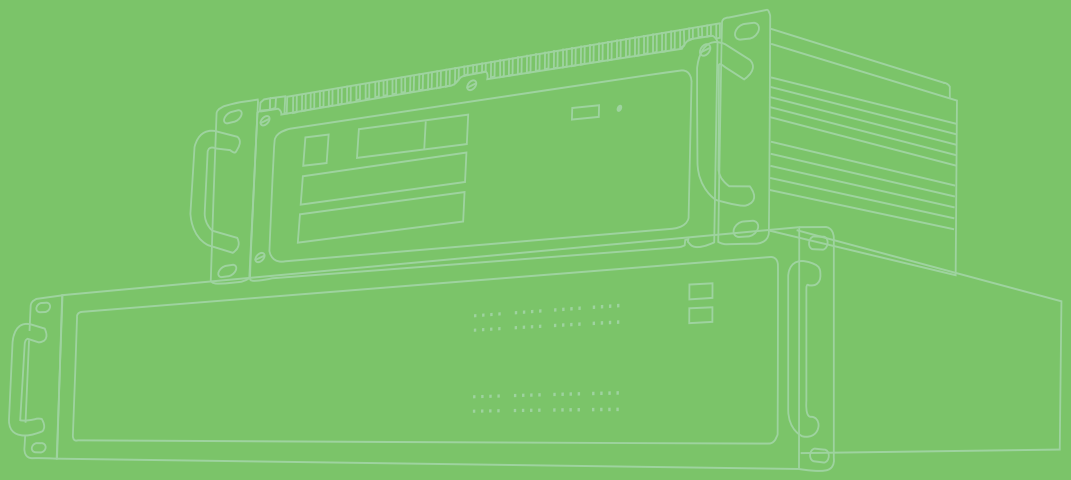

User Manual

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.2003U15000 Edition 1

Printed in China May 2024

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 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.

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 THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -30° C (-22° F) OR ABOVE 70°C (158° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
17. This product is intended to be supplied by an UL certified power supply or dc source with SELV output, rated 10 to 30Vdc, 1.5 to 0.5A minimum and maximum ambient temperature (Tma) 70 degree C minimum without power source or adapter. If you need further assistance, please contact Advantech for further information.
18. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet. The power outlet socket should have a grounded connection.
19. For use in pollution free environments and indoor use.
20. This equipment is not suitable for use in locations where children are likely to be present.

21. If the equipment is used in a manner not specified by the Advantech, the protection provided by the equipment may be impaired.
22. The equipment contains no user-serviceable parts. Do not open, Return to manufacturer for servicing.
23. Do not block air ventilation holes.
24. This is open type equipment and should be installed in a suitable enclosure.
25. Equipment is intended for installation in Restricted Access Area.

Consignes de sécurité

1. Lire attentivement les instructions de sécurité.
2. Conserver ce manuel pour utilisation ultérieure,
3. Débranchez cet équipement de toute prise secteur avant le nettoyer. Utilisez seulement un chiffon humide. N'utilisez pas de détergent liquide ou pulvérisé pour le nettoyage.
4. Gardez cet équipement à l'abri de l'humidité.
5. Placez cet équipement sur une surface fiable pendant l'installation. Le faire ou bien le laisser tomber peut causer des dégâts.
6. Les ouvertures sur l'enceinte servent à la convection de l'air. Protégez l'équipement contre surchauffe. NE COUVREZ PAS LES OUVERTURES.
7. Assurez-vous que la tension de la source d'alimentation est correcte avant de connecter l'équipement à une prise de courant. La prise de courant doit avoir une connexion à la terre.
8. Placez le câble d'alimentation de manière à ce que personne ne puisse marcher dessus. Ne placez rien sur le câble d'alimentation.
9. Toutes les mises en garde et tous les avertissements sur l'équipement doivent être notés.
10. Si l'équipement n'est pas utilisé pendant une longue période, débranchez-le de la source d'alimentation pour éviter tout endommagement dû à une surtension transitoire.
11. Ne jamais verser de liquide dans une ouverture. Cela pourrait provoquer un incendie ou un choc électrique.
12. N'ouvrez jamais l'équipement. Pour des raisons de sécurité, l'équipement doit être ouvert uniquement par du personnel qualifié.
13. Si l'une des situations suivantes se présente, faites vérifier l'équipement par le personnel de service:
    - un liquide a pénétré dans l'équipment.
    - L'équipement a été exposé à l'humidité.
    - L'équipement ne fonctionne pas bien, ou vous ne pouvez pas le faire fonctionner selon le manuel de l'utilisateur.
    - The equipment does not work well, or you cannot get it to work according to the user's manual.
    - L'équipement est tombé et endommagé.
    - L'équipement présente des signes évidents de rupture.
14. NE LAISSEZ PAS CET ÉQUIPEMENT DANS UN ENVIRONNEMENT OU LA TEMPÉRATURE DE STOCKAGE PEUT ÊTRE INFÉRIEURE À -30 ° C (-22 ° F) OU BIEN SUPÉRIEURE À 70 ° C (158 ° F). CECI POURRAIT ENDOMMAGER L'EQUIPEMENT. L'ÉQUIPEMENT DEVRAIT ÊTRE DANS UN ENVIRONNEMENT CONTRÔLÉ.
15. Ce produit est destiné à être alimenté par une source d'alimentation certifiée UL ou par une source cc convenant à une utilisation à une température minimal de 40 degrés Celsius, dont la sortie est conforme à la norme SELV et dont la puis-

