

Installation Sheet (Wiegand Interface)

UA-612 UHF Reader



Reader Description

The UA-612 Reader combines the technology of a UHF long-range reader for vehicle identification with small size and easy mounting for access control. It reads the same UHF tags and cards that AWID's LR-2000 reader reads for automated vehicle identification. The polycarbonate enclosure contains both antenna and RF module. The UA-612 Reader is mounted like a cover plate on a single-gang electrical utility box, or on any surface.

Parts List

(a)	Installation Sheet	Quantity 1
(b)	UA-612 Reader	Quantity 1
(c)	#6-32 x 1" machine screw (for single-gang utility box)	Quantity 2

Installation Procedure

1. Install a single-gang utility box, or drill two no. 27 (0.144-inch) clearance holes for the reader screws and one hole for the cable, at the desired location. Observe ADA height requirements.
2. Snap open the reader's front cover by inserting a wide screwdriver blade into the slot at the bottom edge of the cover, then twisting the blade gently (see Figure 1). Note: Do not remove screws inside the cover.
3. Clip off the white 10-pin in-line connector from the end of the reader's cable. Keep the wires as long as possible.
4. Install the reader on the electrical box or other surface. Fasten the reader to the electrical box with supplied screws (Parts Lists, item c). Hang the reader's cover over the base reader, and snap the cover closed securely.
5. Prepare the cable to the system's panel and power (see Figure 2). (See "Product Specifications", below, for the number of cable conductors.) Power and data may share the same shielded cable, or use separate shielded cables. Use the *black* and *red* wires for the power supply. Use the *black* wire also for the panel's common or negative or ground terminal. For Wiegand data, use the *green* wire for Data-0, and the *white* wire for Data-1. Connect the reader's bare *drain* wire to the cable's shield or drain wire; do not ground the shield anywhere – let it float. Connect the reader's *brown* wire if used for LED control, and the *yellow* wire if used for beeper control. Do not connect the *orange*, *blue* and *violet* wires; tape or cap them separate.
6. Use an independent regulated DC power supply, 12 volts \pm 10% (a battery-charging power supply is OK). The current rating must be 1.0 ampere or more. **Do not use** the panel's DC voltage terminals for reader power.
7. Apply power to the UA-612 reader. The beeper sounds, and the LED is steady red indicating standby.
8. Present an AWID UHF card or tag (same as used with the LR-2000 reader) to the UA-612 reader. The reader's beeper sounds with every tag read, and the LED changes to amber briefly, and then red. If the LED control wire (*brown*) is connected to the panel's terminal, the reader's LED is green when the system authorizes door-unlock.

Product Specifications

Cable to Controller and Power Supply

- 4 to 6 conductors (not twisted pairs), stranded, 22 gauge, color-coded insulation, overall 100% shielded
⇒ Cables may be separated – 2 conductors to power, and 3 to 5 conductors to the panel. Cables must be shielded.
The number of conductors to the panel depends upon the number of control lines used – none / LED / beeper.
- Length for Wiegand interface..... Up to 500 feet

Reading Distance

- With all tags for LR-2000 long-range reader6 to 12 inches (15 to 30 cm)

Characteristics

- Indoor and outdoorRated for outdoor installations if mounted in IP64-rated housing
- Operating temperature-31° F to 150° F (-35 C° to 65° C)
- Operating humidity.....0 to 95% non-condensing

Operating Parameters

- Transmitting frequency range.....902.6 to 927.4 MHz, frequency-hopping
- Frequency channels125 channels; each channel spaced by 200 kHz
- Data format for Wiegand output.....26 bits to 50 bits (as programmed in UHF cards or tags)

Notes

1. Connect the black wire (negative) first, and the red wire (positive) last. Disconnect power before any wiring changes.
2. The LED and Beeper lines are logic levels. *Never* apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their functions, and left floating or pulled to a high level (3.6 to 5.0 VDC) when not used.
3. UA-612 readers have both Wiegand-protocol and RS-232 serial interfaces. For information on RS-232, contact AWID’s technical support.
4. For additional information, please visit AWID’s Web site www.awid.com. For technical support questions visit www.awid.com/support or call **1-800-369-5533** (in the U.S.) or **1-408-825-1100** from 8:00 a.m. to 5:00 p.m. Pacific Time.
5. FCC Compliance: This equipment has been tested and found to be in compliance with the limits for FCC part 15, Class A digital device. 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 instruction manual, may cause harmful interference with 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.

