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CHONGQING BOE OPTOELECTRONICS TECHNOLOGY CO.,LTD				
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REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
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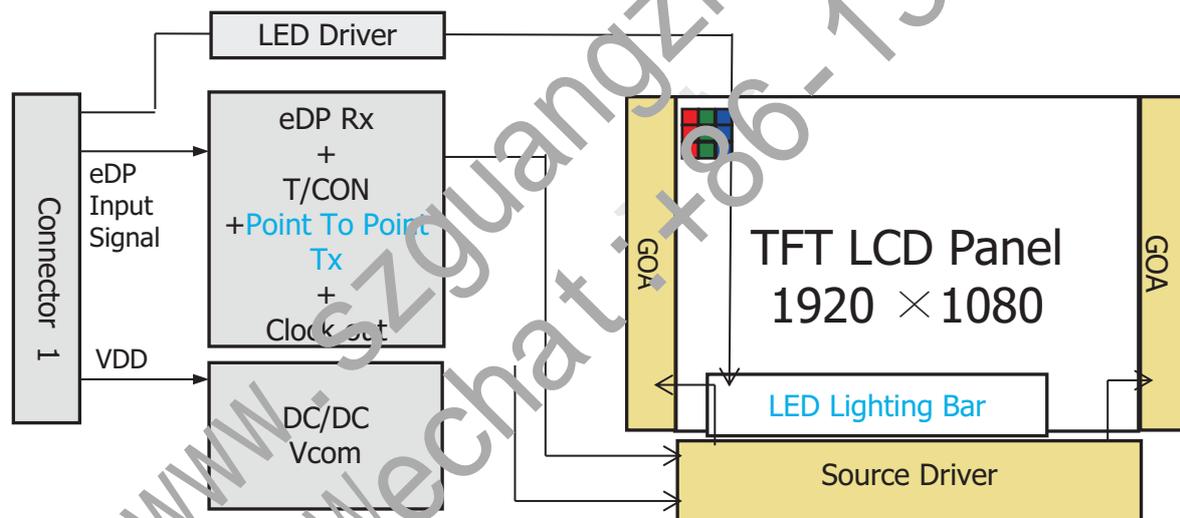
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1.0 GENERAL DESCRIPTION

1.1 Introduction

NV140FHM-N4B 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 14.0 inch diagonally measured active area with FHD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical Stripe and this module can display 262,144 colors. 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.



1.2 Features

- 2 lane eDP Interface with 2.7Gbps Link Rates
- Thin and light weight
- 6-bit color depth, display 262K colors
- Single LED Lighting Bar. (Down side/Horizontal Direction)
- Green Product (RoHS & Halogen free product)
- On board LED Driving circuit
- Low driving voltage and low power consumption
- On board EDID chip

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1.0 General Description				
1.3 Application				
● Notebook PC Without Touch function				
1.4 General Specification				
1.4.1.General LCM Specification(Table 1.)				
<Table 1. General Specifications>				
Parameter	Specification	Unit	Remarks	
Active area	309.312(H) x 173.988(V)	mm		
Number of pixels	1920 (H) x 1080 (V)	pixels		
Pixel pitch	0.1611 (H) x 0.1611 (V)	mm		
Pixel arrangement	RGB Vertical stripe			
Display colors	262K	colors		
Display mode	Normally Black			
Dimensional outline	316.112(H)*186.56(V) (W/O PCB)*3.0(Max) 316.112 x 191.98 max. (W/ PCB)*3.0(Max)	mm		
Weight	280(max)	g		
Back-light	Lower Down side, 1-LED Lighting Bar type		Note 1	
Power consumption	P _D : 0.9	W	@mosaic pattern	
	P _B L : 2.6	W		
	3.5	W	@mosaic pattern	
Notes : 1. LED Lighting Bar (32*LED Array)				
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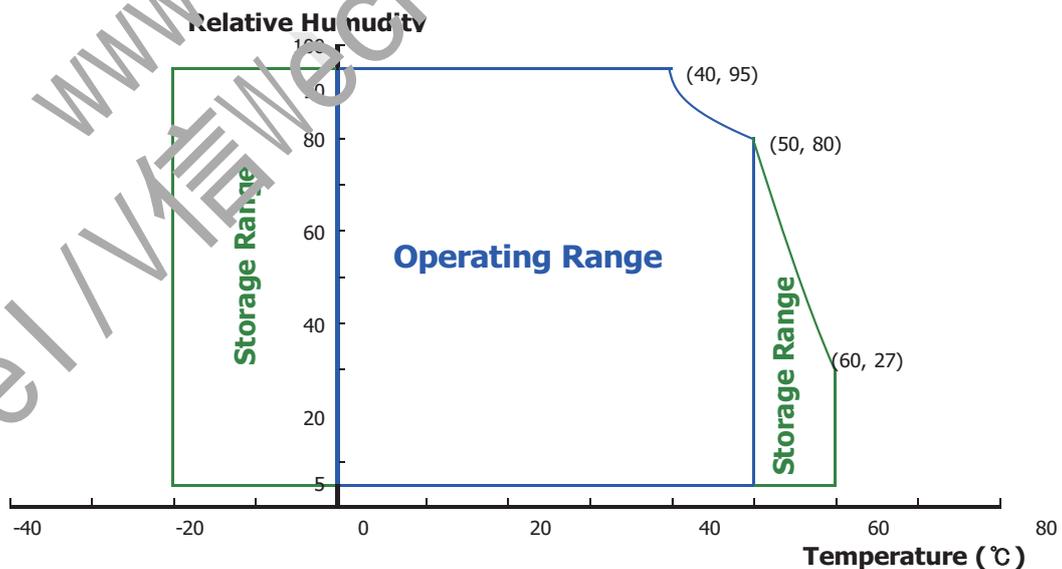
2.0 ABSOLUTE MAXIMUM RATINGS

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}	-0.5	+1.0	V	Note 1
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.



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3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

< Table 3. Electrical specifications >

Ta=25+/-2°C

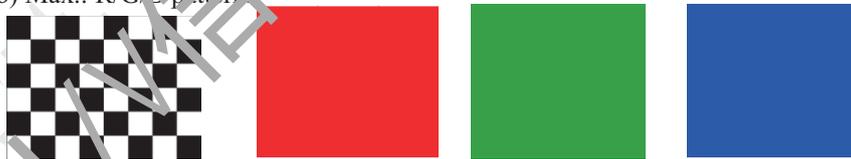
Parameter	Min.	Typ.	Max.	Unit	Remarks	
Power Supply Voltage	3.0	3.3	3.6	V	Note 1	
Permissible Input Ripple Voltage	-	-	100	mV	At V _{DD} = 3.3V	
Power Supply Current	-	273	424	mA	Note 1	
Differential Input Voltage	120	-	1200	mV		
Power Supply Inrush Current	-	-	2.0	A	Note3	
Power Consumption	P _{LED}	0.9	1.4	W	Note 1	
	P _{IC}	-	-	2.6	W	Note 2
	P _{total}	-	3.5	4.0	W	

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.

