Products: R&S Spectrum Analyzer FS315

Resolving Security Issues
When Working with the R&S® FS315 in
Secure Areas

Based upon the user's security requirements, this document describes the Rohde&Schwarz options available to address the user's spectrum analysis needs. It also covers the different memory types and locations where user information can be stored in the spectrum analyzer R&S® FS315.

For secure environments, it describes an approach to physically remove the user data from the spectrum analyzer.

ROHDE & SCHWARZ

Contents

1   Overview

In many cases it is imperative that the R&S® FS315 spectrum analyzer be used in a secured environment. Generally these highly secured environments will not allow any test equipment to leave the area unless it can be proven that no user information will leave with the test equipment. Security concerns can arise when spectrum analyzers need to leave a secured area to be calibrated or serviced.

This document describes the types of memory and their usage in the R&S® FS315 spectrum analyzer. It also addresses methods of ensuring that no user data will leave the secured area should the product be removed for calibration or service needs.

2   Instrument Models Covered

R&S® FS315 Spectrum Analyzers

> **R&S® FS315**

3   Battery Information

The R&S® FS315 spectrum analyzer is fitted with a lithium-ion rechargeable backup battery, located on the power supply, only for backup the real time clock.

4   Types of Memory in the R&S® FS315 Spectrum Analyzer and Their Security Concerns

EEPROM

The measurement board of the R&S® FS315 spectrum analyzer has three EEPROM devices. These devices hold 32 kByte each and contain information related to the installed hardware, such as serial number, hardware options, correction constants etc. The EEPROMs do not hold user data nor can the user access the EEPROM storage.

The EEPROM is not a security concern.

Module – FRAM [1]

The power supply of the R&S® FS315 spectrum analyzer has one FRAM device. This device holds 2 kByte contain information related to the installed hardware, such as serial number, hardware options, correction constants etc. The FRAM does not hold user data nor can the user access the FRAM storage.

The Module-FRAM is not a security concern.

PC - FRAM [2]

The PC module of the R&S® FS315 spectrum analyzer has one FRAM device. This device holds 32 kByte contain information related to the installed hardware, such as serial number, Limit Lines, User saved data sets, User saved trace data etc.

> ➢ Instrument data (Serial numbers, part numbers etc.)
>
> ➢ User Settings (Units, Levels, Frequency Range, Bandwidth etc.)
>
> ➢ Saved User Data (saved traces, saved settings etc.)

The PC FRAM memory has to be cleared by the Master Preset procedure (see below).

Note: *The instrument firmware and factory default settings section of the FLASH, EEPROM and FRAM memorys will not be erased by the Master Preset procedure. The instrument firmware and factory default settings memory section does not hold any user data.*

Module - SRAM

The measurement board of the R&S® FS315 spectrum analyzer has one 1 MByte SRAM memory device which contains intermediate measurement data, the measurement control data and the operating system memory.

The power supply of the R&S® FS315 spectrum analyzer has one 128 kByte SRAM memory device which contains intermediate measurement data, the measurement control data and the operating system memory.

The SRAM is volatile memory and it loses its memory as soon as the instrument is switched off. The SRAM will be unreadable within five minutes after the power is removed from the instrument.

The Module - SRAM memory is not a security concern.

Module - SDRAM

The measurement board of the R&S® FS315 spectrum analyzer has one 32 MByte SDRAM memory device which contains intermediate measurement data, the measurement control data of the signal processor.

The SDRAM is volatile memory and it loses its memory as soon as the instrument is switched off. The SDRAM will be unreadable within five minutes after the power is removed from the instrument.

The Module - SDRAM memory is not a security concern.

PC - SDRAM

The PC board of the R&S® FS315 spectrum analyzer has one 128 MByte SDRAM memory device which contains intermediate measurement data, the measurement control data and the operating system memory.

The SDRAM is volatile memory and it loses its memory as soon as the instrument is switched off. The SDRAM will be unreadable within five minutes after the power is removed from the instrument.

The PC - SDRAM memory is not a security concern.

Module - FLASH

The measurement board of the R&S® FS315 spectrum analyzer has one FLASH device. This device holds 2 MByte and contains the following information:

➢ Instrument Firmware (Bootcode, Operating System, Application)

➢ Default Settings (Startfrequency, Stopfrequency, RBW, Calibration Default Values etc.)

