Add: 2nd Floor, Building C, Jia Huang Yuan Technical Park, Tiegang, Xixiang, Bao'an District, Shenzhen city, Guangdong province, P.R.China 518126.
E-mail: Helen@kingtechgroup.cn TEL: 86-755- 23037763 Mobile: +86-139-2528-0716 Web: www.kingtechgroup.cn

SPEC. NUMBER	PRODUCT GROUP	REV.	ISSUE DATE	PAGE
	TFT- LCD	A0	2021-10-14	1 OF 26

PV215001HS30B LCM 1000nit Spec

ITEM	BUYER SIGNATURE	DATE

ITEM	SUPPLIER SIGNATURE	DATE
Prepared		
Reviewed		
Approved		

Add: 2nd Floor, Building C, Jia Huang Yuan Technical Park, Tiegang, Xixiang, Bao'an District, Shenzhen city, Guangdong province, P.R.China 518126.
E-mail: Helen@kingtechgroup.cn TEL: 86-755- 23037763 Mobile: +86-139-2528-0716 Web: www.kingtechgroup.cn

REVISION HISTORY

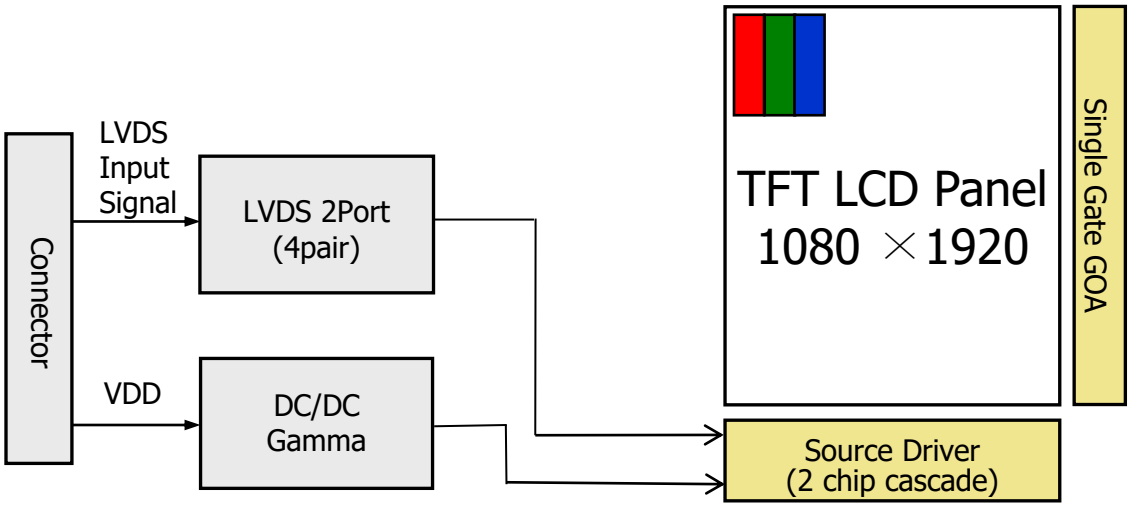
REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
A0		Initial Release	2021-10-14	

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

PV215001HS30B is a color active matrix TFT LCD FOB using amorphous silicon TFT's(Thin Film Transistors) as an active switching devices. This module has a 21.5 inch diagonally measured active area with FHD resolutions (1080 horizontal by 1920 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical Stripe and this module can display 16.7M colors. The TFT-LCD panel used for this module is a low reflection and higher color type. The LED Driver for back-light driving is built in this model.
All input signals are LVDS interface compatible.



1.2 Features

- LVDS Interface Support MIPI & Edp Interface in Qctober 2021
- High-speed response
- Real 8 bit color depth , display 16.7M colors
- DE (Data Enable) only
- Wide Temperature Range -5℃-60℃ Operation Test
- Built In Self Test(BIST) Function
- Low driving voltage and low power consumption
- Normal Reverse type, Forward Type by choose

1.3 Application

- White Goods

1.4 General Specification

The followings are general specifications at the PV215001HS30B:

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active Area	260.28(H)*478.656(V)	mm	
Number Of Pixels	1080(H)×1920(V)	pixels	
Pixel Pitch	0.0831(H)×0.241(V)	mm	
Pixel Arrangement	Pixels RGB stripe arrangement		
Display Mode	Normally Black		
Display Colors	16.7M	colors	
Luminance of LCM	1000	nit	
Surface Treatment	AG25		
Contrast Ratio	1000:1(typ.)		
Viewing Angle(CR>10)	85/85/85/85(typ.)		
Response Time	30(typ.)	ms	
Color Gamut	72%NTSC		
Operation temperature	-5~60	℃	
Storage temperature	-20~60	℃	
Panel outline	267.28*489.956	mm	

2.0 ABSOLUTE MAXIMUM RATINGS

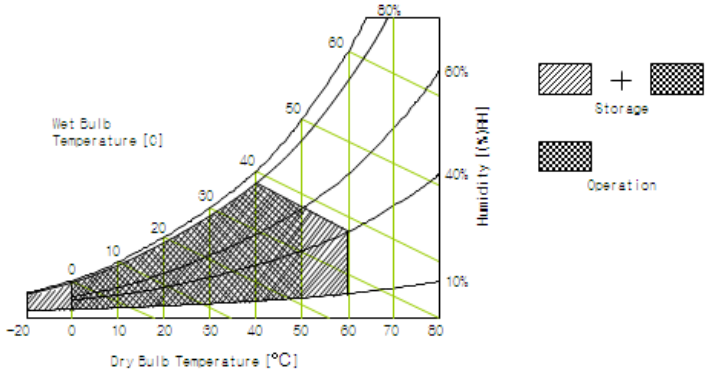
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

< Table 2. Absolute Maximum Ratings>

Parameter		Symbol	Min.	Max.	Unit	Remarks
Power Supply	LCD Module	VDD	VSS-0.3	3.6	V	Ta = 25 ℃ Note 1&2
Operating Temperature		T_{OP}	-5	+60	℃	Note 3
Storage Temperature		T_{ST}	-20	+60	℃	
Operating Ambient Humidity		Hop	10	80	%RH	
Storage Humidity		Hst	10	80	%RH	

Note:

1. These range above is maximum value not the actual operating temperature . Actual Operating temperature is no more than 40℃ and temperature refers to the LCM surface temperature ; Length of operation: No more than 8 hours per day, and no more than 4 hours of continuous use one time.
2. BOE is not responsible for product problems beyond the use conditions.
3. Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be 39 ℃ max. and no condensation of water.



