



Product: Hand Held Spectrum Analyzer R&S FSH3

Effective Test Procedures for Installing and Maintaining RF Transmitter Sites

Application Note

This application note describes an effective method for generating test setups, performing measurements and producing test reports with the hand-held Spectrum Analyzer R&S FSH3.



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1 Overview

During commissioning and maintenance of RF transmitter stations, various measurements have to be performed to ensure proper operation. To make the test results comparable between service teams or between maintenance periods, identical conditions and settings for the test equipment are necessary. Changes compared to earlier measurements are taken into account of during maintenance, which possibly affect the operation in the future.

All measurements need to be documented and archived for customer acceptance or later comparison. In order to save cost and time, ideally the measurements are documented automatically in a standardized test report. The R&S FSH3 takes into account by providing tools for standardized test setups and for easy and customized test report generation.

This application note describes the typical steps beginning with pre-defined test setups to the generation of a customized report using the FSH View software and a Microsoft Word macro for automatic report generation.

For commissioning and maintaining RF transmitter sites, the following steps are typically necessary for measurement setups and documentation:

- Define test setups for different service teams
- Perform the measurements and store the results
- Prepare the test results for documentation
- Generate a test report for the specific transmitter site.

For each step, the R&S FSH3 provides the necessary functions and tools to minimize the workload and to avoid errors.

Version 2.0 or later for both the R&S FSH3 firmware and the FSH View software is required for the procedures described in this application note.

2 Definition of Test Setups

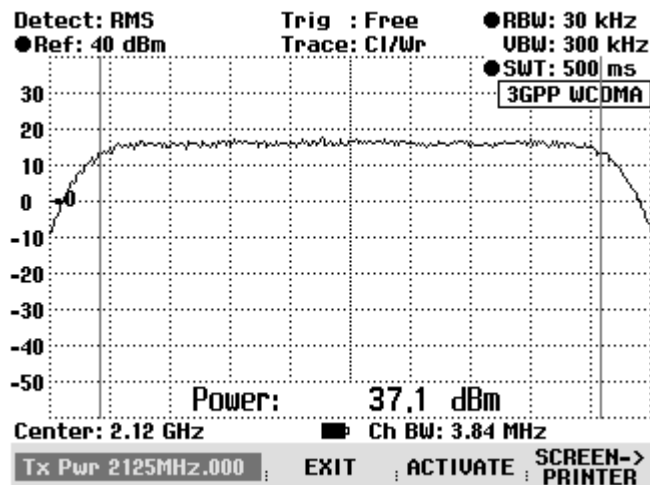
Generating the correct test setups is a prerequisite for performing measurements that are both straightforward and repeatable. This is especially important if different individuals install or maintain transmitter sites. Different sites need to be tested in exactly the same way both when installed and for maintenance for comparability both across site and onsite across time.

With the R&S FSH3 the specific test setups need be generated only once in the central laboratory of a service organization or by the client of a service provider, for example. The test setups are generated by setting the measurement parameter on the instrument, which stores the data set together with the test result in the internal memory. Each data set is assigned an expressive name with up to 15 characters corresponding to the measurement such as

- Tx Power,
- Antenna VSWR,
- Cable DTF,
- Antenna Spectrum.

The R&S FSH3 automatically adds a 3-digit file extension to the name starting with 000. That way different data sets using the same name are distinguishable and the storage of new data sets is very easy.

When recalling a data set, the R&S FSH3 shows the test result stored with the data set to help to identify the data set to be used for a specific measurement. It activates the data set by pressing ACTIVATE. The R&S FSH3 then starts the measurement using the recalled setup.



It is advisable to store data sets with real measurements to help identify the required data set as realistic example of what a correct test result should look like.

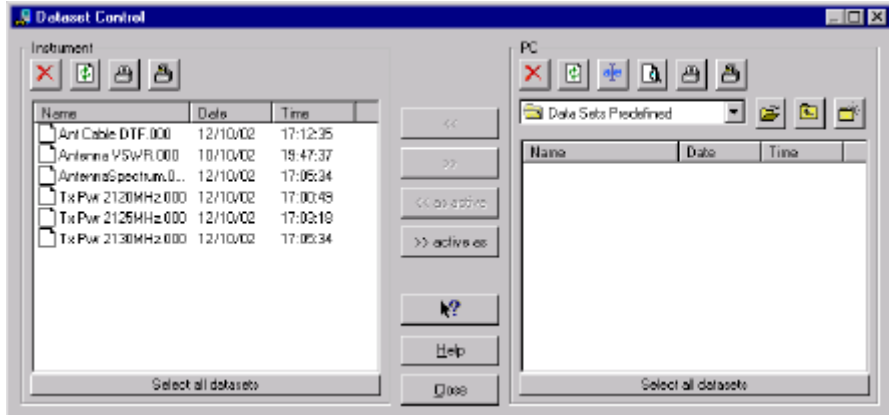
Using the FSH View software the setups to transfer to a PC (or Laptop).

