

NHD-1.1-9696G

Graphic Color OLED Display

| | |
|-------|--------------------|
| NHD- | Newhaven Display |
| 1.1- | 1.1" Diagonal Size |
| 9696- | 96 x 96 Pixels |
| G- | OLED Glass |

Newhaven Display International, Inc.

2661 Galvin Ct.

Elgin IL, 60124

Ph: 847-844-8795

Fax: 847-844-8796

www.newhavendisplay.com

nhtech@newhavendisplay.com

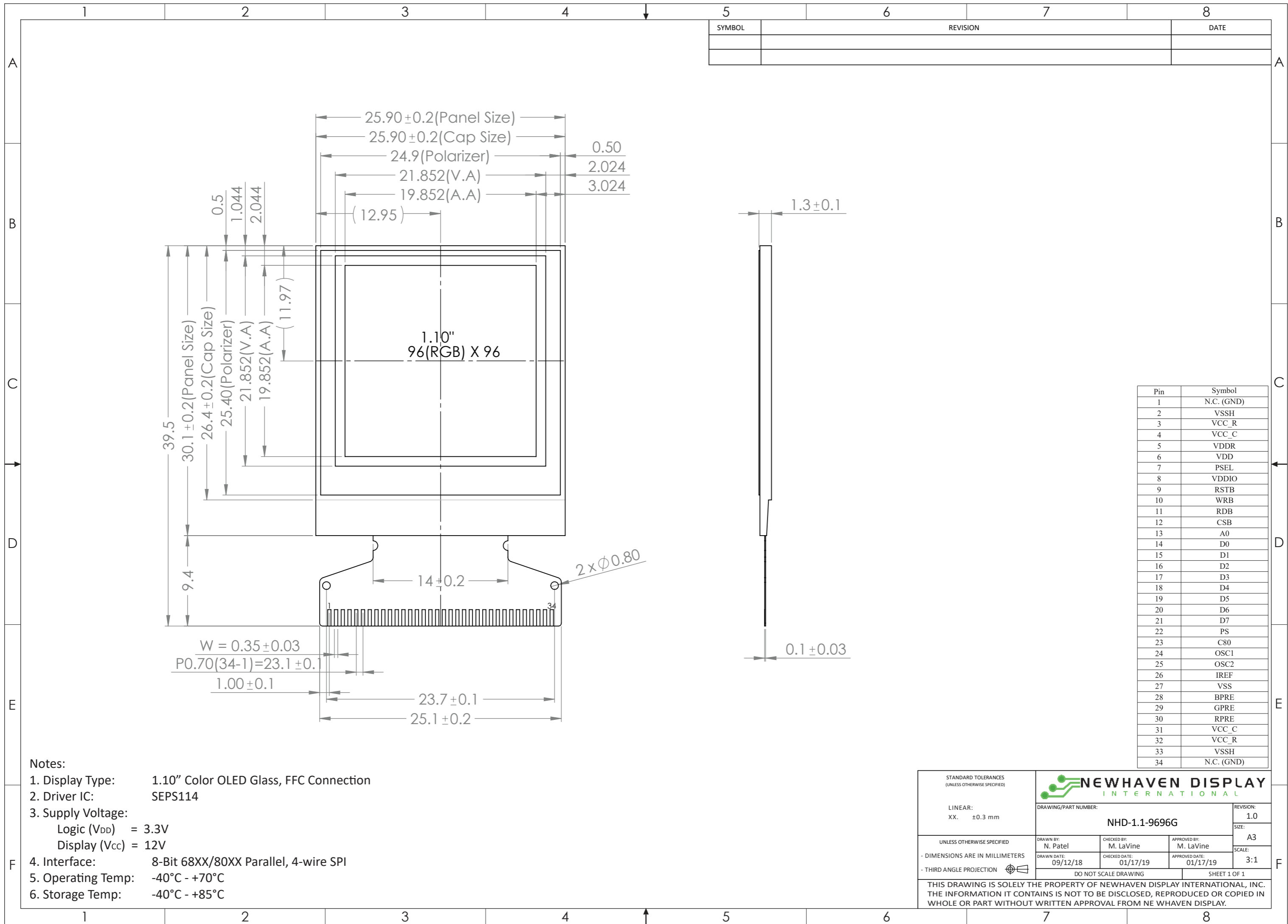
nhsales@newhavendisplay.com

Document Revision History

| Revision | Date | Description | Changed by |
|----------|---------|-----------------|------------|
| - | 1/25/19 | Initial Release | PB |

Functions and Features

- 96 x 96 pixel resolution
- Built-in SEPS114 controller
- Serial or Parallel interface
- RoHS compliant



| SYMBOL | REVISION | DATE |
|--------|----------|------|
| | | |
| | | |

| Pin | Symbol |
|-----|------------|
| 1 | N.C. (GND) |
| 2 | VSSH |
| 3 | VCC_R |
| 4 | VCC_C |
| 5 | VDDR |
| 6 | VDD |
| 7 | PSEL |
| 8 | VDDIO |
| 9 | RSTB |
| 10 | WRB |
| 11 | RDB |
| 12 | CSB |
| 13 | A0 |
| 14 | D0 |
| 15 | D1 |
| 16 | D2 |
| 17 | D3 |
| 18 | D4 |
| 19 | D5 |
| 20 | D6 |
| 21 | D7 |
| 22 | PS |
| 23 | C80 |
| 24 | OSC1 |
| 25 | OSC2 |
| 26 | IREF |
| 27 | VSS |
| 28 | BPRE |
| 29 | GPRES |
| 30 | RPRES |
| 31 | VCC_C |
| 32 | VCC_R |
| 33 | VSSH |
| 34 | N.C. (GND) |

