



# SC1000W CARINA UHF RFID Reader

## User Guide

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# User Guide

Version 6.0

November 07, 2024

## Attention

### FCC Radiation Exposure Statement

The CARINA Integrated Reader (CARINA FCC ID: 2BLW9-SC1000W) described in this User Guide is a commercial product and must be installed by professional installer.

The antennas used for this transmitter must be installed to provide a minimum separation distance of at least 1 meter from any person and must not be co-located with any other transmitter.

### WARNING

This device complies with FCC Part 15 and Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme à FCC Partie 15 de Industrie Canada RSS standard exempts de licence (s). Son utilisation est soumise à Les deux conditions suivantes: (1) cet appareil ne peut pas provoquer 'interférences et (2) cet appareil doit accepter Toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement du dispositif.

### WARNING: Class A Devices

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 which case the user will be required to correct the interference at his own expense.

# 1. Overview

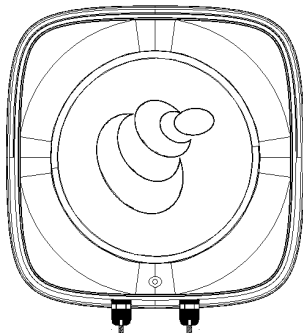
## 1.1. Overview

This document is intended for users who want to set up and operate the CARINA Integrated Reader with embedded circular polarized antenna.

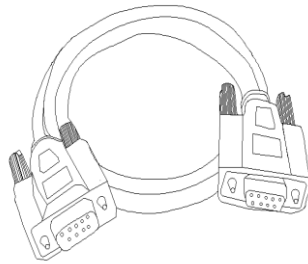
## 2. Reader Hardware

### 2.1. Components

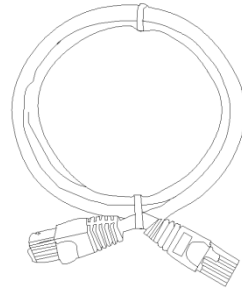
Please verify if all the following components are included after purchasing the CARINA Integrated Reader.



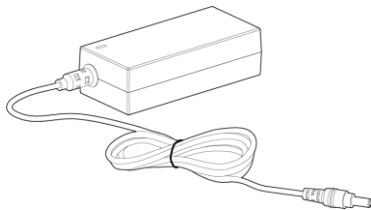
**CARINA Reader**



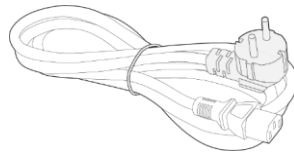
**RS-232 Cable (Optional)**



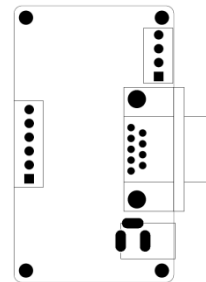
**Ethernet Cable (Optional)**



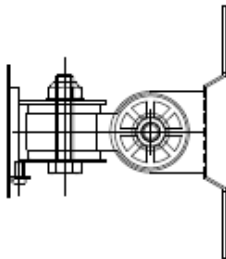
**AC/DC Adapter (Optional)**



**AC Cord Power cable (Optional)**



**Interface board (Optional)**



**Wall Type Bracket (Optional)**

#### **NOTE**

- The images of the components mentioned above may differ from the actual product.
- The specifications of the AC/DC adapter, RS-232 & Ethernet Cables provided with the product may be subject to change depending on the circumstances.

**Shall you need the optional accessories, please contact the our sales team.**

## 2.2. Reader Setting

The CARINA Integrated Reader provides the capability to connect with a host PC via RS-232 or Ethernet for reader setting, Tag Reading & Writing functionalities.

The preparation steps for using the product are as follows.

1. Install the Reader in the desired location using the Wall Type Bracket.
2. Connect with a host PC via RS-232 or ethernet cable.
3. Supply power to the reader using AC/DC adapter.
4. Install and run the “Reader@Express” application on the host PC.
5. Use the “Reader@Express” application to perform reader setting, tag reading & writing.

### **NOTE**

- Please refer to the “Reader@Express\_UG” for detailed instructions on how to use Reader@Express.

