AXIOMTEK

IRU151-I

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 IRU151-I 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 IRU151-I 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 a human body.

▪   When handling boards and components, wear a grounding wrist strap, available from most electronic component stores.

Classification

1. Degree of production against electric shock: not classified

2. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitros oxide.

3. Mode of operation: Continuous

4. Type of protection against electric shock: Class I equipment

General Cleaning Tips

You may need to take 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 cleaned using a product designed for cleaning the same types of components. Please read the instructions that come with a cleaning product to avoid misusage.

● 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 recommend that you should shut down the system before you start to clean any components.

Please follow the steps below:

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

Scrap Computer Recycling

Please inform the nearest Axiomtek distributor as soon as possible for suitable solutions in case computers require maintenance or repair; or for recycling in case computers are out of order or no longer in use.

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Table of Contents

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CHAPTER 1
INTRODUCTION

This chapter contains general information and detailed specifications of the IRU151-I. Chapter 1 includes the following sections:

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

1.1   General Description

The IRU151-I din-rail fanless embedded system features a low power RISC-based module (i.MX 6Ultralite) processor and is designed to withstand temperatures ranging from -40°C to +70°C for operation in extreme environments and industrial automation applications.

The IRU151-I features 1 RS-232/422/485 serial port with Isolation 2KV protection., 1 LAN, 1 DIO Port (2-In/2-Out),1 AI port (4- Differential inputs), 1 eMMC of 8GB onboard and 1 microSD socket for easy storage expansion and access in a compact, industrial-strength robust case. Its vertical din-rail form factor makes it easy to install the system in a small cabinet. Thanks to the RISC-based architecture, the IRU151-I will not generate a lot of heat while being operated. The ready-to-run IRU151-I is specially designed for industrial machines, automatic parking lots, traffic cabinets and more.

- **Features**
    - Fanless
    - Wide operating temperature of -40°C - +70°C
    - Low power RISC-based module (i.MX 6Ultralite), 528MHz Processor
    - 1 10/100Mbps Ethernets with magnetic isolation protection
    - 1 COM Port (RS-232/422/485) with magnetic Isolation 2KV protection.
    - 1 Console Port for user setting and debug (change DB9 connector function via switch)
    - 1 USB 2.0 with power distribution control and over current protection
    - 1 DIO Port (2-In/2-Out) with Dry/Wet contacts and optical isolation protection 2KV
    - 1 AI Port (100 S/s, 16-bit, 4 channel differential Input)
    - 1 Watchdog Timer1
    - LED Indicators (Status, USB Power, COM, DIO, Wireless)
    - Support 2 Wireless (3G/4G or Wifi)
    - SNMP V1/V2c

- Storage:

  Supports one eMMC of 8GB onboard (for boot disk)

  Supports one micro SD Card (easy-to-access, for store only)
- 1 power path with terminal block and 9–48VDC
- Din-rail mounting

1.2   System Specifications

1.2.1   CPU

- Low power RISC-based module (iMX-6 ultralite), ARM® Cortex®-A7 core RISC-based 528MHz Processor

1.2.2   System Memory

- 1 x DDR3 512MB SDRAM onboard

1.2.3   Console Port

- Shared with COM1 (Switch for serial port or console port)
- For user debug settings

1.2.4   LAN

- LAN 1
  - 10/100Mbps LAN w/ magnetic isolation protection 1.5KV

1.2.5   Storage

- 1 x eMMC of 8GB onboard (for boot disk)
- 1 x microSD slot (easy-to- access, for storage only)

1.2.6   USB

- 1 x USB2.0 Type-A port

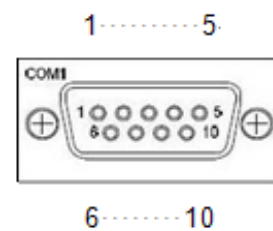### 1.2.7   WatchDog Timer (WDT)

- 0.5 to 128 seconds with a time resolution of 0.5 seconds

1.2.8   COM

● DB9 Pin define

● Magnetic isolation protection 2KV

● RS232/RS422/RS485 (COM1)

● COM 1 with TX/RX/RTS/CTS signals

● RS-232/422/485 interface selected by software

COM1

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

● DC input range 9~48V

● DC Input has UVP/Reverse protection.

