# NHD-0108BZ-RN-YBW

## Character Liquid Crystal Display Module

| | |
|---|---|
| NHD- | Newhaven Display |
| 0108- | 1 line x 8 characters |
| BZ- | Model |
| R- | Reflective |
| N- | No Backlight |
| Y- | STN- Yellow/Green |
| B- | 6:00 view |
| W- | Wide Temperature (-20°C~+70°C) |
| | **RoHS Compliant** |


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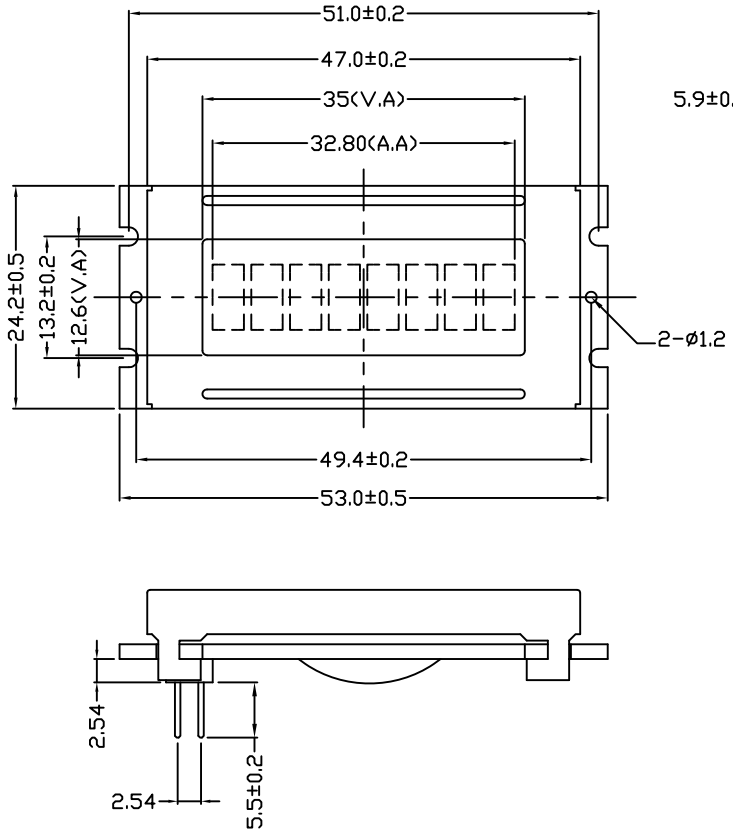
## Document Revision History

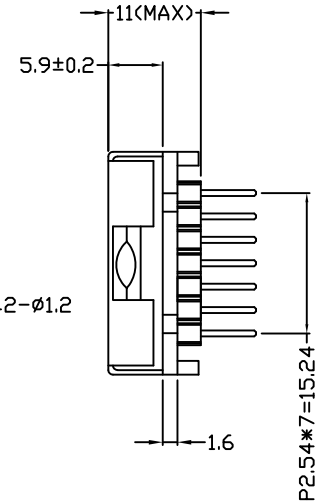
| Revision | Date | Description | Changed by |
|---|---|---|---|
| 0 | 12/17/2008 | Initial Release | - |
| 1 | 10/12/2009 | User Guide Reformat | BE |
| 2 | 10/16/2009 | Block Diagram Revision | BE |
| 3 | 12/22/2009 | Optical revised | BE |
| 4 | 6/30/2010 | Mechanical Drawing Update | MP |
| 5 | 1/4/2011 | Updated second controller information | AK |

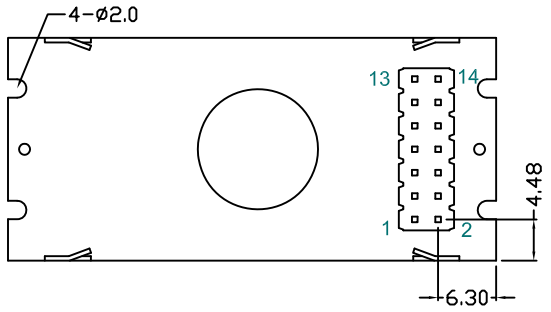
## Functions and Features

- **1 line x 8 characters**
- **Built-in controller (SPLC780D or ST7066U)**
- **+5.0V power supply**
- **1/8 duty, 1/4 bias**
- **RoHS compliant**

