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NV184QUM-N21 V3.1 Preliminary Product Specification Rev.P0

BUYER	
SUPPLIER	HEFEI BOE Optoelectronics Technology CO., LTD
Product Name	NV184QUM-N21 V3.1

ITEM	BUYER SIGNATURE	DATE

ITEM	SUPPLIER SIGNATURE	DATE
Prepared		
Reviewed		
Approved		

HEFEI BOE OPTOELECTRONICS TECHNOLOGY

REVISION HISTORY

REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
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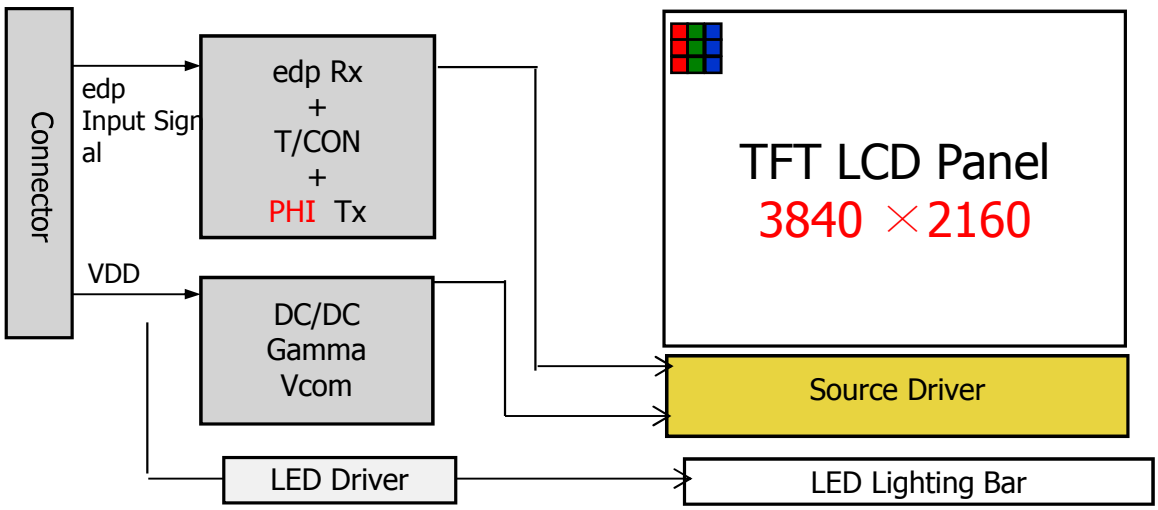
1.0 GENERAL DESCRIPTION

1.1 Introduction

NV184QUM-N21 V3.1 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 18.4 inch diagonally measured active area with UHD resolutions (3840 horizontal by 2160 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors.



1.2 Features

- 4 Lane Edp1.3 Interface;
- 8-bit color depth, display 16.7M colors
- Thin and light weight
- High luminance and contrast ratio, low reflection and wide viewing angle
- RoHS compliant

1.3 Application

- Notebook PC

1.4 General Specification

The followings are general specifications at the model NV184QUM-N21 V3.1

<Table 1. LCD Module Specifications>

Parameter	Specification	Unit	Remarks
Active Area	408.96(H)*230.04(V)	mm	
Number Of Pixels	3840(H)×2160(V)	pixels	
Pixel Pitch	0.0355(H)×RGB×0.1065(V)	mm	
Pixel Arrangement	Pixels RGB stripe arrangement		
Display Mode	Normally Black		
Display Colors	eDP 1.3 4lane 16.7M(True 8bit)	colors	
Display Mode	Normally Black		
Surface Treatment	高精细AG; APF		
Contrast Ratio	1000:1(typ.)		
Viewing Angle(CR>10)	85/85/85/85(typ.)	deg.	
Response Time	15(typ.)	ms	
Color Gamut	Adobe100%		
Brightness	220(min)/260typ)(w/o TP)	cd/m2	
Brightness Uniformity	80% min @5P 67% min@13P		
Power Consumption	Logic: 2.0w(typ.) BLU: 7.97W(Max.) (W/ LED Driver)	watt	Efficiency 87%
Outline Dimension	431(H)*247.5(V)*Spec:4.3mm Max(LCM)	mm	
Weight	600(max.)	gram	
Driver IC	Tcon IC：NT71870(Novatek) Source IC : NT66933(Novatek) Gate IC: NT61223(Novatek)		

2.0 ABSOLUTE MAXIMUM RATINGS

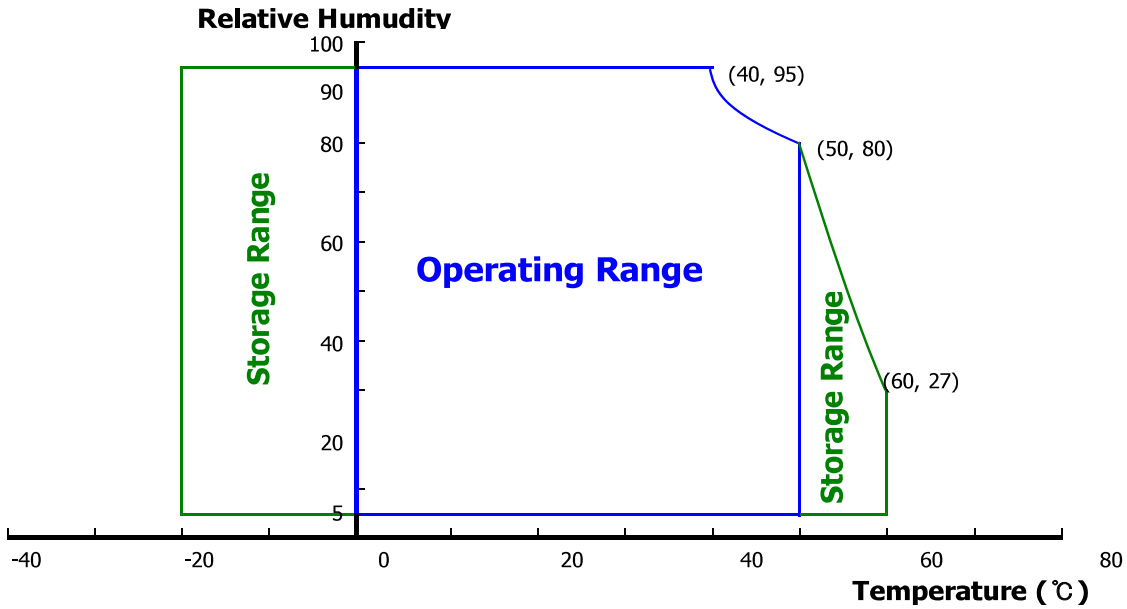
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Absolute Maximum Ratings>