The current draw and power consumption specified is for 3.3V at 25°C.

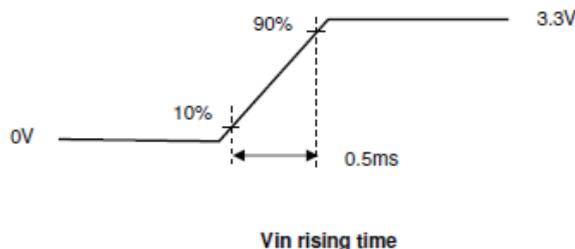
a) Typ.: Mosaic Pattern

b) Max.: R/G/B pattern



2. IF = VF = 32/ efficiency = PLED

3. Measurement Condition



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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	-	-	3	V	-
LED Forward Current	I _F	-	23	-	mA	-
LED Power Consumption	P _{LED}	-	-	2.6	W	Note 1
LED Life-Time	N/A	15,000	-	-	Hour	I = 20mA
Power supply voltage for LED Driver	V _{LED}	5	12	21	V	
Power supply voltage for LED Driver Inrush	I _{led i nrush}	-	-	2.0	A	Note4
EN Control Level	Backlight on	2.0	-	5.0	V	
	Backlight off	0	-	0.6	V	
PWM Control Level	PWM High Level	2.0	-	5.0	V	
	PWM Low Level	0	-	0.6	V	
PWM Control Frequency	f _{PWM}	200	-	10,000	Hz	
Duty Ratio	-	1	-	100	%	

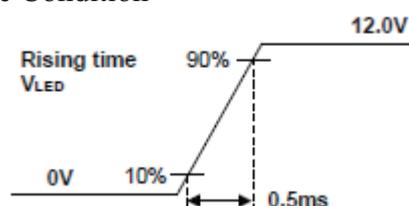
Notes : 1. Power supply voltage 12V for LED Driver

Calculator Value for reference $I_F \times V_F \times 32 / \text{efficiency} = P_{LED}$

