

INDUSTRIAL STRENGTH... Start Your Application From YOURITECH





PROPRIETARY NOTE

THIS SPECIFICATION IS THE PROPERTY OF BOE AND SHALL NOT BE REPRODUCED OR COPIED WITHOUT THE WRITTEN PERMISSION OF BOE AND MUST BE RETURNED TO BOE UPON ITS REQUEST

TITLE : NV122WUM-N41 V8.0

Customer: TBG

Product Specification

Rev. A

• Chongqing BOE Optoelectronics CO., LTD

SPEC. NUMBER

PRODUCT GROUP

Rev.

ISSUE DATE

PAGE

TFT-LCD

A

2023.01.19

1 OF 65

DAS-RD-2019010-D

A4(210 X 297)

	PRODUCT GROUP	REV	ISSUE DATE																																														
	Customer Spec	Rev. A	2023.01.19																																														
REVISION HISTORY ()Preliminary Specification (√)Final Specification <table><tr><th>Revision No.</th><th>Page</th><th>Description of Changes</th><th>Date</th><th></th></tr><tr><td>P0</td><td>32</td><td>Preliminary Release</td><td>2022.03.10</td><td>Zheng Xiaoshuang</td></tr><tr><td>0</td><td>-</td><td>Final Release</td><td>2022.12.29</td><td>Chen Xin</td></tr><tr><td>A</td><td>6,8,10,12</td><td>Negative LC Information Update</td><td>2022.01.19</td><td>Chen Xin</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table> REVIEWED <table><tr><th>Designer</th><th>Manager</th></tr><tr><td>Guo Jiandong(Array)</td><td>Wang Xiaoyun</td></tr><tr><td>Qin Chunyan(Cell)</td><td>Li Zhe</td></tr><tr><td>Yang Guodong/Wei Xiongzhou(CF)</td><td>Wang Xiaoyun/Li Min</td></tr><tr><td>Gao Chao(EE)</td><td>Shen Can</td></tr><tr><td>Liu Song(MO)</td><td>Sun Yan sheng</td></tr><tr><td>Bian Wenhua(QE)</td><td>Cui Chaoyang</td></tr><tr><td>Wang Di(PI)</td><td>Chen Gang</td></tr></table> APPROVED Chen Xin(PM)				Revision No.	Page	Description of Changes	Date		P0	32	Preliminary Release	2022.03.10	Zheng Xiaoshuang	0	-	Final Release	2022.12.29	Chen Xin	A	6,8,10,12	Negative LC Information Update	2022.01.19	Chen Xin											Designer	Manager	Guo Jiandong(Array)	Wang Xiaoyun	Qin Chunyan(Cell)	Li Zhe	Yang Guodong/Wei Xiongzhou(CF)	Wang Xiaoyun/Li Min	Gao Chao(EE)	Shen Can	Liu Song(MO)	Sun Yan sheng	Bian Wenhua(QE)	Cui Chaoyang	Wang Di(PI)	Chen Gang
Revision No.	Page	Description of Changes	Date																																														
P0	32	Preliminary Release	2022.03.10	Zheng Xiaoshuang																																													
0	-	Final Release	2022.12.29	Chen Xin																																													
A	6,8,10,12	Negative LC Information Update	2022.01.19	Chen Xin																																													
Designer	Manager																																																
Guo Jiandong(Array)	Wang Xiaoyun																																																
Qin Chunyan(Cell)	Li Zhe																																																
Yang Guodong/Wei Xiongzhou(CF)	Wang Xiaoyun/Li Min																																																
Gao Chao(EE)	Shen Can																																																
Liu Song(MO)	Sun Yan sheng																																																
Bian Wenhua(QE)	Cui Chaoyang																																																
Wang Di(PI)	Chen Gang																																																
SPEC. NUMBER	SPEC. TITLE	PAGE																																															
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A	2 OF 65																																															

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

Contents

No.	Items	Page
1.0	General Description	4
2.0	Absolute Maximum Ratings	6
3.0	Electrical Specifications	7
4.0	Optical Specifications	11
5.0	Interface Connection	15
6.0	Signal Timing Specification	16
7.0	Input Signals, Display Colors & Gray Scale of Colors	20
8.0	Power Sequence	26
9.0	Connector Description	27
10.0	Mechanical Characteristics	28
11.0	Reliability Test	29
12.0	Handling & Cautions	30
13.0	Label	31
14.0	Packing Information	33
15.0	Mechanical Outline Dimension	34
16.0	EDID Table	36
17.0	General Precautions	40
18.0	Appendix	42

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	3 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

1.0 GENERAL DESCRIPTION

1.1 Introduction

NV122WUM-N41 V8.0 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 12.2 inch diagonally measured active area with WUXGA resolutions (1920 horizontal by 1200 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.2M(6bit+FRC) colors **color gamut NTSC50%**. The TFT-LCD panel used for this module is a low reflection and higher color type. Therefore, this module is suitable for Notebook PC. The LED driver for back-light driving is built in this model. All input signals are eDP1.2 interface compatible.

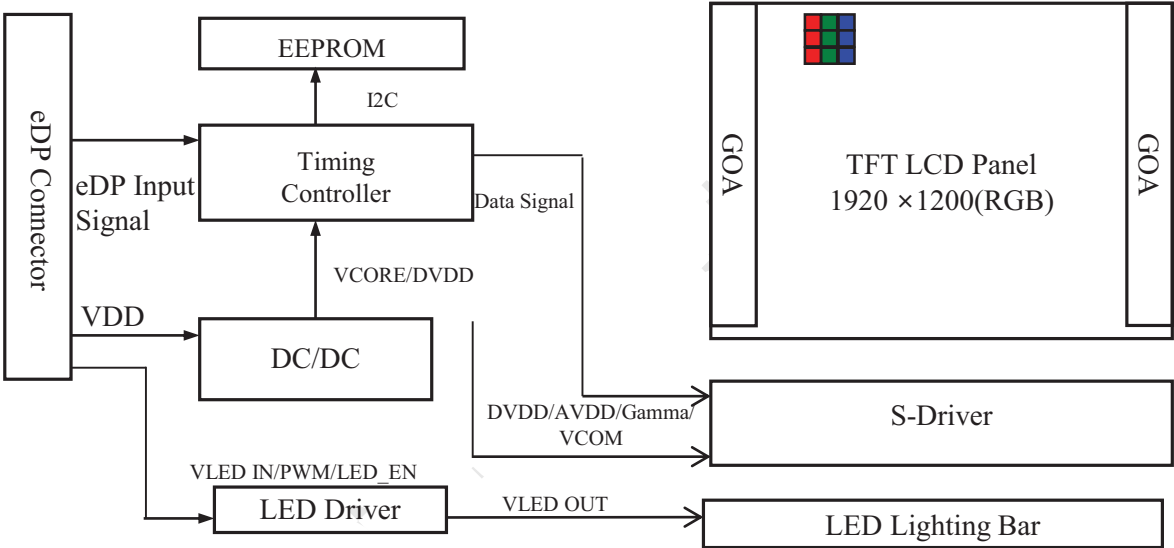


Figure 1. Drive Architecture

1.2 Features

- 2 lane eDP interface with 2.7Gbps link rates
- Thin and light weight, Low Blue Light
- 16.2M(6bit+FRC) color depth, **color gamut NTSC50%**
- Single LED lighting bar (Bottom side/Horizontal Direction)
- Data enable signal mode
- Green product (RoHS & Halogen free product)
- On board LED driving circuit
- Low driving voltage and low power consumption
- On board EDID chip
- Adjust backlight brightness with DC mode

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	4 OF 65

	PRODUCT GROUP			REV	ISSUE DATE	
	Customer Spec			Rev. A	2023.01.19	
1.0 GENERAL DESCRIPTION						
1.2 Features						
DPCD Ver.	sDRRS	DCR	DMRRS	PSR	LRR	MBO
1.1	on	off	on	off	off	off
VESA DSC	MSO	AMD Free-sync	HDR	Dimming	OD	BIST
off	off	on	off	PWM in DC out	off	yes
FRC	DDS	G-sync				
on	off	yes				
SPEC. NUMBER		SPEC. TITLE				PAGE
		NV122WUM-N41 V8.0 Product Specification Rev. A				5 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

1.3 Application

- Notebook PC (Wide type)

1.4 General Specification

The followings are general specifications at the model NV122WUM-N41 V8.0. (listed in Table 1)

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	262.7712 (H)*164.232(V)	mm	
Number of pixels	1920 (H) × 1200 (V)	pixels	
Pixel pitch	45.62 x 136.86	um	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.2M(6bit+FRC)		
Color gamut	NTSC50%		
Display mode	Normally black		
Dimensional outline	269.27±0.3 (H)*174.48±0.3(V)(W/O PCB)*2.8 (Max) 269.27±0.3(H)*181.48±0.5(V) (W/PCB)*2.8(Max)	mm	
Weight	210(max)	g	
Surface treatment	Fine AG		
Surface hardness	3H		
Back-light	Bottom edge side, 1-LED lighting bar type		Note 1
Power consumption	P _D : 0.5(Max.)	W	@Mosaic
	P _{BL} : 2.5(Max.)	W	
	P _{Total} : 3.0(Max.)	W	@Mosaic

Notes : 1. LED Lighting Bar (50*LED Array)

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	6 OF 65

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. Absolute Maximum Ratings>

$T_a=25\pm 2^{\circ}\text{C}$

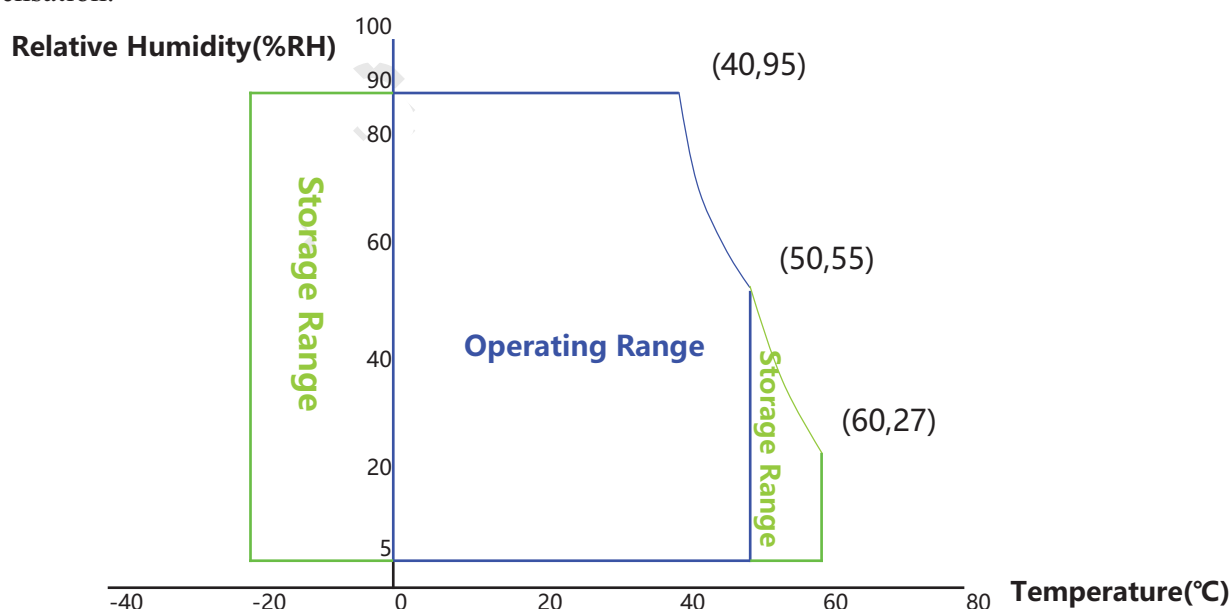
Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	-0.3	4.0	V	Note 1
eDP input Voltage	V_{eDP}	0	2.0	V	
Logic Supply Voltage	V_{IN}	$V_{SS}-0.3$	$V_{DD}+0.3$	V	
Operating Temperature	T_{OP}	0	+50	$^{\circ}\text{C}$	Note 2
Storage Temperature	T_{ST}	-20	+60	$^{\circ}\text{C}$	

Notes :

1. Permanent damage to the device may occur if maximum values are exceeded functional operation should be restricted to the condition described under normal operating conditions.

2. Temperature and relative humidity range are shown in the figure below.

95 % RH Max. ($40^{\circ}\text{C} \geq T_a$) Maximum wet - bulb temperature at 39°C or less. ($T_a > 40^{\circ}\text{C}$) No condensation.



