SEMTECH

Asset Tracking Reference Kit User Guide

("User Guide")

February 2020

Asset Tracking Reference Kit Welcome

Welcome!

The Asset Tracking Reference Kit ("Kit") is a portable reference Kit designed to validate LoRaWAN® network coverage around a building or site and to accelerate solution development for a wide range of stakeholders. The self-contained nature of this reference Kit makes it easy to set up, take down, and move a network in a matter of minutes.

Users can determine a gateway's range of coverage by moving the location of the sensors to different places around a building. Furthermore, solution developers can focus on providing customer value through data collection and analysis by using off-the-shelf hardware available from external suppliers.

The GPS location data of each tracker is displayed on a dashboard that users can access through a web browser. The dashboard shows the type of displays that can be created with the data collected (See Figure 16 and Figure 17). The URL for the dashboard, and how to locate the login credentials for your Kit, are explained in the *Getting Started* section of this guide.

Note: This Kit does not allow direct access to the underlying data or the ability to change the LoRaWAN network server (LNS) to which the gateways are connected. If those features are desired requirements, please contact Semtech at ATKSales@semtech.com.

What is in the Kit?

The Kit contains the following items:

- 6 LoRa®-based GPS Tracking Devices
- 1 LoRaWAN gateway with Cellular backhaul
- Power brick with cable
- LoRa antenna with adapter (1)
- GPS antenna with cable (1)
- Cellular antenna (1)
- Ethernet cable (1)
- Magnets (2) (not pictured)
- Ethernet weatherproofing hood (not pictured)
- Toolset (not pictured)
- Extra batteries (not pictured)

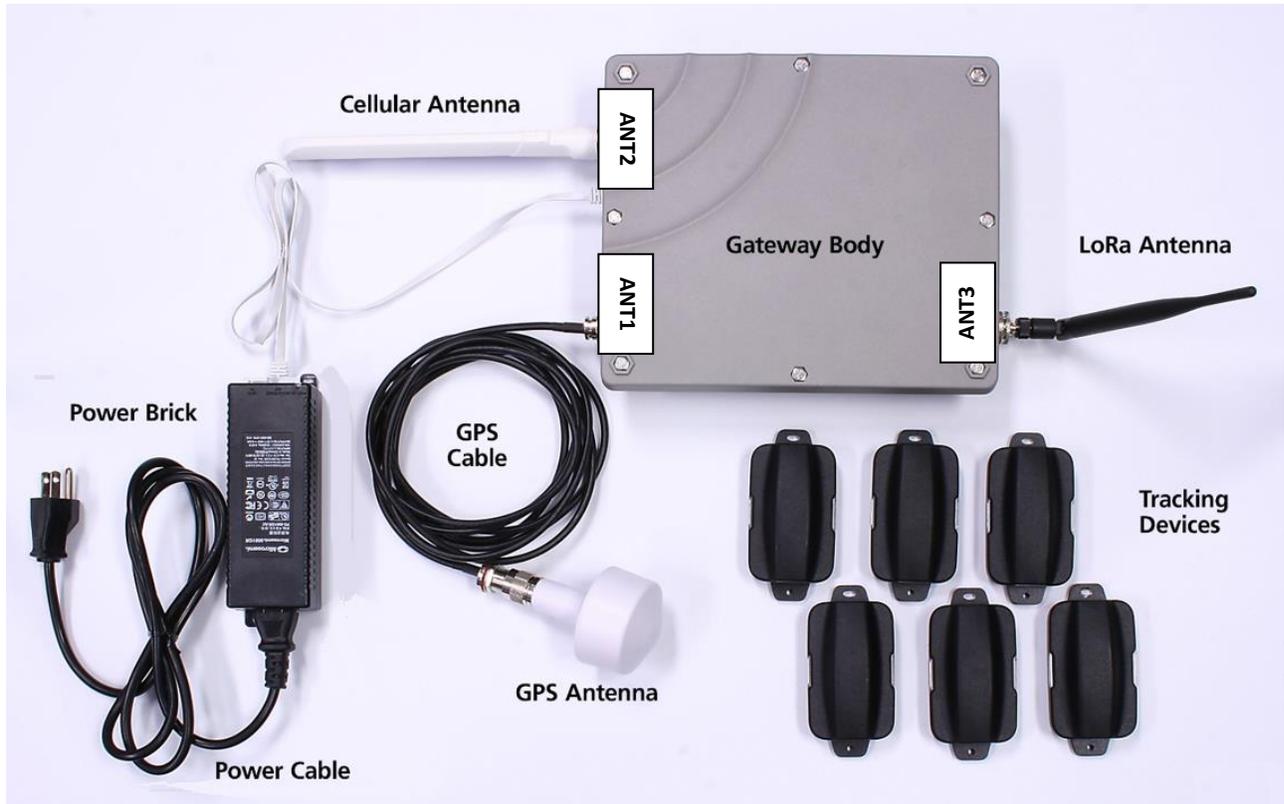
Figure 1: LoRa-based GPS Tracking Device