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

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

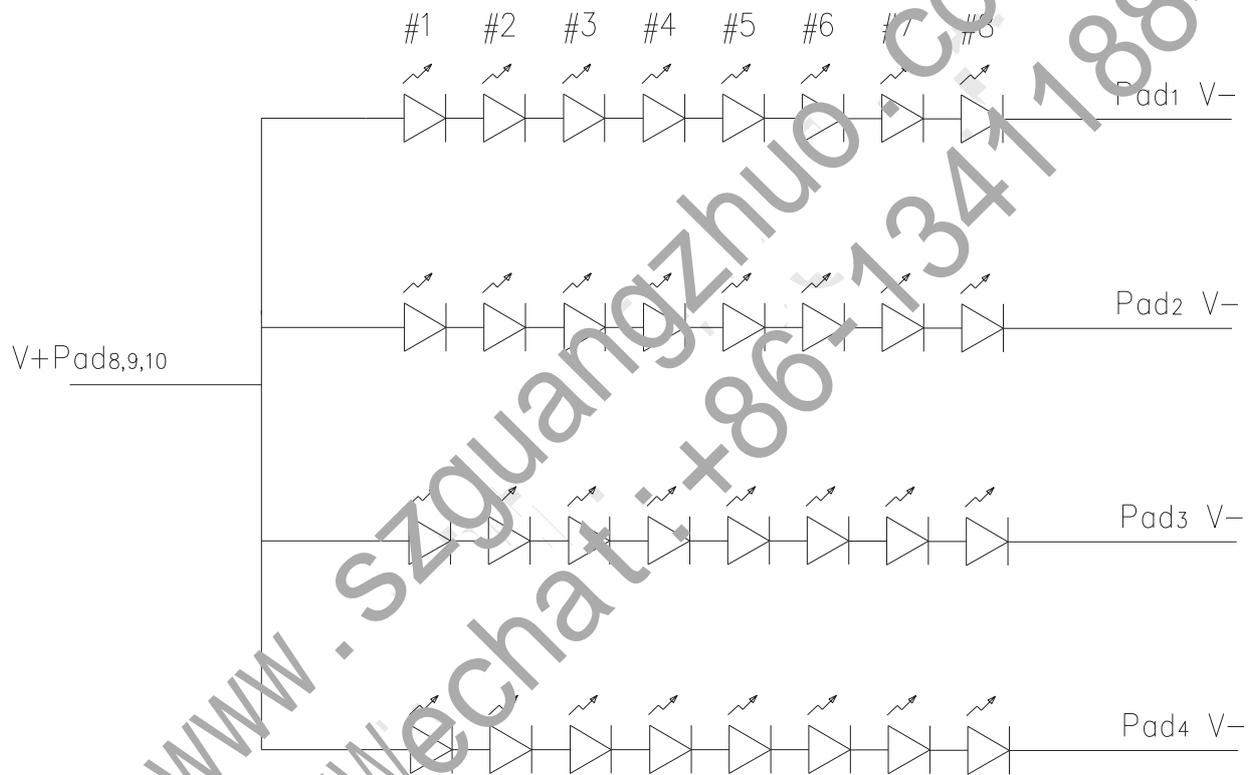
4. Measure Condition



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3.3 LED structure



32(8S4P) WHITE LED DIAGRAM

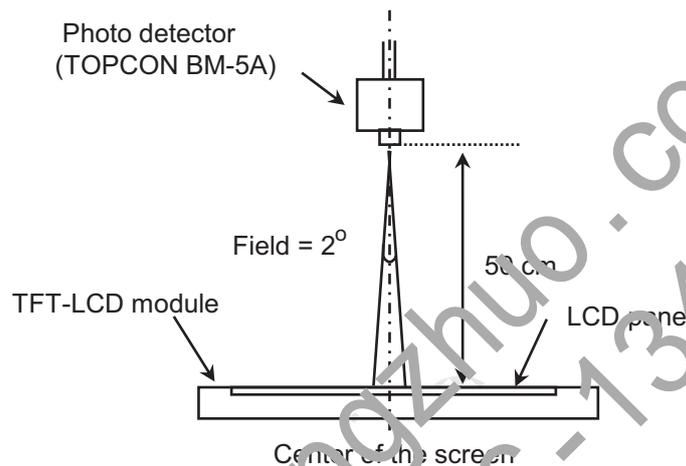
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4.0 OPTICAL SPECIFICATION								
4.1 Overview								
<p>The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = $25\pm 2^\circ\text{C}$) with the equipment of Luminance meter system (Goniometer system and PR370) 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 $\theta=0$ ($=\theta_3$) as the 3 o'clock direction (the "right"), $\theta=90$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta=180$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta=270$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). While scanning θ and 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 o'clock.</p>								
4.2 Optical Specifications								
<Table 5. Optical Specifications>								
Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	θ_3	$\Phi > 10^\circ$	-	85	-	Deg.	Note 1
		θ_9		-	85	-	Deg.	
	Vertical	θ_{12}		-	85	-	Deg.	
		θ_6		-	85	-	Deg.	
Luminance Contrast ratio		CR	$\theta = 0^\circ$	600	700	-	-	
Luminance of White	5 Points	Y_w	$\theta = 0^\circ$ $I_{LED} = 23\text{mA}$	185	220	-	-	
White Luminance uniformity	5 Points	ΔY_5		-	80%	-	-	Type.
	13 Points	ΔY_{13}		-	60%	-	-	
White Chromaticity		x_w	$\theta = 0^\circ$	0.283	0.313	0.343	-	
		y_w		0.299	0.329	0.359	-	
Reproduction of color	Red	x_R	$\theta = 0^\circ$	-0.03	0.585	+0.03	-	
		y_R			0.362		-	
	Green	x_G			0.349		-	
		y_G			0.578		-	
	Blue	x_B			0.163		-	
		y_B			0.136		-	
Gamut		-	-	40	45	-	%	
Response Time (Rising + Falling)		T_{RT}	$T_a = 25^\circ\text{C}$ $\theta = 0^\circ$	-	30	35	Ms	Note 6
Cross Talk		CT	$\theta = 0^\circ$	-	-	2	%	

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<p>Notes :</p> <ol style="list-style-type: none"> Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1). Contrast measurements shall be made at viewing angle of $\theta=0$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) 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 2 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 2 and FIGURE 3). 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 4 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark. (See FIGURE 5). 				
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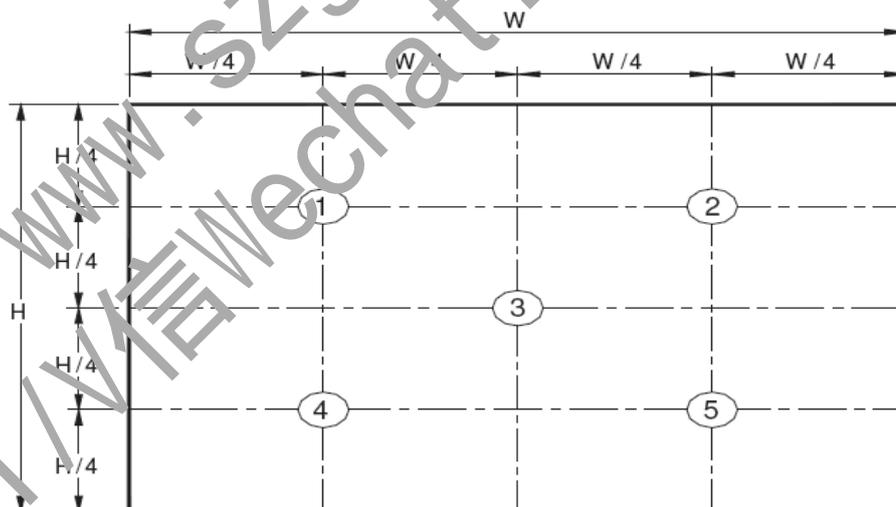
4.3 Optical measurements

Figure 1. Measurement Set Up



Optical characteristics measurement setup

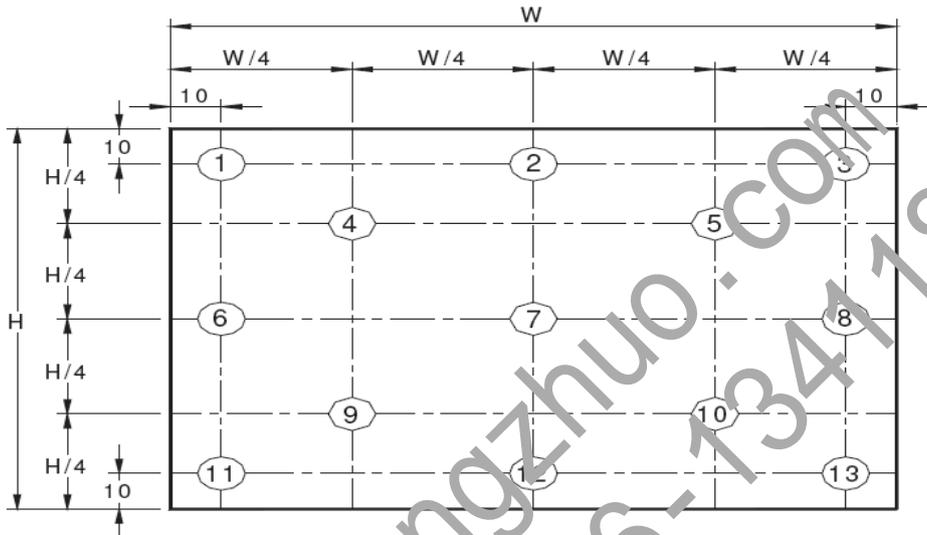
Figure 2. White Luminance and Uniformity Measurement Locations (5 points)



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

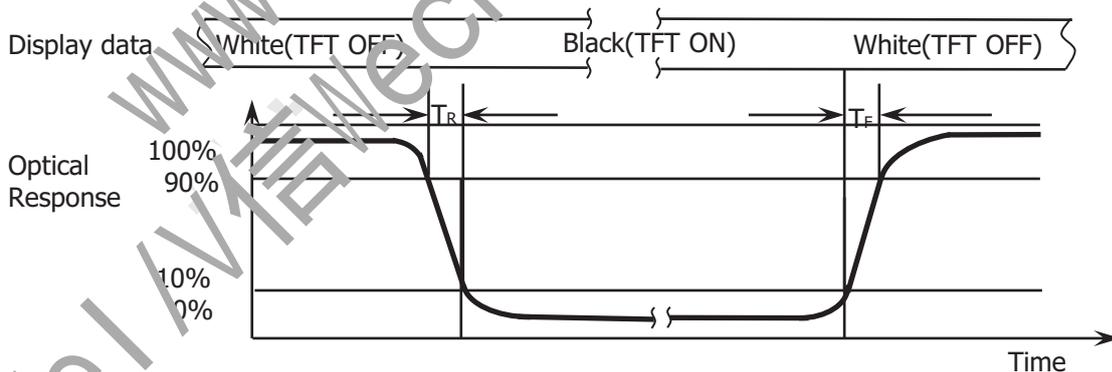
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Figure 3. Uniformity Measurement Locations (13 points)



The White luminance uniformity on LCD surface is then expressed as : $\Delta Y_5 = \text{Minimum Luminance of five points} / \text{Maximum Luminance of five points}$ (see FIGURE 2) , $\Delta Y_{13} = \text{Minimum Luminance of 13 points} / \text{Maximum Luminance of 13 points}$ (see FIGURE 3).

