AXIOMTEK

rBOX610-FL Series

Robust Din-rail Fanless Embedded System

Hardware User's Manual

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Safety Precautions

Before getting started, please read the following important safety precautions.

1. Be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and place all electronic components in any static-shielded devices. Most electronic components are sensitive to static electrical charge.
2. Disconnect the power cord from the rBOX610-FL before making any installation. Be sure both the system and the external devices are turned OFF. Sudden surge of power could ruin sensitive components. Make sure the rBOX610-FL is properly grounded.
3. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
4. Turn OFF the system power before cleaning. Clean the system using a cloth only. Do not spray any liquid cleaner directly onto the screen.
5. Do not leave this equipment in an uncontrolled environment where the storage temperature is below -45℃ or above 85℃. It may damage the equipment.
6. Do not open the system's back cover. If opening the cover for maintenance is a must, only a trained technician is allowed to do so. Integrated circuits on computer boards are sensitive to static electricity. To avoid damaging chips from electrostatic discharge, observe the following precautions:
   - Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This will help to discharge any static electricity on your body.
   - When handling boards and components, wear a wrist-grounding strap, available from most electronic component stores.

Classification

1. Degree of production against electric shock: not classified
2. Degree of protection against the ingress of water: IP40
3. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
4. Mode of operation: Continuous
5. Type of protection against electric shock: Class I equipment

General Cleaning Tips

You may need the following precautions before you begin to clean the computer. When you clean any single part or component for the computer, please read and understand the details below fully.

When you need to clean the device, please rub it with a piece of dry cloth.

1. Be cautious of the tiny removable components when you use a vacuum cleaner to absorb the dirt on the floor.
2. Turn the system off before you start to clean up the component or computer.
3. Never drop the components inside the computer or get circuit board damp or wet.
4. Be cautious of all kinds of cleaning solvents or chemicals when you use it for the sake of cleaning. Some individuals may be allergic to the ingredients.
5. Try not to put any food, drink or cigarette around the computer.

Cleaning Tools

Although many companies have created products to help improve the process of cleaning your computer and peripherals users can also use household items to clean their computers and peripherals. Below is a listing of items you may need or want to use while cleaning your computer or computer peripherals.

Keep in mind that some components in your computer may only be able to be cleaned using a product designed for cleaning that component, if this is the case it will be mentioned in the cleaning.

- Cloth: A piece of cloth is the best tool to use when rubbing up a component. Although paper towels or tissues can be used on most hardware as well, we still recommend you to rub it with a piece of cloth.
- Water or rubbing alcohol: You may moisten a piece of cloth a bit with some water or rubbing alcohol and rub it on the computer. Unknown solvents may be harmful to the plastics parts.
- Vacuum cleaner: Absorb the dust, dirt, hair, cigarette particles, and other particles out of a computer can be one of the best methods of cleaning a computer. Over time these items can restrict the airflow in a computer and cause circuitry to corrode.
- Cotton swabs: Cotton swaps moistened with rubbing alcohol or water are excellent tools for wiping hard to reach areas in your keyboard, mouse, and other locations.
- Foam swabs: Whenever possible it is better to use lint free swabs such as foam swabs.

Note

***We strongly recommended that you should shut down the system before you start to clean any single components*.**

Please follow the steps below:

1. Close all application programs
2. Close operating software
3. Turn off power
4. Remove all device
5. Pull out power cable

Scrap Computer Recycling

If the computer equipments need the maintenance or are beyond repair, we strongly recommended that you should inform your Axiomtek distributor as soon as possible for the suitable solution. For the computers that are no longer useful or no longer working well, please contact your Axiomtek distributor for recycling and we will make the proper arrangement.

Trademarks Acknowledgments

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CHAPTER 1
INTRODUCTION

This chapter contains general information and detailed specifications of the rBOX610-FL. The Chapter 1 includes the following sections:

- General Description
- System Specification
- Dimensions
- I/O Outlets
- Packing List

1.1 General Description

rBOX610-FL cost-effective din-rail fanless embedded system utilizes the low power RISC-based module (iMX-287) processor and is designed to withstand temperatures ranging from -40℃ to +70℃ for using in extreme operating environment and industrial automation applications.

rBOX610-FL features 4 RS-232/422/485 serial ports, dual LANs, 4 digital input channels, 4 digital output channels, 2 CAN bus and 1 eMMC onboard 4GB & 1 x SDHC socket for storage expansion (easy to access) in a compact, IP40 protected, industrial-strength robust case. Two power paths input minimize the risk of data loss in the event of a single power failure. Its vertical din-rail form factor makes it easy to install the system in a small cabinet. Due to the RISC-based architecture, rBOX610-FL will not generate a lot of heat while being operated. The ready-to-run rBOX610-FL is specially designed for remote control/monitoring management applications like unmanned control room, industrial machine, automatic parking lot, traffic cabinet and more.

