Japan Display Inc.

FOR MESSRS : _____ DATE : Jan. 3rd ,2023

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

TX13D204VM0BAA

Contents

ACCEPTED BY : _____ PROPOSED BY : Oblack Tsai

2. RECORD OF REVISION

DATE	SHEET No.	SUMMARY
Jul.26,'22	7B64PS 2711-TX13D204VM0BAA-2 PAGE 11-2/3~3/3	11.2 Revised LCD APPEARANCE SPECIFICATION
Jan.03,'23	7B64PS 2701-TX13D204VM0BAA-3 PAGE 1-1/1 7B64PS 2713-TX13D204VM0BAA-3 PAGE 13-1/1	Company logo changed : KOE JDI Taiwan Inc. → JDI Japan Display Inc.

3. GENERAL DATA

3.1 DISPLAY FEATURES

This module is a 5” WVGA of 16:9 format of amorphous silicon 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	TX13D204VM0BAA
Module Dimensions	121.0(W)mm x 80.0(H)mm x 7.1(D)mm (W/O component & FPC)
LCD Active Area	108.0(W)mm x 64.8(H)mm
Pixel Pitch	0.135(W)mm x 0.135(H)mm
Resolution	800x3(R,G,B)(W)x480(H) Dots
Color Pixel Arrangement	R, G, B Vertical stripe
LCD Type	Transmissive Color TFT; Normally Black
Display Type	Active Matrix
Number of Colors	16.7M Colors (8-bit RGB)
Backlight	Light Emitting Diode (LED)
Weight	90 g (typ.)
Interface	50pin LVDS
Power Supply Voltage	3.3V for LCD driving ; 21 V for Backlight
Power Consumption	0.5 W for LCD ; 3.36 W for B/L
Viewing Direction	Super Wide version

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	4.0	V	Note 1
Operating Temperature	T_{op}	-30	85	˚C	Note 2
Storage Temperature	T_{st}	-40	90	˚C	Note 2
Backlight Input Voltage	V_{LED}	-	28	V	-

Note 1: The rating is defined for the signal voltages of the interface such as DCLK, DE, and RGB data bus.

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 LCD CHARACTERISTICS

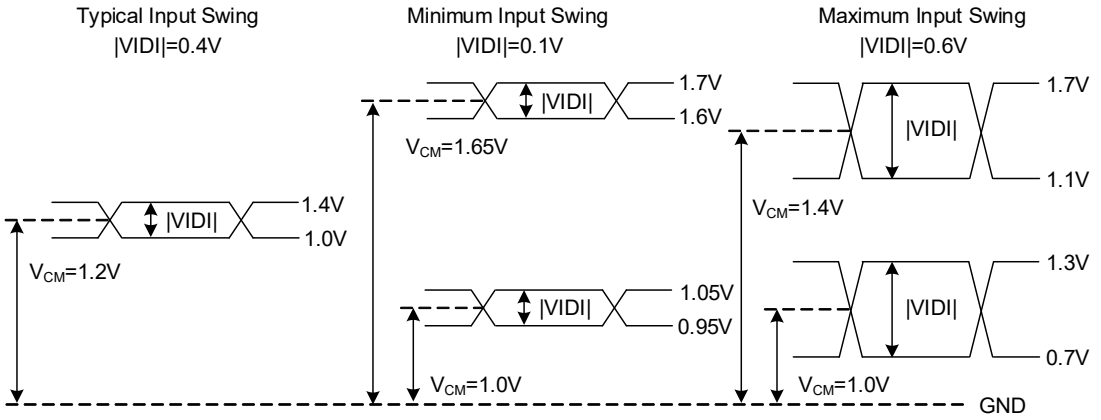
$T_a = 25\,^{\circ}C,\ \mathrm{Vss} = 0\mathrm{V}$

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	-	3.0	3.3	3.6	V	-
Input Voltage of Logic	V_I	"H" level	$0.7V_{DD}$	-	V_{DD}	V	Note 1
		"L" level	0	-	$0.3V_{DD}$		
Power Supply Current	I_{DD}	V_{DD}=3.3V	-	-	150	mA	Note 2
Frame Frequency	f_{Frame}	-	55	60	65	Hz	-
CLK Frequency	f_{CLK}	-	23.2	27.7	33.5	MHz	-

Note 1: The rating is defined for the signal voltages of the interface such as DE, DCLK and RGB data bus.

Note 2: An all white check pattern is used when measuring I_{DD}. f_{Frame} is set to 60 Hz.

Note 3: VCM 1.2V is common mode voltage of LVDS transmitter and receiver.



LVDS Receiver Input Signal Operation Range

5.2 BACKLIGHT CHARACTERISTICS

$T_a = 25\,^{\circ}C$

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remarks
LED Input Voltage	V_{LED}	-	19	-	23.8	V	Note 1
LED Forward Current	I_{LED}	per LED	-	80	-	mA	-
LED lifetime	-	I_{LED}=80 mA/per LED	-	70K	-	hrs	Note 2

Note 1: Fig. 5.1 shows the LED backlight circuit. V_{LED} and I_{LED} is many-to-one relationship, the above V_{LED} range is defined to obtain 80mA per LED chain.

Note 1: The estimated lifetime is specified as the time to reduce 50% brightness by applying 80 mA at 25 °C.