	PRODUCT GROUP		REV	ISSUE DATE			
	Customer Spec		Rev. A	2023.01.19			
3.0 ELECTRICAL SPECIFICATIONS							
3.1 Electrical Specifications							
< Table 3. 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	
Permissible Input Ripple Voltage	V _{RF}	-10% VDD	-	+10% VDD	V	Note 4	
BIST Control Level	High Level	1.44	-	3.3	V	@V _{DDIO} =1.8	
	Low Level	0	-	0.27	V		
Power Supply Inrush Current	Inrush	-	-	2	A	Note3	
Power Supply Current	Mosaic	I _{DD}	-	-	151.5	mA	Note 1
	RGB		-	-	242.4	mA	
	Solid		-	-	696.9	mA	
Power Consumption	Mosaic	P _M	-	-	0.5	W	
	RGB	P _{RGB}	-	-	0.9	W	
	Solid	P _S	-	-	2.3	W	
	BLU	P _{BL}	-	-	2.5	W	Note 2
	Total	P _{Total}	-	-	3.0	W	@Mosaic

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

Notes :

- 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.
 - Mosaic pattern 8*8
 - R/G/B patterns
 - Solid pattern(maximum logic power consumption) : sub v line



Figure 3. Power Measure Patterns

- Calculated value for reference ($V_{LED} \times I_{LED}$) , , The power consumption with LED Driver are under the $V_{LED} = 12.0V$, 25°C, PWM Duty 100% .

- Measure condition (Figure 4)

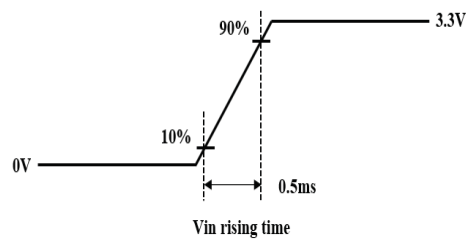


Figure 4. Inrush Measure Condition

- Input voltage range:3.0~3.6V.Test condition: Oscilloscope bandwidth 20MHz, AC coupling

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	9 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

3.2 Backlight Unit

< Table 4. LED Driving Guideline Specifications >

Ta=25+/-2°C

Parameter		Min.	Typ.	Max.	Unit	Remarks	
LED Forward Voltage		V _F	-	-	2.9	V	
LED Forward Current		I _F	-	10.62	-	mA	
LED Power Input Voltage		V _{LED}	5	12	21	V	
LED Power Input Current		I _{LED}	-	-	208	mA	Note 1
LED Power Consumption		P _{LED}	-	-	2.5	W	
Power Supply Voltage for LED Driver Inrush		I _{led} inrush	-	-	2	A	Note 3
LED Life-Time		N/A	15,000	-	-	Hour	I _F = 10.62mA Note 2
EN Control Level	Backlight On	V _{BL_EN}	1.5	-	3.6	V	
	Backlight Off		0	-	0.2	V	
PWM Control Level	High Level	V _{BL_PWM}	1.5	-	3.6	V	
	Low Level		0	-	0.2	V	
PWM Control Frequency		F _{PWM}	200	-	2,000	Hz	
Duty Ratio			1	-	100	%	

Notes :

- Power supply voltage 12V for LED driver.
Calculator value for reference $I_F \times V_F \times 50 / \text{driver efficiency} = P_{LED}$
- The LED life-time define as the estimated time to 50% degradation of initial luminous.
- Measure condition (Figure 5)

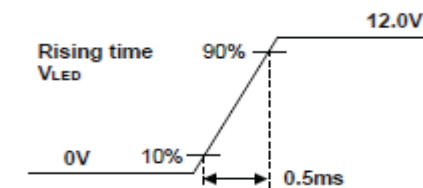


Figure 5. Inrush Measure Condition

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	10 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

3.3 LED Structure

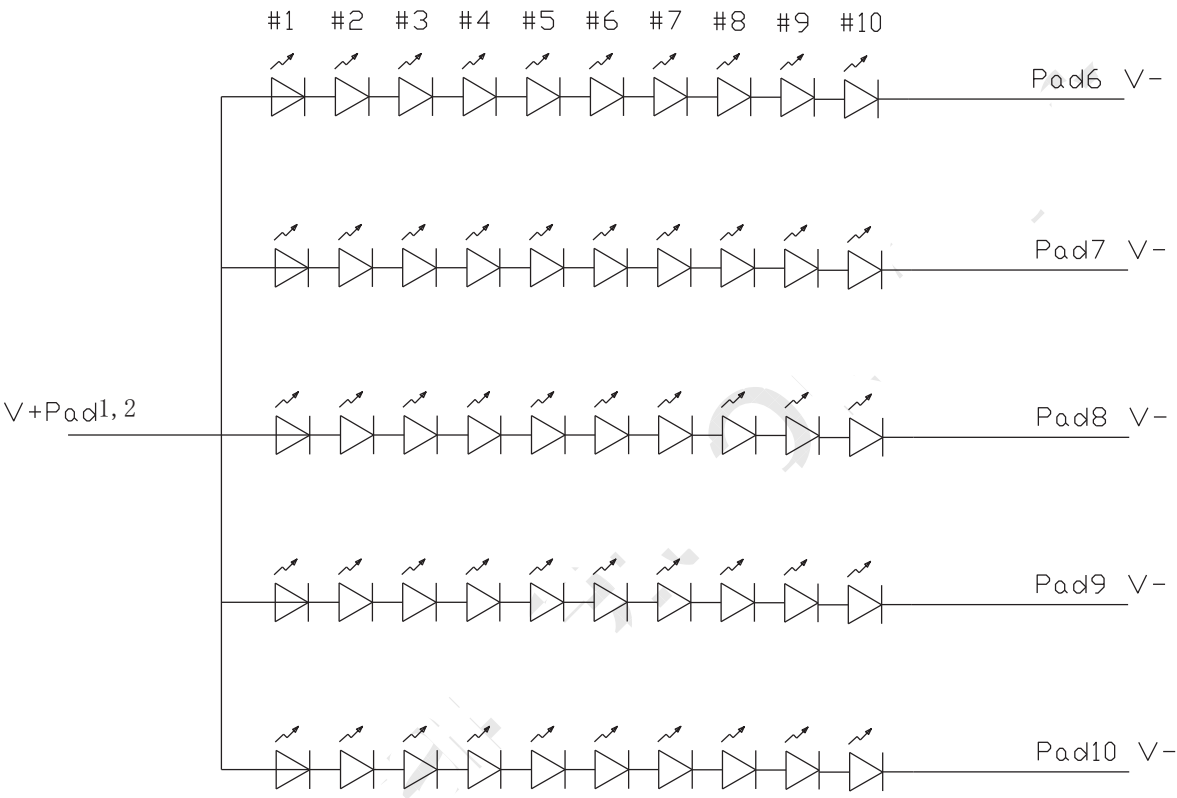


Figure 6. LED Structure

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	11 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

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 (PR730&PR810) 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 $\theta\Phi=0$ ($=\theta_3$) as the 3 o'clock direction (the "right"), $\theta\Phi=90$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta\Phi=180$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta\Phi=270$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). 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

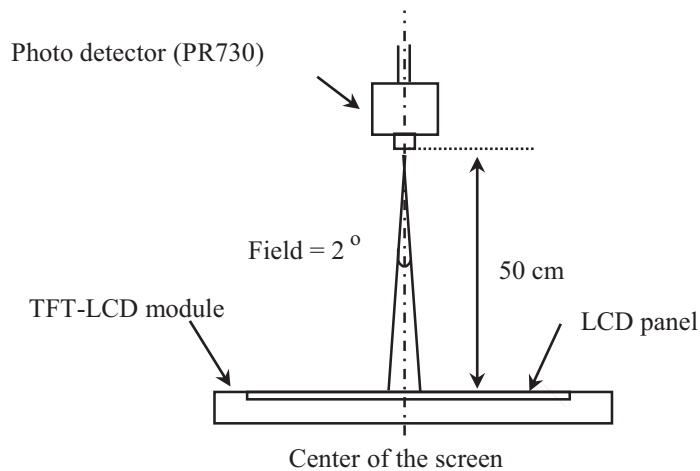
<Table 5. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	Θ_3	CR > 10	80	89	-	Deg.	Note 1
		Θ_9		80	89	-	Deg.	
	Vertical	Θ_{12}		80	89	-	Deg.	
		Θ_6		80	89	-	Deg.	
Luminance Contrast Ratio		CR	$\Theta = 0^\circ$	1000	1500	-		Note 2
Luminance of White	5 Points	Y_w	$\Theta = 0^\circ$ ILED = 12mA	255	300	-	cd/m ²	Note 3
White Luminance Uniformity	5 Points	$\Delta Y5$		80	-	-	%	Note 4
	13 Points	$\Delta Y13$		60	-	-	%	
White Chromaticity		W_x	$\Theta = 0^\circ$	0.283	0.313	0.343		Note 5
		W_y		0.299	0.329	0.359		
	Red	R_x	$\Theta = 0^\circ$	Typ.-0.03	0.597	Typ.+0.03		
		R_y			0.364			
	Green	G_x			0.353			
		G_y			0.604			
	Blue	B_x			0.163			
		B_y			0.116			
Color Gamut					50	-	%	NTSC
Response Time (Rising + Falling)		T _{RT}	Ta= 25°C $\Theta = 0^\circ$	-	20	25	ms	Note 6
Cross Talk		CT	$\Theta = 0^\circ$	-	-	2.0	%	Note 7

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	12 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19
Notes : - 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 7). - 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 7) Luminance Contrast Ratio (CR) is defined mathematically. $CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$ - 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 8 for a total of the measurements per display. - The White luminance uniformity on LCD surface is then expressed as : $\Delta Y = \text{Minimum Luminance of 5(or 13) points} / \text{Maximum Luminance of 5(or 13) points.}$(see Figure 8 and Figure 9). - 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. - The electro-optical response time measurements shall be made as Figure 10 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_r. - 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 11).			
SPEC. NUMBER	SPEC. TITLE		PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A		13 OF 65

4.3 Optical Measurements



Optical characteristics measurement setup

Figure 7. Measurement Set Up

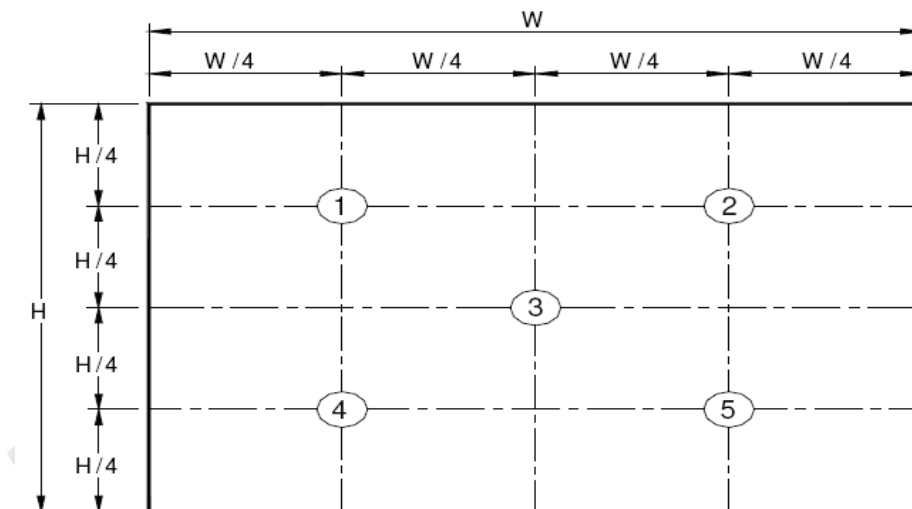


Figure 8. White Luminance and Uniformity Measurement Locations (5 points)

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 7 for a total of the measurements per display.

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

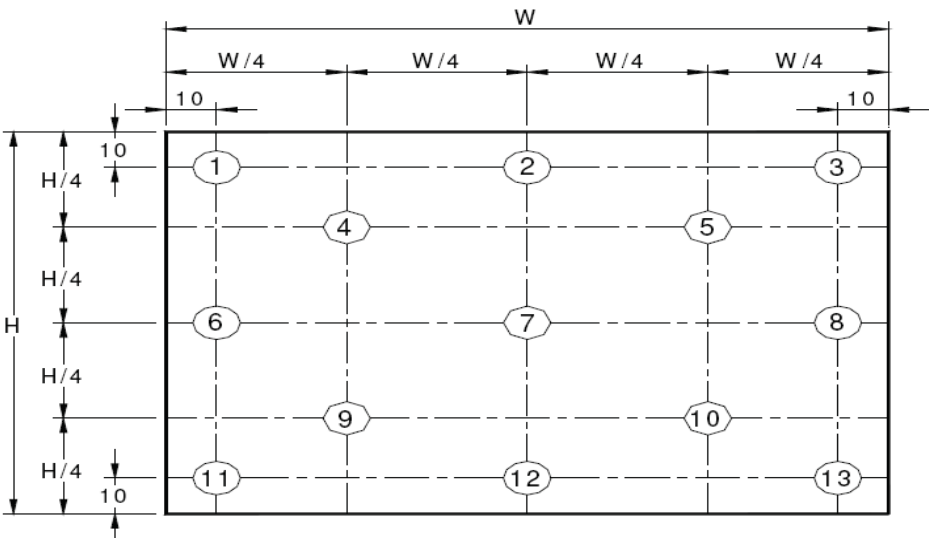


Figure 9. Uniformity Measurement Locations (13 points)

The White luminance uniformity on LCD surface is then expressed as : $\Delta Y5$ = Minimum Luminance of five points / Maximum Luminance of five points (see Figure 8) , $\Delta Y13$ = Minimum Luminance of 13 points /Maximum Luminance of 13 points (see Figure 9).