Figure 2: LoRaWAN gateway with 3G/4G LTE (Cellular) backhaul

Setting up the Kit

Gateway Connections

The gateway body has multiple connectors for antennas and cables. The following table describes those connections.

ANT 1	GPS antenna connector (N-type female)
Ethernet	Power-over-Ethernet connector
ANT 2	3G/4G antenna connector (N-type female)
ANT 3	915/868 MHz LoRa antenna connector (N-type female)
3G/4G	Access port for 3G/4G SIM card
ANT 4	915/868 MHz antenna connector (not connected)

Figure 3: Gateway connections

About the Gateway

The ODU gateway is an 8-channel LoRaWAN-compliant gateway with external antennas. This gateway has the following features:

- Support for LoRa Basics™ Station
- Gateway ping
- Support for LoRaWAN 1.0.2 or higher
- 8+ LoRa channels
- External antenna (for greater range)
- Indoor/Outdoor form factor
- Modular support for 3G/4G
- Optional features (Not supported out-of-the-box)
  - GNSS/precise timing support (for GNSS aiding messages/synchronized downlinks)
  - Outdoor mounting support
  - IP67 rating for outdoor mounting

Gateway Setup

To set up the gateway, follow the steps below.

Note: Do not connect power until all antenna connections are complete.

Step 1: Connect the adapter to the LoRa antenna

Figure 4: Adapter connection

Step 2: Connect the LoRa antenna to the gateway (ANT3)

Figure 5: Connecting the LoRa antenna to the gateway

Step 3: Connect the Ethernet cable to the gateway

Figure 6: Connecting the Ethernet cable to the gateway

Step 4: Connect the Ethernet cable to the power brick.
NOTE: Do not connect Ethernet plug to the jack on the right

Figure 7: Ethernet cable connected to the power brick
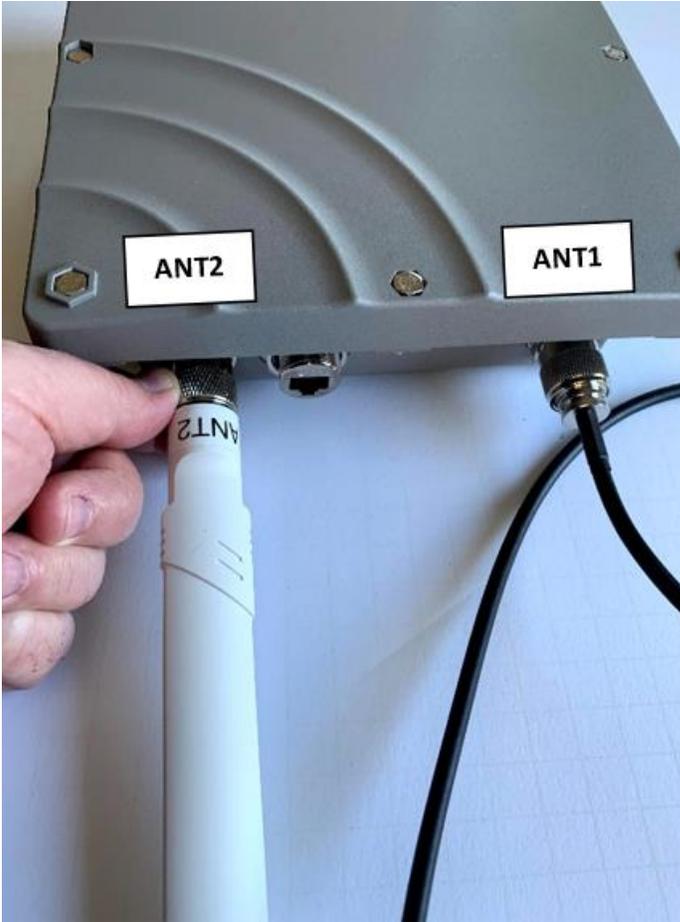
Step 5: Connect the Cellular antenna (ANT2)