   UVP (Under voltage protection)

   Reserve protection

● Power consumption 9~48VDC, 0.5A~0.11A

   ■ 0.5A@9V

   ■ 0.38A@12V

   ■ 0.11A@48V

● DC Terminal Block

| Pin	DC Signal Name
1	Power+
2	Power-
3	UPS signal in
4	UPS signal ground

1.2.10 Digital I/O Connector and Pin Definition

● 2 DI/ 2 DO with optical isolation protection 2KV

● DI: Wet/Dry

● DO: Wet

● DIO Design Specification

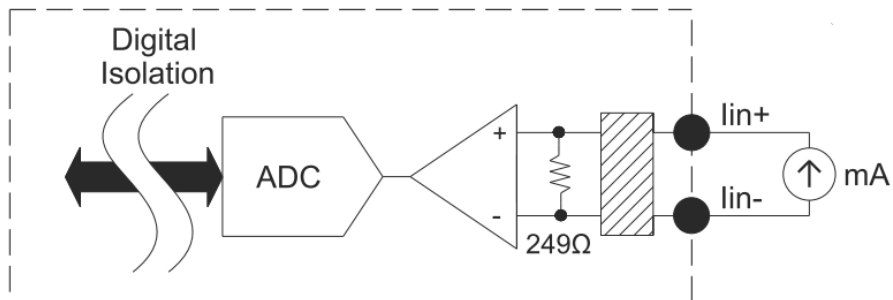| Digital Input	
Input Channels	2,source type
Input Voltage	0 to 24VDC
Digital Input Levels for Dry Contacts	Logic level 0:Close to GND Logic level 1:Open
Digital Input Levels for Wet Contacts	Logic level 0:+10V to +24V (DI To COM-) Logic level 1:+3V max.
Digital Output	
Output Channels	2,sink type
Output Current	Max. 200 mA per channel
On-state Voltage	24VDC nominal, open collector to 30V

DIO 2-IN/2-OUT & AI 4-IN of TB14 Female
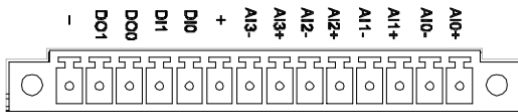
RU151-I DIO & AI Terminal Block

TB18 Pin No.	Signal name	Meaning
1	COM+	Plus Common for DIO
2	DI0	Digital Input
3	DI1	
4	DO	Digital Output
5	COM-	Minus Common for DIO

TB14 Pin No.	Signal name	Meaning
1	AI0+	Analog Input Channel 0+
2	AI0-	Analog Input Channel 0-
3	AI1+	Analog Input Channel 1+
4	AI1-	Analog Input Channel 1-
5	AI2+	Analog Input Channel 2+
6	AI2-	Analog Input Channel 2-
7	AI3+	Analog Input Channel 3+
8	AI3-	Analog Input Channel 3-
9	COM+	Plus Common for DIO

TB14 Pin No.	Signal name	Meaning
10	DI0	Digital Input
11	DI1	
12	DO0	Digital Output
13	DO1	
14	COM-	Minus Common for DIO

