

KOE

JDI Group

Kaohsiung Opto-Electronics Inc.

TENTATIVE

FOR MESSRS : _____

DATE : Jun. 23th ,2021

TECHNICAL DATA

TX13D205VM0BAA

Contents

No.	ITEM	SHEET No.	PAGE
1	COVER	7B64LTD-2699-2	1-1/1
2	RECORD OF REVISION	7B64LTD-2699-2	2-1/1
3	GENERAL DATA	7B64LTD-2699-2	3-1/1
4	ABSOLUTE MAXIMUM RATINGS	7B64LTD-2699-2	4-1/1
5	ELECTRICAL CHARACTERISTICS	7B64LTD-2699-2	5-1/1
6	OPTICAL CHARACTERISTICS	7B64LTD-2699-2	6-1/2~2/2
7	BLOCK DIAGRAM	7B64LTD-2699-2	7-1/1
8	LCD INTERFACE	7B64LTD-2699-2	8-1/6~6/6
9	OUTLINE DIMENSIONS	7B64LTD-2699-2	9-1/2~2/2
10	DESIGNATION OF LOT MARK	7B64LTD-2699-2	10-1/1

ACCEPTED BY : _____

PROPOSED BY : Oblack Tsai

2. RECORD OF REVISION

DATE	SHEET No.	SUMMARY
Jun.23,'21	7B64LTD-2699-2 Page 3-1/1	3.1 DISPLAY FEATURES
		Revised :
		Power Supply Voltage
		Power Consumption
		3.3V for LCD driving ; 28.3 V for Backlight
		0.5 W for LCD ; 3.81 W for B/L
		↓
		Power Supply Voltage
		Power Consumption
	7B64LTD-2699-2 Page 9-1/2	9.1 FRONT VIEW
		Revised : PCB Component thickness
	7B64LTD-2699-2 Page 9-2/2	9.2 RAER VIEW
		Added : PCB Outline

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	TX13D205VM0BAA
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	95 g (typ.)
Interface	45pin CMOS
Power Supply Voltage	3.3V for LCD driving ; 21 V for Backlight
Power Consumption	0.6 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}	-	(TBD)	V	-

Note 1: The rating is defined for the signal voltages of the interface such as DE, CLK 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

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

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}	$V_{DD}=3.3\text{V}$	-	-	180	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, CLK and RGB data bus.

Note 2: An all white check pattern is used when measuring I_{DD} . f_{Frame} is set to 60 Hz. Moreover, 1.0A fuse is applied in the module for I_{DD} . For display activation and protection purpose, power supply is recommended larger than 2.5A to start the display and break fuse once any short circuit occurred.

5.2 BACKLIGHT CHARACTERISTICS

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

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remarks
LED Input Voltage	V_{LED}	-	-	21	-	V	
LED Forward Current	I_{LED}	per LED	-	80	-	mA	
LED lifetime	-	$I_{LED}=80\text{ mA/per LED}$	30K	-	-	hrs	Note 1

Note 1: The estimated lifetime is specified as the time to reduce 50% brightness by applying 80 mA at $25\text{ }^{\circ}\text{C}$.

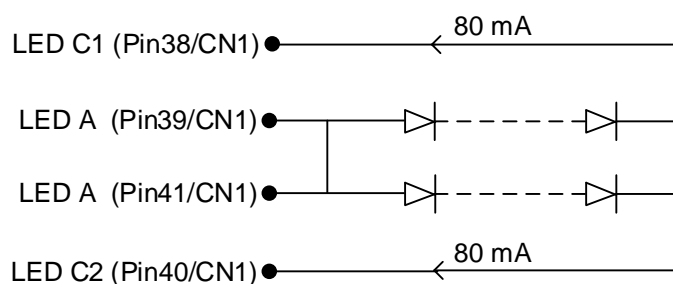


Fig 5.1

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 at least 15 minutes.
- The ambient temperature is 25 °C .
- In the dark room, the equipment has been set for the measurements as shown in Fig 6.1.