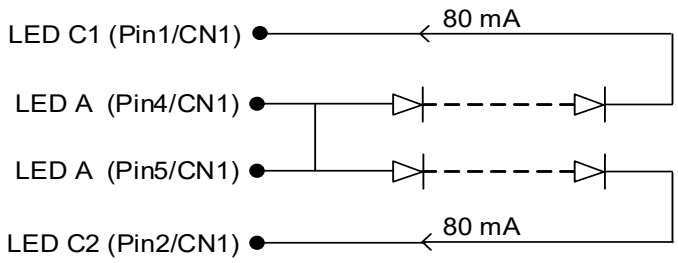


Fig 5.1

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 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		-	$\phi = 0^{\circ}, \theta = 0^{\circ}$,	1000	1300	-	cd/m^2	Note 1
Brightness Uniformity		-	I_{LED}=80 mA	70	70	-	%	Note 2
Contrast Ratio		CR	(per LED)	800	1300	-	-	Note 3
Response Time (Rising + Falling)		$T_r + T_f$	$\phi = 0^{\circ}, \theta = 0^{\circ}$	-	-	25	ms	Note 4
NTSC Ratio		-	$\phi = 0^{\circ}, \theta = 0^{\circ}$	-	70	-	%	-
Viewing Angle		θ x	$\phi = 0^{\circ}$, CR ≥ 10	-	80	-	Degree	Note 5
		θ x′	$\phi = 180^{\circ}$, CR ≥ 10	-	80	-		
		θ y	$\phi = 90^{\circ}$, CR ≥ 10	-	80	-		
		θ y′	$\phi = 270^{\circ}$, CR ≥ 10	-	80	-		
Color Chromaticity	Red	X	$\phi = 0^{\circ}, \theta = 0^{\circ}$	0.60	0.64	0.68	-	Note 6
		Y		0.29	0.33	0.37		
	Green	X		0.28	0.32	0.36		
		Y		0.58	0.62	0.66		
	Blue	X		0.11	0.15	0.18		
		Y		0.02	0.06	0.10		
	White	X		0.27	0.31	0.35		
		Y		0.28	0.32	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.

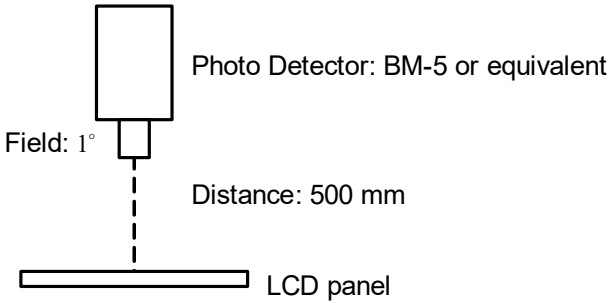


Fig 6.1

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.

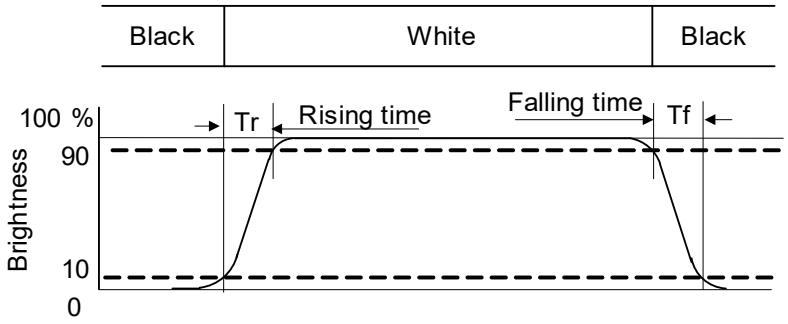


Fig 6.3

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, so that the best optical performance can be obtained from every viewing direction.

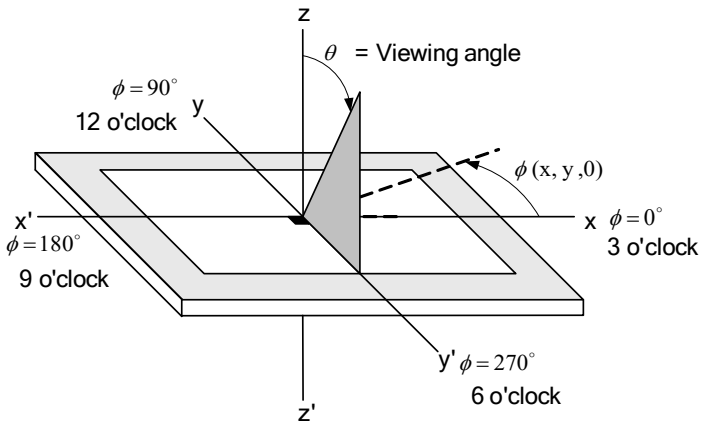
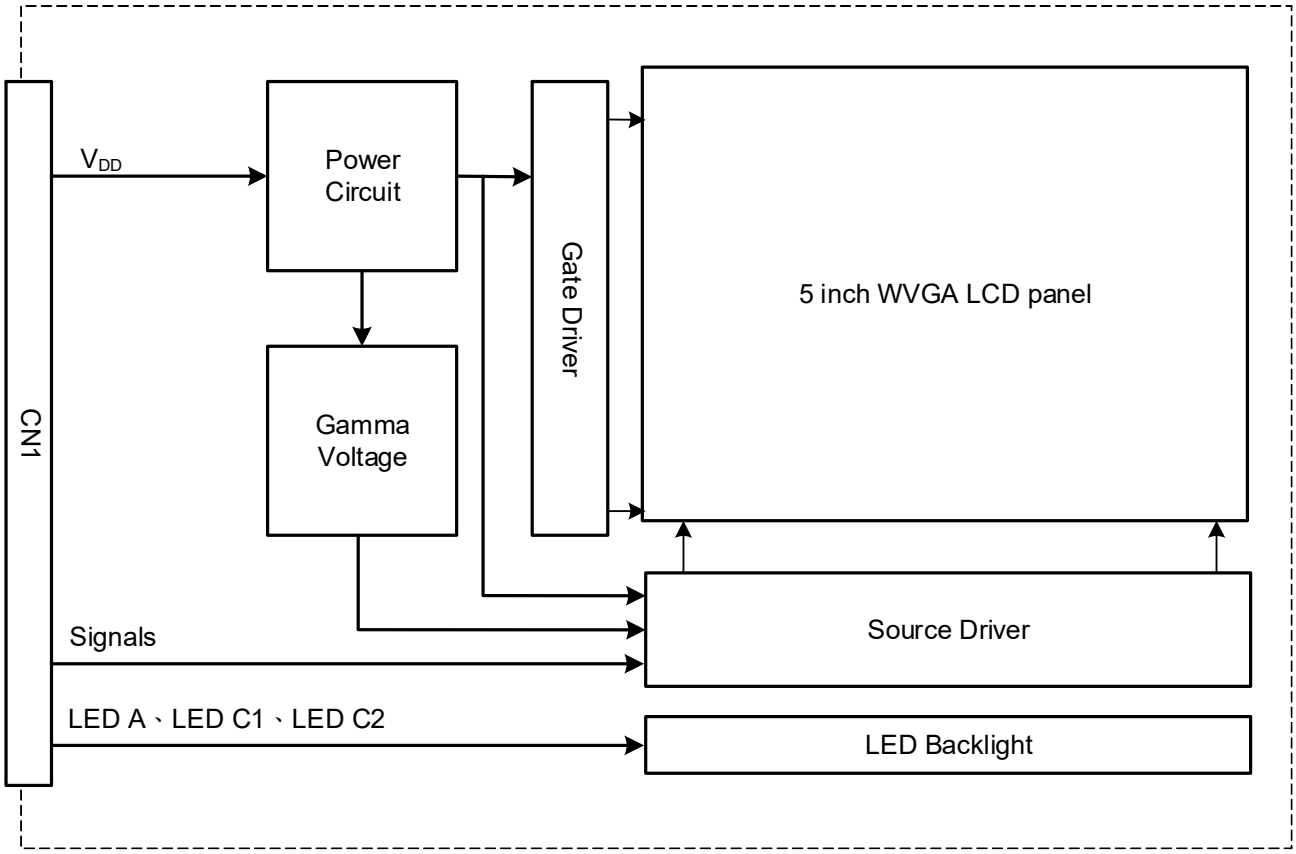


