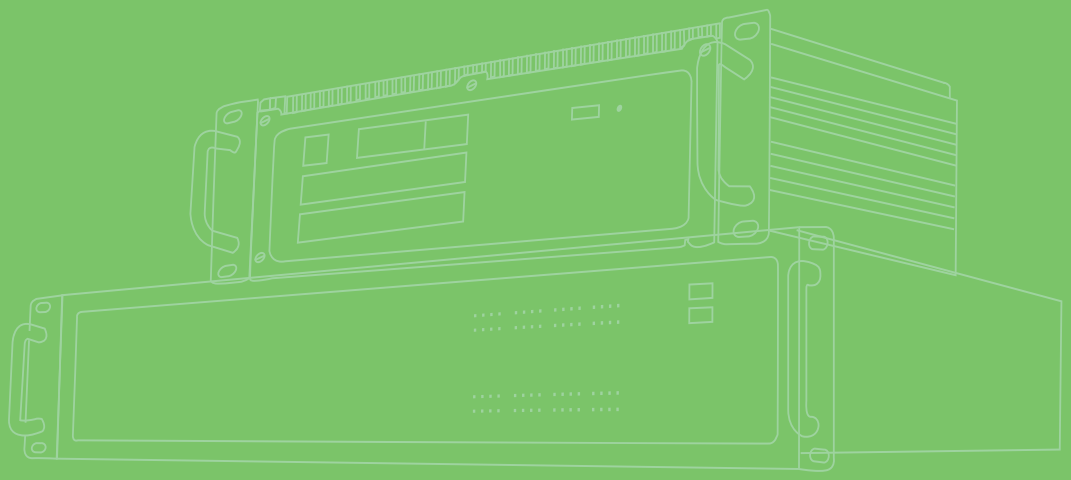

User Manual

ECU-150 Series

ADVANTECH

Enabling an Intelligent Planet

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Support

For more information on this and other Advantech products, please visit our websites at: http://www.advantech.com

For technical support and service, please visit our support website at: http://www.advantech.com/support/

This manual is for ECU-150 Series.

Part No. Edition 1

Printed in China May 2022

Product Warranty (2 years)

Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product is defective, follow the steps outlined below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This type of cable is available from Advantech. Please contact your local supplier for ordering information.

Test conditions for passing also include the equipment being operated within an industrial enclosure. In order to protect the product from damage caused by electrostatic discharge (ESD) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference. In this event, users are required to correct the interference at their own expense.

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before calling:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping or letting the equipment fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
8. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
9. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
12. Never pour liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If any of the following occurs, have the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated the equipment.
    - The equipment has been exposed to moisture.
    - The equipment is malfunctioning, or does not operate according to the user manual.
    - The equipment has been dropped and damaged.
    - The equipment shows obvious signs of breakage.
15. Do not leave the equipment in an environment with a storage temperature of below -25° C (-13° F) or above 70° C (158° F) as this may damage the components. The equipment should be kept in a controlled environment.
16. CAUTION: Batteries are at risk of exploding if incorrectly replaced. Replace only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.
17. Due to the sensitive nature of the equipment it must be stored in a restricted access location, only accessible by qualified engineers.
18. When installing this equipment, ensure that the Earth cable is securely attached using a 3.5mm screw.
19. The equipment does not include a power cord and plug.
20. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from the PC chassis before manual handling. Do not touch any components on the CPU card or other cards while the PC is powered on.
- Disconnect the power before making any configuration changes. A sudden rush of power after connecting a jumper or installing a card may damage sensitive electronic components.

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Chapter 1

Overview

1.1 Introduction

ECU-150 is an i.MX8M based high-performance IoT gateway, which has an open platform design with Quad Core processor, two RS-232/485 isolated serial ports, two 10/100/1000 Ethernet ports, one USB 3.0 port and operating temperature range of -40~70°C. It offers Mini-PCIe and M.2 slot for integrating Wi-Fi/4G/5G modules. With Linux operating system and EdgeLink SDK, ECU-150 enable system integrators to develop applications precisely for solar power, electricity and factory, which require massive data collection, cloud based application and video related monitoring solutions.

