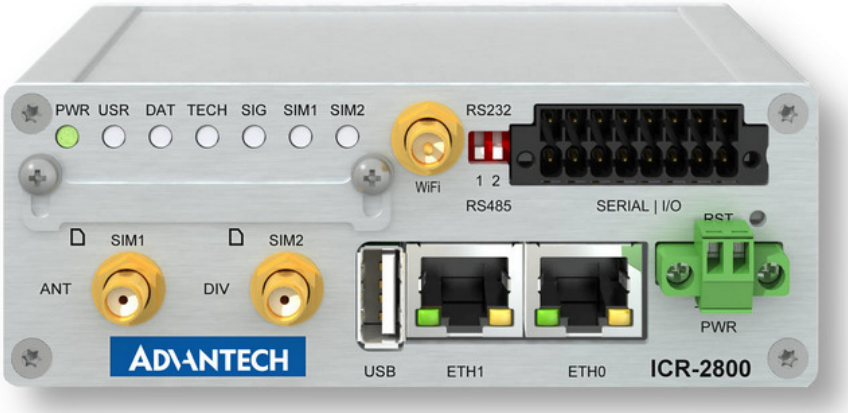
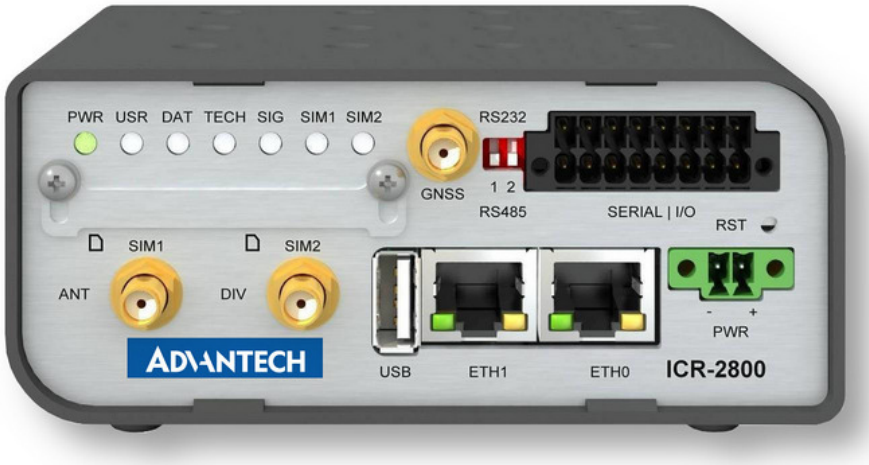
Hardware Manual

Industrial Cellular Router

ICR-2834





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Used symbols

Important

Important — Indicates a risk to personal safety or potential damage to the router. Follow these instructions precisely to prevent injury or equipment damage.

Warning

Warning — Highlights conditions that may cause malfunction, loss of data, or unexpected behavior in specific situations. Read carefully before proceeding.

Info

Info — Provides helpful tips, context, or references that improve understanding but are not strictly required to complete the task.

Code Example

```
Code Example - Copy-pasteable configuration snippets or CLI commands.
```

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1. Product Overview

1.1 Document Content

Info

This Hardware Manual is applicable to both standard (non-S1) and `S1 Router` versions of the Advantech ICR-2834 router.

Standard (non-S1) router models provide users with extensive configuration capabilities, where the overall security level is determined by the user's specific setup. In contrast, `S1 Router` models feature a more focused set of configuration options designed to meet stringent security requirements. S1 Routers are identifiable by the `-S1` suffix in their part number.

This manual provides comprehensive hardware information for Advantech ICR-2834 routers, covering the following key areas:

- **Product Overview** – Includes essential product details such as ordering codes, product revision history, package contents, physical dimensions, and mounting instructions.
- **Hardware Functionality** – Offers a detailed description of all hardware components, including SIM card slots, antenna connectors, Ethernet ports, power supply options, LED status indicators, reset button functionalities, and other physical interfaces.
- **First Use** – Provides step-by-step instructions for the initial setup and basic operation of the router.
- **Technical Specifications** – Lists key technical parameters, applicable standards and regulatory compliance information, results of type tests, cellular module specifications, and detailed interface parameters.

1.2 Product Introduction

Industrial cellular router ICR-2834 is designed for wireless communication in mobile networks that use traditional cellular technologies.

The primary purpose of this router is its use in the Category 4 (**Cat.4**) services on the cellular **LTE** network. Cat.4 rated router is capable of achieving typical speeds in 4G coverage areas where the network is enabled with 20 MHz of contiguous spectrum.

The peak **downlink** data rate for Category 4 is approximately **150 Mbps**. In the **uplink**, LTE Category 4 provides a peak data rate of **50 Mbps**.

The router, which may have a **metal** or **plastic** box, is equipped with two independently configurable **Ethernet ports**, two **Mini SIM slots** (2FF), main and diversity cellular **antenna connectors**, two **RS232** or two **RS485** independently selectable serial ports, four **digital inputs** together with two **digital outputs**, with one **USB 2.0** host interface and with **LEDs for status** indication. It is equipped with either **dual-band Wi-Fi** or **GNSS** module depending on the configuration of the router.

The router provides **diagnostic functions**, which include automatically monitoring the PPP connection, automatic restart in case of connection losses, **Low Power Mode** and **hardware watchdog** that monitors the router status.

The router supports **VPN tunnel** creation using various protocols to ensure safe communications. The router provides diagnostic functions which include automatic monitoring of the wireless and wired connections, automatic restart in case of connection losses, and a hardware watchdog that monitors the router status.

With open Linux platform and wide possibilities of programming customer SW applications in **Python**, **C/C++**. The Advantech existing app library **Router Apps** (formerly *User modules*) with apps already developed to enhance specific router functionality including industrial protocol conversions and support of IoT platforms such as **MS Azure**, **Cumulocity**, **ThingWorx**, and others are supported on the router.

The router supports automatic upgrades of both its configuration and firmware, leveraging updates from a central server. This feature ensures that the router remains up-to-date with the latest enhancements and security protocols.

This model is compatible with Advantech's remote device management platforms: WebAccess/DMP and WebAccess/VPN. These platforms facilitate comprehensive management and monitoring of network devices.

Examples of possible applications

- mobile office
- fleet management
- security system
- telematic
- telemetric
- remote monitoring
- vending and dispatcher machines

1.3 Hardware Overview

The router case preview is shown in Figure 1. A short description of hardware parts of the router is listed in Table 1, including the links to the chapters with a detailed description. For a router in a plastic box, the description of the components is similar.

