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## **SeeYA 0.49" Micro-OLED Specification**

**Model Name: SY049WDM01**





Revision

| Version | Date      | Description                                                                   |
|---------|-----------|-------------------------------------------------------------------------------|
| V1.0    | 2021.4.7  | Initial release                                                               |
| V1.1    | 2021.4.15 | Correct Page13 application circuit; Update page53 warranty term to “12months” |
|         |           |                                                                               |
|         |           |                                                                               |
|         |           |                                                                               |
|         |           |                                                                               |
|         |           |                                                                               |
|         |           |                                                                               |
|         |           |                                                                               |



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## 1 General Description

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This display is a 0.49 inch diagonal, 1920(RGB) × 1080 dots active matrix color OLED module based on single-crystal silicon transistors. This module integrates panel driver and logic driver, and realizes small size, light weight, low power consumption and high resolution.

Applications: Augmented Reality, View finders, Head mounted displays, etc.

- 1920 x 1080 Sub Pixel Rendering Resolution  
Multi-Resolution (4\*M, M=160~480) x RGB x (4\*N, N=120~270)
  - Frame rate: 1920x1080 up to 90Hz
  - Support 8bits or 10bits color depth
  - Interface
    - MIPI+ I2C
    - MIPI DPHY v1.2 with one port (4 lanes), 1.0Gbps/Lane
    - MIPI DSI v1.01 R11 Video mode
    - Support VESA-DSC v1.1 in-chip decoder (3X and 3.75X compression ratio)
    - Support scaling up 1.33x(e.g., 1440x810 to 1920x1080), 1.5x (e.g., 1280x720 to 1920x1080) and 2x (e.g., 960x540 to 1920x1080)
  - Scan direction selection, up or down and right or left
  - Orbit supported
  - Wide range Brightness adjustment
  - Sequential/Global emission
  - Temperature compensation
  - Image Anchoring
-



## 2 General Feature

---

| Parameter                                                                  | Specification                                         |
|----------------------------------------------------------------------------|-------------------------------------------------------|
| Resolution                                                                 | 1920(H) x 1080 (V)                                    |
| Number of dots                                                             | 1920x1080x2(2/3 SPR)                                  |
| Pixel Size                                                                 | 5.616 $\mu$ m x 5.616 $\mu$ m                         |
| Active Area                                                                | 10.783mm x 6.065mm / 0.49" diagonal                   |
| Luminance                                                                  | 1800cd/m <sup>2</sup> typical                         |
| Contrast Ratio                                                             | 50000:1                                               |
| Uniformity                                                                 | > 85%                                                 |
| Operating Voltage                                                          | AVDD: 5.3v~5.5v<br>AVEE: -4~-5.5v<br>VDDI: 1.65~1.95v |
| Power Consumption<br>(3 power mode, 90hz, 1800nits, VESA on, Rolling mode) | 468mW                                                 |
| Gray Levels                                                                | 256 or 1024                                           |
| Interface                                                                  | MIPI                                                  |
| Frame Rate                                                                 | 60Hz~90Hz                                             |
| Weight                                                                     | ~1g                                                   |
| Operating Temperature                                                      | -20°C to +70°C                                        |
| Storage Temperature                                                        | -40°C to +80°C                                        |

### 3 Optical

| Symbol             | Parameter                                                   | Min.    | Typ.    | Max.  | Unit  |
|--------------------|-------------------------------------------------------------|---------|---------|-------|-------|
| Brightness         | Tpanel=20℃<br>~50℃                                          | 1350    | 1800    | 2250  | cd/m2 |
| CR                 | white to Black<br>Contrast Ratio                            | 20000:1 | 50000:1 |       |       |
| Uniformity         | 9 points<br>uniformity                                      | 85      |         |       | %     |
| Red Chromaticity   | CIE1931-x                                                   | 0.625   | 0.655   | 0.685 |       |
|                    | CIE1931-y                                                   | 0.300   | 0.330   | 0.360 |       |
| Green Chromaticity | CIE1931-x                                                   | 0.210   | 0.245   | 0.280 |       |
|                    | CIE1931-y                                                   | 0.650   | 0.680   | 0.710 |       |
| Blue Chromaticity  | CIE1931-x                                                   | 0.120   | 0.150   | 0.180 |       |
|                    | CIE1931-y                                                   | 0.025   | 0.055   | 0.085 |       |
| White Chromaticity | CIE1931-x                                                   | 0.298   | 0.313   | 0.328 |       |
|                    | CIE1931-y                                                   | 0.314   | 0.329   | 0.343 |       |
| Color Gamut        | DCI-P3                                                      | 80%     | 90%     |       |       |
| View angle         | White<br>luminance decay<br>to 50%                          | 35°     |         |       |       |
| Frame rate         |                                                             | 60      |         | 90    | HZ    |
| Power consumption  | 90hz,1800nits,<br>VESA DSC on,<br>Full white, No<br>scaling |         | 468     | 515   | mW    |

