H/W Specifications

CPU / Memory
- CPU: ATMEL 400MHz AT91SAM9G45 CPU w/ MMU
- Memory: 128MB DDR2 SDRAM, 256MB NAND Flash
- DataFlash: 2MB, for system backup

Network Interface
- Type: 1 x 10/100Mbps Ethernet
- Signals: ETX-, ETX+, RST+, RST-
- PHY: DAI/VCOM CM9161, on-board
- Protection: 1.5KV magnetic isolation

UART
- UART 1: TX, RX, RTS, CTS, DCD, DTR, DSR, GND
- UART 2: TX, RX, RTS, CTS, GND
- UART 3: TX, RX, RTS, CTS, GND
- UART 4: TX, RX, RTS, CTS, GND
- Signal Level: CMOS / 3.3V compatible

Common UART Parameters
- Baud Rate: Up to 96Kbps
- 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

USB Ports
- Speed: Supports 480Mbps high-speed mode
- Host Port: 1, USB 2.0 compliant
- Host Signals: USB+, USB-, USB-B, Device (Client): 1, USB 2.0 compliant
- Device (Client) Signals: Uddata+, Uddata-, Uddata

I2C (Inter-IC Bus)
- Signals: TWI+, TWI-, TWI-Clock
- Supported Devices: EEPROM, Real Time Clock

I2S (Inter-IC Sound)
- Transmitter Signals: TSCK, TWS, TSD
- Receiver Signals: NSCK, RWS, RSD

SPI (Serial Peripheral Interface)
- Data Signals: MOSI, MISO, SPICK
- Chip Selects: CS1, CS2

SD (Secure Digital Card Interface)
- Data Signals: MCD2A, MCD2B, MCD2C-MCD2D
- Aux. Signals: CD (Card Detection), WP (Write Protect)
- Compatibility: SD memory card specification 2.0
- Storage Capacity: Up to 32GB

S/W Specifications

General
- OS: Linux, kernel 2.6.38
- Boot Loader: U-Boot

File Systems
- UBL, JFFS2, ETX1, VFAT / FAT, NFS, NTFS

Pre-installed Utilities
- bash, busybox, gtk+, x11, gpe, alsa, madplay, pcpp, sysunit, wget, ip, procps for (webmin)
- psmd, lighttpd, vsftpd, j$(t)ables, ppe, openhab, wireless, tools, ufi-linux-mount / umount, usbutils, python, javm, python, mysql, perl, qt4-embedded, sqlite3, amra, Artila utility and more

Daemons Started by Default
- ssh (secured shell with sshfs)
- syslog / klogd / kernel log
- Iptables
- Pyramid server (ssl/tls)
- web server (lighttpd)
- amr (Artila broadcast search daemon)

Toolchain for Linux
- GCC: C / C++ PC cross compiler
- GLIBC: POSIX Library
- GLIBC: GNU C / C++ Library
- GLIBC: GPE and QT4-Embedded
- GLIBC: GLIBC
- GCC: C / C++ PC cross compiler
- GLIBC: POSIX Library
- GLIBC: GNU C / C++ Library
- GLIBC: GPE and QT4-Embedded
- GLIBC: GLIBC

Pre-installed Utilities
- amgrd (Artila broadcast search daemon)
- web server (lighttpd)
- python, jamvm, php, mysql, perl, qt4-embedded, sqlite3, amra, Artila utility and more

File Systems
- UBI, JFFS2, ETX2 / ETX3, VFAT / FAT, NFS, NTFS

IPKG Package Management
- Supports ipkg to manage the package installation, upgrade and removal

Webmin System Administration
- Supports webmin for web-based system administration

Standard Device Drivers
- LCD, Real Time Clock, SD / MMC, UART, Ethernet, GPIO, Buzzer, EEPROM (ATMEL AT24C16 and compatibles), Audio output