Figure 8: Connecting the Cellular antenna to the gateway

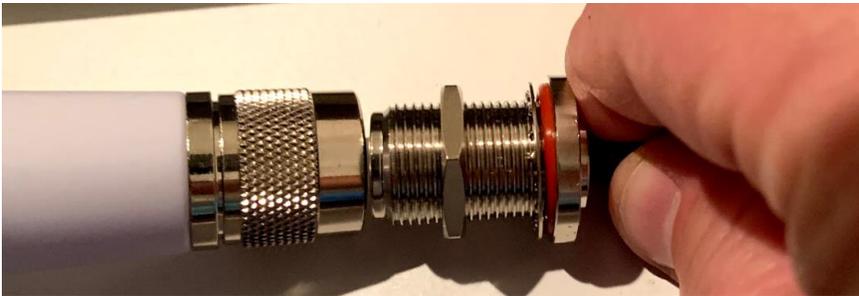**Step 6: (Optional) Connect the GPS cable to the GPS Antenna**

Figure 9: Connecting the GPS cable to the GPS antenna

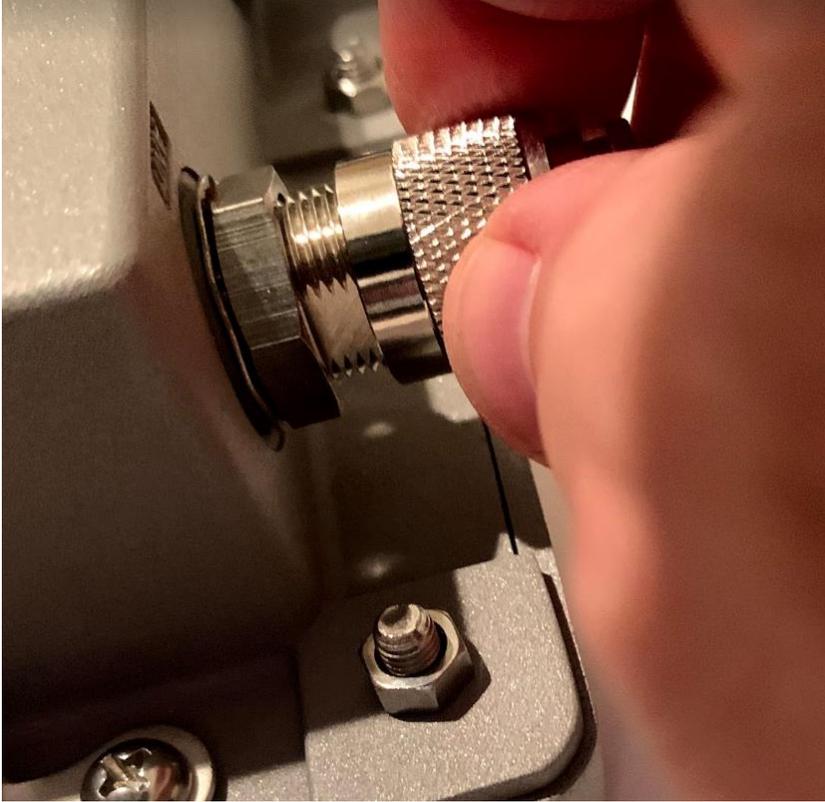**Step 7: (Optional) Connect the GPS cable to the gateway (ANT1)**