- **Features**
  - Fanless
  - Wide temperature operation of -40℃ - +70℃
  - Low power RISC-based module (iMX-287), 454MHz Processor
  - 2 10/100Mbps Ethernets with magnetic isolation protection
  - 4 COM Ports
  - 1 USB 2.0 with power distribution control and over current protection
  - 2 CAN bus 2.0 B Ports
  - 1 DIO Port (4-In/4-Out) with Dry/Wet contacts and optical isolation protection 2KV
  - 1 Console Port (DB9 connector) for user setting with debug
  - 1 Watchdog Timer
  - LED Indicators (Power, Alarm, Active/Ready, COM, Wireless)
  - Support 1 Wireless (3G/GPRS or Wifi)
  - SNMP V1/V2c

- Storage:
  Support one eMMC 4GB onboard (for boot disk)
  Support one SDHC Card (easy-to-access, for store only)
- 2 power paths with terminal block and 12–48VDC
- Din-rail mounting
- Wall mounting (optional)
- Meet safety agency requirements (UL508,UL60950-1)
  Pass heavy industrial CE & FCC Part 18 Class A

1.2 System Specifications

1.2.1 CPU

- Low power RISC-based module (iMX-287), ARM9 16-bit RISC-based 454MHz Processor

1.2.2 System Memory

- 1 x DDR2 128MB SDRAM onboard

1.2.3 Console Port

- DB9 connector
- For user setting with debug

1.2.4 LAN

- LAN 1 / LAN 2
  - 10/100Mbps LAN w/ magnetic isolation protection 1.5KV
  - LED definition: Active LED (Yellow flashing), 10 LAN LED (NO Light),100 LAN LED (Green Light)

1.2.5 Storage

- 1 x eMMC 4GB onboard (for boot disk)
- 1 x SDHC slot (easy-to- access, for store only)

1.2.6 USB

- 1 x USB2.0
- With power distribution control and over current protection

1.2.7 WatchDog Timer (WDT)

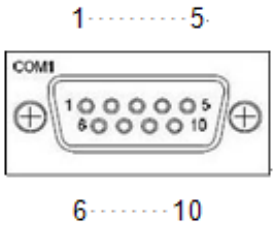
- 1 WatchDog Timer
- One step is 250~280ms,255 levels

1.2.8 COM

- DB9 Pin define
- RS232/RS422/RS485 (COM1 ~ 4)
- COM 1~4 with TX/RX/RTS/CTS signals
- RS-232/422/485 Interface select by software

COM1/COM2/COM3/COM4

Pin	RS-232	RS-422	RS-485
1		TX-	Data-
2	RX	TX+	Data+
3	TX	RX+	--
4		RX-	--
5	Ground	Ground	Ground
6		--	--
7	RTS	--	--
8	CTS	--	--
9		--	--



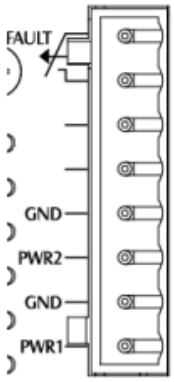
1.2.9 Power

- 2 DC Power Paths
- DC input range 12~48V
- DC Input has UVP/Reverse protection.

  UVP (Under voltage protection)

  Reserve protection
- Main power source is for Input Power Path 1, Backup power source is for Input Power Path 2.
- Only one power source must be for Input Power Path 1.
- DC Terminal Block

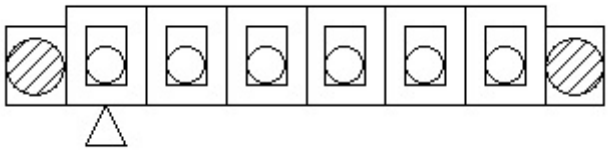
Pin	DC Signal Name
1	AL-
2	AL+
3	-
4	-
5	GND
6	DC2
7	GND
8	DC1



Note ***If 2 power sources aren't same voltage and the system will be possible damage.***