3.0 ELECTRICAL SPECIFICATIONS

3.1 TFT LCD Module

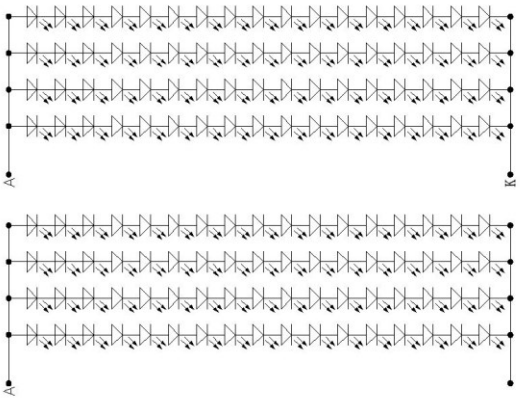
< Table 3. LCD Module Electrical specifications > [Ta =25 ± 2 °C]

Parameter		Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	4.5	5	5.5	V	Note 1
Permissible Input Ripple Voltage	V_{RF}	-	-	100	mV	At V_{DD} = 3.3V
Power Supply Current	I_{DD}	-	500	-	mA	Note 1
High Level Differential Input Threshold Voltage	V_{IH}	-	-	+100	mV	
Low Level Differential Input Threshold Voltage	V_{IL}	-100	-	-	mV	
Differential input voltage	$I V_{ID} I$	0.2	0.4	0.6	V	
Differential input common mode voltage	Vcm	0.6	1.2	2.2	V	
Power Consumption	P_D	-	2.5	-	W	Note 1
	-	-	-	-	W	
	P_{total}	-	-	-	W	

Notes : 1. The supply voltage is measured and specified at the interface connector of FOB.
The current draw and power consumption specified is for 3.3V at 25℃.
a) Typ : Mosaic Pattern
Max: R G B Pattern

3.2 Backlight Uint

Parameter		Min.	Typ.	Max.	Unit	Remarks
LED Light Bar Input Voltage Per Input Pin	VPIN	47.6	51	54.4	V	Duty 100%
LED Light Bar Input Current Per Input Pin	IPIN	-	60	-	mA	Note1,2
LED Power Consumption	P_{BL}	22.84	24.48	26.12	W	Note 3
LED Life-Time	-	30,000	-		Hrs	Note 4



LED: 17*4*2=136 PCS

LED bar consists of 136LED packages,4strings(parallel)*17packages(serial)*2

Note1: There are one light bar ,and the specified current is input LED chip 100% duty current

Note2: The sense current of each input pin is 60mA

Note3: PBL=2*4Input pins*VPIN ×IPIN

Note4: The lifetime is determined as the time at which luminance of LED become 50% of the initial brightness or not normal lighting at IPIN=70mA on condition of continuous operating at 25 ±2 ℃

4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to θØ=0 (=θ3) as the 3 o'clock direction (the "right"), θØ=90 (= θ12) as the 12 o'clock direction ("upward"), θØ=180 (= θ9) as the 9 o'clock direction ("left") and θØ=270(= θ6) as the 6 o'clock direction ("bottom"). While scanning θand/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement. VDD shall be 3.3+/- 0.3V at 25°C. Optimum viewing angle direction is 6 'clock.

4.2 Optical Specifications

<Table 4. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	-	85	-	Deg.	Note 1
		Θ_9		-	85	-	Deg.	
	Vertical	Θ_{12}		-	85	-	Deg.	
		Θ_6		-	85	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	900	1000	-	-	
Transmittance		Tr		-	5	-	%	FOB
Luminance of White	5 Points	Y_w	Θ = 0°	900	1000	-	nit	
White Chromaticity		x_w	Θ = 0°	0.283	0.313	0.343	-	
		y_w		0.299	0.329	0.359	-	
Reproduction of color	Red	x_R	Θ = 0°	-0.03	0.649	+0.03	-	
		y_R			0.346		-	
	Green	x_G			0.329		-	
		y_G			0.623		-	
	Blue	x_B			0.151		-	
		y_B			0.064		-	
Gamut		-	-	68	72	-	%	
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C Θ = 0°	-	30	35	Ms	Note 6
Cross Talk		CT	Θ = 0°	-	-	2	%	

Notes :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state .
(see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

3. Center Luminance of white is defined as luminance values of 5 point average across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

4. The White luminance uniformity on LCD surface is then expressed as : ΔY =Minimum Luminance of 5(or 13) points / Maximum Luminance of 5(or 13) points.
(see FIGURE 2 and FIGURE 3).

