



PRODUCT SPECIFICATION

3.5” 320RGB x 480 TFT

RFQ NUMBER:

MODEL NUMBER: 9962DPLP035H-01

Rev: 06

CUSTOMER P/N:

New Vision Display	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE	Robert Wu	Haigui Jiang	
DATE	2019-6-17	2019-6-17	

CUSTOMER APPROVAL	SIGNATURE	DATE

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Revision History

Revision	Date	Originator	Detail	Remarks
01	2014-11-28	WenFang Cai	Preliminary Issue	
02	2015-5-7	WenFang Cai	1. Modify the symbol of Pin33 from IM3 to NC in Pins Definition Section 2. Update the assembly drawing	Page11 Page30
03	2015-7-14	WenFang Cai	1.Update Pins Definition Section 2.Add the initialization code	Page11 Page15
04	2016-12-23	WenFang Cai	Update the assembly drawing	Page30
05	2019-6-6	Robert Wu	1.Update Module Outline 2. Update the assembly drawing	Page4 Page30
06	2019-6-17	Robert Wu	1. Modify the Active Area	Page4

Note: All parameters and dimensions in this specification are subject to change and will be confirmed once the program is awarded and kicked-off at New Vision Display.

Table of Contents

No.	Item	Page
1.	General Description	4
2.	Module Parameter	4
3.	Absolute Maximum Ratings	5
4.	Electrical Characteristics	5
4.1.	DC characteristics	5
4.2.	Backlight Characteristics	6
5.	Optical Characteristics	6
5.1.	Optical Characteristics	6
5.2.	Definition of Response Time	7
5.3.	Definition of Contrast Ratio	8
5.4.	Definition of Viewing Angles	8
5.5.	Definition of Color Appearance.....	8
5.6.	Definition of Surface Luminance, Uniformity and Transmittance.....	9
5.7.	Definition of Reflectivity	9
6.	Block Diagram and Power Supply.....	10
7.	Interface Pins Definition	11
8.	AC Characteristics	13
8.1.	MCU Parallel Interface Timing.....	13
8.2.	3-SPI Serial Data Transfer Interface Characteristics:.....	13
8.3.	RGB Interface Characteristics:.....	14
9.	Recommended Setting and Initialization Flow	15
10.	Quality Assurance	18
10.1.	Purpose:.....	18
10.2.	Standard for Quality Test:	18
10.3.	Nonconforming Analysis & Disposition	18
10.4.	Agreement Items	19
10.5.	Standard of the Product Visual Inspection:.....	19
10.6.	Inspection Specification:.....	20
10.7.	Classification of Defects:	26
10.8.	Identification/marketing criteria:.....	26
10.9.	Packing:	26
11.	Reliability Specification	27
12.	Precautions and Warranty.....	28
12.1.	Safety	28
12.2.	Handling.....	28
12.3.	Storage.....	28
12.4.	Metal Pin (Apply to Products with Metal Pins)	28
12.5.	Operation	29
12.6.	Static Electricity	29
12.7.	Limited Warranty	29
13.	Packaging	29
14.	Outline Drawing	30

1. General Description

This display module consists of a transmissive 3.5 inch 320RGB x 480, TFT a-Si Active Matrix Color LCD that is electronically and mechanically integrated. The TFT display is capable of displaying 262K colors. Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes.

The display drivers incorporated is the ST7796S, single chip IC with integrated source and gate outputs, timing controller, and power supply, maximum speed rate is 10MHz. All LCD voltages and subsequent voltage regulation functions are provided by the integrated DC/DC converter-based power supply. All supporting components necessary for the correct operation of the driver are included on the module FPC.

2. Module Parameter

Features	Details	Unit
Display Size(Diagonal)	3.5"	Inch
LCD type	α -Si TFT	-
Display Mode	TN/Normally White/ Transmissive	-
Resolution	320RGB(H) x 480(V)	-
View Direction	6 O'clock (best image)	-
Grayscale Reversion	12 O'clock	-
Module Outline	54.66(H) x 82.94(V) x2.30(D)	mm
Active Area	48.96 (H) x 73.44 (V)	mm
Pixel Size	0.153(H) x 0.153 (V)	mm
Pixel Arrangement	RGB Vertical stripe	-
Interface	SPI / RGB / MCU parallel interface	-
Front Polarizer Surface Treatment	Anti-Glare	-
Display Colors	262K	-
Driver IC	ST7796S or EQU	-
Power Consumption	TBD	W
Weight	TBD	g

Note 1: Excluding hooks, posts, FPC/FPC tail etc.

3. Absolute Maximum Ratings

VSS=0V, Ta=25±2°C

Item		Symbol	Min.	Max.	Unit
Supply Voltage	Analog	VDD	-0.3	+4.6	V
	IO	VDDI	-0.3	+4.6	V
Power Supply Voltage		<i>VGH-VSS</i>	-0.3	14.97	V
Power Supply Voltage		<i>VSS-VGL</i>	-0.3	12.5	V
Input Voltage		<i>Vi</i>	-0.3	VDDI+0.3	V
Storage temperature		<i>T_{stg}</i>	-30	+80	°C
Operating temperature		<i>T_{op}</i>	-20	+70	°C
Storage humidity		<i>H_{stg}</i>	10	Note 1	%RH
Operating humidity		<i>H_{op}</i>	10	Note 1	%RH

Note: 1. Note 1: 90% max, if Ta is below 50 deg C; 60% max, if Ta is over 60 deg C.

2. If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

4. Electrical Characteristics

4.1. DC characteristics

Item		Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	Operating voltage	VDD	2.8	3.0	3.3	V
	I/O supply voltage	VDDI	1.65	3.0	3.3	V
Logic Low input voltage		V _{IL}	VSS	-	0.3* VDDI	V
Logic High input voltage		V _{IH}	0.7* VDDI	-	VDDI	V
Logic Low output voltage		V _{OL}	VSS	-	0.2* VDDI	V
Logic High output voltage		V _{OH}	0.8* VDDI	-	VDDI	V
Current Consumption All White	Logic	I _{CC+} I _{IN}	-	TBD	-	mA
	Analog					
Current Consumption All Black	Logic	I _{CC+} I _{IN}	-	TBD	-	mA
	Analog					
Current Consumption RGB	Logic	I _{CC+} I _{IN}	-	TBD	-	mA
	Analog					
Current Consumption Sleep mode	Logic	I _{CC+} I _{IN}	-	TBD	-	uA
	Analog					
Frame Frequency		f _{FR}	-	75	-	Hz

4.2. Backlight Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	V_f	Ta=25 °C, I _F =30mA	-	12.8	-	V
Forward Current	I_f	Ta=25 °C, V _F =12.8V	-	30	-	mA
Reverse Voltage	V _R	-	-	-	20	V
Reverse current	I_R		-	-	10*2	μA
Drive method	Constant current					
LED Configuration	4 *2 White LEDs					

Note: Test condition: I_F=30mA, Ta=25°C.

