

M-501 Industrial ARM9 Linux-based System-on-Module



- ▶ 32 x GPIOs, CMOS/3.3V compatible
- ▶ Compact size, 50 x 80mm only
- ▶ Ultra low power consumption of less than 2.5W
- ▶ GNU C/C++ tool chain is included

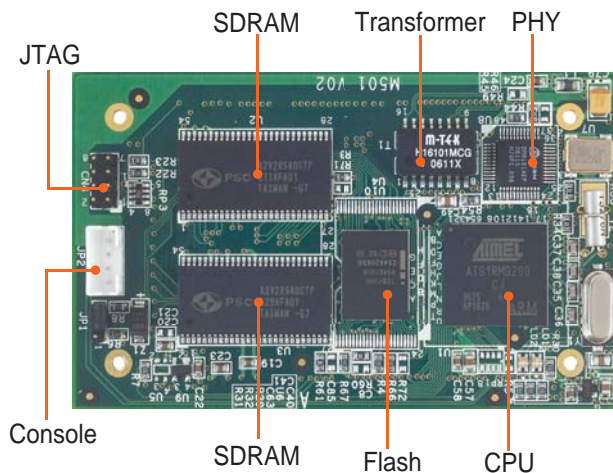
- ▶ ATMEL 180MHz AT91RM9200 CPU w/ MMU
- ▶ Linux kernel 2.6.14 with file system
- ▶ 64MB SDRAM/16MB NOR Flash
- ▶ 1 x 10/100Mbps Ethernet
- ▶ On-board Ethernet PHY/transformer
- ▶ 2 x USB 2.0 Hosts supporting full speed of 12Mbps
- ▶ 1 x SD (secure digital) interface
- ▶ 4 x 921.6Kbps UARTs w/ hardware flow control
- ▶ I2C Interface
- ▶ I2S Interface, one transmitter and one receiver
- ▶ SPI w/ 2 x chip select signals
- ▶ External local bus (A0-A7, D0-D7, RD, WR), with 4x chip select signals



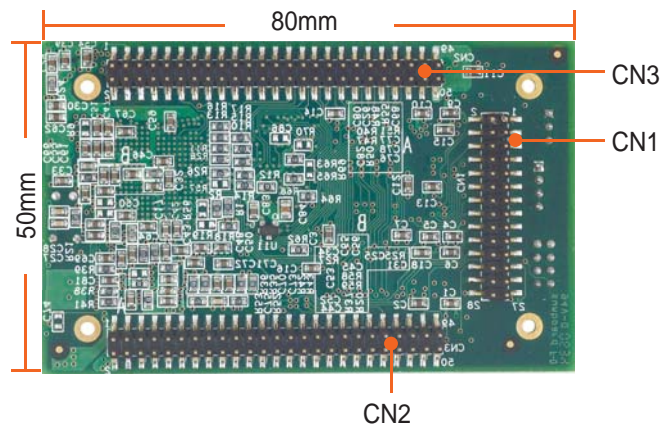
Overview

M-501 is a credit card size ARM9 Linux-based System on Module (SoM). M-501 is powered by 180MHZ AT91RM9200 ARM Thumb Processor with memory management unit, and equipped with 64MB SDRAM, and 16MB NOR Flash. M-501 is also pre-installed with Linux 2.6.14 OS, busybox utility collection, wget, and various hardware device drivers. M-501 comes with one 10/100Mbps Ethernet, two USB 2.0 hosts, four UARTs with hardware flow control, and 32 programmable digital I/Os. In addition, Secure Data Card (SD) interface, Serial Peripheral Interface (SPI), Inter-IC(I2C) bus, Inter-IC Sound (I2S) bus, and external local bus are included. M-501 is a reliable SoM to be used in various embedded systems. It is ideal for all kinds of industrial applications, including intelligent transportation system (ITS), building automation, energy-saving system, and scenario control systems.