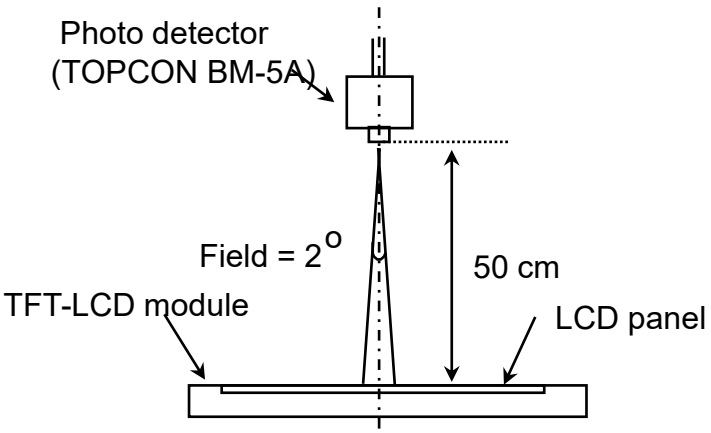
5. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

6. The electro-optical response time measurements shall be made as FIGURE 4 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

7. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark.
(See FIGURE 5).

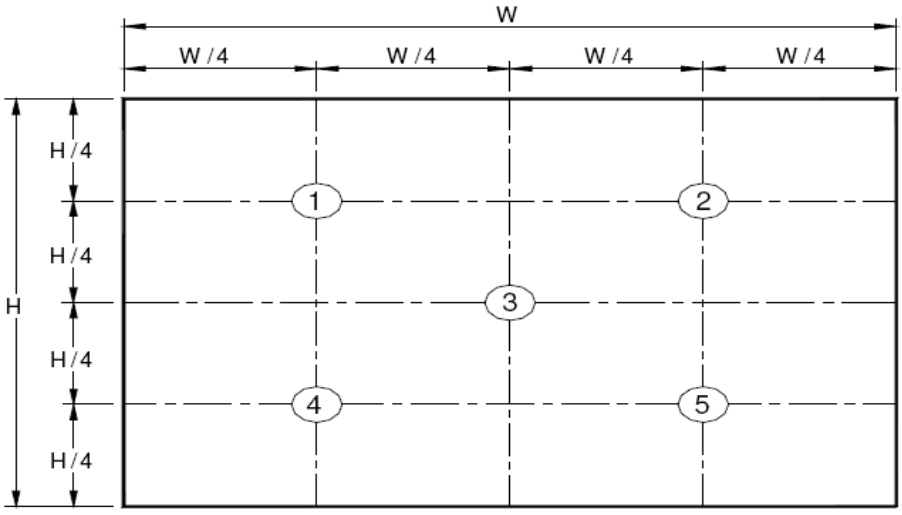
4.3 Optical measurements

Figure 1. Measurement Set Up



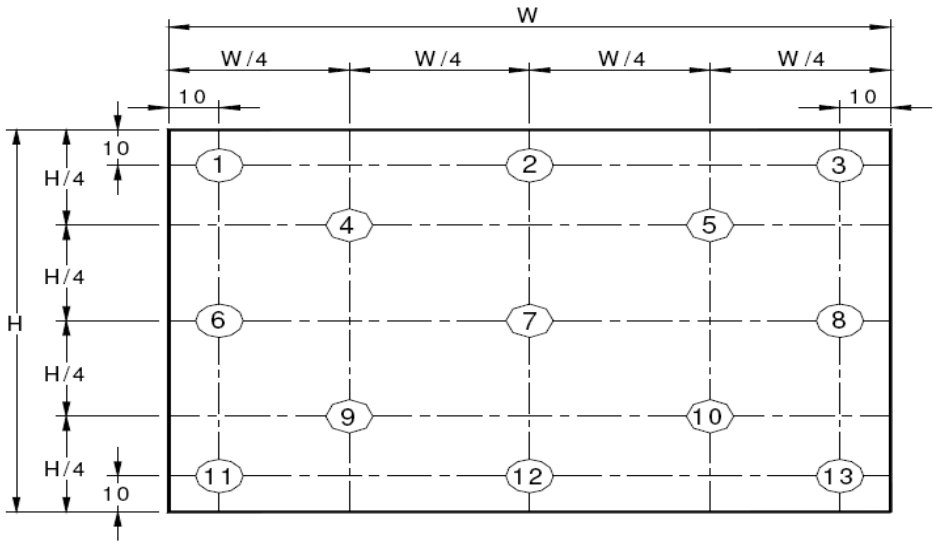
Optical characteristics measurement setup

Figure 2. White Luminance and Uniformity Measurement Locations (5 points)



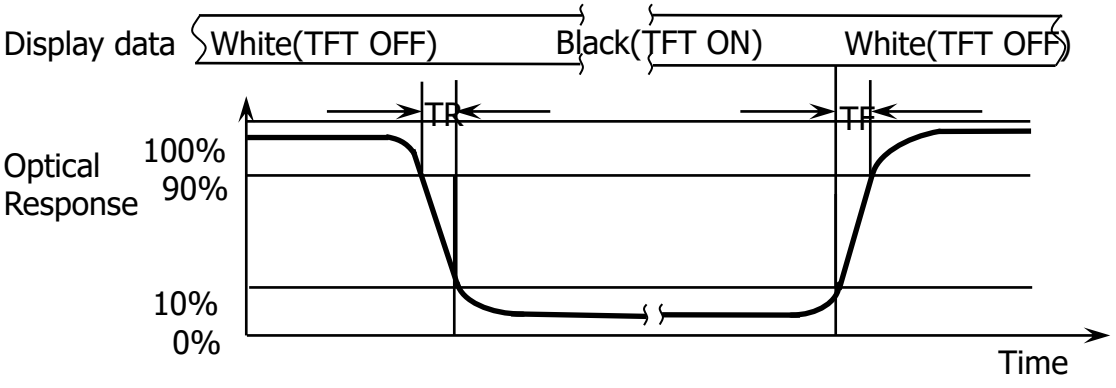
Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

Figure 3. Uniformity Measurement Locations (13 points)



