



# FOCUS LCDs

LCDs MADE SIMPLE®

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TFT | OLED | GRAPHIC | CHARACTER | UWVD | SEGMENT | CUSTOM

## Graphic OLED Module

Part Number

O12864B-GW-TW3

### Overview:

- 128x64 Graphic OLED
- White Pixel Color
- Overall Size: 60.5mm x 37.0mm
- Parallel Interface
- -40C to 70C Operating Temperature
- 1.65V to 3.5V
- Controller: SSD1309ZC
- RoHS Compliant

**Graphic OLED Features:**

Resolution: 128 x 64

Interface: Parallel

Controller: SSD1309ZC

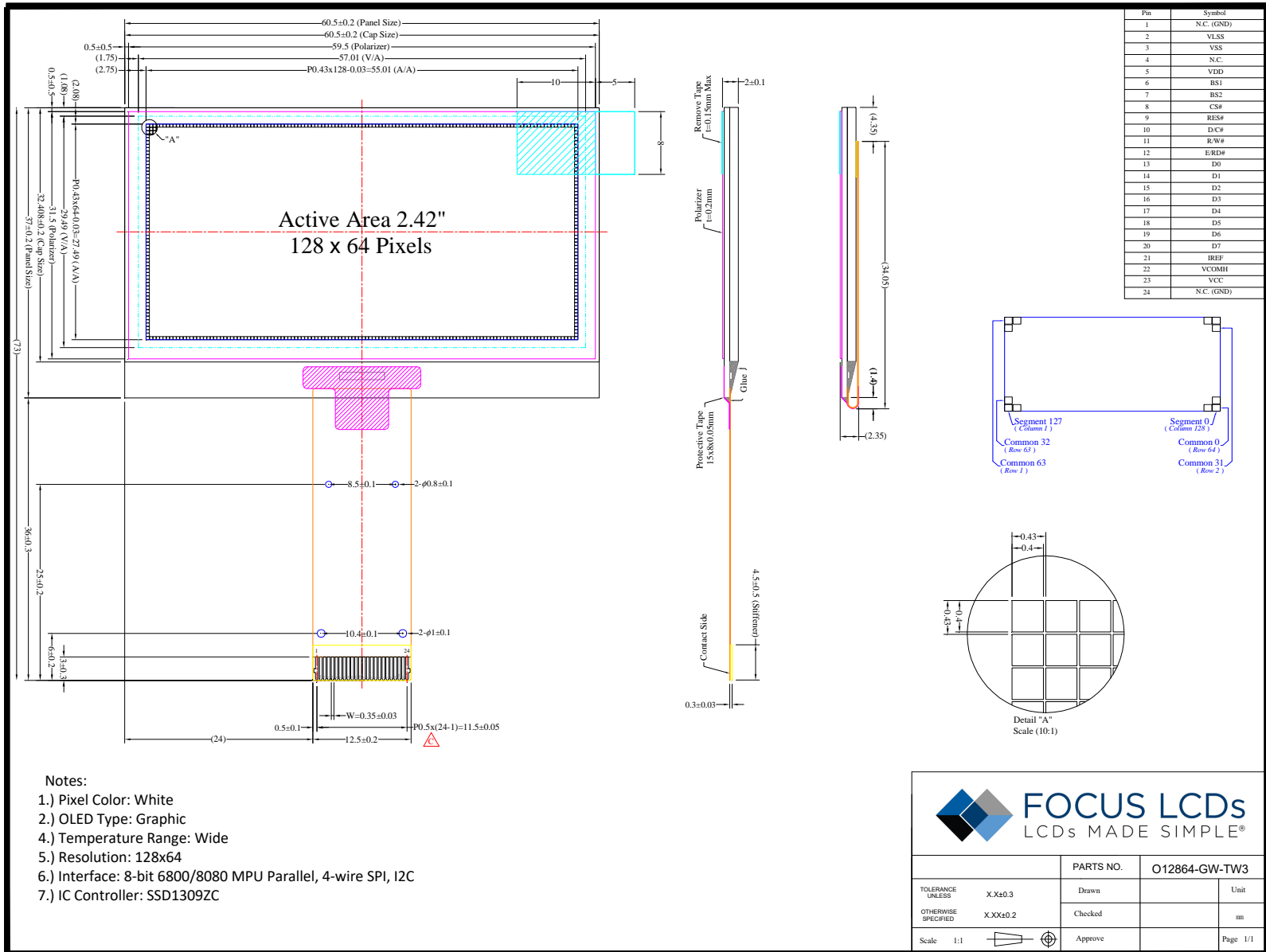
RoHS Compliant

| General Information Items | Specification | Unit    | Note |
|---------------------------|---------------|---------|------|
|                           | Main Panel    |         |      |
| Viewing Area              | 60.5 x 37.0   | mm      | -    |
| Pixel Color               | White         | -       | -    |
| Viewing Direction         | >160          | degrees | -    |
| Voltage                   | 2.8           | V       | -    |
| Resolution                | 128x64        | -       | -    |
| Controller IC             | SSD1309ZC     | -       | -    |
| Interface                 | Parallel      | -       | -    |
| Operating temperature     | -40~+70       | °C      | -    |
| Storage temperature       | -40~+85       | °C      | -    |

**Mechanical Information**

| Item        |            | Min | Typ. | Max | Unit | Note |
|-------------|------------|-----|------|-----|------|------|
| Module size | X (Width)  | -   | 60.5 | -   | mm   | -    |
|             | Y (Height) | -   | 37.0 | -   | mm   | -    |
|             | Z (Depth)  | -   | -    | 2.0 | mm   | -    |

# 1. Outline Dimensions



| Pin | Symbol            |
|-----|-------------------|
| 1   | N.C. (GND)        |
| 2   | V <sub>SS</sub>   |
| 3   | V <sub>SS</sub>   |
| 4   | N.C.              |
| 5   | V <sub>DD</sub>   |
| 6   | BS1               |
| 7   | BS2               |
| 8   | CS#               |
| 9   | RES#              |
| 10  | D/C#              |