## 3. Description

### 3.1. Reader Fixing & Grounding Parts

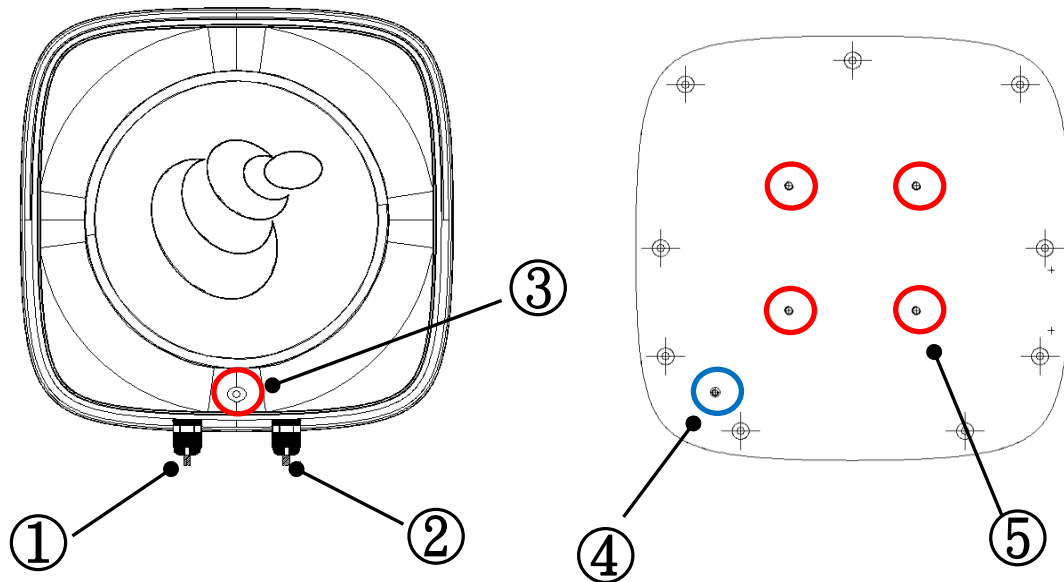


Figure 1. Reader Part

TABLE 3.1 Name and Description of the Reader

| No. | Name                                | Description                                                                                                             |
|-----|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| 1   | Ethernet Interface Cable (Optional) | It is used to connect the host PC by Ethernet cable.                                                                    |
| 2   | RS-232 Interface Cable              | It is composed of an 5C x 18AWG or 8C x 22AWG (optional) cable and consists of power, RS-232, and GPIO (optional) pins. |
| 3   | Status LED                          | It indicates the power and tag reading status.                                                                          |
| 4   | Reader Grounding Bolt               | It is used for grounding purposes of the reader.                                                                        |
| 5   | Reader Fixing Bolt                  | It is used to secure the bracket in place for mounting purposes.                                                        |

3.2. Status LED

TABLE 3.2 Status LED

| Reader Status | Status LED                    |
|---------------|-------------------------------|
| Power on      | RED LED light blinking        |
| Power off     | LED off                       |
| Tag Reading   | Red & Blue LED light blinking |

3.3. RS-232 Pin Assignment

A. Standard Version

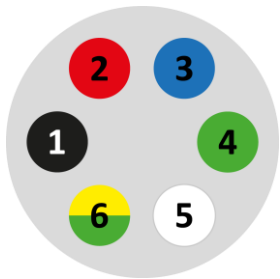


Figure 2. RS-232 Cable Color

TABLE 3.3 Cable Color Assignment

| No. | Color          | Description         |
|-----|----------------|---------------------|
| 1   | Black          | VCC (+/-), Nonpolar |
| 2   | Red            | VCC (+/-), Nonpolar |
| 3   | Blue           | GND (RS-232)        |
| 4   | Green          | TXD (RS-232)        |
| 5   | White          | RXD (RS-232)        |
| 6   | Yellow / Green | Shield GND          |

**B. With Optional GPIO Feature (8-Pin)**



**Figure 3. GPIO 8-Pin RS-232 Cable Color**

**TABLE 3.4 GPIO 8-Pin Cable Color Assignment**

| No. | Color  | Description         |
|-----|--------|---------------------|
| 1   | Black  | VCC (+/-), Nonpolar |
| 2   | Red    | VCC (+/-), Nonpolar |
| 3   | Yellow | GND (RS-232)        |
| 4   | Green  | TXD (RS-232)        |
| 5   | White  | RXD (RS-232)        |
| 6   | Blue   | GPIO_IN or GPIO_OUT |
| 7   | Orange | V+ (GPIO)           |
| 8   | Brown  | V- (GPIO)           |

# 4. Getting Started

This section provides an explanation of the important considerations that need to be understood before using the CARINA Integrated Reader.

The detailed sections for this chapter are as follows.

- Reader Installation
- Reader Connection

## 4.1. Reader Installation

### 4.1.1. Using Wall Type Bracket

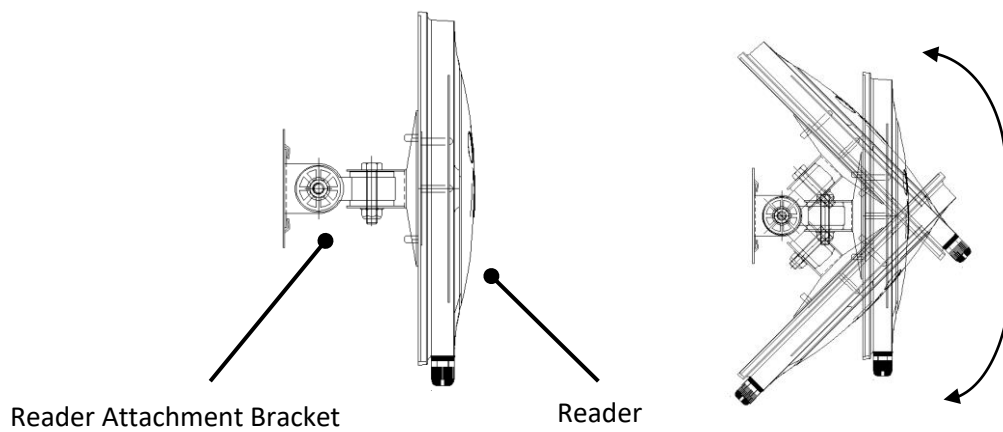
First, install the Wall Type Bracket at the desired location for the Reader installation.

