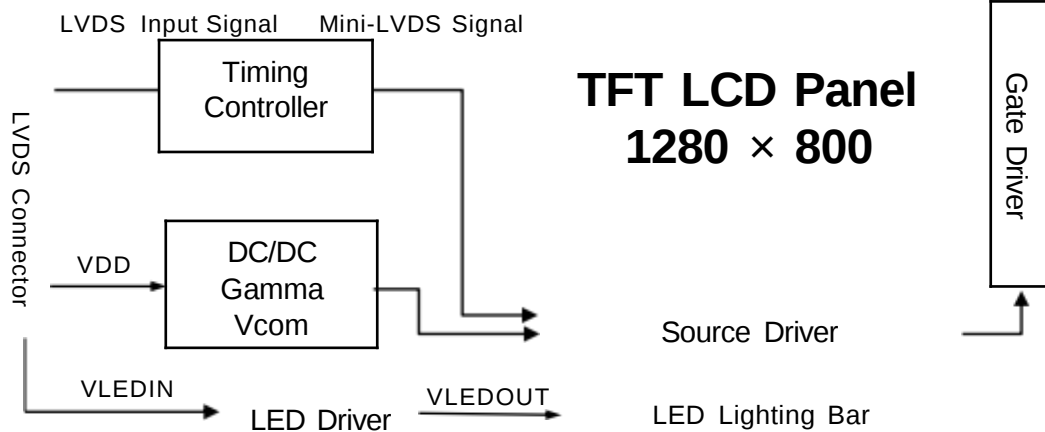


1.0 GENERAL DESCRIPTION

1.1 Introduction

10.1WXGA is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 10.07 inch diagonally measured active area with WXGA resolutions (1280 horizontal by 800 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 adapted for a low reflection and higher color type.



1.2 Features

- 4Lane LVDS Interface
- Thin and light weight
- Display 16.7M colors (Hi FRC)
- High luminance and contrast ratio, low reflection and wide viewing angle
- 3.3V for Logic Power
- RoHS Compliant



PRODUCT GROUP

REV

ISSUE DATE

TFT- LCD PRODUCT

P0

2020.10.10

SPEC. NUMBER

SPEC. TITLE

10.1 WXGA LCM Product Specification

PAGE

5 OF 36

1.3 Application

1.4 General Specification

< Table 1. General Specifications >

Parameter	Specification	Unit	Remarks
Active area	216.96(H) × 135.60(V)	mm	
Number of pixels	1280(H) × 800(V)	pixels	
Pixel pitch	56.5(H) × 169.5(V)	μm	
Pixel arrangement	Pixels RGB stripe arrangement		
Display colors	16.7M(6bits + Hi-FRC)	colors	
Display mode	Transmission mode. Normally Black		
Outline Dimension	228.2× 148.85× 2.8max.(W/O PCBA) 228.2× 148.85× 4.9max.(W/I PCBA)	mm	
Weight	250(max)	gram	
Surface Treatment	HC25		
Back-light	Bottom edge side, 1-LED Lighting Bar Type		40* LED Array

