

# OLED-DISPLAYS

## INCL. CONTROLLER 8-BIT AND 4-BIT



| OLED         |              |             |             |      |      |              |      |                      |              |              |
|--------------|--------------|-------------|-------------|------|------|--------------|------|----------------------|--------------|--------------|
| Part-Number  | Row x Column | Char height | Module size |      |      | Viewing Area |      | Accessories (Frames) | Hints        | Drawing page |
|              |              |             | W           | H    | D    | W            | H    |                      |              |              |
| EA W082-XLG  | 2x8          | 5.5         | 58.0        | 32.0 | 10.0 | 38.0         | 16.0 | ---                  | yellow/green | 8            |
| EA W162-X3LW | 2x16         | 5.5         | 80.0        | 36.0 | 10.0 | 66.0         | 16.0 | EA 017-2U            | icewhite     | 9            |
| EA W162-X3LG | 2x16         | 5.5         |             |      |      |              |      | EA 017-2U            | yellow/green | 9            |
| EA W162-XLG  | 2x16         | 5.5         | 84.0        | 44.0 | 10.0 | 66.0         | 16.0 | EA 017-2U            | yellow/green | 10           |
| EA W162-X9LG | 2x16         | 5.5         | 85.0        | 36.0 | 10.0 | 66.0         | 16.0 | EA 017-2U            | yellow/green | 11           |
| EA W162-XBLW | 2x16         | 8.9         | 122.0       | 44.0 | 10.0 | 99.0         | 24.0 | EA 017-12U           | icewhite     | 12           |
| EA W162-XBLG | 2x16         | 8.9         |             |      |      |              |      | EA 017-12U           | yellow/green | 12           |
| EA W202-XLG  | 2x20         | 5.5         | 116.0       | 37.0 | 9.8  | 85.0         | 18.6 | EA 017-7U            | yellow/green | 13           |
| EA W202-XDLG | 2x20         | 9.66        | 180.0       | 40.0 | 9.3  | 149.0        | 23.0 | ---                  | yellow/green | 14           |
| EA W204-XLG  | 4x20         | 5.5         | 98.0        | 60.0 | 10.0 | 70.0         | 25.2 | EA 017-9U            | yellow/green | 15           |

### TECHNICAL DATA

- \* INTEGRATED CONTROLLER (HD44780-LIKE)
- \* INPUT 4- OR 8-BIT DATA-BUS, 3 CONTROL-WIRES(R/W, E, RS)
- \* SPI INTERFACE MOSI, MISO, CLK, CS
- \* ASCII-CHAR SET AND SPECIAL SYMBOLS STORED IN CHARACTER-ROM
- \* UP TO 8 CHARACTERS (ASCII-CODE 0..7) CAN BE DEFINED BY USER
- \* DIFFERENT FUNCTIONS WITH ONE INSTRUCTION:
  - CLEAR DISPLAY, CURSOR HOME, CURSOR ON/OFF, BLINKING CURSOR
  - SHIFT DISPLAY, SHIFT CURSOR, READ/WRITE DISPLAY DATA, ETC.
- \* SIMPLE SUPPLY (3.3..5V).
- \* LOW POWER CONSUMPTION (15..50 mA)
- \* OPERATING TEMPERATURE -40..+80°C
- \* 4 INTEGRATED FONTS

### ACCESSORIES

- \* FRAMES (SEE TABLE)

**ELECTRONIC  
ASSEMBLY**

making things easy





It is possible to choose one of the shown char sets. The English/Japanese char set is setted by default . You have to set the bits FT1/FT0 of function set register:

| FT 1 | FT 0 | Description                             |
|------|------|---|
| 0    | 0    | Englisch Japanese character font table  |
| 0    | 1    | Western European character font table 1 |
| 1    | 0    | English Russian character font table    |
| 1    | 1    | Western European character font table 2 |

It must be noted that the character font setting must be performed at the head of the program before executing any instructions other than the Busy Flag and Address Instruction. Otherwise, the Function Set Instruction cannot be executed unless the interface data length is changed.

### SELF DEFINIED CHARACTER

All these character display modules got the feature to create 8 own characters (ASCII Codes 0..7) in addition to the ROM fixed codes.

- 1.) The command „CG RAM Address Set“ defines the ASCII code (Bit 3,4,5) and the dot line (Bit 0,1,2) of the new character. Example demonstrates creating ASCII code \$00.
- 2.) Doing 8 times the write command „Data Write“ defines line by line the new character. 8th. byte stands for the cursor line.
- 3.) The new defined character can be used as a „normal“ ASCII code (0..7); use with „DD RAM Address Set“ and „Data Write“.

| Adresse im CG RAM setzen |      | Zeichen | Daten des Zeichens |      |   |   |   |   |   |     |
|--------------------------|------|---------|--------------------|------|---|---|---|---|---|-----|
| Adresse                  | Hex  |         | Bit                |      |   |   |   |   |   | Hex |
|                          |      |         | 7                  | 6    | 5 | 4 | 3 | 2 | 1 |     |
| 0 0 0                    | \$40 |         | 0 0 1 0 0          | \$04 |   |   |   |   |   |     |
| 0 0 1                    | \$41 |         | 0 0 1 0 0          | \$04 |   |   |   |   |   |     |
| 0 1 0                    | \$42 |         | 0 0 1 0 0          | \$04 |   |   |   |   |   |     |
| 0 1 1                    | \$43 |         | 0 0 1 0 0          | \$04 |   |   |   |   |   |     |
| 1 0 0                    | \$44 |         | 1 0 1 0 1          | \$15 |   |   |   |   |   |     |
| 1 0 1                    | \$45 |         | 0 1 1 1 0          | \$0E |   |   |   |   |   |     |
| 1 1 0                    | \$46 |         | 0 0 1 0 0          | \$04 |   |   |   |   |   |     |
| 1 1 1                    | \$47 |         | 0 0 0 0 0          | \$00 |   |   |   |   |   |     |



## INSTRUCTION SET

| Instruction                        | Code |     |            |     |     |     |         |     |     |                                     | Description  | Max. execution time when fsp or fosc=250KHz |
|------------------------------------|------|-----|------------|-----|-----|-----|---------|-----|-----|-------------------------------------|--|---|
|                                    | RS   | R/W | DB7        | DB6 | DB5 | DB4 | DB3     | DB2 | DB1 | DB0                                 |  |   |
| Clear Display                      | 0    | 0   | 0          | 0   | 0   | 0   | 0       | 0   | 0   | 1                                   | Clears entire Display, Sets DDRAM-address 0 into addresscounter  | 6.2ms                                       |
| Return Home                        | 0    | 0   | 0          | 0   | 0   | 0   | 0       | 0   | 1   | 0                                   | Sets DDRAM-address 0 into addresscounter. Returns shifted display to original position. DDRAM contents remain unchanged. | 0ms   |
| Entry Mode Set                     | 0    | 0   | 0          | 0   | 0   | 0   | 0       | 1   | I/D | S                                   | Sets cursor move direction and specifies display shift.(These operations are performed during data write and read.)      | 0ms   |
| Display On/Off Control             | 0    | 0   | 0          | 0   | 0   | 0   | 1       | D   | C   | B                                   | Sets entire Display (D) ON/OFF. Sets Cursor (C) ON/OFF. Sets Blinking (B) of Cursor Position Character.                  | 0ms   |
| Cursor/Display Shift/Mode/Pwr      | 0    | 0   | 0          | 0   | 0   | 1   | S/C     | R/L | 0   | 0                                   | Moves cursor and shifts display without changing DDRAM contents.   | 0ms   |
|                                    |      |     |            |     |     |     | G/C (0) | PWR | 1   | 1                                   | Sets Graphic/Character Mode Sets internal power on/off   | 0ms   |
| Function Set                       | 0    | 0   | 0          | 0   | 1   | DL  | N       | F   | FT1 | FT0                                 | Sets interface data length (DL). Sets number of display lines (N). Sets Character Font (F). Sets Font Table (FT).        | 0ms   |
| Set CGRAM Address                  | 0    | 0   | 0          | 1   | ACG | ACG | ACG     | ACG | ACG | ACG                                 | Sets CGRAM Address. CGRAM data is sent and received after this setting.  | 0ms   |
| Set DDRAM Address                  | 0    | 0   | 1          | ADD | ADD | ADD | ADD     | ADD | ADD | ADD                                 | Sets DDRAM Address. The DDRAM data is sent and received after this setting.  | 0ms   |
| Read Busy Flag and Address         | 0    | 1   | BF         | AC  | AC  | AC  | AC      | AC  | AC  | AC                                  | Reads Busy Flag (BF) indicating that internal operation is being performed. Reads Address Counter contents.              | 0ms   |
| Write data into the CGRAM or DDRAM | 1    | 0   | Write Data |     |     |     |         |     |     | Writes data into the CGRAM or DDRAM |  | 0ms   |
| Read data from the CGRAM or DDRAM  | 1    | 1   | Read Data  |     |     |     |         |     |     | Reads data from the CGRAM or DDRAM  |  | 0ms   |

