

# *Your Trusted Partner for Device Networking & Computing*



## **Artila**

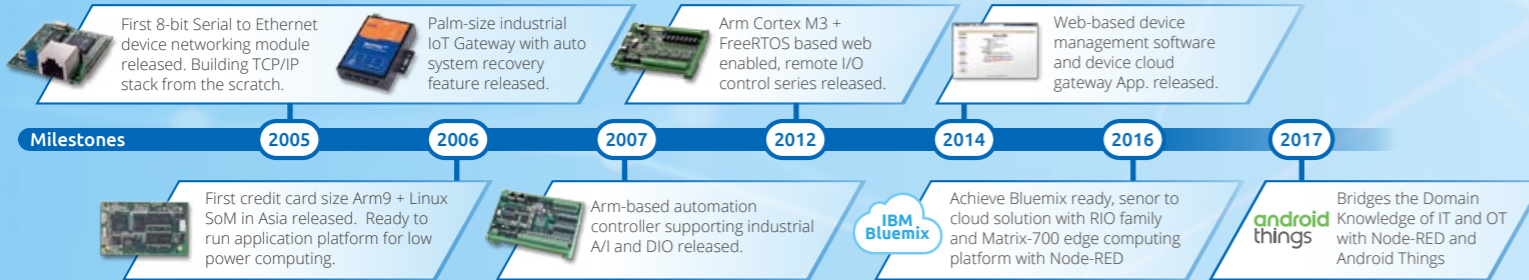
- Intelligent IoT Gateway
- IoT Device Platform
- Programmable Automation Controller
- Remote I/O
- Industrial Communication Gateway
- HMI



# About Artila

## Your Trusted Partner for Device Networking & Computing

Founded in 2004, Artila provides trusted innovative industrial computing products. Artila offers comprehensive system integration, hardware, software, and customer-centric design services; including the intelligent IoT gateway, programmable automation controller, IoT device platform, and remote I/O. We cooperate closely with our partners to help providing complete solutions for a wide array of applications across a diverse range of industries, such as energy management, lighting control and environmental monitoring. Artila has always been an innovator in the development and manufacturing of high-quality, high-performance computing products, and our mission is to empower these innovations by offering trustworthy automation products and services.



## The Full Range of IoT Products

### Intelligent IoT Gateway

Matrix Arm-based IoT Gateway is a Linux-ready industrial computing platform designed for data concentration and device gateway. Built rugged, its extra low-power RISC architecture realizes fanless computing. For real-time and small footprint applications such as protocol conversion and real-time control, the compact and easy-to-use FreeRTOS is the Artila's choice of software operation platform. Artila Intelligent IoT Gateway allows customers to integrate in their systems efficiently and painlessly.



### IoT Device Platform

Artila M-series Arm+Linux-ready System on Module (SoM) is an application-ready platform for designers to reduce cost and time in hardware and software design. The M-series SoM, including Arm SoC, memory and flash, and pre-installed Linux OS, are in a compact size module with pin header or SO-DIMM form factor. The pre-loaded file system includes busybox utility collection, web server and USB device drivers. Artila M-series accelerate the adoption of IoT and facilitate innovation in the digital enterprise.

### Programmable Automation Controller

PAC series is a Linux-based, C/C++ programmable automation controller. Network-enabled and web-ready PAC features rich analog and digital I/O for real-world I/O control. Based on M-series SoM, PAC is a true Linux computing platform with file system support. With failure prevention and the design of redundant start-up, Artila PAC series are ideal for many mission-critical applications.



### Modbus Gateway

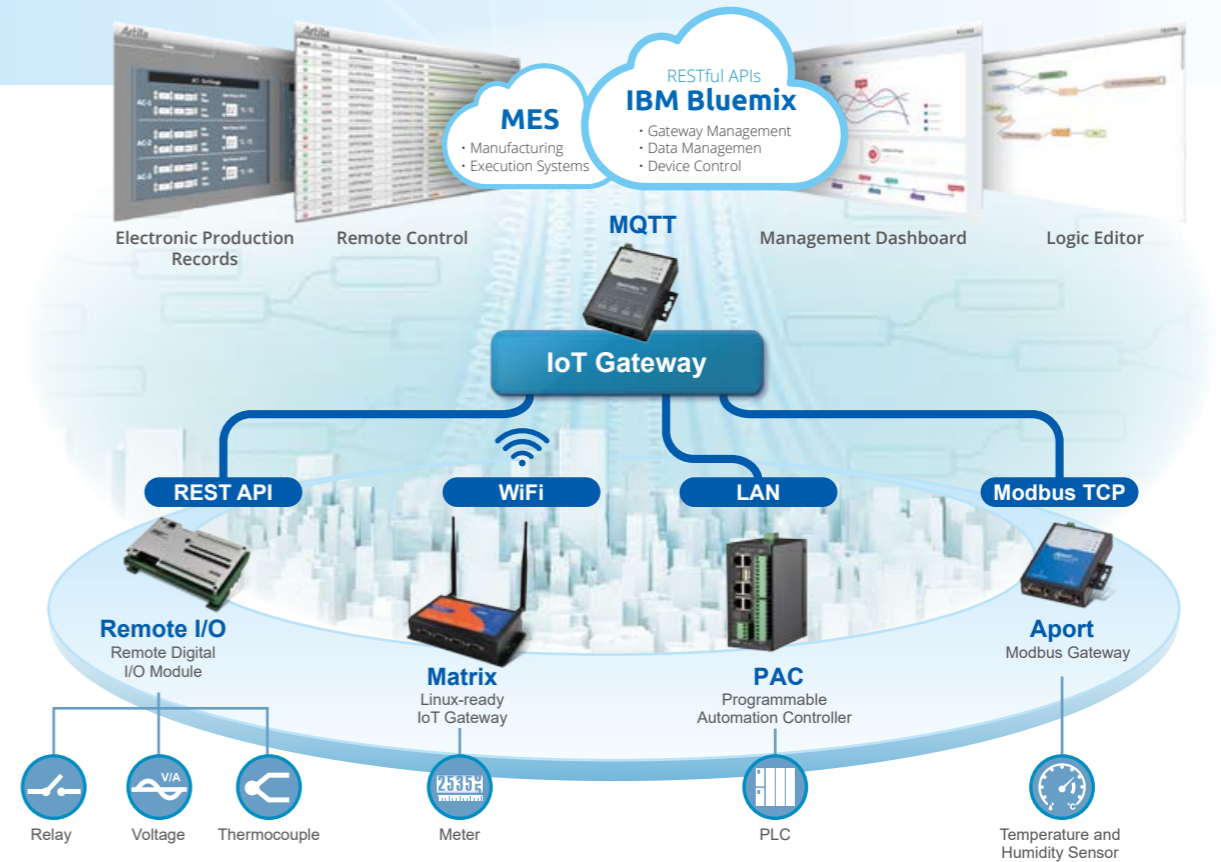
The Aport series come with Arm cortex M series controller plus FreeRTOS and programmer friendly APIs make your life easy. For budget limitation project, the low power Arm CORTEX-M plus the high efficient FreeRTOS make Aport Series an ideal light weight computing platform for device networking and remote monitoring.

### Remote I/O

The RIO family, a web-ready, analog and digital I/O product lines, allows users to access and monitor the real-world data by using web interface or Modbus TCP / RTU protocols. Windows and Linux API library are also included in the RIO family. Thus, users can access the RIO products easily to cope with the fast-pace and ever-changing trend of the industrial computing industry.

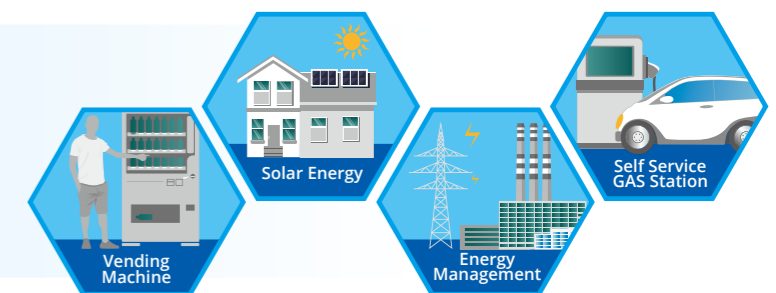


## Looking for A Reliable and Tiny Solution? Arm + Linux is What You Need.



## Application Proven

With worldwide experience in product integration, Artila's products are widely used in power management, light control, access control system, parking facilities, solar energy system integration, RFID, environmental monitoring, and more.





# Intelligent IoT Gateway

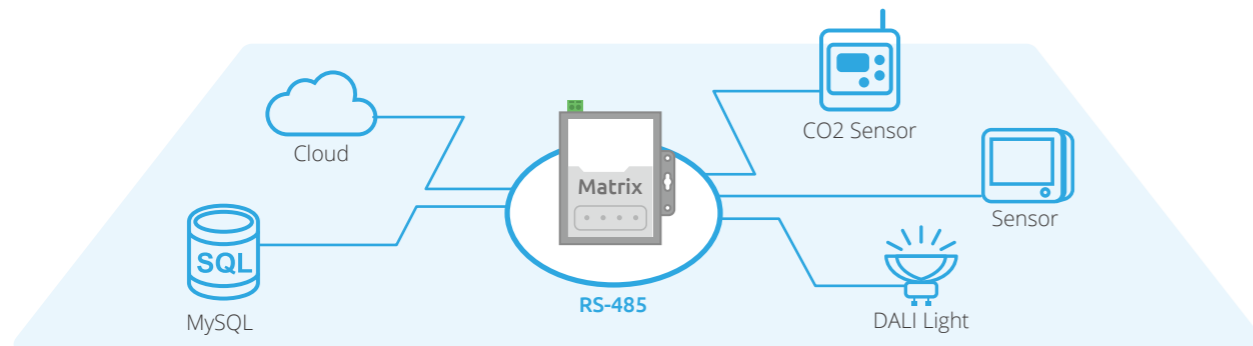
- Low Power Arm SoC for Wide Temperature Operating
- Linux and C / C++ toolchain Ready Computer Platform
- Easy to Expand Wireless module via miniPCIe interface
- WEB / FTP / DHCP / SNMP / PHP / MySQL
- Palm Size, Wall Mount and DIN RAIL Mount



## Matrix Series Linux Arm Industrial IoT Gateway

Arm-based Linux-ready industrial IoT Gateway with multiple Ethernet ports, RS-232/422/485 ports, USB ports and digital I/Os. Truly industrial design, fanless, no cable and no moving parts inside.

CPU AT91SAM9G20 AT91SAM9G45 ATSAMA5D35 i.MX6ULL



Data Acquisition, Buffering and Storage

## Aport-PG Series Programmable Device Server

Programmable device server with low power Arm Cortex M plus high efficient FreeRTOS. Tiny but mighty computing platform for device networking comes with FreeRTOS which is a market leading RTOS (Real Time OS) and professionally developed, strictly quality controlled, robust, supported, and free to embed in commercial products, is designed for users who are looking for a tiny but mighty C/C++ programmable platform which has FreeRTOS and lwIP pre-installed.



## Matrix Series Comparison Table



Model	Matrix-700	Matrix-710	Matrix-713	Matrix-500	Matrix-512	Matrix-504	Matrix-516B	Matrix-518	Matrix-522	Matrix-505	Matrix-513
CPU	Atmel ATSAMA5D35 Arm Cortex-A5 536MHz			Atmel AT91RM9200 Arm9 180MHz		Atmel AT91SAM9G20 Arm926 400MHz			Atmel AT91SAM9G45 Arm926 400MHz		
RAM	512MB DDR2 SDRAM			64MB SDRAM		64MB SDRAM			128MB DDR2 SDRAM		
Flash	8GB eMMC / 8MB Data Flash			16MB		256MB			256MB		
Micro-SD Card socket	1 (Support boot from SD card)			1		1			1		
Ethernet	GLAN x1 10/100Mbps x1	GLAN x1 10/100Mbps x1	GLAN x1 10/100Mbps x1	10/100Mbps x1	10/100Mbps x2	10/100Mbps x1	10/100Mbps x2	10/100Mbps x2	10/100Mbps x2	10/100Mbps x2	10/100Mbps x2
RF Capability (Optional)	YES	YES	YES	N/A		N/A			N/A		
Micro-SIM card socket	N/A	1	2	N/A		N/A			N/A		
GNSS	N/A	N/A	GPS + Glonass	N/A		N/A			N/A		
IMU (Internal Measurement unit)	N/A	N/A	Gyro + G-sensor + E-Compass	N/A		N/A			N/A		
No. of Serial Port (Total)	4	8	4	4	4	4	8	8	2	4	4
. RS-232/422/485	X	X	X	1	4	1	X	8	2	1	4
. RS-232/485	4	1	X	X	X	3	X	X	X	3	4
. RS-232	X	X	X	3	X	X	X	X	X	X	X
. RS-422/485	X	X	1 isolated	X	X	X	X	X	X	X	X
. RS-485	X	7 (4 isolated)	3 isolated	X	X	X	8 isolated	X	X	X	X
CAN Bus (Isolation)	N/A	2	2	N/A		N/A			N/A		
USB 2.0	2 x HOST	4 x HOST	2 x HOST	2 x HOST, 1 x Client		2 x HOST, 1 x Client			2 x HOST, 1 x Client		
GPIO	N/A			N/A	21-pin	N/A	21-pin	21-pin	21-pin	N/A	
Isolated DIO Channels (Total)	0	0	Dlx2, DOx2	0	0	0	0	0	0	0	Dlx2
Audio	N/A	N/A	YES	N/A		N/A	N/A	YES	N/A	N/A	N/A
miniPCIe slot	N/A	1	2	N/A		N/A			N/A		
Linux Kernel	4.9.X			2.6.14		2.6.29			2.6.38		
Dimensions (W x H x D) mm	78 x 108 x 24	166 x 103 x 35	160 x 118 x 35	78 x 108 x 24	160 x 104 x 32	78 x 108 x 24	160 x 104 x 32			78 x 108 x 24	175 x 103 x 43
Power Input	+9 ~ +48VDC			+9 ~ +48VDC	+9 ~ +40VDC	+9 ~ +48VDC	+9 ~ +60VDC	+9 ~ +40VDC	+9 ~ +40VDC	+9 ~ +48VDC	+9 ~ +48VDC

## Programmable Device Server Comparison Table



Model	Aport-214PG	Aport-212PG
CPU	Atmel SAM4E16E Cortex M4 120MHz	NXP LPC1768 Cortex M3 100MHz
RAM	128KB SRAM	32KB SRAM
Flash	1MB	512KB
Micro-SD card socket	1	N/A
10/100Mbps Ethernet	1	1
No. of Serial Port	RS-485 x2	RS-232/422/485 x1 & RS-232/485 x1
Isolated DIO Channels (Total)	Digital Input x4, Relay Out x2	N/A
Serial Console	1	1
RealTime OS	FreeRTOS	FreeRTOS
Windows Utility	YES	YES
Web Server Support	YES	YES
Dimensions (W x H x D) mm	78 x 108 x 24	78 x 108 x 24
Power	+9 ~ +48VDC	+9 ~ +40VDC

## Matrix-700



## Features

- ATMEL ATSAMA5D35 536MHz Cortex-A5 CPU
- Linux kernel 4.9.x with file system
- Toolchain gcc 6.2.x + glibc 2.24
- 512MB LPDDR2 SDRAM
- 8GB eMMC Flash and 8MB DataFlash for system backup
- 1 x Gigabit Ethernet and 1 x 10/100Mbps Ethernet
- 4 x RS-232 / 485 serial ports
- Ultra-low power consumption, less than 3 Watts

## ■ H/W Specifications

## CPU / Memory

- CPU: ATMEL ATSAMA5D35 536MHz w/MMU
- SDRAM: 512MB, LPDDR2
- Flash: 8GB, eMMC
- DataFlash: 8MB, for system backup

## Network Interface

- Type: 1 x Gigabit and 1 x 10/100Mbps Ethernet
- Connector Type: RJ45

## TTY (Serial) Ports

- RS-232 or RS-485, software select
- RS-232 Signals: TX, RX, RTC, CTS
- RS-485 Signals: Data+, Data-
- RS-485 Automatic Flow Control: Yes

## TTY (Serial) Port 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

## Console / Debug Ports

- Support microUSB console port
- Serial console port (inside the box)

## USB 2.0 Host Interface

- Supports 480Mbps hi-speed mode
- Host Ports: 2

## SD Slot

- 1 x Micro-SD socket
- SD 2.0 Compliant, support SDHC
- Storage capacity: support up to 128G

## General

- Watchdog: Yes
- Real-Time Clock (RTC): YES
- Buzzer: Yes
- Supports microUSB power source
- Power Input: +9V~+48Vdc (terminal block)
- Typical Consumption: 12VDC@200mA
- Dimensions (W x H x D): 78 x 108 x 24mm (3.0x4.25x0.94in)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A

## ■ S/W Specifications

## Operation System

- Linux kernel 4.9.x
- Supports bootup from eMMC or SD card
- Boot Loader : BareBox
- File System : EXT4/ETX3/ETX2, VFAT/FAT, NFS

## Software Development

- Toolchain: gcc 6.2.x + glibc 2.24
- Supports in-place C/C++ code compilation

## Package Management

- Package repository: Artilla self-maintained repository
- Command: Using standard apt-get command

## Popular Packages

- Web server: Apache/Nginx/Lighttpd
- Database: MySQL/SQLite3/PostgreSQL
- Script Language: PHP/Python/Perl/NodeJS
- Text editor: vim/nano/sed
- Administration: Webmin

## ■ Ordering Information

## Matrix-700

- Linux-ready Cortex-A5 536MHz Industrial IoT Gateway with 512MB SDRAM, 8GB eMMC Flash

## CB-RJ45F9-150 (91-R45F9-150)

- Serial Cable (RJ45 to DB9 Female, 150cm)

## DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

## PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter

## Matrix-710



## Features

- ATMEL ATSAMA5D35 536MHz Cortex-A5 CPU
- Linux kernel 4.9.x with file system
- 512MB LPDDR2 SDRAM
- 8GB eMMC Flash and 8MB DataFlash for system backup
- 1 x Gigabit Ethernet and 1 x 10/100Mbps Ethernet
- 4 x USB host ports
- 4 x isolation RS-485 serial ports and 4 x RS-485 serial ports
- 2 x CAN ports
- 1 x full size miniPCIe socket inside
- Ultra-low power consumption

## ■ H/W Specifications

## CPU / Memory

- CPU: ATMEL ATSAMA5D35 536MHz w/MMU
- SDRAM: 512MB, LPDDR2
- Flash: 8GB, eMMC
- DataFlash: 8MB, for system backup

## Network Interface

- Type: 1 x Gigabit and 1 x 10/100Mbps Ethernet
- Connector Type: RJ45

## TTY (Serial) Ports

- Port 1, 2, 3, 4: Isolated RS-485 (2500Vrms isolation)
- Port 5, 6, 7, 8: RS-485
- Direction Control: Auto, by hardware
- Connector: Terminal block

## TTY (Serial) Port 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

## CAN Bus Ports

- Type: 2 x CAN bus 2.0 A/B compliant ports
- Speed: Up to 1Mbps
- Isolation: 2500Vrms
- CAN 1: 1~2 pin, CAN 2: 3~4 pin, GND: 5 pin

## Console / Debug Ports

- Support microUSB console port
- Serial console port (inside the box)

## USB 2.0 Host Interface

- Host Ports: 4
- Supports 480Mbps hi-speed mode

## SD Slot

- 1 x Micro-SD socket
- SD 2.0 Compliant, support SDHC
- Storage capacity: support up to 128G

## Expansion Slot

- 1 x miniPCIe socket
- Supports Full-size / half-size

## General

- Watchdog: Yes
- Real-Time Clock (RTC): Yes, backup by super capacitor
- Buzzer: Yes
- Power Input Voltage: +9~+48VDC (terminal block)
- Typical Consumption: 12VDC@500mA
- Dimensions (W x L x H): 166 x 103 x 35mm (6.5 x 4.0 x 1.37in)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A
- Installation: Wall mounting, DIN-rail mounting (with optional kit)

## ■ S/W Specifications

## Operation System

- Linux kernel 4.9.x
- Supports bootup from eMMC or SD card
- Boot Loader : Barebox
- File System : EXT4/ETX3/ETX2, VFAT/FAT, NFS

## Software Development

- Toolchain: gcc 6.2.x + glibc 2.24
- Supports in-place C/C++ code compilation

## Package Management

- Package repository: Artilla self-maintained repository
- Command: Using standard apt-get command

## Popular Packages

- Web server: Apache/Nginx/Lighttpd
- Database: MySQL/SQLite3/PostgreSQL
- Script Language: PHP/Python/Perl/NodeJS
- Text editor: vim/nano/sed
- Administration: Webmin

## ■ Ordering Information

## Matrix-710

- Linux-ready Cortex-A5 536MHz Industrial IoT Gateway with 512MB SDRAM, 8GB eMMC Flash

## DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

## PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter



## Matrix-713



### Features

- Rugged Design, Wide-range Temperature operating
- ATME1 ATSAMA5D35 536MHz Cortex-A5 CPU
- Linux kernel 4.9.x with file system
- Support Node-Red, the browser-based flow editor
- 512MB LPDDR2 SDRAM
- 8GB eMMC Flash and 8MB DataFlash for system backup
- 1 x Micro-SD socket
- 1 x Gigabit Ethernet and 1 x 10/100Mbps Ethernet
- Rich I/Os: 4xIsolated RS-485, 2xCAN, 2xUSB, 2xDI, 2xDO
- Support GNSS (GPS&Glonass), Gyro, G-Sensor, e-Compass
- 2xminiPCIe slot & 2xmicro-SIM card socket reserved

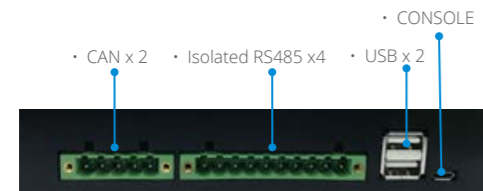
### Key Features

#### High Ability IoT Gateway

- Support versatile communication interface
- Support Plug & play networking protocol upnp & mDNS
- Location smart, support GNSS / 9-Axis Gyro, G-sensor, e-Compass

#### Information Smart

- Sensor / Data acquisition
- Database Management
- Rich I/Os fulfill different applications
- Support Node-Red visual writing tool for IoT

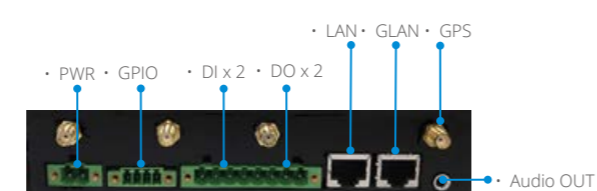


#### Flexibility

- Highly Integrated SoC, easy installation / maintenance
- Market proven open technology
- Completely application building blocks

#### Rugged Reliable Device

- Wide-range Temperature operating
- Low-Power consumption, Saving power / Money
- Dual SIM slots to support cross-zone communication / seamless integration



### GNSS/IMU/Cellular Specifications

#### GNSS (Global Navigation Satellite System)

- 72-channel u-blox M8 e GNSS engine
- Support Dual Satellite: GPS & GLONASS
- -146dBm Tracking and Navigation Sensitivity
- Support AssistNow Online/Offline/Autonomous, OMA SUPL & 3GPP Compliant
- Max nav. update rate: Single channel/up to 18MHz, 2 Concurrent GNSS /up to 10MHz
- Accuracy (Position): 2.5m CEP
- 1 x Active Antenna

#### IMU (Inertial Measurement Unit)

- 1 x 3-Axis digital output Gyroscope
- Gyroscope has a programmable full-scale range of  $\pm 250$ ,  $\pm 500$ ,  $\pm 1000$ , and  $\pm 2000$  degrees/sec and very low rate noise at 0.01dps/Hz. Gyroscope operating current: 3.2mA
- 1 x 3-Axis Accelerometer (G-Sensor)  $\pm 2/\pm 4/\pm 8/\pm 16$  g user-programmable accelerometer full-scale range 16-bit data output
- 1 x 3-Axis Magnetometer (E-Compass) Build-in A to D converter for magnetometer data out 16 bit data each 3-Axis magnetic component (Sensitivity 0.15uT/LSB-typ.)