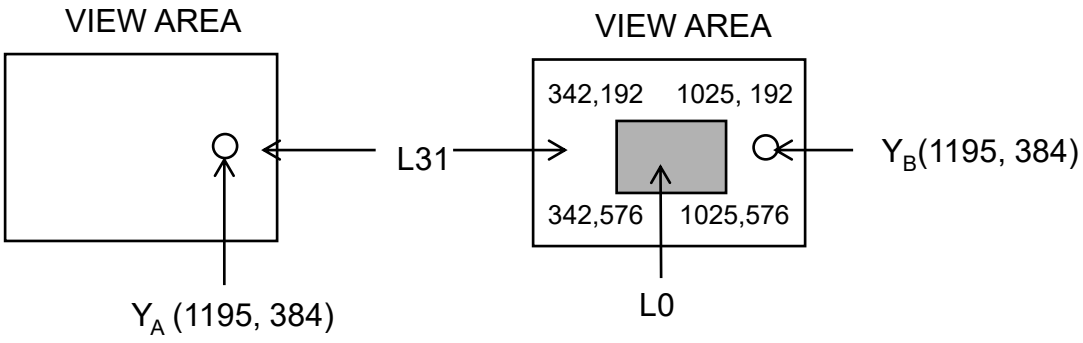
The White luminance uniformity on LCD surface is then expressed as : ΔY5 = Minimum Luminance of five points / Maximum Luminance of five points (see FIGURE 2) , ΔY13 = Minimum Luminance of 13 points /Maximum Luminance of 13 points (see FIGURE 3).

Figure 4. Response Time Testing



The electro-optical response time measurements shall be made as shown in FIGURE 4 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Td and 90% to 10% is Tr.

Figure 5. Cross Modulation Test Description



$$\text{Cross-Talk (\%)} = \left| \frac{Y_B - Y_A}{Y_A} \right| \times 100$$

Where:

Y_A = Initial luminance of measured area (cd/m^2)

Y_B = Subsequent luminance of measured area (cd/m^2)

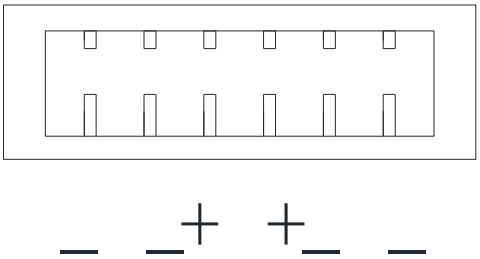
The location measured will be exactly the same in both patterns

Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark (Refer to FIGURE 5).

5.0 INTERFACE CONNECTION.

5.1 LED Light Bar

LED Connector:



5.0 INTERFACE CONNECTION.

5.2 LVDS Interface Connection

The electronics interface connector is UJU IS100-L30R-C23or Equivalent.

< Table 5. FOB Pinmap >

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	RXO0-	Negative Transmission data of Pixel 0 (ODD)
2	RXO0+	Positive Transmission data of Pixel 0 (ODD)
3	RXO1-	Negative Transmission data of Pixel 1 (ODD)
4	RXO1+	Positive Transmission data of Pixel 1 (ODD)
5	RXO2-	Negative Transmission data of Pixel 2 (ODD)
6	RXO2+	Positive Transmission data of Pixel 2 (ODD)
7	STBYB(NC)	*Reserved for LCD manufacturer's use (No Connection)
8	RXOC-	Negative Transmission Clock (ODD)
9	RXOC+	Positive Transmission Clock (ODD)
10	RXO3-	Negative Transmission data of Pixel 3 (ODD)
11	RXO3+	Positive Transmission data of Pixel 3 (ODD)
12	RXE0-	Negative Transmission data of Pixel 0 (EVEN)
13	RXE0+	Positive Transmission data of Pixel 0 (EVEN)
14	GND	Power Ground
15	RXE1-	Negative Transmission data of Pixel 1 (EVEN)
16	RXE1+	Positive Transmission data of Pixel 1 (EVEN)
17	GND	Power Ground
18	RXE2-	Negative Transmission data of Pixel 2 (EVEN)
19	RXE2+	Positive Transmission data of Pixel 2 (EVEN)
20	RXEC-	Negative Transmission Clock (EVEN)
21	RXEC+	Positive Transmission Clock (EVEN)
22	RXE3-	Negative Transmission data of Pixel 3 (EVEN)
23	RXE3+	Positive Transmission data of Pixel 3 (EVEN)
24	GND	Power Ground
25	CTL	*Reserved for LCD manufacturer's use (CTL_DVR)
26	CE	*Reserved for LCD manufacturer's use (CE_DVR)
27	NC	No Connection
28	VDD	Power Supply: +5V(4.5V~5.5V)
29	VDD	
30	VDD	

