

Features

- Industrial standard 24V dc power supply
- DIN-rail enclosure available
- Only 1W CPU power
- Atmel ARM9 (AT91SAM2960) based processor
- 256 MB flash memory
- 64 MB ram memory
- Realtime clock
- Linux operating system 2.6.xx
- EXT_x/JFFS2 filesystem
- Linux drivers for all interfaces
- Apache Web development tools
- MODBUS/TCP drivers included
- 10/100MB ethernet controller
- USB2.0 host interface
- uSD memorycard interface
- 2xUART interface
- SPI interface
- TWI (I²C) interface
- Debug connector with serial and USBdevice connections
- Status leds
- Bootable from FLASH, USB or uSD

Applications

- Ethernet data acquisition applications
- Building and home automation
- GPRS or SMS remote control applications
- Temperature or humidity telemetry bridge
- MAP stack controller for various automation solutions using other MAP interface modules. See section “Related products”

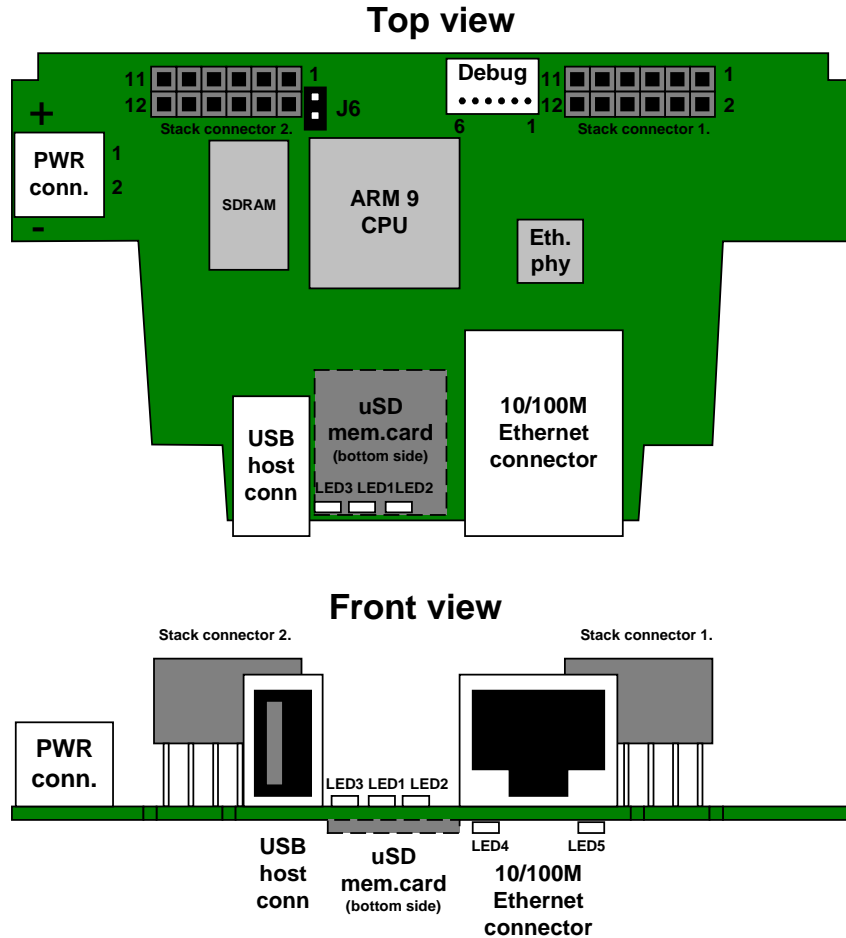
Description

The Map-CPU9 provides 100MIPS of computing power at 1W power consumption fitting in standard DIN-rail enclosure. Included software suite features open Linux development tools, Apache WEB development tools and also solid IO-drivers written on standard Linux 2.6. kernel. MODBUS drivers are also available for distributed automation applications. General purpose MAP-CPU9 is originally designed for remote data acquisition applications to serve modular industrial IO-units.