Fig 6.4

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

7. BLOCK DIAGRAM



Note 1: Signals are DCLK, DE, and RGB data bus.

8. RELIABILITY TESTS

Test Item	Condition	
High Temperature	1) Operating 2) 85°C	240 hrs
Low Temperature	1) Operating 2) -30°C	240 hrs
High Temperature	1) Storage 2) 90°C	240 hrs
Low Temperature	1) Storage 2) -40°C	240 hrs
Thermal Shock	1) Non-Operating 2) -40°C↔85°C 3) 0.5 hr↔0.5 hr	30 cycles
High Temperature & Humidity	1) Operating 2) 60°C & 90%RH 3) Without condensation	240 hrs
Vibration	1) Non-Operating 2) 20～200 Hz 3) 2G 4) X, Y, and Z directions	1 hr for each direction
Mechanical Shock	1) Non-Operating 2) 10 ms 3) 50G 4) ±X, ±Y and ±Z directions	Once for each direction
ESD	1) Operating 2) Tip: 150 pF, 330Ω 3) Air discharge for glass: ± 8KV 4) Contact discharge for metal frame: ± 8KV	1) Glass: 9 points 2) Metal frame: 8 points (Note3)

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: 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 CN1 is pitch 0.5mm 50pin and pin assignment is as below:

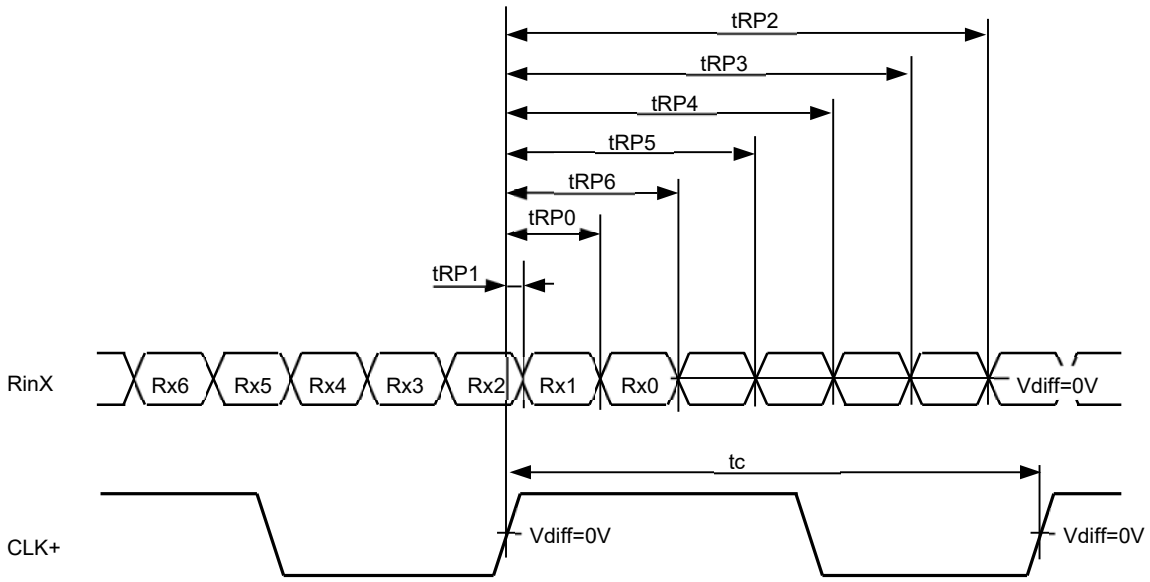
Pin No.	Symbol	Signal	Pin No.	Symbol	Signal
1	LED C1	LED Cathode 1	26	CLK IN-	Clock
2	LED C2	LED Cathode 2	27	V_{SS}	Ground
3	NC	No Connection	28	RST	Reset pin (“L” active)
4	LED A	LED Anode	29	STBYB	Standby mode setting pin (“H” Display ON ; “L Display OFF”)
5			30	V_{SS}	Ground
6	NC	No Connection	31	L/R	Horizontal Display mode Control (Note1)
7	V_{SS}	Ground	32	U/D	Vertical Display mode Control (Note 1)
8			33	V_{SS}	Ground
9			34		
10	NC	No Connection	35		
11			36		
12	V_{SS}	Ground	37		
13	IN3+	Pixel Data	38		
14	IN3-		39		
15	V_{SS}	Ground	40		
16	IN2+	Pixel Data	41		
17	IN2-		42		
18	V_{SS}	Ground	43		
19	IN1+	Pixel Data	44	NC	No Connection
20	IN1-		45	V_{DD}	Supply Voltage
21	V_{SS}	Ground	46		
22	IN0+	Pixel Data	47		
23	IN0-		48	NC	No Connection
24	V_{SS}	Ground	49	V_{SS}	Ground
25	CLK IN+	Clock	50		

Note1: Refer to the section “9.3 SCAN DIRECTION “

9.2 TIMING CHART

(1) LVDS Receiver Timing

(Interface of TFT module)

