IDRO

Fixed Type 4-port RFID Reader
IDRO900F
User's Manual

February 17th, 2020
Ver. 20021701

UHF RFID Reader
Visible RFID Reader & Tag
Visible Light Communication System

Table of Contents

1. Revision History

IDRO Co,.Ltd. IDRO900F Reader document history

1. Revision History

Document Number	Description	Revision Date
2020021701	Initial release	February 2020

2. About This Guide

2. About This Guide

2. 1   Overview

This document is for the setup and operation of the IDRO900F RFID Reader System. Before you use this device, you should be familiar with the following :

• Installing and Operating Windows-based software.

• Device communication parameters including Ethernet and Serial communications.

• RFID Reader Configuration including Antenna Placement

• Basic digital Input/Output control.

2. 2   Configurations

This guide covers the following IDRO900F series of RFID Readers :

[TABLE 2.2.1] IDRO900F Reader Part Number

Part Number	Description
IDRO900F-WW	✓ KOREA, USA, WORLD WIDE
IDRO900F -EU	✓ EUROPE
IDRO900V -JP	✓ JAPAN
IDRO900V -CN	✓ CHINA

2. 3   About the Chapter

The topics covered in this Guide are as follows.
• _Chapter 3, Getting Started_ – Provides a brief overview of IDRO900F hardware and software.
• _Chapter 4, RFID Reader Installation_ – Describes the mechanical and electrical installation methods of IDRO900F.
• _Chapter 5, RFID Reader Components_ – Provides IDRO900F and Accessory information.
• _Chapter 6, RFID Reader Electrical Specifications_ – Provides electrical & environmental information and Interface specification.

- *Chapter 7, RFID Reader Mechanical Specifications* – Provides detailed mechanical spec (info about dimension).

- *Chapter 8, RFID Reader Packing Dimension* – Provides Packing Dimension of IDRO900F.
- *Appendix A, RFID Reader Frequency* – Provides each country-specific channel and frequency information.
- *Appendix B, Cautions* – Provides important safety information. User must read this appendix before using the Reader.

2. 4 Related Documents and Software

The following documents provide additional information of IDRO900F.
- IDRO Regulatory Guide
- IDRO Reader Api Document
- IDRO Reader Protocol Document
- Reader@Express & User's Manual for Reader@Express (IDRO Reader Operating Program).

2. 5 Service Information

If you have any problems with your device, contact to IDRO's Sales team.
Contact information can be found at the following homepage. (URL Link : www.idro.co.kr)

Please let us know the following information when contacting for device inquiry.
- Device Serial number.
- Model name.
- Software version info.

We will respond to e-mail, telephone or fax calls within the time specified in the service contract.
If IDRO's support does not solve the problem, you can return the device for repair service and receive specific instructions.
IDRO shall not be liable for any damages arising from shipment and for any damage caused by incorrect shipment of products.
If you purchased the product from IDRO's business partner, contact your business partner for assistance.
(Do not contact to IDRO directly.)

3. Getting Started

This Chapter provides a brief overview of IDRO900F RFID Reader hardware and software.

3. Getting Started

3. 1 RFID Reader Hardware

IDRO900F RFID Reader is an RFID system that operates in UHF RFID band. (860-960MHz frequency)
Supports up to four TX/RX antennas, serial(RS232) and Ethernet interfaces, as shown below in Figure 3.1.1.
Also, Two GPIO Inputs & Outputs are available.
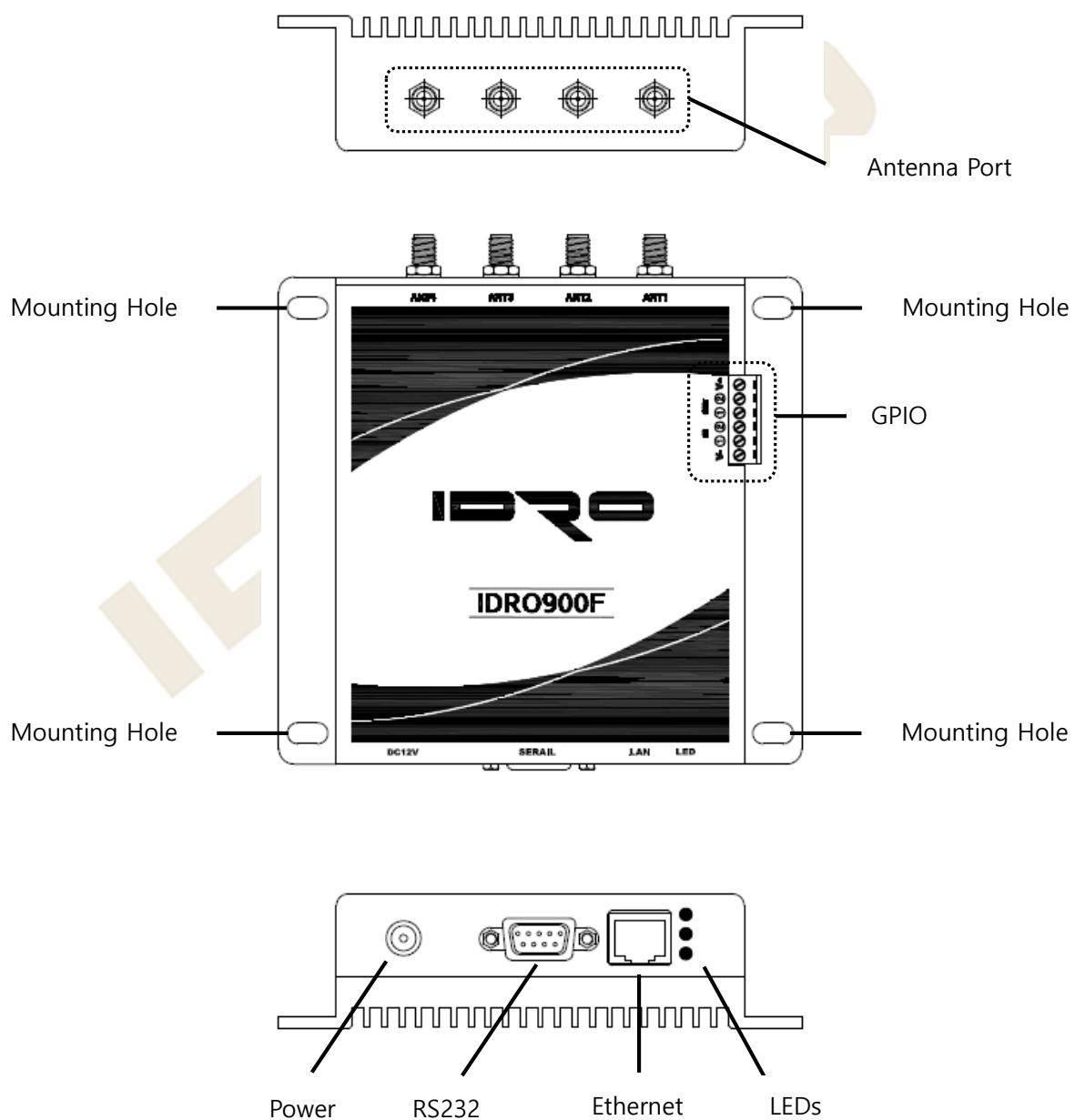
[Figure 3.1.1] IDRO900F RFID Reader