Attach the Reader to 4 holes on the installed Wall Type Bracket and secure it firmly using M5 screws, washers, and nuts to prevent any wobbling.

We recommend using an adjustable bracket that allows for vertical & horizontal adjustments, as shown below.

The bracket should be installed on a sturdy surface or frame to prevent damage or misalignment.

To achieve optimal performance, it may be necessary to adjust the positioning and orientation of the Reader.



**Figure 4. CARINA Reader & Bracket**

## 4.2. Reader Connection

The CARINA Integrated Reader supports RS-232 and Ethernet Interface. Please refer to the diagram below for the electrical connections.

### 4.2.1. Use the RS-232 Cable

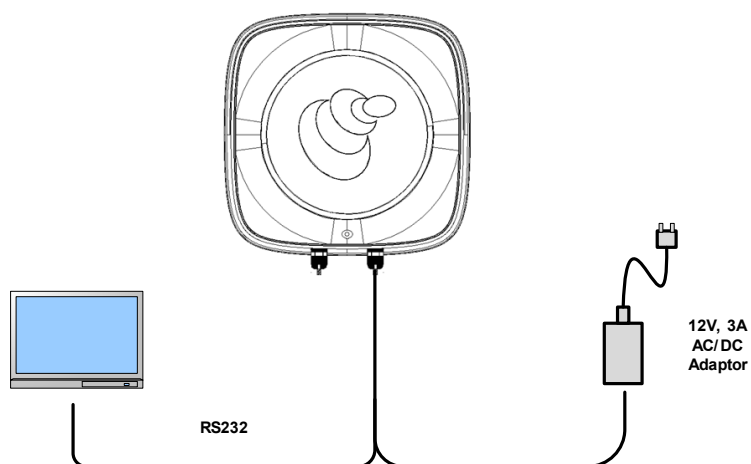


Figure 5. CARINA Electrical Connections (RS232)

### 4.2.2. Use the Ethernet Cable

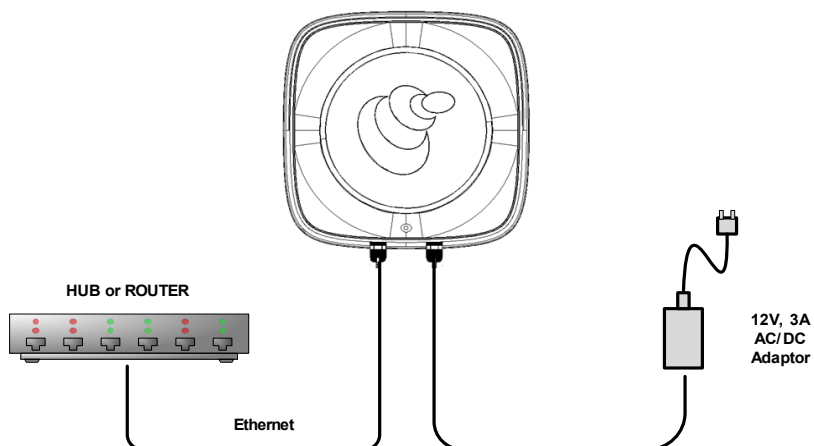


Figure 6. CARINA Electrical Connections (Ethernet)

## 5. How to use

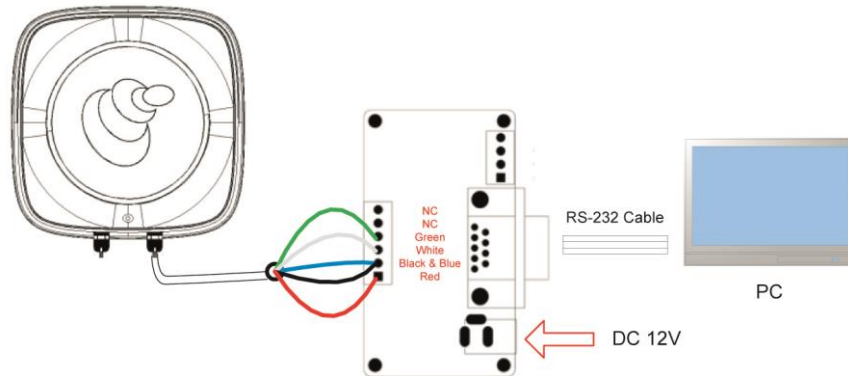
This section provides the method of connecting the CARINA Integrated Reader with a host PC using Interface board.

The method of communication between the host PC and the interface board using RS-232 is as follows.

