

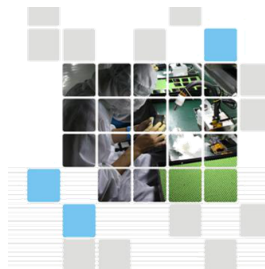
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SPECIFICATION

VXT101YIA-19C

☐ Preliminary Specification

☐ Final Specification



Approved By:

Date:

2. Revision Record

Date	Rev.No.	Page	Revision Items	Prepared
2024.08.01	V00		The first release	Solon

3. General Specifications

VXT101YIA-19C is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, CTP and a back light unit. The 10.1" display area contains 800 x (RGB) x 1280 pixels and can display up to 16.7M colors. This product accords with ROHS environmental criterion..

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M	-	1
Viewing Direction	ALL	O'Clock	
Operating temperature	-10 ~ +50	°C	
Storage temperature	-20 ~ +60	°C	
Module size	Refer to outline drawing	mm	2
Active Area(W×H)	135.36 X 216.58	mm	
Number of Dots	800 X 1280	dots	
TFT Controller	ILI9881C-04T00GA	-	
Power Supply Voltage	3.3	V	
Backlight	3S10P-LEDs (white)	pcs	
Interface	MIPI	-	

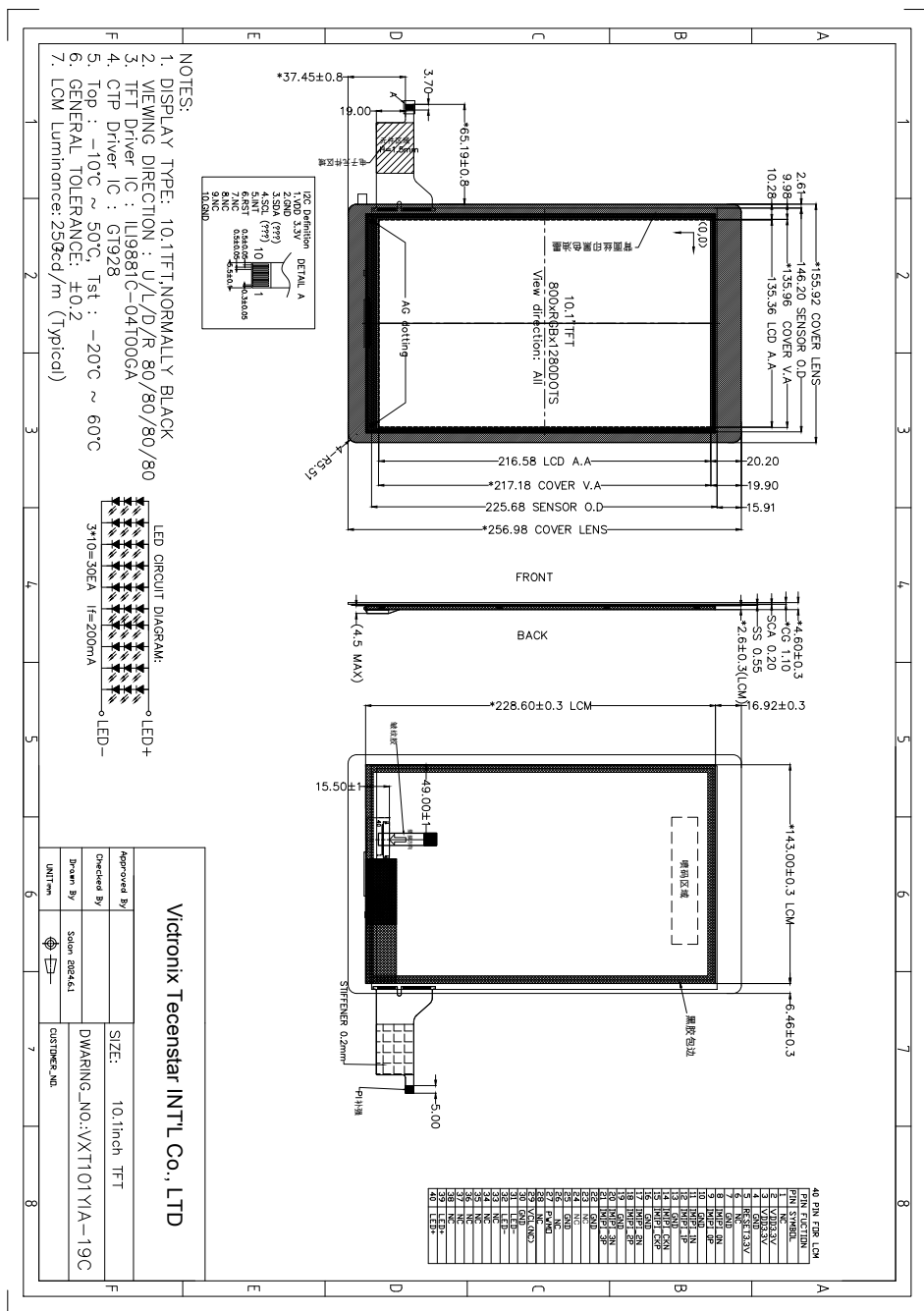
Note 1: Color tune is slightly changed by temperature and driving voltage.