2.0 ABSOLUTE MAXIMUM RATINGS

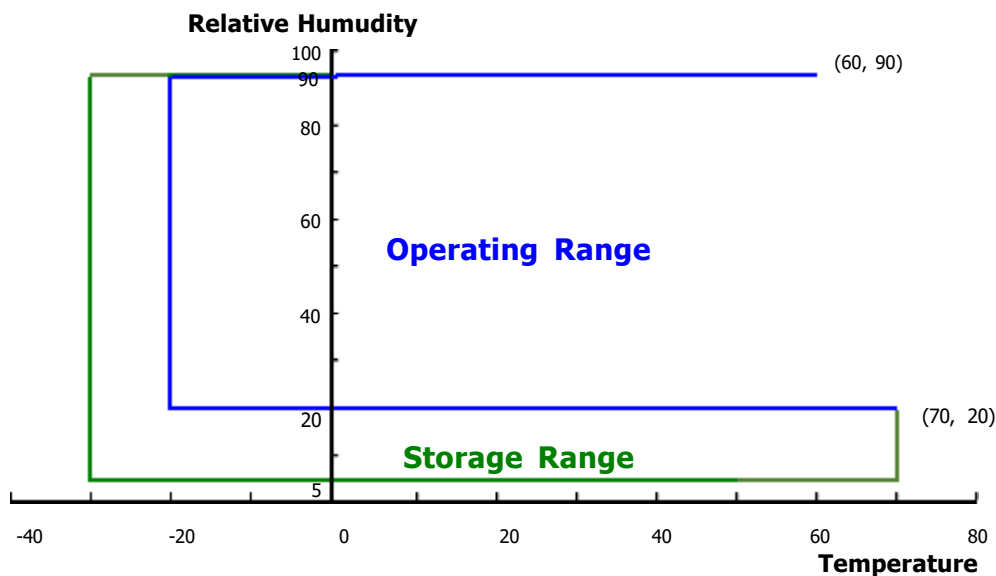
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. LCD Module Electrical Specifications >

[Ta =25± 2 °C]

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	-0.3	4.2	V	Note 1
Logic Supply Voltage	V_{IN}	$V_{SS}-0.3$	$V_{DD}+0.3$	V	
Operating Temperature	T_{OP}	-20	+70	°C	Note 2
Storage Temperature	T_{ST}	-30	+70	°C	

Note : 1) Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39 °C 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}	3.0	3.3	3.6	V	Note 1
Power Supply Current	I _{DD}		272	303	mA	Note 1
Differential Input high Thres hold Voltage	V _{TH}			100	mV	V _{IC} = 1.2V typ.
Differential Input low Thresh old Voltage	V _{TL}	-100			mV	
Differential Input Voltage	V _{ID}	± 100		± 600	mV	
LVDS common mode voltage	V _{IC}	0.7		1.6	V	
Power Consumption	P _D		0.9	1	W	Mosaic Pattern
	P _{BL}			3	W	W/I LED Driver
	P _{total}			4	W	

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25 °C
Max value at Mosaic Pattern

2. Calculated value for reference (VLED X ILED)

3.2 Back-light Unit

< Table 4. LED Driving guideline specifications >

Ta=25+/-2°C

Parameter		Min.	Typ.	Max.	Unit	Remarks
LED Forward Voltage	V_F		2.9	3.0	V	
LED Forward Current	I_F		20		mA	
LED Power Consumption	P_{LED}			2.73	W	Note 1
LED Life-Time	N/A	15000			Hour	IF = 20mA Note 2
Power supply voltage for LED Driver	V_{LED}	5	12	21	V	
EN Control Level	Backlight on	1.9		5.0	V	
	Backlight off	0		0.8	V	
PWM Control Level	PWM High Level	1.9		5.0	V	
	PWM Low Level	0		0.8	V	
PWM Control Frequency	F_{PWM}	200		10K	Hz	
Duty Ratio		1%		100%	%	Note 3

Notes : 1. Power supply voltage 12V for LED Driver, Driver efficiency 85%,

Calculator Value for reference $IF \times VF \times 36 / 0.85 = P_{LED}$

2. The LED Life-time define as the estimated time to 50% degradation of initial luminous.

3. 1% duty cycle is achievable with a dimming frequency less than 1KHz.

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 = $25 \pm 2^\circ\text{C}$) 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° . While scanning θ and/or Φ , 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 $3.3 \pm 0.3\text{V}$ at 25°C . Optimum viewing angle direction is 6 'clock.