6.0 SIGNAL TIMING SPECIFICATION

6.1 The PV215001HS30B is operated by the DE only.

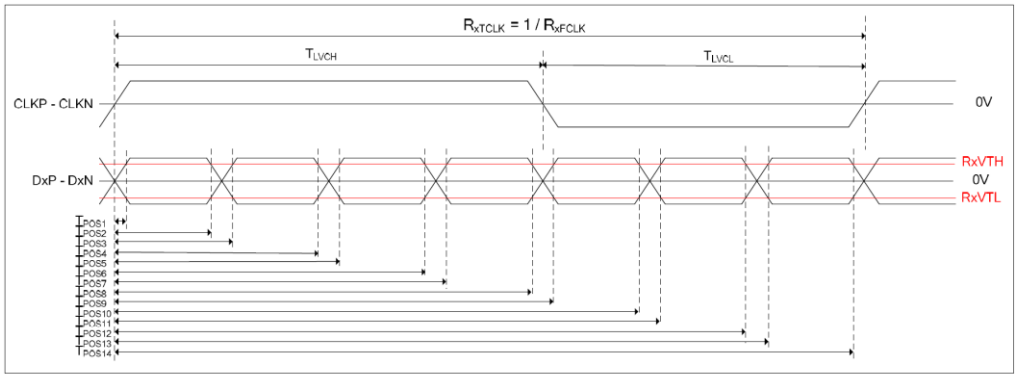
< Table 6. FOB Timing Spec >

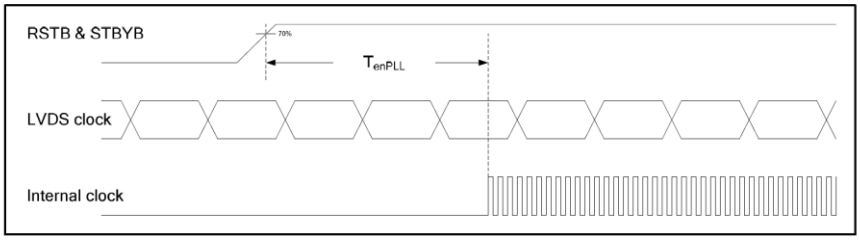
Item		Symbols	Min	Typ	Max	Unit
Frequency		1/Tc	65.60	67.86	77.78	MHz
Horizontal	Frame Rate	F	58	60	62	Hz
	Total	T_H	580	580	594	T_H
	Display	T_{HD}	540			T_H
	Blank	T_{HB}	40	40	54	T_H
Vertical	Total	T_V	1950	1950	2112	T_{CLK}
	Display	T_{VD}	1920			T_{CLK}
	Blank	T_{VB}	30	30	192	T_{CLK}

6.2 LVDS Rx Interface Timing Parameter

<Table 7. LVDS Rx Interface Timing Specification>

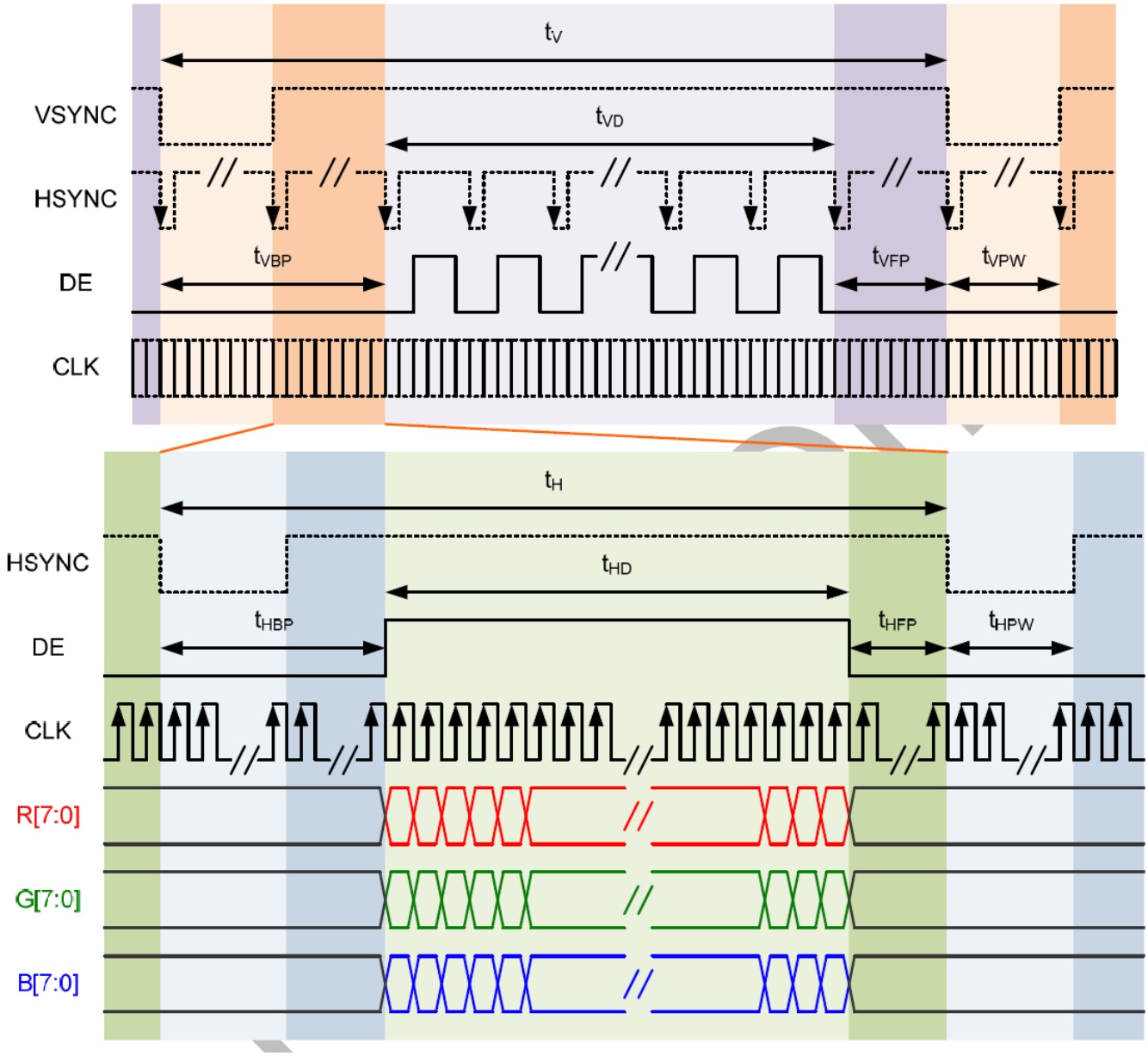
Item	Signal	Symbol	Rating			Unit
			Min.	Typ.	Max.	
Clock Frequency	CLK	R_{xFCLK}	20	-	100	MHz
Clock Period		R_{xTCLK}	10	-	50	ns
1 data bit time		UI	-	1/7	-	R_{xTCLK}
Clock high time	CLK	T_{LVCH}		4		UI
Clock low time		T_{LVCL}		3		UI
Position 1	DATA	T_{POS1}	-0.25	0	0.25	UI
Position 2		T_{POS2}	0.75	-	1.25	
Position 3		T_{POS3}	0.75	1	1.25	
Position 4		T_{POS4}	1.75	-	2.25	
Position 5		T_{POS5}	1.75	2	2.25	
Position 6		T_{POS6}	2.75	-	3.25	
Position 7		T_{POS7}	2.75	3	3.25	
Position 8		T_{POS8}	3.75	-	4.25	
Position 9		T_{POS9}	3.75	4	4.25	
Position 10		T_{POS10}	4.75	-	5.25	
Position 11		T_{POS11}	4.75	5	5.25	
Position 12		T_{POS12}	5.75	-	6.25	
Position 13		T_{POS13}	5.75	6	6.25	
Position 14		T_{POS14}	6.75	-	7.25	
PLL wake-up time		TenPLL	-		150	us





