ALR-S350
User Guide

April 2018

ALR-S350

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This equipment has been tested and found to comply with the limits for Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user can try to correct the interference by reorienting the ALR-S350 antenna or the receiving antenna, increasing the separation between the ALR-S350 and the receiver, connect the ALR-S350 to an outlet on a different circuit than the receiver or consult the dealer.

Any change or modification to this product voids the user’s authority to operate per FCC Part 15 Subpart A. Section 15.21 regulations.

IC Compliance Notice
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. EN/ This Class B digital apparatus complies with Canadian ICES-003.

Le présent appareil est conforme aux CNR d’Industrie Canada applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes : 1) l’appareil ne doit pas produire de brouillage; 2) l’utilisateur de l’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

Caution
This equipment complies with EU, FCC and IC’s RF radiation exposure limits set forth for an uncontrolled environment under the following conditions:

1. This equipment should be installed and operated such that a minimum separation distance of 20 cm is maintained between the antenna and user’s/nearby person’s body at all times.
2. This equipment must not be co-located or operating in conjunction with any other antenna or transmitter.

CE

Alien Technology, LLC. Declares under our own authority that the ALR-S350-EMA is in compliance with the following essential requirements and relevant provisions of
RED: 2014/53/EU
EMC: 2014/30/EU
LVD: 2014/35/EU
RoHS: 2011/65/EU

Table of Contents

1. Getting Started

1.1. General

Alien ALR-S350 provides UHF RFID reader and 1D/2D barcode scanning functionalities for host devices. The Alien ALR-S350 is connected to host devices via Bluetooth® Low Energy wireless technology.

1.2. Available Accessories

Code	Description
ALX-540	Docking Station & PSU for ALR-S350
ALX-541	Quad Lock® Universal Adapter
ALX-542	Replacement battery for ALR-S350

1.3. ALR-S350 Reader Kit Contents

The ALR-S350 Reader Kit includes the ALR-S350 Reader and the ALX-540 Docking Station and Power Supply. The Alien ALR-S350 box contains following items

- The Alien ALR-S350
- Battery
- Components for magnet fastening of host device
- Screws for fastening of host device
- Business card with link to firmware updates

> **NOTE** Quad Lock® universal adaptor is also available from third parties

The Alien ALX-540 box contains following items

- Docking Station
- Power Supply
- USB A to Micro USB B Cable

1.4. Safety

1.4.1. Battery

- Use only battery supplied with ALR-S350:
  Note: Using other battery types or may cause a battery explosion.
- Do not disassemble the battery.
- Do not short circuit the battery's electrical contacts.
- Do not expose the battery to direct sunlight or other heat sources.
- Dispose of the battery according to local laws and regulations.

1.4.2. AC Adapter

- Only use the supplied AC Adapter for charging the ALR-S350 or its rechargeable batteries on the charging cradle.
- Use only AC adapters provided with ALR-S350 or approved by Alien Technology.
- Do not use the AC adapter for any other purposes other than for charging the ALR-S350 rechargeable batteries/or powering the unit.
- Check the mains voltage against those specified in the AC adapter before plugging to mains socket.
- Use the AC adapter indoors at normal room temperatures.

1.4.3. Medical Devices

- To avoid potential interference, keep the ALR-S350 a minimum of 20 centimeters (8 inches) from medical devices such as pacemakers, hearing aids, and / or cardioverter-defibrillators - at all times.

1.4.4. Explosive Atmosphere

- Switch off the ALR-S350 when in areas with a potentially explosive atmosphere. Sparks in such areas could cause fire or an explosion. "Potentially explosive environments" include areas where the air contains chemicals or particles such as dust or other powders. Potentially explosive areas are often, but not necessarily always, clearly marked. Obey all signs and instructions.

1.4.5. Laser Barcode Scanner

- The ALR-S350 includes a laser barcode scanner. The laser power is 1 mW at 650 nm. Do not stare into the beam or point it at another person's eyes.

1.5. Care, Handling and Storage

1.5.1. Cleaning

- The ALR-S350 can be wiped clean with a damp, non-abrasive, clean, lint-free cloth. Do not use harsh chemicals, strong detergents, or abrasive cleaners to clean the device.

1.5.2. Handling and Storage

- Store ALR-S350 and accessories in a clean and dry environment.
- Allow the device / accessory to acclimate for several hours, after being brought in from the cold, before powering up the device.
- If moisture gets inside the device because of condensation or spillage, remove the battery. Power up only when the device is completely dry.
- Do not open the case. There are no user serviceable parts inside the ALR-S350. Opening the case voids the warranty. Contact Alien Customer Service with any issues
- Charge the batteries fully before usage. Charging takes approximately 8 hours.
- Do not use the AC adapter for any purposes other than for charging the ALR-S350 rechargeable batteries/or powering the unit.