- Notes:**
1. Display Type: 1.10" Color OLED Glass, FFC Connection
 2. Driver IC: SEPS114
 3. Supply Voltage:
 - Logic (V_{DD}) = 3.3V
 - Display (V_{CC}) = 12V
 4. Interface: 8-Bit 68XX/80XX Parallel, 4-wire SPI
 5. Operating Temp: -40°C - +70°C
 6. Storage Temp: -40°C - +85°C

| | | | | |
|---|----------------------|---------------|----------------|--------------|
| STANDARD TOLERANCES (UNLESS OTHERWISE SPECIFIED) | | | | REVISION: |
| | | | | 1.0 |
| LINEAR: XX. ±0.3 mm | DRAWING/PART NUMBER: | | | SIZE: |
| | NHD-1.1-9696G | | | A3 |
| UNLESS OTHERWISE SPECIFIED - DIMENSIONS ARE IN MILLIMETERS - THIRD ANGLE PROJECTION | DRAWN BY: | CHECKED BY: | APPROVED BY: | SCALE: |
| | N. Patel | M. LaVine | M. LaVine | 3:1 |
| | DRAWN DATE: | CHECKED DATE: | APPROVED DATE: | |
| | 09/12/18 | 01/17/19 | 01/17/19 | |
| DO NOT SCALE DRAWING | | | | SHEET 1 OF 1 |
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Interface Description

| Pin No. | Symbol | External Connection | Function Description |
|---------|-------------------|---------------------|--|
| 1 | NC (GND) | - | No connect (can be tied to Ground) |
| 2 | V _{SSH} | Power Supply | Ground for OLED panel |
| 3 | V _{CC_R} | Power Supply | Voltage output high level for scan signal (see wiring diagram) |
| 4 | V _{CC_C} | Power Supply | Supply voltage for OLED panel |
| 5 | V _{DDR} | Power Supply | Power supply for core logic circuit (see wiring diagram) |
| 6 | V _{DD} | Power Supply | Supply voltage for Logic |
| 7 | PSEL | MPU | Regulator Enable/Disable for core logic (see wiring diagram) |
| 8 | V _{DDIO} | Power Supply | Supply voltage for I/O |
| 9 | RSTB | MPU | Active LOW Reset signal |
| 10 | R/W WRB | MPU | 6800 mode: Read/Write signal. LOW: Write. HIGH: Read 8080 mode: Active LOW Write signal |
| 11 | E RDB | MPU | 6800 mode: Enable signal. Falling edge triggered 8080 mode: Active LOW Read signal |
| 12 | CSB | MPU | Active LOW Chip Select signal |
| 13 | A0 | MPU | Register Select signal. LOW: Command. HIGH: Data |
| 14 | D0 | MPU | Parallel interface: 8-bit bi-directional data bus Serial interface: D0 = Serial Clock signal (SCL) D1 = Serial Data Input signal (SDI) D2 = Serial Data Output (SDO) D3 = Serial Read High / Write Low (R/W) |
| 15 | D1 | MPU | |
| 16 | D2 | MPU | |
| 17 | D3 | MPU | |
| 18 | D4 | MPU | |
| 19 | D5 | MPU | |
| 20 | D6 | MPU | |
| 21 | D7 | MPU | |
| 22 | PS | MPU | Serial/Parallel Interface selection LOW: Serial. HIGH: Parallel |
| 23 | C80 | MPU | Parallel mode selection LOW: 8080 mode. HIGH: 6800 mode |
| 24-25 | OSC1;OSC2 | MPU | Oscillation adjustment. Connect a 27kΩ resistor between these two pins (see wiring diagram) |
| 26 | I _{REF} | Power Supply | Current reference for brightness adjustment |
| 27 | V _{SS} | Power Supply | Ground |
| 28 | B _{PRE} | Power Supply | External voltage reference for Pre-charge signal (see wiring diagram) |
| 29 | G _{PRE} | Power Supply | |
| 30 | R _{PRE} | Power Supply | |
| 31 | V _{CC_C} | Power Supply | |
| 32 | V _{CC_R} | Power Supply | Voltage output high level for scan signal (see wiring diagram) |
| 33 | V _{SSH} | Power Supply | Ground for OLED panel |
| 34 | NC (GND) | - | No connect (can be tied to Ground) |

Recommended display connector: n/a (Hot-bar solder directly to PCB)

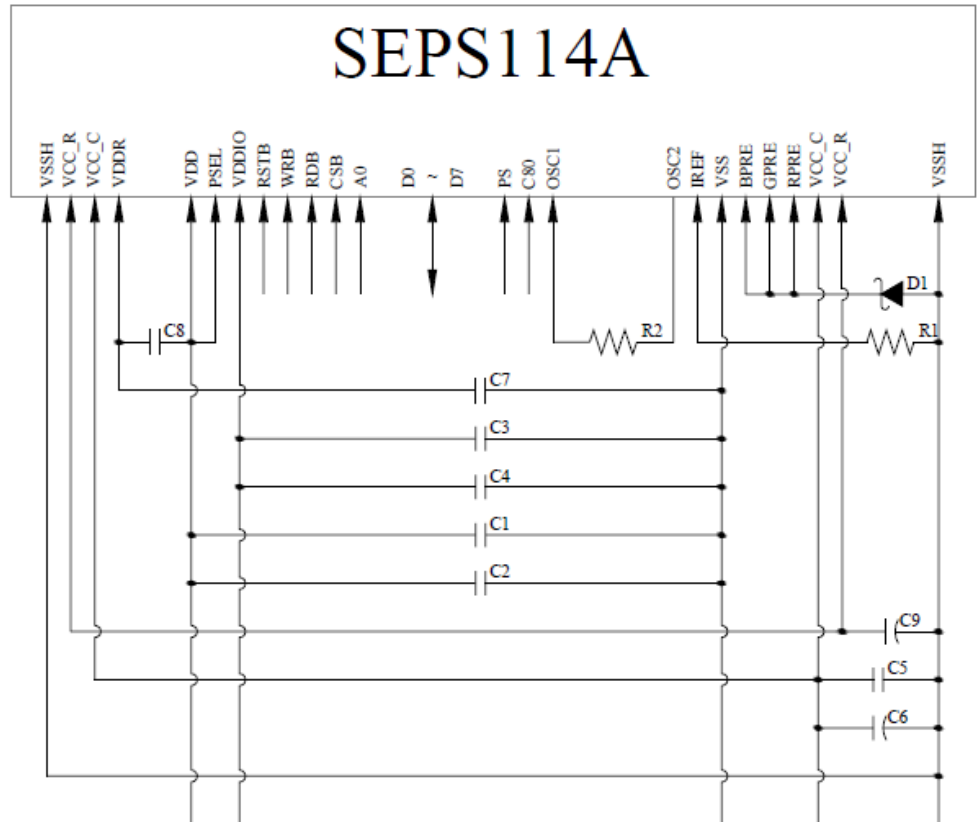
MPU Interface Pin Assignment Summary

| Bus Interface | C80 | PS | RSTB | CSB | A0 | RDB | WRB | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 |
|---------------|-----|----|------|-----|----|-----|-----|--------|-----|-----|-----|----|----|----|----|
| 8-bit 6800 | 1 | 1 | RSTB | CSB | A0 | E | R/W | D[0:7] | | | | | | | |
| 8-bit 8080 | 0 | 1 | RSTB | CSB | A0 | RDB | WRB | D[0:7] | | | | | | | |
| 4-wire SPI | NC | 0 | RSTB | CSB | A0 | 0 | 0 | SCL | SDI | SDO | R/W | 0 | 0 | 0 | 0 |

