

**Powerfull OEM module for rapid application development based on Atmel's AVR ATmega2560 processor.**

## BASIC SPECIFICATIONS

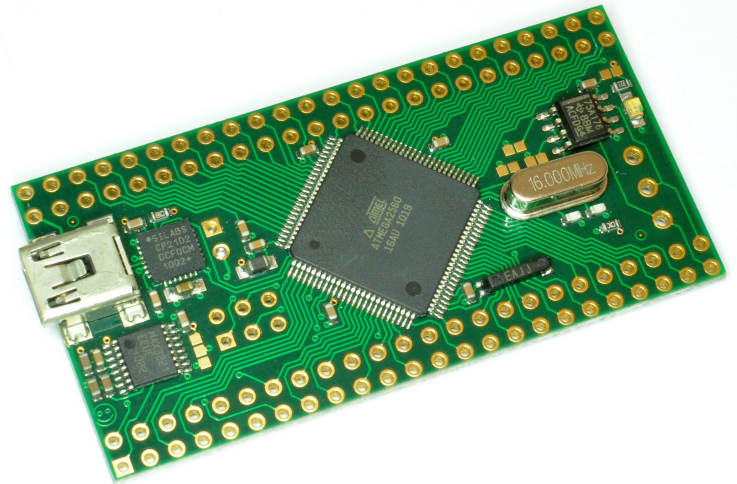
Module	Processor	RAM	EEPROM	Flash	Peripherals
Crumb2560 V1.1	ATmega2560	8kB SRAM	4kB EEPROM	256kB Flash	- CP2102 USB-UART converter - MAX3221 RS232 transceiver - SN75ALS176 RS485 transceiver

### High Performance

- up to 16MHz operating frequency
- single 2.7-5V power supply

### Familiar Integrated AVR Peripherals

- up to 83 IO pins available
- two 8 bit, four 16 bit timer/counter
- 4 PWM channels (8 bit resolution)
- 12 PWM channels (2 to 16 bit resolution)
- input capture and output compare functions
- real time clock counter
- four programmable UARTs
- master/slave SPI interface
- two wire interface (I<sup>2</sup>C comp.)
- analog comparator
- 16 channel 10 bit ADC
- watchdog timer
- ISP and JTAG interface



### Enhanced Onboard Peripherals

- CP2102 USB to UART converter at USART0 (PE0, PE1)
- MAX3221 RS232 transceiver at USART2 (PH0, PH1)
- SN75ALS176 RS485 transceiver at USART3 (PJ0, PJ1, PJ2)
- HC49 type crystal (frequency selectable)
- 32768Hz clock crystal preinstalled
- standard 6 pin Atmel AVR ISP connector
- status LED (connected to PJ7)

### Expansion Headers

- standard 2.54mm headers with all controller signals and signals from onboard peripherals
- auxiliary 3pin screw terminal (connected to RS485 signals for direct cable connection, RS485 signals are also available at pin headers, see below pinout)

## SCOPE OF DELIVERY

This module is being shipped without pin headers (THT components) preinstalled. A Connector Kit with high quality pin headers and receptacles is available separately or any suitable 2.54mm (1/10inch) grid pins can be used.

## BUS INTERFACES

### USB INTERFACE

A USB UART converter CP2102 by Silabs is connected to the MCU's USART0. 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. The USB driver for the CP2102 is available at <http://www.silabs.com/products/interface/usbtouart>.

### RS232 INTERFACE

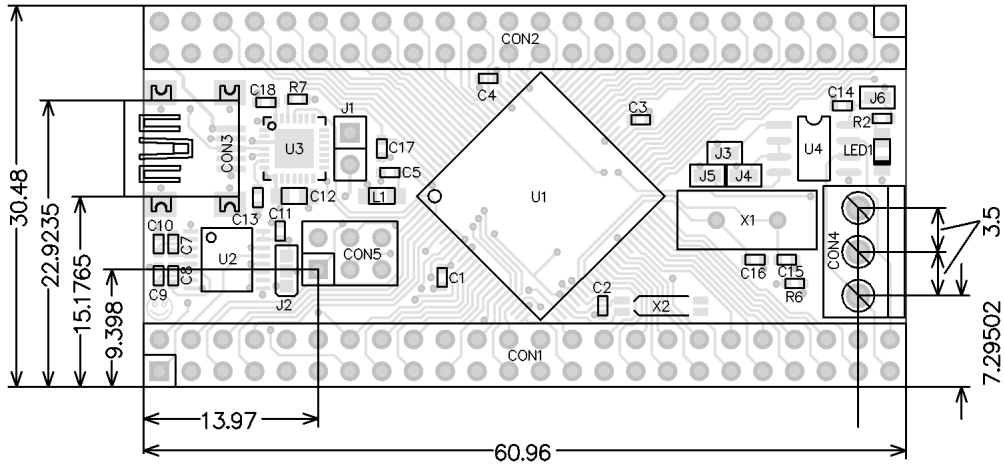
USART2 is connected to an industry standard RS232 transceiver MAX3221. When you want to use the RS232 port, you have to enable it by setting solder jumper J2 to 1-2. If not used, the jumper should be set to 2-3 to fully disable the transceiver. RS232 can be used not only with 5V supply, but with 3.3V supply, too.