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

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		-	$I_{LED}=80\text{ mA}$	-	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	$\phi = 0^{\circ}, CR \geq 10$	-	80	-	Degree	Note 5
		$\theta_{x'}$	$\phi = 180^{\circ}, CR \geq 10$	-	80	-		
		θ_y	$\phi = 90^{\circ}, CR \geq 10$	-	80	-		
		$\theta_{y'}$	$\phi = 270^{\circ}, CR \geq 10$	-	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.

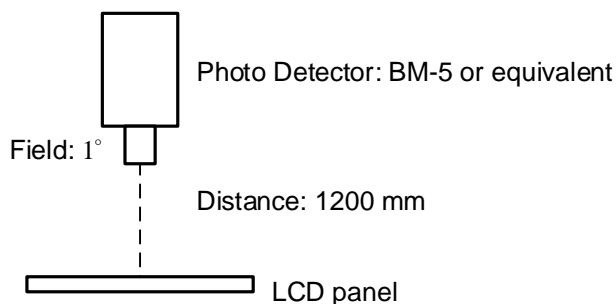


Fig 6.1

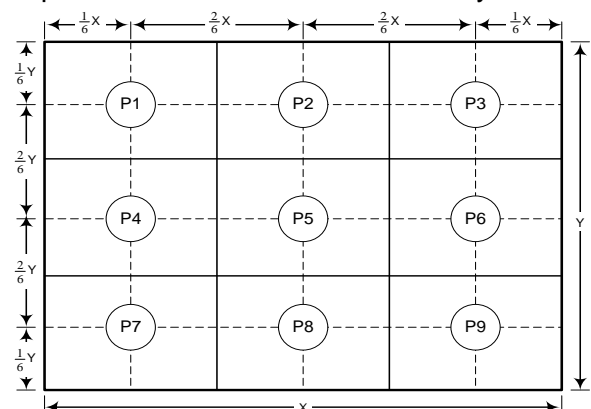


Fig 6.2

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 falling to 10% brightness.

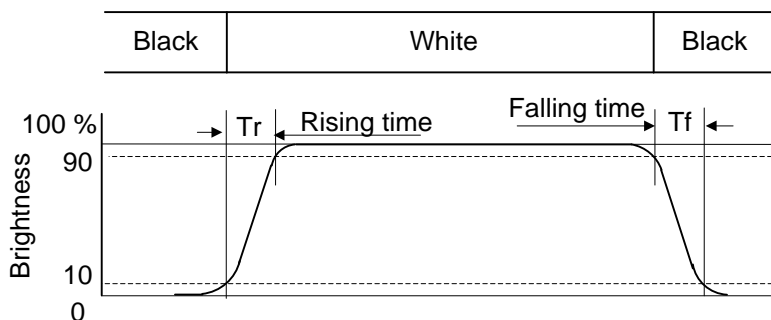


Fig 6.3

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.