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	-0.3	5.5	V	Note 1
Logic Supply Voltage	V_{IN}	V_{ss}-0.3	V_{DD}+0.3	V	
Operating Temperature	T_{OP}	0	+50	℃	Note 2
Storage Temperature	T_{ST}	-20	+60	℃	

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 ^{O}C ≥ Ta)
Maximum wet - bulb temperature at 39 ^{O}C or less. (Ta > 40 ^{O}C) No condensation.



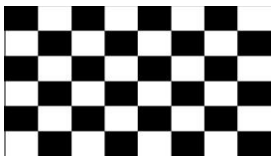
3.0 ELECTRICAL SPECIFICATIONS

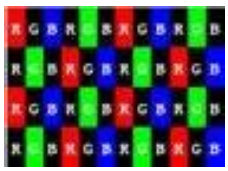
3.1 TFT LCD Module

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

Parameter		Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	4.5	5.0	5.3	V	Note 1
Permissible Input Ripple Voltage	V_{RF}	-	-	100	mV	At V_{DD} = 5V
Power Supply Current	I_{DD}	-	380	800	mA	Note 1
Positive-going Input Threshold Voltage	V_{IT+}	-	-	100	mV	V_{cm} = 1.2V typ.
Negative-going Input Threshold Voltage	V_{IT-}	-100	-	-	mV	
Differential Input Voltage	V_{ID}	380	-	1200	mV	
Power Consumption	P_D	-	1.90	4.0	W	Note 1
	P_{BL}	-		7.97	W	Note 2
	P_{total}	-		11.97	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 5.0V at 25℃.
a) Typ : mosaic pattern
b) Max : Horizontal 1 line skip pattern





2. Calculated value for reference (VLED × ILED)

3.2 Back-Light Unit

Table 4. LED Driver Electrical Specifications > [Ta =25±2 ℃]

Parameter			Min.	Typ.	Max.	Unit	Remarks
LED Forward Voltage		V_F	-	3.3	3.6	V	-
LED Forward Current		I_F	-	23.5	-	mA	-
LED Power Consumption		P_{LED}		7.44	7.97	W	Note 1
LED Life-Time		N/A	15,000	-	-	Hour	I_F = 21.9mA
Power supply voltage for LED Driver		V_{LED}	5	12	21	V	
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}	120	-	30,000	Hz	
Duty Ratio		-	1	-	100	%	

Notes : 1. Power supply voltage12V for LED Driver, Driver efficiency 88%,
Calculator Value for reference IF × VF ×96 / 0.88 = PLED
2. The LED Life-time define as the estimated time to 50% degradation of initial luminous.

3.4 INPUT TERMINAL PIN ASSIGNMENT

This LCD employs three interface connections, a 40 pin ZIF connector is used for the LCD module electronics interface, and a 12 pin FPC connector is used for the internal backlight system.

3.4.1 Pin assignment for LCD module

Connector : MSAK24025P40 (STM)

< Table5. Pin Assignment for LCD Module Connector >

Pin No.	Symbol	Description	I/O
1	NC(G_SYNC)	Reserved for LCD manufacturer’ s use	P
2	H_GND	High Speed Ground	-
3	Lane3_N	Complement Signal Link Lane 3	O
4	Lane3_P	True Signal Link Lane 3	O
5	H_GND	High Speed Ground	-
6	Lane2_N	Complement Signal Link Lane 2	O
7	Lane2_P	True Signal Link Lane 2	O
8	H_GND	High Speed Ground	-
9	Lane1_1N	Complement Signal Link Lane 1	O
10	Lane1_1P	True Signal Link Lane 1	O
11	H_GND	High Speed Ground	-
12	Lane1_0N	Complement Signal Link Lane 0	O
13	Lane1_0P	True Signal Link Lane 0	O
14	H_GND	High Speed Ground	-
15	AUX_CH_P	True Signal Auxiliary Channel	I/O
16	AUX_CH_N	Complement Signal Auxiliary Channel	I/O
17	H_GND	High Speed Ground	-
18	LCD_VCC	5.0VDC	P
19	LCD_VCC	5.0VDC	P
20	LCD_VCC	5.0VDC	P
21	LCD_VCC	5.0VDC	P
22	BIST	VDC LCD Panel Self Test Enable (max2.5VDC)	-
23	LCD_GND	LCD logic and driver ground	-
24	LCD_GND	LCD logic and driver ground	-
25	LCD_GND	LCD logic and driver ground	-

Pin No.	Symbol	Description	I/O
26	LCD_GND	LCD logic and driver ground	-
27	HPD	HPD signal pin	I/O
28	BL_GND	Backlight ground	-
29	BL_GND	Backlight ground	-
30	BL_GND	Backlight ground	-
31	BL_GND	Backlight ground	-
32	BL_ENABLE	3.3VDC from system	I/O
33	BL_PWM	PWM Input	I/O
34	NC(H_SYNC)	Reserved for LCD manufacturer’s use	I/O
35	NC(DBC)	Reserved for LCD manufacturer’s use	I/O
36	BL_PWR	12VDC	P
37	BL_PWR	12VDC	P
38	BL_PWR	12VDC	P
39	BL_PWR	12VDC	P
40	NC(COLOUR ENIN)	Reserved for LCD manufacturer’s use	I/O