#### Cellular Module Parameters

- **For Europe/Asia /LATAM**
  - LTE(4G) support B1(2100)/B3(1800)/ B7(2600)/ B8(900)/ B20(800DD)/ B38(TDD2600)/B40(TDD2300), data rate at 50Mbps(UL)/100Mbps(DL)
  - UMTS(3G) support B1(2100)/B8(900), Data rate at 5.76Mbps(UL)/ 42Mbps(DL)
  - 2G support 900/1800MHz
  - Certification: CE
- **For North America**
  - LTE(4G) support B2(1900)/B4(1700 AWS)/B5(850)/B17(700bc), data rate at 50Mbps(UL)/100Mbps(DL)
  - HSPA(3G) support B2(1900)/B5(850), Data rate at 5.76Mbps(UL)/ 42Mbps(DL)
  - Carrier License: AT&T, Certification: FCC
- **For China**
  - LTE(4G) support B1(2100)/B3(1800)/B8(900)/B38(TDD2600)/B39(TDD1900)/B40(TDD2300)/B41(TDD2500), data rate at 50Mbps(UL) /100Mbps(DL)
  - HSPA(3G) support B1(2100)/B8(900), Data rate at 5.76Mbps(UL)/ 42Mbps(DL)
  - 2G support 900/1800MHz,
  - Certification: CCC

## Matrix-713

### H/W Specifications

#### CPU / Memory

- CPU: ATME1 ATSAMA5D35 536MHz w/MMU
- SDRAM: 512MB, LPDDR2
- Flash: 8GB, eMMC
- DataFlash: 8MB, for system backup

#### Network Interface

- Type: 1 x Gigabit and 1 x 10/100Mbps Ethernet
- Protection: 1.5KV magnetic isolation
- Connector Type: RJ45

#### TTY (Serial) Ports

- 4 x Isolated RS-485 (1500Vrms isolation)
- Port 4 support RS422 / RS-485 (selectable)
- Direction Control: Auto, by hardware
- Connector: Terminal block
- RS485 Signal: Data+, Data-
- LED Indicator: YES

#### CAN Bus Ports

- 2 x CAN bus 2.0 A/B compliant ports
- Speed: Up to 1Mbps

#### Console / Debug Ports

- 1 x microUSB console port
- Serial console port (inside the box)

#### USB 2.0 Host Interface

- 2 x USB Host Port

#### Audio Out

- 1 x Line-out R/L port, optional Earphone R/L
- Connector: Earphone-Jack
- Support MP3 and WAV format

#### Digital Input

- 2 x Digital Input channels
- Isolation Protection: 2500Vrms (Photo-Coupler)
- Logical High: 5~24VDC
- Logical Low: 0~1.5VDC

#### Relay Output

- 2 x Digital Output Channels (Solid state Relay)
- Solid State Relay, Normal Open (NO) Type
- Contact Rating: 80VDC@1.5A
- LED Indicator: YES

#### Power Requirement

- Power Input: +9~+60VDC ( terminal block)
- Typical Consumption : 12VDC@230mA

#### Dual Power Source

- Support external Battery bank
- Via Mirco-USB port (5Vdc@1A)

#### SD Slot

- 1 x Micro-SD socket
- SD 2.0 compliant, supports SDHC
- Storage capacity: Support Up to 128G

#### Expansion

- 2 x miniPCIe Full-size socket
- 2 x micro-SIM card socket, USB interface reserved
- 3 x SMA-type Antenna hole reserved

#### General

- Watchdog: Yes
- Real-Time Clock (RTC): Yes, backup by super capacitor
- Buzzer: Yes
- Power Input: +9~+60VDC (terminal block)
- Typical Consumption: 12VDC@600mA
- Indicator: PWR, READY, LAN, UART, CAN, Status(user define)
- Dimensions (W x L x H): 160 x 118 x 35mm (6.3 x 4.64 x 1.37in)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A
- Installation: Wall mounting, DIN-rail mounting (with optional kit)

### S/W Specifications

#### Operation System

- Linux kernel 4.9.x
- Supports bootup from eMMC or SD card
- Boot Loader : Barebox
- File System : EXT4/ETX3/ETX2, VFAT/FAT, NFS

#### Software Development

- Toolchain: gcc 6.2.x+ glibc 2.24xx
- Supports in-place C/C++ code compilation

#### Package Management

- Package repository: Artila self-maintained repository
- Command: Using standard apt-get command

#### Popular Packages

- Web server: Apache/Nginx/Lighttpd
- Database: MySQL/SQLite3/PostgreSQL
- Script Language: PHP/Python/Perl/NodeJS
- Text editor: vim/nano/sed
- Administration: Webmin

### Ordering Information

#### Matrix-713

- Linux-ready Cortex-A5 536MHz Industrial IoT Gateway with 512MB SDRAM, 8GB eMMC Flash, with GPS/Gyro/G-sensor/E-compass

#### Matrix-713-EA (for Europe, ASIA, LATAM)

- Linux-ready Cortex-A5 536MHz Industrial IoT Gateway with 512MB SDRAM, 8GB eMMC Flash, with GPS/GLONASS, with 4G/LTE miniPCIe Module with antenna

#### Matrix-713-NA (for North America)

- Linux-ready Cortex-A5 536MHz Industrial IoT Gateway with 512MB SDRAM, 8GB eMMC Flash, with GPS/GLONASS, with 4G/LTE miniPCIe Module with antenna

#### Matrix-713-C (for China)

- Linux-ready Cortex-A5 536MHz Industrial IoT Gateway with 512MB SDRAM, 8GB eMMC Flash, with GPS/GLONASS, with 4G/LTE miniPCIe Module with antenna

#### M-W172

- 2.4G Wifi (802.11b/g/n) miniPCIe module with Antenna

#### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

#### PWR-12V-1A (31-62100-000)

- 12VDC@1A power adapter with 110 ~ 240VAC power-in

# Matrix-500



## Features

- Linux 2.6.14 compatible computing platform
- 64MB SDRAM and 16MB NOR Flash
- Ultra-low power consumption, less than 3 Watts
- 1 x 10/100Mbps Ethernet port
- 4 x 921.6Kbps high speed TTY (serial) ports
- 2 x USB 2.0 host ports for add-on functionality expansion
- 1 x SD memory card slot inside for storage expansion
- GNU C / C++ toolchain for Linux / Windows environment
- Extremely compact design, 78 x 108 x 24mm

## ■ H/W Specifications

### CPU / Memory

- CPU: ATMEL AT91RM9200 180MHz (Arm9, w/ MMU)
- Memory: 64MB SDRAM, 16MB NOR Flash

### Network Interface

- Type: 1 x 10/100BaseT, RJ45 connector
- Protection: 1.5KV magnetic isolation

### TTY (Serial) Ports

- Port 1: Can be set as RS-232, RS-422 or RS-485
- Port 2, 3, 4: Can be set as RS-232 or RS-485
- Connector: RJ45 connector

### TTY (Serial) Port 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
- RS-485 Direction Control: Auto, by hardware

### USB Host Ports

- No. of Ports: 2
- Speed: USB 2.0 compliant, supports low-speed (1.5Mbps) and full-speed (12Mbps) data rate

### Mass Storage

- 1 x SD 1.0 compliant socket inside

### General

- Watchdog Timer: Yes, for kernel use
- Real-Time Clock (RTC): Yes
- Buzzer: Yes
- Power Input: +9~+48VDC
- Power Consumption: 12VDC@220mA
- Dimensions (W x H x D): 78 x 108 x 24mm (3.0 x 4.25 x 0.94in)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A

## ■ S/W Specifications

### General

- OS: Linux, kernel 2.6.14
- Boot Loader: U-Boot
- File Systems: JFFS2, ETX2 / ETX3, VFAT / FAT, NFS

### Protocol Stacks

- IPv4, ICMP, ARP, DHCP, NTP, TCP, UDP, FTP, TELNET, HTTP, PPP, PPPoE, CHAP, PAP, SMTP, SNMP V1 / V2, SSL, SSH 1.0 / 2.0

### Pre-installed Utilities

- bash: shell command
- tinylogin: login and user manager utility
- telnet: telnet client program
- busybox: Linux utility collection
- ftp: ftp client program

### 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
- amgrd: Artila manager daemon

### Toolchain for Linux

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

### Device Drivers

- SD / MMC, UART, Real Time Clock, Buzzer, Digital I/O, Ethernet, Watchdog Timer

### USB Host Drivers (Could Be Customized)

- Flash disk, WiFi (IEEE-802.11), and RS-232 adapters

## ■ Ordering Information

### Matrix-500

- Linux-ready Arm9 Industrial IoT Gateway with 16MB on-board Flash

### CB-RJ45F9-150 (91-R45F9-150)

- Serial Cable (RJ45 to DB9 Female, 150cm)

### CB-RJ2CON-100 (91-RJCON-100)

- Console Cable (RJ45 to DB9 Female, 100cm)

### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter

# Matrix-512



## Features

- Linux 2.6.14 compatible computing platform
- 64MB SDRAM and 16MB NOR Flash
- 2 x 10/100Mbps Ethernet ports
- 4 x 921.6Kbps RS-232 / 422 / 485 TTY ports
- 2 x USB 2.0 host ports for add-on functionality expansion
- 1 x SD memory card slot inside for storage expansion
- 21 x CMOS / TTL-level digital I/Os (GPIO)
- GNU C / C++ toolchain for Linux / Windows environment
- Ultra-low power consumption, less than 3 Watts

## ■ H/W Specifications

### CPU / Memory

- CPU: ATMEL AT91RM9200 180MHz (Arm9, w/ MMU)
- Memory: 64MB SDRAM, 16MB NOR Flash

### Network Interface

- Type: 2 x 10/100BaseT, RJ45 connector
- Protection: 1.5KV magnetic isolation

### TTY (Serial) Ports

- 4 x RS-232 / 422 / 485 ports, software select
- Port 2: Supports full modem signals
- Connector: DB9 male connector

### TTY (Serial) Port 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

### USB Host Ports

- No. of Ports: 2
- Speed: USB 2.0 compliant, supports low-speed (1.5Mbps) and full-speed (12Mbps) data rate

### Digital I/Os (GPIO)

- No. of Pins: 21
- Signal Level: CMOS / TTL compatible
- Each pin can be programmed as input or output

### Mass Storage

- 1 x SD 1.0 compliant socket inside2

### General

- Watchdog Timer: Yes, for kernel use
- Real-Time Clock (RTC): Yes
- Buzzer: Yes
- Power Input: +9~+40VDC
- Power Consumption: 12VDC@300mA
- Dimensions (W x H x D): 160 x 104 x 32mm (6.3 x 4.0 x 1.26in)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A

## ■ S/W Specifications

### General

- OS: Linux, kernel 2.6.14
- Boot Loader: U-Boot
- File Systems: JFFS2, ETX2 / ETX3, VFAT / FAT, NFS

### Protocol Stacks

- IPv4, ICMP, ARP, DHCP, NTP, TCP, UDP, FTP, TELNET, HTTP, PPP, PPPoE, CHAP, PAP, SMTP, SNMP V1 / V2, SSL, SSH 1.0 / 2.0

### Pre-installed Utilities

- bash: shell command
- tinylogin: login and user manager utility
- telnet: telnet client program
- busybox: Linux utility collection
- ftp: ftp client program

### 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
- amgrd: Artila manager daemon

### Toolchain for Linux

- GCC: C / C++ PC cross compiler for Linux, Cygwin
- GLIBC: POSIX Library

### Device Drivers

- SD / MMC, UART, Real Time Clock, Buzzer, Digital I/O, Ethernet, Watchdog Timer

### USB Host Drivers (Could Be Customized)

- Flash disk
- WiFi (IEEE-802.11b/g)
- RS-232 adapters

## ■ Ordering Information

### Matrix-512

- Linux-ready Arm9 Industrial IoT Gateway with 16MB on-board Flash

### CB-DB2CON-100 (91-DBCON-100)

- Console Cable (DB9 Female to DB9 Female, 100cm)

### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit



# Matrix-504



## Features

- Linux 2.6.29 compatible computing platform
- 64MB SDRAM and 256MB NAND Flash
- Ultra-low power consumption, less than 3 Watts
- 1 x 10/100Mbps Ethernet port
- 4 x 921.6Kbps high speed TTY (serial) ports
- 2 x USB 2.0 host ports, 12Mbps
- 1 x microSD socket inside
- GNU C / C++ toolchain for Linux / Windows environment
- Extremely compact design, 78 x 108 x 24mm

# Matrix-516



## Features

- ATME AT91SAM9G20 400MHz CPU
- Linux kernel 2.6.29 with file system
- 64MB SDRAM and 256MB NAND Flash
- 1 x microSD socket inside
- 2 x 10/100Mbps Ethernet ports
- 8 x isolated RS-485 serial ports
- 2 x USB hosts, 21 x GPIOs
- Ultra-low power consumption, less than 3 Watts

## ■ H/W Specifications

### CPU / Memory

- CPU: ATME AT91SAM9G20 400MHz (Arm9, w/ MMU)
- Memory: 64MB SDRAM, 256MB NAND Flash
- DataFlash@: 2MB, for system backup

### Network Interface

- Type: 1 x Gigabit and 1 x 10/100Mbps Ethernet
- Connector Type: RJ45

### TTY (Serial) Ports

- Port 1, 2, 3, 4: Isolated RS-485 (2500Vrms isolation)
- Port 5, 6, 7, 8: RS-485
- Direction Control: Auto, by hardware
- Connector: Terminal block

### TTY (Serial) Port 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
- RS-485 Direction Control: Auto, by hardware

### USB Ports

- Host Ports: 2
- Client Port: 1, reserved
- Speed: USB 2.0 compliant, supports low-speed (1.5Mbps) and full-speed (12Mbps) data rate

### General

- Watchdog Timer: Yes, for kernel use
- Real-Time Clock (RTC): Yes
- Buzzer: Yes
- microSD Socket: Yes
- Power Input: +9V~+48VDC
- Power Consumption: 12VDC@250mA
- Dimensions (W x H x D): 78 x 108 x 24mm (3.0 x 4.25 x 0.94in)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A

## ■ S/W Specifications

### General

- OS: Linux, kernel 2.6.29
- Boot Loader: U-Boot
- File Systems: UBI, JFFS2, ETX2 / ETX3, VFAT / FAT, NFS

### Pre-installed Utilities

- bash, busybox, sysvinit, wget, ipkg, procps (for webmin), psmics, apache2, vsftpd, iptables, ppp, ssh, wireless\_tools, util-linux-mount / umount, usbutils, Artila utility

### Daemons Started by Default

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

### Package Management & System Administration

- Supports ipkg to manage the package installation, upgrade and removal
- Supports webmin (use 'ipkg install webmin' to install) for web-based system administration

### Toolchain for Linux

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

## ■ Ordering Information

### Matrix-504

- Linux-ready Arm9 Industrial IoT Gateway with 256MB on-board Flash and microSD Socket Inside

### Matrix-504T

- Wide-temperature (-20~80°C) Version of the Matrix-504

### CB-RJ45F9-150 (91-R45F9-150)

- Serial Cable (RJ45 to DB9 Female, 150cm)

### CB-RJ2CON-100 (91-RJCON-100)

- Console Cable (RJ45 to DB9 Female, 100cm)

### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter

## ■ H/W Specifications

### CPU / Memory

- CPU: ATME AT91SAM9G20 400MHz w/ MMU
- Memory: 64MB SDRAM, 256MB NAND Flash
- DataFlash@: 2MB, for system backup

### Network Interface

- Type: 2 x 10/100BaseT, RJ45 connector
- Protection: 1.5KV magnetic isolation

### TTY (Serial) Ports

- 8 x Isolated RS-485 (1500Vrms isolation)
- Direction Control: Auto, by hardware
- Connector: Terminal block
- Baud Rate: Up to 921.6Kbps
- Parity: None, Even, Odd, Mark, Space
- Data Bits: 5, 6, 7, 8
- Stop Bits: 1, 1.5, 2

### USB Ports

- Host Ports: 2
- Client Port: 1, reserved
- Speed: USB 2.0 compliant, supports low-speed (1.5Mbps) and full-speed (12Mbps) data rate

### SD Socket (Secure Digital Card)

- Type: microSD
- No. of Sockets: 1
- Storage Capacity: Up to 32GB
- Compatibility: SD memory specification 1.0

### Digital I/Os (GPIO)

- No. of Pins: 21
- Signal Level: CMOS / TTL compatible
- Each pin can be programmed as input or output

### General

- Watchdog Timer: Yes
- Real-Time Clock (RTC): Yes
- Buzzer: Yes
- Power Input: +9V~+60VDC
- Power Consumption: 12VDC@190mA
- Dimensions (W x H x D): 160 x 104 x 32mm (6.3 x 4.0 x 1.26in)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A

## ■ S/W Specifications

### General

- OS: Linux, kernel 2.6.29
- Boot Loader: U-Boot
- File Systems: UBI, JFFS2, ETX2 / ETX3, VFAT / FAT, NFS

### Pre-installed Utilities

- bash, busybox, sysvinit, wget, ipkg, procps (for webmin), psmics, lighttpd, vsftpd, iptables, ppp, ssh, wireless\_tools, util-linux-mount / umount, usbutils, Artila utility, and more

### Daemons Started by Default

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

### Package Management & System Administration

- Supports ipkg to manage the package installation, upgrade and removal
- Supports webmin (use 'ipkg install webmin' to install) for web-based system administration

### Toolchain for Linux

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

## ■ Ordering Information

### Matrix-516B

- Linux-ready Arm9 Industrial IoT Gateway

### CBL-F10M9-20 (91-0P9M9-001)

- Console Cable (10Pin Header to DB9 Male, 20cm)

### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

## Matrix-518



## Features

- ATMEL AT91SAM9G20 400MHz CPU
- Linux kernel 2.6.29 with file system
- 64MB SDRAM and 256MB NAND Flash
- 1 x microSD socket inside
- 2 x 10/100Mbps Ethernet ports
- 8 x RS-232 / 422 / 485 serial ports
- USB / GPIO / Audio out
- Ultra-low power consumption, less than 3 Watts

## ■ H/W Specifications

## CPU / Memory

- CPU: ATMEL AT91SAM9G20 400MHz w/ MMU
- Memory: 64MB SDRAM, 256MB NAND Flash
- DataFlash@: 2MB, for system backup

## Network Interface

- Type: 2 x 10/100BaseT, RJ45 connector
- Protection: 1.5KV magnetic isolation

## TTY (Serial) Ports

- 8 x RS-232 / 422 / 485
- Connector: RJ45 connector

## TTY (Serial) Port 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
- RS-485 Direction Control: Auto, by hardware

## USB Ports

- Host Ports: 2
- Client Port: 1, reserved
- Speed: USB 2.0 compliant, supports low-speed (1.5Mbps) and full-speed (12Mbps) data rate

## SD Socket (Secure Digital Card)

- Type: microSD
- No. of Sockets: 1
- Storage Capacity: Up to 32GB
- Compatibility: SD memory specification 1.0

## Digital I/Os (GPIO)

- No. of Pins: 21
- Signal Level: CMOS / TTL compatible
- Each pin can be programmed as input or output

## Audio Output

- MP3 and WAV format are supported

## General

- Watchdog Timer: Yes
- Real-Time Clock (RTC): Yes
- Buzzer: Yes
- Power Input: +9~+40VDC
- Power Consumption: 12VDC@190mA
- Dimensions (W x H x D): 160 x 104 x 32mm (6.3 x 4.0 x 1.26in)
- Operating Temperature: 0~70°C (32~158°F)

## ■ S/W Specifications

## General

- OS: Linux, kernel 2.6.29
- Boot Loader: U-Boot
- File Systems: UBI, JFFS2, ETX2 / ETX3, VFAT / FAT, NFS

## Pre-installed Utilities

- bash, busybox, sysvinit, wget, ipkg, procps (for webmin), psimcs, lighttpd, vsftpd, iptables, ppp, ssh, wireless\_tools, util-linux-mount / umount, usbutils, Artila utility, and more

## Daemons Started by Default

- ssh (secured shell) with sftp
- syslog / klogd (system and kernel log)
- telnet server (disable root permission in /etc/securetty)
- ftp server (vsftpd)
- web server (lighttpd)
- amgrd (Artila broadcast search daemon)

## Package Management &amp; System Administration

- Supports ipkg to manage the package installation, upgrade and removal
- Supports webmin (use 'ipkg install webmin' to install) for web-based system administration

## Toolchain for Linux

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

## ■ Ordering Information

## Matrix-518

- Linux-ready Arm9 Industrial IoT Gateway

## CB-RJ45F9-150 (91-R45F9-150)

- Serial Cable (RJ45 to DB9 Female, 150cm)

## CBL-F10M9-20 (91-0P9M9-001)

- Console Cable (10Pin Header to DB9 Male, 20cm)

## DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

## Matrix-522



## Features

- ATMEL AT91SAM9G20 400MHz CPU
- Linux kernel 2.6.29 with file system
- 64MB SDRAM and 256MB NAND Flash
- 1 x microSD socket inside, up to 32GB capacity
- 2 x CAN bus ports support SocketCAN / CANOpen
- 2 x 10/100Mbps Ethernet ports
- 2 x RS-232 / 422 / 485 serial ports
- 2 x USB hosts, 21 x GPIOs
- Ultra-low power consumption, less than 3 Watts

## ■ H/W Specifications

## CPU / Memory

- CPU: ATMEL AT91SAM9G20 400MHz w/ MMU
- Memory: 64MB SDRAM, 256MB NAND Flash
- DataFlash@: 2MB, for system backup

## Network Interface

- Type: 2 x 10/100BaseT, RJ45 connector
- Protection: 1.5KV magnetic isolation

## TTY (Serial) Ports

- 2 x RS-232 / 422 / 485
- Connector: DB9 male connector

## TTY (Serial) Port 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
- RS-485 Direction Control: Auto, by hardware

## USB Ports

- Host Ports: 2
- Client Port: 1, reserved
- Speed: USB 2.0 compliant, supports low-speed (1.5Mbps) and full-speed (12Mbps) data rate

## Digital I/Os (GPIO)

- No. of Pins: 21
- Signal Level: CMOS / TTL compatible
- Each pin can be programmed as input or output

## CAN Bus Ports

- Type: 2 x CAN bus 2.0A/B compliant ports
- Speed: Up to 1Mbps
- Isolation: 2500Vrms
- Connector: DB9 male connector

## General

- Watchdog Timer: Yes
- Real-Time Clock (RTC): Yes
- Buzzer: Yes
- Power Input: +9V~+40VDC
- Power Consumption: 12VDC@190mA
- Dimensions (W x H x D): 160 x 104 x 32mm (6.3 x 4.0 x 1.26in)

## ■ S/W Specifications

## General

- OS: Linux, kernel 2.6.29
- Boot Loader: U-Boot
- File Systems: UBI, JFFS2, ETX2 / ETX3, VFAT / FAT, NFS

## Pre-installed Utilities

- bash, busybox, sysvinit, wget, ipkg, procps (for webmin), psimcs, lighttpd, vsftpd, iptables, ppp, ssh, wireless\_tools, util-linux-mount / umount, usbutils, Artila utility, and more

## Daemons Started by Default

- ssh (secured shell) with sftp
- syslog / klogd (system and kernel log)
- telnet server (disable root permission in /etc/securetty)
- ftp server (vsftpd)
- web server (lighttpd)
- amgrd (Artila broadcast search daemon)

## Package Management &amp; System Administration

- Supports ipkg to manage the package installation, upgrade and removal
- Supports webmin (use 'ipkg install webmin' to install) for web-based system administration

## Toolchain for Linux

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

## ■ Ordering Information

## Matrix-522

- Linux-ready Arm9 Industrial CAN Bus Box Computer

## CBL-F10M9-20 (91-0P9M9-001)

- Console Cable (10Pin Header to DB9 Male, 20cm)

## DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit



# Matrix-505



## Features

- Linux 2.6.38 compatible computing platform
- 128MB DDR2 SDRAM and 256MB NAND Flash
- System backup Data Flash: 2MB
- 2 x 10/100Mbps Ethernet ports
- 1 x RS-232 / 422 / 485, 3 x RS-232 / 485 TTY ports
- 2 x USB 2.0 host ports, up to 480Mbps
- 1 x microSD socket inside
- Extremely compact design, 78 x 108 x 24mm
- Ultra-low power consumption, less than 3 Watts

## H/W Specifications

### CPU / Memory

- CPU: ATMEL AT91SAM9G45 400MHz (Arm9, w/ MMU)
- Memory: 128MB DDR2 SDRAM, 256MB NAND Flash
- DataFlash@: 2MB, for system backup

### Network Interface

- No. of Ports: 2, independent
- Type: 10/100BaseT, RJ45 connector
- Protection: 1.5KV magnetic isolation

### TTY (Serial) Ports

- Port 1: Can be set as RS-232 / 422 / 485
- Port 2, 3, 4: Can be set as RS-232 / 485
- Connector: RJ45 connector

### TTY (Serial) Port 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
- RS-485 Direction Control: Auto, by hardware

### USB Ports

- Host Ports: 2
- Client Port: 1, reserved
- Speed: USB 2.0 compliant, supports high-speed (480Mbps) mode

### General

- Watchdog Timer: Yes, for kernel use
- Real-Time Clock (RTC): Yes
- Buzzer: Yes
- microSD Socket: Inside the box
- Power Input: +9V~+48VDC
- Power Consumption: 12VDC@200mA
- Dimensions (W x H x D): 78 x 108 x 24mm (3.0 x 4.25 x 0.94in)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A

## S/W Specifications

### General

- OS: Linux, kernel 2.6.38
- Boot Loader: U-Boot
- File Systems: UBI, JFFS2, ETX2 / ETX3, VFAT / FAT, NFS

### Pre-installed Utilities

- bash, busybox, sysvinit, wget, ipkg, procps (for webmin), psmics, lighttpd, vsftpd, iptables, ppp, ssh, wireless\_tools, util-linux-mount / umount, usbutils, Artila utility, and more

### Daemons Started by Default

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

### Package Management & System Administration

- Supports ipkg to manage the package installation, upgrade and removal
- Supports webmin (use 'ipkg install webmin' to install) for web-based system administration

### Toolchain for Linux

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

### USB Host Drivers

- Generic Flash drive
- RS-232 adapters
- WiFi dongles

## Ordering Information

### Matrix-505

- Linux-ready Arm9 Industrial IoT Gateway with 256MB on-board Flash

### CB-RJ45F9-150 (91-R45F9-150)

- Serial Cable (RJ45 to DB9 Female, 150cm)

### CB-PHDF9-050 (91-PHDF9-050)

- Console Cable (Wafer Box to DB9 Female, 50cm)

### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter

# Matrix-513



## Features

- ATMEL 400MHz Arm9 AT91SAM9G45 CPU
- 128MB DDR2 SDRAM and 256MB NAND Flash
- 2 x 10/100Mbps Ethernet ports
- 2 x high-speed USB hosts, up to 480Mbps
- 1 x full size miniPCIe socket inside (USB signal)
- 1 x half size miniPCIe socket inside (USB signal)
- 4 x RS-232 / 422 / 485 serial ports

## H/W Specifications

### CPU / Memory

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

### Network Interface

- Type: 2 x 10/100BaseT, RJ45 connector
- Protection: 1.5KV magnetic isolation

### TTY (Serial) Ports

- Type: RS-232 / 422 / 485, software select
- Connector: DB9 male
- Port 1, 3, 4: TX, RX, RTS, CTS, GND
- Port 2: TX, RX, RTS, CTS, DCD, DTR, DSR, GND

### USB Ports

- Speed: Supports 480Mbps high-speed mode
- Host Ports: 2
- Client Port: 1

### Digital I/Os (GPIO)

- Inputs: 2 x 2500Vrms opto-isolation
- Output: 1 x relay output (30VDC@1A), supports form A or B (by jumper)

### SD Socket (Secure Digital Card)

- Type: microSD
- No. of Sockets: 1

### General

- Watchdog Timer: Yes, for kernel use
- Real-Time Clock (RTC): YES
- Buzzer: YES
- Power Input: +9V~+48VDC
- Typical Consumption: 12VDC@500mA
- Dimensions (W x H x D): 175 x 103 x 43mm (6.9 x 4.05 x 1.69in)
- Operating Temperature: 0~70°C
- Regulations: CE Class A, FCC Class A

## S/W Specifications

### General

- OS: Linux, kernel 2.6.38
- Boot Loader: U-Boot
- File Systems: UBI, JFFS2, ETX2 / ETX3, VFAT / FAT, NFS, NTFS

### Toolchain for Linux

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

### Package Management & System Administration

- Supports ipkg to manage the package installation, upgrade and removal
- Supports webmin (use 'ipkg install webmin' to install) for web-based system administration

## Platform Features

- Web server (lighttpd) with PHP 5, Python 2.6
- MySQL 5, server and client
- SQLite 3
- SNMP V1 / V2 / V3
- Java

## USB miniPCIe Supports

- Interface: Supports USB signals only
- Full-size Socket: 1, suitable for 2G / 3G card
- Half-size Socket: 1, suitable for WiFi card
- Antenna Mounting Holes: 3, suitable for mounting SMA connectors

## Ordering Information

### Matrix-513

- Linux-ready Arm9 Industrial IoT Gateway (Note: miniPCIe card, antenna and pigtail antenna cable are \*\*NOT\*\* included)

### CB-F10M9-20 (91-0P9M9-001)

- Console Cable (10Pin Header to DB9 Male, 20cm)

### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

### Pigtail-WiFi-1001-20 (91-CST16-001)

- IPEX to RP-SMA Female Coaxial Cable, 20cm

### Pigtail-3G-1001-20 (91-CST17-001)

- IPEX to SMA Female Coaxial Cable, 20cm

### Ant-WiFi-1001 (91-CRF38-001)

- 5dBi External WiFi Antenna

### Ant-3G-1001 (91-CRF37-001)

- 5dBi External 2G / 3G Antenna

### M-9001 (ZA-CAR00-002)

- 802.11b/g/n USB Half-size miniPCIe Card

### M-9011 (ZA-CAR00-001)

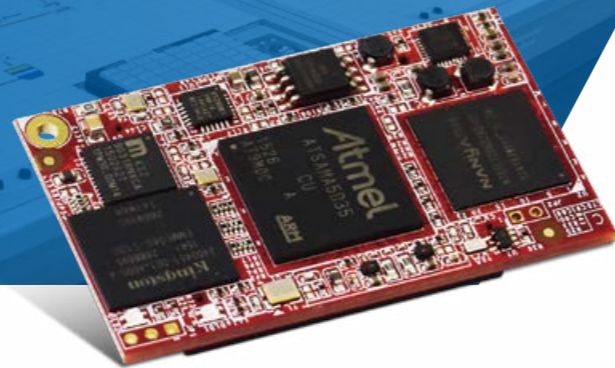
- Full-size miniPCIe 2G / 3G Card

### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter

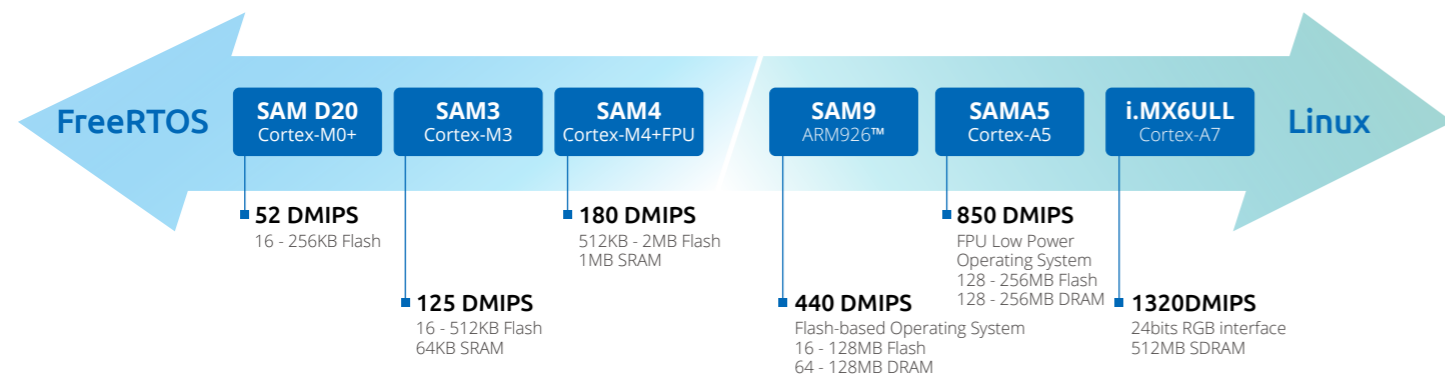
# IoT Device Platform

- Ultra Low Power 32-bit Arm Processor
- Built-in Linux OS with GNU C / C++ Compiler
- Complete Device driver and Utility Support
- Production-ready and Designed-to-cost, Save Time and Resources
- Longevity Support the SoM Solution



## Long-Term Partnership with Arm

A solid foundation for 32-bit Arm® processor-based MCUs



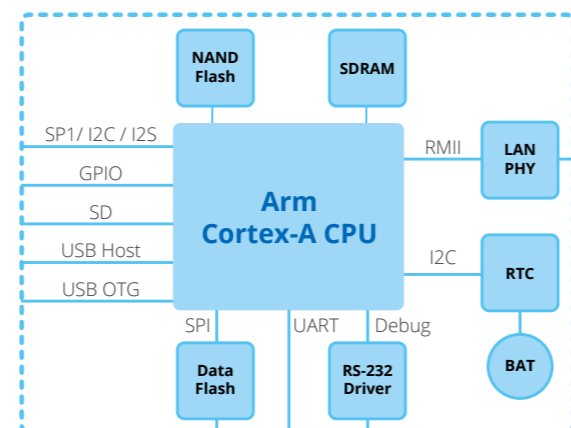
## Linux Arm System On Module

Credit card size, Arm-based Linux-ready System-On-Modules with Ethernet ports, RS-232/422/485 ports, USB ports, SPI, I2S and digital inputs/outputs.

- Market-lead Low Power Consumption
- Arm Cortex-A CPU
- Miniature Size
- Variety of Interfaces

## Linux Arm Single Board Computer

Arm-based Linux-ready single board computers with Ethernet ports, RS-232/422/485 ports, USB ports and digital inputs/outputs.



## Comparison Table



Model	M-X6ULL	M-A5D35	M-501	M-502	M-503	M-9G45A
CPU	NXP i.MX6ULL Cortex-A7 800MHz	Atmel ATSAM5D35 Cortex-A5 536MHz	Atmel AT91RM9200 Arm9 180MHz	Atmel AT91SAM9G20 Arm926 400MHz	Atmel AT91SAM9G20 Arm926 400MHz	Atmel AT91SAM9G20 Arm926 400MHz
Floating Point Unit	YES	N/A				
RAM	512MB SDRAM		64MB SDRAM		128MB DDR2 RAM	
Flash	16M Flash	8MB Flash	16MB NOR	256MB NAND		
SD / MMC	1					
Display	24-bits RGB	N/A				24-bits RGB
Camera Interface	YES	N/A				
Ethernet	10/100Mbps x 2	GLAN x1, 10/100Mbps x 1	10/100Mbps x 1			
UART	4-wire x2, 3-wire x2, 2-wire x1	full x 4	4-wire x 3, full x 1			
CAN Bus	1	2	N/A			
Console	serial console x1					
USB 2.0	OTG x2	HOST x2, Client x1			HOST x1, Client x1	
Touch	YES	N/A	N/A	N/A	N/A	YES
I2C	2	1				
I2S	1					
SPI	0	4	1			
GPIO	8-pin	21-pin	32-pin 3.3V CMOS			15-pin 3.3V CMOS
Linux Kernel	4.14.x	4.9.X	2.6.14	2.6.29	2.6.38	2.6.38
. Boot loader	U-Boot	BareBox	U-Boot			
. File system	EXT4/EXT3/EXT2, VFAT/FAT, NFS		JFFS2, EXT2/EXT3, VFAT/FAT, NFS		UBI, JFFS2, EXT2/3, VFAT/FAT, NFS, NTFS	
Software Development	Tool Chain: gcc + glibc					
Package management	Standard apt-get command, Package repository			support ipkg & webmin		
Node-Red, browser-based editor	YES		N/A			
Dimensions (WxHxD) mm	43 x 68 mm	30 x 50 mm	50 x 80 mm			
Power-Input	5VDC	5VDC	3.3VDC	3.3VDC	3.3VDC	3.3VDC
RTC, Watchdog Timer	YES					



# Linux-ready Cortex-A7 System on Module

# M-X6ULL



## Features

- NXP i.MX6ULL Cortex-A7 CPU, Up to 800MHz
- Linux kernel 4.14.x with boot loader & file system
- Toolchain: gcc 6.2.x + glibc 2.24
- 512MB DDR3/LvDDR3 SDRAM and 16MB DataFlash
- Micro-SD or 4G eMMC
- Dual 10/100MHz Ethernet interface
- 1x CAN, 2x OTG/HOST USB, 4 x UART & I2C / I2S/GPIO
- 24bits RGB display interface
- SODIMM 200 form factor, Compact size, 68 x 43mm
- Single 5VDC operation

## H/W Specifications

### CPU / Memory

- CPU: NXP i.MX6ULL Cortex-A7 MPCore, Up to 800MHz
- SDRAM: 512MB, DDR3/LvDDR3
- DataFlash: 16MB
- eMMC: 4GB (optional to Micro-SD I/F)

### Micro-SD 2.0 Interface

- Signals: cmd, clock, data0~3, card\_detect
- SDHC Compatible

### Network Interface

- Type: 2 x 10/100Mbps Ethernet
- RMII interface

### CAN Interface

- 2 x Flexible Controller Area Network (FlexCAN)
- CAN1~2: TX/RX, compliant to CAN 2.0 partA/B

### UART Interface

- UART1: TX, RX
- UART2: TX, RX, RTS, CTS
- UART5-6: TX, RX, CTS
- Signal Level: 3.3V

### 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

### USB 2.0 Interface

- Supports 480Mbps hi-speed mode
- Two high-speed OTG 2.0 modules with integrated HS USB PHYs

### I2S Interface

- Transmit Signals: data, clock, sync
- Receive Signals: data, clock, sync

### I2C Interface

- Signals: data, clock

### GPIO (General-purpose I/Os)

- No. of Pins: 8

### Console / Debug Ports

- Serial console port (UART interface)

### Display Interface

- One 24bits digital parallel display interface
- Support max 85 MHz display clock and up to WXGA (1366 x 768) at 60 Hz

### Touch Sensor Interface

- With touch controller to support 4-wire and 5-wire resistive touch panel

### General

- Power Input: +5VDC
- SODIMM 200P Form Factor
- Watch-Dog Timer: YES
- Real-Time Clock (RTC): YES
- Dimensions (W x L): 68 x 43 mm
- Mounting Hole x1 reserved, 2.0mm (M2) in diameter
- Consumption: 0.75Watts (Typical)

## S/W Specifications

### Operation System

- Linux kernel 4.14.x
- Support bootup from eMMC or SD card
- Boot Loader: U-Boot
- File System: EXT4/EXT3/EXT2, VFAT/FAT, NFS
- GUI Engine: X11

### Desktop Environment

- Matchbox (X11 Desktop Environment)
- Built-in Firefox / Chromium browser + virtual keyboard

### Software Development

- Toolchain: gcc 6.2.x + glibc 2.24
- Supports in-place C/C++ code compilation

### Package Management

- Package repository: Artila self-maintained repository
- Command: Using standard apt-get command

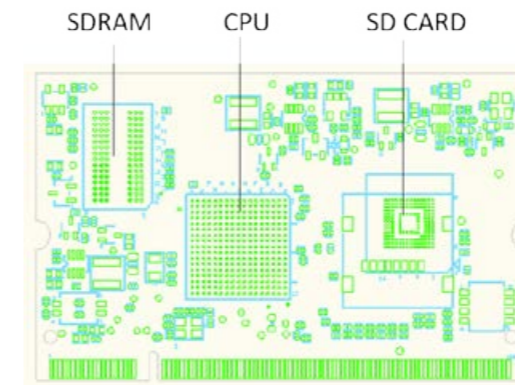
### Popular Packages

- Web server: Apache/Nginx/Lighttpd
- Database: MySQL/SQLite3/PostgreSQL
- Script Language: PHP/Python/Perl/NodeJS
- Text editor: vim/nano/sed
- Administration: Webmin

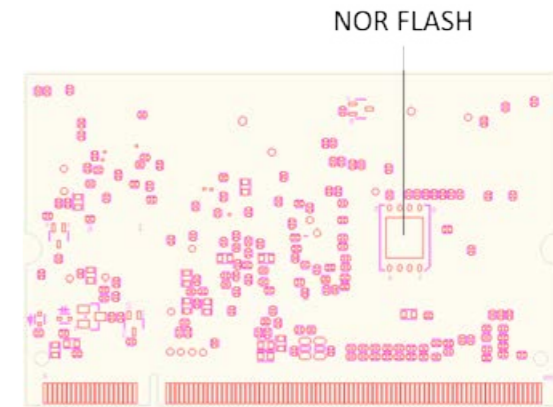
# Linux-ready Cortex-A7 System on Module

# M-X6ULL

## Front View



## Rear View



## M-X6ULL Starter Kit

## H/W Specifications

### M-X6ULL SOM (CPU/Memory)

- CPU: NXP i.MX6ULL Cortex-A7 MPCore, Up to 800MHz
- SDRAM: 512MB, DDR3/LvDDR3
- NOR Flash: 16MB
- eMMC: 4GB (optional to Micro-SD I/F)

### Network Interface

- 2x10/100Mbps Ethernet (RJ45)
- Protection: 1.5KV magnetic isolation

### TTY (Serial) Ports

- 2 x Isolated RS-485 (1500Vrms isolation), Signal: Data+, Data-
- 1 x RS-232 (TX/RX)
- Connector: RS-485/Terminal block, RS-232/D-Sub 9

### CAN Bus Ports

- 2 x CAN bus 2.0 A/B compliant ports
- Speed: Up to 1Mbps

### Console / Debug Ports

- 1 x microUSB console port
- Serial console port (inside the box)

### USB 2.0 Host Interface

- 1 x USB OTG Port (microUSB connector)
- 1 x USB Host Port (USB Type-A connector)

### Audio Out

- 1 x Line-out R/L port, optional Earphone R/L
- Connector: Earphone-Jack

### Digital Input

- 2 x Digital Input channels
- Isolation Protection: 2500Vrms (Photo-Coupler)
- Logical High: 5~24VDC
- Power Requirement
- Expansion
- 1 x miniPCIe Full-size sock t
- 1 x micro-SIM card socket reserve
- SD 2.0 compliant, supports SDHC
- Logical Low: 0~1.5VDC

### Relay Output

- 1 x Relay out channel
- Contact Rating: 30VDC@1A or 125VAC@0.5A

### SD Slot

- 1 x microSD socket
- SD 2.0 compliant, supports SDHC

### Power Requirement

- 1 x microSD socket
- Power Input: +9~+48VDC : 9~48Vdc ( terminal block)

### Display Interface

- 24bits LVDS interface & TTL display interface
- Support max 85 MHz display clock and up to WXGA (1366 x 768) at 60 Hz
- Support Pulse Width Modulation(PWM) to control brightness of LCD

### Touch Sensor Interface

- Reserved touch sensor interface to support 5-wire resistive touch panel

### Expansion

- 1 x miniPCIe Full-size socket
- 1 x micro-SIM card socket reserve

## GNSS/IMU/Cellular Specications

### GNSS (Global Navigation Satellite System)

- 72-channel u-blox M8 e GNSS engine
- Support Dual Satellite: GPS & GLONAS
- -146dBm Tracking and Navigation Sensitivity
- Support AssistNow Online/Offline/Autonomous
- OMA SUPL & 3GPP Compliant
- Max nav. update rate: Single channel/up to 18MHz
- 2 Concurrent GNSS /up to 10MHz
- Accuracy (Position):2.5m CE
- 1 x Active Antenn

## IMU (Inertial Measurement Unit)

### GNSS (Global Navigation Satellite System)

- 1 x 3-Axis digital output Gyroscope
- Gyroscope has a programmable full-scale range of ±250, ±500, ±1000, and ±2000 degrees/sec and very low rate noise at 0.01dps/Hz. Gyroscope operating current: 3.2mA
- 1 x 3-Axis Accelerometer (G-Senso )
- ±2/±4/±8/±16 g user-programmable accelerometer full-scale range
- 16-bit data output
- 1 x 3-Axis Magnetometer (E-Compas )
- Build-in A to D converter for magnetometer data out 16 bit data
- each 3-Axis magnetic component (Sensitivity 0.15uT/LSB-typ.)

