

**TITLE : NV140XTM-N52 V3.1****Customer: ASUS****Product Specification****Rev. P1****BOE Optoelectronics Technology Co., Ltd**

## REVISION HISTORY

( ) Preliminary Specification

(√) Final Specification

| Revision No. | Page | Description of Changes   | Date       | Prepared |
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| P0           | 40   | First Edition  | 2019.03.18 | Li Bin   |
| P1           | 40   | EDID change for 4 group Timing,<br>Add MDL Warpage spec, FG Code | 2019.04.30 | Li Bin   |
|              |      |  |            |          |
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## 1.0 GENERAL DESCRIPTION

### 1.1 Introduction

NV140XTM-N52 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 14.09inch diagonally measured active area with 4k1k resolutions (3840 horizontal by 1100 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(8bit) colors and color gamut 72% NTSC. The TFT-LCD panel used for this module is a low reflection and higher color type. Therefore, this module is suitable for Notebook Touch bar. The LED driver for back-light driving is built in this model.

All input signals are eDP1.3 interface compatible.

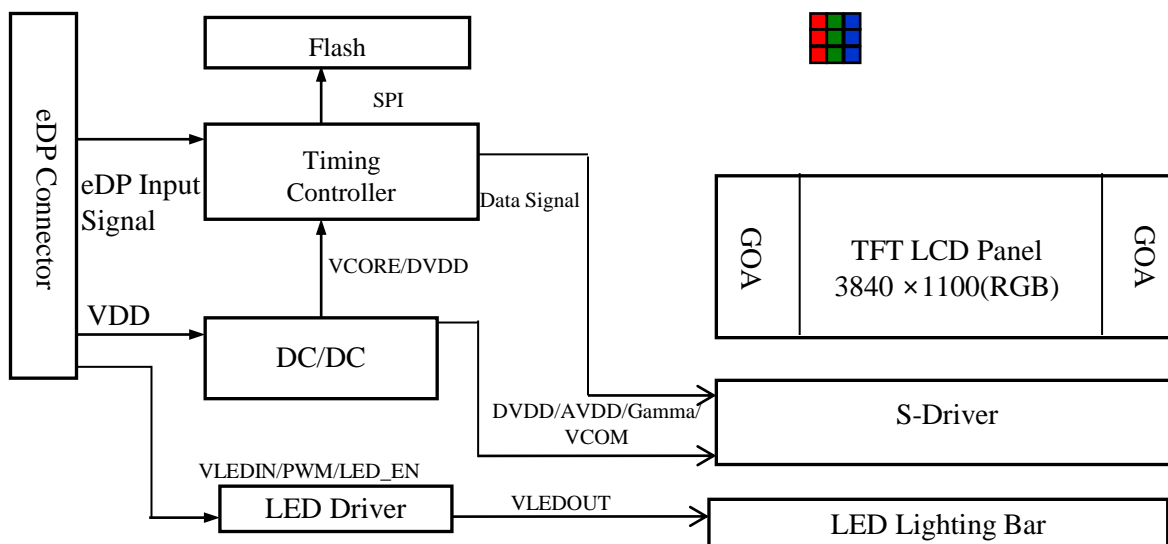


Figure 1. Drive Architecture

### 1.2 Features

- 2 lane eDP interface with 5.4Gbps link rates
- Thin and light weight
- 16.7M(8bit) color depth, color gamut 72% NTSC.
- Single LED lighting bar (Bottom side/Horizontal Direction)
- Data enable signal mode
- Side mounting frame
- Green product (RoHS & Halogen free product)
- On board LED driving circuit
- Low driving voltage and low power consumption
- On board EDID chip
- DPCD Version 1.4
- Function : SDRRS(on) / CABC(on) / PSR(on)
- Edp:1.3

## 1.0 GENERAL DESCRIPTION

### 1.3 Application

- Notebook Touch bar (Wide type)

### 1.4 General Specification

The followings are general specifications at the model NV140XTM-N52 V3.1. (listed in Table 1)