1. Connect the R&S FSH3 to the PC via the optical RS-232 cable.
2. Run the FSH View software.

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3. Select Data Set Control by selecting <Instrument: Data Set Control> in the tool bar menu or by clicking the data set control icon in the icon bar.

The FSH View software shows the data sets stored on the instrument.



4. Select the data sets to store.

- If all data sets in the instrument are to be used for on-site measurement click the 'Select all datasets' button at the bottom of the list.


All data sets are selected (names are highlighted).

- If you want to use only specific data sets, press the 'Ctrl' key on the PC keyboard and click the data sets you require with the mouse.

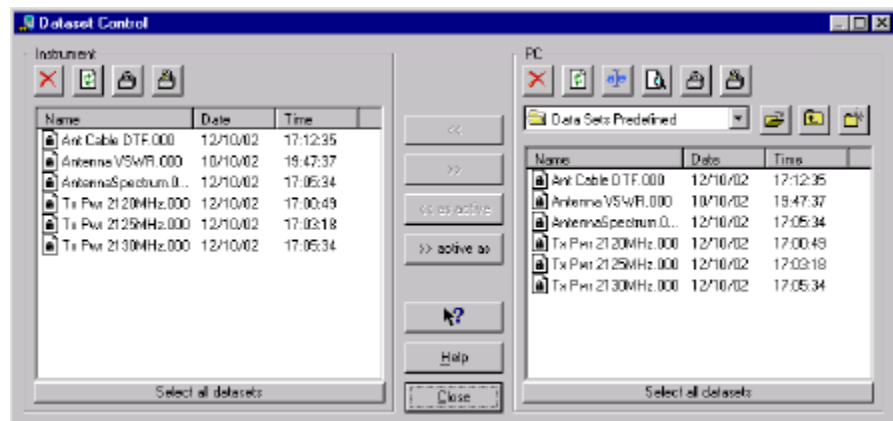
The selected data sets are highlighted.

5. Lock the selected data sets by clicking the lock icon: .

The selected data sets are now locked. The lock icon is visible in front of the data set name. They cannot be changed or deleted in the instrument.

6. Transfer the selected data sets to the PC by clicking the transfer button: .

The data sets are now stored in the selected directory of the PC hard disk (Directory 'Data Sets Predefined' in the example below).



The pre-defined data sets are now ready for distribution, by sending them via email to the different service teams or by downloading them directly into different instruments.

Hint: If cable models, limit lines or transducer factors are needed for the measurement, they need to be distributed and downloaded to the other instruments, too. The R&S FSH3 does not store cable models, transducer factors or limit lines in the data set files, but refers to the name of the cable model, limit line or transducer factor used with the data set. The respective cable models, limit lines or transducer factors used in data sets must be available in the instrument.

3 Performing Measurements and Storage of Results

Standardized measurements in the field are most effectively performed using predefined setups. They minimize the operation steps and assure that only settings consistent with a defined test procedure are used.

To perform a measurement based on a data set:

1. Press the SAVE/PRINT key.
2. Press the RECALL softkey.

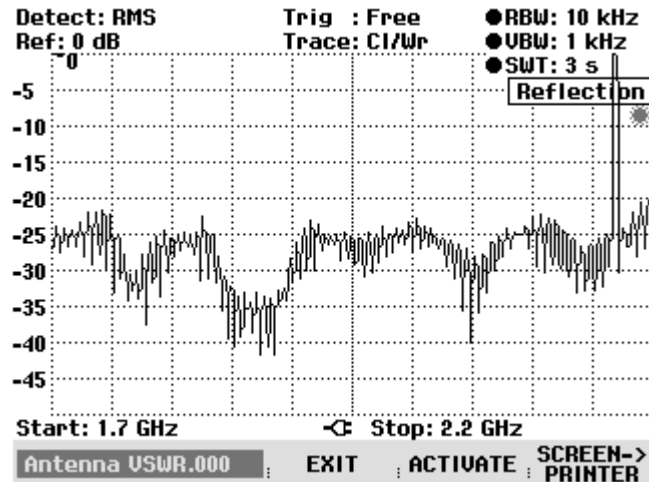
The R&S FSH3 lists of the stored data sets.

