R&S®ZN-Z5x/-Z151
Calibration Units
Instrument Security Procedures
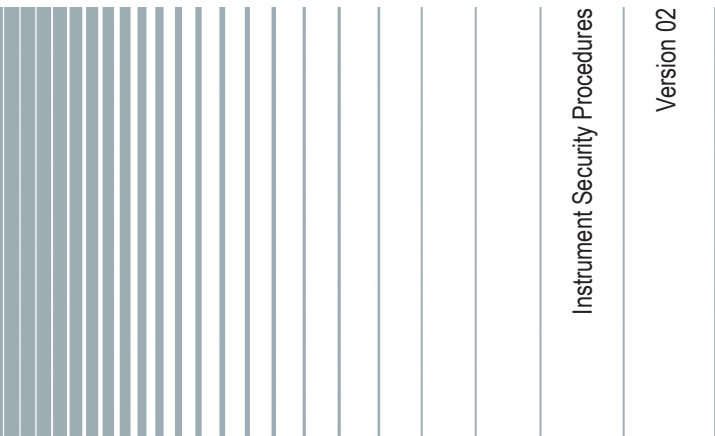
ROHDE&SCHWARZ

1 Overview

It is often imperative that R&S®ZN-Z5x/-Z151 calibration units are used in a secured environment. Generally these highly secured environments do not allow any test equipment to leave the area unless it can be proven that no user information leaves with the test equipment. Security concerns can arise when devices need to leave a secured area, e.g. to be calibrated or serviced.

This document describes the types of memory and their usage in the R&S®ZN-Z5x/-Z151. It provides a statement regarding the volatility of all memory types and specifies the steps required to declassify an instrument through memory clearing or sanitization procedures. These sanitization procedures are designed for customers who need to meet the requirements specified by the US Defense Security Service (DSS).

2 Models Covered

Table 2-1: R&S®ZN-Z5x/-Z151 Models

Product	Ports	Frequency Range	Order Number
R&S®ZN-Z50 calibration unit	2 ports, 3.5 mm (f)	9 kHz to 9 GHz	1335.6904.30
		9 kHz to 26.5 GHz	1335.6904.32
R&S®ZN-Z51 calibration unit	4 ports, 3.5 mm (f)	100 kHz to 8.5 GHz	1319.5507.34
	2 ports, 3.5 mm (f)		1319.5507.32
	4 ports, N (f)		1319.5507.74
	2 ports, N (f)		1319.5507.72
R&S®ZN-Z52 calibration unit	4 ports, 3.5 mm (f)	100 kHz to 26.5 GHz	1335.6991.30
R&S®ZN-Z53 calibration unit	2 ports, 3.5 mm (f)	100 kHz to 26.5 GHz	1335.7046.32
	2 ports, type N (f)	100 kHz to 18 GHz	1335.7046.72
R&S®ZN-Z54 calibration unit	2 ports, 2.92 mm (f)	9 kHz to 40 GHz[1]	1335.7117.92
R&S®ZN-Z55 calibration unit	2 ports, 2.4 mm (f)	9 kHz to 50 GHz	1335.7181.42
R&S®ZN-Z151 calibration unit	2 ports, SMA (f)	100 kHz to 8.5 GHz	1317.9134.32
	2 ports, N (f)		1317.9134.72
[1] characterized up to 43.5 GHz			

3 Security Terms and Definitions

Clearing

The term "clearing" is defined in Section 8-301a of DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)". Clearing is the process of eradicating the data on media so that the data can no longer be retrieved using the standard interfaces on the instrument. Therefore, clearing is typically used when the instrument is to remain in an environment with an acceptable level of protection.

Sanitization

The term "sanitization" is defined in Section 8-301b of DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)". Sanitization is the process of removing or eradicating stored data so that the data cannot be recovered using any known technology. Instrument sanitization is typically required when an instrument is moved from a secure to a non-secure environment, such as when it is returned for service of calibration.

The memory sanitization procedures described in this document are designed for customers who need to meet the requirements specified by the US Defense Security Service (DSS). These requirements are specified in the "Clearing and Sanitization Matrix" in Section 14.1.16 of the ISFO "Manual for the Certification and Accreditation of Classified Systems under the NISPOM".

Instrument declassification

The term "instrument declassification" refers to procedures that must be undertaken before an instrument can be removed from a secure environment, for example when the instrument is returned for calibration. Declassification procedures include memory sanitization or memory removal, or both. The declassification procedures described in this document are designed to meet the requirements specified in DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)", Chapter 8.

4 Types of Memory and Information Storage

This section contains information on the memory components available in your calibration unit R&S®ZN-Z5x/-Z151. It provides details of the size of each memory component, its type, how it is used, its location, volatility, and the sanitization procedure.

