

## To our valued customers

I want to express my thanks to you for being interested in our products and for having confidence in [www.LogiFind.com](http://www.LogiFind.com) or [www.MicroHello.com](http://www.MicroHello.com) . The primary aim of our company is to design and produce high quality electronic products and to constantly improve the performance thereof in order to better suit your needs.

Please share your thoughts and feelings regarding our operation so that we can serve you better in the future. I thank you for your continued support and patronage.

Your Dream is our Destination!

The Microchip, TI, Freescale, ST, Atmel, Silicon and CYPRESS name, logo and products names are trademarks of Microchip, TI, Freescale, ST, Atmel, Silicon and CYPRESS Inc. in the U.S.A. and other countries.

Sincerely,

**Owner and General Manager**  
of [www.LogiFind.com](http://www.LogiFind.com) / [www.MicroHello.com](http://www.MicroHello.com).

# CONTENTS

- Chapter 1: Introduction** ..... 3
  - What is OpenMCU Basic-A? ..... 3
  - What's on Board? ..... 3
  - Power Supply..... 5
  - Card Boards..... 5
- Chapter 2: Hardware Details** ..... 8
  - (1). Power Supply..... 8
  - (2). MCU Card and IO PORT Group ..... 9
  - (3). 6-Digit SEGLED Display..... 10
  - (4). Eight LEDs ..... 11
  - (5). Buttons and Joystick..... 12
  - (6). ADC input and 1-wire DS18B20..... 13
    - a).1-wire DS18B20..... 13
    - b).ADC input ..... 13
  - (7). I<sup>2</sup>C EEPROM..... 15
  - (8). UART via RS-232 ..... 16
  - (9). LCD 2x16 characters (Socket) ..... 17
  - (10). GLCD 128x64(Socket)..... 19
  - (11). ModuleBUS Socket for Expansion ..... 21
  - (12). Stepmotor Socket and Piezo Buzzer ..... 22
    - a).Stepmotor Socket..... 22
    - b).Piezo Buzzer ..... 22
  - (13). DS1302 ResetReal Time Clock ..... 24
- Contact Us** ..... 26

## Chapter 1: Introduction

### What is OpenMCU Basic-A?

**OpenMCU Basic-A** is a development board designed for rapid development of embedded applications via using particular MCU cards of **51,C8051F,AVR,PIC,NXP,MSP430,STM32** and **STM8**. The board features all the necessary hardware, such as power supply,common user buttons,joystick,DS18B20 temperature module,ADC input module,RS232 module,stepmotor drive module,6-digit segment led display module,common user LEDs module,external eeprom module,DS1302 real time clock module,LCD1602 display module,LCD12864 display module. In addition to the hardware features provided by the **OpenMCU Basic-A**, hardware expansion is possible through the use of moduleBUS Socket (compatible with mikroBUS™by Mikroë) Plus accessory boards.

We have designed over a lot of MCU Card boards to equip **OpenMCU Basic-A**.By now,they are **CARD40-51** for 8051 MCUs, **CARD40-AVR** for Atmega16A/32A, **CARD64-AVR** for Atmega128A/64A, **CARD64-XMEGA** for Atxmega128A3U-AU and **CARD44-PIC-A** for all 44pin 8-bit PIC MCUs,**CARD64-MSP430-A** for 64pin MSP430 MCUs, **CARD100-C8051-A/B** for 100pin C8051F MCUs. We are designing more MCU cards to equip **OpenMCU Basic-A**.

### What's on Board?

#### 1.MCU Card Socket

○ The **OpenMCU Basic-A** equips a 106-pin Plug-In Module socket, supporting a wide variety of **51,C8051F,AVR,PIC,NXP,MSP430,STM32** and **STM8**.microcontroller families via **CARDXXX-XXX** series MCU Cards. The MCU Cards supported by the **OpenMCU Basic-A** development board are: **CARD40-51** for 8051 MCUs, **CARD40-AVR** for Atmega16A/32A, **CARD64-AVR** for Atmega128A/64A, **CARD64-XMEGA** for Atxmega128A3U-AU and **CARD44-PIC-A** for all 44pin 8-bit PIC MCUs,**CARD64-MSP430-A** for 64pin MSP430 MCUs, and **CARD100-C8051-A/B** for 100pin C8051F MCUs. You can use different microcontrollers on the **OpenMCU Basic-A** development board for development, demonstration and testing via using these MCU cards.

#### 2.Indicator

- “PWRLED”: Power LED Indicator, indicates when power supply is switched on.
- “L1”: User LED Indicator – useful for indicating the IO state of microcontroller.
- “L2”: User LED Indicator – useful for indicating the IO state of microcontroller.
- “L3”: User LED Indicator – useful for indicating the IO state of microcontroller.
- “L4”: User LED Indicator – useful for indicating the IO state of microcontroller.
- “L5”: User LED Indicator – useful for indicating the IO state of microcontroller.
- “L6”: User LED Indicator – useful for indicating the IO state of microcontroller.
- “L7”: User LED Indicator – useful for indicating the IO state of microcontroller.
- “L8”: User LED Indicator – useful for indicating the IO state of microcontroller.

#### 4.Button Device

- “KEY1”: User Button – state readable by the microcontroller.
- “KEY2”: User Button – state readable by the microcontroller.
- “KEY3”: User Button – state readable by the microcontroller.
- “UP”: Direction UP on Jostick – state readable by the microcontroller.
- “DOWN”: Direction DOWN on Jostick – state readable by the microcontroller.
- “LEFT”: Direction LEFT on Jostick – state readable by the microcontroller.

- “RIGHT”: Direction RIGHT on Jostick – state readable by the microcontroller.
- “CENTER”: Direction CENTER on Jostick – state readable by the microcontroller.

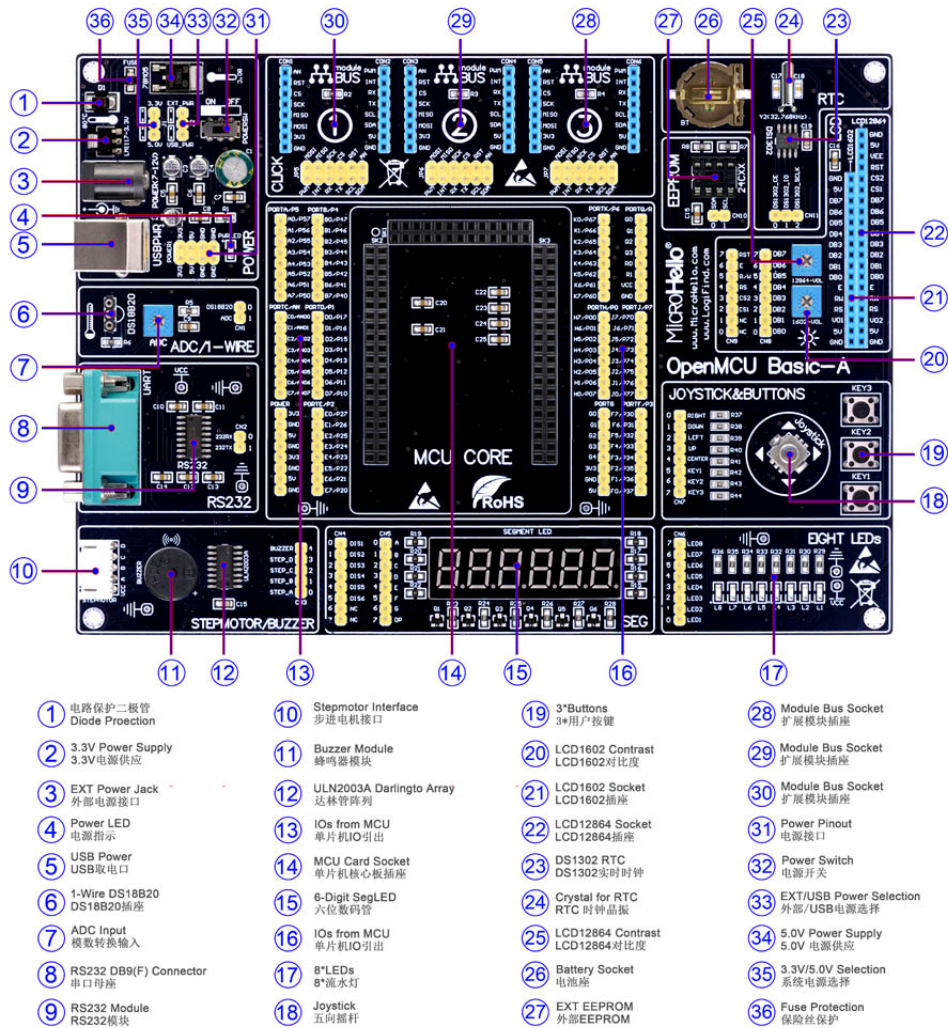


Figure 1-1.What's on board(Motherboard)

## 5.Power Supply

○The board can be powered in two different ways: with USB power supply (USB) or using external DC 7-12V via adapter connector Jack (POWER(7-12V)).

- 5V or 3.3V power supply is optional for the system.

## 6.Communication

○RS232 Module with interface – useful for transferring data to/from the microcontroller using RS232 communication protocol.

