

Crumbuino-Nano

**Arduino-compatible OEM module with ATmega328 controller and CP2102 USB UART converter.**

## AVAILABLE OPTIONS

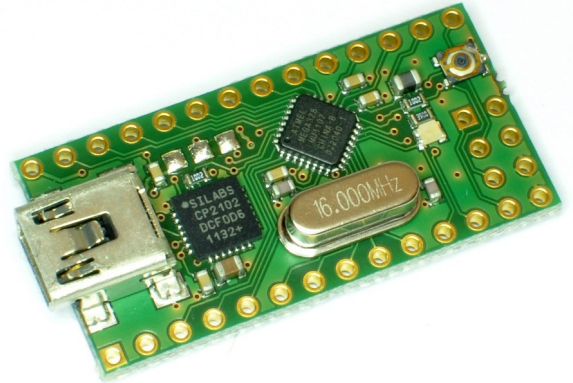
Module	Processor	RAM	EEPROM	Flash	Peripherals
Crumbuino-Nano	ATmega328	2kB SRAM	1kB EEPROM	32kB Flash	- CP2102 USB-UART converter - mini USB B 5pin connector - status LED and tiny reset button

## ARDUINO BOOTLOADER

The Crumbuino-Nano module comes preloaded with the Arduino ATmega328 bootloader. Also activated is the auto-reset function, providing a seamless integration to the Arduino IDE for uploading of a program without the need to reset the module in advance.

## ARDUINO IDE INTEGRATION

Due to the preloaded Arduino Bootloader and the integrated USB UART converter with mini-USB connector, the module can directly be used with the Arduino IDE. The corresponding board support package (BSP) is available here: <https://github.com/beegee-tokyo/Crumbuino-Chip45>. Alternatively it can be used as Arduino Nano.



## AUTO RESET FEATURE

Jumper J1 (on the bottom of the module) is closed by default, thus enabling the automatic reset of the ATmega328 by the Arduino IDE before connecting the bootloader and upload a program.

## USB INTERFACE

A USB UART converter CP2102 by Silabs is connected to the MCU's USART RXD/PD0 and TXD/PD1. A standard 5pin mini USB B connector is available onboard and allows for easy connection to a host PC. The CP2102 is always powered from USB bus.

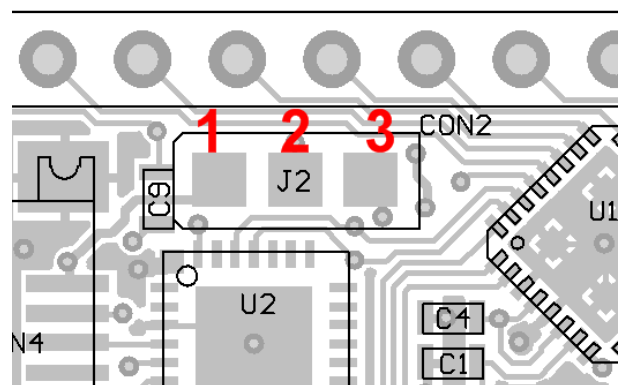
## POWER SUPPLY OPTIONS

The module can be powered either externally (VCC pin on the expansion headers) or from USB bus 5V or from the CP2102's internal 3.3V regulator.

J2 selects between these options:

- open: external power supply (1.8V – 5.5V)
- 1-2: USB bus powered (approx. 5V)
- 2-3: CP2102 3.3V powered

If you add external components in case of USB power supply, make sure to stay within the allowed current consumption for USB powered devices (100mA/500mA)! When powering from CP2102 3.3V regulator, a maximum current of 100mA may be drawn. Please read the CP2102 data sheet on maximum power dissipation of the CP2102 and requirements on power consumption from the USB bus!!!



## RESET BUTTON

A tiny reset button is available to force a manual reset of the MCU. A 10kOhm pullup resistor is connected to the MCU's reset signal to make it less susceptible to EMI, than with just the MCU-internal pullup resistor.

## STATUS LED

A green low-current status LED is connected low-active to the Arduino Pin 10, corresponding to MCU's signal PB2. Setting this pin to output and low will turn on the LED.

## ISP CONNECTOR

An ISP header with Atmel's standard 6-pin pinout is available on the module, see pictures below for location and pinout.