The users are prohibited from making any change or modification to this product. Any modification to this product shall void the user’s authority to operate under FCC Part 15 Subpart A Section 15.21 regulations.

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.

7. Industry Canada Compliance: Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

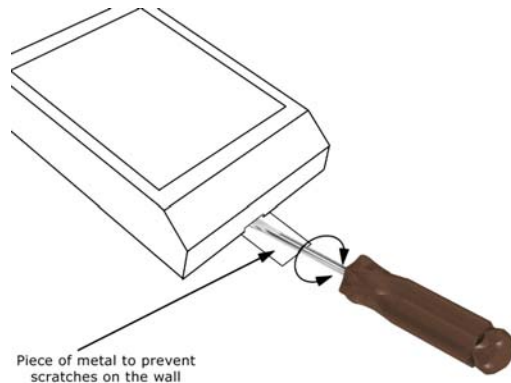


FIGURE 1: SNAPPING OPEN THE COVER

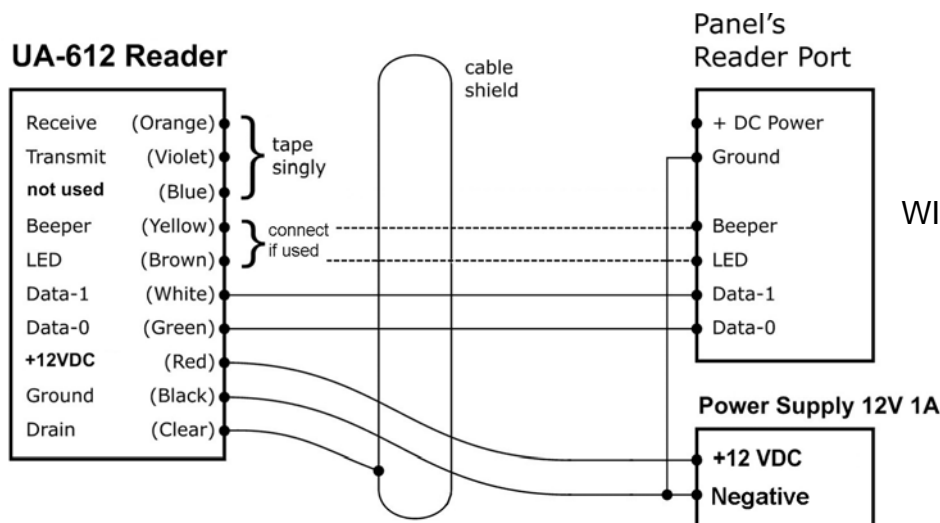


FIGURE 2: WIRING DIAGRAM (WIEGAND)



SENTINEL-SENSE/PROX MPR-2010

2.7E4

Installation & Operation Manual-041378



COPYRIGHT ACKNOWLEDGEMENTS

The contents of this document are the property of Applied Wireless Identifications Group, Inc. (AWID) and are copyrighted. All rights reserved. Any reproduction, in whole or in part, is strictly prohibited. For additional copies of this document please contact:

AWID

18300 Sutter Blvd

Morgan Hill, CA 95037

<http://www.AWID.com>

The information contained herein has been carefully checked and is believed to be accurate, no responsibility is assumed for inaccuracies. AWID reserves the right to make changes without prior notice. This document is not covered by any warranty either expressed or implied. Any comments, corrections or additions to the contents of this document should be directed to AWID at the above address.

Copyright 2006 AWID, Printed in USA.

All other trademarks are the property of their respective owners.