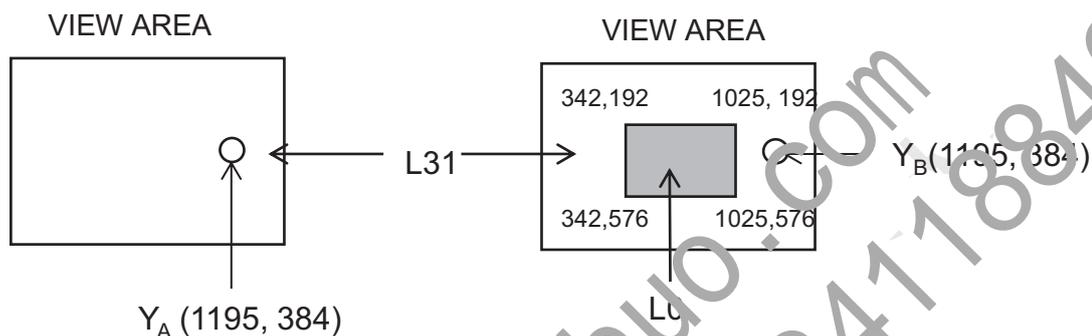
Figure 4 Response Time Testing



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

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Figure 5. Cross Modulation Test Description



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

Where:

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

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

The location measured will be exactly the same in both patterns

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

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5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

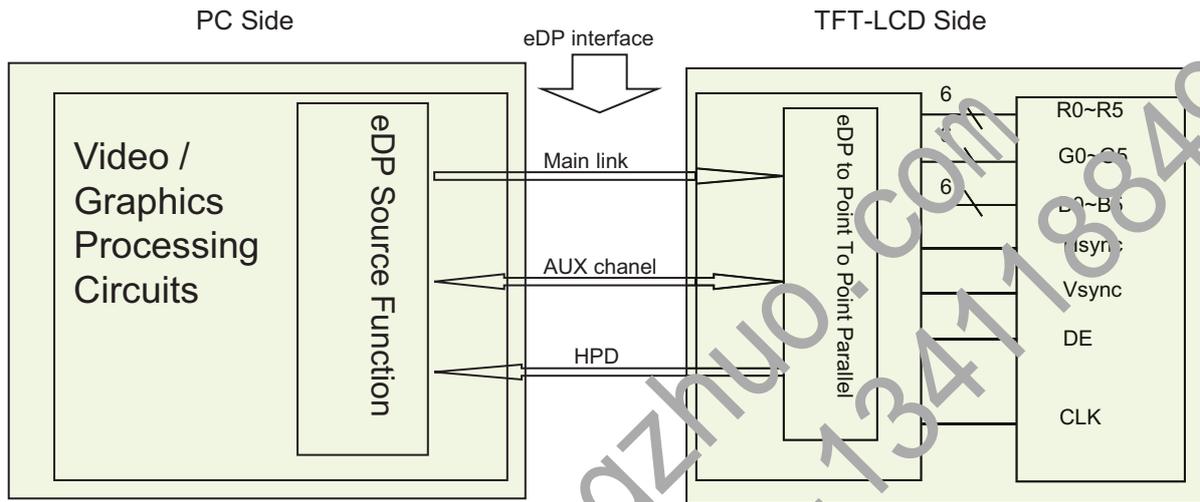
The electronics interface connector is STM MSAK24025P30 or Compatible.
The connector interface pin assignments are listed in Table 6.

<Table 6. Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	NC	No connection
2	H-GND	Ground
3	LAN1_N	Complement Signal Link_Lane1
4	LAN1_P	True Signal Link_Lane1
5	H-GND	Ground
6	LAN0_N	Complement Signal Link_Lane0
7	LAN0_P	True Signal Link_Lane0
8	H-GND	High Speed Ground
9	AUXP	True Signal Link_Auxiliary Channel
10	AUXN	Complement Signal Link_Auxiliary Channel
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	HPD(Hot Plug Detect) Signal Pin
18	BL_GND	High Speed Ground
19	BL_GND	High Speed Ground
20	PL_GND	High Speed Ground
21	BL_GND	High Speed Ground
22	BL_EN	Backlight on/off Control pin
23	BL_PWM	Back light PWM Dimming
24	NC	No connection
25	NC	No connection
26	BL_PWR	Backlight power
27	BL_PWR	Backlight power
28	BL_PWR	Backlight power
29	BL_PWR	Backlight power
30	NC	No connection

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5-2. eDP Interface



Note. Transmitter : DP501 or equivalent
Transmitter is not contained in Module.

5.3.eDP Input signal

Lane 0	Lane 1
R0-5:0 G0-5:4	R1-5:0 G1-5:4
G0-3:0 B0-5:2	G1-3:0 B1-5:2
B0-1:0 R2-5:0	B1-1:0 R3-5:0
G2-5:0 B2-5:4	G3-5:0 B3-5:4
B2-3:0 R4-5:2	B3-3:0 R5-5:2
R4-1:0 G4-5:0	R5-1:0 G5-5:0
B4-5:0 R6-5:4	B5-5:0 R7-5:4
R6-3:0 G6-5:2	R7-3:0 G7-5:2
G6-1:0 B6-5:0	G7-1:0 B7-5:0

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5.4 Back-light & LCM Interface Connection

<Table 7. Pin Assignments for the BLU & LCM Connector>

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

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6.0 SIGNAL TIMING SPECIFICATION

6.1 The NV140FHM-N4B is operated by the DE only.

Item		Symbols	Min	Typ	Max	Unit
Clock	Frequency	1/Tc	136.65	140.24	147.2	MHz
Frame Period		Tv	1095	1100	1115	lines
			-	60	-	Hz
			-	16.67	-	ms
Vertical Display Period		Tvd	-	1080	-	lines
One line Scanning Period		Th	2080	2124	2200	clocks
Horizontal Display Period		Thd	-	1920	-	clocks

NOTE : The above is as optimized setting

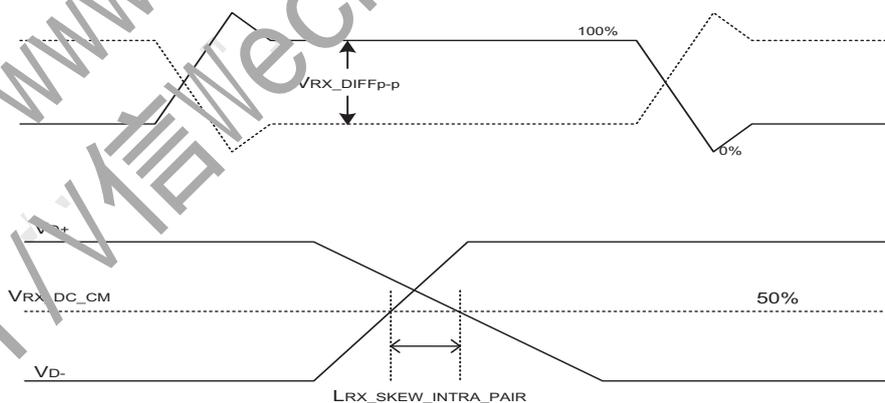
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6.2 eDP Rx Interface Timing Parameter

The specification of the eDP Rx interface timing parameter is shown in Table 8.