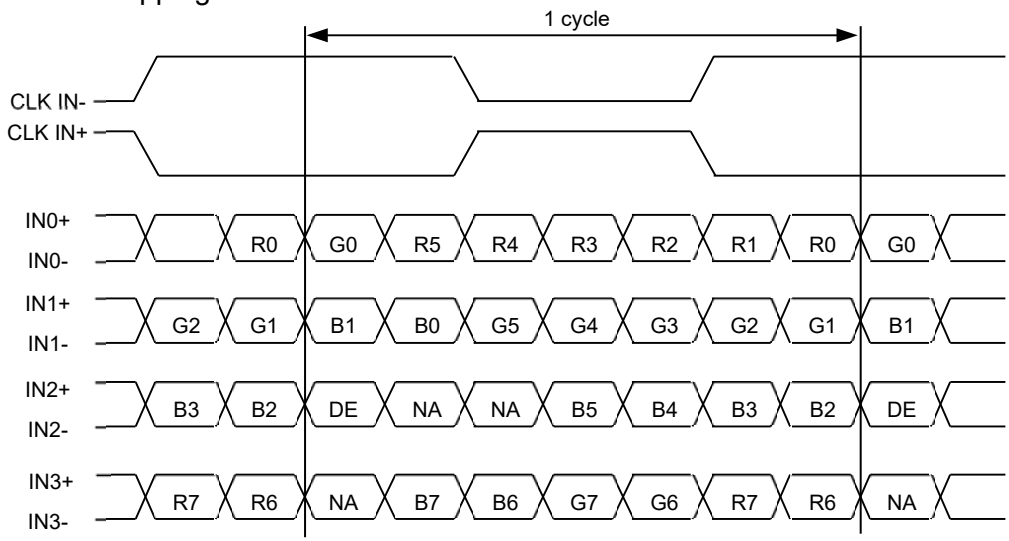


RinX=(RinX+)-(RinX-) (X=0,1,2)

Item		Symbol	Min.	Typ.	Max.	Unit
DCLK	FREQUENCY	1/ t_{CLK}	23.2	27.7 1)	33.5	MHz
RinX (X=0,1,2)	1st data position	t_{RP1}	-0.4	0	0.4	ns
	0 data position	t_{RP0}	1/7t_{CLK}-0.4	1/7*t_{CLK}	1/7t_{CLK}+0.4	
	6th data position	t_{RP6}	2/7t_{CLK}-0.4	2/7*t_{CLK}	2/7t_{CLK}+0.4	
	5th data position	t_{RP5}	3/7t_{CLK}-0.4	3/7*t_{CLK}	3/7t_{CLK}+0.4	
	4th data position	t_{RP4}	4/7t_{CLK}-0.4	4/7*t_{CLK}	4/7t_{CLK}+0.4	
	3rd data position	t_{RP3}	5/7t_{CLK}-0.4	5/7*t_{CLK}	5/7t_{CLK}+0.4	
	2nd data position	t_{RP2}	6/7t_{CLK}-0.4	6/7*t_{CLK}	6/7t_{CLK}+0.4	

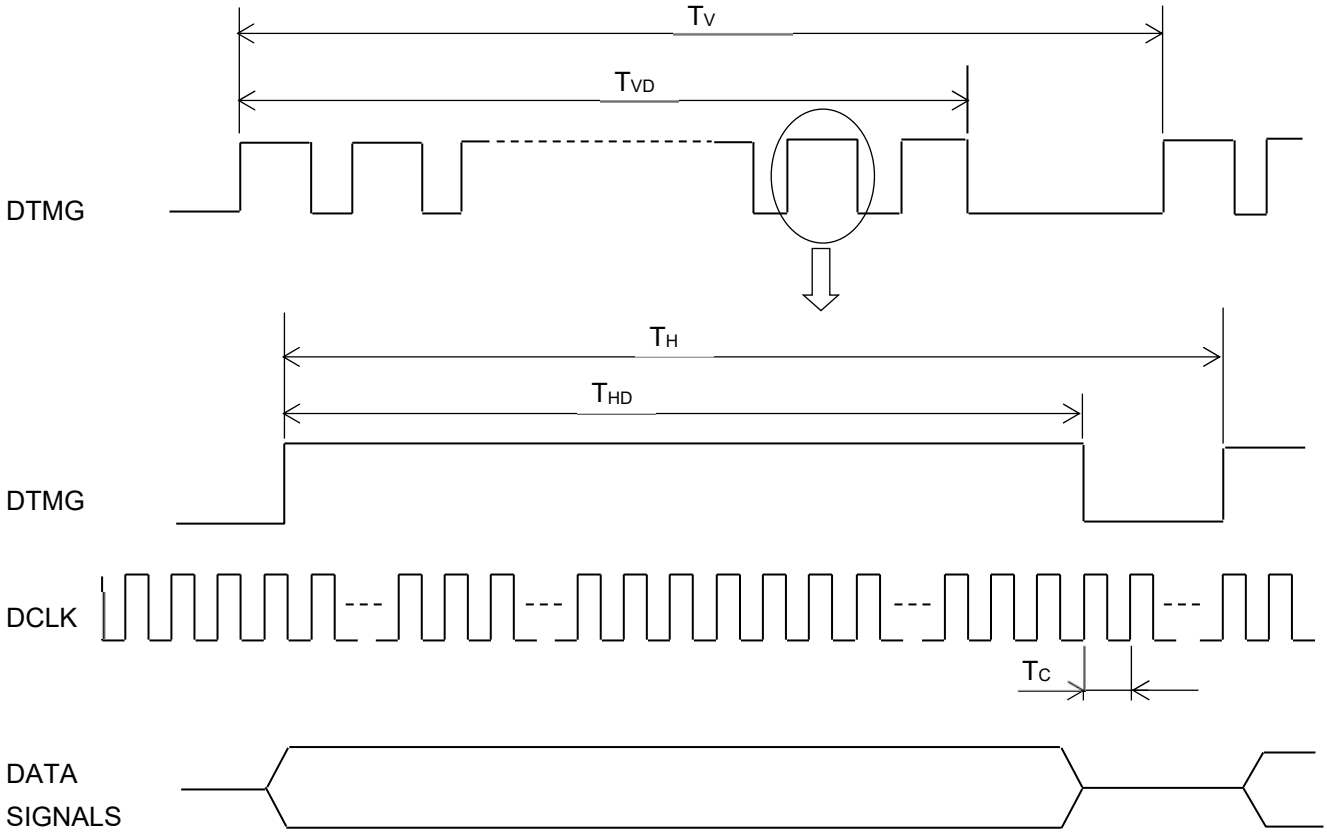
Note 1: fv=60Hz

(2) LVDS Data Mapping



(3) Timing converter timing

(Input timing for transmitter)

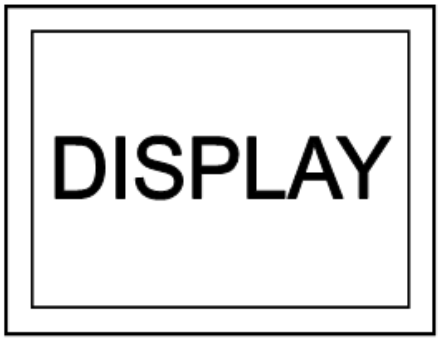


The timings except mentioned above are referred to the specifications of your transmitter.

