# SENTINEL-SENSE ADB-522

## Installation & Operation Manual - 041533

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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 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.

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:
2.2 List of applicable FCC rules
 This module has been tested for compliance to FCC Part 15.247

2.3 Summarize the specific operational use conditions
 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.

2.4 Limited module procedures
 Not applicable.

2.5 Trace antenna designs
 Not applicable.

2.6 RF exposure considerations
 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.

2.7 Antennas
 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.

| Manufacturer/ Brand | Model | Antenna Type | Antenna connector | Max Gain (dBi) | Impedance (Ω) |
|---|---|---|---|---|---|
| AWD | ANT-915CPS | Patch | TNC, RP | 5.84 | 50 |
| AWD | ANT-915-CP-R | Patch | SMA, RP | 5.5 | 50 |
| AWD | ANT-2012 | Patch | SMA, RP | 5.4 | 50 |
| AWD | ANT-915-CC-05 | Patch | TNC, RP | 4.7 | 50 |

### 2.8 Label and compliance information

The final end product must be labeled in a visible area with the following: "Contains FCC ID: OGSADB512". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

### 2.9 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.

### 2.10 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.

### 2.11 Host Guidance

Please follow the guidance provided for host manufacturers in KDB publications 996369 D02 and D04.

### 2.12 How to make changes

Only Grantees are permitted to make permissive changes. Please contact us should the host integrator expect the module to be used differently than as granted:

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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

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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.**

**REVISION HISTORY**

| Version No. | Revised By | Date | Sections Affected | Remarks |
|---|---|---|---|---|
| 0.1 | AWID Engineering | 12/2023 | - | Initial version |
| 0.2 | AWID Engineering | 12/2023 | FCC COMPLIANCE | Revision per Test Lab feedback |

## 1 INTRODUCTION

AWID's Sentinel-Sense ADB-522 is a 4-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-522 is delivered with Firmware Version such as US0-60.xx.xx.

In order to operate an ADB-522 you will need the following:

- ❑ PC running Windows[1] with serial (RS-232) interface
- ❑ Host software (AWID's demo software or your own custom software)

### 1.1 SPECIAL FEATURES

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

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[1] Though this reader can also be controlled from a non-Windows programming platform, only Windows SDK and programs are provided by AWID.

## 2   SPECIFICATIONS

| | |
|---|---|
| Input voltage | +5.8 VDC ~ 6 VDC (max) |
| Input current | 1.4 A max @ +6VDC |
| 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 | 4xMMCX (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/O Connector | 10-pin ZIF |
| Dimension | 2.11"x4.25"x0.35" |

(*) depends on heat sink size

### 2.1   CHANNEL FREQUENCY TABLE

Frequency range: 902.60 ~ 927.40 MHz          Minimum number of frequency channels: 125

