

Hardware User Manual RD710/RD852

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1. CONTACTLESS READER RD710 / RD852 - PHOTO

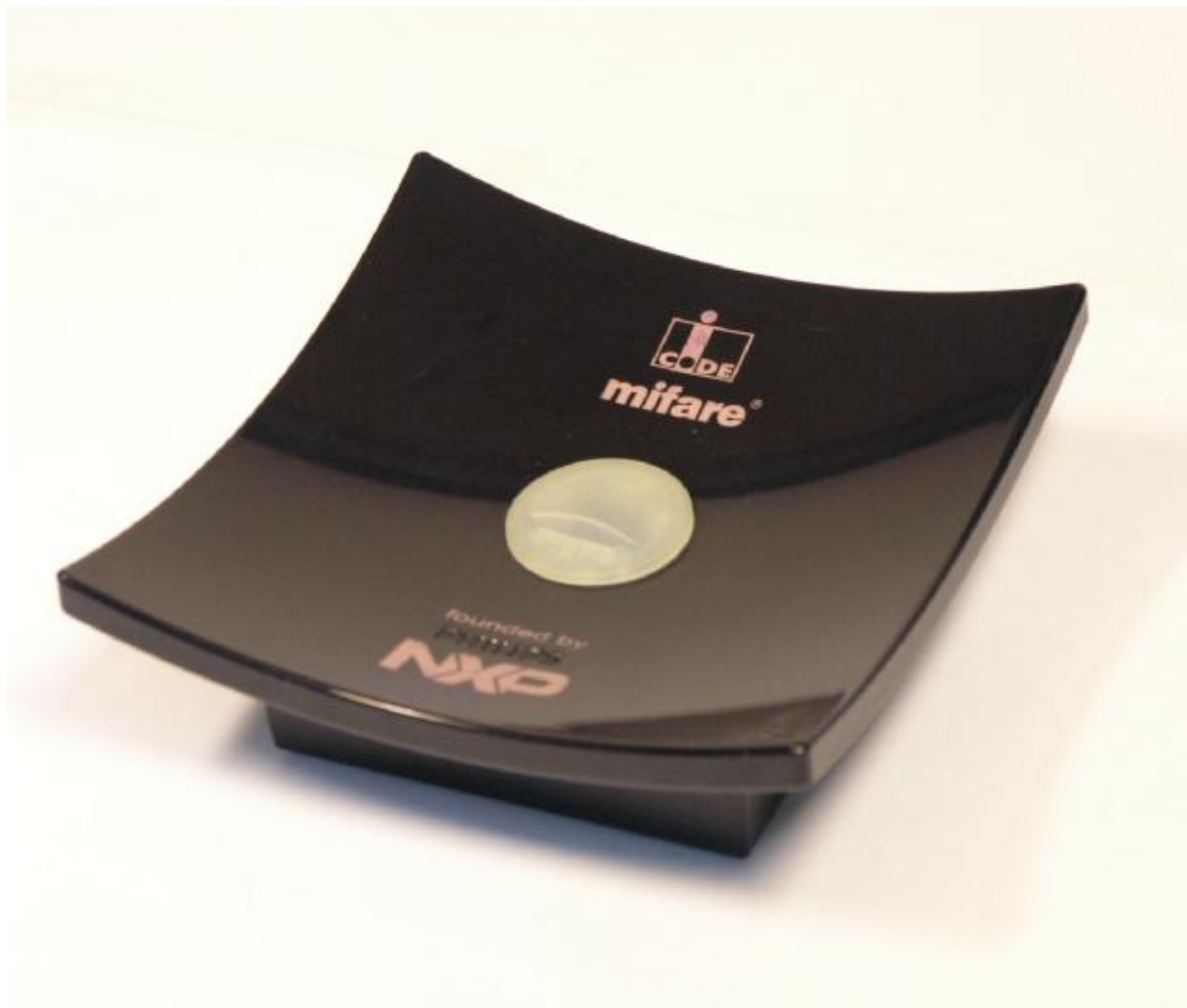


Figure 1: Contactless reader RD710 / RD852 – outside view.

