

Active RFID System Evaluation Kit – ARSEK001

User's Getting Started Quick Guide

1. Overview

The ARSEK001 System Evaluation Kit (**SEK**) was developed to give prospective users of RFID technology an economical and convenient method of evaluating solutions in their own environment.

Small to medium scale evaluations can be rapidly implemented to allow rapid management or customer decisions to be made. For larger scale evaluations, additional readers and tags can be purchased whenever required.

Although the tags supplied with the **SEK** are "**Base-Line**" units, tags with additional features such as movement detection can be purchased and used together with the reader and tags supplied with the **SEK**.

2. SEK Contents

The ARSEK001 **SEK** contains a USB Reader, 10 **Base-Line** Tags packed in a robust tote-box for convenient storage. In addition, a memory stick has been included in the **SEK** to allow any software or data downloaded together with any user-developed software to be stored together with the **SEK**. The tag housings have **not** been sealed to allow the user to view the tag electronics.

Please note that the RF Tags web site details are given in both human readable form and as QR Code scannable images on the tote-box. Both of these addresses vector directly to the Active Tag information on the RF Tags web site. It is important to visit the web site regularly as additional information, updates, new products, free software and many downloads will continuously be posted there. In addition, video tutorials will be posted to answer any questions that appear to be of general interest.

3. Unpacking and Starting up the SEK

The 10 tags are already active and require no user action. The tags can be placed wherever convenient for initial testing. Usually that means on your desk close to the reader and PC.

It must now be established which COM port is assigned to the RFID reader and this must be changed if necessary. This can be easily accomplished by means of the following steps:

- Do **not** plug the reader's USB connector into your PC yet!
- Open the **Device Manager** window.
 - On an XP system this can easily be achieved by clicking on **start** on the Desktop, then right-click **My Computer** then **Properties** on the Drop-Down. You will now be on the **System Properties** window and can select the **Hardware** tab. Finally click the **Device Manager** button.
- Once you have the **Device Manager** window open, open **Ports (COM & LPT)** by clicking on the "+" sign to the left of the **Ports (COM & LPT)** label. At this point you will see a list of the COM ports on your PC together with their number. You will **not** see the RFID reader yet as it has not yet been plugged in.

- Plug the reader's USB connector into any convenient USB connector of the PC to be used for setting up and initial evaluation of the RFID technology system. The RFID reader should now start to read any compatible tags within read range as indicated by beeping emanating from the RFID reader. (As the reader is shipped set to Short Range the tags can be very close to the reader and will read up to approximately 3 meters distance from the reader).
- The display in the **Device Manager** window will now update to show the RFID reader and its pre-assigned COM port number. This should not clash with any of the pre-existing COM port numbers.
- If the COM port number is between 1 and 12, it can be used without change. However, if it clashes with a COM port number used by any other device normally connected to the PC (including devices that are not currently plugged in), the COM port number must be changed. This can easily be achieved as follows:
 - Click on the RFID reader's COM port entry in the **Device Manager** window. If you have followed the above steps this will be the last (bottom) entry under **Ports (COM & LPT)** and will be in the form **USB "Serial Port (COMn) Properties"** where "n" is the actual COM Port number.
 - Now select the **Port Settings** tab and click on the **Advanced** button. The desired COM Port Number can now be selected using the Drop-Down list found on the top left of the **Advanced Setting for COMn** window. Unfortunately Windows tends to mark ports as **(in use)** even when that is not the case. The best solution seems to be to try it if it was not shown on the **Ports (COM & LPT)** list displays in the **Device Manager** window.
- Record the RFID reader's COM Port Number for using in setting up communications with the reader.

4. Running your RFID reader using Hyperterminal.

The easiest way to experiment with the **RFID Reader** supplied with your **SEK** is by means of a terminal program like Hyperterminal. If Hyperterminal is not available on your PC (e.g. with Windows7) you may have to download a suitable terminal program. Please check the RF Tags web site for selected terminal programs.

The following instructions are for Hyperterminal:

- Start Hyperterminal on an XP system by clicking on **start** on the Desktop, then selecting **All Programs, Accessories, Communications, Hyperterminal**. When selecting Hyperterminal choose the one with the Telephone icon and no arrow to show further selections. The other Hyperterminal selects a list of previously save Hyperterminal configurations.
- Once Hyperterminal starts you will be prompted to set up a new connection. Type in the name you wish to call the configuration you are now setting up. (This is not important if you do not intend saving the configuration, but a well thought out name will help you recover your configuration later). Once you have entered the desired name click **OK** and you will be prompted "**Connect To**". Ignore the first 3 items and go directly to "**Connect using**". Click the drop-down arrow and you should be presented with a list of the active COM ports on your PC, including your RFID reader. Click on the RFID reader's COM port and a window titled **COMn Properties** will open. Click the drop-down arrow on "**Bits per second:**" and select **115200**. Now click the drop-down arrow on "**Flow control:**" and select **None**. Finally, click **OK** and Hyperterminal

should be connected and start displaying tag reads on the Hyperterminal screen.