1.2.10 CAN bus

- 2 CAN bus 2.0 B Ports
- Phoenix connector
- CAN bus Design Specification



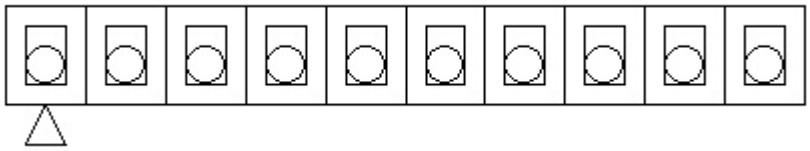
TB6 Pin No.	Signal name
1	GND
2	CAN0_H
3	CAN0_L
4	CAN1_H
5	CAN1_L
6	GND

1.2.11 Digital I/O Connector and Pin Definition

- 4 DI/ 4DO with optical isolation protection 2KV
- DI: Wet/Dry
- DO: Wet
- DIO Design Specification

Digital Input	
Input Channels	4,source type
Input Voltage	0 to 24VDC
Digital Input Levels for Dry Contacts	Logic level 0:Close to GND Logic level 1:Open
Digital Input Levels for Wet Contacts	Logic level 0:+10V to +24V (DI To COM-) Logic level 1:+3V max.
Digital Output	
Output Channels	4,sink type
Output Current	Max. 200 mA per channel
On-state Voltage	24VDC nominal, open collector to 30V

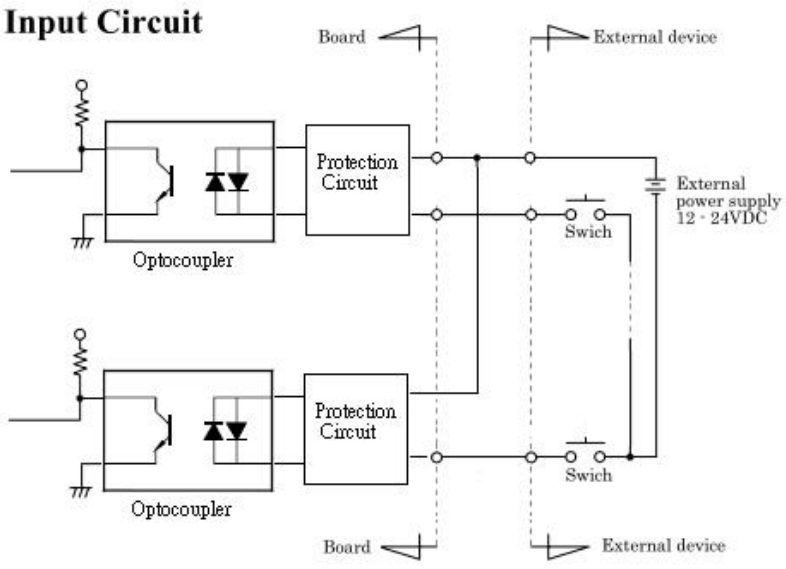
- DIO 4-IN/4-OUT of TB10 Female



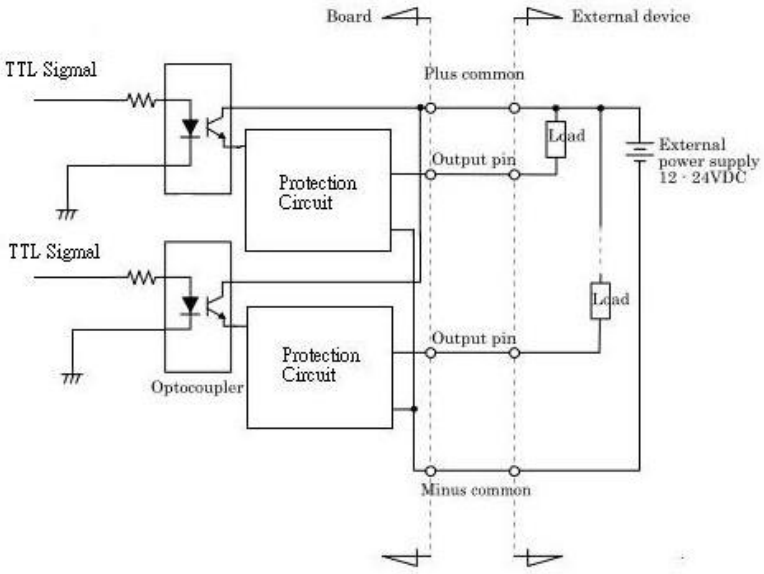
rBOX610 DIO Terminal Block

TB10 Pin No.	Signal name	Meaning
1	COM+	Plus Common for DIO
2	DI0	
3	DI1	
4	DI2	
5	DI3	
6	DO0	
7	DO1	
8	DO2	
9	DO3	
10	COM-	Minus Common for DIO