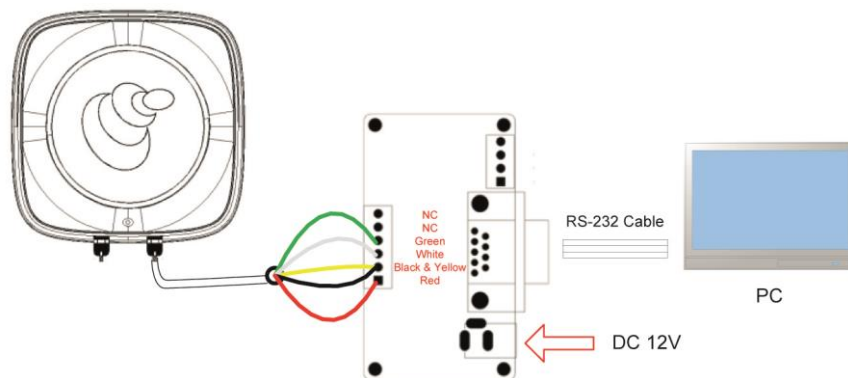
The maximum length of RS-232 cable (Reader + Interface Board) is 10 meters.

When using a baud rate of 115,200 bits/s, it's recommended to use RS-232 cable with a maximum length of 3 meters. If the cable length exceeds the recommended maximum, there is a possibility of data loss.

By default, it is set to 9,600 bits/s baud rates. Baud Rate of this reader can be changed by the user.



**Figure 7. Standard Version RS-232 Interface Board Connections**



**Figure 8. GPIO 8-Pin RS-232 Interface Board Connections**

1. Link the picture above, please connect the Interface Board and Reader accordance with the color of terminal Block.
2. Connect RS-232 Cable to Female DB-9 RS-232 Port of Interface Board.
3. Connect RS-232 Cable to the Serial Port of PC.
4. Set the HyperTerminal of PC as
  - Bit/sec(B): 9600
  - Data bit(D): 8
  - Parity(P): None
  - Stop Bit(S): 1
  - Flow Control (F): None
5. Connect with the Adapter (DC12V, 3.33A) to DC-JACK of Interface Board.
6. Check the Reader operating.
7. When reading the Tag, if the Blue LED light of Reader is blinking and the Tag Data is correctly appearing on the PC.

# 6. Reader Specification

## 6.1. Environmental Specifications

TABLE 6.1 Environmental Specifications

| Parameter                                          | Description                  |
|----------------------------------------------------|------------------------------|
| Operating Temperature                              | -20°C - 60°C / -4°F - 140°F  |
| Storage Temperature                                | -30°C - 80°C / -22°F - 176°F |
| Humidity                                           | 5 - 95% non-condensing       |
| ESD immunity (Air discharge)<br>(Direct discharge) | ±15 kV<br>±8 kV              |
| Sealing                                            | IP65                         |

## 6.2. Physical Specifications

TABLE 6.2 Physical Specifications

| Parameter    | Description                                                              |
|--------------|--------------------------------------------------------------------------|
| Dimensions   | 261mm (W) x 272mm (L) x 42mm (H)/<br>10.28" (W) x 10.71" (L) x 1.65" (H) |
| Weight       | 1.35kg / 1.87lbs                                                         |
| Supply Power | 12Vdc, 3A or PoE IEEE 802.3af (Optional)                                 |
| Notification | LED and Audible tone                                                     |
| LED Status   | Status of Power / Data                                                   |

### 6.3. RFID Performance

TABLE 6.3 RFID Performance

| Parameter                 | Description                                           |
|---------------------------|-------------------------------------------------------|
| Standard supported        | ISO 18000-63 Type-C RAIN (EPC) Gen2V2                 |
| Frequency                 | FCC: 902 – 928 MHz<br>ETSI: 865 – 868 MHz             |
| RF Output                 | 5 - 30dBm (1watt)<br>Enable Power Control by 1dB step |
| Max Current (@Max. Power) | 870mA (@30dBm)                                        |

### 6.4. Communication

TABLE 6.4.1 RS-232 Specifications

| Parameter    | Min. | Typ. | Max.  | Unit  | Conditions   |
|--------------|------|------|-------|-------|--------------|
| Baud rate    | 9.6  |      | 921.6 | kbaud | 9.6(default) |
| Data bits    |      | 8    |       | bit   |              |
| Parity       |      | None |       |       |              |
| Stop         |      | 1    |       | bit   |              |
| Flow control |      | None |       |       |              |

TABLE 6.4.2 Ethernet Specifications

| Parameter | Description                   |
|-----------|-------------------------------|
| Reader IP | 192.168.9.6 (User-changeable) |
| Connector | RJ-45                         |
| Ethernet  | 10/100 BaseT                  |

**Note**

- Please request the Ethernet feature upgrade prior to making your purchase.