Note:

- “NC” : No Connect
- “1” : VDD
- “0” : VSS

Wiring Diagram



MCU Interface Selection: PS, C80

Pins connected to MCU interface: RSTB, WRB, RDB, CSB, A0, and D0~D7

C1, C3, C5: 0.1 μ F

C2, C4, C8: 4.7 μ F

C6, C9: 4.7 μ F / 25V Tantalum Capacitor

C7: 2.2 μ F

R1: 39k Ω

R2: 27k Ω

D1: 2.7V, 0.5W Zener Diode

Electrical Characteristics

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------------|--------------------|----------------------------------|----------------------------|------|-------------------|------|
| Operating Temperature Range | T _{OP} | Absolute Max | -40 | - | +70 | °C |
| Storage Temperature Range | T _{ST} | Absolute Max | -40 | - | +85 | °C |
| Supply Voltage for Logic | V _{DD} | - | 2.4 | 2.8 | 3.3 | V |
| Supply Voltage for I/O Pins | V _{DDIO} | - | 1.65 | 2.8 | V _{DD} | |
| Supply Voltage for Display | V _{CC_C} | - | 11.5 | 12.0 | 12.5 | V |
| Supply Current for Logic | I _{DD} | V _{DD} = 2.8V; 100% On | - | 1.5 | 3.5 | mA |
| Supply Current for Display | I _{CC_C} | V _{CC_C} = 12V; 50% On | - | 10.5 | 13.1 | mA |
| | | V _{CC_C} = 12V; 100% On | - | 19.2 | 24.0 | mA |
| Supply Current (Sleep) | I _{SLEEP} | V _{DD} = 2.8V | - | 5 | 15 | μA |
| "H" Level input | V _{IH} | - | 0.8 * V _{DDIO} | - | V _{DDIO} | V |
| "L" Level input | V _{IL} | - | V _{SS} | - | 0.4 | V |
| "H" Level output | V _{OH} | - | V _{DDIO} -0.4 | - | V _{DDIO} | V |
| "L" Level output | V _{OL} | - | V _{SS} | - | 0.4 | V |

Optical Characteristics

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|------------------------|----------------|---|--------|-----------|------|-------------------|
| Optimal Viewing Angles | Top | | 80 | - | - | ° |
| | Bottom | | 80 | - | - | ° |
| | Left | | 80 | - | - | ° |
| | Right | | 80 | - | - | ° |
| Contrast Ratio | CR | - | - | >10,000:1 | - | - |
| Response Time (rise) | T _R | - | - | 10 | - | μs |
| Response Time (fall) | T _F | - | - | 10 | - | μs |
| Brightness | L _V | 50% Checkerboard | 80 | 100 | - | cd/m ² |
| Lifetime | - | 100 cd/m ² , T _{OP} =25°C 50% Checkerboard | 10,000 | - | - | Hrs |

Note: Lifetime at typical temperature is based on accelerated high-temperature operation. Lifetime is tested at average 50% pixels on and is rated as Hours until **Half-Brightness**. The Display OFF command can be used to extend the lifetime of the display.

Luminance of active pixels will degrade faster than inactive pixels. Residual (burn-in) images may occur. To avoid this, every pixel should be illuminated uniformly.

Controller information

Built-in SEPS114 controller.

Please download specification at <http://www.newhavendisplay.com/appnotes/datasheets/OLEDs/SEPS114.pdf>