Figure 10: Connecting the GPS cable to the gateway

Step 8: Connect the power brick to a power source.

Figure 11: Connecting mains cable to power brick

Step 9: Verify and test. Check the LED on the power brick.

The LED will be green when power is supplied to the gateway.

Figure 12: Green LED on Power Brick Means Gateway is Powered

Gateway SIM and Data Connectivity

The gateway is provided with a SIM card for cellular backhaul. This includes 1GB of free data service, which should be adequate for about one year of operation. If you need more data, you will need to sign up for a cellular service plan and provide a replacement SIM card. The SIM card can be accessed through the clear, sealed access port (the 3G/4G port in Figure 7) on the side of the gateway with the LoRa antenna.

Turning the Sensors On and Off

The device is turned on and off using an external magnet. To turn on a tracking sensor, place the magnet (included) on the top side of the tracking device, near the end with the oval opening, as shown in Figure 17. It is important to place the side of the magnet with the notch against the top of the tracking device and hold it there for 10-15 seconds until the Green LED blinks one to three times slowly (about 1 blink per second).
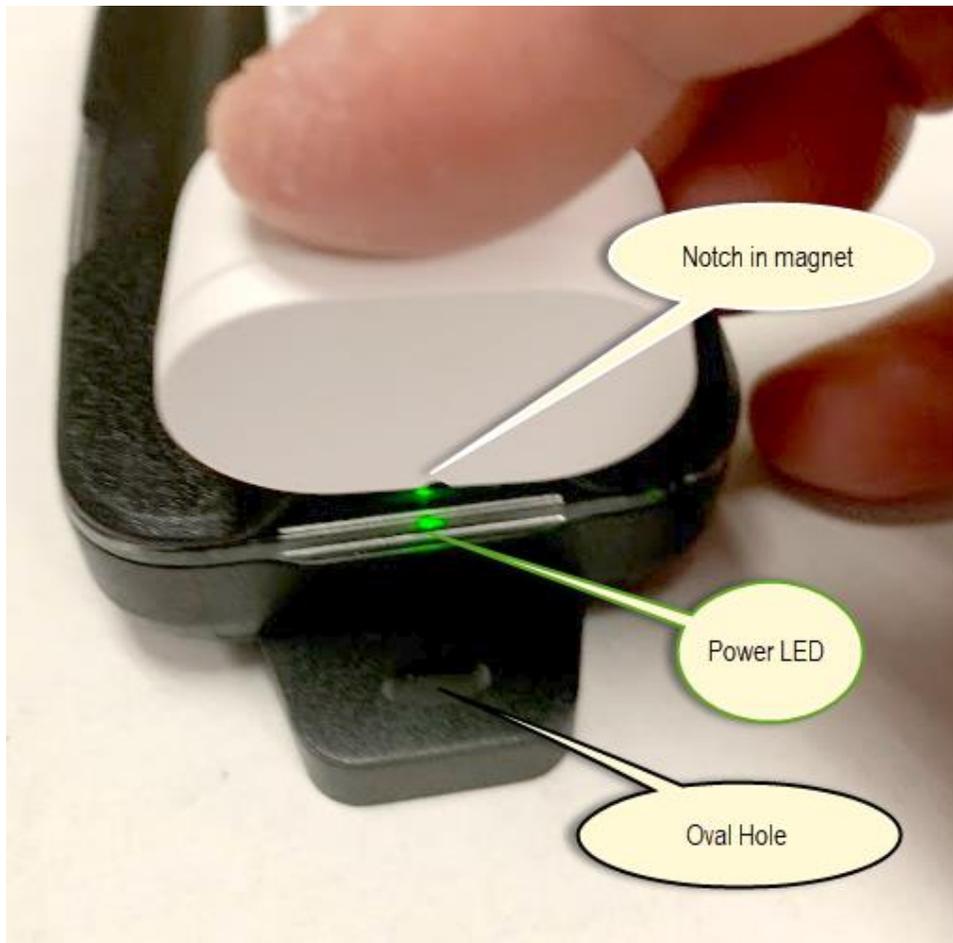