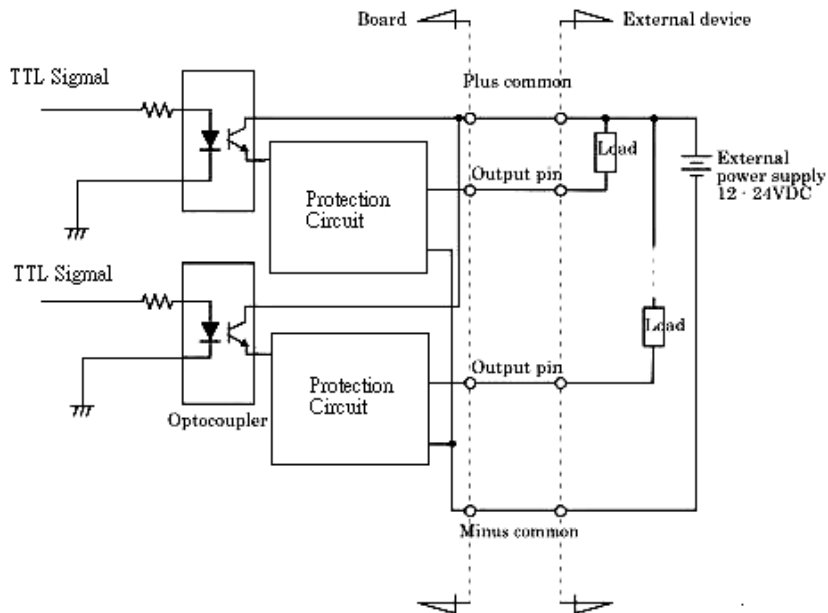- AI operation schematic diagram

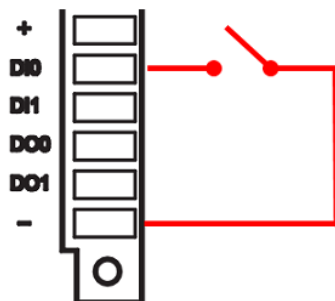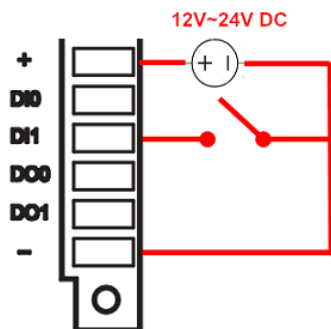- DIO operation schematic diagram

  Input Circuit
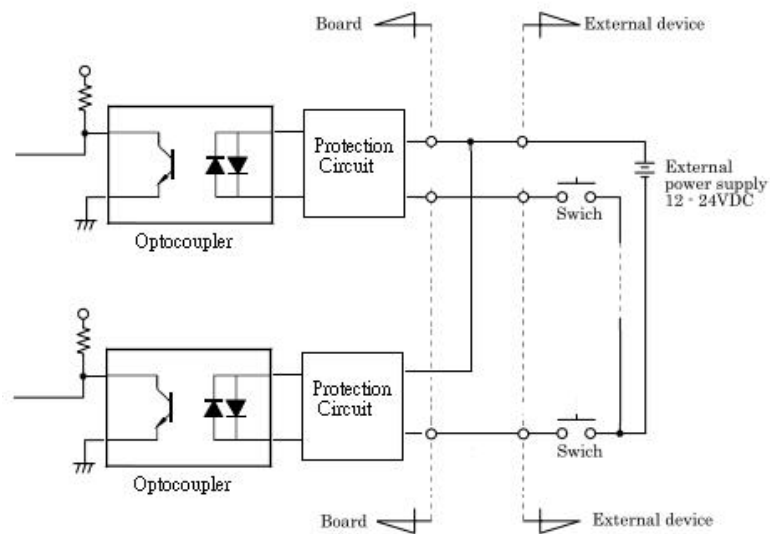
Output Circuit

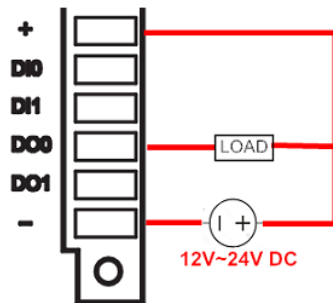
● Digital Input Wiring

Dry Contact

Wet Contact

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

● Digital Output Wiring

1.2.11   Analog Input

● Type: Differential Input

● Resolution: 16 bits

● Input Range: ±20mA

● Input impedance: 249Ω

● Sampling Rate:
   ・ All channels:100 samples/sec
   ・ Per channel: 25 samples/sec

● Over Voltage Protection: +/-55Vp-p

● Trigger source: Analog or Digital(software selectable)

● Accuracy:
   ±0.1% FSR @ 25°C
   ±0.3% FSR @ -40 and 70°C

1.2.12   Device ID Settings
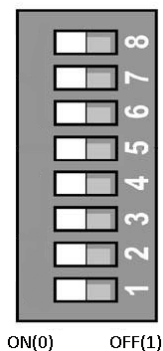
● DIP switches can be used to select different addressing options and assign the Device ID.

