

# NHD-7.0-800480EF-20 Controller Board

## TFT Controller Evaluation Board

|         |  |
|---------|--|
| NHD-    | Newhaven Display   |
| 7.0-    | 7.0" Diagonal  |
| 800480- | 800 x 480 Pixels   |
| EF-     | Model  |
| 20-     | 20-pin FFC Interface (8-bit Parallel Data)<br>SSD1963 Controller |

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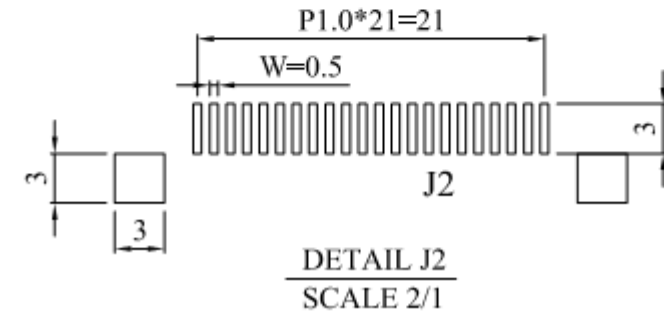
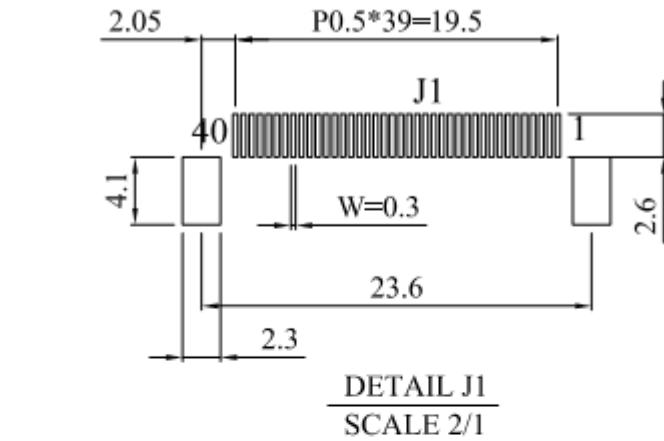
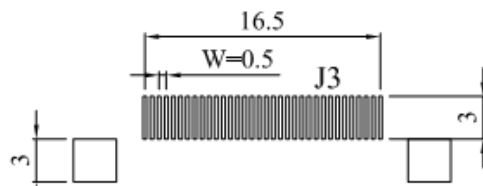
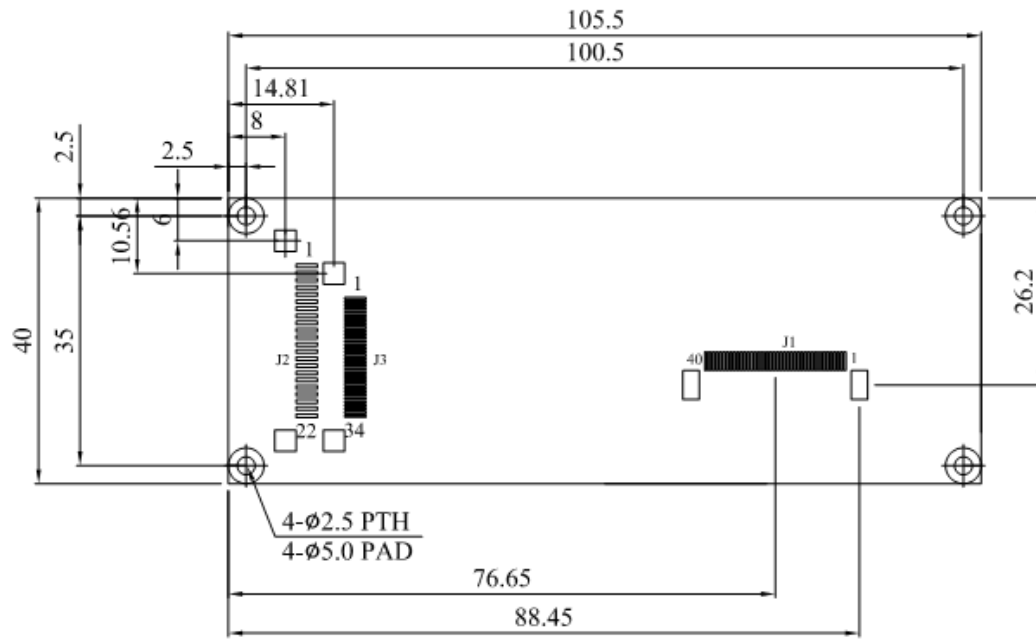
## Document Revision History

