analogRead()

[Analog I/O]

Description

Reads the value from the specified analog pin. Arduino boards contain a multichannel, 10 analog to digital converter. This means that it will map input voltages between 0 and the operating voltage(5V or 3.3V) into integer values between 0 and 1023. On an Arduino UNC example, this yields a resolution between readings of: 5 volts / 1024 units or, 0.0049 volts mV) per unit. See the table below for the usable pins, operating voltage and maximum resolution for some Arduino boards.

The input range can be changed using analogReference(), while the resolution can be changed (only for Zero, Due and MKR boards) using analogReadResolution().

On ATmega based boards (UNO, Nano, Mini, Mega), it takes about 100 microseconds (0.00 s) to read an analog input, so the maximum reading rate is about 10,000 times a second.

BOARD	OPERATING VOLTAGE	USABLE PINS	MAX RESOLUTIO
UNO R3	5 Volts	A0 to A5	10 bits
UNO R4 (Minima, WiFi)	5 Volts	A0 to A5	14 bits**
Mini	5 Volts	A0 to A7	10 bits
Nano, Nano Every	5 Volts	A0 to A7	10 bits
Nano 33 (IoT, BLE, RP2040, ESP32)	3.3 Volts	A0 to A7	12 bits**
Mega, Mega2560, MegaADK	5 Volts	A0 to A14	10 bits
Micro	5 Volts	A0 to A11*	10 bits
Leonardo	5 Volts	A0 to A11*	10 bits
Zero	3.3 Volts	A0 to A5	12 bits**
Due	3.3 Volts	A0 to A11	12 bits**
GIGA R1	3.3 Volts	A0 to A11	16 bits**
MKR Family boards	3.3 Volts	A0 to A6	12 bits**

*A0 through A5 are labelled on the board, A6 through A11 are respecti on pi

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Find anything that can be improved? Suggest corrections and new documentation via GitHub.

Doubts on how to use Github? Learn everything you need to know in this tutorial.

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Syntax

```
analogRead(pin)
```

Parameters

`pin`: the name of the analog input pin to read from.

Returns

The analog reading on the pin. Although it is limited to the resolution of the analog to digi converter (0-1023 for 10 bits or 0-4095 for 12 bits). Data type: `int`.

Example Code

The code reads the voltage on analogPin and displays it.

```
int analogPin = A3; // potentiometer wiper (middle terminal) connected to analog pin 3
                    // outside leads to ground and +5V
int val = 0;  // variable to store the value read

void setup() {
  Serial.begin(9600);           //  setup serial
}

void loop() {
  val = analogRead(analogPin);  // read the input pin
  Serial.println(val);          // debug value
}
```

Notes and Warnings

If the analog input pin is not connected to anything, the value returned by `analogRead()` w fluctuate based on a number of factors (e.g. the values of the other analog inputs, how clo your hand is to the board, etc.).

See also

LANGUAGE analogReadResolution()

EXAMPLE Description of the analog input pins

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