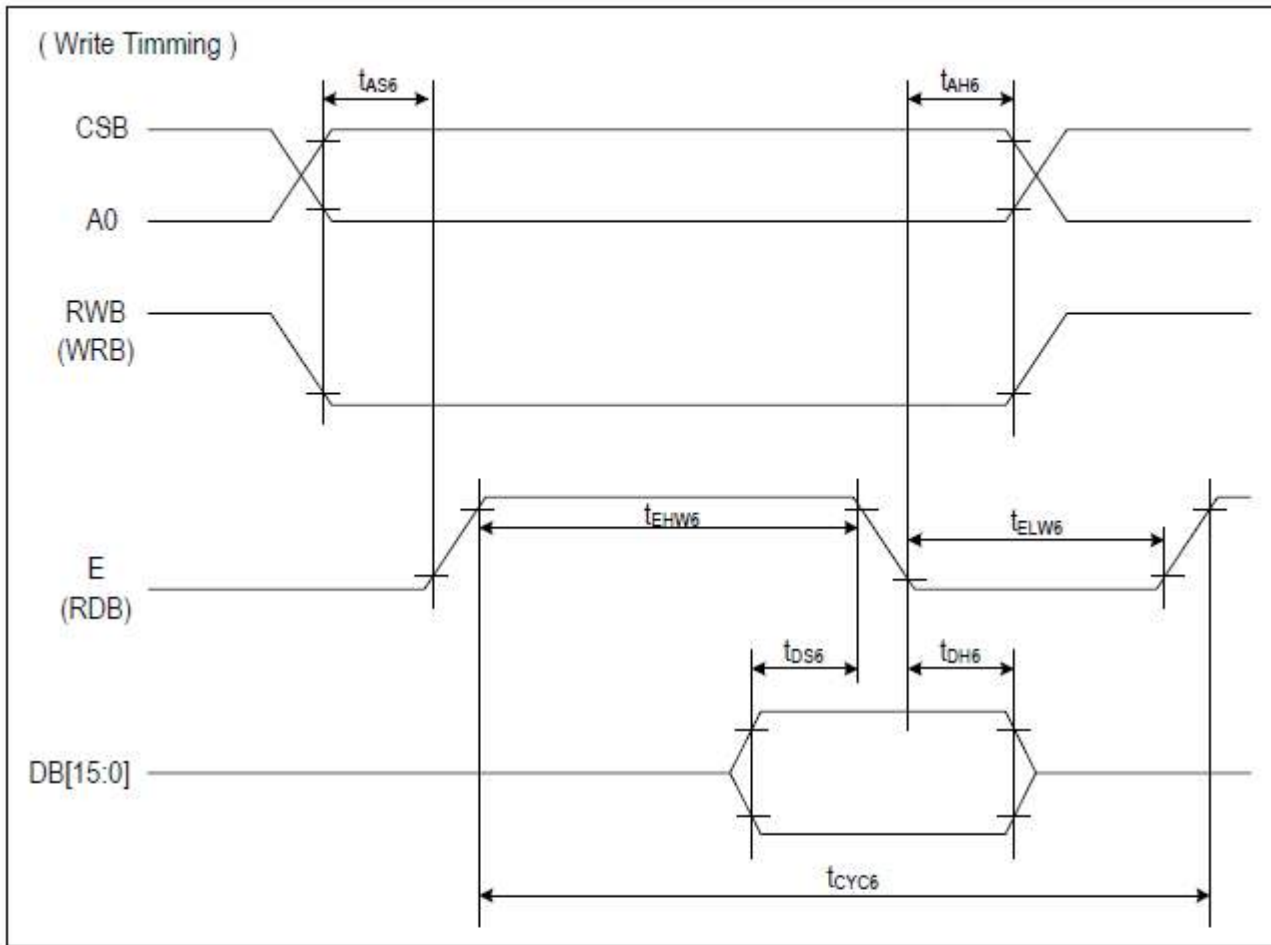
Table of Commands

| ADDR | RW | IB7 | IB6 | IB5 | IB4 | IB3 | IB2 | IB1 | IB0 | Description | Default |
|------|-----|-------------|---------|---------|---------|---------|---------|----------|----------|------------------------|---------|
| 01h | W | IDX[7] | IDX[6] | IDX[5] | IDX[4] | IDX[3] | IDX[2] | IDX[1] | IDX[0] | SOFT_RESET | 00h |
| 02h | R/W | - | - | - | - | - | - | - | DON | DISP_ON_OFF | 00h |
| 0Fh | R/W | SELEXP | SELRES | SELCLK | - | - | - | - | IREF | ANALOG_CONTROL | 80h |
| 14h | R/W | - | - | - | - | - | - | - | STB | STANDBY_ON_OFF | 01h |
| 1Ah | R/W | - | - | - | - | FR[3] | FR[2] | FR[1] | FR[0] | OSC_ADJUST | 03h |
| 09h | R/W | - | - | - | - | - | - | SCAND[1] | SCAND[0] | ROW_SCAN_DIRECTION | 00h |
| 30h | R/W | - | FX[6] | FX[5] | FX[4] | FX[3] | FX[2] | FX[1] | FX[0] | DISPLAY_X1 | 00h |
| 31h | R/W | - | TX[6] | TX[5] | TX[4] | TX[3] | TX[2] | TX[1] | TX[0] | DISPLAY_X2 | 5Fh |
| 32h | R/W | - | FY[6] | FY[5] | FY[4] | FY[3] | FY[2] | FY[1] | FY[0] | DISPLAY_Y1 | 00h |
| 33h | R/W | - | TY[6] | TY[5] | TY[4] | TY[3] | TY[2] | TY[1] | TY[0] | DISPLAY_Y2 | 5Fh |
| 38h | R/W | - | DX[6] | DX[5] | DX[4] | DX[3] | DX[2] | DX[1] | DX[0] | DISPLAYSTART_X | 00h |
| 39h | R/W | - | DY[6] | DY[5] | DY[4] | DY[3] | DY[2] | DY[1] | DY[0] | DISPLAYSTART_Y | 00h |
| 0Dh | R/W | - | - | - | - | - | - | CIF[1] | CIF[0] | CPU_IF | 00h |
| 34h | R/W | - | XS[6] | XS[5] | XS[4] | XS[3] | XS[2] | XS[1] | XS[0] | MEM_X1 | 00h |
| 35h | R/W | - | XE[6] | XE[5] | XE[4] | XE[3] | XE[2] | XE[1] | XE[0] | MEM_X2 | 5Fh |
| 36h | R/W | - | YS[6] | YS[5] | YS[4] | YS[3] | YS[2] | YS[1] | YS[0] | MEM_Y1 | 00h |
| 37h | R/W | - | YE[6] | YE[5] | YE[4] | YE[3] | YE[2] | YE[1] | YE[0] | MEM_Y2 | 5Fh |
| 1Dh | R/W | - | - | - | - | - | VH | MDIR[1] | MDIR[0] | MEMORY_WRITE/READ | 00h |
| 08h | R/W | DDRAM[15:0] | | | | | | | | DDRAM_DATA_ACCESS_PORT | 00h |
| 18h | R/W | - | - | - | DIS[4] | DIS[3] | DIS[2] | DIS[1] | DIS[0] | DISCHARGE_TIME | 08h |
| 16h | R/W | - | - | - | - | PDLY[3] | PDLY[2] | PDLY[1] | PDLY[0] | PEAK_PULSE_DELAY | 05h |
| 3Ah | R/W | - | - | - | PWR[4] | PWR[3] | PWR[2] | PWR[1] | PWR[0] | PEAK_PULSE_WIDTH_R | 05h |
| 3Bh | R/W | - | - | - | PWG[4] | PWG[3] | PWG[2] | PWG[1] | PWG[0] | PEAK_PULSE_WIDTH_G | 05h |
| 3Ch | R/W | - | - | - | PWB[4] | PWB[3] | PWB[2] | PWB[1] | PWB[0] | PEAK_PULSE_WIDTH_B | 05h |
| 3Dh | R/W | PCR[7] | PCR[6] | PCR[5] | PCR[4] | PCR[3] | PCR[2] | PCR[1] | PCR[0] | PRECHARGE_CURRENT_R | 00h |
| 3Eh | R/W | PCG[7] | PCG[6] | PCG[5] | PCG[4] | PCG[3] | PCG[2] | PCG[1] | PCG[0] | PRECHARGE_CURRENT_G | 00h |
| 3Fh | R/W | PCB[7] | PCB[6] | PCB[5] | PCB[4] | PCB[3] | PCB[2] | PCB[1] | PCB[0] | PRECHARGE_CURRENT_B | 00h |
| 40h | R/W | DCR[7] | DCR[6] | DCR[5] | DCR[4] | DCR[3] | DCR[2] | DCR[1] | DCR[0] | COLUMN_CURRENT_R | 00h |
| 41h | R/W | DCG[7] | DCG[6] | DCG[5] | DCG[4] | DCG[3] | DCG[2] | DCG[1] | DCG[0] | COLUMN_CURRENT_G | 00h |
| 42h | R/W | DCB[7] | DCB[6] | DCB[5] | DCB[4] | DCB[3] | DCB[2] | DCB[1] | DCB[0] | COLUMN_CURRENT_B | 00h |
| 48h | R/W | - | - | - | - | - | - | ROW[1] | ROW[0] | ROW_OVERLAP | 00h |
| 49h | R/W | - | - | - | - | SOFF[3] | SOFF[2] | SOFF[1] | SOFF[0] | SCAN_OFF_LEVEL | 04h |
| 17h | R/W | - | - | - | - | - | - | - | SC_ON | ROW_SCAN_ON/OFF | 00h |
| 13h | R/W | - | - | - | - | - | - | - | SCM[0] | ROW_SCAN_MODE | 00h |
| D0h | R/W | SMON | - | - | SLON | - | - | - | - | SCREEN_SAVER_CONTROL | 00h |
| D1h | R/W | STIM[7] | STIM[6] | STIM[5] | STIM[4] | STIM[3] | STIM[2] | STIM[1] | STIM[0] | SS_SLEEP_TIMER | 00h |
| D2h | R/W | - | - | - | - | - | SM[2] | SM[1] | SM[0] | SCREEN_SAVER_MODE | 00h |
| D3h | R/W | SSUT[7] | SSUT[6] | SSUT[5] | SSUT[4] | SSUT[3] | SSUT[2] | SSUT[1] | SSUT[0] | SS_UPDATE_TIMER | 00h |
| E0h | R/W | - | - | RIM[1] | RIM[0] | - | - | - | EIM | RGB_IF | 00h |
| E1h | R/W | VSOEN | VSOP | - | - | VSP | HSP | ENP | DOTP | RGB_POL | 00h |
| E5h | R/W | SWAP | - | RC[1] | RC[0] | - | - | DC[1] | DC[0] | DISPLAY_MODE_CONTROL | 00h |