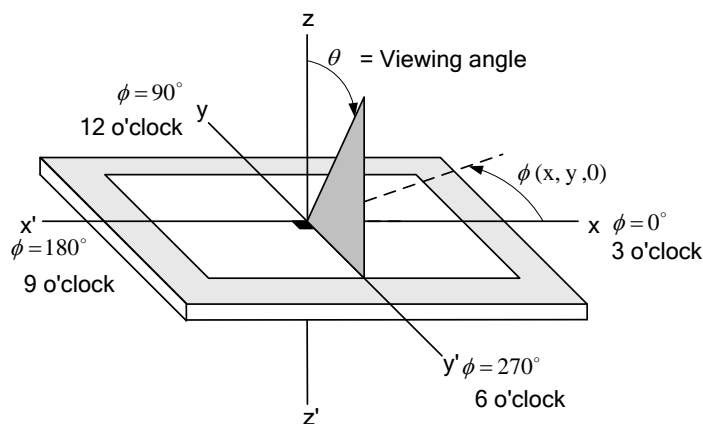
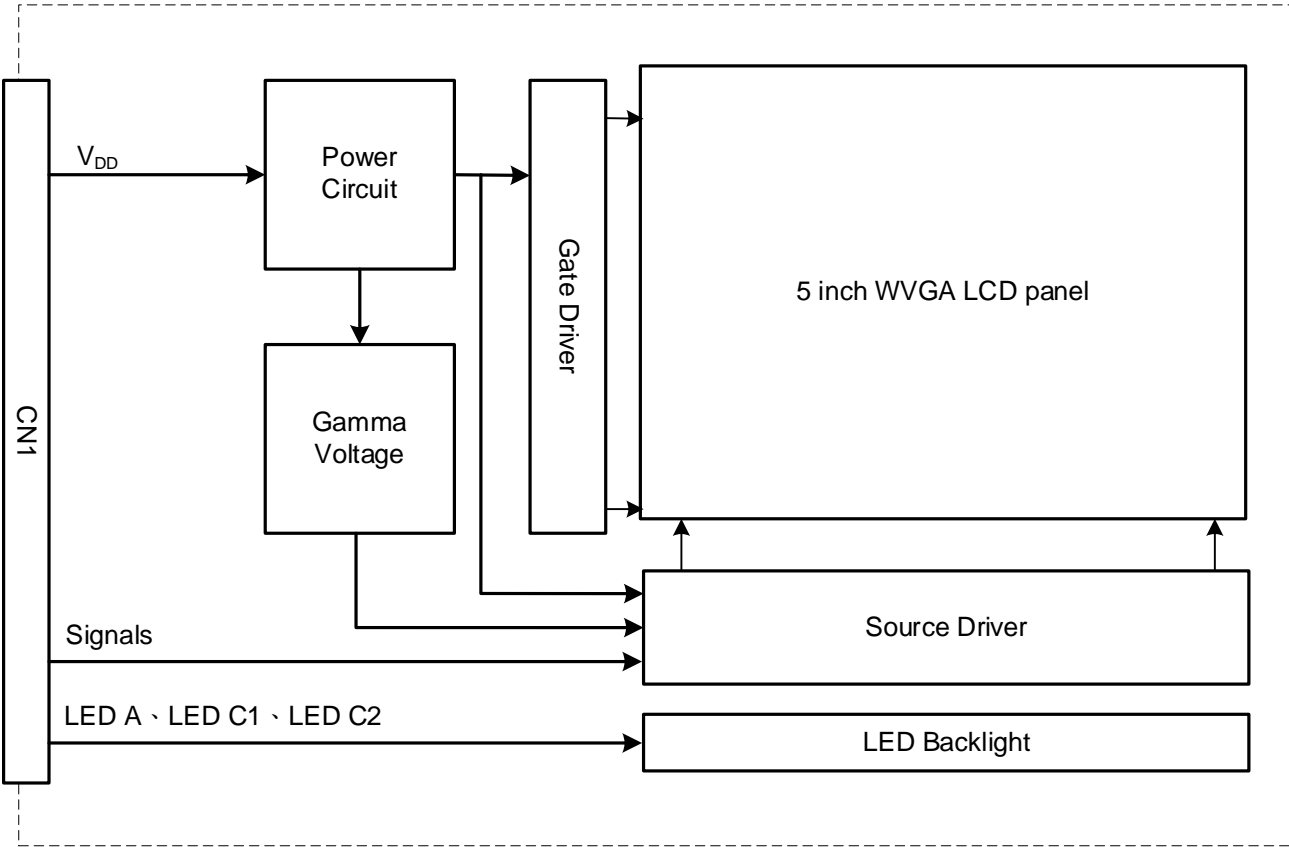


Fig 6.4

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 DE, CLK and RGB data bus.

