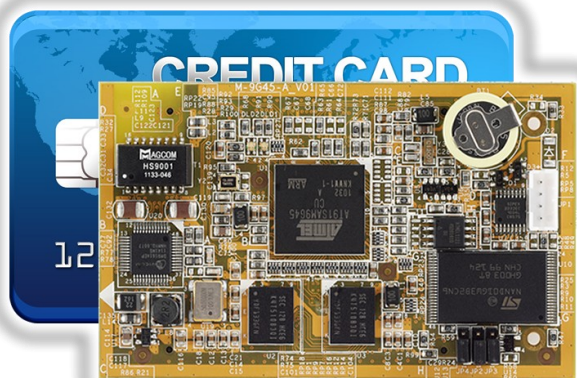


# M-9G45-A

Linux-ready, 400MHz ARM9 SoM (System-on-Module) with 24-bit TTL LCD interface, 1x Ethernet, 4x UART, 1x 480Mbps high-speed USB host, RTC and Battery

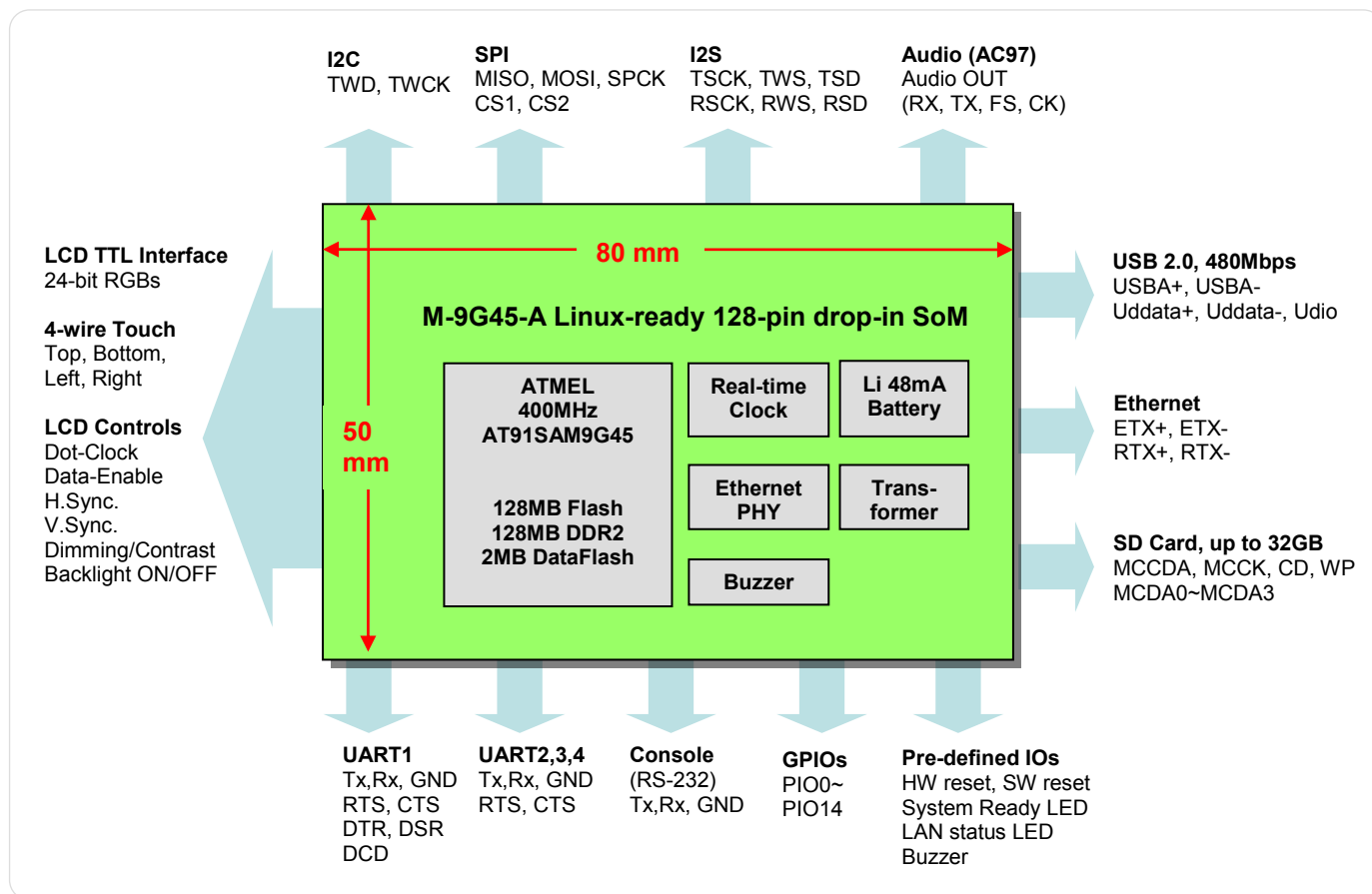


- ✓ ATMEL 400MHz AT91SAM9G45 CPU w/ MMU
- ✓ Linux kernel 2.6.38 with file system
- ✓ 128MB DDR2 DRAM, 128MB NAND Flash
- ✓ Free GNU C/C++ tool chain is included
- ✓ Compact size, 50 x 80mm only
- ✓ Ultra low power consumption, less than 2.5W

- ✓ 24-bit TTL LCD interface with dimming control, supports TFT panel up to 1280x860 pixels
- ✓ Supports 4-wire touchscreen
- ✓ 1x 10/100Mbps Ethernet interface, with PHY and transformer on board
- ✓ 4 x 921.6Kbps UARTs w/ hardware flow control
- ✓ 1x 480Mbps high-speed USB 2.0 host
- ✓ 1x Real-time clock with on-board backup battery, also supports external backup battery
- ✓ 1x SD (secure digital) interface
- ✓ 1x I2C interface
- ✓ 1x I2S interface, 1x transmitter and 1x receiver
- ✓ 1x SPI interface with two chip selects
- ✓ 15 x GPIOs, CMOS/3.3V compatible
- ✓ 1x audio out interface
- ✓ Supports AC97 interface (signals are shared with GPIOs )