## 6.5. GPIO

CARINA Integrated Reader Premium Version provides 1 Input and 1 Output GPIO port. Output port is commonly used for indicator purposes.

| Cable Color | Description                                     |
|-------------|-------------------------------------------------|
| Orange      | V+ ( 3.3 - 24VDC )                              |
| Blue        | Output 1 ( 1A max. ) or Input 1 ( 3.3 - 24VDC ) |
| Brown       | V-                                              |

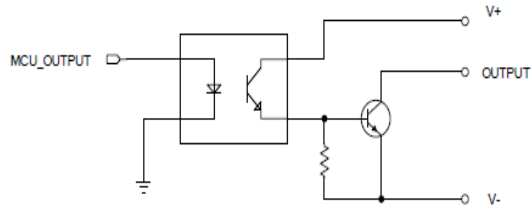


Figure 9. Output Circuits

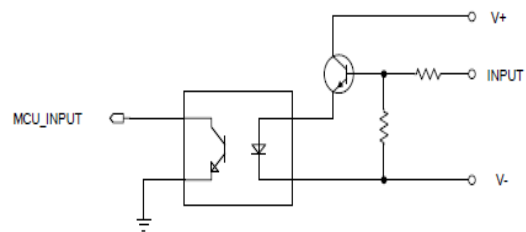


Figure 10. Input Circuits

### Note

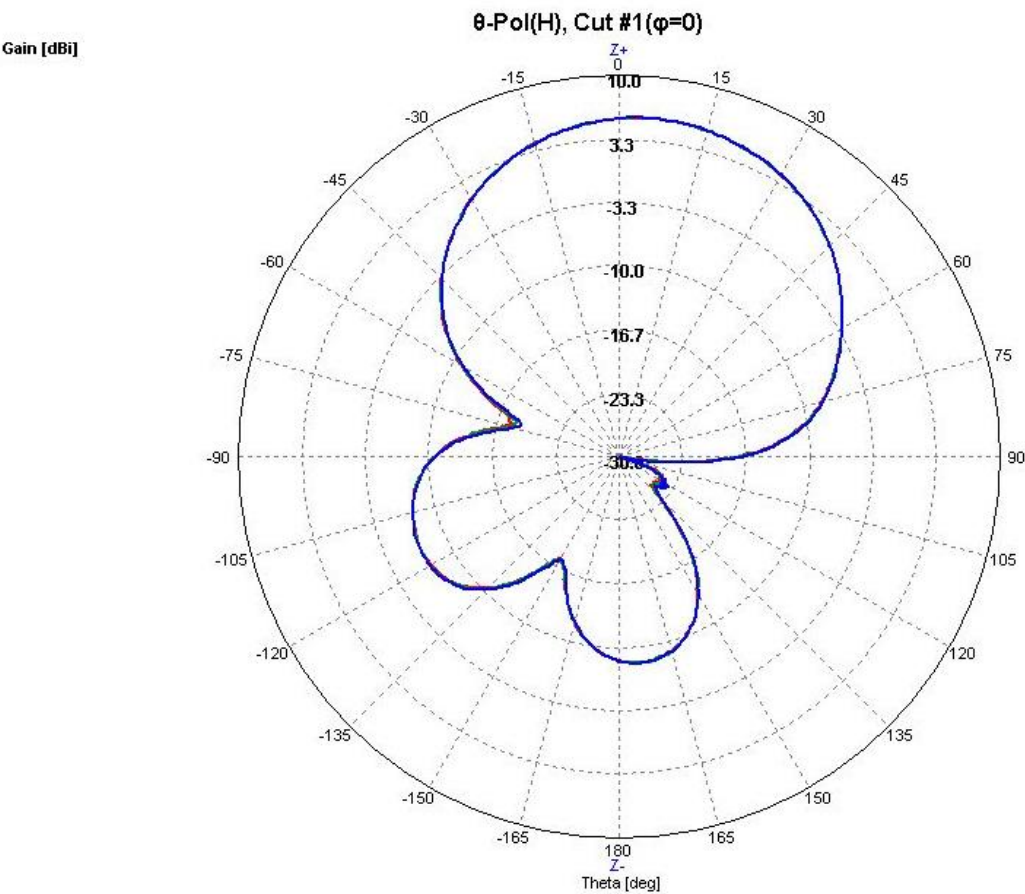
- GPIO supports either INPUT or OUTPUT.
- Please request the GPIO feature upgrade prior to making your purchase.

6.6. Antenna Specification

TABLE 6.6.1 ETSI Antenna Specifications

| ETSI           |                   |
|----------------|-------------------|
| Frequency Band | 865 - 868 MHz     |
| Gain (Max.)    | 5.89 dBic         |
| Polarization   | RHCP              |
| VSWR (Max.)    | 2 : 1             |
| Impedance      | 50 ohm            |
| 3dB Beam Width | 61 degrees (typ.) |

- H-Pol.



- V-Pol.

