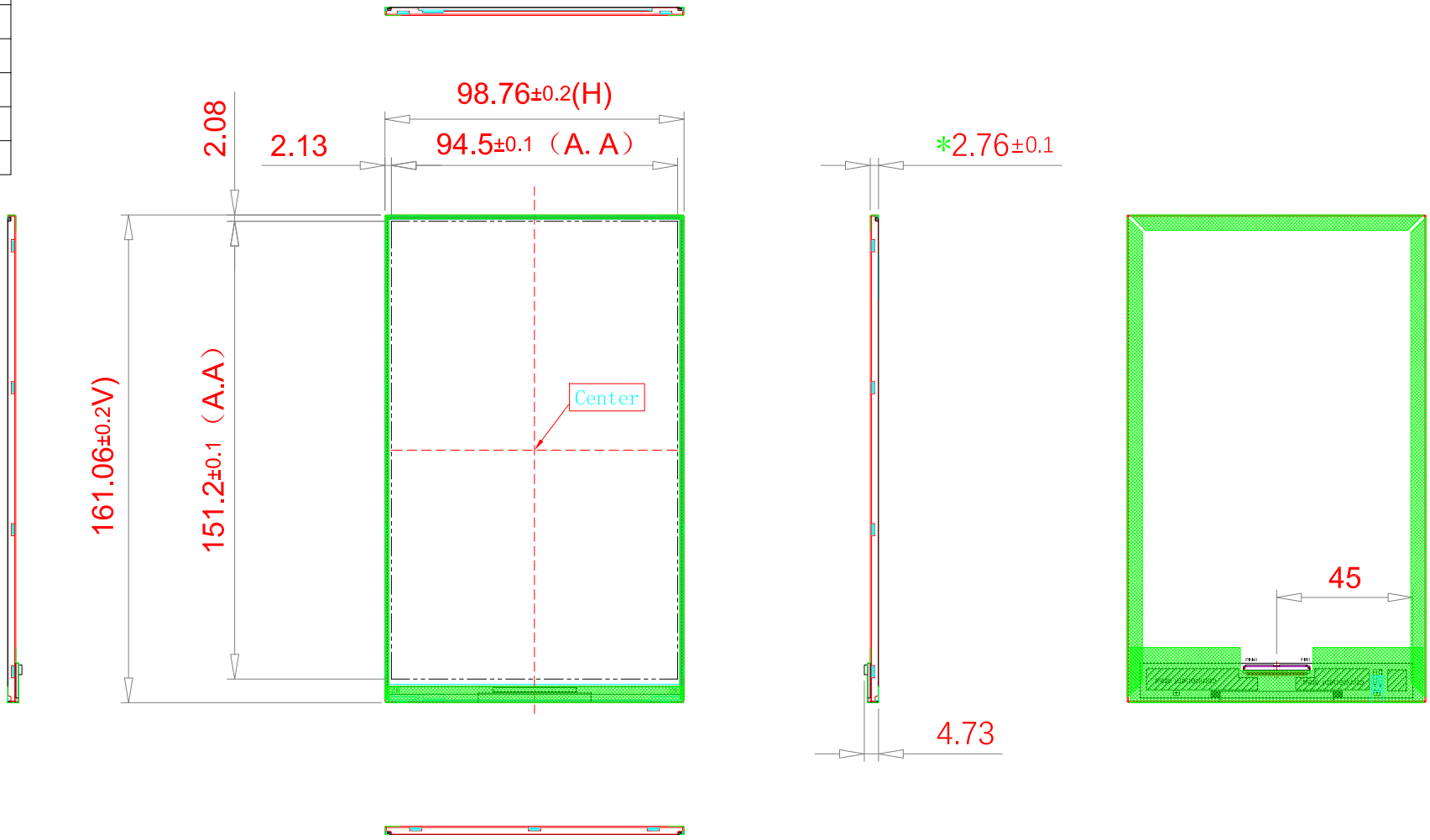
6.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

7.Mechanical Drawing

Tolerance Table	
Size	Tolerance
0-6	±0.08
6-20	±0.11
20-50	±0.15
50-100	±0.25
100-250	±0.30
250-500	±0.40

Version	Mark	Modification	Date	Made by
V1.0			2023.08.08	Jackson Li



DESIGN		MODEL			CLASS	RATIO
		MATERIAL		FIRST PERSON		1：1
REVIEW		NO.		PAGE:1		TOTAL:1
				厦门炬垄森科技有限公司 Xiamen Toroson Technology Co., Ltd		
APPROVAL		SURFACE				

8.Packing and Label Format

TBD