MAP-CPU module is normally used with MAP-family peripheral modules like MAP-SER, MAP-LINET, MAP-IO and/or MAP-RIF modules. It is also possible to run the MAP-CPU module without any other module, for example when debugging and evaluating the cpu.

MAP-CPU card locates always at the bottom of the MAP stack due the it's connectors.

(See MAP stack structure on page 5)

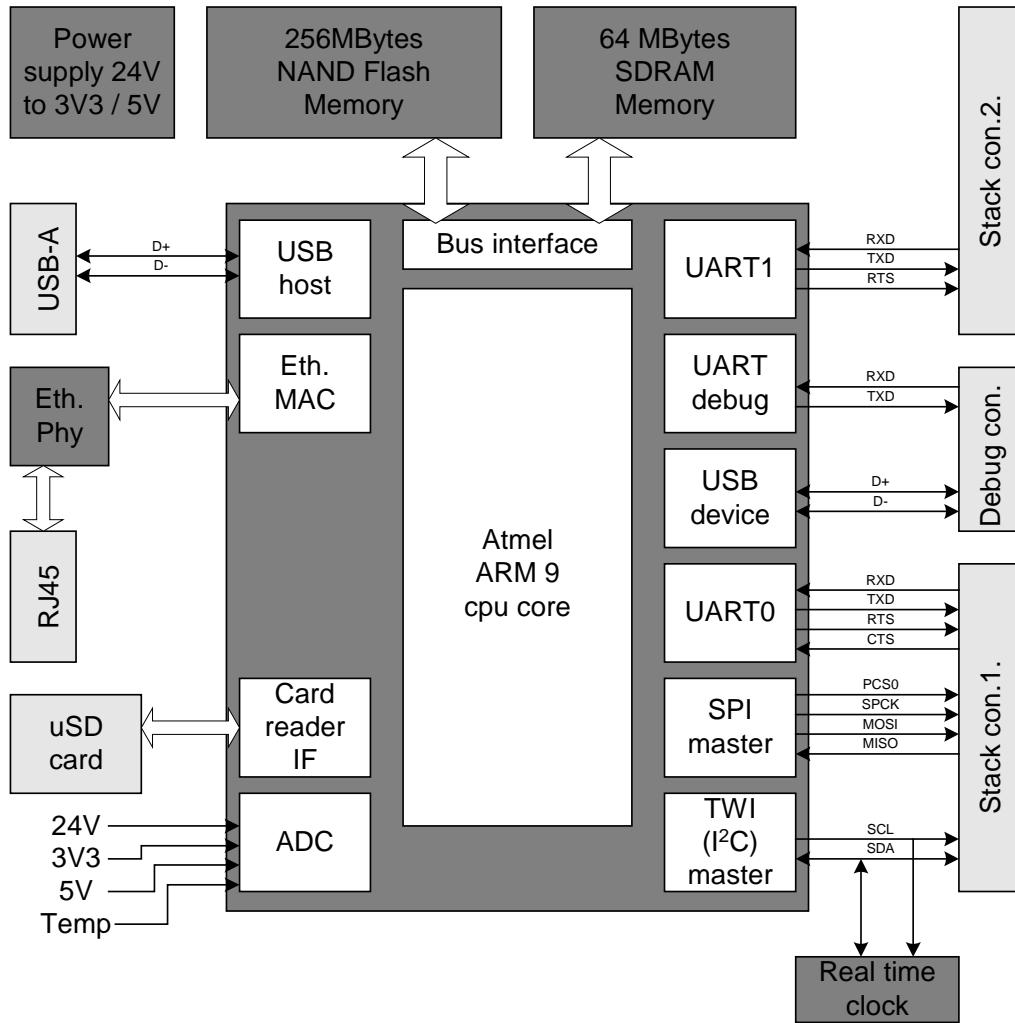


Picture 1. Module connections

General information of IO-signals

All the IO-lines of CPU9 are unbuffered signals, so it is not recommended that these lines are stretched any further than to the other cards in the stack. The maximum number of cards in the stack is limited to 6 cards. However buffering can be easily made on any custom design stack card.