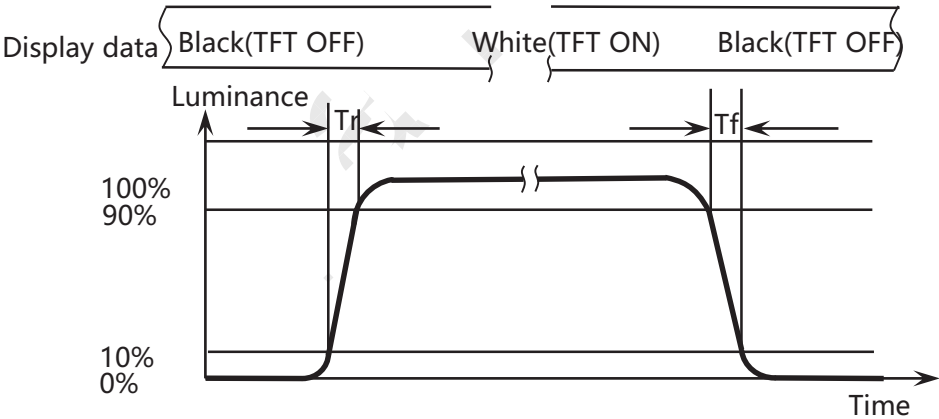


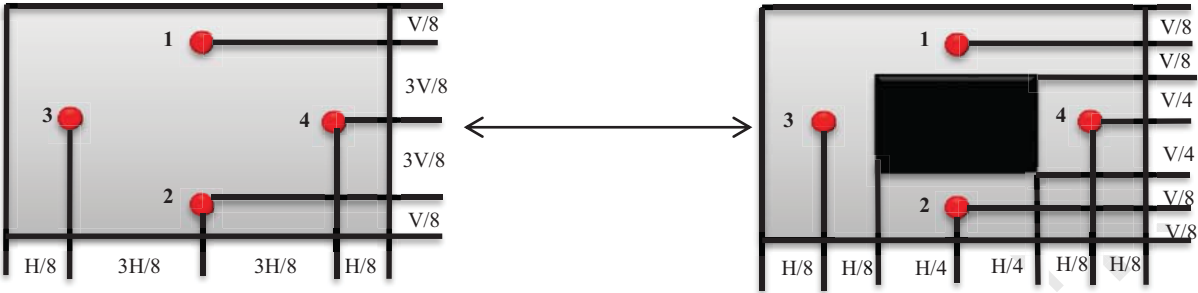
Figure 10. Response Time Testing

The electro-optical response time measurements shall be made as shown in Figure 10 by switching the “data” input signal ON and OFF. Tr: The luminance to change from 10% to 90% ,Tf: The luminance to change from 90% to 10% .

The test system : LMS PR810

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	15 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19



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

Figure 11. Cross Talk Modulation Test Description

Where:

Y_A = Initial luminance of measured area (cd/m²)

Y_B = Subsequent luminance of measured area (cd/m²)

The location 1/2/3/4 measured will be exactly the same in both patterns. The test background gray is from L64 to L192.Take the largest data as the result.

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 11)

The test system: PR730

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	16 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

5.0 INTERFACE CONNECTION

5.1 Electrical Interface Connection

The electronics interface connector is CT W05030-30P-H or Compatible.

The connector interface pin assignments are listed in Table 6.

<Table 6. Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	NC	No Connection
2	H_GND	Ground
3	LANE1_N	eDP RX Channel 1 Negative
4	LANE1_P	eDP RX Channel 1 Positive
5	H_GND	Ground
6	LANE0_N	eDP RX Channel 0 Negative
7	LANE0_P	eDP RX Channel 0 Positive
8	H_GND	Ground
9	AUX_CH_P	eDP AUX CH Positive
10	AUX_CH_N	eDP AUX CH Negative
11	H_GND	Ground
12	LCD_VCC	Power Supply, 3.3V (typ.)
13	LCD_VCC	Power Supply, 3.3V (typ.)
14	BIST	Panel Self Test Enable
15	H_GND	Ground
16	H_GND	Ground
17	HPD	Hot Plug Detect Output
18	BL_GND	LED Ground
19	BL_GND	LED Ground
20	BL_GND	LED Ground
21	BL_GND	LED Ground
22	BL_ENABLE	LED Enable Pin(+3.3V Input)
23	BL_PWM	System PWM Signal Input
24	NC	No Connection
25	NC	No Connection
26	BL_POWER	LED Power Supply 5V-21V
27	BL_POWER	LED Power Supply 5V-21V
28	BL_POWER	LED Power Supply 5V-21V
29	BL_POWER	LED Power Supply 5V-21V
30	NC	No Connection

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	17 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

5.2 eDP Interface

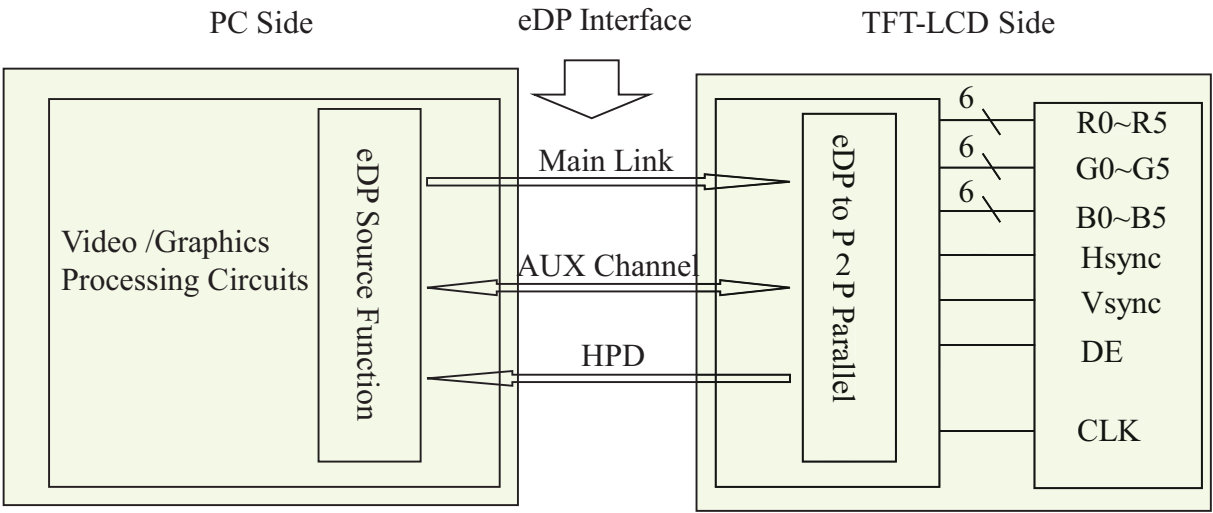


Figure 12. eDP Interface Architecture

Note:
 Transmitter : Parade DP501 or equivalent.
 Transmitter is not contained in module.

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	18 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

5.3 Data Input Format

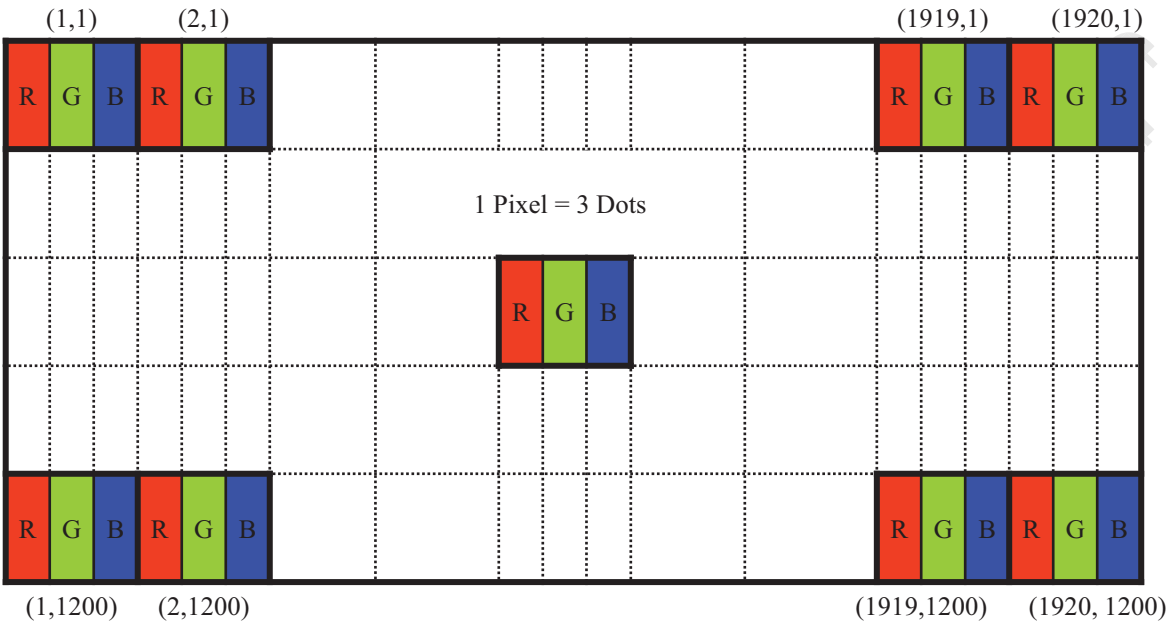


Figure 13. Display Position of Input Data (V-H)

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	19 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

5.4 Back-light & LCM Interface Connection

BLU Interface Connector: STM MSAK24037P10D or Compatible .

<Table 7. Pin Assignments for the BLU Connector>

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	Vout	LED anode connection	6	LED	LED cathode connection
2	Vout	LED anode connection	7	LED	LED cathode connection
3	NC	No Connection	8	LED	LED cathode connection
4	GND	Ground	9	LED	LED cathode connection
5	NC	No Connection	10	LED	LED cathode connection

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	20 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

6.0 SIGNAL TIMING SPECIFICATION

6.1 The NV122WUM-N41 V8.0 Is Operated By The DE Only

< Table 8. Signal Timing Specification >

Item		Symbols	Min	Typ	Max	Unit
Clock	Frequency	1/Tc	159.26	160.24	161.22	MHz
Frame Period		Tv	1245	1248	1251	lines
			-	60	-	Hz
			-	16.67	-	ms
Vertical Display Period		Tvd	-	1200	-	lines
One line Scanning Period		Th	2132	2140	2148	clocks
Horizontal Display Period		Thd	-	1920	-	clocks

Note : The above is as optimized setting.

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	21 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

6.2 eDP Rx Interface Timing Parameter

The specification of the eDP Rx interface timing parameter is shown in Table 9.

<Table 9. eDP Main-Link RX TP4 Package Pin Parameters>

Item	Symbol	Min	Typ	Max	Unit	Remark
Spread spectrum clock (Link clock down-spreading)	SSC	-	-	0.5	%	
Differential peak-to-peak input voltage at package pins	VRX-DIFFp-p	120	-	1200	mV	
Rx input DC common mode voltage	VRX_DC_CM	0	-	2	V	
Differential termination resistance	RRX-DIFF	90	100	110	Ω	
Single-ended termination resistance	RRX-SE	40	-	60	Ω	
Rx short circuit current limit	IRX_SHORT	-	-	20	mA	
Intra-pair skew at Rx package pins (HBR) RX intra-pair skew tolerance at HBR	LRX_SKEW_INTRA_PAIR	-	-	60	ps	
AC Coupling Capacitor	CSOURCE_ML	75		200	nF	Source side

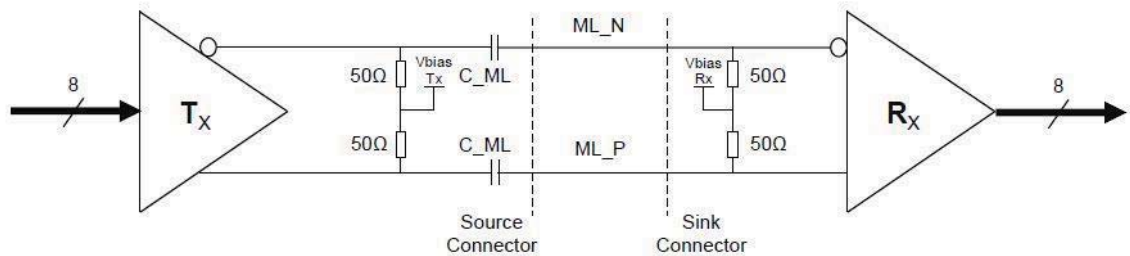


Figure 14. Main link differential pair

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	22 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