3.4.2 Pin assignment for LED Bar

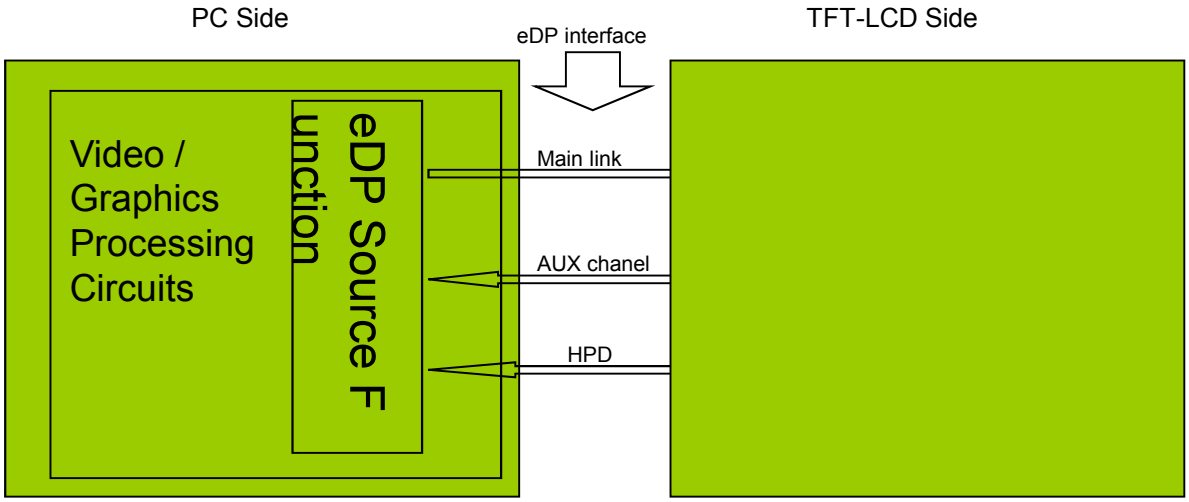
Connector : MSK24022P12 (STM)

< Table6. Pin assignment for LED Bar >

Pin No	Symbol	Description	Remarks
1	VLED	LED Anode Power Supply	
2	VLED	LED Anode Power Supply	
3	VLED2	LED Anode Power Supply	
4	NC	NC	
5	FB1	LED Cathode Power Supply	
6	FB2	LED Cathode Power Supply	
7	FB3	LED Cathode Power Supply	
8	FB4	LED Cathode Power Supply	
9	FB5	LED Cathode Power Supply	
10	FB6	LED Cathode Power Supply	
11	FB7	LED Cathode Power Supply	
12	FB8	LED Cathode Power Supply	

3.5 eDP Interface Characteristic

3.5.1 Data Format

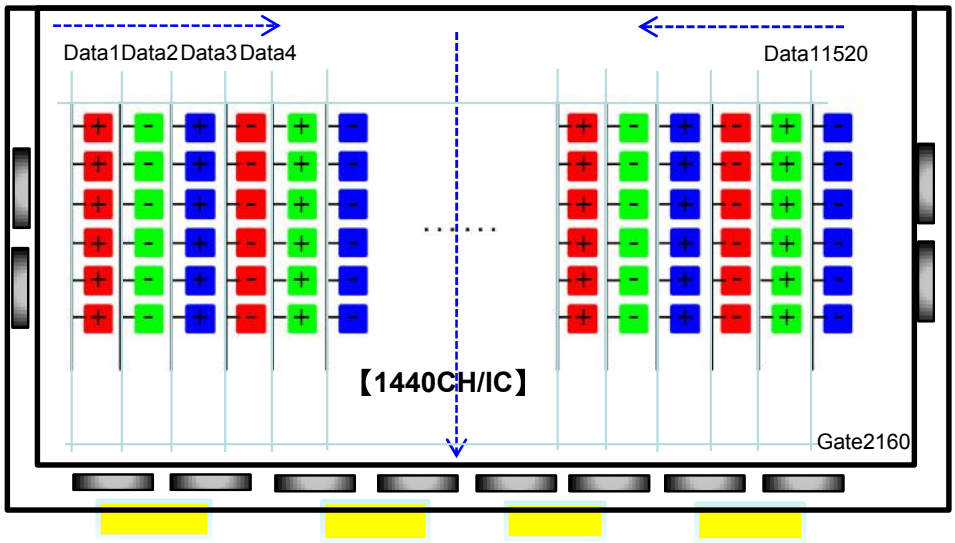


Lane 0	Lane 1
R0-5:0|G0-5:4	R1-5:0|G1-5:4
G0-3:0|B0-5:2	G1-3:0|B1-5:2
B0-1:0|R2-5:0	B1-1:0|R3-5:0
G2-5:0|B2-5:4	G3-5:0|B3-5:4
B2-3:0|R4-5:2	B3-3:0|R5-5:2
R4-1:0|G4-5:0	R5-1:0|G5-5:0
B4-5:0|R6-5:4	B5-5:0|R7-5:4
R6-3:0|G6-5:2	R7-3:0|G7-5:2
R6-1:0|G6-5:0	R7-1:0|G7-5:0

< eDP TxData Configuration >

3.5.2 Data Input Format

<Table7. Pin Assignments for the Interface Connector>



Display Position of Input Data (V-H)

3.6.1 Interface timing Parameter

< Table8. Timing Parameter >

Item		Symbols	Min	Typ	Max	Unit
Clock	Frequency	1/Tc	355.52	533.25	586.6	MHz
	High Time	Tch	-	4/7Tc	-	Tc
	Low Time	Tcl	-	3/7Tc	-	Tc
Frame Period		Tv	3900	4000	4050	lines
			-	60	-	Hz
			25	16.67	15.15	ms
Vertical Display Period		Tvd	-	2160	-	lines
One line Scanning Period		Th	2180	2222	2240	clocks
Horizontal Display Period		Thd	-	3840	-	clocks

Note※: This Module can support low frame refresh rate 50Hz & 40Hz.