Table of Contents

REVISION HISTORY	4
1 INTRODUCTION.....	5
1.1 Special Features	5
1.1.1 <i>Sentinel-Sense Model (BR or BN)</i>	5
1.1.2 <i>Sentinel-Prox Model (LR-911)</i>	5
2 SPECIFICATIONS.....	6
2.1 Channel Frequency Table.....	6
2.2 Measuring Read Distance.....	6
3 INSTALLATION & OPERATION GUIDELINES	7
3.1 Site Survey.....	7
3.2 Preferred Reader Installation Practices	7
3.3 Mounting Preference.....	7
3.4 General Wiring Requirements.....	7
3.5 Grounding	8
4 INSTALLATION PROCEDURE	9
4.1 Parts List.....	9
4.1.1 <i>BR</i>	9
4.1.2 <i>BN</i>	9
4.1.3 <i>LR-911</i>	9
4.2 Preparation for Installation	9
4.2.1 <i>Bench Top Verification</i>	9
4.2.2 <i>Aiming of Antenna</i>	10
4.2.3 <i>Mounting Considerations</i>	11
4.3 Installation Steps.....	11
5 SOFTWARE PROGRAMMING AND SYSTEM OPERATION NOTES.....	13
5.1 System Operation	13
5.1.1 <i>Running a Custom Software Application or the AWID Demo Program</i>	13
5.1.2 <i>Operating Modes</i>	13
5.2 Users Note.....	13
6 PROTOCOL DOCUMENTATION	14

NOTE: READ AND USE THIS MANUAL

FAILURE TO FOLLOW THE INSTALLATION GUIDE MAY RESULT IN POOR PERFORMANCE OR EVEN CAUSE PERMANENT DAMAGE TO THE READER, THUS VOIDS THE PRODUCT WARRANTY.

REVISION HISTORY

Version No.	Revised By	Date	Sections Affected	Remarks
0.1	E. Wei	4/2008	-	Initial version
0.2	E. Wei	6/2008	All, 2	Part name, Input voltage/current info update
0.3	E. Wei	7/2008	2.1	Frequency range spec update

1 INTRODUCTION

AWID's MPR-2010-2.7E4-CN long-range (12 to 15 feet) Radio Frequency IDentification (RFID) reader family/series consists of Sentinel-Sense versions with RS-232 interface (BR) and TCP/IP interface (BN) and Sentinel-Prox version (LR-911) with Wiegand interface that work with most leading UHF passive tags. The reader comes with a unique combination of long read range, small size, and low power consumption. It has an internal power converter, allowing it to work with a wide range of supply inputs without affecting its performance. Its primary applications are asset management and tracking, and fleet management applications.

1.1 SPECIAL FEATURES

1.1.1 Sentinel-Sense Model (BR or BN)

- Multi-Protocol: ISO-18000-6 Type B , EPC Class1¹ Gen 1 & 2
- Thin passive tags with long-range performance
- High performance circular polarized antenna
- RS-232 data input/output by BR
- TCP/IP interface by BN
- Splash proof design for indoor or outdoor applications
- UV stabilized housing

1.1.2 Sentinel-Prox Model (LR-911)

- Thin passive tags with long-range performance
- Designed for automated operation with tags mounted on automobile's windshield
- Simultaneous Wiegand (Access Control) and RS-232 (transaction control) outputs
- Permanently sealed electronics for indoor or outdoor applications
- UV stabilized housing

¹ Both 64- and 96-bit

2 SPECIFICATIONS

Input voltage	+7.0 VDC to +15 VDC
Input current	1.4 A (7.0 V) to .7 A (15 V) typical
Protocol language	ISO-18000-6 Type B, EPC Class 1 Gen 1 & 2
Read range	Depends on type & size of labels used
Output power	30 dBm into 6 dBi antenna
Transmit frequency	920.5~924.5 MHz
Receiver frequency	920.5~924.5 MHz (Amplitude Modulated)
Hopping channels	16 Channels
Channel spacing	250 kHz
Hopping sequence	Pseudo random
Operating temperature range	-30° C to +65° C (-22° F to 149° F)
Color	Beige
Output data formats	
BR	RS-232
BN	TCP/IP
LR-911	Simultaneous Wiegand & RS232 (Standard)
BN	
GP I/O ports	4 input, 4 output
GP I/O Connector	RJ-45 & terminal block
Dimension	8X9.5X1.125 inches (20X24X2.86 cm)
Weight	1,300 g (2.35 lb)

2.1 CHANNEL FREQUENCY TABLE

Frequency range: 920.5 ~ 924.5 MHz

Minimum Number of frequency channels: 16

CH	920.5~924.5	MHz	CH	920.5~924.5	MHz	CH	920.5~924.5	MHz	CH	920.5~924.5	MHz
0	920.625	MHz	4	921.625	MHz	8	922.625	MHz	12	923.625	MHz
1	920.875	MHz	5	921.875	MHz	9	922.875	MHz	13	923.875	MHz
2	921.125	MHz	6	922.125	MHz	10	923.125	MHz	14	924.125	MHz
3	921.375	MHz	7	922.375	MHz	11	923.375	MHz	15	924.375	MHz