Note 2: Without FPC and Solder.

3.2 CTP Parameter

Item	Contents	Unit	Note
Cover View Area	217.18(H)X135.96(V)		
CTP Resolution	1280×800	dots	
Interface Mode	I ² C/USB	-	
Touch Mode	10 Human fingers multi-touch	-	
Surface hardness	>=6H	-	
Transparency	>=85%	-	
Accuracy	Centre +/-1.5mm,Edge +/-2.5mm	mm	
CTP Controller	ILI2511	-	
Power Supply Voltage	3.3	V	

4.Outline.Drawing



5. Absolute Maximum Ratings(Ta=25°C)

5.1 Electrical Absolute Maximum Ratings.(Vss=0V ,Ta=25°C)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	VDD	-0.3	5.0	V	1, 2

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged.
Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2. $V_{DD} > V_{SS}$ must be maintained.
3. Please be sure users are grounded when handing LCD Module.

5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-20°C	60°C	-10°C	50°C	1,2
Humidity	-	-	-	-	3

1. The response time will become lower when operated at low temperature.
2. Background color changes slightly depending on ambient temperature.
The phenomenon is reversible.
3. $T_a \leq 40^\circ\text{C}$:85%RH MAX.
 $T_a > 40^\circ\text{C}$:Absolute humidity must be lower than the humidity of 85%RH at 40°C.

6. Electrical Specifications

6.1 Electrical characteristics for LCD(V_{SS}=0V ,T_a=25°C)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		V _{DD}	T _a =25°C	2.5	3.3	3.5	V	
		I _{VDD}		-	80	-	mA	
Input voltage	‘H’	V _{IH}	V _{DD} =3.3V	0.7V _{DD}	-	V _{DD}	V	
	‘L’	V _{IL}	V _{DD} =3.3V	0	-	0.3V _{DD}	V	

6.2.LED backlight specification(V_{SS}=0V ,T_a=25°C)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	V _f	I _f =200mA	-	9.0	-	V	
Uniformity	Δ Bp	I _f =200mA	80	-	-	%	
Life Time	time	I _f =200mA	30K	-		hours	1

S

Note 1: Brightness to be decreased to 50% of the initial value at ambient temperature T_A=25°C

6.3 Interface signals

6.3.1 CON1 MIPI FEMAL PIN TYPE A

Pin No.	Symbol	I/O	Function
1	NC	-	No connection.
2-3	VDD 3.3V	P	Power supply.
4	GND	P	Ground.
5	RESET 3.3V	I	Reset pin.
6	NC	-	No connection.
7	GND	P	Ground.
8	IMIP1_0N	I	MIPI-DSI Data differential signal input pins. (Data lane 0)
9	IMIP1_0P	I	
10	GND	P	Ground.
11	IMIP1_1N	I	MIPI-DSI Data differential signal input pins. (Data lane 1)
12	IMIP1_1P	I	
13	GND	P	Ground.
14	IMIP1_CKN	I	MIPI-DSI CLOCK differential signal input pins.
15	IMIP1_CKP	I	
16	GND	P	Ground.
17	IMIP1_2N	I	MIPI-DSI Data differential signal input pins. (Data lane 2)
18	IMIP1_2P	I	
19	GND	P	Ground.
20	IMIP1_3N	I	MIPI-DSI Data differential signal input pins. (Data lane 3)
21	IMIP1_3P	I	
22	GND	P	Ground.
23-24	NC	-	No connection.
25	GND	P	Ground.
26	NC	-	No connection.
27	PWMO	O	CABC PWM signal output.
28	NC	-	No connection.
29	VCL(NC)	-	No connection.
30	GND	P	Ground.
31-32	LED-	P	LED back light(Cathode).
33-38	NC	-	No connection.
39-40	LED+	P	LED back light(Anode).

