

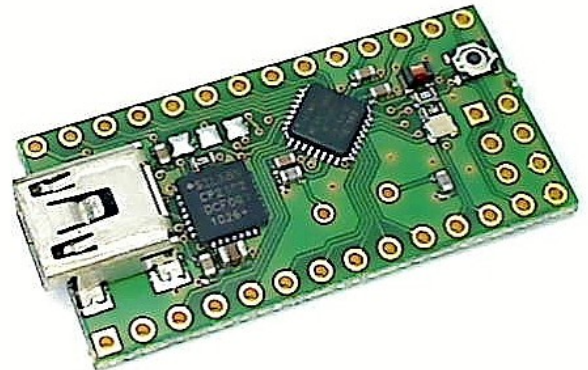
OEM module with USB UART for rapid application development based on Atmel's AVR processors.

AVAILABLE PROCESSOR OPTIONS

Module	Processor	RAM	EEPROM	Flash	Peripherals
Crumb168 V2.3	ATmega168PA	1kB SRAM	512B EEPROM	16kB Flash	- CP2102 USB-UART converter - mini USB B 5pin connector - status LED and tiny reset button
Crumb328 V2.3	ATmega328	2kB SRAM	1kB EEPROM	32kB Flash	- CP2102 USB-UART converter - mini USB B 5pin connector - status LED and tiny reset button

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.



PREINSTALLED BOOTLOADER

The module can be shipped with the latest version of the chip45boot2 bootloader preprogrammed. It allows for flash and eeprom programming over USB without the need for an ISP adapter. The bootloader is being enabled by a certain character sequence after reset, then automatically adjusts it's baudrate to the host PC's baudrate and shows a command prompt and is ready to work. See <http://go.chip45.com/c45b2> for details on the chip45boot2 bootloader. If the preloaded bootloader is desired, please contact us in advance.

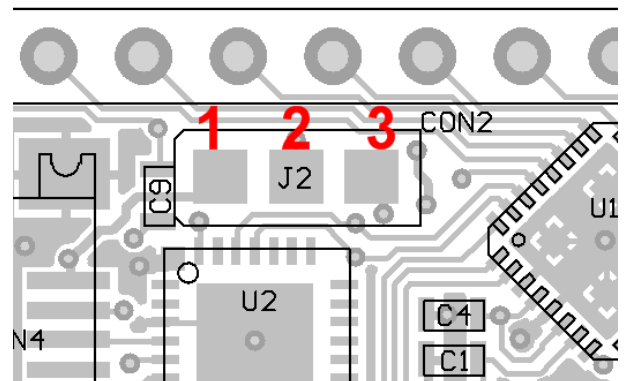
POWER SUPPLY OPTIONS

The module can be power 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!!!



AUTO RESET FEATURE

In case the module comes with the chip45boot2 bootloader preloaded and this bootloader is enabled by USB USART communication after reset, it is possible to automatically reset the module in the moment the virtual COM port on the host PC side is being opened by the bootloader PC application or by a terminal program. The feature is realized by connecting the CP2102's DTR signal through a capacitor to the MCU's reset signal. DTR goes low when the virtual COM port is opened and the capacitor forwards this low as a pulse to reset. This is a comfortable way of working with the module and the bootloader without the need for manually resetting the device for hex file upload!

To enable this feature, close jumper J1 on the bottom side of the module (it's the only jumper on the bottom side!).

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 MCU's signal PB2. Setting this pin to output and low will turn on the LED.

