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SPECIFICATION

VXT700AEA-24C

☐ Preliminary Specification

☐ Final Specification

CUSTOMER:

Made By:	**Approved By:**
Checked By:	
Approved By:	**Date:**
Quality:	
Date:	**Note:**
Note:	

2. Revision Record

Date	Rev.No.	Page	Revision Items	Prepared
2022-9-6	**V0**		**The first release**	**Solon**

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3. General Specifications

3.1 LCM

VXT070AEA-24C is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light,CTP unit. The 7.0'' display area contains 1024 x 600 pixels and can display up to 16.7M colors. This product accords with RoHS environmental criterion.

Item	Contents	Unit	Note
LCD Type	TFT	-	
LCD Brand	BOE		
Display color	16.7M		
Viewing Direction	ALL	O'Clock	1
Operating temperature	-20~+70	℃	
Storage temperature	-30~+80	℃	
Module size	192.00x124.00x5.97	mm	2
Active Area(W×H)	154.21X85.92	mm	
Number of Dots	1024*600	dots	
LCM Controller	EK79007AD/EK73217BCGA	-	
Power Supply Voltage	1.8&3.3	V	
Backlight	30-LEDs (white)	pcs	
LED Brand/Part No.	HuiChenXin/ TY020/TC4		
Weight	---	g	
Interface	MIPI-4lanes	-	

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

Note 2: Without FPC and Solder.With CTP

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3.2 CTP

Item	Specification	Remarks
Outline Dimension	192.10×124.00	mm
Total Thickness	2.85	mm
View Area	154.81×86.52	mm
TP size	7	inch
Interface Type	IIC	
Operation Temperature	-20℃~+70℃	
Storage Temperature	-30℃~+80℃	
Glass Thickness	2.0	
Resolution	1024*600	Dots
Input force	< 10g	
Surface hardness	≥6H	
Control IC	FT5426	
Touch Point	10	point
Reporting Rate	>100	Hz
Jitter	<1	mm
Transparency	≥85%	
Connection Type	FPC(COF)	
Win8 Certified	No	

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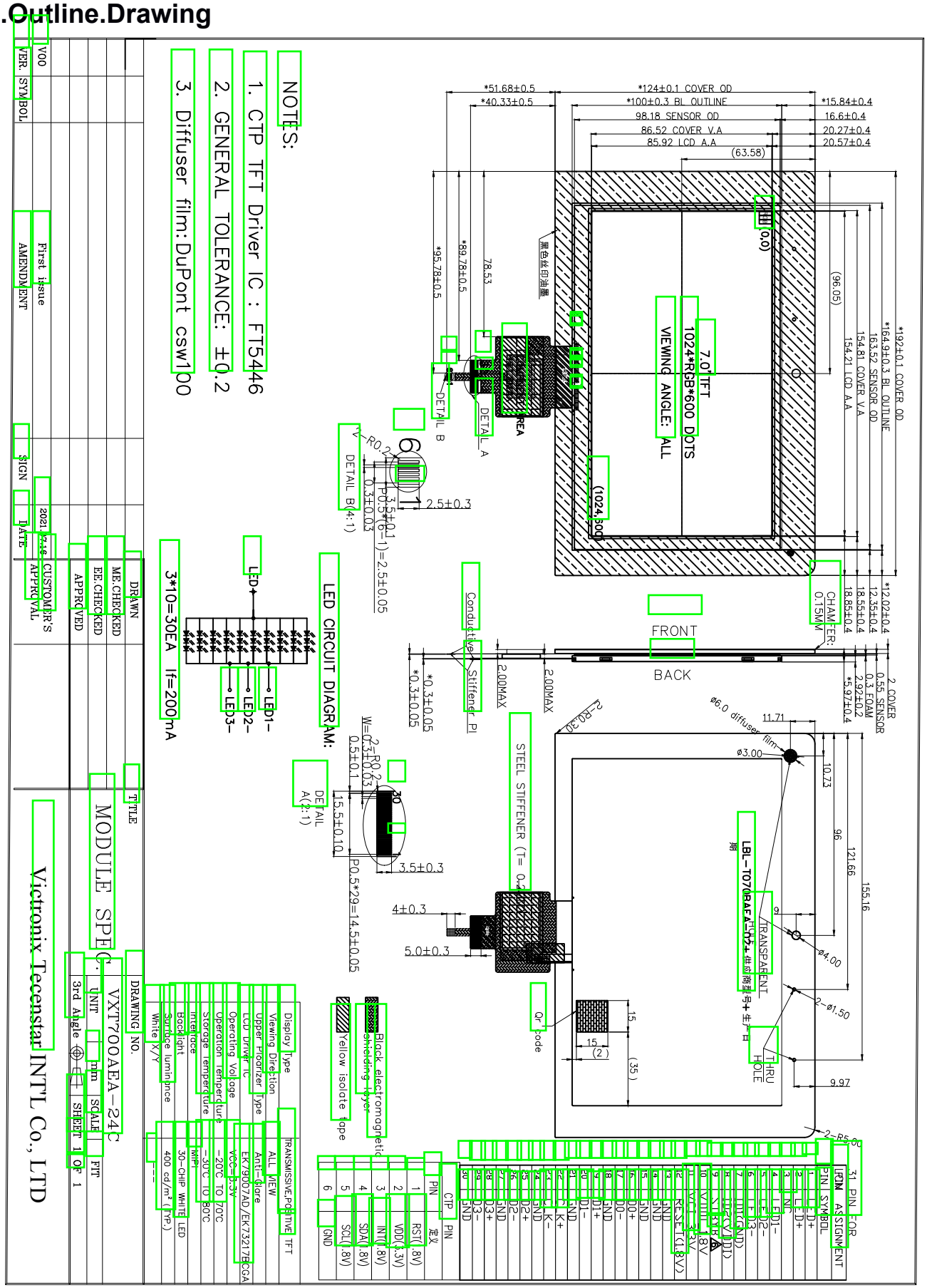
4.Outline.Drawing