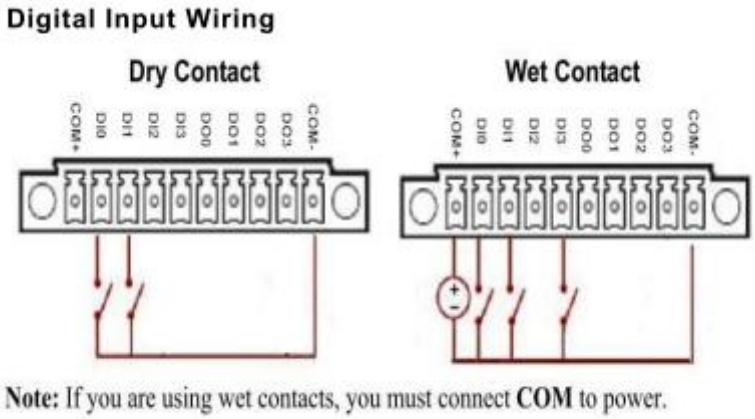
- DIO operation schematic diagram



Output Circuit

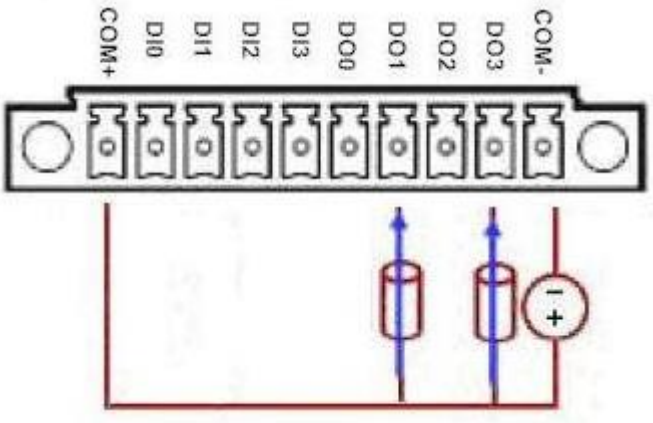


Digital Input Wiring



Note: If you are using wet contacts, you must connect **COM** to power.

Digital Output Wiring



1.2.12 System LED

LED Name	Description	Color	Note
PWR1	Indicate the DC1 input status. When the DC input is acceptable, the LED will ON.	Green	
PWR2	Indicate the DC2 input status. When the DC input is acceptable, the LED will ON.	Green	
Alarm	The LED will ON if PWR1 or PWR2 is lost (default) The behavior of Alarm and Relay are the same. When the LED of Alarm is ON and the Relay will be turn on at the same time.	Red	
ACT/RDY	The LED for ACT/ RDY can help users to judge boot finish or not and the OS can normal work or not. When the boot finishing the configuration of system, the LED will ON. - The LED is blinking, Bootloader or Linux kernel loading. - The LED always ON, system ready.	Yellow	
COM 1~4 TX	When COM1~4 transmitting data, the LED will on.	Green	
COM 1~4 RX	When COM1~4 receiving data, the LED will on.	Green	
Wireless	1 LED (for transmission signal strength, more than 50% is green, less than 50% is red) 1 LED (for link)	Green/ Red	

1.2.13 Alarm Contact

- 1 relay output
- Relay output with 0.5A @30VDC
- Event:Power Fail
- The rBox can support two DC power source. When lost one of them will cause Alarm LED on and trigger Relay out for remote notice.

rBOX Alarm Application:

Troubleshooting is very important in many applications.

In the rBox series we can provide two kinds of way for troubleshooting.