○Mini USB connector(**Installed on MCU Cards**) – shares USB signals with the USB connector and is useful for the development of dedicated USB embedded host applications, when used in conjunction with a USB capable.

## 7.Display

- 6 digit Segment LED Display – useful for displaying user application measured value.
- Socket for 16x2 Character LCD Display Module – useful for displaying user application strings/ measured value.
- Socket for 128x64 Graphical Liquid Crystal Display Module – useful for displaying user application strings/ measured value/graphical interface.

## 8.1-WIRE Bus

○ Socket for DS18B20 Temperature Sensor Module – useful for monitoring the ambient temperature.

## 9.Storage

○ IIC External EEPROM Module – useful to save data that should be saved when the power supply goes off.

## 10.Sound Generator Device

○ Buzzer –to generate voice using a voltage signal of specified frequency from the microcontroller.

## 11.Analog to Digital Conversion

○ Potentiometer ADC Input: 10 kΩ Potentiometer – useful as an analog signal source for ADC demonstration or user interface purposes.

## 12.Motor

○ Socket for 28BYJ-48-5V stepper motor with ULN2003A Darlington Array drive.

## 13.Real Time Clock

○ DS1302 Real Time Clock Source.

## 14.External expansion

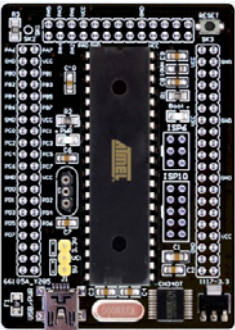
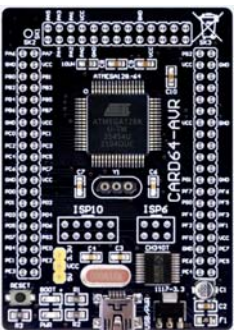
○ Three ModuleBUS Socket for hardware expansion, which is compatible with mikroBUS™ by Mikroe. It is useful for attaching a wide array of hardware expansion boards, for extending the functionality of the platform.

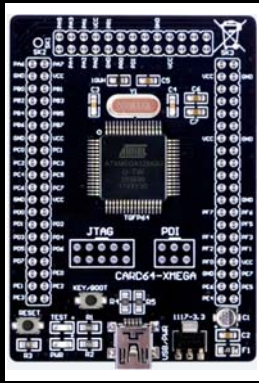
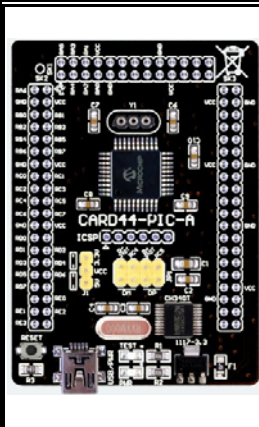
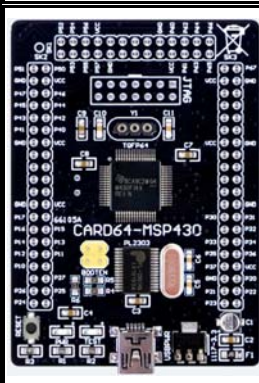
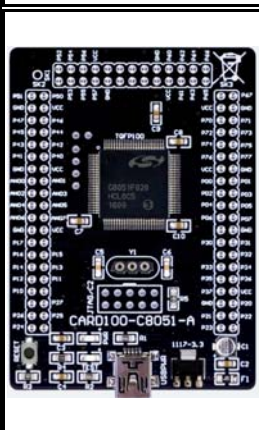
## Power Supply

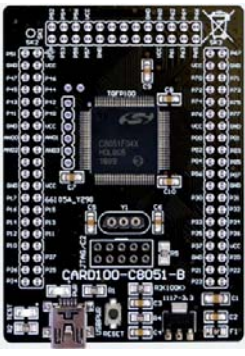

The board can be powered in two different ways: with USB power supply (Type B) or using external DC 7-12V via adapter connector Jack (POWER(7-12V)).Of course,the whole board can be also powered up by the USB mini connector on the card board.

## Card Boards

The following MCU Cards are specially designed for **OpenMCU Basic-A** motherboard(Of course, we are designing more card board to equip **OpenMCU Basic-A** motherboard.):

Image	Card Board	with MCU	Programming
	CARD40-AVR	Atmega16A Atmega16A	with bootloader,supports self-programming,no need external programmer.
	CARD64-AVR	Atmega128A Atmega64A	with bootloader,supports self-programming,no need external programmer.

	CARD64-XMEGA	Atxmega128A3U-AU	with bootloader,supports self-programming,no need external programmer.
	CARD44-PIC-A	all 8-bit 44pin PIC MCUs,likes: PIC16F74 PIC16F914 PIC16F877A PIC16F887 PIC18F452 PIC18F4520 PIC18F4620 PIC18F4550,etc.	with bootloader,supports self-programming,no need external programmer.
	CARD64-MSP430-A	Some 8-bit 64pin MSP430 MCUs,likes: MSP430F149 MSP430F169,etc.	Supports BSL self-programming,no need external programmer.
	CARD100-C8051-A	Some 8-bit 100pin C8051F MCUs,likes: C8051F020 C8051F022 C8051F120 C8051F122 C8051F124 C8051F126 C8051F130 C8051F132,etc.	Doesn't supports self-programming,need a external programmer to download.

	<p>CARD100-C8051-B</p>	<p>Some 8-bit 100pin C8051F MCUs,likes: C8051F040 C8051F042 C8051F044 C8051F046,etc.</p>	<p>Doesn't supports self-programming,need a external programmer to download.</p>
	<p>CARD40-51</p>	<p>Some 8-bit 40pin 51 MCUs,likes: STC89C52 AT89C51 AT89C52 AT89S52,etc.</p>	<p>Supports self-programming (only for STC series),no need external programmer.</p>

## Chapter 2: Hardware Details

### (1). Power Supply

OpenMCU Basic-A Board contains power supply that creates stable voltage 5V and 3.3V and current levels necessary for powering each part of the board. Power supply section contains two power regulators: **78M05**, which generates 5V, and **LM1117-3.3** which creates 3.3V power supply. The board can be powered in two different ways: with USB power supply (**USB**) or using external DC 7-12V via adapter connector Jack (**POWER(7-12V)**). External voltage levels must be in range of DC 7-12V. Use **J1** to specify whether you are using 5V or 3.3V power supply for the system. Use **J2** to specify whether you are using USB or External power supply. Upon providing the power using either external or USB power source you can turn on power supply by using switch(**POWERSW**). LED (**PWRLED**) will indicate the presence of power supply. The Jumper "Power1" is used for DIY when you need power supply for you expansion module.

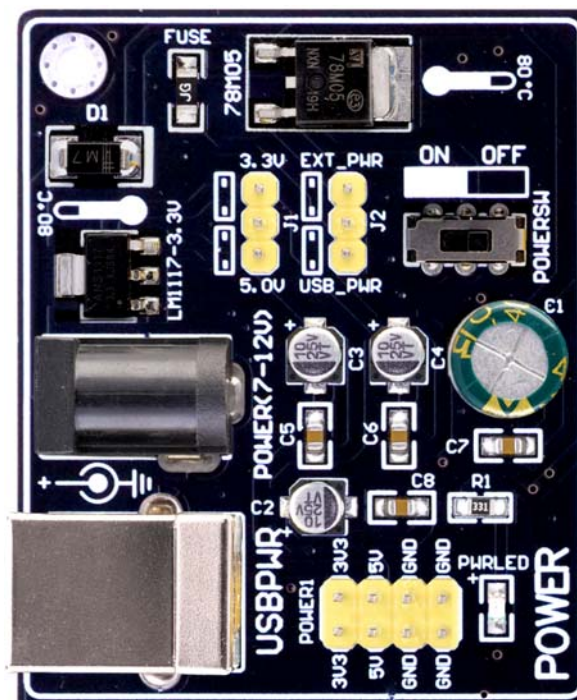


Figure 2-1: power supply unit

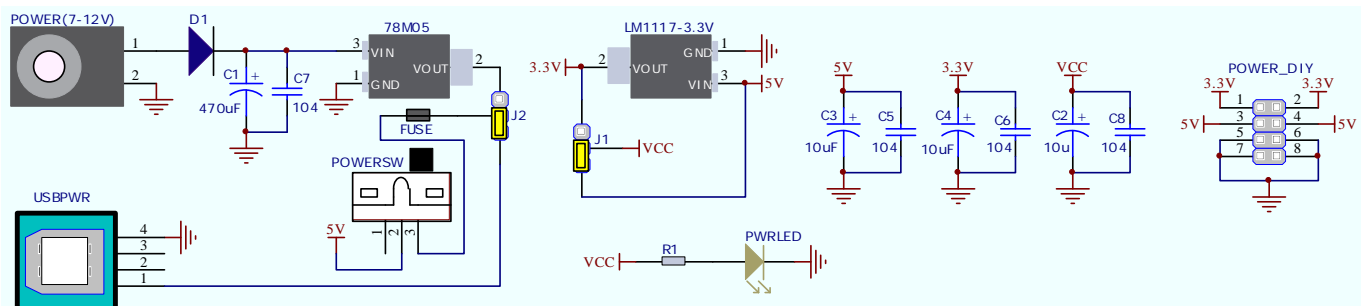


Figure 2-2: schematic of power supply unit



## (2). MCU Card and IO PORT Group

Different microcontrollers are supported using CARDXXX-XXX series MCU cards, which are placed into the on-board female MCU socket which is composed of SK1, SK2 and SK4. Microcontrollers are supported using these specialized MCU cards containing 106 pins, which are placed into the on-board female MCU socket. **OpenMCU Basic-A** provides IO PORT Groups for DIY expansion.

