

M-501

Linux-ready ATMEL AT91RM9200 System-on-Module

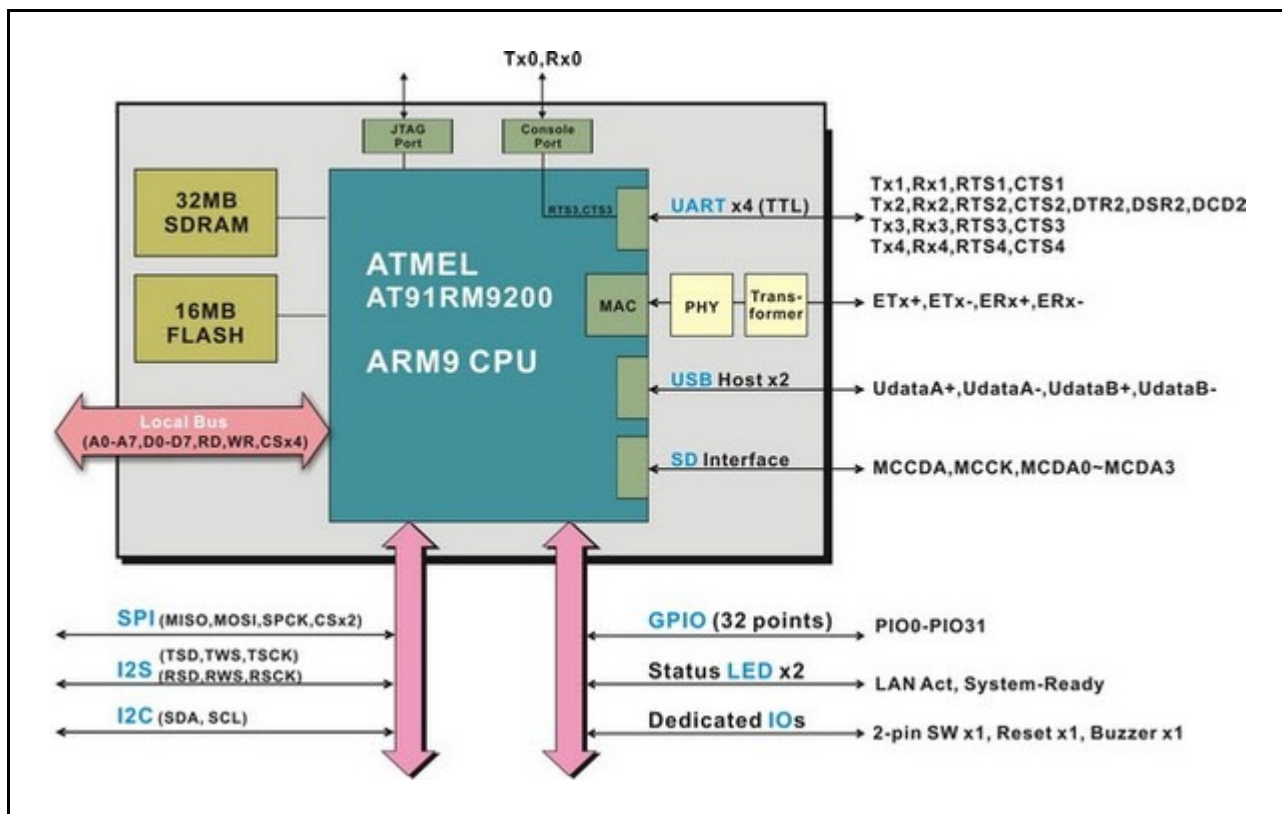


- ✓ ATMEL AT91RM9200 CPU, 200MIPS @180MHz, with MMU.
- ✓ 32MB SDRAM, 16MB NOR FLASH memory
- ✓ One 10/100 Mbps Ethernet interface with on-board PHY and transformer
- ✓ Two USB 2.0 Host ports, supports full speed (12 Mbps)
- ✓ One SD (secure digital) interface, supports SD mode.
- ✓ Four 921.6kbps UARTs supports hardware flow control
- ✓ I2C (Inter-IC) bus
- ✓ I2S (Inter-IC Sound) bus, one transmitter and one receiver
- ✓ SPI (Serial Peripheral Interface) with 2x chip select signals
- ✓ 32x general-purpose IOs (GPIO), CMOS/3.3V compatible
- ✓ External local bus (A0-A7, D0-D7), with 4x chip select signals
- ✓ Small footprint, 80x50mm only
- ✓ Ultra low power consumption, less than 2.5W
- ✓ Linux 2.6.x OS is pre-built in the FLASH, supports file system
- ✓ GNU C/C++ tool chain is included

Introduction

The M-501 is a credit card size ARM9-based SoM (System-on-Module). It includes an AT91RM9200 ARM9 CPU, 32MB SDRAM and 16MB Flash. The operation system, Linux kernel 2.6.x with file system support, is pre-built in the M-501.