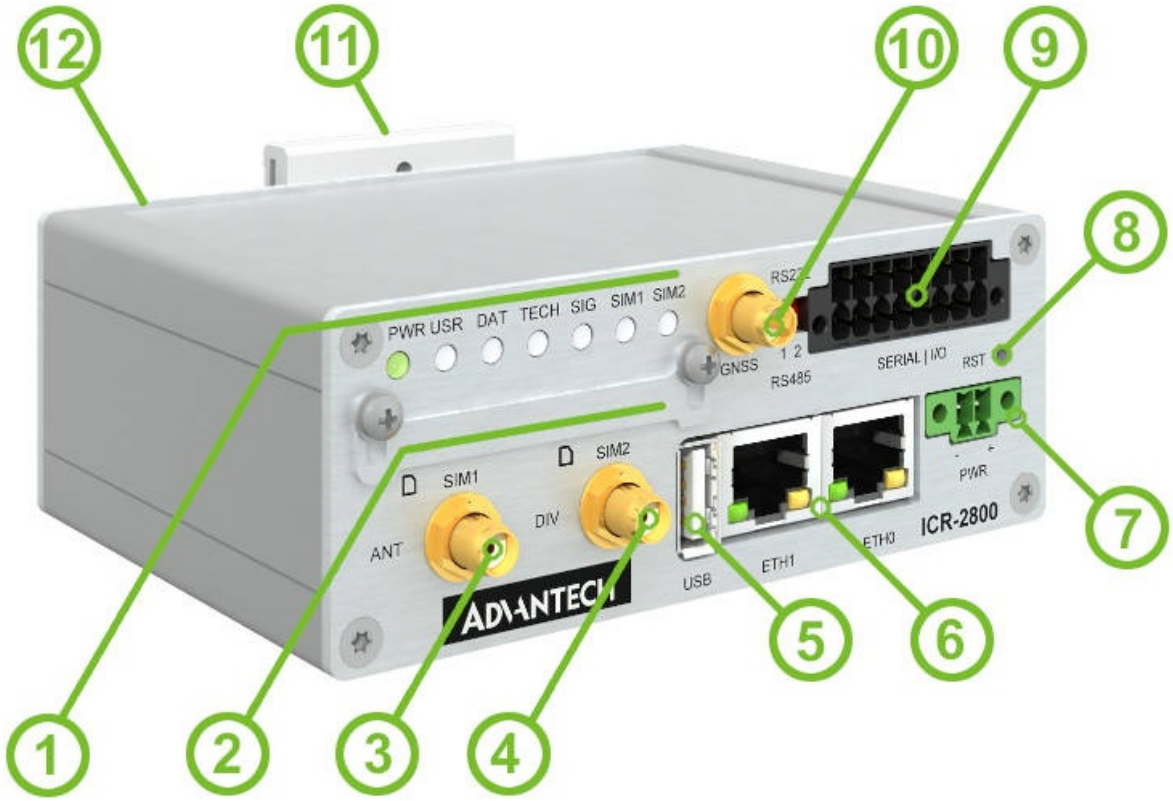


Figure 1: Hardware overview of the router

#	Item	Type	Description
1	LEDs	-	Status LED indication; see Chapter 2.9.
2	SIM	Mini SIM	Two SIM card slots; see Chapter 2.1.
3	ANT	SMA	Connector for the first main antenna of the cellular module; see Chapter 2.2 and Chapter 3.4 for cellular module parameters.
4	DIV	SMA	Connector for the first diversity antenna of the cellular module; see Chapter 2.2 and Chapter 3.4 for cellular module parameters.
5	USB	USB-A	USB-A type socket connector; see Chapter 2.8.
6	ETH	RJ45	100 MB Ethernet connection for the firts and second LAN; see Chapter 2.3.
7	PWR	2-pin	Power supply socket; see Chapter 2.4.
8	RST	-	Button to reboot the router; see Chapter 2.10.
9	SERIAL | I/O	16-pin terminal	Two switchable RS232/RS485, 4 binary inputs, and 2 binary outputs interfaces. See Chapter 2.6 and 2.7 for more information. Chapter 3.7 refers for I/O parameters and Chapter 3.8 for serial interface parameters.
10	Wi-Fi or GNSS	SMA or RP-SMA female	Based on router configuration; Wi-Fi or GNSS antenna connector. See Chapter 2.2 for more information, Chapter 3.6 for GNSS parameters and Chapter 3.5 for Wi-Fi parameters.
11	DIN clip	-	DIN rail clip, included as standard accessories; see Chapter 1.9.
12	GND	M3	Pay attention to proper grounding of model with metal box; see Chapter 2.4.

Table 1: Hardware overview of the router

1.4 Order Codes

Order code	Configuration
ICR-2834**G**	metal box, LTE Cat.4 with 3G/2G fallback module, **GNSS**, ETH0, ETH1, USB, four binary inputs, two binary outputs, 2x RS232/RS485, two SIM readers
ICR-2834**GP**	**plastic box**, LTE Cat.4 with 3G/2G fallback module, **GNSS**, ETH0, ETH1, USB, four binary inputs, two binary outputs, 2x RS232/RS485, two SIM readers
ICR-2834**GA01**	metal box, LTE Cat.4 with 3G/2G fallback module, **GNSS**, ETH0, ETH1, USB, four binary inputs, two binary outputs, 2x RS232/RS485, two SIM readers, **accessories** with Ethernet cable, two cellular antennas, and **EU power supply**
ICR-2834**GPA01**	**plastic box**, LTE Cat.4 with 3G/2G fallback module, **GNSS**, ETH0, ETH1, USB, four binary inputs, two binary outputs, 2x RS232/RS485, two SIM readers, **accessories** with Ethernet cable, two cellular antennas, and **EU power supply**
ICR-2834**GA02**	metal box, LTE Cat.4 with 3G/2G fallback module, **GNSS**, ETH0, ETH1, USB, four binary inputs, two binary outputs, 2x RS232/RS485, two SIM readers, **accessories** with Ethernet cable, two cellular antennas, and **UK power supply**
ICR-2834**GPA02**	**plastic box**, LTE Cat.4 with 3G/2G fallback module, **GNSS**, ETH0, ETH1, USB, four binary inputs, two binary outputs, 2x RS232/RS485, two SIM readers, **accessories** with Ethernet cable, two cellular antennas, and **UK power supply**
ICR-2834**W**	metal box, LTE Cat.4 with 3G/2G fallback module, **GNSS**, ETH0, ETH1, USB, four binary inputs, two binary outputs, 2x RS232/RS485, two SIM readers, **dual-band Wi-Fi**
ICR-2834**WP**	**plastic box**, LTE Cat.4 with 3G/2G fallback module, **GNSS**, ETH0, ETH1, USB, four binary inputs, two binary outputs, 2x RS232/RS485, two SIM readers, **dual-band Wi-Fi**
ICR-2834**WA01**	metal box, LTE Cat.4 with 3G/2G fallback module, **GNSS**, ETH0, ETH1, USB, four binary inputs, two binary outputs, 2x RS232/RS485, two SIM readers, **dual-band Wi-Fi**, **accessories** with Ethernet cable, two cellular with one Wi-Fi antennas, and **EU power supply**
ICR-2834**WPA01**	**plastic box**, LTE Cat.4 with 3G/2G fallback module, **GNSS**, ETH0, ETH1, USB, four binary inputs, two binary outputs, 2x RS232/RS485, two SIM readers, **dual-band Wi-Fi**, **accessories** with Ethernet cable, two cellular with one Wi-Fi antennas, and **EU power supply**
ICR-2834**WA02**	metal box, LTE Cat.4 with 3G/2G fallback module, **GNSS**, ETH0, ETH1, USB, four binary inputs, two binary outputs, 2x RS232/RS485, two SIM readers, **dual-band Wi-Fi**, **accessories** with Ethernet cable, two cellular with one Wi-Fi antennas, and **UK power supply**
ICR-2834**WPA02**	**plastic box**, LTE Cat.4 with 3G/2G fallback module, **GNSS**, ETH0, ETH1, USB, four binary inputs, two binary outputs, 2x RS232/RS485, two SIM readers, **dual-band Wi-Fi**, **accessories** with Ethernet cable, two cellular with one Wi-Fi antennas, and **UK power supply**
ICR-.....**-S1**..	The **-S1 prefix** indicates that the product is designed for the **S1 Router** platform. This platform ensures compliance with strict security requirements. For more details, refer to the S1 version of the configuration manual [1].

Table 2: Order code overview

1.5 Product Revisions

For the product revision history of the entire product platform, refer to the table below. Please note that some revisions may not be available for certain order codes. The revision number is printed on both the packaging and product labels.
The router GUI can also display the product revision under *Status* → *General* → *System Information* → *Product Revision*. Please note that the default revision (Rev. 1.0) may not be available here.

Rev.#	Description
1.0	Initial version (revision number not printed on the labels).
2.0	Wi-Fi support added to the mainboard; see PCN-2023-10 for details.
2.1	Not released for this model.

Table 3: HW revision history

1.6 Package Contents and Accessories

Table 4 refers to router package contents and other accessories, which depend on the order code; see Chapter 1.4. You can order an accessory separately; use the order code mentioned.

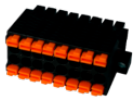
Description	Figure	Q'ty
Router in metal or plastic box		1 pc
DIN rail clip with screws (screws differ for metal and plastic versions)		1 set
2-pin terminal block for power supply (deployed on the router)		1 pc
16-pin terminal block for serial and I/O interfares (deployed on the router)		1 pc
Printed *Quick Start Guide Leaflet*		1 pc
Ethernet cross cable of length 1.5 m. Order code: *BB-KD-ETH*		0 / 1 pc
5G/LTE Antenna (SMA male). Order code: *ANT-LTE5G-025*		0 / 2 pcs
Wi-Fi Antenna (RP-SMA male). Order code: *BB-AW-A2458G-FSRPK*		0 / 1 pc
Wall mount power supply, 12V/1A with EU plug. Order code: *BB-RPS-v2-EU*		0 / 1 pc
Wall mount power supply, 12V/1A with UK plug. Order code: *BB-RPS-v2-UK*		0 / 1 pc
Wall mount power supply, 12V/1A with US plug. Order code: *BB-RPS-v2-US*		0 / 1 pc

Table 4: Package contents

1.7 Product Dimensions

For the dimensions of the product in metal and plastic boxes see the figures below. Note that all sizes are measured in millimeters.