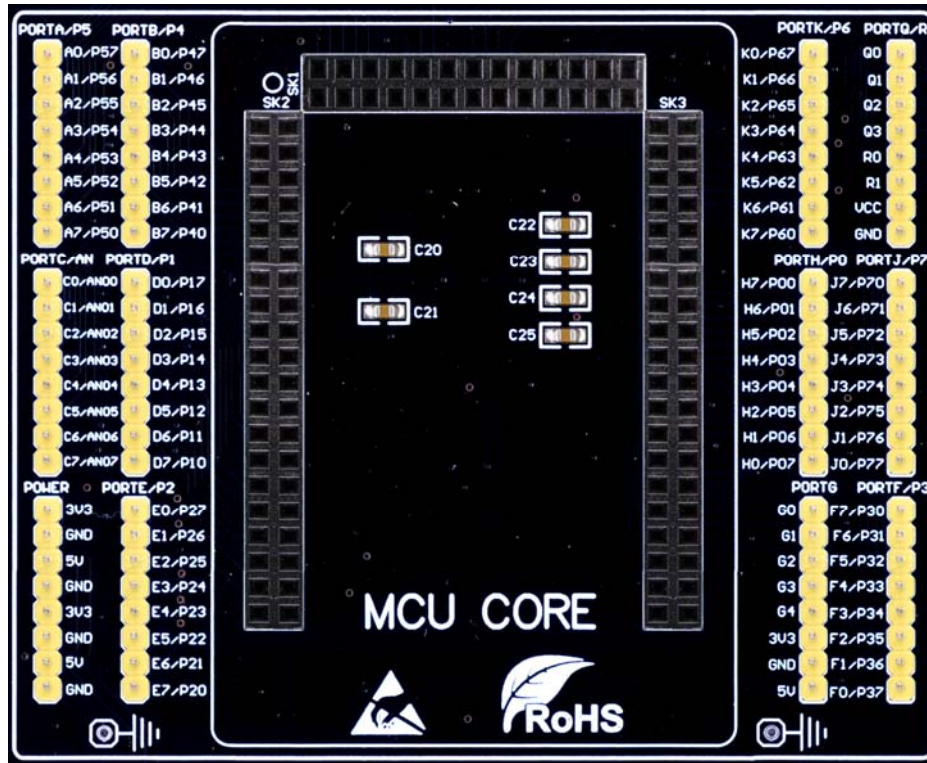


Figure 2-3: MCU Card and IO PORT Groups

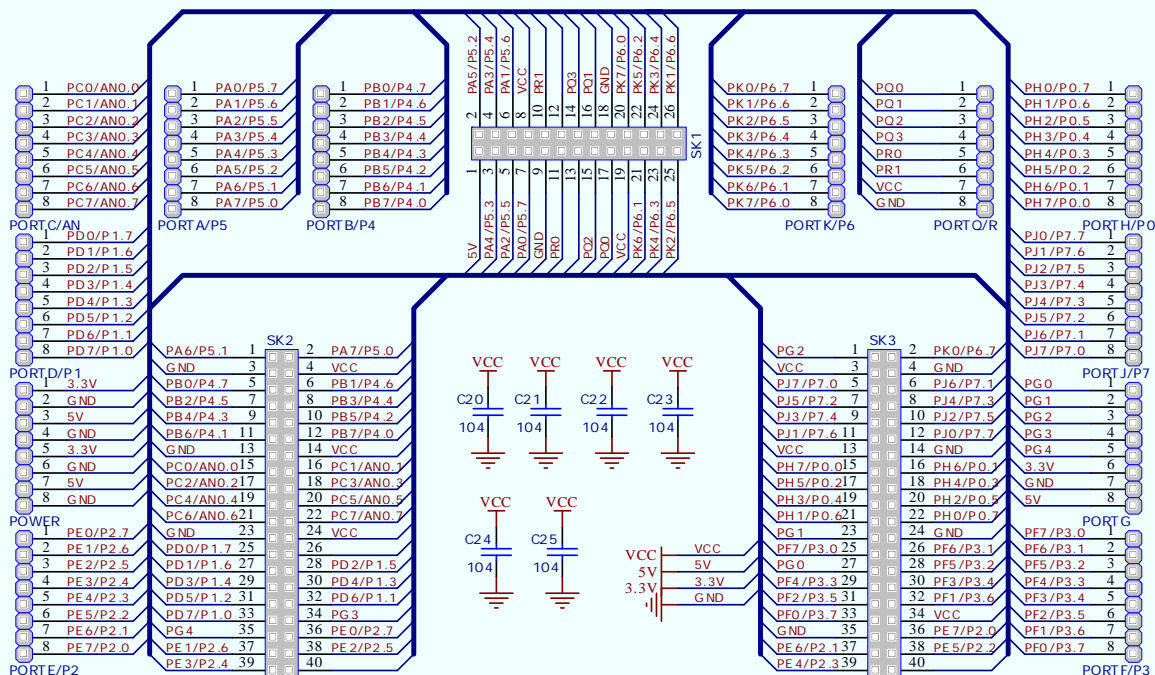


Figure 2-4: schematic of MCU Card and IO PORT Groups

### (3). 6-Digit SEGLED Display

One seven segment digit consist of 7+1 LEDs which are arranged in a specific formation which can be used to represent digits from 0 to 9 and even some letters. One additional LED is used for marking the decimal dot, in case you want to write a decimal point in the desired segment. The **OpenMCU Basic-A** contains six of these digits put together to form 6-digit segled display. Driving such a display is done using multiplexing techniques. Data lines are shared between segments, and therefore the same segment LEDs in each digit are connected in parallel. Each digit has it's unique digit select line, which is used to enable the digit to which the data is currently being sent. By multiplexing data through all six segments fast enough, you create an illusion that all six segments are in operation simultaneously. This is possible because human eye has a slower reaction time than the mention changes. This way you can represent numbers in decimal or hexadecimal form. Eight data lines that are common for all the digits are connected to connector (CN5), and digit select lines are connected to connector (CN4). The two connectors does not be connected to any IOs, and it makes your experiments more flexible. In order to enable Segled Display, you must connect the **CN4** and **CN5** to the IO lines of the microcontroller .See the comments in the source code provided in CD Rom for how to connect the hardware.



Figure 2-5: 6-Digit segled Display Module

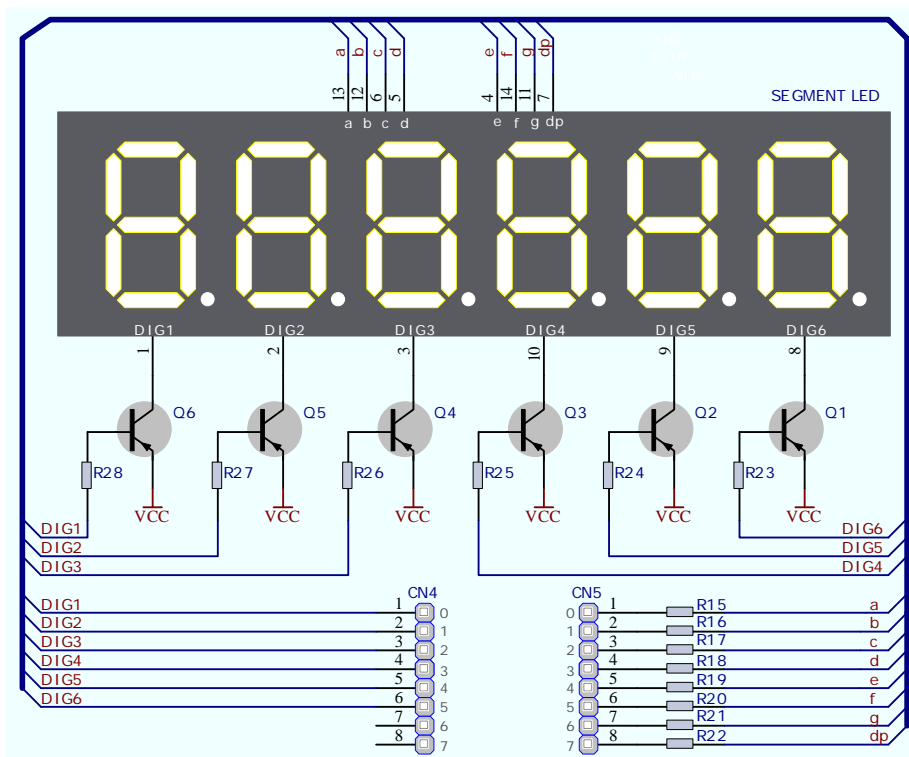


Figure 2-6: schematic of 6-Digit segled Display Module

## (4). Eight LEDs

**LED (Light-Emitting Diode)** is a highly efficient electronic light source. When connecting LEDs, it is necessary to place a current limiting resistor in series so that LEDs are provided with the current value specified by the manufacturer. The current varies from 0.2mA to 20mA, depending on the type of the LED and the manufacturer.. The EasyPIC-40 board uses low-current LEDs with typical current consumption of 0.2mA or 0.3mA, depending of VCC voltage selection. Board contains 8 LEDs which can be used for visual indication of the logic state on PORT pins. An active LED indicates that a logic high (1) is present on the pin.