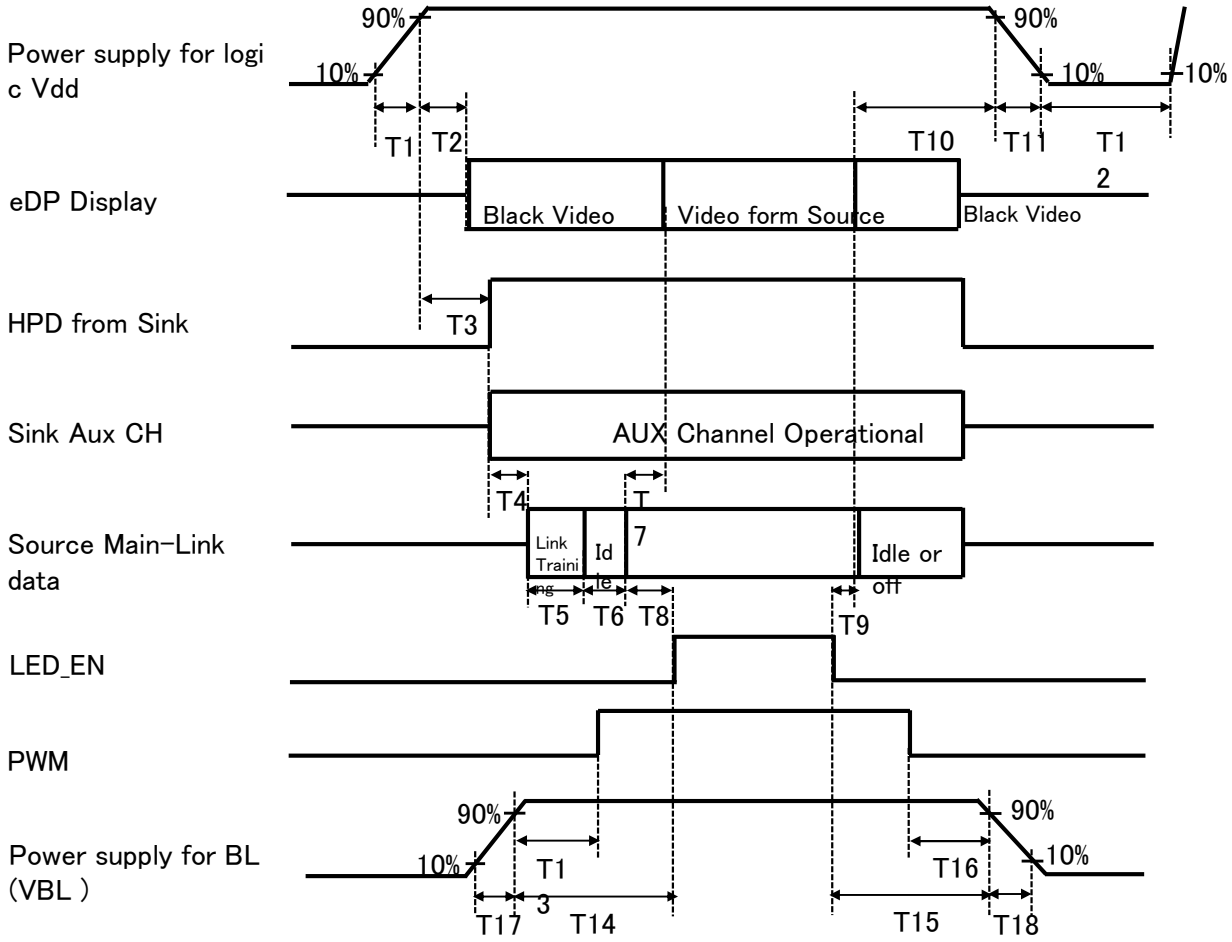
3.7 Input Color Data Mapping

< Table10. Input Signal and Display Color Table >

Color & Gray Scale		Input Data Signal																							
		Red Data								Green Data								Blue Data							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4		B2	B1	B0
Basic Colors	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
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	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	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
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	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	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray Scale of White	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	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	▽	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

3.8 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
- 0ms ≤ T7 ≤ 50ms
- 0ms ≤ T10 ≤ 500 ms
- 0 ms ≤ T11 ≤ 10 ms
- 150ms ≤ T12
- 0ms ≤ T15
- 0ms ≤ T16
- 0ms ≤ T18

Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. 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.

4.0 OPTICAL SPECIFICATIONS

4.1 Overview

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

4.2 Optical Specifications

< Table12. Optical Table >

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	0	85	-	Deg.	Note 1
		Θ_9		0	85	-	Deg.	
	Vertical	Θ_{12}		0	85	-	Deg.	
		Θ_6		0	85	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	700	1000	-	-	Note 2
Luminance of White	Center Point	Y_w	Θ = 0° I_{LED} = 23.5mA	220	260	-	cd/m^2	Note 3
White Luminance uniformity	5 Points	ΔY5		80%	-	-	-	Note 4
	13 Points	ΔY13		67%	-	-	-	
White Chromaticity		x_w	Θ = 0°	0.283	0.313	0.343	-	Note 5
		y_w		0.299	0.329	0.359	-	
Reproduction of color	Red	x_R	Θ = 0°	-0.03	0.653	+0.03	-	-
		y_R			0.317		-	
	Green	x_G			0.207		-	
		y_G			0.713		-	
	Blue	x_B			0.150		-	
		y_B			0.058		-	
Gamut		-	Θ = 0°	95	100	-	%	Adobe
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C Θ = 0°	-	15	18	ms	Note 6
Cross Talk		CT	Θ = 0°	-	-	2.0	%	Note 7

Notes :

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

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

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

3. Center Luminance of white pattern on the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

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

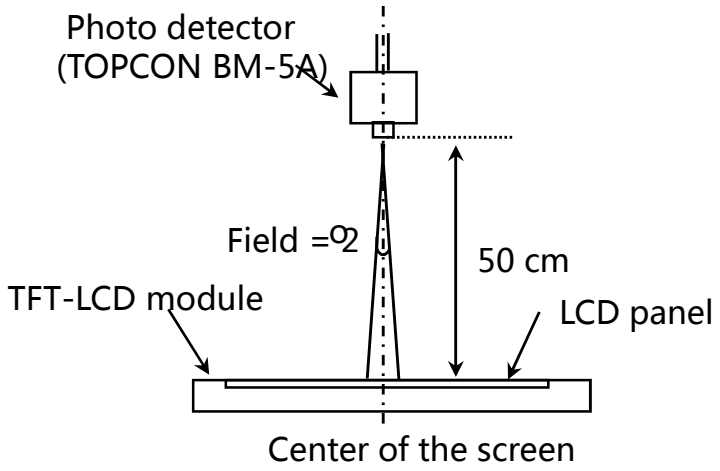
5. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