sance nominale est de 10 to 30Vdc, 1.5 to 0.5A en cas de besoin. Température ambiante maximale (tma) minimum 70 degrés Celsius sans alimentation ni adaptateurcontactez Advant-ech pour plus d'informations.

16. Pour une utilisation dans des environnements non polluant et à l'intérieur.
17. C'est appareil ne doit pas être utilisé dans des endroits où se trouvent des enfants.
18. Si l'équipement est utilisé d'une manière non spécifiée par le fabricant, la protection fournie par l'équipement peut être altéré.
19. L'équipement ne contient aucune pièce réparable par l'utilisateur. Ne pas ouvrir, retourner au fabricant pour réparation.
20. Ne bloquez pas les ou es de ventilation.
21. Il s'agit d'un équipement de type ouvert et doit être installé dans un boîtier approprié.
22. Les matériels sont destinés à être installés dans des EMPLACEMENTS À ACCÈS RESTREINT

ATTENTION! *Danger d'explosion si la batterie est mal remplace. Remplacer uniquement par le meme type ou equivalent recommandé par le fabricant. Jeter les piles usagées selon les instructions du fabricant.*

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Chapter 1

Overview

1.1 Introduction

The ECU-150 is a high-performance IoT gateway based on the i.MX8M platform. It features an open design with a Quad Core processor, two isolated RS-232/485 serial ports, two 10/100/1000 Ethernet ports, one USB 3.0 port, and an operating temperature range of -40 to 70°C. It offers Mini-PCIe and various expansion options for integrating Wi-Fi, LTE, 4G, 5G, and iDoor modules. Running on a Linux operating system with EdgeLink, the ECU-150 allows system integrators to develop applications specifically for solar power, electricity, and factory settings, which require extensive data collection, cloud-based applications, and video monitoring solutions.

1.2 Specifications:

1.2.1 General

- **Certification:** CE, FCC, UL
- **Mounting:** Wall-Mount/ DIN-Rail
- **Power Consumption:** 8W @ $24V_{DC}$
- **Power Requirements:** 10 ~ 30 V_{DC}
- **Dimensions (W x D x H):** Basic Unit: 30 x 100 x 93mm
  Double Stack: 55.1 x 100 x 93mm
- **Enclosure:** Aluminum Housing
- **Operating System:** Yocto 4.14/Ubuntu 22.04

1.2.2 System

- **CPU:** NXP i.MX8M Quad Core Cortex A53 1.3G
- **Memory:** LPDDR4 2/4GB
- **Storage:** eMMC 16/32GB
- **Indicators:** LEDs for Power, LAN (LINK, ACT), Serial (Tx, Rx), Programmable
- **Display:** N/A (optional 1 x HDMI resolution 1280 x 720)
- **SD Slot:** 1 x Micro-SD slot
- **SIM Slot:** 1 x Nano SIM slot
- **Watchdog:** Yes
- **RTC:** Yes
- **Security:** TPM2.0
- **FRAM:** N/A (optional 128KB)

1.2.3 Communication

- **Serial Port:** 2 x RS-232/485, 50 ~ 115200 bps
- **Isolation:** 2500 V_{DC}
- **Ethernet Port:** 2 x 10/100/1000 RJ-45 ports
- **USB Port:** 1 x USB3.0
- **Console Port:**
  - 3-pin COM (ECU-150-12A)
  - Micro-USB (ECU-150-12A1)
- **Expansion:**
  - Interface: 1 x Mini-PCIe (Full-size)
  - Type: WIFI/Cellular/4G
  - Signal: USB 2.0 (Optional PCIe)

1.2.4 Environment

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

1.2.5 SSH Login User Name & Password

- **User Name:** root
- **Password:** no password (press "Enter")

1.2.6 Default IP

- **LAN1:** 10.0.0.1
- **LAN2:** 11.0.0.1

1.2.7 Software

- **Protocol Support**

SouthBound	NorthBound
IEC 60870-5-101	Modbus Server
IEC 60870-5-103	IEC 60870-104 Server
IEC 60870-5-104	WASCADA (WebAccess)
DL/T 645-2007	BACnet Server
DL/T 645-1997	OPC UA Server
IEC 62056-21	Data Transfer
ODBC	
JDBC	
OPCUA Client	
BACnet IP	
BACnet MS/TP	
SNMP	
Modbus Client	