In order to enable LEDs, it is necessary to connected them to the appropriate IOs Port via connector (**CN6**) using dupont wires. The **CN6** connector does not be connected to any IOs, and it makes your experiments more flexible. See the comments in the source code provided in CD Rom for how to connect the hardware.

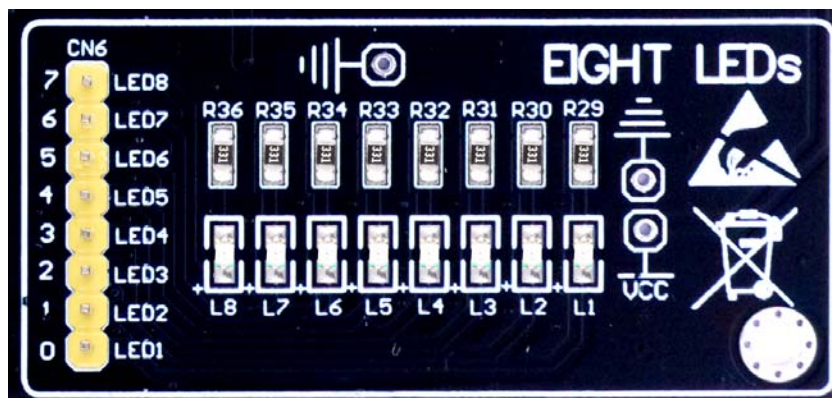


Figure 2-7: 8xLEDs Module

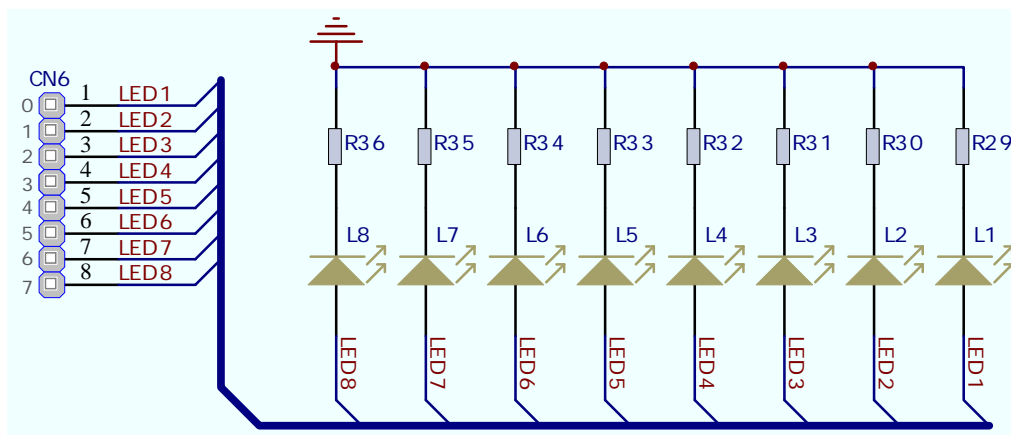


Figure 2-8: schematic of 8xLEDs

## (5). Buttons and Joystick

The logic state of all microcontroller digital inputs may be changed using push buttons. **OpenMCU Basic-A** equips 3 user buttons **KEY1~KEY3**. **OpenMCU Basic-A** also equips a **Joystick** which is a smart navigation key concept based on contactless, magnetic movement detection, and can think it simply as five buttons, and they are **Left, Right, Up, Down** and **Center**. In order to enable the **KEY1, KEY2, KEY3, Left, Right, Up, Down** and **Center**, it is necessary to connected them to the appropriate IOs Port via connector **CN7** using dupont wires. The **CN7** connector does not be connected to any IOs, and it makes your experiments more flexible. See the comments in the source code provided in CD Rom for how to connect the hardware.

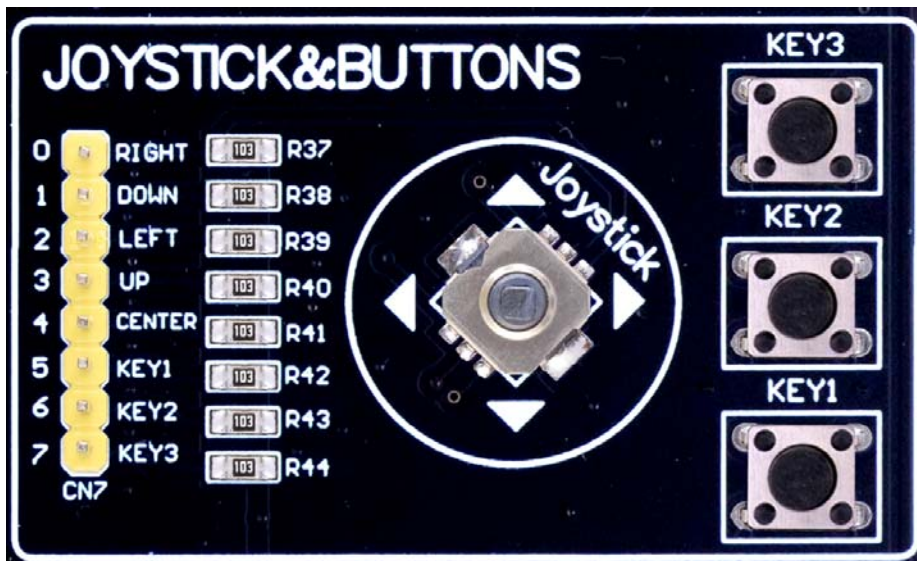


Figure 2-9: Buttons and Joystick Module

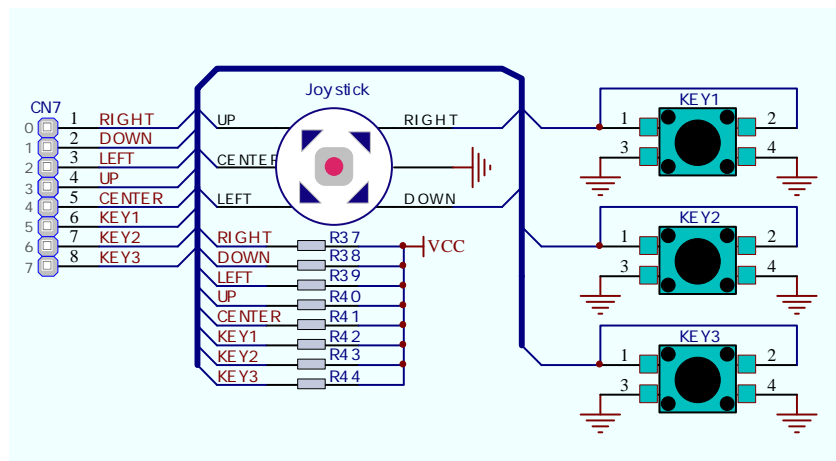


Figure 2-10: schematic of Buttons and Joystick

## (6). ADC input and 1-wire DS18B20

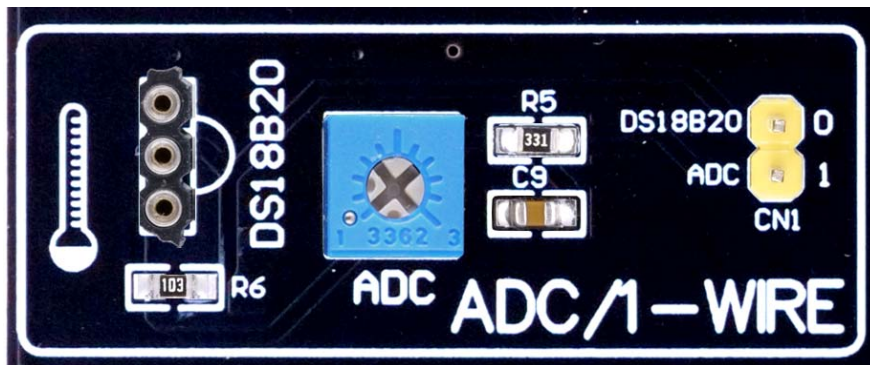


Figure 2-11: ADC input and 1-wire DS18B20 Module

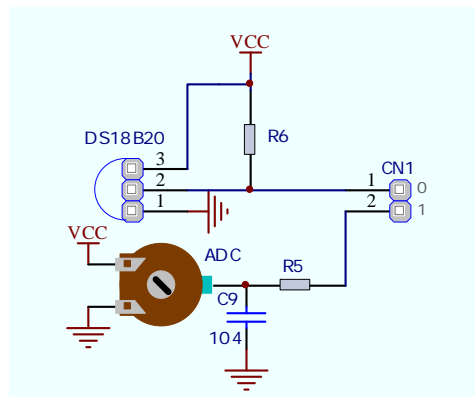


Figure 2-12: schematic of ADC input and 1-wire DS18B20

### a).1-wire DS18B20

**DS18B20** is a digital temperature sensor that uses 1-wire® interface for its operation. It is capable of measuring temperatures within the range of -55 to 128°C, and provides  $\pm 0.5^\circ\text{C}$  accuracy for temperatures within the range of -10 to 85°C. It requires 3V to 5.5V power supply for stable operation. It takes maximum of 750ms for the **DS18B20** to calculate temperature with 9-bit resolution. 1-wire® serial communication enables data to be transferred over a single communication line, while the process itself is under the control of the master microcontroller. The advantage of such communication is that only one microcontroller pin is used. Multiple sensors can be connected on the same line. All slave devices by default have a unique ID code, which enables the master device to easily identify all devices sharing the same interface.