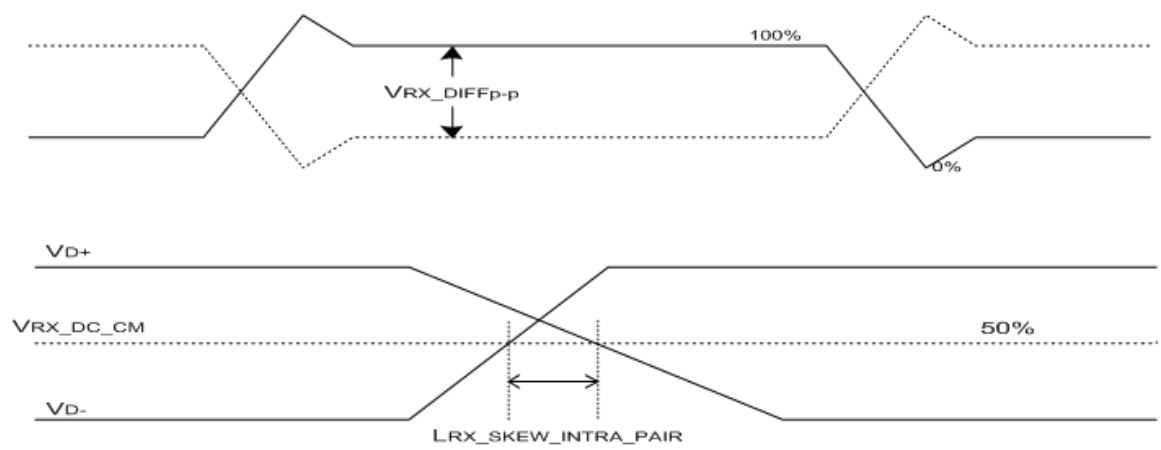


Figure 15. VRX-DIFFp-p & LRX_SKEW_INTRA_PAIR

SPEC. NUMBER	SPEC. TITLE	PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A	23 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

<Table 10. HPD Characteristics>

Item	Symbol	Min	Typ	Max	Unit	Remark
HPD voltage	V _{HPD}	2.25	-	3.6	V	
Hot Plug Detection Threshold	-	2.0	-	-	V	Source side Detecting
Hot Unplug Detection Threshold	-	-	-	0.8V	V	
HPD_IRQ Pulse Width	HPD_IRQ	0.5	-	1	ms	
HPD_TimeOut	-	2.0	-	-	ms	

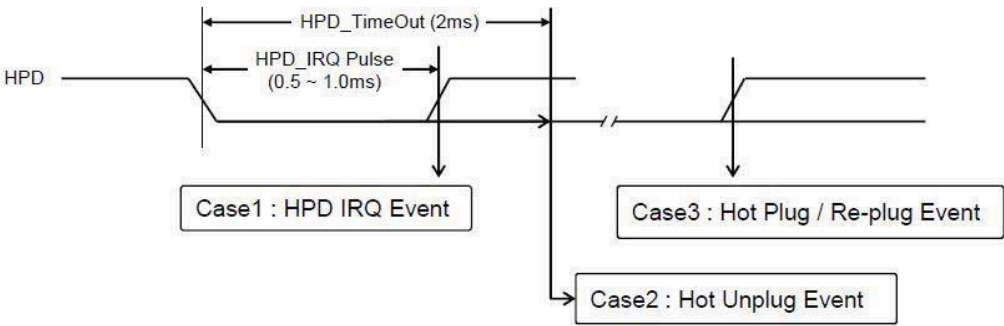


Figure 16. HPD Events

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	24 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

<Table 11. AUX Characteristics>

Item	Symbol	Min	Typ	Max	Unit	Remark
AUX unit interval	UIAUX	0.4	0.5	0.6	Us	
AUX peak-to-peak input differential voltage	VAUX-RX-DIFFp-p	0.29	-	1.38	V	
AUX CH termination DC resistance	RAUX-TERM	80	100	120	Ohm	
AUX DC common mode voltage	VAUX-DC-CM	0	-	2	V	
AUX turn around common mode voltage	VAUX-TURN-CM	-	-	0.3	V	
AUX short circuit current limit	IAUX-SHORT	-	-	90	mA	
AUX AC Coupling Capacitor	CSOURCE-AUX	75	-	200	nf	Source side

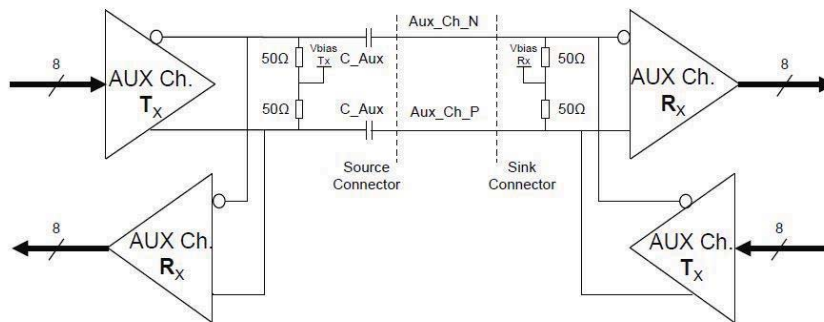


Figure 17. AUX differential pair

SPEC. NUMBER	SPEC. TITLE	PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A	25 OF 65

7.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

<Table 12. Input Signal & Basic Display Colors & Gray Scale of Colors >

	Colors & Gray scale	Data signal																	
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Light Blue	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Purple	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
Gray scale of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△ ▽	↑ ↓						↑ ↓						↑ ↓					
	Brighter	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	▽	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray scale of 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	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	△ ▽	↑ ↓						↑ ↓						↑ ↓					
	Brighter	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray scale of 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	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	△ ▽	↑ ↓						↓ ↓						↑ ↓					
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Gray scale of White & Black	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
	Darker	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
	△ ▽	↑ ↓						↑ ↓						↑ ↓					
	Brighter	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1
	▽	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

8.0 POWER SEQUENCE

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

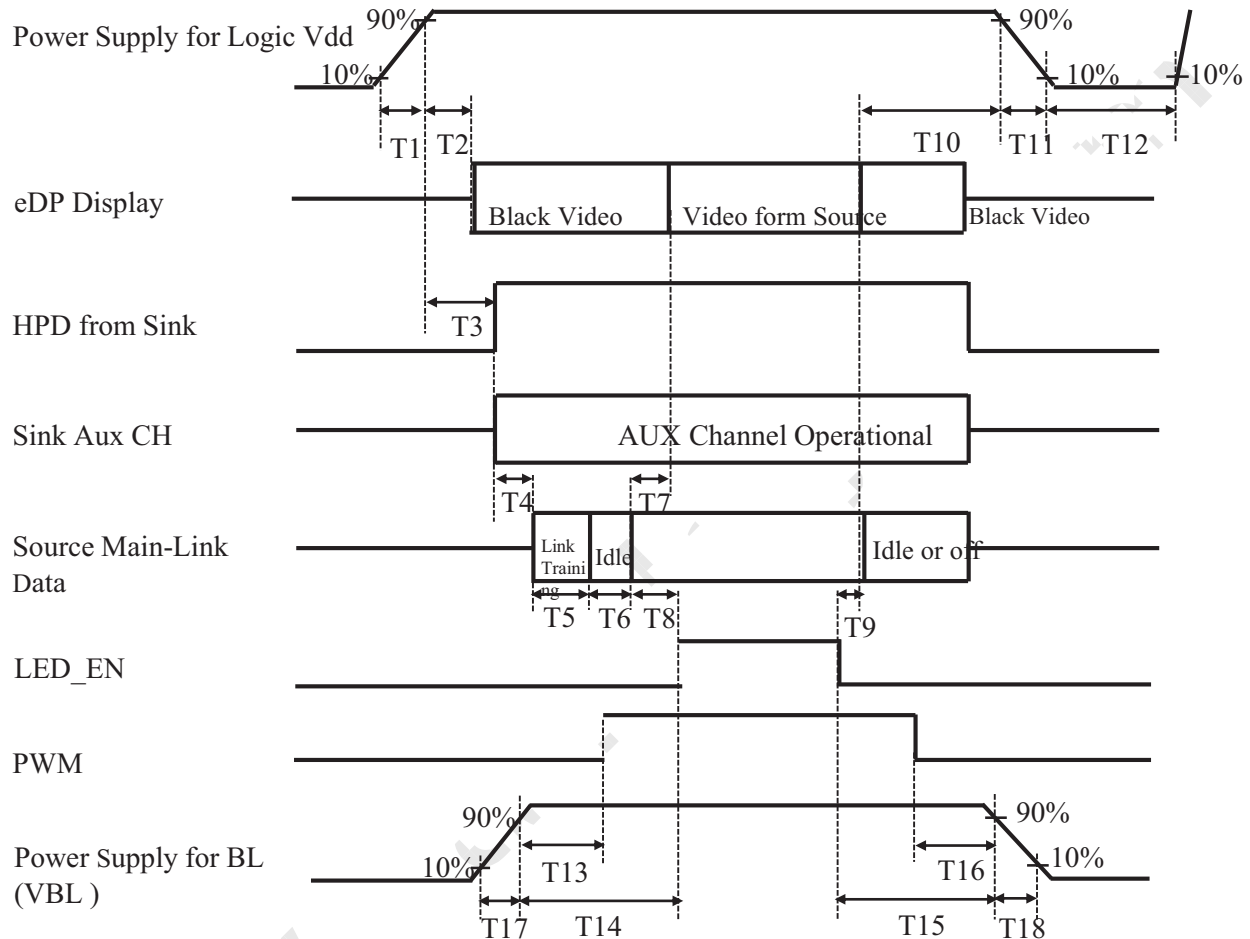


Figure 18. Power Sequence

- $0.5\text{ms} \leq T1 \leq 10\text{ ms}$
- $0\text{ms} < T2 \leq 200\text{ ms}$
- $0\text{ms} < T3 \leq 200\text{ ms}$
- $T4+T5+T6+T8 > 80\text{ms}$
- $0\text{ms} < T7 \leq 50\text{ms}$
- $50\text{ms} < T8$
- $0\text{ms} < T9$
- $0\text{ms} < T10 < 500\text{ ms}$
- $0.5\text{ms} \leq T11 \leq 10\text{ ms}$
- $500\text{ms} \leq T12$
- $0\text{ms} < T13$
- $0\text{ms} < T14$
- $0\text{ms} < T15$
- $0\text{ms} < T16$
- $0.5\text{ms} \leq T17$
- $0.5\text{ms} \leq T18$

Notes:

- When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
- Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	27 OF 65

DAS-RD-2019010-D

A4(210 X 297)

BOE

PRODUCT GROUP

REV

ISSUE DATE

Customer Spec

Rev. A

2023.01.19

Power Supply for Logic Vdd

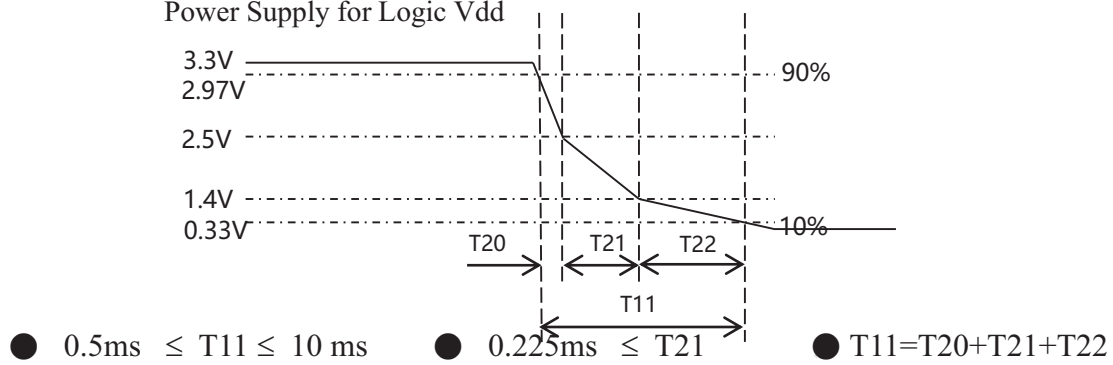


Figure 19. T11 timing requirements

SPEC. NUMBER

SPEC. TITLE

NV122WUM-N41 V8.0 Product Specification Rev. A

PAGE

28 OF 65

DAS-RD-2019010-D

A4(210 X 297)

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

9.0 Connector Description

Physical interface is described as for the connector on LCM.
 These connectors are capable of accommodating the following signals and will be following components.

9.1 TFT LCD Module

< Table 13. Signal Connector >

Connector Name /Description	For Signal Connector
Manufacturer	CT
Type/ Part Number	W05030-30P-H or Compatible
Mating Housing/ Part Number	I-PEX 20454-030T or Compatible

SPEC. NUMBER	SPEC. TITLE	PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A	29 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

10.0 MECHANICAL CHARACTERISTICS

10.1 Dimensional Requirements

Figure 23 shows mechanical outlines for the model NV122WUM-N41 V8.0.
Other parameters are shown in Table 14.

<Table 14. Dimensional Parameters>

Parameter	Specification	Unit
Active Area	262.7712*164.232	mm
Number of pixels	1920 (H) X 1200 (V) (1 pixel = R + G + B dots)	pixels
Pixel pitch	45.62 x 136.86um	um
Pixel arrangement	RGB Vertical stripe	
Display colors	16.2M(6bit+FRC)	
Display mode	Normally black	
Dimensional outline	269.27±0.3 (H)*174.48±0.3(V)(W/O PCB)*2.8 (Max) 269.27±0.3(H)*181.48±0.5(V) (W/PCB)*2.8(Max)	mm
Weight	210 (max)	g

10.2 Mounting

See Figure 24.

10.3 Anti-Glare and Polarizer Hardness.

The surface of the LCD has an Anti-Glare coating to minimize reflection and a 3H hardness coating to reduce scratching

10.4 Light Leakage

There shall not be visible light from the back-lighting system around the edges of the screen as seen from a distance 50cm from the screen with an overhead light level of 350lux.