5. Optical Characteristics

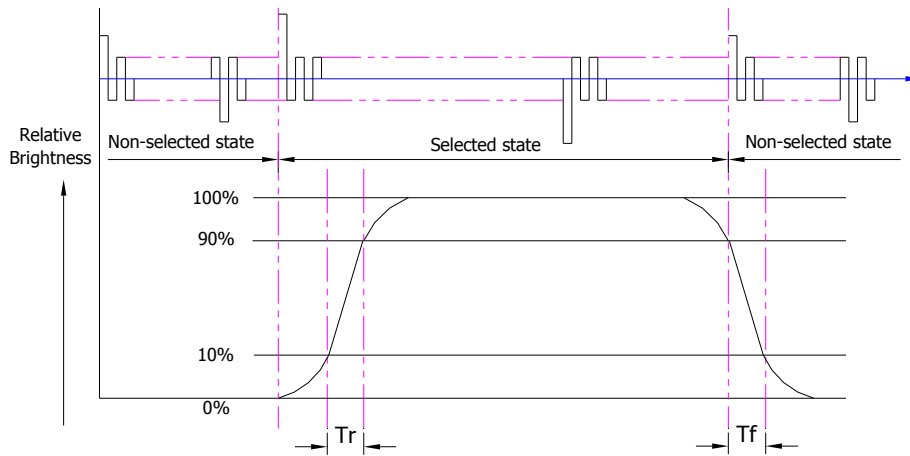
5.1. Optical Characteristics

Ta=25°C, VDDI=3.0V, ILED=30mA

Backlight On (Transmissive Mode)	Item		Symbol	Condition	Specification			Unit
					Min.	Typ.	Max.	
	Transmittance(See 5.6)		T%	Normally viewing angle $\theta_x = \theta_y = 0^\circ$	5.0	5.3	-	%
	Luminance on TFT($I_f = 30\text{mA}$)		Lv		250	300	-	cd/m ²
	Contrast ratio(See 5.3)		CR		400	500	-	
	Response time (See 5.2)		TR+TF			16	32	ms
	Chromaticity Transmissive (See 5.5)	Red	XR		0.56	0.60	0.64	
			YR		0.31	0.35	0.39	
		Green	XG		0.27	0.31	0.35	
			YG		0.55	0.59	0.63	
		Blue	XB		0.11	0.15	0.19	
			YB		0.04	0.08	0.12	
		White	XW		0.23	0.27	0.31	
			YW		0.25	0.29	0.33	
	Viewing Angle (See 5.4)	Horizontal	θ_{X+}	Center CR $\geq$ 10	60	65	-	Deg.
			θ_{X-}		60	65	-	
		Vertical	θ_{Y+}		60	65	-	
			θ_{Y-}		55	60	-	
	Uniformity				70	80		%
	NTSC Ratio(Gamut)				50	55	-	%

5.2. Definition of Response Time

5.2.1. Normally Black Type (Negative)

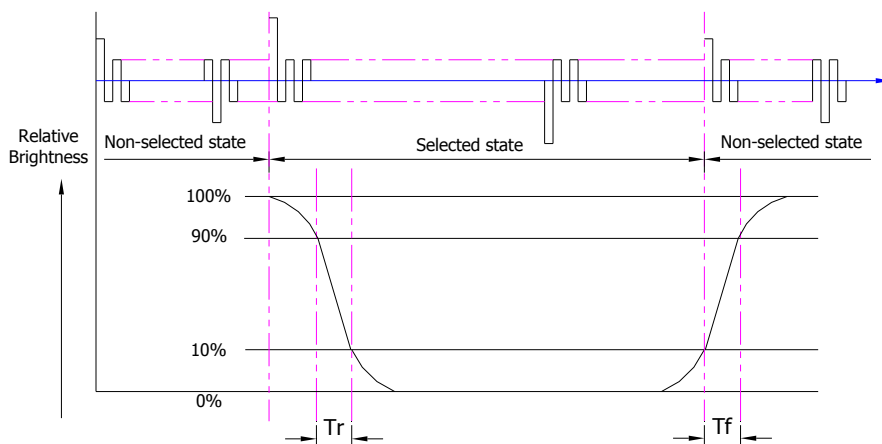


T_r is the time it takes to change from non-selected state with relative luminance 10% to selected state with relative luminance 90%;

T_f is the time it takes to change from selected state with relative luminance 90% to non-selected state with relative luminance 10%.

Note: Measuring machine: BM-7

5.2.2. Normally White Type (Positive)



T_r is the time it takes to change from non-selected stage with relative luminance 90% to selected state with relative luminance 10%;

T_f is the time it takes to change from selected state with relative luminance 10% to non-selected state with relative luminance 90%;

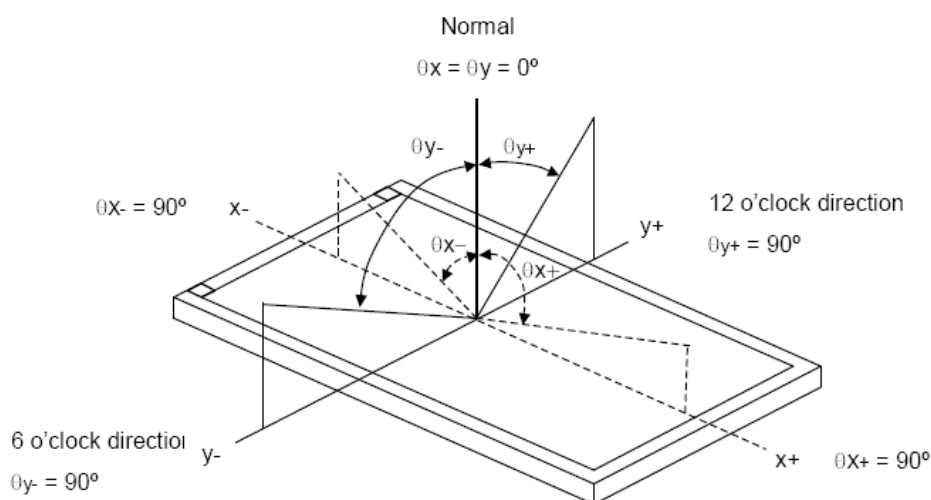
5.3. Definition of Contrast Ratio

Contrast is measured perpendicular to display surface in reflective and transmissive mode.
The measurement condition is:

Measuring Equipment	BM-7 or Equivalent
Measuring Point Diameter	3mm//1mm
Measuring Point Location	Active Area centre point
Test pattern	A: All Pixels white
	B: All Pixel black
Contrast setting	Maximum

Definitions: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

5.4. Definition of Viewing Angles



Measuring machine: LCD-5100 or EQUI

5.5. Definition of Color Appearance

R, G, B and W are defined by (x, y) on the IE chromaticity diagram

NTSC=area of RGB triangle/area of NTSC triangleX100%

Measuring picture: Red, Green, Blue and White (Measuring machine: BM-7)

TBD

5.6. Definition of Surface Luminance, Uniformity and Transmittance

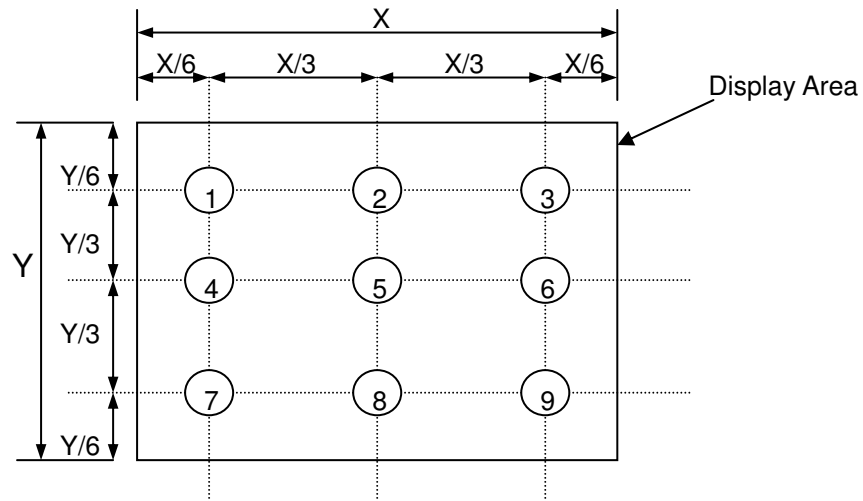
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