8. LCD INTERFACE

8.1 INTERFACE PIN CONNECTIONS

The display interface connector CN1 is FH28K-45S-0.5SH made by Hirose and pin assignment is as below:

Pin No.	Symbol	Signal	Pin No.	Symbol	Signal
1	V _{SS}	Ground	24	B3	Blue Data
2			25	B4	Blue Data
3	V _{DD}	Supply Voltage	26	B5	Blue Data
4			27	B6	Blue Data
5	R0	Red Data (LSB)	28	B7	Blue Data (MSB)
6	R1	Red Data	29	V _{SS}	Ground
7	R2	Red Data	30	CLK	Dot Clock
8	R3	Red Data	31	DISP	Display ON/OFF ("L" Display OFF ; "H" Display ON)
9	R4	Red Data			
10	R5	Red Data	32	NC	No Connection
11	R6	Red Data	33		
12	R7	Red Data (MSB)	34	DE	Data Enable Signal
13	G0	Green Data (LSB)	35	NC	No Connection
14	G1	Green Data	36	SD	Scan Direction Control (Note1)
15	G2	Green Data	37	V _{SS}	Ground
16	G3	Green Data	38	LED C1	LED Cathode 1
17	G4	Green Data	39	LED A	LED Anode
18	G5	Green Data	40	LED C2	LED Cathode 2
19	G6	Green Data	41	LED A	LED Anode
20	G7	Green Data (MSB)	42	NC	No Connection
21	B0	Blue Data (LSB)	43		
22	B1	Blue Data	44		
23	B2	Blue Data	45		

Note 1: Please refer to 8.3 SCAN DIRECTION for the setting methods of SD function.