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	30 OF 65

11.0 RELIABILITY TEST

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

<Table 15. Reliability Test>

No	Test Items	Conditions	Remark
1	High temperature storage test	Ta = 60°C , 60%RH, 240 hrs	
2	Low temperature storage test	Ta = -20°C , 240 hrs	
3	High temperature & high humidity operation test	Ta = 50°C , 80%RH, 240 hrs	
4	High temperature operation test	Ta = 50°C , 60%RH, 240 hrs	
5	Low temperature operation test	Ta = 0°C , 240 hrs	
6	Thermal shock	Ta = -20 °C ↔ 60 °C (0.5 hr), 60%±3%RH, 100 cycle	
7	Vibration test (non-operating)	Ta = 25°C , 60%RH, 1.5G, 10~500Hz, Sine X,Y,Z / Sweep rate : 1 hour	Note 1
8	Shock test (non-operating)	Ta = 25°C , 60%RH, 220G, Half Sine Wave 2msec±X,±Y,±Z Once for each direction	Note 1
9	Electro-static discharge test (operating)	Air : 150 pF, 330Ω, ±15 KV Contact : 150 pF, 330Ω, ±8 KV Ta = 25°C , 60%RH,	Note 2

Notes :

1. The fixture must be hard enough , so that the module would not be twisted or bent.
2. Self- recovery and restart recovery is allowed. No hardware failures.

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

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.

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	32 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

13.0 LABEL

(1) Product Label



Figure 20. Product Label

Module ID Naming Rule:

<Table 16. Module ID Naming Rule>

Digit Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Code	B	9	A	F	1	7	8	8	D	3	1	0	0	0	0	6	8
Description	Product Name		Product Grade	B8	Year		Month	Model Extension Code (Last 4 Digits of FG CODE)				Serial No. 00001-ZZZZZZ					

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	33 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

(2) High voltage caution label

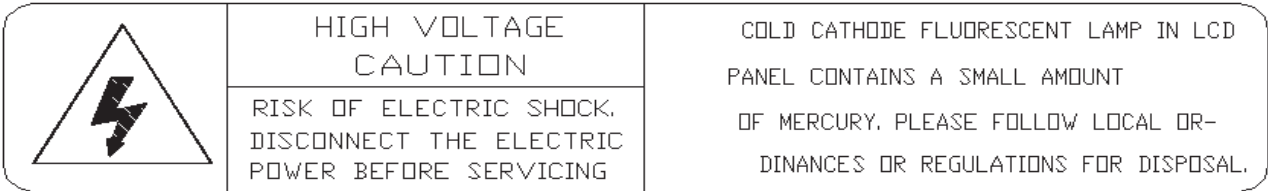


Figure 20. High Voltage Caution Label

(3) Box label



Figure 21. Box Label

Serial number marked part needs to print, show as follows:

1. FG-CODE(Before 12 bit)
2. Product quantity
3. Box ID
4. Date
5. The client section material number(The client)
6. FG-Code After four
7. The supplier code

Total Size:100×60mm

<Table 17. Box Label Naming Rule >

Digit Code	1	2	3	4	5	6	7	8	9	10	11	12	13
Code	B	9	A	F	1	7	8	N	0	0	3	2	7
Description	Product Name		Product Grade	B8	Year		Month	Revision	BOX Serial Number				

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	34 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

14.0 PACKING INFORMATION

14.1 Packing Order

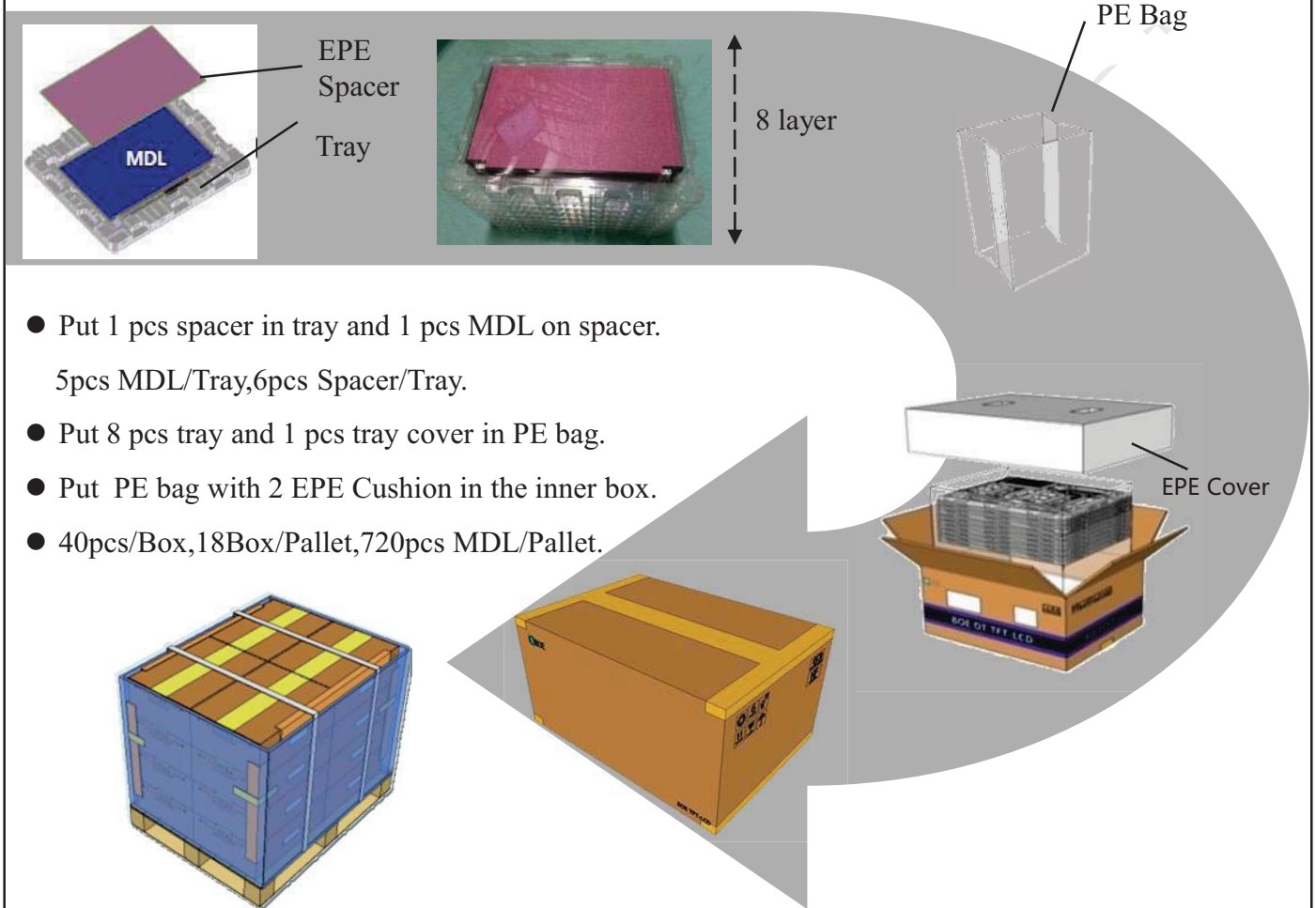


Figure 23. Packing Order

14.2 Note

- Box dimension 482mm*366mm*297mm
- Package quantity in one box: 40pcs
- Total weight: 11.3 kg/Box

SPEC. NUMBER	SPEC. TITLE	PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A	35 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

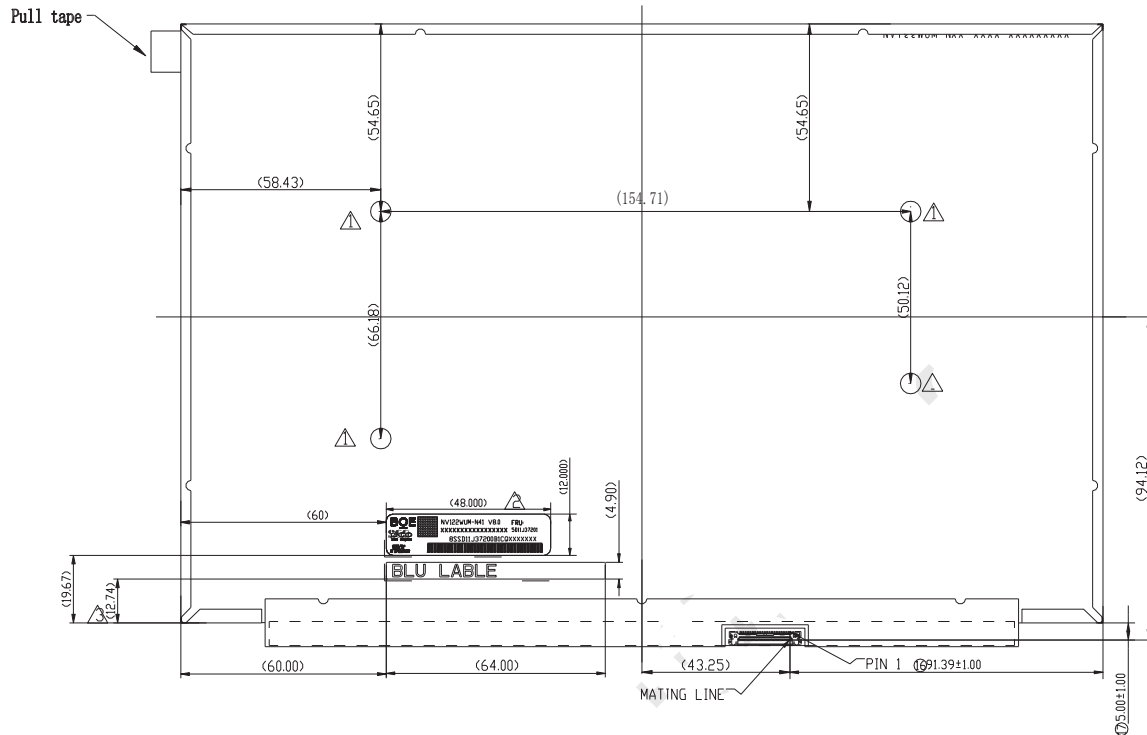


Figure 26. TFT-LCD Module Outline Dimensions (Rear view)

Notes:

1. Warpage and deformation Spec.: 0.5mm Max..
2. The eDP connector is measured at PIN 1 and mating line.
3. Unspecified tolerance refer to ± 0.3 mm.
4. Top polarizer is the highest portion.
5. Critical dimension: 1 ~ 17 CPK: 1 ~ 5
6. Do not have light leakage on four corners of module.
7. Measurement method refer to Appendix A
8. System matching refer to Appendix B
9. “()”marks the reference dimensions.
10. Cell tape and polarizer step tolerance is 0.08 ± 0.026 mm for L/R/U portion.

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	37 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

16.0 EDID Table

Address (HEX)	Function	Hex	Dec	crc	Input values.	Notes
00	Header	00	0		0	EDID Header
01		FF	255		255	
02		FF	255		255	
03		FF	255		255	
04		FF	255		255	
05		FF	255		255	
06		FF	255		255	
07		00	0		0	
08	ID Manufacturer Name	09	9		BOE	ID = BOE
09		E5	229			
0A	ID Product Code	34	52		2868	ID = 2868
0B		0B	11			
0C	32-bit serial No.	00	0		0	
0D		00	0		0	
0E		00	0		0	
0F		00	0		0	
10	Week of manufacture	0D	13		13	
11	Year of Manufacture	20	32		2022	Manufactured in 2022
12	EDID Structure Ver.	01	1		1	EDID Ver 1.0
13	EDID revision #	04	4		4	EDID Rev. 0.4
14	Video input definition	A5	165		-	Refer to right table
15	Max H image size	1A	26		26	26.27712 cm (Approx)
16	Max V image size	10	16		16	16.4232 cm (Approx)
17	Display Gamma	78	120		2.2	Gamma curve = 2.2
18	Feature support	03	3		-	Refer to right table
19	Red/Green low bits	D6	214		-	Red / Green Low Bits
1A	Blue/White low bits	F5	245		-	Blue / White Low Bits
1B	Red x high bits	98	152	611	0.597	Red (x) = 10011000 (0.597)
1C	Red y high bits	5D	93	373	0.364	Red (y) = 01011101 (0.364)
1D	Green x high bits	5A	90	361	0.353	Green (x) = 01011010 (0.353)
1E	Green y high bits	9A	154	618	0.604	Green (y) = 10011010 (0.604)
1F	Blue x high bits	29	41	167	0.163	Blue (x) = 00101001 (0.163)
20	Blue y high bits	1D	29	119	0.116	Blue (y) = 00011101 (0.116)
21	White x high bits	50	80	321	0.313	White (x) = 01010000 (0.313)
22	White y high bits	54	84	337	0.329	White (y) = 01010100 (0.329)
23	Established timing 1	00	0		-	Refer to right table
24	Established timing 2	00	0		-	
25	Established timing 3	00	0		-	

