

# Matrix-700

## Linux-Ready Cortex-A5 Industrial IoT Gateway

### Hardware Guide



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**Artila**

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### **FCC AND IC INFORMATION:**

This Class A digital apparatus complies with Part 15 of the FCC rules and with Canadian ICES-003

### **Operation is subject to the following two conditions:**

1. This device may not cause interference and
2. This device must accept any interference. Including interference that may cause undesired operation of the device.

## Safety information

### Warning



#### ATTENTION:

Before Connecting Matrix-700 to DC power input, make sure the DC power source voltage is stable.



#### ATTENTION:

This product is intended to be mounted to a well-grounded mounting surface, such as a metal panel.



This Metal surface can be very hot when operating in high temperature. To avoid injure, please do not touch the metal surface.

## Document Amendment History

Revision	Date	Remark
V 1.0	2016 Jun.	Initial
V1.01	2016 Aug.	Appendix Setuart, How to configure USB dongle, Installation Toolchain, Webmin, and Restore to default.
V1.02	2016 Nov.	Update Kernel version. Add Webmin link information.
V1.03	2016 Dec.	Update Kernel version.
V1.1	2017 Jul.	Hardware Guide
V1.11	2017 Nov.	Update outline dimension & model description
V1.12	2018 Jan.	Safety information
V1.13	2019 Nov.	FCC instruction, Spec updated
V1.14	2020 Dec..	Software information updated
V1.15	2023 Apr.	Linux kernel updated

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## 1. Introduction

Matrix-700 based on ARM Cortex-A5, is a Linux-ready IoT gateway with highly integrated and low power consumption. Matrix-700 provides an ideal building block that easily integrates with a wide range of target markets, such as industrial control, automation, mobile gateway and other applications.

### 1.1 Features

- ATMEL ATSAMA5D35 536MHz Cortex-A5 Processor
- Linux kernel 5.10.x (or up) and file system
- Support Toolchain: gcc 9.3.0 + glibc 2.31
- 512MB LPDDR2 SDRAM
- 16GB eMMC Flash and 8MB DataFlash for system backup
- One Gigabit and one 10/100Mbps Ethernet port
- Two USB 2.0 high speed (480Mbps) Host port
- Four RS-485/RS-232 serial port
- One microSD socket
- +9 to +48VDC power input
- Ultra-low power consumption, less than 3 Watts
- Wall-mounting, Optional DIN RAIL mounting adaptor

### 1.2 Specifications (Hardware)

#### CPU / Memory

- CPU: ATMEL ATSAMA5D35 536MHz w/MMU
- SDRAM: 512MB, LPDDR2
- Flash: 16GB, eMMC
- DataFlash: 8MB, for system backup

#### Network Interface

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

#### USB 2.0 Host Interface

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

### **Console / Debug Ports**

- Support micro-USB console port
- Serial console port (inside the box)

### **TTY (Serial) Ports**

- 4 x RS-485 / RS-232 ports, can be selected by software
- RS-232 Signal: TX, RX, RTS, CTS
- RS-485 Signal: Data+, Data- (Automatic flow control)

### **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

### **SD Slot**

- SD 2.0 compliant, supports SDHC
- 1 x microSD socket
- Storage capacity: Support up to 64G

### **Power Requirement**

- Input Voltage: +9~+48VDC (terminal block)
- Typical Power Consumption: 12VDC@200mA

### **General**

- Real-Time Clock (RTC): Yes
- Buzzer: Yes
- Watchdog: Yes
- Dimensions (W x L x H): 78 x 108 x 24mm (3.0 x 4.25 x 0.94in)
- Weight: 324g (0.71lb)
- Operating Temperature: 0~70°C (32~158°F)
- Regulation: CE Class A, FCC Class A
- Installation: Wall mounting, DIN-rail mounting (with optional kit)

### 1.3 Specifications (Software)

#### Operation System

- Linux kernel 5.10.x (or up)
- Supports bootup from eMMC or SD card
- Support Backup/Restore from SD card or USB device
- Boot Loader: Barebox
- File System: EXT4

#### Software Development

- Toolchain: gcc 9.3.0 + glibc 2.31
- 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

#### Software Operating & Utility

Please refer to “M-A5D35” system on module information for software operating & utility at following: <http://www.artila.com/download/A5D35/Linux/>