8.2 TIMING CHART

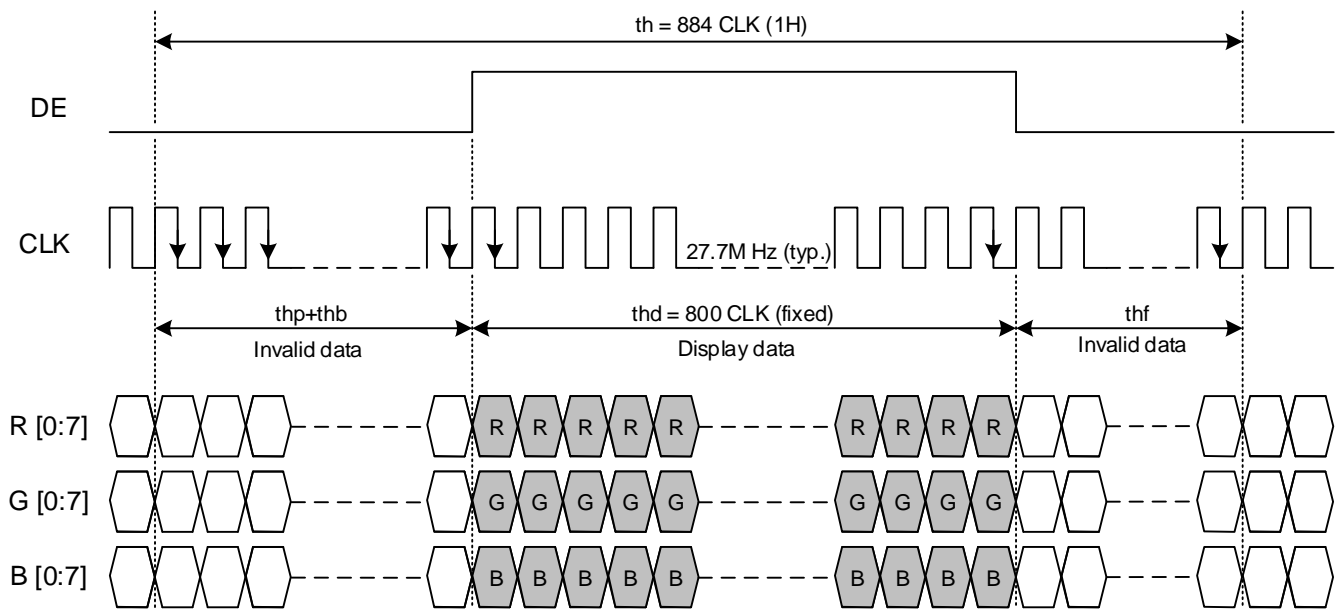


Fig. 8.1 Horizontal Timing

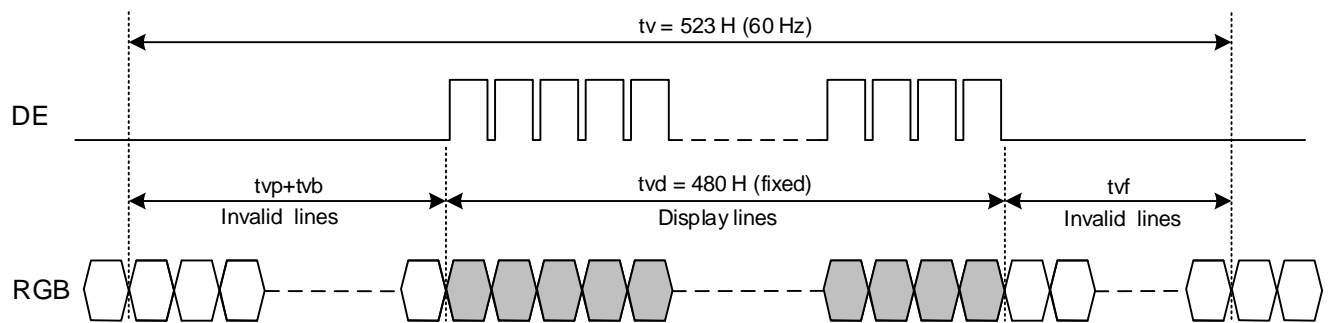


Fig. 8.2 Vertical Timing

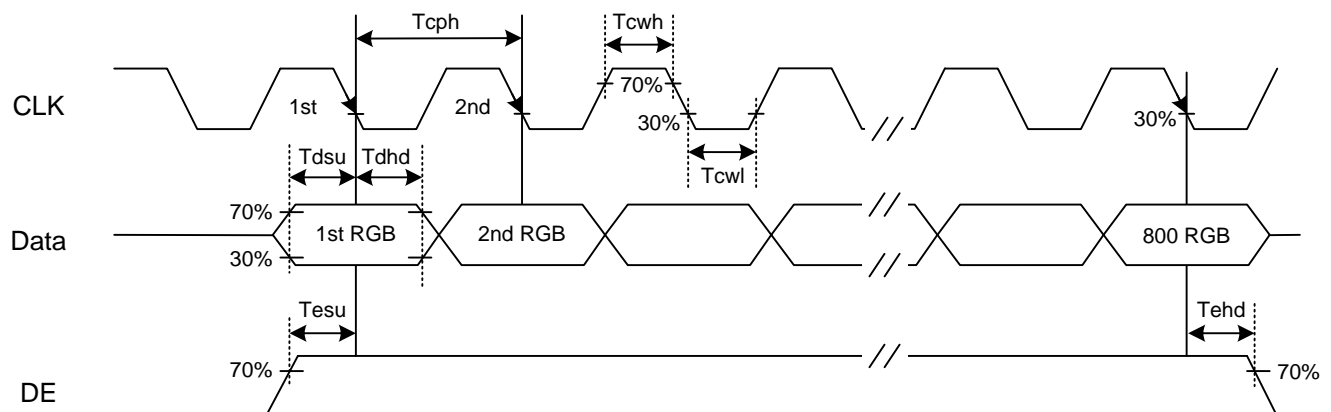


Fig. 8.3 Setup & Hold Time

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

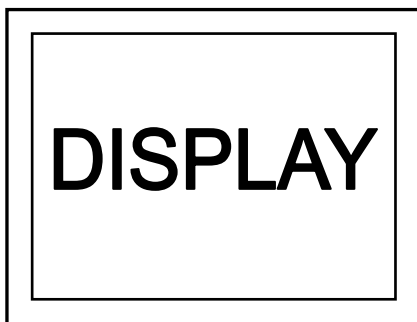
Item		Symbol	Min.	Typ.	Max.	Unit	remarks
DCLK	Cycle time	T_C	29.9	36.1	43.1	ns	
Horizontal	Horizontal period	T_H	862	884	920	T_C	
	Horizontal width-Active	T_{HD}	800			T_C	
Vertical	Vertical period	T_V	490	523	560	T_H	
	Vertical width-Active	T_{VD}	480			T_H	
	Frame frequency	f_V	55	60	65	Hz	