Variant with Metal Box

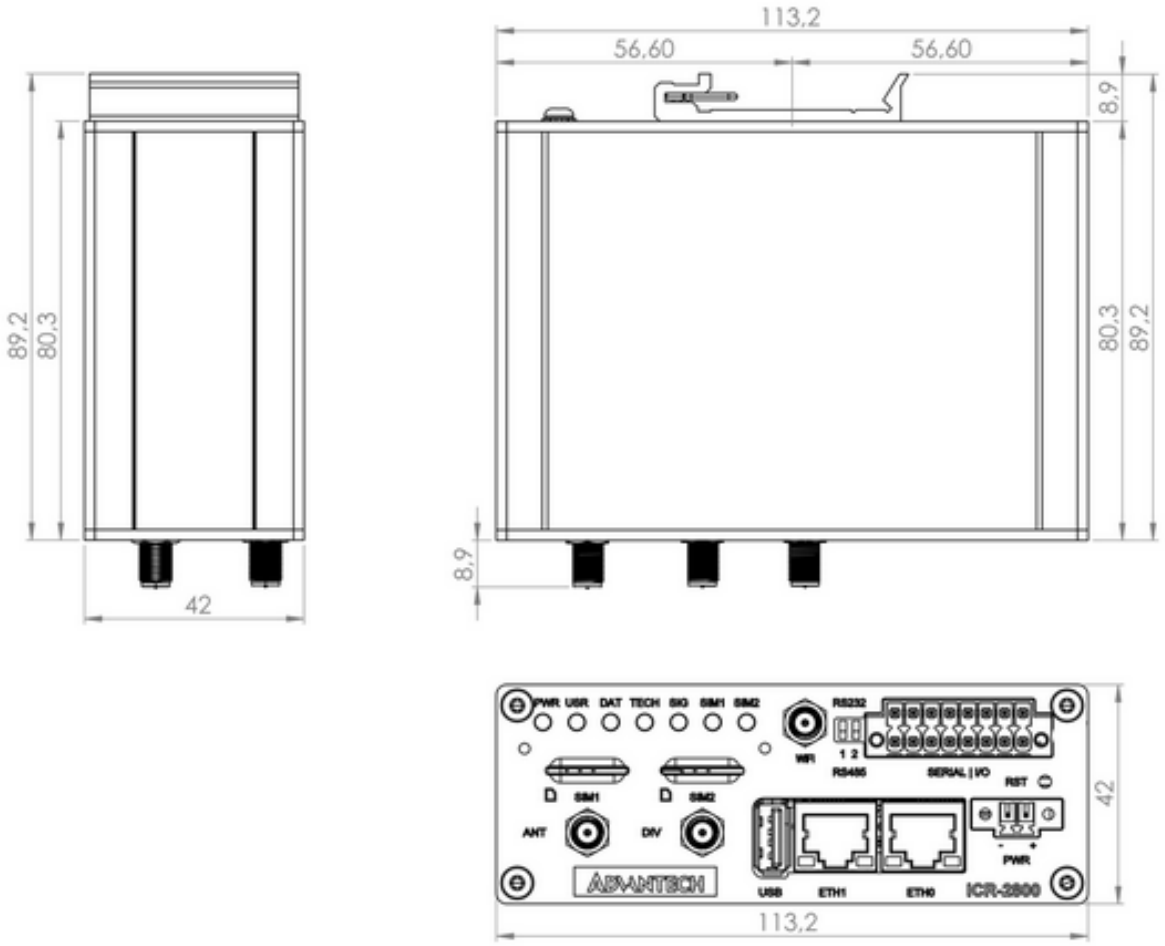


Figure 2: Metal box – top, side and front view

Variant with Plastic Box

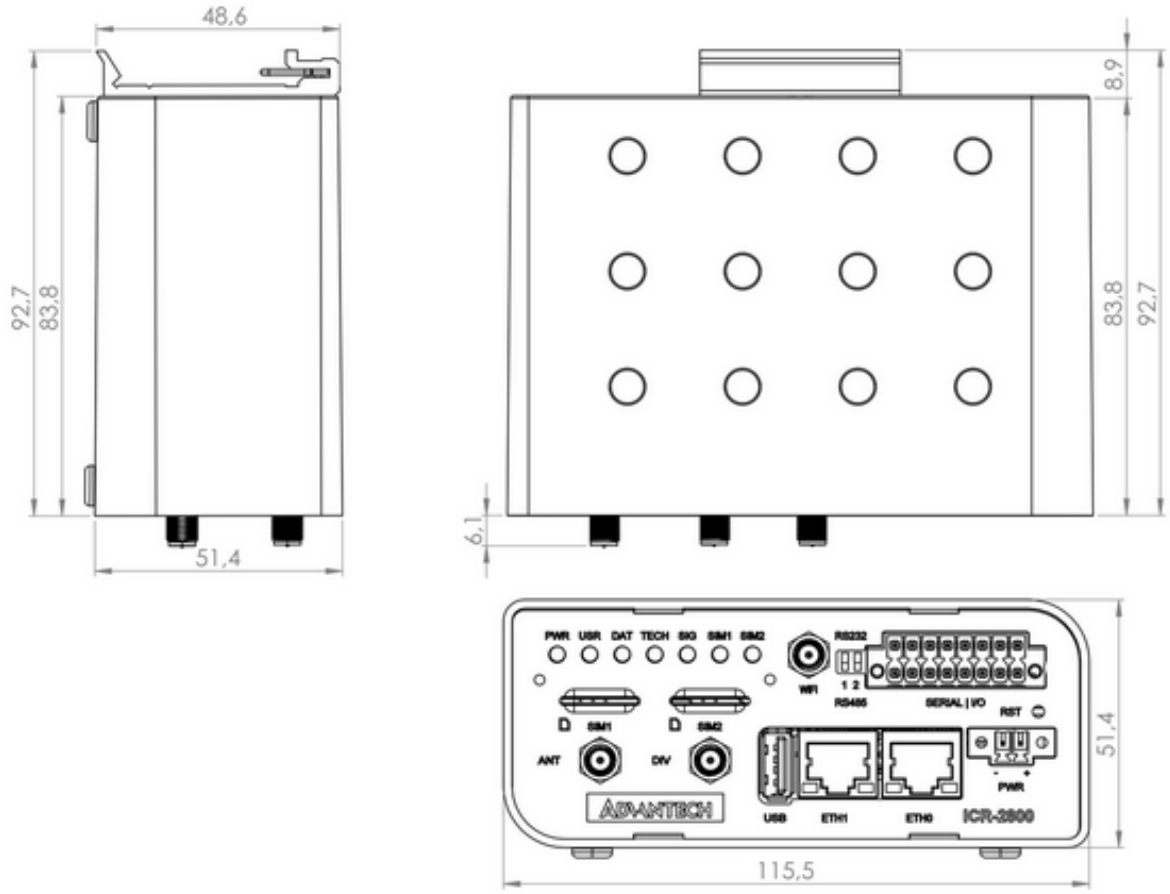


Figure 3: Plastic box – top, side and front view

1.8 Mounting Recommendations

The router can be placed:

- on a flat surface,
- on a DIN rail EN 60715 with the metal DIN rail clip (see Chapter 1.9)

For most applications with a built-in router within a switchboard, it is possible to recognize two kinds of environments:

- A non-public, industry environment of low voltage with high interference,
- a public environment of low voltage and without high interference.

For both of these environments, it is possible to mount the router to a switchboard, after which there is no need to have examination immunity or issues in connection with EMC according to EN 61439-1:2011.