4.2 Optical Specifications

<Table 5. Optical Specifications>

	Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
	Viewing Angle range	Horizontal	Θ_3	CR > 10	80	85	.	Deg.	Note 1
			Θ_9		80	85	.	Deg.	
		Vertical	Θ_{12}		80	85	.	Deg.	
			Θ_6		80	85	.	Deg.	
	Color Gamut				45	50	.	%	
	Luminance Contrast ratio		CR	$\Theta = 0^\circ$	600	800	.		Note 2
	Luminance of White	center Points	Y_w	$\Theta = 0^\circ$	380	430	.	cd/m ²	Note 3
	White Luminance uniformity	9 Points	$\Delta Y5$		75	80	.		Note 4
	White Chromaticity		W_x	$\Theta = 0^\circ$	0.283	0.313	0.343	.	Note 5
			W_y		0.299	0.329	0.359	.	
	Reproduction of color	Red	R_x	$\Theta = 0^\circ$	Typ. -0.03	0.580	Typ. +0.03	.	
			R_y			0.348		.	
		Green	G_x			0.338		.	
			G_y			0.571		.	
		Blue	B_x			0.159		.	
			B_y			0.103		.	
	Response Time (Rising + Falling)		T_{RT}	Ta= 25° C $\Theta = 0^\circ$	.	30	35	ms	Note 6
	Gamma Scale				2.0	2.2	2.4	.	
	Cross Talk		CT	$\Theta = 0^\circ$	.	.	2.0	%	Note 7

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).

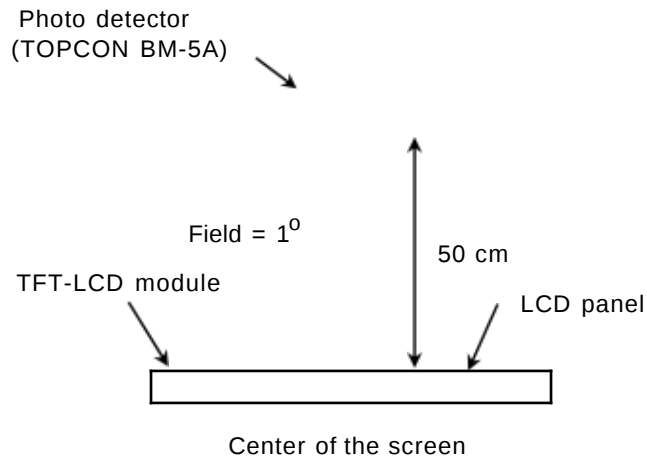
2. Contrast measurements shall be made at viewing angle of $\Theta = 0$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1)
- 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Center Luminance of white is defined as luminance values of center point 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, the LED current is set at 20mA.
4. The White luminance uniformity on LCD surface is then expressed as : $\Delta Y = \text{Minimum Luminance of 9 points} / \text{Maximum Luminance of 9 points}$ (see 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 T_r , and 90% to 10% is T_d .
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).