1.2 Specifications:

1.2.1 General

- **Certification:** CE, FC
- **Mounting:** Wall-Mount/ DIN-Rail
- **Power Consumption:** 13W @ 24V_{DC}
- **Power Requirements:** 10 ~ 30 V_{DC}

1.2.2 System

- **CPU:** NXP i.MX8M Quad Core Cortex A53 1.3G
- **Memory:** LPDDR4 2GB
- **FRAM:** 128KB (Optional)
- **Indicators:** Power, LAN (LINK, ACT), Serial (Tx, Rx), Programmable
- **Storage:** 16GB eMMC
- **Display:** 1 x HDMI resolution 1280 x 720 (Optional)
- **SD Slot:** 1 x Micro-SD slot
- **SIM Slot:** 1 x Nano SIM slot
- **Watchdog:** Yes
- **Real-time clock:** Yes
- **Security:** TPM2.0 (Optional)

1.2.3 Communication

- **Serial Port:** 2 x RS-232/485
- **Isolation:** 2500 V_{DC}
- **Serial Port Speed:** 50 ~ 115200 kbps
- **Default Mode:** RS-485
- **Ethernet Port:** 2 x 10/100/1000 RJ-45
- **Default Mode:** LAN1 10.0.0.1
- **USB Port:** 1 x USB3.0
- **Expansion:** 1x Mini-PCIe (Full-size)
- **Type:** WIFI/Cellular/4G
- **Signal:** USB 2.0/PCIe

1.2.4 Software

- **OS Support:** Linux Kernel 4.9/Ubuntu 20.04
- **Programming:** Linux C, Phython
- **Protocol Support:** DNP3.0 Client & Server,
  OPC-UA Client & Server,
  BACNet/IP Client & Server,
  Modbus RTU/TCP Master & Slave,
  IEC-60870-5-101 Master,
  IEC-60870-5-103 Master,
  IEC-60870-5-104 Master & Slave
- **PLC driver support:** Siemens/Mitsubishi/Omron/Allen-Bradley, Delta etc 200+PLC drivers

1.2.5 Environment

- **Humidity:** 5~95% (non-condensing)
- **Operating Temperature:** -40 ~ 70°C
- **Storage Temperature:** -40~85°C

1.3 Safety Precautions

The following messages informs how to make each connection. In most cases, you will simply need to connect a standard cable

Warning! *Always disconnect the power cord from your chassis whenever you are working on it. Do not connect while the power is on. A sudden rush of power can damage sensitive electronic components. Only experienced electronics personnel should open the chassis.*

Caution! *Always ground yourself to remove any static electric charge before touching ECU-150 Series. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag.*

Note! *If DC voltage is supplied by an external circuit, please put a protection device in the power supply input port.*