<Table 8. eDP Rx Interface Timing Specification>

Item	Symbol	Min	Typ	Max	Unit	Remark
Spread spectrum clock	SSC		0		%	
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	80	100	120	Ω	
Single-ended termination resistance	RRX-SE	40	-	60	Ω	
Rx short circuit current limit	IRX_SHORT			50	mA	
Intra-pair skew at Rx package pins (HBR) RX intra-pair skew tolerance at HBR	LRX_SKEW_INTRA_PAIR	-		60	ps	



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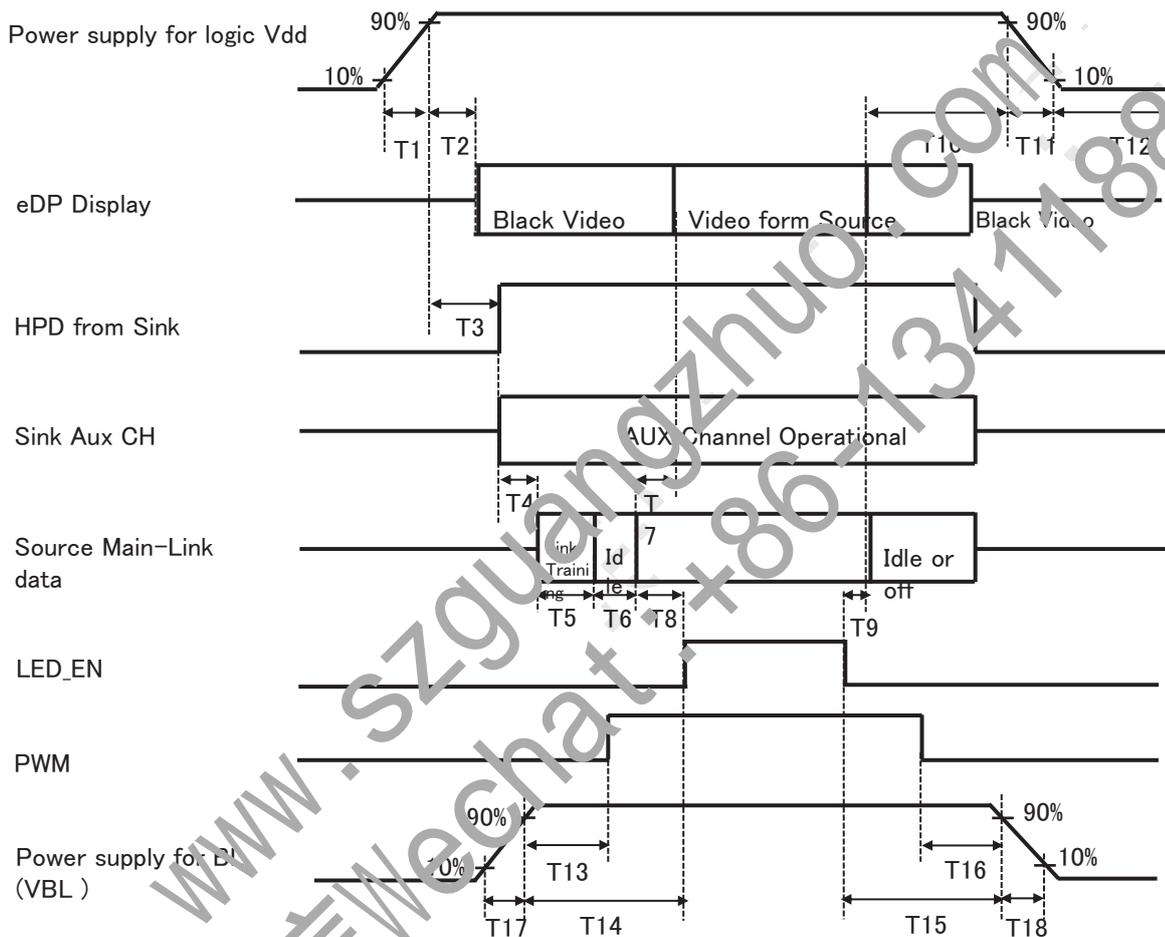
7.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

	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
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	0	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
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
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
White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

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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



- 0.5ms ≤ T1 ≤ 10 ms
- 0ms ≤ T2 ≤ 200 ms
- 0ms ≤ T3 ≤ 200 ms
- 0ms ≤ T13
- 0ms ≤ T14
- 0ms ≤ T17
- T3+T4+T5+T6+T8 > 200ms
- 0ms < T7 ≤ 50ms
- 0ms < T9
- 0ms ≤ T10 ≤ 500 ms
- 0.5ms ≤ T11 ≤ 10 ms
- 500ms ≤ T12
- 0ms ≤ T15
- 0ms ≤ T16
- 0ms ≤ T18
- T7 < T8

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.

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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

Connector Name /Description	For Signal Connector
Manufacturer	STM or Compatible
Type/ Part Number	MSAK24025P30 or Compatible
Mating housing/ Part Number	I-PEX 20454-030T or Compatible

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10.0 MECHANICAL CHARACTERISTICS				
10.1 Dimensional Requirements				
FIGURE 6 shows mechanical outlines for the model NV140FHM-N4B. Other parameters are shown in Table 9.				
<Table 9. Dimensional Parameters>				
Parameter	Specification			Unit
Active Area	309.312 (H) x 173.988 (V)			
Number of pixels	1920 (H) x 1080 (V)			
Pixel pitch	0.1611 (H) x 0.1611 (V)			mm
Pixel arrangement	RGB Vertical stripe			
Display colors				
Display mode	Normally Black			
Dimensional outline	316.112(H)*186.56(V)(W/O PCB)*3.0(Max) 316.112 x 197.98 max. (W/ PCB)*3.0(Max)			mm
Weight	280g (max)			gram
Surface treatment	Anti-glare			
Back Light	Connector :10 pin			
	LED, Horizontal-LED Array type			
10.2 Mounting				
See FIGURE 6.				
10.3 Glare and Polarizer Hardness.				
The surface of the LCD has a Anti-Glare coating to minimize reflection and a coating to reduce scratching.				
10.4 Light Leakage				
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.				