## Ordering Information

### M-X6ULL

- Linux-ready Cortex-A7 800MHz System on Module with 512MB SDRAM

### M-X6ULL Starter Kit

- Includes one M-X6ULL SoM and one CB-X6ULL carrier board with power circuitry, Ethernet, Serial port/USB/CAN and SD/miniPCIe socket

# Linux-ready Cortex-A5 System on Module M-A5D35



## Features

- ATMEC Arm Cortex-A5 ATSAMA5D35 536MHz CPU
- Linux kernel 4.9.x with file system
- Toolchain gcc 6.2.x+ glibc 2.24
- 512MB LPDDR2 SDRAM
- 8GB eMMC Flash and 8MB DataFlash for system backup
- Dual Ethernet interface, 1 x Gigabit and 1 x 10/100Mbps, with on-board PHY
- SPI / I2C / I2S / UART / USB / GPIO / CAN / SD
- Miniature size, 50 x 30 mm only
- Single 5VDC operation, less than 1.0W

## H/W Specifications

### CPU / Memory

- CPU: ATMEC Cortex-A5 ATSAMA5D35 536MHz w/ MMU
- SDRAM: 512MB, LPDDR2
- Flash: 8GB, eMMC
- DataFlash: 8MB, for system backup

### Network Interface

- Type: 1 x Gigabit and 1 x 10/100Mbps Ethernet
- PHY: Micrel KSZ8081RNAIA (10/100Mbps)
- PHY: Micrel KSZ9031RNXC (Gigabit)

### UART Interface

- UART1: TX, RX, RTS, CTS (shared w/ CAN1 TX)
- UART2~4: TX, RX, RTS, CTS
- Signal Level: 3.3V

### 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

### CAN Interface

- CAN1: TX (shared w/ UART1 CTS), RX
- CAN2: TX, RX

### Console / Debug Ports

- Serial console port (UART interface)
- USB console port

### USB 2.0 Host Interface

- Supports 480Mbps hi-speed mode
- Host ports: 2

### SPI Interface

- Signals: MISO, MOSI, clock
- Chip Selects: 4, CS0~CS3

### I2C Interface

- Signals: data, clock

### I2S Interface

- Transmit Signals: data, clock, sync
- Receive Signals: data, clock, sync

### SD 2.0 Interface

- Signals: cmd, clock, data0~3, card\_detect
- SDHC Compatible

### Watchdog Interface

- 1 x external watchdog timer input
- 1 x watchdog timer output

### GPIO (General-purpose I/Os)

- No. of Pins: 21

### Power Requirement

- Power Input: +5VDC
- Power Consumption: 0.75 Watts (typical)

### General

- Dimensions (W x L): 50 x 30mm
- Pins: Total 50x2 pins, 1.27mm pitch Female header
- Mounting Hole: x 1, 2.0mm (M2) in diameter

## S/W Specifications

### Operation System

- Linux kernel 4.9.x with file system
- Supports bootup from eMMC or SD card
- Boot Loader : Barebox
- File System: EXT4/ETX3/ETX2, VFAT/FAT, NFS

### Software Development

- Toolchain: gcc 6.2.x + glibc 2.24
- Supports in-place C/C++ code compilation

### Package Management

- Package repository: Artila self-maintained repository
- Command: Using standard apt-get command

### Popular Packages

- Web server: Apache/Nginx/Lighttpd
- Database: MySQL/SQLite3/PostgreSQL
- Script Language: PHP/Python/Perl/NodeJS
- Text editor: vim/nano/sed
- Administration: Webmin

## Ordering Information

### M-A5D35

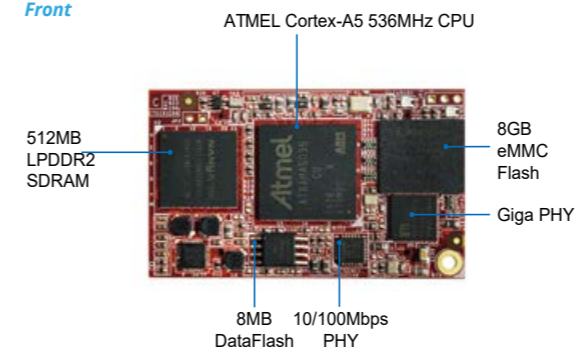
- Linux-ready Cortex-A5 536MHz System on Module with 512MB SDRAM, 8GB eMMC Flash

### M-A5D35 Starterkit

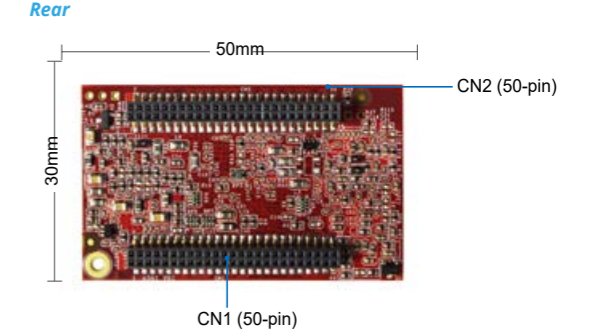
- Includes one M-A5D35 SoM and one carrier board with power circuitry, Ethernet, Serial port/USB and SD socket

# Linux-ready Cortex-A5 System on Module M-A5D35

Front



Rear



## Pin Assignment

CN1

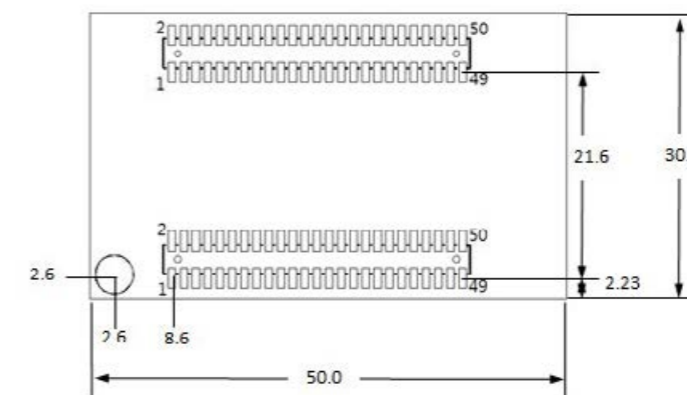
GLAN_RX2-	1	2	GLAN_RX2+
GLAN_TX2-	3	4	GLAN_TX2+
GLAN_RX1-	5	6	GLAN_RX1+
GLAN_TX1-	7	8	GLAN_TX1+
GLAN_GND	9	10	GLAN_GND
LAN_TX+	11	12	LAN_LED
LAN_TX-	13	14	GLAN_LED
LAN_RX+	15	16	Debug_TX
LAN_RX-	17	18	Debug_RX
Ready_LED	PD5	19	PE31/IRQ
USB Device Data-	21	20	USB Device Data+
USB Host_1 Data-	23	24	USB Host_2 Data+
USB Host_1 Data-	25	26	USB Host_2 Data-
Buzzer	PD6	27	PC22 or SPI_MISO
Wakeup	N/A	29	PC23 or SPI_MOSI
H/W Reset	RST#1	31	PC24 or SPI_CLK
		32	PC25 or SPI_CS0
		33	PC26 or SPI_CS1
		34	PC27 or SPI_CS2
		35	PC28 or SPI_CS3
		36	PD19
		37	PD20
		38	PD21
		39	PD22
		40	PD23
		41	PD24
		42	PD25
		43	PD26
		44	PD27
		45	PD28
		46	PD29
		47	PD30
		48	PD31
		49	PD32
		50	PD33

CN2

BAT_In	1	2	+5V
GND	3	4	GND
PD14 or CAN0_RXD	5	6	PB14 or CAN1_RXD
PD15 or CAN0_TXD	7	8	PB15 or CAN1_TXD
PD16 or COM1_RTS	9	10	PB26 or COM2_CTS
PD17 or COM1_RXD	11	12	PB27 or COM2_RTS
PD18 or COM1_TXD	13	14	PB28 or COM2_RXD
PE23 or COM3_CTS	15	16	PB29 or COM2_TXD
PE24 or COM3_RTS	17	18	PE16 or COM4_CTS
PE25 or COM3_RXD	19	20	PE17 or COM4_RTS
PE26 or COM3_TXD	21	22	PE18 or COM4_RXD
PA18 or I2C_Data	23	24	PE19 or COM4_TXD
PA19 or I2C_CLK	25	26	PC16 or I2S_TX_CLK
PD0 or SD_CMD	27	28	PC17 or I2S_TX_Sync
PD1 or SD_Data0	29	30	PC18 or I2S_TX_Data
PD2 or SD_Data1	31	32	PC19 or I2S_RX_CLK
PD3 or SD_Data2	33	34	PC20 or I2S_RX_Sync
PD4 or SD_Data3	35	36	PC21 or I2S_RX_Data
PD9 or SD_CLK	37	38	PD31 or Audio CLK
PA27 or SD_CD	39	40	PA0
PA20	41	42	PA1
PA21	43	44	PA2
PA22	45	46	PA3
PA23	47	48	PA2G
RST#2	49	50	NA

Note: pin 7 also can be used as COM1\_CTS

## Dimension





# Linux-ready Arm9 System on Module M-501



## Features

- ATMEL 180MHz AT91RM9200 CPU w/ MMU
- Linux kernel 2.6.14 with file system
- 64MB SDRAM and 16MB NOR Flash
- 1 x 10/100Mbps Ethernet
- 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
- External bus (A0-A7, D0-D7, RD, WR), with 4 x chip select
- Ultra-low power consumption, less than 2.5 Watts
- GNU C / C++ toolchain is included

## H/W Specifications

### CPU / Memory

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

### Network Interface

- Type: 1 x 10/100Mbps Ethernet
- PHY: DAVIDCOM DM9161
- Protection: 1.5KV magnetic isolation

### UART Interface

- 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

- Host Ports: 2, 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, MCKK, MCDA0-MCDA3
- Compatible with SD memory card specification 1.0

### Watchdog Timer

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

### GPIO (General-purpose I/Os)

- 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 I/O Pins (Reserved)

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

### Debug Ports

- 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: x 4 (CS3, CS4, CS5, CS6)
- Control Bus: RD, WR
- Signal Level: CMOS / 3.3V compatible

### Power Requirement

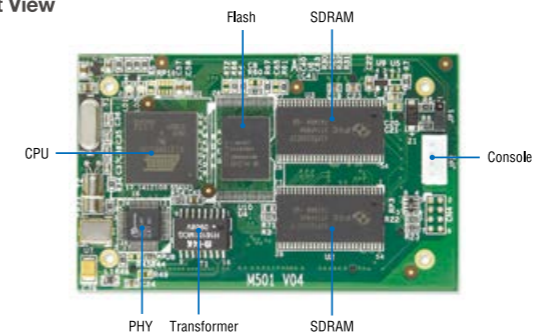
- Power Input: +3.3VDC (Typical)
- Power Consumption: 2W

### General

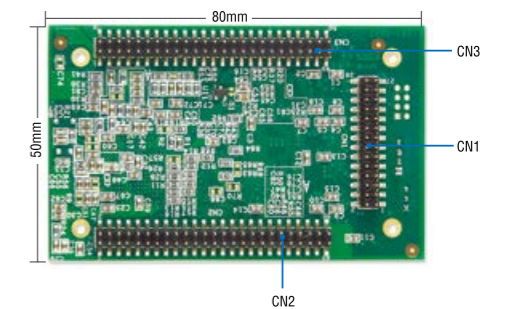
- Board Dimensions (W x L): 80 x 50mm
- 2.0mm Pitch Connectors
- CN1: 28 pins; CN2: 50 pins; CN3: 50 pins
- Mounting Holes: x 4, 2.0mm (M2) in diameter
- Operating Temperature:
  - M-501: 0~70°C (32~158°F)
  - M-501T: -20~80°C (-4~176°F)

# Linux-ready Arm9 System on Module M-501

## Front View



## Rear View



## S/W Specifications

### General

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

### Pre-installed Utilities

- bash, busybox, wget, boa, iptables, ppp, ssh, wireless\_tools, Artila utility

### Daemons Started by Default

- ssh (secured shell)
- syslog / klogd (system and kernel log)
- telnet server (disable root permission in /etc/securetty)
- ftp server (vsftpd)
- web server (lighttpd)
- amgrd (Artila broadcast search daemon)

### 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

### Toolchain for Linux

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

### Standard Device Drivers

- SD / MMC, UART, Ethernet, GPIO, Buzzer
- Real-Time Clock (RTC): Supports Ricoh R55C372
- EEPROM: Supports ATMEL AT24C16 and its compatibles

### Pre-load USB Host Drivers (Could Be Customized)

- Generic Flash drive
- IEEE-802.11 WiFi adapter
- 10/100Mbps Fast Ethernet adapter
- RS-232 adapter
- ADSL modem
- ISDN modem (CDC / ACM compatible)

## Ordering Information

### M-501

- AT91RM9200 + Linux 2.6.14 System on Module with 64MB SDRAM, 16MB NOR Flash

### M-501T

- AT91RM9200 + Linux 2.6.14 System on Module with 64MB SDRAM, 16MB NOR Flash, Wide-temp. Version

### M-501 Starter Kit

- Includes one M-501 SoM and one carrier board with power circuitry, 3 x RS-232 ports, 1 x RS-232 / 422 / 485 port, 1 x Ethernet port, 2 x USB hosts, 1 x SD socket (at rear side), 2 x GPIO connectors, Real Time Clock, EEPROM, and local bus connector

# Linux-ready Arm9 System on Module M-502



## Features

- AT91SAM9G20 CPU w/ MMU
- Linux kernel 2.6.29 with file system
- 64MB SDRAM and 256MB NAND Flash
- 1 x 10/100Mbps Ethernet
- 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
- 32 x GPIOs, CMOS / 3.3V compatible
- Compact size, 50 x 80mm only
- Ultra-low power consumption, less than 2.5 Watts
- GNU C / C++ toolchain is included

## H/W Specifications

### CPU / Memory

- CPU: AT91SAM9G20 w/ MMU
- Memory: 64MB SDRAM, 256MB NAND Flash
- DataFlash@: 2MB, for system backup

### Network Interface

- Type: 1 x 10/100Mbps Ethernet
- 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

- Host Ports: 2, USB 2.0 compliant
- Host Signals: UdataA+, UdataA-, UdataB+, UdataB-
- Device (Client): 1, USB 2.0 compliant
- Device (Client) Signals: Uddata+, Uddata-, Udio

### 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
- Additional watchdog timer is available for users' applications

### GPIO (General-purpose I/Os)

- 32 x GPIOs can be programmed as digital input or output
- 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

### Real Time Clock

- Chip: ST M41T81
- Backup Battery: Lithium, 48mAh

### Debug Ports

- JTAG Port: for low level debug
- Console Port: RS-232 (Tx / Rx) serial console

### Local Bus

- Data Bus: 8-bit (D0~D7)
- Address Bus: 8-bit (A0~A7)
- Chip Select: x 3 (CS0, CS5, CS6)
- Control Bus: RD, WR
- Signal Level: CMOS / 3.3V compatible

### Power Requirement

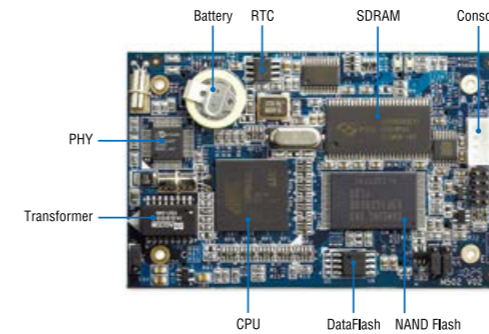
- Power Input: +3.3VDC (Typical)
- Power Consumption: 2W

### General

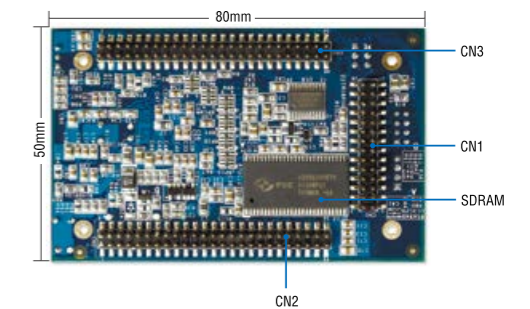
- Board Dimensions (W x L): 80 x 50mm
- 2.0mm Pitch Connectors
- CN1: 28 pins; CN2: 50 pins; CN3: 50 pins
- Mounting Holes: x 4, 2.0mm (M2) in diameter
- Operating Temperature: 0~70°C (32~158°F)

# Linux-ready Arm9 System on Module M-502

## Front View



## Rear View



## S/W Specifications

### General

- OS: Linux, kernel 2.6.29
- Boot Loader: U-Boot
- File Systems: UBI, JFFS2, ETX2 / ETX3, VFAT / FAT, NFS

### Pre-installed Utilities

- bash, busybox, sysvinit, wget, ipkg, procps (for webmin), psimcs, lighttpd, vsftpd, iptables, ppp, ssh, wireless\_tools, util-linux-mount / umount, usbutils, Artila utility

### Daemons Started by Default

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

### Package Management & System Administration

- Supports ipkg to manage the package installation, upgrade and removal
- Supports webmin (use 'ipkg install webmin' to install) for web-based system administration

### Toolchain for Linux

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

### Standard Device Drivers

- Real Time Clock, SD / MMC, UART, Ethernet, GPIO, Buzzer
- EEPROM: Supports AT91SAM9G20 and its compatibles

### Pre-load USB Host Drivers (Could Be Customized)

- Generic Flash drive
- IEEE-802.11 WiFi adapter
- 10/100Mbps Fast Ethernet adapter
- RS-232 adapter
- ADSL modem
- ISDN modem (CDC / ACM compatible)

## Ordering Information

### M-502

- AT91SAM9G20 + Linux 2.6.29 System on Module with 256MB NAND Flash, 64MB SDRAM

### M-502 Starter Kit

- Includes one M-502 SoM and one carrier board with power circuitry, 3 x RS-232 ports, 1 x RS-232 / 422 / 485 port, 1 x Ethernet port, 2 x USB hosts, 1 x SD socket (at rear side), 2 x GPIO connectors, Real Time Clock, EEPROM, and local bus connector



# Linux-ready Arm9 System on Module M-503



## 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
- 1 x 10/100Mbps Ethernet interface, with PHY and transformer on board
- 4 x 921.6Kbps UARTs w/ hardware flow control
- 1 x USB 2.0 host supporting high speed of 480Mbps
- 1 x SD (secure digital) interface, 1 x I2C interface, 1 x I2S interface, 1 x transmitter and 1 x receiver
- 1 x SPI interface with two chip selects

## H/W Specifications

### CPU / Memory

- CPU: ATMEL 400MHz AT91SAM9G45 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-, ERX+, ERX-
- PHY: DAVIDCOM DM9161, on-board
- Protection: 1.5KV magnetic isolation

### UART

- UART 1: TX, RX, RTS, CTS, GND
- UART 2: TX, RX, RTS, CTS, DCD, DTR, DSR, 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 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

### USB Ports

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

### 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: 32, PIO0-PIO32, for input / output
- IRQ Support: PIO32 only
- Signal Level: CMOS / 3.3V compatible

### Pre-defined I/O Pins

- Reset Button (CN2, pin#35), input
- System Reset (CN2, pin#34), input / output
- Buzzer (CN2, pin#37), output
- System Ready LED (CN2, pin#38), output
- LAN activity LED (CN3, pin#11), 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

### Power Requirement

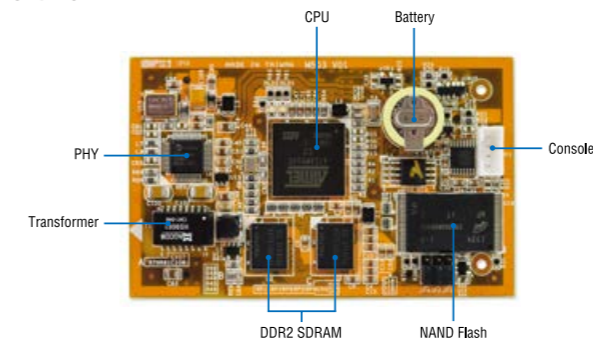
- Power Input: +3.3VDC (Typical)
- Power Consumption: 2Watts (Typical)

### General

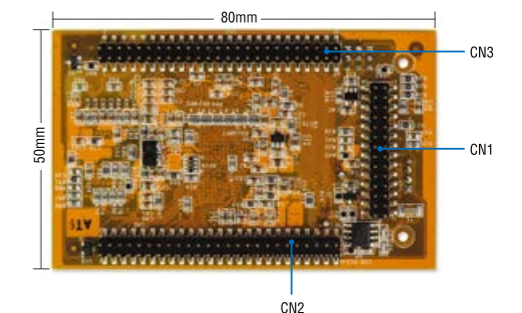
- Board Dimensions (W x L): 80 x 50mm
- Pins: Total 128 pins, 2.0mm pitch  
CN1: 28 pins; CN2: 50 pins; CN3: 50 pins
- Mounting Holes: x 2, 2.0mm (M2) in diameter

# Linux-ready Arm9 System on Module M-503

## Front View



## Rear View



## S/W 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, gk+, x11, gpe, alsa, madplayer, psplash, sysvinit, wget, ipkg, procps (for webmin), psmics, lighttpd, vsftpd, iptables, ppp, openssh, wireless\_tools, util-linux-mount / umount, usbutils, python, 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 permission in /etc/security)
- ftp server (vsftpd)
- web server (lighttpd)
- amgrd (Artila broadcast search daemon)

### Toolchain for Linux

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

### 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

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

### Pre-load USB Device Drivers (Could Be Customized)

- Generic Flash drive
- IEEE-802.11 WiFi adapter
- 10/100Mbps Fast Ethernet adapter
- RS-232 adapter
- Webcam
- Keyboard / Mouse
- 3G modem
- ISDN modem (CDC / ACM compatible)
- Bluetooth

## Ordering Information

### M-503

- AT91SAM9G45 + Linux 2.6.38 System on Module with 256MB NAND Flash, 128MB DDR2 SDRAM

### M-503 Starter Kit

- Includes one M-503 SoM and one carrier board with power circuitry, 3 x RS-232 ports, 1 x RS-232 / 422 / 485 port, 1 x Ethernet port, 2 x USB hosts, 1 x SD socket (at rear side), 2 x GPIO connectors, Real Time Clock, EEPROM, and local bus connector

# Linux-ready Arm9 System on Module M-9G45A



## 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 860 pixels
- Supports 4-wire touchscreen
- 1 x 10/100Mbps Ethernet interface, with PHY and transformer on board

## H/W Specifications

### CPU / Memory

- CPU: ATMEL 400MHz AT91SAM9G45 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-, ERX+, ERX-
- PHY: DAVIDCOM DM9161, 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 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

### USB Ports

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

### 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, PIO0-PIO14
- Signal Level: CMOS / 3.3V compatible

### AC97 Interface

- Signals: RX, TX, FS, CK
- (Note: signals are shared with GPIOs, PIO11-14)

### Pre-defined I/O 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

### Debug Ports

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

### LCD Interface (TTL)

- Resolution: Up to 1280 x 860 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 Requirement

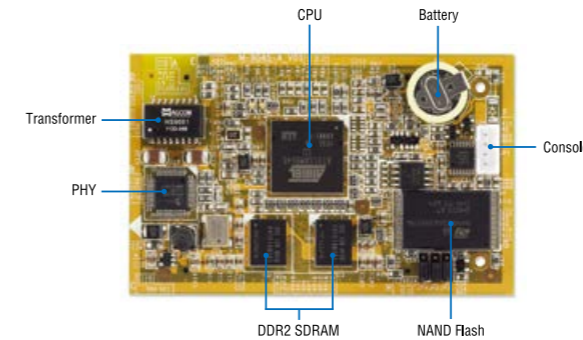
- Power Input: +3.3VDC (Typical)
- Power Consumption: 2 Watts (Typical)

### General

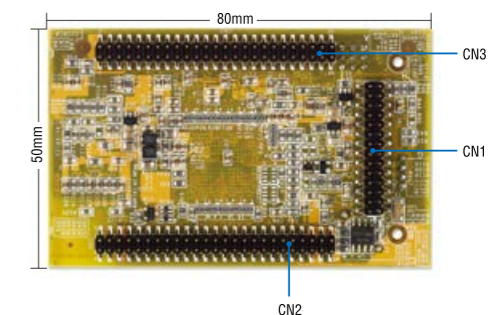
- Board Dimensions (W x L): 80 x 50mm
- Pins: Total 128 pins, 2.0mm pitch
- CN1: 28 pins; CN2: 50 pins; CN3: 50 pins
- Mounting Holes: x 2, 2.0mm (M2) in diameter

# Linux-ready Arm9 System on Module M-9G45A

## Front View



## Rear View



## S/W 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, gk+, x11, gpe, alsa, madplayer, psplash, sysvinit, wget, ipkg, procps (for webmin), psmics, lighttpd, vsftpd, iptables, ppp, openssh, wireless\_tools, util-linux-mount / umount, usbutils, python, 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 permission in /etc/security)
- ftp server (vsftp)
- web server (lighttpd)
- amgrd (Artila broadcast search daemon)

### Toolchain for Linux

- GCC: C / C++ PC cross compiler
- GLIBC: POSIX Library
- GUL: 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 (Could Be Customized)

- Generic Flash drive
- IEEE-802.11 WiFi adapter
- 10/100Mbps Fast Ethernet adapter
- RS-232 adapter
- Webcam
- Keyboard / Mouse
- 3G modem
- ISDN modem (CDC / ACM compatible)
- Bluetooth

## Ordering Information

### M-9G45A

- AT91SAM9G45 + 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



# Programmable Automation Controller

- Arm-based, Linux-ready Industrial-grade Programmable Controller
- Industrial Isolated I/O
- Dual Ethernet and Isolated RS-485
- DIN RAIL Mounting



## PAC Series Linux Arm Programmable Automation Controllers

Arm-based Linux-ready PAC (programmable automation controller) supporting analog inputs, isolated digital inputs and high-drive digital outputs. PAC series featuring a modular, Arm-based system, expansable the I/Os with lineup of discrete, analog and specialty I/O modules to solve advanced control problems in rugged, industrial environments.



Redundant Network



Efficient Performance



Advanced Security



Easy Management



500mA High-Drive Digital Output



16-bit A/D Converter  
Diff. input, mV, V, 0~20mA



2500Vrms Opto-isolation Digital Input

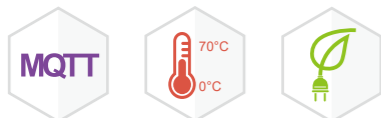


2500Vrms Isolation

## Remote IO-PG Series FreeRTOS Programmable Remote I/O Module

The device manager utility featuring device discovery, network configuration, user's web page and firmware upload is also included. An example program which demonstrates how to push sensor data to IBM Bluemix using MQTT is also included for quick sensor to cloud application development. Low power consumption of Arm cortex M4 plus high efficiency of FreeRTOS make RIO-2014PG an ideal light weight computing platform for device networking and remote monitoring.

