**ePAPER 2.0“ - 172X72 DOTS**

INCL. CONTROLLER SSD1606 WITH SPI

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**TECHNICAL DATA**

* HIGH-CONTRAST E-PAPER LCD DISPLAY
* WIDE VIEWING ANGLE
* ACTIVE MATRIX ELECTROPHORETIC DISPLAY (ePAPER) 2“ WITH 172X72 DOTS
* CONTROLLER SSD1606 FOR SPI (4-WIRE) INTERFACE
* POWER: +3,3V SINGLE SUPPLY
* NO ADDITIONAL VOLTAGES REQUIRED
* OPERATING TEMPERATURE RANGE 0°...+50°C (STORAGE TEMP. -25°..+75°C)
* STANDBY-POWER 0W (CONTENT READABLE)
* POWER CONSUMPTION WHILE CONTENT CHANGE ca. 40 mW (~1 sec image update)
* ON-CHIP DISPLAY RAM
* ON-CHIP BOOSTER AND REGULATOR FOR GATE AND SOURCE VOLTAGES
* 4 GRAYSCALES - BLACK, DARK GRAY, LIGHT GRAY AND WHITE

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**ORDERING CODE**

ePAPER DISPLAY 2“ 172X72  
EA EPA20-A

**ACCESSORIES**

ZIFF-CONNECTOR, 24 PINS, TOP CONTACT  
EA WF050-24T
APPLICATION EXAMPLE
Please find a sample schematic below.

![Sample Schematic]

INITIALISATION EXAMPLE

```c
const unsigned char lut_data[] =
{ 0x82, 0x00, 0x00, 0x00, 0xAA, 0x00, 0x00, 0x00, 0xAA,
  0xAA, 0x00, 0x00, 0xAA, 0xAA, 0xAA, 0x00, 0x05, 0xAA,
  0xAA, 0x00, 0x55, 0x55, 0x55, 0xAA, 0xAA, 0xAA,
  0xAA, 0x55, 0x55, 0x55, 0xAA, 0xAA, 0xAA, 0x00,
  0x15, 0x15, 0x05, 0x05, 0x05, 0x05, 0x05, 0x01,
  0x01, 0x01, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
  0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
  0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
  0x45, 0xF1, 0xFF, 0x5F, 0x55, 0x01, 0x00, 0x00, 0x00
};

void SPI_out(unsigned char data)
{
    uchar count;
    CS=0;
    for(count=0; count<8; count++)
    {
        if(data&0x80)
            SDIN=1;
        else
            SDIN=0;
        SCLK=1;
        data<<=1;
        SCLK=0;
    }
    CS=1;
}

void writecmd(char data)
{
    DC=0;
    SPI_out(data);
}

void writedata(char data)
{
    DC=1;
    SPI_out(data);
}
```
void init(void)
{
    unsigned char i;
    CS=1; //perform reset CS idle=1
    SCLK=0; //SCLK idle=0
    RST=1;
    delayms(1);
    RST=0;
    delayms(2);
    RST=1;
    delayms(3);

    writecmd(0x10); //do not enter deep sleep mode
    wriedata(0x00);

    writecmd(0x11); //data entry mode setting, 0x01,Y decrement,X increment
    wriedata(0x01);
    writecmd(0x44); //set RAM X-address start/end position
    wriedata(0x00); //RAM X-address start at 00H
    writecmd(0x11); //RAM X-address end at 11H->(17D), that is (17+1*4=72) start/end position
    wriedata(0xAB); //RAM Y-address start at ABH->(171D)
    wriedata(0x00); //RAM Y-address end at 00H
    writecmd(0x4E); //set RAM x address count to 0;
    wriedata(0x00);
    writecmd(0x4F); //set RAM Y address count to 172->0;
    wriedata(0xAB);