## M-9G45-A Functional Block Diagram



## Hardware Specifications

### CPU/Memory

**CPU:** ATMEL 400MHz AT91SAM9G45 w/MMU  
**DDR2:** 128MB  
**NAND Flash:** 128MB  
**DataFlash®:** 2MB, for system backup

### Network Interface

**Type:** Ethernet, 10/100Mbps  
**Signals:** ETX+, ETX-, ERX+, ERX-  
**PHY:** DAVICOM DM9161, on-board  
**Protection:** 1.5KV magnetic isolation

### UART

**UART1:** TX, RX, RTS, CTS, DCD, DTR, DSR, GND  
**UART2:** TX, RX, RTS, CTS, GND  
**UART3:** TX, RX, RTS, CTS, GND  
**UART4:** TX, RX, RTS, CTS, 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 bit:** 1, 1.5, 2  
**Flow control:** RTS/CTS, XON/XOFF, None

### USB 2.0 High Speed Interface

**Speed:** supports 480Mbps high-speed mode  
**Host:** one, USB 2.0 compliant  
**Host signals:** USBA+, USBA-  
**Device (client):** one, USB 2.0 compliant  
**Device (client) signals:** Uddata+, Uddata-, Udio

### I2C (Inter-IC Bus)

**Signals:** TWD, TWCK  
**Supported devices:** EEPROM, Real Time Clock

### I2S (Inter-IC Sound)

**Transmitter signals:** TSCK, TWS, TSD  
**Receiver signals:** RSCK, RWS, RSD

### SPI (Serial Peripheral Interface)

**Data signals:** MISO, MOSI, SPCK  
**Chip selects:** CS1, CS2

### SD (Secure Digital Card Interface)

**Data signals:** MCCDA, MCCK, MCDA0~MCDA3  
**Aux. signals:** CD(Card Detection), WP(Write Protect)  
**Compatibility:** SD memory card specification 1.0  
**Storage capacity:** 32GB max.