Warning

In compliance with the EN 61439-1:2011 specification, it is necessary to observe the following assembly instructions for a router attached to a switchboard:

- For whip antennas it is recommended to observe a minimum distance of 6 cm from cables and metal surfaces on every side in order to avoid interference. When using an external antenna separate from the switchboard it is necessary to fit a lightning conductor.
- When mounting a router on sheet-steel we recommend using a cable antenna.
- For all cables, we recommend to bind the bunch, and for this we recommend:
  - The length of the bunch (the combination of power supply and data cables) should be a maximum 1.5 m. If the length of data cables exceeds 1.5 m or if the cable is leading towards the switchboard, we recommend installing surge protectors.
  - Data cables must not have a reticular tension of $\sim$ 230 V/50 Hz or $\sim$ 120 V/60 Hz.
- Sufficient space must be left between each connector for the handling of cables,
- To ensure the correct functioning of the router we recommend the use of an earth-bonding distribution frame for the grounding of the grounding screew, see Chapter 2.4.

1.9 DIN Rail Mounting

The DIN rail clip is suitable for a DIN rail according to EN 60715 standard only. There are four possible positions of the clip as shown in Figure 4.

Info

The DIN rail clip is the same for the metal and plastic router box. It just differs by the screws used.

Warning

When mounting the DIN rail clip, tighten the screws with max. torque of 0.4 Nm.

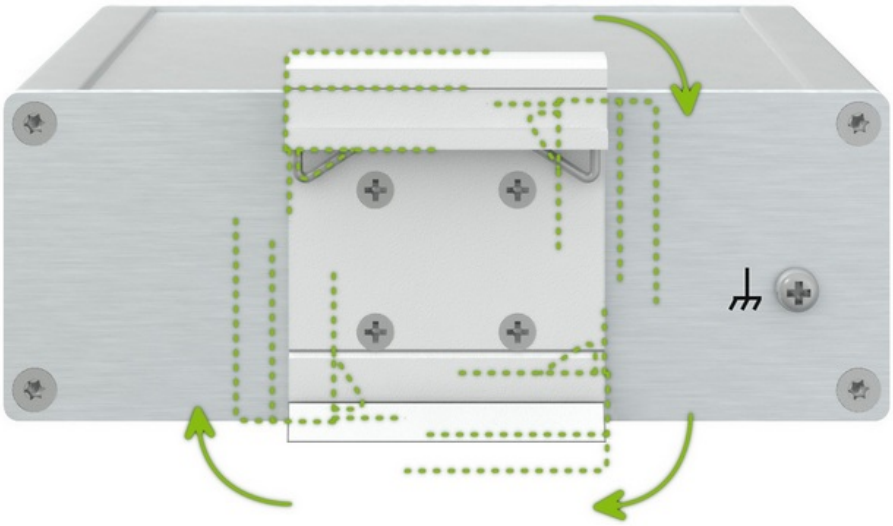


Figure 4: Position of the DIN rail clip

To remove the router from the DIN rail it is necessary to lightly push down the router so that the bottom part of the DIN rail clip hitched to the DIN rail get out of this rail and then fold out the bottom part of the router away from the DIN rail, see Figure 5.

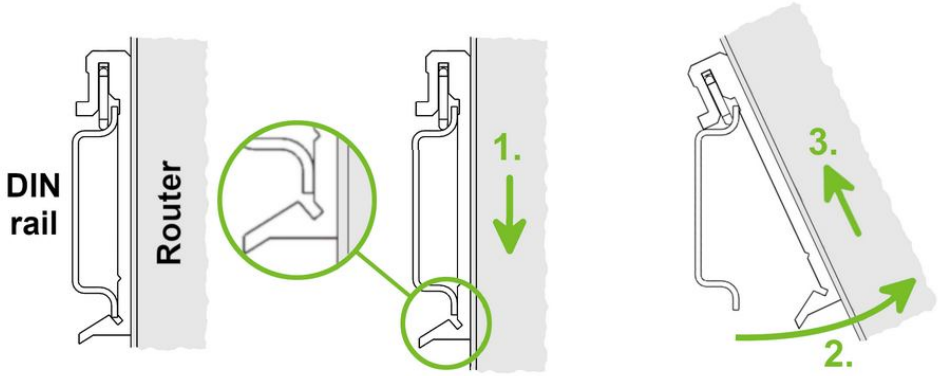


Figure 5: Removing the router from the DIN rail

1.10 Product Label

The figure below shows an example of the product labels with all the information printed on them.

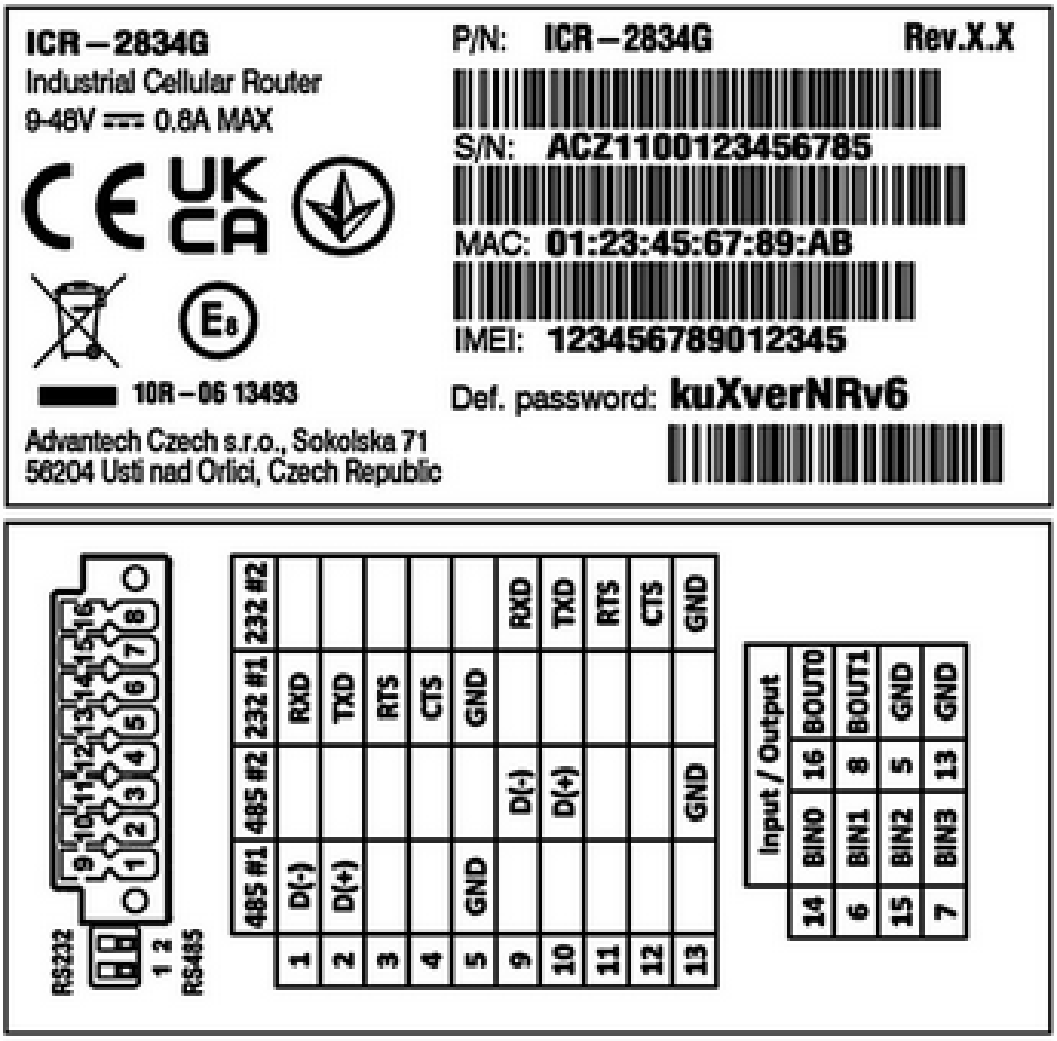


Figure 6: Product label

1.11 First Use

You can perform the initial configuration of the router using a web browser on your PC. This interface enables router monitoring, configuration, and administration.

Warning

- Before putting the router into operation, ensure that all components required for running your applications are connected. Refer to Chapter *1.3 Hardware Overview* for an overview of the hardware.
- Do not operate the router without an antenna connected to the main antenna connector. Transmitted energy will be reflected by an open connector, which could potentially damage the equipment.

