DATA MODUL

JDI

Specification

TX31D203VM0EAC

12.3" - 1920 x 720 – LVDS

Spec Revision:
Revision Date: 11.10.2024

Note: This specification is subject to change without prior notice

Passion Displayed

Japan Display Inc.

FOR MESSRS : _____ DATE : Oct.11th ,2024

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

TX31D203VM0EAC

Contents

ACCEPTED BY : _____ PROPOSED BY : Alex Lee

2. RECORD OF REVISION

DATE	SHEET No.	SUMMARY

3. GENERAL DATA

3.1 DISPLAY FEATURES

This module is a 12.3” HD of 8:3 format LTPS TFT. The pixel format is vertical stripe and sub pixels are arranged as R(red), G(green), B(blue) sequentially. This display is RoHS compliant, and COG (chip on glass) technology and LED backlight are applied on this display.

Part Name	TX31D203VM0EAC
Module Dimensions	308.5(W) mm x 130.2(H) mm x 12.34(D) mm
LCD Active Area	292.032(W) mm x 109.512(H) mm
Pixel Pitch	0.1521(W) mm x 0.1521(H) mm
Resolution	1920 x 3(RGB)(W) x 720(H) dots
Color Pixel Arrangement	R, G, B Vertical stripe
LCD Type	IPS, Normally Black, transmissive type
Display Type	Active Matrix
Number of Colors	16.7M Colors (8-bit RGB)
Backlight	Light Emitting Diode (LED)
Weight	580g
Interface	LVDS; 20 pins
Power Supply Voltage	3.3V for LCD ; 30V for Backlight
Viewing Direction	Super Wide Version (In Plane Switching)

4. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Remarks
Supply Voltage	V_{DD}	-0.3	4.0	V	-
Input Voltage of Logic	V_I	-0.3	V_{DD} +0.3	V	Note 1
Operating Temperature	Top	-40	85	˚C	Note 2
Storage Temperature	Tst	-40	90	˚C	Note 2
Backlight Input Current	I_{LA}	0	120	mA	Note 2

Note 1: The rating is defined for the signal voltages of the interface such as CLK and pixel data pairs.

Note 2: The maximum rating is defined as above based on the chamber temperature, which might be different from ambient temperature after assembling the panel into the application. Moreover, some temperature-related phenomenon as below needed to be noticed:

- Background color, contrast and response time would be different in temperatures other than 25 ˚C.
- Operating under high temperature will shorten LED lifetime.

5. ELECTRICAL CHARACTERISTICS

5.1 OPERATING CONDITIONS

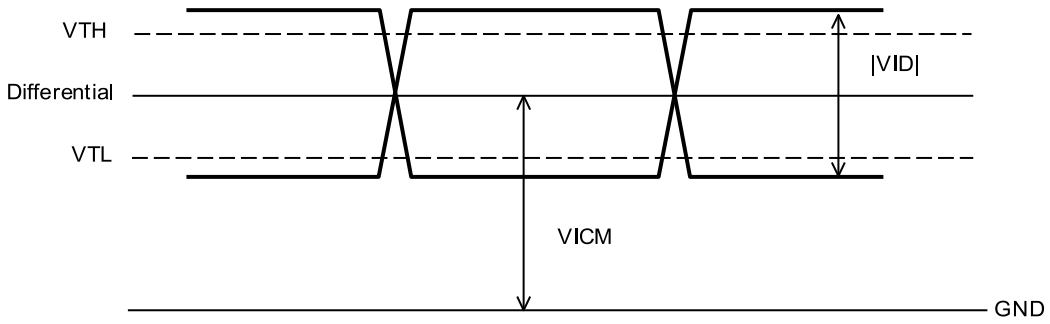
$T_a = 25\ ^{\circ}C,\ V_{SS} = 0V$

Item	Symbol	Condition	Standard Value			Unit	Remarks
			Min.	Typ.	Max.		
Power supply voltage	V_{DD}	-	3.0	3.3	3.6	V	-
Power supply current	I_{DD}	Note 1	-	220	270	mA	Note 1
Input signal voltage (CMOS)	V_{IH1}	-	$0.8V_{DD}$	-	V_{DD}	V	-
	V_{IL1}	-	V_{SS}	-	0.5V	V	-
Allowable Ripple Voltage	VRP	-	-	-	100	mV (p-p)	-
Differential Input High Threshold	VTH	VICM=1.2V	-	-	100	mV	Note 2
Differential Input Low Threshold	VTL	VICM=1.2V	-100	-	-	mV	Note 2
Input Differential Voltage	|VID|	-	100	-	600	mV	Note 2
Differential Input Common Mode Voltage	VICM	-	1.125	1.2	1.375	V	Note 2
Frame Frequency	f_{Frame}	-	50	60	-	Hz	-
CLK Frequency	f_{CLK}	-	80	100	120	MHz	-

Note 1: Measurement picture: White Pattern.

Power supply voltage: Typ. voltage.

Note 2:



5.2 BACKLIGHT CHARACTERISTICS

$T_a = 25\ ^\circ C$

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remarks
LED Input Voltage	V_{LA}	I_{LA}=95mA	-	(30)	-	V	Note 1
LED Forward Current	I_{LA}	V_{LA} = (30V)	-	95	-	mA	Note 2
LED Lifetime	-	I_{LA}=95mA	-	50K	-	hrs	Note 3

Note 1: Fig. 5.1 shows the LED backlight circuit.

Note 2: The estimated lifetime is specified as the time to reduce 50% brightness by applying 95mA at 25°C.

