

Crumb128/2561-4.0

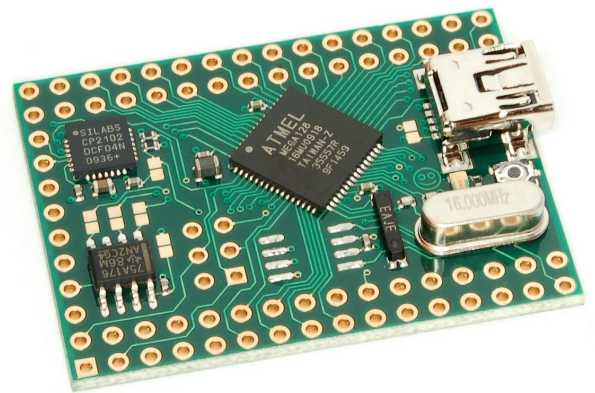
OEM module with USB and RS485 for rapid application development based on Atmel's AVR processors.

AVAILABLE PROCESSOR OPTIONS

Module	Processor	RAM	EEPROM	Flash	Peripherals
Crumb128 V4.0	ATmega128	4kB SRAM	4kB EEPROM	128kB Flash	- CP2102 USB-UART converter - mini USB B 5pin connector - 75ALS176 RS485 transceiver - status LED and tiny reset button
Crumb128-CAN V4.0 <i>No longer available, see Crumb128-CAN V5.0 or V5.1!</i>	AT90CAN128	4kB SRAM	4kB EEPROM	128kB Flash	- CP2102 USB-UART converter - mini USB B 5pin connector - 75ALS176 RS485 transceiver - PCA82C251 CAN transceiver - status LED and tiny reset button
Crumb2561 V4.0	ATmega2561	8kB SRAM	4kB EEPROM	256kB Flash	- CP2102 USB-UART converter - mini USB B 5pin connector - 75ALS176 RS485 transceiver - status LED and tiny reset button

USB INTERFACE

A USB UART converter CP2102 by Silabs is connected to the MCU's first USART RXD0/PE0 and TXD0/PE1. 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. By closing jumper J6, USB bus power is connected to VCC of the module, allowing for USB powered applications. If you add external components in that case, make sure to stay within the allowed current consumption for USB powered devices (100mA/500mA)!



RS485 INTERFACE

The module comes with an SN75ALS176 RS485 transceiver onboard. It is connected to the MCU's second USART RXD1/PD2 and TXD1/PD3 as well as PD4 to control the transceiver transmit or receive mode. Four jumpers J1 to J4 are used to disconnect the signals plus the transceiver's VCC from the MCU to fully disable the RS485 transceiver and allow for other usage of the USART signals. The four jumpers are open by default, thus disabling RS485. If you want to use RS485, close all four jumpers!

CAN INTERFACE

In case the module is equipped with the AT90CAN128 MCU, also a 82C251 CAN transceiver is assembled, thus allowing for direct connection to a CAN bus without external components. The 82C251 provides a slope resistor input to limit slew rate of the CAN signals. This signal is available on the expansion headers and must be connected externally to either high (standby) or low (high speed) or a MCU pin (to select mode in software) or to a resistor for slope control.

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.

AUTO RESET FEATURE

Since 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. This is possible by closing jumper J5, which connects 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!

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 PB7. Setting this pin to output and low will turn on the LED.