- Stand Alone Operation Without a Host PC
- Control Algorithm is Programmable by C Language
- FreeRTOS Real Time I/O



## PAC Series Comparison Table



Model	PAC-4000	PAC-4010	PAC-4070	PAC-5010	PAC-5070
CPU		Atmel AT91SAM9G20 Arm926 400MHz		Atmel AT91RM9200 Arm920 180MHz	
RAM		64MB SDRAM		64MB SDRAM	
Flash		256 NAND		16MB NOR	
SD Card socket		Micro-SD x 1		SD x 1	
Ethernet		10/100Mbps x2		10/100Mbps x2	
No. of Serial Port		RS-232 x2, RS-232/485 isolation x2		RS-232 x1, RS-485 x1	
USB Host		2		2	
USB Client		1		1	
Digital I/O Channels	N/A	16	8	24	16
. Digital Input (Isolated))	--	8	4	16	8
. Relay Out	--	8	4	--	--
. High Drive Output (500mA)	--	--	--	8	8
Differential Analog Input	N/A	N/A	4	N/A	4
miniPCIe slot		N/A		N/A	
Linux Kernel		2.6.29		2.6.19	
. Boot loader		U-Boot		U-Boot	
. File system		JFFS2, EXT2/EXT3, VFAT/FAT, NFS			
Software Development		Tool Chain: gcc + glibc			
Package management		support ipkg & webmin			
Dimensions (W x H x D) mm	45x130x102.5	65x130x102.5		160x104x32	
Power Input		+9 ~ +48VDC		+9 ~ +40VDC	

## RIO-PG Comparison Table



Model	RIO-2010PG	RIO-2014PG	RIO-2015PG	RIO-2017PG
CPU	NXP LPC1768 Cortex M3 100MHz	Atmel SAM4E16E Cortex-M4120MHz		NXP LPC1768 Cortex-M3 100MHz
RAM	128M SRAM	128KB SRAM		128M SRAM
Flash	2MB Flash	1MB		2MB Flash
Micro-SD card socket		1		
10/100Mbps Ethernet		10/100Mbps x 1		
No. of Serial Port	1	2	2	0
. RS-232	0	1	1	0
. RS-485	1 isolated	1 isolated	1 isolated	
Digital I/O Channels	24	6	6	0
. Digital Input (Isolated))	16	4	4	1
. Relay Output	8	2	2	0
Maxim 1-Wire Interface	3	2	1	1
Isolated Analog Input	N/A	4	4	8
Isolated Analog Output	N/A	N/A	2	N/A
RealTime OS		FreeRTOS		
. ToolChain	Sourcery CodeBench Lite or Keil	ATMEL Studio		Sourcery CodeBench Lite or Keil
. Library support		lwIP / BSD socket library		
Windows Utility		YES		
Web Server Support		YES		
Dimensions (W x H x D) mm	182x118x35.82	116x121.5x43	116x121.5x43	78 x 108 x 24
Power		+9 ~ +48VDC		

# Linux-based Arm9 Programmable Automation Controller

## PAC-4000



### Features

- ATMEL AT91SAM9G20 400MHz CPU w/ MMU
- Linux kernel 2.6.29 with file system
- 64MB SDRAM and 256MB NAND Flash
- 2MB DataFlash for system recovery
- On-board real-time clock
- 2 x 10/100Mbps Ethernet ports
- 4 x RS-232 ports, 921.6Kbps max.
- 2 x 1500Vrms isolated RS-485 ports, with auto direction control
- 2 x USB 2.0 Hosts supporting full speed of 12Mbps
- Small form factor (W x H x D): 45 x 130 x 102.5mm

### H/W Specifications

#### CPU / Memory

- CPU: ATMEL AT91SAM9G20 400MHz w/ MMU
- Memory: 64MB SDRAM, 256MB NAND Flash
- DataFlash@: 2MB, for system backup

#### Network Interface

- No. of Ports: 2
- Type: 10/100Mbps Ethernet, RJ45 connector
- Protection: 1.5KV magnetic isolation

#### Serial Ports

- 2 x RS-485 or RS-232 (Port 1 and Port 2)
- 2 x RS-232 (Port 3 and Port 4)
- Protection: 15KV ESD for RS-232; 1500Vrms isolation and 15KV ESD for RS-485
- Connector: RJ45 for RS-232; Terminal Block for RS-485

#### Serial Port 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
- RS-485 Direction Control: Auto, by hardware

#### USB Ports

- Host Ports: 2, USB 2.0 compliant
- Client Port: 1, reserved
- Speed: Supports low-speed (1.5Mbps) and full-speed (12Mbps)

#### SD Socket (Secure Digital Card)

- 1 x Micro-SD socket (at bottom side)
- SD 2.0 Compliant, support SDHC

#### General

- Watchdog Timer: Yes
- Real-Time Clock (RTC): Yes, with backup battery
- Buzzer: Yes
- Power Input: +9V~+48VDC
- Power Consumption: 12VDC@300mA
- Dimensions (W x H x D): 45 x 130 x 102.5mm (1.77x5.12x4.03in)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A

### S/W Specifications

#### General

- OS: Linux, kernel 2.6.29
- Boot Loader: U-Boot
- File Systems: UBI, JFFS2, ETX2 / ETX3, VFAT / FAT, NFS
- Internet Protocol: TCP, UDP, IPv4, SNMP V1 / V2 / V3, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SMTP, TELNET, FTP, TFTP, PPP, PPPoE
- Internet Security: OpenVPN, iptables

#### Pre-installed Utilities

- bash, busybox, sysvinit, wget, ipkg, procs (for webmin), psmics, lighttpd, vsftpd, iptables, ppp, ssh, wireless\_tools, util-linux-mount / umount, usbtutils, Artila utility and more

#### Daemons Started by Default

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

#### Package Management & System Administration

- Supports ipkg to manage the package installation, upgrade and removal
- Supports webmin for web-based system administration

#### Toolchain for Linux

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

#### USB Host Drivers (Could Be Customized)

- Generic Flash drive
- RS-232 adapters
- WiFi dongles

### Ordering Information

#### PAC-4000

- Linux-based Arm9 Programmable Automation Controller

#### CB-RJ45F9-150 (91-R45F9-150)

- Serial Cable (RJ45 to DB9 Female, 150cm)

#### CB-PHDF9-050 (91-PHDF9-050)

- Console Cable (Wafer Box to DB9 Female, 50cm)

#### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter

# Linux-based Arm9 Programmable Automation Controller

## PAC-4010



### Features

- ATMEL AT91SAM9G20 400MHz CPU w/ MMU
- Linux kernel 2.6.29 with file system
- 64MB SDRAM and 256MB NAND Flash
- 2MB DataFlash for system recovery
- 2 x 10/100Mbps Ethernet ports
- Up to 4 x RS-232 ports, 921.6Kbps max.
- 2 x 1500Vrms isolated RS-485 ports, with auto direction control
- 2 x USB 2.0 Hosts supporting full speed of 12Mbps
- 8 x 2500Vrms opto-isolated digital inputs
- 8 x 500mA max. High-Drive digital outputs
- Small form factor (W x H x D): 65 x 130 x 102.5mm

### H/W Specifications

#### CPU / Memory

- CPU: ATMEL AT91SAM9G20 400MHz w/ MMU
- Memory: 64MB SDRAM, 256MB NAND Flash
- DataFlash@: 2MB, for system backup

#### Network Interface

- Type: 2 x 10/100Mbps Ethernet, RJ45 connector
- Protection: 1.5KV magnetic isolation

#### Serial Ports

- 2 x RS-485 or RS-232 (Port 1 and Port 2)
- 2 x RS-232 (Port 3 and Port 4)
- Protection: 15KV ESD for RS-232; 1500Vrms isolation and 15KV ESD for RS-485
- Connector: RJ45 for RS-232; Terminal Block for RS-485

#### Serial Port 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
- RS-485 Direction Control: Auto, by hardware

#### USB Ports

- Host Ports: 2, USB 2.0 compliant
- Client Port: 1, reserved
- Speed: Supports low-speed (1.5Mbps) and full-speed (12Mbps)

#### SD Socket (Secure Digital Card)

- 1 x Micro-SD socket (at bottom side)
- SD 2.0 Compliant, support SDHC

#### Isolated Digital Input

- No. of Channels: 8
- Logical High: 5~24VDC; Logical Low: 0~1.5VDC
- Input Resistance: 1.2K ohms@0.5W
- Response Time: 20µs
- Opto-isolation: 2500Vrms

#### High-Drive Digital Output

- No. of Channels: 8
- Source Driver: UDN2981A (Allegro MicroSystems)
- Source Voltage (VDD): 5~50VDC
- Output Current: 500mA max.
- Isolation: 2500Vrms

#### General

- Watchdog Timer: Yes
- Real-Time Clock (RTC): Yes, with backup battery
- Buzzer: Yes

- Power Input: +9V~+48VDC
- Power Consumption: 12VDC@300mA
- Dimensions (W x H x D): 65 x 130 x 102.5mm (2.56x5.12x4.03in)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A

### S/W Specifications

#### General

- OS: Linux, kernel 2.6.29
- Boot Loader: U-Boot
- File Systems: UBI, JFFS2, ETX2 / ETX3, VFAT / FAT, NFS
- Internet Protocol: TCP, UDP, IPv4, SNMP V1 / V2 / V3, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SMTP, TELNET, FTP, TFTP, PPP, PPPoE
- Internet Security: OpenVPN, iptables

#### Pre-installed Utilities

- bash, busybox, sysvinit, wget, ipkg, procs (for webmin), psmics, lighttpd, vsftpd, iptables, ppp, ssh, wireless\_tools, util-linux-mount / umount, usbtutils, Artila utility and more

#### Daemons Started by Default

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

#### Package Management & System Administration

- Supports ipkg to manage the package installation, upgrade and removal
- Supports webmin for web-based system administration

#### Toolchain for Linux

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

#### USB Host Drivers (Could Be Customized)

- Generic Flash drive
- RS-232 adapters
- WiFi dongles

### Ordering Information

#### PAC-4010

- Linux-based Arm9 Programmable Automation Controller

#### CB-RJ45F9-150 (91-R45F9-150)

- Serial Cable (RJ45 to DB9 Female, 150cm)

#### CB-PHDF9-050 (91-PHDF9-050)

- Console Cable (Wafer Box to DB9 Female, 50cm)

#### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter



## PAC-4070



## Features

- ATMEL AT91SAM9G20 400MHz CPU w/ MMU
- Linux kernel 2.6.29 with file system
- 64MB SDRAM and 256MB NAND Flash
- GNU C / C++ toolchain is included
- 4 x 16-bit multiplexed differential analog inputs
- 4 x 2500Vrms 500mA High-Drive digital outputs
- 4 x 2500Vrms Opto-isolated bipolar digital inputs
- 2 x 10/100Mbps Ethernet ports
- Up to 4 x RS-232 ports, 921.6Kbps max.
- 2 x 1500Vrms isolated RS-485 ports, with auto direction control

## ■ H/W Specifications

## CPU / Memory

- CPU: ATMEL AT91SAM9G20 400MHz w/ MMU
- Memory: 64MB SDRAM, 256MB NAND Flash
- DataFlash@: 2MB, for system backup

## Network Interface

- No. of Ports: 2
- Type: 10/100Mbps Ethernet, RJ45 connector
- Protection: 1.5kV magnetic isolation

## TTY (Serial) Ports

- Port 1: Can be set as RS-232 or RS-485, software selectable  
RS-232: TX, RX, RTS, CTS, GND  
RS-485: D+, D- (must wiring to terminal block)
- Port 2: Can be set as RS-232 or RS-485, software selectable  
RS-232: TX, RX, RTS, CTS, DSR, DTR, DCD, GND  
RS-485: D+, D- (must wiring to terminal block)
- Port 3, 4: RS-232 only  
RS-232: TX, RX, RTS, CTS, GND

## 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

## USB Ports

- Host Ports: 2, USB 2.0 compliant
- Client Port: 1, USB 2.0 compliant
- Speed: Supports 12Mbps full-speed mode

## SD Socket (Secure Digital Card)

- 1 x Micro-SD socket (at bottom side)
- SD 2.0 Compliant, support SDHC

## Real Time Clock

- Chip: ST M41T81
- Backup Battery: Lithium, 48mAh, on-board

## Watchdog Timer

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

## Debug Port

- Type: RS-232 serial console, inside the box
- Signals: Tx, Rx, GND

## High-precision Analog Input

- A/D Converter: AD7712 (Analog Devices)
- No. of Channels: 4, multiplexed, differential
- Sampling Speed: 10 readings per second
- Input Range (selected by software):  
0~150mV, 0~500mV, +/-150mV, +/-500mV  
0~1V, 0~5V, 0~10V, +/-1V, +/-5V, +/-10V  
0~20mA
- Resolution: 16-bit
- Accuracy: +/-0.1%
- Voltage Input Mode: Differential, 100db CMR
- Voltage Input Impedance: 20M Ohms
- Current Input Impedance: 120 Ohms
- Isolation Protection: 1500VDC

## Isolated Digital Input

- No. of Channels: 4, supporting bipolar input
- Opto-isolation: 2500Vrms
- Logical High: 5~24VDC
- Logical Low: 0~1.5VDC
- Response Time: 20µs
- Input Resistance: 1.2k ohms@0.5W

## High-Drive Digital Output

- No. of Channels: 4
- Source Driver: UDN2981A (Allegro MicroSystems)
- Source Voltage (VDD): 5~50VDC
- Output Current: 500mA max.
- Isolation: 2500Vrms

## General

- Power Input Range: +9V~+48VDC
- Power Consumption: 12VDC@500mA, 6 Watts max.
- Operating Temperature: 0~70°C (32~158°F)
- EMC Regulation: CE Class A, FCC Class A
- Dimensions (W x H x D): 65 x 130 x 102.5mm (2.56x5.12x4.03in)
- Mounting: DIN RAIL mountable

## ■ Ordering Information

## PAC-4070

- Linux-based Arm9 Programmable Automation Controller

## CB-RJ45F9-150 (91-R45F9-150)

- Serial Cable (RJ45 to DB9 Female, 150cm)

## CB-PHDF9-050 (91-PHDF9-050)

- Console Cable (Wafer Box to DB9 Female, 50cm)

## PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter

## PAC-5010



## Features

- Linux kernel 2.6.14 OS with file system
- 64MB SDRAM and 16MB NOR Flash
- 16 x opto-isolated digital inputs
- 8 x Darlington-pair digital outputs to drive external relays
- 2 x 10/100Mbps Ethernet ports
- 1 x RS-232 port, 1 x RS-485 port
- 2 x USB 2.0 host ports for add-on functionality expansion
- 1 x SD memory card slot included for storage expansion
- GNU C / C++ toolchain for Linux / Windows environment
- 9~40VDC input range

## ■ H/W Specifications

## CPU / Memory

- CPU: ATMEL Arm9 AT91RM9200 180MHz w/MMU
- Memory: 64MB SDRAM, 16MB NOR Flash

## Network Interface

- Type: 2 x 10/100BaseT, RJ45 connector

## TTY (Serial) Ports

- RS-485: One port, with screw-fixed wiring terminal  
Signals: Data+, Data-, GND
- RS-232: One port, with 10-pin header  
Signals: Tx, Rx, RTS, CTS, DSR, DTR, DCD, GND
- Console: One port, with 10-pin header  
Signals: Tx, Rx, GND

## TTY (Serial) Port 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

## USB Ports

- Host Ports: 2, USB 2.0 compliant, with 10-pin header
- Data Rate: Up to 12Mbps

## Mass Storage

- 1 x Micro-SD socket (at bottom side)
- SD 2.0 Compliant, support SDHC

## Isolated Digital Input

- No. of Channels: 16
- Logical High: 5~24VDC
- Logical Low: 0~1.5VDC
- Input Resistance: 1.2K ohms@0.5W
- Response Time: 20µs
- Opto-isolation: 2500Vrms

## Digital Output

- No. of Channels: 8
- Source Driver: UDN2981A (Allegro MicroSystems)
- Source Voltage (VDD): 5~50VDC
- Output Current: 500mA max.

## General

- Watchdog Timer: Yes, for kernel use
- Real-Time Clock (RTC): Yes
- Buzzer: Yes
- Power Input: +9~+40VDC
- Power Consumption: 12VDC@800mA
- Dimensions (W x H x D): 160 x 104 x 32mm (6.3x4.13x1.26in)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A

## ■ S/W Specifications

## General

- OS: Linux, kernel 2.6.14
- Boot Loader: U-Boot
- File Systems: JFFS2, ETX2 / ETX3, VFAT / FAT, NFS

## Protocol Stacks

- IPv4, ICMP, ARP, DHCP, NTP, TCP, UDP, FTP, TELNET, HTTP, PPP, PPPoE, CHAP, PAP, SMTP, SNMP V1 / V2, SSL, SSH 1.0 / 2.0

## Pre-installed Utilities

- bash: shell command
- tinylogin: login and user manager utility
- telnet: telnet client program
- busybox: Linux utility collection
- ftp: ftp client program

## 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
- amgrd: Artilla manager daemon

## Toolchain for Linux

- GCC: C / C++ PC cross compiler for Linux, Cygwin
- GLIBC: POSIX Library

## Device Drivers

- SD / MMC, UART, Real Time Clock, Buzzer, Digital I/O, Ethernet, Watchdog Timer

## USB Host Drivers (Could Be Customized)

- Flash disk
- WiFi (IEEE-802.11)
- RS-232 adapters

## ■ Ordering Information

## PAC-5010

- Linux-based Arm9 Programmable Automation Controller

## CB-F10M9-20 (91-0P9M9-001)

- Console Cable (10Pin Header to DB9 Male, 20cm)

# Linux-based Arm9 Programmable Automation Controller PAC-5070



## Features

- Linux kernel 2.6.14 OS with file system
- 64MB SDRAM and 16MB NOR Flash
- 4 x 16-bit high-precision multiplexed analog inputs
- 8 x 2500Vrms opto-isolated digital inputs
- 8 x 500mA High-Drive digital outputs
- 2 x 10/100Mbps Ethernet ports
- 1 x RS-232 port, 1 x RS-485 port
- 2 x USB 2.0 host ports for add-on functionality expansion
- 1 x SD memory card slot included for storage expansion
- GNU C / C++ toolchain for Linux / Windows environment
- 9~40VDC input range

## H/W Specifications

### CPU / Memory

- CPU: ATMEL Arm9 AT91RM9200 180MHz w/MMU
- Memory: 64MB SDRAM, 16MB NOR Flash

### Network Interface

- Type: 2 x 10/100BaseT, RJ45 connector

### USB Ports

- Host Ports: 2, USB 2.0 compliant, with 10-pin header
- Data Rate: Up to 12Mbps

### Mass Storage

- 1 x Micro-SD socket (at bottom side)
- SD 2.0 Compliant, support SDHC

### TTY (Serial) Ports

- RS-485: One port, with screw-fixed wiring terminal
- Signals: Data+, Data-, GND
- RS-232: One port, with 10-pin header
- Signals: Tx, Rx, RTS, CTS, DSR, DTR, DCD, GND
- Console: One port, with 10-pin header
- Signals: Tx, Rx, GND

### TTY (Serial) Port Parameters

- 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

### High Drive Digital Output

- No. of Channels: 8
- Source Driver: UDN2981A (Allegro MicroSystems)
- Source Voltage (VDD): 5~50VDC
- Output Current: 500mA max.

### General

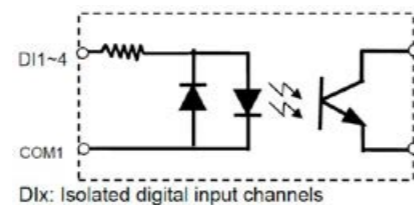
- Watchdog Timer: Yes, for kernel use
- Real-Time Clock (RTC): Yes
- Buzzer: Yes
- Power Input: +9V~+40VDC
- Power Consumption: 12VDC@800mA
- Dimensions (W x H x D): 160 x 104 x 32mm (6.3x4.13x1.26in)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A

### High-precision Analog Input

- A/D Converter: AD7712 (Analog Devices)
- No. of Channels: 4, multiplexed, differential
- Sampling Speed: 10 readings per second
- Input Range (selected by software):  
0~150mV, 0~500mV, +/-150mV, +/-500mV  
0~1V, 0~5V, 0~10V, +/-1V, +/-5V, +/-10V  
0~20mA
- Resolution: 16-bit
- Accuracy: +/-0.1%
- Voltage Input Mode: Differential, 100db CMR
- Voltage Input Impedance: 20M Ohms
- Current Input Impedance: 120 Ohms
- Isolation Protection: 1500VDC

### Isolated Digital Input

- No. of Channels: 8  
Logical High: 5~24VDC  
Logical Low: 0~1.5VDC  
Input Resistance: 1.2K ohms@0.5W
- Response Time: 20µs
- Opto-isolation: 2500Vrms



# Linux-based Arm9 Programmable Automation Controller PAC-5070

## S/W Specifications

### General

- OS: Linux, kernel 2.6.14
- Boot Loader: U-Boot
- File Systems: JFFS2, ETX2 / ETX3, VFAT / FAT, NFS

### Protocol Stacks

- IPv4, ICMP, ARP, DHCP, NTP, TCP, UDP, FTP, TELNET, HTTP, PPP, PPPoE, CHAP, PAP, SMTP, SNMP V1 / V2, SSL, SSH 1.0 / 2.0

### Pre-installed Utilities

- bash: shell command
- tinylogin: login and user manager utility
- telnet: telnet client program
- busybox: Linux utility collection
- ftp: ftp client program

### 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
- amgrd: Artila manager daemon

### Toolchain for Linux

- GCC: C / C++ PC cross compiler for Linux, Cygwin
- GLIBC: POSIX Library

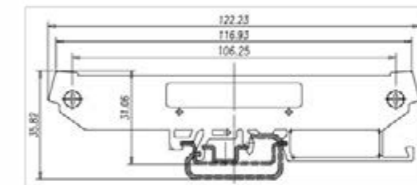
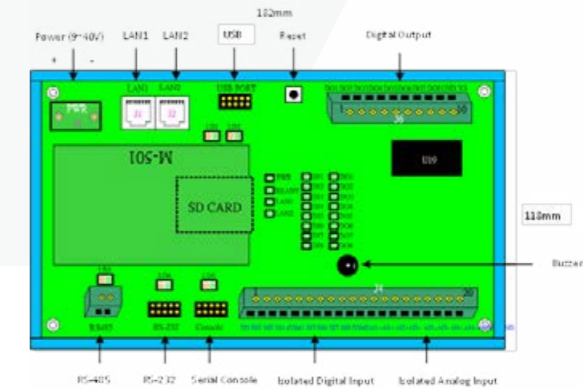
### Device Drivers

- SD / MMC, UART, Real Time Clock, Buzzer, Digital I/O, Ethernet, Watchdog Timer

### USB Host Drivers (Could Be Customized)

- Flash disk
- WiFi (IEEE-802.11)
- RS-232 adapters

## Layout



## Ordering Information

### PAC-5070

- Linux-based Arm9 Programmable Automation Controller
- **CB-F10M9-20 (91-0P9M9-001)**
- Console Cable (10Pin Header to DB9 Male, 20cm)



# FreeRTOS Programmable Remote I/O Module

## RIO-2010PG



### Features

- NXP Arm Cortex-M3 LPC1768 100MHz CPU
- 512KB on-chip Flash and 64KB SRAM
- 1 x full modem RS-232 and 1 x isolated RS-485 serial port
- 1 x 10/100Mbps Ethernet port
- 1 x serial console port
- Support lwIP and BSD socket library
- Support tiny web server
- Windows configuration utility included
- Toolchain: Sourcery CodeBench Lite or Keil from ARM

### H/W Specifications

#### CPU / Memory

- CPU: NXP Arm Cortex-M3 LPC1768 100MHz
- Memory: 512KB on-chip Flash, 64KB SRAM

#### Network Interface

- Type: 1 x 10/100Mbps Ethernet, RJ45 connector
- Protection: 1.5KV magnetic isolation

#### Serial Ports

- Port 1: RS-232 full modem
- Port 2: RS-485 2500Vrms isolated
- Console: RS-232 three wires

#### Serial Port Parameters

- Baud Rate: 1.2~921.6Kbps
- Flow Control: None / Hardware / Xon\_Xoff
- Data Bits: 5 to 8
- Stop Bits: 1 to 2
- Protection: 15KV ESD

