R&S®MXO 5 Series
Oscilloscope
Instrument Security Procedures

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Version 01

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This document describes the types of memory and their use in the R&S®MXO 5 oscilloscope.
While every effort has been made to ensure the accuracy of the information herein, it is provided without warranty. Design iteration and revisions may result in minor differences between the information provided here and your product.

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Throughout this document, products from Rohde & Schwarz are indicated without the ® symbol , e.g. R&S®MXO 5 is indicated as R&S MXO 5 .

Contents

1 Overview

Securing important information is crucial in many applications.

Generally, 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, e.g. to be calibrated.

"Regarding sanitization, the principal concern is ensuring that data is not unintentionally released" [1].

This document provides a statement regarding the volatility of the memory types used and specifies the steps required to sanitize an instrument.

The procedures in this document follow "NIST Special Publication 800-88: Guidelines for Media Sanitization" [1].

In addition, recommendations are provided to safeguard information on the product.

References

See the following literature for further information.

[1] **Kissel Richard L. [et al.]** Guidelines for Media Sanitization = Special Publication (NIST SP) = NIST SP - 800-88 Rev 1. - Gaithersburg : [s.n.], December 17, 2014.

[2] **National Industrial Security Program Authorization Office** Defense Security Service (DSS) Assessment and Authorization Process Manual (DAAPM). - May 6, 2019.

[3] **ACSC Australian Cyber Security Centre** Australian Government Information Security Manual, January 2020.

2 Instrument models covered

Table 2-1: R&S MXO 5 models

Product name	Order number
R&S MXO54	1802.1008.04
R&S MXO58	1802.1008.08

3 Security terms and definitions

Terms defined in Guidelines for Media Sanitization

According to NIST Special Publication 800-88 [1]: "Sanitization is a process to render access to target data (the data subject to the sanitization technique) on the media infeasible for a given level of recovery effort." It defines the following categories of sanitization:

- **"Sanitization"**
  "Media sanitization refers to a process that renders access to target data on the media infeasible for a given level of effort."
- **"Clear"**
  "Clear applies logical techniques to sanitize data in all user-addressable storage locations for protection against simple non-invasive data recovery techniques; typically applied through the standard Read and Write commands to the storage device, such as by rewriting with a new value or using a menu option to reset the device to the factory state (where rewriting is not supported)."
- **"Purge"**
  "Purge applies physical or logical techniques that render Target Data recovery infeasible using state of the art laboratory techniques."
- **"Destroy"**
  "Destroy renders Target Data recovery infeasible using state of the art laboratory techniques and results in the subsequent inability to use the media for storage of data."

Control of media

Another option to secure sensitive information is to keep physical media within the classified area, see [1], paragraph 4.4.

Volatile memory

"Memory components that do not retain data after removal of all electrical power sources, and when reinserted into a similarly configured system, are considered volatile memory components." [2]

Typical examples are RAM, e.g. SDRAM.

Non-volatile memory

"Components that retain data when all power sources are discontinued are non-volatile memory components." [2].

In the context of this document, non-volatile memory components are non-user accessible internal memory types, e.g. EEPROM, Flash, etc.

Media

Media are types of non-volatile memory components. In the context of this document, media are user-accessible and retain data when you turn off power.

Media types are Hard Disk Drives (HDD), Solid State Drives (SSD), Memory Cards, e.g. SD, microSD, CFast, etc., USB removable media, e.g. Pen Drives, Memory Sticks, Thumb Drives, etc. and similar technologies.

4 Statement of volatility

The R&S MXO 5 contains various memory components. See the subsequent sections for a detailed description regarding type, size, usage and location.

Notes on memory sizes

Due to the continuous development of memory components, the listed values of memory sizes may not represent the current, but the minimal configuration.

This document uses the common notation kbyte, Mbyte and Gbyte for memory sizes, although the prefix multiplication factor is 1024.

4.1 Volatile memory

Volatile memory modules refer to non-accessible internal storage devices, as described in Security terms and definitions > Volatile memory.

Table 4-1: Types of volatile memory

Memory type	Location	Size	Content / Function	User modifiable
SDRAM/DDR4	Mainboard	4 GByte	Temporary information storage for operating system and instrument firmware	Yes
SDRAM/DDR4	Mainboard	1 Gbyte	Waveform generator data	Yes
SRAM	Mainboard	16 kbyte	Operating system	Yes
SDRAM/DDR4	Mainboard	≥ 2x7 Gbyte	• Waveform data • Measurement data	Yes

Memory type	Location	Size	Content / Function	User modifiable
SRAM	Front panel board	16 kbyte	Operating system	Yes
SDRAM/DDR4	IPS14/4-12 board	8 Gbyte	Operating system	Yes

4.2 Non-volatile memory

Non-volatile memory modules refer to non-accessible internal storage devices, as described in Security terms and definitions > Non-volatile memory.

Table 4-2: Types of non-volatile memory

Memory type	Location	Size	Content / Function	User modifiable
Flash	Mainboard	128 kbyte	Boot code	No
Flash	Mainboard	≥ 16 Gbyte	• Factory adjustment data • Module Header Data	No
EEPROM	Mainboard	256 kbit	• Product identification data • Product options	No
Flash	Front panel board	128 kbyte	Boot code	No

4.3 Media

Media memory modules refer to non-volatile storage devices, as described in Security terms and definitions > Media.

Table 4-3: Types of media memory modules

Memory type	Location	Size	Content / Function	User modifiable
SSD (solid state drive	IPS connecting board	256 Gb	Removable media (mass memory) • Operating system and instrument firmware • Firmware options and applications • Instrument states and setups • Waveform data • Measurement results and screen images	Yes

5 Instrument sanitization procedure

5.1 Volatile memory

You can purge the volatile memory by following the procedure below. The sanitization procedure complies with the definition of NIST [1], see "Terms defined in Guidelines for Media Sanitization" on page 4.

The volatile memory in the instrument does not have battery backup. It loses its contents when power is removed from the instrument.

To turn off and remove power

1. Turn off the R&S MXO 5.
2. Disconnect the power plug.

   Leave the instrument powered off at least for 10 minutes to make sure that all volatile memory modules lose their contents, see [3].

5.2 Non-volatile memory

The non-volatile memories do not contain user data. Therefore no sanitization procedure is required.

5.3 Media

To remove the SSD memory module at the rear of the instrument:

1. **NOTICE!** Do not remove the SSD memory during operation it can lose data.

   Turn off the R&S MXO 5.
2. Remove all media memory devices.
3. Keep the memory devices under organizational control.

6 Operability outside secured area

The sanitization does not affect the functionality of the R&S MXO 5 oscilloscope. The instrument works properly after sanitization.

7 Validity of instrument calibration

The validity of the R&S MXO 5 oscilloscope's calibration is maintained throughout the sanitization.

Glossary

C

CFast: Compact Fast - compact flash mass memory device.

D

DRAM: Dynamic Random Access Memory.

H

HDD: Hard disk drive.

M

microSD: Micro Solid-state Drive - memory card.

S

SD: Solid-state drive - memory card.

SSD: ATA Solid-state drives (including PATA, SATA, eSATA, mSATA,...).