20/10/2002	DATASET LIST	19:20:50
AntennaSpectrum.000	Ⓜ 12/10/2002 17:05:34	
Tx Pwr 2130MHz.000	Ⓜ 12/10/2002 17:05:34	
Tx Pwr 2125MHz.000	Ⓜ 12/10/2002 17:03:18	
Tx Pwr 2120MHz.000	Ⓜ 12/10/2002 17:00:49	
Antenna VSWR.000	Ⓜ 10/10/2002 19:47:37	
Ant Cable DTF.000	Ⓜ 31/07/2002 15:56:36	

DELETE : DELETE : EXIT : RECALL : LIST-> : ALL : PRINTER

3. Select the data set to be used for a specific measurement.
4. Press the RECALL softkey.

The R&S FSH3 shows the test results stored with the settings and the name of the data set (eg Antenna VSWR.000) in the lower left corner of the screen.



Use the rotary knob or the up and down keys to browse through the different data sets. The contents of the selected data set are shown on screen.

5. Press the softkey ACTIVATE to enable the settings of the selected data set.

Hint: With Transmission measurement, Reflection measurement and Distance to Fault measurement a calibration is necessary to get correct test results. The calibration data are not stored in a data set. Therefore perform a calibration before starting the actual measurement.

6. Perform the measurement using the settings from the recalled data set.
7. Press the SAVE key.
8. Press the SAVE softkey.

The R&S FSH3 prompts for a name for the data set to be stored. It offers the name of most recent stored data set with the file extension number incremented by 1.

9. Either accept the name or type in an alternative using the letters and numbers of the numeric keypad. The R&S FSH3 adds the numeric file extension automatically.

For really convenient and quick operation decide on a name for the data set for whole test session, such as the name of the transmitter site, when the first test result is saved. All the following test results use the same name and the R&S FSH3 increments the numeric file extension by 1 for each new data set. It is only necessary to confirm the proposed name instead of typing in a new name.

4 Preparing Test Results for Documentation

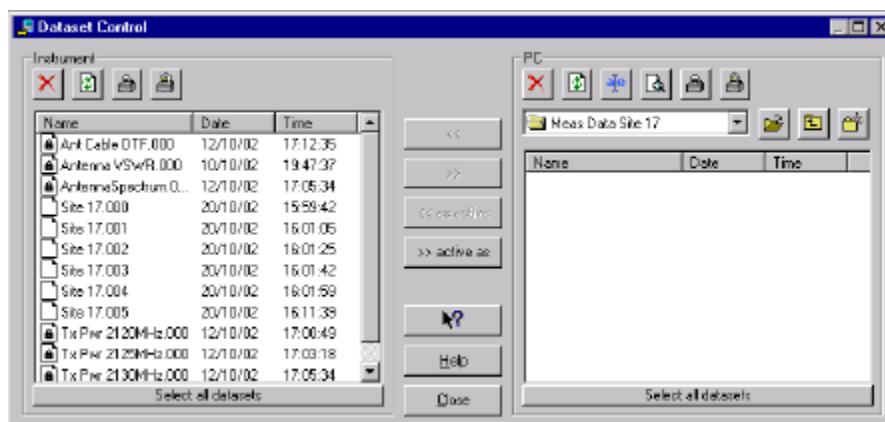
After the test session is finished and all the required test results are stored in the R&S FSH3 transfer the recorded data to a PC or a laptop.

1. Connect the R&S FSH3 to the PC via the optical RS-232 interface cable.
2. Run the FSH View software.

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3. Select the Data Set control by selecting <Instrument: Data Set Control> in the tool bar menu or by clicking the data set control icon in the icon bar.

The FSH View software shows the data sets stored on the instrument.