5.6.1 Surface Luminance: $L_V = \text{average } (L_{P1}:L_{P9})$

5.6.2 Uniformity = $\text{Minimal } (L_{P1}:L_{P9}) / \text{Maximal } (L_{P1}:L_{P9}) * 100\%$

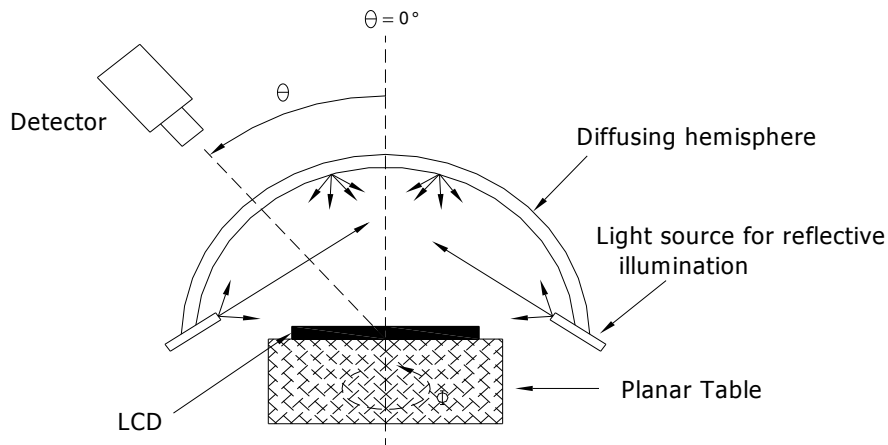
5.6.3 Transmittance = $L_V \text{ on LCD} / L_V \text{ on Backlight} * 100\%$

Note: Measuring machine: BM-7

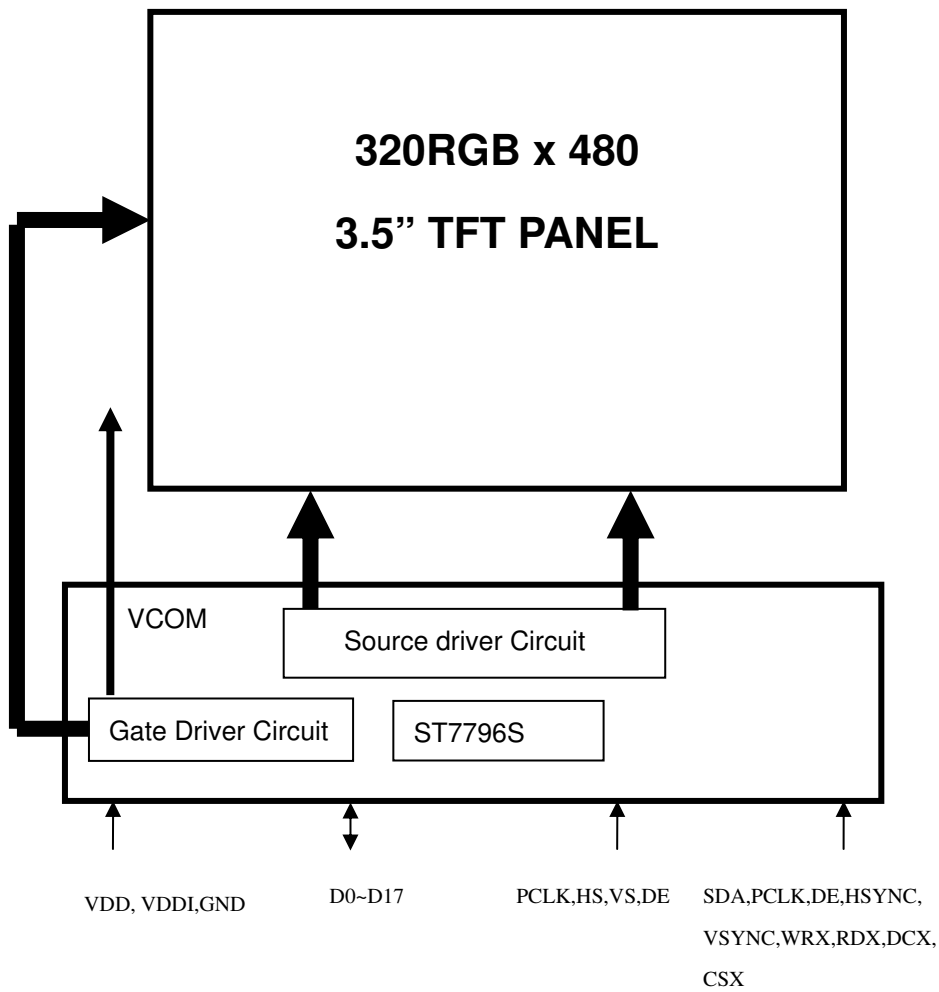


5.7. Definition of Reflectivity

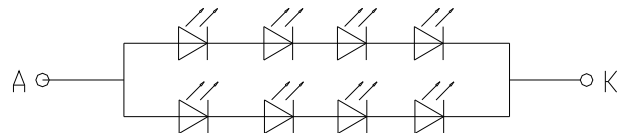
To measure the reflectivity, the detector should be aligned to the normal direction of the LCD surface corresponding azimuthally angle $\theta=0^\circ$