**Note1:** If there is no specified, the specification of optical is specified at 30 degree Celsius.

**Note2:** Definition of optical measurement system.

The optical characteristics should be measured in dark room. Brightness is measured as peak luminance at full white pattern (Gray level=255);

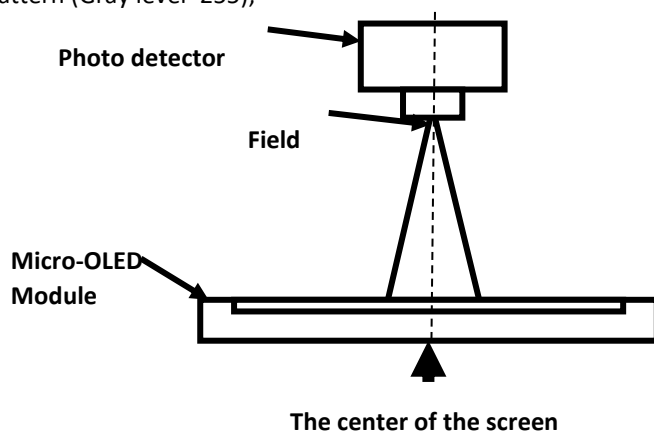
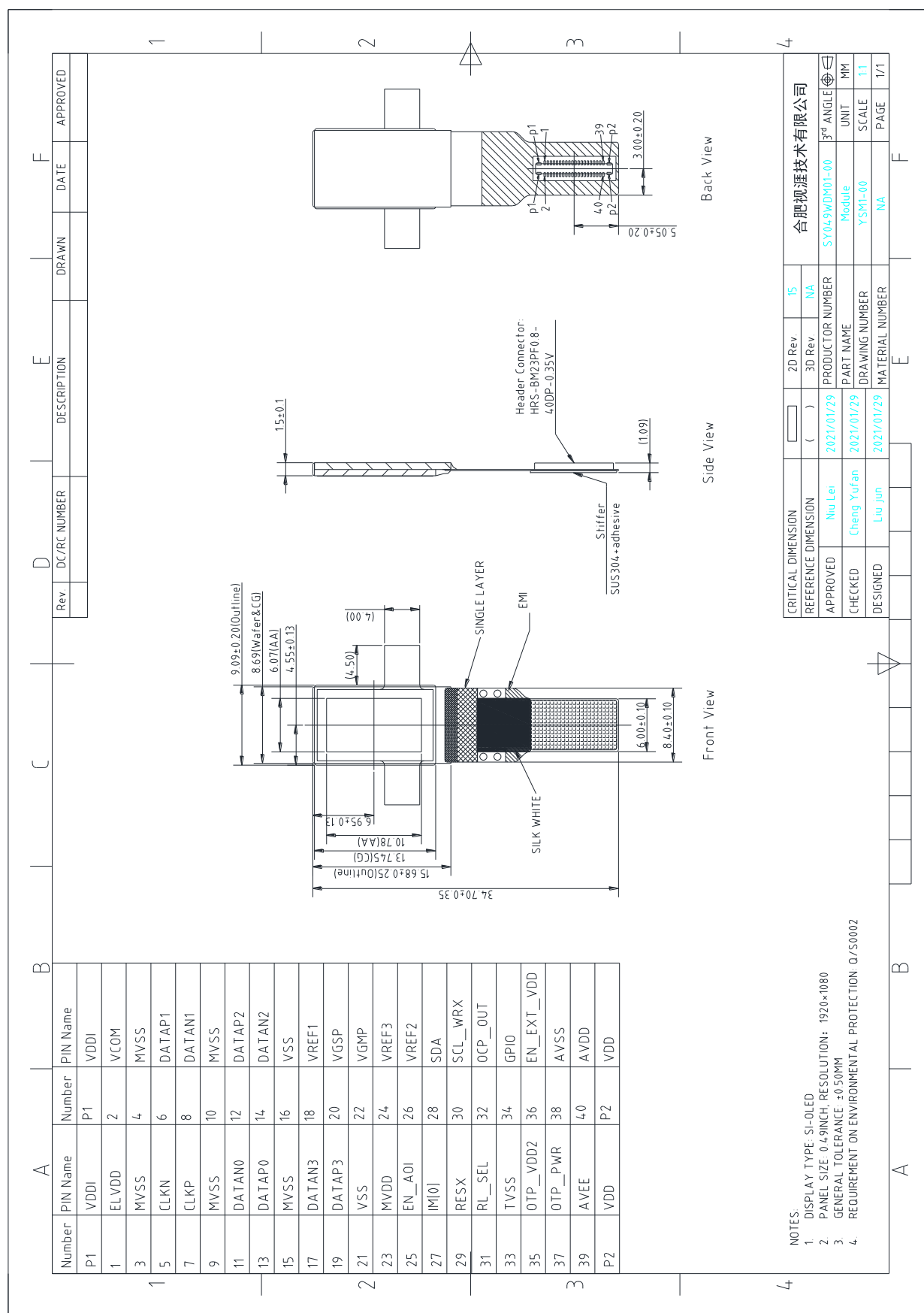