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

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

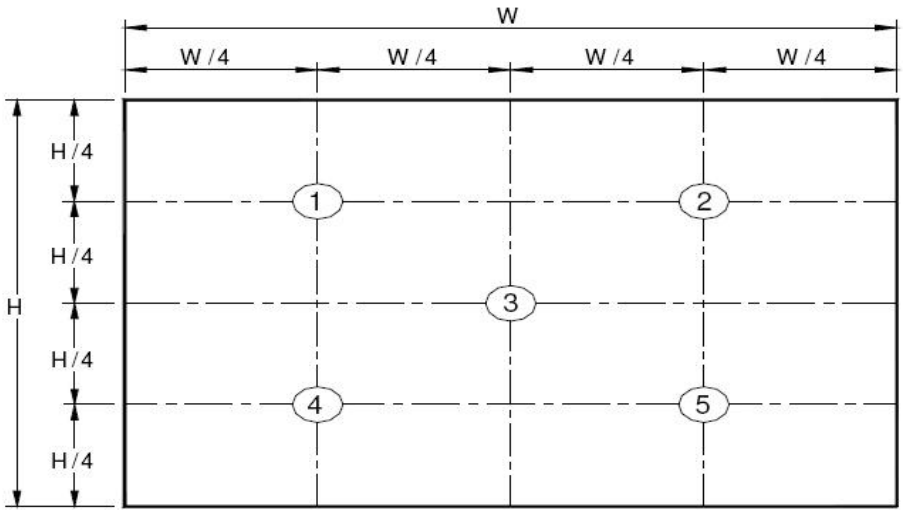
4.3 Optical measurements

Figure 1. Measurement Set Up



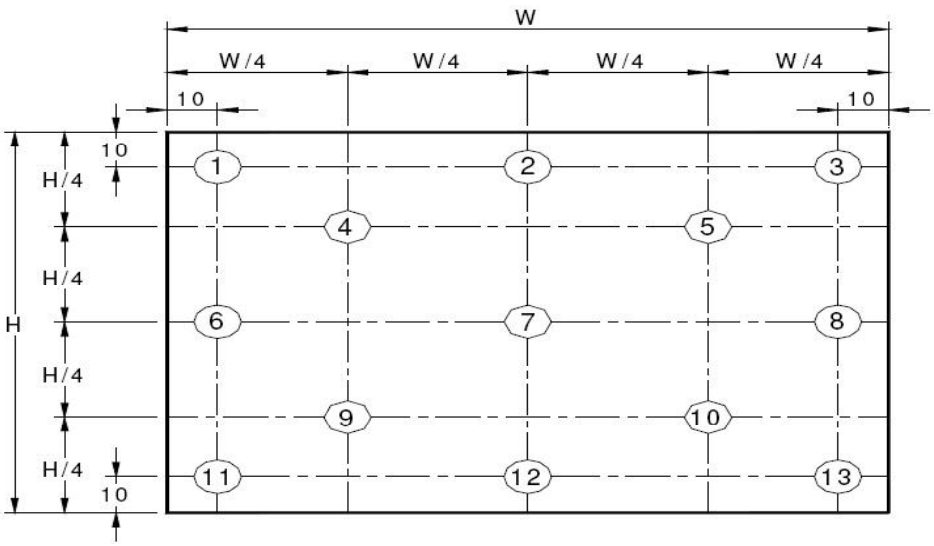
Optical characteristics measurement setup

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



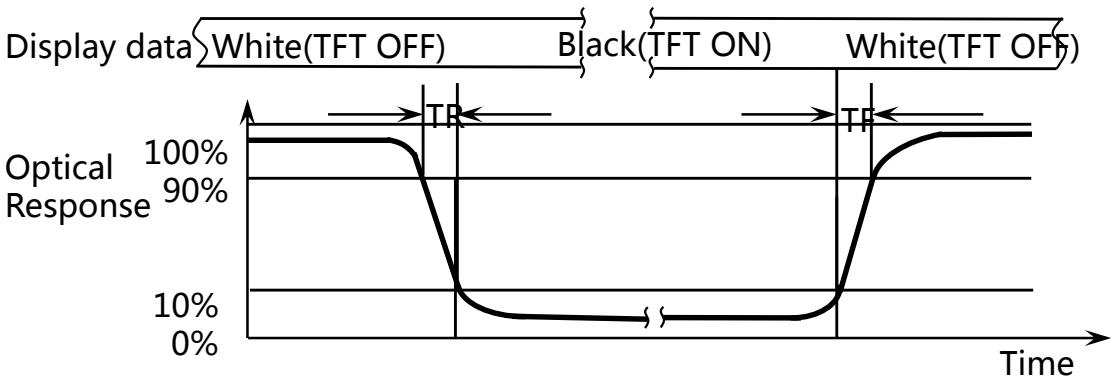
Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

Figure 3. Uniformity Measurement Locations (13 points)



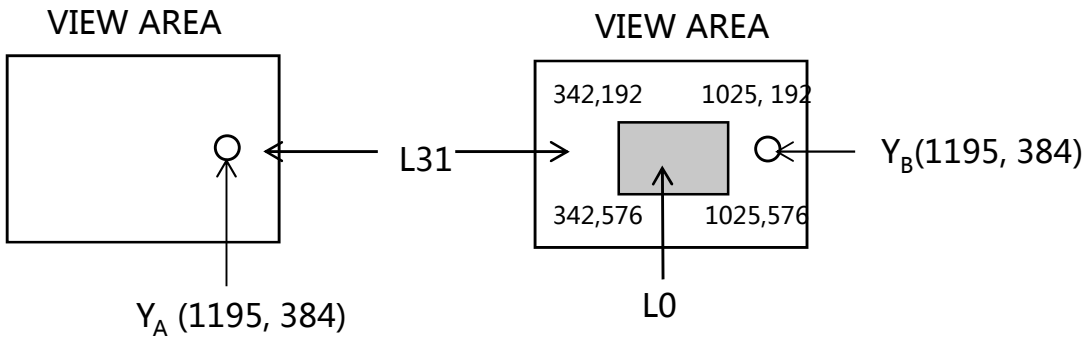
The White luminance uniformity on LCD surface is then expressed as : ΔY5 = Minimum Luminance of five points / Maximum Luminance of five points (see FIGURE 2) , ΔY13 = Minimum Luminance of 13 points /Maximum Luminance of 13 points (see FIGURE 3).

