SPSDEVK1MT-GEVK:
Getting Started Guide

ON Semiconductor®

APPLICATION NOTE

Introduction;

The SPSDEVK1MT Predictive Maintenance Turnkey Solution kit enables fast installation of full Smart Passive Sensor^{TM} systems. This evaluation kit includes:

- SPSDEVR1−8 UHF SPS Reader
- 2 SPS1DEVA1−W UHF Antennas w/ RF cables
- 20 SPSxT001PCB Temperature Sensors
- 20 SPSxT001PET Temperature Sensors
- 20 SPSxM001FOM Moisture Sensors
- 20 SPSxT001CER Temperature Sensors
- 20 SPSxTM01PET Moisture Sensors
- 12 V DC Universal Power Supply
- Ethernet Cable

Note: Frequency band of sensor tags is determined by version of kit ordered.

Software Tools

ON Semiconductor has developed an application specifically for reading Smart Passive Sensors that unlocks the full functionality of the tags. This is done by automatically detecting the type of tag and reading back sensor data over time graphically. This application is known as TagReader and can be found on this kit's landing page under "Software".

Figure 1. Turnkey Solution Kit Components

Figure 2. SPSDEVK1MT−GEVK Hardware Setup

Hardware Setup

The SPSDEVK1MT requires three hardware connections to be made in the following order:

- Connect at least one antenna to the RF SMA port on the SPSDEVR1−8 reader
- Connect a USB or Ethernet cable from the SPSDEVR1−8 to the host computer that will be running the application software
- Plug in the 12 VDC supply that was included with the kit

Note: please refer to SPS tag and antenna datasheets to verify optimal positioning of each to achieve best results.

TagReader Software Setup

Once the reader is connected and the correct drivers are installed, please run the TagReader application downloaded from the ON Semiconductor website. Figure 3 shows the setup screen that will open when the TagReader application is run. The ON Semiconductor SPSDEVR1−8 will be autodetected and should be displayed in the "Select Reader" drop−down menu. If the drop−down menu is empty, confirm that the reader is powered on and the USB/Ethernet is connected to the host PC and click the "Rescan Readers" button.

With "ON Semiconductor SPSDEVR1−8" selected, please select the antenna port(s) that the antenna(s) is connected to as well as the correct UHF region for your location (North America, Europe, etc). The rest of the settings will depend on the test environment and the type of tags being used and will be discussed further in the next section. When the settings are finalized, click "Read" and tag information will begin being displayed under the "Tags" tab as shown in Figure 4 on the next page.
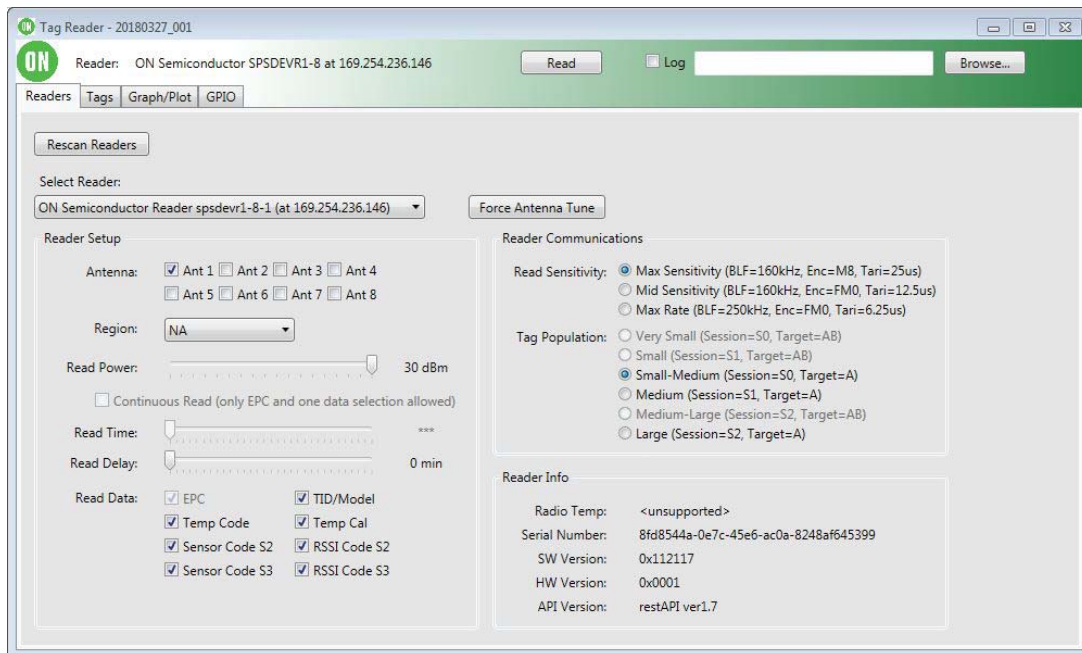

Figure 3. TagReader Setup Screen

Advanced Reader Settings Descriptions

Read Power – maximum transmit power is set by which region is used, power may need to be reduced if sensors appear to be overpowered.