Front View of M-501



Back View of M-501



Hardware Specifications

CPU/Memory

CPU: ATMEL 180MHz AT91RM9200 w/ MMU
SDRAM: 64MB
NOR Flash: 16MB

Network Interface

Type: Ethernet, 10/100Mbps
PHY: DAVIDCOM DM9161
Protection: 1.5KV magnetic isolation

UART

Port 0: TXD0, RXD0, RTS0, CTS0, GND
Port 1: TXD1, RXD1, RTS1, CTS1, DCD1, DTR1, DSR1, GND
Port 2: TXD2, RXD2, RTS2, CTS2, GND
Port 3: TXD3, RXD3, RTS3, CTS3, GND
Signal Level: CMOS/3.3V compatible

Common UART Parameters

Baud Rate: up to 921.6Kbps
Parity: None, Even, Odd, Mark, Space
Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Flow Control: RTS/CTS, XON/XOFF, None

UART Advanced Feature (when used as RS-485)

Supports 9-bit Multi-drop mode
Supports hardware auto direction control

USB Ports

Hosts: Two, USB 2.0 compliant
Host Signals: UdataA+, UdataA-, UdataB+, UdataB-

I2C (Inter-IC Bus)

Signals: TWD, TWCK
Supported Devices: (driver has been built-in)

I2S (Inter-IC Sound)

Transmitter Signals: TSCK, TWS, TSD
Receiver Signals: RSCK, RWS, RSD

SPI (Serial Peripheral Interface)

Signals: MISO, MOSI, SPCK, CS1, CS2

SD (Secure Digital Card Interface)

Signals: MCCDA, MCCK, MCDA0-MCDA3
Compatible with SD memory card Specification 1.0

Watchdog Timer

CPU built-in internal watchdog timer, used by Linux kernel

General-Purpose IOs (GPIO)

32 x GPIOs can be programmed as digital input or output
Supports interrupt function when GPIOs are set as digital input
Signal Level: CMOS/3.3V compatible

Pre-defined Pins

Reset Button (CN2, pin#35), input
Buzzer (CN2, pin#37), output
2-pin DIP SW (CN2, pin#12,#13), input
System ready LED (CN2, pin#38), output
LAN activity LED (CN3, pin#11), output

Undefined Digital IO Pins (reserved)

CN1: pin#23, #24, #25, #26
CN3: pin#23, #24

Debug Ports

JTAG Port: for low level debug
Console Port: Tx/Rx serial console (share RTS3, CTS3)

Local Bus

Data Bus: 8-bit (D0-D7)
Address Bus: 8-bit (A0-A7)
Chip Select: x 4 (CS3,CS4,CS5,CS6)
Control Bus: RD, WR
Signal Level: CMOS/3.3V Compatible

