Ks0002 keyestudio Mega 2560 R3 Development Board

Introduction:

Keyestudio Mega 2560 R3 is a microcontroller board based on the ATMEGA2560-16AU , fully compatible with ARDUINO MEGA 2560 REV3.

It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, 2 ICSP headers, and a reset button.

It contains everything needed to support the microcontroller. With its bootloader, program can be downloaded directly with USB and you don't need to use other external programmer.

Just simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Mega 2560 board is compatible with most shields designed for the Uno.

The 2560 R3 differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 programmed as a USB-to-serial converter.

The MEGA 2560 is designed for more complex projects. With 54 digital I/O pins, 16 analog inputs and a larger space for your sketch, it is the recommended board for 3D printers and robotics projects. This gives your projects plenty of room and opportunities.

Specification:

Microcontroller: ATMEGA2560-16AU

Input Voltage: DC 7-12V

Operating Voltage: DC 5V

Digital I/O Pins 54   (D0-D53)

PWM Digital I/O Pins 15 (D2-D13; D44-D46)

Analog Input Pins 16 (A0-A15)

DC Current per I/O Pin 20 mA

DC Current for 3.3V Pin 50 mA

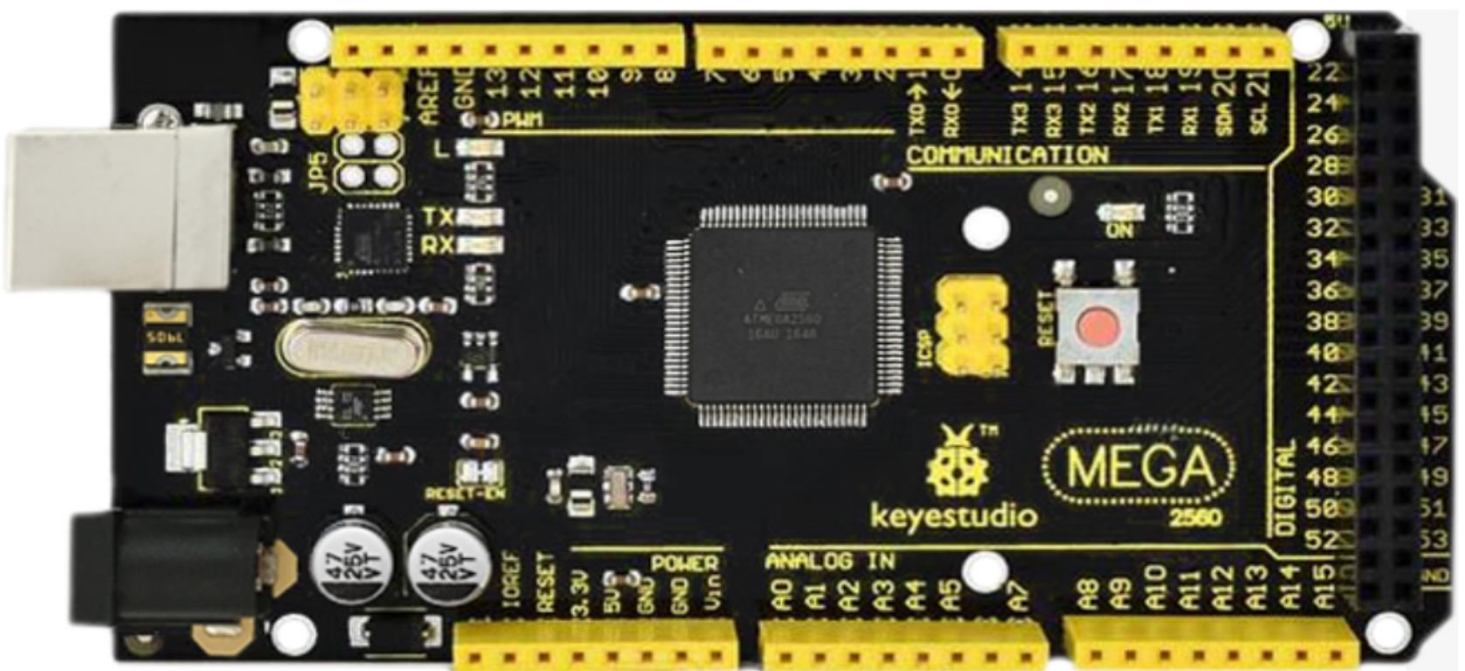Flash Memory 256 KB of which 8 KB used by bootloader