5. Absolute Maximum Ratings(Ta=25℃)

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

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	VDDI	-0.3	2.0	V	1，2
Power Supply Voltage	VCI	-0.3	6.0	V	1，2
CTP Supply Voltage	VDD	2.7	3.6	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_{DDI} >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	-30℃	80℃	-20℃	70℃	1,2
Humidity	-	-	-	-	3

Notes:

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. Ta<=40℃:85%RH MAX.

Ta>=40℃:Absolute humidity must be lower than the humidity of 85%RH at 40℃.

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6. Electrical Specifications and Instruction Code

6.1 Electrical characteristics(Vss=0V ,Ta=25℃)

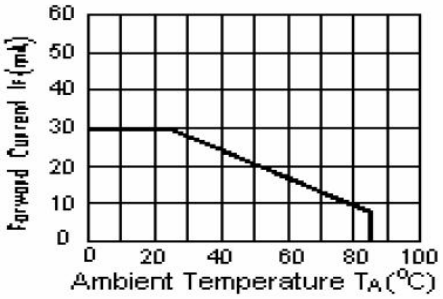
Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		VDDI	Ta=25℃	1.71	1.8	1.89	V	
Power supply		VCI	Ta=25℃	3.0	3.3	6.0	V	
Input voltage	'H'	V_{IH}	VDDI=1.8V	0.7*VDDI	-	VDDI	V	
	'L'	V_{IL}	VDDI=1.8V	0	-	0.3*VDDI	V	

6.2 *Electrical characteristics for CTP* (Vss=0V ,Ta=25℃)

Parameter		Symbol	MIN	TYP	MAX	Unit	Remark
Power supply Voltage		VDD(CTP)	2.8	3.3	3.6	V	
Input Signal Voltage	Low Level	VIL	0	-	0.3* VDD	V	
	High Level	VIH	0.7* VDD	-	0.3+VDD	V	

6.3 LED backlight specification(VSS=0V ,Ta=25℃)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	Vf	If=10*20mA	8.1	9.0	9.9	V	
Uniformity	ΔBp	If=10*20mA	75	80	-	%	
Life Time	time	If=200mA	15K	20K	-	hours	1



Note 1: Brightness to be decreased to 50% of the initial value at ambient temperature TA=25℃

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6.4 LCM Interface signals

Pin No.	Symbol	I/O	Function
1-2	LED+	P	LED Anode
3	NC	-	No connection
4-6	LED1-~LE	P	LED Cathode
7	ID1(GND)	O	GND
8	ID2(VDDI)	O	VDDI
9	STBYB	I	Standby mode. STBYB = ”H” ,normal operation(default) STBYB = ”L” . timing controller, source driver will turn off.
10	VDDI_1.8V	P	Power supply for digital circuits
11	VCI_3.3V	P	Power Supply pin for DC to DC
12	RESET(1.8	I	Global reset pin. Active Low to enter Reset State.
13-15	GND	P	Ground
16	D0+	I	MIPI-DSI Data differential signal input pins. (Data lane 0)
17	D0-	I	MIPI-DSI Data differential signal input pins. (Data lane 0)
18	GND	P	Ground
19	D1+	I	MIPI-DSI Data differential signal input pins. (Data lane 1)
20	D1-	I	MIPI-DSI Data differential signal input pins. (Data lane 1)
21	GND	P	Ground
22	CLK+	I	MIPI-DSI CLOCK differential signal input pins.
23	CLK-	I	MIPI-DSI CLOCK differential signal input pins.
24	GND	P	Ground
25	D2+	I	MIPI-DSI Data differential signal input pins. (Data lane 2)
26	D2-	I	MIPI-DSI Data differential signal input pins. (Data lane 2)
27	GND	P	Ground
28	D3+	I	MIPI-DSI Data differential signal input pins. (Data lane 3)
29	D3-	I	MIPI-DSI Data differential signal input pins. (Data lane 3)
30	GND	P	Ground