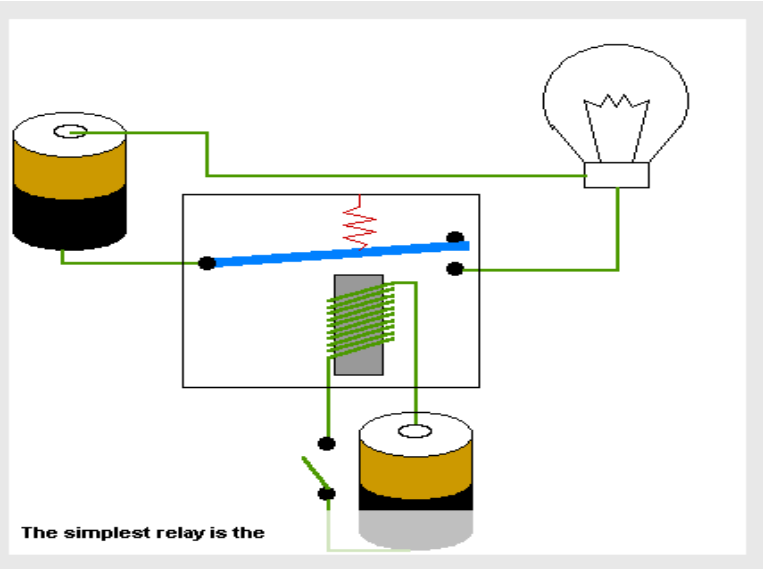
- Alarm LED
- Relay out

1. Maintenance Staff can check the Alarm LED for basic troubleshooting

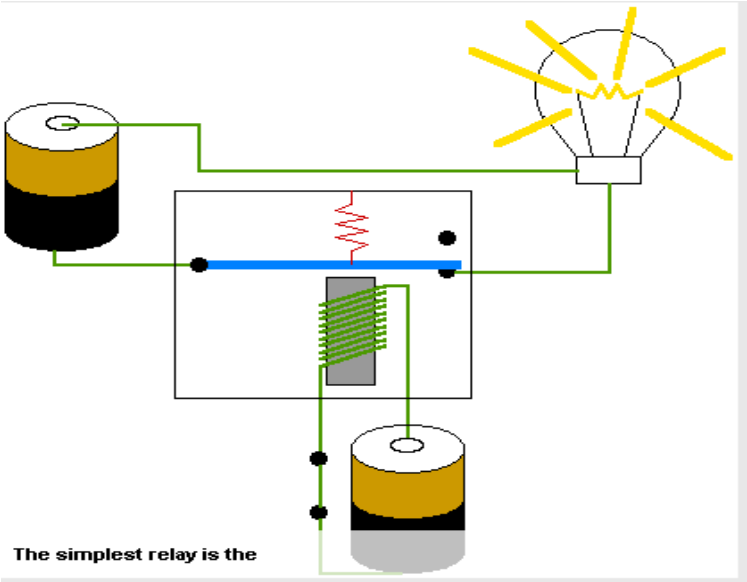
2 Relay output

Below is a very simple application for remote notice use relay and lamp.