#### Isolation Digital Input

- No. of Channels: 16
- Photo Isolation (AC in): 2500Vrms
- Logical High: 5~24VDC
- Logical Low: 0~1.5VDC
- Input Resistance: 1.2k Ohms@0.5W

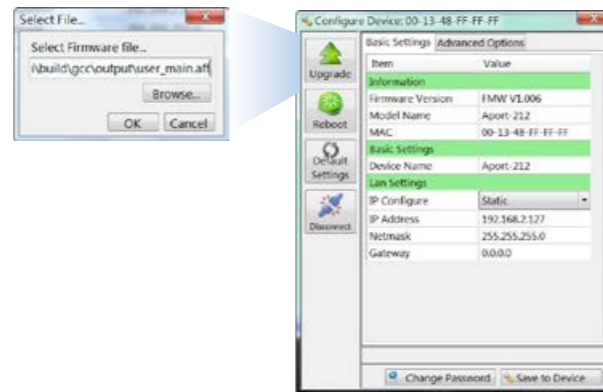
#### Relay Output

- No. of Channels: 8
- Contact Rating: 30VDC@1A or 125VAC@0.5A

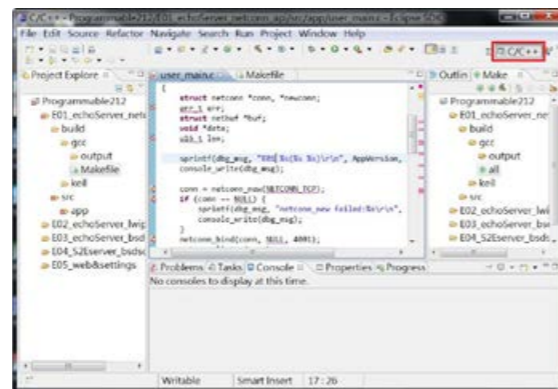
#### General

- Temperature Sensor: Maxim DS18B20 (optional accessory 91-6DS18-001)
- Temperature Range: -55°C~125°C
- Accuracy: +/-0.5°C
- Real-Time Clock (RTC): Manual or NTP (Network Time Protocol) setup and sync.
- Power: 9~48VDC power jack and terminal block
- Dimensions (W x H x D): 182 x 118 x 36 mm (7.16x4.64x1.41in)
- Operating Temperature: 0~70°C (32~158°F)

### Windows Utility Software



### Example Program



### Ordering Information

- RIO-2010PG**
  - Programmable Remote I/O Module
- CB-F10M9-20 (91-0P9M9-001)**
  - Console Cable (10Pin Header to DB9 Male, 20cm)
- DS18B20 (91-6DS18-001)**
  - Programmable Resolution 1-wire Digital Thermometer
- PWR-12V-1A (31-62100-000)**
  - 110~240VAC to 12VDC 1A Power Adapter

# C Programmable Remote I/O Module

## RIO-2014PG



### Features

- 4 x Opto-isolated digital inputs
- 2 x Relay outputs
- 4 x Isolation Analog inputs
- 2 x Maxim 1-Wire interface
- 1 x 10/100Mbps Ethernet interface
- 1 x Isolation RS-485 port, 1 Serial Console / RS-232 port
- 1 x microSD card interface
- Support lwIP and BSD socket library
- Support tiny web server
- Windows configuration utility included
- Toolchain: Atmel Studio

### H/W Specifications

#### CPU / Memory

- CPU: Atmel SAM4E16E Cortex M4 SoC 120MHz
- Memory: 128KB SRAM, 1MB Flash inside SoC  
128KB SRAM, 2MB Flash on board via SPI expansion

#### Network Interface

- Type: 1 x 10/100 Mbps Ethernet, RJ45 connector
- Protection: 1.5KV magnetic isolation

#### Serial Ports

- Serial Console / RS-232 x 1
- RS-485 1500Vrms isolated x 1

#### Isolated Analog Input

- No. of Channel: 4
- Input Type: Differential input
- Input Mode: Current / Voltage
- Resolution: 16-bit
- Input Range:
  - Unipolar: 0~150 mV, 0~500 mV, 0~1V, 0~5V, 0~10V
  - Bipolar: +/-150 mV, +/-500 mV, +/-1V, +/-5V, +/-10V
- Current: 0~20mA
- Input Impedance: 20M Ohm (voltage), 120 Ohm (current)
- Accuracy: +/-0.1% FSR
- Isolated: 1500Vrms

#### Isolation Digital Input

- No. of Channels: 4
- Isolation protection: 2500Vrms
- Logical High: 5~24VDC
- Logical Low: 0~1.5VDC
- LED indicator: Yes

#### Relay Output

- No. of Channels: 2
- Contact Rating: 30VDC@1A or 125VAC@0.5A
- LED Indicator: Yes

#### Maxim 1-Wire Interface

- No. of Channels: 2
- Connector: 3-pin terminal block (VDD, DQ, GND)

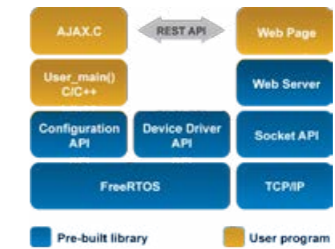
#### General

- Power Input: +9~+48VDC
- Operating Temperature: 0~70°C (32~158°F)
- Dimension(WxLxH): 116 x 121.5 x 43mm (4.56x4.78x1.69in)
- Installation: DIN-rail mounting
- Mass Storage: Miro-SD socket inside x1

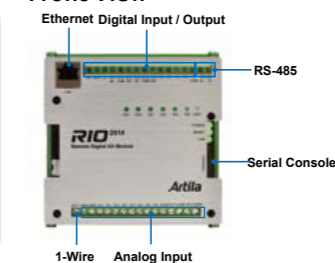
### Windows Utility Software



### Example Program



### Front View



### Ordering Information

- RIO-2014PG**
  - C Programmable Remote I/O Module
- CB-F10M9-20 (91-0P9M9-001)**
  - Console Cable (10Pin Header to DB9 Male, 20cm)
- DS18B20 (91-6DS18-001)**
  - Programmable Resolution 1-wire Digital Thermometer
- PWR-12V-1A (31-62100-000)**
  - 110~240VAC to 12VDC 1A Power Adapter

# C Programmable Remote I/O Module

## RIO-2015PG



### Features

- 4 x Opto-isolated digital inputs
- 2 x Relay outputs
- Free RTOS real-time operating system
- 4 x Isolation Analog inputs, 2 x Isolation Analog outputs
- 1 x Maxim 1-Wire interface
- 1 x 10/100Mbps Ethernet interface
- 1 x 10/100Mbps Ethernet interface
- 1 x Isolation RS-485 port, 1 Serial Console / RS-232 port
- 1 x microSD card interface
- Support lwIP and BSD socket library
- Support tiny web server
- Windows configuration utility included
- Toolchain: Atmel Studio

### H/W Specifications

#### CPU / Memory

- CPU: Atmel SAM4E16E Cortex M4 SoC 120MHz
- Memory: 128KB SRAM, 1MB Flash inside SoC  
128KB SRAM, 2MB Flash on board via SPI expansion

#### Network Interface

- Type: 1 x 10/100 Mbps Ethernet, RJ45 connector
- Protection: 1.5KV magnetic isolation

#### Serial Ports

- Serial Console / RS-232 x 1
- RS-485 1500Vrms isolated x 1

#### Mass Storage

- microSD socket inside x 1

#### Isolated Analog Input

- No. of Channel: 4
- Input Type: Differential input
- Input Mode: Current / Voltage
- Resolution: 16-bit
- Input Range:  
Unipolar: 0~150 mV, 0~500 mV, 0~1V, 0~5V, 0~10V  
Bipolar: +/-150 mV, +/-500 mV, +/-1V, +/-5V, +/-10V  
Current: 0~20mA
- Input Impedance: 20M Ohm (voltage), 120 Ohm (current)
- Accuracy: +/-0.1% FSR
- Isolated: 1500Vrms

#### Isolated Analog Output

- No. of Channels: 2
- Output Mode: Current / Voltage
- Resolution: 16-bit
- Output Range:  
Unipolar: 0~5V, 0~10V  
Bipolar: +/-5V, +/-10V  
Current: 4~20mA, 0~20mA, 0~24mA
- Accuracy: +/-0.25% FSR (voltage)  
+/-0.2% FSR (current)
- Load Resistor: 0~1k Ohm
- Isolation: 1500Vrms

#### Isolation Digital Input

- No. of Channels: 4
- Isolation protection: 2500Vrms
- Logical High: 5~24VDC
- Logical Low: 0~1.5VDC
- LED indicator: Yes

#### Relay Output

- No. of Channels: 2
- Contact Rating: 30VDC@1A or 125VAC@0.5A
- LED Indicator: Yes

#### Maxim 1-Wire Interface

- No. of Channels: 1
- Connector : 3-pin terminal block (VDD, DQ, GND)

#### General

- Power Input: +9~+48VDC
- Operating Temperature: 0~70°C (32~158°F)
- Dimension (WxLxH): 116x121.5x43mm  
(4.56x4.78x1.69in)
- Weight: 242g (0.53lb)
- Installation: DIN-rail mounting

### Windows Utility Software

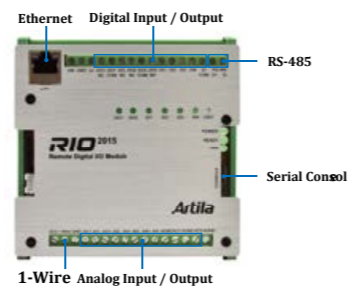


### Example Program



- Users only need to write application main program user\_main (), web interface, interactive AJAX.C and home page HTML

### Front View



### Ordering Information

#### RIO-2015PG

- C Programmable Remote I/O Module
- **CBL-F10M9-20 (91-0P9M9-001)**
- Console Cable (10Pin Header to DB9 Male, 20cm)
- **DS18B20 (91-6DS18-001)**
- Programmable Resolution 1-wire Digital Thermometer
- **PWR-12V-1A (31-62100-000)**
- 110~240VAC to 12VDC 1A Power Adapter

# C Programmable Analog In Remote I/O Module

## RIO-2017PG



### Features

- C Programmable analog input remote I/O module
- 1 x 10/100Mbps Ethernet port
- 8 x 16-bit A/D, isolation up to 2500Vrms
- 1 x relay output
- Form A or Form B relay with contact rating 30VDC@1A or 125VAC@0.5A
- Support lwIP and BSD socket library
- Support tiny web server
- Windows configuration utility included
- Toolchain: Sourcery CodeBench Lite or Keil from arm

### H/W Specifications

#### CPU / Memory

- CPU: NXP LPC1768 Cortex-M3 100MHz
- Memory: 2MB on-chip Flash, 128KB SRAM

#### Network Interface

- Type: 1 x 10/100Mbps, RJ45 connector
- Protection: 1.5KV Magnetic isolation

#### Serial Ports

- Serial Console / RS-232 x 1
- RS-485 1500Vrms isolated x 1

#### Isolated Analog Input

- No. of Channels: 8
- Input Type: Differential input
- Input Mode: Voltage / Current
- Resolution: 16-bit
- Input Range:  
Unipolar: 0~150mV, 0~500mV, 0~1V, 0~5V, 0~10V  
Bipolar: +/-150mV, +/-500mV, +/-1V, +/-5V, +/-10V  
Current: 0~20mA
- Input Impedance: 20M Ohm (voltage), 120 Ohm (current)
- Accuracy: +/-0.1% FSR
- Isolation: 2500VDC

#### Relay Output

- No. of Channels: 2
- Contact Rating: 30VDC@1A or 125VAC@0.5A
- LED Indicator: Yes

#### Maxim 1-Wire Interface

- No. of Channels: 1
- Contact Rating: 30VDC@1A or 125VAC@0.5A

### Front View



### General

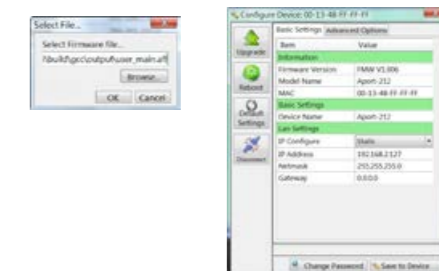
- Power Input: +9~+48VDC (Terminal block)
- Protection: Auto polarity and surge protect
- Dimensions (W x H x D): 78 x 108 x 24mm (3.0x4.25x0.94in)

### S/W Specifications

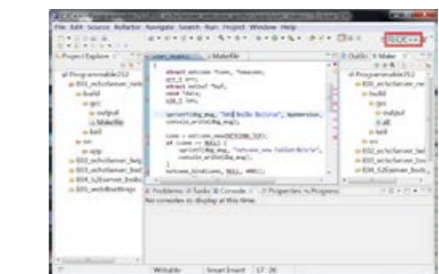
- Protocol Stacks: IPv4, ICMP, ARP, DHCP, NTP, TCP, UDP, HTTP
- Device Drivers: SD / MMC, UART, Real Time Clock, Buzzer,
- Digital I/O, Ethernet, Watchdog Timer

### Windows Utility Functionalities

- Broadcast search
- Configuration
- User web page conversion



### Example Program



### Ordering Information

#### RIO-2017PG

- C Programmable Analog Input Remote I/O Module
- **DK-35A (36-DK35A-000)**
- DIN RAIL Mounting Kit
- **PWR-12V-1A (31-62100-000)**
- 110~240VAC to 12VDC 1A Power Adapter



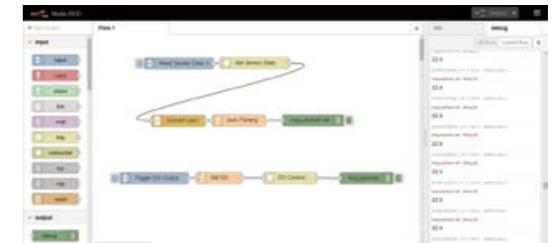
# Remote I/O

Easy-to-use DIN-rail mountable Web-ready Modbus/TCP IO modules, supporting analog inputs, isolated digital inputs and relay outputs.



## ■ Artila Bridges the Domain Knowledge of IT and OT with Node-RED

RIO-BM is designed with FreeRTOS+lwIP (lightweight version of TCP/IP), which can automatically connect to Bluemix with verified instructions and push sensor data to cloud with Transport Layer Security (TLS) and MQTT Protocol. Applying on a Watson IoT platform, users can easily create a web-based application to monitor and analyze data. RIO-BM supports Node-RED, a powerful visual wiring tool for the Internet of Things which is easy to wire together events and devices for the Internet of Things. With it, customers can take their IoT innovation to market faster and create new business value.



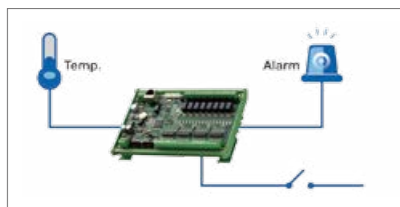
## ■ RIO-BM Series IBM Bluemix Ready Remote I/O

RIO-BM is designed with FreeRTOS+lwIP (lightweight version of TCP/IP), which can automatically connect to Bluemix with verified instructions and push sensor data to cloud with Transport Layer Security (TLS) and MQTT Protocol. Applying on a Watson IoT platform, users can easily create a web-based application to monitor and analyze data. RIO-BM supports Node-RED, a powerful visual wiring tool for the Internet of Things which is easy to wire together events and devices for the Internet of Things. With it, customers can take their IoT innovation to market faster and create new business value.



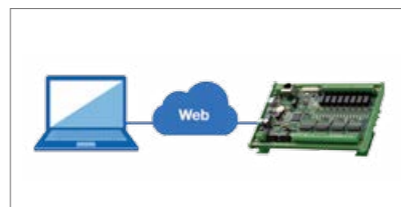
## ■ RIO Series

- Modbus TCP
- Stand alone control (event trigger I/O)



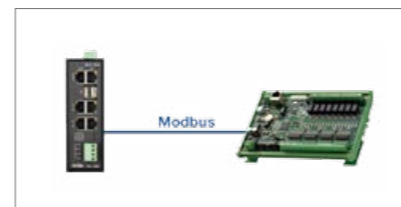
### Stand-alone Operation

The RIO series can be programmed as a stand-alone controller by using the FreeRTOS SDK. Once the firmware is downloaded to the RIO, it can perform the task without using a host computer. Several pre-programmed applications firmware are available for users to download to RIO.



### Web Control

In web control mode, RIO can be controlled by web browser. User can edit a web page and download it to RIO. The web page can use AJAX technique to access the RIO.



### Modbus Control

In the Modbus mode, RIO supports Modbus protocol and it can be controlled by any hardware and software which support Modbus. In addition, Windows and Linux API library are available for programmers to easily access RIO.

## ■ Remote I/O Comparison Table



Remote I/O	RIO-2010	RIO-2017	RIO-2018
Bluemix Ready Remote I/O	RIO-2010BM	RIO-2017BM	RIO-2018BM
CPU	NXP LPC1768 Arm Cortex-M3 100MHz		
RAM	32KB SRAM		
Flash	512KB		
Micro-SD card socket	N/A	1	
10/100Mbps Ethernet	10/100Mbps x 1		
No. of Serial Port	1	N/A	N/A
. RS-485	1 isolated	--	--
Digital I/O Channels	24	1	1
. Digital Input (Isolated)	16	N/A	N/A
. Relay Output	8	1	1
Maxim 1-Wire Interface	3	N/A	N/A
Isolated Analog Input	N/A	8	8
Thermocouple Input	N/A	N/A	J / K type
RealTime OS	FreeRTOS		
Windows Utility	YES		
Web Server Support	YES		
Node-Red, browser-based editor	N/A		
Dimensions (W x H x D) mm	182x118x36	78 x 108 x 24	78 x 108 x 24
Operating Temperature	0~70°C (32~158°F)		
Power	+9 ~ +48VDC		
RTC, Watchdog Timer	Yes		
Buzzer, LED Indicators	Yes		
Battery	Li 48mAh		
DIN Rail Kit	Plastic	YES	

# Modbus / TCP Remote Digital I/O Module RIO-2010



## Features

- Web based remote I/O monitoring and control
- Web server and web interface ready
- Modbus, AJAX, MQTT
- Stand-alone alarm relay control and email alert
- Periodically data and event publishing to server (broker) via MQTT
- 8x Relay Out Form A or form B relay with contact rating 30VDC@1A or 125VAC@0.5A
- 16 x isolated digital input and 3x Maxim 1-wire temperature measurement
- 1x 10/100Mbps Ethernet Port

## H/W Specifications

### CPU / Memory

- CPU: NXP LPC1768 Cortex-M3 100MHz
- Memory: 2MB on-chip Flash, 128KB SRAM

### Network Interface

- Type: 1 x 10/100Mbps, RJ45 connector
- Protection: 1500Vrms magnetic isolation

### RS-485 Interface

- Isolation Protection: 2500Vrms
- Direction Control: Auto, by hardware
- Connector: Terminal block
- Baud Rate: 1.2~460.8Kbps
- Parity: None, Even, Odd, Mark, Space
- Data Bits: 5, 6, 7, 8
- Stop Bits: 1, 1.5, 2

### Digital Input

- No. of Channels: 16
- Photo Isolation (AC in): 2500Vrms
- Logical High: 5~24VDC
- Logical Low: 0~1.5VDC
- LED Indicators: Yes

### Relay Output

- No. of Channels: 8
- Contact Rating: 30VDC@1A or 125VAC@0.5A
- LED Indicators: Yes

### Maxim 1-Wire Interface

- No. of Channels: 3
- Connector: 3-pin header (VDD, DQ, GND)

### General

- Temperature Sensor: Maxim DS18B20 (optional accessory 91-6DS18-001)
- Temperature Range: -55°C~125°C
- Accuracy: +/-0.5°C
- Real-Time Clock (RTC): Manual or NTP (Network Time Protocol) setup and sync.
- Power Input: +9~+48VDC
- Power Consumption: 12VDC@220mA(max.), 12VDC@55mA(min)
- Dimensions (W x H x D): 182 x 118 x 36mm (7.16x4.64x1.42in)
- Operating Temperature: 0~70°C (32~158°F)

## Access Control Guidelines

### Default Access Ports

- Modbus / TCP Port: 502
- Telnet Console Port: 5001
- HTTP Port: 5003

### Access Through Modbus Protocols

- Modbus / TCP via LAN interface
- Modbus / ASCII, Modbus / RTU via RS-485 interface

### Access Through HTTP GET / POST Protocols

- AJAX-enabled demo page for up-and-running web-based monitoring and controls

### Operation Mode

- Modbus TCP / RTU slave
- Web direct I/O control
- MQTT auto data and event publish and log
- Stand-alone alarm relay control and email alert
- C / C++ programmable controller (RIO-2010PG)



## Ordering Information

### RIO-2010

- Modbus / TCP Remote Digital I/O Module

### CBL-F10M9-20 (91-0P9M9-001)

- Console Cable (10Pin Header to DB9 Male, 20cm)

### DS18B20 (91-6DS18-001)

- Programmable Resolution 1-wire Digital Thermometer

### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter

# Analog Input Remote I/O Module RIO-2017



## Features

- Remote analog input module with web access AJAX and Modbus TCP
- One 10/100Mbps Ethernet port
- 8x 16bit A/D, isolation up to 2500Vrms
- 1 x relay output
- Form A or Form B relay with contact rating 30VDC@1A or 125VAC@0.5A
- Support web-based I/O control
- Optional DIN RAIL mounting kit (DK-35A)
- Windows configuration utility included

## H/W Specifications

### CPU / Memory

- CPU: NXP LPC1768 Cortex-M3 100MHz
- Memory: 2MB on-chip Flash, 128KB SRAM

### Network Interface

- Type: 1 x 10/100Mbps, RJ45 connector
- Protection: 1.5kV Magnetic isolation
- Protocol: Modbus / TCP, UDP, HTTP, DHCP

### Isolation Analog Input

- No. of Channels: 8
- Input Type: Differential input
- Input Mode: Voltage / Current
- Resolution: 16-bit
- Input Range:
  - Unipolar: 0~150mV, 0~500mV, 0~1V, 0~5V, 0~10V
  - Bipolar: +/-150mV, +/-500mV, +/-1V, +/-5V, +/-10V
- Current: 0~20mA
- Input Impedance: 20M Ohm (voltage), 120 Ohm (current)
- Accuracy: +/-0.1% FSR
- Isolation: 2500Vrms

### Relay Output

- No. of Channels: 1
- Contact Rating: 30VDC@1A or 125VAC@0.5A

### General

- Power Input: +9~+48VDC (Terminal block)
- Protection: Auto polarity and surge protect
- Dimensions (W x H x D): 78 x 108 x 24mm (3.0x4.25x0.94in)

## Front View



## Access Control Guidelines

### Default Access Ports

- Modbus / TCP Port: 502
- Telnet Console Port: 5001
- HTTP Port: 5003

### Access Through Modbus Protocols

- Modbus / TCP via LAN interface
- Modbus / ASCII, Modbus / RTU via RS-485 interface

### Access Through HTTP GET / POST Protocols

- AJAX-enabled demo page for up-and-running web-based monitoring and controls



## Windows Utility Functionalities

- Broadcast search
- Configuration
- User web page conversion

## Ordering Information

### RIO-2017

- Analog Input Remote I/O Module

### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter



# Modbus / TCP Remote Digital I/O Module RIO-2018



## Features

- Remote thermocouple input module with web access AJAX and Modbus / TCP
- 1 x 10/100Mbps Ethernet port
- 3 channels J or K type thermocouple input with cold junction compensation
- 2 x 2500Vrms isolated digital input (bipolar input photocoupler)
- 1 x Form C relay with contact rating 30VDC@1A or 125VAC@0.5A
- Support web-based temperature monitoring and DIO control
- Optional DIN RAIL mounting kit (DK-35A)
- Windows configuration utility included

## H/W Specifications

### CPU / Memory

- CPU: NXP LPC1768 Cortex-M3 100MHz
- Memory: 2MB on-chip Flash, 128KB SRAM

### Network Interface

- Type: 1 x 10/100Mbps Ethernet, RJ45 connector
- Protection: 1.5KV magnetic isolation
- Protocol: Modbus / TCP, UDP, HTTP, DHCP

### Thermocouple Input

- J type: Maxim MAX31855J converter with CJC Range: -210°C~+1200°C
- K type: Maxim MAX31855K converter with CJC Range: 200°C~+1350°C
- Resolution: 14-bit, 0.25°C
- Connector: OMEGA PCC-SMP Thermocouple connector
- Thermocouple fault detection

### Relay Output

- No. of Channels: 1 x Form C
- Contact Rating: 30VDC@1A or 125VAC@0.5A

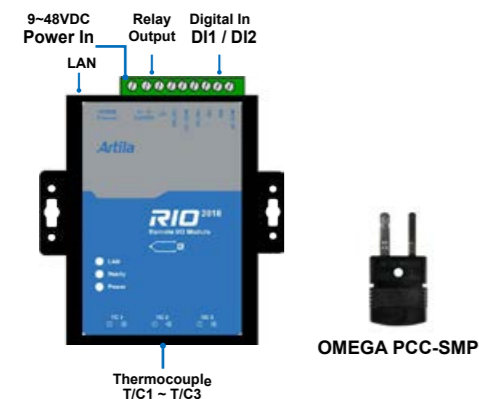
### Isolated Digital Input

- No. of Channels: 2
- Logic High: 5~24VDC
- Logic Low: 0~1.5VDC
- Input Resistance: 1.2K Ohm@0.5W
- Response Time: 20µs

### General

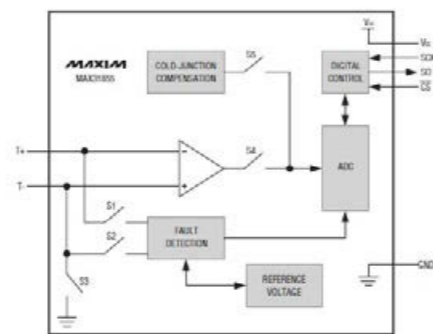
- Power Input: +9~+48VDC (Terminal Block)
- Protection: Auto polarity and surge protect
- Dimensions (W x H x D): 78 x 108 x 24mm (3. (3.0x4.25x0.94in))

## Front View

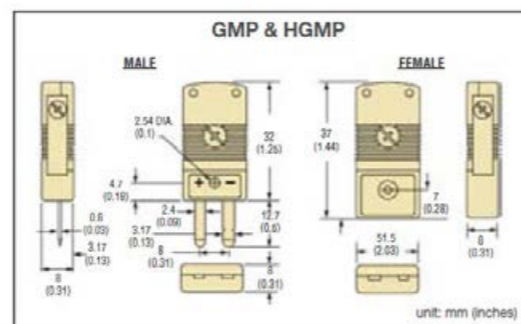


## Thermocouple Input

- The thermocouple input is connected to MAX31855 Cold Junction Compensated Thermocouple to Digital Converter. The connector is OMEGA PCC-SMP. Please make sure the type of thermocouple matches the model of RIO-2018. Please refer to datasheet of MAX31855
- for the technical specification of thermocouple measurement.