For the full command table descriptions, please download the following:
<http://www.newhavendisplay.com/appnotes/datasheets/OLEDs/SEPS114.pdf>

Timing Characteristics

Parallel (6800 mode):

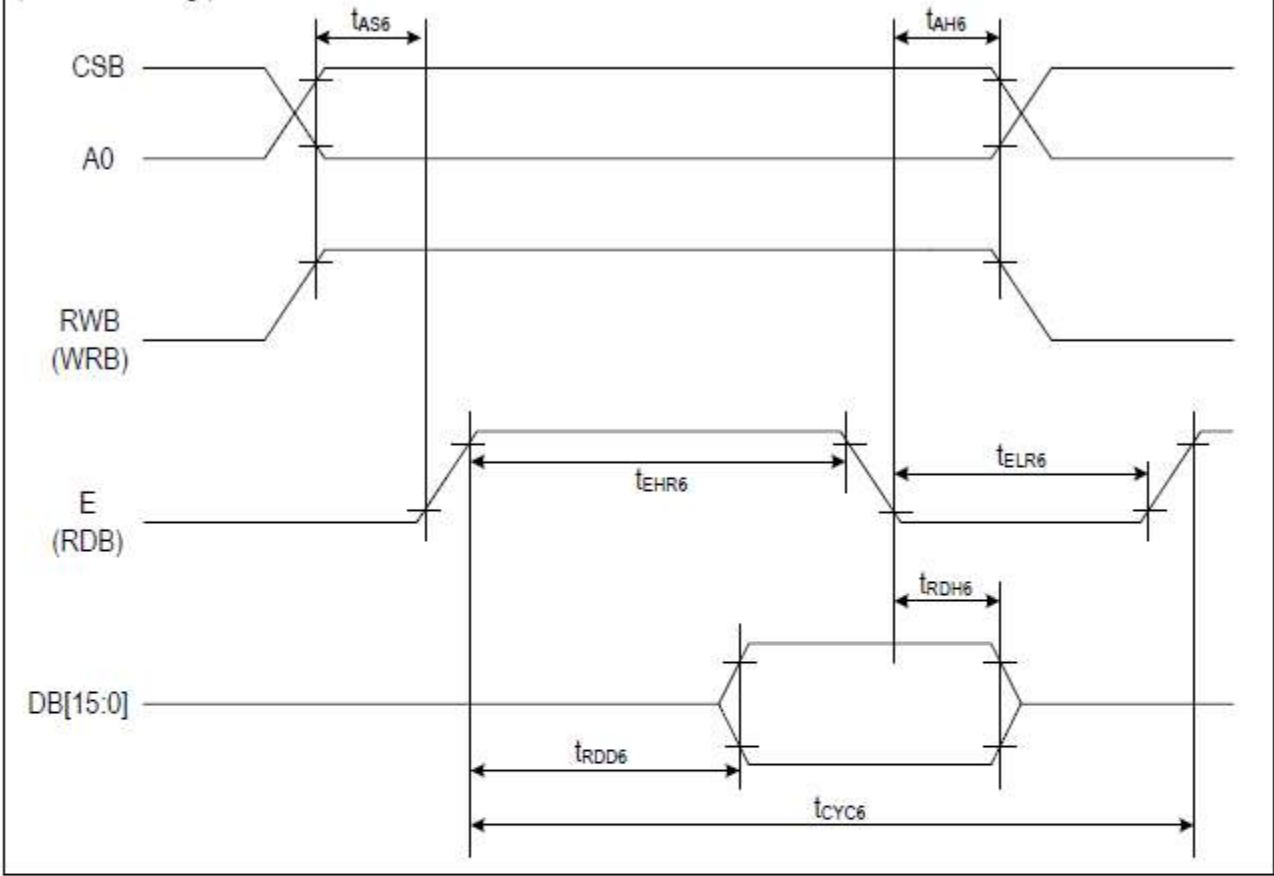


(VDD = 2.8V, Ta = 25°C)

| ITEM | SYMBOL | CONDITION | MIN | MAX | UNIT | PORT |
|-----------------------|--------|-----------|-----|-----|------|----------|
| Address hold timing | tAH6 | - | 5 | - | ns | CSB |
| Address setup timing | tAS6 | - | 5 | - | ns | A0 |
| System cycle timing | tCYC6 | - | 100 | - | ns | |
| Write "L" pulse width | tELW6 | - | 45 | - | ns | E |
| Write "H" pulse width | tEHW6 | - | 45 | - | ns | |
| Data setup timing | tDS6 | - | 40 | - | ns | DB[15:0] |
| Data hold timing | tDH6 | - | 10 | - | ns | |

Notice) All the timing reference is 10% and 90% of VDDIO.