1.5.3. Precautions When Using the Battery

- Don't leave batteries unused for extended periods of time, either in the product or in storage. When the battery has been unused for 6 months, check the charge status and charge or dispose of the battery as appropriate.
- The typical estimated life of a Lithium-Ion battery is about two or three years, or 300 to 500 charge cycles, whichever occurs first. One charge cycle is a period of use from fully charged, to fully discharged, and fully recharged again. Expect a two to three year life for batteries that do not run through complete charge cycles.
- Rechargeable Lithium-Ion batteries have a limited life and will gradually lose their capacity to hold a charge. This loss of capacity (aging) is irreversible. As the battery loses capacity, the length of time it will power the product (run time) decreases.
- Lithium-Ion batteries continue to slowly discharge (self-discharge) when not in use or while in storage. Routinely check the battery's charge status.
- Carefully monitor batteries that are approaching the end of their estimated life.
- Consider replacing the battery with a new one if you note either of the following conditions:
    - The battery run time drops below about 80% of the original run time.
    - The battery charge time increases significantly.
- If a battery is stored or otherwise unused for an extended period, be sure to follow the storage instructions in this document. If you do not follow the instructions, and the battery has no charge remaining when you check it, consider it to be damaged. Do not attempt to recharge it or to use it. Replace it with a new battery.
- Charge or discharge the battery to approximately 50% of capacity before storage.
- Charge the battery to approximately 50% of capacity at least once every six months.
- Remove the battery and store it separately from the product.
- Store the battery at temperatures between 5 °C and 20 °C (41 °F and 68 °F).

1.6. Features Overview

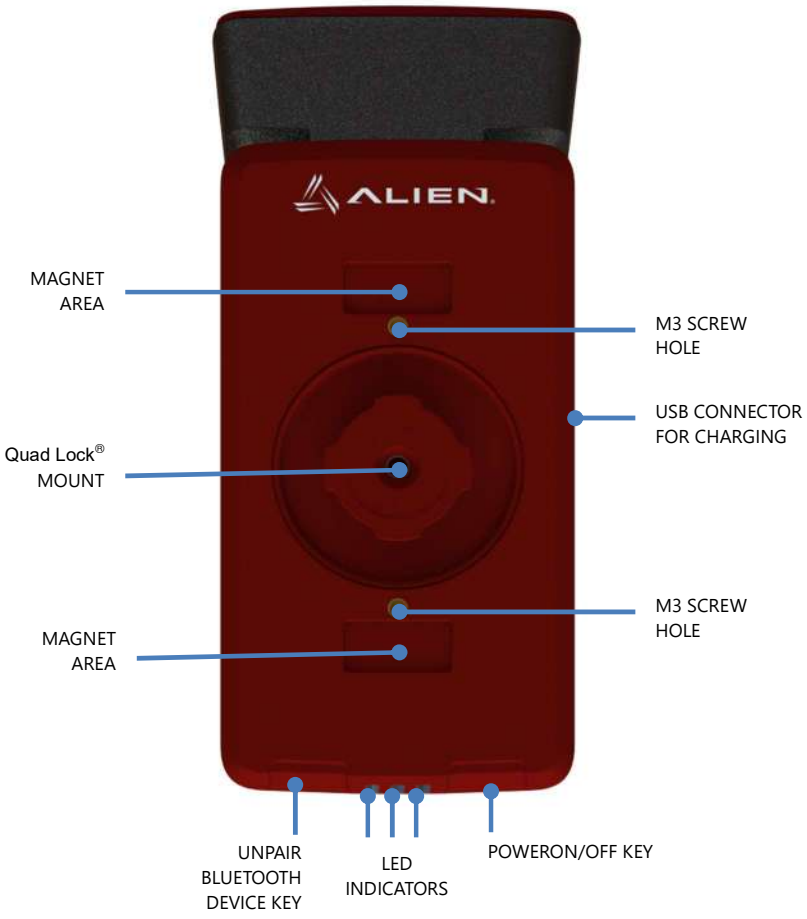


Figure 1: Key features of the ALR-S350

1.6.1. Keys and Buttons

The Alien ALR-S350 includes two capacitive keys and one trigger button for user interactions.

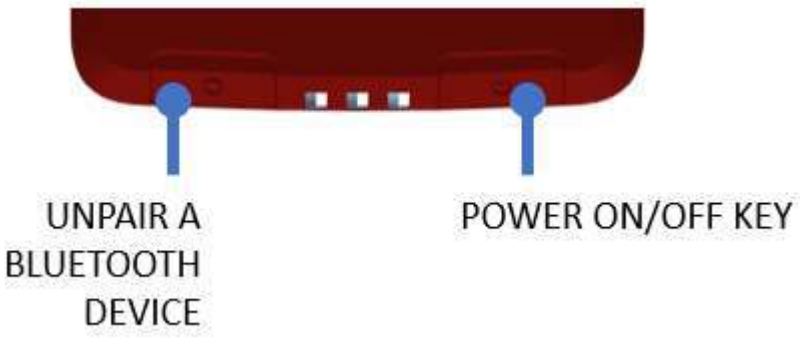


Figure 2: Location of Capacitive keys

1.6.1.1. Power Key

The Power key turns the ALR-S350 On/Off. To turn on the ALR-S350 press the power key for 2-3 seconds until the red LED turns to green. This protects against accidental turn on. Turn off in the same way. When there is an active Bluetooth connection the power key must be pressed for at least 7 seconds to turn off.

1.6.1.2. Unpair a Bluetooth Device Key

If the Alien ALR-S350 is paired to the host device, it stores information about the paired devices and tries to connect automatically when turned on. The “Unpair a Bluetooth device” key clears paired device data from the ALR-S350 memory.

Unpairing:

- Make sure device is disconnected from the host device.
- Press and keep “Unpair” button down for at least 3 second.
- When the ALR-S350 beeps three times, pairing is cleared.