### 1.4 Packing List

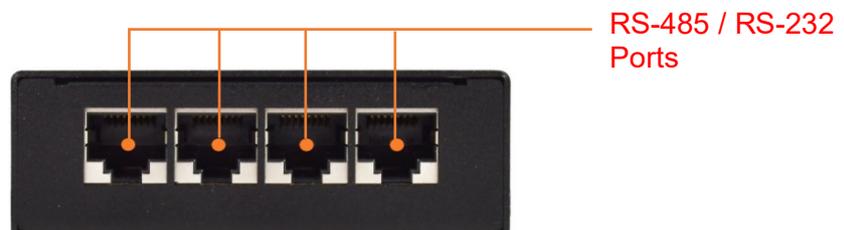
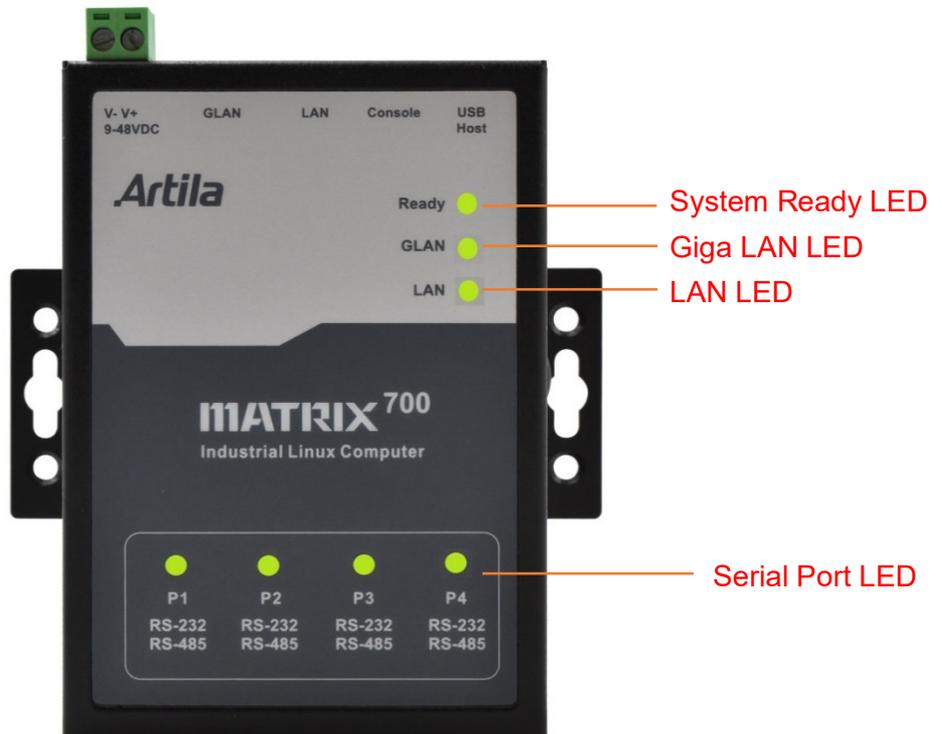
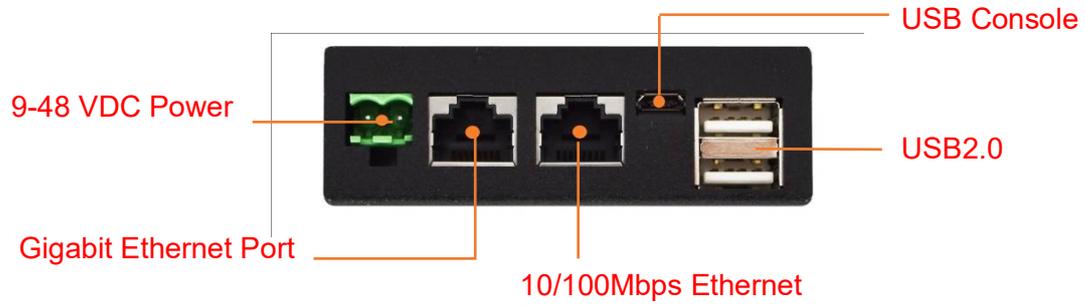
- **Matrix-700**: Linux-ready Cortex-A5 536MHz Industrial IoT Gateway with 512MB SDRAM, 16GB eMMC Flash