Figure 13: Turning on a tracking sensor

To turn the tracking device off, repeat the process: hold the magnet (notch-side down) on the top of the device above the oval opening for 10-15 seconds. When the device turns off, the Green LED it will blink rapidly (about 10 times in 2 seconds).

Once the gateway and tracking devices are turned on, when you connect to the online web interface the device should report be visible on the **Device Settings** page, and should show an updated time, similar to the example shown in Figure 14.

Device		Device ID	Update rate ?	Est. battery life	Battery	Signal strength	Last message
● 2B-76	✎	58-A0-CB-00-00-20-2B-76	Low ⌄	High	🔋	▮▮▯	2020-02-07 09:22:05
● 2C-4F	✎	58-A0-CB-00-00-20-2C-4F	Medium (default) ⌄	Medium	🔋	▮▯▯	2020-01-28 17:34:45
● 2C-9A	✎	58-A0-CB-00-00-20-2C-9A	Lowest ⌄	Highest	🔋	▮▮▯	2020-02-07 09:22:05
● Gateway 04-93	✎	58-A0-CB-80-04-93	N/A	N/A	N/A	▮▮▮	2020-01-28 17:08:13
● Gateway 09-B3	✎	58-A0-CB-80-09-B3	N/A	N/A	N/A	▮▯▯	2020-01-31 19:12:30

Figure 14 – Devices and Gateway Reporting Example

Using the Web Dashboard

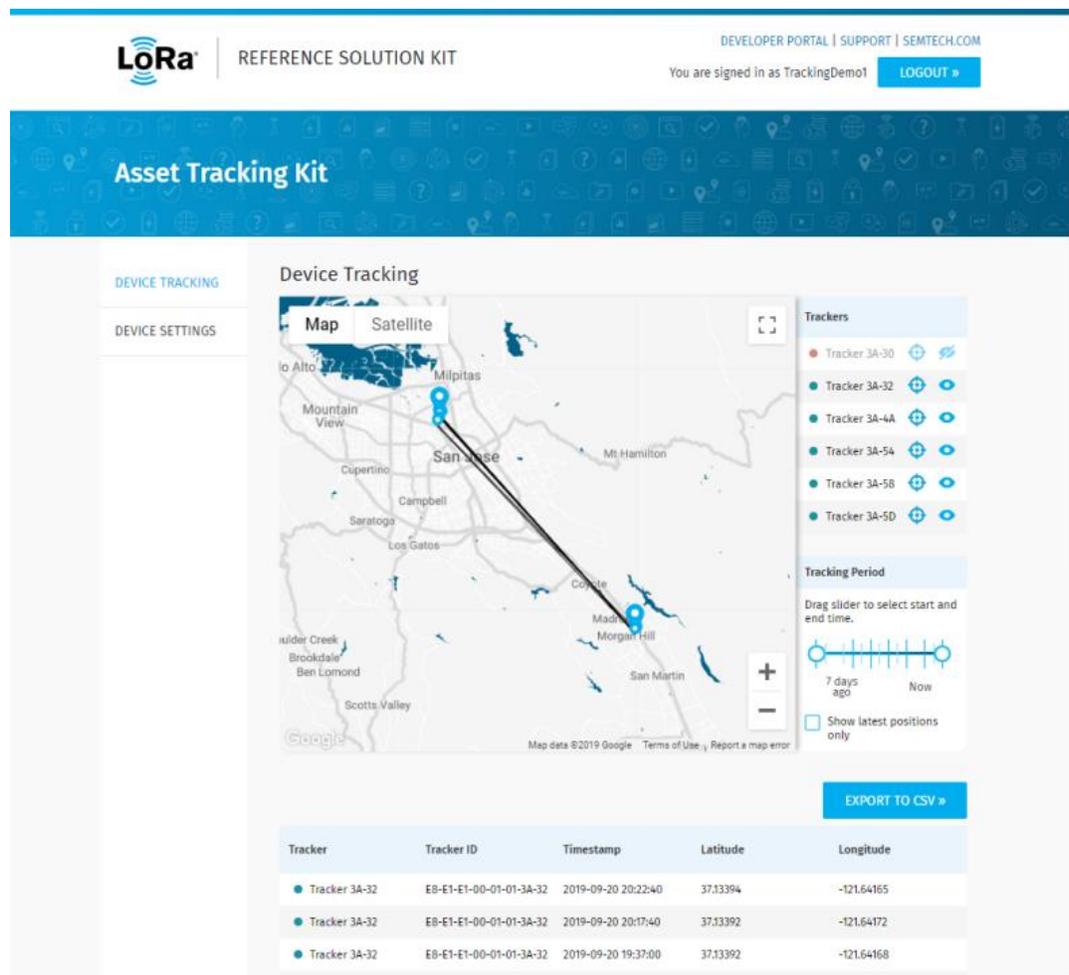To begin, log in by scanning the QR code below or, using your web browser (Chrome preferred), navigate to https://lora-developers.semtech.com/resources/developer-kits/asset-tracking-kit