Figure 4. Response Time Testing



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

Figure 5. Cross Modulation Test Description



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

Where:

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

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

The location measured will be exactly the same in both patterns

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

5.0 RELIABLITY TEST

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

<Table 17. Reliability Test Parameters >

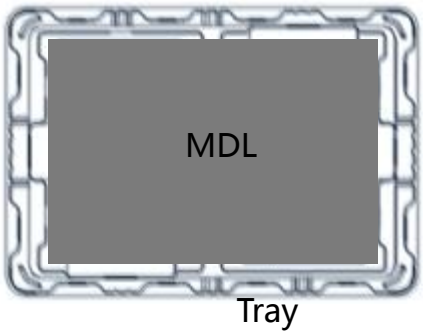
No	Test Items	Conditions
1	High temperature storage test	Ta = 60 ℃, 240 hrs
2	Low temperature storage test	Ta = -20 ℃, 240 hrs
3	High temperature & high humidity (operation test)	Ta = 50 ℃, 80%RH, 240 hrs
4	Low temperature operation test	Ta = 0 ℃, 240 hrs
5	High temperature operation test	Ta = 50 ℃, 240 hrs
6	Thermal Shock Test	Ta = -20 ℃ ↔ 60 ℃ (0.5 hr), 100 cycle
7	Vibration test (non-operating)	1.5G, 10~500Hz,Half Sine X,Y,Z / Sweep rate : 1 hour
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
…		

6.0 PACKING INFORMATION(产品形态：LCM)

Packing procedure:

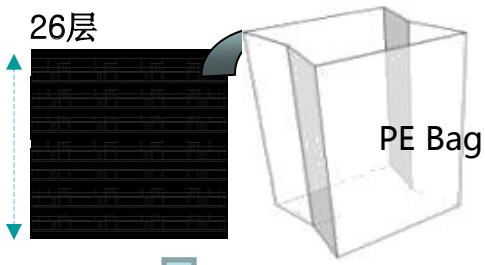
-. 将 1pcs MDL 平放入Tray

-. 上面放置1pcs Spacer



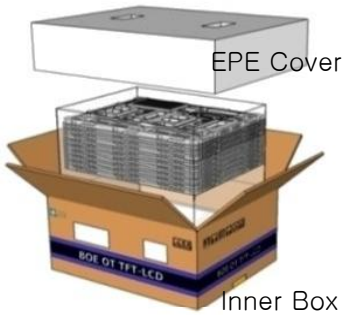
-. 将26pcs PET Tray 平放入PE Bag 顶部1pcs 空Tray

-. Tray 不旋转码放



- .将PET Tray堆码后平放入Inner Box 上下放置EPE Cover

-. 容量：25pcs/Inner Box



-. 每个Pallet上放3层Box, 1层4箱 Box旋转码放, 共计12ea Box

-. Pallet外进行缠膜包装

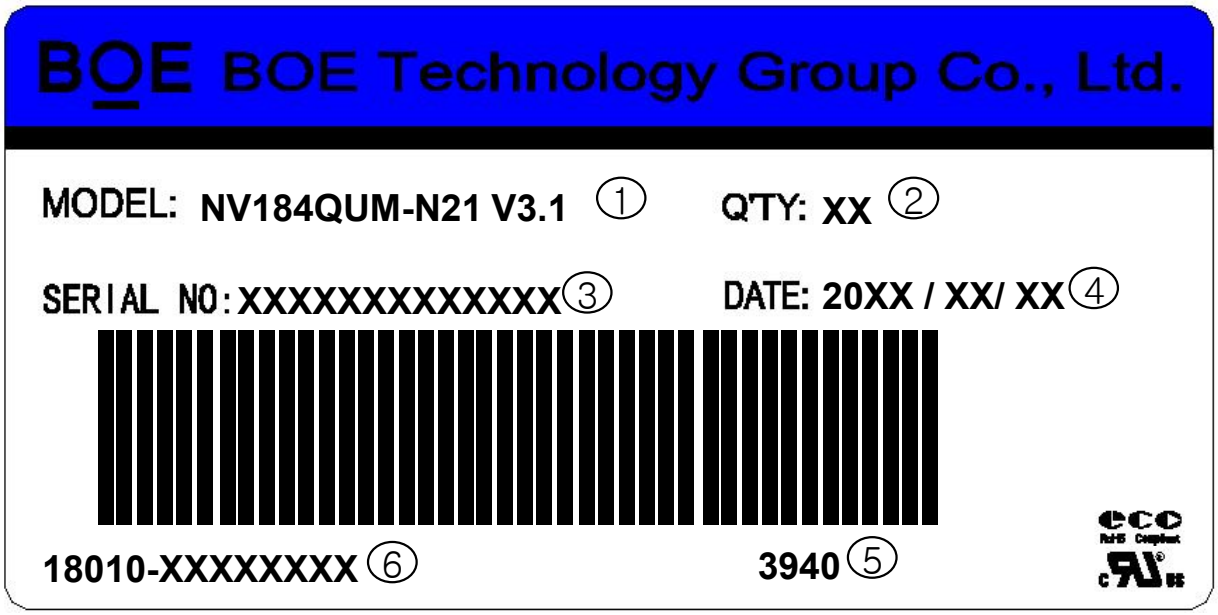
-. 容量: 300pcs/Pallet

6.1 Packing Note(产品形态：LCM)

- Box Dimension: 630mm(W) x 430mm(D) x 290mm(H)
- Package Quantity in one Box: 25pcs