1.4 Chassis Dimensions:

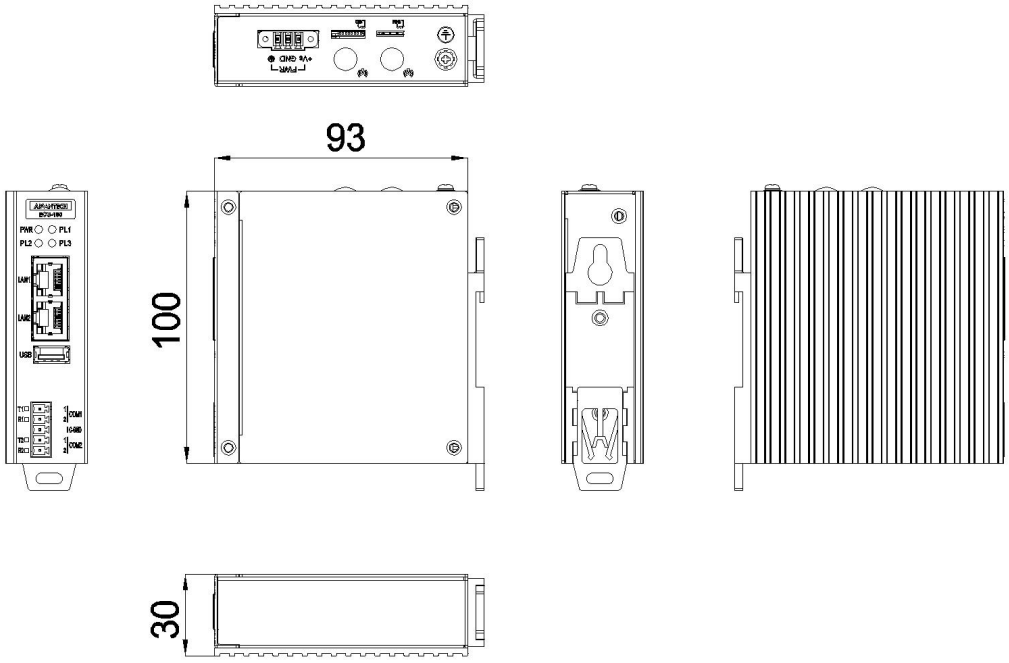


Figure 1.1 ECU-150 Chassis Dimensions

1.5 Packing List

The accessory package of ECU-150 contains the following items:

(A) ECU-150

(B) 1 x warranty card

(C) Connector

(D) Din-rail

Chapter 2

Hardware Functionality

2.1 Overview

The following figures show the panel configuration on ECU-150. More information of each peripheral is included in the following sections.

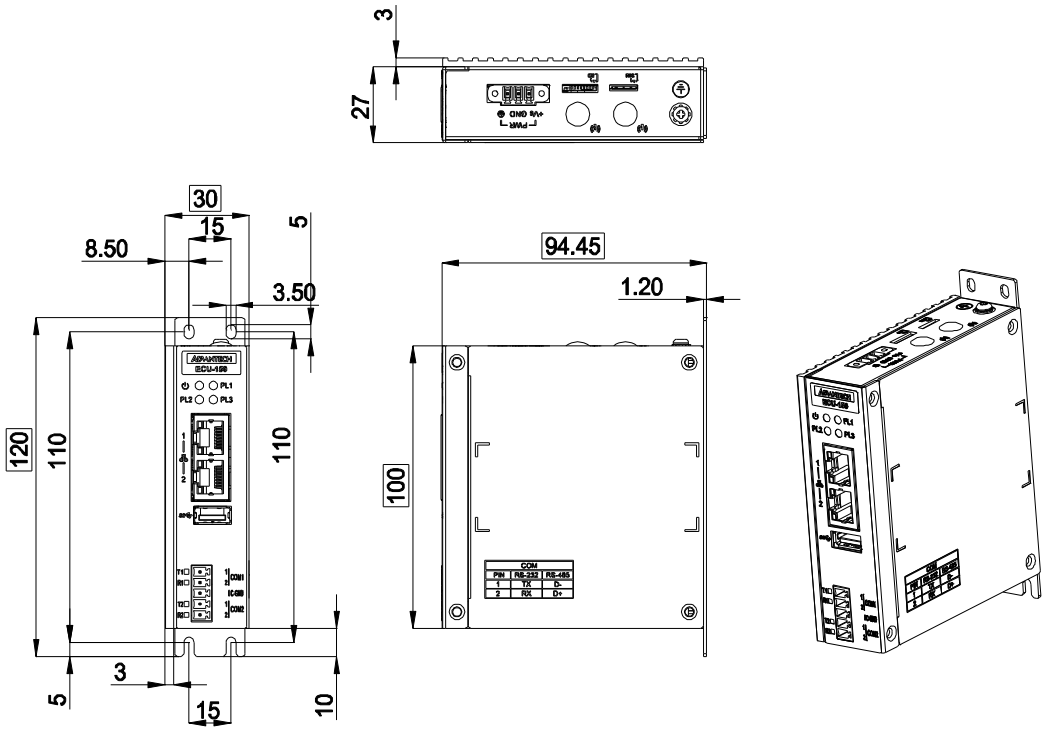


Figure 2.1 ECU-150 Overview

2.2 LED Status Indicators

The LEDs in the front panel can be divided into 4 groups:

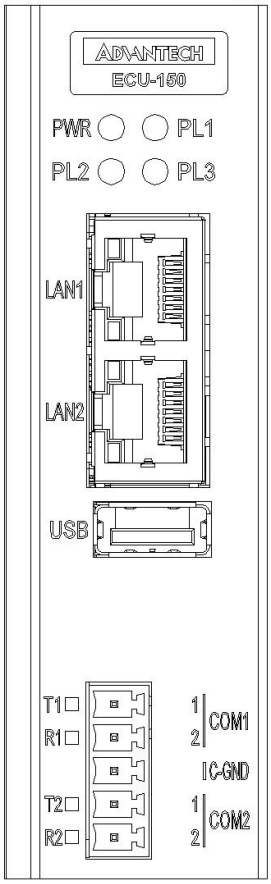
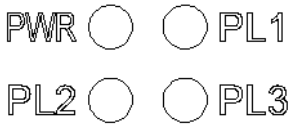


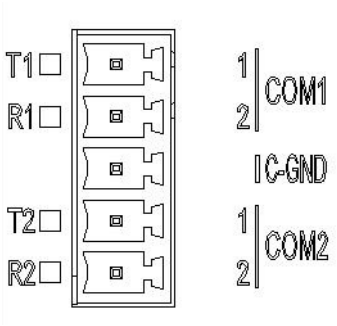
Figure 2.2 ECU-150 LED Status Indicator

2.2.1 System Status Indicators:



LED	Status	Description
PWR	Green	Power is on
	Off	Power is off
IRIG	Green	Customers can define the Programmable LED state according to the actual need.
	Off	

2.2.2 Serial Communication Status Indicator



LED	Color	Description
TX1	Orange	Blinking, Serial port 1 data being transmitted
RX1	Green	Blinking, Serial port 1 data being received
TX2	Orange	Blinking, Serial port 2 data being transmitted
RX2	Green	Blinking, Serial port 2 data being received

2.2.3 Ethernet Status Indicator

LED	Color	Description
Link1	Yellow	Lighting, Ethernet not connected
Act1	Green	Blinking, Ethernet data being transmitted
Link2	Yellow	Lighting, Ethernet not connected
Act2	Green	Blinking, Ethernet data being transmitted

Chapter 3

Wiring and Installation

3.1 Wiring

3.1.1 Power Supply Wiring

ECU-150 supports power input ranging from and $10V_{DC}$ to $30V_{DC}$.

1. Remove all power and signal connections.
2. Place the unit heat-sink side down.
3. Remove the screws shown below.

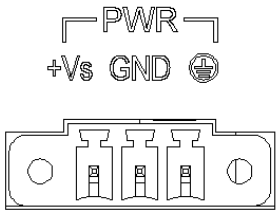


Figure 3.1 Power Supply Wiring

Table 3.1: AC/DC Power Input Connector Pin Definition

Function	Pin	Screen Printing	Function Description
Power Input	1	+Vs	PWR V+ DC power input PIN
	2	GND	PWR V- DC power input PIN
	3	⏚	GND

3.1.2 Communication Ports

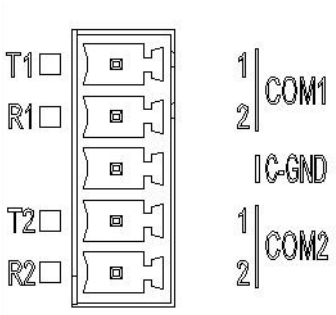


Figure 3.2 RS-232/485 Serial Ports (COM1~ COM2)

Table 3.2: RS-232/485 Serial Ports (Pin Assignments)

Pins	1	2	3
RS-232	Rx	Tx	GND
RS-485	Data+	Data-	GND

3.1.3 Wireless Card Installation

ECU-150 is equipped with a Mini-PCIe interface on the front of motherboard, which supports one full-size wireless network card. If users also need SIM card, slot on the front of motherboard can be used. The installation is shown as below.