Figure 15 - Scan to log in

From this page you can log in to the kit and get information about its setup and use. To log in directly, go to https://asset-tracking-kit.semtech.com/signin. Note that your login credentials can be found either on the inside cover of the Kit box, or on the device data sheet provided with the Kit.

Once you log in to the website, two views will be available: the **Device Tracking** view and the **Device Settings** view. In the Device Tracking view, the location of each tracking device is plotted on a map. From there, you can extract the time histories of the location data. Use the Device Settings view to designate a nickname for each device and to see the current status of devices and the gateway.

Device Tracking View

At the center of the Device Tracking view is a map showing the locations of the enabled tracking devices. To the right of the map, in the **Trackers** pane, is a list of the available trackers. To turn the display of a given tracker on or off, toggle the "eye" icon ( ). To zoom in on the latest position for a given tracker, click the "target" icon ( ).

Figure 16. Device Tracking view

Below the list of trackers is the **Tracking Period** pane. You can select the period of time for which you want to see tracking data. You can choose to view data for any period between the last half-day up to the last seven days.

Device Settings View

This view displays a list of trackers associated with your kit. Here, you can designate how often you want to each of them to send updated location information. You can also monitor estimated battery life and the signal strength of each tracker.
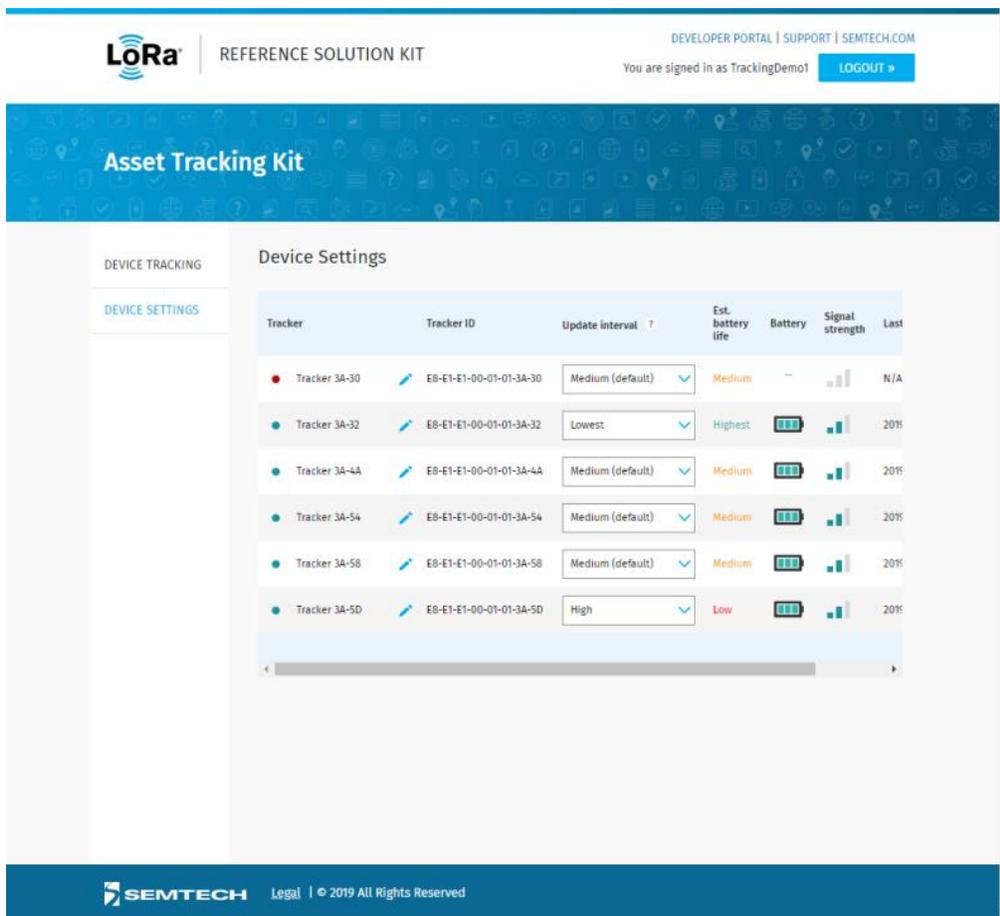
Figure 17. Device Settings view

Replacing the Batteries

To replace the batteries in a tracking device, take the following steps:

Step 1: Unscrew the battery cover (using a T6 screwdriver)

Step 2: Remove the battery cover

Step 3: Remove the batteries

Step 4: Place new batteries in the device

Step 5: Replace the battery cover

Step 6: Screw in the battery cover (using a T6 screwdriver)

Problems/Concerns

Direct any problems or concerns to ATKSupport@semtech.com

Figure 18: Changing sensor batteries

Important Information: Warranty Disclaimer

The Kits are supplied for demonstration purposes only. Your use of the Kits for any purposes (e.g., commercial) is unauthorized by Semtech and at your own risk.

THE KITS ARE PROVIDED "AS IS" AND WITHOUT WARRANTY OF ANY KIND EXPRESSED OR IMPLIED. SEMTECH EXPRESSLY DISCLAIMS ALL WARRANTIES, EXPRESSED, IMPLIED OR OTHERWISE, INCLUDING WITHOUT LIMITATION, WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS.

Product & Safety Instructions

Certain sensors contain magnets. **Keep away from ALL children!** Do not put in nose or mouth. Swallowed magnets can stick to intestines causing serious injury or death. Seek immediate medical attention if magnets are swallowed.

Observe the following precautions to avoid a sensor explosion or fire:

Do not drop, disassemble, open, crush, bend, deform, puncture, shred, microwave, incinerate, or paint the sensors, or other hardware.

Do not insert foreign objects into any opening on the sensors or gateways

Do not use the hardware if it has been damaged—for example, if cracked, punctured, or harmed by water.

Disassembling or puncturing the battery (whether integrated or removable) can cause an explosion or fire.

Do not dry the sensors or battery with an external heat source such as a microwave oven or hair dryer.

These products are not toys and contain small parts that can be dangerous to children under three years old. Do not allow children or pets to play with products.

