

SensorRFA-GEVK: Getting Started Guide Evaluation Board User's Manual



ON Semiconductor®

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EVAL BOARD USER'S MANUAL

Introduction

The SensorRFA SPS Evaluation Kit enables exploration and development of applications using Smart Passive Sensors built around the Magnus®-S chip from RF Micron. This evaluation kit includes:

- ThingMagic Mercury6e Reader Module
- UHF Antenna
- Coaxial Antenna Cable
- USB Cable
- DC Power Supply
- SPS Temperature and Moisture Tags

Software Tools

There are two separate applications that can be used with the ThingMagic M6e. The Universal Reader Assistant (URA) is a useful tool for utility tasks such as debugging the reader, re-programming tag EPCs, and quick inventory tests. This software can be found directly from ThingMagic's website along with its' own set of documentation at: <http://www.thingmagic.com/manuals-firmware>.

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".

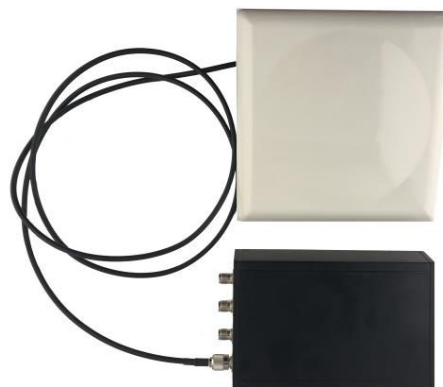


Figure 1.

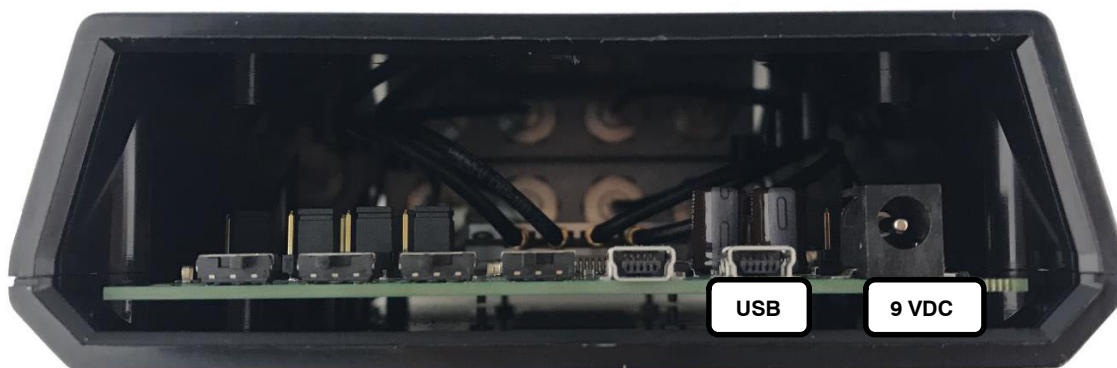


Figure 2. ThingMagic M6e Reader Port Setup

Hardware Setup

The SensorRFA-GEVK requires three connections to be made in the following order:

- Connect one end of the coax cable securely to the UHF antenna and then connect the other end to Antenna Port 1 of the M6e module
- Plug Mini-USB cable into the USB port closest to the DC jack as shown in Figure 2 and connect the other end into the PC that will be used to run the software
- Plug in 9 VDC supply that was included with the kit (the red LED on the M6e will light up)

When the reader is powered on and connected to the test PC, the computer should begin looking for the correct USB driver for this device. If the computer cannot find the correct driver, please download and install the driver directly from ThingMagic's website at:

<http://www.thingmagic.com/manuals-firmware>.

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 ThingMagic M6e 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 is connected to the correct port and click the “Rescan Readers” button.

With “ThingMagic M6e on COMx” selected, please select the antenna port that the antenna 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.