Figure 3.3 USB Connector

Table 3.3: USB Connector Pin Assignment

Pin	Signal
1	VCC
2	DATA-
3	DATA+
4	GND

Figure 3.4 LAN Connectors (LAN1~LAN2)

Table 3.4: LAN Connector Pin Assignments

Pin	Assignment	Description
1	TD+	Transmit+
2	TD-	Transmit-
3	RD+	Receive+
4	N/C	Not used
5	N/C	N/C
6	RD-	Receive-
7	N/C	N/C
8	N/C	N/C

3.1.4 SD&SIM Card Installation

ECU-150 is equipped with a SD card and a Mini-PCIe interface on the front of motherboard, which supports one full-size wireless network card. If users also need a SIM card, a slot on the front of motherboard can be used. The installation is shown below.

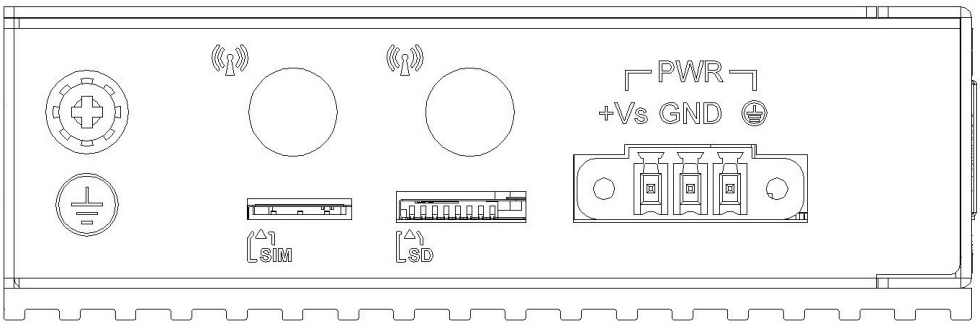


Figure 3.5 SIM & SD Card Slot

3.2 Jumper Setting

3.2.1 Jumper Setting

The motherboard of ECU-150 has two types of jumper for user operation, as the below shown.