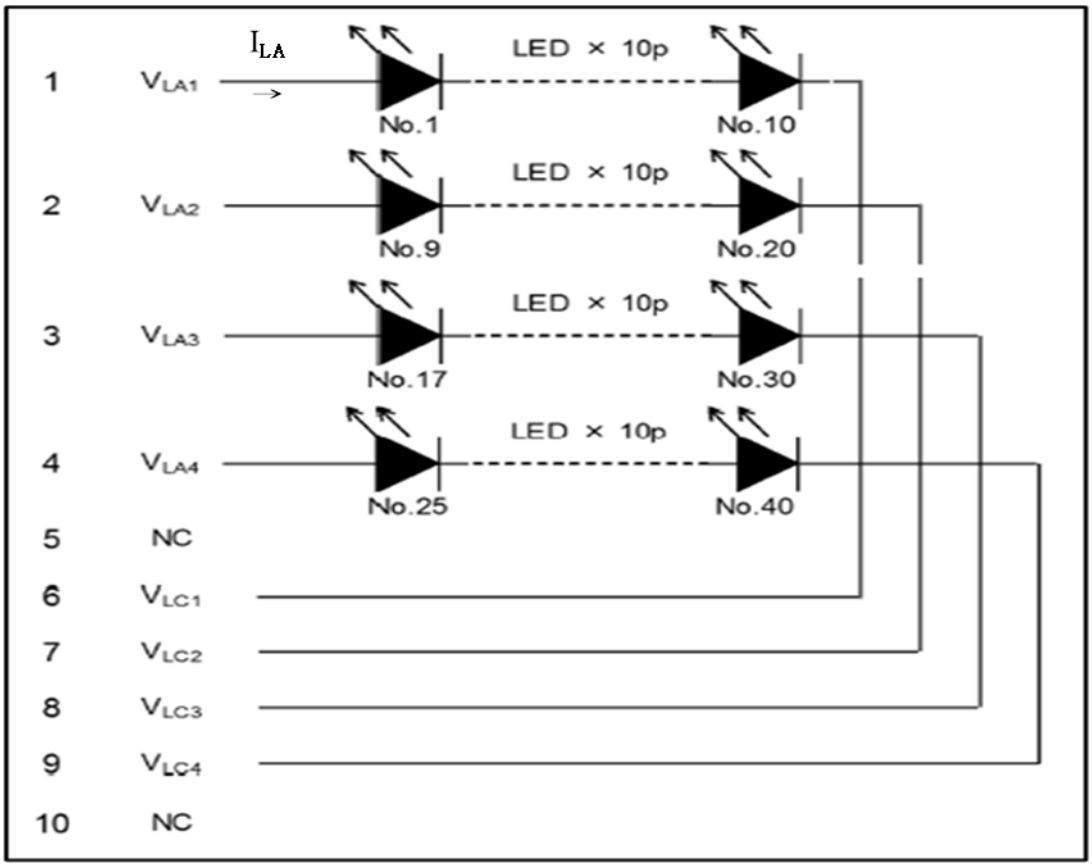


Fig 5.1

6. OPTICAL CHARACTERISTICS

The optical characteristics are measured based on the conditions as below:

- Supplying the signals and voltages defined in the section of electrical characteristics.
- The backlight unit needs to be turned on for 30 minutes.
- The ambient temperature is 25°C.
- In the dark room less than 100 lx, the equipment has been set for the measurements as shown in Fig 6.1.

$T_a = 25\ ^{\circ}C,\ f_{Frame} = 60\ \text{Hz}, V_{DD} = 3.3\text{V}$

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remarks
Brightness of White		-	$\phi = 0^{\circ}, \theta = 0^{\circ}$, I_{LA}= 95mA	1200	1500	-	cd/m^2	Note 1
Brightness Uniformity		-		75	-	-	%	Note 2
Contrast Ratio		CR		800	1300	-	-	Note 3
Response Time		-	$\phi = 0^{\circ}, \theta = 0^{\circ}$	-	-	25	ms	-
NTSC Ratio		-	$\phi = 0^{\circ}, \theta = 0^{\circ}$	-	70	-	%	-
Viewing Angle		θ x	$\phi = 0^{\circ}, CR \geq 10$	-	85	-	Degree	Note 5
		θ x′	$\phi = 180^{\circ}, CR \geq 10$	-	85	-		
		θ y	$\phi = 90^{\circ}, CR \geq 10$	-	85	-		
		θ y′	$\phi = 270^{\circ}, CR \geq 10$	-	85	-		
Color Chromaticity	Red	X	$\phi = 0^{\circ}, \theta = 0^{\circ}$	0.59	0.64	0.69	-	Note 6
		Y		0.28	0.33	0.38		
	Green	X		0.24	0.29	0.34		
		Y		0.56	0.61	0.66		
	Blue	X		0.10	0.15	0.20		
		Y		0.01	0.06	0.11		
	White	X		0.25	0.30	0.35		
		Y		0.26	0.31	0.36		

Note 1: The brightness is measured from the panel center point, P5 in Fig. 6.2, for the typical value.

Note 2: The brightness uniformity is calculated by the equation as below:

$$\text{Brightness uniformity} = \frac{\text{Min. Brightness}}{\text{Max. Brightness}} \times 100\%$$

which is based on the brightness values of the 9 points in active area measured by BM-5 as shown in Fig. 6.2.

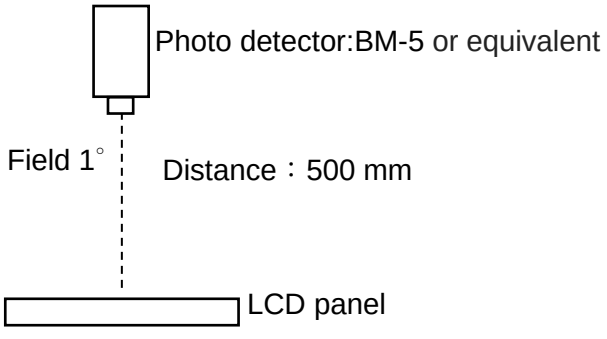


Fig 6.1

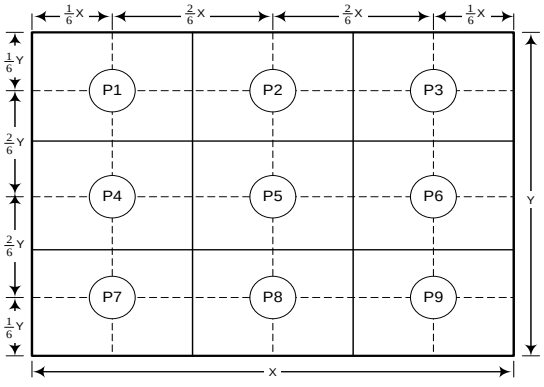


Fig 6.2

Note 3: The Contrast Ratio is measured from the center point of the panel, P5, and defined as the following equation:

$$CR = \frac{\text{Brightness of White}}{\text{Brightness of Black}}$$

Note 4: The definition of response time is shown in Fig. 6.3. The rising time is the period from 10% brightness to 90% brightness when the data is from black to white. Oppositely, Falling time is the period from 90% brightness rising to 10% brightness.

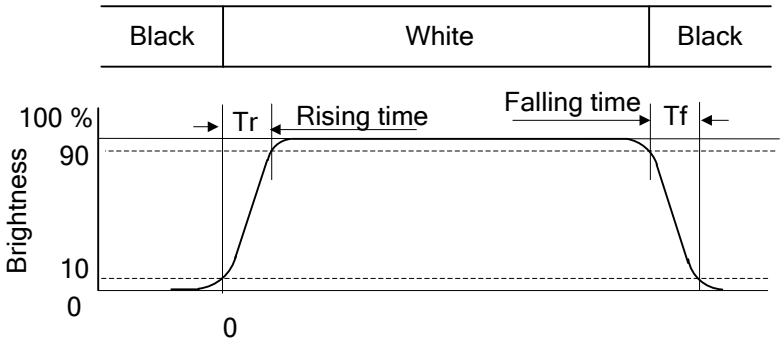


Fig 6.3

Note 5: The definition of viewing angle is shown in Fig. 6.4. Angle ϕ is used to represent viewing directions, for instance, $\phi = 270^\circ$ means 6 o'clock, and $\phi = 0^\circ$ means 3 o'clock. Moreover, angle θ is used to represent viewing angles from axis Z toward plane XY.

The display is super wide viewing angle version; 85° viewing angle can be obtained from each viewing direction.