There are 3 LED status indicators located at the bottom of IDRO900F RFID Reader, which represent the status of the reader as follows.
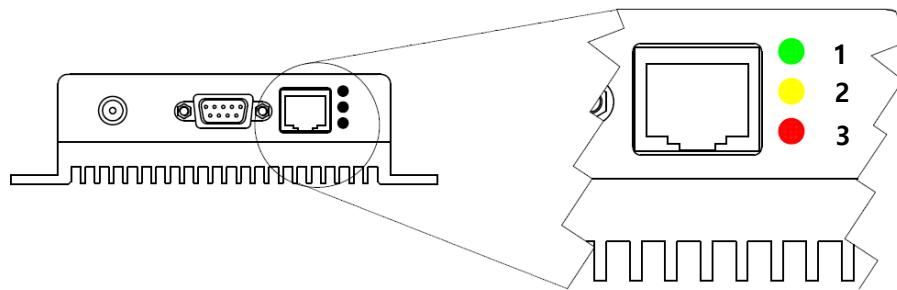
[Figure 3.1.2] IDRO900F Status LED

[Table 3.1.1] IDRO900F Status LED

Number	Color	Name	Indication
1	Green	Read	OFF : RF off Blinking : Tag Read
2	Yellow	User	TBD
3	Red	Power	OFF : Power off ON : Power on

3. 2   RFID Reader Software

IDRO900F is provided with software applications that can be used to configure and control RFID Reader.

3. 2. 1   Reader@Express

Reader@Express is an RFID Reader application that provides access to RFID Reader.
If you enter the IP address of RFID Reader in to a web browser, you can set the RFID Reader over the Internet.
This application provides the function to set the RFID Reader's communication, network and operational parameters.
It also provides the function to read tags, review tag data, and checking the condition of the device.
This application is used to manage the RFID Reader installed.
For more information, please refer to **"User's manual for Reader@Express"**.
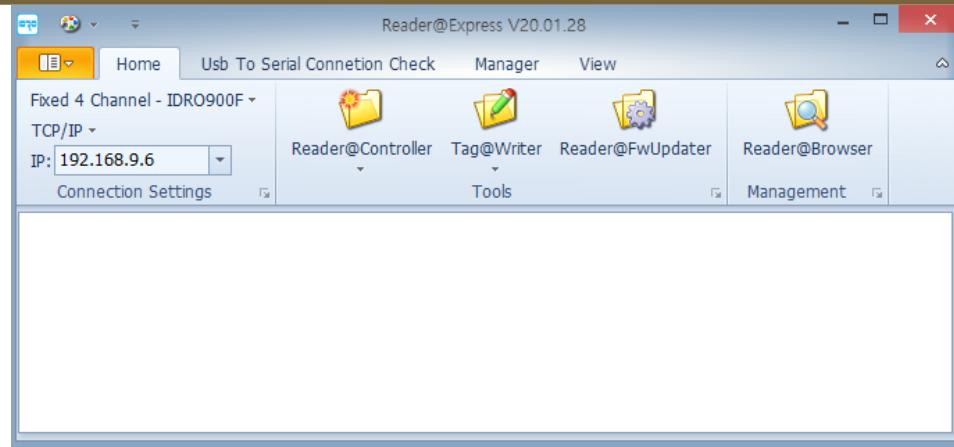
[Figure 3.2.1] IDRO900F Reader@Express

4. RFID Reader Installation

This chapter describes the mechanical and electrical installation methods of IDRO900F RFID Reader.

4. RFID Reader Installation

4. 1　Mechanical Installation

4. 1. 1　Mounting the RFID Reader

IDRO900F Reader has a mounting hole that allows 4 #10(M5) screws to be used.

Drill the mounting surface in advance according to the dimension of [Figure 4.1.1]. The Mounting surface shall be capable of supporting up to 1.88lb (580g).
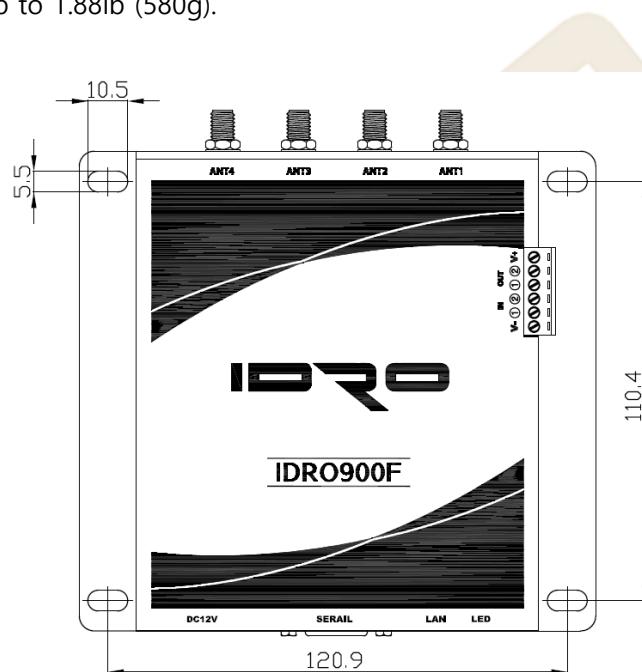
[Figure 4.1.1] IDRO900F Mount Hole Dimensions(dimensions in mm)

4. 1. 2　Mounting the Antennas

IDRO900F RFID Reader supports up to four Antennas.

In most applications, such as conveyor systems or access control, one or two antennas are commonly used, while four configurations are used for entrance to doors and loading dock doorways.

As shown in [Figure 4.1.2] below, it is recommended to use antenna brackets that can adjust the antenna direction upper, lower, left and right.