The procedure for connecting to a new router is described in the *Configuration Manual* [1], Chapter *Introduction* → *Configuration Environments* → *Initial Web Configuration GUI Access*. This manual also provides detailed descriptions and examples of router configuration using the web interface.

2. Hardware Functionality

See Chapter 1.3 for an overview of the product's hardware, along with links to chapters offering detailed explanations.

2.1 SIM Card Slots

Slots for two SIM cards are located on the router beneath a metal cover. If you plan to use this device for cellular network communication, insert an activated data-provisioned SIM card into the SIM card slot.
You have the option to install two SIM cards simultaneously for utilizing the switching feature. The SIM cards can have different Access Point Names (APNs) configured. The procedure for changing SIM cards is outlined below. If the SIM requires a PIN, input it in the router's web interface (*Administration* → *Unlock SIM Card*).

Info

Type of SIM card: Mini SIM (2FF) 25.0 × 15.0 × 0.76 mm.

Warning

Inserting the SIM card:

- Always disconnect the router from the power supply before handling the SIM card.
- Release the two screws on the SIM card cover and swipe up the cover.
- To remove an inserted SIM card, use the flat end of a spudger or your fingernail to press the SIM card slightly into its slot until you hear a click. Upon hearing the click, release the card, and it will pop out of its slot.
- To insert a SIM card, push the card into the slot until it clicks into place.
- Swipe down the cover and tighten the cover screws.

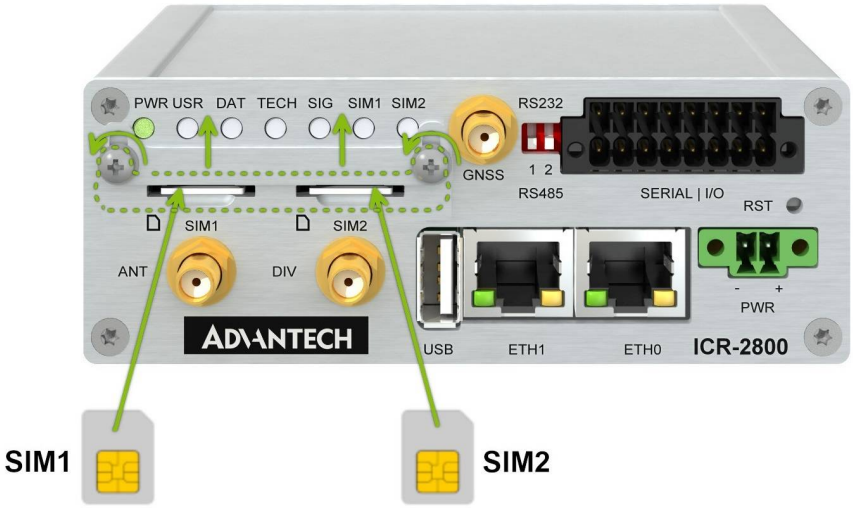


Figure 7: SIM card insertion

2.2 Antennas

Connect cellular antennas to the router to main (ANT) and diversity (DIV) SMA female connectors on the front panel. Based on router configuration, connect the Wi-Fi or GNSS antenna to the Wi-Fi/GNSS RP-SMA/SMA female connector on the front panel.

Warning

Always operate the router with a cellular antenna securely connected to the main antenna connector. Transmitting without an antenna attached will cause RF energy to be reflected at the open connector, which can lead to permanent damage to the radio circuitry. Ensure the antenna is properly installed before powering on or transmitting to prevent equipment failure.

Info

The DIV cellular antenna is required for the MIMO DL functionality.

Info

Recommended tightening moment for screwing the antenna to the SMA female connectors is 0.9 Nm.

2.3 Ethernet Interfaces

The panel socket of RJ45 is used for Ethernet interface. The pinout is described below.

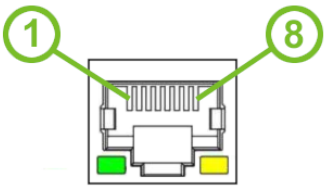


Figure 8: Ethernet connector pinout

Pin	Signal mark	Description
1	Tx+	Transmit Data+ (positive pole)
2	Tx-	Transmit Data- (negative pole)
3	Rx+	Receive Data+ (positive pole)
4	—	—
5	—	—
6	Rx-	Receive Data- (negative pole)
7	—	—
8	—	—

Table 5: Ethernet connector pinout description

Info

The isolation barrier of the Ethernet ports against the ground is 1500 V.

2.4 Power Supply

A two-pin terminal connector (pitch 3.5 mm) is utilized to power the router. The corresponding connector is included as a standard accessory with the router.

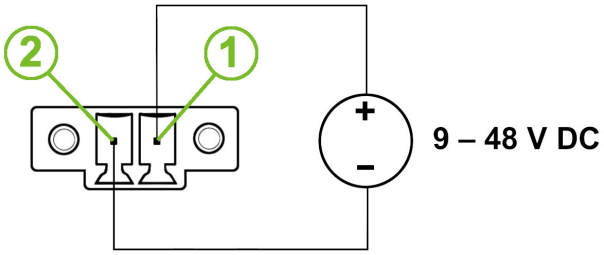


Figure 9: Power supply connection

Pin	Signal mark	Description
1	PWR(+)	Positive pole of DC supply voltage (+9 to +48 V DC)
2	PWR(-)	Negative pole of DC supply voltage

Table 6: Power connector pinout

The required power supply voltage for the router ranges between +9 V and +48 V DC. Refer to the connection scheme in Figure 9 for proper setup. The router is equipped with built-in protection against reversed polarity, functioning without signaling. To guarantee correct operation, the power source must be capable of providing a sufficient amount of energy, as detailed in the consumption section of Chapter 3.1.

Warning

Unit has to be supplied by a power supply specified as a Limited Power Source (LPS) or CEC/NEC Class 2 source of supply.

All metal parts, including the box, are interconnected with the negative pole of the power supply (common pole). If recommended for the installation environment, protect the router by properly grounding it using the grounding screw, as depicted in Figure 10. The maximum tightening torque for the grounding screw is 1 Nm.

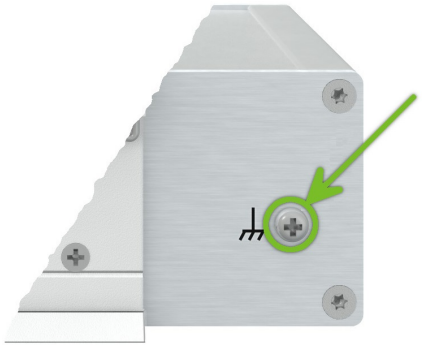


Figure 10: Grounding screw position

2.5 Low Power Mode

Warning

In applications requiring low power consumption (such as solar power - not 7/24 mode) is strictly recommended to use LPM mode prior to powering down the entire router.

LPM (Low Power Mode) is a router mode where the router is in sleep mode with minimal power consumption; see Chapter 3.1 for the LPM consumption. The router can be woken up from this mode by a signal applied to the BIN1 input or after a predetermined period of time. Putting the router into LPM mode can be done using the `lpm` command, see *Command Line Interface* application note for more details.

2.6 I/O Port Interfaces

The pins of I/O interface are physically connected to the 16-pin terminal block panel socket. The pinout of the I/O interface is described in Figure 11 and Table 7.

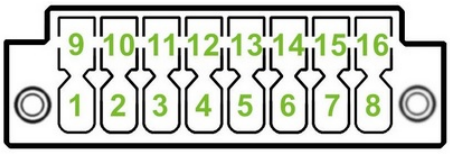


Figure 11: I/O connector pinout

Pin	Signal mark	Description
14	BIN0	The first binary input
6	BIN1	The second binary input
15	BIN2	The third binary input
7	BIN3	The fourth binary input
16	BOUT0	The first binary output
8	BOUT1	The second binary output
5, 13	GND	Ground (common negative pole)

Table 7: I/O ports pinout

Info

The I/O interface is not eletrically isolated from the router.

The I/O user interface is designed for binary input processing and binary output control. For detailed electrical parameters see Chapter 3.7. The functional scheme of connection for the binary input and binary output is in Figure 12.