- **PLC driver support:** ABB/Advantech/Allen-Bradley/BECKHOFF/ DELTA/ FATEK/GE/Honeywell/Keyence/Mitsubishi/Omron/Panasonic/Schneider/Sharp/ Siemens/Toyopuc/Wago 750/Yaskawa/Yokogawa
- **Programming:** IEC-61131-3, Linux C, Python
- **Configuration Tool:** EdgeLink Studio*(ECU-150-12A)
- **Data Monitoring:** 20000 Tags MAX.
- **Cloud Connectivity(MQTT):** EdgeSync 360, WISE-PaaS, Azure, AWS, Google Cloud IoT Core and more
- **Database Transmission:** SQL Server, MySQL, ORACLE, FTP Server
- **VPN:** OpenVPN, L2TP over IPSec

* EdgeLink is bundled with Yocto Linux version. Please refer to EdgeLink specification for more details.

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

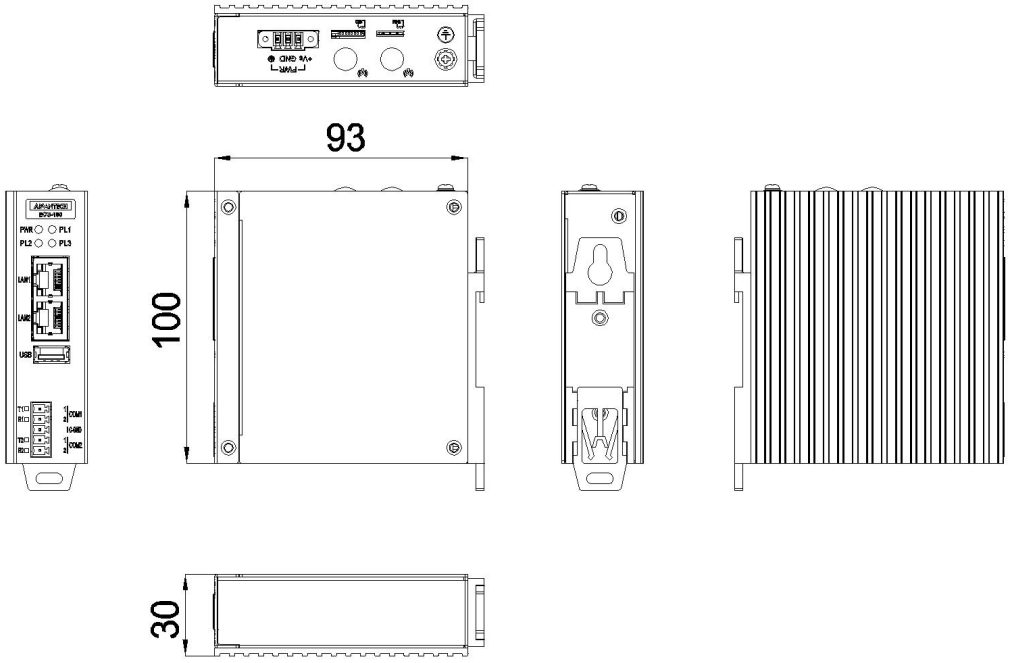


Figure 1.1 ECU-150 Chassis Dimensions

1.5 Packing List

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

(A) ECU-150
(B) Warranty card
(C) RoHS
(D) Connector
(E) 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.