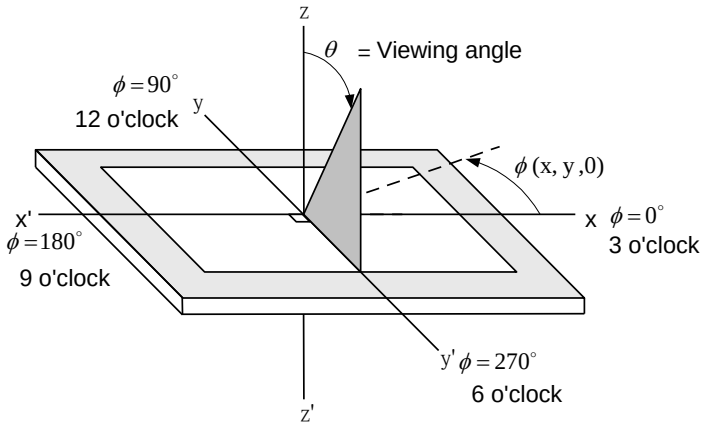
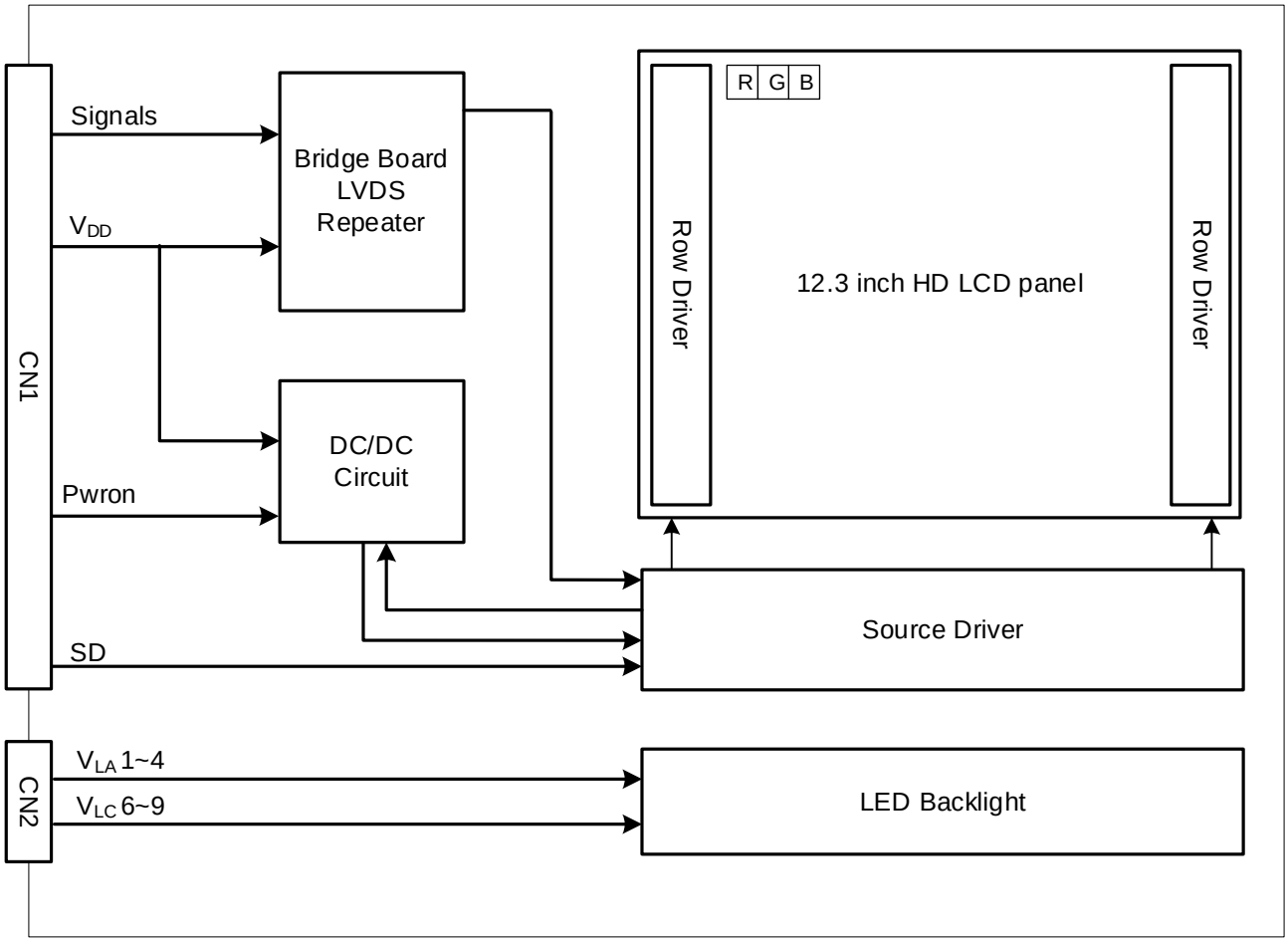


Fig 6.4

Note 6: The color chromaticity is measured from the center point of the panel, P5, as shown in Fig. 6.2.

7. BLOCK DIAGRAM



8. RELIABILITY TESTS

Test Item	Condition	
High Temperature	1) Operating 2) 85°C	240 hrs
Low Temperature	1) Operating 2) -40°C	240 hrs
High Temperature	1) Storage 2) 90°C	240 hrs
Low Temperature	1) Storage 2) -40°C	240 hrs
Heat Cycle	1) Operating 2) –40°C ~85°C 3) 3hrs~1hr~3hrs	240 hrs
Thermal Shock	1) Non-Operating 2) -40°C↔85°C 3) 0.5 hr↔0.5 hr	240 hrs
High Temperature & Humidity	1) Operating 2) 65°C & 85%RH 3) Without condensation	240 hrs (Note 3)
Vibration	1) Non-Operating 2) 10~200 Hz 3) 5G 4) X, Y, and Z directions	1 hr for each direction
Mechanical Shock	1) Non-Operating 2) 10 ms 3) 80G 4) ±X, ±Y and ±Z directions	Once for each direction
ESD	1) Operating 2) Tip:150 pF,330Ω 3) Air discharge for glass: ± 12KV 4) Contact discharge for metal frame: ± 15KV	1) Glass: 9 points 2) Metal frame: 8 points (Note4)

Note 1: Display functionalities are inspected under the conditions defined in the specification after the reliability tests.

Note 2: The display is not guaranteed for use in corrosive gas environments.

Note 3: Under the condition of high temperature & humidity, if the temperature is higher than 65°C, the humidity needs to be reduced as Fig. 8.1 shown.

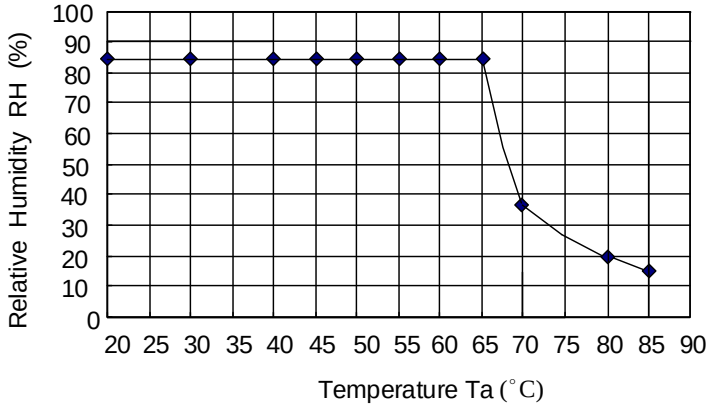


Fig. 8.1

Note 4: All pins of LCD interface (CN1) have been tested by ±100V contact discharge of ESD under non-operating condition.

9. LCD INTERFACE

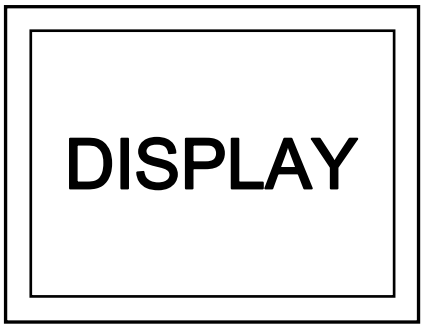
9.1 INTERFACE PIN CONNECTIONS

The display interface connector is FI-SEB20P-HF13E made by JAE or equivalent.