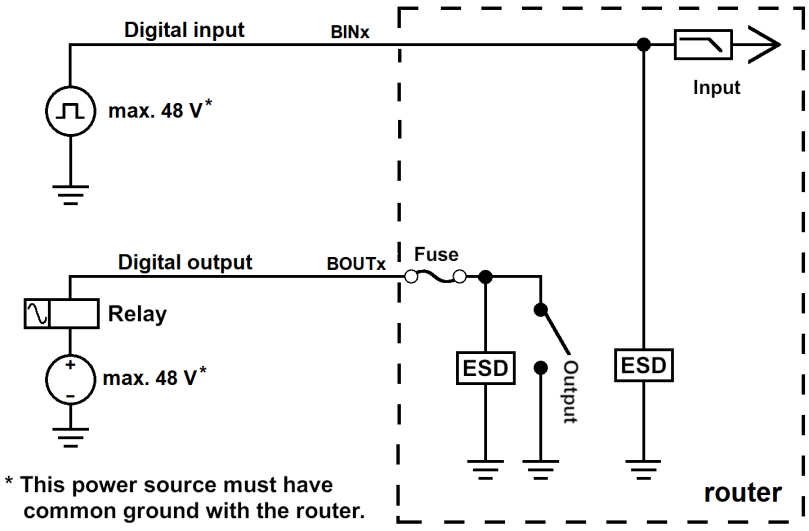


Figure 12: Functional scheme of the binary interface

2.7 Serial Interfaces

Important

For device protection, the serial interface can only be switched when the router is powered off.

Two independently switchable serial interfaces are connected to the 16-pin terminal block panel socket. Both interfaces can be switched independently to the RS232 or RS485 serial interfaces by the switch located on the left of the terminal socket.
If a switch is switched to the upper position, the corresponding serial interface is switched to operate as RS232; see Figure 13, Table 8, and Table 9.

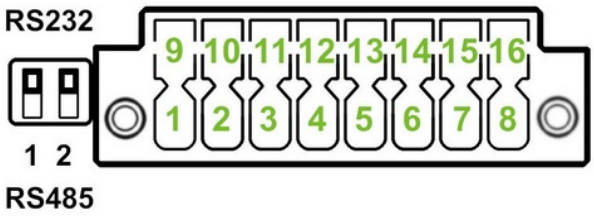


Figure 13: Both interfaces in RS232 mode

Pin	Signal mark	Description
1	RXD	Received Data
2	TXD	Transmit Data
3	RTS	Request to Send
4	CTS	Clear to Send
5	GND	Ground

Table 8: First serial interface – RS232 mode

Pin	Signal mark	Description
9	RXD	Received Data
10	TXD	Transmit Data
11	RTS	Request to Send
12	CTS	Clear to Send
13	GND	Ground

Table 9: Second serial interface – RS232 mode

If a switch is switched to the down position, the corresponding serial interface is switched to operate as RS485; see Figure 14, Table 10, and Table 11.

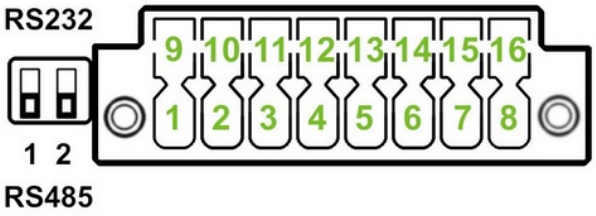


Figure 14: Both interfaces in RS485 mode

Pin	Signal mark	Description
2	D (+)	In/Out
1	D (-)	In/Out
5	GND	Ground

Table 10: First serial interface – RS485 mode

Pin	Signal mark	Description
10	D (+)	In/Out
9	D (-)	In/Out
13	GND	Ground

Table 11: Second serial interface – RS485 mode

Info

The serial interfaces are not eletrically isolated from the router.

2.8 USB Port

The router is equipped with a single USB 2.0 host port featuring a USB-A type socket. The pinout details of the USB socket are illustrated in Figure 15 and further described in Table 12.

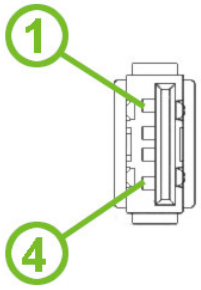


Figure 15: USB connector pinout

Pin 1	Signal Mark	Description	Data Flow Direction
1	+5 V	Positive pole of 5 V DC supply voltage, 0.5 A	
2	USB Data -	USB data signal (negative pole)	Input/Output
3	USB Data +	USB data signal (positive pole)	Input/Output
4	GND	Negative pole of DC supply voltage	

Table 12: USB connector pinout

For detailed USB port configuration options, refer to the configuration manual [1], Chapter *Configuration → USB Port*.

2.9 LED Status Indication

There are LED indicators on the front panel of the router to provide router status information. Moreover, ETH connector, has two additional LEDs providing information about the port status.

Caption	Color	State	Description
PWR	Green Green Green	On Blinking Fast blinking	The router is booting up. The router booted up and is ready. The router firmware is being updated.
USR	Green	—	The function of this LED is user-defined.
DAT	Green	Blinking	Cellular communication is in progress.
TECH	Green Orange Red	On Blinking Fast blinking	The active SIM uses 4G technology. The active SIM uses 3G technology. The active SIM uses 2G technology.
SIG	Green Orange Red	On Blinking Fast blinking	Good cellular signal. Fair cellular signal. Poor cellular signal.
SIM1	Green Red	On Fast blinking	SIM1 is active for the cellular connection. A SIM1 issue (missing card or PIN not entered).
SIM2	Green Red	On Fast blinking	SIM2 is active for the cellular connection. A SIM1 issue (missing card or PIN not entered).
ETH0 ETH1	Green Green	On Off	Selected 100 Mbps bit rate. Selected 10 Mbps bit rate.
ETH0 ETH1	Orange Orange Orange	On Brief off blinks Off	The network cable is connected. Data transmission. The network cable is not connected.

Table 13: LED status indication

2.10 Reset Functions

The *RST* button has multiple functions. For more details, refer to the configuration manual [1], Chapter *Introduction* → *Device* → *Reset*.

Info

Use a narrow screwdriver or a small tool to press the *RST* button.

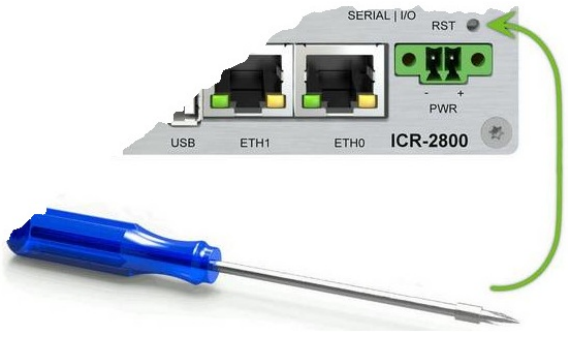


Figure 16: Resetting the router

3. Technical Specifications

3.1 Basic Parameters

Parameter	Conditions	Description
Temperature range	Operating Storage	-40 °C to +75 °C -40 °C to +85 °C
Humidity	Operating Storage	5 to 95 % relative humidity non condensing 5 to 95 % relative humidity non condensing
Altitude	Operating	2000 m / 70 kPa
Degree of protection		IP30
Supply voltage		9 to 48 V DC
Battery for RTC		CR1225
Consumption for non-Wi-Fi (Wi-Fi) version	Idle Average Maximum LPM mode	1.9 W (2.3 W) 3.5 W (4.0 W) 7.4 W (7.7 W) 6 mW
Dimensions of device w/o clip		113,2 × 80,3 × 42 mm (metal box) 117 × 83,8 × 51,4 mm (plastic box)
DIN rail clip specification		DIN 35 mm, EN 60715
Weight		300 g (metal box) 240 g (plastic box)

Table 14: Basic parameters

3.2 Standards and Regulations

The router complies with the following standards and regulations:

Parameter	Description
Radio	ETSI EN 301 511, ETSI EN 301 908-1, ETSI EN 301 908-2, ETSI EN 301 908-13, ETSI EN 303 413, ETSI EN 301 893, ETSI EN 300 328
EMC	ETSI EN 301 489-1, ETSI EN 301 489-17, ETSI EN 301 489-19, ETSI EN 301 489-52, EN 55032, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-3
Safety	EN IEC 62368-1, EN IEC 62311, IEEE 802.3
Transportation	E-Mark (E8) homologation number: 10R-06 13493[1]
Cybersecurity	EN 18031-1
National	CE, UKCA, UK compliant
Environmental	REACH, RoHS3 and WEEE compliant

Table 15: Standards and regulations

[1] Not applicable to Wi-Fi models.