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<p>(4) Cautions for the atmosphere</p> <ul style="list-style-type: none"> • 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. <p>(5) Cautions for the module characteristics</p> <ul style="list-style-type: none"> • 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. <p>(6) Other cautions</p> <ul style="list-style-type: none"> • 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. 				
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11.0 RELIABILITY TEST

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

<Table 10. Reliability test>

No	Test Items	Conditions
1	High temperature storage test	Ta = 60 °C, 240 hrs
2	Low temperature storage test	Ta = -20 °C, 240 hrs
3	High temperature & high humidity operation test	Ta = 40 °C, 90%RH, 240 hrs
4	High temperature operation test	Ta = 50 °C, 240 hrs
5	Low temperature operation test	Ta = 0 °C, 240 hrs
6	Thermal shock	Ta = -40 °C ↔ 80 °C (0.5 hr), 100 cycle
7	Drop (non-operating)	60cm/1 corner/3 edges/6 faces
8	Shock test (non-operating)	220G, Half Sine Wave 2msec ±X, ±Y, ±Z Once for each direction
9	Electro-static discharge test (non-operating)	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV

12.0 HANDLING & CAUTIONS

- (1) Cautions when taking out the module
 - Pick the pouch only, when taking out module from a shipping package.
- (2) Cautions for handling the module
 - As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
 - As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
 - As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
 - Do not pull the interface connector in or out while the LCD module is operating.
 - Put the module display side down on a flat horizontal plane.
 - Handle connectors and cables with care.
- (3) Cautions for the operation
 - When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
 - Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

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(4) Cautions for the atmosphere

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

(5) Cautions for the module characteristics

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

(6) Other cautions

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

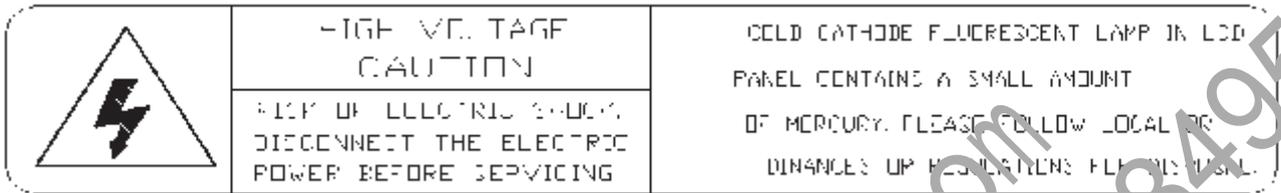
13.0 LABEL

(1) MDL label



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(2) High voltage caution label



(3) Box label



The marked part of serial number needs to print, show as follows:

- 1. FG - CODE (The first 12 digits)
- 2. The number of products
- 3. Box ID
- 4. Packing date
- 5. Material number (the client)
- 6. The last four digits of FG - Code
- 7. Supplier code - no printing, the space reserved

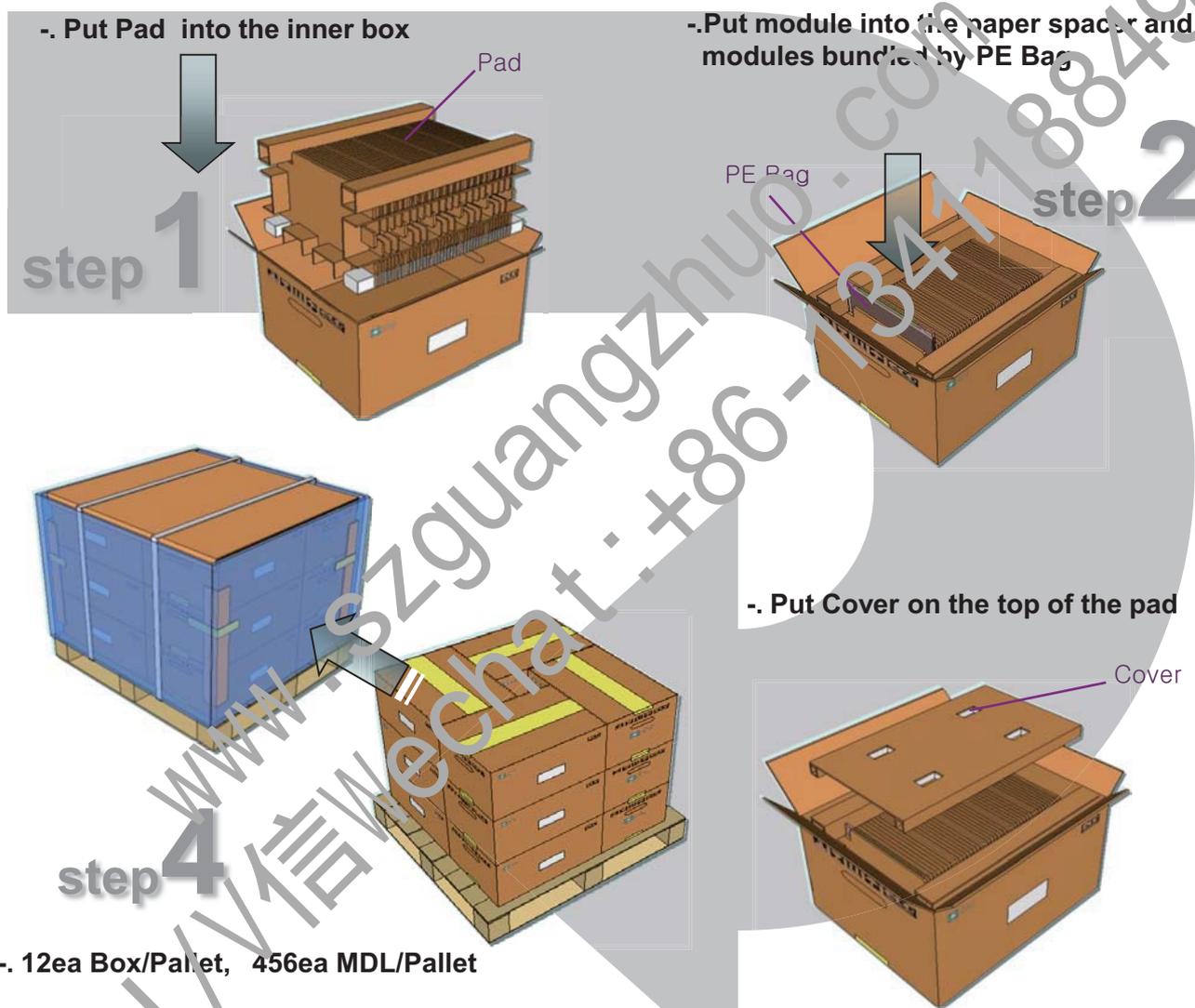
Total Size: 110 x 55 mm

Code	Digit 1	2	3	4	5	6	7	8	9	10	11	12	13
Code	S	L	S	F	1	2	3	D	0	0	0	6	8
Description	Products GBN		Grade	Line	Year		Month	Revision Code	Serial No				