Read Time – defines how long the reader will look for sensors each cycle. Default value of 150 ms is good for small amounts of sensors while using a single antenna.
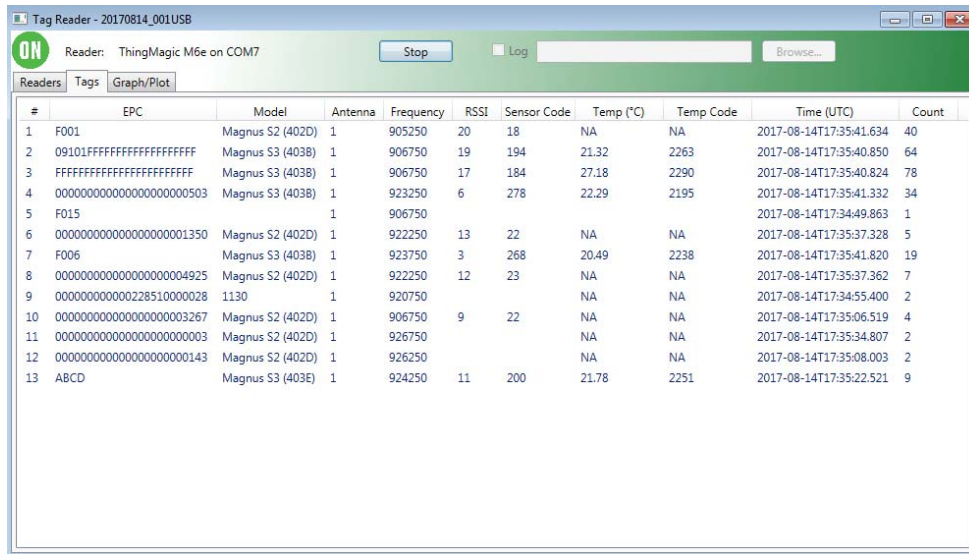
Read Delay – delay inserted between read cycles. Useful for reducing power consumption if only occasional reads are required.

Read Data – select the information that is of interest in the particular application. Sensor codes are used for moisture and pressure measurements and are read differently

depending on the generation of Magnus chip used (S2 or S3). Please refer to the datasheet of the particular sensor to verify which version is being used.

Read Sensitivity – the UHF protocol can be optimized to either maximize sensitivity or read rate. If tags are placed far from the reader, higher sensitivity will be required. If all tags are near the reader, the sampling rate of the sensor data can be increased without having to worry about missing distant, less sensitive sensors.

Tag Population – another performance tuning parameter similar to Read Sensitivity. UHF protocol can be optimized to work with different tag population sizes, ranging from Very Small (a handful of tags) to Large (50+ tags).

Figure 4. Sensor Information Displayed Under "Tags" Tab

Data Collection and Logging

The TagReader application offers two additional ways to view the SPS sense data. In the Graph/Plot tab, tags can be selected by EPC code and the sensor data can be viewed over time. Figure 5 shows four unique tags' temperature plotted over time (scaling makes measurements look noisy, but all temperature stay within a 1°C window).

The second way to view data is by setting up a Log File using the "Browse" button at the top of application and checking the "Log" checkbox. This will dump all the information collected during the session to a logfile including EPC, sensor code, timestamp, etc.
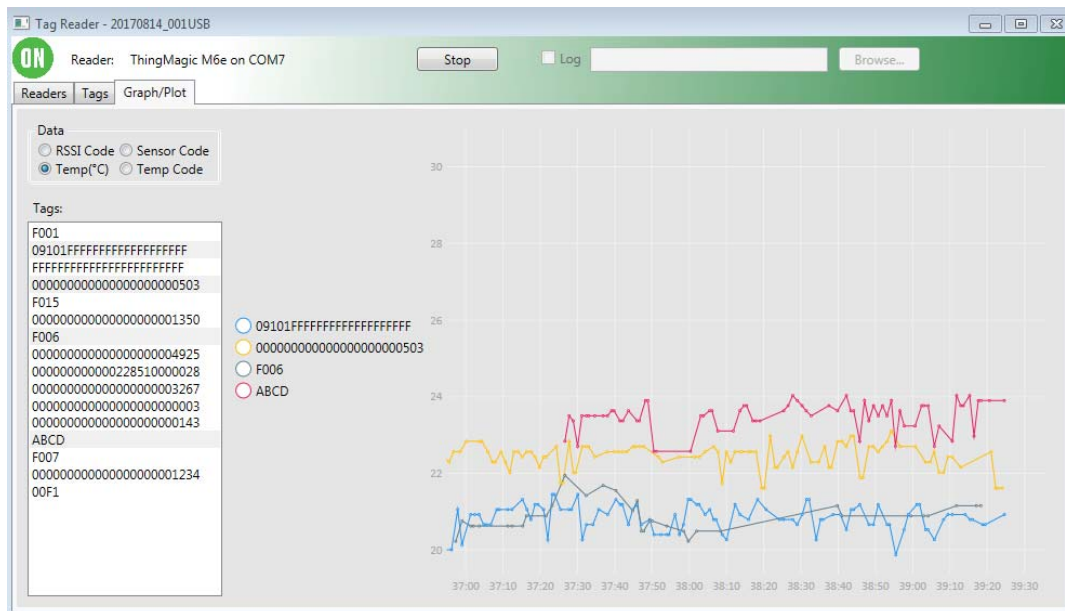
Figure 5. Sensor Information Displayed Under "Graph/Plot" Tab

Smart Passive Sensor is a trademark of RFMicron, Inc.

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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

| moschip.ru | moschip.ru_6 |
| moschip.ru_4 | moschip.ru_9 |