

FSH: How to perform a signal strength measurement showing the results on the outdoor map

From the expert's desk

Products:

| FSH 4 / 8 / 13 / 20

| HA-Z240

1. Introduction:

The R&S FSH Handheld Spectrum Analyzer Family provides the most important RF analysis functions that an RF service technician or an installation and maintenance team needs to solve daily routine measurement tasks.

When combining the FSH with the HA-Z240 GPS receiver, it allows to perform measurements referenced to geodetic coordinates. With the outdoor and indoor mapping measure mode it also makes it possible, to directly display some kind of a relative field strength plot on a map.



With this Application Sheet we give a step by step introduction how to setup and perform an outdoor coverage measurement using the R&S FSH Handheld Spectrum Analyzer together with the HA-Z240 GPS receiver.

It is a compilation of the single steps already described in the FSH user manual, bringing them in a logical row. It does not claim to be complete as we e.g. do not explain, how to set up the transducers for the measurement antenna. All information has been compiled with care. However errors can't be ruled out.

2. Preparation of the instrument

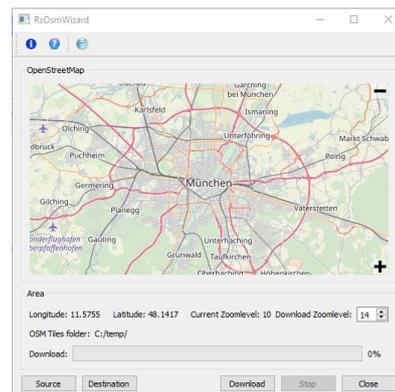
For a defined starting point, you should always press [PRESET] at the beginning. We have some sub steps to go:

a.) Define and download the required map.

The available maps can be downloaded using the R&S Open Street Map Wizard. This application is to be found on the DVD coming with the FSH.

It is also available as download on the R&S webpage (<https://www.rohde-schwarz.com/software/fsh/>).

After installing the software, it automatically connects to the OSM server. You can then choose the desired map range (lowest download level), adjust the Download Zoom level (highest download level) and then download the files to a folder (e.g. "Maps") of an SD Card. This card will be used later on for displaying the map on your FSH.



b.) Choose the operation mode and reception parameters. Setting these parameters is mandatory for the next steps. In this case we select "Receiver / Interference - Maps", 1 GHz, RBW 100 kHz leaving all the other parameters at the default settings.

Press the following buttons:

[MODE] <Receiver/Interference> <Maps>

[FREQ] 1 [GHz]

[BW] <Manual RBW> 100 [kHz]

c.) Install the GPS Receiver

After the HA-Z240 is connected to the FSH, please check for correct settings:

[SETUP]<Instrument Setup>

Scroll to the GPS section using the rotating wheel and check, if the receiver is recognized and GPS state is "On". After enabling the GPS it can take some seconds until the receiver is recognized.

GPS	
GPS	Enabled
Show GPS Information	Enabled
Coordinate Format	ddd° mm' ss.sss"
GPS Receiver Connected	Yes

d.) Load the map

Insert the SD-Card (referring to step a) into the FSH and open the Maps Menu

[MEAS] <Map>

Now select the maps (the name is similar to the directory's name given in step a).

Zoom in to the desired size using the <Zoom in> button

If you want to get to this menu later on, just press the [MEAS] Key while you are in the Maps Mode as shown in step b.

e.) Set measurement mode to "Geotagging"

[MEAS] <Meas Mode> (Geotagging)

f.) Define the appropriate colors and levels for field strength display
The instrument offers three levels to be defined. Because we do not have a transducer integrated in our measurement, our levels are in dBm and do not represent a field strength, but a power level.

Let's keep the standard settings:

Good Coverage > -30dBm (color=green)
Average Coverage = -55dBm (color=yellow)
Bad Coverage < -80dBm (color=red)

[MEAS] <Settings> and choose the setting to check the value and eventually change it.

The colors will be assigned to your representative measurement points on the map according to the measured level. It is important to know, that these colors are not static. Between the levels the color will change based on the subtractive mixture of color:



After all these steps are done, the FSH is well prepared to go outside for a measurement.

3. Performing the measurement

There are several ways to perform a geo-referenced measurement. To get the results displayed on the map immediately, it is important to have "Live map update" in the [MEAS] – (GPS Position) menu switched on.

a.) Automatic based on an event (to be enabled in [MEAS]<Settings> <Save On Event> while using the Maps Mode).

In the Event Source you can choose between

- Time intervals
- Limit failures
- Distance intervals
- Every sweep

This makes us able to do e.g. mobile measurement without a need for experts on site. The instrument is "armed" once and will do all the tasks without any need for further manual assistance. Typically a distance interval of 100m is used for mobile BC measurements.

b.) Manually on the instrument (to be found in [MEAS]<GPS position> while using the Maps Mode

- saving the current position
- manual position and azimuth (e.g. when no GPS reception)

In our example only manually saving the current position will be explained.

[MEAS]<GPS Position><Save Current Position> will trigger the geo-referenced measurement. After collecting some geo tags, your map will give you the first view on the current supply situation.



The instrument saves all the collected information on the SD Card. So when the task is complete, simply connect the SD Card to your computer. In the folder "Geotagging" you will find a GPX file containing all the geo-referenced information (e.g. Time & Date, Coordinates in decimal degrees, Frequency, Signal Level) necessary to have an analysis on a separate computer later on.

4. Conclusion

The FSH is a great tool making it easy to perform outdoor measurements while having an overview of the supply situation at a glance.

The measurement can be set up within minutes.

References:

- R&S FSH4/8/13/20 Quick Start Guide
- R&S FSH4/8/13/20 Operating Manual

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