### Notes on the instruction set:

- After the CGRAM/DDRAM Read or Write Instruction has been executed, the RAM Address Counter is incremented or decremented by 1. After the Busy Flag is turned OFF, the RAM Address is updated.
- I/D**=Increment/Decrement Bit  
I/D="1": Increment  
I/D="0": Decrement
- S**=Shift Entire Display Control Bit.  
S="0", shift function disable.  
S="1", shift function enable.
- BF**=Busy Flag  
BF="1": Internal Operating in Progress  
BF="0": No Internal Operation is being executed, next instruction can be accepted.
- R/L**=Shift Right/Left  
R/L="1": Shift to the Right  
R/L="0": Shift to the Left
- S/C**=Display Shift/Cursor Move  
S/C="1": Display Shift  
S/C="0": Cursor Move
- G/C**=Graphic/Character mode selection.  
G/C="0", Character mode is selected.  
G/C="1", Graphic mode is selected.
- PWR**=Internal DCDC on/of control.  
PWR="1", DCDC on.  
PWR="0", DCDC off.
- DDRAM**=Display Data RAM
- CGRAM**=Character Generator RAM
- ACG**=CGRAM Address
- ADD**=Address Counter Address (corresponds to cursor address)
- AC**=Address Counter (used for DDRAM and CGRAM Addresses)
- F**=Character Pattern Mode  
F="1": 5 x 10 dots  
F="0": 5 x 8 dots
- N**=Number of Lines Displayed  
N="1": 2- and 4-Line Display  
N="0": 1-Line Display

## INITIALISATION EXAMPLES

| Initialisation example: 8-Bit / SPI |     |     |     |     |     |     |     |     |     |      |  |
|-------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|--|
| RS                                  | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | HEX  | Description  |
| 0                                   | 0   | 0   | 0   | 1   | 1   | 1   | 0   | 0   | 1   | \$39 | Function Set, western european character set, 8-Bit  |
| 0                                   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | \$08 | Display off  |
| 0                                   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | \$06 | Entry mode set, increment cursor by 1 not shifting display                                       |
| 0                                   | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 1   | 1   | \$17 | Character mode and internal power on (have to turn on internal power to get the best brightness) |
| 0                                   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | \$01 | Clear display  |
| 0                                   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | \$02 | Return home  |
| 0                                   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | \$0C | Display on   |

*void* initDisplay (*void*)

```
{
    RS_DD=1; //RS Pin as output
    RW_DD=1; //RW Pin as output
    EN_DD=1; //EN Pin as output
    WriteIns(0x39); //function set european character set
    WriteIns(0x08); //display off
    WriteIns(0x06); //entry mode set increment cursor by 1 not shifting display
    WriteIns(0x17); //Character mode and internal power on
    WriteIns(0x01); //clear display
    WriteIns(0x02); //return home
    WriteIns(0x0C); //display on
}
```

*void* WriteIns(*char* instruction)

```
{
    CheckBusy();
    DATA_PORT_DD=0xFF; //Dataport as Output
    RS = 0;
    RW = 0;
    DATA_PORT = instruction; //set Data on Outputport
    EN = 1; //set Enable to high
    Wait(10); //wait 1us (stabilize Outputport)
    EN = 0; //reset Enable to low
}
```

| Initialisation example: 4-Bit |     |     |     |     |     |     |     |     |     |      |  |
|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|--|
| RS                            | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | HEX  | Description  |
| 0                             | 0   | 0   | 0   | 1   | 0   | 1   | 0   | 0   | 0   | \$28 | Function Set, English/Japanese char set, 4-Bit<br>Note: Western European charset not available   |
| 0                             | 0   | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | \$08 | Display off  |
| 0                             | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | \$06 | Entry mode set, increment cursor by 1 not shifting display                                       |
| 0                             | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 1   | 1   | \$17 | Character mode and internal power on (have to turn on internal power to get the best brightness) |
| 0                             | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | \$01 | Clear display  |
| 0                             | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 0   | \$02 | Return home  |
| 0                             | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 0   | \$0C | Display on   |

*void* initDisplay(*void*)

```
{
    RS_DD=1; //RS-Pin as Output
    EN_DD=1; //EN-Pin as Output
    RW_DD=1; //RW-Pin as Output
    RS = 0; //RS-Pin to low
    RW = 0; //RW-Pin to low
    EN = 0; //EN-Pin to low
    send_nibble(0x03); //Be sure to
    send_nibble(0x03); //be in
    send_nibble(0x03); //8-Bit-Mode
    send_nibble(0x02); //Switch to 4 Bit
    Wait(50); //Wait 5us
    WriteIns(0x28); //4-Bit-Mode
    WriteIns(0x08); //display off
    WriteIns(0x06); //entry mode set increment cursor by 1 not shifting display
    WriteIns(0x17); //Character mode and internal power on
    WriteIns(0x01); //clear display
    WriteIns(0x02); //return home
    WriteIns(0x0C); //display on
}
```

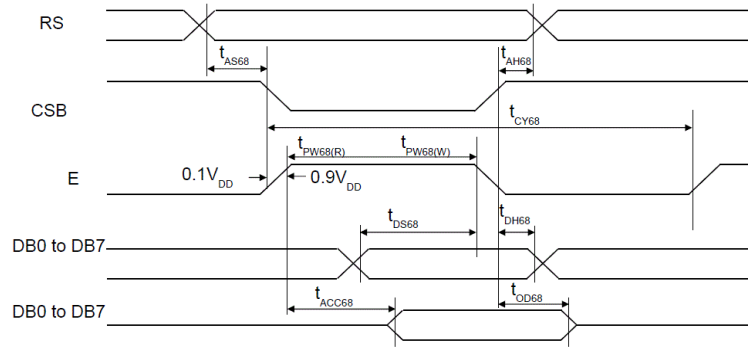
*void* send\_nibble (*char* data)

```
{
    DATA_PORT = data; //output data
    EN=1;
    Wait(10); //wait 1us (stabilize outupt)
    EN=0;
    Wait(10); //wait 1us (stabilize outupt)
}
```

*void* WriteIns(*char* instruction)

```
{
    CheckBusy();
    DATA_PORT_DD=0x0F; //Dataport as Output
    RS = 0;
    RW = 0;
    send_nibble((instruction&0xF0)>>4); //Highbyte
    send_nibble(instruction&0x0F); //Lowbyte
}
```