> **NOTE:** The “Unpair a Bluetooth device” key is disabled when the ALR-S350 has an active Bluetooth connection with host device

1.6.1.3. Trigger Button

The trigger button is located on the pistol grip and it can be used to start/stop UHF RFID/barcode scanning and turn reader on. When turning the reader on the trigger button needs to be pressed 0.5 seconds until blue LED starts blinking before it triggers. This ensures that accidental presses are avoided. Depending on the application in use, the trigger button starts/stops UHF RFID or barcode reading. By default, the first press of the button starts the reading and the second press of the button stops it.

> **NOTE:** Button usage depends on the software in use.

1.6.2. LED Indicators

The Alien ALR-S350 includes three LEDs indicators.

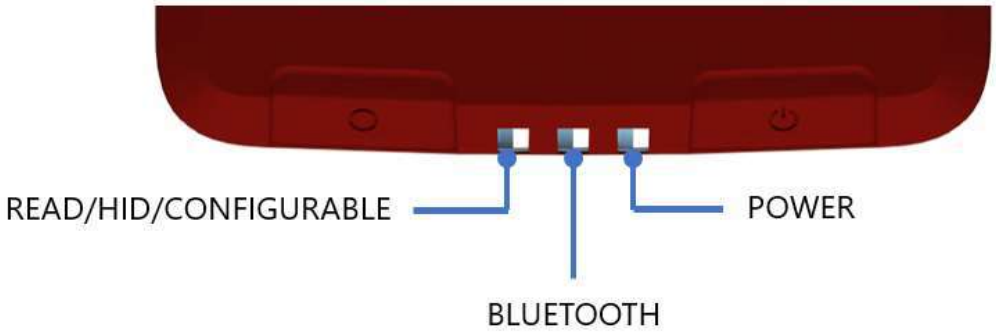
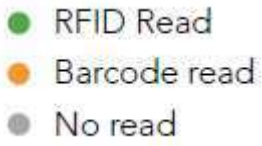


Figure 3: Location of LEDs

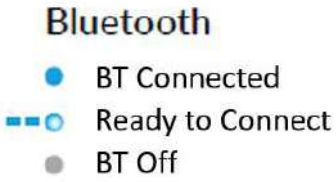
1.6.2.1. READ/HID/CONFIGURABLE LED

By default, Read/HID/Configurable LED indicates whether RFID or barcode reading is active. The Read/HID/Configurable LED can be configured via API if needed.



1.6.2.2. Bluetooth LED

The Bluetooth LED indicates whether the Bluetooth connection is On/Off or in search mode.



1.6.2.3. POWER LED

The Power LED indicates whether the reader is On/Off it also indicates the battery level of the reader. The battery level is indicated by the color of the Power LED.

- Power On Battery Full > 20 %
- Power On Battery Low < 10 %
- Power On Battery Medium 10–20 %
- Power Off

A blinking Power LED indicates that the device is charging. The battery level during charging is indicated by the color of the blinking Power LED.

1.7. Installing the Battery

Figure 4: Installing battery

1.8. Charging

1.8.1. Charging the Alien ALR-S350 in the Cradle

The Alien ALR-S350 is charged via the cradle and USB charger. Maximum charging power via the cradle is 10W (5V @ 2A). Charging time from 0 to 100% via the cradle is about 5 hours. Only charge the ALR-S350 using the supplied charger.

The ALR-S350 can also be charged from a USB charger via a Micro USB cable. The recommended charging power is 10 W (5V @ 2 A).

Charging status is indicated by Power LED.

Figure 5: Charging of the Alien ALR-S350 via the ALX-540 cradle

Figure 6: Charging the Alien ALR-S350 via USB charging port

1.8.2. Charging the Host device via USB

Host device can be charged via the cradle using a compatible USB cable (the cradle contains an USB type-A connector). Maximum charging power via the cradle depends on charge level of the Alien ALR-S350 battery. Maximum 7W charging power can be achieved when the battery of the Alien ALR-S350 is full/almost full. When the Alien ALR-S350 charges at full power then the maximum charging power of host device is limited to 4W.

Figure 7: Charging the Host device via USB

1.8.3. Charging the Battery

The battery of the Alien ALR-S350 can be charged in the cradle. Please note that when USB charging from the cradle is used, spare battery charging of the cradle is disabled.

Figure 8: Battery charging in cradle

1.9. Fastening the Host Device

The Alien ALR-S350 provides three different fastening methods for host devices. The fastening methods are Quad Lock®, magnets, and screw fastenings.

1.9.1. Quad Lock® Fastening

The Quad Lock® fastening uses popular and easy to use Quad Lock® fastening system. The Quad Lock® fastening system provides strong and secure fastening and is suitable for different kind of host devices. The Quad Lock® Universal Adapter is available from Alien Technology as Model ALX-541 or from third parties.

Fastening of the host device on the Alien ALR-S350 with the Quad Lock® fastening system is easy. The first step is to attach a Quad Lock® adapter on the host device. Second step is to fasten the host device on the Alien ALR-S350 by attaching and locking the Quad Lock® fastening system.

Figure 9: Quad Lock® installation

NOTE: Quad Lock® universal adapter is sold separately

1.9.2. Magnet Fastening

The magnet fastening is strong and effortless option to mount a host device on the Alien ALR-S350. Using magnet fastening is easy. The first step is to place the magnetic fastening components in the recesses located on the top cover of the Alien ALR-S350 with the protective tape pointing outwards from the Alien ALR-S350. The second step is to remove protective tape from the counter parts of magnets. The third step is to place the host device on top of the Alien ALR-S350 and ensure that the magnet counter parts are securely attached to the host device.