● Right switch position: OFF

● Left switch position: ON

1.2.13   System LED

LED Name	Description	Color	Note
Status	The LED helps users judge whether boot is finished and the OS can work normally or not. When the boot has finished system configuration, the LED will turn ON. - The LED is blinking : Bootloader or Linux kernel is loading. - The LED is always ON: The system is ready.	Green	
USB Power	On −USB Power is on. Off −USB Power is off.	Green	
COM	Blinking −Working in console mode On −Working in UART mode	Green	
COM TX	When COM1 is transmitting data, the LED will turn on.	Green	
COM RX	When COM1 is receiving data, the LED will turn on.	Green	
LINK 0/1	MiniCard 0/1 indicator On − There is activity on this port. Off − No link is established.	Green	
DI 0/1	Digital input 0/1 indicator On −The digital input is high Off −The digital input is low	Green	
DO 0/1	Digital output 0/1 indicator On −The digital output is high Off −The digital output is low	Green	

1.2.14   Wireless (3G/GPRS or WiFi)

- 1 x Mini card socket 0 (supports USB interface) with 1 x SIM Card Socket 1 by inside
- 1 x Mini card socket 1 (supports USB interface)
- Support WiFi or 3G/4G
  ;
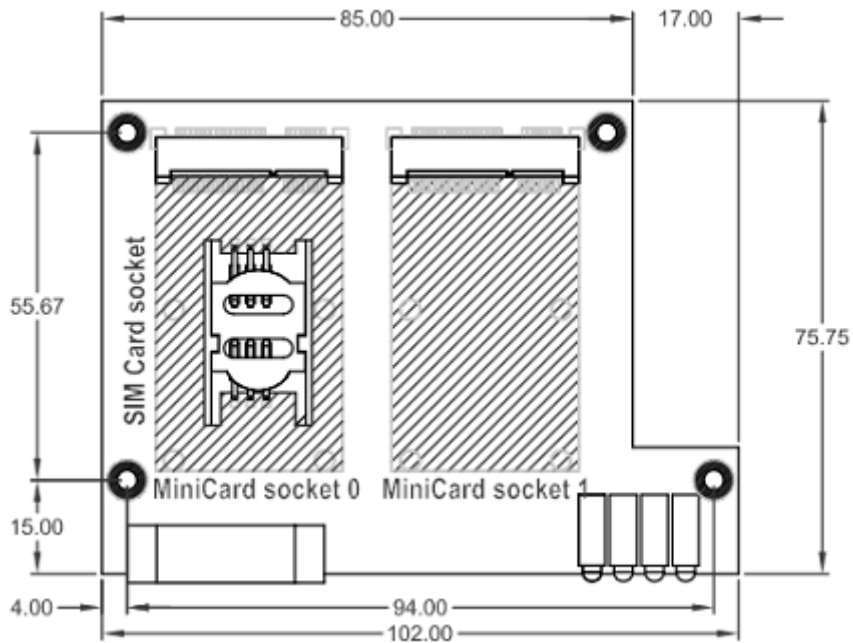
Mini card sockets correspond to SIM card sockets and LED:

Mini Card Socket	SIM Card Socket	LED
Mini Card Socket 0	SIM Card Socket	Link 0
Mini Card Socket 1		Link 1

1.2.15   Reset Button

- 1 x Reset button

1.2.16   Operation Temperature

- -40°C ~ +70°C (-40 ⁰F ~ +158⁰F)

1.2.17   Storage Temperature

- -45°C ~ +85°C (-49 ⁰F ~ +185⁰F)

1.2.18   Humidity

- 10% ~ 95% (non-condensation)

1.2.19   Weight

- 0.3kg

1.2.20   Dimensions

- 55mm (W) x 82mm (D) x 108mm (H)

1.2.21   System I/O Outlet

- 1 9-pin D-Sub male connectors (COM1 port or Console Port)
- 1 10/100Mbps Ethernets with magnetic isolation protection
- 1 USB 2.0 Type-A with power distribution control and over current protection
- 1 DIO Port (2-In/2-Out) with Dry/Wet contacts and optical isolation protection 2KV
- 1 AI Port (100 S/s, 16-bit, 4 channel differential Input)
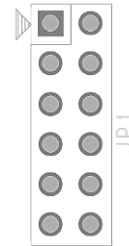
- 1 DC Power Input with terminal block

> *All specifications and images are subject to change without notice.*
>
> **Note**