6. Block Diagram and Power Supply



BACKLIGHT SCHEMATIC



CONSTANT CURRENT

7. Interface Pins Definition

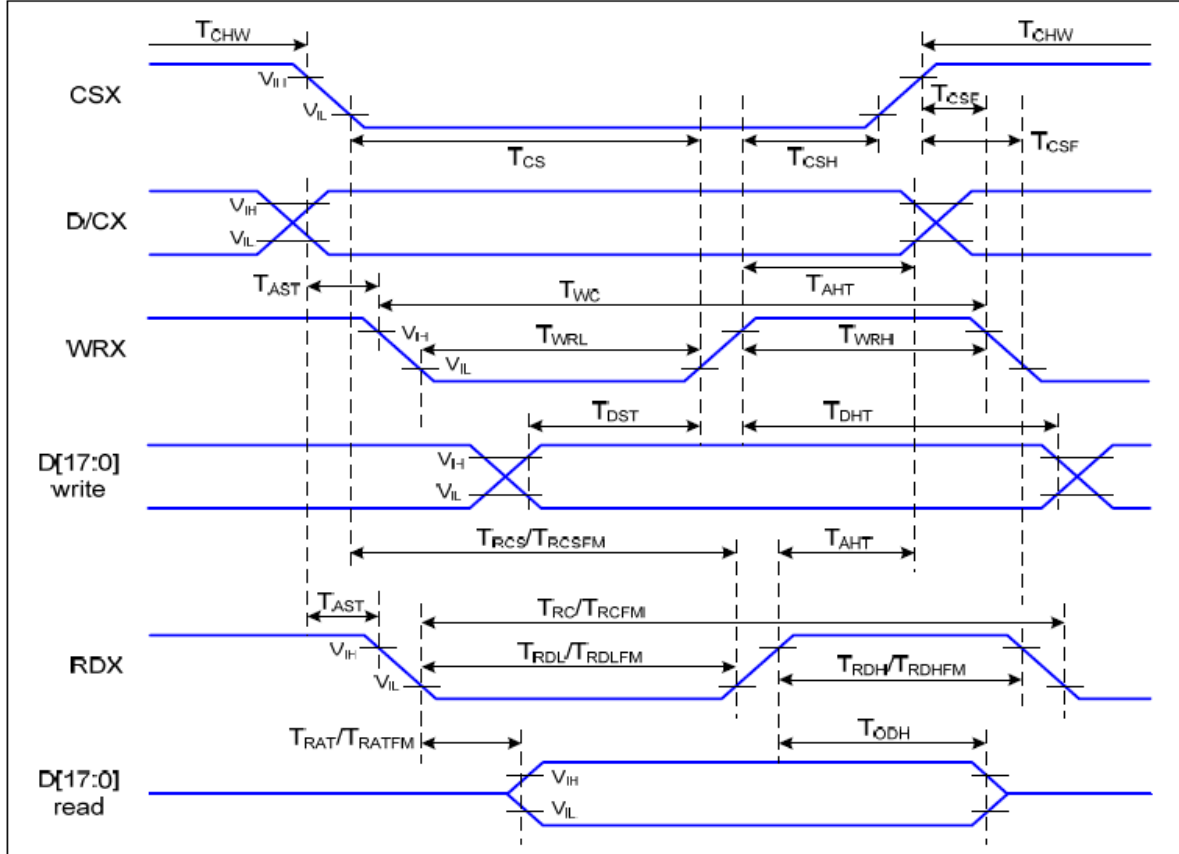
No.	Symbol	I/O	Function
1	TE	O	- Tearing effect output. - If not used, leave this pin open
2~19	DB17~DB0	I/O	- In MCU 8080 parallel interface, DB[17:0] are used as data bus. 8-bit I/F: DB[7:0] is used. 9-bit I/F: DB[8:0] is used. 16-bit I/F: DB[15:0] is used. 18-bit I/F: DB[17:0] is used. - In RGB interface, DB[17:0] are used as data bus. 16-bit RGB I/F: DB[15:0] are used. 18-bit RGB I/F: DB[17:0] are used. - If not used, please fix this pin at VDDI or GND level.
20	SDA	I	- SPI interface input/output pin. - The data is latched on the rising edge of the SCL signal. - If not used, please fix this pin at VDDI or GND level.
21	PCLK	I	-Dot clock signal for RGB interface operation. -If not used, please fix this pin at VDDI or GND.
22	DE	I	-Data enable signal for RGB interface operation. -If not used, please fix this pin at VDDI or GND.
23	HSYNC	I	-Horizontal synchronizing input signal for RGB interface operation. - If not used, please fix to VDDI or GND.
24	VSXNC	I	-Vertical synchronizing input signal for RGB interface operation. -If not used, please fix to the VDDI or GND.
25	RDX	I	- Read enable in 8080 MCU parallel interface. Low-active. - If not used, please fix this pin at VDDI or GND level.
26	WRX/SCL	I	- Write enable in MCU parallel interface. - In SPI mode, this pin is used as SCL. - If not used, please fix this pin at VDDI or GND level.
27	DCX	I	-Display data/command selection (RS) pin in MCU interface. - DCX='1': display data or parameter. - DCX='0': register index / command. - If not used, please fix this pin at VDDI or GND level.
28	CSX	I	- Chip selection pin. Low-active. - If not used, please fix this pin at VDDI or GND level.

29	RESTX	I	- This signal will reset the device and it must be applied to properly initialize the chip. - Signal is active low.				
30	IM0	I	The MCU interface mode select. -The MCU interface mode select.				
31	IM1	I	IM2	IM1	IM0	MPU Interface Mode	Data pin
			0	0	0	8080 18-bit Interface	DB[17:0]
			0	0	1	8080 9-bit Interface	DB[8:0]
			0	1	0	8080 16-bit Interface	DB[15:0]
			0	1	1	8080 8-bit Interface	DB[7:0],
			1	0	0	Reserve	--
			1	0	1	3SPI	SDA, SDO
			1	1	0	MIPI	MIPI_DATA MIPI_CLOCK
32	IM2	I	1	1	1	4Line SPI	SDA, SDO
33	NC						
34	VDD	I	Power Supply for Analog,				
35	VDDI	I	Power Supply for I/O System.				
36	GND	P	Ground				
37	GND	P	Ground				
38	NC		NC				
39	K	I	Cathode of Backlight LED				
40	A	I	Anode of Backlight LED				

8. AC Characteristics

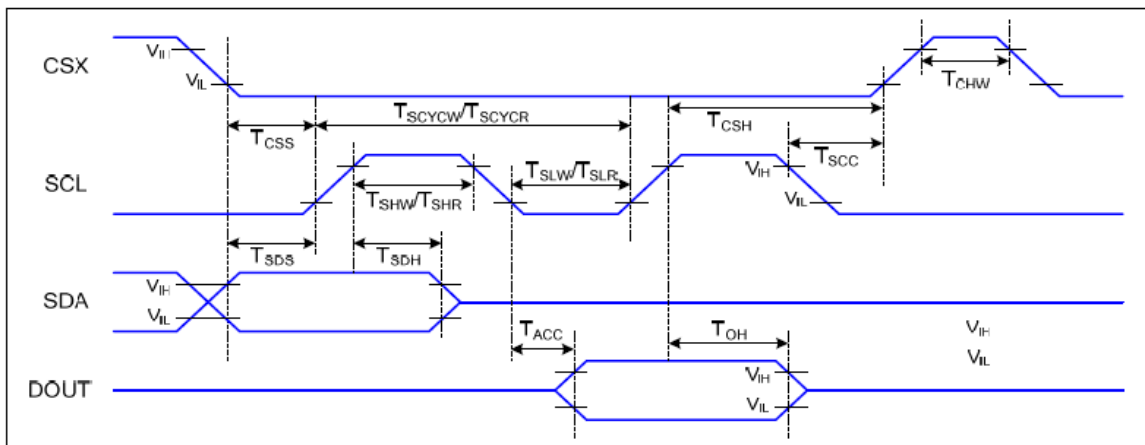
8.1. MCU Parallel Interface Timing

8080 Series MCU Parallel Interface Characteristics: 18/16/9/8-bit Bus



Parallel Interface Timing Characteristics (8080-Series MCU Interface)