The Antenna bracket should be installed on a rigid surface or frame to ensure that it does not damage or break later. For best performance, we strongly recommend adjusting the antenna mounting position and direction.
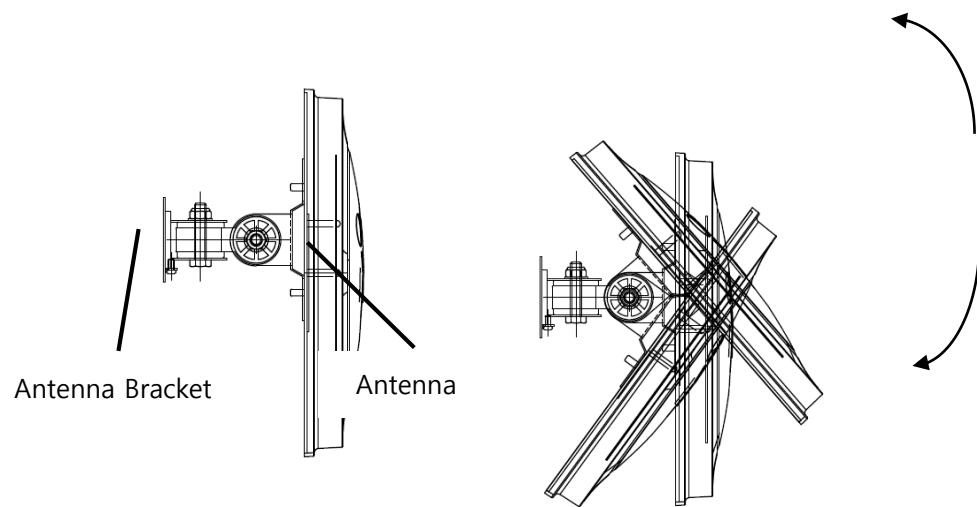
[Figure 4.1.2] IDRO900F Antenna & Bracket

4. 2 Electrical Installation
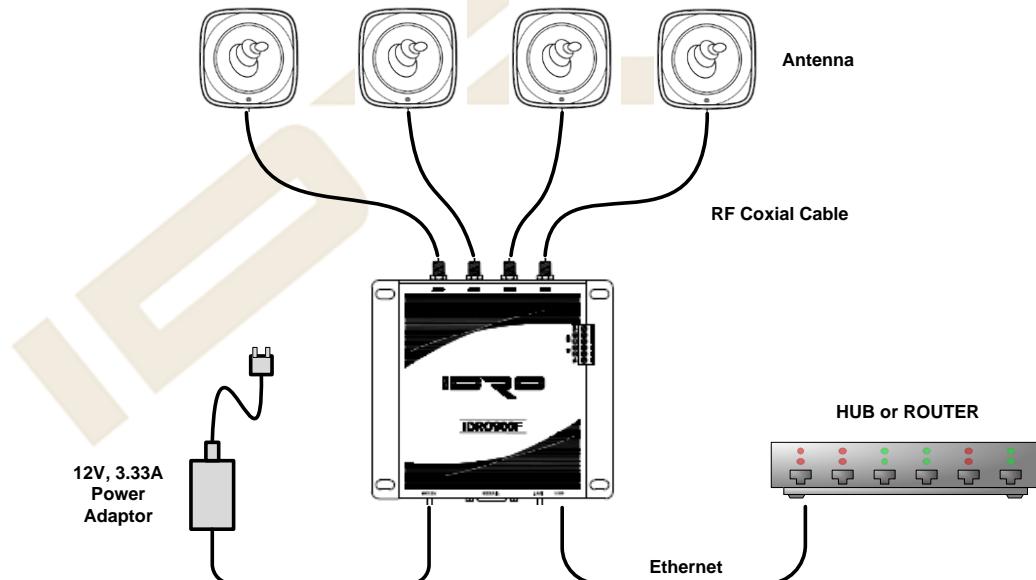
[Figure 4.2.1] IDRO900F Electrical Connections (Ethernet)
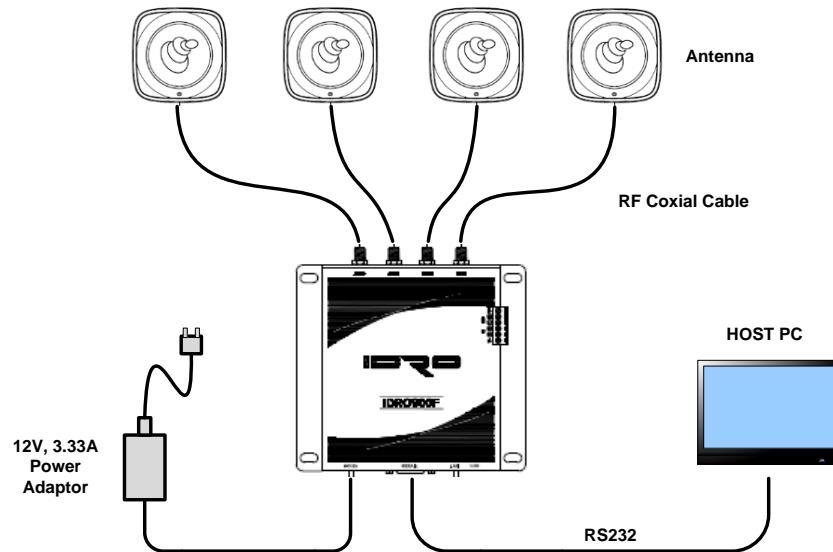
[Figure 4.2.2] IDRO900F Electrical Connections (RS232)

IMPORTANT

IDRO900F antenna port may be susceptible to damage due to static electricity(ESD) or other high voltages. Appropriate electrostatic precautions are required to avoid static incoming when handling or connecting IDRO900F antennas or communication ports. A Breakdown may occur if the antenna or communication port is exposed to the ESD.

4. 2. 1 Connecting and Configuring the Ethernet Port

The maximum length of an Ethernet cable is 30 meters. If you are communicating with the RFID Reader over the LAN(Local Area Network), connect the Ethernet cable to RJ45 port on the reader from the hub or router.
By default, RFID Reader does not support DHCP server and is set to a fixed IP address of 192.168.9.6.
Fixed IP address of the reader can be changed by the user.

4. 2. 2 Connecting and Configuring the RS232 Port

The maximum length of RS232 cable is 3 meters. Connect to the host PC with a serial cable to the RS232 port on the reader. We recommend using 9600 baud rate when using a 10-meter RS232 cable. Otherwise, there may be data loss.
By default, Baud rate is set to 115200.
Baud rate of the reader can be changed by the user.

4. 2. 3 Connecting the Antennas

The maximum length of antenna cable is 10 meters. Connect the antenna using the RF Coaxial cable to the antenna port ANT1 on the reader. If you are using an additional antenna, connect the antenna to the antenna port ANT2-ANT4.
RF Coaxial cable is recommended to use LMR200 50 ohms, and the cable loss is 1dB/3m.

NOTE

The longer the antenna cable is, the lower the reader's performance, so we recommend using it as short as possible.

Please contact the sales team when you order the antenna cable length. It takes about 7days to produce an antenna cable.