M-501 Hardware Block Diagram



H/W Specifications

CPU/Memory

- ▷ CPU: ATMEL AT91RM9200, with MMU
- ▷ Clock: 180MHz
- ▷ SDRAM: 32MB (16MB user space)
- ▷ Flash: 16MB (12MB user space)

Network

- ▷ Type: Ethernet, 10/100 Mbps
- ▷ PHY: DAVCOM DM9161
- ▷ Isolation: 1.5 KV

USB

- ▷ Host: x2, USB 2.0 compliant
- ▷ Signals: UdataA+, UdataA-, UdataB+, UdataB-

UART

- ▷ Port0: TXD0, RXD0, RTS0, CTS0, GND
- ▷ Port1: TXD1, RXD1, RTS1, CTS1, DCD1, DTR1, DSR1, GND
- ▷ Port2: TXD2, RXD2, RTS2, CTS2, GND
- ▷ Port3: TXD3, RXD3, RTS3, CTS3, GND
- ▷ Signal Level: CMOS/3.3V compatible

Common UART Parameters

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

UART Port 0 advanced feature, (when Port0 used as RS-485)

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

I2C (Inter-IC Bus)

- ▷ Signals: TWD, TWCK
- ▷ Supported devices: (driver has been built-in)
Real-time Clock: Ricoh RS5C372
EEPROM: ATMEL AT24C16 and compatibles

I2S (Inter-IC Sound)

- ▷ Signals:
- ▷ Transmitter: TSCK, TWS, TSD
- ▷ Receiver: 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 GPIOs, can be programmed as digital input or output
- ▷ Support interrupt function when GPIO 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 RTS2, CTS2)

Local Bus

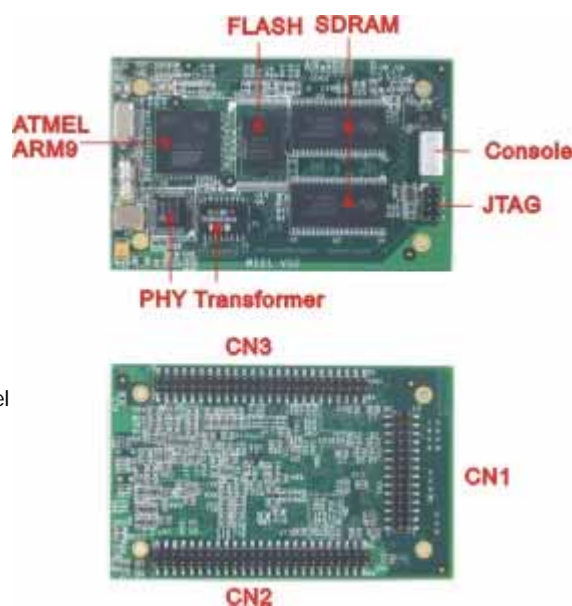
- ▷ Data bus: 8-bit (D0~D7)
- ▷ Address bus: 8-bit (A0~A7)
- ▷ Chip select: x4 (NCS3~NCS6)
- ▷ Control bus: RD, WR
- ▷ Signal Level: CMOS/3.3V Compatible

Power Consumption

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

Mechanism

- ▷ Board dimension: 50 x80mm
- ▷ Connectors (2.0mm pitch)
- ▷ CN1: 28 pins; CN2: 50 pins; CN3: 50 pins
- ▷ Mounting holes: x4, 2.0mm(M2) diameter



S/W Specifications

Operation System

- ▶ Linux kernel 2.6.X

File System

- ▶ Supports JFFS2, EXT2/EXT3, VFAT/FAT, NFS

Protocol Stacks

- ▶ support IPV4, ICMP, ARP, DHCP, NTP, TCP, UDP, FTP, Telnet, HTTP, PPP, PPPoE, CHAP, PAP, SMTP, SNMP V1/V3,SSL, SSH 1/2

Pre-load Utilities

- ▶ Bash: Shell Command
- ▶ Telnet: Telnet client program
- ▶ Busybox: Linux utility collection
- ▶ FTP: FTP client program

Pre-load Daemons

- ▶ pppd: Dial In/out over serial port and PPPoE
- ▶ snmpd: SNMP agent program
- ▶ telnetd: Telnet server program
- ▶ inetd: TCP server program
- ▶ ftpd: FTP server program
- ▶ boa: Web server program
- ▶ sshd: secured shell server
- ▶ iptables: Firewall service manager
- ▶ armd: Artila manager daemon

Tool Chain for Linux/Windows

- ▶ GCC: C/C++ PC cross compiler
- ▶ GLIBC: POSIX Library
- ▶ To use the tool chain for Windows, users have to install Cygwin first, and Invoke the cross-compiler in the Cygwin console. Cygwin package 1.5.19-x is already included in the CD.

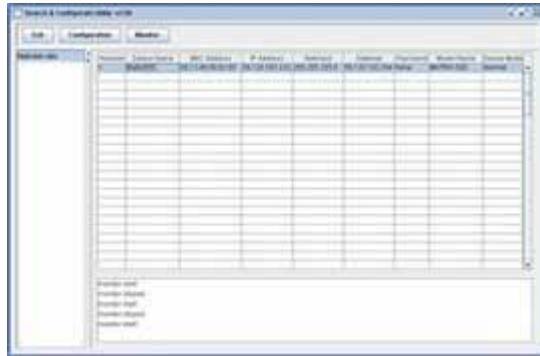
Standard Device Drivers

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

Pre-load USB Host Drivers (could be customized)

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

Screenshots



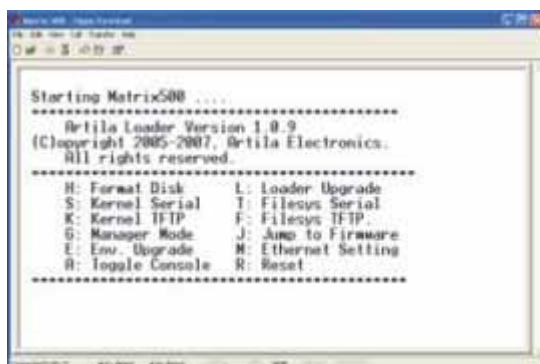
Search utility to find all the M-501 on the network



M-501 login screen (telnet)



Cross compile user applications in Cygwin Console



Serial Console for advanced debug and maintenance