## Mechanical Drawing



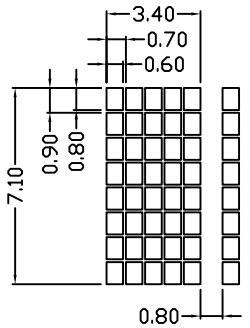




PIN ASSIGNMENT

| | |
|---|---|
| 1 | VSS |
| 2 | VDD |
| 3 | V0 |
| 4 | RS |
| 5 | RW |
| 6 | E |
| 7 | DB0 |
| 8 | DB1 |
| 9 | DB2 |
| 10 | DB3 |
| 11 | DB4 |
| 12 | DB5 |
| 13 | DB6 |
| 14 | DB7 |

DOTS DETAIL

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Notes:

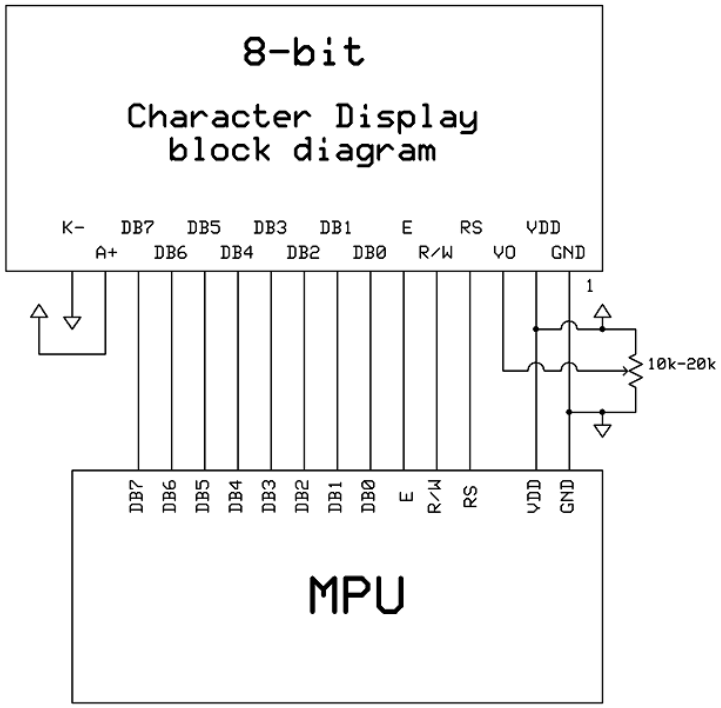
1). Driver Method: 1/8duty, 1/4bias, VDD5.0V VLCD4.4V
2). Display Type: STN-YG/Positive/Reflective/6:00 Visual Angle
3). Operating Temp: -20°C~70°C/Storage Temp: -30°C~80°C
4). Driver: SPLC780D or ST7066U
5). RoHS Compliant