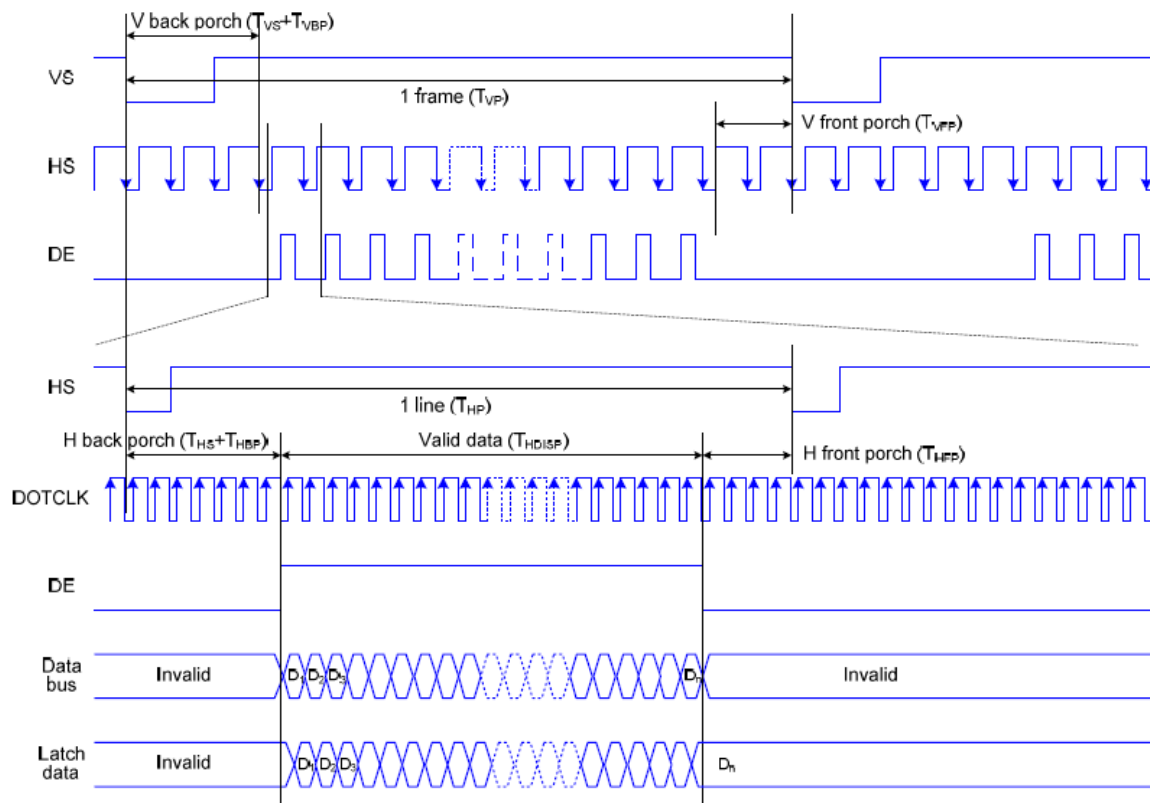
8.2. 3-SPI Serial Data Transfer Interface Characteristics:



3-SPI Interface Timing Characteristics

8.3. RGB Interface Characteristics:

The timing chart of RGB interface DE mode is shown as follows.



Note: The setting of front porch and back porch in host must match that in IC as this mode.

Timing Chart of Signals in RGB Interface DE Mode

Parameter	Symbol	Min.	Typ.	Max.	Unit
Horizontal Sync. Width	hpw	2	-	hpw + hbp = 75	Clock
Horizontal Sync. Back Porch	hbp	4	-		Clock
Horizontal Sync. Front Porch	hfp	2	38	-	Clock
Vertical Sync. Width	vs	2	4	-	Line
Vertical Sync. Back Porch	vbp	2	4		Line
Vertical Sync. Front Porch	vfp	2	8	-	Line

9. Recommended Setting and Initialization Flow

```
void LCD_ST7796S_Init(void)
{
    RESET = 1;
    Delay(1);      // Delay 1ms
    RESET = 0;
    Delay(10);     // Delay 10ms
    RESET = 1;

    Delay(120);    // Delay 120ms
    RGB_SerialSendIndex(0x01); //Software Reset
    Delay(120);    // Delay 120ms

    RGB_SerialSendIndex(0x11); // Sleep Out
    Delay(120);    // Delay 120ms

    RGB_SerialSendIndex(0xf0); //Command Set Control
    RGB_SerialSend_data(0xc3); //D[7:0] = C3h enable command 2 part I

    RGB_SerialSendIndex(0xf0); //Command Set Control
    RGB_SerialSend_data(0x96); //D[7:0] = 96h enable command 2 part II

    RGB_SerialSendIndex(0x36); //Memory Data Access Control
    RGB_SerialSend_data(0x48); //MY MX MV ML RGB MH

    RGB_SerialSendIndex(0x3a); //Interface Pixel Format
    RGB_SerialSend_data(0x66); //i@110i = 18bit/pixel

    RGB_SerialSendIndex(0xB0); //Interface Mode Control
    RGB_SerialSend_data(0x80); //SPI_EN = 1, 3 wire serial interface

    RGB_SerialSendIndex(0xB5);
    RGB_SerialSend_data(TVFB); //VFP: Front porch of vertical lines =4
    RGB_SerialSend_data(TVB); //VBP: Back porch of vertical lines =2
    RGB_SerialSend_data(0x00);
    RGB_SerialSend_data(THB); //HBP: Back porch of horizontal dotclk=10
    RGB_SerialSendIndex(0xB6); //Display Function Control
    RGB_SerialSend_data(0xe0); //D5=1:RGB,D5=0:System Interface D6=1:SYNC Mode
    RGB_SerialSend_data(0x02);
    RGB_SerialSend_data(0x3B);
```

```
RGB_SerialSendIndex(0xe8) ;    //Display Output Ctrl Adjust
RGB_SerialSend_data(0x40) ;
RGB_SerialSend_data(0x82) ;
RGB_SerialSend_data(0x07) ;
RGB_SerialSend_data(0x18) ;
RGB_SerialSend_data(0x27) ;
RGB_SerialSend_data(0x0A) ;
RGB_SerialSend_data(0xB6) ;
RGB_SerialSend_data(0x33) ;

RGB_SerialSendIndex(0xc2) ;    //Power Control 3
RGB_SerialSend_data(0xA7) ;

RGB_SerialSendIndex(0xc5) ;    // VCOM Control
RGB_SerialSend_data(0x3e) ;

RGB_SerialSendIndex(0xc6) ;    //Vcom Offset Register
RGB_SerialSend_data(0x00) ;
//*****Positive Voltage Gamma Control*****//
RGB_SerialSendIndex(0xe0);
RGB_SerialSend_data(0xf0);
RGB_SerialSend_data(0x00);
RGB_SerialSend_data(0x02);
RGB_SerialSend_data(0x0a);
RGB_SerialSend_data(0x0d);
RGB_SerialSend_data(0x1d);
RGB_SerialSend_data(0x35);
RGB_SerialSend_data(0x55);
RGB_SerialSend_data(0x45);
RGB_SerialSend_data(0x3c);
RGB_SerialSend_data(0x17);
RGB_SerialSend_data(0x17);
RGB_SerialSend_data(0x18);
RGB_SerialSend_data(0x1b);
//*****Negative Voltage Gamma Control*****//
RGB_SerialSendIndex(0xe1) ;
RGB_SerialSend_data(0xf0);
RGB_SerialSend_data(0x00);
RGB_SerialSend_data(0x02);
RGB_SerialSend_data(0x07);
RGB_SerialSend_data(0x06);
RGB_SerialSend_data(0x04);
RGB_SerialSend_data(0x2e);
RGB_SerialSend_data(0x44);
```

```
RGB_SerialSend_data(0x45);
RGB_SerialSend_data(0x0b);
RGB_SerialSend_data(0x17);
RGB_SerialSend_data(0x16);
RGB_SerialSend_data(0x18);
RGB_SerialSend_data(0x1b);

RGB_SerialSendIndex(0xf0) ;      //Command Set Control
RGB_SerialSend_data(0x3c) ;      //D[7:0] = C3h enable command 2 part I

RGB_SerialSendIndex(0xf0) ;      //Command Set Control
RGB_SerialSend_data(0x69) ;      //D[7:0] = 96h enable command 2 part II

Delay(120);                      // Delay 120ms
RGB_SerialSendIndex(0x29) ;      // Display ON

}
```

10. Quality Assurance

10.1.Purpose:

This standard for Quality Assurance assures the quality of TP+TFT module products supplied to customer by NVD.