Observe proper precautions when handling batteries. Batteries may leak or explode if improperly handled.

Warnings

Do not place naked flame sources, such as lighted candles, on or near the equipment.

The battery should not be exposed to excessive heat such as sunshine, fire, or the like.

Do not dismantle, open, or shred battery pack or cells.

Do not expose batteries to heat or fire. Avoid storage in direct sunlight.

Do not short-circuit the battery. Do not store batteries in a box or drawer where they may short-circuit each other or be short-circuited by other metal objects.

Do not remove a battery from its original packaging until required for use.

Do not subject batteries to mechanical shock.

In the event of a battery leaking, do not allow the liquid to come in contact with skin or eyes. If contact has been made, wash the affected area with copious amounts of water, and seek medical advice.

Do not use any charger other than that specifically provided for use with the equipment.

Observe the plus (+) and minus (-) marks on the battery and equipment, and ensure correct use.

Do not use any battery which is not designed for use with the product.

Do not mix cells of different manufacture, capacity, size, or type within a device.

Keep batteries out of the reach of children.

Seek medical advice immediately if a battery has been swallowed.

Always purchase the correct battery for the equipment.

Keep batteries clean and dry.

Wipe the battery terminals with a clean, dry cloth if they become dirty.

Rechargeable batteries need to be charged before use. Always use the correct charger, and refer to the manufacturer's instructions or equipment manual for proper charging instructions.

Do not leave a rechargeable battery on prolonged charge when not in use.

Notices

⚠ Avoid exposing your sensors or batteries to very cold or very hot temperatures. Low or high temperature conditions may temporarily shorten the battery life or cause the sensors to temporarily stop working.

⚠ Take care in setting up the gateway and other hardware. Follow all installation instructions in the User Guide. Failure to do so may result in injury.

⚠ Do not install hardware equipment while standing in water or with wet hands. Failure to do so can result in electric shock or death. Use caution when setting up all electronic equipment.

⚠ PROP 65 WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

⚠ Cleaning: Use a clean, dry cloth or wipe to clean products. Do not use detergent or abrasive materials to clean the products, as this may damage the sensors.

Hereby, Semtech declares that the radio equipment for the Asset Tracking Reference Kit is in compliance with Directive 2014/53/EU.

This device complies with Part 15 of the FCC Rules and license-exempt RSS Standards of Industry Canada.

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.

For the full FCC/IC Compliance Statements and EU declaration of conformity, visit www.tabs.io/legal

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This symbol means that according to local laws and regulations, your product should be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. Some collection points accept products for free. The separate collection and recycling of your product at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment.

Federal Communication Commission Interference Statement

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 of 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 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.

IMPORTANT NOTE

To comply with FCC and Industry Canada RF radiation exposure limits for general population, the antenna(s) used for this transmitter must be installed such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and all persons at all times and must not be co-located or operating in conjunction with any other antenna or transmitter.

Federal Communication Commission Interference Statement

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:

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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 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.

IMPORTANT NOTE:

Radiation Exposure Statement:

The product comply with the Canada portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

Industry Canada statement

This device complies with Industry Canada's license-exempt RSSs. 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.

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**RF Radiation Hazard Warning**

To ensure compliance with FCC and Industry Canada RF exposure requirements, this device must be installed in a location where the antennas of the device will have a minimum distance of at least 20 cm from all persons. Using higher gain antennas and types of antennas not certified for use with this product is not allowed. The device shall not be co-located with another

Déclaration d'exposition aux radiations:
Le produit est conforme aux limites d'exposition pour les appareils portables RF pour les Etats-Unis et le Canada établies pour un environnement non contrôlé. Le produit est sûr pour un fonctionnement tel que décrit dans ce manuel. La réduction aux expositions RF peut être augmentée si l'appareil peut être conservé aussi loin que possible du corps de l'utilisateur ou que le dispositif est réglé sur la puissance de sortie la plus faible si une telle fonction est disponible.