Figure 10: Magnet Installation

1.9.3. Screw Fastening

The screw fastening is a robust option to mount a host device on the Alien ALR-S350. This option requires a protective case or cover for the host device which is screwed on the Alien ALR-S350. First, screw the case/cover to screw holes of the Alien ALR-S350. The distance between the screw holes is 68 mm and the diameter of each screw is 3.5 mm. Next place the host device in the case/cover

Figure 11: Screw Mounting

1.10. Connecting the Host Device to the ALR-S350

The Alien ALR-S350 supports only Bluetooth Low Energy Class 2 connection for host devices. Supported Bluetooth Low Energy versions are 4.0 – 4.2 and supported profiles are GATT and HID.

NOTE: The host device must support Bluetooth Low Energy

1.10.1. Connect the Host Device via Bluetooth Without Pairing (Recommended)

The ALR-S350 will advertise itself via Bluetooth until the host device connects to it. This state is indicated by flashing the blue Bluetooth LED. To connect via Bluetooth

1. Enable Bluetooth in the host device Settings. If you plan to use the Alien RFID Demo do not pair with any device. If pairing is requested select No.
2. Open the Alien RFID Demo and tap the three-bar icon in the upper left corner of the application window.
3. Select Connection. This will display the ALR-S350s available for connection by their serial number. The serial number of the ALR-S350 can be found on the label applied to the RFID module housing.
4. Select an ALR S350 by tapping the serial number. The ALR-S350 Bluetooth LED will glow a steady blue when connected.
   The Bluetooth connection remains active until the application is closed or the host device Bluetooth is turned off. Once disconnected the ALR-S350 will start advertising itself again and any host device can connect to it.
   The ALR-S350 will remember the Host device. If a previously connected host device is in range and has not been forced to forget the ALR-S350 it will automatically connect again when the Alien RFID demo is opened.

NOTE: In most case pairing of the ALR-S350 with the Host device is not required and and not recommended

1.10.2. Pairing and unpairing the ALR-S350 with a host device

By default, pairing support is disabled (since firmware 2.2.1). If your application requires pairing of the ALR-S350 and the host device, the ALR-S350 must be configured for pairing. Pairing can be enable two different ways that are:

1. To enable pairing using the Alien RFID demo. connect ALR-S350 to host device.
   a. For Android go to Settings -> Reader Settings-> Host device connection and check Pairing enabled tick box.
   b. For iOS go to Settings -> Reader Settings-> Connection and enable Allow pairing
2. Disconnect the host device Bluetooth connection
3. Tap the Barcode icon
4. Scan the configuration barcodes below to enable/disable pairing support. To scan pull and release the trigger and scan the desired code
   a. ALLOWPAIRON = Pairing enabled
   b. ALLOWPAIROFF = Pairing disabled

NOTE: Barcode configuration codes can be scanned only when there is no active Bluetooth connection with the host device

The ALR-S350 can be paired based on the instructions below once pairing has been enabled.

1. Turn on the host device Bluetooth.
2. For Android 6.0 or newer enable location in Settings -> Location
3. Power on the ALR-S350 by pressing the power button for 2 to 3 seconds
4. Open Bluetooth connection settings on the host device and you should see nearby, unpaired ALR-S350 serial number in the list
5. Select the ALR-S350 serial number from the list to pair your host device with the ALR-S350

iOS devices typically prompt “pairing request” message box if ALR-S350 supports pairing. When pairing is not needed, the user can press “cancel” button and device will connect without pairing. If an iOS device is going to be used without pairing, disable pairing support and the “pairing request” prompt will no longer appear.

When paired, other host devices cannot connect to the ALR-S350 until pairing information has been cleared from the host device and the ALR-S350. Unpairing can be done based on information found in section 1.6.4 or using clear Bluetooth pairings barcode. Read barcode below to clear Bluetooth pairings from the ALR-S350.

NOTE: Barcode configuration codes can be read only when there is no active Bluetooth connection with the host device

1.10.3. Connecting with Host Device via HID Mode

In this mode, the Alien ALR-S350 functions and communicates in a similar manner as a keyboard. Therefore, the device will work with any application that supports an active cursor on input fields, for example web browser applications. When operating in HID mode, the Alien ALR-S350 needs to be paired with the host device and configured for the HID mode.

NOTE: When the ALR-S350 is configured for HID mode, remember that you will need to reconnect it after using non-HID applications (such as Alien RFID Demo). This will enable the HID mode again. The easiest way to do this is toggle the host device Blutooth Off/On

1.10.4. Configuring HID Mode with Barcode

Scan barcode below to configure the Alien ALR-S350 to desired HID mode. Make sure device is not connected with Bluetooth while configuring with barcodes.

- HIDMODE0 = All HID modes disabled
- HIDMODE1 = HID barcode enabled
- HIDMODE2 = HID RFID enabled

1.10.5. Configuring HID mode via Application

1. Install Alien RFID Demo application (see section 0)
2. Connect your device
3. Turn on HID mode, RFID and/or barcode mode in reader settings
4. Close application and make sure Bluetooth connection is closed
5. Reboot your ALR-S350 device by pressing the power button for 2 - 3 seconds.