| CH | 902~928 | MHz | CH | 902~928 | MHz | CH | 902~928 | MHz | CH | 902~928 | MHz | CH | 902~928 | MHz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 902.60 | MHz | 25 | 907.60 | MHz | 50 | 912.60 | MHz | 75 | 917.60 | MHz | 100 | 922.60 | MHz |
| 1 | 902.80 | MHz | 26 | 907.80 | MHz | 51 | 912.80 | MHz | 76 | 917.80 | MHz | 101 | 922.80 | MHz |
| 2 | 903.00 | MHz | 27 | 908.00 | MHz | 52 | 913.00 | MHz | 77 | 918.00 | MHz | 102 | 923.00 | MHz |
| 3 | 903.20 | MHz | 28 | 908.20 | MHz | 53 | 913.20 | MHz | 78 | 918.20 | MHz | 103 | 923.20 | MHz |
| 4 | 903.40 | MHz | 29 | 908.40 | MHz | 54 | 913.40 | MHz | 79 | 918.40 | MHz | 104 | 923.40 | MHz |
| 5 | 903.60 | MHz | 30 | 908.60 | MHz | 55 | 913.60 | MHz | 80 | 918.60 | MHz | 105 | 923.60 | MHz |
| 6 | 903.80 | MHz | 31 | 908.80 | MHz | 56 | 913.80 | MHz | 81 | 918.80 | MHz | 106 | 923.80 | MHz |
| 7 | 904.00 | MHz | 32 | 909.00 | MHz | 57 | 914.00 | MHz | 82 | 919.00 | MHz | 107 | 924.00 | MHz |
| 8 | 904.20 | MHz | 33 | 909.20 | MHz | 58 | 914.20 | MHz | 83 | 919.20 | MHz | 108 | 924.20 | MHz |
| 9 | 904.40 | MHz | 34 | 909.40 | MHz | 59 | 914.40 | MHz | 84 | 919.40 | MHz | 109 | 924.40 | MHz |
| 10 | 904.60 | MHz | 35 | 909.60 | MHz | 60 | 914.60 | MHz | 85 | 919.60 | MHz | 110 | 924.60 | MHz |
| 11 | 904.80 | MHz | 36 | 909.80 | MHz | 61 | 914.80 | MHz | 86 | 919.80 | MHz | 111 | 924.80 | MHz |
| 12 | 905.00 | MHz | 37 | 910.00 | MHz | 62 | 915.00 | MHz | 87 | 920.00 | MHz | 112 | 925.00 | MHz |
| 13 | 905.20 | MHz | 38 | 910.20 | MHz | 63 | 915.20 | MHz | 88 | 920.20 | MHz | 113 | 925.20 | MHz |
| 14 | 905.40 | MHz | 39 | 910.40 | MHz | 64 | 915.40 | MHz | 89 | 920.40 | MHz | 114 | 925.40 | MHz |
| 15 | 905.60 | MHz | 40 | 910.60 | MHz | 65 | 915.60 | MHz | 90 | 920.60 | MHz | 115 | 925.60 | MHz |
| 16 | 905.80 | MHz | 41 | 910.80 | MHz | 66 | 915.80 | MHz | 91 | 920.80 | MHz | 116 | 925.80 | MHz |
| 17 | 906.00 | MHz | 42 | 911.00 | MHz | 67 | 916.00 | MHz | 92 | 921.00 | MHz | 117 | 926.00 | MHz |
| 18 | 906.20 | MHz | 43 | 911.20 | MHz | 68 | 916.20 | MHz | 93 | 921.20 | MHz | 118 | 926.20 | MHz |
| 19 | 906.40 | MHz | 44 | 911.40 | MHz | 69 | 916.40 | MHz | 94 | 921.40 | MHz | 119 | 926.40 | MHz |
| 20 | 906.60 | MHz | 45 | 911.60 | MHz | 70 | 916.60 | MHz | 95 | 921.60 | MHz | 120 | 926.60 | MHz |
| 21 | 906.80 | MHz | 46 | 911.80 | MHz | 71 | 916.80 | MHz | 96 | 921.80 | MHz | 121 | 926.80 | MHz |
| 22 | 907.00 | MHz | 47 | 912.00 | MHz | 72 | 917.00 | MHz | 97 | 922.00 | MHz | 122 | 927.00 | MHz |
| 23 | 907.20 | MHz | 48 | 912.20 | MHz | 73 | 917.20 | MHz | 98 | 922.20 | MHz | 123 | 927.20 | MHz |
| 24 | 907.40 | MHz | 49 | 912.40 | MHz | 74 | 917.40 | MHz | 99 | 922.40 | MHz | 124 | 927.40 | MHz |

**Table 1   Channel Frequency Table for ADB-522**

## 2.2   CONNECTOR PIN ASSIGNMENT

| Pin | Function | Pin | Function |
|-----|----------|-----|----------|
| 1 | Reserved | 6 | GND |
| 2 | Reserved | 7 | Unit Enable (*) |
| 3 | Reserved | 8 | SCIR |
| 4 | +6 VDC | 9 | SCIT |
| 5 | +6 VDC | 10 | GND |

(*) Note: pin 7 is internally pulled high. User may leave this pin unconnected if manual control is not required


## 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.

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## 3    INSTALLATION & OPERATION GUIDELINES

For ease of explanation, MPR reader in this section refers to an RFID device that consists of ADB-522 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.

### 3.1    GENERAL WIRING REQUIREMENTS

ADB-522 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.

## 4   INSTALLATION PROCEDURE

This section provides installation and operation information for ADB-522 reader modules.

### 4.1   PARTS LIST

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

- Sentinel-Sense ADB-522                                                      Qty=1
- Documentation                                                              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 ADB-522 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 1 on top page then click "Connect". Follow with some commands.

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## 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 Communication Protocol* and/or the supporting SDK ([http://www.awid.com](http://www.awid.com) Support/Download) to issue commands to the MPR reader/module as specified.

### 5.2    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-522.

**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 ADB-522 is configured then click "Connect" should get you started.

### 6    Reference

*MPR Communication Protocol Manual* – Doc# 041479
*MPR Command Demo II Quick Reference* Guide – Doc# 041483