RFID Reader's Isolation between antenna ports is 33dB~44dB. We recommend using ANT2 and ANT3 when using two antenna ports. Because Isolation between antenna port 2 and 3 is good.

IMPORTANT

Stop reading the tag on the RFID reader before removing the antenna connection to the antenna port on the reader..

4. 2. 4 Connecting Digital Inputs/Outputs

IDRO900F has a General Purpose Digital Input/Output port that provides two optically isolated 0Vdc active input signals and two open-collector output signals. Digital input can be used for general purposes or to trigger RFID readers for tag reading. These inputs are consists of an external reading trigger input from a proximity sensor, a photo switches, or other devices.

Digital output can be used as a normal outputs, to indicate tag reading, or to indicate the RFID reader is transmitting (RF On).

You can also set the output to trigger a conveyor gate, or other access control and sorting devices.
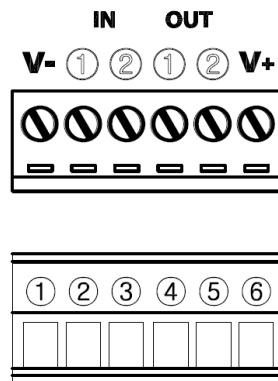
[Figure 4.2.3] IDRO900F General Purpose Input/Output

4. 2. 5 Connecting the Power

The rated input voltage is AC100 to 240V, 50 to 60Hz, and the output voltage connects the 12Vdc adapter to the RFID Reader. RFID Reader takes approximately 30 seconds to initialize after powering on.

5. RFID Reader Components
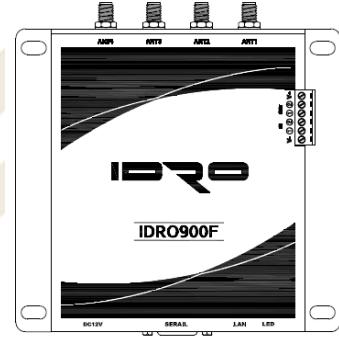
This chapter describes the components provided with IDRO900F RFID Reader

5. RFID Reader Components

5. 1   Components

The Components provided with IDRO900F RFID Reader are shown below in [Table 5.1].

[Table 5.1] IDRO900F RFID Reader Components

Items	Pictures
RFID Reader (IDRO900F)	
DC 12V/3.33A Adaptor	
Ethernet Cable (2m)	
Antenna (Option)	

Antenna cable (Option)	
Reader Attachment Bracket (Option)	
Reader Software & User Document	
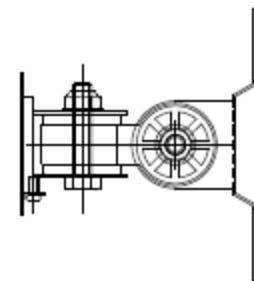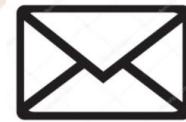
NOTE

The actual product may differ from the picture of the above components.

AC/DC Adapter & Ethernet cable spec provided with the product may vary depending on our circumstances.

Option products are not available when you purchase the reader, please contact IDRO sales team if necessary.

6. RFID Reader Electrical Specifications

This chapter provides electrical and environmental information for IDRO900F RFID Reader

6. Electrical Specifications

6. 1 Environmental Specifications

Table 6-1 : Environmental Specifications

Parameter	Description
Operating Temperature	-20 ~55℃
Storage Temperature	-30 ~85℃
Humidity	5~95%RH
Case Material	Aluminum
ESD immunity (Air discharge) (Contact discharge)	±8 kV EN6100-4-2 ±4 kV
Case Dimensions	135.9 x 126.4 x 35 mm
Weight	580g

6. 2 Power Supply Specifications

Table 6-2 : Power Supply Specifications

Parameter	Description
Input Voltage	100 ~ 240 Vac
Input Current	1.3A max.
Input Frequency	50 ~ 60 Hz
Output Voltage	12Vdc
Output Current	3A max.

6. 3 Reader Specifications

VCC=12V, typical values at 25℃, unless otherwise noted.

Table 6-3 : Reader   Specifications

Parameter	Min.	Typ.	Max.	Unit	Conditions
Supply Current (Active mode)			800	mA	Transmit Power : +30dBm
Supply Current (Standby mode)			100	mA	
RX input impedance		50		Ω	
RX sensitivity		-74		dBm	
TX Power	+5		+30	dBm	
Frequency	860		960	MHz	See Appendix A
Channel bandwidth			200	kHz	

Channel Dwell time			0.4	Sec.	
Carrier sensing time	5			ms	Case in Japan
Carrier sensing level		-74		dBm	Case in Japan
Transmission time			4	Sec.	Case in Japan

6. 4 Ethernet & RS232 Specifications

Table 6-4-1 : Ethernet Specifications

Parameter	Description
Reader IP	192.168.9.6 (User can change)
Connector	RJ-45
Ethernet	10/100 BaseT
Indicators	Yellow - Link LED Green - Act LED

Table 6-4-2 : RS232 Specifications

Parameter	Min.	Typ.	Max.	Unit	Conditions
Baud rate	9.6	115.2	921.6	kbaud	
Data bits		8		bit	
Parity		None			
Stop		1		bit	
Flow control		None			

6. 5 GPIO (General Purpose Input/Output)

Digital Input/Output port for external device control.
It provides 2 Input and 2 Output.

6. 5. 1 Specifications

GPIO Port

I/O PORT Terminal Block Connector		
Pin 1	V-	GND
Pin 2	Input 1	0 VDC (Low input --> Active)
Pin 3	Input 2	0 VDC (Low input --> Active)
Pin 4	Output 1	1A max. (Active --> Low output)
Pin 5	Output 2	1A max. (Active --> Low output)
Pin 6	V+	5 ~ 24VDC

Output circuits   Input Circuits

Output Diagram   Input Diagram

6. 5. 2 Connection Diagram and Operating method

(1) GPIO Output

Usually used for buzzer or lamp actions when tag reading.

• Connection Diagram

　Use Power from external devices (LAMP or Buzzer) for power(V+,V-).