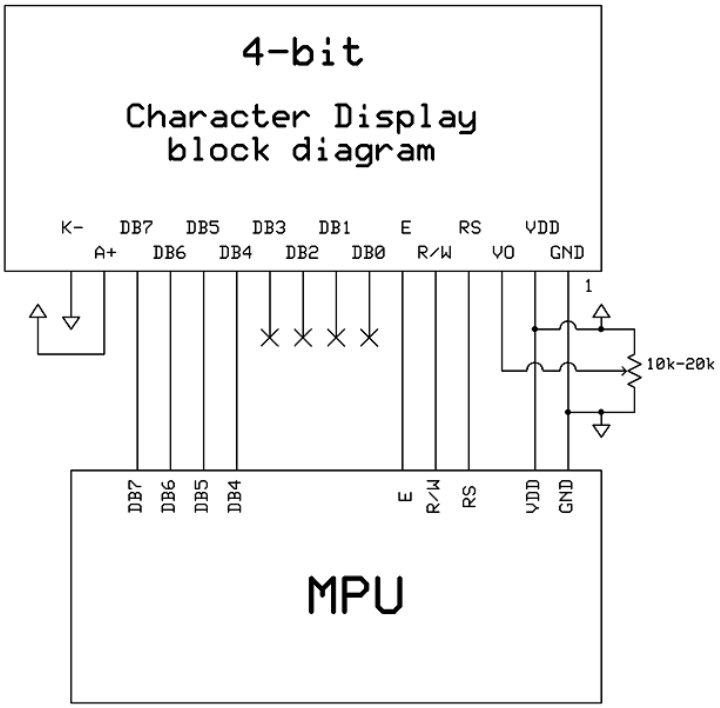
| Newhaven Display | |
|---|---|
| Part No. | NHD-0108BZ-RN-YBW |

## Pin Description and Wiring Diagram

| Pin No. | Symbol | External Connection | Function Description |
|---|---|---|---|
| 1 | VSS | Power Supply | Ground |
| 2 | VDD | Power Supply | Supply Voltage for logic (+5.0V) |
| 3 | V0 | Adj Power Supply | Power supply for contrast (approx. 0.6V) |
| 4 | RS | MPU | Register select signal. RS=0: Command, RS=1: Data |
| 5 | R/W | MPU | Read/Write select signal, R/W=1: Read R/W: =0: Write |
| 6 | E | MPU | Operation enable signal. Falling edge triggered. |
| 7-10 | DB0 – DB3 | MPU | Four low order bi-directional three-state data bus lines. These four are not used during 4-bit operation. |
| 11-14 | DB4 – DB7 | MPU | Four high order bi-directional three-state data bus lines. |

**Recommended LCD connector:** 2.54mm pitch pins
**Backlight connector:** --- **Mates with:** ---



## 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 | | 4.7 | 5.0 | 5.5 | V |
| Supply Current | IDD | Ta=25°C, VDD=5.0V | - | 1.5 | 2.5 | mA |
| Supply for LCD (contrast) | VDD-V0 | Ta=25°C | - | 4.4 | - | V |
| "H" Level input | Vih | | 2.2 | - | VDD | V |
| "L" Level input | Vil | | 0 | - | 0.6 | V |
| "H" Level output | Voh | | 2.4 | - | - | V |
| "L" Level output | Vol | | - | - | 0.4 | V |
| | | | | | | |
| Backlight Supply Voltage | Vled | - | - | - | - | V |
| Backlight Supply Current | Iled | - | - | - | - | mA |

## Optical Characteristics

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Viewing Angle – Vertical (top) | AV | Cr ≥ 2 | - | 25 | - | º |
| Viewing Angle -Vertical (bottom) | AV | Cr ≥ 2 | - | 70 | - | º |
| Viewing Angle – Horizontal (left) | AH | Cr ≥ 2 | - | 30 | - | º |
| Viewing Angle – Horizontal (right) | AH | Cr ≥ 2 | - | 30 | - | º |
| Contrast Ratio | Cr | | - | 2 | - | - |
| Response Time (rise) | Tr | - | - | 120 | 150 | ms |
| Response Time (fall) | Tf | - | - | 120 | 150 | ms |

## Controller Information

**Built-in SPLC780D. Download specification at http://www.newhavendisplay.com/app_notes/SPLC780D.pdf**

**Built-in ST7066U. Download specification at http://www.newhavendisplay.com/app_notes/ST7066U.pdf**

DDRAM address:

Display position

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 |

DDRAM address

## Built-in Font Table

## Example Initialization Program

8-bit Initialization:

```
/*********************************************************/
void command(char i)
{
      P1 = i;                       //put data on output Port
      D_I =0;                       //D/I=LOW : send instruction
      R_W =0;                       //R/W=LOW : Write
      E  = 1;
      Delay(1);                     //enable pulse width  >= 300ns
        E  = 0;                     //Clock enable: falling edge
}
/*********************************************************/
void write(char i)
{
      P1 = i;                       //put data on output Port
      D_I =1;                       //D/I=LOW : send data
      R_W =0;                       //R/W=LOW : Write
      E  = 1;
      Delay(1);                     //enable pulse width  >= 300ns
      E  = 0;                       //Clock enable: falling edge
}
/*********************************************************/
void init()
{
      E = 0;
      Delay(100);                   //Wait >15 msec after power is applied
      command(0x30);                //command 0x30 = Wake up
      Delay(30);                    //must wait 5ms, busy flag not available
      command(0x30);                //command 0x30 = Wake up #2
      Delay(10);                    //must wait 160us, busy flag not available
      command(0x30);                //command 0x30 = Wake up #3
      Delay(10);                    //must wait 160us, busy flag not available
      command(0x38);                //Function set: 8-bit/2-line
      command(0x10);                //Set cursor
      command(0x0c);                //Display ON; Cursor ON
      command(0x06);                //Entry mode set
}
/*********************************************************/
```

4-bit Initialization:

```
/*************************************************************/
void command(char i)
{
      P1 = i;                       //put data on output Port
      D_I =0;                       //D/I=LOW : send instruction
      R_W =0;                       //R/W=LOW : Write
      Nybble();                     //Send lower 4 bits
      i = i<<4;                     //Shift over by 4 bits
      P1 = i;                       //put data on output Port
      Nybble();                     //Send upper 4 bits
}
/*************************************************************/
void write(char i)
{
      P1 = i;                       //put data on output Port
      D_I =1;                       //D/I=HIGH : send data
      R_W =0;                       //R/W=LOW : Write
      Nybble();                     //Clock lower 4 bits
      i = i<<4;                     //Shift over by 4 bits
      P1 = i;                       //put data on output Port
      Nybble();                     //Clock upper 4 bits
}
/*************************************************************/
void Nybble()
{
      E = 1;
      Delay(1);                     //enable pulse width  >= 300ns
      E = 0;                        //Clock enable: falling edge
}
/*************************************************************/
void init()
{
      P1 = 0;
      P3 = 0;
      Delay(100);                   //Wait >15 msec after power is applied
      P1 = 0x30;                    //put 0x30 on the output port
      Delay(30);                    //must wait 5ms, busy flag not available
      Nybble();                     //command 0x30 = Wake up
      Delay(10);                    //must wait 160us, busy flag not available
      Nybble();                     //command 0x30 = Wake up #2
      Delay(10);                    //must wait 160us, busy flag not available
      Nybble();                     //command 0x30 = Wake up #3
      Delay(10);                    //can check busy flag now instead of delay
      P1= 0x20;                     //put 0x20 on the output port
      Nybble();                     //Function set: 4-bit interface
      command(0x28);                //Function set: 4-bit/2-line
      command(0x10);                //Set cursor
      command(0x0F);                //Display ON; Blinking cursor
      command(0x06);                //Entry Mode set
}
/*************************************************************/
```

## 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 , 48hrs | 2 |
| Low Temperature storage | Endurance test applying the low storage temperature for a long time. | -30°C , 48hrs | 1,2 |
| High Temperature Operation | Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time. | +70°C 48hrs | 2 |
| Low Temperature Operation | Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time. | -20°C , 48hrs | 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. | +40°C , 90% RH , 48hrs | 1,2 |
| Thermal Shock resistance | Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress. | 0°C,30min -> 25°C,5min -> 50°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

## Warranty Information and Terms & Conditions

**http://www.newhavendisplay.com/index.php?main_page=terms**

Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

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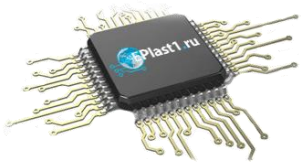
- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.




**Как с нами связаться**

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