Item		Symbol	Min.	Typ.	Max.	Unit	Remarks
DCLK	Cycle time	T_C	29.9	36.1	43.1	ns	
Horizontal	Horizontal period	T_H	862	884	920	T_C	
	Horizontal width-Active	T_{HD}		800		T_C	
Vertical	Vertical period	T_V	490	523	560	T_H	
	Vertical width-Active	T_{VD}		480		T_H	
	Frame frequency	f_V	55	60	65	H_Z	

9.3 SCAN DIRECTION

Scan direction is available to be switched as below:



L/R: H , U/D: H (Default)

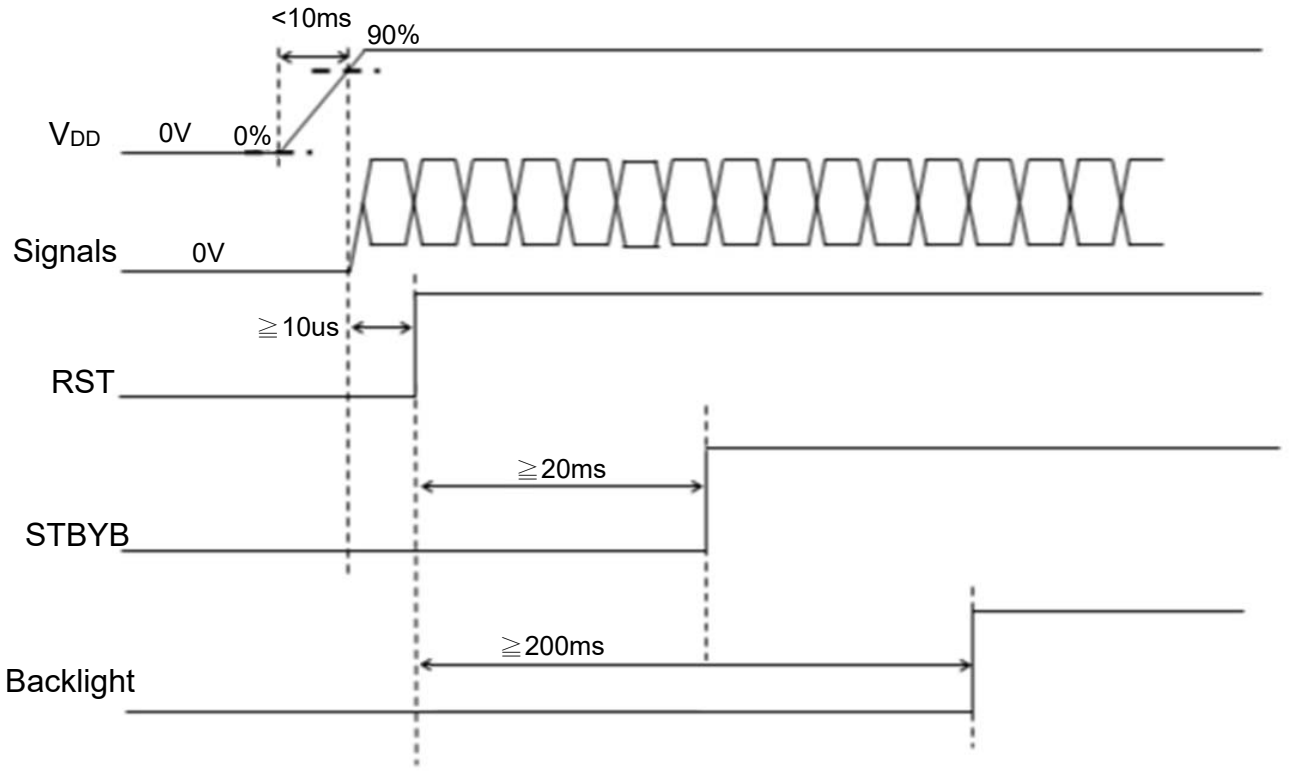
L/R: L , U/D: H

L/R: H , U/D: L

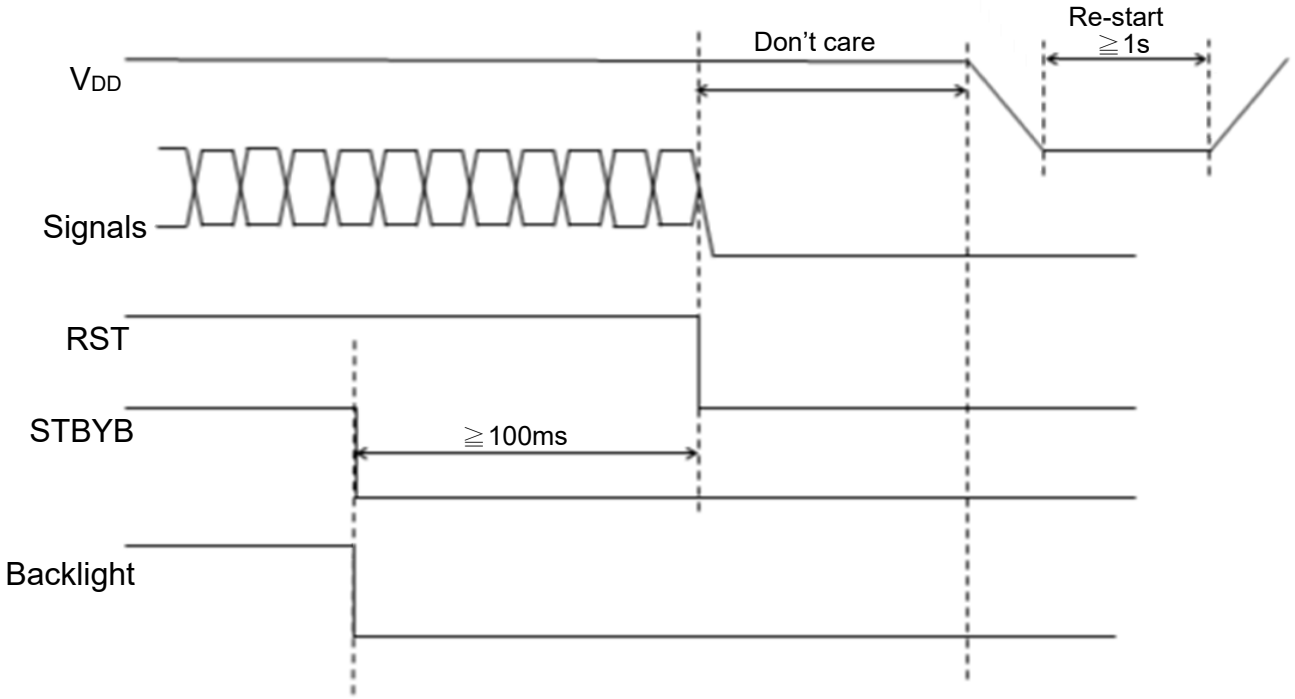