　Select a product with an external device voltage of 5 to 24 VDC.
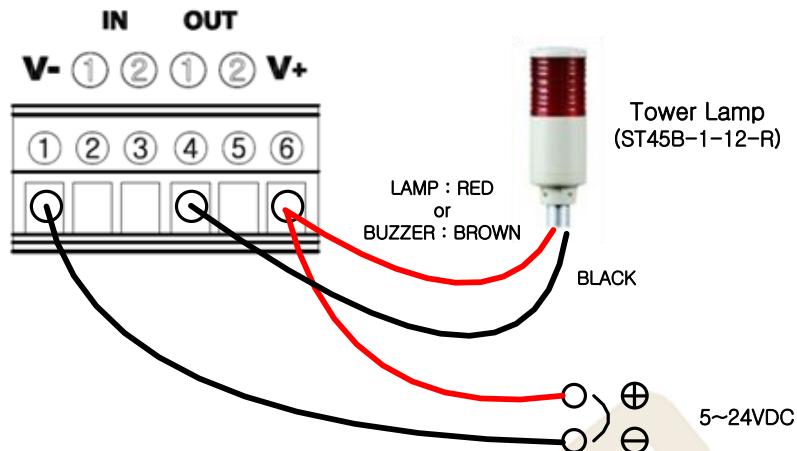
[Figure 6.5.2] IDRO900F GPIO Output Connections

• Operating method

　①. Click Properties on the Reader@Express → Click GPIO and set the Output like below → Apply → Close
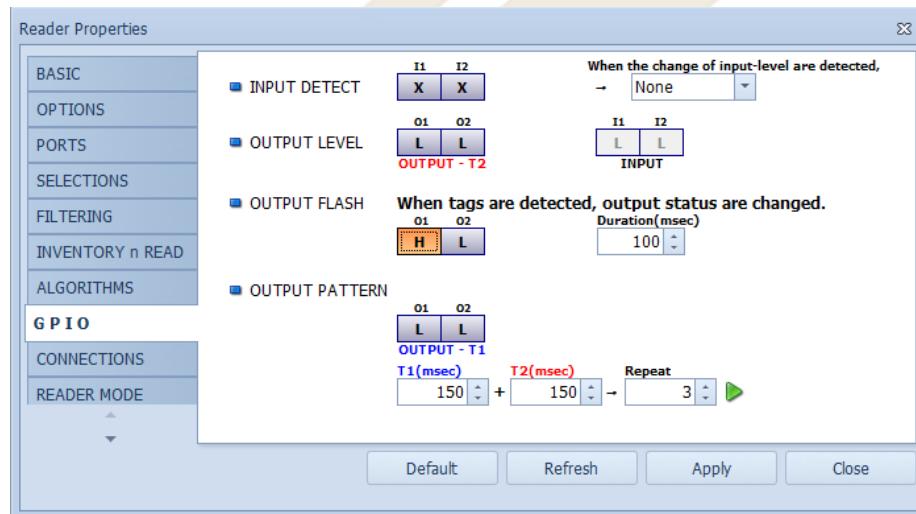
　　> OUTPUT LEVEL : Display the output level status before Inventory.

　　- L : Lamp or BUZZER OFF

　　- H : Lamp or BUZZER ON

　　> OUTPUT FLASH : Display the output level status when tag reading after Inventory.

　　- L : Lamp or BUZZER OFF

　　- H : Lamp or BUZZER ON

　　- Duration (msec) :　Set the Lamp or Buzzer on/off time.

　> If OUTPUT LEVEL and OUTPUT FLASH are set as shown above, when LAMP is connected to GPIO output 1 port, it operates as follows.

LAMP OFF(Initial state) → Tag reading → LAMP ON

②. Click Properties on the Reader@Express → Click GPIO and set the Output like below → Apply → Close
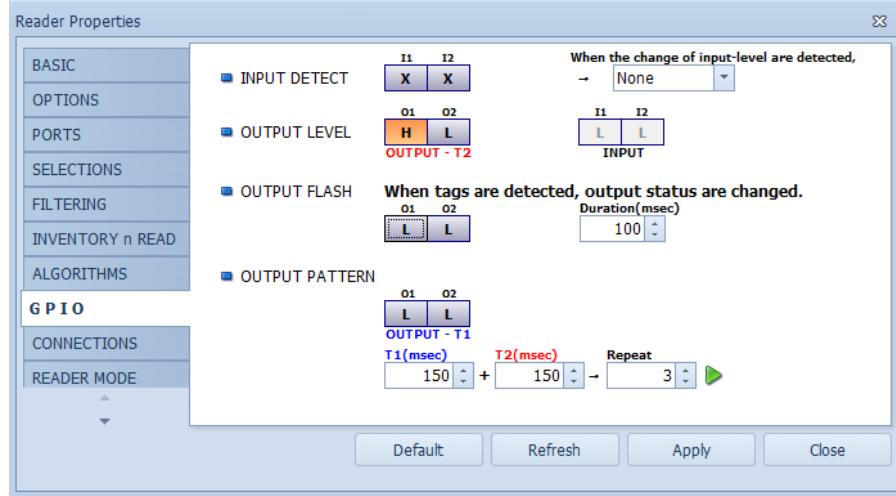
> If OUTPUT LEVEL and OUTPUT FLASH are set as shown above, when LAMP is connected to GPIO output 1 port, it operates as follows.

LAMP ON(Initial state) → Tag reading → LAMP OFF

③. OUTPUT PATTERN : Used when Host PC gives random signals to the GPIO Output port.

Generally intended to control the GPIO output in HOST, used to test whether the reader is functioning normally.
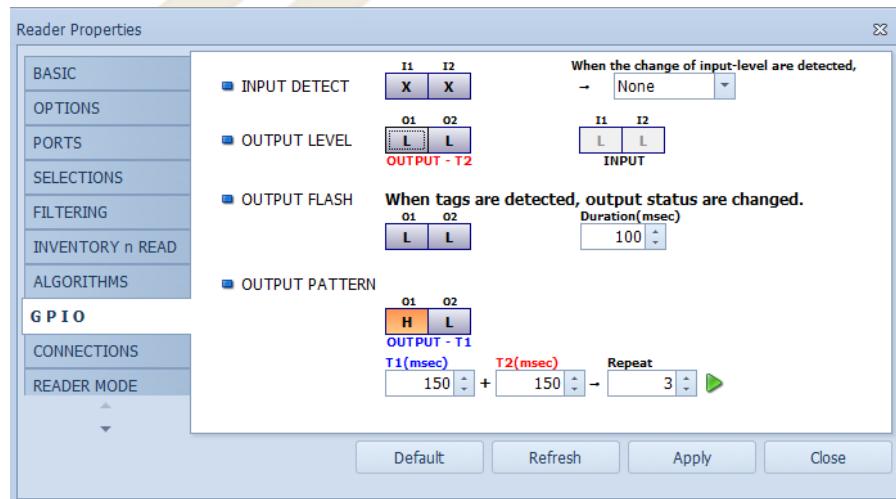
(1) GPIO Intput

Used as a sensor input, and it is used for the application system in which the reader operates when a sensor is detected.

• Connection Diagram

Use Power from external device (sensor) for power(V+,V-)..

Select a product with an external device voltage of 5 to 24 VDC.