| 11  | R/W#              |
| 12  | E/RD#             |
| 13  | D0                |
| 14  | D1                |
| 15  | D2                |
| 16  | D3                |
| 17  | D4                |
| 18  | D5                |
| 19  | D6                |
| 20  | D7                |
| 21  | REF               |
| 22  | V <sub>COMH</sub> |
| 23  | V <sub>CC</sub>   |
| 24  | N.C. (GND)        |

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|  |          |
|--|----------|
| PARTS NO. O12864-GW-TW3                      |          |
| TOLERANCE UNLESS OTHERWISE SPECIFIED X.X±0.3 | Drawn    |
| OTHERWISE SPECIFIED X.XX±0.2                 | Checked  |
| Scale 1:1                                    | Approve  |
|  | Unit mm  |
|  | Page 1/1 |

## 2. Input Terminal Pin Assignment

Recommended Connector: FH19C-24S-0.5SH(10)

| NO.   | Symbol | Description                                 |
|-------|--------|---|
| 1     | NC     | No connection                               |
| 2     | VSS    | Ground                                      |
| 3     | VSS    | Ground                                      |
| 4     | NC     | No connection                               |
| 5     | VDD    | Power Supply Input                          |
| 6     | BS1    | MCU Bus Interface Selection Pins            |
| 7     | BS2    | MCU Bus Interface Selection Pins            |
| 8     | CS#    | Chip Select Input                           |
| 9     | RES#   | Power Reset for Controller and Driver       |
| 10    | D/C    | Data Control Pad                            |
| 11    | WR#    | Write Select                                |
| 12    | RD#    | Read Select                                 |
| 13-20 | D0-D7  | Host Data Input/Output Bus                  |
| 21    | IREF   | Current Reference for Brightness Adjustment |
| 22    | VCOMH  | Voltage Output High Level for COM Signal    |
| 23    | VCC    | Power Supply for OEL Panel                  |
| 24    | NC     | No connection                               |