10.2.Standard for Quality Test:

NVD performs the following tests to ensure the quality of product before shipment.

2.1 Sampling Plan:

ANSI / ASQC Z1.4-2008. General Inspection Level II.

Single sampling, normal inspection.

2.2 Sampling Criteria:

Visual inspection: AQL 1.5

Electrical functional: AQL 0.65

2.3 Reliability Test:

Detailed requirement refer to Reliability Test Specification.

10.3.Nonconforming Analysis & Disposition

10.3.1. Nonconforming analysis:

10.3.1.1. Customer should provide overall information of non-conforming sample for their complaints.

10.3.1.2. After receipt of detailed information from customer, the analysis of nonconforming parts usually should be finished in one week.

10.3.1.3. If New Vision Display can not finish the analysis on time, customer will be notified with the progress status.

10.3.2. Disposition of nonconforming:

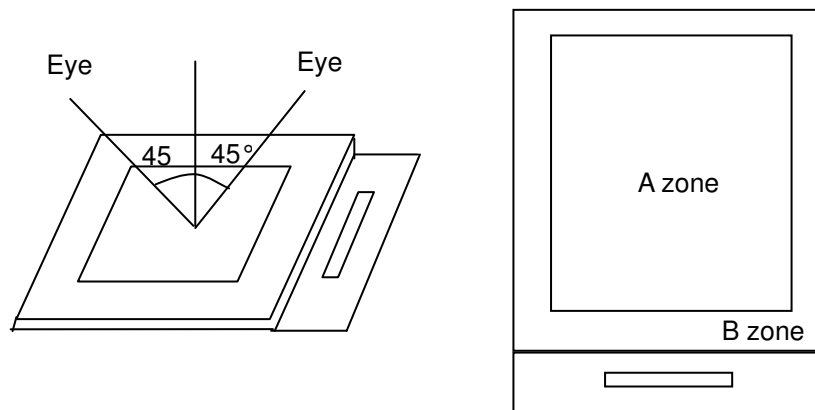
Non-conforming product over ppm level, New Vision Display will offer corrective actions, not over PPM, New Vision Display can offer FA if customer need. And the failures are confirmed to be New Vision Display responsibility and within the shelf life of 1 year, they will be replaced.

10.4. Agreement Items

- 10.4.1. New Vision Display and customer shall negotiate if the following situation occurs:
- 10.4.1.1. There is any discrepancy in standard of quality assurance.
 - 10.4.1.2. Additional requirement to be added in product specification.
 - 10.4.1.3. Any other special problem.

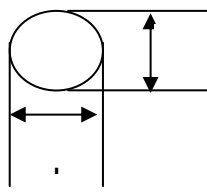
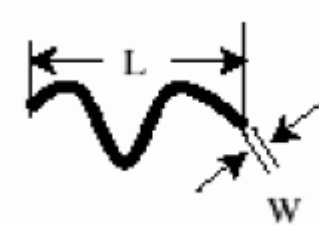
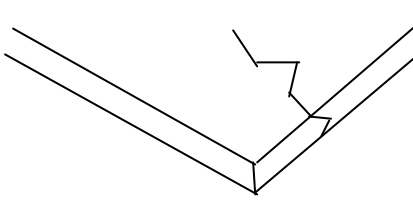
10.5. Standard of the Product Visual Inspection:

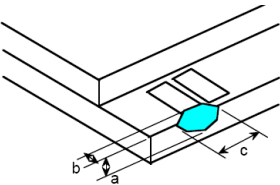
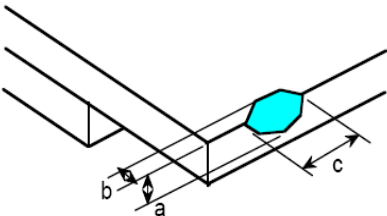
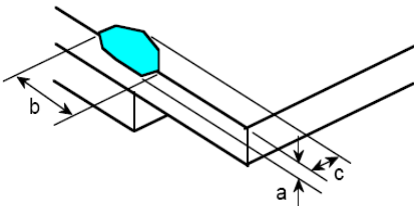
- 10.5.1. Appearance inspection:
- 10.5.1.1. The inspection must be under illumination about 750 – 1500 lux, and the distance of view must be at 35cm $\pm$ 5cm.
 - 10.5.1.2. The viewing angle should be 45° from the vertical line without reflection light or follows customer's viewing angle specifications.
 - 10.5.1.3. Definition of area: A Zone: Active Area, B Zone: Viewing Area,

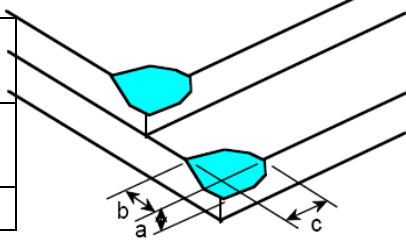


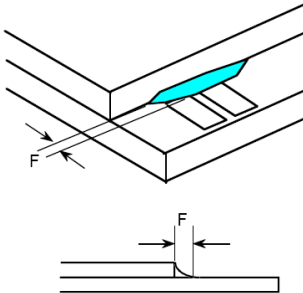
- 10.5.2. Basic principle:
- 10.5.2.1. A set of sample to indicate the limit of acceptable quality level must be discussed by both New Vision Display and customer when there is any dispute.
 - 10.5.2.2. New item must be added on time when it is necessary.

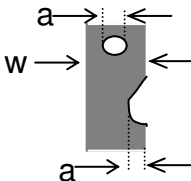
10.6. Inspection Specification:

No.	Item	Criteria (Unit: mm)																		
01	Dot(Applied for dot defect except item 15, include Visual Defect and Functional Defect)	 $\varphi = (a + b) / 2$ <table><thead><tr><th>Size</th><th>Acc. Qty</th></tr></thead><tbody><tr><td>$\varphi \leq 0.10$</td><td>Ignore</td></tr><tr><td>$0.10 < \varphi \leq 0.20$</td><td>2</td></tr><tr><td>$0.20 < \varphi \leq 0.30$</td><td>1</td></tr><tr><td>$0.30 < \varphi$</td><td>0</td></tr><tr><td>Total</td><td>2 no include $\varphi \leq 0.10$</td></tr></tbody></table> Distance between 2 defects should more than 3mm apart.	Size	Acc. Qty	$\varphi \leq 0.10$	Ignore	$0.10 < \varphi \leq 0.20$	2	$0.20 < \varphi \leq 0.30$	1	$0.30 < \varphi$	0	Total	2 no include $\varphi \leq 0.10$						
Size	Acc. Qty																			
$\varphi \leq 0.10$	Ignore																			
$0.10 < \varphi \leq 0.20$	2																			
$0.20 < \varphi \leq 0.30$	1																			
$0.30 < \varphi$	0																			
Total	2 no include $\varphi \leq 0.10$																			
02	Black and White line Scratch Foreign material (Line type)	 <table><thead><tr><th>Length</th><th>Width</th><th>Acc. Qty</th></tr></thead><tbody><tr><td>/</td><td>$W \leq 0.03$</td><td>Ignore</td></tr><tr><td>$L \leq 5$</td><td>$0.03 < W \leq 0.05$</td><td>3</td></tr><tr><td>$L \leq 5$</td><td>$0.05 < W \leq 0.10$</td><td>2</td></tr><tr><td>/</td><td>$0.1 < W$</td><td>0</td></tr><tr><td colspan="2">Total</td><td>3</td></tr></tbody></table> Distance between 2 defects should more than 3mm apart. Scratches not viewable through the back of the display are acceptable.	Length	Width	Acc. Qty	/	$W \leq 0.03$	Ignore	$L \leq 5$	$0.03 < W \leq 0.05$	3	$L \leq 5$	$0.05 < W \leq 0.10$	2	/	$0.1 < W$	0	Total		3
Length	Width	Acc. Qty																		
/	$W \leq 0.03$	Ignore																		
$L \leq 5$	$0.03 < W \leq 0.05$	3																		
$L \leq 5$	$0.05 < W \leq 0.10$	2																		
/	$0.1 < W$	0																		
Total		3																		
03	Crack	 Crack is potential to enlarge, any type is not allowed.																		