Photo sensor must use the NPN open collector output. (example: BA2M-DDT, BJX1M-DDT....)
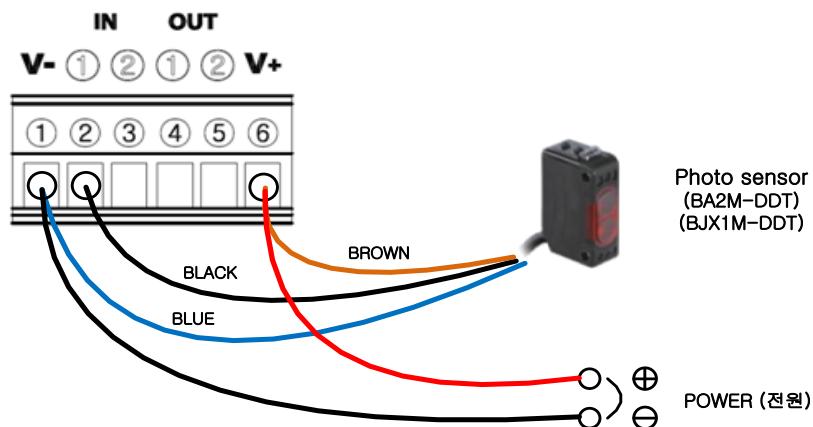
[Figure 6.5.3] IDRO900F GPIO Input Connections

• Operating method

①. Clinck Properties on the Reader@Express → Click GPIO and set the Input like below → Apply → Close
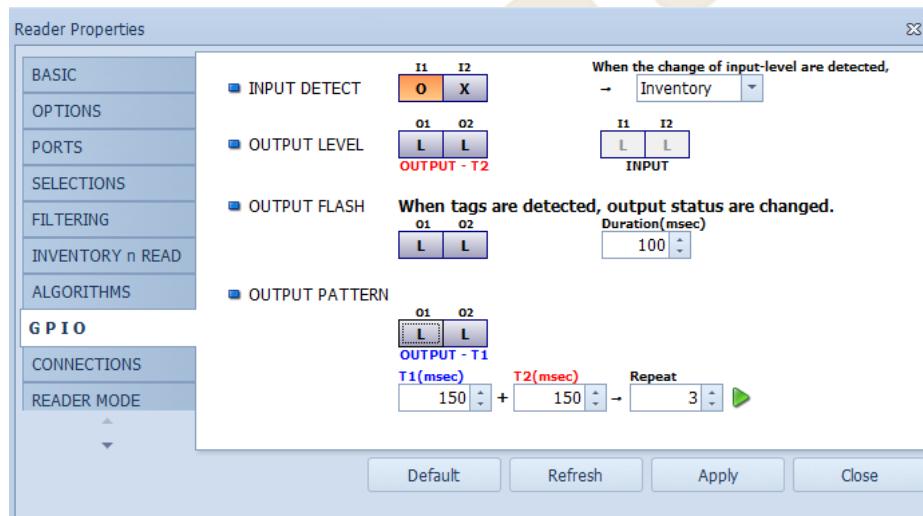
> If INPUT DETECT is set as above and the DC Level changes to H→L or L→H in GPIO input 1, the reader performs Inventory operation.

(2) GPIO Input & output

In the parking management system, when a sensor is detected in the GPIO input, the reader operates and is used in the application system to open and close the door by outputting a signal to the GPIO output during tag reading.

• Operating method

①. Click Properties on the Reader@Express → Click GPIO and set the Input & Output like below → Apply → Close
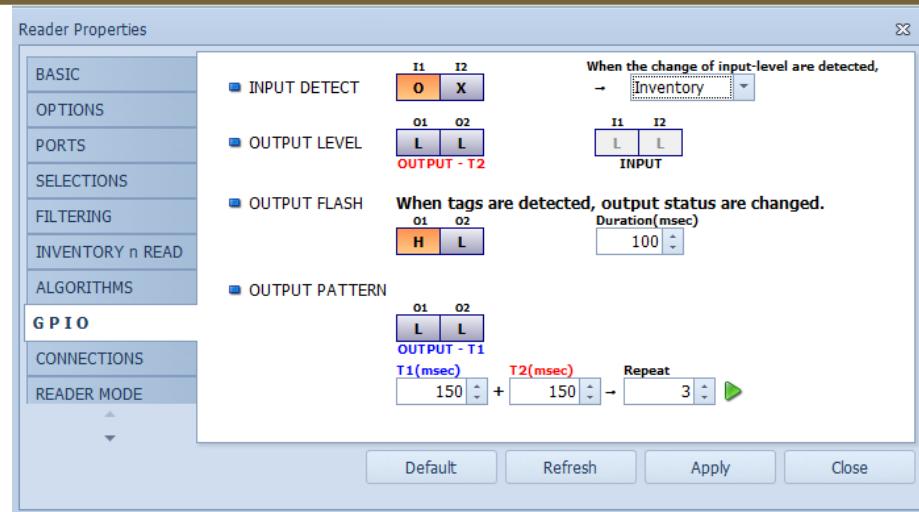
[Figure 6.5.4] IDRO900F GPIO Input/Output Timing

Ton	Time to GPIO Output after detection of GPIO Input	1.2 sec.
Toff	Time to release GPIO Output after GPIO Input is released	172 ms

< Example of Parking management system using GPIO >
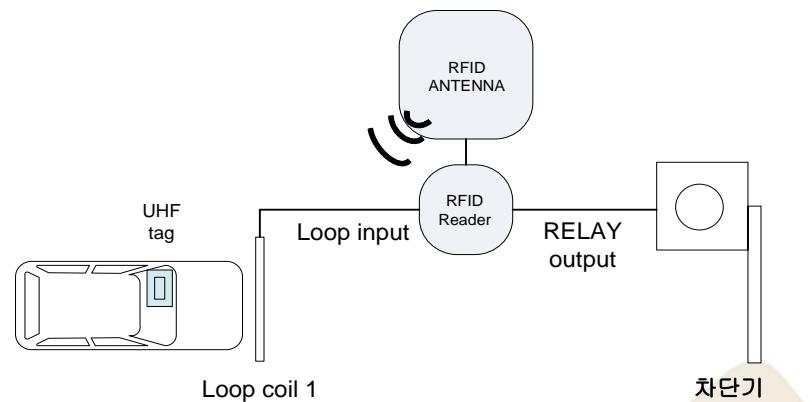
① Loop coil 1 detects vehicle.

② Apply Loop detection signal to Reader's GPIO input.

③ Reader ON

④ Read the UHF tag in the vehicle.

⑤ Output the RELAY signal with GPIO output.

⑥ Door is open.

➢ **For more detail, Please refer to " Reader Control Protocol specifications - IDRO900F ".**

7. RFID Reader Mechanical Specifications

This chapter provides mechanical information for IDRO900F RFID Reader.