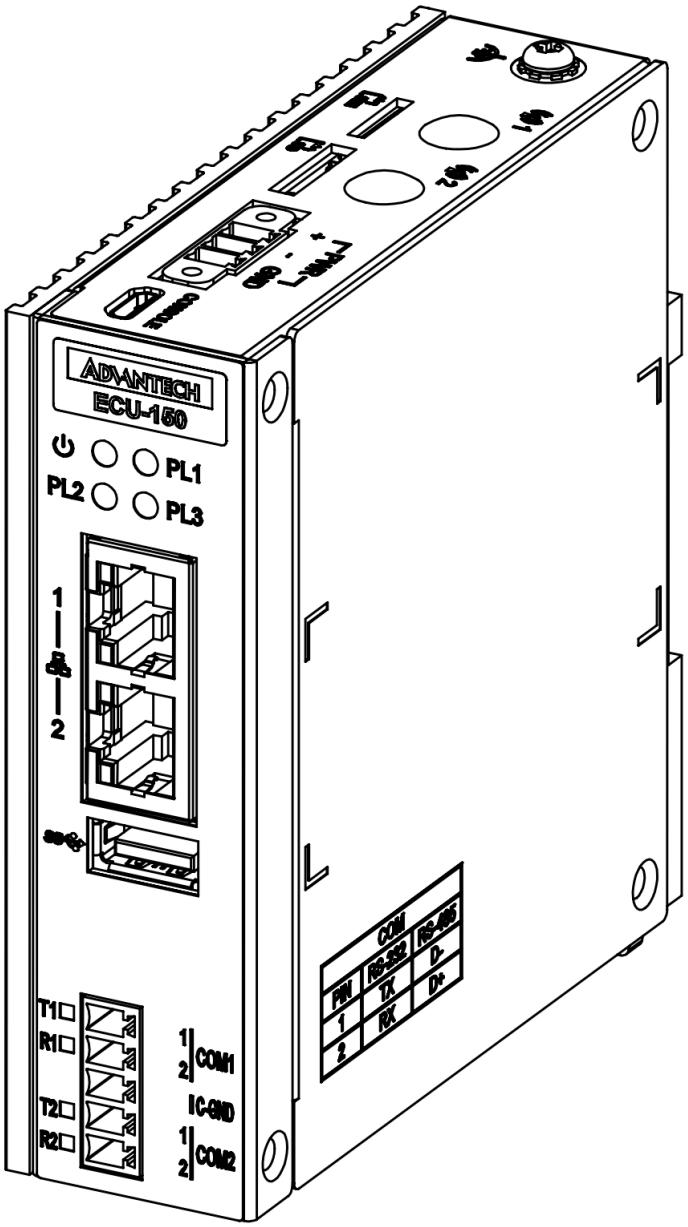


Figure 2.1 ECU-150 Overview

2.2 LED Status Indicators

The LEDs in the front panel can be divided into 3 groups:

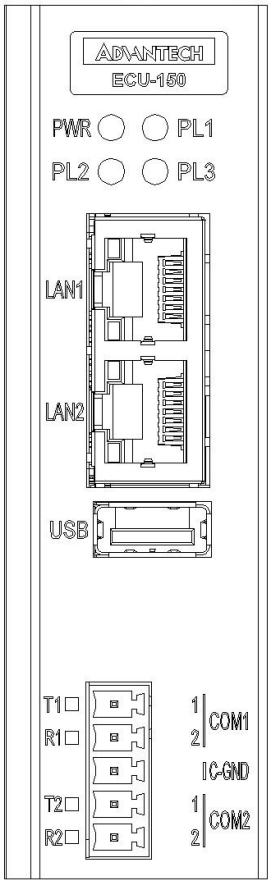
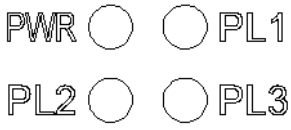


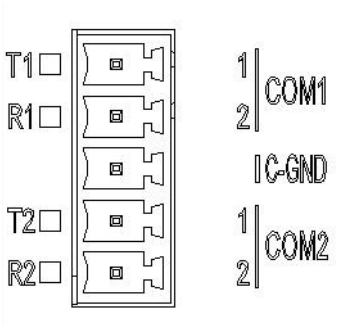
Figure 2.2 ECU-150 LED Status Indicator

2.2.1 System Status Indicators:



LED	Status	Description
PWR	Green	Power is on
	Off	Power is off
PLx	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 $30V_{DC}$. The terminal block is suitable for 16-26 AWG, Torque value 3 Lb In. Use copper conductors only. Must be installed by skilled personnel.

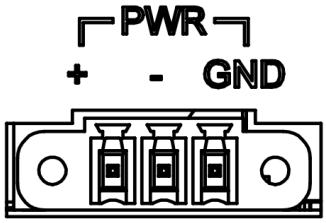


Figure 3.1 Power Supply Wiring

Table 3.1: DC Power Input Connector Pin Definition

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

3.1.2 Communication Ports

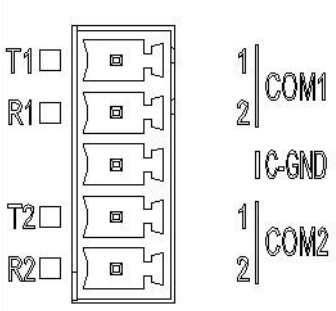


Figure 3.2 RS-232/485 Serial Ports (COM1~ COM2)

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

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

3.1.3 USB Port

ECU-150 is equipped with one USB 3.0 Type A port for optional extension choice.

Figure 3.3 USB Connector

Table 3.3: USB Connector Pin Assignment

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

3.1.4 LAN Port

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

3.1.5 Console Port

ECU-150 is equipped with a 3-Pin COM or Micro-USB port as console port for debugging.