**OpenMCU Basic-A** provides a separate socket for the DS18B20. Communication line with the microcontroller is connected via **CN1.0**. See the comments in the source code provided in CD Rom for how to connect the hardware.

### b).ADC input

Digital signals have two discrete states, which are decoded as high and low, and interpreted as logic 1 and logic 0. Analog signals, on the other hand, are continuous, and can have any value within defined range. A/D converters are specialized circuits which can convert analog signals (voltages) into a digital representation, usually in form of an integer number. The value of this number is linearly dependent on the input voltage value. Most microcontrollers nowadays internally have A/D

converters connected to one or more input pins. Some of the most important parameters of A/D converters are conversion time and resolution. Conversion time determines how fast can an analog voltage be represented in form of a digital number. This is an important parameter if you need fast data acquisition. The other parameter is resolution. Resolution represents the number of discrete steps that supported voltage range can be divided into. It determines the sensitivity of the A/D converter. Resolution is represented in maximum number of bits that resulting number occupies. Most microcontrollers have 10-bit resolution, meaning that maximum value of conversion can be represented with 10 bits, which converted to integer is  $2^{10}=1024$ . This means that supported voltage range, for example from 0-3.3V, can be divided into 1024 discrete steps of about 3.222mV.

**OpenMCU Basic-A** provides an external ADC input which allows you to connect to any ADC pin of the on-board microcontroller.

In order to enable the **ADC** input, it is necessary to connected it to the appropriate ADC input Port via connector (**CN1.1**) using dupont wires. The **CN1** connector does not be connected to any IOs, and it makes your experiments more flexible. See the comments in the source code provided in CD Rom for how to connect the hardware.

## (7). I<sup>2</sup>C EEPROM

**I<sup>2</sup>C** is a multi-master serial single-ended bus that is used to attach low-speed peripherals to computer or embedded systems. **I<sup>2</sup>C** uses only two open-drain lines, Serial Data Line (**SDA**) and Serial Clock (**SCL**), pulled up with resistors. **SCL** line is driven by a master, while **SDA** is used as bidirectional line either by master or slave device. Up to 112 slave devices can be connected to the same bus. Each slave must have a unique address.

**EEPROM** is short for Electrically Erasable Programmable Read Only Memory. It is usually a secondary storage memory in devices containing data that is retained even if the device loses power supply. **EEPROMs** come with parallel or serial interface to the master device. Because of the ability to alter single bytes of data, **EEPROM** devices are used to store personal preference and configuration data in a wide spectrum of consumer, automotive, telecommunication, medical, industrial, and PC applications. **OpenMCU Basic-A** supports serial EEPROM which uses I2C communication interface and has

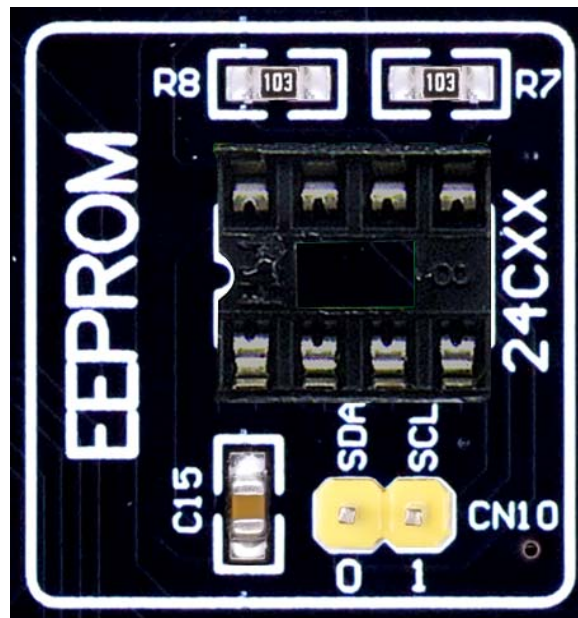


Figure 2-13: I<sup>2</sup>C EEPROM Module

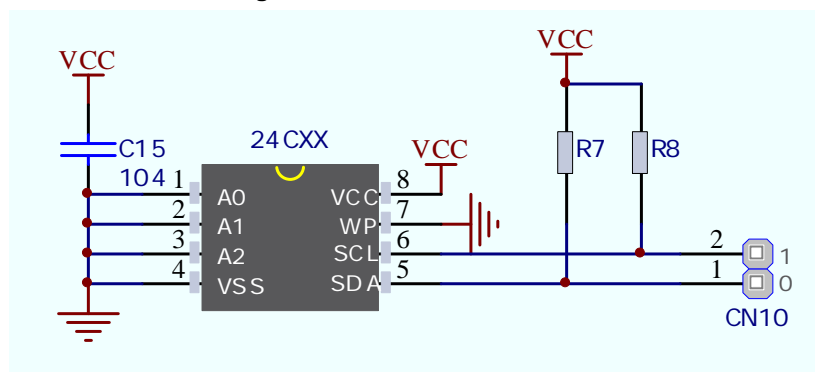


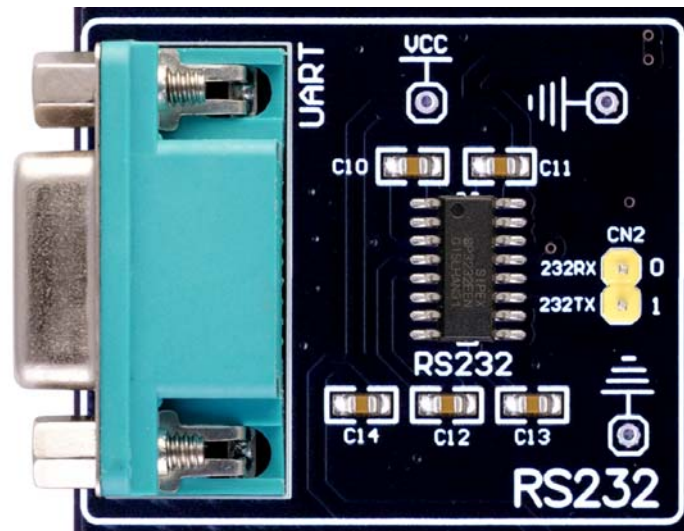
Figure 2-14: schematic of I<sup>2</sup>C EEPROM Module

1024 bytes of available memory. **EEPROM** itself supports single byte or 16-byte (page) write and read operations. Data rates are dependent of power supply voltage, and go up to 400 kHz for 3.3V power supply.

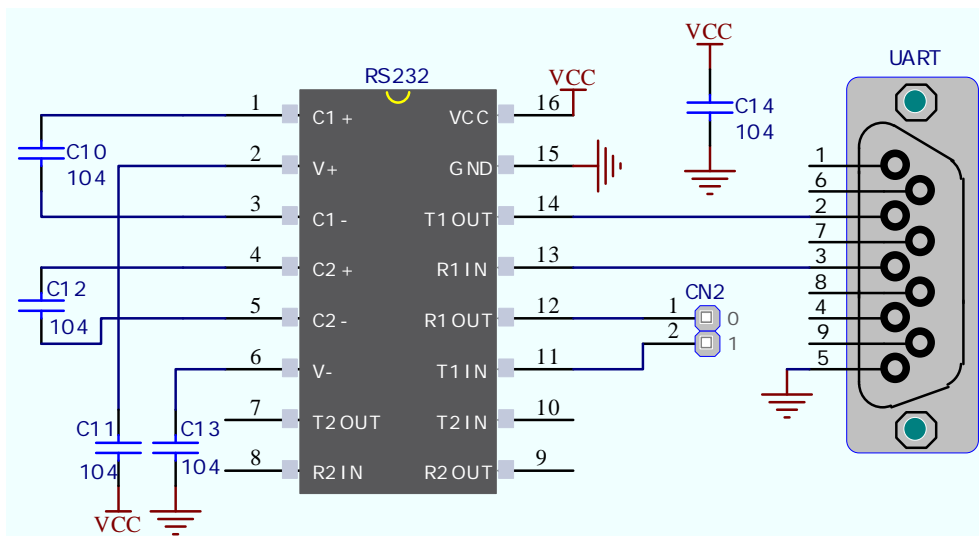
**OpenMCU Basic-A** equips an IC socket for **EEPROM IC** with different capacity. In order to enable the **I<sup>2</sup>C EEPROM**, it is necessary to connected it to the appropriate microcontroller Pin via connector (**CN10**) using dupont wires. The **CN10** connector does not be connected to any IOs, and it makes your experiments more flexible. See the comments in the source code provided in CD Rom for how to connect the hardware.