7. Mechanical Specifications

7. 1 Drawing and Dimension
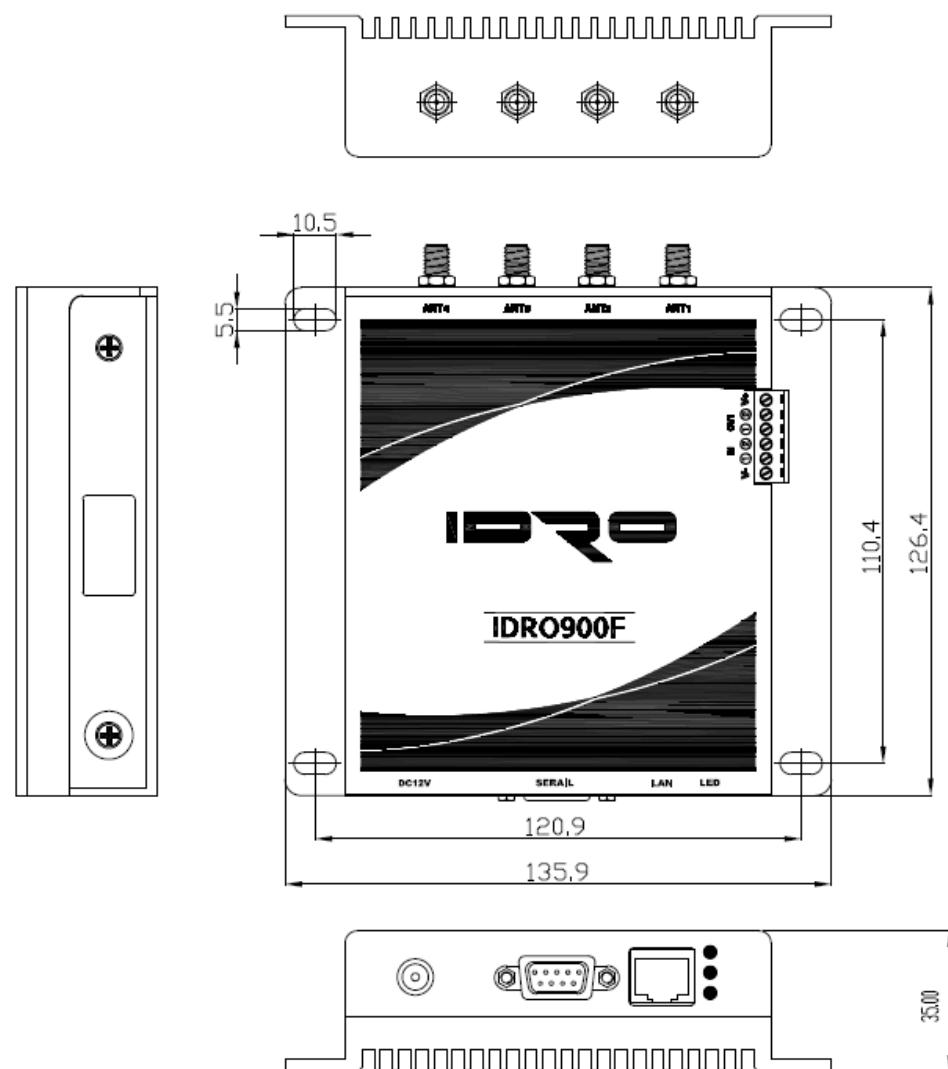
8. RFID Reader Packing Dimension

This chapter provides packaging information for IDRO900F RFID Reader.

8. RFID Reader Packing Dimension

8. 1 Reader Packing

It is made of Styrofoam material for shock protection and can be packed with 1 reader, 1 adapter, and 1 Ethernet or Serial cable per Packing.

8. 2 Packing Box

- Embedded box : 1 Styrofoam consisting of 1 reader, 1 adapter, and 1 Ethernet or Serial cable. .
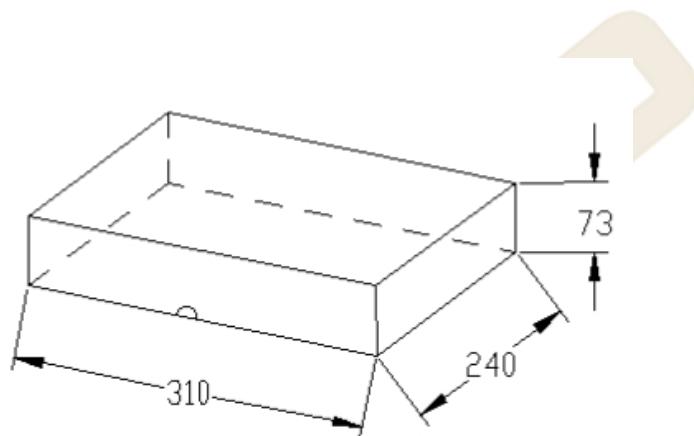
- Exterior Box : Includes 10 internal boxes. Up to 10 packaging / external boxes.
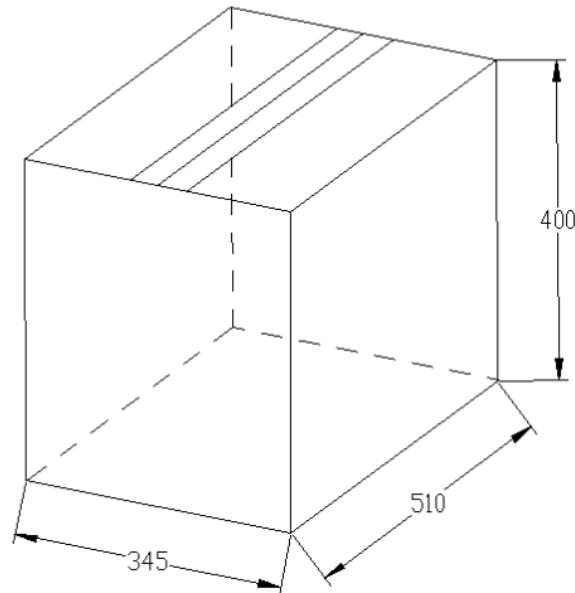
Appendix A   RFID Reader Frequency

This chapter provides channel and frequency information for IDRO900F RFID Reader.