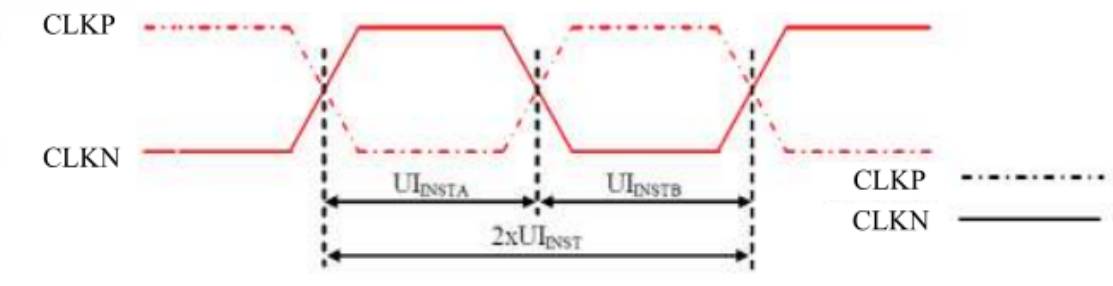
6.3.2 CTP PIN

Pin No	Symbol	I/O	Function
1	VDD3.3V	P	CTP Analog or digital supply voltage
2	GND	P	Ground.
3	SDA	I/O	CTP Serial in/out signal pin
4	SCL	I/O	CTP Serial interface clock pin
5	INT	I	External Interrupt to the IC of CTP
6	RST	I	CTP Reset pin
7-9	NC	-	No connect
10	GND	P	Ground.

6.4 AC Characteristics

6.4.1 DSI Timing Characteristics

High Speed Mode – Clock Channel Timing



Signal	Symbol	Parameter	Min	Max	Unit
CLKP/N	$2xUI_{INST}$	Double UI instantaneous	Note 2	25	ns
CLKP/N	UI_{INSTA}, UI_{INSTB} (Note 1)	UI instantaneous Half	Note 2	12.5	ns

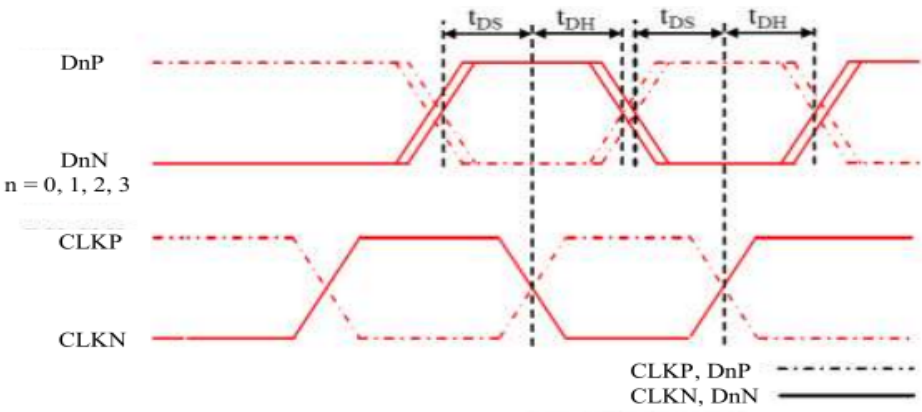
Notes:

- 1. $UI = UI_{INSTA} = UI_{INSTB}$
- 2. Define the minimum value, see Table 39.

Table 39: Limited Clock Channel Speed

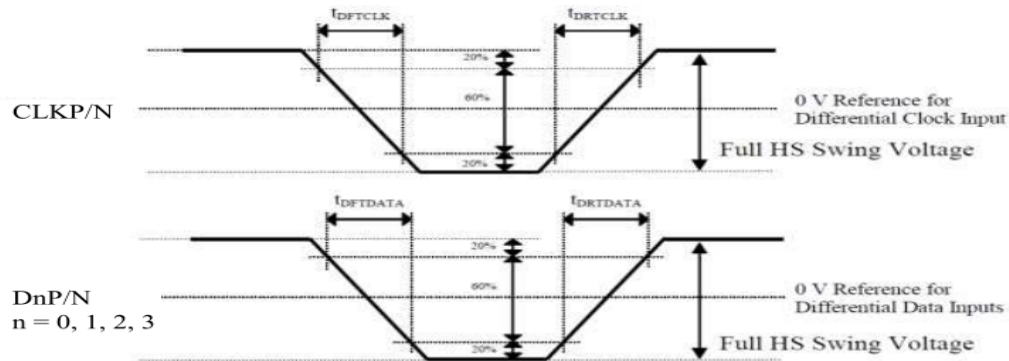
Data type	Two Lanes speed	Three Lanes speed	Four Lanes speed
Data Type = 00 1110 (0Eh), RGB 565, 16 UI per Pixel	566 Mbps	466 Mbps	366 Mbps
Data Type = 01 1110 (1Eh), RGB 666, 18 UI per Pixel	637 Mbps	525 Mbps	412 Mbps
Data Type = 10 1110 (2Eh), RGB 666 Loosely, 24 UI per Pixel	850 Mbps	700 Mbps	550 Mbps
Data Type = 11 1110 (3Eh), RGB 888, 24 UI per Pixel	850 Mbps	700 Mbps	550 Mbps