2.2 MEASURING READ DISTANCE

Make sure you know the tag types. For certain readers and tags, user must also be mindful of the tag's orientation and the reader's antenna orientation, what mounting surface the tags are designed for and how the tags are supposed to be mounted. Any departure from its intended purpose will drastically affect the reader's ability to energize the tag and its read range.

When measuring the reader's read range, make sure that the tag is properly oriented to the reader antenna, and for optimum performance, be sure the operator's finger is not within three (3) inches of the tag's antenna surface.

3 INSTALLATION & OPERATION GUIDELINES

3.1 SITE SURVEY

Always conduct a site survey before starting installation. Avoid any possible sources of interference. For best result, use a spectrum analyzer with a wideband antenna and set the spectrum analyzer in Max Hold mode to gain measurement of the maximum signal strength on the airwave. If the reader is not installed properly, the performance will be degraded. Listed below are steps that should be followed during installation:

- Do not install reader in an area where sources of broadband noise may exist. Avoid mounting the reader facing a cellular phone tower or in close proximity to the base station of a 900 MHz wireless telephone.
- Keep all of the reader wiring a safe distance from all other wiring, including, but not limited to, AC power, computer data wiring, and telephone wiring, and wiring to electrical locking devices.
- Avoid operating the reader in close proximity to other 900 MHz wireless equipment/devices. It should be noted that BR and BN readers are known to work in electromagnetic crowded areas, such as trade shows.

3.2 PREFERRED READER INSTALLATION PRACTICES

- Avoid mounting the under direct sunlight. Exposure to direct sunlight may cause the reader to operate at a temperature above the 65 degrees Celsius upper limit.
- Make sure that the supply voltage of the reader is within specification
- Use cables with over-all braid or shield
- For best results, avoid bundling data cable with AC power and computer cables
- Use the largest wire gauge where feasible
- Use dedicated power supply, where necessary
- Use Single Point Grounding, and avoid ground loops

3.3 MOUNTING PREFERENCE

The reader has a uni-directional antenna with an antenna beam width of about 60-70 degrees. The radiation pattern is an oval-shaped beam, which should be aimed toward where the transponders will pass.

3.4 GENERAL WIRING REQUIREMENTS

All the reader wiring should be continuously shielded. AWID recommends using #24 AWG up to #22 AWG, longer distances and higher current consumption on the power supply line will require larger gauge wires.

TABLE 3.4-1: Data Line's Wiring Requirement

WIRE SIZE	#22 AWG (0.6 mm Dia.)	#24 AWG (0.5 mm Dia.)
WIEGAND (*)	500 ft (152 meters)	980 ft (300 meters)
RS-232	50 ft (15 meters)	50 ft (15 meters)

(*) LR-911 only

3.5 GROUNDING

Grounding is critical for proper operation of MPR-2010-2.7E45V-CN readers. When installing the reader, it is crucial to assure that the earth ground is the best ground available. If you elect to use the 120 VAC power ground, conduct a test by measuring its resistance relative to a known good ground, such as a cold water pipe or structural steel that is in direct contact with the ground. The resistance should be less than 50 ohms.

When using the GP I/O for sensing or display functions with a BN unit, make sure there is no ground loop between the different sensors or displays.

For multiple LR-911 installations, it is critical that all units are connected to the same grounding system. Using different grounding systems will create secondary current paths or ground loops that can affect the performance and cause damage to LR-911.

4 INSTALLATION PROCEDURE

This section provides information on installation and operation of MPR-2010-2.7E45V-CN readers.

4.1 PARTS LIST

Verify that all items listed below are present before starting the installation.