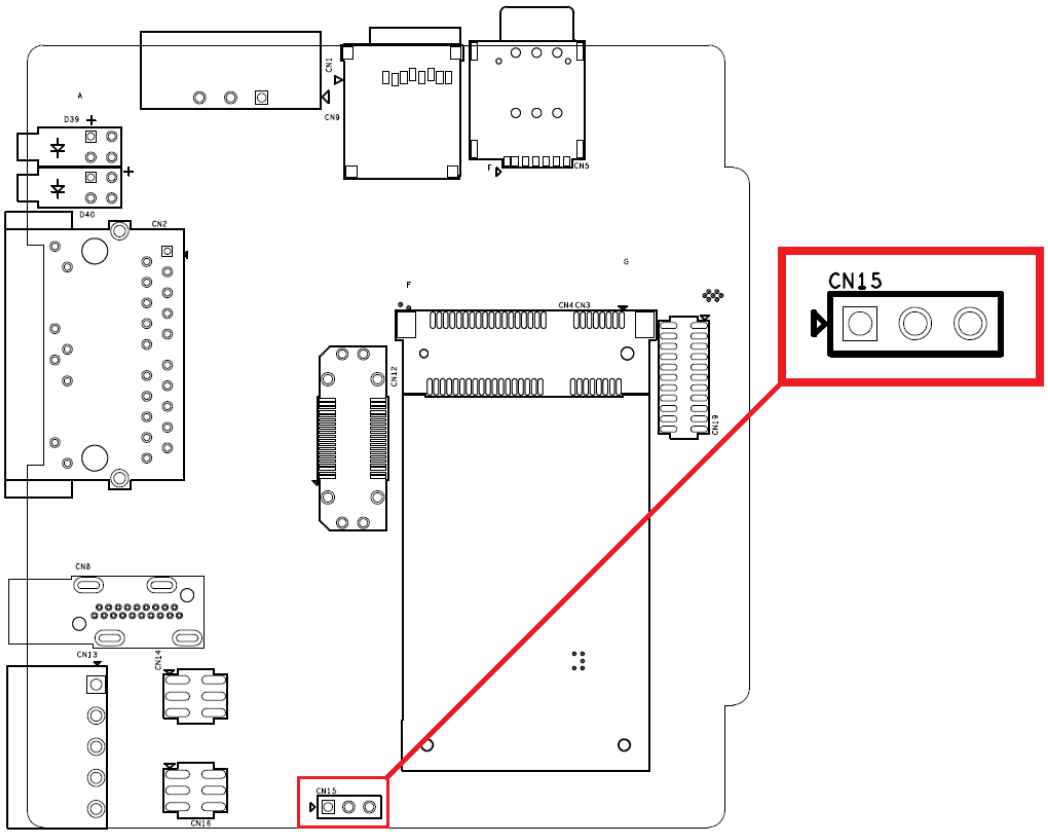


Figure 3.5 Console Port of ECU-150-12A

Table 3.5: 3-Pin COM Assignments

Pin	Assignment
1	COM_Debug_TX
2	COM_Debug_RX
3	COM_ISO_GND

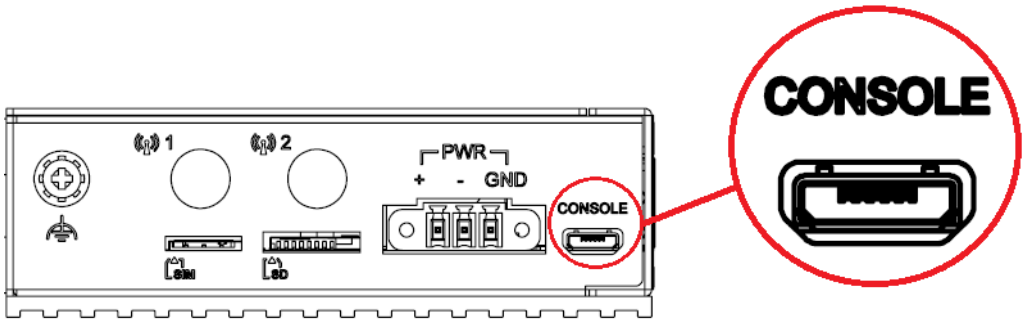


Figure 3.6 Console Port of ECU-150-12A1

3.1.6 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.