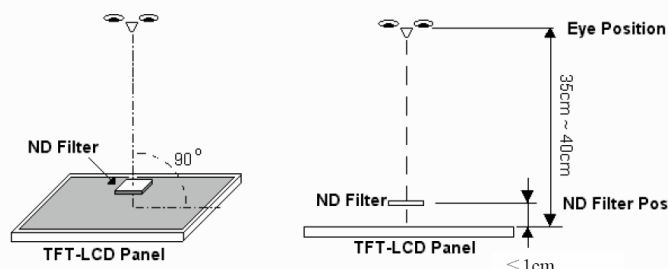
No.	Item	Criteria (Unit: mm)										
04	Chipping Pad Area:	 <table><tr><th></th><th>Acc. Qty</th></tr><tr><td>$c > 3.0, b < 1.0$</td><td>1</td></tr><tr><td>$c < 3.0, b < 1.0$</td><td>3</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>		Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	3	$a < \text{Glass Thickness}$			
	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	3											
$a < \text{Glass Thickness}$												
05	Chipping Rear of Pad Area:	 <table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c > 3.0, b < 1.0$</td><td>1</td></tr><tr><td>$c < 3.0, b < 1.0$</td><td>2</td></tr><tr><td>$c < 3.0, b < 0.5$</td><td>4</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	2	$c < 3.0, b < 0.5$	4	$a < \text{Glass Thickness}$	
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	2											
$c < 3.0, b < 0.5$	4											
$a < \text{Glass Thickness}$												
06	Chipping Except Pad Area:	 <table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c > 3.0, b < 1.0$</td><td>1</td></tr><tr><td>$c < 3.0, b < 1.0$</td><td>2</td></tr><tr><td>$c < 3.0, b < 0.5$</td><td>4</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	2	$c < 3.0, b < 0.5$	4	$a < \text{Glass Thickness}$	
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	2											
$c < 3.0, b < 0.5$	4											
$a < \text{Glass Thickness}$												

07	Corner Chipping:	<table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c < 3.0, b < 3.0</td><td>Ignore</td></tr><tr><td colspan="2">a < Glass Thickness</td></tr></table>	Length and Width	Acc. Qty	c < 3.0, b < 3.0	Ignore	a < Glass Thickness		
		Length and Width	Acc. Qty						
		c < 3.0, b < 3.0	Ignore						
a < Glass Thickness									

No.	Item	Criteria (Unit: mm)				
08	Burr:					
		<table><tr><td>Length</td><td>Acc. Qty</td></tr><tr><td>F < 1.0</td><td>Ignore</td></tr></table>	Length	Acc. Qty	F < 1.0	Ignore
		Length	Acc. Qty			
F < 1.0	Ignore					
Glass burr don't affect assemble and module dimension.						

9	FPC Defect: 	9.1 Dent, pinhole width $a < w/3$. (w: circuitry width.) 9.2 Open circuit is unacceptable. 9.3 No oxidation, contamination and distortion.								
10	Bubble	<table border="1"><thead><tr><th>Diameter</th><th>Acc. Qty</th></tr></thead><tbody><tr><td>$\phi \leq 0.20$</td><td>Ignore</td></tr><tr><td>$0.20 < \phi \leq 0.30$</td><td>4</td></tr><tr><td>$0.30 < \phi$</td><td>None</td></tr></tbody></table> “ϕ” is defined as item 1.	Diameter	Acc. Qty	$\phi \leq 0.20$	Ignore	$0.20 < \phi \leq 0.30$	4	$0.30 < \phi$	None
Diameter	Acc. Qty									
$\phi \leq 0.20$	Ignore									
$0.20 < \phi \leq 0.30$	4									
$0.30 < \phi$	None									

11	Dent	Diameter	Acc. Qty
		$\phi \leq 0.20$	Ignore
		$0.20 < \phi \leq 0.30$	4
		$0.30 < \phi$	None
		“ ϕ ” is defined as item 1.	
12	Bezel	12.1 No rust, distortion on the Bezel. 12.2 No visible fingerprints, stains or other contamination.	
13	PCB	13.1 No distortion or contamination on PCB terminals. 13.2 All components on PCB must same as documented on the BOM/component layout. 13.3 Follow IPC-A-600F.	
14	RTV	14.1 The RTV glue on the surface of IC isn't permissible to be scratched. The RTV glue can't exist on the surface of polarizer. 14.2 No visible non-metal foreign material and metal material in RTV. 14.3 Entrapped air bubble isn't permissible to exist on the juncture of RTV glue and pins of LCD. 14.4 Air bubble and scratch on the surface of RTV glue invisible within 0.3 m distance is acceptable and the surface of the RTV glue can't flow.	
15	Soldering	Follow IPC-A-610C standard	

16	Dot(Electrical Defect)	<table><tr><td rowspan="2">Bright Dot</td><td>Active area</td><td rowspan="2">Note 1</td></tr><tr><td>$N \leq 1$</td></tr><tr><td>Dark Dot</td><td>$N \leq 2$</td><td></td></tr><tr><td>Total Dot</td><td>$N \leq 2$</td><td></td></tr><tr><td>Two or More Adjacent Dot</td><td colspan="2">Not Allowed</td></tr></table>	Bright Dot	Active area	Note 1	$N \leq 1$	Dark Dot	$N \leq 2$		Total Dot	$N \leq 2$		Two or More Adjacent Dot	Not Allowed	
		Bright Dot		Active area		Note 1									
$N \leq 1$															
Dark Dot	$N \leq 2$														
Total Dot	$N \leq 2$														
Two or More Adjacent Dot	Not Allowed														
		Remark: One pixel consists of 3 sub-pixels, including R,G and B dot(Sub-pixel=Dot) Note 1 Bright dot is defined through 5% transmission ND filter as following:  Defects on the black Matrix, out of viewing area, aren't considered as a defect counted.													
17	Electrical Defect (Major defect)	The below defects must be rejected. 19.1 Missing vertical / horizontal segment, 19.2 Abnormal Display. 19.3 No function or no display. 19.4 Current exceeds product specifications. 19.5 LCD viewing angle defect. 19.6 No Backlight. 19.7 Dark Backlight. 19.8 Touch Panel no function.													