4.1.1 BR

- a. Sentinel-Sense MPR-2010-2.7E4-CN BR (FW version 2.xxMf) Qty=1
- b. Documentation and Demo Program CD Qty=1
- c. Power supply – PS92A-0-0, 50-60 Hz and 110 to 220 VA Qty=1
- d. Reader mounting bracket – MPR-2010MB (Optional) Qty=1
- e. External/Secondary Antenna – MPR-2012ANT (Optional) Qty=1

4.1.2 BN

- a. Sentinel-Sense MPR-2010-2.7E4-CN BN (FW version 2.xxNf) Qty=1
- b. Documentation and Demo Program CD Qty=1
- c. Power Injector-Power Supply unit – PIPS48-0.3A Qty=1
- d. Reader mounting bracket – MPR-2010MB (Optional) Qty=1
- e. External/Secondary Antenna – MPR-2012ANT (Optional) Qty=1

4.1.3 LR-911

- a. Sentinel-Prox LR-911 Reader Qty=1
- b. Installation Instructions (packed inside Reader carton) Qty=1
(Tags for the LR-911 Reader and Installation Kit are available separately)

4.2 PREPARATION FOR INSTALLATION

4.2.1 Bench Top Verification

It is always a good idea to verify system operation before committing to a full-scale installation. The following are the necessary steps to test the reader's operation in a static environment.

BR

- Connect BR to the RS-232 port of a PC
- Connect the power jack from the wall plug power supply to MPR-2010BR.

BN

- Connect the RJ-45 cable between the reader and connector labeled "Out" on the PIPS48-0.3A, connect from Ethernet Hub/Switch to where "In" is labeled. Plug in power.

BR or BN

- ❑ Power up PC
- ❑ Install demo software on PC
- ❑ Activate demo software and verify performance of the reader.

- ❑ Select a COM port for BR or type in the IP address for BN on top page then click “Connect”. Follow with some commands.
- ❑ Place the RFID tags at the exact same locations as the final configuration
- ❑ Measure tag’s read distance and confirm that read distance is correct.

LR-911

- ❑ Connect the SP-6820-LR test unit, which is part of the LR Installation Kit, to the Reader cable. Use the wiring list in the Installation Instructions. Apply power to the reader and the test unit, using the plug-in DC power module in the Installation Kit.
- ❑ Use either a Prox-Linc WS tag that is attached firmly by its adhesive to a rectangle of windshield glass, or a Prox-Linc MT tag for verification. Hold the tag so that the hand does not interfere with direct line-of-sight between the tag and the Reader.
- ❑ Move the tag into the field. Observing the SR-6820-LR test unit, there is a brief LED color change and a beep to indicate each read of the tag by the Reader. Reads will repeat at a rate that is determined by the Reader’s firmware.
- ❑ Move the tag from side to side, and at varying distances from the front of the Reader housing, to determine the space in which the tag and Reader are active.

4.2.2 Aiming of Antenna**Antenna Pattern**

MPR-2010-2.7E4-CN reader comes with a circular polarized antenna to ensure reading tag with random orientation. Most circular polarized antenna has a horizontal to vertical differential of up to 3 dB, this will cause the antenna pattern to deviate from a true circle. AWID’s antenna has a horizontal to vertical differential of typically less than 0.5 dB, making its pattern as near to a circle as possible.