1.10.6. Operating with HID modes

1.10.6.1. HID Barcode Scanner Enabled

Scanning Barcode:

- Press the trigger down → barcode aimer starts →Release trigger →scanning starts
- When barcode is scanned, the result is sent to HID immediately
- Press the trigger down during scan → scanning is aborted

1.10.6.2. HID RFID Reader ENABLED

Reading RFID tags:

- Press the trigger down → RFID reading starts
- Reader reads tags into memory as long as trigger is held down. A short beep indicates that a new tag is found
- Release the trigger → Reading stops and tags in memory are transmitted to HID. A short beep sounds when a single tag is sent. If no tags are found, the reader sounds double low note beeps.

NOTE: HID operation is slow and can affect use cases where there is a need to read and transfer data from more than 5 tags

1.10.6.3. Both HID Barcode Scanner & HID RFID Reader Enabled

Activate Barcode reader:

- Press trigger briefly (<350ms) and release immediately → Barcode scanning starts immediately without aiming.
- Press trigger and hold down at least 350ms → Barcode aimer starts →Release trigger → scanning starts.

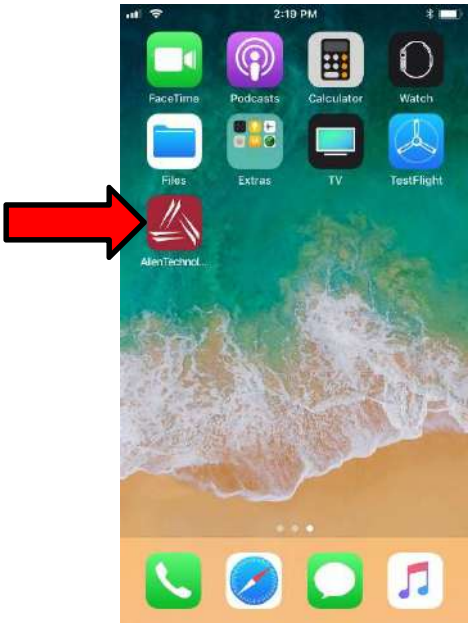
Activate RFID reader:

- Press trigger twice and hold down → RFID reading starts. A short beep indicates when tags are found.
- Release trigger → Reading stop and tags in memory are transmitted to HID. A short beep sounds when single tag is sent. If no tags found, the reader sounds double low note beeps.
- Press trigger during the sending of tag data → Sending data is aborted.
- Press trigger during barcode scanning → Barcode scanning is aborted.

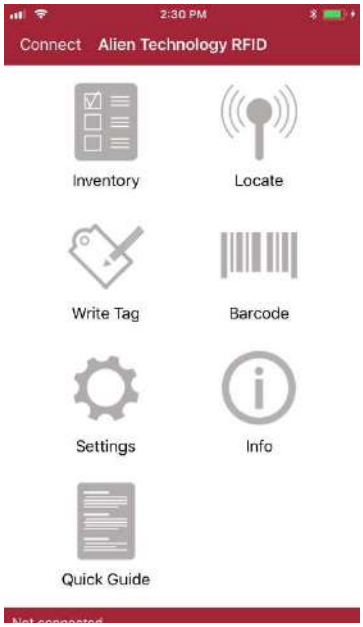
2. Using the ALR-S350

Download the Alien RFID Demo Application as outlined in section 3.1.

Power up both the ALR-S350 and the iPhone. Start the Alien RFID Demo application.



This displays the home screen.



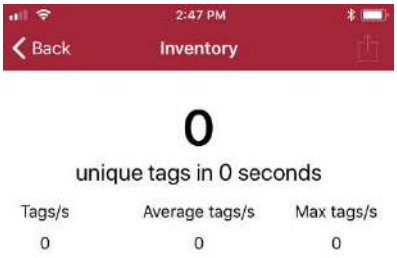
The following options are available on the application home screen:

Inventory:	Allows you to inventory UHF RFID tags. You will be able to see thel related statistics and as well as the tag details.
Locate:	Allows easy location of a UHF RFID tag from the inventory list.
Write Tag:	Allows you to select a UHF RFID tag from the inventory list and program a new EPC code.
Barcode:	Allows you to scan 1D/2D Barcodes.
Settings:	Allows you to adjust the reader and application settings.
Info:	Contains Software version information
Quick Guide:	Application guide.

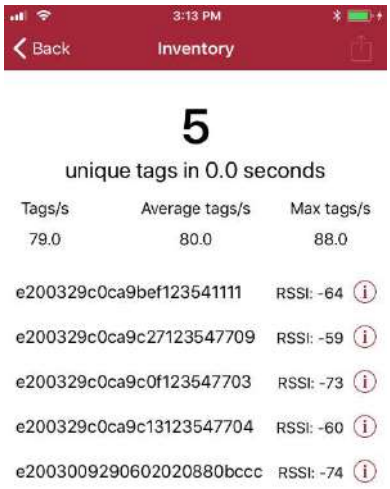
2.1. Inventory

From the home screen press the “Inventory” icon.

The inventory screen will appear. Pull and release the trigger to start scanning. Alternately you can press the “Start” button on the screen.