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	38 OF 65

BOE		PRODUCT GROUP				REV	ISSUE DATE
		Customer Spec				Rev. A	2023.01.19

26	Standard timing #1	01	1			Not Used
27		01	1			
28	Standard timing #2	01	1			Not Used
29		01	1			
2A	Standard timing #3	01	1			Not Used
2B		01	1			
2C	Standard timing #4	01	1			Not Used
2D		01	1			
2E	Standard timing #5	01	1			Not Used
2F		01	1			
30	Standard timing #6	01	1			Not Used
31		01	1			
32	Standard timing #7	01	1			Not Used
33		01	1			
34	Standard timing #8	01	1			Not Used
35		01	1			
36	Detailed timing/monitor descriptor #1	99	153		160.24	160.2432MHz Main clock
37		3E	62			
38		80	128		1920	Hor Active = 1920
39		DC	220		220	Hor Blanking = 220
3A		70	112		-	4 bits of Hor. Active + 4 bits of Hor. Blanking
3B		B0	176		1200	Ver Active = 1200
3C		30	48		48	Ver Blanking = 48
3D		40	64		-	4 bits of Ver. Active + 4 bits of Ver. Blanking
3E		30	48		48	Hor Sync Offset = 48
3F		20	32		32	H Sync Pulse Width = 32
40		36	54		3	V sync Offset = 3 line
41		00	0		6	V Sync Pulse width : 6 line
42		07	7		263	Horizontal Image Size = 262.7712 mm (Low 8 bits)
43		A4	164		164	Vertical Image Size = 164.232 mm (Low 8 bits)
44		10	16		-	4 bits of Hor Image Size + 4 bits of Ver Image Size
45		00	0		0	Hor Border (pixels)
46		00	0		0	Vertical Border (Lines)
47		1A	26		-	Refer to right table

SPEC. NUMBER	SPEC. TITLE	PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A	39 OF 65

	PRODUCT GROUP					REV	ISSUE DATE	
	Customer Spec					Rev. A	2023.01.19	
48	Detailed timing/monitor descriptor #2	00	0		-	Indicates descriptor is a display Descriptor		
49		00	0		-			
4A		00	0		-		Reserved	
4B		FD	253		-	Tag Number for Display Range Limits Descriptor		
4C		00	0		-	Vertical/Horizontal Rate Offset are zero		
4D		28	40		40	Minimum Vertical Rate:40 Hz		
4E		3C	60		60	Maximum Vertical Rate:60 Hz		
4F		4B	75		74.88	Minimum Horizontal Rate:74.88 kHz		
50		4B	75		74.88	Maximum Horizontal Rate:74.88 kHz		
51		10	16		160.2432	Maximum Pixel Clock:160.2432 MHz		
52		01	1		-	Range Limits Only		
53		0A	10		-	Display Range Limits & CVT Support Definition		
54		20	32		-			
55		20	32		-			
56		20	32		-			
57		20	32		-			
58		20	32		-			
59		20	32		-			
5A	Detailed timing/monitor descriptor #3	00	0			Indicates descriptor #3 is a display Descriptor		
5B		00	0					
5C		00	0				Reserved	
5D		FE	254			Tag : ASCII String		
5E		00	0			Reserved		
5F		42	66		B	Manufacture name : BOECQ		
60		4F	79		O			
61		45	69		E			
62		20	32					
63		43	67		C			
64		51	81		Q			
65		0A	10					
66		20	32					
67		20	32					
68	20	32						
69	20	32						
6A	20	32						
6B	20	32						
SPEC. NUMBER		SPEC. TITLE					PAGE	
		NV122WUM-N41 V8.0 Product Specification Rev. A					40 OF 65	
							A4(210 X 297)	

BOE		PRODUCT GROUP				REV	ISSUE DATE
		Customer Spec				Rev. A	2023.01.19
6C	Detailed timing/monitor descriptor #4	00	0			Indicates descriptor #4 is a display Descriptor	
6D		00	0				
6E		00	0				
6F		FE	254			Tag : ASCII String	
70		00	0			Reserved	
71		4E	78		N	Model name : NE160WUM-N62	
72		56	86		V		
73		31	49		1		
74		32	50		2		
75		32	50		2		
76		57	87		W		
77		55	85		U		
78		4D	77		M		
79		2D	45		-		
7A		4E	78		N		
7B		34	52		4		
7C		31	49		1		
7D		0A	10				
7E	Extension flag	01	1			0 : 1個EDID ; N-1 : N個EDID	
7F	Checksum	52	82	82	-		
80	EDID Extension Block Tag	02	2		2	Tag 0x02 assigned by VESA to CTA for this extension	
81	Revision Number	03	3		3	indicates revision of CTA-861 used by this device (Ver3)	
82	Pointer to detailed timing descriptors"d"	0D	13		13	Pointer to detailed timing descriptors"d"	
83	Number of detailed descriptors"n"	00	0		0	Number of detailed descriptors"n"	
84	Length of Info Frame	68	104		104	CEA Data Block for AMD VSDB	
85	AMD IEEE OUI Value	1A	26		26	24bit AMD IEEE OUI Value (0x00001A) (least significant byte first) PB1 = 0x1A, PB2 = 0x00, PB3 = 0x00	
86		00	0		0		
87		00	0		0		
88	AMD VSDB version	01	1		1	AMD VSDB version 1	
89	FreeSync Capability	01	1		1		
8A	Min Refresh Rate	28	40		40	Min Refresh Rate in 40 Hz	
8B	Max Refresh Rate	3C	60		60	Max Refresh Rate in 60 Hz	
8C	VCP code	00	0		0	0x00 or MCCS VCP code to query current state of FreeSync	
8D~FE	...	00	0		0		
FF	Checksum(80~FE)	06	6				
SPEC. NUMBER		SPEC. TITLE					PAGE
		NV122WUM-N41 V8.0 Product Specification Rev. A					41 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

17.0 GENERAL PRECAUTIONS

17.1 HANDLING

- (1) When the module is assembled, It should be attached to the system firmly using every mounting holes.
Be careful not to twist or bend the modules.
- (2) Refrain from strong mechanical shock or any force to the module. Otherwise, it may cause improper operation or damage to the module.
- (3) Note that polarizers are very fragile and could be easily damaged. Do not press or scratch the surface harder than 1 HB pencil lead.
- (4) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, Staining and discoloration may occur.
- (5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
- (6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Do not use Ketone type materials(ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage to the polarizer due to chemical reaction.
- (7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth .In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static , it may cause damage to the module.
- (9) Use fingerstalls with soft gloves to keep display clean during the incoming inspection and assembly process.
- (10) Do not disassemble the module.
- (11) Do not pull or fold the LED FPC.
- (12) Do not touch any component which is located on the back side.
- (13) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (14) Pins of connector shall not be touched directly with bare hands.

17.2 STORAGE

- (1) Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35°C and relative humidity of less than 70%.
- (2) Do not store the TFT-LCD module in direct sunlight.
- (3) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	42 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

17.3 OPERATION

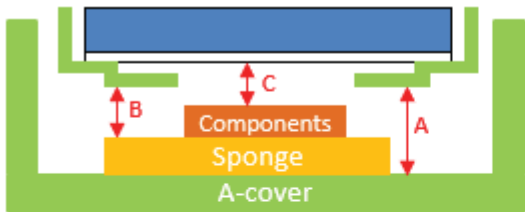
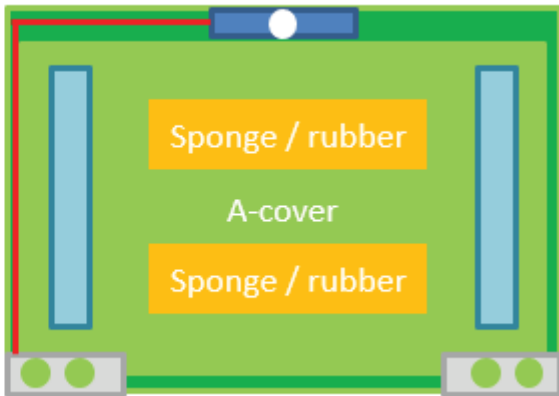
- (1) Do not connect, disconnect the module in the “ Power On” condition.
- (2) Power supply should always be turned on/off by following item 8.0 “ Power on/off sequence “.
- (3) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.
- (4) The standard limited warranty is only applicable when the module is used for general notebook applications. If used for purposes other than as specified, BOE is not to be held reliable for the defective operations. It is strongly recommended to contact BOE to find out fitness for a particular purpose.

17.4 OTHERS

- (1) Avoid condensation of water. It may result in improper operation or disconnection of electrode.
- (2) Do not exceed the absolute maximum rating value. (the supply voltage variation, input voltage variation, Variation in part contents and environmental temperature, so on) Otherwise the module may be damaged.
- (3) If the module displays the same pattern continuously for a long period of time, it can be the situation when The “ image sticks” to the screen.
- (4) This module has its circuitry PCB’s on the rear or bottom side and should be handled carefully to avoid being stressed.

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	43 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19
Appendix A The Measurement Methods for the Dimensions of Module Caliper: a. Length of Outline b. Width of Outline (Without/With PCB) c. Thickness of Outline (Without/ With PCB) Coordinate Measuring Machine: - CF Polarizer Size - Active Area Size - Active Area to Outline (Without Tape Wrinkle or Bulged) - Active Area to CF Polarizer - The Distance of Bracket Holes - P-Cover to Outline (Without Tape Wrinkle or Bulged) - Length of P-Cover - Connector Pin 1 to Outline (Without Tape Wrinkle or Bulged) Height Gauge: The Different Height of Root and Top on the Bracket (Need to Calculate From Bracket Angle Spec.) Feeler Gauge: The Warpage Spec. of Module Notes: Except the Critical Dimensions as Above, Other Dimensions are Measured by Coordinate Measuring Machine If Necessary.			
SPEC. NUMBER	SPEC. TITLE		PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A		44 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE												
	Customer Spec	Rev. A	2023.01.19												
Appendix B: System design Recommendation															
LCM to A-Cover / sponges Z-gap															
 <table><tr><th></th><th>Plastic Cover</th><th>Metal Cover</th></tr><tr><td>A</td><td>≥ 1.0mm</td><td>≥ 0.8mm</td></tr><tr><td>B</td><td colspan="2">≥ 0mm</td></tr><tr><td>C</td><td colspan="2">> 0.5mm</td></tr></table> 					Plastic Cover	Metal Cover	A	≥ 1.0mm	≥ 0.8mm	B	≥ 0mm		C	> 0.5mm	
	Plastic Cover	Metal Cover													
A	≥ 1.0mm	≥ 0.8mm													
B	≥ 0mm														
C	> 0.5mm														
Purpose	The reflector area is very sensitive, BOE would suggest that design enough z-gap to decrease the risk of water ripple, white spots and other abnormal display														
SPEC. NUMBER	SPEC. TITLE		PAGE												
	NV122WUM-N41 V8.0 Product Specification Rev. A		45 OF 65												

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19
Appendix B: System design Recommendation			
LCM to A-Cover / sponges z-gap			
Purpose	If attach sponges or rubbers which correspond to white reflector area, it may cause white spot, pooling or other relative issues. BOE would suggest that attach wide range sponges / rubbers which can cover the LCM back-bezel opening		
SPEC. NUMBER	SPEC. TITLE		PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A		46 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

Appendix B: System design Recommendation

LCM to side wall / protrusions

Diagram illustrating the LCM (blue) and its gap around LCM (green). Dimensions X1, X2, Y1, Y2, Px1, Px2, and Py are indicated. A-cover is shown at the top left.

	Normal border (screws)	Narrow border (fix by tapes)
X1 / X2	Min: 0.45mm	Min: 0.35mm
Y1 / Y2	Min: 0.45mm	Min: 0.35mm
Px1 / Px2	Min: 0.55mm	
Py		

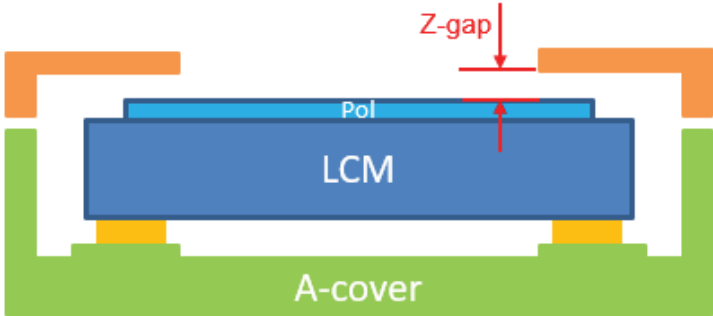
Purpose	BOE would suggest that design enough gap around LCM to prevent shock test failure, or interference, cell crack, abnormal display...etc. in the reliability test
---------	---

SPEC. NUMBER	SPEC. TITLE	PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A	47 OF 65