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14.0 PACKING INFORMATION

14.1 Packing order



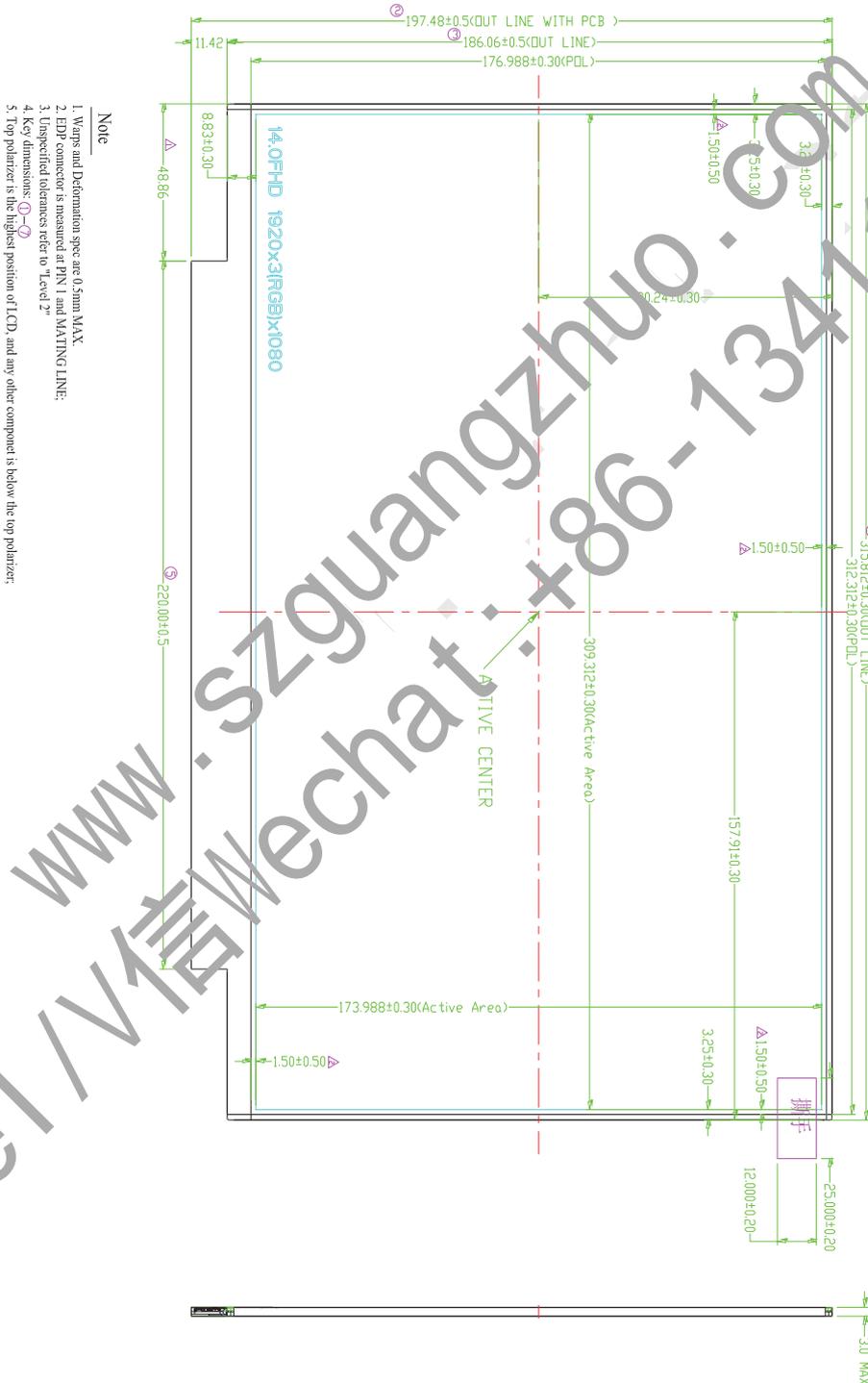
14.2 Notes

- Box Dimension: 565mmx440mmx283mm
- Package Quantity in one Box: 38pcs
- Total Weight: 14.1KG

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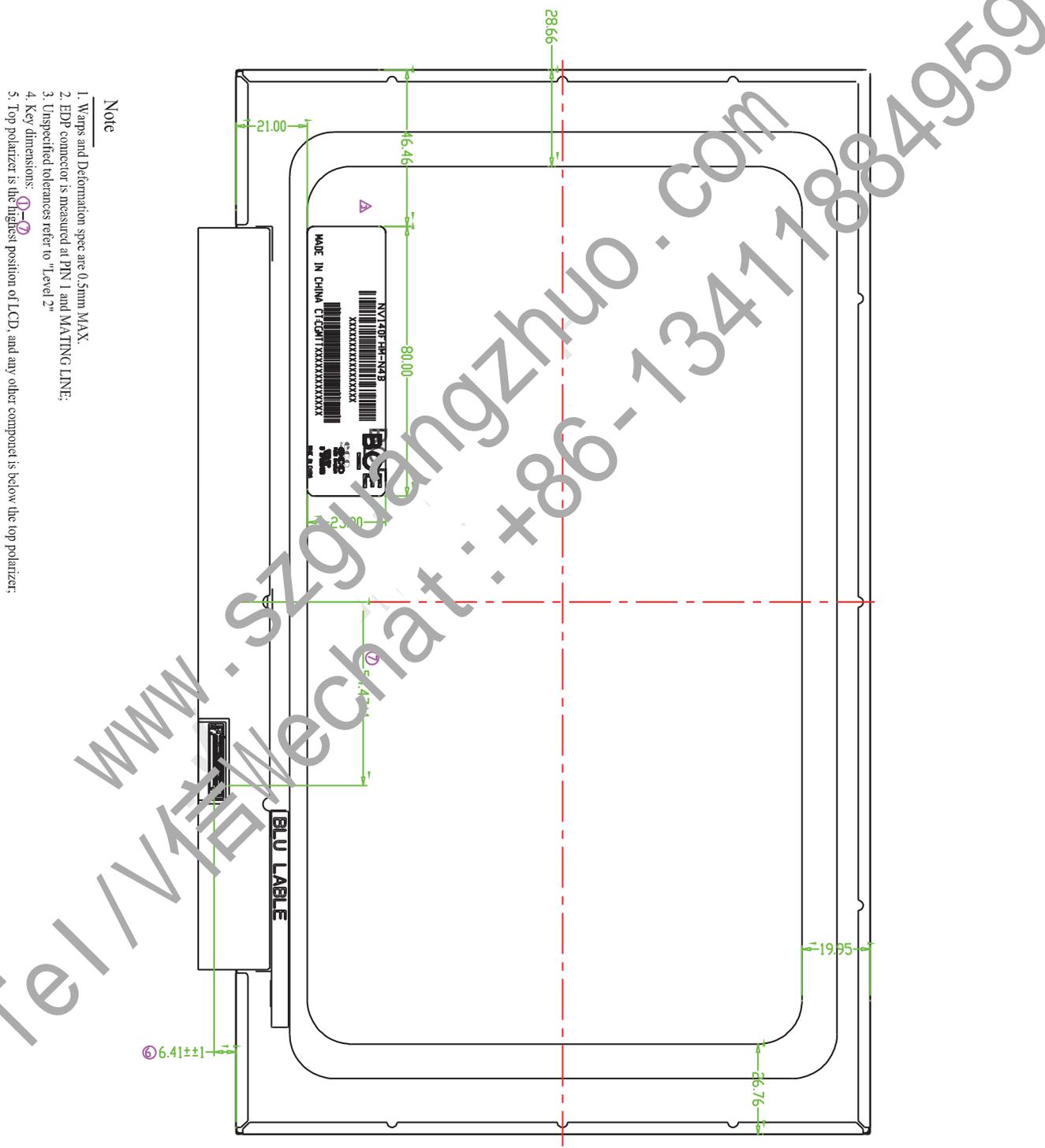
15.0 MECHANICAL OUTLINE DIMENSION