### 3. Optical Characteristics

| Characteristic      | Symbol         | Condition                       | Min              | Typ.             | Max              | Unit              |
|---------------------|----------------|---------------------------------|------------------|------------------|------------------|-------------------|
| Brightness          | L              | $V_{DD} = 3V$<br>$V_{CC} = 14V$ | 100              | 120              | -                | cd/m <sup>2</sup> |
| Operating Life Time | -              | -                               | 30000            | -                | -                | hours             |
| Frame Frequency     | Fr             | -                               | -                | 100              | -                | Hz                |
| White Color         | CIE            | -                               | X=0.26<br>Y=0.29 | X=0.30<br>Y=0.33 | X=0.34<br>Y=0.37 | -                 |
| Contrast Ratio      | CR             | 10000:1                         | -                | -                | -                | -                 |
| Viewing Angle       | $\Delta\theta$ | -                               | 160              | -                | -                | degrees           |

### 4. DC Electrical Characteristics

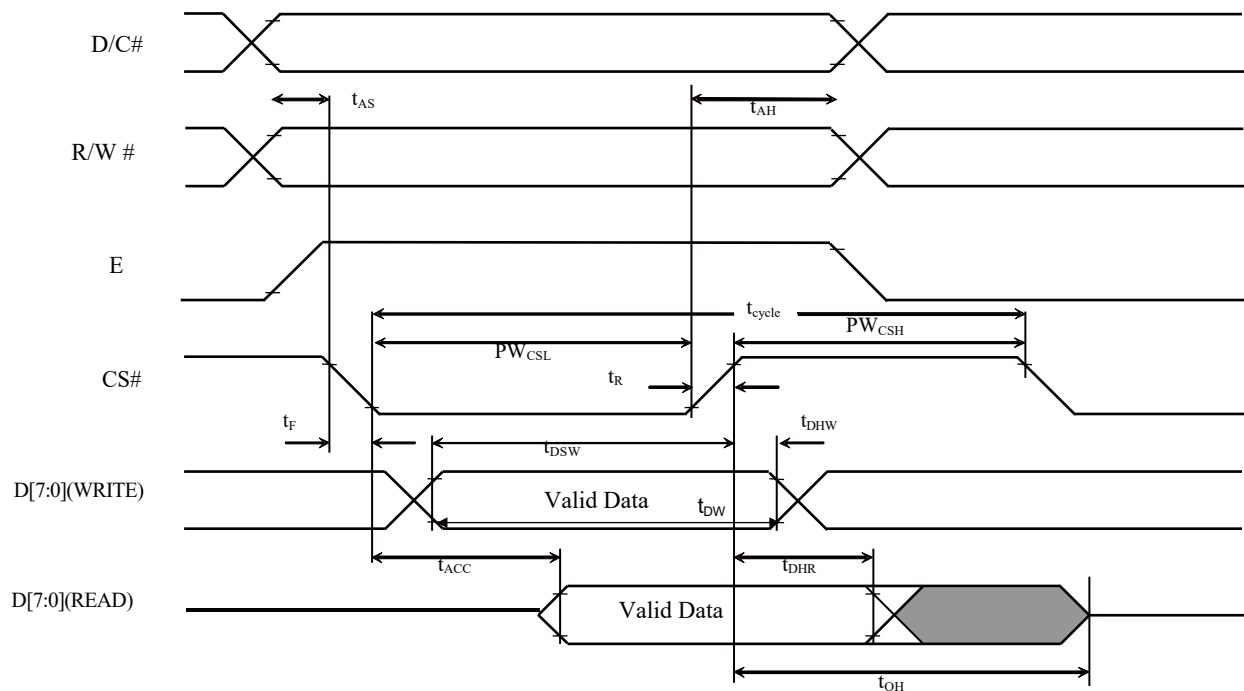
| Characteristics              | Symbol   | Conditions                                   | Min         | Typ. | Max         | Unit |
|------------------------------|----------|--|-------------|------|-------------|------|
| Supply Voltage for Logic     | $V_{DD}$ | $V_{DD1} \Rightarrow$<br>1.65V<br>to<br>3.5V | 1.65        | -    | 3.5         | V    |
| Supply Voltage for Operating | $V_{CC}$ |  | 7.0         | -    | 16.0        | V    |
| High Level Input             | $V_{IH}$ |  | $0.8V_{DD}$ | -    | $V_{DD1}$   | V    |
| Low Level Input              | $V_{IL}$ |  | $V_{SS}$    | -    | $0.2V_{DD}$ | V    |
| High Level Output            | $V_{OH}$ |  | $0.8V_{DD}$ | -    | $V_{DD}$    | V    |
| Low Level Output             | $V_{OL}$ |  | $V_{SS}$    | -    | $0.2V_{DD}$ | V    |