SRAM 8 KB
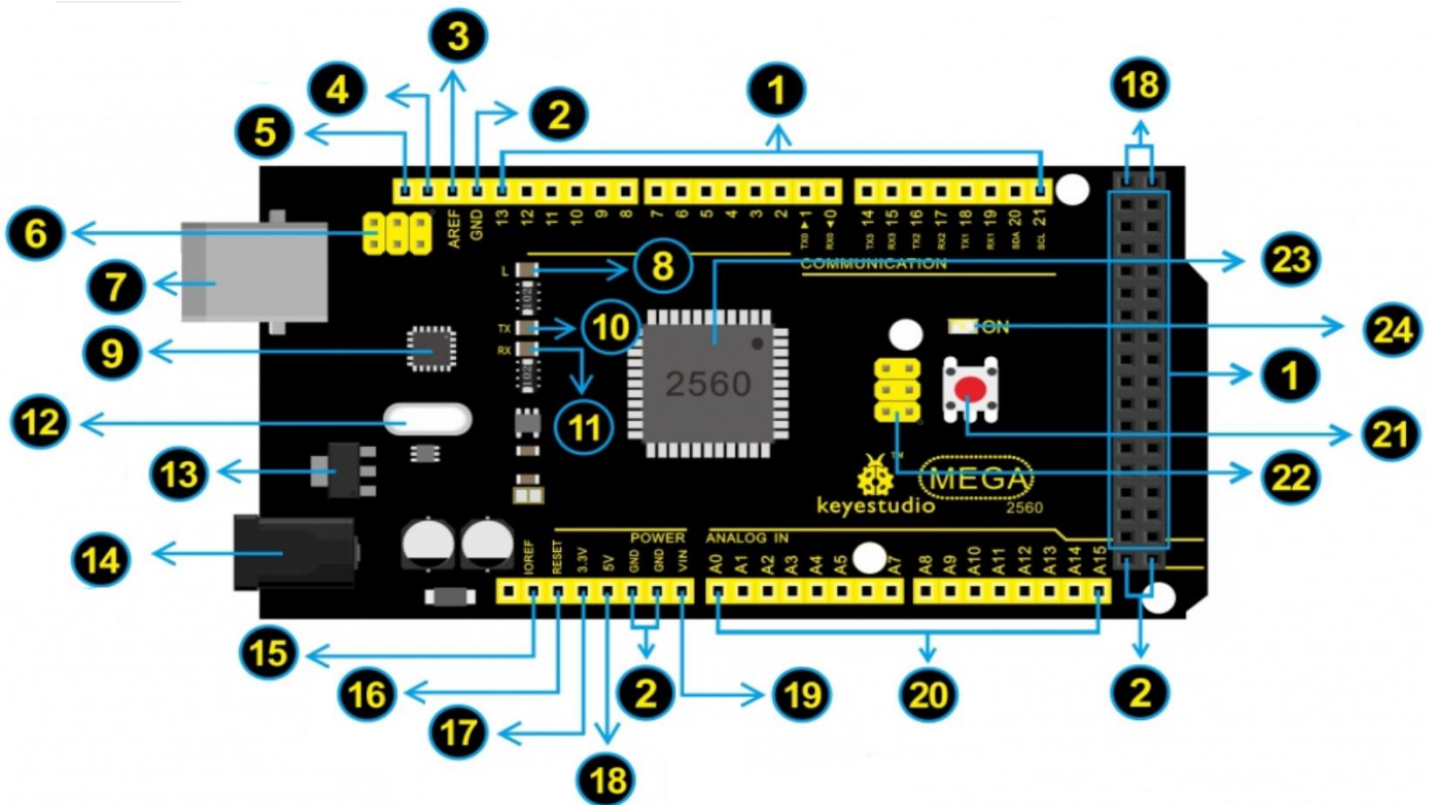
EEPROM 4 KB

Clock Speed 16 MHz

Dimensions: 108*54mm, H-15mm

Environmental properties: ROHS

Element and Pin Interfaces

1 **Digital I/O** Arduino MEGA has 54 digital input/output pins (of which 15 can be used as PWM outputs). These pins can be configured as digital input pin to read the logic value (0 or 1). Or used as digital output pin to drive different modules like LED, relay, etc.
Using pinMode(), digitalWrite(), and digitalRead() functions.

2 **GND** Ground pins

3 **AREF** Reference voltage (0-5V) for analog inputs. Used with analog Reference(). Configures the reference voltage used for analog input (i.e. the value used as the top of the input range).