18	Glue Cosmetic Inspection Criteria	Item	Criteria	Judgment
		Glue overflow	1. Not exceed sensor 2. Not over 2mm from frame 3. For product with frame $\leq$ 2mm, not exceed LENS and not higher than sensor	Accept
			Exceed sensor	Reject
			Exceed 2mm from frame	Reject
			For product with frame $\leq$ 2mm, exceed LENS and higher than sensor	Reject
		Missing glue	1. Not in area A 2. $\leq$ 1/2 width of frame	Accept
			In area A	Reject
			Exceed 1/2 width of frame	Reject
		Air bubble	For air bubble in area A, refer to foreign material inspection criteria	
			For air bubble not in area A, not exceed 1/2 width of frame	Accept
			For air bubble not in area A, exceed 1/2 width of frame	Reject
		UV glue not fully cured	Uncured glue sticky	Reject
		Uneven dot	Not visible at 35cm $\pm$ 5cm distance	Accept

Remark: a. LCD Panel Broken shall be rejected. Defect out of LCD viewing area is acceptable.

b. The CTP must be revalidated if the end product design changed, especially in hardware, software, TFT display or the assemble air gap between TFT and CTP.

10.7. Classification of Defects:

- 10.7.1. Visual defects (Except no / wrong label) are treated as minor defect and electrical defect is major.
- 10.7.2. Two minor defects are equal to one major in lot sampling inspection.

10.8. Identification/marketing criteria:

- 10.8.1. Any unit with illegible / wrong /double or no marking/ label shall be rejected.

10.9. Packing:

- 10.9.1. There should be no damage of the outside carton box; each packaging box should have one identical label.
- 10.9.2. Modules inside package box should have compliant mark.
- 10.9.3. All direct package materials shall offer ESD protection.

11. Reliability Specification

Item	Condition	Cycle Time	Quantity	Remark
High Temp. Operation Test	+70 °C	96hrs	8pcs	
Low Temp. Operation Test	-20 °C	96hrs	8pcs	
High Temperature and High Humidity(operation)	Ta=+50 °C, 90%RH	96 hrs	8pcs	
Thermal Shock Test	-20 °C (30min) → +70 °C (30min)	10cycles	5pcs	
Packing Drop test (for packaging)	1 drop on a corner, 1 drop on three arris, 1 drop on six sides	1time	One inner carton	
ESD(On Final Product)	150pF,330Ω, ±8KV & ±10KV air & contact test	10times	5pcs	

Note: 1.For humidity test, DI water should be used.

Inspection Standard: Inspect after 1-2hrs storage at room temperature, the sample shall be free from the following defects:

- Air bubble in the LCD
- Seal Leakage
- Non-display
- Missing Segment
- Glass Crack
- IDD is greater than twice initial value.
- Others as per QA Inspection Criteria

2. No defect is allowed after testing.

3. ESD should be applied to LCD glass panel, not other areas (such as on IC and so on)
IDD should be within twice initial value.

In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

12. Precautions and Warranty

12.1. Safety

- 12.1.1. The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.
- 12.1.2. Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

12.2. Handling

- 12.2.1. Reverse and use within ratings in order to keep performance and prevent damage.
- 12.2.2. Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.

12.3. Storage

- 12.3.1. Do not store the LCD module beyond the specified temperature ranges.

12.4. Metal Pin (Apply to Products with Metal Pins)

12.4.1. Pins of LCD and Backlight

- 12.4.1.1. Solder tip can touch and press on the tip of Pin LEAD during the soldering

12.4.1.2. Recommended Soldering Conditions

Solder Type: Sn96.3~94-Ag3.3~4.3-Cu0.4~1.1

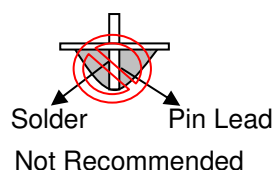
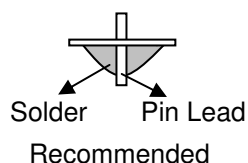
Maximum Solder Temperature: 370℃

Maximum Solder Time: 3s at the maximum temperature

Recommended Soldering Temp: 350±20℃

Typical Soldering Time: ≤3s

12.4.1.3. Solder Wetting



12.4.2. Pins of EL

- 12.4.2.1. Solder tip can touch and press on the tip of EL leads during soldering.

- 12.4.2.2. No Solder Paste on the soldering pad on the motherboard is recommended.

12.4.2.3. Recommended Soldering Conditions

Solder type: Nippon Alimit Leadfree SR-34, size 0.5mm

Recommended Solder Temperature: 270~290℃

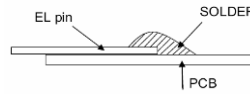
Typical Soldering Time: ≤2s

Minimum solder distance from EL lamp (body): 2.0mm

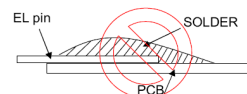
12.4.2.4. No horizontal press on the EL leads during soldering.

12.4.2.5. 180° bend EL leads three times is not allowed.

12.4.2.6. Solder Wetting

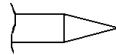


Recommended

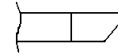


Not Recommended

12.4.2.7. The type of the solder iron:

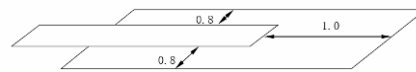


Recommended



Not Recommended

12.4.2.8. Solder Pad



12.5. Operation

12.5.1. Do not drive LCD with DC voltage

12.5.2. Response time will increase below lower temperature

12.5.3. Display may change color with different temperature

12.5.4. Mechanical disturbance during operation, such as pressing on the display area, may cause the segments to appear "fractured".

12.6. Static Electricity

12.6.1. CMOS LSIs are equipped in this unit, so care must be taken to avoid the electro-static charge, by ground human body, etc.

12.6.2. The normal static prevention measures should be observed for work clothes and benches.

12.6.3. The module should be kept into anti-static bags or other containers resistant to static for storage.

12.7. Limited Warranty

12.7.1. Unless otherwise agreed between New Vision Display and customer, New Vision Display will replace or repair any of its LCD and LCM which New Vision Display found to be defective electrically and visually when inspected in accordance with New Vision Display Quality Standards, for a period of one year from date of shipment.

12.7.2. The warranty liability of New Vision Display is limited to repair and/or replacement. New Vision Display will not be responsible for any consequential loss.

12.7.3. If possible, we suggest you use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.

13. Packaging

(TBD)

CRITICAL DIMENSION MUST MEET THE REQUIREMENT OF Cpk
CONTROL CAPABILITY=1.33
IMPORTANT CONTROL DIMENSION MUST MEET A TOLERANCE
DIMENSIONS IN PARENTHESES () ARE FOR REFERENCE.THEREFORE TOLERANCE IS NOT APPLIED TO THE DIMENSIONS IN PARENTHESES.
USE THE DIMENSION SPECIFIED WHEN SPECIFYING A DIMENSION.
SPECIAL CHARACTERISTICS

VIEWING DIRECTION

BACKLIGHT SCHEMATIC

CONSTANT CURRENT

DETAIL B
 SCALE 20.000

DETAIL A
 SCALE 2.000

UNIT: mm

GENERAL TOLERANCE:
 XX±
 YY±
 Z±
 ANGLE= ± 0.5°

3RD ANGLE

NOT IN SCALE

NAME

DATE

DRAFTED BY:

CHECKED BY:

APPROVED BY:

NEW VISION DISPLAY (SHENZHEN FACTORY)
 102 L Jie Road, Heng Gang,
 Shenzhen, China
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 Tel: +86-755-26626688
 Fax: +86-755-26624113

New Vision Display

PART NO: 2MLCM00962M01

TITLE: ASSEMBLY DRAWING FOR 9962-01

DRAWING NO: A9962A01-04

REV: 04

SH NO:1/1

THE DRAWING IS PROPERTY OF NEW VISION DISPLAY LIMITED

Reference

Item	Description	Revision
ST7796S	driver IC datasheet	