(Read Timing)

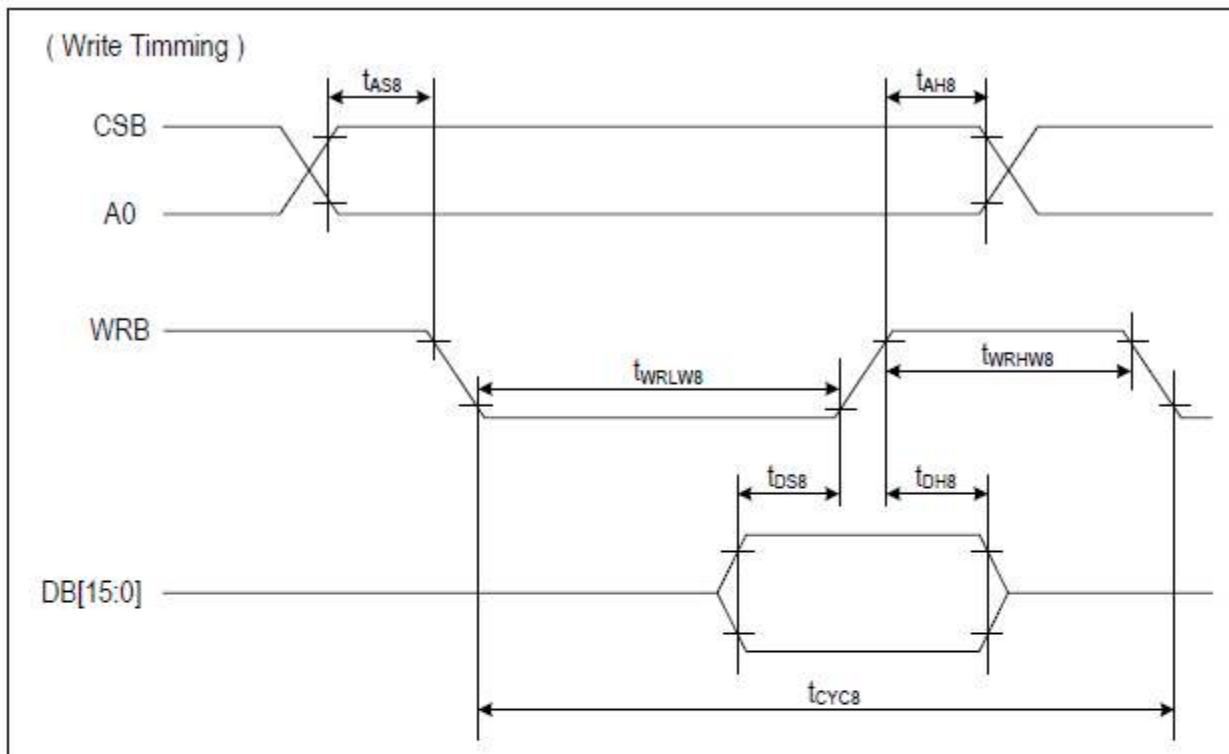


(VDD = 2.8V, Ta = 25°C)

| ITEM | SYMBOL | CONDITION | MIN | MAX | UNIT | PORT |
|-----------------------------|--------|------------|-----|-----|------|----------|
| Address hold timing | tAH6 | - | 10 | - | ns | CSB |
| Address setup timing | tAS6 | - | 10 | - | ns | A0 |
| System cycle timing | tCYC6 | - | 200 | - | ns | E |
| Read "L" pulse width | tELR6 | - | 90 | - | ns | E |
| Read "H" pulse width | tEHR6 | - | 90 | - | ns | E |
| Read data output delay time | tRDD6 | CL = 15 pF | 0 | 70 | ns | DB[15:0] |
| Data hold timing | tRDH6 | CL = 15 pF | 0 | 70 | ns | DB[15:0] |

Notice) All the timing reference is 10% and 90% of VDDIO.

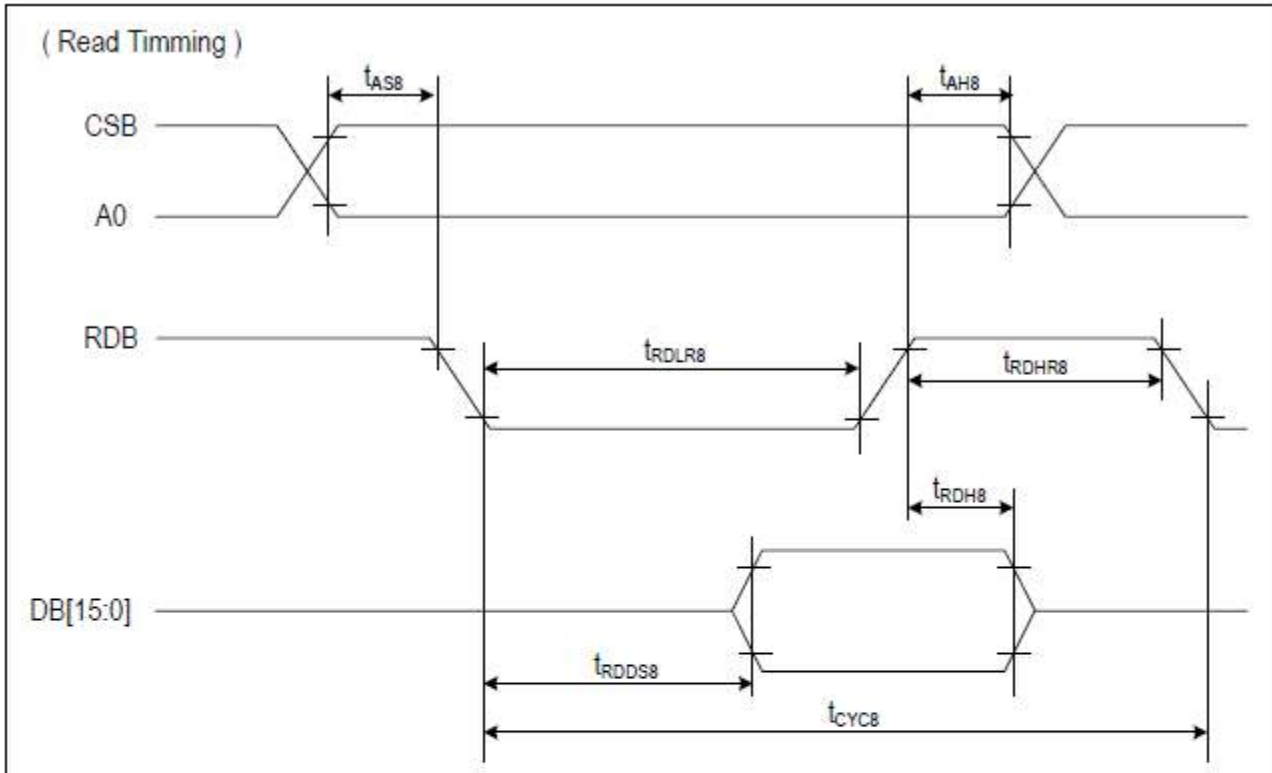
Parallel (8080 mode):