### RS485 INTERFACE

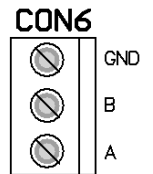
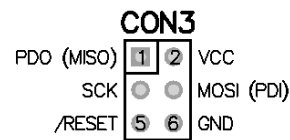
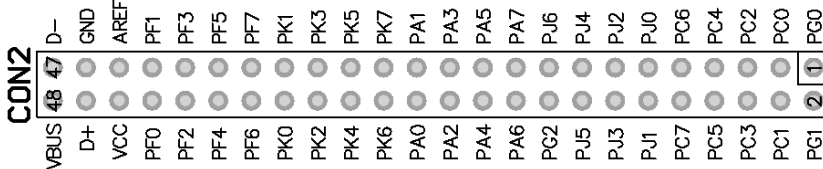
USART3 is connected to an industry standard RS485 transceiver SN75ALS176. By closing all four jumpers J3 to J6, the RS485 transceiver is connected to the MCU and to VCC. If not used, all four jumper should be left open. The RS485 is available with 5V supply only.

## PHYSICAL DIMENSIONS

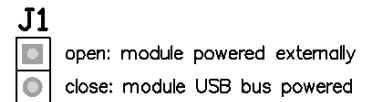
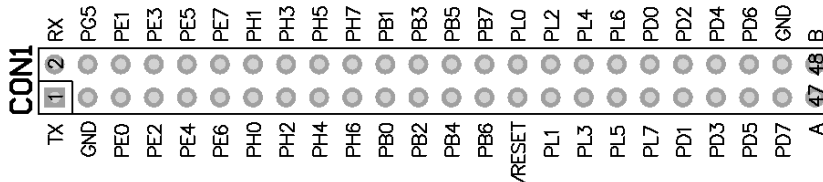
Values are [mm] unless otherwise noted.



## PIN CONFIGURATION



auxiliary screw terminal with RS485 bus signals



## 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
		true RS232	3.0		5.5	V
		with RS485 active	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 vallues.)	Active 8MHz Vcc = 3V		15		mA
		Active 16MHz Vcc = 5V		22		mA
		USB bus active		+26		mA
		RS485 active			+30	mA
T	Operating Temperature (industrial temperature range on request)		-20		+70	°C

## 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.

## 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: [http://www.atmel.com/dyn/products/tools\\_card.asp?tool\\_id=2725](http://www.atmel.com/dyn/products/tools_card.asp?tool_id=2725)
- WinAVR compiler toolset: <http://winavr.sourceforge.net/>

## WHAT ELSE DO YOU NEED?

- An ISP adapter for in-system programming of the ATmega2560, see <http://shop.chip45.com/AVR-ATmega-Xmega-Development-Tools> for suitable devices.
- A USB (A ↔ mini-B 5pin) cable for PC USB connection (see <http://shop.chip45.com/Cable-Adapter-Hubs-Switches>)
- The USB driver for the CP2102 USB UART converter (see <http://shop.chip45.com/Downloads/en> download page)
- A development environment and compiler/assembler (see above DEVELOPMENT TOOLS)

## Declaration of Electro Magnetic Conformity of the CHIP45 „Crumb2560 V1.1“



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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CHIP45 products lacking protective enclosures are subject to damage by ESD and, hence, may only be unpacked, handled or operated in environments in which sufficient precautionary measures have been taken in respect to ESD-dangers. It is also necessary that only appropriately trained personnel (such as electricians, technicians and engineers) handle and/or operate these products. Moreover, CHIP45 products should not be operated without protection circuitry if connections to the product's pin header rows are longer than 3m.

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Implementation of CHIP45 products into target devices, as well as user modifications and extensions of CHIP45 products, is subject to renewed establishment of conformity to, and certification of, Electro Magnetic Directives. Users should ensure conformance following any modifications to the products as well as implementation of the products into target systems

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