*NOTE: If the maximum rating of the above parameters is exceeded, even momentarily, the quality of the product may be degraded. The maximum ratings specify the values which the product may be physically damaged if exceeded. Be sure to use the product within the range of the specified parameters.*

## 5. Timing Characteristics

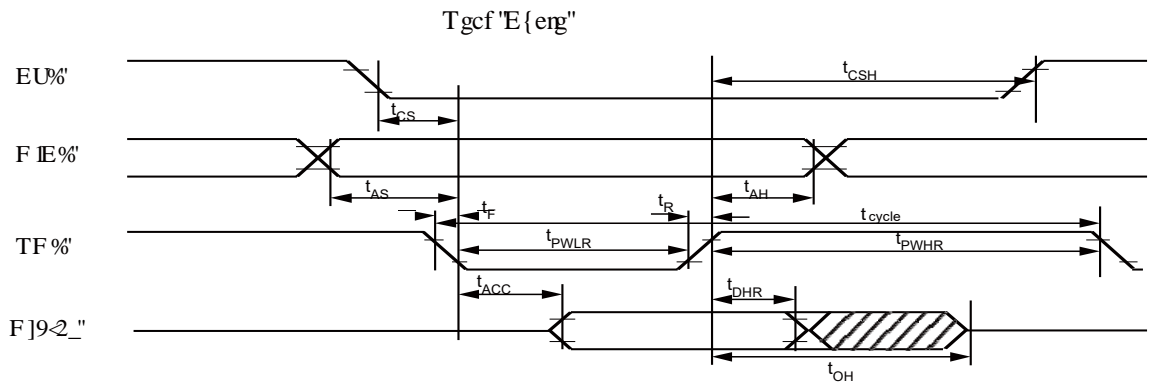
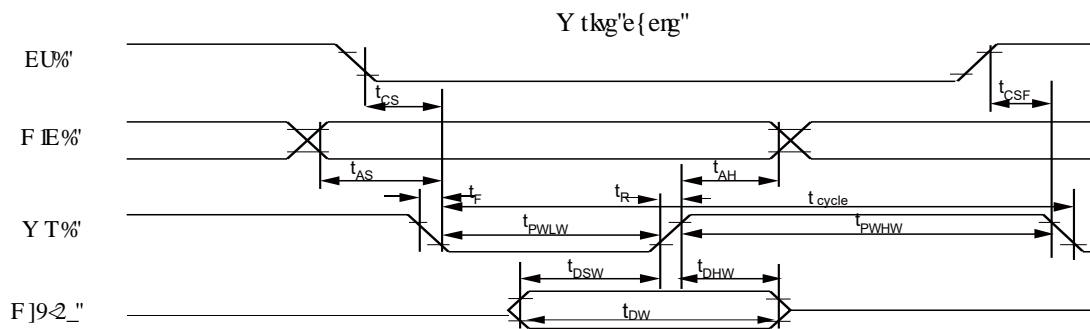
### 5.1 6800-Series MPU Parallel Interface Timing Characteristics