| Revision | Date       | Description     | Changed by |
|----------|------------|-----------------|------------|
| 0        | 12/14/2013 | Initial Release | AK         |

## Functions and Features

- To use for testing, evaluating, or in final production with NHD-7.0-800480EF-A displays.

# Mechanical Drawing



## Pin Description: J1 (SSD1963 output to display panel)

| Pin No. | Symbol  | Connection   | Function Description             |
|---------|---------|--------------|----------------------------------|
| 1       | LED-K   | Power Supply | Backlight Cathode                |
| 2       | LED-A   | Power Supply | Backlight Anode (60mA @ 16V)     |
| 3       | GND     | Power Supply | Ground                           |
| 4       | VDD     | Power Supply | Power Supply (+3.3V)             |
| 5-12    | [R0-R7] | MPU          | Red Data Signals                 |
| 13-20   | [G0-G7] | MPU          | Green Data Signals               |
| 21-28   | [B0-B7] | MPU          | Blue Data Signals                |
| 29      | GND     | Power Supply | Ground                           |
| 30      | CLKIN   | MPU          | Clock for input data             |
| 31      | DISP    | MPU          | Display on/off DISP=1:Display on |
| 32      | HSD     | MPU          | Line synchronization signal      |
| 33      | VSD     | MPU          | Frame synchronization signal     |
| 34      | DEN     | MPU          | Data Enable signal               |
| 35      | NC      | -            | No Connect                       |
| 36      | GND     | Power Supply | Ground                           |
| 37      | NC      | -            | No Connect                       |
| 38      | NC      | -            | No Connect                       |
| 39      | NC      | -            | No Connect                       |
| 40      | NC      | -            | No Connect                       |

## Pin Description: J2 (SSD1963 input from user's MPU)

| Pin No. | Symbol     | External Connection | Function Description                             |
|---------|------------|---------------------|--|
| 1       | GND        | Power Supply        | Ground   |
| 2       | VDD        | Power Supply        | Power supply for LCD and logic (3.3V)            |
| 3       | B/L Enable | Power Supply        | Backlight Enable                                 |
| 4       | D/C        | MPU                 | Data/Command select. D/C=0: Command, D/C=1: Data |
| 5       | /WR        | MPU                 | Active LOW Write signal                          |
| 6       | /RD        | MPU                 | Active LOW Read signal                           |
| 7-14    | DB0-DB7    | MPU                 | 8-bit bidirectional data bus                     |
| 15      | /CS        | MPU                 | Active LOW Chip Select signal                    |
| 16      | /RESET     | MPU                 | Active LOW Reset signal                          |
| 17      | NC         | -                   | No Connect                                       |
| 18      | NC         | -                   | No Connect                                       |
| 19      | DISP       | MPU                 | Display On signal                                |
| 20      | NC         | -                   | No Connect                                       |

Note: J2 has a 20-pin FFC connector installed; pins 21, 22 are not connected.