<Table 1. General Specifications>

| Parameter           | Specification   | Unit   | Remarks |
|---------------------|---|--------|---------|
| Active area         | 344.2176(H)×98.604(V)   | mm     |         |
| Number of pixels    | 3840 (H) ×1100 (V)  | pixels |         |
| Pixel pitch         | 0.08964 (H) ×0.08964 (V)  | um     |         |
| Pixel arrangement   | RGB Vertical stripe   |        |         |
| Display colors      | 16.7M (8Bit)  |        |         |
| Color gamut         | 72% NTSC ( typ. )   |        |         |
| Display mode        | Normally Black  |        |         |
| Dimensional outline | 350.52±0.3x108.75±0.3(w/o PCBA)<br>350.52±0.3x118.65±0.5(w/ PCBA) | mm     |         |
| Weight              | 170(max)  | g      |         |
| Surface treatment   | HC+APF  |        |         |
| Surface hardness    | 3H  |        |         |
| Back-light          | Down edge side, 1-LED lighting bar type                           |        | Note 1  |
| Power consumption   | P <sub>D</sub> : 1.1(Max.)  | W      | @Mosaic |
|                     | P <sub>BL</sub> : 2.0(Max.)                                       | W      |         |
|                     | P <sub>Total</sub> : 3.1(Max.)                                    | W      | @Mosaic |

Notes : 1. LED Lighting Bar (60\*LED Array)

## 2.0 ABSOLUTE MAXIMUM RATINGS

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

< Table 2. Absolute Maximum Ratings >

Ta=25+/-2°C

| Parameter             | Symbol           | Min.                 | Max.                 | Unit | Remarks |
|-----------------------|------------------|----------------------|----------------------|------|---------|
| Power Supply Voltage  | V <sub>DD</sub>  | -0.3                 | 4.0                  | V    | Note 1  |
| eDP input Voltage     | V <sub>eDP</sub> | 0                    | 1.2                  | V    |         |
| Logic Supply Voltage  | V <sub>IN</sub>  | V <sub>SS</sub> -0.3 | V <sub>DD</sub> +0.3 | V    |         |
| Operating Temperature | T <sub>OP</sub>  | 0                    | +60                  | °C   | Note 2  |
| Storage Temperature   | T <sub>ST</sub>  | -20                  | +65                  | °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 °C ≥ Ta) Maximum wet - bulb temperature at 39 °C or less. (Ta > 40 °C ) No condensation.