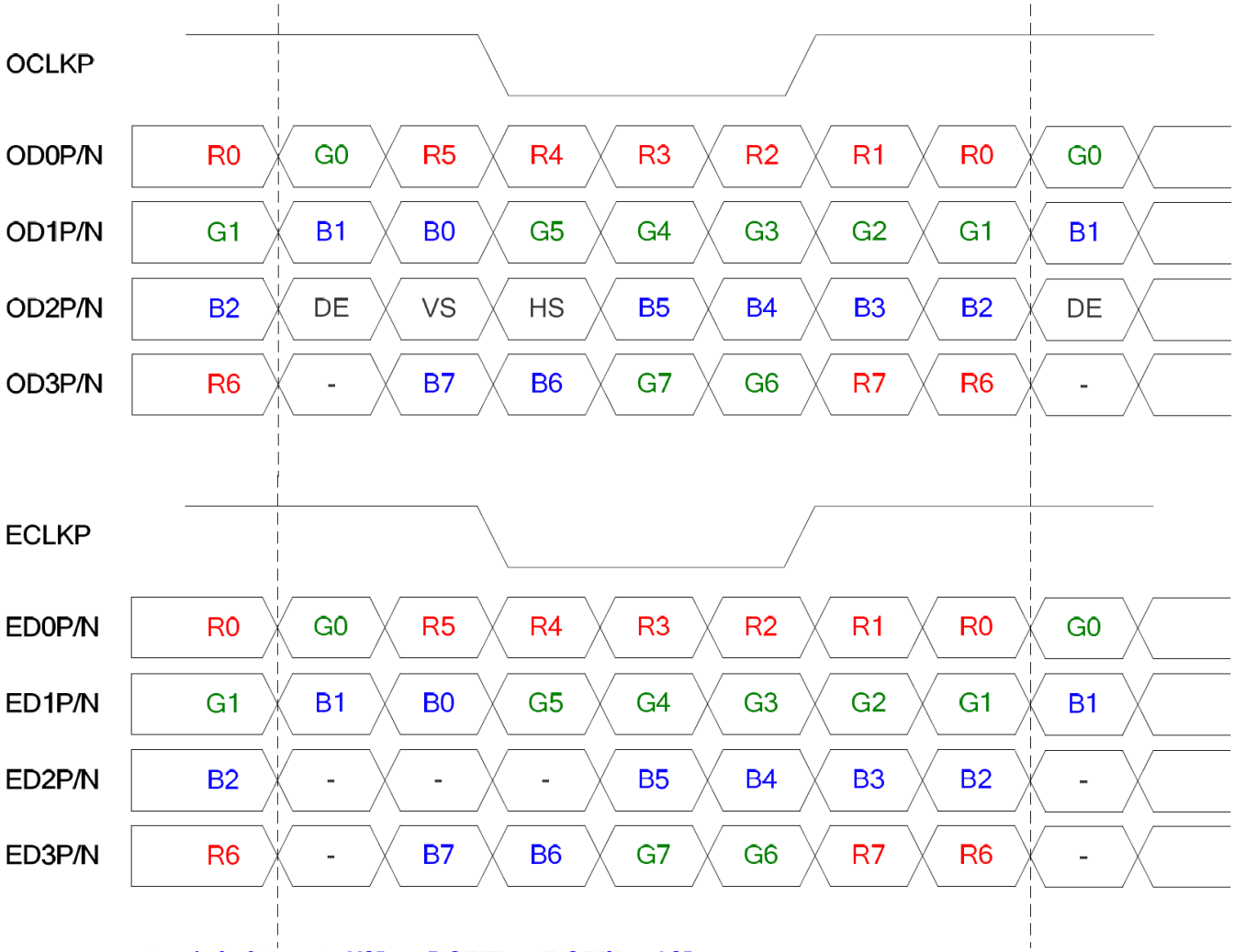
7.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

