



# AWiD ADB-510 UHF RFID Reader Module User Manual

[Home](#) » [AWiD](#) » AWiD ADB-510 UHF RFID Reader Module User Manual 

## AWiD ADB-510 UHF RFID Reader Module User Manual



### Contents

- [1 REVISION HISTORY](#)
- [2 INTRODUCTION](#)
- [3 SPECIFICATIONS](#)
- [4 Installation & Operation Guidelines](#)
- [5 Installation Procedure](#)
- [6 Reference](#)
- [7 COPYRIGHT](#)
- [ACKNOWLEDGEMENTS](#)
- [8 FCC COMPLIANCE](#)
- [9 Documents / Resources](#)
- [10 Related Posts](#)

### REVISION HISTORY

Version No.	Revised By	Date	Sections Affected	Remarks
0.1	AWID Engineering	6/2021	–	Initial version
0.2	AWID Engineering	7/2021	p.5	Editorial – IC Compliance statement
0.3	AWID Engineering	7/2021	p.2, p.5	Updated – FCC, IC Compliance

## INTRODUCTION

AWID's Sentinel-Sense ADB-510 is a single-port, long-range Radio Frequency Identification (RFID) reader module with 3.3 V TTL logical interface that works with most leading UHF passive tags. The reader module comes with a unique combination of long read range, small size, and low power consumption. Its primary applications are asset management and tracking, and fleet management applications.

ADB-510 is delivered with Firmware Version such as US0-62.xx.xx.

**In order to operate an ADB-510 you will need the following:**

- PC running Windows 7<sup>1</sup> or higher and one serial port
- Host software (AWID's demo software or your own custom software)

## SPECIAL FEATURES

- **Multi-Protocol:** ISO-18000-6 Type C, EPC Class 1 Gen 2
- Thin passive tags with long-range performance
- 3 V (5.0V tolerable) Serial TTL logical interface

<sup>1</sup> Though ADB-510 can also be controlled from a non-Windows programming platform, AWID demo and FW upgrade programs are applications to run in Windows.

## SPECIFICATIONS

- **Input voltage:** +5.8 VDC ~ 6 VDC (max)
- **Input current:** 1.4 A max @ +6V
- **Idle Power:** 0.5W in stand-by
- **Protocol language:** ISO Type C, EPC Class 1 Gen 2
- **Read range:** Depends on type & size of labels used
- **RF connectors:** MMCX (F) VSWR<1.2 @50OHMs
- **Output power:** +30 dBm max
- **Transmit frequency:** 902.60-927.40 MHz

- **Receiver frequency:** 902.60-927.40 MHz (Amplitude Modulated) Hopping channels 125 Channels
  - **Channel spacing:** 200 kHz typical
  - **Hopping sequence:** Pseudo random
  - **Operating temperature range:** -30° C to +65° C (-22° F to 149° F) (\*)
  - **Output data formats:** 3.3V TTL Serial
  - **I/OConnector :** 10-pin ZIF
  - **Dimension:** 2.11"x3.31"x0.35"
- (\*) depends on heat sink size

## CHANNEL FREQUENCY TABLE

**Frequency range:** 902.60 ~ 927.40 MHz

**Minimum number of frequency channels:** 125

C H	902~92 8	MH z	C H	902~92 8	MH z	C H	902~92 8	MH z	C H	902~92 8	MH z	CH	902~928	MHz
0	902.60	MH z	25	907.60	MH z	50	912.60	MH z	75	917.60	MH z	100	922.60	MHz
1	902.80	MH z	26	907.80	MH z	51	912.80	MH z	76	917.80	MH z	101	922.80	MHz
2	903.00	MH z	27	908.00	MH z	52	913.00	MH z	77	918.00	MH z	102	923.00	MHz
3	903.20	MH z	28	908.20	MH z	53	913.20	MH z	78	918.20	MH z	103	923.20	MHz
4	903.40	MH z	29	908.40	MH z	54	913.40	MH z	79	918.40	MH z	104	923.40	MHz
5	903.60	MH z	30	908.60	MH z	55	913.60	MH z	80	918.60	MH z	105	923.60	MHz
6	903.80	MH z	31	908.80	MH z	56	913.80	MH z	81	918.80	MH z	106	923.80	MHz
7	904.00	MH z	32	909.00	MH z	57	914.00	MH z	82	919.00	MH z	107	924.00	MHz
8	904.20	MH z	33	909.20	MH z	58	914.20	MH z	83	919.20	MH z	108	924.20	MHz
9	904.40	MH z	34	909.40	MH z	59	914.40	MH z	84	919.40	MH z	109	924.40	MHz
10	904.60	MH z	35	909.60	MH z	60	914.60	MH z	85	919.60	MH z	110	924.60	MHz