(VDD = 2.8V, Ta = 25°C)

| ITEM | SYMBOL | CONDITION | MIN | MAX | UNIT | PORT |
|-----------------------|--------|-----------|-----|-----|------|----------|
| Address hold timing | tAH8 | - | 5 | - | ns | CSB |
| Address setup timing | tAS8 | - | 5 | - | ns | A0 |
| System cycle timing | tCYC8 | - | 100 | - | ns | |
| Write "L" pulse width | tWRLW8 | - | 45 | - | ns | WRB |
| Write "H" pulse width | tWRHW8 | - | 45 | - | ns | |
| Data setup timing | tDS8 | - | 30 | - | ns | DB[15:0] |
| Data hold timing | tDH8 | - | 10 | - | ns | |

notice) All the timing reference is 10% and 90% of VDDIO.

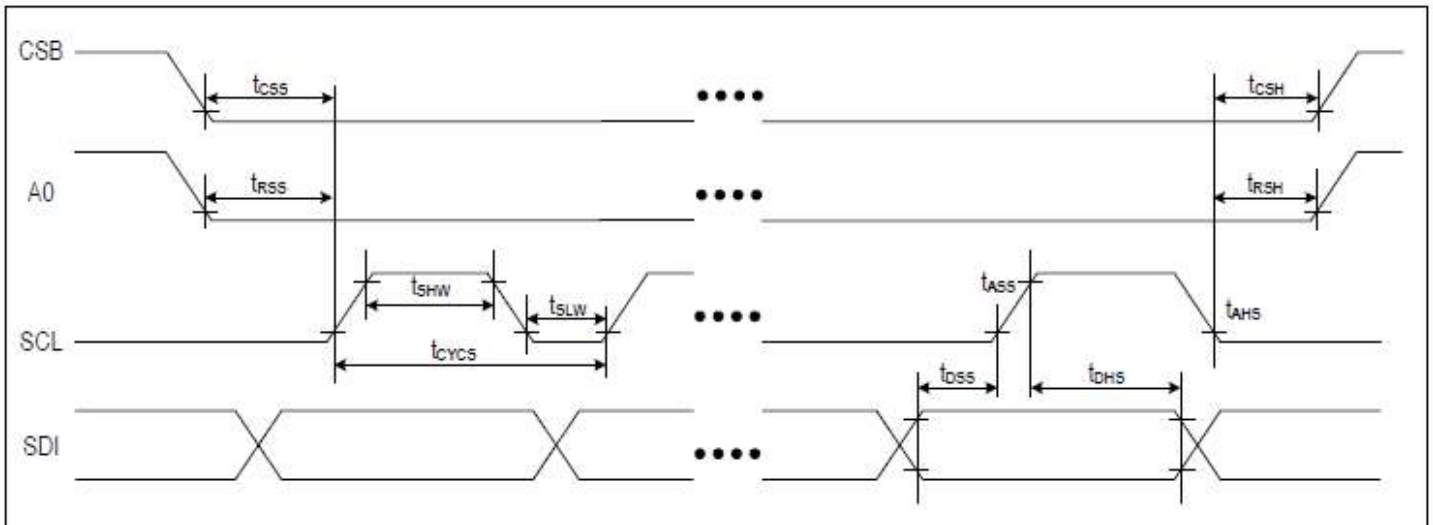


(VDD = 2.8V, Ta = 25°C)

| ITEM | SYMBOL | CONDITION | MIN | MAX | UNIT | PORT |
|-----------------------------|-------------|------------|-----|-----|------|----------|
| Address hold timing | t_{AH8} | - | 5 | - | ns | CSB |
| Address setup timing | t_{AS8} | - | 5 | - | ns | A0 |
| System cycle timing | t_{CYC8} | - | 200 | - | ns | |
| Read "L" pulse width | t_{RDLR8} | - | 90 | - | ns | RDB |
| Read "H" pulse width | t_{RDHR8} | - | 90 | - | ns | |
| Read data output delay time | t_{RDDS8} | CL = 15 pF | - | 60 | ns | DB[15:0] |
| Data hold timing | t_{RDH8} | | 0 | | ns | |

Notice) All the timing reference is 10% and 90% of VDDIO.

4-wire SPI:



(VDD = 2.8V, Ta = 25°C)

| ITEM | SYMBOL | CONDITION | MIN | MAX | UNIT | PORT |
|---------------------|------------|-----------|-----|-----|------|------|
| Serial clock cycle | t_{CYCS} | - | 200 | - | ns | SCL |
| SCL "H" pulse width | t_{SHW} | - | 90 | - | ns | SCL |
| SCL "L" pulse width | t_{SLW} | - | 90 | - | ns | SCL |
| Data setup timing | t_{DSS} | - | 25 | - | ns | SDI |
| Data hold timing | t_{DHS} | - | 25 | - | ns | SDI |
| CSB-SCL timing | t_{CSS} | - | 25 | - | ns | CSB |
| CSB-hold timing | t_{CSH} | - | 25 | - | ns | CSB |
| RS-SCL timing | T_{RSS} | - | 25 | - | ns | RS |
| RS-hold timing | T_{RSH} | - | 25 | - | ns | RS |

Notice) All the timing reference is 10% and 90% of VDDIO.