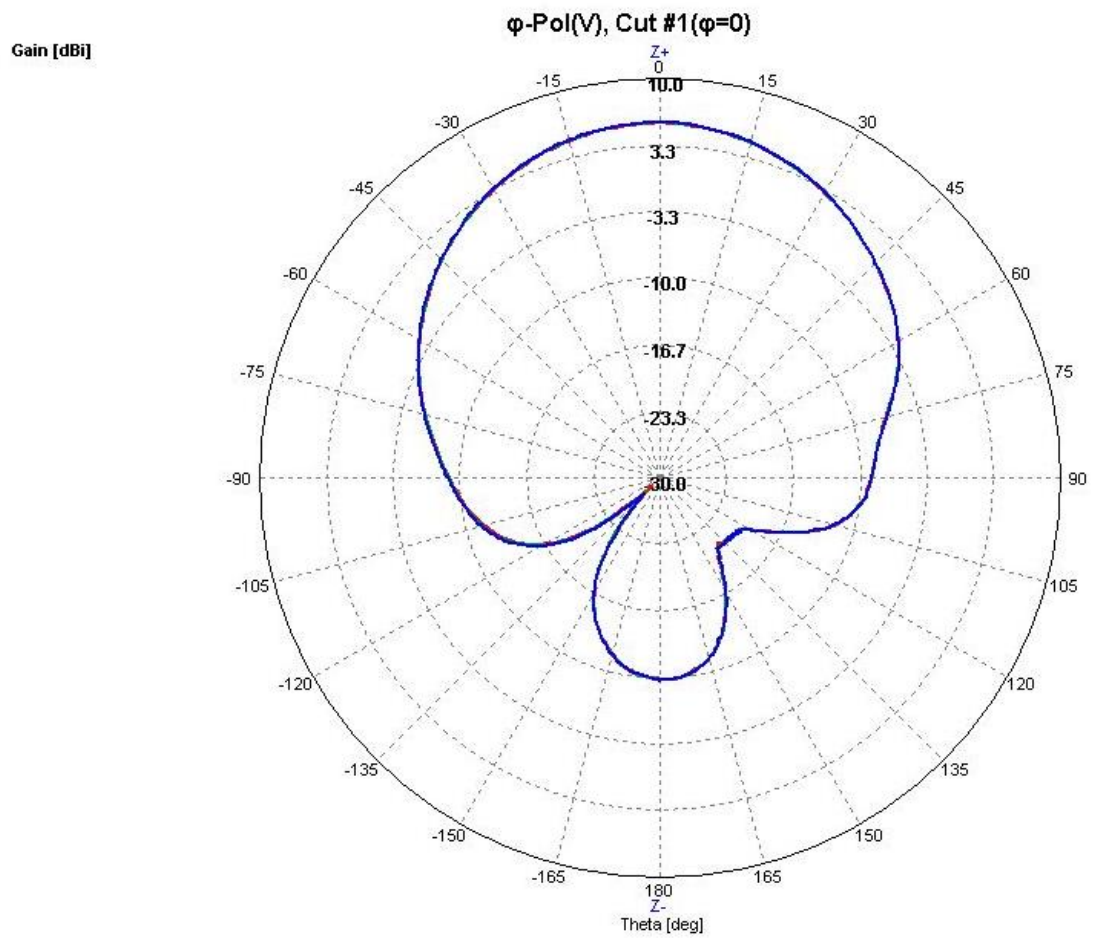
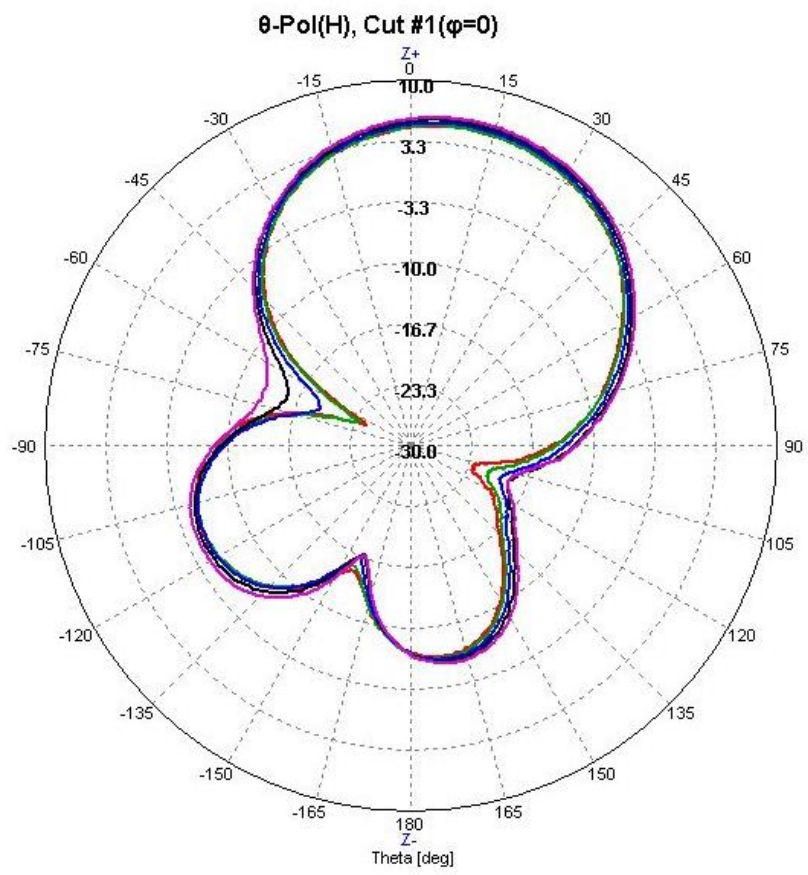