| Parameter                            | Symbol     | Min | Max | Unit |
|--------------------------------------|------------|-----|-----|------|
| Clock Cycle Time                     | $t_{cyc}$  | 300 | -   | ns   |
| Address Setup Time                   | $t_{AS}$   | 20  | -   | ns   |
| Address Hold Time                    | $t_{AH}$   | 0   | -   | ns   |
| Write Data Setup Time                | $t_{DSW}$  | 40  | -   | ns   |
| Write Data Hold Time                 | $t_{DHW}$  | 20  | -   | ns   |
| Read Data Hold Time                  | $t_{DHR}$  | 20  | -   | ns   |
| Output Disable Time                  | $t_{OH}$   | -   | 70  | ns   |
| Access Time                          | $t_{ACC}$  | -   | 140 | ns   |
| Chip Select Low Pulse Width (Read)   | $PW_{CSL}$ | 120 | -   | ns   |
| Chip Select Low Pulse Width (Write)  |            | 60  |     | ns   |
| Chip Select High Pulse Width (Read)  | $PW_{CSH}$ | 60  | -   | ns   |
| Chip Select High Pulse Width (Write) |            | 60  |     | ns   |
| Rise Time                            | $t_r$      | -   | 40  | ns   |
| Fall Time                            | $t_f$      | -   | 40  | ns   |



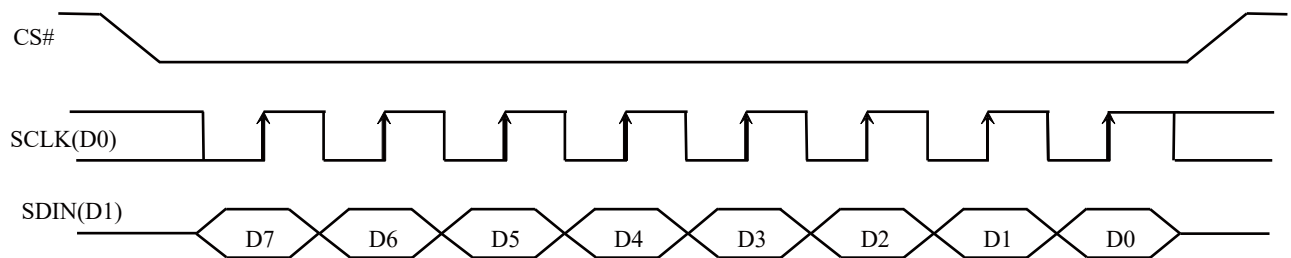
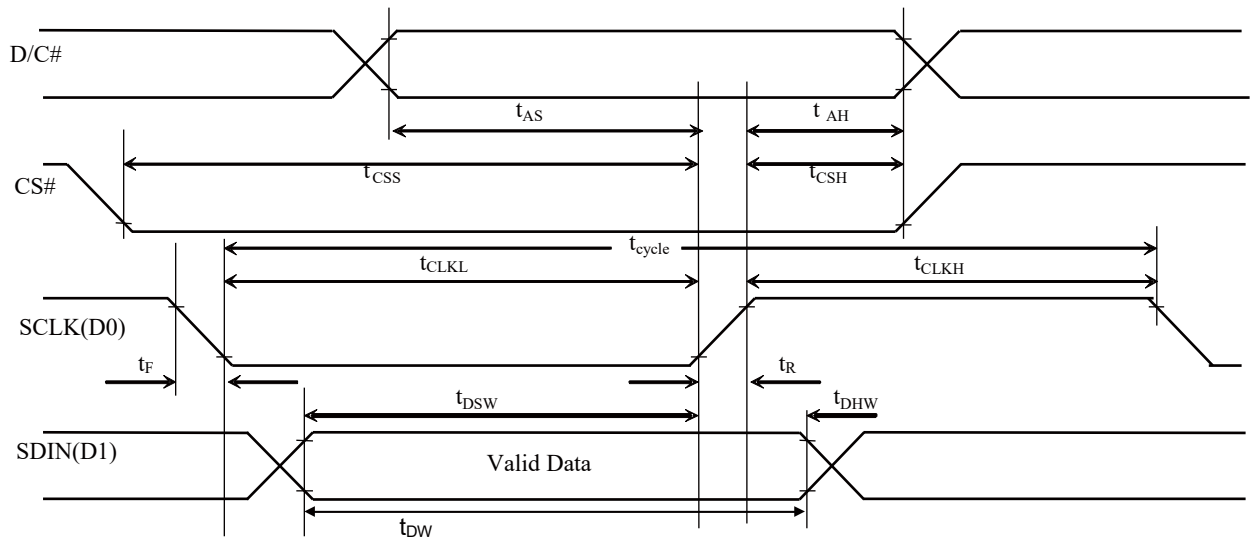
## 5.2 8080-Series MPU Parallel Interface Timing Characteristics