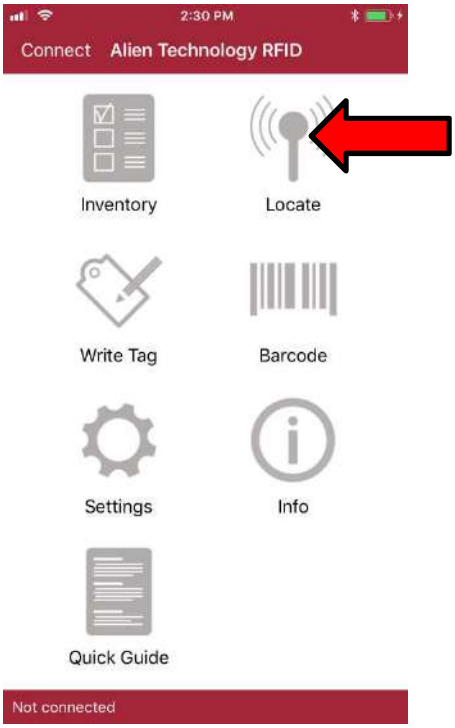
The scanner will start listing tags. At this time, you may move around and scan the area for tags. All the tags found will be listed on the screen. When finished scanning pull the trigger again to stop scanning. Alternately you can press the “Stop” button on the screen.



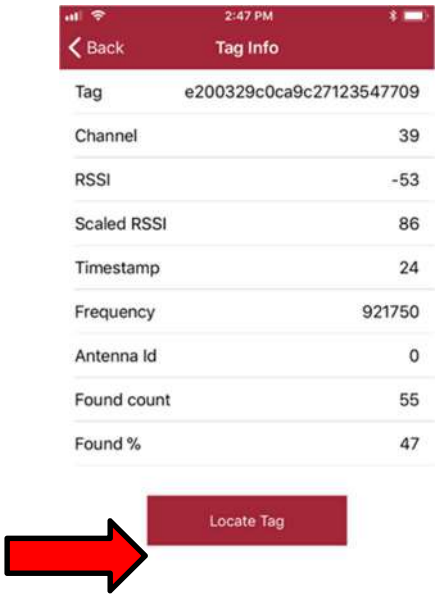
Select the tag to see more information.

2.2. Locate

There are two ways to start the Locate application. From the home screen select "Locate" or from the "Tag info" screen from the "Inventory" Application.



Or

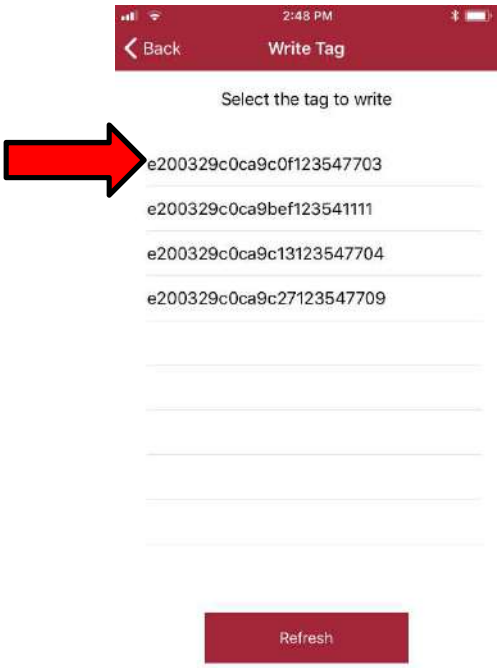


The screen will switch to a percentile sweep. Move the Handheld until the sweep reads in the 90 percentiles. Pull the trigger to stop the scan when the tag is located.

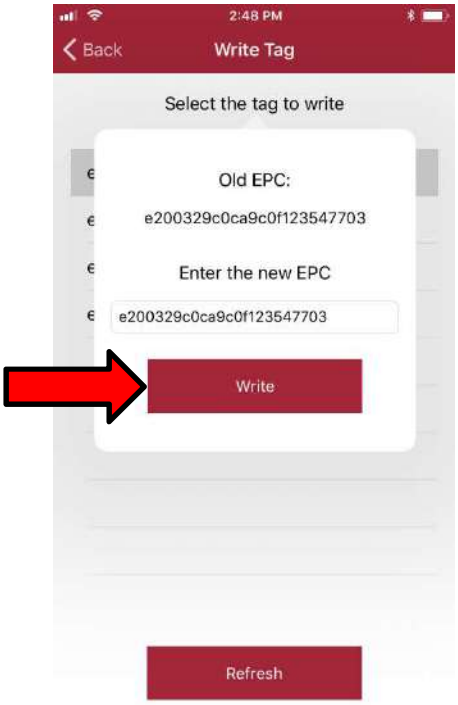
2.3. Write Tag

From the home screen press the “Write Tag” icon.

The “Write Tag” screen will open and display all the tags in the inventory. Select the tag whose data will be reprogrammed.

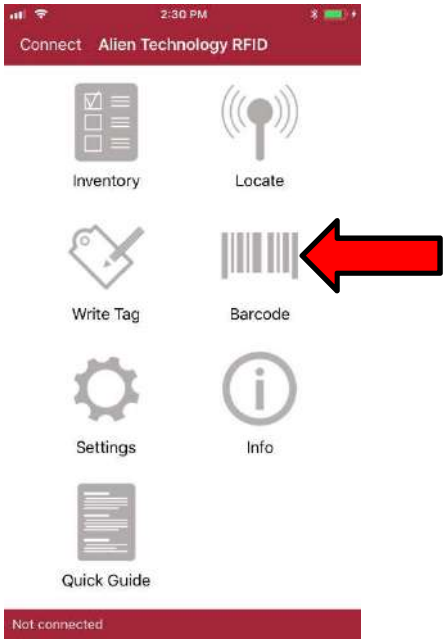


A pop-up screen will appear showing the old EPC and a field to type the new EPC. Enter the new EPC code and press the “Write” icon to complete the task.