## TIMING 8-BIT INTERFACE



(VDD = 3.0 to 5.3V, Ta = 25°C)

| Item                | Signal     | Symbol               | Min. | Typ. | Max. | Unit | Remark                 |
|---------------------|------------|----------------------|------|------|------|------|------------------------|
| Address setup time  | RS         | t <sub>AS68</sub>    | 20   | -    | -    | ns   |                        |
| Address hold time   | RS         | t <sub>AH68</sub>    | 0    | -    | -    | ns   |                        |
| System cycle time   |            | t <sub>CY68</sub>    | 500  | -    | -    | ns   |                        |
| Pulse width (E)     | E_RDB      | t <sub>PW68(W)</sub> | 250  | -    | -    | ns   |                        |
| Pulse width (E)     | E_RDB      | t <sub>PW68(R)</sub> | 250  | -    | -    | ns   |                        |
| Data setup time     | DB7 to DB0 | t <sub>DS68</sub>    | 40   | -    | -    | ns   |                        |
| Data hold time      | DB7 to DB0 | t <sub>DH68</sub>    | 20   | -    | -    | ns   |                        |
| Read access time    | DB0        | t <sub>ACC68</sub>   | -    | -    | 180  | ns   | C <sub>L</sub> = 100pF |
| Output disable time | DB0        | t <sub>OD68</sub>    | 10   | -    | -    | ns   |                        |

## ELECTRICAL CHARACTERISTICS

| Item                  | Symbol          | Test Condition          | Standard Value |          |         | Unit |
|-----------------------|-----------------|-------------------------|----------------|----------|---------|------|
|                       |                 |                         | min.           | typ.     | max     |      |
| Input "high" voltage  | V <sub>IH</sub> | -                       | 0.9 VDD        | -        | VDD     | V    |
| Input "low" voltage   | V <sub>IL</sub> | -                       | GND            | -        | 0.1 VDD | V    |
| Output "high" voltage | V <sub>OH</sub> | I <sub>OH</sub> =-0.5mA | 0.8 VDD        | -        | VDD     | V    |
| Output "low" voltage  | V <sub>OL</sub> | I <sub>OL</sub> =0.5mA  | GND            | -        | 0.2 VDD | V    |
| Power supply current  | ICC             | VDD=5V                  |                | 15..50mA |         | A    |

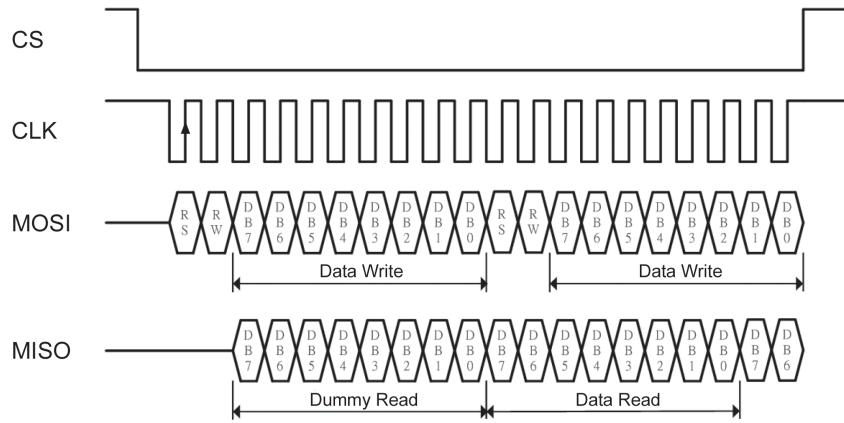
## ABSOLUTE MAXIMUM RATINGS

VCC=5.0V, Ta=25°C

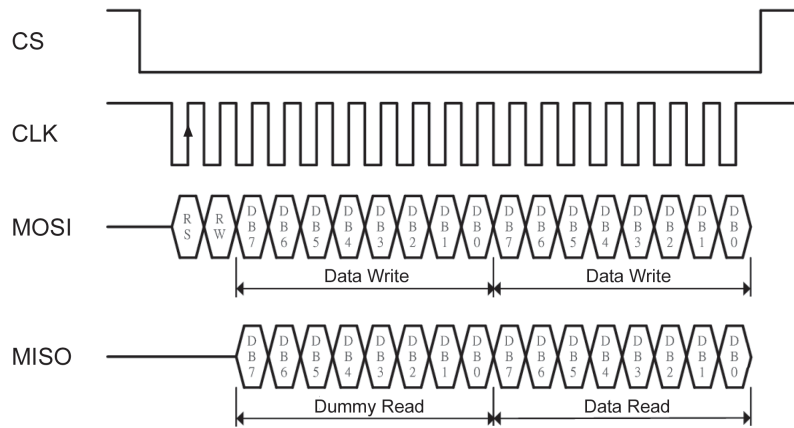
| Item                           | Symbol         | Standard Value |     | Unit |
|--------------------------------|----------------|----------------|-----|------|
|                                |                | min.           | max |      |
| Power supply voltage for logic | VDD-GND        | -0.3           | 5.3 | V    |
| Input Voltage                  | V <sub>I</sub> | -0.3           | VDD | V    |
| Operating temperature          | TOP            | -40            | 80  | °C   |
| Storage Temperature            | TST            | -40            | 80  | °C   |

*It must be noted:  
Supplied with 3.3V reduces brightness compared to 5V*

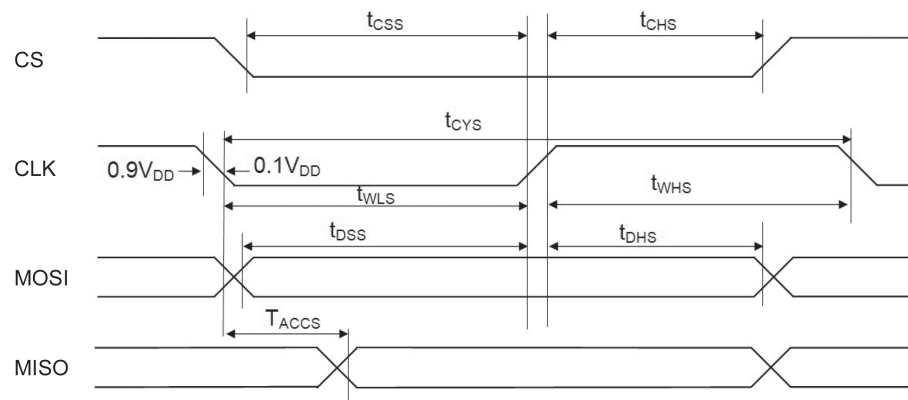
### SPI INSTRUCTION DIAGRAM



### SPI DATA TRANSMISSION DIAGRAM

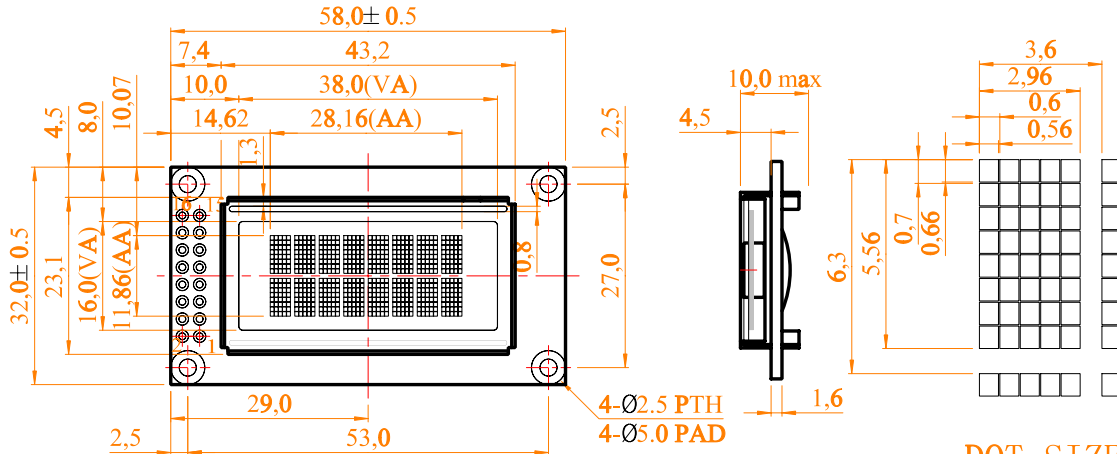


### TIMING SPI INTERFACE



| Item                 | Signal | Symbol | Min. | Typ. | Max. | Unit |
|----------------------|--------|--------|------|------|------|------|
| Serial clock cycle   | CLK    | tCYS   | 300  | -    | -    | ns   |
| SCL high pulse width | CLK    | tWHS   | 100  | -    | -    | ns   |
| SCL low pulse width  | CLK    | tWLS   | 100  | -    | -    | ns   |
| CSB setup time       | CS     | tCSS   | 150  | -    | -    | ns   |
| CSB hold time        | CS     | tCHS   | 150  | -    | -    | ns   |
| Data setup time      | MOSI   | tDSS   | 100  | -    | -    | ns   |
| Data hold time       | MOSI   | tDHS   | 100  | -    | -    | ns   |
| Read access time     | MOSI   | tACCS  | -    | -    | 80   | ns   |