L/R: L , U/D: L

9.4 POWER SEQUENCE

Power ON



Power OFF

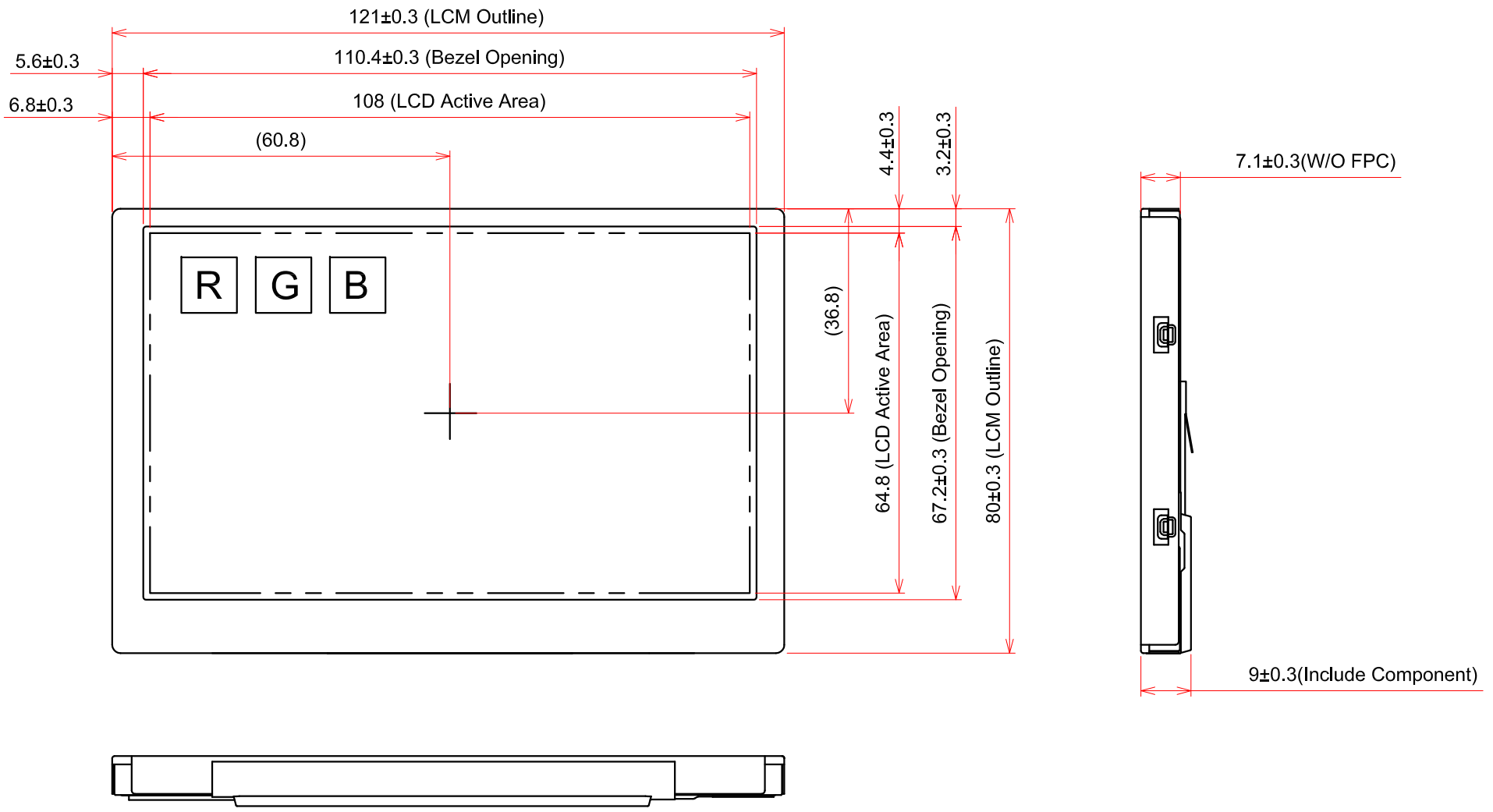


9.5 DATA INPUT for DISPLAY COLOR

`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

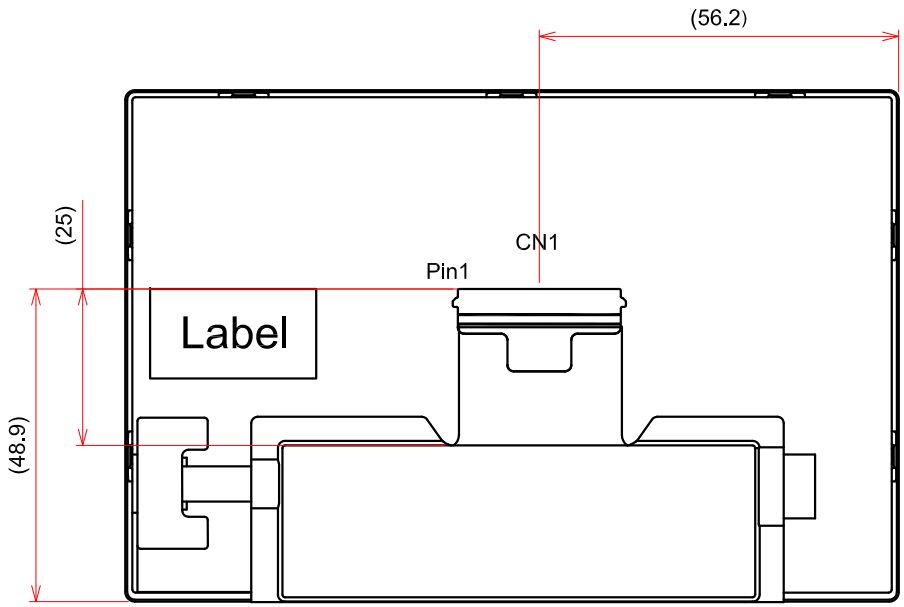
10. OUTLINE DIMENSIONS

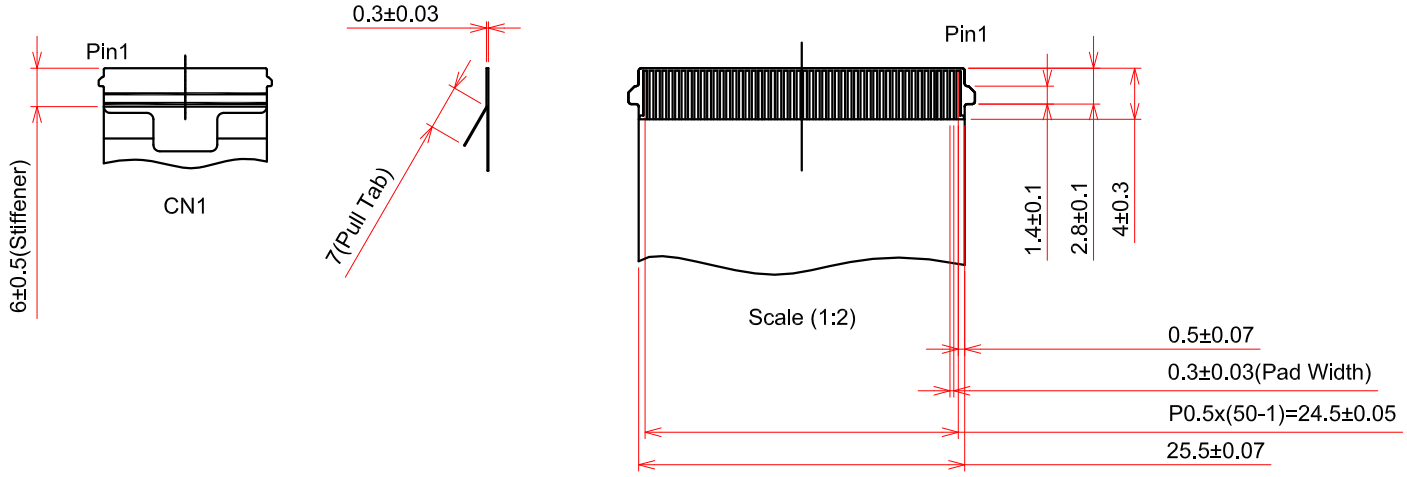
10.1 FRONT VIEW



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

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 dark room around 500~1000 lx based on the conditions as below:

- The distance between inspector's eyes and display is 30 cm. ambient temperature is 25°C±5°C.
- 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.

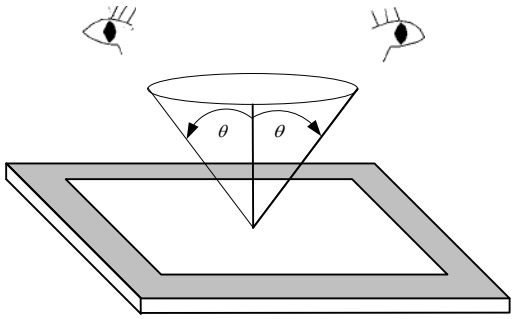


Fig. 11.1

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, which extended 1 mm out from LCD active area; C zone is the area between B zone and metal frame.

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

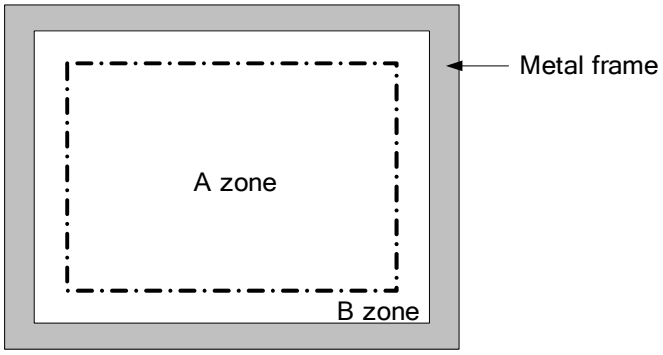


Fig. 11.2

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.

