**1602LCD Parameters:**

* Display Capacity: 16 × 2 characters.
* Chip Operating Voltage: 4.5 ~ 5.5V.
* Working Current: 2.0mA (5.0V).
* Optimum working voltage of the module is 5.0V.
* Character Size: 2.95 \* 4.35 (W \* H) mm.

**Pin Description of 1602 LCD：**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Mark** | **Pin Description** | **No.** | **Mark** | **Pin Description** |
| 1 | VSS | Power GND | 9 | D2 | Date I/O |
| 2 | VDD | Power Positive | 10 | D3 | Date I/O |
| 3 | VL | LCD Voltage Bias Signal | 11 | D4 | Date I/O |
| 4 | RS | Select data/command(V/L) | 12 | D5 | Date I/O |
| 5 | R/W | Select read/write(H/L) | 13 | D6 | Date I/O |
| 6 | E | Enable Signal | 14 | D7 | Date I/O |
| 7 | D0 | Date I/O | 15 | BLA | Back Light Power Positive |
| 8 | D1 | Date I/O | 16 | BLK | Back Light Power Negative |

**Interface Description:**  
1. two power sources, one for module power, another one for backlight, generally use 5V. In this project, we use 3.3V for backlight.  
2. VL is the pin for adjusting contrast ratio; it usually connects a potentiometer(no more than 5KΩ) in series for its adjustment. In this experiment, we use a 1KΩ resistor. For the connection, it has 2 methods, namely high potential and low potential. Here, we use low potential method; connect the resistor and then the GND.  
3. RS is a very common pin in LCD. It's a selecting pin for command/data. When the pin is in high level, it's in data mode; when it's in low level, it's in command mode.  
4. RW pin is also very common in LCD. It's a selecting pin for read/write. When the pin is in high level, it's in read operation; when it's in low level, it's in write operation.  
5. E pin is also very common in LCD. Usually, when the signal in the bus is stabilized, it sends out a positive pulse requiring read operation. When this pin is in high level, the bus is not allowed to have any change.  
6. D0-D7 is 8-bit bidirectional parallel bus, used for command and data transmission.  
7. BLA is anode for back light; BLK, cathode for back light.

**4 Basic Operations of 1602LCD:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Read status | input | RS=L, R/W=H, E=H | output | D0-D7=status word |
| Write command | input | RS=L, R/W=H, D0-D7=command code, E=high pulse | output | none |
| Read data | input | RS=H, R/W=H, E=H | output | D0-D7=data |
| Write data | input | RS=H, R/W=L, D0-D7=data, E=high pulse | output | none |