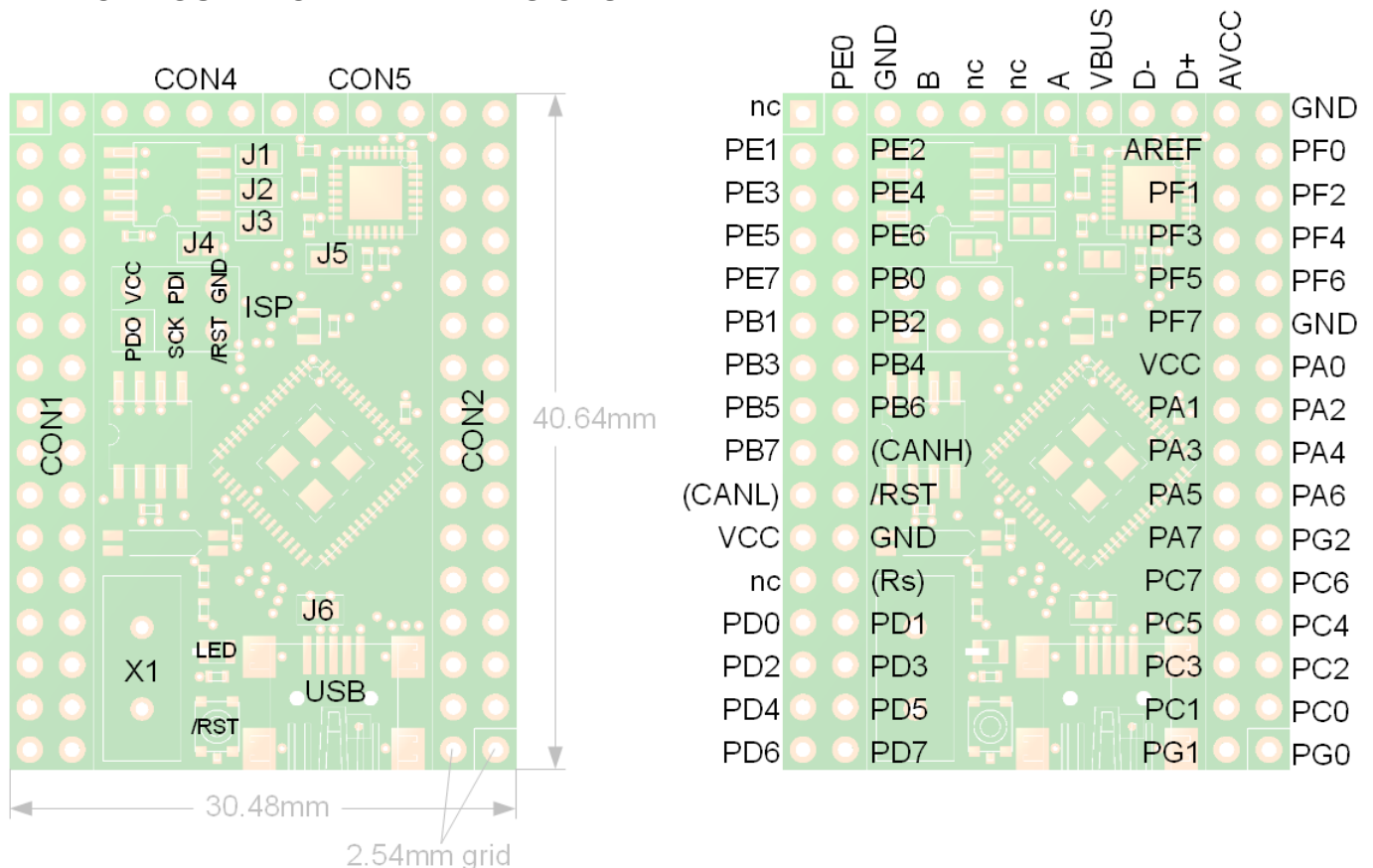
ISP CONNECTOR

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 32 pin headers provide all free MCU signals, as well as the optional CAN signals. RS485 and USB signals are available on a third 8 pin connector. See the following pictures for details.

PIN CONFIGURATION AND DIMENSIONS



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	0-8 MHz	2.7		5.5	V	
		0-16 MHz	4.5		5.5	V	
		RS485 used	4.5		5.5	V	
		CAN used	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. The values for RS485 or CAN bus usage depend on bus termination resistance and can vary from the listed values.)	Active 8MHz Vcc = 3V		16		mA	
		Active 16MHz Vcc = 5V		30		mA	
		USB bus active		+20			mA
		RS485		+30			
		CAN bus dominant				+85	mA
		CAN bus recessive				10	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)

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