	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

Appendix B: System design Recommendation

LCM to B-cover z-gap



Bezel Tape	Z-Gap
Without	0.15 ~ 0.25mm
With	0.15 ~ 0.20mm

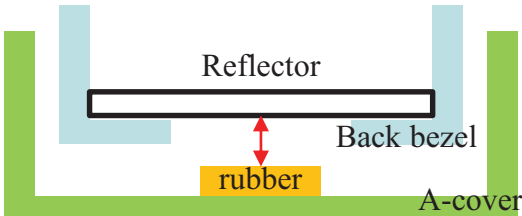
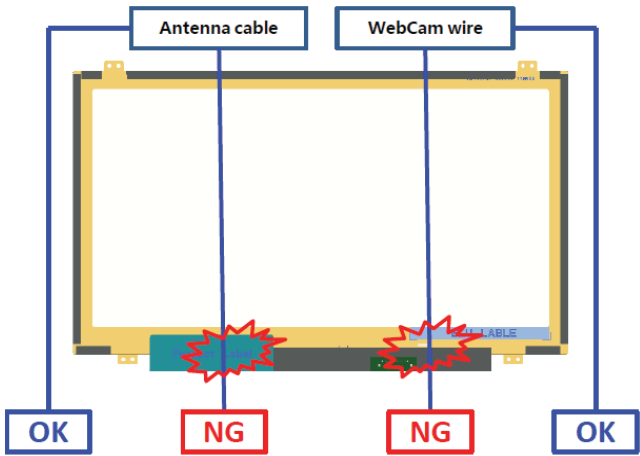
Purpose	Too less z-gap between system B-cover and LCM top pol has high risk that may cause cell crack, pooling, light leakage and other issues
---------	--

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	48 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

Appendix B: System design Recommendation

Antenna Cable & Webcam wire

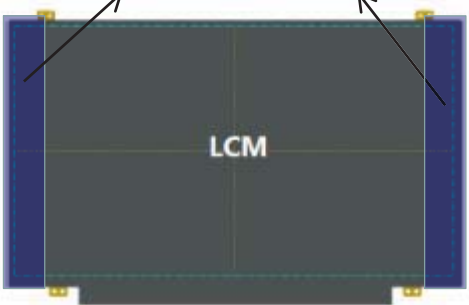


If sponge within the reflector area is necessary, we suggest that the gap between reflector and sponge is more than 0.5mm

Purpose	1. BOE would suggest that do not set Antenna or WebCam cable / wire go behind LCM to avoid backpack test, hinge test ,twist test or pogo test with abnormal display 2. If the cable / wire is necessary to go behind LCM, please make a groove with rounds or chamfers to protect the cable / wire, or attach with higher sponges / rubbers adjacent to the cable / wire route 3. Suggest that attach the cable / wire with tapes to A-cover 4. Do not attach anything with LCM reflector area. If attach cable / wire with LCM reflector area, it may cause pooling, white spot, light leakage and other related issues

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	50 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19
Appendix B: System design Recommendation			
LCM paste area LCM rear view White Reflector Attachable area			
Purpose	If use the stretch remove tapes to fix LCM with A-cover, please set the stretch remove tapes correspond to the LCM back-bezel and do not let the tapes override the back-bezel's level step of opening		
SPEC. NUMBER	SPEC. TITLE		PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A		51 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19
Appendix B: System design Recommendation			
LCM pressable area			
Position of pressure head (Inside AA W/O border)  Position of pressure head (With Border)  NG OK			
Purpose	1. If LCM is fixed on A-cover by using the press jig during assembling. 2. To avoid panel broken the design of pressure head of press jig can not only pin on cell panel. The pressure head needs to pin on the LCM frame, which the LCM frame can share the pressure of the pressing head.		
SPEC. NUMBER	SPEC. TITLE	PAGE	
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A	52 OF 65	

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19
Appendix B: System design Recommendation			
Wire setting			
LCM cable A-cover OK LCM cable A-cover Not Recommend			
Purpose	Wires should be placed between protrusions/side wall and A-cover. If place the wires between LCM and Protrusions/side wall, it may interfere with LCM when assembling, or even cause LCM broken in reliability test.		
SPEC. NUMBER	SPEC. TITLE		PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A		53 OF 65

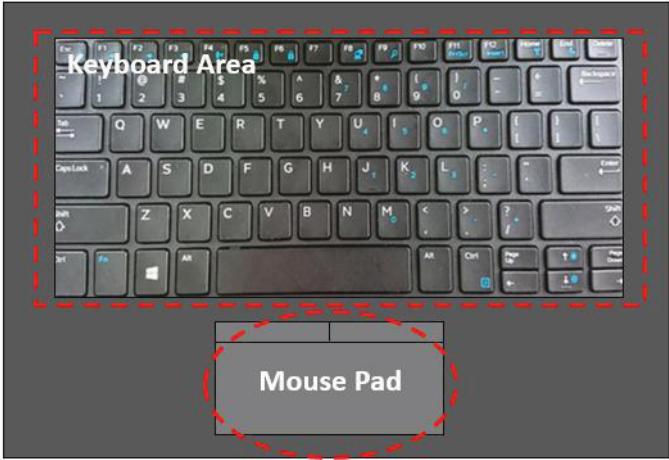
BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19
Appendix B: System design Recommendation			
A-cover strength			
LCM A-cover Rib/ Bracket OK LCM A-cover Not Recommend			
Purpose	1. BOE would recommend that structural Rib/Bracket height is higher than LCM, in order to avoiding pressures to LCM. 2. The L-shape Bracket is recommended.		
SPEC. NUMBER	SPEC. TITLE		PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A		54 OF 65

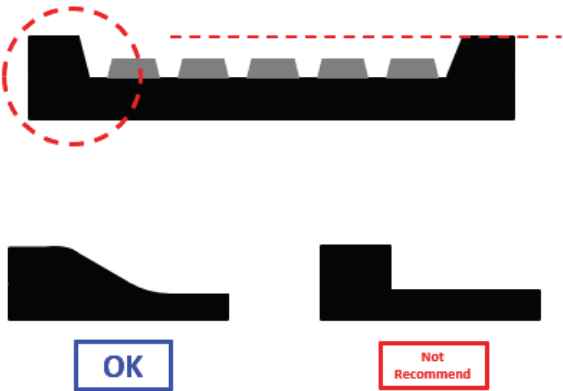
BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19
Appendix B: System design Recommendation			
System A-cover Inner Surface			
LCM Step Burr sponge A-cover Brand logo			
Purpose	There should not exist any burr, segment gap or protrusions beside Logo, which may cause White Spot or Glass Broken by stress concentration.		
SPEC. NUMBER	SPEC. TITLE		PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A		55 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

Appendix B: System design Recommendation

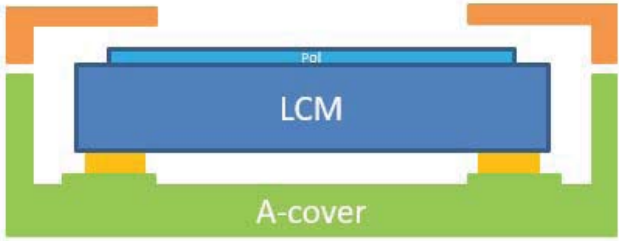
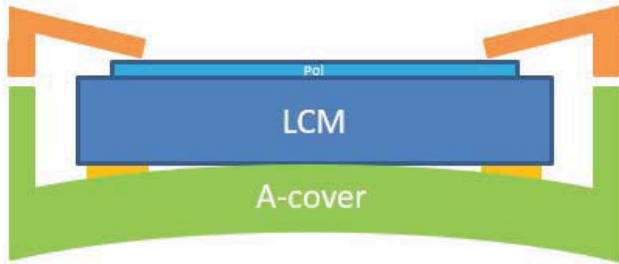
Keyboard area & Mouse pad

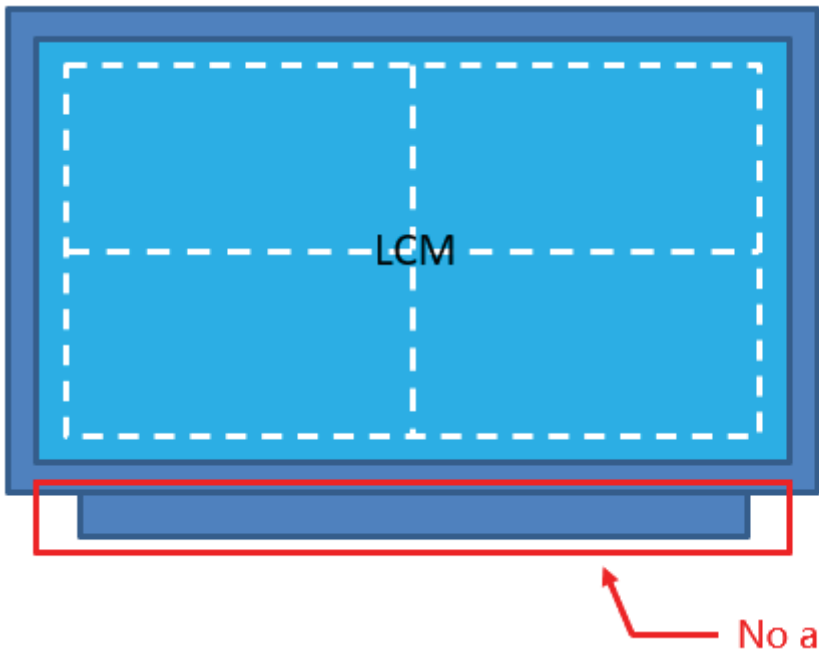




Purpose	The transition surface between keyboard and mouse pad should be smooth and without vertical steps\ too large level steps
---------	--

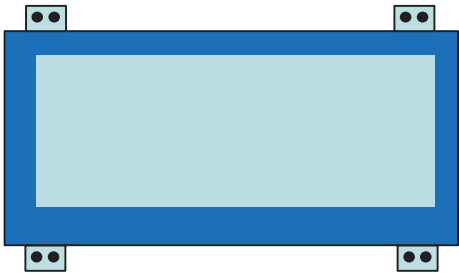
SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	56 OF 65

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19
Appendix B: System design Recommendation			
System cover reliability			
  OK Not Recommend			
Purpose	1. No interference between system and LCM in assembly process except compressible grounding gaskets 2. The permanent deformation which caused by Reliability test is not allowed to contact LCM		
SPEC. NUMBER	SPEC. TITLE		PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A		57 OF 65

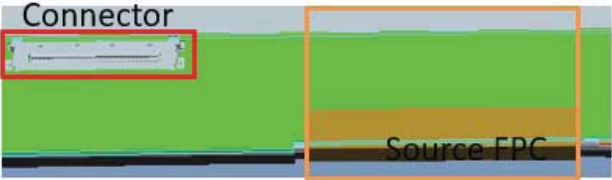
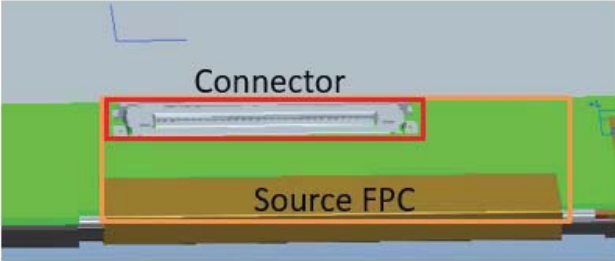
BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19
Appendix B: System design Recommendation			
A/B-cover near LCD PCBA			
 The diagram shows a blue rectangular area representing the LCD PCBA. Inside this area, there is a dashed white rectangle labeled 'LCM'. Below the LCM area, there is a red rectangular box. A red arrow points from the text 'No any magnet' to this red box, indicating that no magnets should be placed near the LCM PCBA.			
Purpose	There should not been any magnet object close to LCM PCBA, it may cause physical or electricity noise issue		
SPEC. NUMBER	SPEC. TITLE		PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A		58 OF 65
DAS-RD-2019010-D		A4(210 X 297)	

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

Appendix B: System design Recommendation

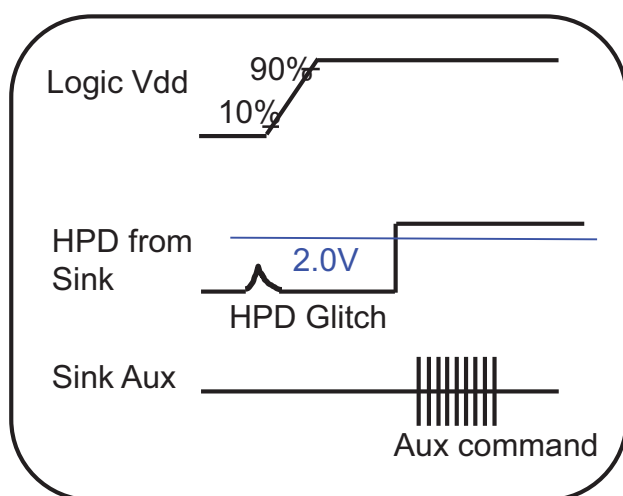
A-cover add sponges on Boss side wall	
  	
Purpose	BOE would suggest to attach Sponges to the side-wall of the Boss column of A-cover to reduce the risk of panel broken in assembling process.