6.5 CTP PIN

Pin No.	Symbol	I/O	Function
1	RST(1.8V)	I	Reset PIN
2	VDD(3.3V)	P	Power supply
3	INT(1.8V)	O	Interrupt pin
4	SDA(1.8V)	I/O	Serial in/out signal
5	SCL(1.8V)	I	serial interface clock
6	GND	P	Ground.

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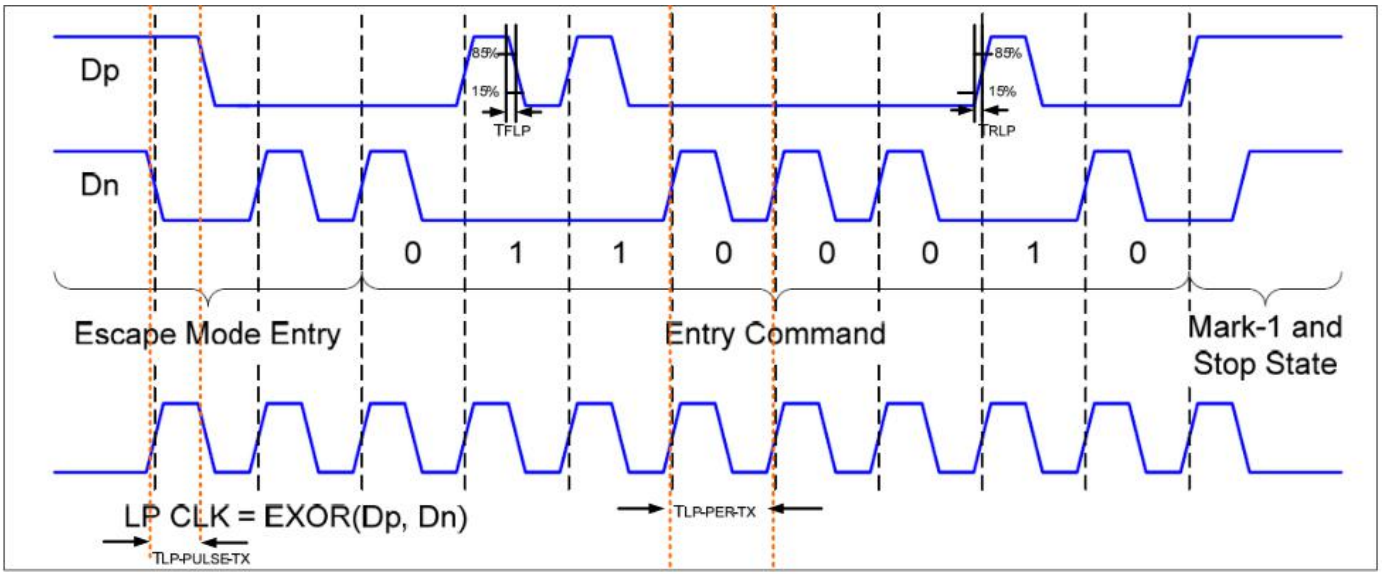
6.6 AC Characteristics

6.6.1 LP Transmitter AC Specification

Parameter		Symbol	Min	Typ	Max	Units	Notes
15%~85% rising time and falling time		T_{RLP} /T_{FLP}	-	-	25	ns	-
30%~85% rising time and falling time		T_{REOT}	-	-	35	ns	-
Pulse width of LP exclusive-OR clock	First LP EXOR clock pulse after STOP state or Last pulse before stop state	$T_{LP-PULSE-TX}$	40	-	-	ns	-
	All other pulses		20	-	-	ns	-
Period of the LP EXOR clock		$T_{LP-PER-TX}$	90	-	-	mV/ns	-
Slew Rate @C_{LOAD} =0pF		$\delta V/\delta t_{SR}$	30	-	500	mV/ns	-
Slew Rate @C_{LOAD} =5pF			30	-	200	mV/ns	-
Slew Rate @C_{LOAD} =20pF			30	-	150	mV/ns	-
Slew Rate @C_{LOAD} =70pF			30	-	100	mV/ns	-
Load Capacitance		T_{RLP}	-	-	70	pF	-