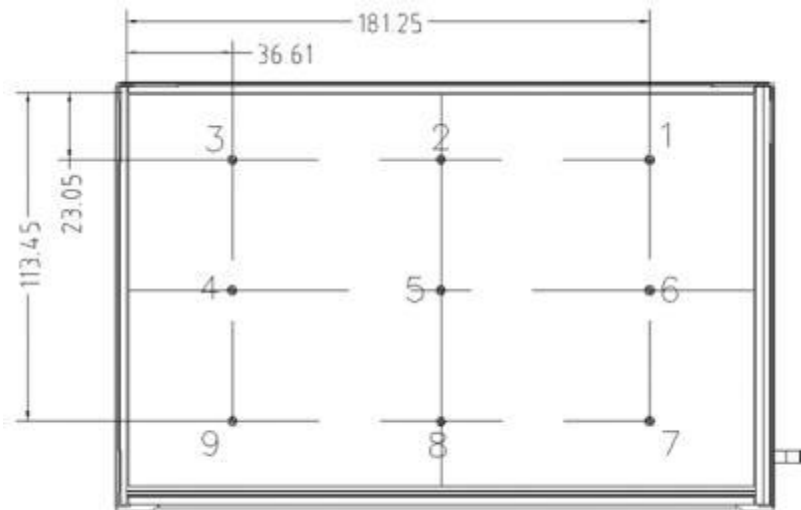
4.3 Optical measurements

Figure 1. Measurement Set Up



View angel range measurement setup

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

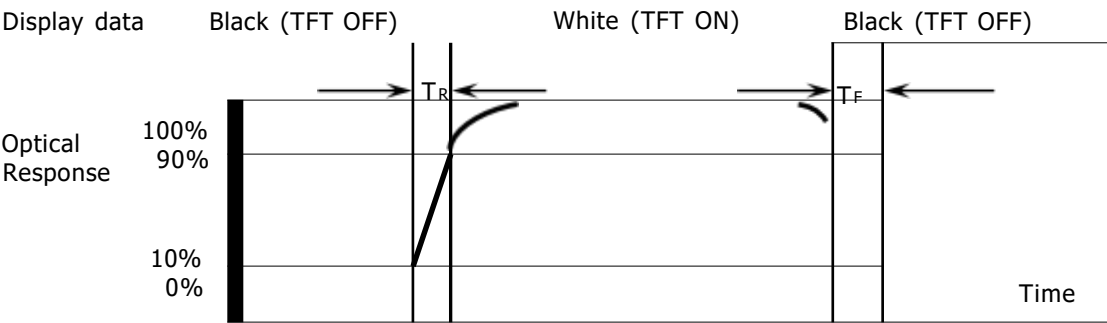


Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

The White luminance uniformity on LCD surface is then expressed as : $\Delta Y5 = \text{Minimum Luminance of 5 points} / \text{Maximum Luminance of 5 points}$ (see FIGURE 2).

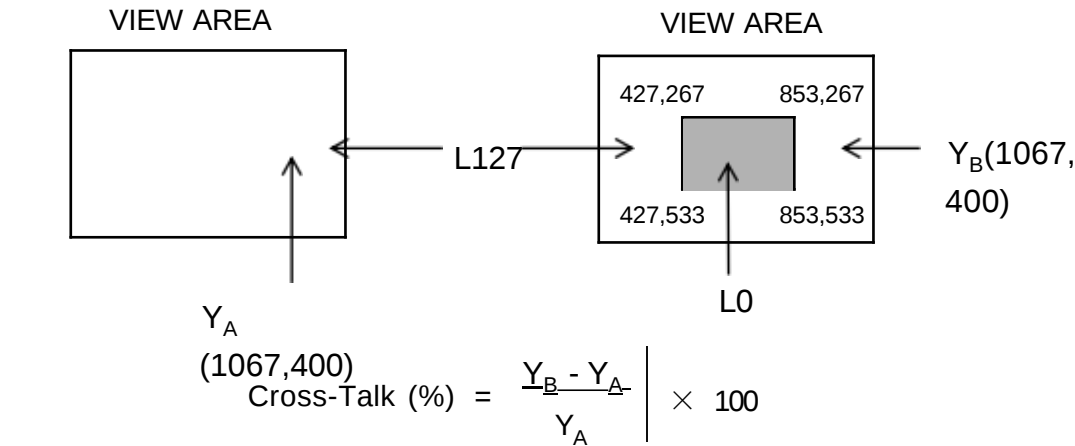
BOE	PRODUCT GROUP	REV	ISSUE DATE
	TFT- LCD PRODUCT	P0	2020.10.10
SPEC. NUMBER	SPEC. TITLE 10.1 WXGA LCM Product Specification		PAGE 12 OF 36

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 T_r and 90% to 10% is T_d .

Figure 5. Cross Modulation Test Description



Y^A = Initial luminance of measured area (cd/m²)
 Y^B = Subsequent luminance of measured area (cd/m²)

The location measured will be exactly the same in both patterns.



PRODUCT GROUP

REV

ISSUE DATE

TFT- LCD PRODUCT

P0

2020.10.10

SPEC. NUMBER

SPEC. TITLE

10.1 WXGA LCM Product Specification

PAGE

13 OF 36

5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

The electronics interface connector is STM MSAK24025P40G.

The connector interface pin assignments are listed in Table 6 and 7.