<table>
<tr><td>Item</td><td colspan="5">Criteria</td><td>Applied zone</td></tr>
<tr><td rowspan="4">Scratches</td><td>Length (mm)</td><td colspan="2">Width (mm)</td><td>Maximum number</td><td>Minimum space</td><td rowspan="4">A</td></tr>
<tr><td>Ignored</td><td colspan="2">W≦0.05</td><td>Ignored</td><td>-</td></tr>
<tr><td>1≦L≦5.0</td><td colspan="2">0.05＜W≦0.2</td><td>4</td><td>-</td></tr>
<tr><td>-</td><td colspan="2">0.2＜W</td><td>Not allowed</td><td>-</td></tr>
<tr><td>Dent</td><td colspan="5">Serious one is not allowed</td><td>A</td></tr>
<tr><td>Wrinkles in polarizer</td><td colspan="5">Serious one is not allowed</td><td>A</td></tr>
<tr><td rowspan="4">Bubbles on polarizer</td><td colspan="3">Average diameter (mm)</td><td colspan="2">Maximum number</td><td rowspan="4">A</td></tr>
<tr><td colspan="3">D≦0.2</td><td colspan="2">Ignored</td></tr>
<tr><td colspan="3">0.2＜D≦0.5</td><td colspan="2">3</td></tr>
<tr><td colspan="3">0.5＜D</td><td colspan="2">Not allowed</td></tr>
<tr><td rowspan="14">1) Stains
2) Foreign Materials
3) Bright / Dark Spot</td><td colspan="5">Filamentous (Line shape)</td><td rowspan="5">A, B</td></tr>
<tr><td>Length (mm)</td><td colspan="2">Width (mm)</td><td colspan="2">Maximum number</td></tr>
<tr><td>-</td><td colspan="2">W≦0.05</td><td colspan="2">Ignored</td></tr>
<tr><td>0.3≦L≦0.7</td><td colspan="2">0.05＜W≦0.1</td><td colspan="2">4</td></tr>
<tr><td>0.7 < L</td><td colspan="2">0.1＜W</td><td colspan="2">Not allowed</td></tr>
<tr><td colspan="5">Round (Dot shape)</td><td rowspan="9">A, B</td></tr>
<tr><td>Average diameter (mm)</td><td colspan="4">Maximum number</td></tr>
<tr><td rowspan="2">D≦0.2</td><td colspan="2">Bright Spot</td><td colspan="2">3</td></tr>
<tr><td colspan="2">Dark Spot</td><td colspan="2">Ignored</td></tr>
<tr><td>0.2＜D≦0.4</td><td colspan="4">3</td></tr>
<tr><td>0.4＜D</td><td colspan="4">Not allowed</td></tr>
<tr><td>In total</td><td colspan="4">6</td></tr>
<tr><td colspan="5">Those wiped out easily are acceptable</td></tr>
<tr><td rowspan="5">Dot-Defect
(Note 1)</td><td></td><td colspan="2">Type</td><td colspan="2">Maximum number</td><td rowspan="5">A</td></tr>
<tr><td>Bright dot-defect</td><td colspan="2">1 dot</td><td colspan="2">0</td></tr>
<tr><td rowspan="2">Dark dot-defect</td><td colspan="2">1 dot</td><td colspan="2">4</td></tr>
<tr><td colspan="2">2 adjacent dot</td><td colspan="2">Not allowed</td></tr>
<tr><td colspan="5">Minimum distance between dark dots≧5mm</td></tr>
<tr><td>Mura</td><td colspan="5">Invisible through 2% ND filter</td><td>A
(Note 2)</td></tr>
</table>

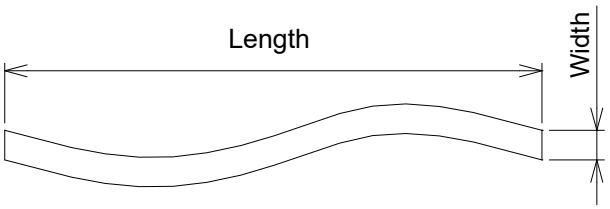


Fig 11.3

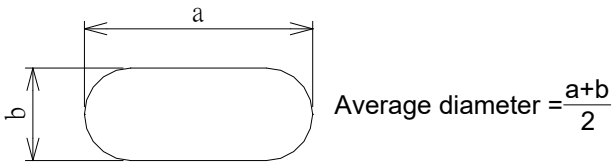


Fig 11.4

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

- For bright dot-defect, showing black pattern, defect size over 1/2 dot area is defined.
- For dark dot-defect, showing white pattern, defect size over 1/2 dot area is defined.
- 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.

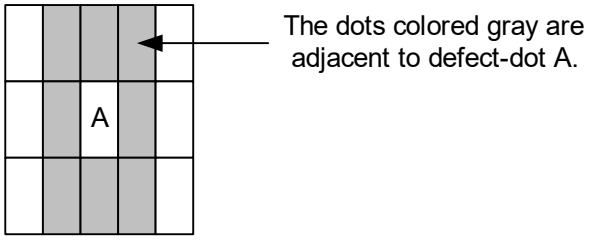
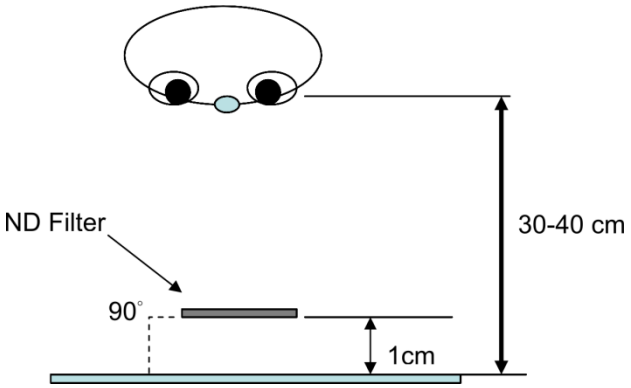


Fig. 11.5

Note 2: The inspection method with ND Filter is to hold it in front of the panel around 1 cm and inspect the panel with 35±5 cm distance for 1 second.



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 $1\,cm^2$, 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 $25\,C^\circ$. 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 ± 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.

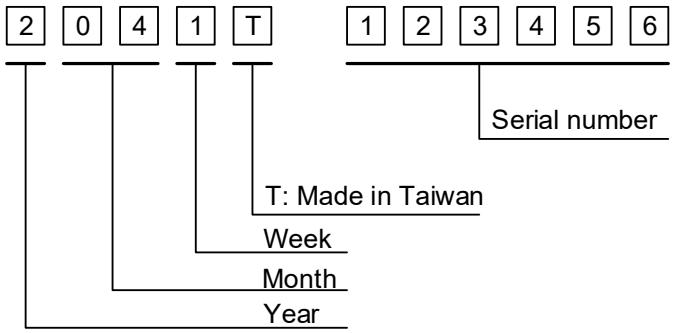


Fig. 13.1

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

Year	Lot Mark
2022	2
2023	3
2024	4
2025	5
2026	6

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.

REV No.	ITEM	REMARKS
A	-	-

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

Label example:

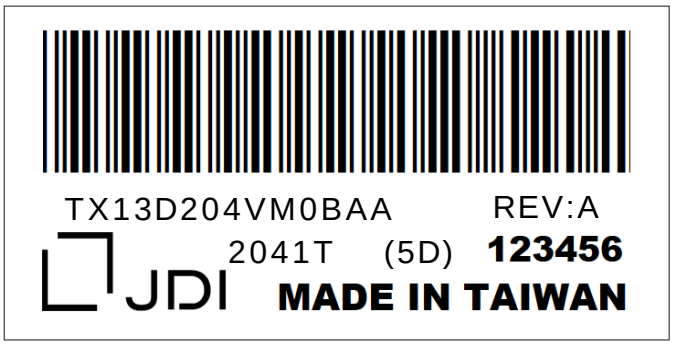


Fig. 13.2