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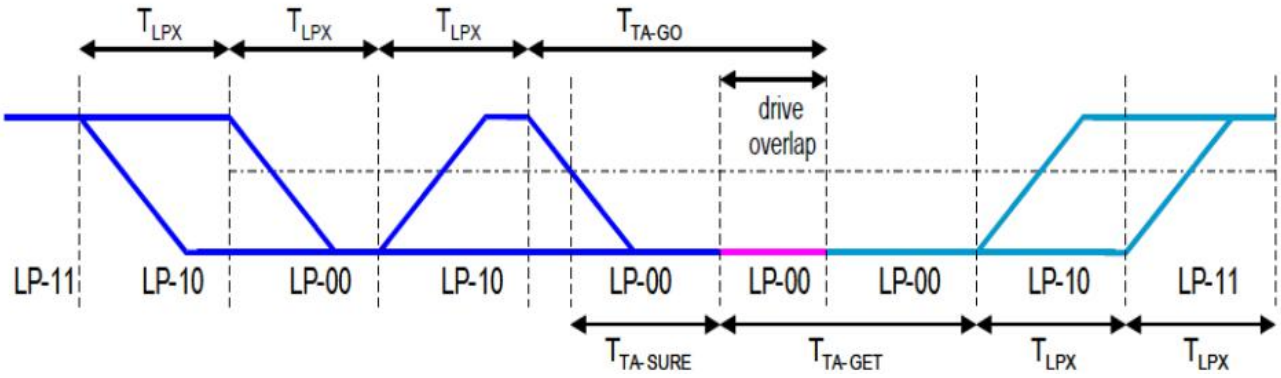
6.6.2 Turnaround Procedure

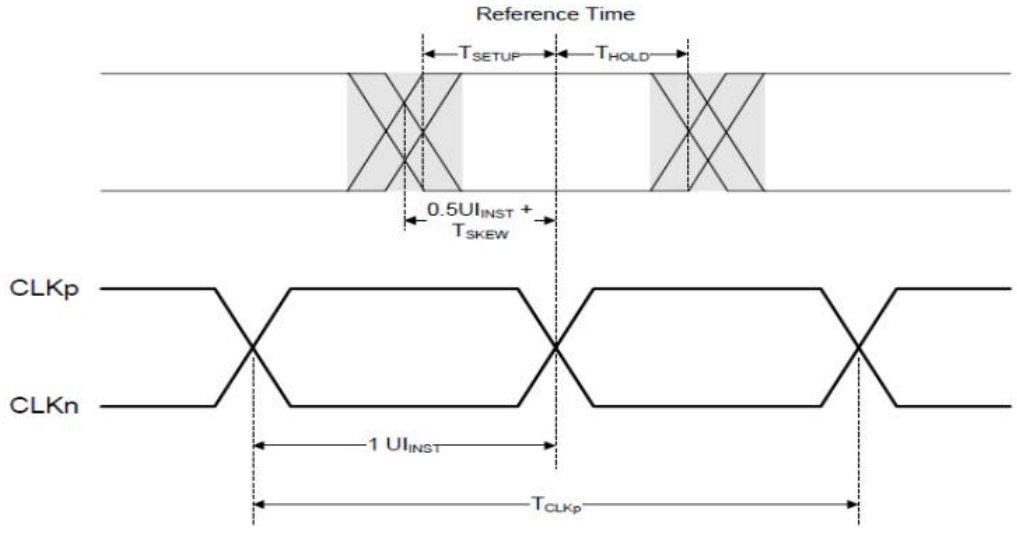
Turnaround Procedure Operation Timing Parameters

Parameter	Symbol	Min	Typ	Max	Units
Length of any Low-Power state period: Master side	T_{LPX}	50	-	75	ns
Length of any Low-Power state period: Slave side	T_{LPX}	50	55.56	58.34	ns
Ratio of T_{LPX}(Master)/ T_{LPX} (Slave) between Master and Slave side	Ratio T_{LPX}	2/3	-	3/2	
Time-out before new TX side start driving	$T_{TA-Sure}$	T_{LPX}	-	$2T_{LPX}$	ns
Time to drive LP-00 by new TX	T_{TA-GET}	-	$5T_{LPX}$	-	ns
Time to drive LP-00 after Turnaround Request	T_{TA-GO}	-	$4T_{LPX}$	-	ns



6.6.3 High speed transmission

Parameter	Symbol	Min	Typ	Max	Units
UI instantaneous	UI_{INST}	2	-	12.5	ns
Data to Clock Skew(measured at transmitter)	$T_{SKEW(TX)}$	-0.15	-	0.15	UI_{INST}
Data to Clock Setup time(measured at receiver)	$T_{SETUP(RX)}$	0.15	-	-	UI_{INST}
Data to Clock Hold time(measured at receiver)	$T_{HOLD(RX)}$	0.15	-	-	UI_{INST}
20%~80% rise time and fall time	T_R, T_F	150	-	-	ps
		-	-	0.3	UI_{INST}