## EA W082-XLG



DOT SIZES  
SCALE 5/1

### INTERFACE 4-/8-BIT, 6800/ Z80



4-/8-Bit 6800  
(default)



4-/8-Bit Z80

| Pinout for 8-Bit Interface |          |              |  |
|----------------------------|----------|--------------|--|
| Pin                        | Symbol   | Level        | Description                                |
| 1                          | VSS      | L            | Power Supply 0V, GND                       |
| 2                          | VDD      | H            | Power Supply +3.3V-5V                      |
| 3                          | NC       | -            | Not Connected                              |
| 4                          | RS       | H / L        | Register Select                            |
| 5                          | R/W (WR) | H / L<br>(L) | H: Read / L: Write<br>(L: Write, Z80-Mode) |
| 6                          | E (RD)   | H<br>(L)     | H: Enable<br>(L: Read, Z80-Mode)           |
| 7..14                      | D0..D7   | H / L        | Data Bus, bidirectional                    |
| 15                         | NC       | -            | Not Connected                              |
| 16                         | NC       | -            | Not Connected                              |

| Pinout for 4-Bit Interface |          |              |  |
|----------------------------|----------|--------------|--|
| Pin                        | Symbol   | Level        | Description                                |
| 1                          | VSS      | L            | Power Supply 0V, GND                       |
| 2                          | VDD      | H            | Power Supply +3.3V-5V                      |
| 3                          | NC       | -            | Not Connected                              |
| 4                          | RS       | H / L        | Register Select                            |
| 5                          | R/W (WR) | H / L<br>(L) | H: Read / L: Write<br>(L: Write, Z80-Mode) |
| 6                          | E (RD)   | H<br>(L)     | H: Enable<br>(L: Read, Z80-Mode)           |
| 7..10                      | DNC      | -            | Do Not Connect                             |
| 11..14                     | D4..D7   | H / L        | Data Bus, bidirectional                    |
| 15                         | NC       | -            | Not Connected                              |
| 16                         | NC       | -            | Not Connected                              |

### SPI INTERFACE



SPI

| Pinout for SPI-Bit Interface |        |       |                       |
|------------------------------|--------|-------|-----------------------|
| Pin                          | Symbol | Level | Description           |
| 1                            | VSS    | L     | Power Supply 0V, GND  |
| 2                            | VDD    | H     | Power Supply +3.3V-5V |
| 3..11                        | NC     | -     | Not Connected         |
| 12                           | CLK    | H / L | L-H: Serial Clock     |
| 13                           | MISO   | H / L | Serial Data Output    |
| 14                           | MOSI   | H / L | Serial Data Input     |
| 15                           | CS     | L     | L: Chip Select        |
| 16                           | NC     | -     | Not Connected         |

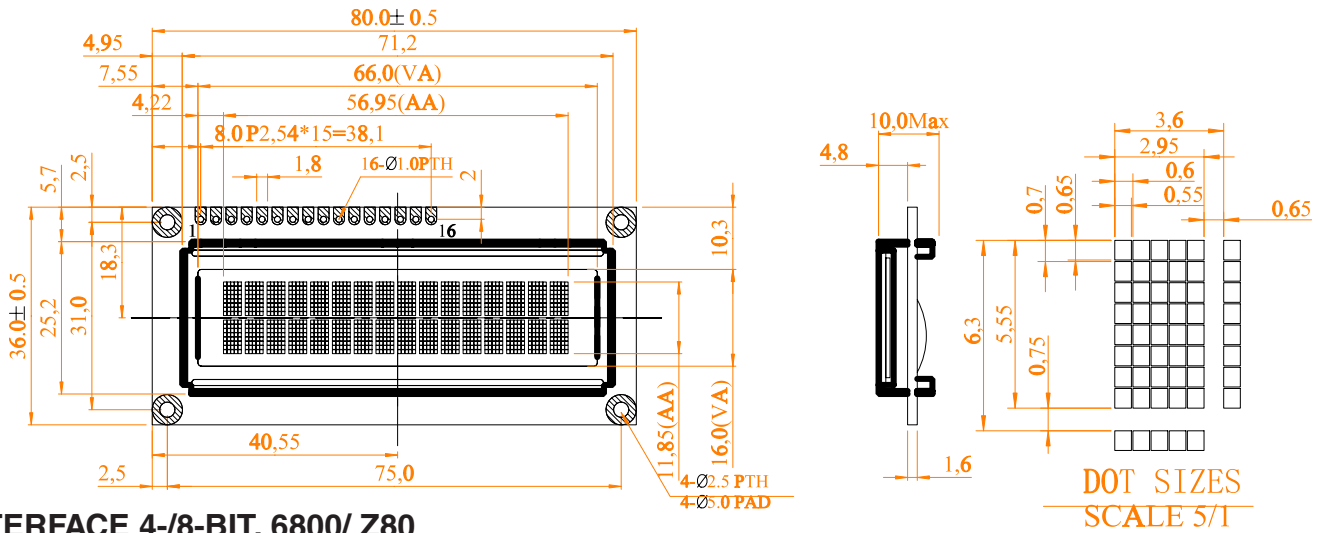
In delivery state the display can be connected directly to the 4- or 8-Bit data bus (compatible to 6800 mode). By changing the solder bridges, the mode „Z80“ is set. Additionally the SPI interface can be selected.

For timing information please refer to page 6 and 7.



**EA W162-X3LW (ICEWHITE)**  
**EA W162-X3LG (YELLOW/GREEN)**

**FRAME**  
**EA 017-2U**



**INTERFACE 4-/8-BIT, 6800/ Z80**



4-/8-Bit 6800 (default)



4-/8-Bit Z80

| Pinout for 8-Bit Interface |          |           |   |
|----------------------------|----------|-----------|---|
| Pin                        | Symbol   | Level     | Description                             |
| 1                          | VSS      | L         | Power Supply 0V, GND                    |
| 2                          | VDD      | H         | Power Supply +3.3V~5V                   |
| 3                          | NC       | -         | Not Connected                           |
| 4                          | RS       | H / L     | Register Select                         |
| 5                          | R/W (WR) | H / L (L) | H: Read / L: Write (L: Write, Z80-Mode) |
| 6                          | E (RD)   | H (L)     | H: Enable (L: Read, Z80-Mode)           |
| 7..14                      | D0..D7   | H / L     | Data Bus, bidirectional                 |
| 15                         | NC       | -         | Not Connected                           |
| 16                         | NC       | -         | Not Connected                           |

| Pinout for 4-Bit Interface |          |           |   |
|----------------------------|----------|-----------|---|
| Pin                        | Symbol   | Level     | Description                             |
| 1                          | VSS      | L         | Power Supply 0V, GND                    |
| 2                          | VDD      | H         | Power Supply +3.3V~5V                   |
| 3                          | NC       | -         | Not Connected                           |
| 4                          | RS       | H / L     | Register Select                         |
| 5                          | R/W (WR) | H / L (L) | H: Read / L: Write (L: Write, Z80-Mode) |
| 6                          | E (RD)   | H (L)     | H: Enable (L: Read, Z80-Mode)           |
| 7..10                      | DNC      | -         | Do Not Connect                          |
| 11..14                     | D4..D7   | H / L     | Data Bus, bidirectional                 |
| 15                         | NC       | -         | Not Connected                           |
| 16                         | NC       | -         | Not Connected                           |