Pre-load USB Device Drivers (Could Be Customized)
- Generic Flash drive
- IEEE-802.1ib/b/g WiFi adapter
- 10/100Mbps Fast Ethernet adapter (RT8150)
- RS-232 adapter (Prolific PL-2303)
- Webcam
- Keyboard / Mouse
- 3G modem
- SSDP modem (MPD / ACM compatible)
- Bluetooth

Ordering Information
- M-9G45A
  - AT91SAM4G5 + Linux 2.6.38 System on Module with 256MB NAND Flash, 128MB DDR2 SDRAM

- M-9G45A Starter Kit
  - Includes one M-9G45A SoM and one carrier board with power circuitry, 1 x RS-485 port, 3 x RS-232 ports, 1 x Ethernet port, 4 x USB hosts, 1 x USB client, 1 x microSD socket, Real Time Clock, EEPROM, and local bus connector

Features
- ATMEL 400MHz AT91SAM9G45 CPU w/ MMU
- Linux kernel 2.6.38 with file system
- 128MB DDR2 SDRAM and 256MB NAND Flash
- GNU C / C++ toolchain is included
- Compact size, 50 x 80mm only
- Ultra-low power consumption, less than 2.5 Watts
- 24-bit TTL LCD interface with dimming control, supports TFT panel up to 1280 x 800 pixels
- Supports 4-wire touchscreen
- 1 x 10/100Mbps Ethernet interface, with PHY and transformer on board

Watchdog Timer
- CPU built-in watchdog timer, used by Linux kernel
- Additional watchdog timer is available for users’ applications

GPIO (General-purpose I/Os)
- No. of Pins: 15, GPIO-J014
- Signal Level: CMOS / 3.3V compatible

AC97 Interface
- Signals: RDA, TX, FS, CK
- Note: signals are shared with GPIOs P1011-1-6

Pre-defined I/O Pins
- Reset Button (CN1, pin#11), input
- System Reset (CN1, pin#13), input / output
- Buzzer (CN1, pin#22), output
- LAN Activity LED (CN1, pin#3), output
- System Ready LED (CN1, pin#1), output
- Buzzer (CN1, pin#22), output
- System Reset (CN1, pin#13), input / output
- Reset Button (CN1, pin#11), input
- Buzzer (CN1, pin#22), output
- System Ready LED (CN1, pin#1), output
- LAN Activity LED (CN1, pin#3), output

Real Time Clock
- Chip: ST M41T81
- Backup Battery: Lithium, 45mAh, on-board
- External Battery Input: on CN1 pin5

Debug Ports
- Type: RS-232 serial console
- Signals: TX, Rx, GND

LCD Interface (TTL)
- Resolution: Up to 1280 x 800 TFT
- RGB Signals (24-bit): Red x 8, Green x 8, Blue x 8
- Control Signals: Dot Clock, Data Enable, H.sync, V.sync, Dimming (contrast), Backlight

Touchscreen Interface
- Type: Support 4-wire touchscreen
- Signals: Top, Bottom, Left, Right

Power Consumption
- Input Range: 3~3.6VDC (3.3V nominal)
- Current: 150mA
- Voltage: 12VDC
- Board Dimensions (W x H): 80 x 50mm
- Pins: Total 128 pins, 2.0mm pitch
- CN1: 28 pins, CN2-50 pins, CN3: 50 pins
- Mounting Holes: x2, 2.0mm (M2) in diameter

Security
- Protection: 1.5KV magnetic isolation
- PHY: DAI/VCOM CM9161, on-board
- Protection: 1.5KV magnetic isolation

M-9G45A Linux-ready ARM9 System on Module
## H/W Specifications

**CPU / Memory**
- CPU: ATMEG 400MHz AT91SAM9G45 CPU w/ MMU
- Memory: 128MB DDR2 SDRAM, 256MB NAND Flash
- DataFlash: 2MB, for system backup