## Electrical Characteristics

| Item                        | Symbol | Condition    | Min.    | Typ. | Max.    | Unit |
|-----------------------------|--------|--------------|---------|------|---------|------|
| Operating Temperature Range | Top    | Absolute Max | -20     | -    | +70     | °C   |
| Storage Temperature Range   | Tst    | Absolute Max | -30     | -    | +80     | °C   |
| Supply Voltage              | VDD    |              | 3.0     | 3.3  | 3.6     | V    |
| Input High Voltage          | VIH    |              | 0.8*VDD | -    | VDD     | V    |
| Input Low Voltage           | VIL    |              | 0       | -    | 0.2*VDD | V    |
| Supply Current              | IDD    |              | -       | 285  | -       | mA   |

## Controller Information

Built-in SSD1963 controller.

Please download specification at [http://www.newhavendisplay.com/app\\_notes/SSD1963.pdf](http://www.newhavendisplay.com/app_notes/SSD1963.pdf)

## Table of Commands

Please download specification at [http://www.newhavendisplay.com/app\\_notes/SSD1963.pdf](http://www.newhavendisplay.com/app_notes/SSD1963.pdf)

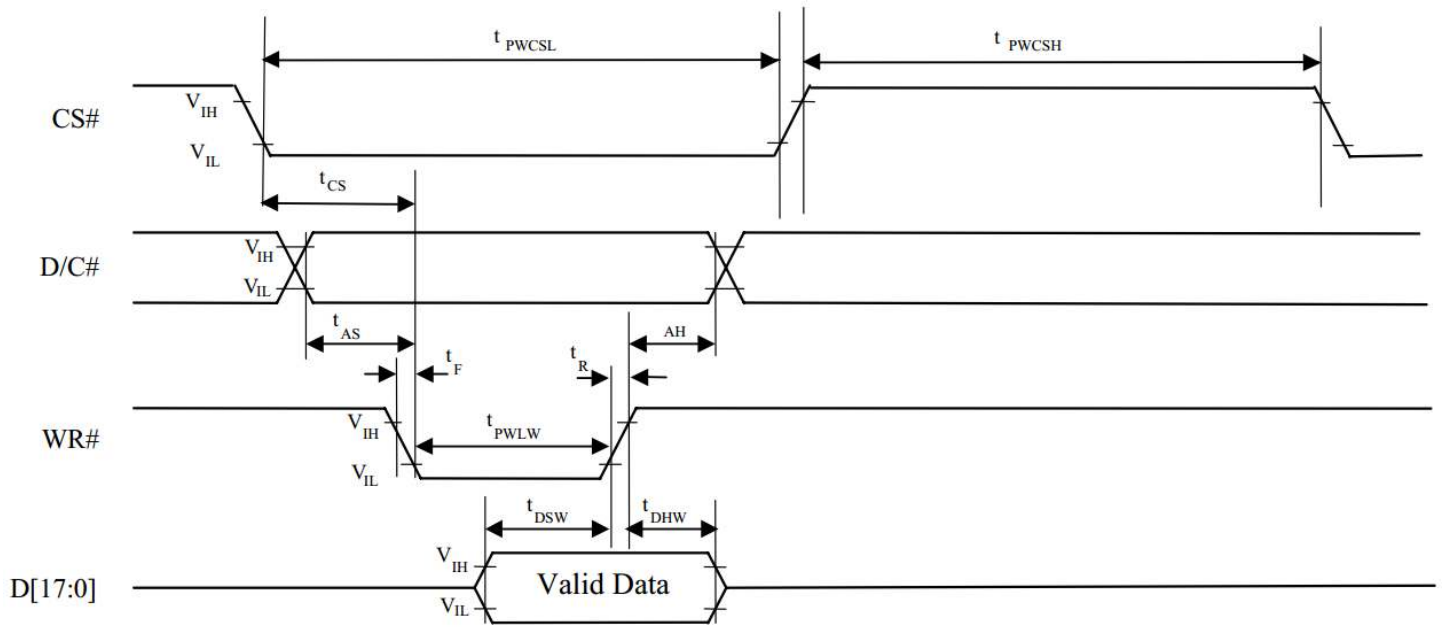
## Timing Characteristics

### Parallel 8080-series Interface Timing Characteristics

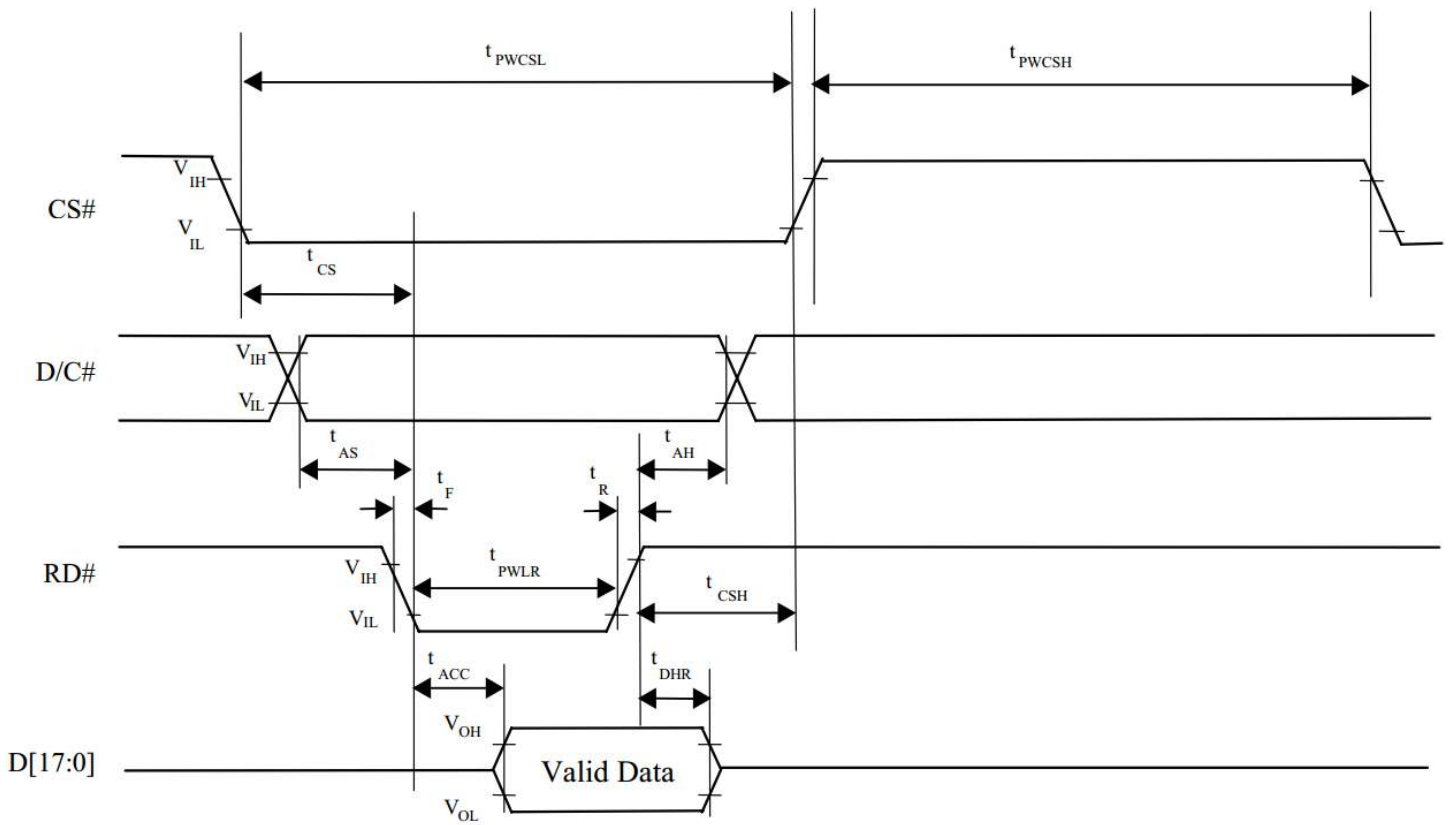
| Symbol      | Parameter                            | Min   | Typ            | Max  | Unit    |
|-------------|--------------------------------------|---|----------------|--|---------|
| $f_{MCLK}$  | System Clock Frequency*              | 1   | -              | 110  | MHz     |