**SPI INTERFACE**



SPI

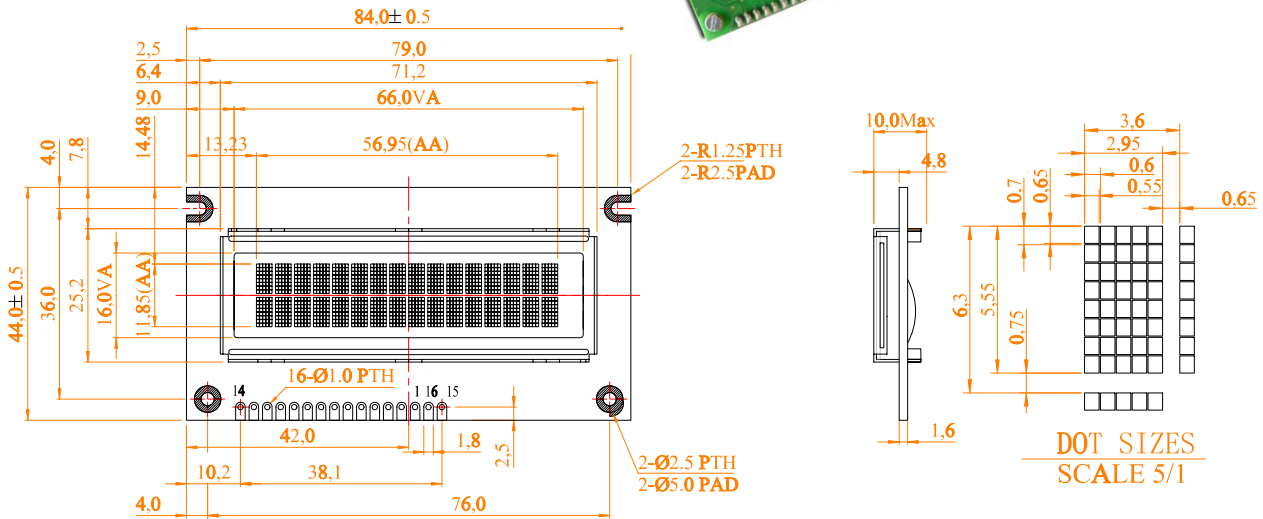
| Pinout for SPI-Bit Interface |        |       |                       |
|------------------------------|--------|-------|-----------------------|
| Pin                          | Symbol | Level | Description           |
| 1                            | VSS    | L     | Power Supply 0V, GND  |
| 2                            | VDD    | H     | Power Supply +3.3V~5V |
| 3..11                        | NC     | -     | Not Connected         |
| 12                           | CLK    | H / L | L-H: Serial Clock     |
| 13                           | MISO   | H / L | Serial Data Output    |
| 14                           | MOSI   | H / L | Serial Data Input     |
| 15                           | NC     | -     | Not Connected         |
| 16                           | CS     | L     | L: Chip Select        |

In delivery state the display can be connected directly to the 4- or 8-Bit data bus (compatible to 6800 mode). By changing the solder bridges, the mode „Z80“ is set. Additionally the SPI interface can be selected.

For timing information please refer to page 6 and 7.

## EA W162-XLG (YELLOW/GREEN)

## FRAME EA 017-2U



## INTERFACE 4-/8-BIT, 6800/ Z80



4-/8-Bit 6800  
(default)



4-/8-Bit Z80

| Pinout for 8-Bit Interface |             |              |  |
|----------------------------|-------------|--------------|--|
| Pin                        | Symbol      | Level        | Description                                |
| 1                          | VSS         | L            | Power Supply 0V, GND                       |
| 2                          | VDD         | H            | Power Supply +3.3V-5V                      |
| 3                          | NC          | -            | Not Connected                              |
| 4                          | RS          | H / L        | Register Select                            |
| 5                          | R/W<br>(WR) | H / L<br>(L) | H: Read / L: Write<br>(L: Write, Z80-Mode) |
| 6                          | E<br>(RD)   | H<br>(L)     | H: Enable<br>(L: Read, Z80-Mode)           |
| 7..14                      | DO..D7      | H / L        | Data Bus, bidirectional                    |
| 15                         | NC          | -            | Not Connected                              |
| 16                         | NC          | -            | Not Connected                              |

| Pinout for 4-Bit Interface |             |              |  |
|----------------------------|-------------|--------------|--|
| Pin                        | Symbol      | Level        | Description                                |
| 1                          | VSS         | L            | Power Supply 0V, GND                       |
| 2                          | VDD         | H            | Power Supply +3.3V-5V                      |
| 3                          | NC          | -            | Not Connected                              |
| 4                          | RS          | H / L        | Register Select                            |
| 5                          | R/W<br>(WR) | H / L<br>(L) | H: Read / L: Write<br>(L: Write, Z80-Mode) |
| 6                          | E<br>(RD)   | H<br>(L)     | H: Enable<br>(L: Read, Z80-Mode)           |
| 7..10                      | DNC         | -            | Do Not Connect                             |
| 11..14                     | D4..D7      | H / L        | Data Bus, bidirectional                    |
| 15                         | NC          | -            | Not Connected                              |
| 16                         | NC          | -            | Not Connected                              |

## SPI INTERFACE



SPI

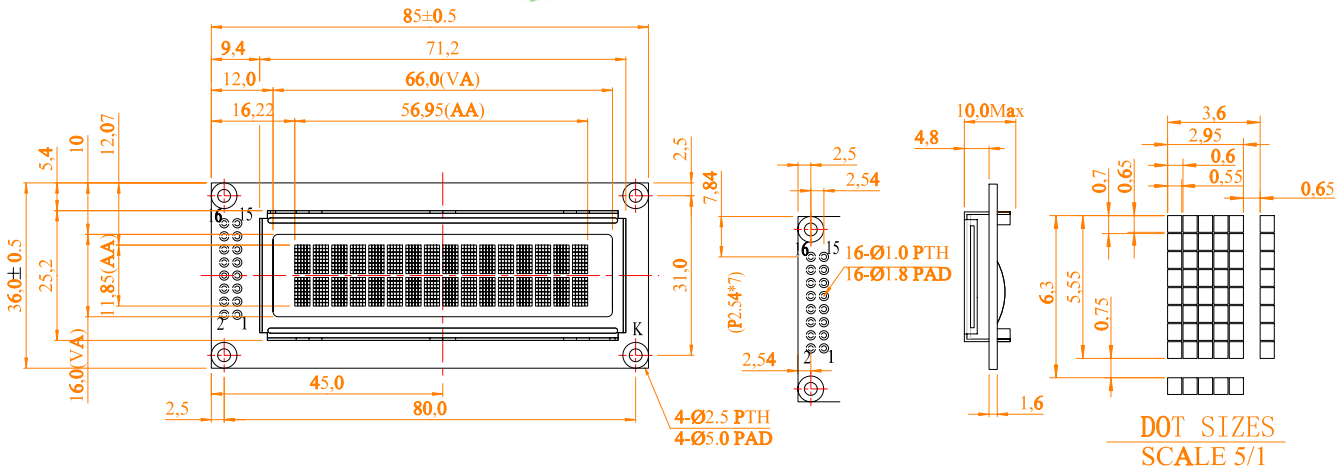
| Pinout for SPI-Interface |        |       |                       |
|--------------------------|--------|-------|-----------------------|
| Pin                      | Symbol | Level | Description           |
| 1                        | VSS    | L     | Power Supply 0V, GND  |
| 2                        | VDD    | H     | Power Supply +3.3V-5V |
| 3..11                    | NC     | -     | Not Connected         |
| 12                       | CLK    | H / L | L-H: Serial Clock     |
| 13                       | MISO   | H / L | Serial Data Output    |
| 14                       | MOSI   | H / L | Serial Data Input     |
| 15                       | NC     | -     | Not Connected         |
| 16                       | CS     | L     | L: Chip Select        |

In delivery state the display can be connected directly to the 4- or 8-Bit data bus (compatible to 6800 mode). By changing the solder bridges, the mode „Z80“ is set. Additionally the SPI interface can be selected.