5. Controlling the RFID Reader using Hyperterminal

The RFID reader supplied with the **SEK** uses single byte binary commands to control its operation. This was done in order to minimize the overhead when controlling the reader. Because the commands are single byte no terminator (CR/LF) is required.

Binary commands are not always easy or even possible using a terminal program (unless bytes are represented by 2 alpha-numeric characters). For this reason, all of the binary commands were carefully chosen so that they can be sent using a text character with the correct bit settings.

The basic aspects that can be controlled using the binary commands are:

- Output Data Format – currently 3 formats are supported:
 - Verbose – tag data is a text string followed by the Battery Status information in text.
 - Binary - tag data is a text string followed by Status Byte giving the Battery Status as a bit (B1).
 - iPico – this format was implemented for compatibility with the iPico RFU used on the 868/915 MHz Passive Tag readers manufactured by RF Tags.
- Beeper Operation – the beeper can be turned on or off.
- Read Range – the reader can be set up for Short or Long Read Range. This feature is useful for implementing *Search/Locate* applications as the read range is directly controlled by the application software. *Warning – when set up for Long Read Range, the reader may be overloaded by tags that are very close (<1,5 meters) resulting in a reduced read rate.*
- Reader On / Off.

6. Use of the Various Output Data Formats

The 3 different Output Data Formats support different uses of the RFID reader. Some information concerning the output formats is appropriate:

VERBOSE MODE

This is intended for testing and very simple applications in which the data from the tag be used without any significant processing. For example, the data could be re-directed to a serial interface printer to give a hard copy of all tags read. However it must be stressed that the primary use of this mode is for testing purposes. The tag data is transmitted first as “unpacked” hex bytes (i.e. 2 text characters per byte). Additional information, such as Battery Condition, is displayed in human readable text. The tag data is transmitted first as “unpacked” hex bytes (i.e. 2 text characters per byte). When the Verbose Mode is selected, the reader sends a “Splash Screen” to the terminal program, which gives software revision information as well as contact details. This “Splash Screen” is displayed for approximately 2 seconds, during which time the reader is inactive, before being removed.

BINARY MODE

BINARY MODE outputs tag data first as “unpacked” hex bytes as with the VERBOSE MODE described above. This is followed by a single

status byte, which is also transmitted as an “unpacked” hex byte. This mode is for applications in which software is developed for use with the reader so that parsing a text string to extract status information is not required. No “Splash Screen” is transmitted to the terminal program when in Binary Mode and software version information is not available.

IPICO MODE

The iPico MODE is mainly used to support integration into Active Tag versions of RF Tags legacy products and as such is not intended for general use. This mode is selected by sending the D, E, T or U commands for the usual permutations of Beeper On/Off and Long/Short read range.

7. Text Mode Commands for use with a Terminal Program

A few commands are required to operate the RFID reader from a terminal program. This list is not comprehensive but lists all of the essential commands.

The available commands will be listed in 3 groups:

VERBOSE MODE

B : Reader Active, Beeper Enabled, Short Read Range

C : Reader Active, Beeper Disabled, Short Read Range

R : Reader Active, Beeper Enabled, Long Read Range

S : Reader Active, Beeper Disabled, Long Read Range

BINARY MODE

@ : Reader Active, Beeper Enabled, Short Read Range

A : Reader Active, Beeper Disabled, Short Read Range

P : Reader Active, Beeper Enabled, Long Read Range

Q : Reader Active, Beeper Disabled, Long Read Range

GENERAL

K : Reader Off

The Command Characters are not exclusive as several alternate characters could achieve the same result. The Command Characters are not case sensitive.

8. Reader Operating Mode Storage

The Reader Operating Mode is stored in non-volatile memory every time a change is made to it. On power-up the Active Tag Reader will check if a valid Operating Mode has been stored and if this is the case, it will read the stored Operating Mode and configure the RFID reader to operate with the previous settings. For this reason, the Active Tag Reader will always perform as configured before its last power down when next powered up.

9. Command Byte Bits

The bits of the Command Byte have the following meaning:

- Bit 7 - Never used as it is not easily accessed from a keyboard.
- Bit 6 - Don't care bit.
- Bit 5 - Hi for lower case when testing from a terminal program.
- Bit 4 - LongRange Hi enables Long Read Range.
- Bit 3 - RdMdOff Stops the reader from reading tags.
- Bit 2 - iPicoMd Transmits data in iPico RFU format.

Bit 1 - VerboseMd	Hi displays status info in human readable form.
Bit 0 - NoBeep	A hi in this bit disables the readers beeper.