The pin assignment of LCD interface CN1 is as below.

Pin No.	Symbol	Signal	Pin No.	Symbol	Signal
1	V_{DD}	Power Supply for Logic	11	IN2-	B4~B7, DE
2	V_{DD}	Power Supply for Logic	12	IN2+	
3	V_{SS}	GND	13	V_{SS}	GND
4	V_{SS}	GND	14	CLK IN-	Pixel Clock
5	IN0-	R2~R7, G2	15	CLK IN+	
6	IN0+		16	V_{SS}	GND
7	V_{SS}	GND	17	IN3-	R0~R1, G0~G1, B0~B1
8	IN1-	G3~G7, B2~B3	18	IN3+	
9	IN1+		19	NC	No Connect
10	V_{SS}	GND	20	SD	Scan Direction Control (Note 1)

Note 1: Scan direction is available to be switched as below.



SD：Low or Open (Default)

SD：High

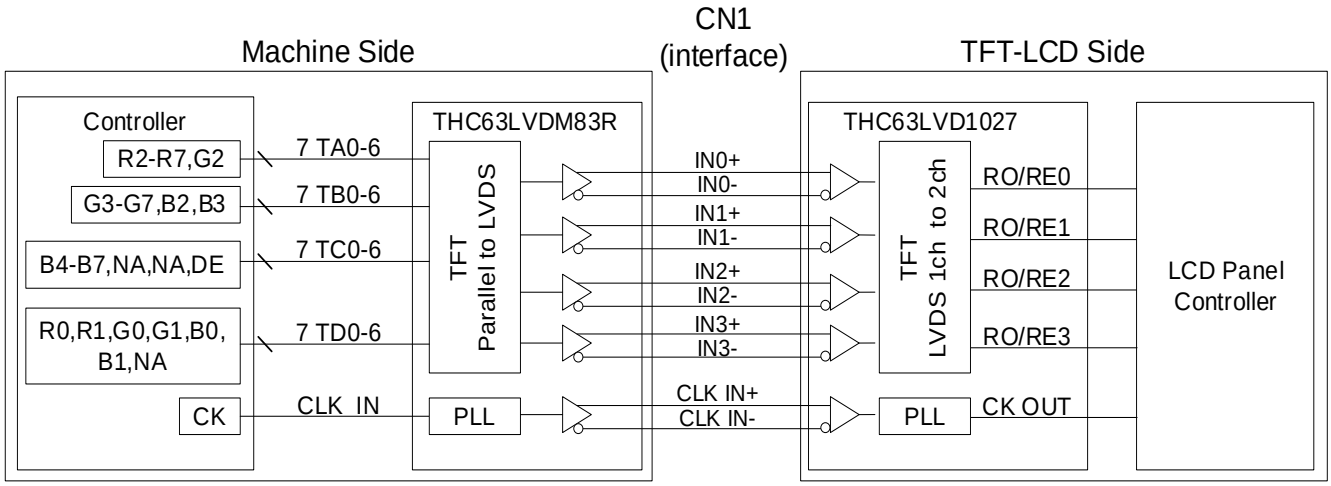
Note 2: INn- and INn+ (n=0,1,2,3), CLK IN- and CLK IN+ should be wired by twist-pairs or side-by-side FPC patterns, respectively.

The backlight interface (CN2) is SM10B-SRSS-TB(LF)(SN) made by JST or equivalent.

The pin assignment is as below:

Pin No.	Symbol	Signal	Pin No.	Symbol	Signal
1	VLA1	LED Anode Terminal1	6	VLC1	LED Cathode Terminal1
2	VLA2	LED Anode Terminal2	7	VLC2	LED Cathode Terminal2
3	VLA3	LED Anode Terminal3	8	VLC3	LED Cathode Terminal3
4	VLA4	LED Anode Terminal4	9	VLC4	LED Cathode Terminal4
5	NC	Non-Connection	10	NC	Non-Connection

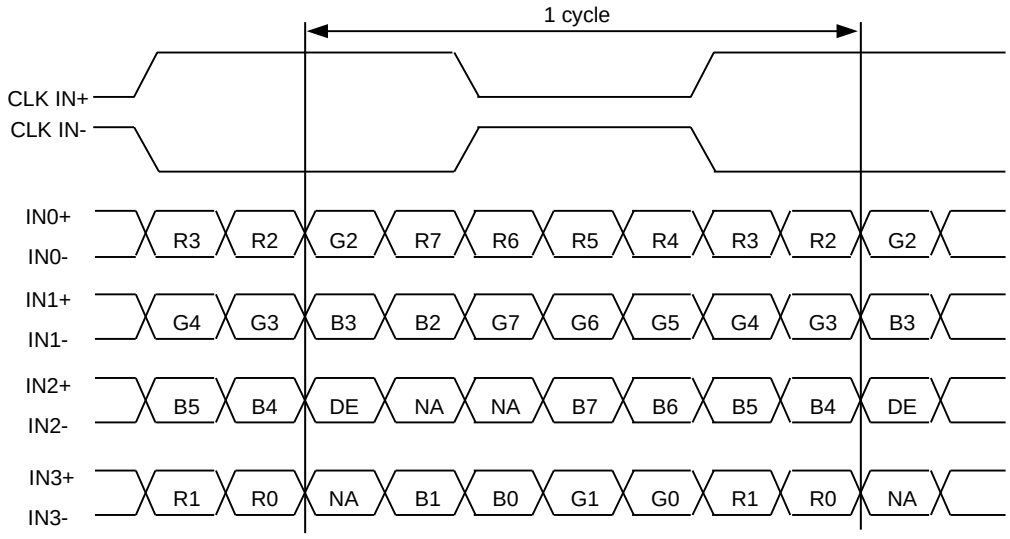
9.2 LVDS INTERFACE



Note 1: LVDS cable impedance should be 100 ohms per signal line when each 2-lines (+, -) is used in differential mode.

Note 2: The recommended transmitter, THC63LVDM83R, is made by Thine or equivalent, which is not contained in the module.