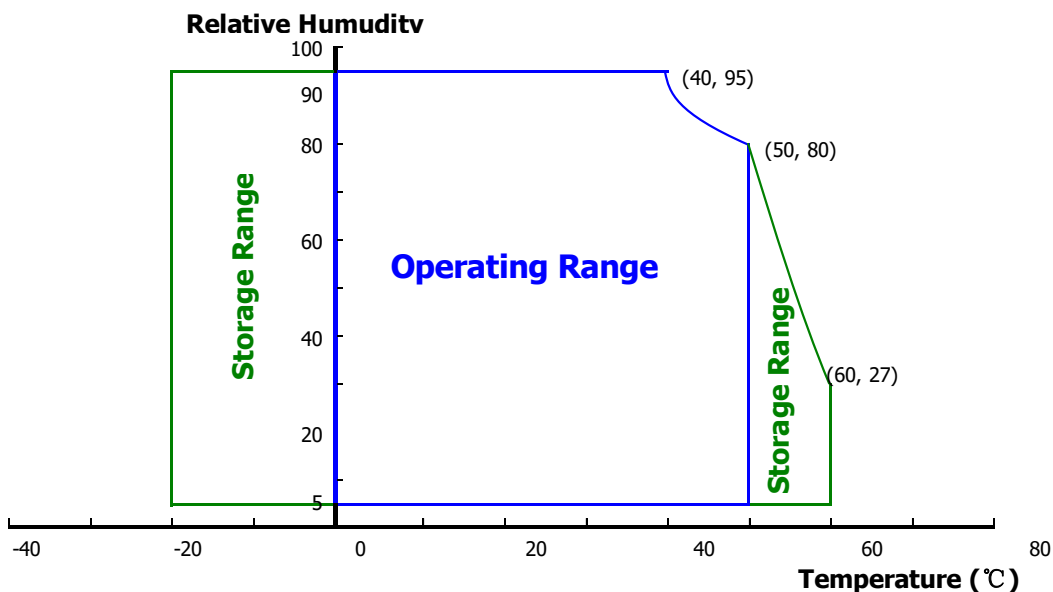


Figure 2. Temperature and Relative Humidity Range

### 3.0 ELECTRICAL SPECIFICATIONS

#### 3.1 Electrical Specifications

< Table 3. Electrical Specifications >

Ta=25+/-2°C

| Parameter                        |                 | Min.               | Typ. | Max.       | Unit | Remarks                  |         |
|----------------------------------|-----------------|--------------------|------|------------|------|--------------------------|---------|
| Power Supply Voltage             | V <sub>DD</sub> | 3.0                | 3.3  | 3.6        | V    | Note 1                   |         |
| Permissible Input Ripple Voltage | V <sub>RF</sub> | -                  | -    | 100        | mV   | @ V <sub>DD</sub> = 3.3V |         |
| BIST Control Level               | High Level      | 0.8 VDDIO          | -    | 3.3        | V    | @VDDIO=1.8 V             |         |
|                                  | Low Level       | 0                  | -    | 0.15 VDDIO | V    |                          |         |
| Power Supply Inrush Current      | Inrush          | -                  | -    | 2          | A    | Note3                    |         |
| Power Supply Current             | Mosaic          | I <sub>DD</sub>    | -    | 330        | 360  | mA                       | Note 1  |
|                                  | RGB             |                    | -    | 600        | 670  | mA                       |         |
| Power Consumption                | Mosaic          | P <sub>M</sub>     | -    | -          | 1.1  | W                        |         |
|                                  | RGB             | P <sub>RGB</sub>   | -    | -          | 2    | W                        |         |
|                                  | BLU             | P <sub>BL</sub>    | -    | -          | 2    | W                        | Note 2  |
|                                  | Total           | P <sub>Total</sub> | -    | -          | 3.1  | W                        | @Mosaic |

## 3.0 ELECTRICAL SPECIFICATIONS

### 3.1 Electrical Specifications

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) Mosaic pattern 8\*4
- b) R/G/B patterns (maximum logic power consumption)



Figure 3. Power Measure Patterns

- 2. Calculated value for reference ( $V_{LED} \times I_{LED}$ )
- 3. Measure condition (Figure 4)

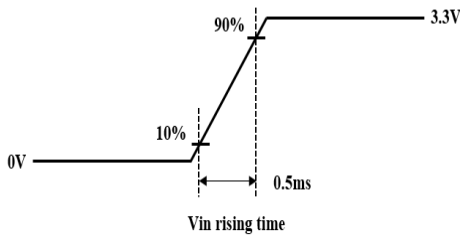


Figure 4. Inrush Measure Condition



## 3.0 ELECTRICAL SPECIFICATIONS

### 3.2 Backlight Unit

< Table 4. LED Driving Guideline Specifications >

Ta=25+/-2°C

| Parameter                                  |                  | Min.                | Typ. | Max.  | Unit | Remarks                         |  |
|--|------------------|---------------------|------|-------|------|---------------------------------|--|
| LED Forward Voltage                        | V <sub>F</sub>   | -                   | -    | 2.9   | V    |                                 |  |
| LED Forward Current                        | I <sub>F</sub>   | -                   | 9.5  | -     | mA   |                                 |  |
| LED Power Input Voltage                    | V <sub>LED</sub> | 5                   | 12   | 21    | V    |                                 |  |
| LED Power Input Current                    | I <sub>LED</sub> | -                   | -    | 167   | mA   | Note 1                          |  |
| LED Power Consumption                      | P <sub>LED</sub> | -                   | -    | 2     | W    |                                 |  |
| Power Supply Voltage for LED Driver Inrush | V <sub>LED</sub> | 5                   | 12   | 21    | V    | Note 3                          |  |
| LED Life-Time                              | N/A              | 15,000              | -    | -     | Hour | I <sub>F</sub> = 20mA<br>Note 2 |  |
| EN Control Level                           | Backlight On     | V <sub>BL_EN</sub>  | 1.8  | 2.5   | 5.0  | V                               |  |
|  | Backlight Off    |                     | 0    | -     | 0.5  | V                               |  |
| PWM Control Level                          | High Level       | V <sub>BL_PWM</sub> | 1.8  | 2.5   | 5.0  | V                               |  |
|  | Low Level        |                     | 0    | -     | 0.5  | V                               |  |
| PWM Control Frequency                      | F <sub>PWM</sub> | 200                 | -    | 2,000 | Hz   |                                 |  |
| Duty Ratio                                 |                  | 1                   | -    | 100   | %    |                                 |  |