Example Initialization Sequence:

```
void OLED_Init_9696RGB(void)
{
  GPIO_ResetBits(RES_pin);
  delay_ms(10);
  GPIO_SetBits(RES_pin);
  delay_ms(10);

  oled_Command_9696RGB(0x01); //Set SOFT_RESET
  oled_Data_9696RGB(0x00);

  oled_Command_9696RGB(0x14); //Set STANDBY_ON_OFF
  oled_Data_9696RGB(0x01);

  delay_ms(1);

  oled_Command_9696RGB(0x14); //Set STANDBY_ON_OFF
  oled_Data_9696RGB(0x01);

  delay_ms(1);

  oled_Command_9696RGB(0x02); //Set DISP_ON_OFF
  oled_Data_9696RGB(0x00);

  oled_Command_9696RGB(0x0F); //Set ANALOG_CONTROL
  oled_Data_9696RGB(0x40);

  oled_Command_9696RGB(0x1A); //Set OSC_ADJUST
  oled_Data_9696RGB(0x40);

  oled_Command_9696RGB(0x30); //Set DISPLAY_X1
  oled_Data_9696RGB(0x00);

  oled_Command_9696RGB(0x31); //Set DISPLAY_X2
  oled_Data_9696RGB(0x5F);

  oled_Command_9696RGB(0x32); //Set DISPLAY_Y1
  oled_Data_9696RGB(0x00);

  oled_Command_9696RGB(0x33); //Set DISPLAY_Y2
  oled_Data_9696RGB(0x5F);

  oled_Command_9696RGB(0xE0); //Set RGB_IF
  oled_Data_9696RGB(0x00);

  oled_Command_9696RGB(0xE1); //Set RGB_POL
  oled_Data_9696RGB(0x00);

  oled_Command_9696RGB(0xE5); //Set DISPLAY_MODE_CONTROL
  oled_Data_9696RGB(0x80);

  oled_Command_9696RGB(0x0D); //Set CPU_IF
  oled_Data_9696RGB(0x00);

  oled_Command_9696RGB(0x1D); //Set MEMORY_WRITE/READ
  oled_Data_9696RGB(0x00);

  oled_Command_9696RGB(0x09); //Set ROW_SCAN_DIRECTION
  oled_Data_9696RGB(0x00);
```

```

oled_Command_9696RGB(0x13); //Set ROW_SCAN_MODE
oled_Data_9696RGB(0x00);

oled_Command_9696RGB(0x40); //Set COLUMN_CURRENT_R
oled_Data_9696RGB(0x6E);

oled_Command_9696RGB(0x41); //Set COLUMN_CURRENT_G
oled_Data_9696RGB(0x4F);

oled_Command_9696RGB(0x42); //Set COLUMN_CURRENT_B
oled_Data_9696RGB(0x77);

oled_Command_9696RGB(0x48); //Set ROW_OVERLAP
oled_Data_9696RGB(0x00);

oled_Command_9696RGB(0x18); //Set DISCHARGE_TIME
oled_Data_9696RGB(0x01);

oled_Command_9696RGB(0x16); //Set PEAK_PULSE_DELAY
oled_Data_9696RGB(0x00);

oled_Command_9696RGB(0x3A); //Set PEAK_PULSE_WIDTH_R
oled_Data_9696RGB(0x02);

oled_Command_9696RGB(0x3B); //Set PEAK_PULSE_WIDTH_G
oled_Data_9696RGB(0x02);

oled_Command_9696RGB(0x3C); //Set PEAK_PULSE_WIDTH_B
oled_Data_9696RGB(0x02);

oled_Command_9696RGB(0x3D); //Set PRECHARGE_CURRENT_R
oled_Data_9696RGB(0x14);

oled_Command_9696RGB(0x3E); //Set PRECHARGE_CURRENT_G
oled_Data_9696RGB(0x50);

oled_Command_9696RGB(0x3F); //Set PRECHARGE_CURRENT_B
oled_Data_9696RGB(0x19);

oled_Command_9696RGB(0x17); //Set ROW_SCAN_ON/OFF
oled_Data_9696RGB(0x00);

oled_Command_9696RGB(0x49); //Set SCAN_OFF_LEVEL
oled_Data_9696RGB(0x04);

oled_Clear_Screen(); //Clear Display

oled_Command_9696RGB(0x38); //Set DISPLAYSTART_X
oled_Data_9696RGB(0x00);

oled_Command_9696RGB(0x39); //Set DISPLAYSTART_Y
oled_Data_9696RGB(0x00);

oled_Command_9696RGB(0x02); //Set DISP_ON_OFF
oled_Data_9696RGB(0x01);

delay_ms(100);

oled_Command_160128RGB(0x08); //Enable write to display RAM
}

```

Quality Information

| Test Item | Content of Test | Test Condition | Note |
|---------------------------------------|--|--|------|
| High Temperature storage | Test the endurance of the display at high storage temperature. | +85°C, 240 Hrs. | 2 |
| Low Temperature storage | Test the endurance of the display at low storage temperature. | -40°C, 240 Hrs. | 1,2 |
| High Temperature Operation | Test the endurance of the display by applying electric stress (voltage & current) at high temperature. | +70°C, 240 Hrs. | 2 |
| Low Temperature Operation | Test the endurance of the display by applying electric stress (voltage & current) at low temperature. | -40°C, 240 Hrs. | 1,2 |
| High Temperature / Humidity Operation | Test the endurance of the display by applying electric stress (voltage & current) at high temperature with high humidity. | +60°C, 90% RH, 120 Hrs. | 1,2 |
| Thermal Shock resistance | Test the endurance of the display by applying electric stress (voltage & current) during a cycle of low and high temperatures. | -40°C, 30 min -> 25°C, 5 min -> 70°C, 30 min = 1 cycle 100 Cycles | |
| Vibration test | Test the endurance of the display by applying vibration to simulate transportation and use. | 10-22Hz , 15mm amplitude. 22-500Hz, 1.5G 30min in each of 3 directions X,Y,Z | 3 |
| Atmospheric Pressure test | Test the endurance of the display by applying atmospheric pressure to simulate transportation by air. | 115mbar, 40hrs | 3 |
| Static electricity test | Test the endurance of the display by applying electric static discharge. | V _s =800V, R _s =1.5kΩ, C _s =100pF One time | |

Note 1: No condensation to be observed.

Note 2: Conducted after 2 hours of storage at 25°C, 0%RH.

Note 3: Test performed on product itself, not inside a container.

Evaluation Criteria:

- 1: Display is fully functional during operational tests and after all tests, at room temperature.
- 2: No observable defects.
- 3: Luminance >50% of initial value.
- 4: Current consumption within 50% of initial value

Precautions for using OLEDs/LCDs/LCMs

See Precautions at www.newhavendisplay.com/specs/precautions.pdf

Warranty Information

See Terms & Conditions at http://www.newhavendisplay.com/index.php?main_page=terms