11	904.80	MH z	36	909.80	MH z	61	914.80	MH z	86	919.80	MH z	111	924.80	MHz
12	905.00	MH z	37	910.00	MH z	62	915.00	MH z	87	920.00	MH z	112	925.00	MHz
13	905.20	MH z	38	910.20	MH z	63	915.20	MH z	88	920.20	MH z	113	925.20	MHz
14	905.40	MH z	39	910.40	MH z	64	915.40	MH z	89	920.40	MH z	114	925.40	MHz
15	905.60	MH z	40	910.60	MH z	65	915.60	MH z	90	920.60	MH z	115	925.60	MHz
16	905.80	MH z	41	910.80	MH z	66	915.80	MH z	91	920.80	MH z	116	925.80	MHz
17	906.00	MH z	42	911.00	MH z	67	916.00	MH z	92	921.00	MH z	117	926.00	MHz
18	906.20	MH z	43	911.20	MH z	68	916.20	MH z	93	921.20	MH z	118	926.20	MHz
19	906.40	MH z	44	911.40	MH z	69	916.40	MH z	94	921.40	MH z	119	926.40	MHz
20	906.60	MH z	45	911.60	MH z	70	916.60	MH z	95	921.60	MH z	120	926.60	MHz
21	906.80	MH z	46	911.80	MH z	71	916.80	MH z	96	921.80	MH z	121	926.80	MHz
22	907.00	MH z	47	912.00	MH z	72	917.00	MH z	97	922.00	MH z	122	927.00	MHz
23	907.20	MH z	48	912.20	MH z	73	917.20	MH z	98	922.20	MH z	123	927.20	MHz
24	907.40	MH z	49	912.40	MH z	74	917.40	MH z	99	922.40	MH z	124	927.40	MHz

**Table 1 Channel Frequency Table for ADB-510**

## CONNECTOR PIN ASSIGNMENT

<b><u>Pin</u></b>	<b><u>Function</u></b>	<b><u>Pin</u></b>	<b><u>Function</u></b>
1	Reserved (*)	6	GND
2	Reserved	7	Unit Enable (**)
3	Reserved	8	SCIR (***)
4	+6.0 V	9	SCIT (***)
5	+6.0 V	10	GND

(\*) unit is disabled if pin 1 is low.

(\*\*) pin 7 is internally pulled high, user may leave this pin unconnected if manual control is not required.

(\*\*\*) SCIR receives input of reader, SCIT transmits output of reader.

## 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.

## Installation & Operation Guidelines

For ease of explanation, MPR reader in this section refers to an RFID device that consists of ADB-510 and a high performance circular polarized antenna inside a splash proof, UV stabilized housing case. The module should be installed on a heat sink.

Example of a heat sink could be an aluminum plate of size 8"x8"x0.1" exposed to convection air flow. The screws at the bottom of module shall be used for mounting the module on the heat sink.

## GENERAL WIRING REQUIREMENTS

ADB-510 requires 10-pin flat flex cable (FFC) to connect from the supply source. Avoid using long (e.g., 10" or longer) cables when connecting the unit from the power supply source.

## Installation Procedure

This section provides installation and operation information for ADB-510 reader modules.

## PARTS LIST

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

- Sentinel-Sense ADB-510 Qty=1

- Documentation and Demo SW<sup>2</sup> Qty=1

## **PREPARATION FOR INSTALLATION**

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

### **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 ADB-510 to the RS-232 port of a PC through the interface board provided in the demonstration kit
- 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 on top page then click "Connect". Follow with some commands.