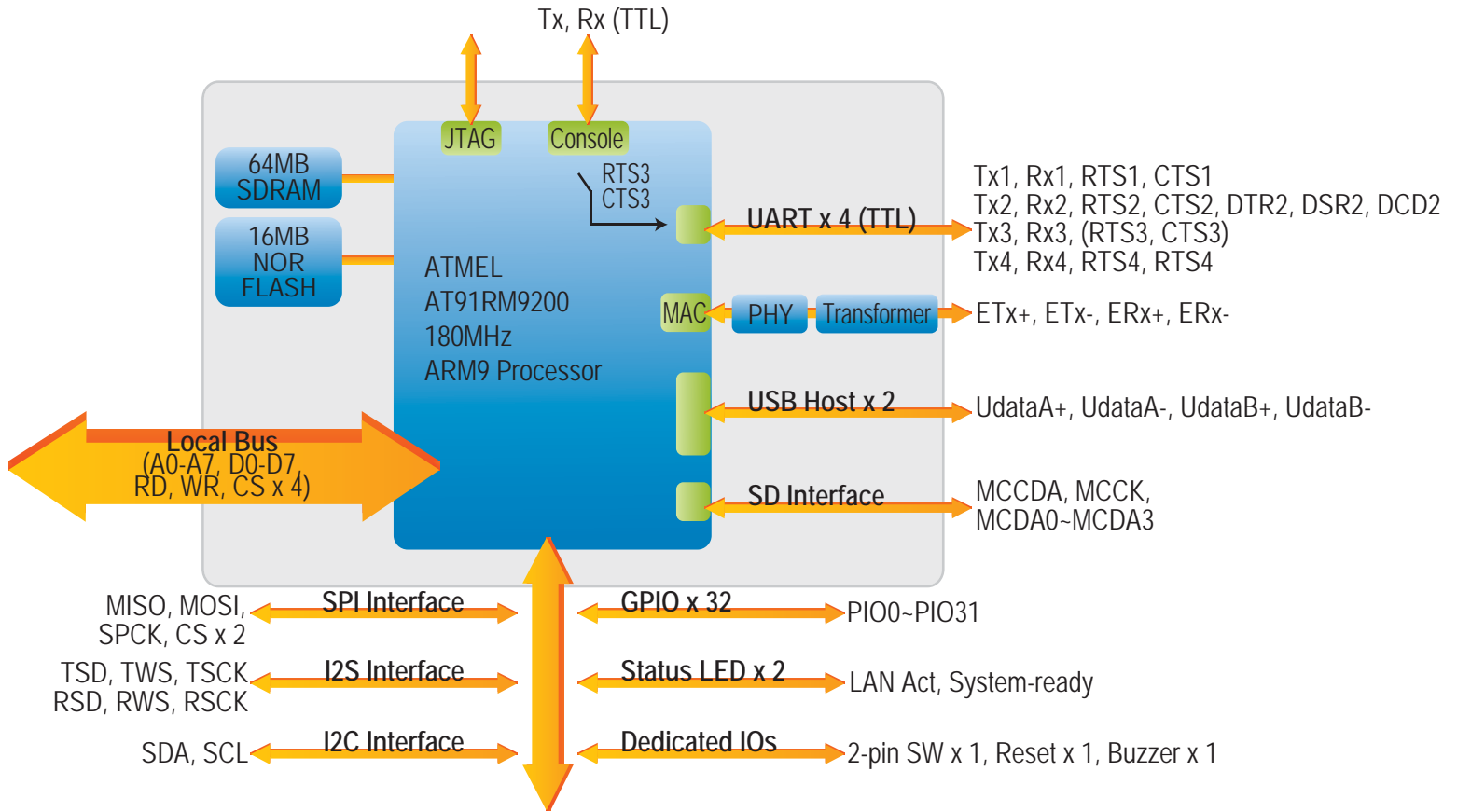
Power Consumption

Input range: 3.0 to 3.6VDC (3.3V nominal)
Consumption: 2W

Power Consumption

Board Dimension: 50 x 80mm
2.0mm pitch Connectors
CN1: 28 pins; CN2: 50 pins; CN3: 50 pins
Mounting Holes: x 4, 2.0mm (M2) in diameter

Block Diagram



Software Specifications

General

OS: Linux, Kernel 2.6.14
 Boot Loader: U-Boot 1.1.2
 File Systems: JFFS2, ETX2, VFAT/FAT, NFS

Pre-installed Utilities

bash, busybox, wget, boa, iptable, ppp, ssh, wireless_tools, Artila utility

Daemons Started by Default

ssh (secured shell)
 syslog/klogd (system and kernel log)
 telnet server (disable root with/etc/security)
 ftp server (vsftpd)
 Web server (lighttpd)
 amgrd (Artila broadcast search daemon)

Tool Chain for Linux

GCC: C/C++ PC cross compiler
 GLIBC: POSIX Library

Standard Device Drivers

SD/MMC, UART, Ethernet, GPIO, Buzzer
 Real Time Clock: supports Ricoh RS5C372
 EEPROM: supports ATMEL AT24C16 and its compatibles

Pre-load USB Host Drivers (customizable)

Flash thumb disk
 IEEE-802.11b/g WiFi adapter (Ralink rt73usb)
 10/100Mbps Fast Ethernet adapter (RT8150)
 RS-232 adapter (prolific PL-2303)
 ADSL modem
 ISDN modem (CDC/ACM compatible)