The CPU9 card can supply +3.3V/200mA and +5V/200mA powers to the stack connector. Normally all stack cards should create their own supply voltages from common +24V line on the stack connector but if only small amount of power (max.35mA/card) is required then it can be taken from these signals.



Picture 2. Functional block diagram

Peripheral interfaces

All processor IO-lines connected to the CPU9 connector pins can operate as general purpose IO-pins. In the section “Connectors” you can find processor IO-port addresses of each signal line. From the ATMEL web-pages you can find the processor AT91SAM9260 data sheet.

However this card is designed to take advantage of the special features of each signal. Also the Linux drivers are made to support this.

ETHERNET

The Ethernet interface supports both 100M and 10M communication speeds. The interface supports also signal multiplexing so no “crosscables” are needed. Link (LED4) and Act.(LED5) leds can be found below the RJ45 connector. Linux 2.6.xx operating system fully supports this interface.

USB HOST

This USB host connector is mainly intended to be used as USB-mass storage interface. The driver supports also program booting from this interface. It is also possible to use other USB-devices in this interface and driver sw to many of them can be found readily available from Linux open source groups in the Internet. The connector is standard USB-A connector.

USB DEVICE

This USB device connector is mainly intended to be used as a system programming and debugging interface. With this connection it is also possible to use the CPU9 as a USB-device that can be connected to some USB host. Drivers for such applications may be found readily available from Linux open source groups in the Internet. This connector need some kind of adapter to standard USB -cable.

uSD MEMORY

This uSD connector is a micro SD memory card interface. The driver supports also program booting from this interface.

ADC

The four 10-bit ADC-channels are connected to monitor +3.3V, +5V and +24V power supplies as well as the card temperature. The included Linux driver also supports these functions.

REAL TIME CLOCK

A realtime clock function is also supported. This clock has a super capacitor power backup feature and it can keep the clock running for about 9 hours after the power loss. The included Linux driver also supports this function. This clock is connected to Processors TWI (I²C) interface.

UART0 & UART1

These UART-port can be configured to operate in any standard baud rate. UART0 supports RTS and CTS hand shake signals and UART1 supports RTS hand shake signal. These RTS- signals can

be used to automatically set the direction of possible RS485-buffer if needed. These ports use standard Linux serial port device drivers.