6.2 Box label (产品形态：LCM)

- Label Size :80mm*50mm
- Contents
  Model : LCM
  Q`ty : 25pcs/Box
  Serial No. : Box Serial No. as shown below.
  Date : Packing Date
  FG Code : FG Code of Product



1. FG-CODE: NV184QUM-N21 V3.1
2. Box 产品数量
3. Box ID, 编码规则如下
4. Box Packing 日期
5. FG-CODE 后四位: 3940
6. 客户料号: 18010-XXXXXXXX

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13
代码	X	X	S	3	1	5	B	0	0	0	1	H	D
描述	GBN代码		等级	B3	年份		月	Rev	序列号				

7.0 Product Label

Label Size: 48mm × 12mm / 厚度: 0.08mm

1. FG-CODE
2. MDL ID
3. MDL ID 条纹码

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
代码	X	X	P	3	5	2	7	3	9	4	0	0	0	1	E	E	J
描述	生管指定		等级 S,A,P,Q 等	工厂 B3	年	月	日	FG Code后四位				流水码 36进制(无I和 O)					

年: 2015—5, 2016—6 …… 2020---0, 2021---1…..
月: 1~12月→ 1~9, A, B, C
日: 1~31 → 1~9, A~V

8.0 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.

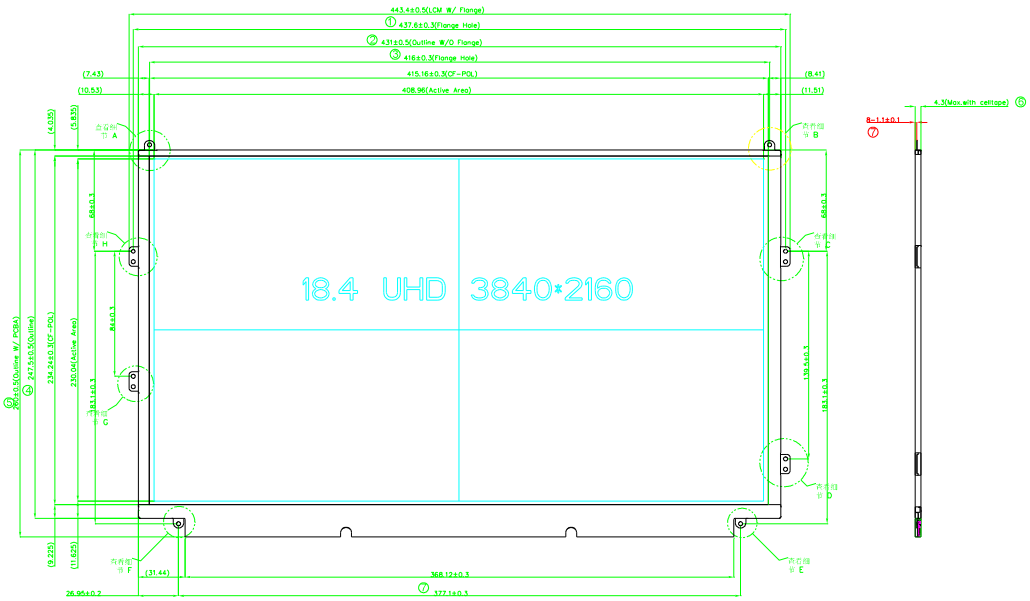
(5) Cautions for the module characteristics
- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.

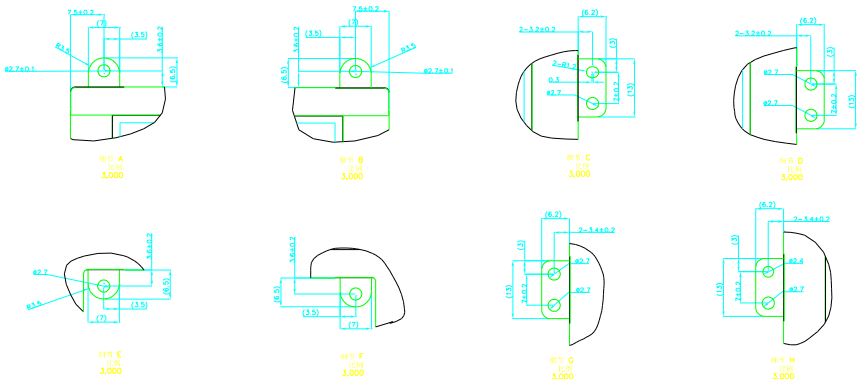
(6) Other cautions
- Do not disassemble and/or re-assemble LCD module.
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc., Please pack the module not to be broken.
  We recommend to use the original shipping packages.