<Table 6. Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	NC	No Connection
2	VDDIN	Power Supply VDDIN=3.3V (typ.)
3	VDDIN	Power Supply VDDIN=3.3V (typ.)
4	VDC	Power Supply VDC=3.3V (typ.)
5	NC	No Connection
6	CLK EDID	CLK for EDID function use
7	Data EDID	CLK for EDID function use
8	LVDS_0N	LVDS Negative data signal (-)
9	LVDS_0P	LVDS Positive data signal (+)
10	GND	Ground
11	LVDS_1N	LVDS Negative data signal (-)
12	LVDS_1P	LVDS Positive data signal (+)
13	GND	Ground
14	LVDS_2N	LVDS Negative data signal (-)
15	LVDS_2P	LVDS Positive data signal (+)
16	GND	Ground
17	LVDS_CLKN	LVDS Negative CLK signal (-)
18	LVDS_CLKP	LVDS Positive CLK signal (+)
19	GND	Ground
20	LVDS_3N	LVDS Negative data signal (-)
21	LVDS_3P	LVDS Positive data signal (+)
22	NC	No Connection
23	NC	No Connection
24	NC	No Connection
25	GND	Ground
26	NC	No Connection
27	NC	No Connection
28	GND	Ground
29	NC	No Connection
30	NC	No Connection
31	LED_GND	LED Ground
32	LED_GND	LED Ground
33	LED_GND	LED Ground
34	NC	No Connection
35	LED_PWM	LED driver PWM Signal
36	LED_EN	LED driver enable (+3.3V Input)
37	NC	No Connection
38	VLED	LED Power Supply 5V-21V
39	VLED	LED Power Supply 5V-21V
40	VLED	LED Power Supply 5V-21V