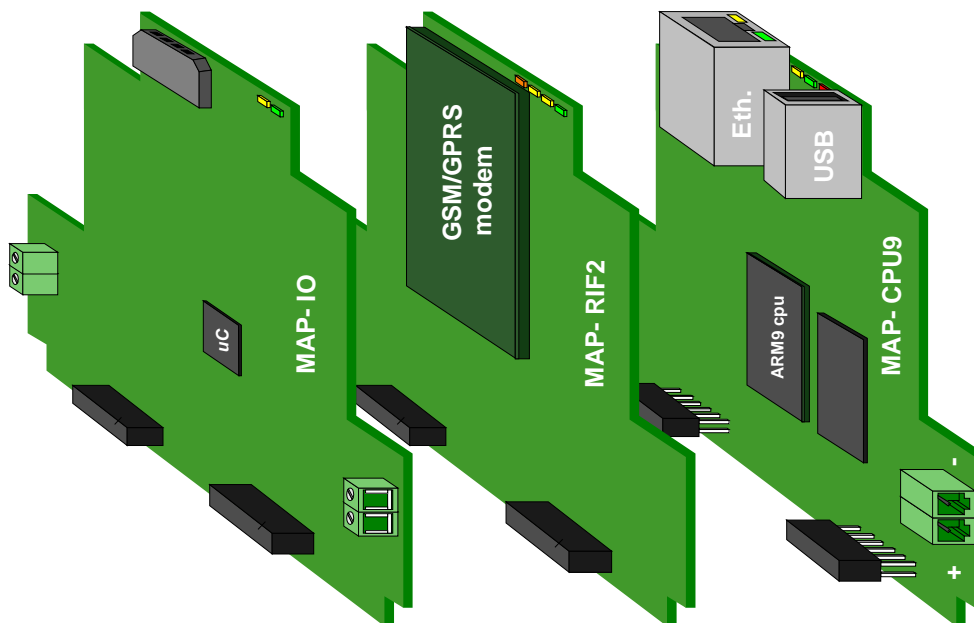
SPI

For the operation of this port, see ATMEL AT91SAM9260 datasheets from www.atmel.com.

TWI

For the operation of this port, see ATMEL AT91SAM9260 datasheets from www.atmel.com.

Stack structure



Picture 3. Example of MAP-stack

MAP- stack cards can be stacked on top of each other to create MAP-controllers with custom defined interfaces. Remember that CPU9 card is allways on the bottom of the stack.

Connectors

CONNECTOR	pin	cpu port	FUNCTION
PWR conn.	1	-	+24Vdc±5% / max.300mA (cpu alone)
PWR conn.	2	-	GND (protective EARTH connection recommended)

Table 1. Power connector pins

CONNECTOR	pin	cpu port	FUNCTION
STACK CON 1	1	PB05	RXD0 or general purpose IO-pin
	2	PB04	TXD0 or general purpose IO-pin
	3	PB27	CTS0 or general purpose IO-pin
	4	PB26	RTS0 or general purpose IO-pin
	5	PC15	IRQ1 or general purpose IO-pin
	6		GND
	7	PB00	MISO or general purpose IO-pin
	8	PB01	MOSI or general purpose IO-pin
	9	PB02	SPCK or general purpose IO-pin
	10	PB03	nPCS0 or general purpose IO-pin
	11	PA23	SDA or general purpose IO-pin
	12	PA24	SCL or general purpose IO-pin
STACK CON 2	1	PC05	EXT1 general purpose IO-pin
	2		nRST HW reset out/in (active low)
	3	PC04	EXT2 general purpose IO-pin
	4		+3V3 out max.200mA
	5		GND
	6		+5V out max. 200mA
	7		GND
	8		+24V in/out
	9		GND
	10	PB07	RXD1 or general purpose IO-pin
	11	PB06	TXD1 or general purpose IO-pin
	12	PB28	RTS1 or general purpose IO-pin

Table 2. Stack connector pins

CONNECTOR	pin	cpu port	FUNCTION
DEBUG CON	1	PB14	RXD debug if
	2	PB15	TXD debug if
	3		GND
	4		DDM USB device/debug
	5		DDP USB device/debug
	6		USB connection detection in

Table 3. Debug connector pins

LEDS	FUNCTION
LD 1 (green)	Running
LD 2 (yellow)	Booting
LD 3 (red)	Error code
LD 4 (green)	Ethernet LINK
LD 5 (yellow)	Ethernet Activity

Table 4. Status leds

Technical specifications

Parameter	Value		Notes
+24V supply	24V	$\pm 5\%$	
I(+24) supply current	300mA	Max.	No cards on stack connector
V _{ih} dig.inputs	2...3,3V		All digital logic inputs
V _{il} dig.inputs	0...1,0V		All digital logic inputs
V _{oh} dig.outputs			
+3.3V external load	200mA	Max.	
+5V external load	200mA	Max.	
Operation temperature	0...+60 °C		
Humidity	Non-condensing environment.		

Other related products:

- MAP-CPU9 debug connector card
- MAP-TDIO01 / io-card (2ch.temp.+ 2ch. DI + 2ch.DO)
- MAP-RIF02 / GPRS or SMS radio modem interface card
- MAP-RSI02 / 16ch. Radio sensor interface card
- MAP-SER serial communication interface card
- MAP-LIN Linet interface card
- DIN-rail enclosure (52mm wide)