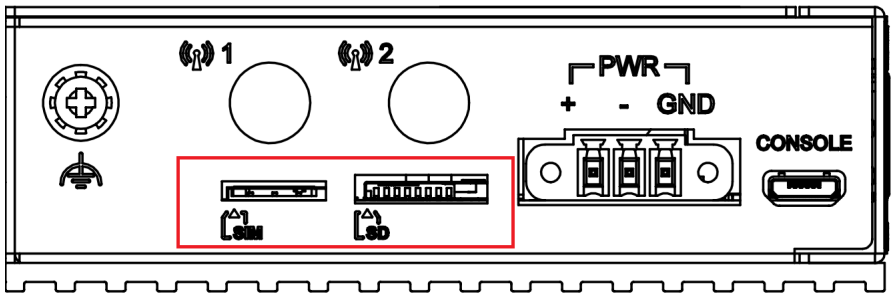


Figure 3.7 SIM & SD Card Slot

3.2 Jumper Setting

3.2.1 Jumper Setting

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

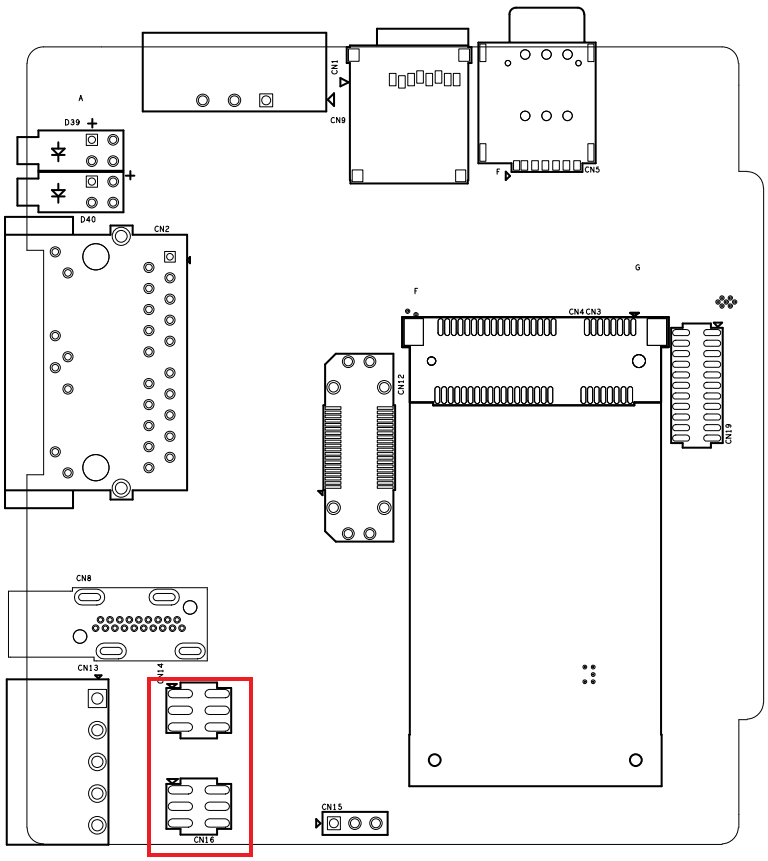
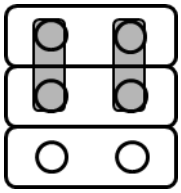
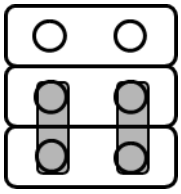


Figure 3.8 Jumper Setting

Table 3.6: Jumper Setting of Terminal Resistor For COM(1~4)		
Location		**Description**
CN14 (COM1) / CN16 (COM2)		Data+/Data- of RS-485 (Default Setting)
CN14 (COM1) / CN16 (COM2)		RX/TX of RS-232

3.3 Extension and Installation

3.3.1 Extension Socket and Expansion Module List

ECU-150 could be extended to a 2nd stack for extra communication by adding three types of expansion module through CN12 & CN19 sockets.

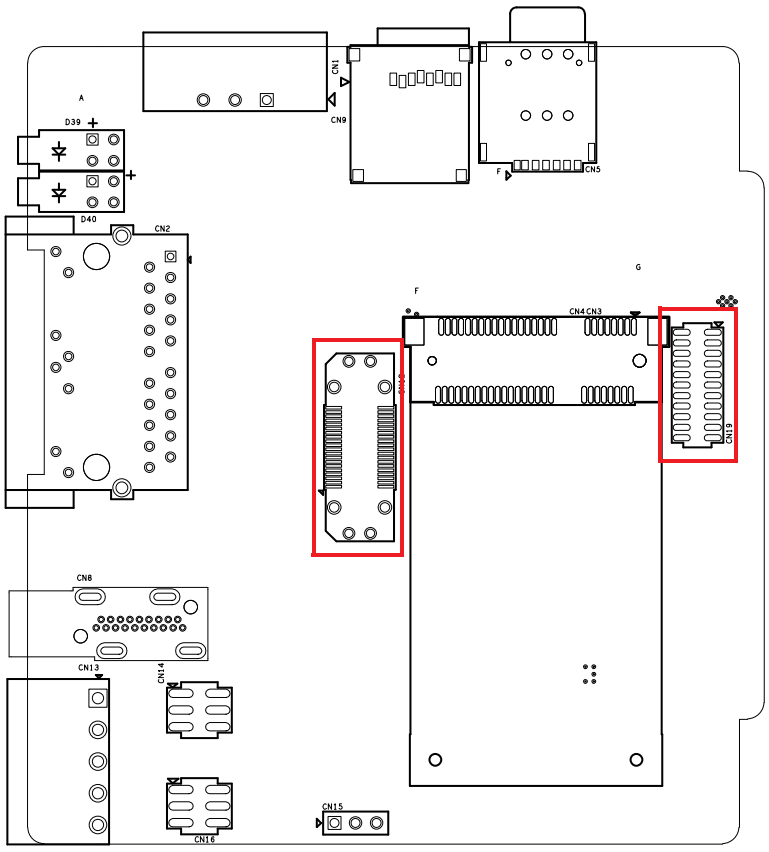
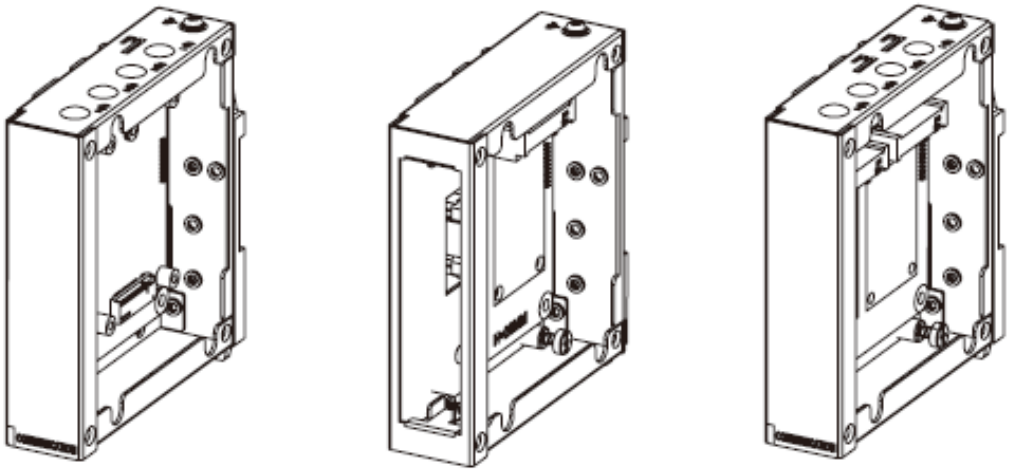


