



SENTINEL-SENSE MPR-1510A-RM

2.6h

Installation & Operation Manual-041322



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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 voids 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."

INDUSTRY CANADA COMPLIANCE

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.

This device has been designed to operate with the antennas listed below, and having a maximum gain of -8 dBi. Antennas not included in this list or having a gain greater than -8 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

- 1) Printronix, P/N 252459-001; -8 dBi RF Coupler antenna

CAUTION:

Reader should be positioned so that personnel in the area for prolonged periods may safely remain at least 20 cm in an uncontrolled environment from the reader's surface. Observe FCC OET Bulletin 56 "Hazards of radio frequency and electromagnetic fields" and Bulletin 65 "Human exposure to radio frequency electromagnetic fields."

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NOTE: READ AND USE THIS MANUAL.

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

1 INTRODUCTION

AWID's Sentinel-Sense MPR-1510A-RM Rev 2.6 h (MPR-1510AR 2.6h or simply 2.6h) is a long-range (12 to 15 feet) Radio Frequency IDentification (RFID) reader module with RS-232 I/O interface that works with most leading passive UHF passive tags. The reader module comes with a unique combination of long read range, small size, and low power consumption. The reader module 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.

The MPR-1510AR 2.6h reader modules are delivered with firmware version 4.xxM

In order to operate an MPR-1510AR 2.6h you will need the following:

- PC running Windows¹ 98 or higher, CD-ROM drive and one RS-232 serial port.
- Host software (AWID's demo software or your own custom software)

1.1 SPECIAL FEATURES

- Multi-Protocol: ISO-18000-6 Type B, EPC Class 1² Gen 1 & 2, EPC V1.19 Rev.2
- Thin passive tags with long-range performance
- RS-232 outputs

¹ Though MPR-1510AR can also be controlled from a non-Windows programming platform, AWID demo and FW upgrade programs are applications to run in Windows.

² Both 64- and 96-bit

2 SPECIFICATIONS

| | |
|-----------------------------|---|
| Input voltage | +7.0 VDC to +15 VDC |
| Input current | 1.0 A (7.0 V) to 0.40 A (15 V) typical |
| Protocol language | ISO Type B, EPC Class 1 Gen 1 & 2, EPC V1.19 Rev.2 |
| Read range | Depends on type & size of labels used |
| Output power | +18.5 dBm max |
| Transmit frequency | 902.75-927.25 MHz |
| Receiver frequency | 902.75-927.25 MHz (Amplitude Modulated) |
| Hopping channels | 50 Channels |
| Channel spacing | 500 kHz |
| Hopping sequence | Pseudo random |
| Operating temperature range | -30° C to +65° C (-22° F to 149° F) |
| Output data formats | RS-232 |
| I/O Connector | DB-9 connector |
| Dimension | 3"x5"x0.25" |

2.1 CHANNEL FREQUENCY TABLE

Frequency range: 902.75 ~ 927.25 MHz

Minimum number of frequency channels: 50

| CH | 902~928 | MHz | CH | 902~928 | MHz | CH | 902~928 | MHz | CH | 902~928 | MHz | CH | 902~928 | MHz |
|----|---------|-----|----|---------|-----|----|---------|-----|----|---------|-----|----|---------|-----|
| 0 | 902.75 | MHz | 10 | 907.75 | MHz | 20 | 912.75 | MHz | 30 | 917.75 | MHz | 40 | 922.75 | MHz |
| 1 | 903.25 | MHz | 11 | 908.25 | MHz | 21 | 913.25 | MHz | 31 | 918.25 | MHz | 41 | 923.25 | MHz |
| 2 | 903.75 | MHz | 12 | 908.75 | MHz | 22 | 913.75 | MHz | 32 | 918.75 | MHz | 42 | 923.75 | MHz |
| 3 | 904.25 | MHz | 13 | 909.25 | MHz | 23 | 914.25 | MHz | 33 | 919.25 | MHz | 43 | 924.25 | MHz |
| 4 | 904.75 | MHz | 14 | 909.75 | MHz | 24 | 914.75 | MHz | 34 | 919.75 | MHz | 44 | 924.75 | MHz |
| 5 | 905.25 | MHz | 15 | 910.25 | MHz | 25 | 915.25 | MHz | 35 | 920.25 | MHz | 45 | 925.25 | MHz |
| 6 | 905.75 | MHz | 16 | 910.75 | MHz | 26 | 915.75 | MHz | 36 | 920.75 | MHz | 46 | 925.75 | MHz |
| 7 | 906.25 | MHz | 17 | 911.25 | MHz | 27 | 916.25 | MHz | 37 | 921.25 | MHz | 47 | 926.25 | MHz |
| 8 | 906.75 | MHz | 18 | 911.75 | MHz | 28 | 916.75 | MHz | 38 | 921.75 | MHz | 48 | 926.75 | MHz |
| 9 | 907.25 | MHz | 19 | 912.25 | MHz | 29 | 917.25 | MHz | 39 | 922.25 | MHz | 49 | 927.25 | MHz |