2. CONTACTLESS READERS: RD710 AND RD852

2.1. Operational description

Family of contactless readers are composed from two contactless readers: RD710 and RD852. Both readers are made on the same printed circuit board Peridot 1.3. The main part of both readers with main microcontroller and all peripheral devices (communication interfaces, connectors, external antenna) are the same. Different part is integrated circuit (reader IC) with cryptology and antenna driver. Both readers support Contactless Smart Card Interface ISO14443A and ISO14443B standards. Data transmission rate between reader and contactless card is 106kbit, 212kbit, 424kbit up to 848kbit.

Both readers have the same communication interfaces: one USB serial port, one RS232 serial ports (and additional serial port via MEC6 connector), one RS485 (configurable as half or full duplex) serial port, one JTAG connector for JTAG interface and one MEC6 connector for external LPC_COM board (LPC_COM board has included ethernet adapter).

Both contactless readers, RD710 and RD852, are desktop readers and intended for use in development environment for development purposes – as reference contactless readers for working with MIFARE contactless cards. The main purpose is to develop new software (or hardware) for contactless readers based on LPC 1768 microcontroller and MIFARE reader ICs RC523 and MFRX852.

Contactless readers RD710 and RD852 are connected to personal computer as peripheral devices via USB serial port. Both devices (RD710 and RD852) are bus powered. The data transfer between reader and card is carried by 13.56 MHz RF-field. The communication between reader and smartcard is dependant on the type of smartcard. Both readers supported various transfer rates specified in ISO standards.

To start working with reader (RD710 or RD852) just plug in into free USB port (on personal computer) and install the drivers. The reader is ready for the operation.

Figure 2: Pegoda housing: view and dimensions.