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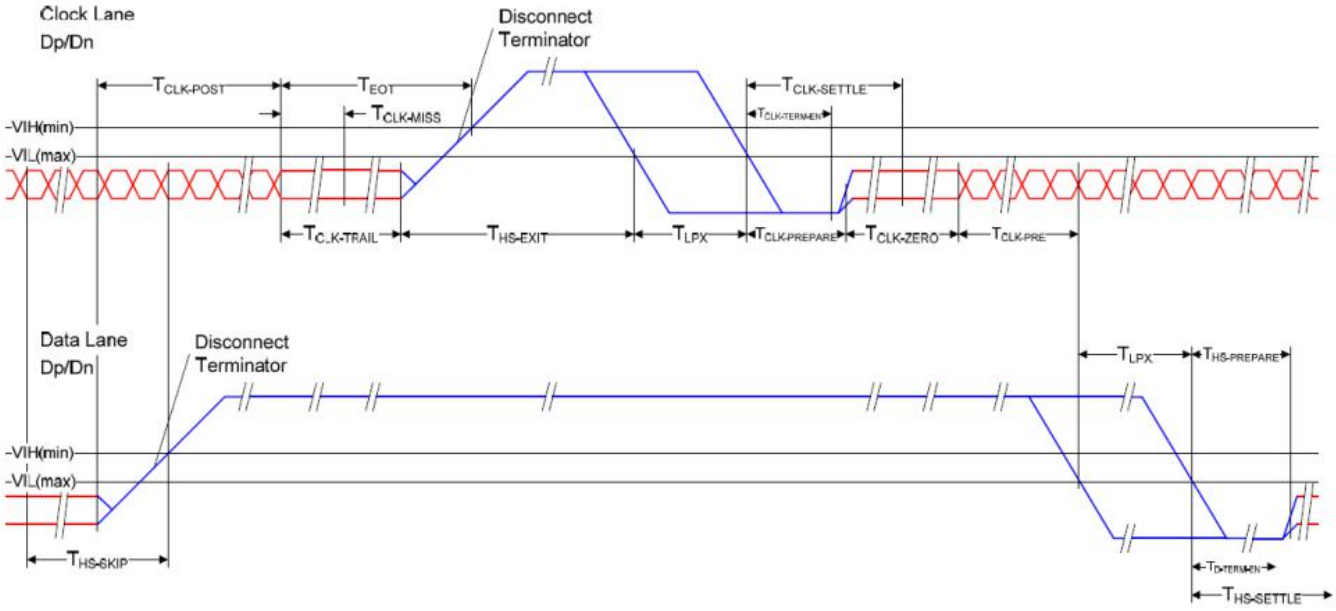
6.6.4 High Speed Clock Transmission

Parameter	Symbol	Min	Typ	Max	Units
Time that the transmitter shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode	TCLK-POST	60+52UI	-	-	ns
Detection time that the clock has stopped toggling	TCLK-MISS	-	-	60	ns
Time to drive LP-00 to prepare for HS clock transmission	TCLK-PREPARE	38	-	95	ns
Minimum lead HS-0 drive period before starting clock	TCLK-PREPARE + TCLK-ZERO	300	-	-	ns
Time to enable Clock Lane receiver line termination measured from when Dn cross $V_{IL,MAX}$	THS-TERM-EN	-	-	38	ns
Minimum time that the HS clock must be prior to any associated data lane beginning the transmission from LP to HS mode	TCLK-PRE	8	-	-	UI
Time to drive HS differential state after last payload clock bit of a HS transmission burst	TCLK-TRAIL	60	-	-	ns