| Parameter                            | Symbol      | Min | Max | Unit |
|--------------------------------------|-------------|-----|-----|------|
| Clock Cycle Time                     | $t_{cycle}$ | 300 | -   | ns   |
| Address Setup Time                   | $t_{AS}$    | 20  | -   | ns   |
| Address Hold Time                    | $t_{AH}$    | 0   | -   | ns   |
| Write Data Setup Time                | $t_{DSW}$   | 40  | -   | ns   |
| Write Data Hold Time                 | $t_{DHW}$   | 15  | -   | ns   |
| Read Data Hold Time                  | $t_{DHR}$   | 20  | -   | ns   |
| Output Disable Time                  | $t_{OH}$    | -   | 70  | ns   |
| Access Time                          | $t_{ACC}$   | -   | 140 | ns   |
| Read Low Time                        | $t_{PWLR}$  | 120 | -   | ns   |
| Write Low Time                       | $t_{PWLWW}$ | 60  | -   | ns   |
| Read High Time                       | $t_{PWHR}$  | 60  | -   | ns   |
| Write High Time                      | $t_{PWHW}$  | 60  | -   | ns   |
| Chip Select Setup Time               | $t_{CS}$    | 0   | -   | ns   |
| Chip Select Hold Time to Read Signal | $t_{CSH}$   | 0   | -   | ns   |
| Chip Select Hold Time                | $t_{CSF}$   | 20  | -   | ns   |
| Rise Time                            | $t_r$       | -   | 40  | ns   |
| Fall Time                            | $t_f$       | -   | 40  | ns   |
| Data Write Time                      | $t_{DW}$    | 70  | -   | ns   |