### 1.5 Optional Accessory

- **DK-35A** (36-DK35A-000): DIN RAIL Mounting Kit
- **PWR-12V-1A** (31-62100-000): 110~240VAC to 12VDC 1A Power Adaptor

## 2. Layout

### 2.1 Connector & LED Indicator



## 2.2 Dimension

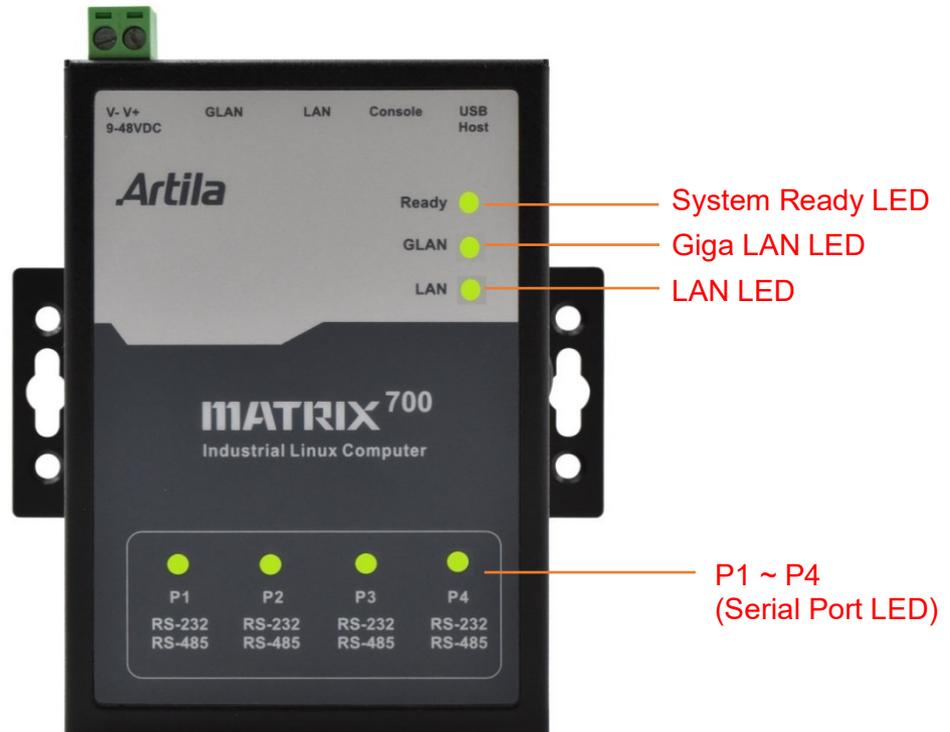
Unit: mm



### 3. Pin Assignment and Definitions

#### 3.1 LED Indicators

The LED provides the Matrix-700 operation information. The LED status is described as follow:

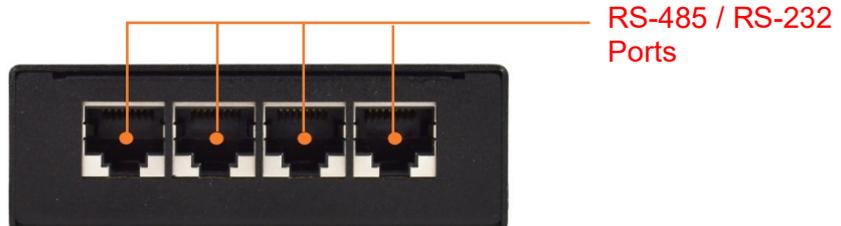


- **“Ready”** (Ready LED indicator): Ready LED will turn on in green color while power is properly supplied. After system is ready for operation, Ready LED will keep in solid orange color and a beep will be heard
- **“GLAN” & “LAN”** (Network LED indicator): Link and Activity LED will turn ON when the Ethernet cable is connected. When there is network data traffic, this LED will flash.
- **“P1 ~ P4”** (Serial Port LED indicator): These eight dual color LEDs indicate the data traffic at the serial ports. When RXD line is high then Green light is ON and when TXD line is high, Yellow light is ON.