## (8). UART via RS-232

The **UART** (universal asynchronous receiver/transmitter) is one of the most common ways of exchanging data between the MCU and peripheral components. It is a serial protocol with separate transmit and receive lines, and can be used for full-duplex communication. Both sides must be initialized with the same baud rate, otherwise the data will not be received correctly. **RS-232** serial communication is performed through a 9-pin SUB-D connector and the microcontroller **UART** module. In order to enable this communication, it is necessary to establish a connection between RX and TX lines on SUB-D connector and the same pins on the target microcontroller using **CN2**. Since RS-232 communication voltage levels are different than microcontroller logic levels, it is necessary to use a RS-232 Transceiver circuit, such as SP3232 as shown on the following **Figure 2-16**.



**Figure 2-15:** RS-232 Module



**Figure 2-16:** schematic of RS-232 Module

In order to enable the **RS232 Module**, it is necessary to connected it to the appropriate microcontroller Pin via connector (**CN2**) using dupont wires. The **CN2** connector does not be connected to any IOs, and it makes your experiments more flexible. See the comments in the source code provided in CD Rom for how to connect the hardware.



## (9). LCD 2x16 characters (Socket)

Liquid Crystal Displays or LCDs are cheap and popular way of representing information to the end user of some electronic device. Character LCDs can be used to represent standard and custom characters in the predefined number of fields. The **OpenMCU Basic-A** provides the connector and the necessary interface for supporting 2x16 character LCDs. This type of display has two rows consisted of 16 character fields. Each field is a 7x5 pixel matrix. Board equips an universal socket allowing you to install 16x2 LCD very easily.

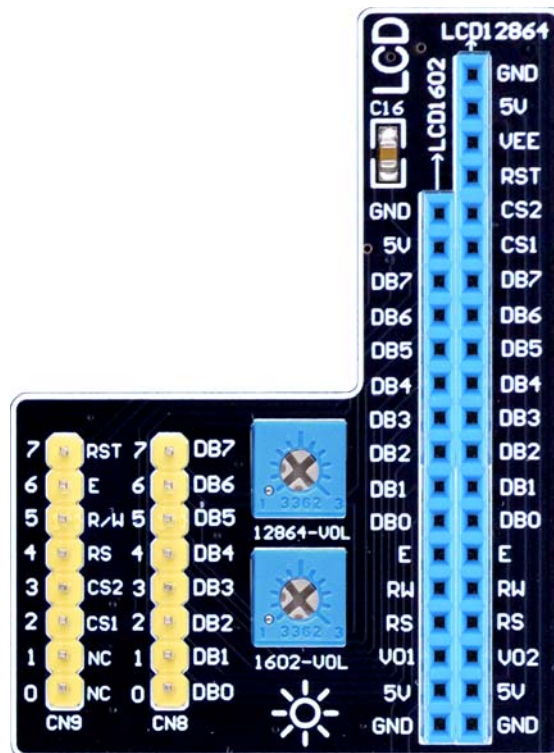


Figure 2-17: LCD1602 and LCD12864 Module

### Connector Pinout explained

1-GND

2-5V

3-V<sub>0</sub>,LCD contrast level from potentiometer **1602-VOL**

4-RS,Register Select Signal

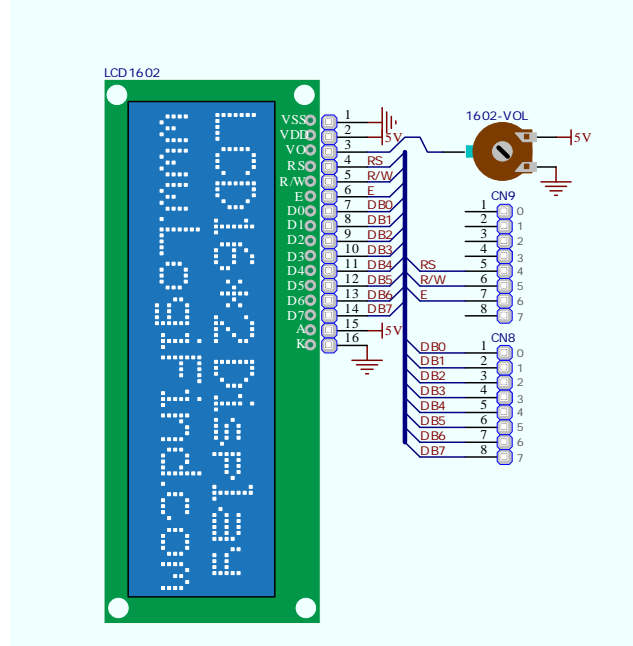
5-E,Display Enable

6-R/W,Determines whether display is in Read or Write mode. It's always connected to GND, leaving the display in Write mode all the time.

7~14-Data Port,Display is supported in 8-bit data mode.

15-LED+,Connection with 5V

16-LED-,Connection with GND



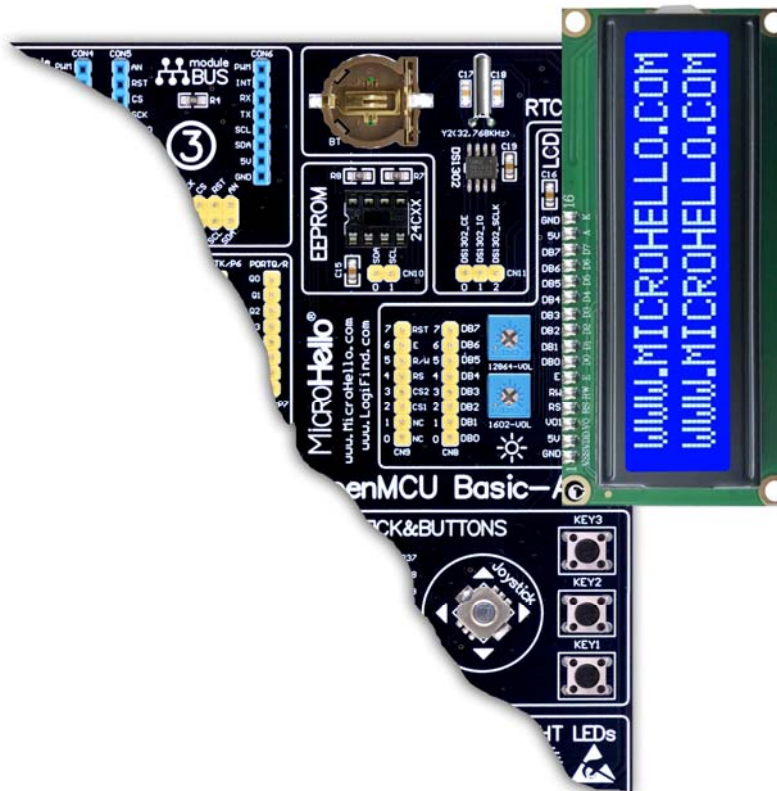
**Figure 2-18:** schematic of LCD 2x16 characters Socket

In order to enable the **LCD1602**, it is necessary to connected it to the appropriate MCU Port via connector (**CN8**) and (**CN9**) using dupont wires. See the comments in the source code provided in CD Rom for how to connect the hardware.

**IMPORTANT:**

Make sure to Place the LCD1602 in the right direction, see below **Figure 2-19**.

Make sure to turn off the power supply before placing LCD onto the board. Otherwise your display can be permanently damaged.



**Figure 2-19:** Installing direction of LCD 2x16 characters display

(10). GLCD 128x64(Socket)

Graphical Liquid Crystal Displays, or GLCDs are used to display monochromatic graphical content, such as text, images, humanmachine interfaces and other content. **OpenMCU Basic-A** provides the connector and necessary interface for supporting GLCD with resolution of 128x64 pixels and proper PINOUTs. It is compatible with the most popular LCD12864 in the market with KS108 or ST7920 display controller. The example we provide is only for LCD12864 with ST7920 display controller. **OpenMCU Basic-A** equips an universal socket allowing you to install 128\*64 Graphical LCD very easily.