Figure 3.9 Extension Socket

Table 3.7: Expansion Modules	
Part Number	**Description**
ECU-150P-M1A	2nd stack expansion module support 1 x M.2
ECU-150P-D1A	2nd stack expansion module support 1 x iDOOR
ECU-150P-P2A	2nd stack expansion module support 2 x mPCIE



ECU-150P-M1A ECU-150P-D1A ECU-150P-P2A

Figure 3.10 Expansion Modules

3.3.2 Assembly of Expansion Module

Remove the top cover, assemble the expansion module onto ECU-150 aligning to the extension sockets, then fasten the four screws.

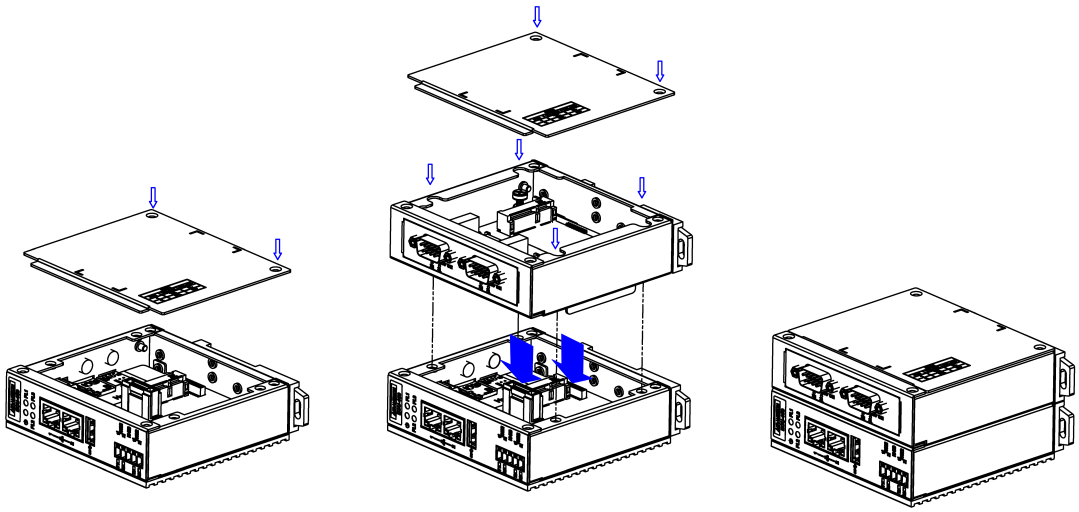


Figure 3.11 Assembly of Expansion Module

3.3.3 Wall-mounted and DIN-Rail Installation

ECU-150 supports two-in-one type of installation: Wall-mount and DIN-Rail Installation.