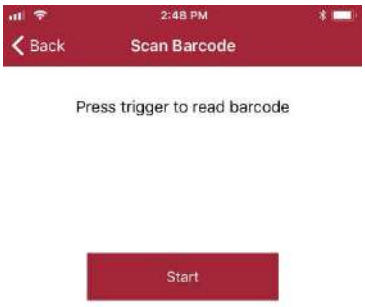


2.4. Barcode

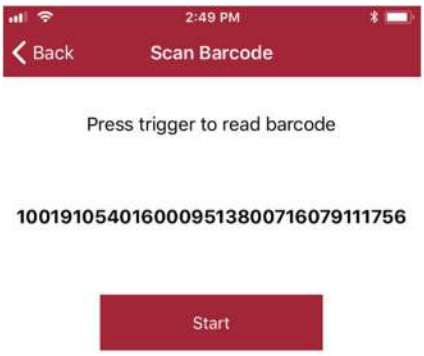
From the home screen press the “barcode” icon.



Pull the trigger one to start scanning.



The scanner will stay on for up to 5 seconds until it either scans a barcode or shuts off because no barcode was scanned.



2.5. Antennas

The Alien ALR-S350 includes Adaptive Cross Dipole antenna that includes four software controllable (via either Alien RFID demo application or the API) antenna modes:

- Linear with horizontal polarization mode (read range is up to 7m/22ft)
- Linear with vertical polarization mode (read range is up to 7m/22ft)
- Circular polarization mode (read range is up to 4m/13ft)
- Proximity mode (locate tags to approximately 1cm/0.4 in)

NOTE: The read range depends on the tag and the environment

The linear antenna modes are intended for long range reading when tag density is high and tags are in known horizontal or vertical orientation. In most cases, enabling both linear antenna modes provides the best performance. The circular polarization mode is intended for use cases requiring medium range reading and the tags are randomly oriented. The circular polarization mode works well if high performance tags are used and the tags easily readable. The proximity mode is ideal for locating and writing tag data.

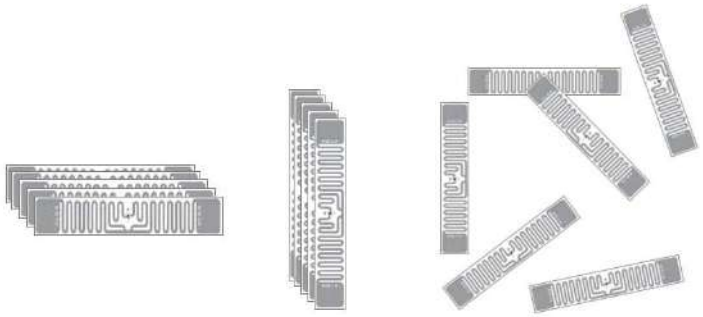


Figure 12: Tags in horizontal, vertical and random orientation

3. Software

Alien provides a demo application to control the reader and an SDK to aid development of applications for the ALR-S350.

3.1. Alien RFID Demo Applications

Alien provides feature rich yet easy-to-use RFID demo applications for iOS and Android platforms.

3.1.1. Alien RFID Demo for Android

Alien RFID demo application for Android supports Android 5.0 and newer versions. The Alien RFID demo application is available from the Google Play Store.

3.1.2. Alien RFID Demo for iOS

Alien RFID demo application for iOS supports iOS 9 and newer versions. The Alien RFID demo application is available from the Apple App Store.

3.2. Application Development

Alien provides a Software Development Kits (SDK) including the API Libraries, documentation and code samples for users to develop custom applications for either Android or iOS platforms.

3.3. Firmware Update

The Alien ALR-S350 firmware includes the following components:

- NUR firmware (firmware of the NUR RFID module)
- NUR bootloader (bootloader of the NUR RFID module)
- Device firmware (firmware of the reader)

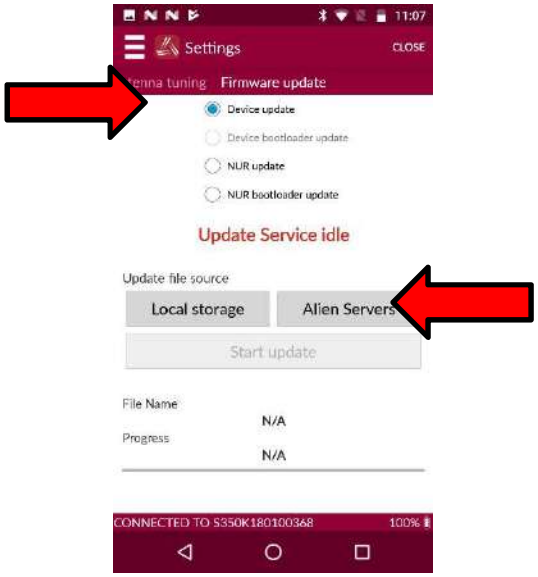
All the firmware components can be updated using the Alien RFID demo applications presented in section 3.3.1 for Android or 3.3.2 for iOS or implementing update functionality in 3rd party applications using the API.