1.3   Jumper setting

1.3.1   JP1

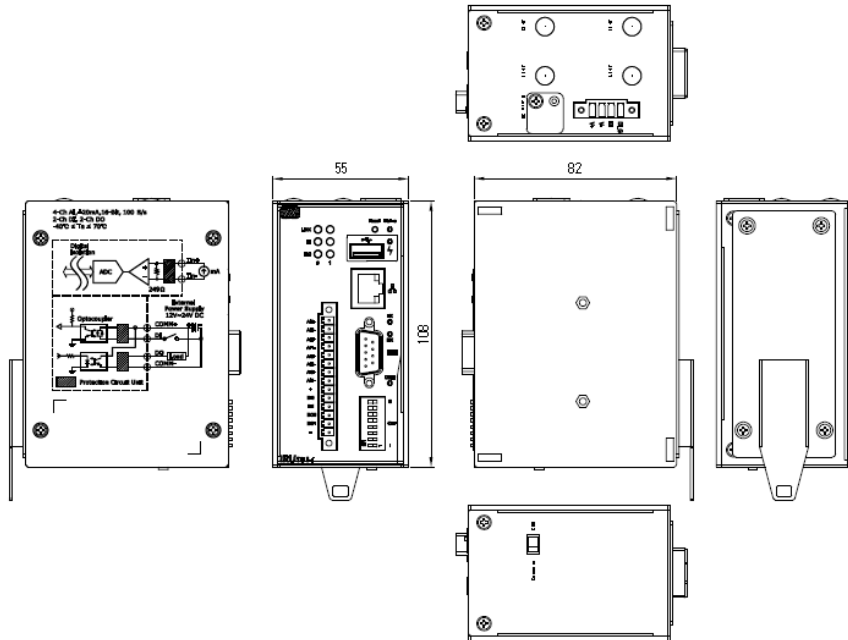| Function	Setting
Copy image to eMMC	JP1 1-2 Close
Boot to OS (eMMC) (Default)	JP2 3-4,5-6 Close JP2 7-8, 11-12 Close
Boot to OS (SD Card)	JP2 3-4, 9-10 Close

1.3.2   JP3

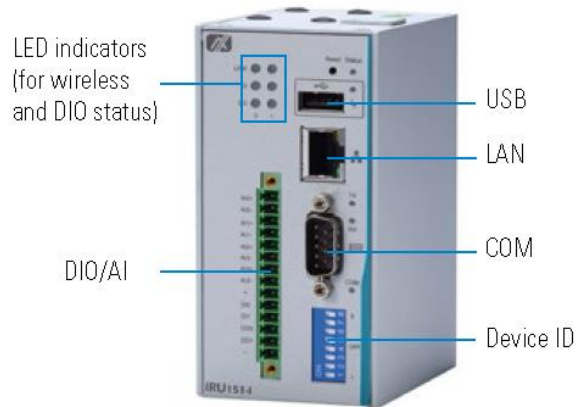| Function	Setting
OTG Client	JP3 1-2 Close
OTG Host (Default)	JP3 1-2 Open

1.4   Dimensions

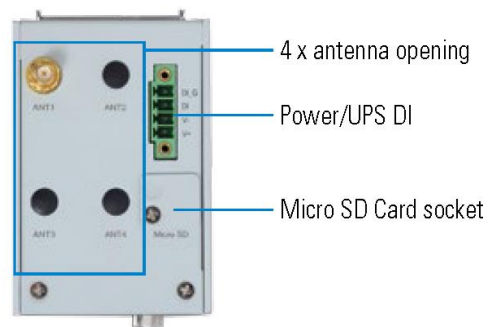The following diagrams show the dimensions and outlines of the IRU151-I

1.5　I/O Outlets

The following figures help you locate the I/O outlets on the front, top and bottom of the IRU151-I.

● **Front View**

● **Top　View**

● **Bottom View**

1.6   Packing List

The package bundled with your IRU151-I should contain the following items:

● IRU151-I System Unit x 1

● IRU151-I Quick Installation Guide x 1

● Screws x 8

● Din-rail Kit x1

● Power terminal block x 1

● DIO & AI terminal block x 1

Note

Please download the latest BSP or the latest Web_AP for IRU151-I from Axiomtek's website as below list if you have the demand

http://www.axiomtek.com/Default.aspx?MenuId=Products&FunctionId=ProductView&ItemId=24860&upcat=134&C=IRU151-I

Please contact an Axiomtek distributor if any of the above-mentioned items is damaged or missing.

CHAPTER 2
HARDWARE INSTALLATION

2.1   Installing Din-rail Mounting

The IRU151-I provides a Din-rail mount that customers can install as below:

Prepare the Din-rail mount assembling components (four screws and a bracket) ready.

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