9.3 LVDS DATA FORMAT



DE: Display Enable

NA: Not Available

9.4 TIMING CHART

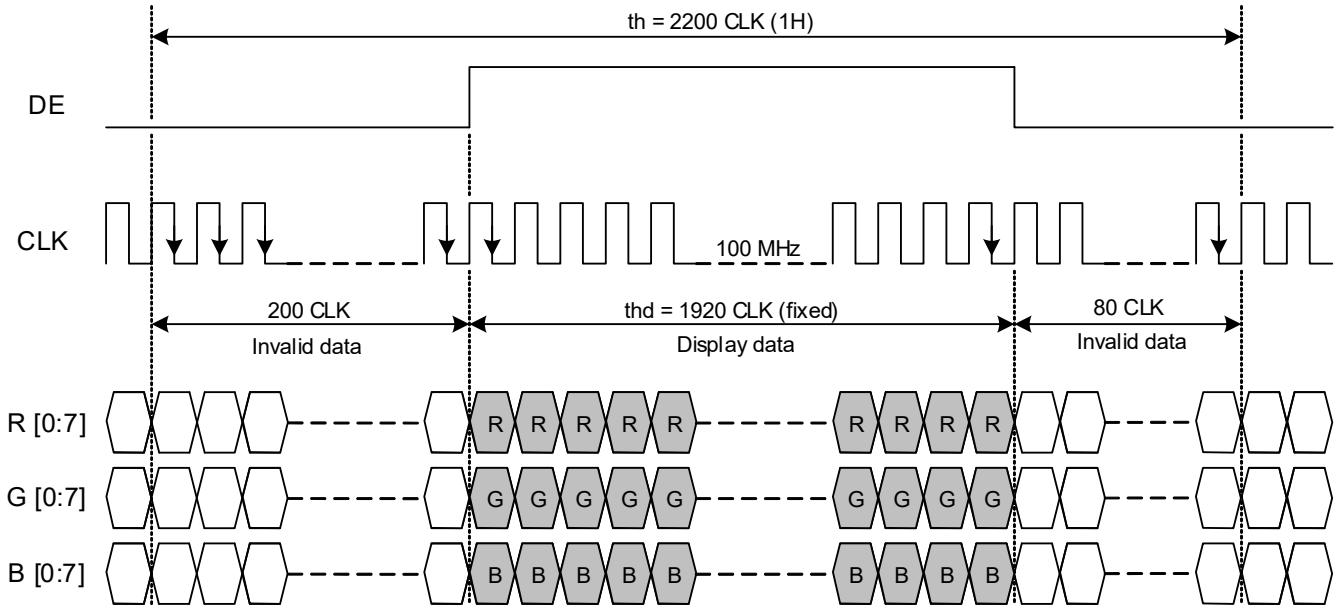


Fig. 9.1 Horizontal Timing

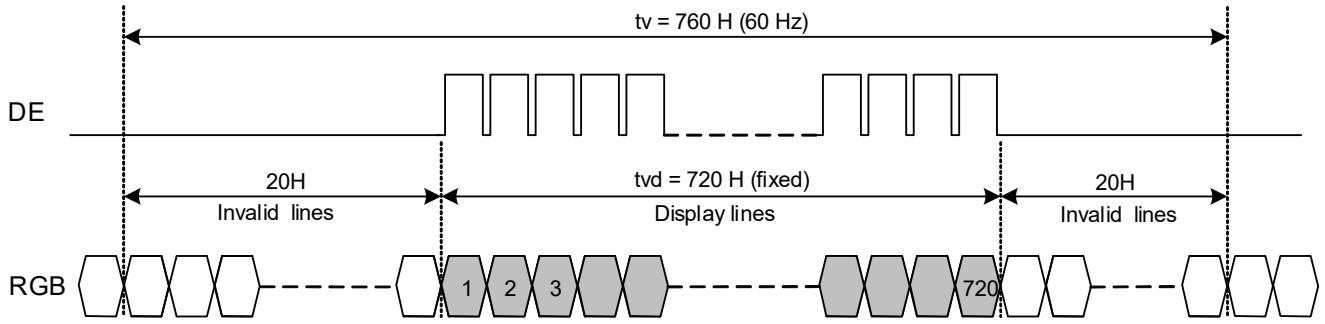


Fig. 9.2 Vertical Timing

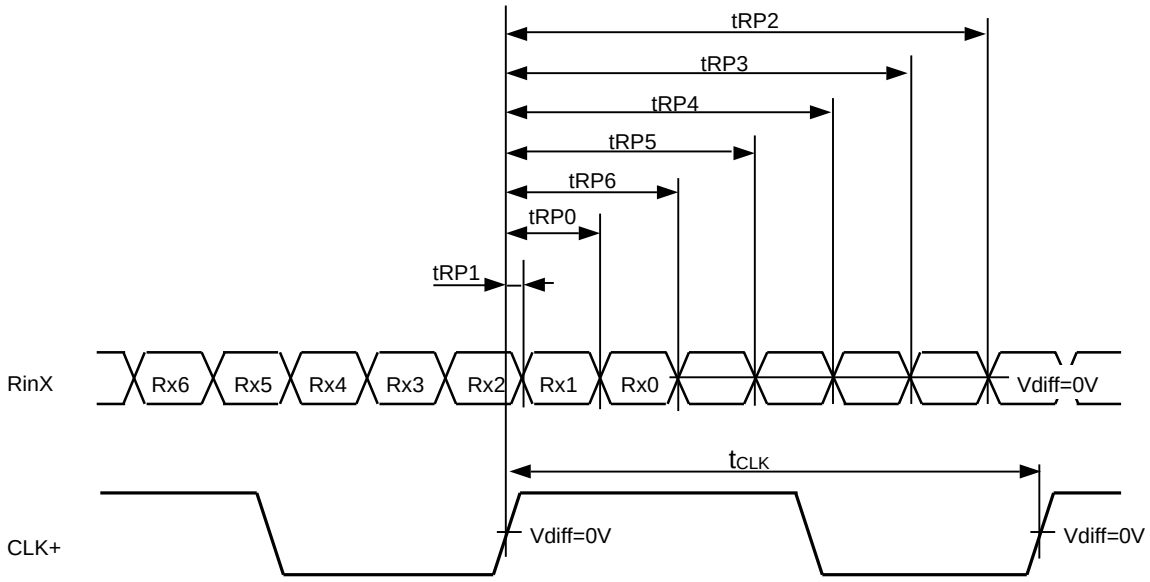
9.5 TIME TABLE

The column of timing sets including minimum, typical, and maximum as below are based on the best optical performance, frame frequency (f_{Frame}) = 60 Hz to define.

A. Horizontal and Vertical Timing

Item		Symbol	Min.	Typ.	Max.	Unit
Horizontal	CLK Frequency	fclk	96	100	120	M Hz
	Display Data	thd		1920		CLK
	Cycle Time	th	2130	2200	2520	
Vertical	Display Data	tvd		720		H
	Cycle Time	tv	750	760	800	

9.6 LVDS RECEIVER TIMING



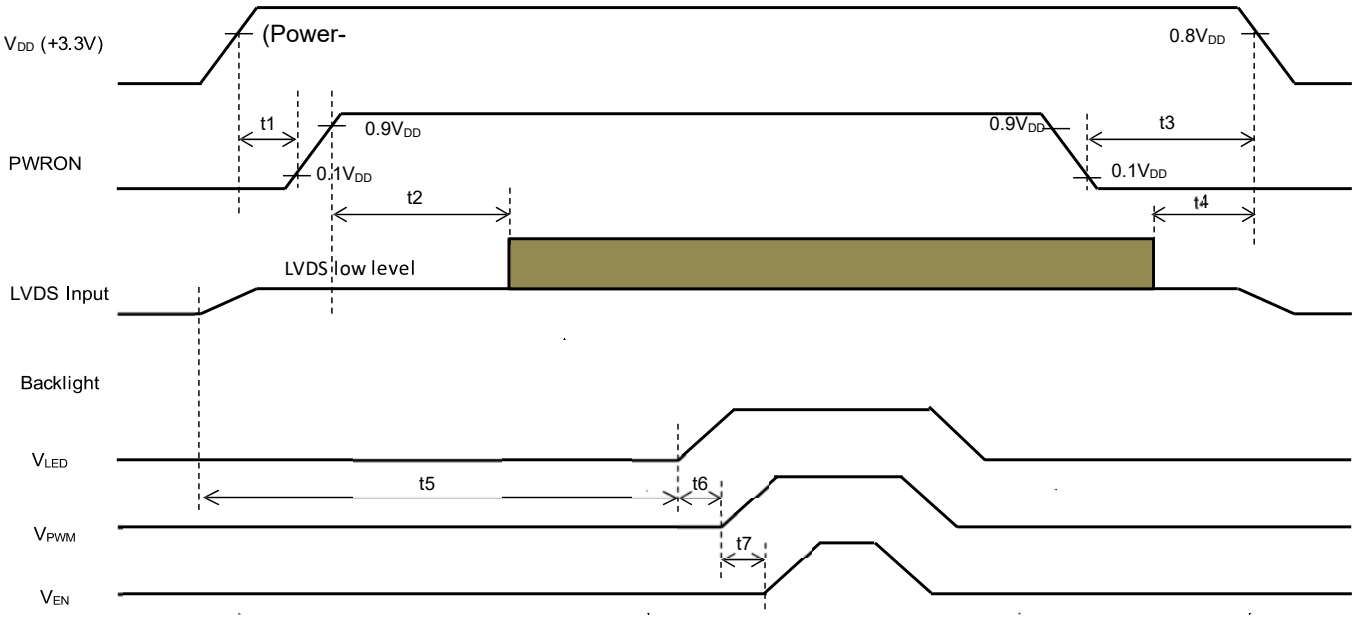
RinX= (RinX+)-(RinX-) (X=0, 1, 2, 3)