### 3.2 Serial Port

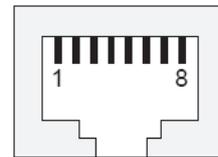
The Matrix-700 provide total four RS-485 / RS-232 ports that each port can be configured by software.

RS-485 supports automatic direction control (by hardware).



The pin assignment is shown as following table.

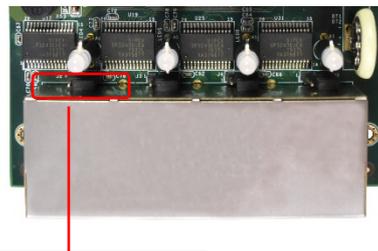
Pin No.	RS-232	RS-485
1	DSR	-
2	RTS	DATA+
3	GND	GND
4	TXD	DATA-
5	RXD	--
6	DCD	-
7	CTS	-
8	DTR	-



#### Enable/Disable Termination resistor for RS-485

The Matrix-700 equips on-board 120Ohm termination resistor for each RS-485 port. Default setting is disable termination resistor. In order to enable termination resistor, please remove the top cover of the Matrix-700, and the adjust the associated jumper to short position 1 - 2, shown below:

RS-485 Port	P1	P2	P3	P4
Jumper No.	J2	J3	J4	J5



Termination Resistor Disabled (default)	
Termination Resistor Enabled	

### 3.3 Power Connector

Connecting +9 ~ +48VDC power line to the Power in terminal block. In the meantime, Ready LED will turn on in green color while power is properly supplied.

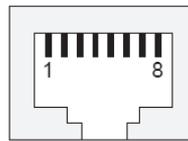
After system is ready for operation, Ready LED will keep in solid orange color and a beep will be heard.

### 3.4 Ethernet LAN Port

The Ethernet Port use RJ45 connector for both 10/100LAN port and GigaLAN port.

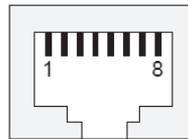
Pin definition of 10/100LAN connector.

PIN	Signal
1	ETx +
2	ETx -
3	ERx +
6	ERx -



Pin definition of GigaLAN port

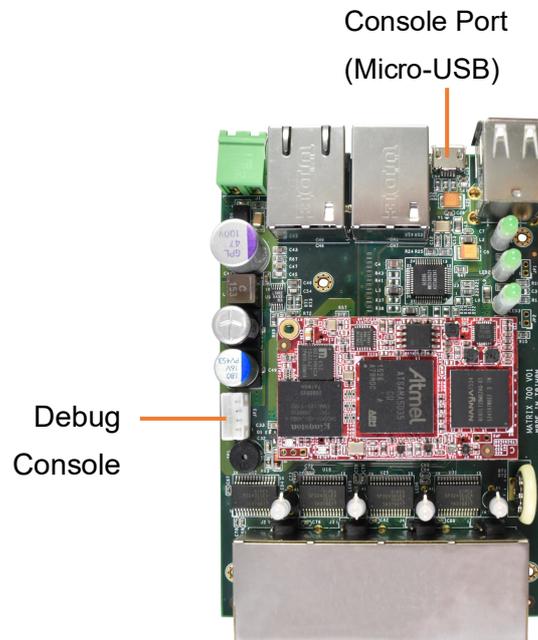
PIN	Signal
1	TP0 +
2	TP0 -
3	TP1 +
6	TP1 -
4	TP2 +
5	TP2 -
7	TP3 +
8	TP3 -



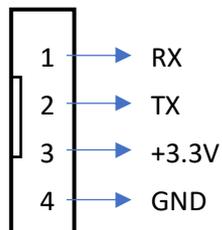
### 3.5 Console Port

There are two serial console ports for use:

- Micro-USB connector which is USB client acts as serial console port.
- Debug Console: There is a 4-pin wafer box header (JP3) inside the box.



Pin assignment is: RX, TX, +3.3V, GND.



Therefore, you need to open the upper metal case and prepare or purchase a serial console cable to use the serial console port.

Or, it can be purchased “Console Cable” from Artilla, P/N is [CB-PHDF9-050](#).



### 3.6 USB Port

Two type-A USB 2.0 ports are built for operation.

### 3.7 SD card socket

There is a SD card socket inside as data storage. It can be accessed by opening top cover.