Table 1 Channel Frequency Table for 2.6 HA

2.2 CONNECTOR PIN ASSIGNMENT

| <u>Pin</u> | <u>Function</u> | <u>Pin</u> | <u>Function</u> |
|------------|-----------------|------------|-----------------|
| 1 | Ground | 6 | +7V/+15V |
| 2 | RS232 Tx | 7 | +7V/+15V |
| 3 | RS232 Rx | 8 | Data 0 |
| 4 | Enable RFID | 9 | Data 1 |
| 5 | Ground | 10 | Ext Data in |

2.3 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

For ease of explanation, MPR reader in this section refers to an RFID device that consists of 2.6h and a high performance circular polarized antenna inside a splash proof, UV stabilized housing case.

3.1 GENERAL WIRING REQUIREMENTS

All the MPR 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.

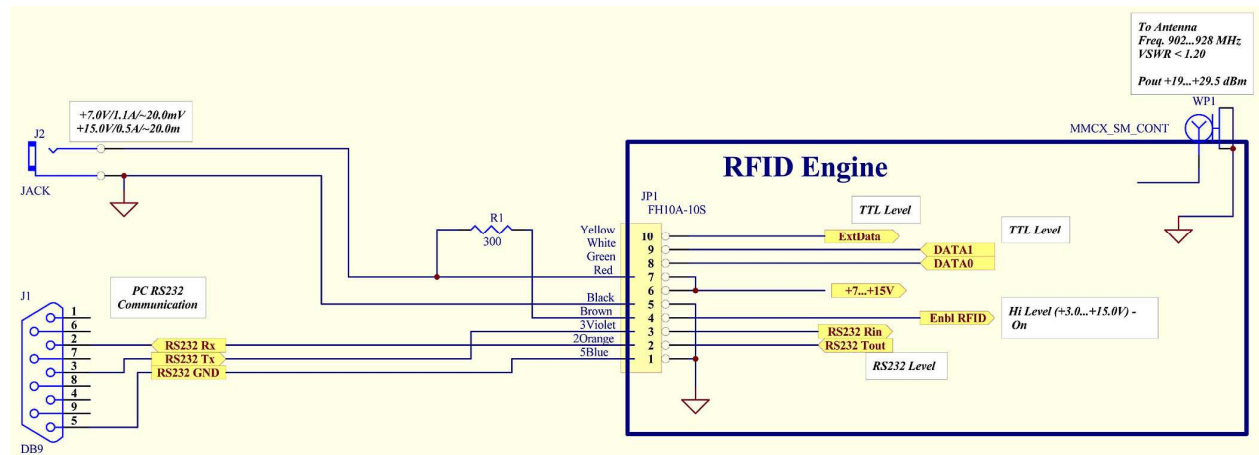
TABLE 3.4-1: Data Line's Wiring Requirement

| WIRE SIZE | #22 AWG (0.6 mm Dia.) | #24 AWG (0.5 mm Dia.) |
|-----------|-----------------------|-----------------------|
| RS-232 | 50 ft (15 meters) | 50 ft (15 meters) |

3.2 WIRING DIAGRAMS

See section 2.1 for pin assignment for the RS-232 connector of a 2.6H.

The MPR RS-232 interface is a short distance serial interface, a full command set for the standard serial interface is not necessary, therefore only transmit, receive and ground wires are used. Sense input is an enable input, which is traditionally used to activate the RF energy of the reader and to start the read functions.



4 INSTALLATION PROCEDURE

This section provides installation and operation information for 2.6h reader modules.

4.1 PARTS LIST

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

- Sentinel-Sense MPR-1510RM-V2.6H Qty=1
- Documentation and command demo program CD Qty=1

4.2 PREPARATION FOR INSTALLATION

Familiarize yourself with the connectors and pin out assignment of each I/O connectors.

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.

- Connect 2.6h to the RS-232 port of a PC
- Connect the power jack from the wall plug power supply to reader module
- Power up PC
- Install demo software on PC
- Activate demo software and verify performance of the reader.
- Select COM port 1 on top page then click "Connect". Follow with some commands.

5 SOFTWARE PROGRAMMING AND SYSTEM OPERATION NOTES

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 to issue commands to the MPR reader/module as specified.

5.1.2 Operating Modes

Typical operating modes for MPR readers can be grouped into the following modes:

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, MPR 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. Therefore, if there are many different protocols, for an untrained observer, 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 an MPR-1510RM-V2.6H.

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 RFID demonstration software application which is .NET based with easy-to-follow GUI operations, simply select the COM port for which the 2.6h is configured then click "Connect" should get you started.

6 MPR SERIAL COMMUNICATION PROTOCOL

See MPR Serial Communication Protocol Manual - 041304