Memory type	Size	Content	Volatility	User Data	Sanitization procedure
SRAM	52 kbyte	µController SRAM: µC firmware downloaded when device is powered up. Used for device operation.	Volatile	Yes	Turn off device power (disconnect USB)
Flash	256 kbyte	µController firmware to control the functionality of the device	Non-volatile	No	None required
Flash	16 Mbyte	• Device configuration data (Product ID, device serial number, hardware info) • Factory characterization data, programmed in factory or service • User characterization data[1] Memory allocation not accessible by user.	Non-volatile	No	None required
microSD card (R&S®ZN-Z5x only)	1 Gbyte included in delivery	• User characterization data[1] • Can contain user data (removable, standard type memory, which can contain data not generated by analyzer FW)	Non-volatile	Yes	Remove microSD Card

[1] User characterization data can only be generated by the vector analyzer firmware and characterize the calibration unit, e.g. with adapters or cables

4.1 Volatile Memory

The volatile memory in the R&S®ZN-Z5x/-Z151 does not have battery backup. It loses its contents when power is removed from the calibration unit. The volatile memory is not a security concern.

Removing power from this memory meets the memory sanitization requirements specified in the "Clearing and Sanitization Matrix" in Section 5.2.5.5.5 of the ISFO Process Manual for the Certification and Accreditation of Classified Systems under the NISPOM.

SRAM

The R&S®ZN-Z5x/-Z151 has a microcontroller with 52 kbyte SRAM to control the calibration unit functionality. The microcontroller firmware is downloaded to this SRAM whenever the calibration unit is powered on (connected via USB).

Sanitization procedure: Turn off device power (disconnect USB)

4.2   Non-Volatile Memory

The device contains no user-accessible non-volatile memory, except for the removable microSD card (R&S®ZN-Z5x only). For this reason, as described below, no sanitization procedure is required for any memory component except the microSD card.

Microcontroller Flash

The microcontroller firmware is stored in its internal Flash of 256 kbyte. The firmware controls the functionality of the R&S®ZN-Z5x/-Z151 calibration unit.

The microcontroller Flash memory does not hold user data nor can the user access the microcontroller Flash memory.

Sanitization procedure: None required (no user data)

Flash

The R&S®ZN-Z5x/-Z151 calibration unit has a 16 Mbyte Flash memory that contains the device configuration data such as the R&S® product ID and the device serial number together with the factory characterization data.

The Flash memory device does not hold user data nor can the user access the storage.

Sanitization procedure: None required (no user data)

Removable microSD Card (R&S®ZN-Z5x only)

On the rear side of a R&S®ZN-Z5x calibration unit, there is a microSD slot. The memory on the microSD card (1 Gbyte included in delivery) can be used to store user characterization data.

The microSD card content is non-volatile, so nothing is lost when power is removed from the calibration unit. It is not a security concern because the microSD card can be physically removed from the calibration unit and left in the secure area.

Sanitization procedure: Remove microSD Card from R&S®ZN-Z5x

5   Instrument Declassification

Before the R&S®ZN-Z5x/-Z151 leaves the secured area, e.g. to perform service or calibration, all classified user data needs to be removed from the calibration unit.

To hold classified user data in the secure areas, remove the inserted microSD card from the R&S®ZN-Z5x calibration unit. This can be done by performing the following steps for the declassification:

1. Power off the calibration unit by disconnecting the USB

2. Remove the classified microSD card (with the user data). This can be done without opening the calibration unit. To remove the micro SD card, perform the following steps:

   a) Locate the micro SD card slot at the rear of the R&S®ZN-Z5x.

Figure 5-1: Location of the micro SD card slot

   b) Remove the micro SD card

   This removes all user data from the calibration unit.

The R&S®ZN-Z5x, without the removable microSD card, can now leave the secured area. It still functions properly for service or other needs. When the calibration unit is back within the secured area, the original classified removable microSD card can be reinstalled.

With these declassification procedures, the R&S®ZN-Z5x calibration unit addresses the needs of customers working in secure areas.

The R&S®ZN-Z151 is not equipped with a microSD card slot. Hence, it doesn't require this kind of instrument declassification.

Validity of calibration after declassification

Calibration ensures that measurements are traceable to a government standard. Rohde & Schwarz highly recommends that users follow the calibration cycle suggested for their instruments and devices.

The Flash is the only memory type used to hold permanent adjustment values (factory characterization) required to maintain the validity of the R&S®ZN-Z5x/-Z151's calibration. Hence, removing the microSD card from a R&S®ZN-Z5x does not affect the validity of the calibration.