4 **SDA** IIC communication pin

5 **SLC** IIC communication pin

6 **ICSP (In-Circuit Serial Programming) Header** The AVR, an Arduino micro-program header consisting of MOSI, MISO, SCK, RESET, VCC, and GND. Connected to the ATMEGA16U2-MU. When connecting to PC, program the firmware to ATMEGA16U2-MU.

7 **USB Connection** Arduino board can be powered via USB connector.
All you needed to do is connecting the USB port to PC using a USB cable.

8 **D13 LED** There is a built-in LED driven by digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

9 **ATMEGA 16U2-MU** USB to serial chip, can convert the USB signal into serial port signal.

10 **TX LED** On board you can find the label: TX (transmit)
When Arduino board communicates via serial port, send the message, TX led flashes.

11 **RX LED** On board you can find the label: RX(receive)
When Arduino board communicates via serial port, receive the message, RX led flashes.

12 **Crystal Oscillator** How does Arduino calculate time? by using a crystal oscillator.
The number printed on the top of the Arduino crystal is 16.000H9H. It tells us that the frequency is 16,000,000 Hertz or 16MHz.

13 **Voltage Regulator** Convert an external input DC7-12V voltage into DC 5V, then switch DC 5V to the processor and other components.

14 **DC Power Jack** Arduino board can be supplied with an external power DC7-12V from the DC power jack 2.1mm.

15 IOREF   This pin on the board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs for working with the 5V or 3.3V.

16 RESET Header   Connect an external button to reset the board. The function is the same as reset button.

17 Power Pin 3V3   Provides 3.3V voltage output

18 Power Pin 5V   Provides 5V voltage output.

19 Vin   You can supply an external power input DC7-12V through this pin to Arduino board.

20 Analog Pins   On board has 16 analog inputs, labelled A0 to A15.

21 RESET Button   You can reset your Arduino board, for example, start the program from the initial status. You can use the RESET button.

22 ICSP (In-Circuit Serial Programming) Header   The AVR, an Arduino micro-program header consisting of MOSI, MISO, SCK, RESET, VCC, and GND.
It is often called the SPI (serial peripheral interface) and can be considered an "extension" of the output. In fact, slave the output devices to the SPI bus host.
When connecting to PC, program the firmware to ATMEGA2560-16AU.

23 Microcontroller   Each Arduino board has its own microcontroller. You can regard it as the brain of your board.
The main IC (integrated circuit) on the Arduino is slightly different from the panel pair. Microcontrollers are usually from ATMEL. Before you load a new program on the Arduino IDE, you must know what IC is on your board. This information can be checked at the top of IC.

24 Power LED Indicator   Powering the Arduino, LED on means that your circuit board is correctly powered on. If LED is off, connection is wrong.

Specialized Functions of Some Pins

Serial Communication: D0 (RX0) and D1 (TX1); Serial 1: D19 (RX1) and D18 (TX1); Serial 2: D17 (RX2) and D16 (TX2); Serial 3: D15 (RX3) and D14 (TX3).

Used to receive (RX) and transmit (TX) TTL serial data. Pins 0 and 1 are also connected to the corresponding pins of the ATmega16U2 USB-to-TTL Serial chip.

PWM Pins (Pulse-Width Modulation): D2 to D13, and D44 to D46.

Provide 8-bit PWM output with the analogWrite() function.

External Interrupts: D2 (interrupt 0), D3 (interrupt 1), D18 (interrupt 5), D19 (interrupt 4), D20 (interrupt 3), and D21 (interrupt 2).

These pins can be configured to trigger an interrupt on a low level, a rising or falling edge, or a change in level. See the attachInterrupt() function for details.

SPI communication: D53 (SS), D52 (SCK), D51 (MOSI), D50 (MISO).

These pins support SPI communication using theSPI library. The SPI pins are also broken out on the ICSP header, which is physically compatible with the Arduino Uno.

IIC communication: D20 (SDA); D21 (SCL). Support TWI communication using the Wire library

Warnings:

1. The Mega 2560 has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

2. Automatic (Software) Reset:

   Rather than requiring a physical press of the reset button before an upload, the Mega 2560 board is designed in a way that allows it to be reset by software running on a connected computer.

3. be soldered together to re-enable it. It's labeled "RESET-EN". You may also be able to disable the auto-reset by connecting a 110 ohm resistor from 5V to the reset line; see this forum thread for details.

Resources:
https://wiki.keyestudio.com/Ks0002_keyestudio_Mega_2560_R3_Development_Board