High Speed Mode – Data Clock Channel Timing



Signal	Symbol	Parameter	Min	Max
DnP/N , n=0 and 1	t_{DS}	Data to Clock Setup time	0.15xUI	-
	t_{DH}	Clock to Data Hold Time	0.15xUI	-

High Speed Mode – Rising and Falling Timings

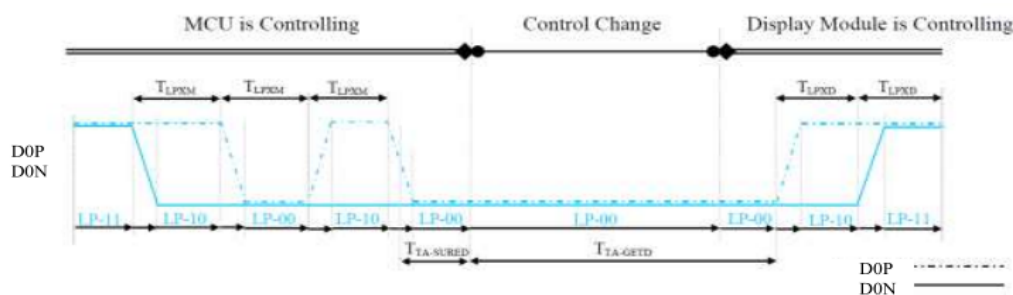


Parameter	Symbol	Condition	Specification		
			Min	Typ	Max
Differential Rise Time for Clock	t_{DRTCLK}	CLKP/N	150 ps	-	0.3UI (Note)
Differential Rise Time for Data	$t_{DRTDATA}$	DnP/N n=0 and 1	150 ps	-	0.3UI (Note)
Differential Fall Time for Clock	t_{DFTCLK}	CLKP/N	150 ps	-	0.3UI (Note)
Differential Fall Time for Data	$t_{DFTDATA}$	DnP/N n=0 and 1	150 ps	-	0.3UI (Note)

Note: The display module has to meet timing requirements, which are defined for the transmitter (MCU) on MIPI D-Phy standard.

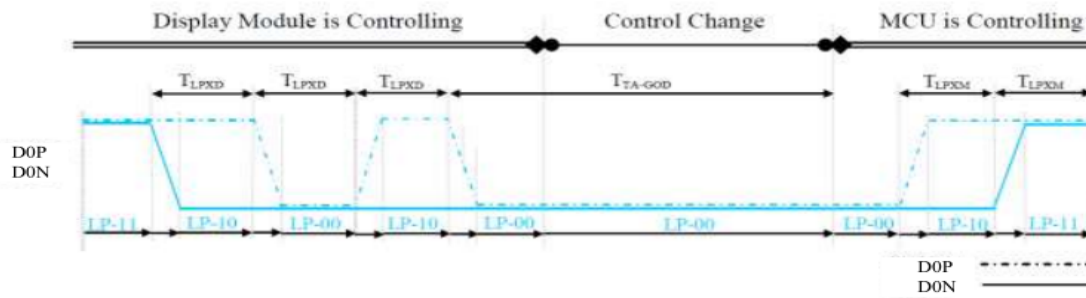
Low Speed Mode – Bus Turn Around

Lower Power Mode and its State Periods on the Bus Turnaround (BTA) from the MCU to the Display Module (ILI9881C-0D) are illustrated for reference purposes below.



BTA from the MCU to the Display Module

Lower Power Mode and its State Periods on the Bus Turnaround (BTA) from the Display Module (ILI9881C-0D) to the MCU are illustrated for reference purposes below.