## Thermocouple



The following two items are available from [www.omega.com](http://www.omega.com).

- J type Thermocouple: 5SRTC-GG-J-24-36
- K type Thermocouple: 5SRTC-GG-K-24-36

## Ordering Information

- RIO-2018J**
  - Analog Input Remote I/O Module with J type Thermocouple input channel
- RIO-2018K**
  - Analog Input Remote I/O Module with K type Thermocouple input channel
- DK-35A (36-DK35A-000)**
  - DIN RAIL Mounting Kit
- PWR-12V-1A (31-62100-000)**
  - 110~240VAC to 12VDC 1A Power Adapter

# Modbus / TCP Remote Digital I/O Module RIO-2010BM



## Features

- Bluemix ready remote I/O monitoring and control
- MQTT and web interface ready
- Stand-alone alarm relay control
- Periodically data and event publishing to Bluemix IoT via MQTT
- Form A or form B relay with contact rating 30VDC@1A or 125VAC@0.5A
- 16x isolated digital input and 3x Maxim 1-wire temperature measurement

## H/W Specifications

### CPU / Memory

- CPU: NXP LPC1768 Cortex-M3 100MHz
- Memory: 2MB on-chip Flash, 128KB SRAM

### Network Interface

- Type: 1 x 10/100Mbps Ethernet, RJ45 connector
- Protection: 1500Vrms magnetic isolation

### RS-485 Interface

- Isolation Protection: 2500Vrms
- Direction Control: Auto, by hardware
- Connector: Terminal block
- Baud Rate: 1.2~460.8Kbps
- Parity: None, Even, Odd, Mark, Space
- Data Bits: 5, 6, 7, 8
- Stop Bits: 1, 1.5, 2

### Digital Input

- No. of Channels: 16
- Photo Isolation (AC in): 2500Vrms
- Logical High: 5~24VDC
- Logical Low: 0~1.5VDC
- LED Indicators: Yes

### Relay Output

- No. of Channels: 8
- Contact Rating: 30VDC@1A or 125VAC@0.5A
- LED Indicators: Yes

### Maxim 1-Wire Interface

- No. of Channels: 3
- Connector: 3-pin header (VDD, DQ, GND)

### General

- Temperature Sensor: Maxim DS18B20 (optional accessory 91-6DS18-001)
- Temperature Range: -55°C~125°C
- Accuracy: +/-0.5°C
- Real-Time Clock (RTC): Manual or NTP (Network Time Protocol) setup and sync.
- Power Input: +9~+48VDC
- Power Consumption: 12VDC@220mA(max.), 12VDC@55mA(min)
- Dimensions (W x H x D): 182 x 118 x 36mm (7.16x4.64x1.42in)
- Operating Temperature: 0~70°C (32~158°F)

## Access Control Guidelines

### Default Access Ports

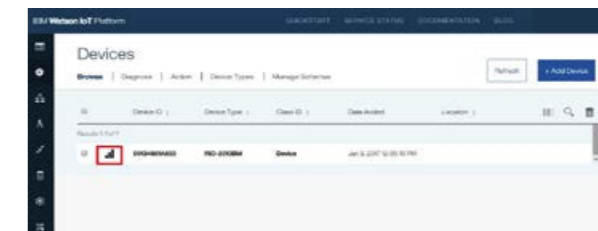
- Telnet Console Port: 5001
- HTTP Port: 5003

### Access Through HTTP GET / POST Protocols

- REST Web API

### Operation Mode

- MQTT auto data and event publish and log
- Stand-alone alarm relay control
- C / C++ programmable controller (RIO-2010PG)



## Ordering Information

- RIO-2010BM**
  - BM Remote Digital I/O Module
- CBL-F10M9-20 (91-0P9M9-001)**
  - Console Cable (10Pin Header to DB9 Male, 20cm)
- DS18B20 (91-6DS18-001)**
  - Programmable Resolution 1-wire Digital Thermometer
- PWR-12V-1A (31-62100-000)**
  - 110~240VAC to 12VDC 1A Power Adapter

# Bluemix Ready Remote Analog Input Module RIO-2017BM



## Features

- Remote analog input module with Web API and MQTT
- One 10/100Mbps Ethernet port
- 8x 16bit A/D, isolation up to 2500Vrms
- One channel relay output port
- Form A or form B relay with contact rating 30VDC@1A or 125VAC@0.5A
- DIN Rail mounting
- Windows configuration utility for bluemix settings

## Introduction

- RIO-2017BM is an analog input remote I/O module supports Bluemix IoT and Web API. The analog input channel can be configured as current and voltage and it is auto calibrated and 2500Vrms isolated.
- In addition to the analog input, RIO-2017BM also has one relay output. Therefore it is suitable for remote data acquisition and control. RIO-2017BM supports web RESTful interface for web based application to access its analog and digital I/O.

## H/W Specifications

### CPU / Memory

- CPU: NXP LPC1768 Cortex-M3 100MHz
- Memory: 2MB on-chip Flash, 128KB SRAM

### Ethernet

- Type: 10/100Mbps, RJ45
- Protection: 1500Vrms Magnetic isolation
- Protocol: Modbus / TCP, UDP, HTTP, DHCP

### Isolation Analog Input

- Channel Number: 8
- Input Type: Differential input
- Input Mode: Voltage / Current (0~20mA)
- Resolution: 16-bit
- Input Range: Unipolar: 0~150mV, 0~500mV, 0~1V, 0~5V, 0~10V  
Bipolar: +/-150mV, +/-500mV, +/-1V, +/- 5V, +/-10V  
Current: 0~20mA
- Input Impedance: 20M Ohm (voltage), 120 Ohm (current)
- Accuracy: +/- 1% FSR
- Isolation: 2500Vrms

### Relay Output

- No. of Channels: 1
- Contact Rating: 30VDC@1A or 125VAC@0.5A

### General

- Power Input: +9~+48VDC (Terminal block)
- Protection: Auto polarity and surge protect
- Dimension: 108 x 78 x 24 mm (H x W x D) (3.0x4.25x0.94in)

## Access Control Guidelines

### Default Access Ports

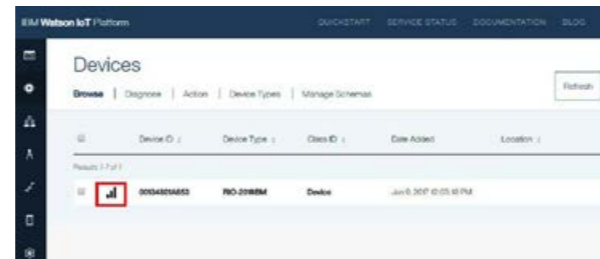
- Telnet Console Port: 5001
- HTTP Port: 5003

### Access Through HTTP GET / POST Protocols

- REST Web API

### Operation Mode

- MQTT auto data and event publish and log
- Stand-alone alarm relay control
- C / C++ programmable controller (RIO-2010PG)



## Ordering Information

### RIO-2017BM

- Bluemix ready remote analog input module

### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter

# Bluemix Ready Remote Analog Input Module RIO-2018BM



## Features

- Remote thermocouple input module with Web API and MQTT
- 1x 10/100Mbps Ethernet port
- 3 channels J or K type thermocouple input with cold junction compensation
- 2x 2500Vrms isolated digital input (bipolar input photocouple)
- One Form C relay with contact rating 30VDC@1A or 125VAC@0.5A
- Support cloud-based temperature monitoring and DIO control
- Optional DIN Rail mounting kit (DK-35A)
- Windows configuration utility for Bluemix settings

## Introduction

- RIO-2018BM is a thermocouple input remote I/O module supports IBM Bluemix connection. RIO-2018BM has two models J and K to support J and K type thermocouple. In addition to the thermocouple input, RIO-2018 also has two isolated digital input channels and one form C relay output. Therefore it is suitable for temperature measurement and control. RIO-2018BM uses MQTT to push temperature data to IBM Bluemix automatically and the temperature data can also be acquired by REST web interface

## H/W Specifications

### CPU / Memory

- CPU: NXP LPC1768 Cortex-M3 100MHz
- Memory: 2MB on-chip Flash, 128KB SRAM

### Ethernet

- Type: 10/100Mbps, RJ45
- Protection: 1500V Magnetic isolation
- Protocol: Modbus / TCP, UDP, HTTP, DHCP

### Thermocouple Input

- J Type: Maxim MAX31855J converter with CJC  
Range: -210°C to +1200°C
- K Type: Maxim MAX31855K converter with CJC  
Range: -Range: 200°C to +1350°C
- Resolution: 14-bit, 0.25°C
- Connector: OMEGA PCC-SMP Thermocouple connector  
Thermocouple fault detection

### Relay Output

- No. of Channels: 1 form C
- Contact Rating: 30VDC@1A or 125VAC@0.5A

### Isolated Digital Input

- Channel Number: 2
- Logic High: 5~24VDC
- Logic Low: 0~1.5VDC
- Input Resistance: 1.2KOhm@0.5W
- Response Time: 20µs

### General

- Power Input: +9~+48VDC (Terminal block)
- Protection: Auto polarity and surge protect
- Dimension: 108 x 78 x 24 mm (H x W x D) (3.0x4.25x0.94in)

## Access Control Guidelines

### Default Access Ports

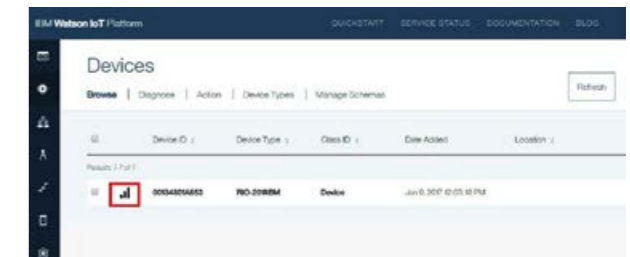
- Telnet Console Port: 5001
- HTTP Port: 5003

### Access Through HTTP GET / POST Protocols

- REST Web API

### Operation Mode

- MQTT auto data and event publish and log
- Stand-alone alarm relay control
- C / C++ programmable controller (RIO-2010PG)



## Ordering Information

### RIO-2018BM

- Bluemix ready analog input remote I/O module

### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter



# Industrial Communication Gateway

Easy-to-use serial-to-Ethernet gateways allowing users access RS-232/422/485 devices via LAN or Internet. Virtual COM driver or Fixed-TTY driver is included for free.



## ■ Aport Series Industrial Communication Gateway

**Allow nearly any device with serial ports to connect and share a WLAN network**

Artila's communication gateway is the ideal choice that provides connectivity for your serial devices, such as meters and sensors to 802.11 wireless local area networks (WLANs). Eliminating the need for the development of a wireless LAN driver and security supplicant, it is ideal for minimizing upfront engineering investment and reducing time to market.



### Configure via Web Browser & Windows Manager Utility

Simple to configure Aport-213 by using any devices like Smart phone, Notebook or PC via web browser without any software installation. Windows Manager Utility is a software provided by Artila that is used to configure and test devices through network.



## ■ Industrial Communication Gateway Comparison Table



Model	Aport-213	Aport-212	Aport-211S
Core Module	SW-200M	X	SE-100M
CPU	Arm Cortex-M3 166Mhz	NXP Arm Cortex-M3 LPC1768 100MHz	SoC
10/100Mbps Ethernet	N/A	1	1
RF Capability	Wifi 802.11b/g/n	N/A	N/A
No. of Serial Port	1	2	1
. RS-232/422/485	1	1	1
. RS-232/485	N/A	1	N/A
Serial Console	1	1	1
RealTime OS		FreeRTOS	
Windows Utility		YES	
Web Server Support		YES	
Dimensions (W x H x D) mm		78 x 108 x 24	
Operating Temperature		0~70°C (32~158°F)	
Power	+9 ~ +48VDC	+9 ~ +40VDC	+9 ~ +40VDC
Buzzer, LED indicators		YES	
DIN Rail Kit		YES	

# Aport-213



## Features

- Connect RS-232/422/485 devices to IEEE 802.11b/g/n network
- 921.6Kbps baudrate for RS-232/422/485 transmission
- Radio frequency support FCC/ETSI/worldwide domain
- Modbus RTU to Modbus / TCP Gateway
- Supports TCP / Server mode and TCP / Client mode
- Secure data access with WEP-64/128, WPA, WPA2
- Windows application Utility
- Web / Serial consoles for device configuration
- Firmware upgradable
- 1 x Wifi external antenna through SMA connector

## H/W Specifications

### WLAN Interface

- Port: 1
- Connectivity: 2.4GHz, IEEE 802.11b/g/n
- Data Rate: (IEEE 802.11b) 1 to 11Mbps  
(IEEE 802.11g) 6 to 54Mbps  
(IEEE 802.11n) 7.2 to 150Mbps
- Frequency: USA (FCC), Europe(ETSI), Worldwide Domain
- Protocols support: TCP, UDP, ICMP, IGMP, IPv4, DHCP, ARP, DNS,SMTP, SNMP, RFC2217 and HTTP in Software
- Security: WEP-64/128, WPA, WPA2
- R F R e c e i v e r Max Receive Level: 802.11b DSSS/-4dBm, 802.11b CCK/-10dBm 802.11g OFDM/-20dBm, 802.11n/-20dBm
- R e c e i v e S ensitivity:  
802.11b: -80dBm @ 1 Mbps; -80dBm @ 2 Mbps; -79dBm @ 5.5 Mbps; -76dBm @ 11 Mbps
- 802.11g: -82dBm @ 6 Mbps; -81dBm @ 9 Mbps; -79dBm @ 12 Mbps; -77dBm @ 18 Mbps; -74dBm @ 24 Mbps; -70dBm @36Mbps; -66dBm @ 48 Mbps; -65dBm @ 54 Mbps
- 802.11n (20MHz): -82dBm @ MCS0; -79dBm @ MCS1; -77dBm @ MCS2; -74dBm @ MCS3; -70dBm @ MCS4; -66dBm @ MCS5; -65dBm @ MCS6; -64dBm @ MCS7
- 802.11n (40MHz): -79dBm @ MCS0; -76dBm @ MCS1; -74dBm @ MCS2; -71dBm @ MCS3; -67dBm @ MCS4; -63dBm @ MCS5; -62dBm @ MCS6; -61dBm @ MCS7

### Serial Interface

- Type: RS-232 / 422 / 485, switch selectable
- Connector: DB9, male
- Signals: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
- Baud Rate: 1.2~38.4Kbps
- Parity: None, Even, Odd
- Data Bits: 7, 8
- Stop Bits: 1, 2
- Flow Control: None, RTS / CTS, XON / OFF

### Switch

- 1 x Reset Button
- 1 x WPS (Wifi Protected Setup) Button
- 1 x Restore to Default Button
- 1 x four-pin dip switch for Serial interface setting

### Configuration Methods

- Web console and Serial Console
- Windows application Utility

### General

- Power Input: +9~+48VDC (Terminal Block / Micro-USB power source)
- Power Consumption: 12VDC@180mA
- Operating Temperature: 0~70°C, 5~95% RH
- RF output power: 802.11b/16 ±2dBm; 802.11g/14 ± 2dBm; 802.11n/13 ± 2dBmH
- Dimensions (W x H x D): 78 x 108 x 24mm (3.0x4.25x0.94in)
- Regulation: CE / FCC compliant
- Buzzer: YES
- LED Indicator: Power, Status, COM, Serial Console

## PIN Assignment

Serial Interface (D-Sub / Male)	PIN	RS-232	RS-422	RS-485
1	TX-	TX-	TX-	---
2	RXD	TX+	---	---
3	TXD	RX-	D+	---
4	---	RX+	D-	---
5	GND	GND	GND	---
6	---	---	---	---
7	RTS	---	---	---
8	CTS	---	---	---
9	---	---	---	---

Serial Console (D-Sub / Female)	PIN	Console
1	---	---
2	TX	---
3	RX	---
4	---	---
5	GND	---
6	---	---
7	---	---
8	---	---
9	---	---

## Ordering Information

### Aport-213

- Single-port Serial-to-WiFi Gateway

### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter

### SW-200M

- Serial-to-wifi Module

# Aport-212



## Features

- Gateway of Modbus / TCP to Modbus RTU / ASCII
- 2 x configurable RS-232 / 485 serial ports
- Supports up to 16 x Modbus / TCP masters or 32 x Modbus / TCP slaves
- Supports transparent serial to Ethernet conversion
- 1 x 10/100Mbps Ethernet port
- Supports telnet, web and serial console configuration
- Support command line interface configuration
- Windows configuration utility included
- Firmware upgradable by Ethernet / Internet

## H/W Specifications

### CPU / Memory

- CPU: NXP LPC1768 Cortex-M3 100MHz
- Memory: 2MB on-chip Flash, 128KB SRAM

### Network Interface

- Type: 1 x 10/100Mbps Ethernet, RJ45 connector
- Protection: 1500Vrms magnetic isolation

### Serial Ports

- Port 1: RS-232 / 422 / 485
- Port 2: RS-232 / 485

### Serial Port Parameters

- Baud Rate: 1.2~921.6Kbps
- Data Bits: 5, 6, 7, 8
- Stop Bits: 1, 2
- Flow Control: None / Hardware / XON\_XOFF
- Protection: 1500Vrms ESD

### Serial Console Port

- RS-232: 115.2Kbps baud rate, no flow control, 8 bits data, 1 stop bit

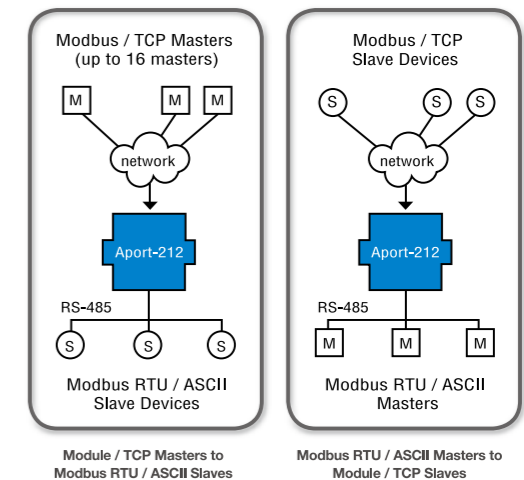
### Operation Mode

- Modbus Gateway: Slave RTU, Slave ASCII, Master RTU, Master ASCII
- S2E Gateway: TCP server, TCP client

### General

- Power Input: +9~+40VDC power jack and terminal block
- Dimensions (W x H x D): 78 x 108 x 24mm (3.0x4.25x0.94in)
- Operating Temperature: 0~60°C

## Block Diagram



## Ordering Information

### Aport-212

- Modbus Gateway with 2 x Serial Ports, and 1 x Ethernet Port

### CB-RJ2CON-100 (91-RJCON-100)

- Console Cable (RJ45 to DB9 Female, 100cm)

### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter



# Aport-211S



## Features

- Connect RS-232 / 422 / 485 devices to TCP/IP network
- 8 x programmable digital I/Os
- 1 x 10/100Mbps Port
- Supports TCP / Server mode and TCP / Client mode
- Web / Telnet / Serial consoles for device configuration
- Windows utility for device configuration and management
- Firmware upgradable

## H/W Specifications

### Network Interface

- Type: 1 x 10/100Mbps Ethernet, RJ45 connector
- Protocols: TCP, UDP, HTTP, TELNET, IP, ICMP, ARP
- IP addressing: DHCP, Static IP

### Operation Modes

- TCP / Server and TCP / Client

### Serial Interface

- Type: RS-232 / 422 / 485, switch selectable
- Connector: DB9, male
- Signals: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
- Baud Rate: 1.2~38.4Kbps
- Parity: None, Even, Odd
- Data Bits: 7, 8
- Stop Bits: 1, 2
- Flow Control: None, RTS / CTS, XON / OFF

### Programmable Digital I/Os

- PIO0~PIO5: TTL level compatible
- PIO6~PIO7: CMOS level compatible
- Connector: DB9, male

### Configuration Methods

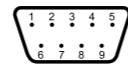
- Web console, Telnet Console and Serial Console

### General

- Power Input: +9~+40VDC
- Power Consumption: 12VDC@70mA
- Operating Temperature: 0~70°C, 5~95% RH
- Dimensions (W x H x D): 78 x 108 x 24mm (3.0x4.25x0.94in)
- Regulation: CE / FCC compliant

## PIN Assignment

PIN	GPIO	PIN	RS-232	RS-422	RS-485
1	PIO 0	1	DCD	Tx-	---
2	PIO 1	2	Rx	Tx+	---
3	PIO 2	3	Tx	Rx+	Data+
4	PIO 3	4	DTR	Rx-	Data-
5	PIO 4	5	GND	GND	GND
6	PIO 5	6	DSR	---	---
7	PIO 6	7	RTS	---	---
8	PIO 7	8	CTS	---	---
9	GND	9	---	---	---



## Dimensions



## Ordering Information

### Aport-211S

- Single-port Serial-to-Ethernet Gateway

### DK-35A (36-DK35A-000)

- DIN RAIL Mounting Kit

### PWR-12V-1A (31-62100-000)

- 110~240VAC to 12VDC 1A Power Adapter

# SW-200M



## Features

- Connect Serial devices to IEEE 802.11b/g/n network
- 921.6Kbps baudrate for RS-232/422/485 transmission
- Radio frequency support FCC/ETSI/worldwide domain
- Modbus RTU to Modbus / TCP Gateway
- Supports TCP / Server mode and TCP / Client mode
- Secure data access with WEP-64/128, WPA, WPA2
- Windows application Utility, Firmware upgradable
- Web / Serial consoles for device configuration
- Single power input: +3.3V @500mA
- Board Size: 40x45mm
- Regulation: CE / FCC complian