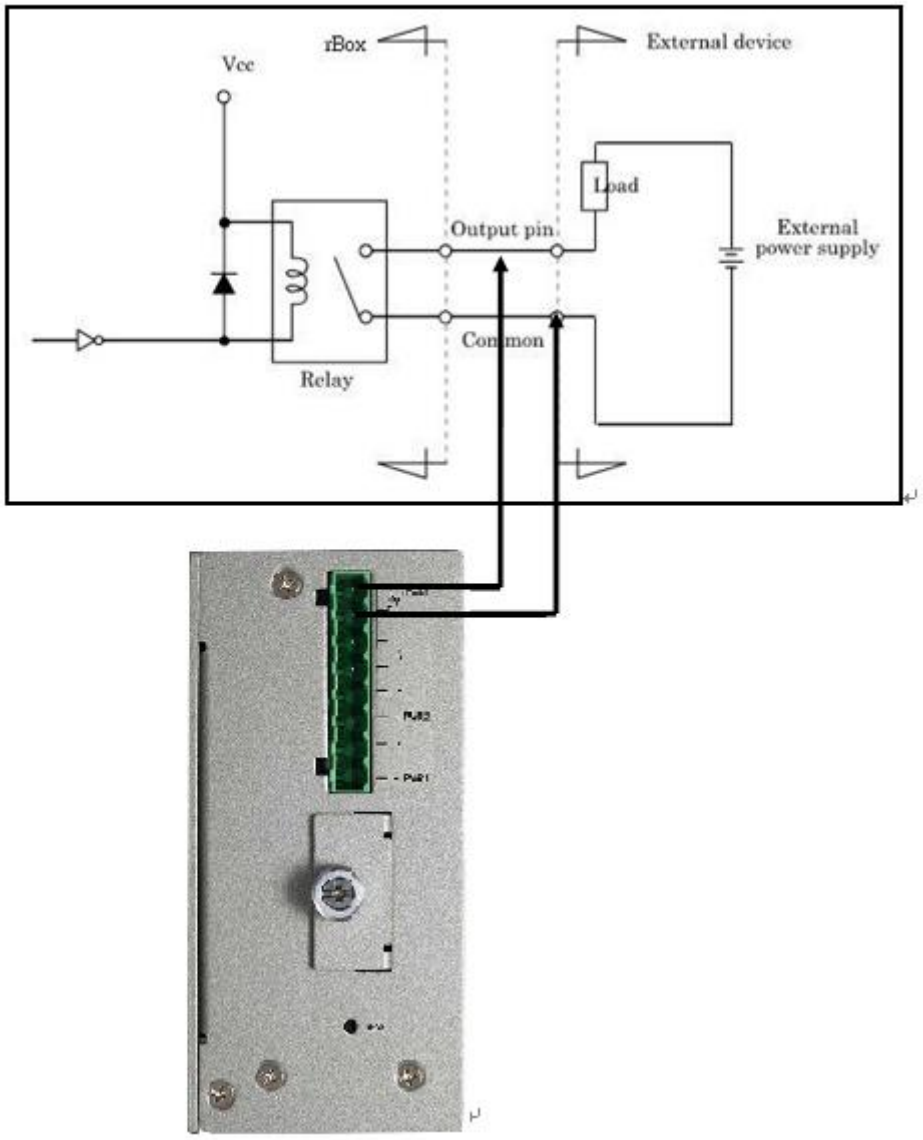
a) Normal



b) Warning



c) Relay wiring of rBox



1.2.14 Wireless (3G/GPRS or Wifi)

- 1 x Mini card socket (supports USB interface)
- 1 x SIM Socket by outside accedss and is easy plug/pull
- Support WiFi or 3G/GPRS
- 2 LEDs (for transmission signal strength, more than 50% is green, less than 50% is red) ; 1 LED (for link)

1.2.15 Reset Button

- 1 x Reset button

1.2.16 Operation Temperature

- -40℃ ~ +70℃ (-40 ºF ~ +158ºF)

1.2.17 Storage Temperature

- -45℃ ~ +85℃ (-49 ºF ~ +185ºF)

1.2.18 Humidity

- 5% ~ 95% (non-condensation)

1.2.19 Weight

- 1kg

1.2.20 Dimensions

- 55mm(W)x110mm(D)x155mm(H)

1.2.21 System I/O Outlet

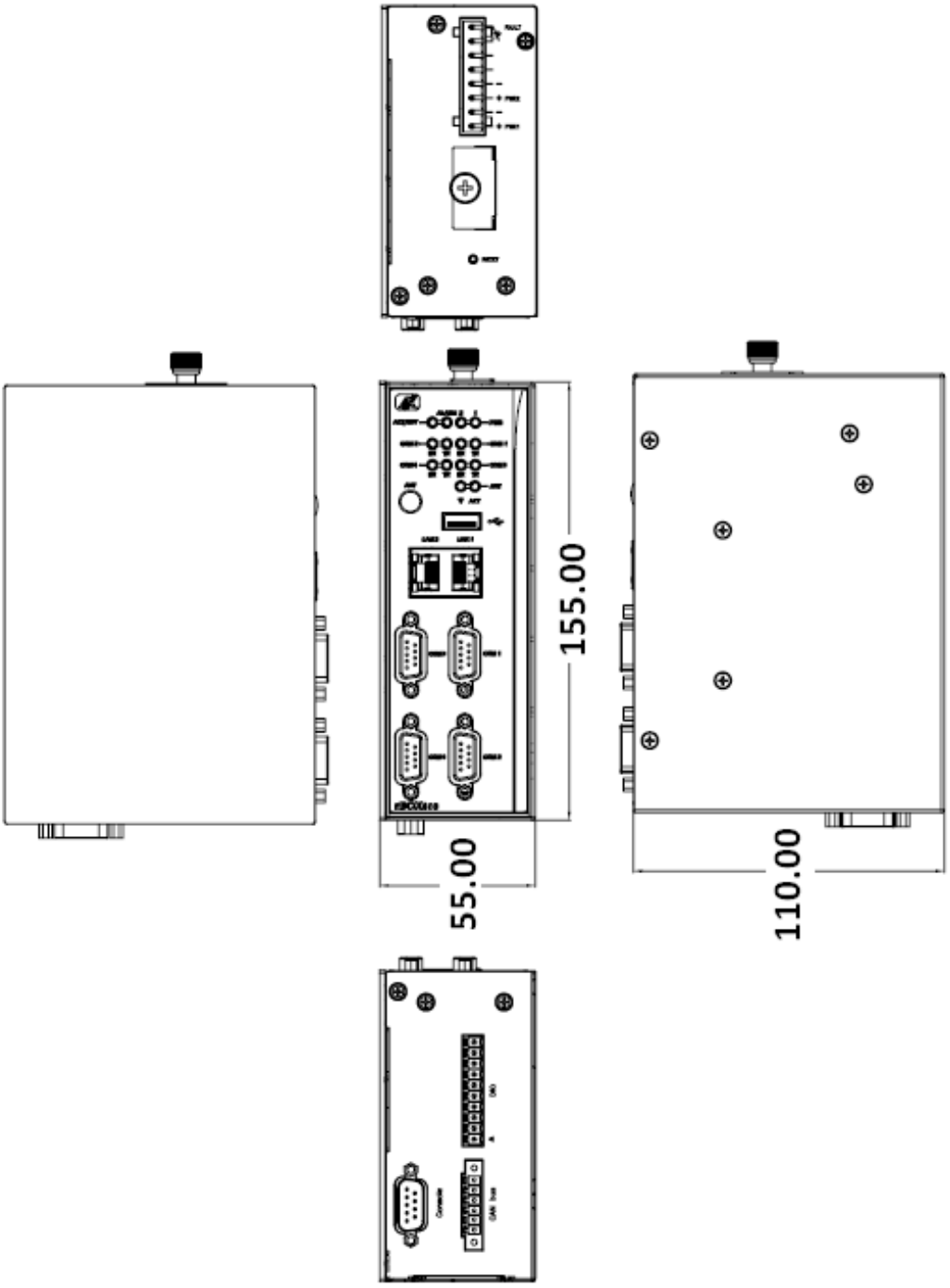
- Four 9-pin D-Sub male connectors, COM1~COM4
- One Console Port
- Two 10/100Mbps Ethernet with magnetic isolation protection
- One USB 2.0 connector
- Two CAN bus
- One DIO (4-In/4-out) with optical isolation protection
- Two DC Powers Input with terminal block
- Alarm contact
- One Wireless (3G/GPRS or WiFI)