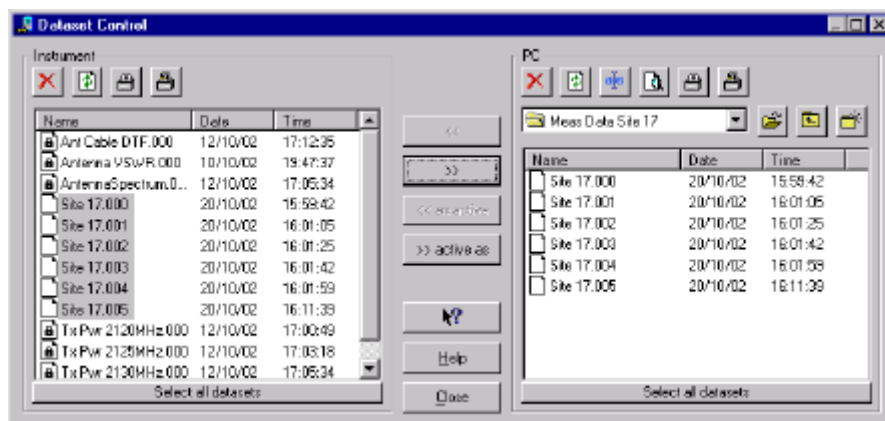


Note: The measured data is not locked in contrast to the predefined settings.

4. Select the measured data set by pressing the keyboard 'Ctrl' key and clicking the respective data sets. To select measured data sets in a sequence, press the 'Shift' key and click the first one and then the last one.
5. Transfer the selected data sets to the PC by clicking the transfer button:

All measured data sets are stored now on the hard disk of the PC in the selected directory ("Meas Data Site 17" in the example).

Hint: To simplify the handling of measurement data from different sites it is helpful to store the test results in different directories.



The measured data sets stored in the R&S FSH3 can be deleted now.

6. Click the delete icon in the Instrument section of the FSH View Data Set Control.

Hint: The R&S FSH3 can store 100 complete data sets. Therefore, the measured data sets need not be deleted. However, the shorter the data set list the easier it is to handle.

The data sets stored on the PC can be used for documentation as required.

5 Generating a standardized Test Report

Generating a standardized Test Report from results on the PC hard disk

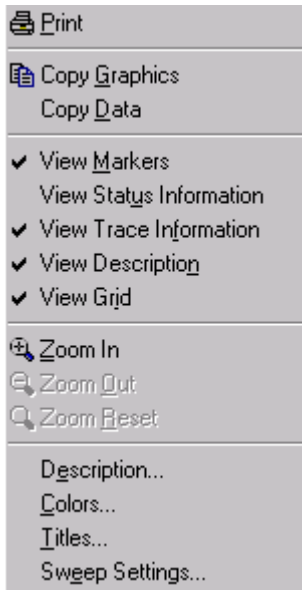
The FSH View software can load data sets generated with the R&S FSH3 for viewing, manipulating or storing in different graphic formats such as Bitmap (BMP), Windows Meta File (WMF), Portable Network Graphic (PNG), PC Paintbrush (PCX) or in Microsoft EXCEL™ (CSV) or ASCII (TXT) format.

For evaluating test results off-line it is the recommended way to handle the stored test results.

1. Run the FSH View software. An R&S FSH3 does not need to be connected to the PC. Click 'Cancel' in the Instrument Connect window that pops up during startup.
2. Select <File: Open> in the menu bar or click the file open icon.
3. Change the directory in the File Open control to the directory of the stored data sets.
4. Select a data set and click the Open button.

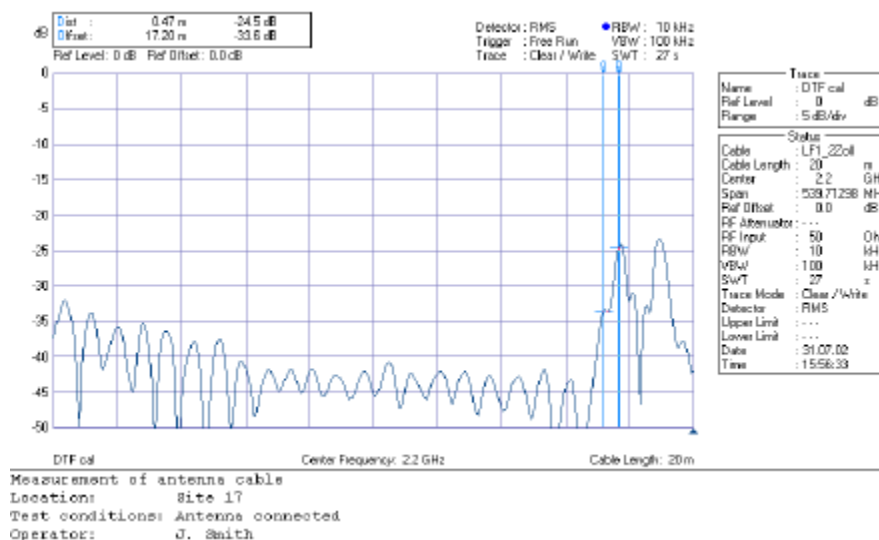
The software opens the selected data set and shows the measurement results along with the associated settings.