B. Setup and Hold Time

Item		Symbol	Min.	Typ.	Max.	Unit
CLK	Duty	T_{cwh}	40	50	60	%
	Cycle Time	T_{cph}	-	36.1	-	ns
Data	Setup Time	T_{dsu}	5	-	-	
	Hold Time	T_{dhd}	5	-	-	
DE	Setup Time	T_{esu}	5	-	-	
	Hold Time	T_{ehd}	5	-	-	

8.3 SCAN DIRECTION

Scan direction is available to be switched as below:

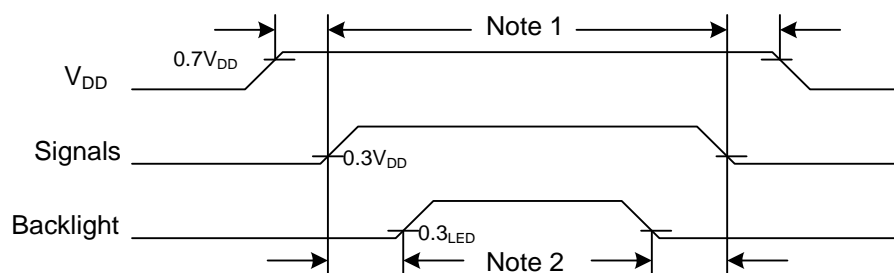


SD : L (Default)



SD : H

8.4 POWER SEQUENCE



Note 1: In order to avoid any damages, V_{DD} has to be applied before all other signals. The opposite is true for power off where V_{DD} has to be remained on until all other signals have been switch off. The recommended time period is 1 second.

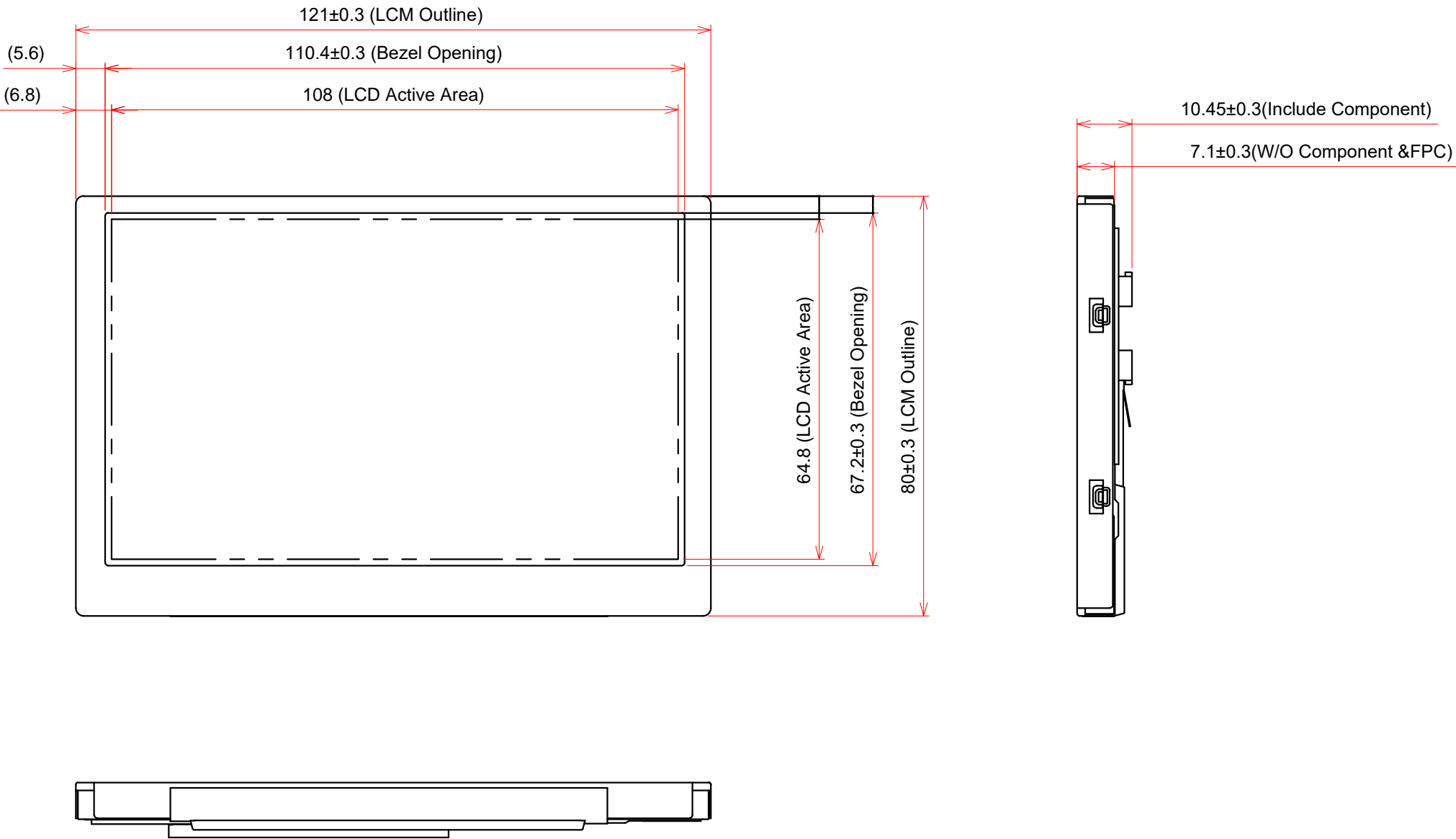
Note 2: In order to avoid showing uncompleted patterns in transient state. It is recommended that switching the backlight on is delayed for 1 second after the signals have been applied. The opposite is true for power off where the backlight has to be switched off 1 second before the signals are removed.