Note

All specifications and images are subject to change without notice.

1.3 Dimensions

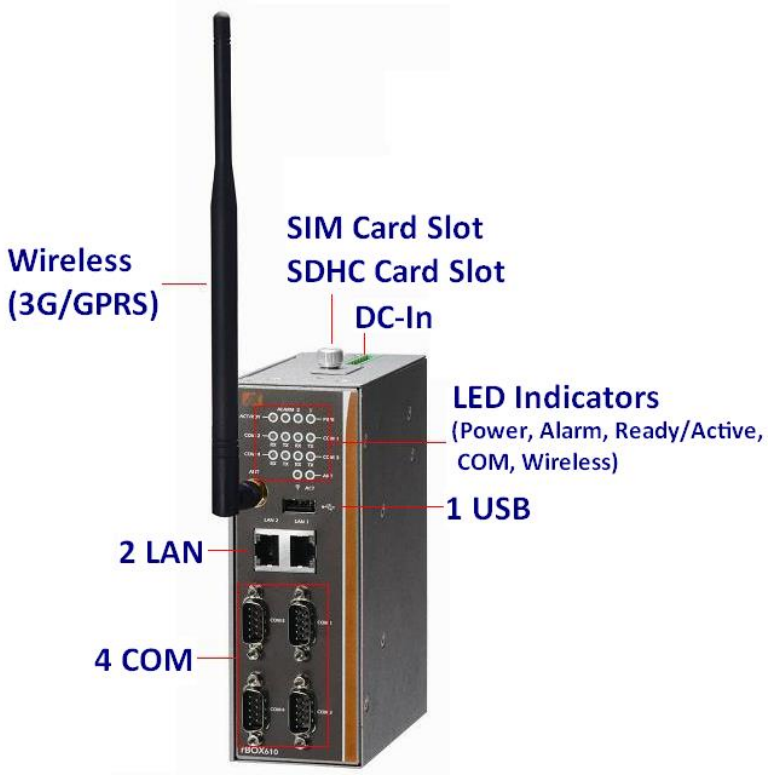
The following diagrams show you dimensions and outlines of the rBOX610-FL