Figure 6. signal Timing



8.0 LVDS VESA Data Mapping

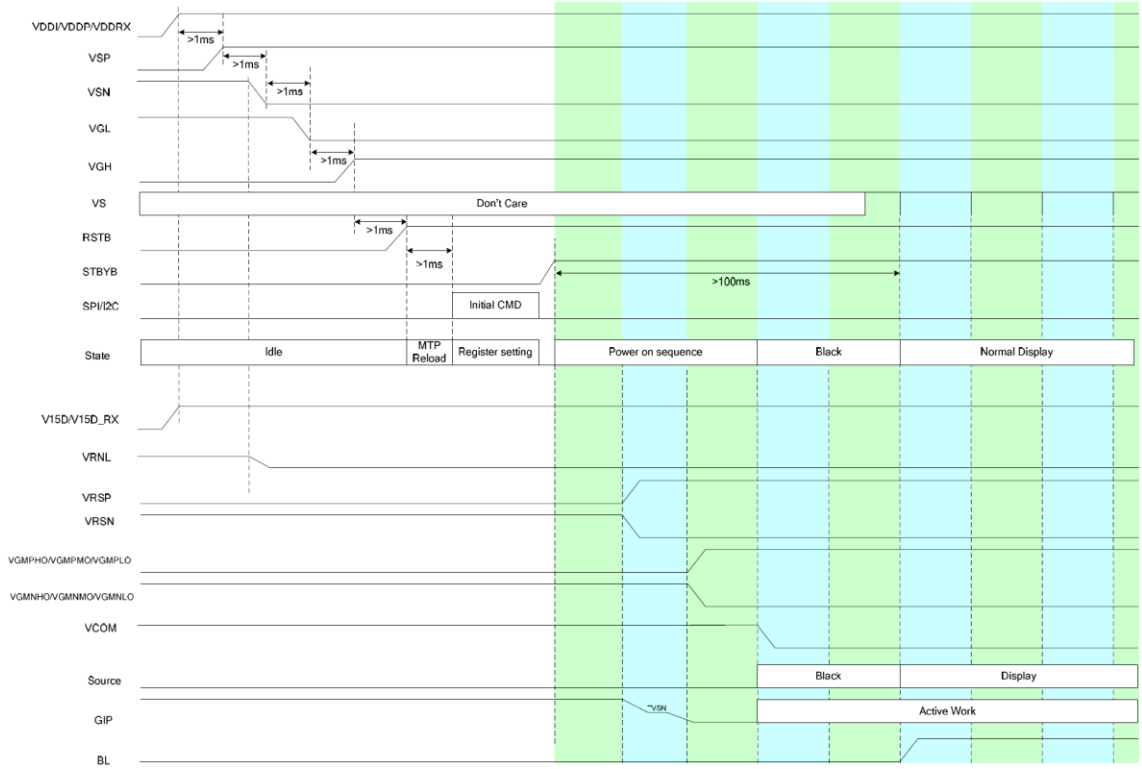
Figure 7. Data Mapping

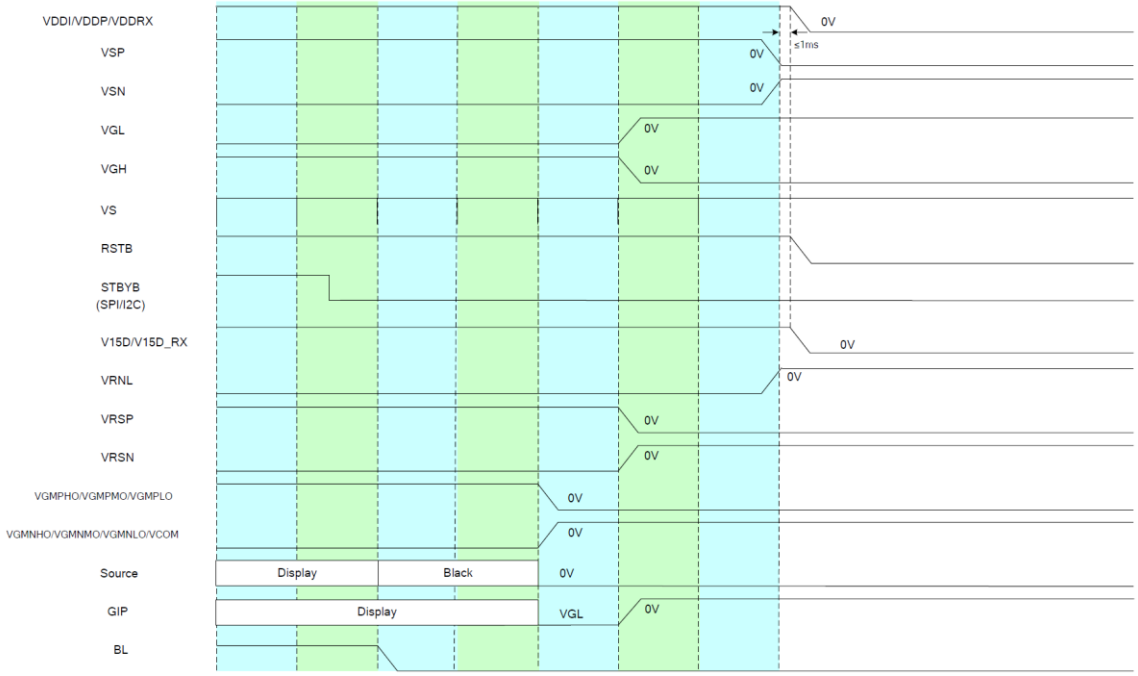


Note 1 : for 6 bit mode, MSB are R/G/B[5] and R/G/B[0] are LSB
Note 2 : for 8 bit mode, MSB are R/G/B[7] and R/G/B[0] are LSB

9.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off seq uence shall be as shown in below





10.0 MECHANICAL CHARACTERISTICS

10.1 Dimensional Requirements

FIGURE 6 shows mechanical outlines for the model PV215001HS30B.
Other parameters are shown in Table 8.

<Table 8. Dimensional Parameters>

Parameter	Specification	Unit
Active Area	260.28(H)*478.656(V)	mm
Number of pixels	1080 (H) x 1920 (V)	
Pixel pitch	0.1335(H)×0.1335(V)	mm
Pixel arrangement	RGB Vertical stripe	
Display colors	16.7M	
Display mode	Normally Black	
Dimensional outline	292.2 (H)*495.6(V) *8.0(D)typ	mm
Weight	-	gram

10.2 Mounting

See FIGURE 6.

10.3 AG and Polarizer Hardness.

The surface of the LCD has a Anti Glare coating to minimize reflection and a coating to reduce scratching.