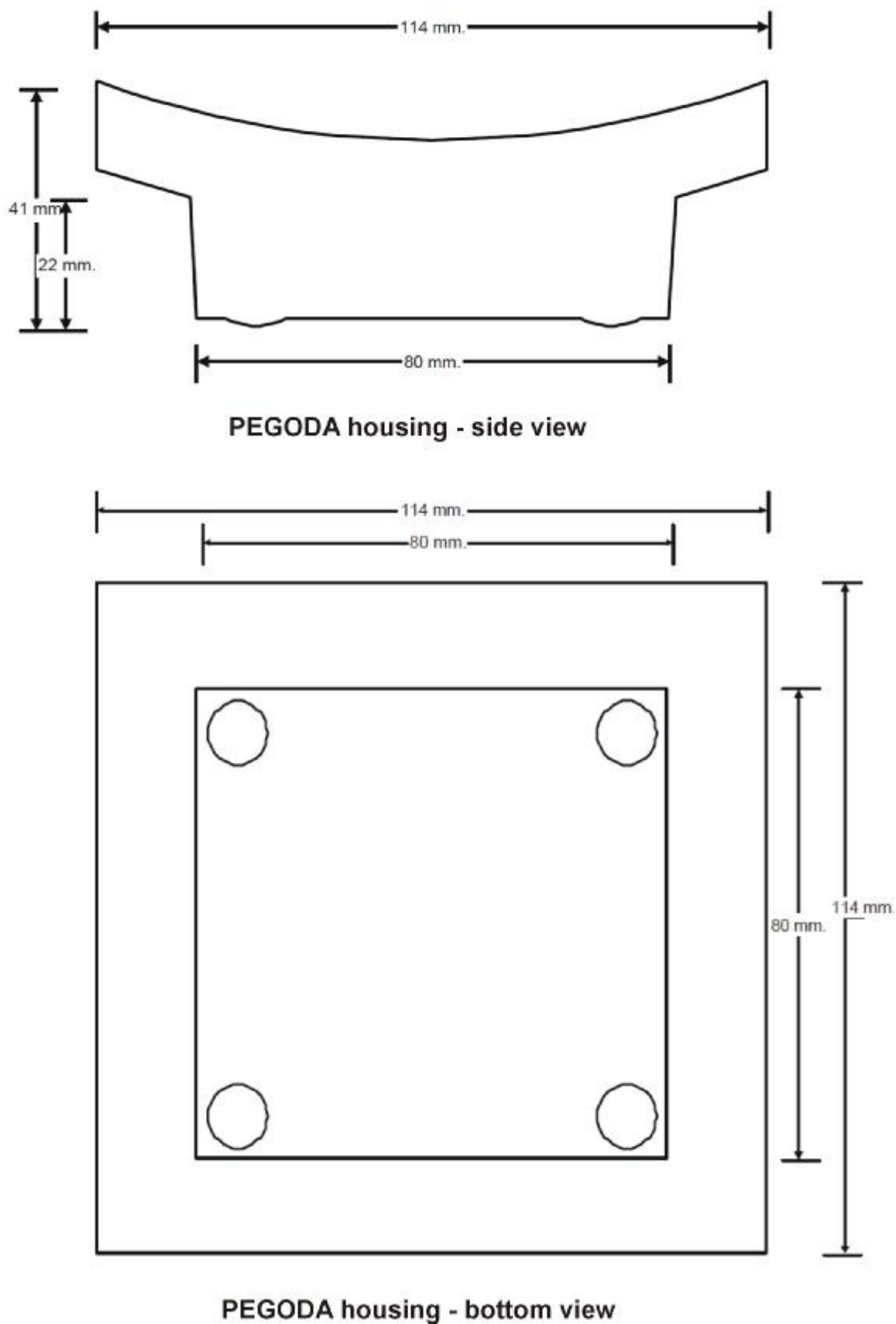
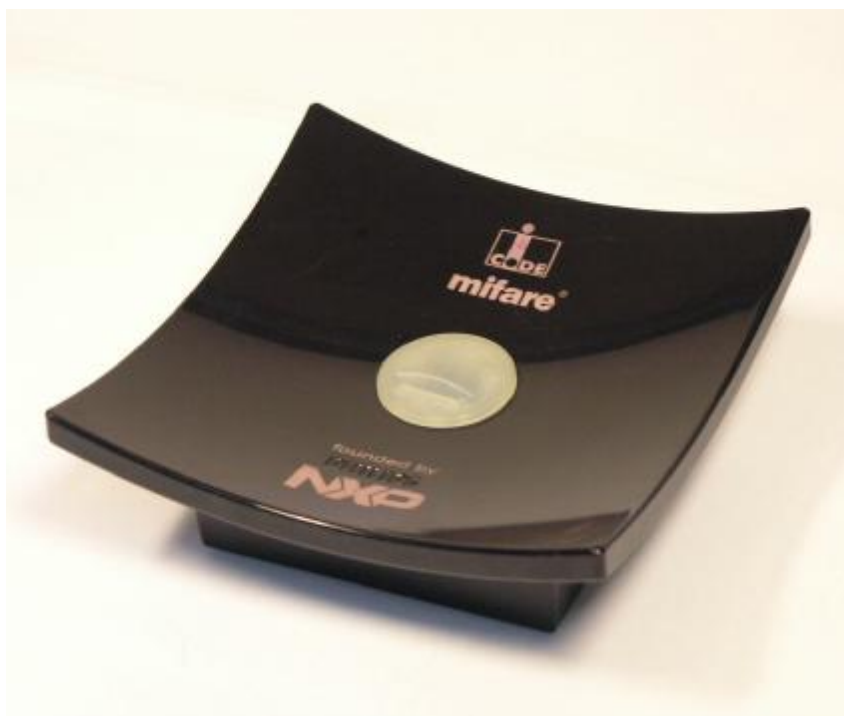


Figure 3: Pegoda housing: top view.



Figure 4: Pegoda housing: side view.



3. CONTACTLESS READER RD710 / RD852 - SPECIFICATIONS

Table 1: Contactless reader RD710 specifications

Antenna	
External Antenna	Model AN710
Additional antenna connector	5-pin header: for active antenna
Contactless operating frequency	
13.56 MHz	
Card reading/writing distance	
Up to 75 mm	
Contactless (RFID) Smart Card Interface	
ISO 14443 A with 848 Kbps transmission rate (depending on card)	
ISO 14443 B with 848 Kbps transmission rate (depending on card)	
MIFARE SAM Interface (for RD710 reader)	
Standards	ISO/IEC 7816
Protocols	T=1
Baud rate	9.6 to 1500 Kbps
Smart card clock frequency	Up to 10MHz
Connection (mode)	S- mode, X - mode
Host Interface	
Host Interface	USB 2.0 (also supported USB 1.1)
Transmission Speed	12 Mbps (USB 2.0 full speed)
Power Supply	Bus powered
Other Communication Interfaces	
RS 232C Serial Interface	1 serial ports; connector type: 10-pin Header; Communication speed: 115 200 bps (standard)
RS 485 Serial Interface	1 serial ports; configurable as RS485 (half or full duplex), connector type: 5-pin Header; Communication speed: 115 200 bps (standard)
JTAG IEEE1149.1 Serial Interface	JTAG 10-pin connector; to connect JTAG adapter
IEEE802.3 Ethernet Interface	Supported via LPC-COM extension board on MEC6 connector; connector type MEC6
Electrical and Mechanical Specifications	
Power Supply	5V DC $\pm 5\%$, 300 mA (via USB port or via 10-pin Header)
PCB Dimensions (L x W x H)	72 mm x 72 mm x 16 mm (passed in Pegoda housing)
Reader Dimensions (L x W x H)	114 mm x 114 mm x 41 mm
Weight	approx. 137g
Operating Temperature	-25 ... + 85 °C (without condensing)
Operating Humidity	5 ... 95% RH
Certificates	CE, FCC