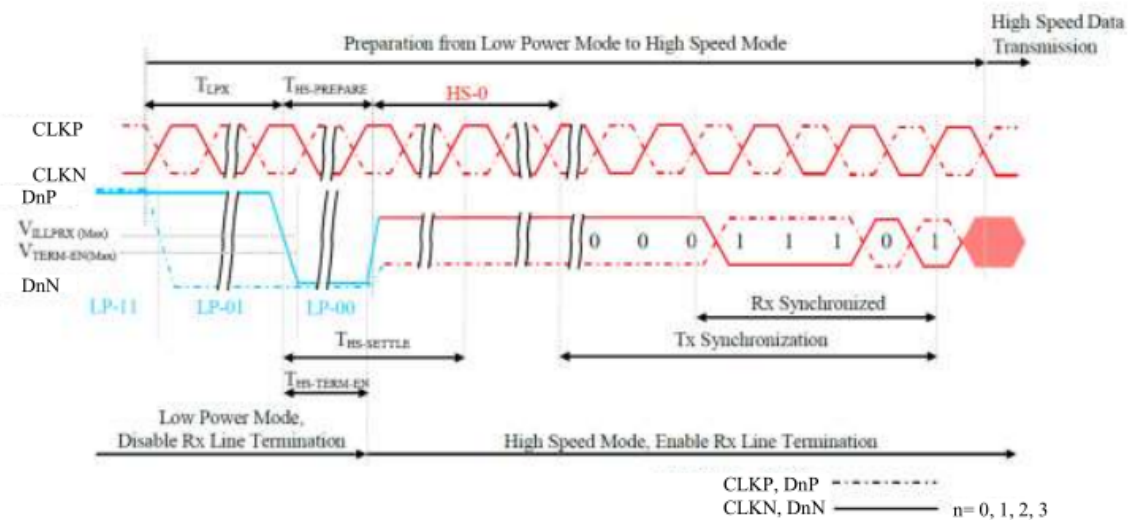
BTA from the Display Module to the MCU Low Power State Period Timings – A

Signal	Symbol	Description	Min	Max	Unit
D0P/N	T_{LPXM}	Length of LP-00, LP-01, LP-10 or LP-11 periods MCU → Display Module (ILI9881C-0D)	50	75	ns
D0P/N	T_{LPXD}	Length of LP-00, LP-01, LP-10 or LP-11 periods Display Module (ILI9881C-0D) → MCU	50	75	ns
D0P/N	$T_{TA-SURED}$	Time-out before the Display Module (ILI9881C-0D) starts driving	T_{LPXD}	$2 \times T_{LPXD}$	ns

Low Power State Period Timings – B

Signal	Symbol	Description	Time	Unit
D0P/N	$T_{TA-GETD}$	Time to drive LP-00 by Display Module (ILI9881C-0D)	$5 \times T_{LPXD}$	ns
D0P/N	T_{TA-GOD}	Time to drive LP-00 after turnaround request - MCU	$4 \times T_{LPXD}$	ns

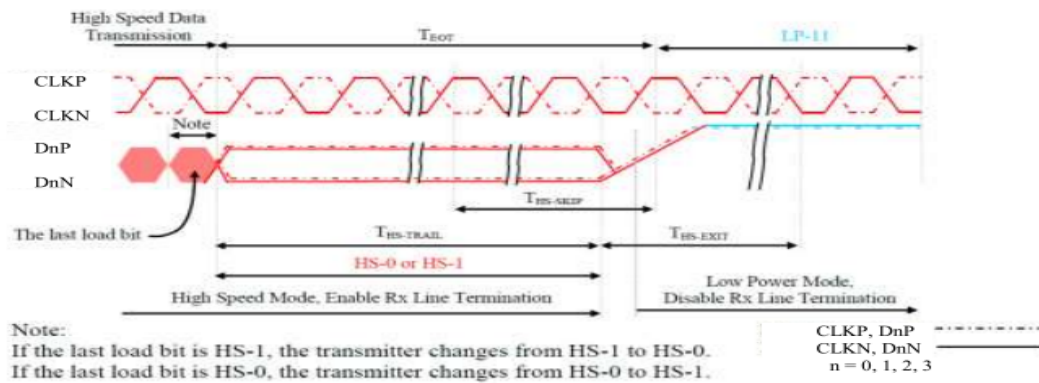
Data Lanes from Low Power Mode to High Speed Mode



Data Lanes - Low Power Mode to High Speed Mode Timings

Signal	Symbol	Description	Min	Max	Unit
DnP/N, n = 0 and 1	T_{LPX}	Length of any Low Power State Period	50	-	ns
DnP/N, n = 0 and 1	$T_{HS-PREPARE}$	Time to drive LP-00 to prepare for HS Transmission	$40+4xUI$	$85+6xUI$	ns
DnP/N, n = 0 and 1	$T_{HS-TERM-EN}$	Time to enable Data Lane Receiver line termination measured from when Dn crosses VILMAX	-	$35+4xUI$	ns