Notes :

1. Power supply voltage 12V for LED driver.

Calculator value for reference  $I_F \times V_F \times N / \text{driver efficiency} = P_{LED}$

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

3. Measure condition (Figure 5)

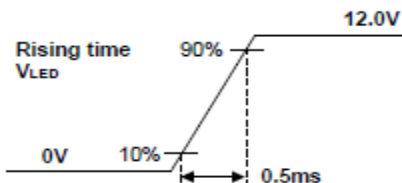


Figure 5. Inrush Measure Condition

## 3.0 ELECTRICAL SPECIFICATIONS

### 3.3 LED Structure

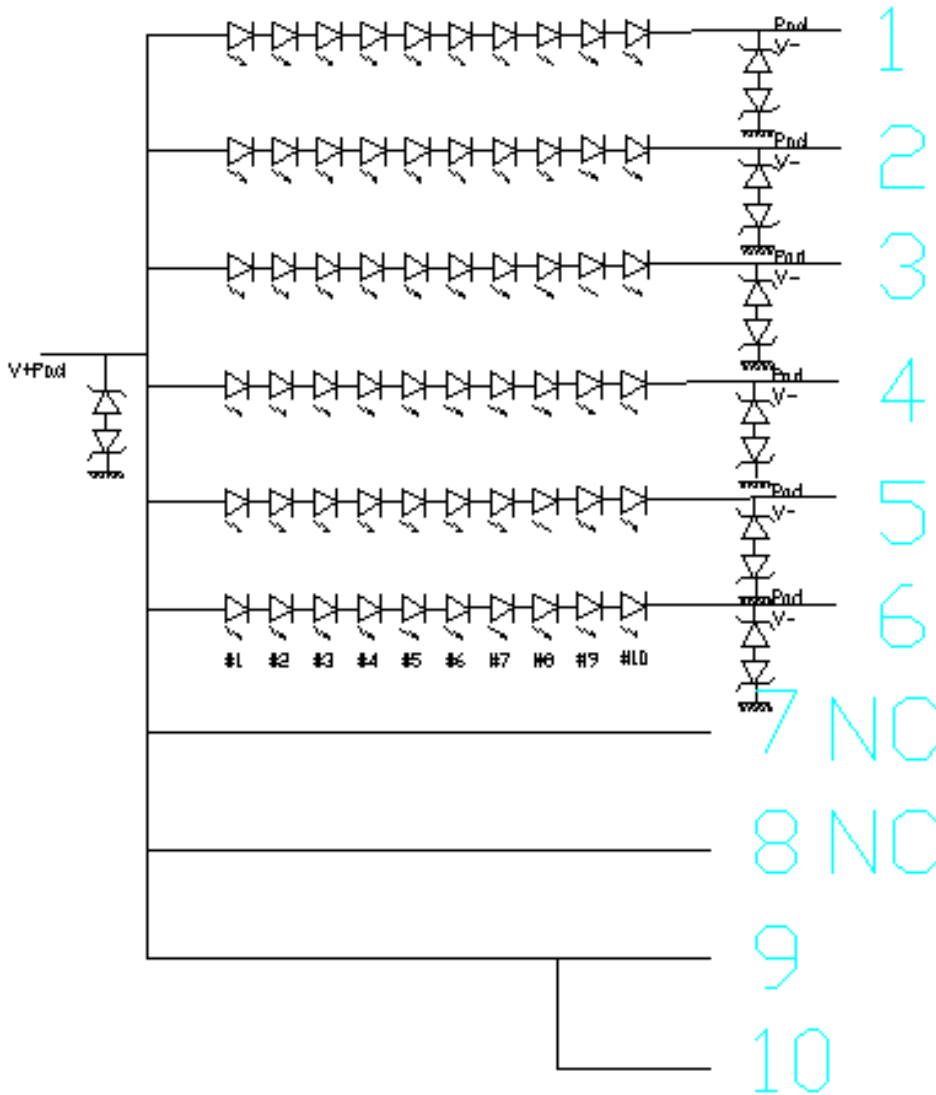


Figure 6. LED Structure