| $t_{MCLK}$  | System Clock Period*                 | $1/f_{MCLK}$  | -              | -  | ns      |
| $t_{PWCSL}$ | Control Pulse High Width             | Write<br>Read   | 13<br>30       | $1.5 * t_{MCLK}$<br>$3.5 * t_{MCLK}$                 | -<br>ns |
| $t_{PWCSH}$ | Control Pulse Low Width              | Write (next write cycle)<br>Write (next read cycle)<br>Read | 13<br>80<br>80 | $1.5 * t_{MCLK}$<br>$9 * t_{MCLK}$<br>$9 * t_{MCLK}$ | -<br>ns |
| $t_{AS}$    | Address Setup Time                   | 1   | -              | -  | ns      |
| $t_{AH}$    | Address Hold Time                    | 2   | -              | -  | ns      |
| $t_{DSW}$   | Write Data Setup Time                | 4   | -              | -  | ns      |
| $t_{DHW}$   | Write Data Hold Time                 | 1   | -              | -  | ns      |
| $t_{PWLW}$  | Write Low Time                       | 12  | -              | -  | ns      |
| $t_{DHR}$   | Read Data Hold Time                  | 1   | -              | -  | ns      |
| $t_{ACC}$   | Access Time                          | 32  | -              | -  | ns      |
| $t_{PWLR}$  | Read Low Time                        | 36  | -              | -  | ns      |
| $t_R$       | Rise Time                            | -   | -              | 0.5  | ns      |
| $t_F$       | Fall Time                            | -   | -              | 0.5  | ns      |
| $t_{CS}$    | Chip select setup time               | 2   | -              | -  | ns      |
| $t_{CSH}$   | Chip select hold time to read signal | 3   | -              | -  | ns      |