### 5.3 Serial Interface Timing Characteristics

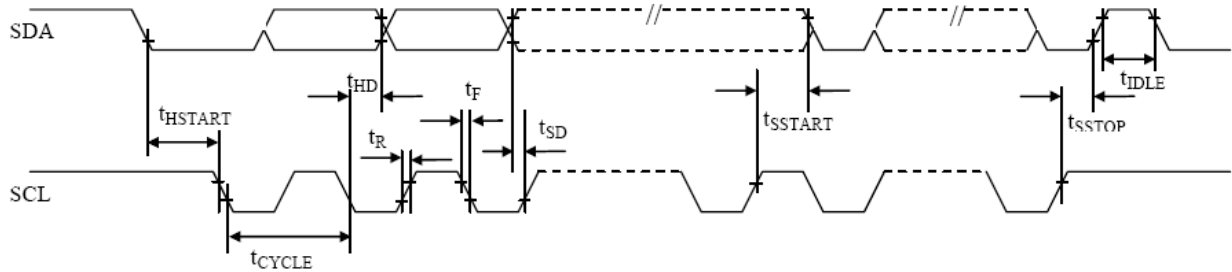
| Parameter              | Symbol             | Min | Max | Unit |
|------------------------|--------------------|-----|-----|------|
| Clock Cycle Time       | $t_{\text{cycle}}$ | 100 | -   | ns   |
| Address Setup Time     | $t_{\text{AS}}$    | 15  | -   | ns   |
| Address Hold Time      | $t_{\text{AH}}$    | 15  | -   | ns   |
| Chip Select Setup Time | $t_{\text{CSS}}$   | 20  | -   | ns   |
| Chip Select Hold Time  | $t_{\text{CSH}}$   | 50  | -   | ns   |
| Write Data Setup Time  | $t_{\text{DSW}}$   | 15  | -   | ns   |
| Write Data Hold Time   | $t_{\text{DHW}}$   | 15  | -   | ns   |
| Clock Low Time         | $t_{\text{CLKL}}$  | 50  | -   | ns   |
| Clock High Time        | $t_{\text{CLKH}}$  | 50  | -   | ns   |
| Rise Time              | $t_{\text{r}}$     | -   | 40  | ns   |
| Fall Time              | $t_{\text{f}}$     | -   | 40  | ns   |
| Data Write Time        | $t_{\text{DW}}$    | 55  | -   | ns   |





## 5.4 I<sup>2</sup>C Interface Timing Characteristics

| Parameter  | Symbol               | Min | Max | Unit          |
|--|----------------------|-----|-----|---------------|
| Clock Cycle Time   | $t_{\text{cycle}}$   | 2.5 | -   | $\mu\text{s}$ |
| Start Condition Hold Time  | $t_{\text{HSTART}}$  | 0.6 | -   | $\mu\text{s}$ |
| Data Hold Time (for "SDA <sub>OUT</sub> " Pin)                               | $t_{\text{HD}}$      | 0   | -   | ns            |
| Data Hold Time (for "SDA <sub>IN</sub> " Pin)                                |                      | 300 |     |               |
| Data Setup Time  | $t_{\text{SD}}$      | 100 | -   | ns            |
| Start Condition Setup Time<br>(Only relevant for a repeated Start Condition) | $t_{\text{SSSTART}}$ | 0.6 | -   | $\mu\text{s}$ |
| Stop Condition Setup Time  | $t_{\text{SSSTOP}}$  | 0.6 | -   | $\mu\text{s}$ |
| Rise Time for Data and Clock Pin   | $t_r$                | -   | 300 | ns            |
| Fall Time for Data and Clock Pin   | $t_f$                | -   | 300 | ns            |
| Idle Time before a New Transmission can Start                                | $t_{\text{IDLE}}$    | 1.3 | -   | $\mu\text{s}$ |



## **6. Cautions and Handling Precautions**

### **6.1 Handling and Operating the Module**

1. When the module is assembled, it should be attached to the system firmly. Do not warp or twist the module during assembly work.
2. Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
3. Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
4. Do not allow drops of water or chemicals to remain on the display surface. If you have the droplets for a long time, staining and discoloration may occur.
5. If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
6. The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
7. If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.
8. Protect the module from static, it may cause damage to the CMOS ICs.
9. Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
10. Do not disassemble the module.
11. Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
12. Pins of I/F connector shall not be touched directly with bare hands.
13. Do not connect, disconnect the module in the "Power ON" condition.
14. Power supply should always be turned on/off by the item Power On Sequence & Power Off Sequence.

### **6.2 Storage and Transportation**

1. Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35 °C and relative humidity of less than 70%
2. Do not store the OLED module in direct sunlight.
3. The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
4. It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module. In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
5. This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.