10.4 Light Leakage

Light Leakage shall be checked by naked eye Applying Limit sample and/or 10% ND filter with conditions as follow:
1.With a viewing distance of 500mm from the screen.
2.With overhead light less than 350lux
3.Viewing angle Within 45 degrees at Left/Right/Upper/Lower.
4.Check pattern with Black, White and 32-gray (Half-gray) screens.

11.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

<Table 9. Reliability test>

No	Test Items	Conditions
1	High temperature storage test	Ta = 60 ℃, 240 hrs
2	Low temperature storage test	Ta = -20 ℃, 240 hrs
3	High temperature & high humidity (operation test)	Ta = 50 ℃, 80%RH, 240 hrs
4	High temperature operation test	Ta = 60 ℃, 240 hrs
5	Low temperature operation test	Ta = -5 ℃, 240 hrs
6	Thermal shock	Ta = -5 ℃ ↔ 60 ℃ (1 hr), 100 cycle
7	Drop (non-operating)	60cm/1 corner/3 edges/6 faces
8	Shock test (non-operating)	220G, Half Sine Wave 2msec ±X, ±Y, ±Z Once for each direction
9	Electro-static discharge test (non-operating)	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV

12.0 HANDLING & CAUTIONS

(1) Cautions when taking out the module
- Pick the pouch only, when taking out module from a shipping package.

(2) Cautions for handling the module
- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD module is operating.
- Put the module display side down on a flat horizontal plane.
- Handle connectors and cables with care.

(3) Cautions for the operation
- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

(4) Cautions for the atmosphere
- Dew drop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

(5) Cautions for the module characteristics
- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.

(6) Other cautions
- Do not disassemble and/or re-assemble LCD module.
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

13.0 LABEL

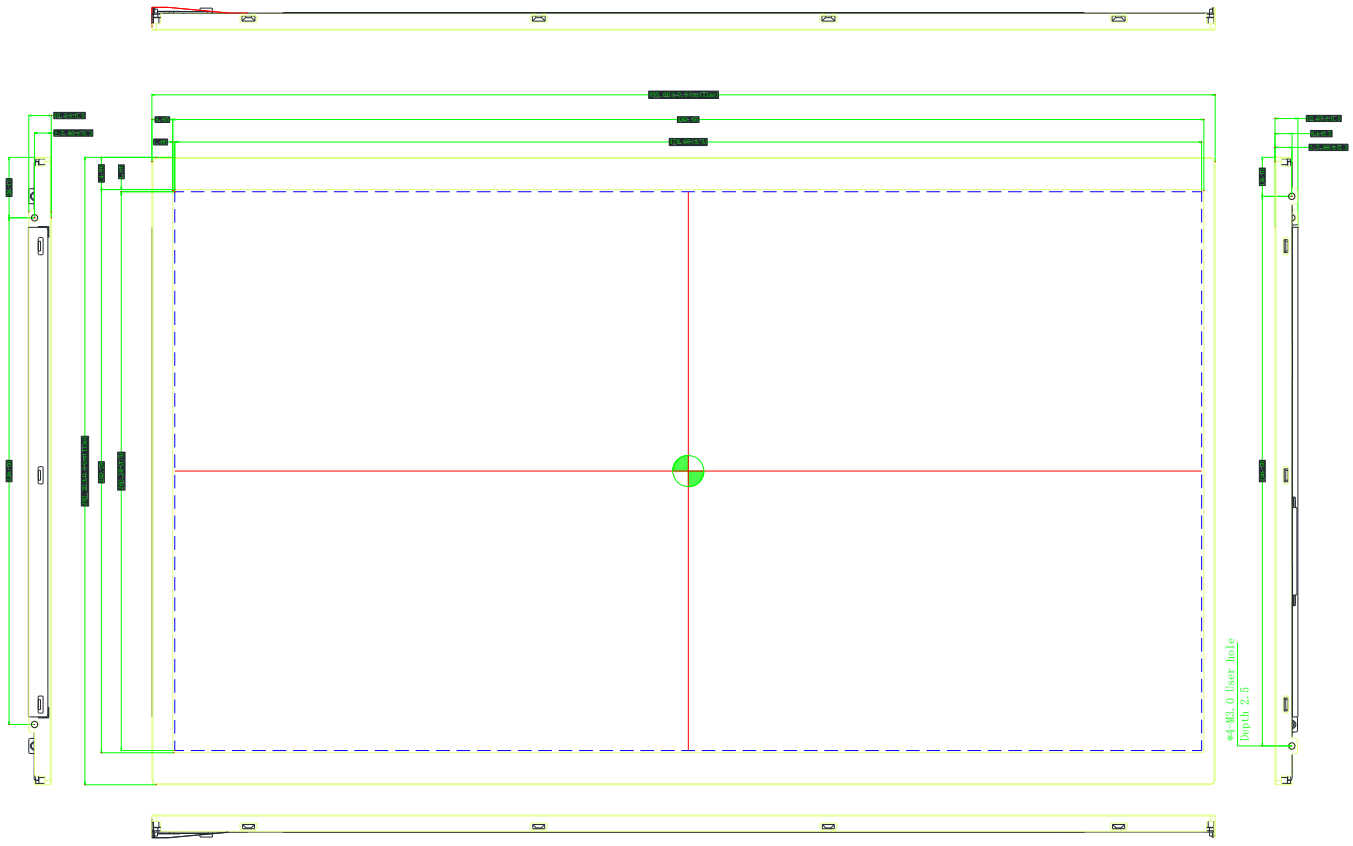
TBD

14.0 PACKING INFORMATION

TBD

15.0 MECHANICAL OUTLINE DIMENSION

Figure 6. Outline Dimensions (Front view)



15.0 MECHANICAL OUTLINE DIMENSION

Figure 7. Outline Dimensions (Rear view)