Table 2: Contactless reader RD852 specifications

Antenna	
External Antenna	Model AN710
Additional antenna connector	5-pin header: for active antenna
Contactless operating frequency	
13.56 MHz	
Card reading/writing distance	
Up to 75 mm	
Contactless (RFID) Smart Card Interface	
ISO 14443 A with 848 Kbps transmission rate (depending on card)	
ISO 14443 B with 848 Kbps transmission rate (depending on card)	
MIFARE SAM Interface (for RD852 reader)	
Standards	ISO/IEC 7816, T=1
SAM in X - mode	SAM in X-mode incorporated in MFRX852 IC
Host Interface	
Host Interface	USB 2.0 (also supported USB 1.1)
Transmission Speed	12 Mbps (USB 2.0 full speed)
Power Supply	Bus powered
Other Communication Interfaces	
RS 232C Serial Interface	1 serial ports; connector type: 10-pin Header; Communication speed: 115 200 bps (standard)
RS 485 Serial Interface	1 serial ports; configurable as RS485 (half or full duplex), connector type: 5-pin Header; Communication speed: 115 200 bps (standard)
JTAG IEEE1149.1 Serial Interface	JTAG 10-pin connector; to connect JTAG adapter
IEEE802.3 Ethernet Interface	Supported via LPC-COM extension board on MEC6 connector; connector type MEC6
Electrical and Mechanical Specifications	
Power Supply	5V DC $\pm 5\%$, 300 mA (via USB port or via 10-pin Header)
PCB Dimensions (L x W x H)	72 mm x 72 mm x 16 mm (passed in Pegoda housing)
Reader Dimensions (L x W x H)	114 mm x 114 mm x 41 mm
Weight	approx. 136g
Operating Temperature	-25 ... + 85 °C (without condensing)
Operating Humidity	5 ... 95% RH
Certificates	CE, FCC

4. INSTALLING MANUAL

4.1. Desktop use

Contactless readers RD710 and RD852 are both desktop readers and they are intended for development use in development environment such as development departments in factories, at institutes, at universities etc. Readers are usually connected via USB serial communication port (USB 2.0) or RS232 serial port to personal computer. USB port supply power to contactless reader and permits communication with computer.

Usual climate conditions in development environment (room temperature and humidity) are deep inside readers specified climate conditions.

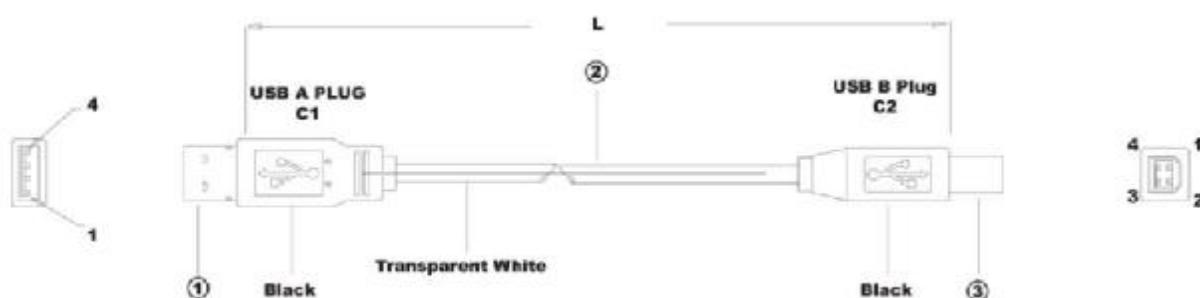
4.2. USB type A-B plug cable

Use of USB type A-B plug cable is the default configuration for both readers; RD710 and RD852. USB type A-B plug cable is delivered with contactless reader to connect reader with host computer.