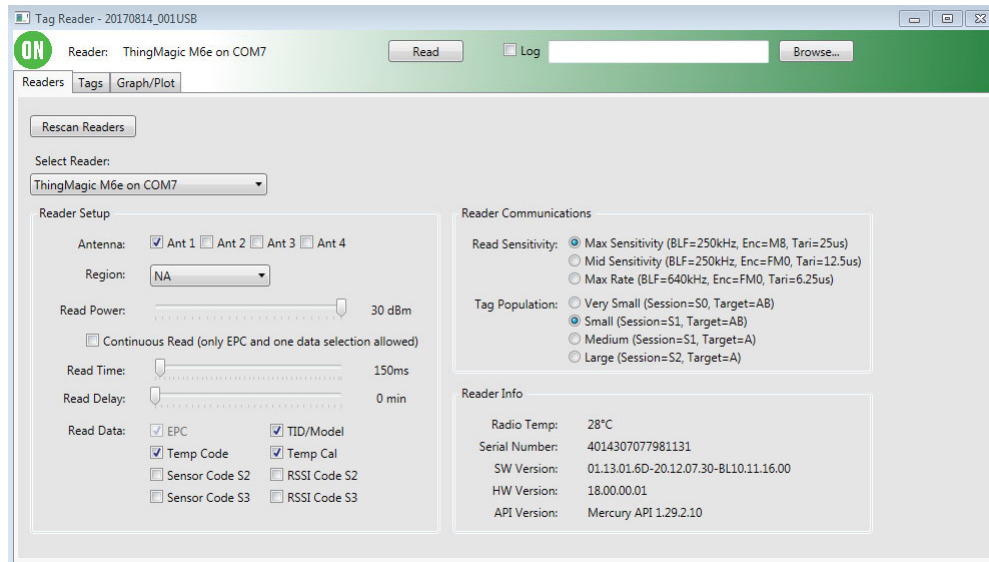


Figure 3. TagReader Setup Screen

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.

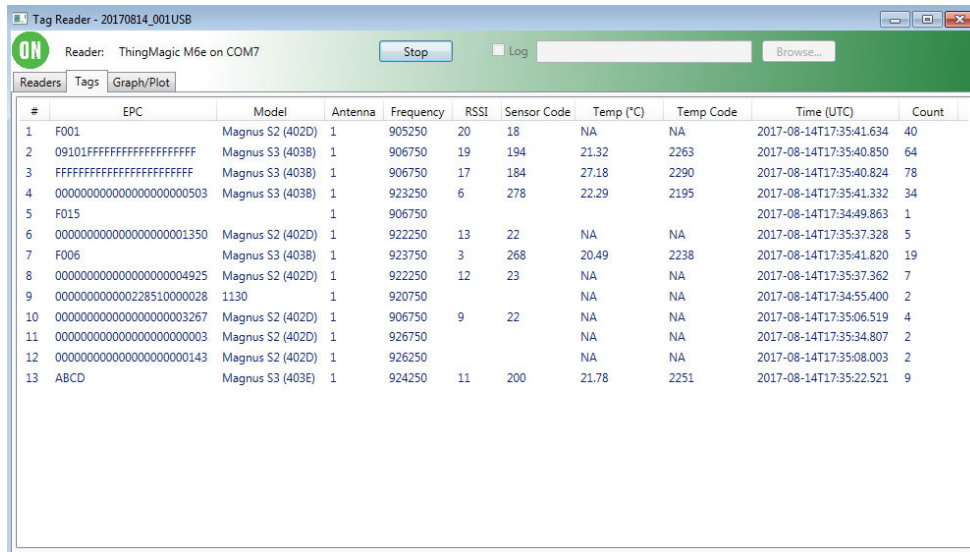
Read Delay – delay inserted between read cycles. Useful for reducing power consumption if only occasional reads are required.

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).



Tag Reader - 20170814_001USB

Reader: ThingMagic M6e on COM7

Buttons: Stop, Log, Browse...