Item		Symbol	Min.	Typ.	Max.	Unit
CLK	Cycle frequency	1/tcLK	80	100	120	MHz
RinX (X=0,1,2,3)	0 data position	tRP0	1/7*t_{CLK} -0.22	1/7* t_{CLK}	1/7*t_{CLK} +0.22	ns
	1st data position	tRP1	-0.22	0	+0.22	
	2nd data position	tRP2	6/7*t_{CLK} -0.22	6/7* t_{CLK}	6/7*t_{CLK} +0.22	
	3rd data position	tRP3	5/7*t_{CLK} -0.22	5/7* t_{CLK}	5/7*t_{CLK} +0.22	
	4th data position	tRP4	4/7*t_{CLK} -0.22	4/7* t_{CLK}	4/7*t_{CLK} +0.22	
	5th data position	tRP5	3/7*t_{CLK} -0.22	3/7* t_{CLK}	3/7*t_{CLK} +0.22	
	6th data position	tRP6	2/7*t_{CLK} -0.22	2/7* t_{CLK}	2/7*t_{CLK} +0.22	

9.7 DATA INPUT for DISPLAY COLOR

Input color		Red Data								Green Data								Blue Data							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
		MSB							LSB	MSB							LSB	MSB							LSB
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

9.8 POWER SEQUENCE



Symbol	Item	Min	Typ	Max	Unit	Remarks
t1	Period from Power-on(3.3V) to PWRON↑	0	-	100	ms	
t2	Period from Power-on(3.3V) to LVDS input-on	0	-	-	ms	
t3	Period from PWRON↓ to Power-off(3.3V)	100	-	500	ms	
t4	Period from LVDS input-off to Power-off(3.3V)	0	-	-	ms	
t5	Period from LVDS input-on to V_{LED}-on	500	-	-	ms	
t6	Period from V_{LED} input-on to V_{PWM} on	1	-	-	ms	
t7	Period from V_{PWM} input-on to V_{EN} on	1	-	-	ms	

Note 1:

a) When power supply is OFF (V_{DD}=0V), logic input must be kept at either V_{SS} level or high impedance

b) The rising speed of power supply (V_{DD}=+3.3V) should be less than 2V/100μs.

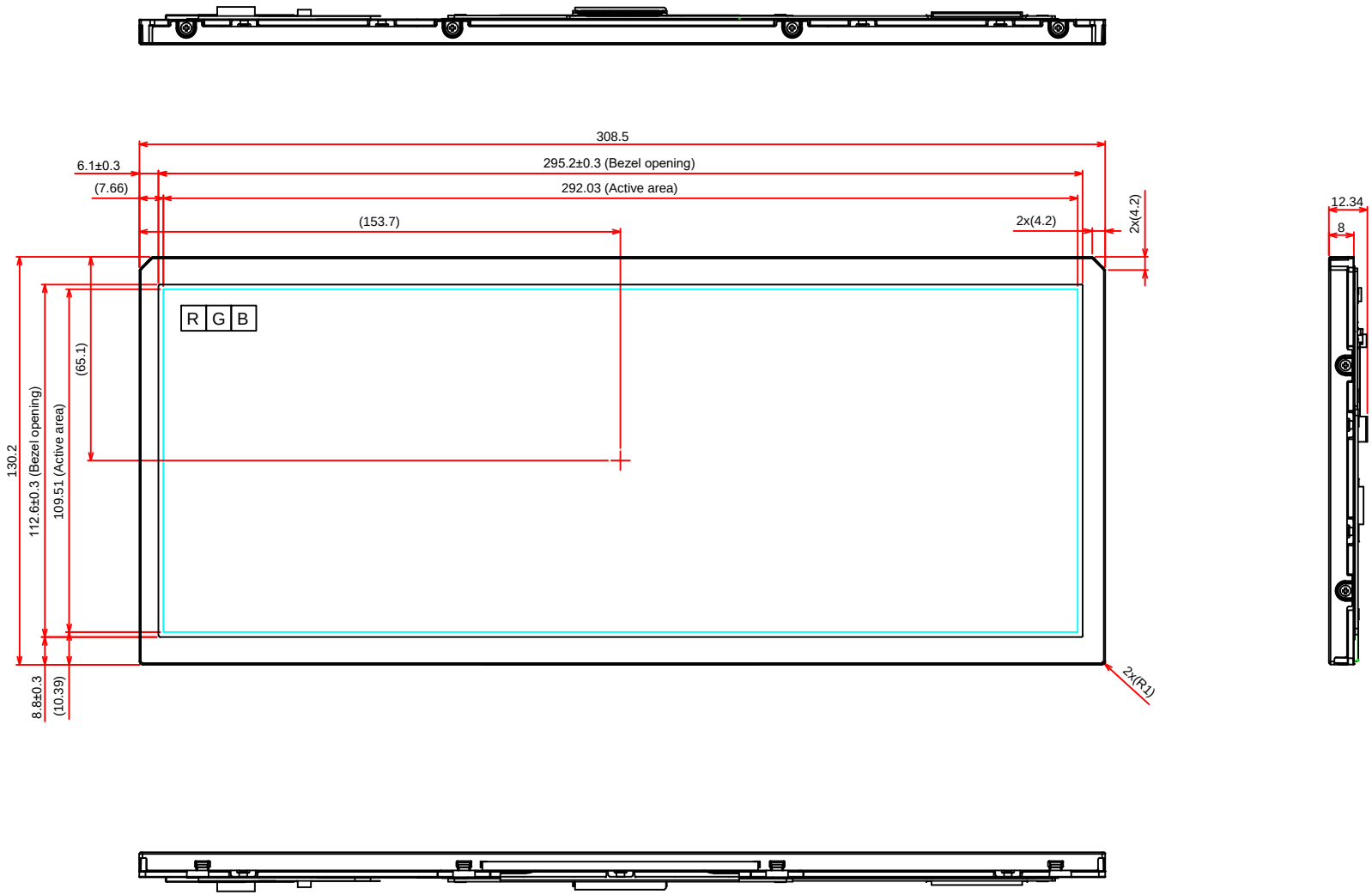
c) When the PWRON signal is 0V, V_{DD} must be 0V. (However t1 and t7 except)

d) LVDS signal level of the invalid period may be within the absolute maximum rating.