### **Notes on Software Programming and System Operation**

## **SYSTEM OPERATION**

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 to send commands using *AWID MPR Communication Protocol* and/or the supporting SDK<sup>3</sup> to the reader

## **USERS NOTE**

### **For System Integrators and/or Software Developers**

System Integrators and/or Software developers should get familiar with the MPR Communication Protocol specifications and/or the supporting SDK for developing applications that control an ADB-510.

### **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 (AWIDMPR Command Demo II) which is .NET based with easy-to-follow GUI operations (ref II), simply fill in the IP address of the MPR reader installed then click "Connect" should get you started.

## **Reference**

1. MPR Communication Protocol – Doc# 041479

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## **FCC COMPLIANCE**

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

- Reorient or relocate the receiving
- Increase the separation between the equipment and
- 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.

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

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

### **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 23 cm between the radiator & your body.

This module is intended for OEM integrators only. Per FCC KDB 996369 D03 OEM Manual v01 guidance, the following conditions must be strictly followed when using this certified module:

**KDB 996369 D03 OEM Manual v01 rule sections:**

**1. List of applicable FCC rules**

2. This module has been tested for compliance to FCC Part 15

**3. Summarize the specific operational use conditions**

4. The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change application or new certification.

**5. Limited module procedures**

Not Applicable.

**6. Trace antenna designs**

Not Applicable.

**7. RF exposure considerations**

8. This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 23 cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

**9. Antennas**

10. The following antennas have been certified for use with this module; antennas of the same type with equal or lower gain may also be used with this module. The antenna must be installed such that 23 cm can be maintained between the antenna and users.

<b>Manufacturer/Brand</b>	<b>Model</b>	<b>Antenna Type</b>	<b>Antenna connector</b>	<b>Max Gain (dBi)</b>	<b>Impedance (<math>\Omega</math>)</b>
<b>AWID</b>	ANT-915CPS	<b>Patch</b>	<b>TNC, RP</b>	5.8	50
<b>AWID</b>	ANT-915-CP-R	<b>Patch</b>	<b>SMA, RP</b>	5.5	50
<b>AWID</b>	ANT-2012	<b>Patch</b>	<b>SMA, RP</b>	5.4	50
<b>AWID</b>	ANT-915-CC-05	<b>Patch</b>	<b>TNC, RP</b>	4.7	50

**11. Label and compliance information**

The final end product must be labeled in a visible area with the following: "Contains FCC ID: OGSADB510". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

**12. Information on test modes and additional testing requirements**

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) or portable use will require a separate class II permissive change re evaluation or new certification.

**13. Additional testing, Part 15 Subpart B disclaimer**



This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

As long as all conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

**IMPORTANT NOTE:** In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

### **Manual Information to the End User**

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

### **OEM/Host manufacturer responsibilities**

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.

### **INDUSTRY CANADA COMPLIANCE**

This device complies withISED's licence-exempt RSSs. 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.

### **Radiation Exposure Statement:**

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 34 cm between the radiator & your body.

**This device is intended only for OEM integrators under the following conditions: (For module device use)**

1. The antenna must be installed such that 34 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

### **DETACHABLE ANTENNA USAGE**

This radio transmitter [IC: 6449A-ADB510] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

<b>Manufacturer/ Brand</b>	<b>Model</b>	<b>Antenna Type</b>	<b>Antenna connector</b>	<b>Max Gain (dBi)</b>	<b>Impedance (<math>\Omega</math>)</b>
<b>AWID</b>	ANT-915CPS	<b>Patch</b>	<b>TNC, RP</b>	5.8	50
<b>AWID</b>	ANT-915-CP-R	<b>Patch</b>	<b>SMA, RP</b>	5.5	50
<b>AWID</b>	ANT-2012	<b>Patch</b>	<b>SMA, RP</b>	5.4	50
<b>AWID</b>	ANT-915-CC-05	<b>Patch</b>	<b>TNC, RP</b>	4.7	50

#### **IMPORTANT NOTE:**

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

#### **End Product Labeling**


This transmitter module is authorized only for use in device where the antenna may be installed such that 34 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains IC:6449A- ADB510".

#### **Manual Information to the End User**

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.



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