## Specifications

### WLAN Interface

- Connectivity: 2.4GHz, IEEE 802.11b/g/n
- Data Rate : (IEEE 802.11b) 1 to 11Mbps (IEEE 802.11g) 6 to 54Mbps (IEEE 802.11n) 7.2 to 150Mbps
- Frequency: USA (FCC), Europe(ETSI), Worldwide Domain
- Protocol support: TCP, UDP, ICMP, IGMP, IPv4, DHCP, ARP, DNS, SMTP, SNMP, RFC2217 and HTTP in Software
- Security : WEP-64/128, WPA, WPA2
- RF Receiver Max Receive Leve: 802.11b DSSS/-4dBm, 802.11b CCK/-10dBm 802.11g OFDM/-20dBm, 802.11n/-20dBm
- Receive Sensitivity:
  - 802.11b: -80dBm @ 1 Mbps; -80dBm @ 2 Mbps; -79dBm @ 5.5 Mbps; -76dBm @ 11 Mbps
  - 802.11g: -82dBm @ 6 Mbps; -81dBm @ 9 Mbps; -79dBm @ 12 Mbps; -77dBm @ 18 Mbps; -74dBm @ 24 Mbps; -70dBm @ 36 Mbps; -66dBm @ 48 Mbps; -65dBm @ 54 Mbps
  - 802.11n (20MHz): -82dBm @ MCS0; -79dBm @ MCS1; -77dBm @ MCS2; -74dBm @ MCS3; -70dBm @ MCS4; -66dBm @ MCS5; -65dBm @ MCS6; -64dBm @ MCS7
  - 802.11n (40MHz): -79dBm @ MCS0; -76dBm @ MCS1; -74dBm @ MCS2; -71dBm @ MCS3; -67dBm @ MCS4; -63dBm @ MCS5; -62dBm @ MCS6; -61dBm @ MCS7

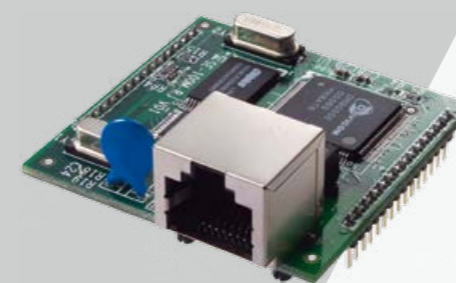
### Serial Interface

- Signals: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
- Baud Rate: 1.2~38.4Kbps
- Parity: None, Even, Odd
- Data Bits: 7, 8
- Stop Bits: 1, 2
- Flow Control: None, RTS / CTS, XON / OFF

### PIN Assignment

J1	PIN Assignment	J2	PIN Assignment
1	UART Log-out (GPIOB_0)	1	UARTO_IN (GPIOA_6)
2	UART Log-in (GPIOB_1)	2	UARTO_OUT (GPIOA_7)
3	I2C SCL (GPIOB_2)	3	UARTO_RTS (GPIOA_3)
4	I2C SDA (GPIOB_3)	4	UARTO_CTS (GPIOA_5)
5	Status_LED (GPIOE_0)	5	N/C
6	GPIOC_0	6	N/C
7	GPIOC_1	7	N/C
8	GPIOC_2	8	N/A (P19)
9	GPIOC_3	9	N/A (P23)
10	RESET (CHIP_EN)	10	N/A (P21)
11	GPIOE_2	11	N/A (P20)
12	SW WPS (GPIOE_1)	12	N/C
13	SW Default (GPIOE_3)	13	BEEP (GPIOE_4)
14	GND	14	+3.3V
15	N/C	15	GND

# SE-100M



## Features

- Connect Serial devices to Ethernet
- 921.6Kbps baudrate for RS-232/422/485 transmission
- 30-pin dual-inline drop-in module adds Ethernet connectivity to RS-232 / 422 / 485 device
- Ethernet interface: 10/100Mbps, auto-select
- Serial interface: asynchronous UART, TxD,RxD, RTS, CTS, DTR, DSR, DCD, GND
- GPIOs: 5 x TTL-level IOs plus 3 x CMOS-level IOs
- Supports TCP / Server, TCP / Client and UDP modes
- Easy-to-use ASCII command set is provided to help users implement their own configuration and / or management utilities
- Power input: +5VDC@100mA

# Arm-based Linux-ready HMI Computing

- Fanless, Rugged Design for harsh environment.
- Arm-based, Linux-ready HMI computing
- TFT LCD Display / LED Backlight with Capacity Touch
- QT5 library, support 2D / 3D graphics accelerator and LXDE desktop environment
- Easily Panel-mounting, no screw hole needed



## Rugged, High-Performance, All-in-One industrial HMI Computing

The Artila HMI Computing suits for visualization tasks directly on the machine or in the plant. The all-in-one Panel PC devices integrate an Arm-based Linux-ready computing and an capacity touch panel. It convinces through its robustness, performance, and a brilliant display. Various device families fulfill a wide range of requirements in manufacturing and process automation.



## HMI Series Comparison Table



Model	HC-3120	HC-3080
CPU	TI AM3354 Cortex A8 800MHz	TI AM3354 Cortex A8 800MHz
RAM	256MB DDR3	256M DDR3
eMMC	512MB	512MB
Micro-SD Card socket	YES	YES
Graphic	SGX530 3D Graphic Engine	SGX530 3D Graphic Engine
Display	12" TFT LCD, 16.2M color	8" TFT LCD, 262K color
. Backlight	LED	LED
. Resolution	800 x 600	800 x 600
. Viewing Angle (H/V°)	89° / 89°	70° / 50°
. Luminance (cd/m2)	600	250
. Contrast	1500:1	500:1
Touch	Projective Capacity Touch	Projective Capacity Touch
Ethernet	2 x Gigabit LAN	2 x Gigabit LAN
CAN Bus (Isolation)	2 isolated (2nd is optional)	2 isolated (2nd is optional)
USB 2.0	2 x HOST	2 x HOST
Linux Kernel	4.9.X	4.9.X
. File system	EXT4	EXT4
. Tool Chain	gcc 6.2.0 + glibc 2.24	gcc 6.2.0 + glibc 2.24
2D / 3D graphics accelerator	QT5	QT5
Desktop Environment	LXDE (Lightweight X11)	LXDE (Lightweight X11)
Build-in Browser	Chrome / Firefox	Chrome / Firefox
Node-Red, browser-based editor	YES	YES
Dimensions (W x H x D) mm	339 x 270 x 53	260 x 210 x 50
Operating Temperature	0~50°C (32~122°F)	0~50°C (32~122°F)
Power Input	+24VDC (18~30VDC)	+24VDC (18~30VDC)
RTC, Watchdog Timer	YES	YES
Buzzer, Reset button, LEDs	YES	YES
Wall-Mounting Kit	YES (no screw hole needed)	YES (no screw hole needed)

# Linux-ready Arm-based 8" HMI Computing HC-3080



## Features

- Fanless / Rugged Design HMI Computing
- 8" TFT LED backlight LCD display
- TI AM3354 Sitara Arm Cortex-A8 32-Bit RISC Processor
- Onboard 256MB DDR3 SDRAM
- Onboard storage eMMC 512MB NAND Flash
- IP65 compliant front panel, resistant to water and dust
- Rich I/O with RS-232, USB, CAN bus and Gigabit LAN
- Easily panel-mounting, no screw hole needed
- Low power consumption, +18~+30Vdc wide range input

## H/W Specifications

### CPU / Memory

- CPU: TI AM3354 Sitara Arm Cortex-A8 32-Bit RISC Processor
- Frequency: 800MHz, up to 1GHz
- SDRAM: 256MB DDR3, up to 512MB
- microSD Card Slot reserved (inside the enclosure)

### Graphic

- SGX530 3D Graphics Engine
- Industry Standard API Support of Direct3D Mobile, OGL-ES 1.1 / 2.0, OpenVG 1.0, and OpenMax

### LCD Display

- Display Size: 8" TFT LCD, 262K colors
- Resolution: 800 x 600
- Viewing Angle (H/V°): 70°/50°
- Luminance (cd/m2): 250
- Contrast Ratio: 500:1
- Backlight: LED
- Life: 20000hrs

### Touchscreen (Optional)

- Touch Type: Projective Capacity Touch
- Controller: USB

### External I/O Ports

- 2 x USB 2.0, Type A
- 1 x CAN bus
- 1 x CAN bus (Optional)

### Network

- 2 x Gigabit Ethernet (10/100/1000Mbps), RJ45

### SD Slot

- 1x MicroSD socket
- SD 2.0 compliant, supports SDHC

## Dimension Drawing



### Power Requirement

- 1 x phoenix male 2-pin terminal block
- Power Input: +24VDC typical (+18~+30VDC)
- Cable Length Suggestion: 3m (Typical), 12m (Max.)
- Power Consumption: 8W (+24V/320mA)

### General

- Material: Die-casting aluminum (Front bezel), Metal (Case)
- Dimensions (W x H x D): 260 x 210 x 50mm (10.24x8.26x1.97in)
- Net Weight: 1.82kg (4lb)
- Installation: Panel mount, VESA mount
- Operating Temperature: 0~50°C (32~122°F)
- Operating Humidity: 25~85% @ 40°C, non-condensing
- Front Panel Protection: IP65 compliant

## S/W Specifications

### Operation System Support

- Linux kernel 4.9.x
- Supports bootup from eMMC or SD card
- File System : EXT4
- GUI Engine: X11
- Support QT Library

### Desktop Environment

- Matchbox (X11) w/ virtual keyboard
- Built-in Firefox / Chromium browser

### Software Development

- Toolchain: gcc 6.2.x + glibc 2.24
- Supports in-place C/C++ code compilation

### Package Management

- Package repository: Artila self-maintained repository
- Command: Using standard apt-get command
- Support Node-Red
- Support Mono for running Windows .NET app

## Ordering Information

### HC-3080

- Linux-ready Arm-based 8" HMI Computing



# Linux-ready Arm-based 12" HMI Computing

## HC-3120



### Features

- Fanless / Rugged Design HMI Computing
- 12" TFT LED backlight LCD display with Projective Capacity Touch
- TI AM3354 Sitara Arm Cortex-A8 32-Bit RISC Processor
- Onboard 256MB DDR3 SDRAM
- Onboard storage eMMC 512MB NAND Flash
- IP65 compliant front panel, resistant to water and dust
- Rich I/O with RS-232, USB, CAN bus and Gigabit LAN
- Easily Panel-mounting, no screw hole needed
- Low power consumption, +18~+30Vdc wide range input

### H/W Specifications

#### CPU / Memory

- CPU: TI AM3354 Sitara Arm Cortex-A8 32-Bit RISC Processor
- Frequency: 800MHz, up to 1GHz
- SDRAM: 256MB DDR3, up to 512MB
- Onboard eMMC 512MB NAND Flash

#### Graphic

- SGX530 3D Graphics Engine
- Industry Standard API Support of Direct3D Mobile, OGL-ES 1.1 / 2.0, OpenVG 1.0, and OpenMax

#### LCD Display

- Display Size: 12" TFT LCD, 16.2M colors
- Resolution: 800 x 600
- Viewing Angle (H/V°): 89°/89°
- Luminance (cd/m2): 600
- Contrast Ratio: 1500:1
- Backlight: LED
- Life: 50000hrs

#### Touchscreen

- Touch Type: Projective Capacity Touch
- Light Transparency: >85% at 550nm wavelength
- Controller: USB
- Explosion-proof

#### CAN Bus Ports

- Type: 1 x CAN bus 2.0 A/B compliant ports (second is option)
- Speed: Up to 1Mbps

#### USB 2.0 Host Interface

- Host Ports: 2
- Supports 480Mbps hi-speed mode
- Type A USB connector

#### SD Slot

- 1 x microSD socket
- SD 2.0 compliant, supports SDHC

#### Network

- 2 x Gigabit Ethernet (10/100/1000Mbps)
- Connector : RJ45

#### Power Requirement

- 1 x phoenix male 2-pin terminal block
- Power Input: +24VDC typical (+18~+30VDC)
- Cable Length Suggestion: 3m (Typical), 12m (Max.)
- Power Consumption: 14.4W (+24V/600mA)

#### General

- Material: Die-casting aluminum (Front bezel), Metal (Case)
- Dimensions (W x H x D): 339 x 270 x 53mm (13.35x10.63x2.09in)
- Net Weight: 2.92kg (6.4lb)
- Installation: Panel mount, VESA mount
- Operating Temperature: 0~50°C (32~122°F)
- Operating Humidity: 25~85% @ 40°C, non-condensing

# Linux-ready Arm-based 12" HMI Computing

## HC-3120

### S/W Specifications

#### Operation System Support

- Linux kernel 4.9.x
- Supports bootup from eMMC or SD card
- File System : EXT4
- GUI Engine: X11
- Support QT Library

#### Desktop Environment

- Matchbox (X11) w/ virtual keyboard
- Built-in Firefox / Chromium browser

#### Software Development

- Toolchain: gcc 6.2.x + glibc 2.24
- Supports in-place C/C++ code compilation

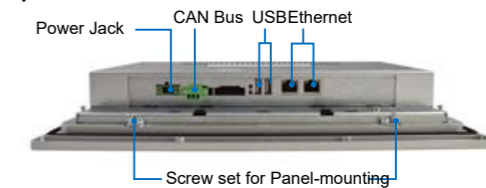
#### Package Management

- Package repository: Artilla self-maintained repository
- Command: Using standard apt-get command
- Support Node-Red
- Support Mono for running Windows .NET app

#### Popular Packages

- Web server: Apache/Nginx/Lighttpd
- Database: MySQL/SQLite3/PostgreSQL
- Script Language: PHP/Python/Perl/NodeJS
- Text editor: vim/nano/sed
- Administration: Webmin

### I/O PORTS

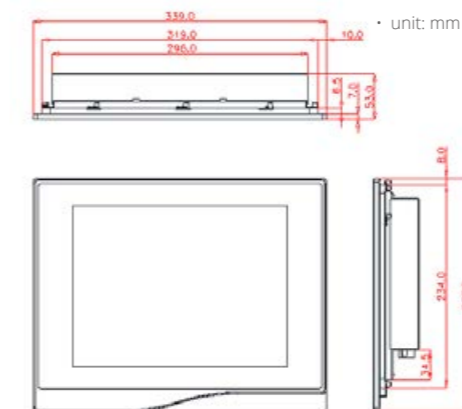


### Ordering Information

#### HC-3120

- Linux-ready Arm-based 12" HMI Computing

### Dimension Drawing



# Optional Accessory

## Serial Cable



### CB-RJ45F9-150 (91-R45F9-150)

Serial Cable (RJ45 to DB9 Female, 150cm)

#### Model No.

- Matrix-500, Matrix-504, Matrix-505, Matrix-510, Matrix-514, Matrix-518, Matrix-604, Matrix-605, Matrix-700, PAC-4000, PAC-4010, PAC-4070

## Console Cable



### CB-RJ2CON-100 (91-RJCON-100)

Console Cable (RJ45 to DB9 Female, 100cm)

#### Model No.

- Matrix-500, Matrix-504, Matrix-510, Matrix-514, Matrix-604, Aport-212, Aport-212PG



### CBL-F10M9-20 (91-OP9M9-001)

Console Cable (10Pin Header to DB9 Male, 20cm)

#### Model No.

- Matrix-513, Matrix-516, Matrix-518, Matrix-618, Matrix-522, M-5360A Starter Kit, PAC-5010, PAC-5070, RIO-2010, RIO-2010PG, RIO-2015PG



### CB-DBCON-100 (91-DBCON-100)

Console Cable (DB9 Female to DB9 Female, 100cm)

#### Model No.

- Matrix-512



### CB-RJ45F9-150

Console Cable (Wafer Box to DB9 Female, 50cm)

#### Model No.

- Matrix-505, Matrix-605, M-502, M-503, M-9G45A, PAC-4000, PAC-4010, PAC-4070

## DIN RAIL Mounting Kit



### DK-35A (36-DK35A-000)

DIN RAIL Mounting Kit

#### Model No.

- Matrix-500, Matrix-504, Matrix-505, Matrix-510, Matrix-512, Matrix-513, Matrix-514, Matrix-516, Matrix-518, Matrix-522, Matrix-604, Matrix-605, Matrix-700, Aport-211S, Aport-211W, Aport-212, Aport-212PG, RIO-2017, RIO-2018

## Power Adaptor



### PWR-12V-1A (31-62100-000)

110~240VAC to 12VDC 1A Power Adaptor

#### Model No.

- Matrix-500, Matrix-504, Matrix-505, Matrix-513, Matrix-604, Matrix-605, Matrix-700, Aport-211S, Aport-211W, Aport-212, Aport-212PG, PAC-4000, PAC-4010, PAC-4070, RIO-2010, RIO-2010PG, RIO-2015PG, RIO-2017, RIO-2018

## WiFi / 3G



### Pigtail-WiFi-1001-20 (91-CST16-001)

IPEX to RP-SMA Female Coaxial Cable, 20cm

#### Model No.

- Matrix-513



### Pigtail-3G-1001-20 (91-CST17-001)

IPEX to SMA Female Coaxial Cable, 20cm

#### Model No.

- Matrix-513



### Ant-WiFi-1001 (91-CRF38-001)

5dBi External WiFi Antenna

#### Model No.

- Matrix-513

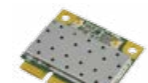


### Ant-3G-1001 (91-CRF37-001)

5dBi External 2G/3G Antenna

#### Model No.

- Matrix-513



### M-9001 (ZA-CAR00-002)

802.11b/g/n USB Half-size miniPCIe Card, Ralink RT5390U, 1T2R

#### Model No.

- Matrix-513



### M-9011 (ZA-CAR00-001)

Full-size miniPCIe 2G / 3G Card, with SIM Socket

#### Model No.

- Matrix-513

## Sensor



### DS18B20 (91-6DS18-001)

Programmable Resolution 1-Wire Digital Thermometer

#### Model No.

- RIO-2010, RIO-2015PG, RIO-2010PG



### 5SRTC-GG-K-24-36 (91-5SRTC-K50)

Subminiature Connector, K Thermocouple, Glass Braid Insulation, 24 AWG, 36 inch Length

#### Model No.

- RIO-2018, Note: Artila generally suggests our customers to purchase this item from the original manufacturer directly.



### 5SRTC-GG-J-24-36 (91-5SRTC-J50)

Standard Size Connector, J Thermocouple, Glass Braid Insulation, 24 AWG, 36 inch Length

#### Model No.

- RIO-2018, Note: Artila generally suggests our customers to purchase

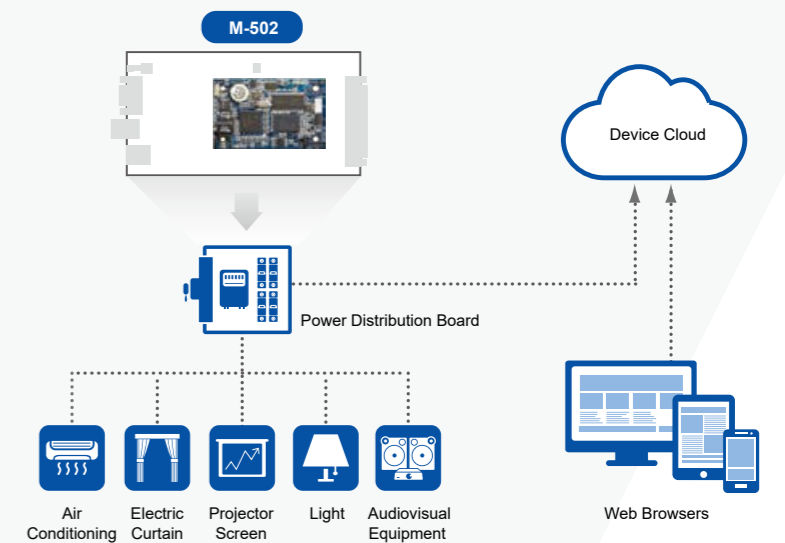
# Application

## Building Automation

### Intelligent Conference Room Situational Control Solution

In such application structure, by placing the M-502 into the company's power distribution board and with the multi-functional GPIO interface of M-502, an intelligent control can be realized after conversation to achieve the function of auto-turning off meeting room facilities to ultimately realize the purpose of energy management such as the turning on/off of projectors, lighting control, electric curtains, intelligent air-conditioning, video systems, etc.

Also, the one-to-many instant monitoring and control function can be integrated for a relational situational control for multiple objects at the same time, for example, during a meeting, the instant data monitoring can be done for the speaker's movement, interior temperature and humidity, light, sound, etc., and the instant control can be done for projector screen up/down, air-conditioning, lights and volume control for telephone conferences.

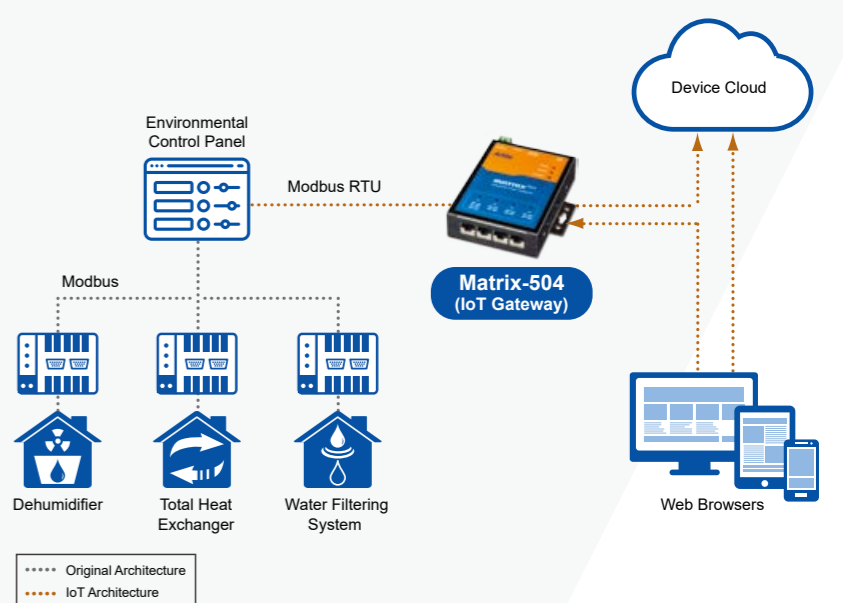


## Environment and Facility Monitoring System

### Intelligent Household Environment Control Solution

Most of traditional household appliances cannot connect to internet directly, while it takes a long time for the change and evolution from design aspect. However, as the development trend of IoT is rapidly spreading into the household market, a stable and reliable gateway is expected to be developed for reading traditional control signals at one end and connecting to cloud platforms at the other end.

In such application structure, Matrix-504 enables developers to connect traditional household appliances to a cloud server in the simplest and fastest way, by which to immediately upgrade them into intelligent appliances that can be controlled and monitored by remote units for the intelligent adjustment and control function of household environmental conditions, and to effectively attain the purpose of energy saving.







**Your Trusted Partner for  
Device Networking & Computing**

Artila Electronics has more than 15 years of experience in Industrial Computing. Artila's product lines include the intelligent IoT gateway, programmable automation controller, IoT device platform, and web-based remote I/O. Artila's products have been widely used in energy management, intelligent buildings, lighting control and environmental monitoring, and so on. Artila also provides hardware and software customization services to meet customer requirements for special specifications and features. From product design to production quality, Artila Electronics strives for delivering top-notch solutions and services to our customers in the industrial automation market.



**Artila** [www.artila.com](http://www.artila.com)

Please verify specifications before quoting. This guide is intended for reference purposes only. All product specifications are subject to change without notice. No part of this publication may be reproduced in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission of the publisher. All brand and product names are trademarks or registered trademarks of their respective companies.  
© Artila Electronics Co., Ltd. 2018

50-401709-EN