This cable is part of the EV710 and EV852 reader KIT (KIT included: contactless reader, CD with drivers and additional software, USB A-B cable and some contactless cards).

The default configuration uses the USB cable for communication between reader and host as well as to supply the 5 V supply voltage.

Figure 5: USB type A - B plug cable.



Note: USB 2.0 cable is type A – B plug cable, max. length 1.8 m.

4.3. Power supply

Contactless readers, RD710 and RD852, are both powered via USB cable – with 5V DC and typical consumption 290mA.

Another possibility is to power, both readers, via 10-pin COM header – with external 5V DC power supply.

4.4. Electrical characteristics

Operating Range

Symbol	Description	Conditions	Min	Typ	Max	Unit
+5V	+5V Power Supply	Active Reader	4.75	5.00	5.25	V
T _{amb}	Ambient Temperature	/	-25	+25	+85	°C

Current Consumption

Symbol	Description	Conditions	Min	Typ	Max	Unit
IC5V	Supply Current	Active, RF on	-	290	-	mA

Operating Distance

Symbol	Description	Conditions	Min	Typ	Max	Unit
DST	Operating Distance	Measured from the center of the antenna	-	0 – 75	-	mm

Interface Characteristics

Symbol	Description	Conditions	Min	Typ	Max	Unit
USB	USB baudrate	Cable lenght max. 1.8m (1*)	-	12	-	Mbaud
RS232	RS232 baudrate	Cable lenght max. 1.8m	-	115 200	-	bps
RS485	RS485 baudrate	Cable lenght max. 1.8m	-	115 200	-	bps

(1*) USB 2.0 cable is type A – B plug cable, max. lenght 1.8 m.

5. USER MANUAL

5.1. User manual

Contactless readers RD710 and RD852 are intended to send and receive data according to the ISO 14443A and ISO 14443B protocol. Data transfer from reader to/from contactless cards operates at frequency 13.56 MHz.

At the other side the reader communicate with host computer via serial interface: USB, RS232, RS485 or JTAG interface.

Main functions which permit both readers are:

- sending and receiving data to/from contactless cards according ISO 14443A and ISO 14443B protocol.
- Supporting MIFARE contactless memory cards.
- ISO/IEC7816 T=1 compatibility.
- Card reading distance up to 75 mm.
- The data exchange from Reader to the host PC over the host interfaces: USB, RS232 and RS485.
- The data exchange from Reader to the host PC over JTAG IEEE 1149.1 interface.
- The data exchange from Reader to the host PC over Ethernet IEEE802.3 network – via LPC_COM extension board.

Contactless readers RD710 and RD852 are intended for development use and support large set of commands. User can write user specific application.

General user instructions:

- Reading/writing is possible only with MIFARE contactless cards.
- Reading device can detect contactless card up to 75 mm from the center reader's antenna.
- Contactless card identification is possible in electromagnetic field (created from contactless reader). Nonmetal material have no influence to reading distance or reading reliability.
- Reading/writing to/from card is very simple: user approaches his contactless card to reader's antenna. Reading device detects card and confirm reading or writing with sound (beeper) and light (LED) signal.

5.2. INSTRUCTIONS FOR SAFE WORK, MAINTAINING AND CARE

- Be careful not to damage the housing, connectors, antenna, PCB and other connected parts.
- Because of the specifics of the device and the damage, only qualified staff, authorized by the producer, are allowed to repair the device. All interventions of the unauthorized person and mechanical damage means repealing of the guarantee.
- Due to being exposed to a lot of people, the device needs to be cleaned and maintained regularly (some cleansers may contain substances which can damage the material of the housing).

5.3. ELECTROMAGNETIC COMPATIBILITY

Contactless readers RD 710 and RD 852 fulfil the following requirements of electromagnetic compatibility:

FCC, Part 15 and CE.

5.3.1. FCC Compliance Statement

NOTE:

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 when the equipment is operated in a residential 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. 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.

Caution!