**Network Interface**
- Type: 1 x 10/100Mbps Ethernet
- Ports: 4 x TX, 4 x RX, 4 x RTS, 4 x CTS, 4 x GND
- **Data Signals**: MCCDA, MCCK, MCDA0~MCDA3
- **Aux. Signals**: CD (Card Detection), WP (Write Protect)
- **Data Signals**: MISO, MOSI, SPCK
- **Receiver Signals**: RSCK, RWS, RSD
- **Transmitter Signals**: TSCK, TWS, TSD

**I2S (Inter-IC Sound)**
- **Supported Devices**: EEPROM, Real Time Clock
- **Signals**: TWD, TWCK

**I2C (Inter-IC Bus)**
- **Device (Client) Signals**: Uddata+, Uddata-, Udio
- **Host Signals**: USBA+, USBA-
- **Host Port**: 1, USB 2.0 compliant
- **Speed**: Supports 480Mbps high-speed mode

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

**Common UART Parameters**
- **Signals**: Top, Bottom, Left, Right
- **Resolution**: Up to 1280 x 860 TFT

**UART**
- **No. of Pins**: 15, PIO0~PIO14
- **Signal Level**: CMOS, 3.3V compatible

**AC97 Interface**
- **Signals**: RX, TX, FS, CK
- **Type**: RS-232 serial console
- **Chip**: ST M41T81

**Real Time Clock**
- **Chip**: ST M41T81
- **Backup Battery**: Lithium, 48mAh, on-board
- **External Battery Input**: on CNT1 pin45

**Debug Ports**
- **Signals**: TX, Rx, GND
- **Control Signals**: Dot Clock, Data Enable, H.sync, V.sync, Dimming [contrast], Backlight

**Touchscreen Interface**
- **Type**: Support 4-wire touchscreen
- **Power Consumption**: Input Range: 3.3-5.0VDC (3.3V nominal)
- **Consumption**: 2 Watts typ.

**General**
- **Board Dimensions** (W x H): 80 x 50mm
- **Power**: Total 128 pins, 2.0mm pitch
- **Mounting Holes**: x 2, 2.0mm (M2) in diameter

## S/W Specifications

### General
- OS: Linux, kernel 2.6.38
- Boot Loader: U-Boot

### File Systems
- **USB, JFFS2, ETX2 / ETX3, VFAT / FAT, NFS, NTFS

### Pre-installed Utilities
- **Daemons Started by Default**:
  - ssh (secured shell with sftp)
  - syslog / klogin (system and kernel log)
  - lanet server (disable root permission in /etc/securetty)
  - Tp server (sftp)
  - web server (lighttpd)
  - amgd (Artila broadcast search daemon)

### Toolchain for Linux
- GCC: C / C++ cross compiler
- GLIBC: POSIX Library
- GUI: GTK+, X window (X11), GPE and QT4-Embedded
- GLIBC: POSIX Library
- GLIBC: C / C++ cross compiler

### Pre-installed Utilities
- **Open Source Applications**
  - amgrd (Artila broadcast search daemon)
  - ftp server (vsftpd)
  - telnet server (disable root permission in /etc/securetty)
  - syslog / klogd (system and kernel log)
  - ssh (secured shell) with sftp
  - python, jamvm, php, mysql, perl, qtp-embedded, sqlite3, smplib, Artila utility and more

### IPKG Package Management
- **IPKG Package Management**
  - Supports ipkg to manage the package installation, upgrade and removal

### Webmin System Administration
- **Webmin**
  - Supports webmin for web-based system administration

### Standard Device Drivers
- **LINUX Subsystem**
  - LCD, Real Time Clock, SD / MMC, UART, Ethernet, GPIO, Buzzer, EEPROM, Flash, 128MB DDR2 SDRAM
  - U-Boot, AT91SAM9G45 System on Module with 256MB NAND Flash, 128MB DDR2 SDRAM

### Ordering Information
- **M-9G45A Starter Kit**
  - Includes one M-9G45A SoM and one carrier board with power circuitry, 1 x RS-485 port, 3 x RS-232 ports, 1 x Ethernet port, 4 x USB hosts, 1 x USB client, 1 x microSD socket, Real Time Clock, EEPROM, and local bus connector