Readers | Tags | Graph/Plot

#	EPC	Model	Antenna	Frequency	RSSI	Sensor Code	Temp (°C)	Temp Code	Time (UTC)	Count
1	F001	Magnus S2 (402D)	1	905250	20	18	NA	NA	2017-08-14T17:35:41.634	40
2	09101FFFFFFFFFFFFFFFFF	Magnus S3 (403B)	1	906750	19	194	21.32	2263	2017-08-14T17:35:40.850	64
3	FFFFFFFFFFFFFFFFFFFFFFF	Magnus S3 (403B)	1	906750	17	184	27.18	2290	2017-08-14T17:35:40.824	78
4	00000000000000000000503	Magnus S3 (403B)	1	923250	6	278	22.29	2195	2017-08-14T17:35:41.332	34
5	F015		1	906750					2017-08-14T17:34:49.863	1
6	000000000000000000001350	Magnus S2 (402D)	1	922250	13	22	NA	NA	2017-08-14T17:35:37.328	5
7	F006	Magnus S3 (403B)	1	923750	3	268	20.49	2238	2017-08-14T17:35:41.820	19
8	000000000000000000004925	Magnus S2 (402D)	1	922250	12	23	NA	NA	2017-08-14T17:35:37.362	7
9	000000000000028510000028	1130	1	920750			NA	NA	2017-08-14T17:34:55.400	2
10	000000000000000000003267	Magnus S2 (402D)	1	906750	9	22	NA	NA	2017-08-14T17:35:06.519	4
11	000000000000000000000003	Magnus S2 (402D)	1	926750			NA	NA	2017-08-14T17:35:34.807	2
12	000000000000000000000143	Magnus S2 (402D)	1	926250			NA	NA	2017-08-14T17:35:08.003	2
13	ABCD	Magnus S3 (403B)	1	924250	11	200	21.78	2251	2017-08-14T17:35:22.521	9

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.

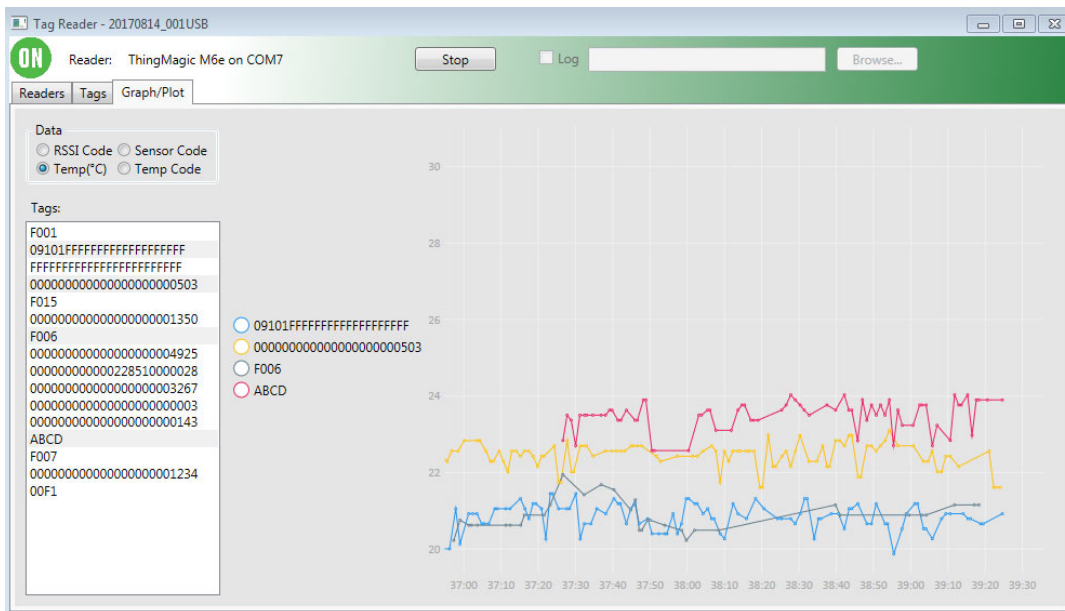


Figure 5. Sensor Information Displayed under “Graph/Plot” Tab

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