TABLE 6.6.2 FCC Antenna Specifications

| FCC            |                   |
|----------------|-------------------|
| Frequency Band | 902 - 928 MHz     |
| Gain (Max.)    | 6 dBic            |
| Polarization   | RHCP              |
| VSWR (Max.)    | 2 : 1             |
| Impedance      | 50 ohm            |
| 3dB Beam Width | 59 degrees (typ.) |

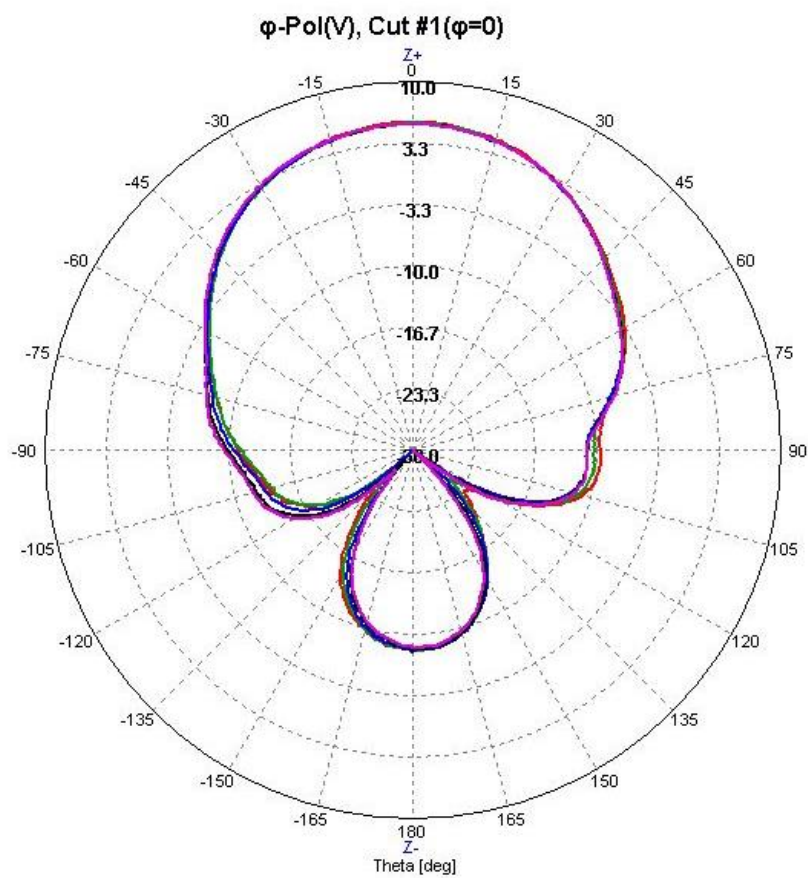
# - H-Pol.

Gain [dBi]



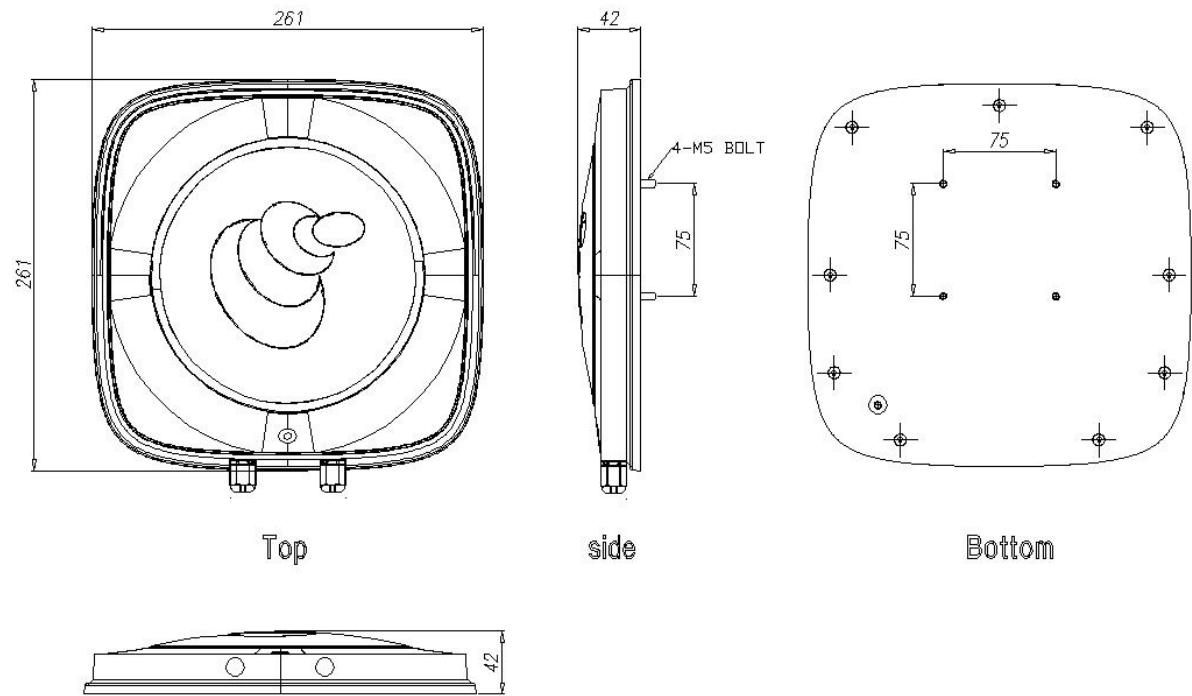
# - V-Pol.