For timing information please refer to page 6 and 7.

EA W162-X9LG

FRAME  
EA 017-2U



INTERFACE 4-/8-BIT, 6800/ Z80



4-/8-Bit 6800  
(default)

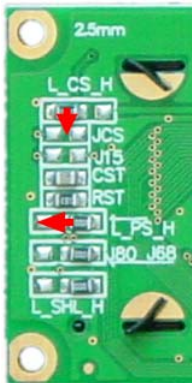


4-/8-Bit Z80

| Pinout for 8-Bit Interface |          |           |   |
|----------------------------|----------|-----------|---|
| Pin                        | Symbol   | Level     | Description                             |
| 1                          | VSS      | L         | Power Supply 0V, GND                    |
| 2                          | VDD      | H         | Power Supply +3.3V~5V                   |
| 3                          | NC       | -         | Not Connected                           |
| 4                          | RS       | H / L     | Register Select                         |
| 5                          | R/W (WR) | H / L (L) | H: Read / L: Write (L: Write, Z80-Mode) |
| 6                          | E (RD)   | H (L)     | H: Enable (L: Read, Z80-Mode)           |
| 7..14                      | D0..D7   | H / L     | Data Bus, bidirectional                 |
| 15                         | NC       | -         | Not Connected                           |
| 16                         | NC       | -         | Not Connected                           |

| Pinout for 4-Bit Interface |          |           |   |
|----------------------------|----------|-----------|---|
| Pin                        | Symbol   | Level     | Description                             |
| 1                          | VSS      | L         | Power Supply 0V, GND                    |
| 2                          | VDD      | H         | Power Supply +3.3V~5V                   |
| 3                          | NC       | -         | Not Connected                           |
| 4                          | RS       | H / L     | Register Select                         |
| 5                          | R/W (WR) | H / L (L) | H: Read / L: Write (L: Write, Z80-Mode) |
| 6                          | E (RD)   | H (L)     | H: Enable (L: Read, Z80-Mode)           |
| 7..10                      | DNC      | -         | Do Not Connect                          |
| 11..14                     | D4..D7   | H / L     | Data Bus, bidirectional                 |
| 15                         | NC       | -         | Not Connected                           |
| 16                         | NC       | -         | Not Connected                           |

SPI INTERFACE



SPI

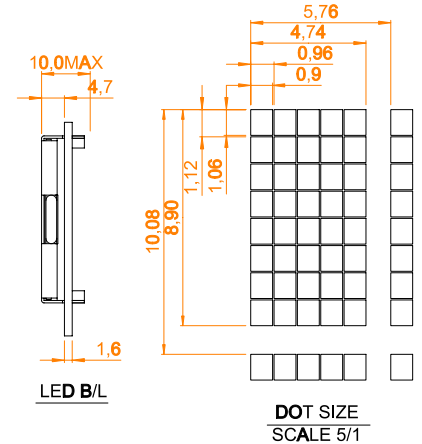
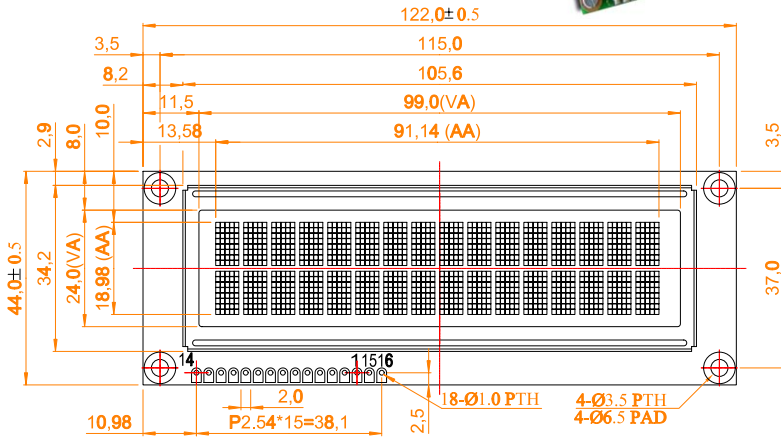
| Pinout for SPI-Bit Interface |        |       |                       |
|------------------------------|--------|-------|-----------------------|
| Pin                          | Symbol | Level | Description           |
| 1                            | VSS    | L     | Power Supply 0V, GND  |
| 2                            | VDD    | H     | Power Supply +3.3V~5V |
| 3..11                        | NC     | -     | Not Connected         |
| 12                           | CLK    | H / L | L-H: Serial Clock     |
| 13                           | MISO   | H / L | Serial Data Output    |
| 14                           | MOSI   | H / L | Serial Data Input     |
| 15                           | NC     | -     | Not Connected         |
| 16                           | CS     | L     | L: Chip Select        |

In delivery state the display can be connected directly to the 4- or 8-Bit data bus (compatible to 6800 mode). By changing the solder bridges, the mode „Z80“ is set. Additionally the SPI interface can be selected.

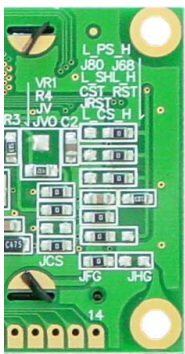
For timing information please refer to page 6 and 7.

EA W162-XBLW (ICEWHITE)  
EA W162-XBLG (YELLOW/GREEN)

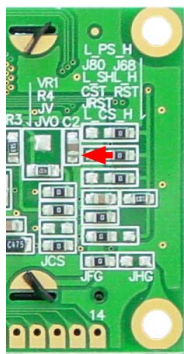
FRAME  
EA 017-12U



## INTERFACE 4-/8-BIT, 6800/ Z80



4-/8-Bit 6800  
(default)

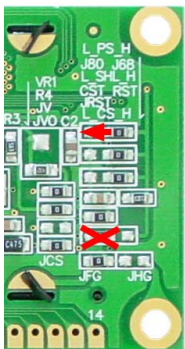


4-/8-Bit Z80

| Pinout for 8-Bit Interface |          |           |   |
|----------------------------|----------|-----------|---|
| Pin                        | Symbol   | Level     | Description                             |
| 1                          | VSS      | L         | Power Supply 0V, GND                    |
| 2                          | VDD      | H         | Power Supply +3.3V~5V                   |
| 3                          | NC       | -         | Not Connected                           |
| 4                          | RS       | H / L     | Register Select                         |
| 5                          | R/W (WR) | H / L (L) | H: Read / L: Write (L: Write, Z80-Mode) |
| 6                          | E (RD)   | H (L)     | H: Enable (L: Read, Z80-Mode)           |
| 7..14                      | D0..D7   | H / L     | Data Bus, bidirectional                 |
| 15                         | NC       | -         | Not Connected                           |
| 16                         | NC       | -         | Not Connected                           |

| Pinout for 4-Bit Interface |          |           |   |
|----------------------------|----------|-----------|---|
| Pin                        | Symbol   | Level     | Description                             |
| 1                          | VSS      | L         | Power Supply 0V, GND                    |
| 2                          | VDD      | H         | Power Supply +3.3V~5V                   |
| 3                          | NC       | -         | Not Connected                           |
| 4                          | RS       | H / L     | Register Select                         |
| 5                          | R/W (WR) | H / L (L) | H: Read / L: Write (L: Write, Z80-Mode) |
| 6                          | E (RD)   | H (L)     | H: Enable (L: Read, Z80-Mode)           |
| 7..10                      | DNC      | -         | Do Not Connect                          |
| 11..14                     | D4..D7   | H / L     | Data Bus, bidirectional                 |
| 15                         | NC       | -         | Not Connected                           |
| 16                         | NC       | -         | Not Connected                           |