\* System Clock denotes external input clock (PLL-bypass) or internal generated clock (PLL-enabled)

## Write Cycle



## Read Cycle



## Quality Information

| Test Item                             | Content of Test   | Test Condition  | Note |
|---------------------------------------|---|---|------|
| High Temperature storage              | Endurance test applying the high storage temperature for a long time.   | +80°C , 200hrs  | 2    |
| Low Temperature storage               | Endurance test applying the low storage temperature for a long time.  | -30°C , 200hrs  | 1,2  |
| High Temperature Operation            | Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.                    | +70°C 200hrs  | 2    |
| Low Temperature Operation             | Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.                     | -20°C , 200hrs  | 1,2  |
| High Temperature / Humidity Operation | Endurance test applying the electric stress (voltage & current) and the high thermal with high humidity stress for a long time. | +60°C , 90% RH , 96hrs  | 1,2  |
| Thermal Shock resistance              | Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.                  | -20°C,30min -> 25°C,5min -> 70°C,30min = 1 cycle<br>10 cycles                       |      |
| Vibration test                        | Endurance test applying vibration to simulate transportation and use.   | 10-55Hz , 15mm amplitude.<br>60 sec in each of 3 directions X,Y,Z<br>For 15 minutes | 3    |
| Static electricity test               | Endurance test applying electric static discharge.  | VS=800V, RS=1.5kΩ, CS=100pF<br>One time   |      |

**Note 1:** No condensation to be observed.

**Note 2:** Conducted after 4 hours of storage at 25°C, 0%RH.

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

## Precautions for using LCDs/LCMs

See Precautions at [www.newhavendisplay.com/specs/precautions.pdf](http://www.newhavendisplay.com/specs/precautions.pdf)

## Warranty Information and Terms & Conditions

[http://www.newhavendisplay.com/index.php?main\\_page=terms](http://www.newhavendisplay.com/index.php?main_page=terms)