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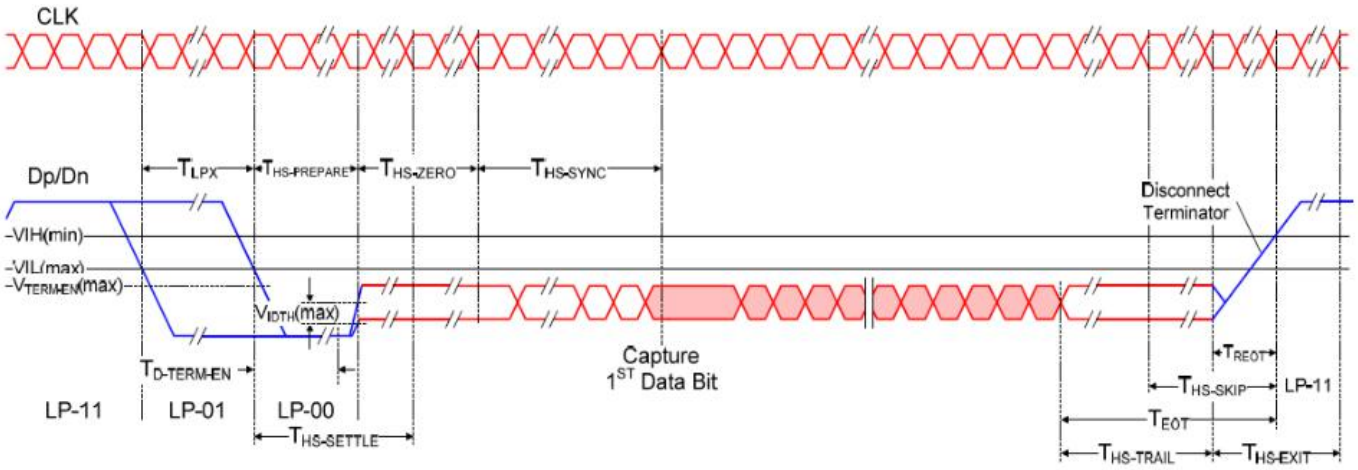
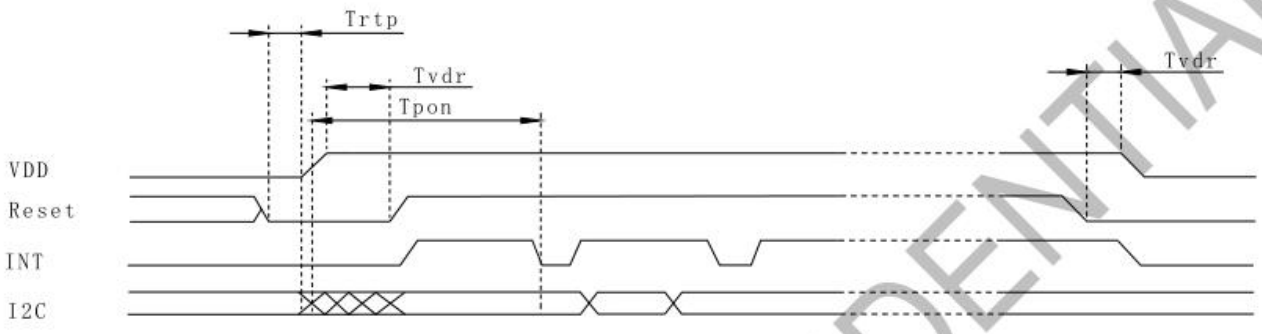
6.6.5 High Speed Data Transmission in Bursts

Parameter	Symbol	Min	Typ	Max	Units
Time to drive LP-00 to prepare for HS transmission	$T_{HS-PREPARE}$	40+4UI	-	85+6UI	ns
Time from start of $t_{HS-TRAIL}$ or $t_{CLK-TRAIL}$ period to start of LP-11 state	T_{EOT}	-	-	105+12UI	ns
Time to enable Data Lane receiver line termination measured from when Dn cross $V_{IL,MAX}$	$T_{HS-TERM-EN}$	-	-	35+4UI	ns
Time to drive flipped differential state after last payload data bit of a HS transmission burst	$T_{HS-TRAIL}$	60+4UI	-	-	ns
Time-out at RX to ignore transition period of EoT	$T_{HS-SKIP}$	40	-	55+4UI	ns
Time to drive LP-11 after HS burst	$T_{HS-EXIT}$	100	-	-	ns
Length of any Low-Power state period	T_{LPX}	50	-	-	ns
Sync sequence period	$T_{HS-SYNC}$	8UI	-	-	ns
Minimum lead HS-0 drive period before the Sync sequence	$T_{HS-ZERO}$	105+6UI	-	-	ns



6.7 CTP AC Characteristics



Item	Symbol	Test Condition	Min	Typ	Max	Unit	Note
TX acceptable clock	ftx		50	150	400	KHz	
TX output rise time	Ttxr		--	210	--	nS	
TX output fall time	Ttxf		--	210	--	nS	
RX input voltage	Trxi		1.2	--	1.6	V	

7. *Optical Characteristics*

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp		θ=0° Φ=0°	-	400	-	Cd/m^2	1
Uniformity	⊿Bp			75	80	-	%	1,2
Viewing Angle	3:00		Cr≥10	-	80	-	Deg	3
	6:00			-	80	-		
	9:00			-	80	-		
	12:00			-	80	-		
Contrast Ratio	Cr		θ=0° Φ=0°	500	800		-	4
Response Time	T_r+T_f			-	25	40	ms	5
							ms	
Color of CIE Coordinate	W	x	θ=0° Φ=0°		0.28		-	1,6
		y			0.30		-	
	R	x			0.58		-	
		y			0.35		-	
	G	x			0.33		-	
		y			0.56		-	
	B	x			0.14		-	
		y			0.09		-	
NTSC Ratio	S			45	50	-	%	

