Arduino Mega 2560:
Subsystems, Peripheral Circuitry, and Components

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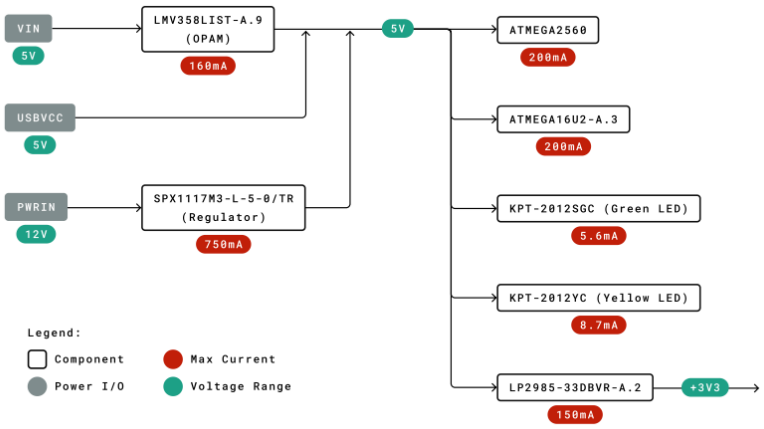
1 Introduction

Arduino Mega 2560 is a powerful micro-controller board in the Arduino family that is widely used in robotics among with many other fields. With main focus to the **Rev3** edition of the board, this report discusses about the different subsystems present in the board along with the peripheral circuitry and components.

2 Main Subsystems of Arduino Mega 2560

2.1 Power Subsystem



The board can be powered in various ways such as through the USB cable, power jack or the V_{in} input. Voltage regulators are used to give the ATmega2560 micro-controller and other components with their required voltage, and a 3.3V output.

The Arduino board has 3.3V, 5V pins to provide power to the externally connected components along with 5 ground (GND) pins.

Connector	Voltage Range	Component Used
USB	4.8V - 5.5V	-
V_{in}	5V	LMV358LIST-A.9 Op-Amp
PWRIN (DC jack)	7V - 12V	SPX1117M3-L-5-0 Regulator

2.2 Communication Subsystem

ATmega16U2

This chip acts as an interface between the ATmega2560 and the USB input signals. It is a USB-to-Serial converter acting as a bridge between the USB port of the computer and the serial ports of the micro-controller. It enables the user to program the micro-controller easily and get data back from the board as well.

I2C Ports

In Arduino Mega2560, pins 20 and 21 act as I2C (Inter-Integrated Circuits) pins. Multiple I2C devices can be simultaneously connected to these ports to communicate using the I2C protocol. LCD displays are one example.

UART Ports

Arduino Mega2560 consists of 4 UART (Universal Asynchronous Receiver/ Transmitter) serial ports. These ports enables to communicate with some external devices like GPS and RFID modules.

SPI Ports

Arduino Mega2560 has 4 SPI (Serial Peripheral Interface) pins, 50, 51, 52, and 53, for quicker communication with peripheral devices within short distances.

2.3 Micro-Controller Unit (MCU)

ATmega2560

ATmega2560 micro-controller sits as the core of all performances of the board. It works up to 16 MIPS at 16MHz clock speed (which is provided by a separate crystal oscillator on the board) and consists of 256KB ROM, 4KB EEPROM, 8KB SRAM and 32 x 8 general purpose registers.

Crystal Oscillator

A 16MHz crystal oscillator is fixed in the board to provide the micro-controller with accurate clock signals to work properly.

2.4 Input Output (I/O) Subsystem

The Arduino Mega2560 board comprises with 54 digital I/O pins of which 15 are capable of generating PWM signals, and 16 analog pins.

Other than that, there are 6 interrupt pins, 2, 3, 18, 19, 20, 21. When a peripheral connected to these pins triggers an interrupt, the processor will immediately stops whatever it is currently doing an starts processing the interrupt signal.

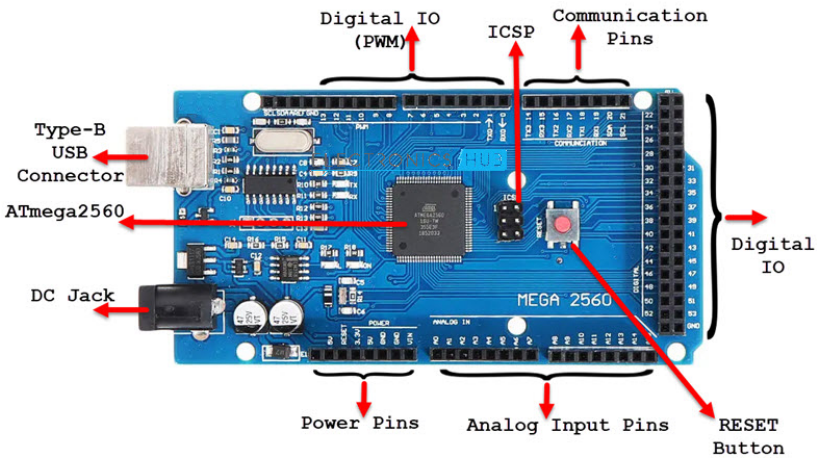
2.5 Other Components

LEDs

Three types of LEDs are visible in Arduino Mega2560 board, namely the power LED, two Tx/ Rx LEDs, and the LED on pin 13.

RESET Button

By pressing this button, the program that is running on the micro-controller can be reset to its beginning.



References

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