Fig.1



## 6 Module Diagram





## 7 Pin Description

### 7.1 Pin Description

| Pin No. | Symbol | Type             | Description                                                                                                                                        |
|---------|--------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| P1      | VDDI   | Power            | Power supply for interface system except for the interface.                                                                                        |
| P1      | VDDI   | Power            | Power supply for interface system except for the interface.                                                                                        |
| 1       | ELVDD  | Output           | Power supply for OLED cell.<br>connect a capacitor for stabilization.                                                                              |
| 2       | VCOM   | Output           | Regulator output for common electrode voltage.<br>connect a capacitor for stabilization, connect a TVS diode to GND.                               |
| 3       | MVSS   | Power            | System GND for MIPI interface.                                                                                                                     |
| 4       | MVSS   | Power            | System GND for MIPI interface.                                                                                                                     |
| 5       | CLKN   | Input            | This pin is DSI CLK- signal if MIPI interface is used.<br>CLKP/N is differential small amplitude signals.<br>If not used, please keep it open.     |
| 6       | DATAP1 | Input/<br>Output | This pin is DSI D1+ signal if MIPI interface is used.<br>DATA1P/N is differential small amplitude signals.<br>If not used, please keep it open.    |
| 7       | CLKP   | Input            | This pin is DSI CLK+ signal if MIPI interface is used.<br>CLKP/N_PTA is differential small amplitude signals.<br>If not used, please keep it open. |
| 8       | DATAN1 | Input/<br>Output | This pin is DSI D1- signal if MIPI interface is used.<br>DATA1P/N is differential small amplitude signals.<br>If not used, please keep it open.    |
| 9       | MVSS   | Power            | System GND for MIPI interface.                                                                                                                     |
| 10      | MVSS   | Power            | System GND for MIPI interface.                                                                                                                     |
| 11      | DATAN0 | Input/<br>Output | This pin is DSI D0- signal if MIPI interface is used.<br>DATA0P/N is differential small amplitude signals.<br>If not used, please keep it open.    |
| 12      | DATAP2 | Input/<br>Output | This pin is DSI D2+ signal if MIPI interface is used.<br>DATA2P/N is differential small amplitude signals.<br>If not used, please keep it open.    |
| 13      | DATAP0 | Input/<br>Output | This pin is DSI D0+ signal if MIPI interface is used.<br>DATA0P/N is differential small amplitude signals.<br>If not used, please keep it open.    |
| 14      | DATAN2 | Input/<br>Output | This pin is DSI D2- signal if MIPI interface is used.<br>DATA2P/N is differential small amplitude signals.<br>If not used, please keep it open.    |
| 15      | MVSS   | Power            | System GND for MIPI interface.                                                                                                                     |
| 16      | VSS    | Power            | System GND for internal digital system.                                                                                                            |
| 17      | DATAN3 | Input/<br>Output | This pin is DSI D3- signal if MIPI interface is used.<br>DATA3P/N is differential small amplitude signals.<br>If not used, please keep it open.    |
| 18      | VREF1  | Power            | Regulator output for internal reference voltage.<br>Connect a capacitor for stabilization.                                                         |
| 19      | DATAP3 | Input/<br>Output | This pin is DSI D3+ signal if MIPI interface is used.<br>DATA3P/N is differential small amplitude signals.<br>If not used, please keep it open.    |
| 20      | VGSP   | Output           | Regulator output for gamma low voltage generation.<br>Connect a capacitor for stabilization.                                                       |
| 21      | VSS    | Power            | System GND for internal digital system.                                                                                                            |
| 22      | VGMP   | Output           | Regulator output for gamma high voltage generation.<br>Connect a capacitor for stabilization.                                                      |
| 23      | MVDD   | Output           | Regulator output for MIPI digital system power.<br>Connect a capacitor for stabilization.                                                          |
| 24      | VREF3  | Output           | Regulator output for internal reference voltage.<br>Connect a capacitor for stabilization.<br>Connect a Schottky diode to GND                      |
| 25      | EN_AOI | Input            | Connect to GND.                                                                                                                                    |
| 26      | VREF2  | Output           | Regulator output for internal reference voltage.<br>Connect a capacitor for stabilization.                                                         |