3.3 Type Testing and Environmental Conditions

Phenomena	Test	Description	Test levels
ESD	EN 61000-4-2	Enclosure	CD ±6 kV, L3 AD ±8 kV, L3
RF field AM modulated	EN 61000-4-3	Enclosure	20 V/m, 80 MHz – 1 GHz, LX 10 V/m, 1 GHz – 6 GHz, L3
Fast transient	EN 61000-4-4	DC ETH - FTP RS232 RS485 Binary input Binary output AC/DC	±1 kV, 5/50Tr/Th ns, 100 kHz, L2 ±1 kV, 5/50Tr/Th ns, 100 kHz, L3 ±1 kV, 5/50Tr/Th ns, 100 kHz, L3 ±1 kV, 5/50Tr/Th ns, 100 kHz, L3 ±1 kV, 5/50Tr/Th ns, 100 kHz, L3 ±1 kV, 5/50Tr/Th ns, 100 kHz, L3 ±2 kV, 5/50Tr/Th ns, 100 kHz, L3
Surge	EN 61000-4-5	DC ETH AC/DC	±1 kV,1,2/50(8/20) Tr/Th us L2 ±1 kV,1,2/50(8/20) Tr/Th us L2 ±2 kV,1,2/50(8/20) Tr/Th us L3
RF conducted	EN 61000-4-6	DC ETH RS232 RS485 I/O AC/DC	10V,0.15-80MHz,80% AM(1kHz),L3 10V,0.15-80MHz,80% AM(1kHz),L3 10V,0.15-80MHz,80% AM(1kHz),L3 10V,0.15-80MHz,80% AM(1kHz),L3 10V,0.15-80MHz,80% AM(1kHz),L3 10V,0.15-80MHz,80% AM(1kHz),L3
Dips & interruptions	EN 61000-4-11	AC/DC	dip 0% 0,5cycle, 0% 1 cycle, 70% 25 cycles, interuption 0% 250 cycles
Radiated emission	EN 55032	Enclosure DC ETH RS232 RS485 AC/DC	Cl. B,30MHz-1GHz,1GHz-6GHz Class B, 150 kHz – 30 MHz Class B, 150 kHz – 30 MHz Class B, 150 kHz – 30 MHz Class B, 150 kHz – 30 MHz Class B, 150 kHz – 30 MHz

Table 16: Type testing and environmental conditions

3.4 Parameters of Cellular Module

Parameter	Description
Antenna	**Connector type:** SMA **Impedance:** 50 Ω
LTE parameters	**LTE:** LTE Cat.4, 3GPP Rel. 10 **FDD frequencies:** B28 (700 MHz), B20 (800 MHz), B5 (850 MHz), B8 (900 MHz), B3 (1800 MHz), B1 (2100 MHz), B7 (2600 MHz) **Bit rates:** up to 150 Mbps (DL), 50 Mbps (UL) **Maximum output power:** 23±2 dBm
HSPA+/UMTS parameters	**HSPA:** 3GPP Release 7 **UMTS:** 3GPP Release 4 **Supported frequencies:** B8 (900 MHz), B3 (1800 MHz), B1 (2100 MHz) **Bit rates:** max. 21 Mbps (DL) / 5.7 Mbps (UL) **Maximum output power:** 24+1/-3 dBm
EDGE/GPRS parameters	**Supported frequencies:** B5 (850 MHz), B8 (900 MHz) B3 (1800 MHz), B2 (1900 MHz) **Bit rates:** max. 237 kbps (DL) / 237 kbps (UL) **Maximum output power:** 33±2 dBm

Table 17: Cellular module technical parameters

3.5 Parameters of Wi-Fi

Parameter	Description
Supported Standards	IEEE 802.11a/b/g/n/ac, 2.4 GHz & 5 GHz
Antenna Connector	1x RP-SMA Input impedance: 50 Ω
Data Rate	802.11b: 1, 2, 5.5, 11Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: Max. 72 Mbps @ 20 MHz channel 802.11n: Max. 150 Mbps @ 40 MHz channel
Frequency Ranges	2.4 GHz ISM Bands 2.412-2.472 GHz 5.15-5.25 GHz (FCC UNII-low band) for US/Canada and EU 5.25-5.35 GHz (FCC UNII-middle band) for US/Canada and EU 5.47-5.725 GHz for EU 5.725-5.825 GHz (FCC UNII-high band) for US/Canada
Modulation	DSSS, OFDM, DBPSK, DQPSK, CCK, 16-QAM, 64-QAM
2.4 GHz Channels	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
5 GHz Channels	36, 38, 40, 42, 44, 46, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165
Type of Device	Access point (AP) (up to 8 clients) Station (STA) Multirole (STA&AP)
Security – Standards	WPA, WPA2, WPA3, 802.1X
Security – Encryption	WEP, TKIP, AES
TX Power	Max. 18 dBm @ 2.4 GHz Max. 15 dBm @ 5 GHz

Table 18: Technical parameters of Wi-Fi

3.6 Parameters of GNSS

Supported by models with GNSS only, see Chapter 1.4 Order Codes.

Parameter	Description
Protocol	NMEA
GNSS Systems	GPS, GLONASS, Beidou, Galileo
Antenna	Impedance: 50 Ω Connector type: SMA Power Mode: 3 V / 20 mA power supply for the active antenna Automatic power saving modes. DC feed bridge and control of power supply for active antenna.
Frequency	GPS: min. 1574.4 MHz, typ. 1575.42 MHz, max. 1576.4 MHz GLONASS: min. 1597.5 MHz, typ. 1575.42 MHz, max. 1605.9 MHz
Tracking Sensitivity (open sky)	GPS (active antena): -159 dBm GLONASS (active antenna): -158 dBm GPS (passive anttenna): -156 dBm GLONASS (passive antenna): -156 dBm
Acquisition Sensitivity (open sky)	GPS (active antena): -147 dBm GLONASS (active antenna): -146 dBm GPS (passive anttenna): -145 dBm GLONASS (passive antenna): -144 dBm
TTFF (av. at -130 dBm)	Warm: 28 s Cold: 32 s

Table 19: Technical parameters of GNSS

3.7 Parameters of I/O Ports

Electrical characteristics of the digital input are in Table 20. Status of the digital input can be retrieved in the router's web interface (on the *General Status* page) or by the `status ports` and `io get` commands, see *Command Line Interface* application note.

Logical[1]	Voltage	Current	Status[2]
1	3 V	0.5 mA	Off
0	5 V	0.8 mA	On
0	12 V	1.6 mA	On
0	48 V	3.4 mA	On

Table 20: Electrical characteristics of digital input

The maximum digital output load is **500 mA** at **48 V**.

3.8 Parameters of Serial Interfaces

Supported parameters of the RS232 and RS485 interfaces, which can be configured in *Expansion Port 1* resp. *Expansion Port 2* menu items, are in Table 21.

Parameter	Description
Baudrate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400.
Data Bits	5, 6, 7, 8.
Parity	none, even, odd.
Stop Bits	1, 2.
Flow Control	none, hardware.

Table 21: Parameters of serial interfaces

[1] The digital status returned by the `io get` shell command.
[2] The digital status returned by the `status ports` shell command and displayed on the *General Status* page.

3.9 System Configuration

The main parametes of the system are listed in Table 22.

Parameter	Description
CPU architecture	32-bit ARM926EJ-S
CPU frequency	600 MHz
CPU power	4,72 DMIPS/MHz
Flash memory	4 MB of NOR 4 096 MB of eMMC • 838 MB for Router Apps • 512 MB for customer data • The remaining space is reserved for the system.
RAM size	128 MB
Watchdog	HW Watchdog
RTC	Battery Backup RTC
TPM[1]	Trusted Platform Module (TPM) 2.0

Table 22: System configuration

[1] Not assembled by default, for a dedicated customer order only.