3.3.1 Updating Firmware Using the Alien RFID Demo Application (Android)

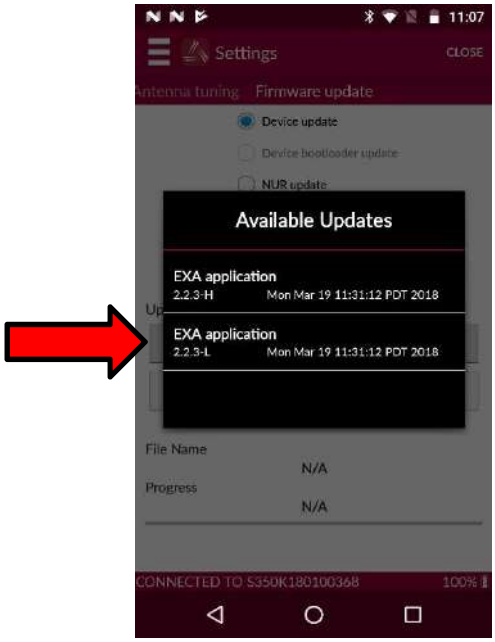
To update the ALR-S350 firmware with an Android phone and Alien RFID Demo application, perform the following steps.

1. Connect to the ALR-S350 to be upgraded
2. Click on Settings

3. Swipe right to left until the firmware update screen is seen.
4. Select firmware component to be updated.



5. Click on Alien Server and select the firmware to update
   Please note that for the Device Update you will click on the "L" version of the firmware (x.y.z-L).

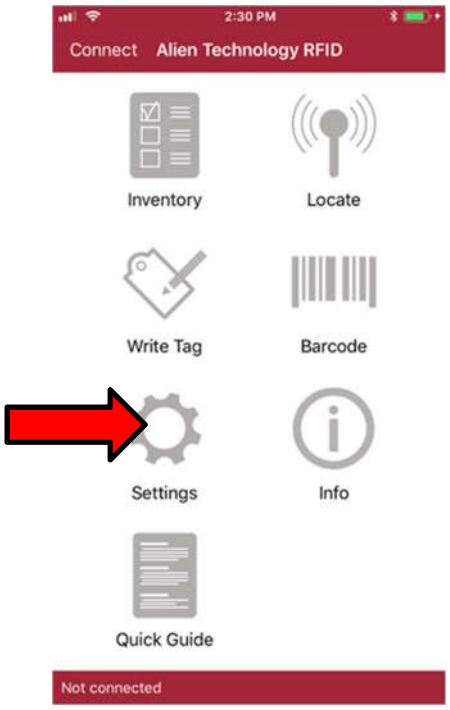


6. Click on Start Update. The ALR-S350 will briefly disconnect and the left and right LEDs will glow steady Orange indicating the unit is in update mode.
7. The host device will indicate progress.
8. After the update is complete, the ALR-S350 will reboot automatically.

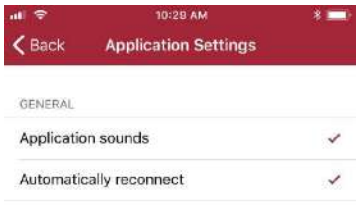
3.3.2 Updating Firmware Using the Alien RFID Demo Application (iOS)

To update the ALR-S350 firmware with an iPhone and the Alien RFID Demo application perform the following steps.

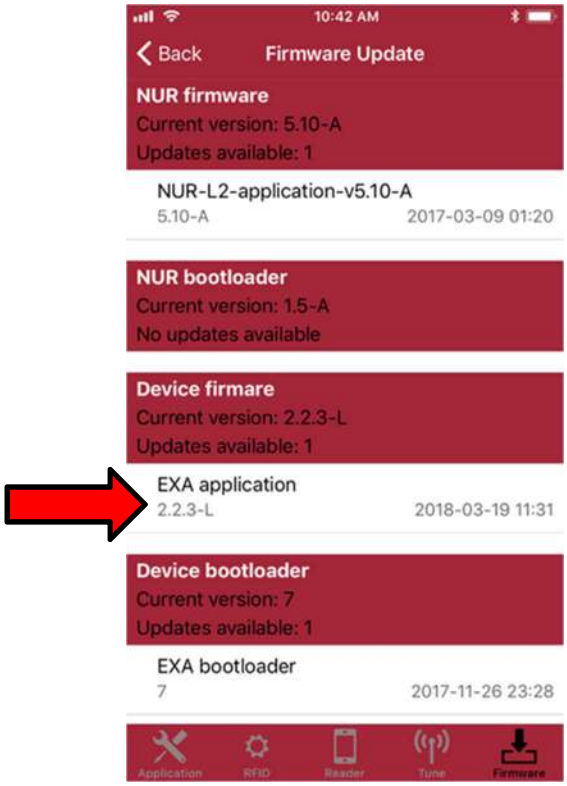
1. Connect to the ALR-S350 to be upgraded
2. Click on Settings



3. Click on Firmware in the bottom right corner.



4. Select the firmware component to be updated
   Please note that for the Device Update you will click on the "L" version of the firmware (x.y.z-L).



5. Click on Update button
6. Confirm update by clicking on Proceed button
7. The ALR-S350 will briefly disconnect and the left and right LEDs will glow steady Orange indicating the unit is in update mode.
8. The Host Device will indicate progress.
9. After the update is complete, the ALR-S350 will reboot.

4 Service and Support

For technical and warranty related questions regarding Alien devices or software development, please contact Alien Technical Support:

Website: http://www.alientechnology.com/support/
Phone: +1-800-RFID-NOW