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	59 OF 65

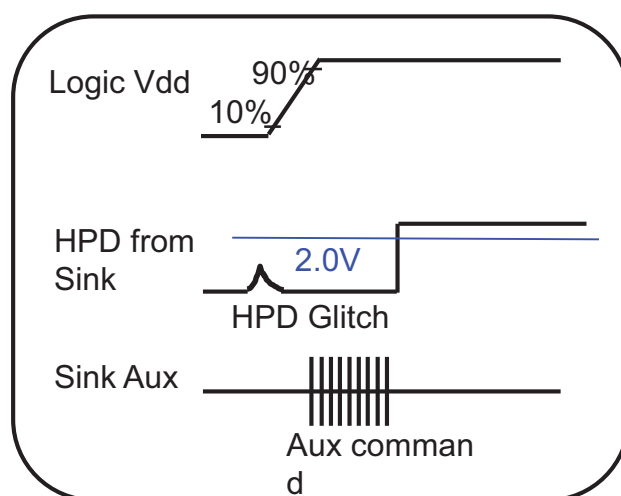
	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19
Appendix B: System design Recommendation			
LCM to A-Cover / sponges z-gap			
  Y ↑ • → X OK Not Recommend			
Purpose	Bent type product: The System Connector should not overlap with LCM FPC in X-direction, it may cause FPC lead broken during system connector plug and un-plug process (Panel FPC Bonding location is related to Mask and can not be changed easily)		
SPEC. NUMBER	SPEC. TITLE		PAGE
DAS-RD-2019010-D	NV122WUM-N41 V8.0 Product Specification Rev. A		60 OF 65

Appendix C : System design Recommendation

HPD Signal recognition



Normal Signal (Ignore HPD Glitch)



Abnormal Signal

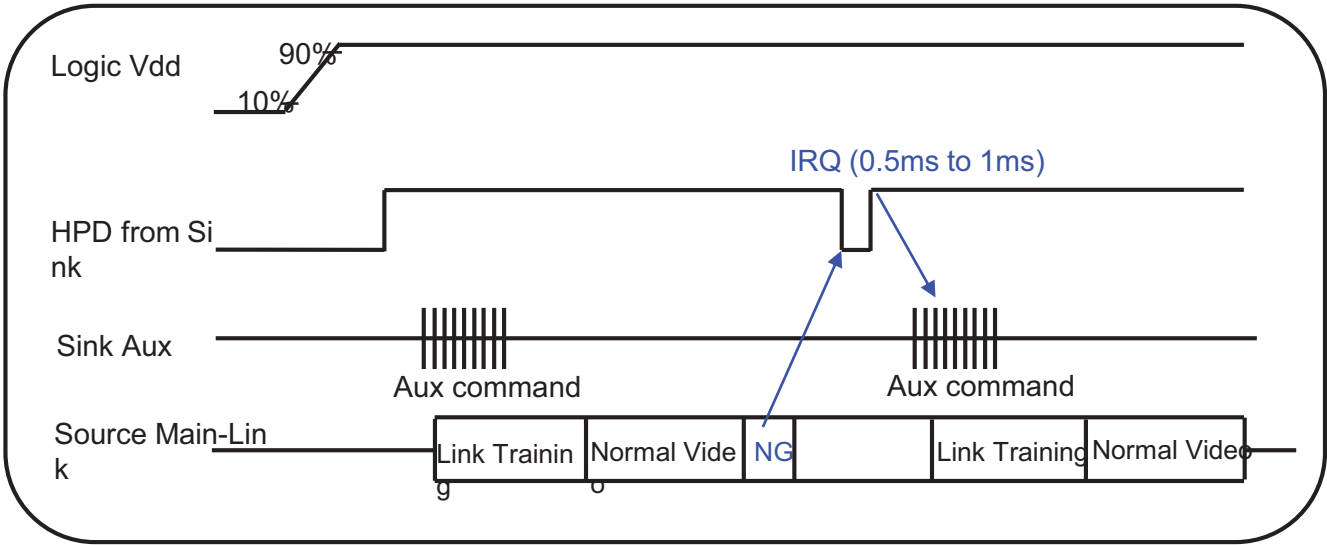
Purpose

When HPD glitch voltage less than 2.0(V), system signal can't output AUX command data.

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

Appendix C : System design Recommendation

HPD Signal Definition IRQ (Interrupt Request)

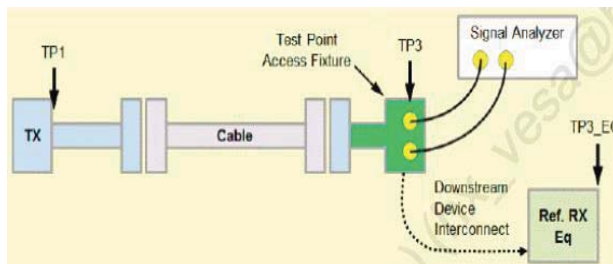


Purpose	When HPD signal low than 0.5ms to 1ms, the source device should check sink status field from the DPCD and take link training again.
---------	---

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	62 OF 65

Appendix C : System design Recommendation

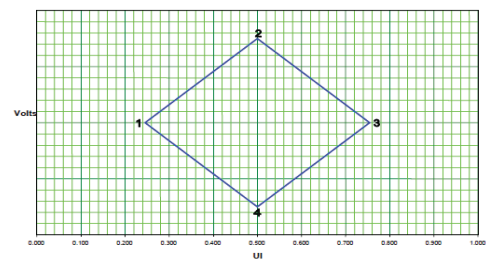
Main link eye diagram of TP3



Measured TP3 on LCM connector.

	UI	Voltage
1	0.246	0
2	0.5	0.075
3	0.755	0
4	0.5	-0.075

Eye for TP3 at HBR



Downstream Device Mask at TP3

	UI	Voltage
1	0.375	0
2	0.5	0.023
3	0.625	0
4	0.5	-0.023

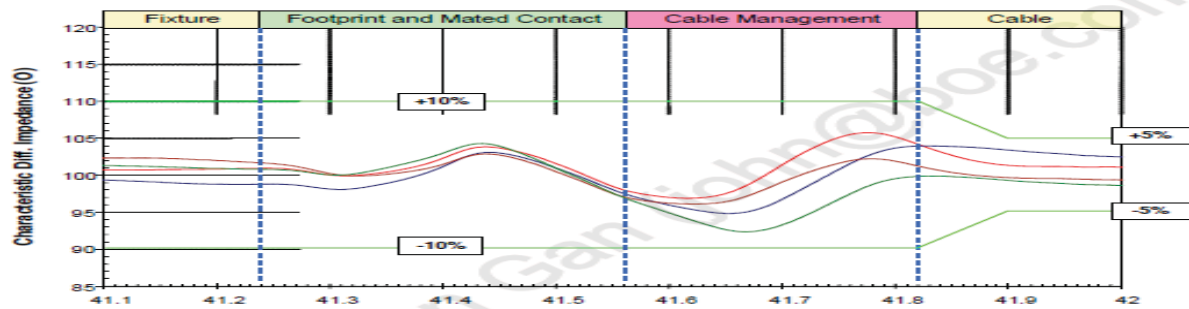
Eye for TP3 at RBR

Purpose

1. Main Link EYE Diagram should meet TP3 point of VESA.
2. The measure method is through access fixture.

Appendix C : System design Recommendation

Impedance Profile through a DP Connector



Differential Impedance Profile Measurement Data Example

Segment	Differential Impedance Value	Maximum Tolerance
Fixture	100Ω/VESA	±10%
Connector	100Ω/VESA	±10%
Wire management	100Ω/VESA	±10%
Cable	100Ω/VESA	±5%

Impedance Profile Values for Cable Assembly

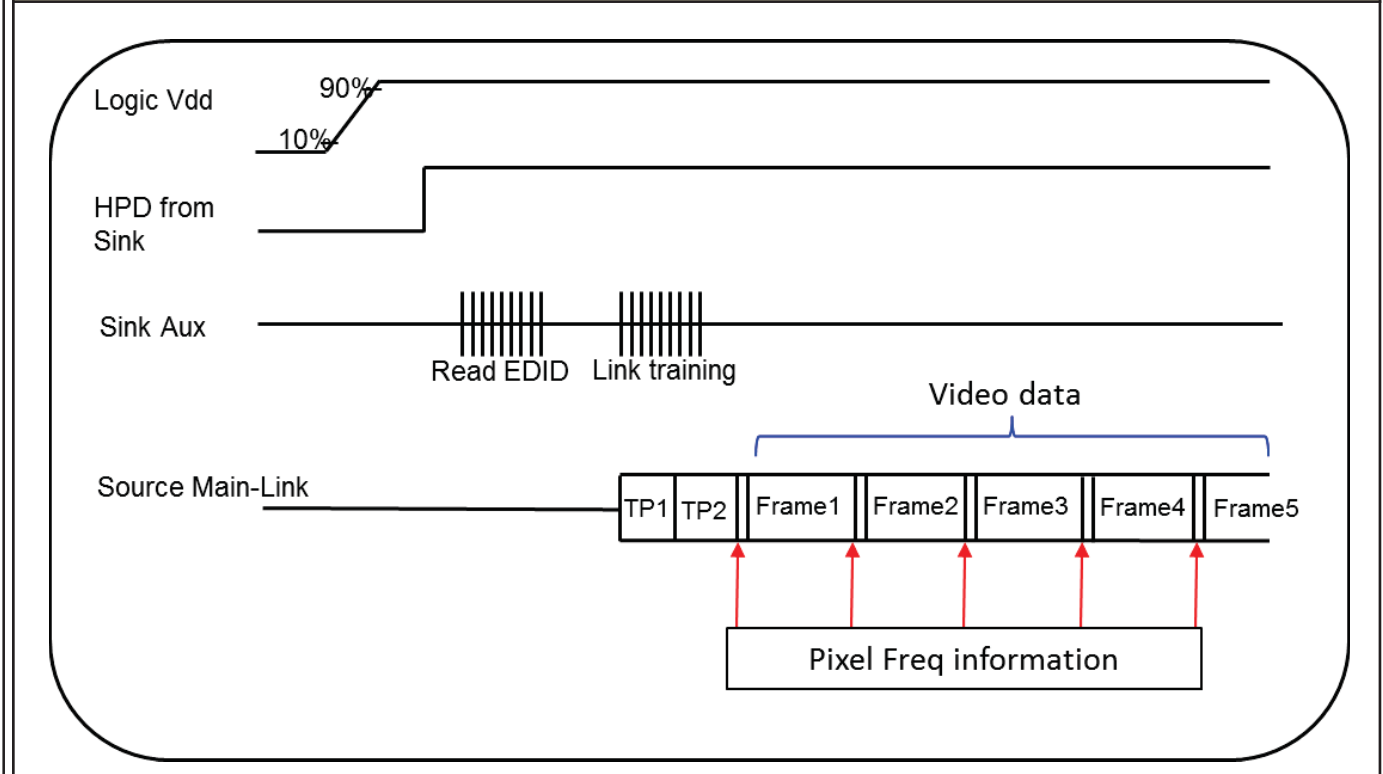
Purpose

Cable Impedance Profile 100ohm for Cable Assembly

BOE	PRODUCT GROUP	REV	ISSUE DATE
	Customer Spec	Rev. A	2023.01.19

Appendix C : System design Recommendation

Main Link Pixel Freq information value of MSA data

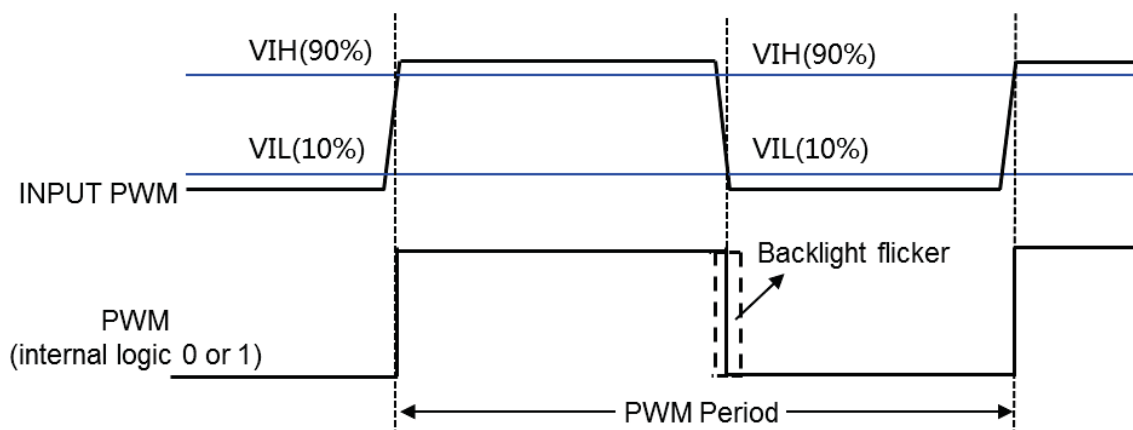


Purpose	1. It need to fix pixel freq information value of MSA data output to prevent the initial abnormal pixel freq information value from incoming after power on. 2. BOE can read DPCD to check this value. Ex: BIOS is 1.62G , but into windows is 2.7G.
---------	--

SPEC. NUMBER	SPEC. TITLE	PAGE
	NV122WUM-N41 V8.0 Product Specification Rev. A	65 OF 65

Appendix C : System design Recommendation

System Input PWM Rising/Falling time



Example:

Freq	Cycle Time	PWM Rising Time	PWM Falling Time
200Hz	5ms	$\leq 1\mu s$	$\leq 1\mu s$
1KHz	1ms	$\leq 200ns$	$\leq 200ns$

Purpose

1. LED driver need to calculate the duty cycle of input PWM signal.
2. To avoid backlight flicker visible on LCD, system input PWM suggest :
PWM rising $\leq 200\text{ppm} \times \text{cycle time}$; PWM falling $\leq 200\text{ppm} \times \text{cycle time}$.