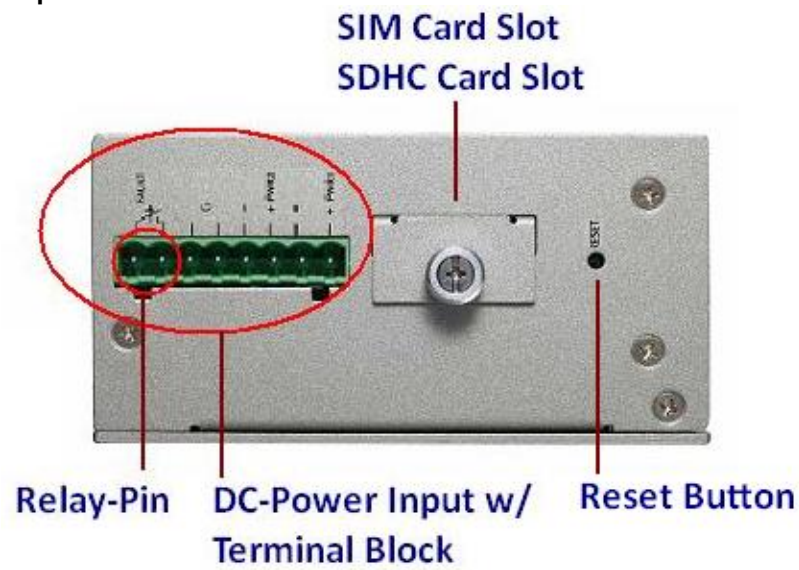
1.4 I/O Outlets

The following figures show you I/O outlets on front view and bottom view of the rBOX610-FL.

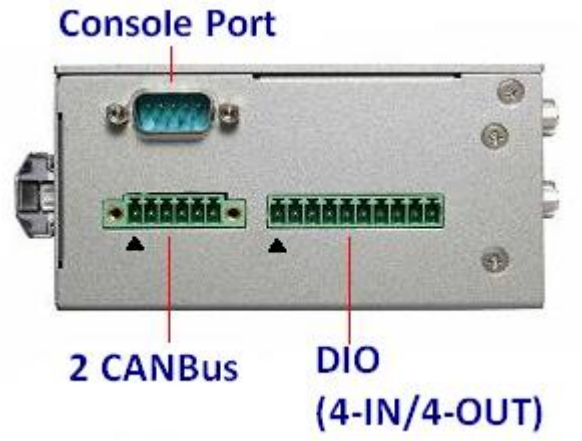
- **Front View**



- **Top View**



- Bottom View



1.5 Packing List

The package bundled with your rBOX610-FL should contain the following items:

- ✓rBOX610-FL System Unit x 1
- ✓rBOX610-FL Quick Installation Guide x 1
- ✓Screws
- ✓Din-rail Kit x1
- ✓Power terminal block x1
- ✓CAN terminal block x1
- ✓DIO terminal block x1
- ✓Console cable x1
- ✓DVD x1 (for Driver & User's Manual)

Note

Please contact your local vendors if any damaged or missing items.

Please download the latest BSP or the latest Web_AP for rBOX610 from Axiomtek's website as below list if you have the demand.
http://www.axiomtek.com/products/ViewProduct.asp?view=1086

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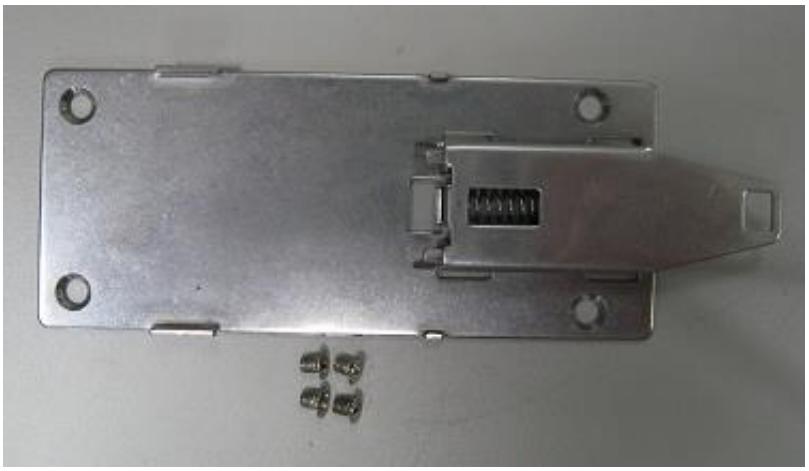
CHAPTER 2
HARDWARE INSTALLATION

2.1 Installing Din-rail Mounting

The rBOX provides Din-rail Mount that customers can install as below:

Prepare DIN Mount assembling components (screws and bracket) ready.



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