|    |            |                  |                                                                                                                                |             |              |
|----|------------|------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|
| 27 | IM[0]      | Input            | Use to select the Interface type.                                                                                              |             |              |
|    |            |                  | IM[0]                                                                                                                          | Command     | Display Data |
|    |            |                  | 0V                                                                                                                             | MIPI        | MIPI         |
|    |            |                  | 1.8V                                                                                                                           | I2C or MIPI | MIPI         |
| 28 | SDA        | Input/<br>Output | Bi-direction data PIN in I2C I/F.<br>If this pin is not used, please connect to VDDI.                                          |             |              |
| 29 | RESX       | Input            | This signal will reset the device and must be applied to properly initialize the chip. Signal is active low.                   |             |              |
| 30 | SCL_WRX    | Input            | Synchronous clock signal in I2C I/F.<br>If this pin is not used, please connect to VDDI.                                       |             |              |
| 31 | RL_SEL     | Input            | Use to select I2C slave address.<br>RL_SEL = 0v: slave address = 0x4C or 0x4E.<br>RL_SEL = 1.8v: slave address = 0x4D or 0x4E. |             |              |
| 32 | OCP_OUT    | Output           | Over current protect output flag.                                                                                              |             |              |
| 33 | V_TEST     | Output           | Connect to VCOM.                                                                                                               |             |              |
| 34 | GPIO       | Input/<br>Output | Digital global purpose in/out test pin.                                                                                        |             |              |
| 35 | OTP_VDD2   | Output           | Regulator output for MTP analog system power.<br>Connect a capacitor for stabilization.                                        |             |              |
| 36 | EN_EXT_VDD | Input            | Connect to GND.                                                                                                                |             |              |
| 37 | OTP_PWR    | Input            | Connect to GND.                                                                                                                |             |              |
| 38 | AVSS       | Power            | System GND for analog system.                                                                                                  |             |              |
| 39 | AVEE       | Power            | -4.0V~-5.5V Power supply for OLED cell.<br>connect a capacitor for stabilization.                                              |             |              |
| 40 | AVDD       | Power            | 5.3V~5.5V Power supply for analog system.<br>connect a capacitor for stabilization.                                            |             |              |
| P2 | VDD        | Output           | Regulator output for logic system power.<br>Connect a capacitor for stabilization.                                             |             |              |
| P2 | VDD        | Output           | Regulator output for logic system power.<br>Connect a capacitor for stabilization.                                             |             |              |