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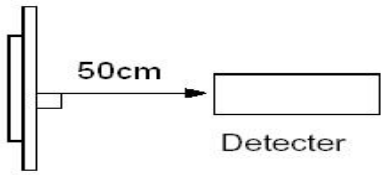
Note：The parameter is slightly changed by temperature, driving voltage and materiel

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 BM-7(Φ5mm)

Measuring condition:

- *Measuring surroundings: Dark room.*
- *Measuring temperature: Ta=25℃.*
- *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.

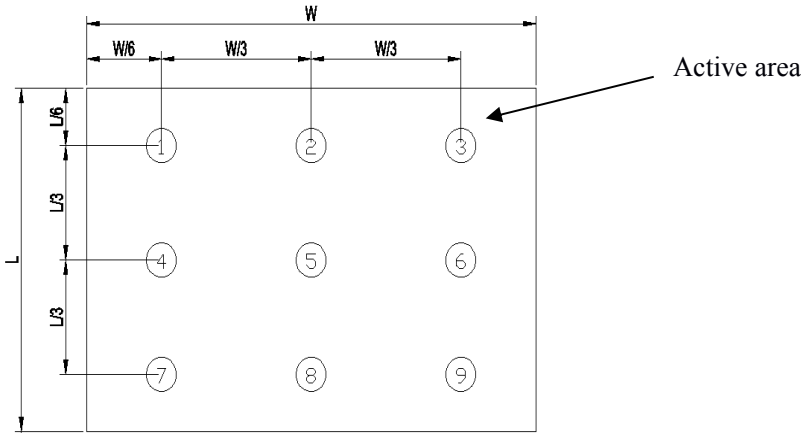


Note 2: The luminance uniformity is calculated by using following formula.

⊿Bp = Bp (Min.) / Bp (Max.)×100 (%)

Bp (Max.) = Maximum brightness in 9 measured spots

Bp (Min.) = Minimum brightness in 9 measured spots.



Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and Φ

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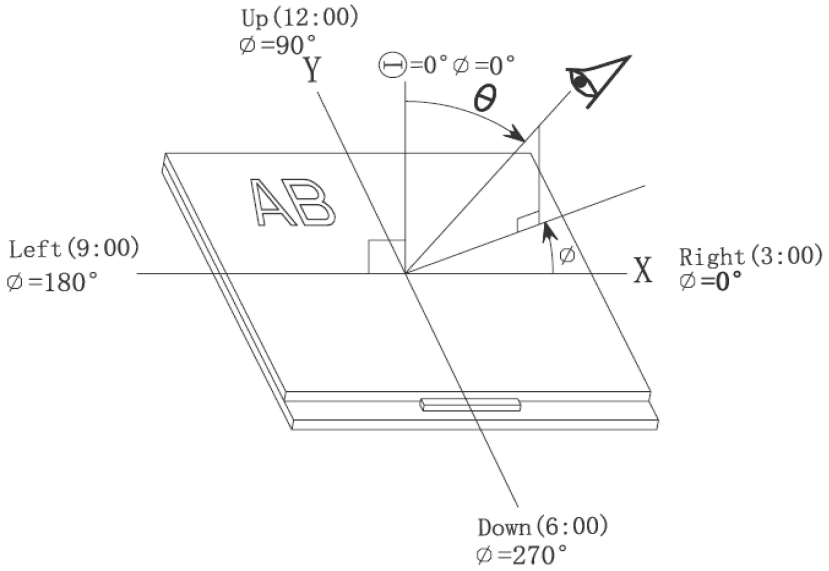
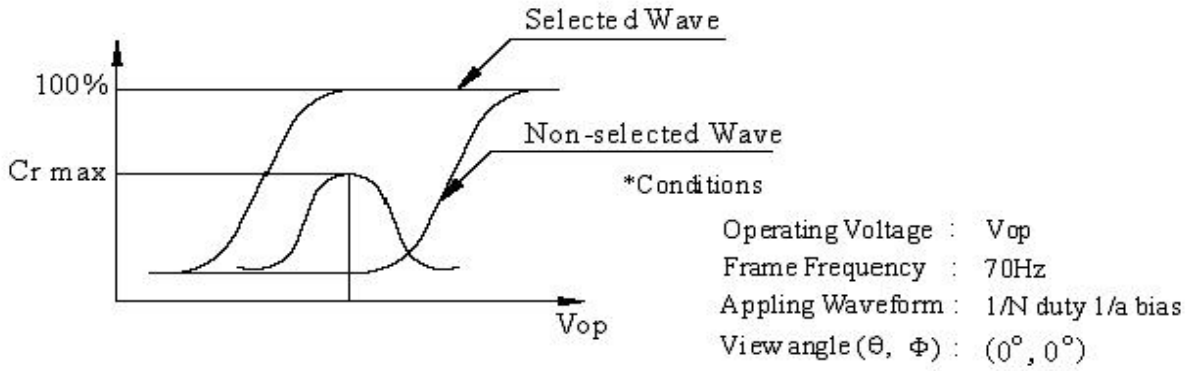