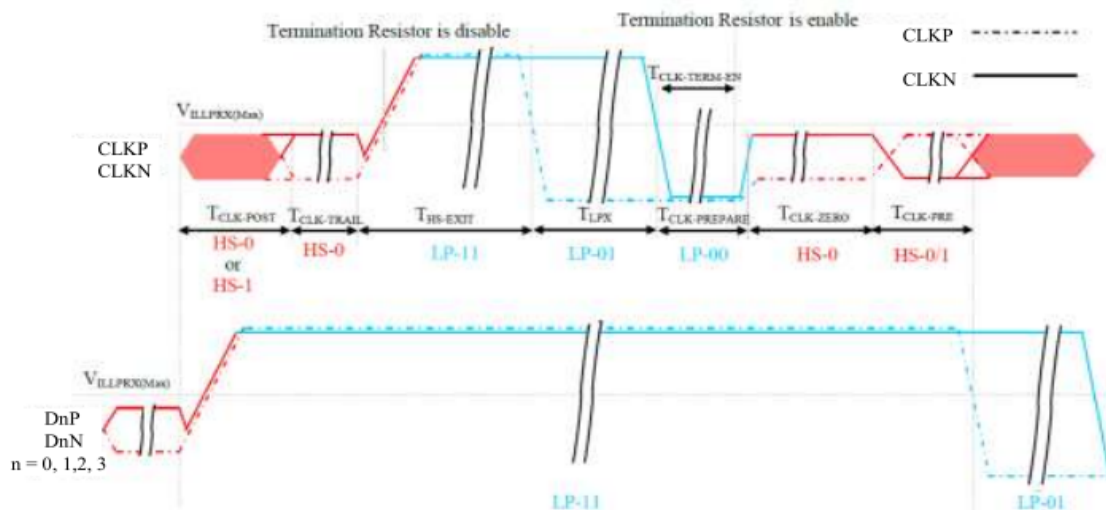
Data Lanes from High Speed Mode to Low Power Mode



Data Lanes - High Speed Mode to Low Power Mode Timings

Signal	Symbol	Description	Min	Max	Unit
DnP/N, n = 0 and 1	$T_{HS-SKIP}$	Time-Out at Display Module (ILI9881C-0D) to ignore transition period of EoT	40	$55+4xUI$	ns
DnP/N, n = 0 and 1	$T_{HS-EXIT}$	Time to driver LP-11 after HS burst	100	-	ns

DSI Clock Burst – High Speed Mode to/from Low Power Mode



Clock Lanes - High Speed Mode to/from Low Power Mode Timings

Signal	Symbol	Description	Min	Max	Unit
CLKP/N	T _{CLK-POST}	Time that the MCU shall continue sending HS clock after the last associated Data Lanes has transitioned to LP mode	60+52xUI	-	ns
CLKP/N	T _{CLK-TRAIL}	Time to drive HS differential state after last payload clock bit of a HS transmission burst	60	-	ns
CLKP/N	T _{HS-EXIT}	Time to drive LP-11 after HS burst	100	-	ns
CLKP/N	T _{CLK-PREPARE}	Time to drive LP-00 to prepare for HS transmission	38	95	ns
CLKP/N	T _{CLK-TERM-EN}	Time-out at Clock Lane to enable HS termination	-	38	ns
CLKP/N	T _{CLK-PREPARE} + T _{CLK-ZERO}	Minimum lead HS-0 drive period before starting Clock	300	-	ns
CLKP/N	T _{CLK-PRE}	Time that the HS clock shall be driven prior to any associated Data Lane beginning the transition from LP to HS mode	8xUI	-	ns

6.4.2 Input Timing Table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
MIPI (4 Lane) @Frame rate=60Hz			432		Mbps
MIPI (3 Lane) @Frame rate=60Hz			576		Mbps
DCLK frequency @Frame rate=60Hz	F _{DCLK}		71.9		MHz
HSYNC period time	T _H		920		DCLK
Horizontal display area	T _{HD}		800		DCLK
HSYNC pulse width	T _{HPW}		24	-	DCLK
HSYNC back porch	T _{HBP}		24	-	DCLK
HSYNC front porch	T _{FBP}		72	-	DCLK
VSYNC period time	T _V		1304		H
Vertical display area	T _{VD}		1280		H
VSYNC pulse width	T _{VPW}		2	-	H
VSYNC back porch	T _{VBP}		10	-	H
VSYNC front porch	T _{VFP}		12	-	H

MIPI Frequency = (Frame rate) x TH x TV x 24bits.

7. Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp	$\theta=0^\circ$ $\Phi=0^\circ$	-	250	-	Cd/m ²	1
Uniformity	∠Bp		80	-	-	%	1,2
Viewing Angle	3:00	Cr≥10	-	80	-	Deg	3
	6:00		-	80	-		
	9:00		-	80	-		
	12:00		-	80	-		

Contrast Ratio	Cr		Ta=25°C Φ=0°	800	1000	-	-	4
Response Time	T _r +T _f			-	35	-	ms	5
Color of CIE Coordinate	W	x	θ=0° Φ=0°	Typ -0.05	0.2880	Typ +0.05	-	1,6
		y			0.3231		-	
	R	x			0.6107		-	
		y			0.3698		-	
	G	x			0.3191		-	
		y			0.5927		-	
	B	x			0.1488		-	
		y			0.1056		-	
NTSC Ratio	S		-	50	-	%		

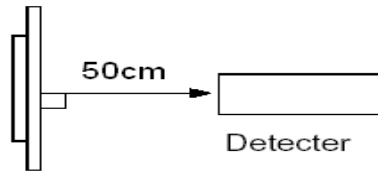
Note: The parameter is slightly changed by temperature, driving voltage and materiel

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment CA310

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25°C.
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.

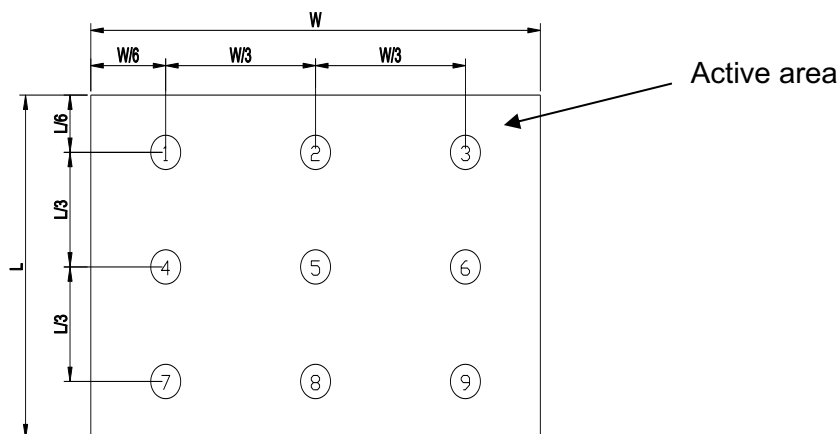


Note 2: The luminance uniformity is calculated by using following formula.

$$\Delta Bp = Bp \text{ (Min.)} / Bp \text{ (Max.)} \times 100 \text{ (\%)}$$

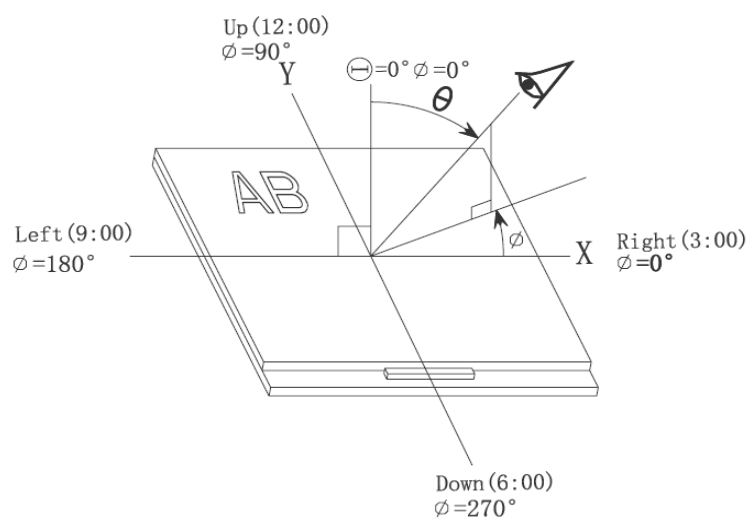
$Bp \text{ (Max.)}$ = Maximum brightness in 9 measured spots

$Bp \text{ (Min.)}$ = Minimum brightness in 9 measured spots.