9.0 APPENDIX

Mechanical Drawing

Drawing Attachment: Front

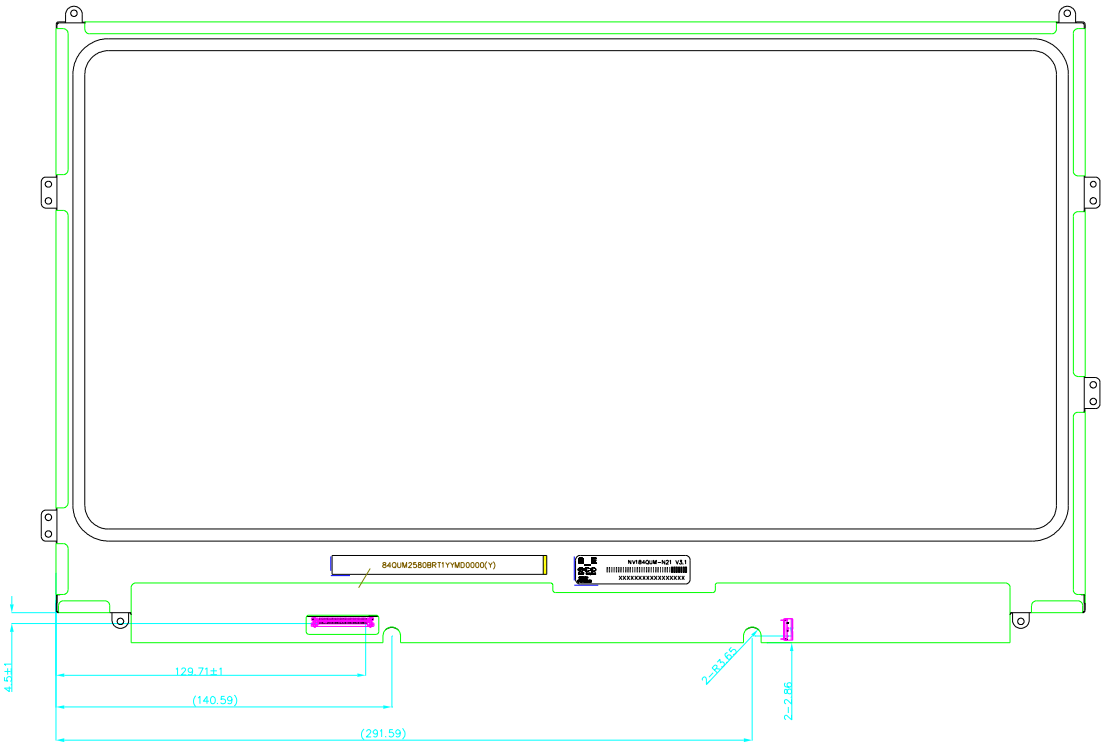




TOLERANCE TABLE(±)				
DIMENSION	1 GRADE	2 GRADE	3 GRADE	4 GRADE
L ≤ 20	0.05	0.1	0.1	0.2
20 < L ≤ 50	0.1	0.15	0.2	0.25
50 < L ≤ 100	0.15	0.2	0.25	0.3
100 < L ≤ 200	0.2	0.25	0.3	0.5
200 < L	0.25	0.3	0.5	0.8
UNLESS OTHERWISE SPECIFIED				

Mechanical Drawing

Drawing Attachment: Back



NOTE

1. PCB side is lower than Top Polarizer, and any other PCB componet IS lower than Top Polarizer.
2. Other side Cell Tape is lower than Top Polarizer.
3. Warps And Deformation Are 0.8mm MAX

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	DA	218		1754	ID = 1754
0B		06	6			
0C	32-bit serial No.	00	0			
0D		00	0			
0E		00	0			
0F		00	0			
10	Week of manufacture	13	19		19	
11	Year of Manufacture	1A	26		2016	Manufactured in 2016
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		-	
15	Max H image size	28	40		41	40.896 cm (Approx)
16	Max V image size	17	23		23	23.004 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	0E	14		-	Red / Green Low Bits
1A	Blue/White low bits	7E	126		-	Blue / White Low Bits

Address (HEX)	Function	Hex	Dec	crc	Input values.	Notes
1B	Red x high bits	A7	167	668	0.653	Red (x) = 10100111 (0.653)
1C	Red y high bits	51	81	324	0.317	Red (y) = 01010001 (0.317)
1D	Green x high bits	35	53	211	0.207	Green (x) = 00110101 (0.207)
1E	Green y high bits	B6	182	730	0.713	Green (y) = 10110110 (0.713)
1F	Blue x high bits	26	38	153	0.15	Blue (x) = 00100110 (0.15)
20	BLue y high bits	0E	14	59	0.058	Blue (y) = 00001110 (0.058)
21	White x high bits	53	83	331	0.324	White (x) = 01010011 (0.324)
22	White y high bits	54	84	338	0.331	White (y) = 01010100 (0.331)
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			

Address (HEX)	Function	Hex	Dec	crc	Input values.	Notes
36	Detailed timing/ monitor descriptor #1	4D	77		533.3	533.3MHz Main clock
37		D0	208			
38		00	0		3840	Hor Active = 3840
39		A0	160		160	Hor Blanking = 160
3A		F0	240		-	4 bits of Hor. Active + 4 bits of Hor. Blanking
3B		70	112		2160	Ver Active = 2160
3C		3E	62		62	Ver Blanking = 62
3D		80	128		-	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		35	53		3	V sync Offset = 3 line
41		00	0		5	V Sync Pulse width : 5 line
42		98	152		409	Horizontal Image Size = 409 mm (Low 8 bits)
43		E6	230		230	Vertical Image Size = 230 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	E0	224		355.5	355.5MHz Main clock
49		8A	138			
4A		00	0		3840	Hor Active = 3840
4B		A0	160		160	Hor Blanking = 160
4C		F0	240		-	4 bits of Hor. Active + 4 bits of Hor. Blanking
4D		70	112		2160	Ver Active = 2160
4E		3E	62		62	Ver Blanking = 62
4F		80	128		-	4 bits of Ver. Active + 4 bits of Ver. Blanking
50		30	48		48	Hor Sync Offset = 48
51		20	32		32	H Sync Pulse Width = 32
52		35	53		3	V sync Offset = 3 line
53		00	0		5	V Sync Pulse width : 5 line
54		98	152		409	Horizontal Image Size = 409 mm (Low 8 bits)
55		E6	230		230	Vertical Image Size = 230 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			

Address (HEX)	Function	Hex	Dec	crc	Input values.	Notes
5A	Detailed timing/ monitor descriptor #3	00	0			
5B		00	0			
5C		00	0			
5D		00	0			
5E		00	0			
5F		00	0			
60		00	0			
61		00	0			
62		00	0			
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			
6C	Detailed timing/ monitor descriptor #4	00	0		0	
6D		00	0		0	
6E		00	0		0	
6F		02	2			
70		00	0		0	
71		0C	12			
72		2D	45			
73		FF	255			
74		10	16			
75		3C	60			
76		A6	166			
77		32	50			
78		46	70			
79		3A	58			
7A		A6	166		0	
7B		00	0		0	
7C		00	0		0	
7D		00	0			
7E	Extension flag	00	0			
7F	Checksum	6D	109	109	-	