## SPI INTERFACE



SPI

| Pinout for SPI-Interface |        |       |                       |
|--------------------------|--------|-------|-----------------------|
| Pin                      | Symbol | Level | Description           |
| 1                        | VSS    | L     | Power Supply 0V, GND  |
| 2                        | VDD    | H     | Power Supply +3.3V~5V |
| 3..11                    | NC     | -     | Not Connected         |
| 12                       | CLK    | H / L | L-H: Serial Clock     |
| 13                       | MISO   | H / L | Serial Data Output    |
| 14                       | MOSI   | H / L | Serial Data Input     |
| 15                       | NC     | -     | Not Connected         |
| 16                       | CS     | L     | L: Chip Select        |

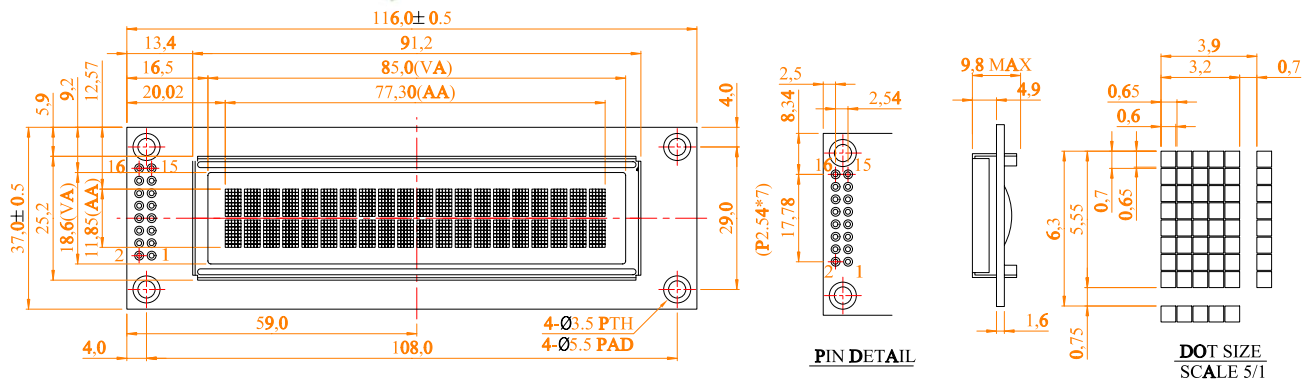
In delivery state the display can be connected directly to the 4- or 8-Bit data bus (compatible to 6800 mode). By changing the solder bridges, the mode „Z80“ is set. Additionally the SPI interface can be selected.

For timing information please refer to page 6 and 7.



EA W202-XLG

FRAME  
EA 017-7U



INTERFACE 4-/8-BIT, 6800/ Z80



4-/8-Bit 6800 (default)



4-/8-Bit Z80

SPI INTERFACE



SPI

In delivery state the display can be connected directly to the 4- or 8-Bit data bus (compatible to 6800 mode). By changing the solder bridges, the mode „Z80“ is set. Additionally the SPI interface can be selected.

For timing information please refer to page 6 and 7.

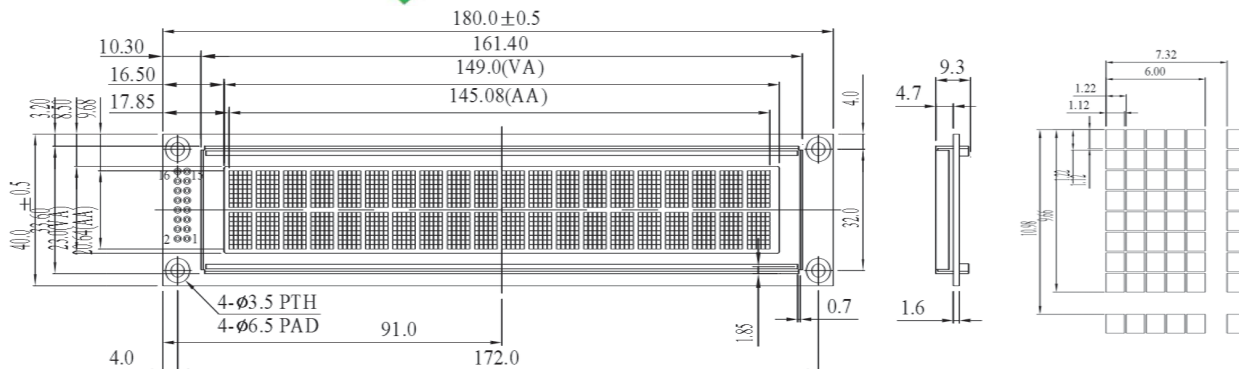
PIN DETAIL

| Pinout for 8-Bit Interface |          |           |   |
|----------------------------|----------|-----------|---|
| Pin                        | Symbol   | Level     | Description                             |
| 1                          | VSS      | L         | Power Supply 0V, GND                    |
| 2                          | VDD      | H         | Power Supply +3.3V-5V                   |
| 3                          | NC       | -         | Not Connected                           |
| 4                          | RS       | H / L     | Register Select                         |
| 5                          | R/W (WR) | H / L (L) | H: Read / L: Write (L: Write, Z80-Mode) |
| 6                          | E (RD)   | H (L)     | H: Enable (L: Read, Z80-Mode)           |
| 7..14                      | DO..D7   | H / L     | Data Bus, bidirectional                 |
| 15                         | NC       | -         | Not Connected                           |
| 16                         | NC       | -         | Not Connected                           |

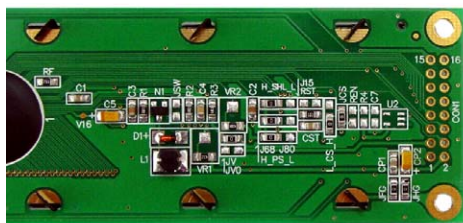
| Pinout for 4-Bit Interface |          |           |   |
|----------------------------|----------|-----------|---|
| Pin                        | Symbol   | Level     | Description                             |
| 1                          | VSS      | L         | Power Supply 0V, GND                    |
| 2                          | VDD      | H         | Power Supply +3.3V-5V                   |
| 3                          | NC       | -         | Not Connected                           |
| 4                          | RS       | H / L     | Register Select                         |
| 5                          | R/W (WR) | H / L (L) | H: Read / L: Write (L: Write, Z80-Mode) |
| 6                          | E (RD)   | H (L)     | H: Enable (L: Read, Z80-Mode)           |
| 7..10                      | DNC      | -         | Do Not Connect                          |
| 11..14                     | D4..D7   | H / L     | Data Bus, bidirectional                 |
| 15                         | NC       | -         | Not Connected                           |
| 16                         | NC       | -         | Not Connected                           |

| Pinout for SPI-Interface |        |       |                       |
|--------------------------|--------|-------|-----------------------|
| Pin                      | Symbol | Level | Description           |
| 1                        | VSS    | L     | Power Supply 0V, GND  |
| 2                        | VDD    | H     | Power Supply +3.3V-5V |
| 3..11                    | NC     | -     | Not Connected         |
| 12                       | CLK    | H / L | L-H: Serial Clock     |
| 13                       | MISO   | H / L | Serial Data Output    |
| 14                       | MOSI   | H / L | Serial Data Input     |
| 15                       | NC     | -     | Not Connected         |
| 16                       | CS     | L     | L: Chip Select        |

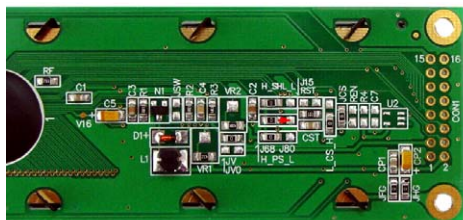
## EA W202-XDLG



### INTERFACE 4-/8-BIT, 6800/ Z80

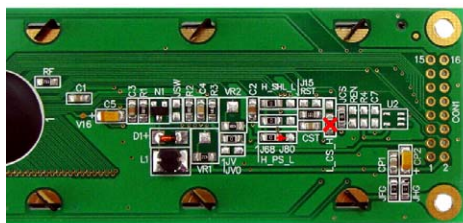


4-/8-Bit 6800  
(default)



4-/8-Bit Z80

### SPI INTERFACE



SPI

In delivery state the display can be connected directly to the 4- or 8-Bit data bus (compatible to 6800 mode). By changing the solder bridges, the mode „Z80“ is set. Additionally the SPI interface can be selected.