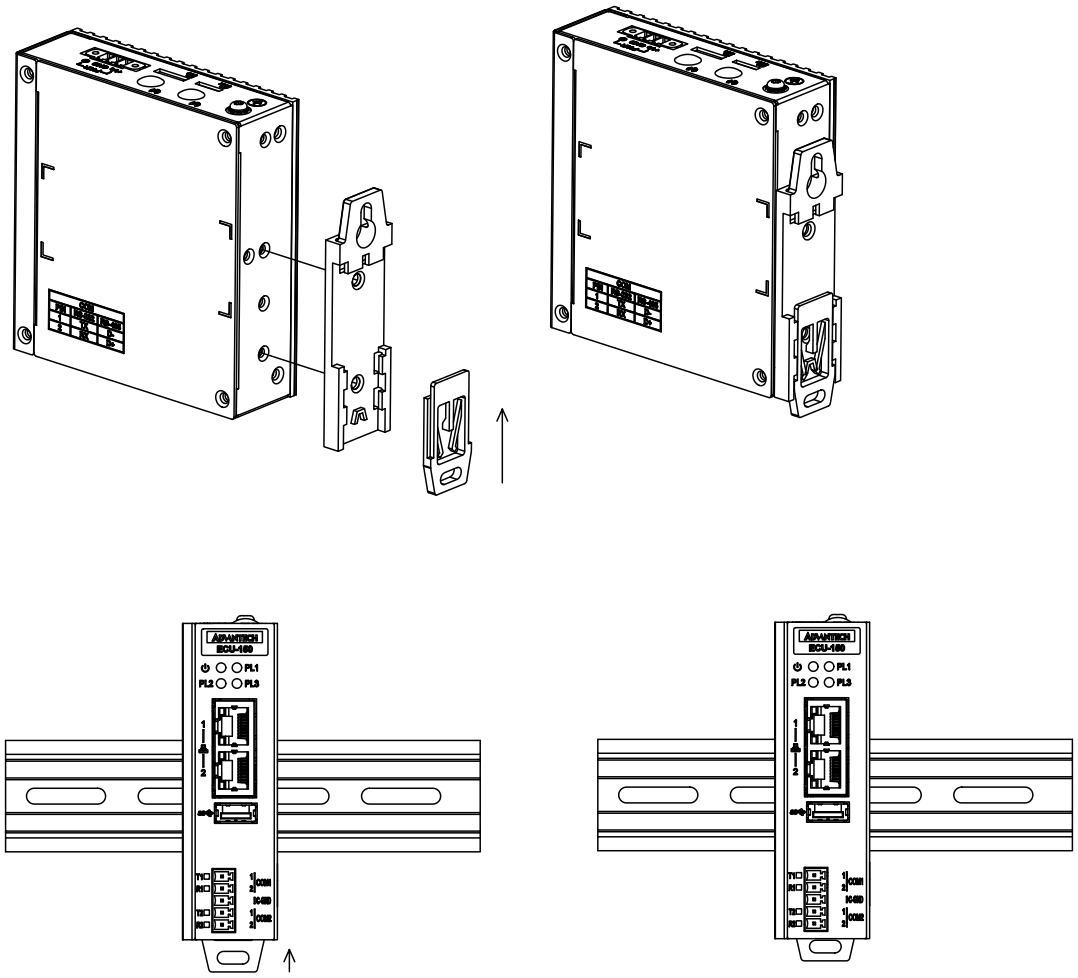


Figure 3.12 Wall-mount and DIN-Rail Installation

3.3.4 Installing a Wireless module Card and Antenna (Optional)

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

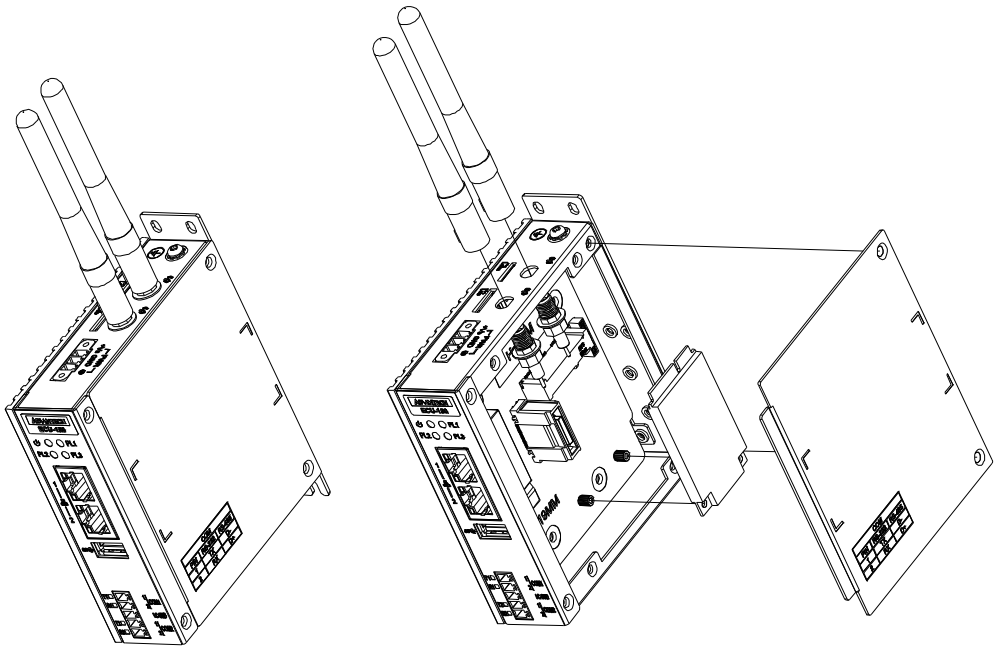


Figure 3.13 Installing a Wireless module Card and Antenna

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