Note 2: In order to avoid high Inrush current, V_{DD} and V_{LED} rising time need to set more than 0.5ms.

10. OUTLINE DIMENSIONS

10.1 FRONT VIEW



General Tolerance:±0.5mm
Scale : NTS
Unit : mm

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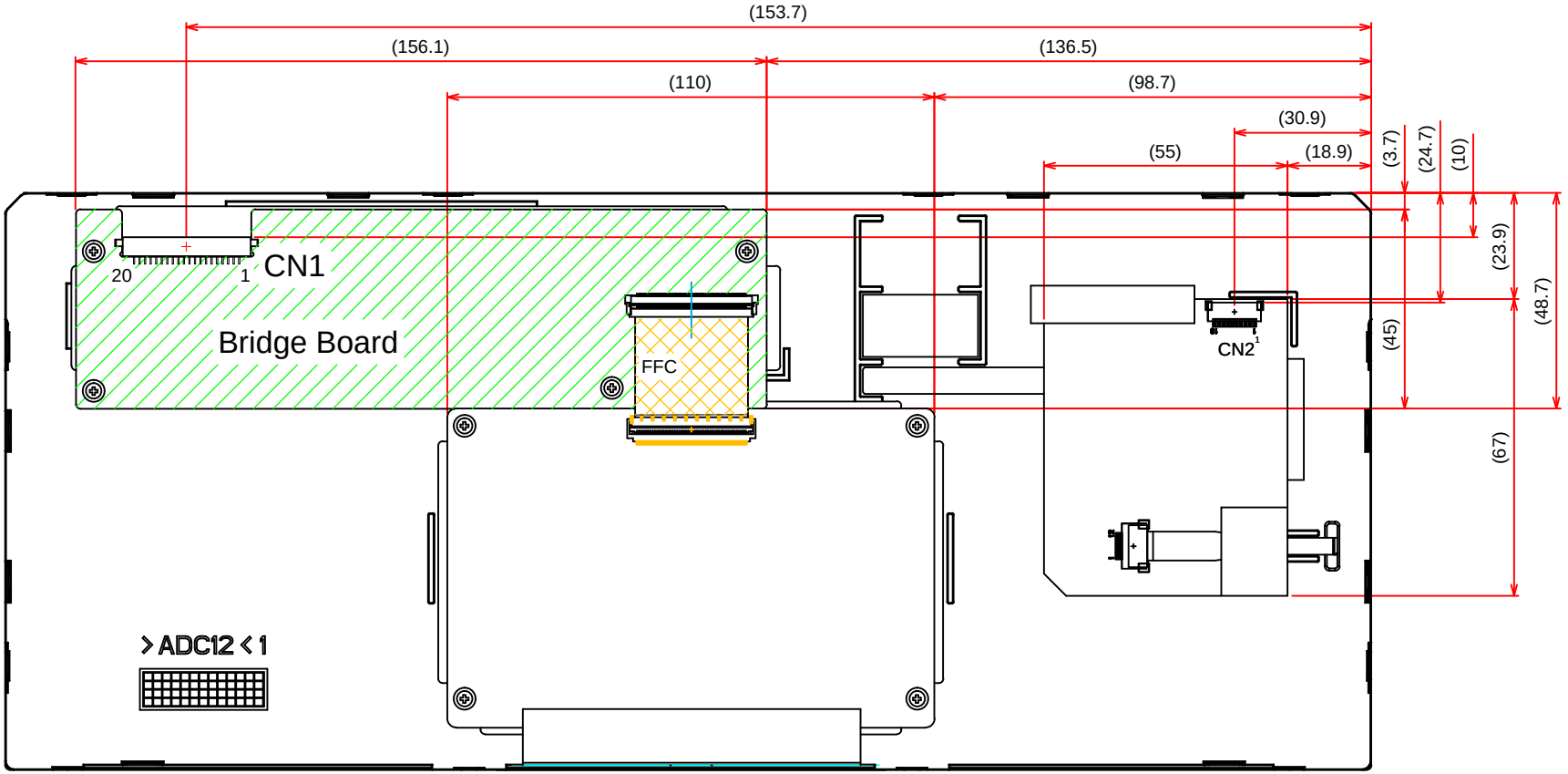
10.2 RAER VIEW



General Tolerance:±0.5mm
Scale : NTS
Unit : mm

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11. APPEARANCE STANDARD

The appearance inspection is performed in a room around 500~1000 lx based on the conditions as below:

- The distance between inspector's eyes and display is 30 cm.
- The viewing zone is defined with angle θ shown in Fig. 11.1 The inspection should be performed within 45° when display is shut down. The inspection should be performed within 5° when display is power on.

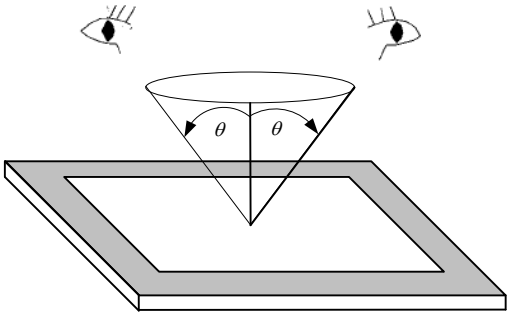


Fig. 11.1

11.1 THE DEFINITION OF LCD ZONE

LCD panel is divided into 3 areas as shown in Fig.11.2 for appearance specification in next section. A zone is the LCD active area (dot area); B zone is the area between A zone and metal frame.

In terms of housing design, B zone is the recommended window area customers' housing should be located in.

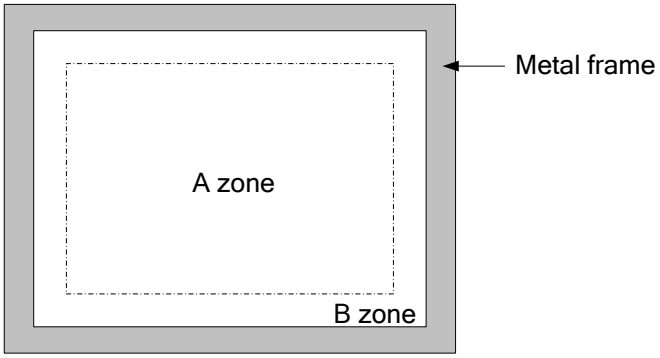


Fig. 11.2

11.2 LCD APPEARANCE SPECIFICATION

The specification as below is defined as the amount of unexpected phenomenon or material in different zones of LCD panel. The definitions of length, width and average diameter using in the table are shown in Fig. 11.3 and Fig. 11.4.