8.5 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

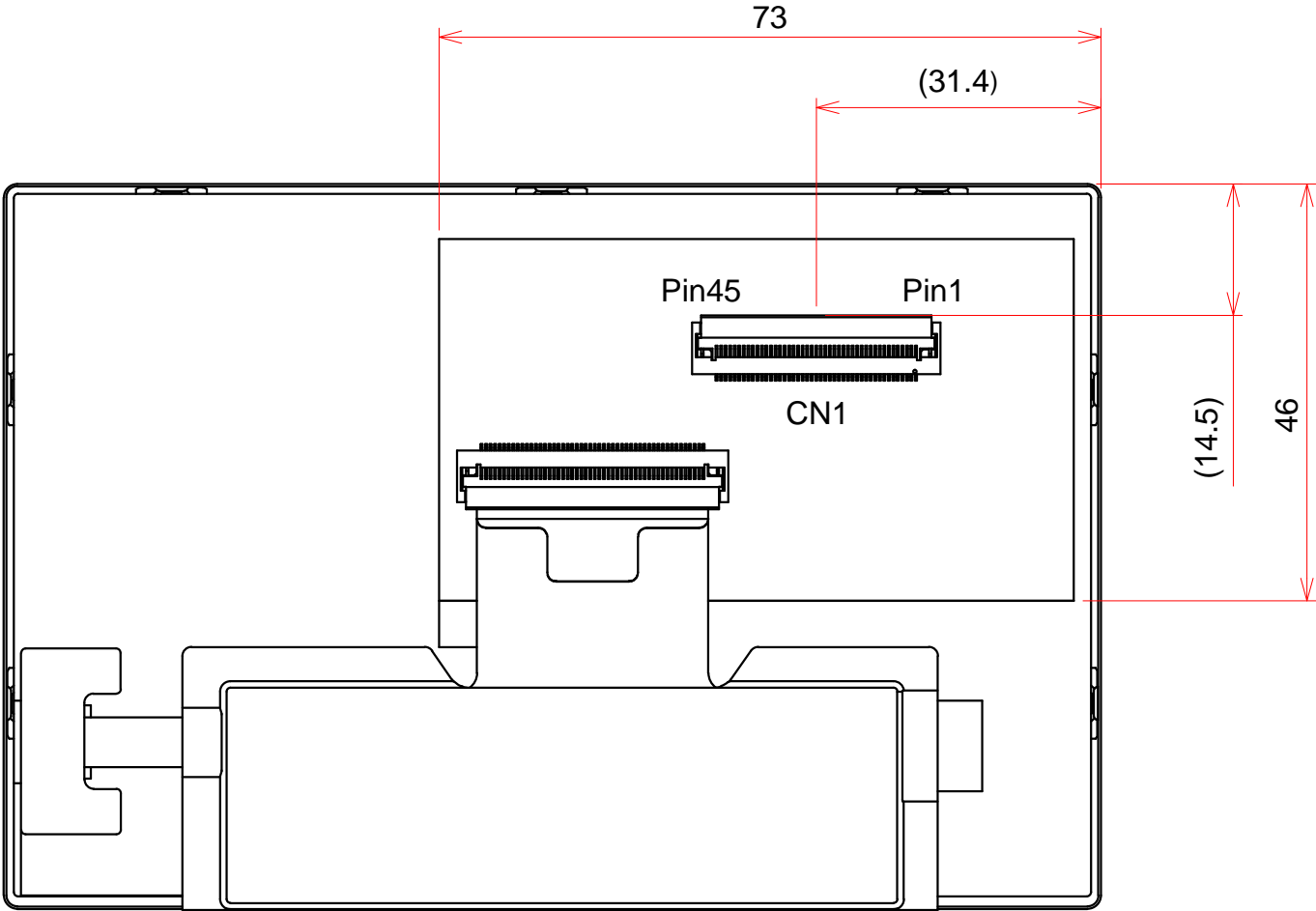
9. OUTLINE DIMENSIONS

9.1 FRONT VIEW



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

9.2 RAER VIEW



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

10. DESIRNATION of LOT MaRK

- 1) The lot mark is showing in Fig.10.1. First 4 digits are used to represent production lot, T represented made in Taiwan, and the last 6 digits are the serial number.

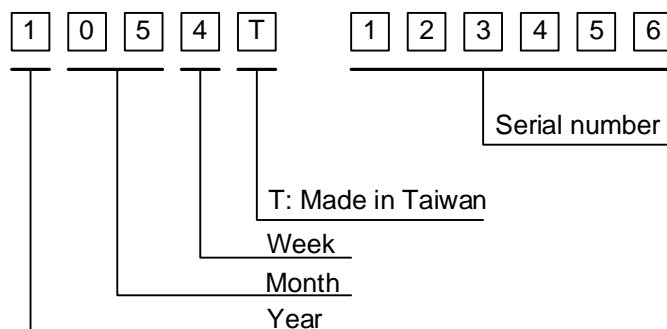


Fig. 10.1

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

Year	Lot Mark	Month	Lot Mark	Month	Lot Mark	Week	Lot Mark
2021	1	Jan.	01	Jul.	07	1~7 days	1
2022	2	Feb.	02	Aug.	08	8~14 days	2
2023	3	Mar.	03	Sep.	09	15~21 days	3
2024	4	Apr.	04	Oct.	10	22~28 days	4
2025	5	May	05	Nov.	11	29~31 days	5
		Jun.	06	Dec.	12		

- 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. 10.2.

Label example:

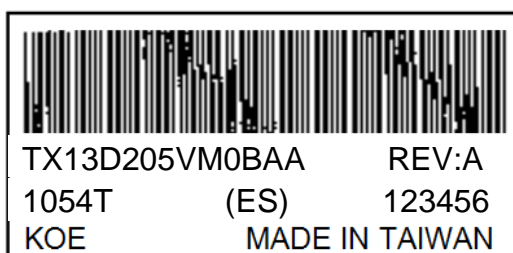


Fig. 10.2