The power supply of the R&S$^®$ FS315 spectrum analyzer has one FLASH device. This device holds 2 MByte and contains the following information:

> ➢ Instrument Firmware (Bootcode, Operating System, Application)

> ➢ Default Settings (Calibration Default Values, Default Temperature und Voltage Limits, Default Serial Numbers etc.)

The Module-FLASH memories do not hold user data nor can the user access the Module-FLASH storage.

TheModule - FLASH memory is not a security concern.

PC - FLASH

The PC board of the R&S$^®$ FS315 spectrum analyzer has one FLASH device. The size of the FLASH device depends on the PC board revision. This device holds 64 MByte (PC board revision 1147.1346.00) or 128 MByte (PC board revision 1147.1181.00) and contains the following information:

> ➢ Instrument Firmware (Bootcode, Operating System, Application)

> ➢ Default Settings (Startfrequency, Stopfrequency, RBW, Calibration Default Values etc.)

The PC-FLASH memory does not hold user data nor can the user access the PC-FLASH storage.

The PC - FLASH memory is not a security concern.

BIOS - FLASH

The PC board of the R&S$^®$ FS315 spectrum analyzer has another FLASH devices. This device holds 512 kByte and contains the following information:

> ➢ BIOS

The BIOS-FLASH memory does not hold user data nor can the user access the BIOS-FLASH storage.

The BIOS - FLASH memory is not a security concern.

5 Information Storage in the R&S® FS315 Spectrum Analyzer

DATA	EEPROM Not a security concern	Module FRAM Not a security concern	Module SRAM Not a security concern	Module SDRAM Not a security concern	PC - SDRAM Not a security concern	Module FLASH Not a security concern	PC- FLASH Not a security concern	BIOS- FLASH Not a security concern	PC - FRAM **Master preset required**
Hardware Info, Serial Number, Cal-Correction Constants	X	X							
Measure-ment control data Intermediate meas. data			X	X	X				
Active instrument setup Active meas. data			X	X	X				
BIOS, Operating Systems and Instrument Firmware Factory default settings						X	X	X	
Limit Lines, User saved data sets User saved trace data									X

6 Memory Clearing Procedure

Since Module-SRAM and Module- and PC-SDRAM memories are erased when the instrument is switched off they do not pose a security risk. No user data is written to the EEPROMs, Module-FRAM, Module-FLASH, PC-FLASH and BIOS-FLASH memory; hence, it is deemed that it does not pose a risk either.

The PC-FRAM is a memory device that does not lose its memory when power is removed and can contain user data. Therefore, this memory device must be cleared prior before leaving the secured area.

R&S® FS315 Spectrum Analyzer - Master preset procedure

To remove any **classified** user data from the R&S® FS315 spectrum analyzer perform the following steps:

➢ Remove user settings by restoring the factory defaults via SYS-PRESET menu , than select FACTORY and press the PRESET Softkey.

➢ Clear any user data, user calibration data and stored instrument settings by pressing entering the SYS-INFO menu then press the SYSTEM MESSAGES Softkey, than select 'Delete x Messages' and press ENTER. Type the master password '**0364168960**' in the 'Enter Password:' entry field and confirm with ENTER. The master reset is performed and ends after appr. 40 sec

➢ Turn the instrument off and remove the power supply unit. This will clear any data in the SRAM and SDRAM.

The R&S® FS315 spectrum analyzer can now leave the secured area.

Calibration and the validity of the spectrum analyzer's calibration after memory clearing

The calibration ensures a user that their measurements are traceable to a government standard. Rohde & Schwarz highly recommends that users follow the calibration cycle suggested for their instrument.

The EEPROM and FRAM are the only locations used to hold permanent adjustment values required to maintain the validity of the spectrum analyzer's calibration. Hence, performing the memory clearing procedures described above does not affect the validity of the instrument's calibration.

7 Special Considerations for USB ports

USB ports can pose a security threat in high-security locations. Generally, this threat comes from small USB pen drives (a.k.a. memory sticks, key drives, etc) which can be very easily concealed, yet can quickly read/write several GBytes of data.

Additional Information

1) 2) **FRAM** - Ferroelectric Random Access Memory

A type of non-volatile read/write random access semiconductor memory. FRAM combines the advantages of SRAM - writing is roughly as fast as reading, and EPROM - non-volatility and in-circuit programmability. FRAM has similar applications to EEPROM, but can be written much faster.

References:

http://www.cacs.louisiana.edu/~mgr/404/burks/foldoc/86/41.htm

http://www.ramtron.com/doc/AboutFRAM/Technology.asp

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