Appendix A. RFID Reader Frequency

Channel number & Frequency table

Table 8-1 : Part number vs Region information

Part Number	Global band	Remark
IDRO900F-WW	KOREA	Available after changing country at the Reader@Express program.
	NORTHAMERICA	
	TAIWAN	
	BRAZILE	
	MALAYSIA	
	INDONESIA	
	ISRAEL	
	AUSTRALIA	
	NEWZEALAND	
	PHILIPPINES	
	HONGKONG	
	SINGAPORE	
	THAILAND	
	VIETNAM	
	URUGUAY	
	SOUTH AFRICA	
IDRO900F-EU	EURO	Available after changing country at the Reader@Express program.
	INDIA	
	MOROCCO	
IDRO900F-CN	CHINA	CHINA only
IDRO900F-JP	JAPAN(1W)	JAPAN(1W) only

➢ **Contact IDRO Co.,Ltd for other countries not in above table 8-1.**

These tables show each countries frequency channel Allocation status of IDRO

KOREA	
CHANNEL No.	Frequency (MHz)
0	917.3
1	917.9
2	918.5
3	919.1
4	919.7
5	920.3

EURO	

CHANNEL No.	Frequency (MHz)
0	865.7
1	866.3
2	866.9
3	867.5

NORTH AMERICA	
CHANNEL No.	Frequency (MHz)
0	902.75
1	903.25
2	903.75
3	904.25
4	904.75
5	905.25
6	905.75
7	906.25
8	906.75
9	907.25
10	907.75
11	908.25
12	908.75
13	909.25
14	909.75
15	910.25
16	910.75
17	911.25
18	911.75
19	912.25
20	912.75
21	913.25
22	913.75
23	914.25
24	914.75
25	915.25
26	915.75
27	916.25
28	916.75
29	917.25
30	917.75
31	918.25
32	918.75
33	919.25
34	919.75
35	920.25
36	920.75
37	921.25
38	921.75
39	922.25
40	922.75

41	923.25
42	923.75
43	924.25
44	924.75
45	925.25
46	925.75
47	926.25
48	926.75
49	927.25

CHINA	
CHANNEL No.	Frequency (MHz)
0	920.625
1	920.875
2	921.125
3	921.375
4	921.625
5	921.875
6	922.125
7	922.375
8	922.625
9	922.875
10	923.125
11	923.375
12	923.625
13	923.875
14	924.125
15	924.375

JAPAN(1W)	
CHANNEL No.	Frequency (MHz)
0	916.8
1	918.0
2	919.2
3	920.4
4	920.6
5	920.8

JAPAN(250mW)	
CHANNEL No.	Frequency (MHz)
0	916.8
1	918.0
2	919.2
3	920.4
4	920.6
5	920.8
6	921.0

7	921.2
8	921.4
9	921.6
10	921.8
11	922.0
12	922.2
13	922.4
14	922.6
15	922.8
16	923.0
17	923.2
18	923.4

TAIWAN	
CHANNEL No.	Frequency (MHz)
0	922.25
1	922.75
2	923.25
3	923.75
4	924.25
5	924.75
6	925.25
7	925.75
8	926.25
9	926.75
10	927.25
11	927.75

BRAZILE	
CHANNEL No.	Frequency (MHz)
0	902.75
1	903.25
2	903.75
3	904.25
4	904.75
5	905.25
6	905.75
7	906.25
8	906.75
9	907.25
10	915.25
11	915.75
12	916.25
13	916.75
14	917.25
15	917.75
16	918.25
17	918.75

18	919.25
19	919.75
20	920.25
21	920.75
22	921.25
23	921.75
24	922.25
25	922.75
26	923.25
27	923.75
28	924.25
29	924.75
30	925.25
31	925.75
32	926.25
33	926.75
34	927.25

MALAYSIA	
CHANNEL No.	Frequency (MHz)
0	919.25
1	919.75
2	920.25
3	920.75
4	921.25
5	921.75
6	922.25
7	922.75

INDIA	
CHANNEL No.	Frequency (MHz)
0	865.1
1	865.7
2	866.3
3	866.9

INDONESIA	
CHANNEL No.	Frequency (MHz)
0	923.25
1	923.75
2	924.25
3	924.75

ISRAEL	
CHANNEL No.	Frequency (MHz)
0	916.25

AUSTRALIA	
CHANNEL No.	Frequency (MHz)
0	920.25
1	920.75
2	921.25
3	921.75
4	922.25
5	922.75
6	923.25
7	923.75
8	924.25
9	924.75
10	925.25
11	925.75

NEW ZEALAND	
CHANNEL No.	Frequency (MHz)
0	922.25
1	922.75
2	923.25
3	923.75
4	924.25
5	924.75
6	925.25
7	925.75
8	926.25
9	926.75
10	927.25

PHILIPPINES	
CHANNEL No.	Frequency (MHz)
0	918.25
1	918.75
2	919.25
3	919.75

HONGKONG SINGAPORE, THAILAND, VIETNAM	
CHANNEL No.	Frequency (MHz)
0	920.25
1	920.75
2	921.25

3	921.75
4	922.25
5	922.75
6	923.25
7	923.75
8	924.25
9	924.75

URUGUAY	
CHANNEL No.	Frequency (MHz)
0	916.25
1	916.75
2	917.25
3	917.75
4	918.25
5	918.75
6	919.25
7	919.75
8	920.25
9	920.75
10	921.25
11	921.75
12	922.25
13	922.75
14	923.25
15	923.75
16	924.25
17	924.75
18	925.25
19	925.75
20	926.25
21	926.75
22	927.25

SOUTH AFRICA	
CHANNEL No.	Frequency (MHz)
0	915.6
1	915.8
2	916.0
3	916.2
4	916.4
5	916.6
6	916.8
7	917.0
8	917.2
9	917.4
10	917.6
11	917.8

12	918.0
13	918.2
14	918.4
15	918.6
16	918.8

MOROCCO	
CHANNEL No.	Frequency (MHz)
0	867.7
1	867.9

Appendix B Cautions

This chapter provides information about user Cautions for IDRO900F RFID Reader.

Appendix B. Cautions

Cautions

(1) Please supply the power according to the product's power specifications. Failure to do so may result in fire, product damage.

(2) Do not disassemble or shock the product. Causes product damage.

(3) Do not install in humid places. Risk of product damage and electric shock.
Use within the humidity specified in the manual.

(4) Never disassemble or repair the product yourself. This cause product damage and will not allow A/S later.

(5) Do not use this product in liquid environments such as water, oil, organic solvents, etc.

(6) When installing antenna, make sure that there are no metal objects in front of the antenna. This can cause the performance degradation.

(7) Avoid drastic temperature changes as they can cause performance degradation.

Certification and Safety Approvals FCC Compliance Statement

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.

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 on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antennae

-Increase the separation between the equipment and the 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.

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

FCC RF Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for uncontrolled equipment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65. This equipment must be installed and operated with at least 20cm and more between the radiator and person's body (excluding extremities: hands, wrists, feet and ankles).

UHF RFID Reader

Visible RFID Reader & Tag

Visible Light Communication System

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