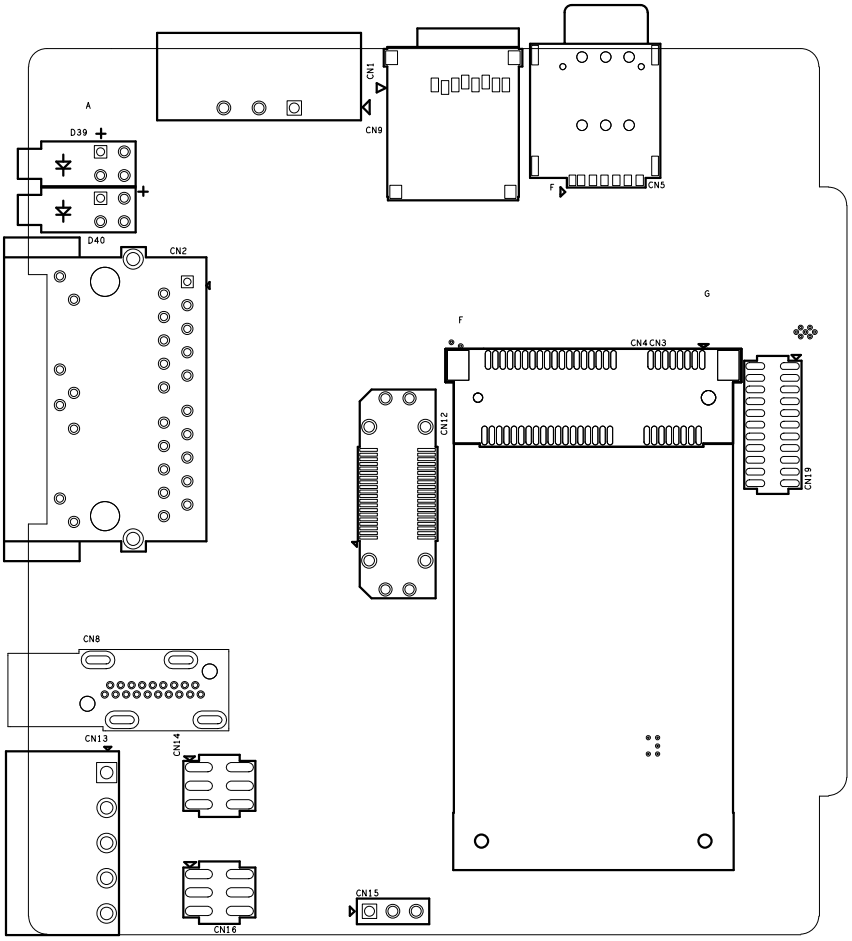
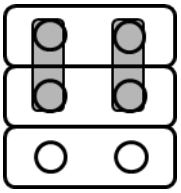
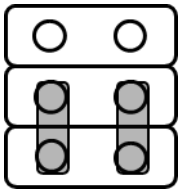
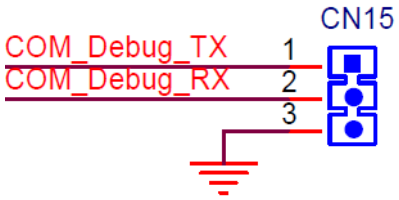


Figure 3.6 Jumper Setting

Table 3.5: Jumper Setting of Terminal Resistor For COM(1~4)	
Location	**Description**
CN14 	Data+/Data- of RS-485
CN16 	RX/TX of RS-232



3.3 Installation

3.3.1 Wall-mounted and DIN-Rail Installation

ECU-150 supports two types of installation: Wall-mounted and DIN-Rail Installation. For wall-mounted installation, users can fix the device on the wall with 4 screws as shown below.

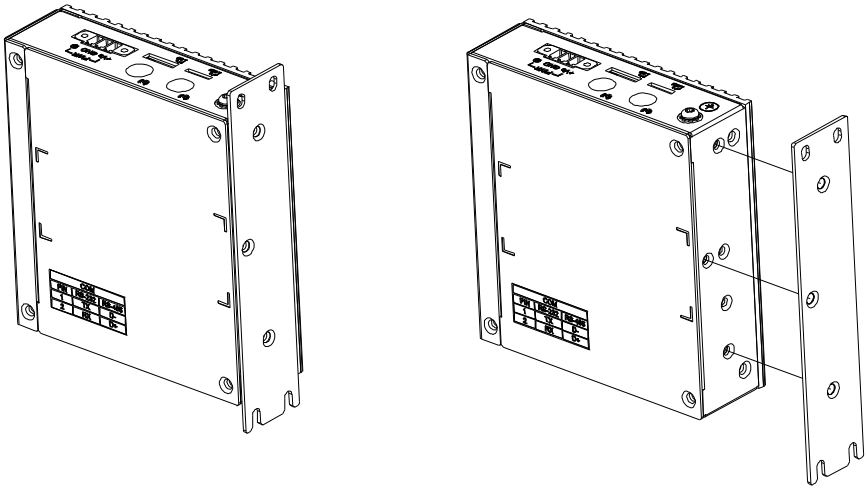


Figure 3.7 Wall-mount Bracket Installation

ECU-150 supports DIN-Rail installation. Firstly, users can install a sliver DIN-Rail buckle with screws on the back of ECU-150. And then fix ECU-150 on the DIN-Rail. The detailed steps are shown as below:

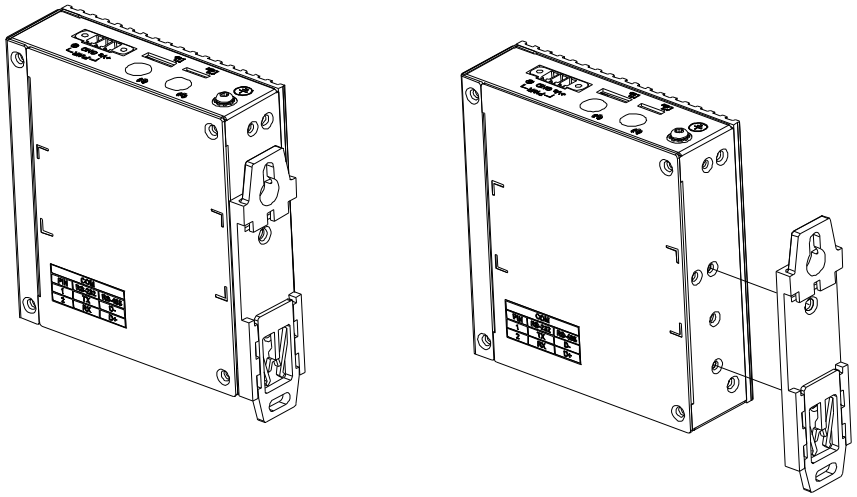


Figure 3.8 Vertical DIN-Rail Bracket Installation

3.3.2 Installing a Wireless module Card and Antenna (Optional)

For optional wireless module card and antenna, please contact Advantech for the following wireless solution kit.

- Top panel with pre-cut antenna holes.

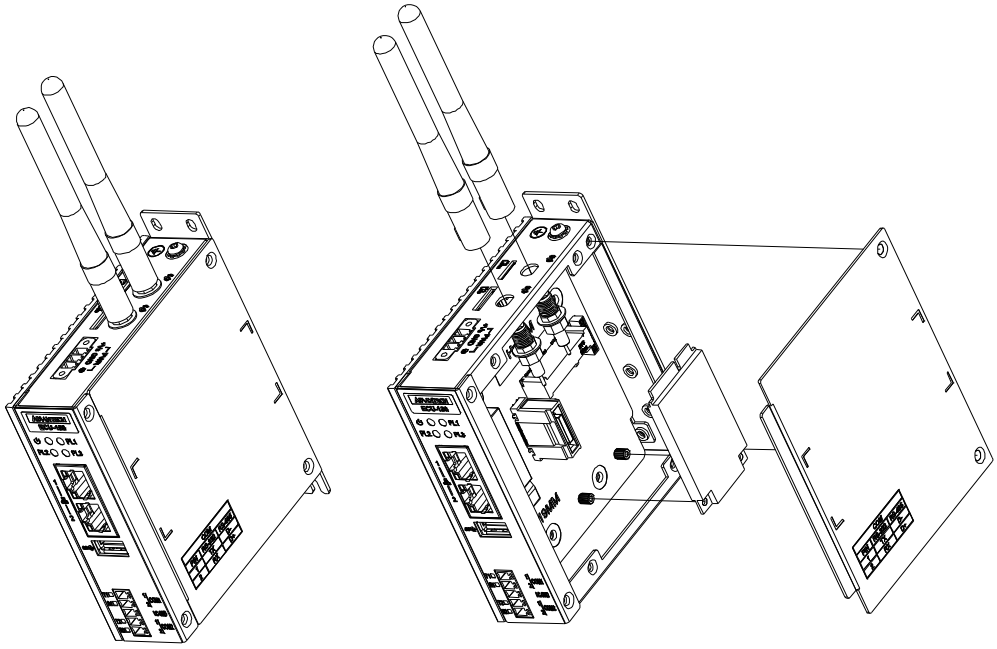


Figure 3.9 Installing a Wireless module Card and Antenna

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