For timing information please refer to page 6 and 7.

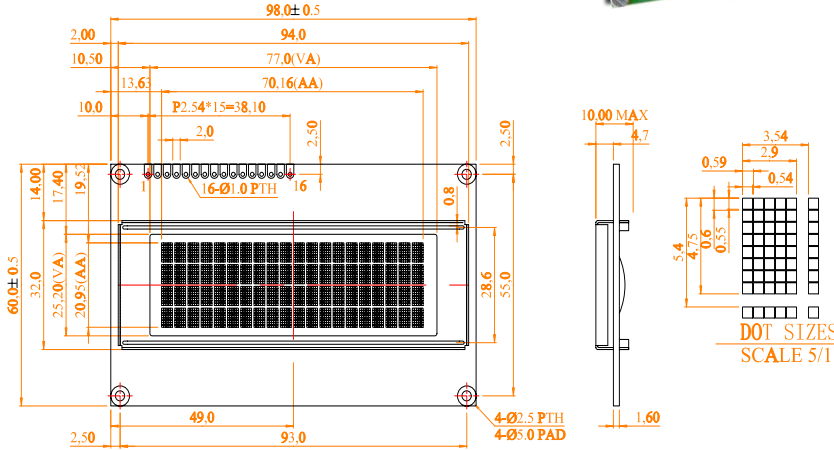
| Pinout for 8-Bit Interface |          |           |   |
|----------------------------|----------|-----------|---|
| Pin                        | Symbol   | Level     | Description                             |
| 1                          | VSS      | L         | Power Supply 0V, GND                    |
| 2                          | VDD      | H         | Power Supply +3.3V~5V                   |
| 3                          | NC       | -         | Not Connected                           |
| 4                          | RS       | H / L     | Register Select                         |
| 5                          | R/W (WR) | H / L (L) | H: Read / L: Write (L: Write, Z80-Mode) |
| 6                          | E (RD)   | H (L)     | H: Enable (L: Read, Z80-Mode)           |
| 7..14                      | D0..D7   | H / L     | Data Bus, bidirectional                 |
| 15                         | NC       | -         | Not Connected                           |
| 16                         | NC       | -         | Not Connected                           |

| Pinout for 4-Bit Interface |          |           |   |
|----------------------------|----------|-----------|---|
| Pin                        | Symbol   | Level     | Description                             |
| 1                          | VSS      | L         | Power Supply 0V, GND                    |
| 2                          | VDD      | H         | Power Supply +3.3V~5V                   |
| 3                          | NC       | -         | Not Connected                           |
| 4                          | RS       | H / L     | Register Select                         |
| 5                          | R/W (WR) | H / L (L) | H: Read / L: Write (L: Write, Z80-Mode) |
| 6                          | E (RD)   | H (L)     | H: Enable (L: Read, Z80-Mode)           |
| 7..10                      | DNC      | -         | Do Not Connect                          |
| 11..14                     | D4..D7   | H / L     | Data Bus, bidirectional                 |
| 15                         | NC       | -         | Not Connected                           |
| 16                         | NC       | -         | Not Connected                           |

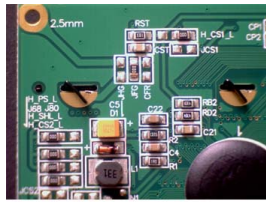
| Pinout for SPI-Bit Interface |        |       |                       |
|------------------------------|--------|-------|-----------------------|
| Pin                          | Symbol | Level | Description           |
| 1                            | VSS    | L     | Power Supply 0V, GND  |
| 2                            | VDD    | H     | Power Supply +3.3V~5V |
| 3..11                        | NC     | -     | Not Connected         |
| 12                           | CLK    | H / L | L-H: Serial Clock     |
| 13                           | MISO   | H / L | Serial Data Output    |
| 14                           | MOSI   | H / L | Serial Data Input     |
| 15                           | NC     | -     | Not Connected         |
| 16                           | CS     | L     | L: Chip Select        |

EA W204-XLG

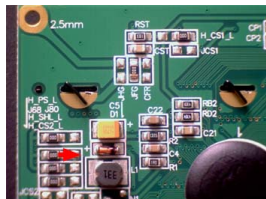
FRAME  
EA 017-9U



INTERFACE 4-/8-BIT, 6800/ Z80



4-/8-Bit 6800  
(default)

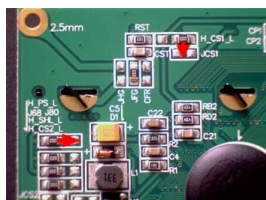


4-/8-Bit Z80

| Pinout for 8-Bit Interface |          |           |   |
|----------------------------|----------|-----------|---|
| Pin                        | Symbol   | Level     | Description                             |
| 1                          | VSS      | L         | Power Supply 0V, GND                    |
| 2                          | VDD      | H         | Power Supply +3.3V-5V                   |
| 3                          | NC       | -         | Not Connected                           |
| 4                          | RS       | H / L     | Register Select                         |
| 5                          | R/W (WR) | H / L (L) | H: Read / L: Write (L: Write, Z80-Mode) |
| 6                          | E (RD)   | H (L)     | H: Enable (L: Read, Z80-Mode)           |
| 7..14                      | D0..D7   | H / L     | Data Bus, bidirectional                 |
| 15                         | NC       | -         | Not Connected                           |
| 16                         | NC       | -         | Not Connected                           |

| Pinout for 4-Bit Interface |          |           |   |
|----------------------------|----------|-----------|---|
| Pin                        | Symbol   | Level     | Description                             |
| 1                          | VSS      | L         | Power Supply 0V, GND                    |
| 2                          | VDD      | H         | Power Supply +3.3V-5V                   |
| 3                          | NC       | -         | Not Connected                           |
| 4                          | RS       | H / L     | Register Select                         |
| 5                          | R/W (WR) | H / L (L) | H: Read / L: Write (L: Write, Z80-Mode) |
| 6                          | E (RD)   | H (L)     | H: Enable (L: Read, Z80-Mode)           |
| 7..10                      | DNC      | -         | Do Not Connect                          |
| 11..14                     | D4..D7   | H / L     | Data Bus, bidirectional                 |
| 15                         | NC       | -         | Not Connected                           |
| 16                         | NC       | -         | Not Connected                           |

SPI INTERFACE



SPI

| Pinout for SPI-Bit Interface |        |       |                       |
|------------------------------|--------|-------|-----------------------|
| Pin                          | Symbol | Level | Description           |
| 1                            | VSS    | L     | Power Supply 0V, GND  |
| 2                            | VDD    | H     | Power Supply +3.3V-5V |
| 3..11                        | NC     | -     | Not Connected         |
| 12                           | CLK    | H / L | L-H: Serial Clock     |
| 13                           | MISO   | H / L | Serial Data Output    |
| 14                           | MOSI   | H / L | Serial Data Input     |
| 15                           | CS     | L     | L: Chip Select        |
| 16                           | NC     | -     | Not Connected         |

In delivery state the display can be connected directly to the 4- or 8-Bit data bus (compatible to 6800 mode). By changing the solder bridges, the mode „Z80“ is set. Additionally the SPI interface can be selected. For timing information please refer to page 6 and 7.

## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

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