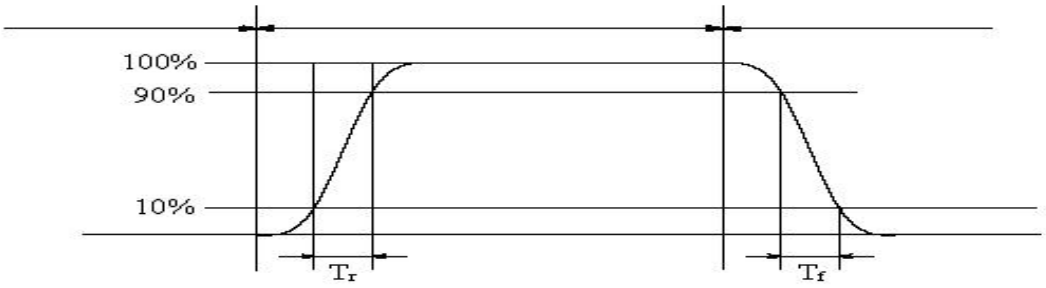
Note 4: Definition of contrast ratio.(Test LCD using DMS501)



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

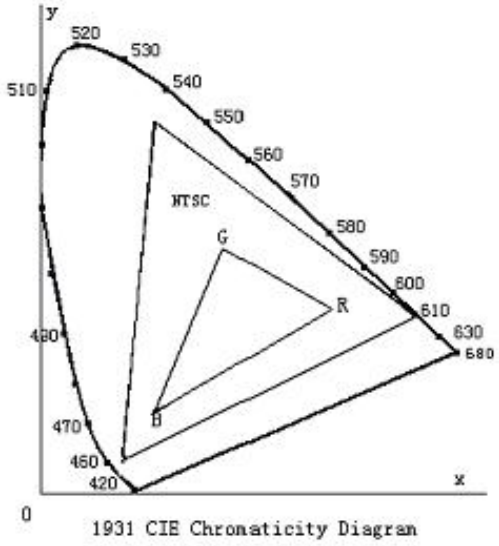
Note 5: Definition of Response time. (Test LCD using DMS501):

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

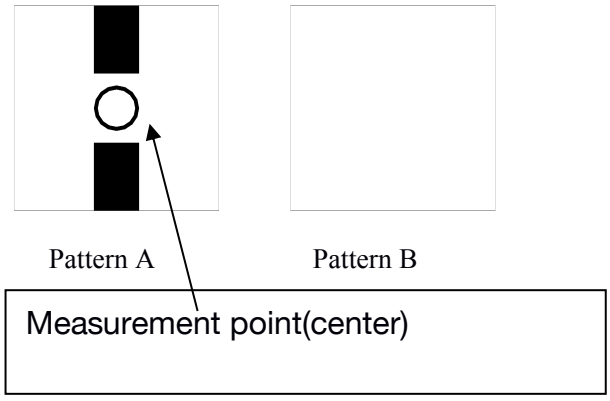
Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.



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*



Electric volume value=3F+/-3Hex

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8. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80℃±2℃ 96H Restore 2H at 25℃ Power off	1. After testing, cosmetic and electrical defects should not happen. 2. Total current consumption should not be more than twice of initial value.
2	Low Temperature Storage	-30℃±2℃ 96H Restore 2H at 25℃ Power off	
3	High Temperature Operation	70℃±2℃ 96H Restore 2H at 25℃ Power on	
4	Low Temperature Operation	-20℃±2℃ 96H Restore 4H at 25℃ Power on	
5	High Temperature/Humidity Operation	60℃±2℃ 90%RH 96H Power off	
6	Temperature Cycle	–30℃←——→80℃ 30min 5min 30min after 5 cycle, Restore 2H at 25℃ Power off	

Note: Operation: Supply 3.3V for logic system.
The inspection terms after reliability test, as below

ITEM	Inspection
Contrast	CR>50%
IDD	IDD<200%
Brightness	Brightness>60%
Color Tone	Color Tone+/-0,05

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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.

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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℃ ~ 40℃

Relatively humidity: ≤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

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