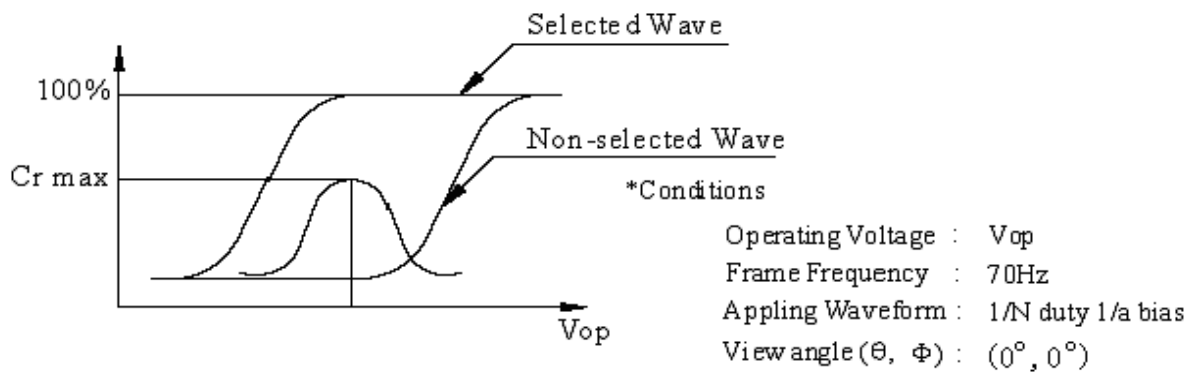


Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and ϕ



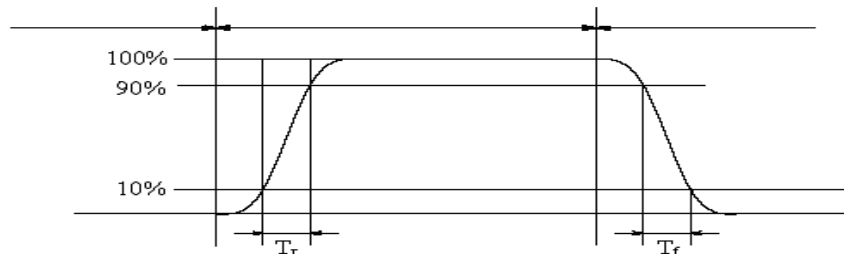
Note 4: Definition of contrast ratio.(Test LCD using DMS501)



$$\text{Contrast ratio}(Cr) = \frac{\text{Brightness of selected dots}}{\text{Brightness of non-selected dots}}$$

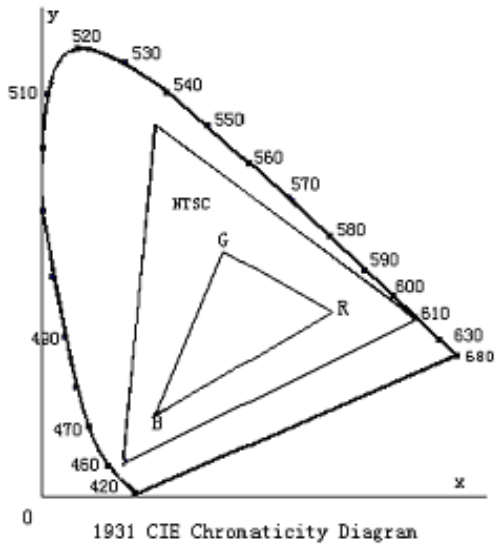
Note 5: Definition of Response time. (Test LCD using DMS501):

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.

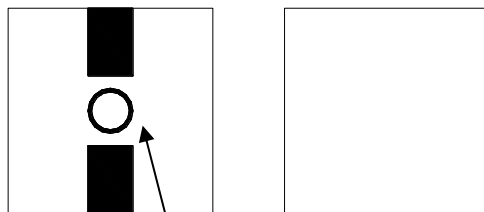


Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 7: Definition of cross talk.

Cross talk ratio(%)=|pattern A Brightness-pattern B Brightness|/pattern A Brightness*100



Pattern A

Pattern B

Measurement point(center)

Electric volume value=3F+/-3Hex

8. Reliability Test Items and Criteria

Test Item	Test condition	Remark
High Temperature Storage	Ta = 60°C 96hrs	Note1,Note3, 4
Low Temperature Storage	Ta = -20°C 96hrs	Note1,Note3, 4
High Temperature Operation	Ta = 50°C 96hrs	Note2,Note3, 4
Low Temperature Operation	Ta = -10°C 96hrs	Note1,Note3, 4
Operation at High Temperature/Humidity	+50°C, 90%RH 96hrs	Note3, 4
Thermal Shock	-20°C/30 min ~ +60°C/30 min for a total 10 cycles, Start with cold temperature and end with high temperature. Power Off	Note3, 4

Note 1: Ta is the ambient temperature of samples.

Note 2: Ts is the temperature of panel's surface.

Note 3: 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.

Note 4: Before cosmetic and function test, the product must have enough recovery time,at least 2 hours at room temperature

9. Precautions for Use of LCD Modules

9.1 Handling Precautions

- 9.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- 9.1.2 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.
- 9.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- 9.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- 9.1.5 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 — Ketone — Aromatic solvents
- 9.1.6 Do not attempt to disassemble the LCD Module.
- 9.1.7 If the logic circuit power is off, do not apply the input signals.
- 9.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
- a. Be sure to ground the body when handling the LCD Modules.
 - b. Tools required for assembly, such as soldering irons, must be properly ground.
 - c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - d. 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.

9.2 Storage precautions

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

9.2.2 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 : $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$

Relatively humidity: $\leq 80\%$

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

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

END