PRODUCT GROUP

REV

ISSUE DATE

TFT- LCD PRODUCT

P0

2020.10.10

SPEC. NUMBER

SPEC. TITLE
10.1 WXGA LCM Product Specification

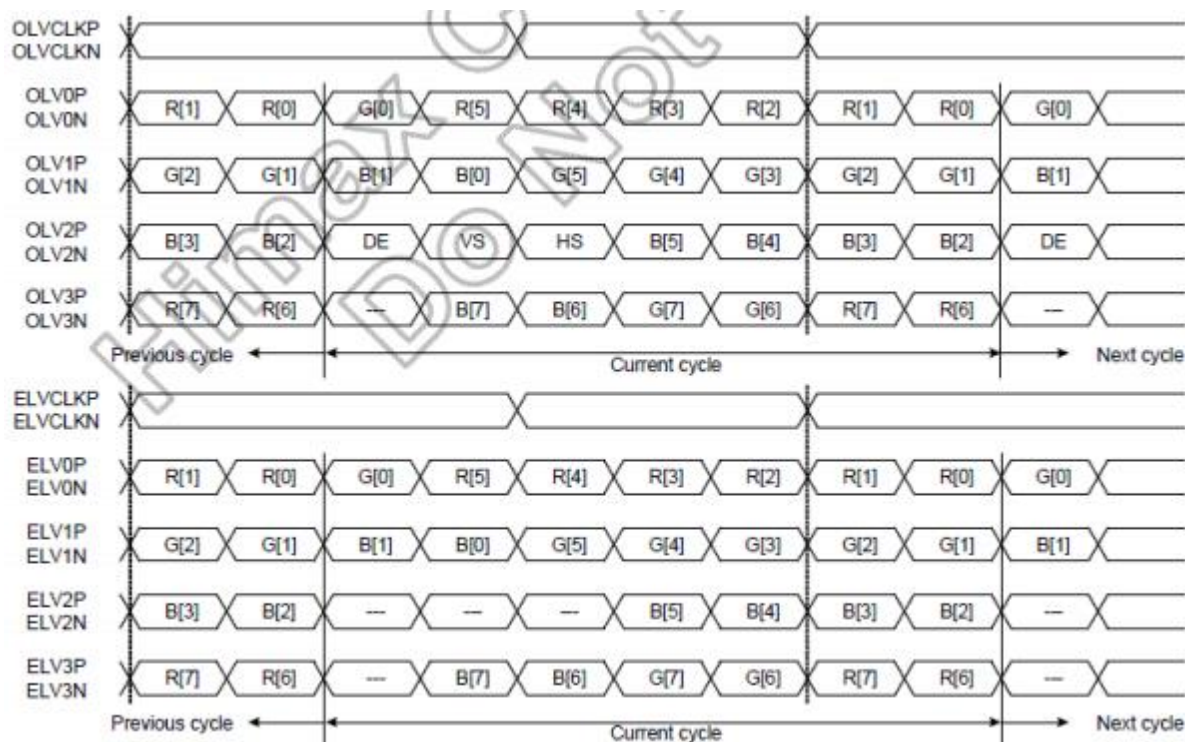
PAGE
14 OF 36

BLU Interface Connector: [STM MSAK24037P9](#) .

<Table 7. Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	LED1	LED cathode connection
2	LED2	LED cathode connection
3	LED3	LED cathode connection
4	LED4	LED cathode connection
5	NC	No Connection
6	NC	No Connection
7	VLEDOUT	LED anode connection
8	VLEDOUT	LED anode connection
9	VLEDOUT	LED anode connection

5.2 LVDS Input signal





PRODUCT GROUP

REV

ISSUE DATE

TFT- LCD PRODUCT

P0

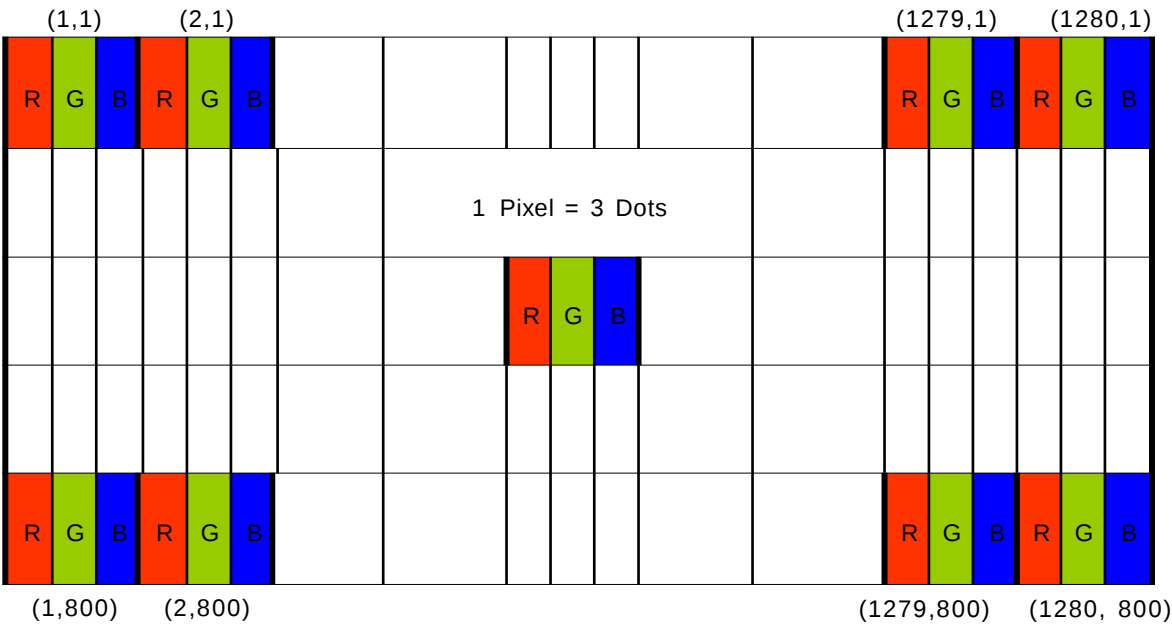
2020.10.10

SPEC. NUMBER

SPEC. TITLE
10.1 WXGA LCM Product Specification

PAGE
16 OF 36

5.3 Data Input Format



Display Position of Input Data (V-H)