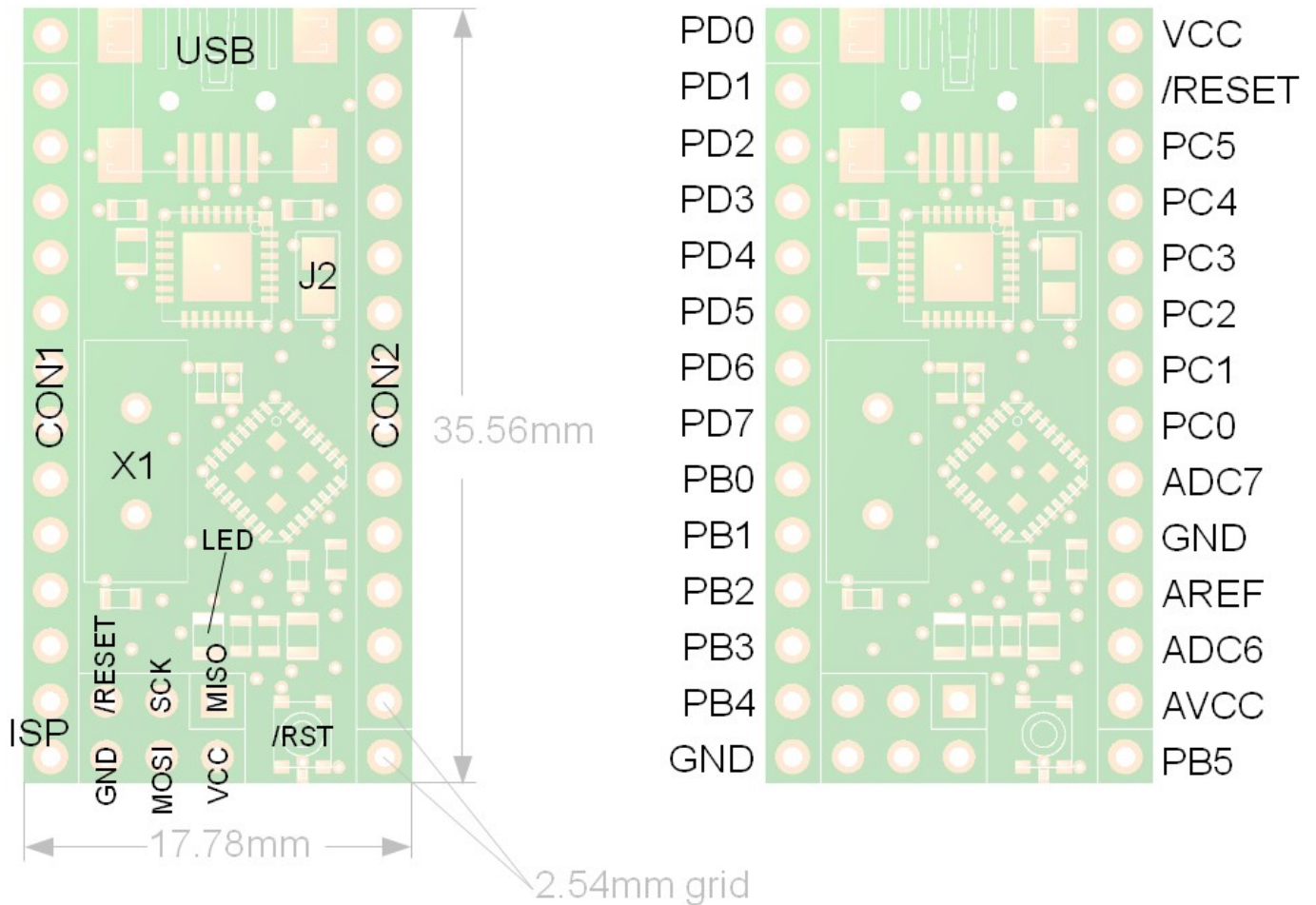
## EXPANSION CONNECTORS

Two 14 pin headers provide all free MCU signals.

Connector Con1					Connector Con2
Pin#	Port	Arduino GPIO# / Function	Arduino GPIO# / Function	Port	Pin#
1	PD0	0 / RX		VCC	1
2	PD1	1 / TX		/RESET	2
3	PD2	2		PC5	3
4	PD3	3 / PWM	A4	PC4	4
5	PD4	4	A3	PC3	5
6	PD5	5 / PWM	A2	PC2	6
7	PD6	6 / PWM	A1	PC1	7
8	PD7	7	A0	PC0	8
9	PB0	8	A7	ADC7	9
10	PB1	9 / PWM		GND	10
11	PB2	10 / PWM		Aref	11
12	PB3	11 / PWM	A6	ADC6	12
13	PB4	12	VCC	AVCC	13
14	GND	16 / USART2_TX	13	PB5	14

## PIN CONFIGURATION AND DIMENSIONS

The picture on the right shows the pin names in Arduino environment (black) as well as the original ATmega328 pin names (grey).



Note: J2 has three pads on V2.3! See section "Power Supply Options"

## DESIGN AND HANDLING GUIDELINES

This module – just like any other semiconductor devices – is susceptible to damage by ESD. Suitable precautions should be taken when handling and transporting devices. The possible damage to devices depends on the circumstances of the handling and transporting, and the nature of the device. The extent of damage can vary from immediate functional or parametric malfunction to degradation of function or performance in use over time. Devices suspected of being affected should be replaced.

## OPERATING CHARACTERISTICS

Symbol	Parameter	Condition	Min	Typ	Max	Units
Vcc	Supply Voltage	16 MHz	4.5		5.5	V
Icc	Power Supply Current  <i>(Icc strongly depends on CPU activity, like frequency, power saving modes, etc. as well as external circuitry, io pin input and output current, etc. The values denoted here are for reference only and can differ from final application vallues.)</i>	Active 16MHz Vcc = 5V		10		mA
		USB bus active  <i>(power is drawn from USB bus)</i>		+20		mA
T	Operating Temperature <i>(industrial temperature range on request)</i>		-20		+70	°C

## SCOPE OF DELIVERY

This module is being shipped with preloaded Arduino bootloader and separate 16MHz crystal.

## DEVELOPMENT TOOLS

As an Arduino-compatible module, the Crumbuino-Mega is intended to be used with the Arduino IDE as development environment.

- Arduino Homepage: <http://arduino.cc/en/>
- Getting Started Page: <http://arduino.cc/en/Guide/HomePage>
- Arduino Software Page: <http://arduino.cc/en/Main/Software>

## WHAT ELSE DO YOU NEED?

The only thing you really need, is a USB cable to connect the Crumbuino-Mega to a PC or Mac.

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