Gain [dBi]

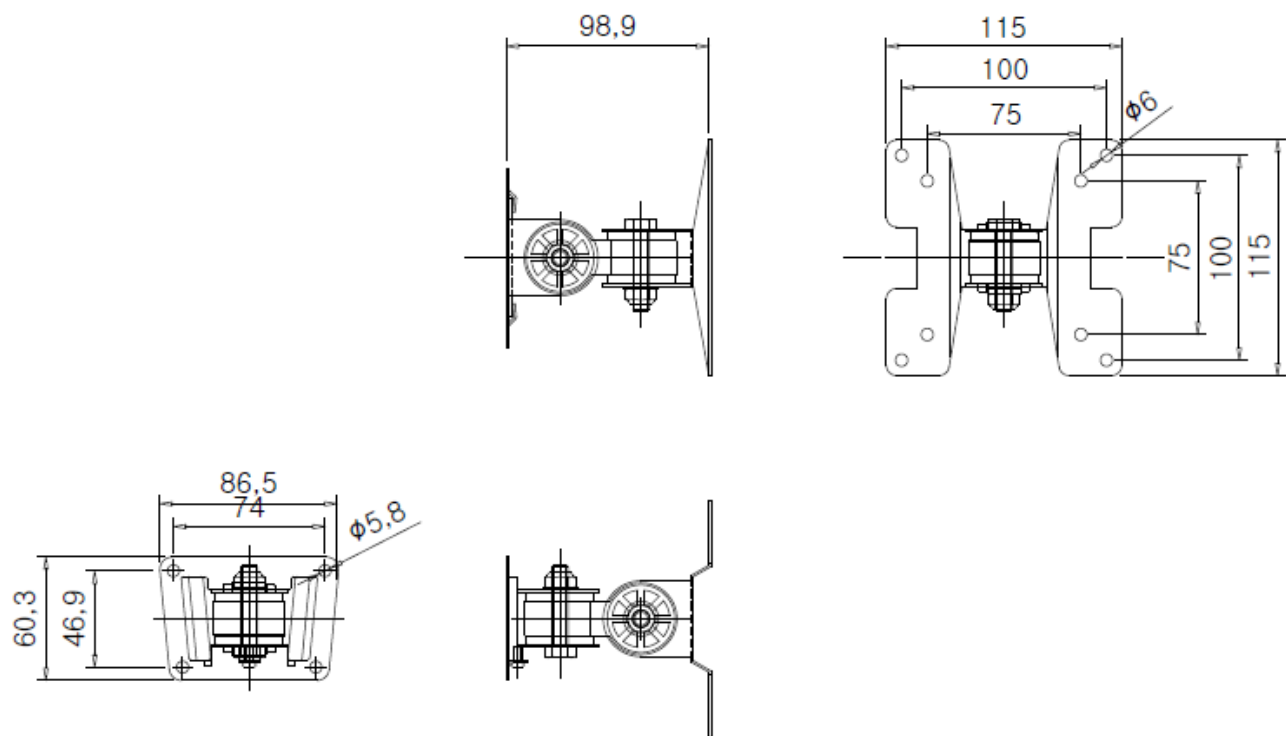


6.7. Mechanical Dimension

6.7.1. Embedded Antenna RFID Reader



6.7.2. Optional: Antenna Attachment Bracket



# 7. Appendix

## Warning:

1. Make sure to use the correct power supply as specified in the product manual to prevent fire or damage.
2. Disassembling or subjecting the product to impacts can result in damage to the product.
3. Don't install the product in high humidity environments. There is a risk of product damage and electric shock.
4. Please use the product within the humidity range specified in the User Guide.
5. Never attempt to repair or disassemble the product yourself to prevent future damage and ensure availability of after-sales service.
6. Do not use the product in liquid environments like water, oil, or organic solvents.
7. Ensure that there are no metal objects near the front direction of the antenna during installation.
8. Avoid exposing the product to sudden temperature changes as it can lead to performance degradation.

## FCC Information to User

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

## IMPORTANT NOTE:

### FCC RF Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.