Item	Criteria				Applied zone
Scratches	Length (mm)	Width (mm)	Maximum number	Minimum space	A, B
	Ignored	W≦0.02	Ignored	-	
	L≦40	0.02＜W≦0.04	10	-	
	-	0.04＜W	Not allowed	-	
Dent	Serious one is not allowed				A
Wrinkles in polarizer	Serious one is not allowed				A
Bubbles on polarizer	Average diameter (mm)		Maximum number		A
	D≦0.3		Ignored		
	0.3＜D≦0.5		12		
	0.5＜D		Not allowed		
1) Stains 2) Foreign Materials 3) Dark Spot	Filamentous (Line shape)				A, B
	Length (mm)	Width (mm)	Maximum number		
	L≦2.0	W≦0.03	Ignored		
	L≦3.0	0.03＜W≦0.05	10		
	L≦2.5	0.05＜W≦0.1	1		
	Round (Dot shape)				A, B
	Average diameter (mm)	Maximum number	Minimum Space		
	D≦0.2	Ignored	-		
	0.2＜D≦0.3	10	10 mm		
	0.3＜D≦0.4	5	30 mm		
	0.4＜D	Not allowed	-		
	In total	Filamentous + Round=10			
	Those wiped out easily are acceptable				
Dot-Defect		Type	Maximum number		A (Note 1)
	Bright dot-defect	1 dot	0		
		2 adjacent dot	0		
		3 adjacent dot or above	Not allowed		
		In total	0		
	Dark dot-defect	1 dot	5		
		2 adjacent dot	2		
		3 adjacent dot or above	Not allowed		
		In total	5		
	In total		5		

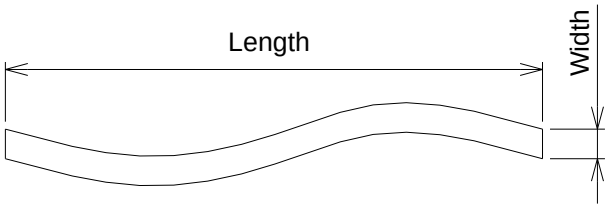
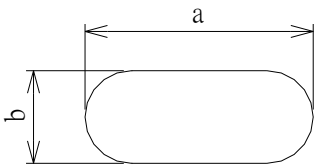


Fig 11.3



Average diameter $=\frac{a+b}{2}$

Fig 11.4

Note 1: The definitions of dot defect are as below:

- The defect area of the dot must be bigger than half of a dot.
- For bright dot-defect, showing black pattern, the dot's brightness must be over 30% brighter than others.
- For dark dot-defect, showing white pattern, the dot's brightness must be under 70% darker than others.
- The definition of 1-dot-defect is the defect-dot, which is isolated and no adjacent defect-dot.
- The definition of adjacent dot is shown as Fig. 11.5.
- The Density of dot defect is defined in the area within diameter ϕ =20mm.

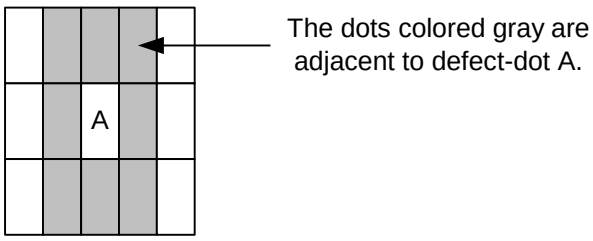


Fig 11.5

12. PRECAUTIONS

12.1 PRECAUTIONS of ESD

1) Before handling the display, please ensure your body has been connected to ground to avoid any damages by ESD. Also, do not touch display's interface directly when assembling.

2) Please remove the protection film very slowly before turning on the display to avoid generating ESD.

12.2 PRECAUTIONS of HANDLING

1) In order to keep the appearance of display in good condition, please do not rub any surfaces of the displays by sharp tools harder than 3H, especially touch panel, metal frame and polarizer.

2) Please do not pile the displays in order to avoid any scars leaving on the display. In order to avoid any injuries, please pay more attention for the edges of glasses and metal frame, and wear finger cots to protect yourself and the display before working on it.

3) Touching the display area or the terminal pins with bare hand is prohibited. This is because it will stain the display area and cause poor insulation between terminal pins, and might affect display's electrical characteristics furthermore.

4) Do not use any harmful chemicals such as acetone, toluene, and isopropyl alcohol to clean display's surfaces.

5) Please use soft cloth or absorbent cotton with ethanol to clean the display by gently wiping. Moreover, when wiping the display, please wipe it by horizontal or vertical direction instead of circling to prevent leaving scars on the display's surface, especially polarizer.

6) Please wipe any unknown liquids immediately such as saliva, water or dew on the display to avoid color fading or any permanently damages.

7) Maximum pressure to the surface of the display must be less than 1.96×10^4 Pa. If the area of adding pressure is less than $1\,\mathrm{cm}^2$, the maximum pressure must be less than 1.96N.

12.3 PRECAUTIONS OF OPERATING

1) Please input signals and voltages to the displays according to the values defined in the section of electrical characteristics to obtain the best performance. Any voltages over than absolute maximum rating will cause permanent damages to this display. Also, any timing of the signals out of this specification would cause unexpected performance.

2) When the display is operating at significant low temperature, the response time will be slower than it at $25\,^{\circ}\mathrm{C}$. In high temperature, the color will be slightly dark and blue compared to original pattern. However, these are temperature-related phenomenon of LCD and it will not cause permanent damages to the display when used within the operating temperature.

3) The use of screen saver or sleep mode is recommended when static images are likely for long periods of time. This is to avoid the possibility of image sticking.

4) Spike noise can cause malfunction of the circuit. The recommended limitation of spike noise is no bigger than $\pm$ 100 mV.

12.4 PRECAUTIONS of STORAGE

If the displays are going to be stored for years, please be aware the following notices.

1) Please store the displays in a dark room to avoid any damages from sunlight and other sources of UV light.
2) The recommended long term storage temperature is between 10℃~35℃ and 55%~75% humidity to avoid causing bubbles between polarizer and LCD glasses, and polarizer peeling from LCD glasses.
3) It would be better to keep the displays in the container, which is shipped from JDI, and do not unpack it.
4) Please do not stick any labels on the display surface for a long time, especially on the polarizer.

13. DESIGNATION of LOT MARK

1) The lot mark is showing in Fig.13.1. First 4 digits are used to represent production lot, T represented made in Taiwan, and the last 6 digits are the serial number.

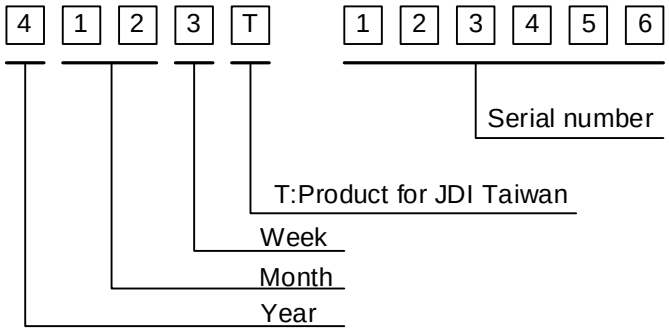


Fig 13.1

2) The tables as below are showing what the first 4 digits of lot mark are shorted for.

Year	Lot Mark
2024	4
2025	5
2026	6
2027	7
2028	8

Month	Lot Mark	Month	Lot Mark
Jan.	01	Jul.	07
Feb.	02	Aug.	08
Mar.	03	Sep.	09
Apr.	04	Oct.	10
May	05	Nov.	11
Jun.	06	Dec.	12

Week	Lot Mark
1~7 days	1
8~14 days	2
15~21 days	3
22~28 days	4
29~31 days	5

3) Except letters I and O, revision number will be shown on lot mark and following letters A to Z.

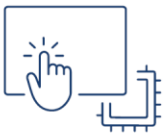
4) The location of the lot mark is on the back of the display shown in Fig. 13.2.

Label example:

Fig. 13.2

DATA MODUL

Passion Displayed



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