### Watchdog Timer

CPU built-in watchdog timer, used by Linux kernel  
 Additional watchdog timer is available for user applications

### GPIO (General-Purpose IOs)

**No. of pins:** 15x, PIO0~PIO14  
**Signal level:** CMOS/3.3V compatible

### AC97 Interface

**Signals:** RX, TX, FS, CK  
 Note: signals are shared with GPIO PIO11~14

### Pre-defined IO Pins

**Reset Button:** (CN1, pin#11), input  
**System Reset:** (CN1, pin#13), input/output  
**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, 48mAh, on-board  
**External Battery Input:** on CN1 pin#5

### Debug Ports

**Type:** RS-232 serial console  
**Signals:** Tx, Rx, GND

### LCD Interface (TTL)

**Resolution:** upto 1280x860 TFT  
**RGB Signals (24-bit):** red x8, green x8, blue x8  
**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:** 3.0 to 3.6VDC (3.3V nominal)  
**Consumption:** 2Watts typ.

### Mechanics

**Board Dimension:** 50mm x 80mm  
**Pins:** total 128 pins, 2.0mm pitch  
           CN1: 28 pins; CN2: 50 pins; CN3: 50 pins  
**Mounting Holes:** x2, 2.0mm (M2) in diameter

## Software Specifications

### General

**OS:** Linux, Kernel 2.6.38  
**Boot Loader:** U-Boot

### File Systems

UBI, JFFS2, ETX2/ETX3, VFAT/FAT, NFS, NTFS

### Pre-installed Utilities

bash, busybox, gtk+, x11, gpe, alsa, madplayer, psplash, sysvinit, wget, ipkg, procps (for webmin), psmics, lighttpd, vsftpd, iptable, ppp, openssh, wireless\_tools, util-linux-mount/umount, usbutils, phyton, jamvm, php, mysql, perl, qt4-embedded, sqlite3, snmp, Artila utility and more

### Daemons Started by Default

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

### Tool Chain for Linux

**GCC:** C/C++ PC cross compiler  
**GLIBC:** POSIX Library  
**GUI:** GTK+, X window(X11), GPE and QT4-Embedded

### IPKG Package Management

Supports ipkg to manage the package installation, upgrade and removal.

### Webmin System Administration

Supports webmin for web-based system administration

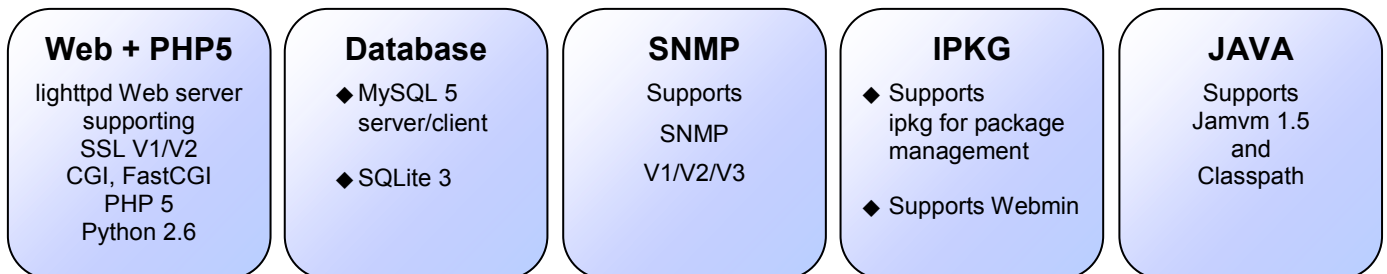
### Standard Device Drivers

LCD, Real Time Clock, SD/MMC, UART, Ethernet, GPIO, Buzzer, EEPROM (ATMEL AT24C16 and compatibles), Audio out

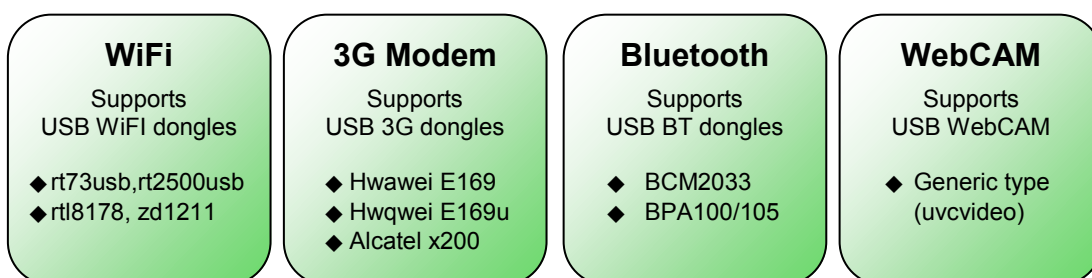
### Pre-load USB Device Drivers (customizable)