    writecmd(0x50); //booster feedback selection, 0x1F->internal feedback is used
    wriedata(0x1F);
    writecmd(0x21); //bypass the RAM data into the display, enable pass
    wriedata(0x03);
    writecmd(0x2C); //write VCOM register
    wriedata(0xA0);
    writecmd(0x3C); //board waveform, board voltage
    wriedata(0x63);
    writecmd(0x42); //enable sequence, CLK->CP->
    wriedata(0xC4);

    writecmd(0x32); //write LUT register
    for(i=0; i<90; i++)
    wriedata(lut_data[i]);
}

void fill_display(uchar dat) //0xFF=white, 0x00=black, 0x55=gray 1, 0xAA=gray 2
{
    unsigned int i;

    writecmd(0x24);//data write into RAM after this command
    for(i=0; i<3096; i++) //3096 = 172x72/8x2, (2-Bit per dot)
    {
        wriedata(dat);
    }
    writecmd(0x20);
    //Booster disable
    writecmd(0x22); //display update sequence option ,in page 33
    wriedata(0x02);
    writecmd(0x20);
}

Further details concerning the command set and electrical specifications are mentioned in the controller's datasheet SSD1606:
http://www_lcd-module_de/eng/pdf/zubehoer/ssd1606_1_1.pdf
**DIMENSIONS**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Symbol</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NC</td>
<td>do not connect</td>
</tr>
<tr>
<td>2</td>
<td>GDR</td>
<td>Gate drive control</td>
</tr>
<tr>
<td>3</td>
<td>RESE</td>
<td>current sense input</td>
</tr>
<tr>
<td>4</td>
<td>VGL</td>
<td>negative gate driving voltage</td>
</tr>
<tr>
<td>5</td>
<td>VGH</td>
<td>positive gate driving voltage</td>
</tr>
<tr>
<td>6</td>
<td>TSCL</td>
<td>PC digital temp. sensor clock</td>
</tr>
<tr>
<td>7</td>
<td>TSDA</td>
<td>PC digital temp. sensor data</td>
</tr>
<tr>
<td>8</td>
<td>BS1</td>
<td>Bus selector pin</td>
</tr>
<tr>
<td>9</td>
<td>BUSY</td>
<td>Busy state output pin</td>
</tr>
<tr>
<td>10</td>
<td>!RES</td>
<td>Reset (active low)</td>
</tr>
<tr>
<td>11</td>
<td>D/I C</td>
<td>data (high)/command (low) control</td>
</tr>
<tr>
<td>12</td>
<td>ICS</td>
<td>Chip select (active low)</td>
</tr>
<tr>
<td>13</td>
<td>D0</td>
<td>SPI-Clock (SCK)</td>
</tr>
<tr>
<td>14</td>
<td>D1</td>
<td>SPI-Data (MOSI)</td>
</tr>
<tr>
<td>15</td>
<td>VDDIO</td>
<td>Power for I/O logic pins</td>
</tr>
<tr>
<td>16</td>
<td>VCI</td>
<td>Power for display driver chip</td>
</tr>
<tr>
<td>17</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>18</td>
<td>VDD</td>
<td>Power supply</td>
</tr>
<tr>
<td>19</td>
<td>VPP</td>
<td>Power for OTP programming</td>
</tr>
<tr>
<td>20</td>
<td>VSH</td>
<td>positive source driving voltage</td>
</tr>
<tr>
<td>21</td>
<td>PREVGH</td>
<td>power supply for VGH and VSH</td>
</tr>
<tr>
<td>22</td>
<td>VSL</td>
<td>negative source driving voltage</td>
</tr>
<tr>
<td>23</td>
<td>PREVGL</td>
<td>Power supply for VCOM, VGL, VSL</td>
</tr>
<tr>
<td>24</td>
<td>VCOM</td>
<td>VCOM driving voltage</td>
</tr>
</tbody>
</table>

**Note:**
- The display's surface is covered with a protecting foil. Please remove.
- Handle with care. Slim glass