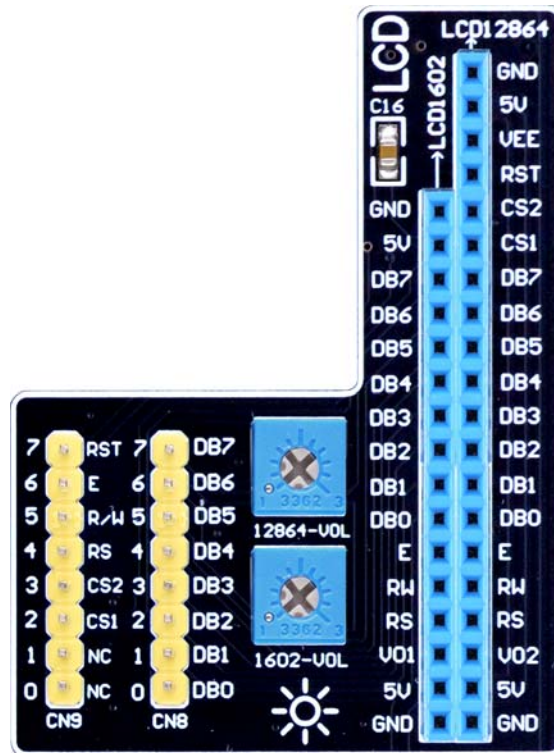


Figure 2-20: LCD1602 and LCD12864 Module

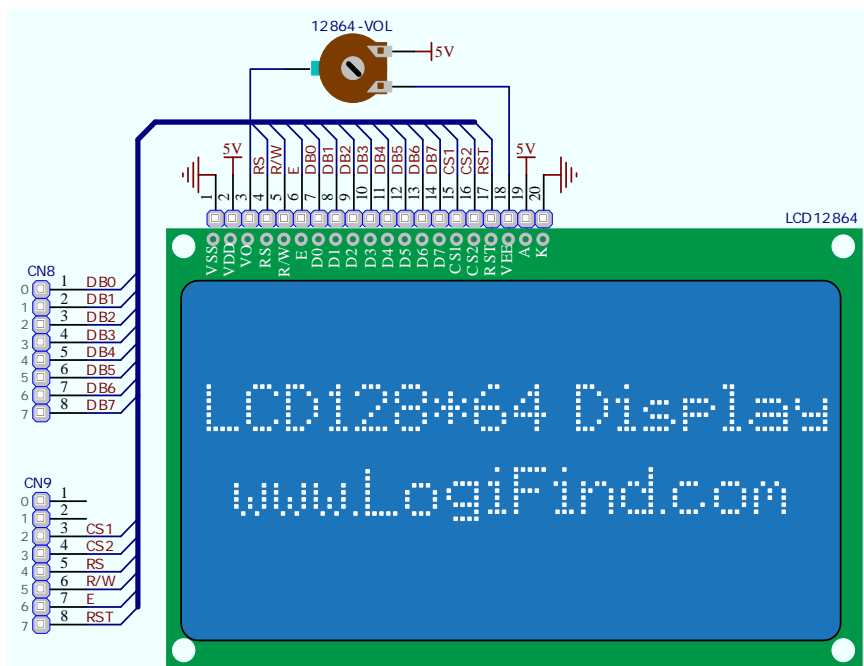


Figure 2-21: schematic of LCD12864 characters Socket

**Connector pinout explained:**

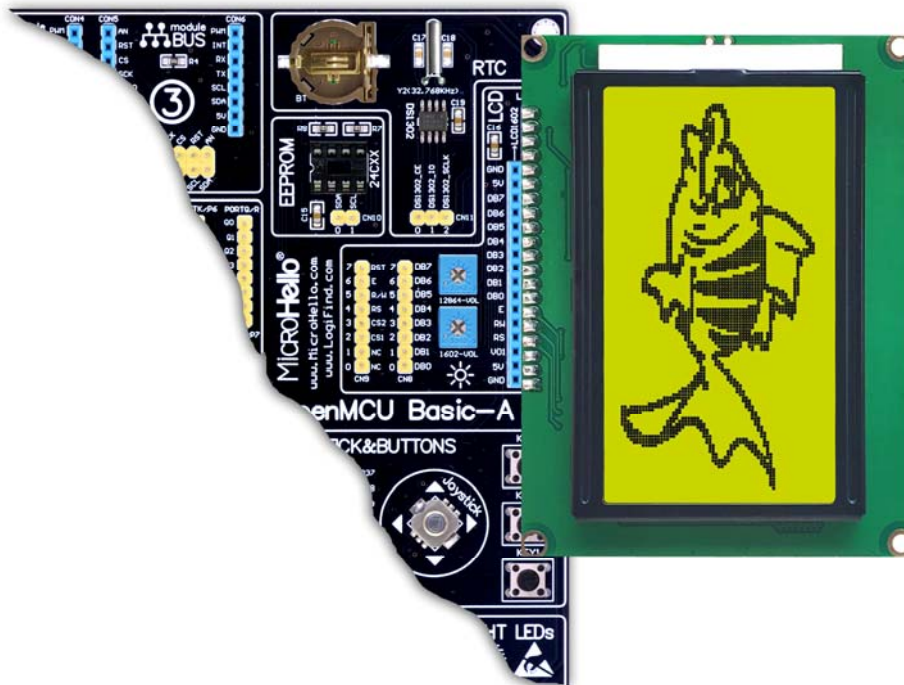
- 1-GND
- 2-VCC
- 3-V<sub>o</sub>,GLCD contrast level from potentiometer **12864-VOL**
- 4-RS,Data (High), Instruction (Low) selection
- 5-R/W,Determines whether display is in Read or Write mode.
- 6-E,Display Enable line
- 7~14,D0~D7,Data lines
- 15-PSB,Parallel/Serial Mode Selection
- 16-NC
- 17-RST
- 18-VEE
- 19-LEDA - 5V
- 20-LEDK – GND

In order to enable the **LCD12864**, it is necessary to connected it to the appropriate MCU Port via connector (**CN8**) and (**CN9**) using dupont wires. See the comments in the source code provided in CD Rom for how to connect the hardware.

**IMPORTANT:**

Make sure to Place the LCD12864 in the right direction below **Figure 2-22**.

Make sure to turn off the power supply before placing LCD onto the board. Otherwise your display can be permanently damaged.



**Figure 2-22:** Installing direction of LCD12864 display

## (11). ModuleBUS Socket for Expansion

OpenMCU Basic-A equips three moduleBUS Socket (compatible with mikroBUS™ by Mikroe) for hardware expansion. When you are using an external module, it is necessary to connect the jumper “JP5”, “JP6” or “JP7” to the appropriate MCU Port using dupont DIY wire.

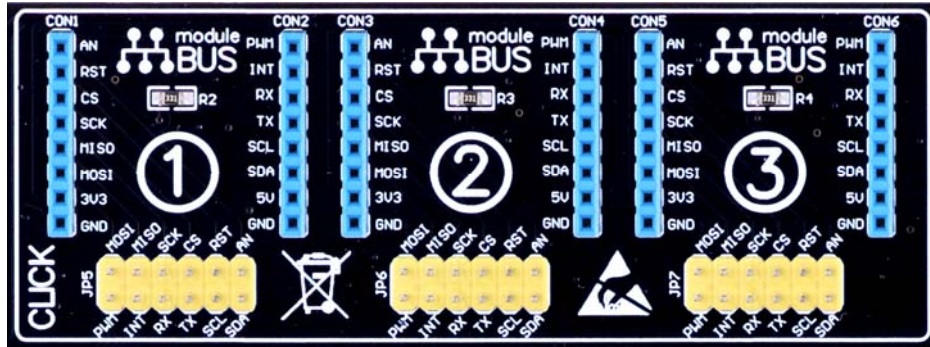


Figure 2-23: moduleBUS Socket

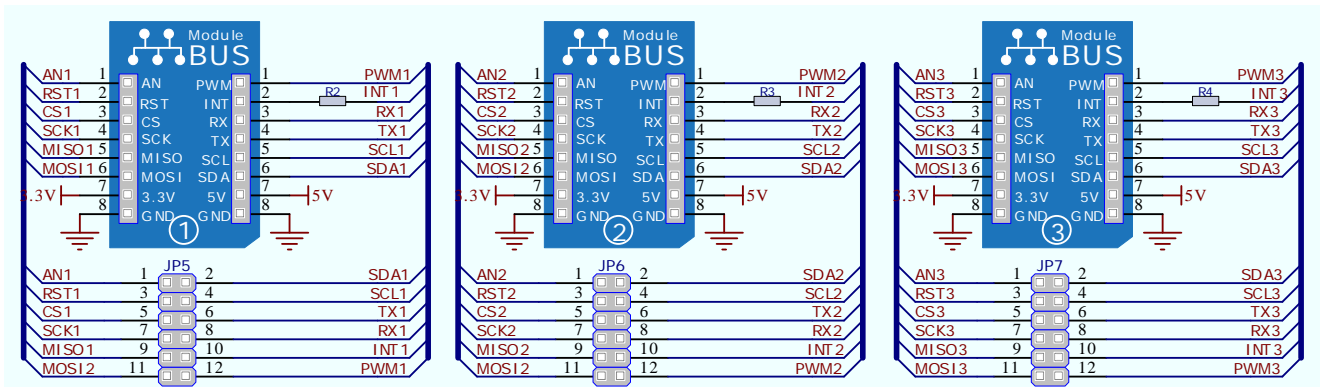


Figure 2-24: schematic of moduleBUS Socket

## (12). Stepmotor Socket and Piezo Buzzer

### a). Stepmotor Socket

OpenMCU Basic-A equips a Socket for 28BYJ-48-5V stepmotor (see below **Figure 2-27**) with ULN2003A Darlington Array drive. In order to enable the connection, it is necessary to connect it to the appropriate IO Port via connector **CN3** using dupont wires.