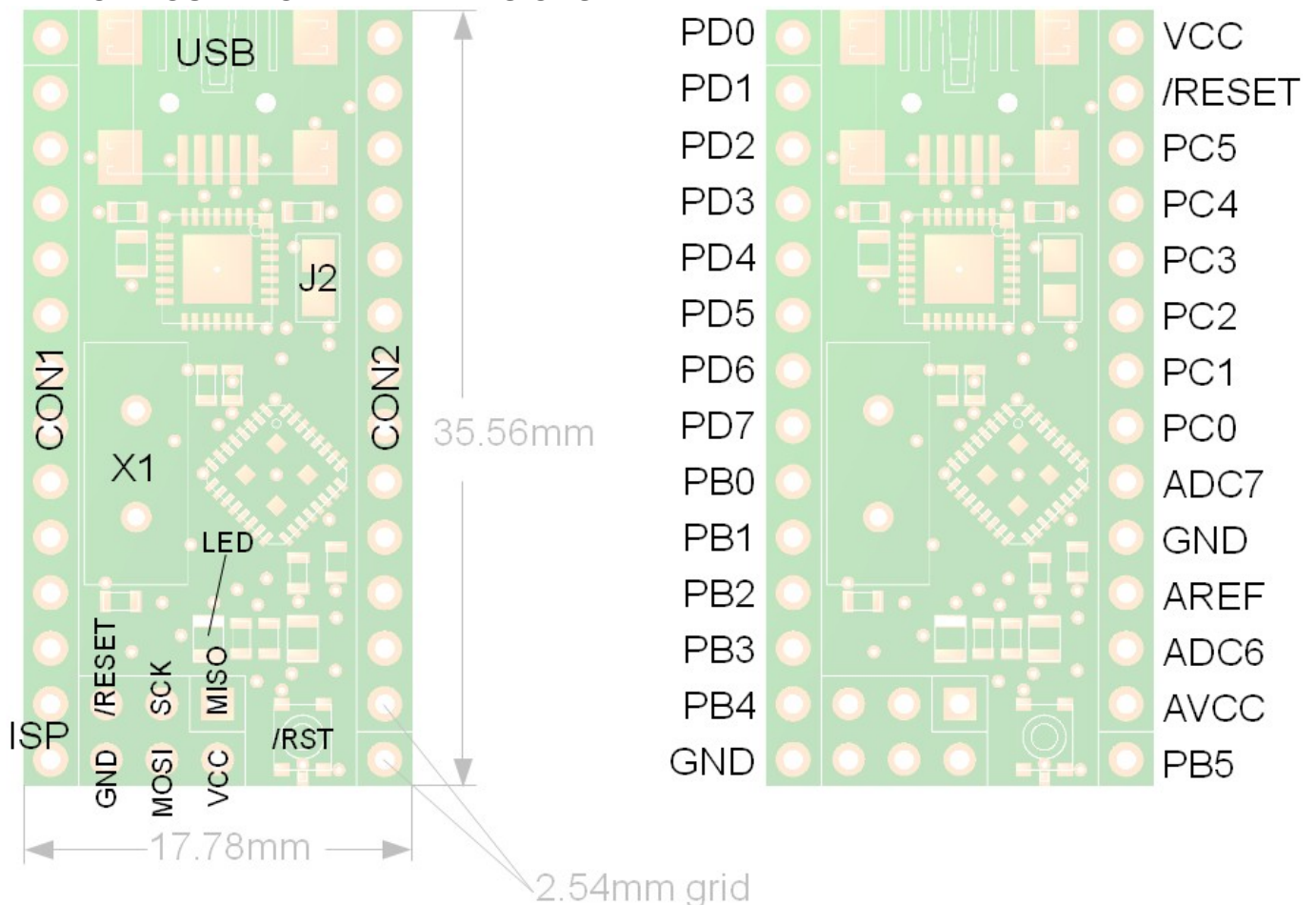
ISP CONNECTOR

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.

PIN CONFIGURATION AND DIMENSIONS



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	0-4 MHz	1.8		5.5	V
		0-10 MHz	2.7		5.5	V
		0-20 MHz	4.5		5.5	V
Icc	Power Supply Current (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 values.)	Active 10MHz Vcc = 3V		3		mA
		Active 20MHz Vcc = 5V		11		mA
		USB bus active		+20		mA
T	Operating Temperature (industrial temperature range on request)		-20		+70	°C

SCOPE OF DELIVERY

This module is being shipped without pin headers (THT components) preinstalled. A Connector Kit with standard pin headers and receptacles can be ordered as option.

DEVELOPMENT TOOLS

The free WinAVR C/C++ compiler toolset provides a powerful and stable development environment, which is nicely integrated into Atmel's AVR-Studio development suite. Please visit the following pages for more details:

- Atmel AVR Studio 4.18 (build 684): http://www.atmel.com/forms/software_download.asp?category_id=163&family_id=607&subfamily_id=760&fn=dl_AvrStudio4Setup.exe
- Atmel AVR Studio Service Pack 1 (build 692): http://www.atmel.com/dyn/resources/prod_documents/AVRStudio4.18SP1.exe
- Atmel AVR Studio Service Pack 3 (build 716): http://www.atmel.com/dyn/resources/prod_documents/AVRStudio4.18SP3.exe
- Atmel AVR Toolchain Installer: http://www.atmel.com/forms/software_download.asp?category_id=163&family_id=607&subfamily_id=760&fn=dl_avr-toolchain-installer-3.2.3.579-win32.win32.x86.exe

Note: Make sure to install both service pack 1 and service pack 3 for AVR Studio 4!

Always check

http://www.atmel.com/dyn/products/tools.asp?category_id=163&family_id=607&subfamily_id=760
for the latest version of AVR Studio or the AVR toolchain.

WHAT ELSE DO YOU NEED?

- To use the bootloader comfortably from a Windows PC application, see www.chip45.com/info/chip45boot2.html for the latest version of the chip45boot2 GUI application.
- If you prefer ISP programming, you need an ISP adapter for in-system programming of the MCU, see www.chip45.com/AVR-ISP-Programmer-Adapter for suitable devices.
- If you need source level debugging, you should consider Atmel's JTAGICE-mkII debugger (which is available here: www.chip45.de/AVR-ISP-Programmer-Adapter).
- Windows and Mac users need the latest USB driver for the CP2102 USB UART converter (see CP2102 homepage at <https://www.silabs.com/products/interface/usbtouart/Pages/default.aspx>)
- A development environment and compiler/assembler (see above DEVELOPMENT TOOLS)

Declaration of Electro Magnetic Conformity of the CHIP45 „Crumb168 V2.3 / Crumb328 V2.3“



CHIP45 embedded microcontroller modules (henceforce products) are designed for installation in electrical appliances or as dedicated evaluation boards (i.e.: for use as a test and prototype platform for hardware/software development) in laboratory environments.

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