5. Press the right mouse button to see options for manipulating the graphics.



- The Marker and Delta Marker are available for evaluating the trace: Position the markers by setting the mouse pointer on a marker line, pressing the left mouse button and drag the line to the position required.
- The sweep window can be zoomed for higher trace resolution: Position the mouse cursor, press the left mouse button and create a zoom window.
- The level resolution can be changed (Sweep Settings...).
- Alter the reference level by setting the mouse pointer on the trace, clicking the left mouse button and dragging the trace vertically.
- Add up to 10 lines description at the bottom of the graphics for documentation.
- The color of the graphics can be set for the most favorable documentation.
- The graphic can be sent directly to a printer.
- The graphic or the trace data can be copied to the clipboard for pasting it into a test report.

After the graphic is configured it can be inserted into a prepared test report template via the clipboard or stored in a graphic or text file and inserted to the form.



Generating a Test Report from the R&S FSH3 Memory

To simplify automated the test report generation, a Microsoft Word macro comes with the FSH View software. It imports data sets from the FSH3 memory into a prepared test report. The additional report information such as company, operator or date can be prepared in advance for all test reports.

The macro consists of two files stored in the directory of the FSH View software: FSH Report.doc and FSH Report.dot. The FSH Report.dot file can be configured to specific requirements, by adding a company logo in the header or adapting the predefined fields for measurement specific information.

1. Connect the R&S FSH3 to the PC or Laptop with the optical RS-232 interface.
2. Select the Windows Start menu.
3. Select Programs.
4. Select FSH View.
5. Select FSH Report.

Microsoft Word is started.

6. Select 'Activate Macros' to activate the macro for report generation.

The macro in Microsoft Word has added two icons for automatic insert of R&S FSH3 data sets into the open Microsoft Word document, one for importing the instrument screen in color and one in black and white.

7. Press the key SAVE/PRINT on the R&S FSH3.
8. Press the RECALL softkey.
9. Select the file to be put into the documentation.
10. Press the RECALL softkey.

The R&S FSH3 shows the test result along with the file name on screen.

Use the rotary knob or the up- or down key to browse through the different data sets.

11. Click the icon for color or black and white graphic import on the upper left hand corner of the Microsoft Word frame.

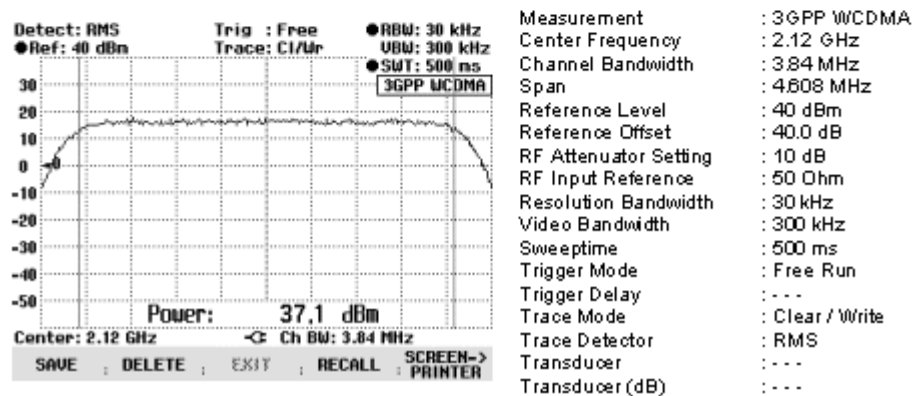
The Microsoft Word macro starts the FSH View software and the screen content of the R&S FSH3 is transferred to the Microsoft Word form. In addition all settings used for measurement are displayed in a table beneath the graphic.



Installation Test Report

Company: Rohde & Schwarz
Address: P.O.B. 801469, 81614 Munich
Client: Mobile Communication Enterprise
Location: Site 17
Operator: Jeff W. Smith
Phone: +49 89 4129 0
E-mail: jeff.w.smith@xxx.com
Date: 2002-10-31

Transmit Power



With this procedure as many test results as needed can be put into the template.

6 Ordering information

Type of instrument		Ordering number
FSH3	Hand-held Spectrum Analyzer 100 kHz to 3 GHz	1145.5740.03
FSH3	Hand-held Spectrum Analyzer 100 kHz to 3 GHz, with Tracking Generator	1145.5740.13



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