Figure 2-25: Stepmotor Port and Its Drive

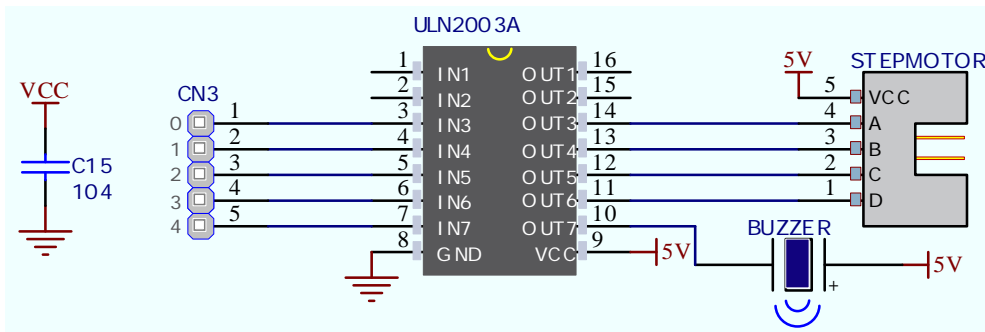


Figure 2-26: schematic of Stepmotor Port and Its Drive

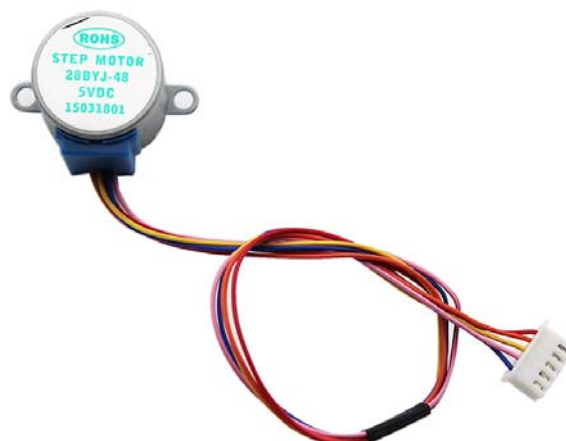


Figure 2-27: 28BYJ-48-5V stepmother

### b). Piezo Buzzer

**Piezoelectricity** is the charge which accumulates in certain solid materials in response to mechanical pressure, but also

providing the charge to the **piezo** electric material causes it to physically deform. One of the most widely used applications of piezoelectricity is the production of sound generators, called piezo buzzers. **Piezo buzzer** is an electric component that comes in different shapes and sizes, which can be used to create sound waves when provided with analog electrical signal. **OpenMCU Basic-A** comes with **piezo buzzer** which can be connected to any IO of microcontroller via connector (**CN3.4**). **Buzzer** is also driven by **ULN2003A**. Microcontrollers can create sound by generating a PWM(Pulse Width Modulated) signal - a square wave signal, which is nothing more than a sequence of logic zeros and ones. Frequency of the square signal determines the pitch of the generated sound, and duty cycle of the signal can be used to increase or decrease the volume in the range from 0% to 100% of the duty cycle. You can generate PWM signal using hardware capture-compare module, which is usually available in most microcontrollers, or by writing a custom software which emulates the desired signal waveform.

In order to enable the **piezo buzzer**, it is necessary to connected it to the appropriate MCU Port via connector (**CN3.4**) using dupont wires. The **CN3** connector does not be connected to any IOs, and it makes your experiments more flexible. See the comments in the source code provided in CD Rom for how to connect the hardware.

**(13). DS1302 ResetReal Time Clock**

The DS1302 Trickle Charge Timekeeping Chip contains a real time clock/calendar and 31 bytes of static RAM. It communicates with a microprocessor via a simple serial interface. The real time clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with less than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with an AM/PM indicator. Interfacing the DS1302 with a microprocessor is simplified by using synchronous serial communication. Only three wires are required to communicate with the clock/RAM: (1) RST (Reset), (2) I/O (Data line), and (3) SCLK (Serial clock). Data can be transferred to and from the clock/RAM 1 byte at a time or in a burst of up to 31 bytes. The DS1302 is designed to operate on very low power and retain data and clock information on less than 1 microwatt. The DS1302 is the successor to the DS1202. In addition to the basic timekeeping functions of the DS1202, the DS1302 has the additional features of dual power pins for primary and back-up power supplies, programmable trickle charger for VCC1, and seven additional bytes of scratchpad memory.

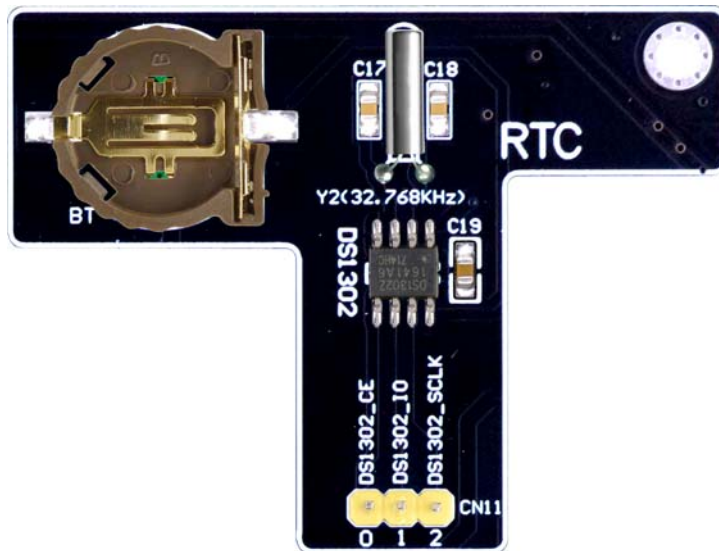


Figure 2-28: schematic of DS1302

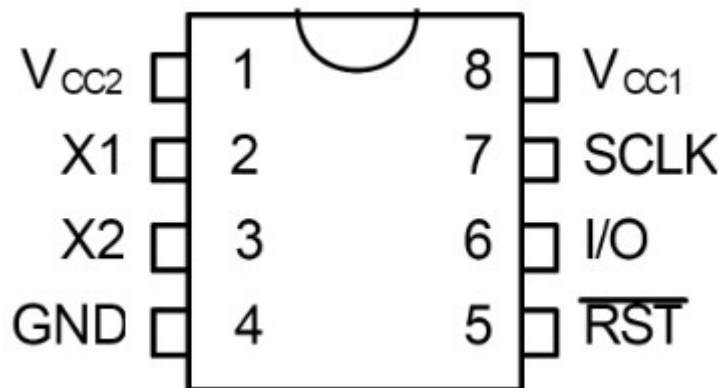


Figure 2-29: DS1302 pin assignment



Num	Name	Function
1	VCC2	Power Supply Pins
2	X1,	32.768 kHz Crystal Pins
3	X2	32.768 kHz Crystal Pins
4	GND	Ground
5	RST	Reset
6	I/O	Data Input/Output
7	SCLK	Serial Clock
8	VCC1	Power Supply Pins

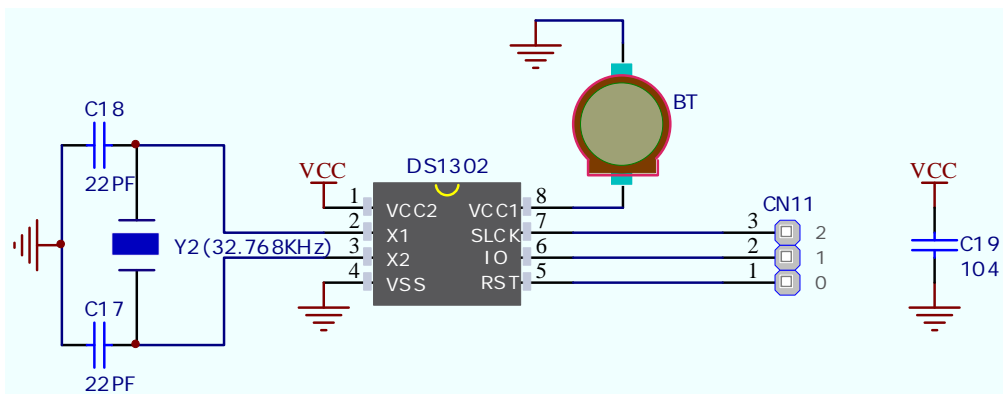


Figure 2-30: schematic of DS1302

In order to enable the **DS1302 Module**, it is necessary to connected it to the appropriate MCU Port via connector (**CN11**) using dupont wires. The **CN11** connector does not be connected to any IOs, and it makes your experiments more flexible. See the comments in the source code provided in CD Rom for how to connect the hardware.

## Contact Us



LogiFind Tech CO.,LTD

Address:Room 2409,B# of Nanguo Building,NO.16,Zhuxi South Road,Nanning,Guangxi,P.R.China

Mobile:(0086)15978193886/TEL: (0086)0771-5677749

Skype:**love100mhz**

Wechat:**weixinliang003**(or **15978193886**)

E-MAIL:**love100mhz@hotmail.com**

for Buying and Download:[www.LogiFind.com](http://www.LogiFind.com) or [www.MicroHello.com](http://www.MicroHello.com)