The Federal Communications Commission warns the users that changes or modifications to the unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The accessories associated with this equipment are as follows:

- . Shielded communication cable

These accessories are required to be used in order to ensure compliance with FCC rules.

5.3.2. COMPLIANCE INFORMATION according to 47CFR 2.1077

We,

Company: _____

Address: _____

Phone: _____

declare that the products

RD 710,
FCC ID: OWRMFRD710

and

RD 852,
FCC ID: OWRMFRD852

are in conformity with Part 15 of the FCC Rules.

Operation of this product is subject to the following conditions:

- (1) this device may not cause harmful interference
- (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 the equipment.

5.3.3. CE Declaration of Conformity

This Information Technology Equipment has been tested and found to comply with the following European directives:

Harmonised Standards applied	Description
EN 300 330 – 2 V 1.5.1	Air interface of the radio systems pursuant to § 3(2) (Article 3(2))
EN 60950-1:2001 +A11:2004	Health and safety requirements pursuant to § 3 (1) 1. (Article 3(1) a)
EN 301 489-01 V1.6.1 EN 301 489-03 V1.4.1.	Protection requirements concerning electromagnetic compatibility § 3(1)2,(Article 3(1)(b))
EN 55022:2006	Electromagnetic compatibility-Limits and methods of radio disturbance characteristics of information technology class B (Part 1: Emission)
EN 55024:1998+A1:2001+A2:2003	Electromagnetic compatibility - Limits and methods of radio disturbance characteristics of information technology equipment (Part 2: Immunity)
EN 61000-3-2	Electromagnetic compatibility - Limits for harmonic current emissions
EN 61000-3-3	Electromagnetic compatibility - Limitation of voltage fluctuations and flicker in low-voltage supply systems
EN 61000-4-2	Electromagnetic compatibility – Electronic discharge immunity test
EN 61000-4-3	Electromagnetic compatibility – Radiated radio-frequency electromagnetic field immunity test
EN 61000-4-4	Electromagnetic compatibility - Electrical Fast Transient / Burst immunity test
EN 61000-4-5	Electromagnetic compatibility – Surge immunity test
EN 61000-4-6	Electromagnetic compatibility – Immunity to conducted disturbances induced by radio fields
EN 61000-4-11	Electromagnetic compatibility – Voltage dips, short interruptions and voltage immunity test

Manufacturer's Name: NXP Semiconductors

Manufacturer's Address: Mikronweg 1, A-8101 Gratkorn, Austria

Type of Equipment: Contactless reader

Model No.: RD710 and RD852

NXP Semiconductors hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s), and said equipment is in conformity with the relevant harmonised standards as mentioned above.

6. WARRANTY, LIMITATIONS OF LIABILITY

WARRANTY POLICY

Manufacturer warrants that any product ("Product") sold by Manufacturer to an end user ("User") shall be free of defects in material and workmanship for a period a one year (or other period if specified) from date of sale by Manufacturer.

If any Product, Product's part fail to conform or is defective then Manufacturer, at its option, will repair or replace it at the premises of the User (On-Site).

To obtain warranty service, you must send the Product in either its original packaging or packaging offering an equal degree of protection directly to Manufacturer. Please contact Manufacturer for warranty replacement fee information.

LIMITATIONS AND EXCLUSIONS

This warranty does not cover customer instruction, installation, set up adjustments or signal reception problems (RFID readers).

This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of, or to any part of the Product, including the antenna. This warranty does not cover damage due to improper operation or maintenance, connection to improper voltage supply, or attempted repair by anyone other than a facility authorized by Manufacturer to service the Product.

Proof of purchase in the form of a bill of sale or receipted invoice which is evidence that the unit is within the Warranty period must be presented to obtain warranty service.

This warranty is invalid if the factory applied serial number has been altered or removed from the Product.

THIS WARRANTY REPRESENTS THE ENTIRE AGREEMENT BETWEEN MANUFACTURER AND USER WITH RESPECT TO THE SUBJECT MATTER HEREIN AND SUPERSEDES ALL PRIOR OR CONTEMPORANEOUS ORAL OR WRITTEN COMMUNICATIONS, REPRESENTATIONS, UNDERSTANDINGS OR AGREEMENTS RELATING TO THIS SUBJECT.

End User: _____

Model Number: _____

Serial Number: _____

Startup Date: _____ Warranty End Date: _____