Appendix A: Troubleshooting

Warning

If you cannot connect to the router from your PC, your network card may be configured in a way that prevents a connection. Try one or more of the following steps to resolve the issue:

- Ensure your PC's network card is configured to obtain an IP address automatically from a DHCP server (the router's DHCP server is enabled by default).
- Connect the router to the PC via a network switch.
- Connect the PC directly to the router, but start the router first and wait for it to initialize completely before starting the PC.

Ethernet Connection Fails or Is Unstable

- On the router's *Configuration* → *LAN* page, you can disable auto-negotiation and manually set a specific link speed and duplex mode. This can resolve compatibility issues with some network devices.

Mobile WAN Connection Fails or Is Intermittent

- Check the signal strength on the *Status* → *Mobile WAN* page. If the signal is weak, a more powerful antenna is required. If neighboring cells have similar signal strength, a directional antenna may be necessary to lock onto the optimal cell tower.
- Enable the connection check feature on the *Configuration* → *Mobile WAN* page in the *Check connection* section. Select the *Enable + bind* option. This will send periodic pings to check connectivity and restart the connection if it fails. The "bind" option ensures the ping is always sent through the Mobile WAN interface.

Cannot Establish Mobile WAN Connection

- Verify all settings on the *Configuration* → *Mobile WAN* page, including the *APN*, *username*, *password*, and *IP address*. For many public networks, these fields can be left blank.
- Check if the SIM card requires a PIN. If so, enter it on the *Administration* → *Unlock SIM Card* page.
- For private APN networks, it is often not recommended to obtain DNS server addresses from the operator. Disable this option on the *Configuration* → *Mobile WAN* page.
- Check the *Status* → *System Log* for error messages that can help diagnose the issue.

Cannot Connect to a Device Behind the Router from the Internet (NAT)

- The device behind the router must be configured to use the router's IP address as its default gateway.

Cannot Access a Web Server Behind the Router via NAT

- Remote HTTP access to the router itself must be disabled. This can be done on the *Configuration* → *NAT* page.
- On the same page, enable the *Send all remaining incoming packets to default server* feature and enter the IP address of your web server.
- Ensure the web server's default gateway is set to the router's IP address.

✍ DynDNS Does Not Work

- DynDNS will not work with a private APN if the router's IP address is not publicly accessible.
- If your DynDNS hostname resolves to the same private IP address that is assigned to the router, it means your mobile operator is using NAT or a firewall, preventing direct connections.
- You can verify operator NAT by pinging a server with a static public IP and comparing the source IP (seen by the server) with the IP address shown on the router's status page.
- You can test for a firewall by trying to access the router's web interface remotely.
- The operator may not be providing DNS server addresses. Without DNS, the router cannot resolve the DynDNS service hostname. The System Log would show errors like:
  - `Error resolving hostname: no such file or directory`
  - `Connect to DynDNS server failed`

✍ L2TP or IPsec Tunnel Fails to Establish

- Check the *Status* → *System Log* for specific error messages related to the VPN tunnel negotiation.

✍ IPsec Tunnel Establishes, but No Data Is Transferred

- This is typically caused by incorrect routing rules or a misconfigured default gateway on either the client device or the remote network.

✍ Router Reverts to Online Mode After a Reboot, Despite Being Set to Offline via SMS

- State changes made via SMS commands are temporary and do not alter the saved configuration. They remain in effect only until the router is rebooted.

✍ Serial Communication Is Not Working

- Verify that your router model is equipped with a serial port. Check the serial communication settings on the *Configuration* → *Expansion Port* page.

✍ Is the Router Cisco Compatible?

- No. The router's operating system (ICR-OS) is based on Linux, not Cisco IOS. Therefore, Cisco configuration commands cannot be used.
- However, since all network connections are based on open standards, the router is fully compatible and can be connected to Cisco devices or any other standard networking equipment.

✍ FTP or SFTP Does Not Work

- **FTP** is available on v2 platform routers only. Ensure it is enabled in *Configuration* → *Services* → *FTP*. Connect using any FTP client to port `21` with the same username and password as the web interface.
- **SFTP** (SSH File Transfer Protocol) is available on all routers. Ensure SSH is enabled in *Configuration* → *Services* → *SSH*. Connect using any SFTP-capable client (like FileZilla or WinSCP) to port `22` with the same credentials as the web interface.

✍ How to Access the Router's Command Line

- You can connect to the router's command line using SSH (all routers) or Telnet (v2 routers only).
- **SSH** is enabled by default. You can verify this in *Configuration* → *Services* → *SSH*. Use any SSH client to connect to the router's IP address on port `22`.
- **Telnet** can be enabled on v2 routers in *Configuration* → *Services* → *Telnet*.
- For both methods, use the same username and password as for the web interface.

Appendix B: Customer Support

Customer Support for Europe

Advantech Czech s.r.o.
Sokolska 71
562 04, Usti nad Orlici
Czech Republic

Phone: +353 91 792444
Fax: +353 91 792445
E-mail: iiotcustomerservice@advantech.eu
Web: www.advantech.com

Customer Support for NAM

Advantech B+B SmartWorx
707 Dayton Road
Ottawa, IL 61350 USA

Phone: +1-800-346-3119 (Monday – Friday, 7 a.m. to 5:30 p.m. CST)
Fax: +1-815-433-5109
E-mail: support.iiot.ana@advantech.com
Web: www.advantech.com

Customer Support for Asia

Phone: +886-2-2792-7818 #1299 (Monday – Friday, 9 a.m. to 5:30 p.m. UTC+8)
Fax: +886-2-2794-7327
E-mail: icg.support@advantech.com.tw
Web: www.advantech.com

Appendix C: Regulatory & Safety Information

Safety Notices

For your safety and the appropriate operation of the device, please observe the following instructions:

- The router must comply with all applicable international and national laws, including any specific regulations or restrictions concerning its operation in designated applications and environments.
- To avoid personal injury and damage to the device, use only accessories that are approved or supplied by the manufacturer. Unauthorized modifications or the use of non-approved accessories could damage the router, violate regulations, and result in loss of warranty coverage.
- Do not attempt to open the router enclosure under any circumstances.
- Before handling the SIM card, always switch off the router and disconnect it from the power supply.

Important

This equipment is not suitable for use by or near young children. Small children could accidentally swallow the SIM card.

- Ensure that the power supply voltage does not exceed 48 V DC.
- Do not expose the router to harsh environmental conditions. Protect it from dust, moisture, and excessive temperatures.
- Use routers with correct certifications and markings only in areas containing flammable or explosive materials (such as gas stations, chemical plants, or locations with explosives). In these environments, follow all restrictions regarding the use of radio devices.
- When traveling by airplane, always switch off the router. Using the router on board may endanger flight safety, interfere with mobile networks, and violate local regulations. Non-compliance can result in suspension or cancellation of telecommunications services, or legal penalties.
- Take special care when operating the router in close proximity to personal medical devices such as cardiac pacemakers or hearing aids.
- This device may cause interference if used close to television sets, radio receivers, or personal computers.
- Maintain a safe separation distance of at least 20 cm between the router and the human body during operation.
- It is strongly recommended to regularly back up all critical device settings stored in the router's memory.

Product Disposal Instructions

The WEEE directive (Waste Electrical and Electronic Equipment: 2012/19/EU) ensures the environmentally responsible recycling and recovery of electronic products. This device contains high-quality materials and components suitable for recycling. At the end of its life, **do not dispose of this product with ordinary commercial waste**. The router also contains a battery. Remove the battery before disposing of the device, and ensure the battery is disposed of separately and in accordance with local regulations. For detailed information on product and battery disposal, consult your supplier's terms and conditions.

Appendix D: Related Documents

[1] *ICR-2[78]00 Configuration Manual* (see *Documents to download* → *Manuals* section)

[EP] Product-related documents and applications can be obtained on **Engineering Portal** at `https://icr.advantech.com/download` address.

We, Advantech Czech s.r.o., declare that the radio equipment narrated in this user's manual complies with Directive **2014/53/EU**.

We, Advantech Czech s.r.o., declare that the radio equipment narrated in this user's manual complies with Radio Equipment Regulations 2017 (**S.I. 2017 No. 1206**).

The full text of the EU Declaration of Conformity is available at the following internet address:
icr.advantech.com/doc