- ◆ Flash thumb disk
- ◆ IEEE-802.11b/g WiFi adapter
- ◆ 10/100Mbps Fast Ethernet adapter (RT8150)
- ◆ RS-232 adapter (prolific PL-2303)
- ◆ WebCAM
- ◆ Keyboard/Mouse
- ◆ 3G modem
- ◆ ISDN modem (CDC/ACM compatible)
- ◆ Bluetooth

## Platform Features



## USB Peripherals



## Pin Assignments

| CN1      |    | CN2       |    | CN3           |    |
|----------|----|-----------|----|---------------|----|
| RDY LED  | 1  | LAN.ETX0- | 1  | VCC3          | 1  |
|          | 2  | LAN.ETX0+ | 2  | VCC3          | 2  |
| ACT LED  | 3  | LAN.ERX0- | 3  | GND           | 3  |
|          | 4  | LAN.ERX0+ | 4  | GND           | 4  |
| V.BAT    | 5  | A.GND     | 5  | GND           | 5  |
| I2C.TWD  | 7  | Udio      | 7  | COM2.TXD      | 7  |
| I2C.TWCK | 9  | Uddata+   | 9  | COM2.RXD      | 9  |
| RST#1    | 11 | Uddata -  | 11 | COM2.RTS      | 11 |
| RST#0    | 13 | USB A -   | 13 | COM2.CTS      | 13 |
| PIO6     | 15 | USB A+    | 15 | COM3.TXD      | 15 |
| PIO7     | 17 | GND       | 17 | COM3.RXD      | 17 |
| PIO8     | 19 | LCD.R0    | 19 | COM3.RTS      | 19 |
| PIO9     | 21 | LCD.R1    | 21 | COM3.CTS      | 21 |
| PIO10    | 23 | LCD.R2    | 23 | COM4.TXD      | 23 |
| TX 232   | 25 | LCD.R3    | 25 | COM4.RXD      | 25 |
| VCC3     | 27 | LCD.R4    | 27 | COM4.RTS      | 27 |
|          | 28 | LCD.R5    | 29 | COM4.CTS      | 29 |
|          |    | LCD.R6    | 31 | PIO11 Ac97.RX | 31 |
|          |    | LCD.R7    | 33 | PIO12 Ac97.TX | 33 |
|          |    | LCD.DE    | 35 | PIO13 Ac97.FS | 35 |
|          |    | LCD.DIM   | 37 | PIO14 Ac97.CK | 37 |
|          |    | LCD.HSync | 39 | I2S.TSCK      | 39 |
|          |    | LCD.VSync | 41 | I2S.TWS       | 41 |
|          |    | LCD.BKLG1 | 43 | I2S.TSD       | 43 |
|          |    | GND       | 45 | I2S.RSD       | 45 |
|          |    | GND       | 47 | I2S.RSCK      | 47 |
|          |    | VCC3      | 49 | I2S.RWS       | 49 |
|          |    |           |    | SD.MCDA0      | 24 |
|          |    |           |    | SD.MCDA1      | 26 |
|          |    |           |    | SD.MCDA2      | 28 |
|          |    |           |    | SD.MCDA3      | 30 |
|          |    |           |    | SD.MCCK       | 32 |
|          |    |           |    | SD.MCCDA      | 34 |
|          |    |           |    | SD.CD         | 36 |
|          |    |           |    | SD.WP         | 38 |
|          |    |           |    | SPI.MISO      | 40 |
|          |    |           |    | SPI.MOSI      | 42 |
|          |    |           |    | SPI.SPCK      | 44 |
|          |    |           |    | SPI.NPCS1     | 46 |
|          |    |           |    | SPI.NPCS2     | 48 |
|          |    |           |    | Audio IO      | 50 |

## Dimensions