Figure 6. Outline Dimensions (Front view)



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Figure 7. Outline Dimensions (Rear view)



- Note
1. Warps and Deformation spec are 0.5mm MAX.
 2. EDP connector is measured at PIN 1 and MATING LINE.
 3. Unspecified tolerances refer to "Level 2"
 4. Key dimensions: ϕ , \ominus
 5. Top polarizer is the highest position of LCD, and any other component is below the top polarizer.

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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	2C	44		1836	ID = 1836
0B		07	7			
0C	32-bit serial No.	00	0			
0D		00	0			
0E		00	0			
0F		00	0			
10	Week of manufacture	01	1		1	
11	Year of Manufacture	1B	27		2017	Manufactured in 2017
12	EDID Structure Ver.	01	1			EDID Ver 1.0
13	EDID revision #	04	4			EDID Rev. 0.4
14	Video input definition	95	149		-	
15	Max H image size	1F	31		31	31 cm (Approx)
16	Max V image size	11	17		17	17 cm (Approx)
17	Display Gamma	78	120		2.2	Gamma curve = 2.2
18	Feature support	02	2			RGB display, Preferred Timming mode
19	Red/Green low bits	E7	231		-	Red / Green Low Bits
1A	Blue/White low bits	B0	176		-	Blue / White Low Bits
1B	Red x high bits	95	149	599	0.585	Red (x) = 10010101 (0.585)
1C	Red y high bits	5C	92	370	0.362	Red (y) = 01011100 (0.362)
1D	Green x high bits	59	89	357	0.349	Green (x) = 01011001 (0.349)
1E	Green y high bits	74	118	591	0.578	Green (y) = 10010100 (0.578)
1F	Blue x high bits	29	41	166	0.163	Blue (x) = 00101001 (0.163)
20	Blue y high bits	22	34	139	0.136	Blue (y) = 00100010 (0.136)
21	White x high bits	50	80	320	0.313	White (x) = 01010000 (0.313)
22	White y high bits	54	84	336	0.329	White (y) = 01010100 (0.329)
23	Established timing 1	00	0		-	
24	Established timing 2	00	0		-	
25	Established timing 3	00	0		-	
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			

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16.0 EDID Table

36	Detailed timing/monitor descriptor #1	C8	200		140.2	140.24MHz Main clock
37		36	54			
38		80	128		1920	Hor Active = 1920
39		CC	204		204	Hor Blanking = 204
3A		70	112		-	4 bits of Hor. Active + 4 bits of Hor. Blanking
3B		38	56		1080	Ver Active = 1080
3C		14	20		20	Ver Blanking = 20
3D		40	64		-	4 bits of Ver. Active + 4 bits of Ver. Blanking
3E		30	48		48	Hor Sync Offset = 5
3F		20	32		32	H Sync Pulse Width = 32
40		36	54		3	V sync Offset = 3 line
41		00	0		6	V Sync Line width = 6 line
42		35	53		309	Horizontal Image Size = 309 mm (Low 8 bits)
43		AD	173		173	Vertical Image Size = 173 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	
48	Detailed timing/monitor descriptor #2	86	134		93.5	93.5MHz Main clock
49		24	36			
4A		80	128		1920	Hor Active = 1920
4B		CC	204		204	Hor Blanking = 204
4C		70	112			4 bits of Hor. Active + 4 bits of Hor. Blanking
4D		38	56		1080	Ver Active = 1080
4E		14	20		20	Ver Blanking = 20
4F		40	64		-	4 bits of Ver. Active + 4 bits of Ver. Blanking
50		64	100		100	Hor Sync Offset = 100
51		64	100		100	H Sync Pulse Width = 100
52		44	68		20	V sync Offset = 20 line
53		05	5		20	V Sync Pulse width : 20 line
54		35	53		309	Horizontal Image Size = 309 mm (Low 8 bits)
55		AD	173		173	Vertical Image Size = 173 mm (Low 8 bits)
56		10	16		-	4 bits of Hor Image Size + 4 bits of Ver Image Size
57		00	0		0	Hor Border (pixels)
58		00	0		0	Vertical Border (Lines)
59	1A	26				
5A	00	0				
5B	00	0				
5C	00	0				
5D	00	0				
5E	00	0				
5F	00	0				
60	00	0				
61	00	0				
62	Detailed timing/monitor descriptor #3	00	0			Nvidia nvDPS refresh rate that does not cause any visual/optical side effect
63		00	0			
64		00	0			
65		00	0			
66		00	0			
67		00	0			
68		00	0			
69		00	0			
6A	00	0				
6B	00	0				

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16.0 EDID Table

6C	Detailed timing/monitor descriptor #4	00	0	0	Detailed Timing Description #4
6D		00	0	0	Flag
6E		00	0	0	Reserved
6F		02	2		For Brightness Table and Power consumption
70		00	0	0	Flag
71		0A	10		PWM % [7:0] @ Step 1
72		40	64		PWM % [7:0] @ Step 5
73		ED	237		PWM % [7:0] @ Step 1
74		0A	10		Nits [7:0] @ Step 0
75		3C	60		Nits [7:0] @ Step 5
76		6E	110		Nits [7:0] @ Step 10
77		11	17		Panel Electronics Power @32x32 Chess Pattern=699
78		10	16		Backlight Power @60 nits=640
79		1A	26		Backlight Power @Step 10=2150
7A		75	117		Nits @ 100% PWM Duty =235
7B		00	0	0	Flags
7C	00	0	0	Flags	
7D	00	0	0	Flags	
7E	Extension flag	00	0		
7F	Checksum	8D	141	141	-