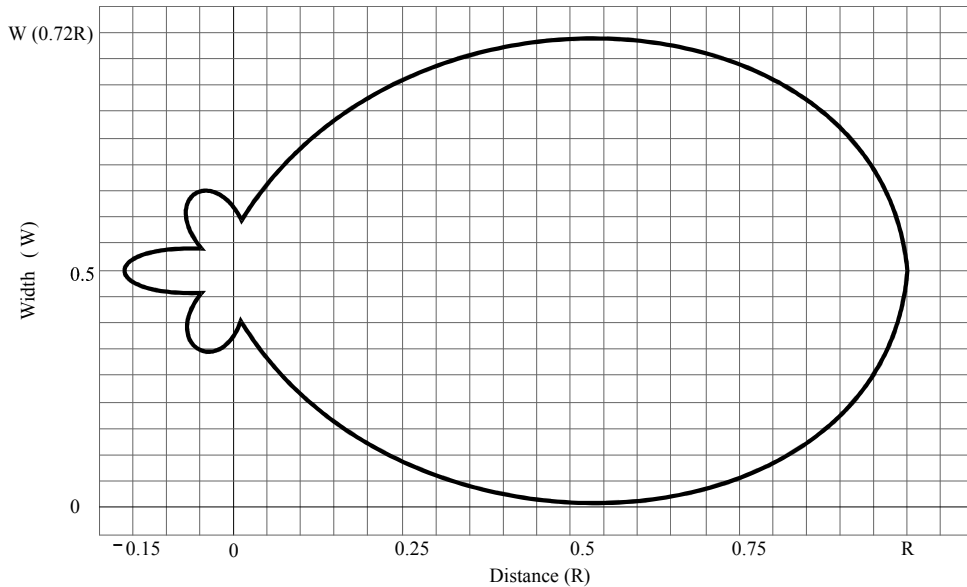


Figure 1 MPR 2010-2.7E4-CN Antenna Pattern

- Antenna pattern measurements represent both horizontal and vertical polarized planes of the read area transmitted by the reader.
- In the drawing above, R = approximately 12 feet to 15 feet for MPR-2010 with Alien free space tags.
- Antenna pattern can be affected by RFI and other environmental conditions.

4.2.3 Mounting Considerations

Antenna Mounting Bracket

Available from AWID is an optional antenna-mounting bracket that provides antenna tilt adjustment and pan adjustment.



4.3 INSTALLATION STEPS

- 1) Check to ensure that all connections are secure. Make sure all wires through the cable clamps are anchored properly. Avoid dangling wires that may become a safety hazard.

- 2) Mount the Reader/Antenna using the two recessed threaded holes to fasten to reader on the desired mounting surface. Please note that the threaded inserts are closed-ended, the user must select screws with the exact length to ensure proper tightening of the mounting screws. The screw length cannot sink lower than 3/8" (0.9cm.) In cases where the reader aiming is critical, please order antenna-mounting bracket from AWID. This mounting bracket provides pan/tilt adjustment for the reader. Users can also drill holes through the plate as required.
- 3) Adjust the position or the angle of the reader so that the tags are detected and read at the desired distance from the reader.

5 SOFTWARE PROGRAMMING AND SYSTEM OPERATION NOTES

This section applies to Sentinel Sense models BR or BN only since LR-911 requires a controlling system such as SP-6820-LR to operate.

5.1 SYSTEM OPERATION

5.1.1 Running a Custom Software Application or the AWID Demo Program

If AWID Demo Program is not used, it is expected user will launch a Custom Software Application developed using the *MPR Serial Communication Protocol* or *MPR-2010 TCPIP Interface* to issue commands as defined by the protocol to reader.

5.1.2 Operating Modes

Typical operating modes for BR or BN readers can be grouped into the following:

Search Mode

This mode is used when operator or user is not certain what family of tags is placed on the items to be tracked. Since most tags are deterministic in nature, reader must cycle through each and every protocol, issue a protocol specific inquiry, to hail and to wait for a response from tags of that specific protocol. When there are many different protocols in use the reader response will appear sluggish.

Mixed Mode

This mode assumes the user is aware of the types of protocol in use, and furthermore, the user made a determined effort to operate the reader in a mixed protocol mode. In this mode, the user can decide how many and which specific protocols to be selected. Once Mix Protocol Mode is selected, the reader will routinely cycle through each protocol, dwell long enough for the reader to wait for a response and then move on to the next protocol. It should be noted that in a mixed protocol mode, the tag must have sufficient time to respond to the reader, and therefore, it can only be used on a conveyor belt arrangement, with specific speed restrictions.

Single Protocol Mode

Single protocol is the normal mode of operation, where the protocol type is known and many tags are expected to pass through the readers.

5.2 USERS NOTE

For System Integrators and/or Software Developers

System Integrators and/or Software developers should get familiar with the MPR Serial Communication Protocol specifications for developing applications that control MPR-2010BR readers.

For Custom System Users

For custom system user, please refer to your host software user guide for information regarding system and software operations

For Demo Software Users



If you are using the AWID demonstration software application which is .NET based with easy-to-follow GUI operations, simply select the COM port for which the reader is configured then click *Connect* should get you started.

6 PROTOCOL DOCUMENTATION

See *MPR Serial Communication Protocol* – Doc# 041300

See *MPR 2010 TCPIP Interface* – Doc# 041301

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End user must follow the specific operating instructions for satisfying RF exposure compliance. To maintain compliance with FCC RF exposure compliance requirements, please follow operation instruction as documented in this manual.