KEITHLEY
A Tektronix Company

Model 4200A-SCS Parameter Analyzer

Declassification and Security Instructions

Keithley Instruments
28775 Aurora Road
Cleveland, Ohio 44139
1-800-833-9200
tek.com/keithley

Letter of Volatility

If you have data security concerns, this document tells you how to clear or sanitize the memory devices inside of your Model 4200A-SCS Parameter Analyzer. It also explains how to declassify an instrument that is not functioning.

The procedures in this document are written to meet the requirements specified in:

- NISPOM, DoD 5220.22-M, chapter 8
- ISFO Process Manual for Certification and Accreditation of Classified Systems under NISPOM

WARNING

Turn off the system and disconnect the power cord and measurement cables before removing the instrument cover. Failure to do so may result in electrical shock that could cause injury or death.

Contact information

If you have any questions after you review the information in this documentation, please contact your local Keithley Instruments office, sales partner, or distributor. You can also call the Tektronix corporate headquarters (toll-free inside the U.S. and Canada only) at 1-800-833-9200. For worldwide contact numbers, visit tek.com/contact-us.

Products

This document contains procedures for the following Keithley Instruments models:

- 4200A-SCS Parameter Analyzer
- 4200-SMU Medium Power Source-Measure Unit
- 4210-SMU High Power Source-Measure Unit
- 4201-SMU Medium Power Source-Measure Unit
- 4211-SMU High Power Source-Measure Unit
- 4210-CVU 4210 Capacitance Voltage Unit
- 4215-CVU 4215 Capacitance Voltage Unit
- 4220-PGU Pulse-Generator Unit
- 4225-PMU Pulse-Measure Unit
- 4200-PA Remote Preamplifier
- 4225-RPM Remote Amplifier/Switch Module
- 4200A-CVIV Multi-Switch

Terminology

The following terms may be used in this document:

Clear: Removes data on media or in memory before reusing it in a secured area. Clears all reusable memory to deny access to previously unsecured information.

Demo setups: Demonstration modules that come loaded on the instrument; you cannot modify them.

Direct method of modification: You can modify data directly.

Erase: Equivalent to clear (see above).

Indirect method of modification: The instrument system resources modify the data; you cannot modify it.

Instrument declassification: Procedures that must be completed before an instrument can be removed from a secure environment. Declassification procedures include memory sanitization and memory removal.

Media storage and data export device: Devices that can be used to store or export data from the instrument, such as a USB port.

Nonvolatile memory: Data is retained when the instrument power is turned off.

Protected user data area: Contains data that is protected by a password.

Remove: Clears instrument data by physically removing the memory device from the instrument.

Sanitize: Eradicates instrument data from media and memory so it cannot be recovered by other means or technology. This is typically used when the device will be moved (temporarily or permanently) from a secured area to a non-secured area.

Scrub: Directly retrieve and clear the contents of the memory device.

SSD: Solid state drive. This is usually the main permanent storage device for a piece of computing equipment. Solid state drives are a replacement for conventional rotating magnetic disks and instead consist of an array of NAND flash memory devices connected to the computing equipment through a specialized controller and may or may not have on-board cache RAM.

User accessible: You can directly retrieve the contents of the memory device.

User data: Measurement data that represents signals that you connect to the instrument.

User-modifiable: You can write to the memory device during normal instrument operation using the front-panel interface or remote control.

User settings: Instrument settings that you can change.

Volatile memory: Temporary memory; data is lost when the instrument is turned off.

Description of memory

Model 4200A-SCS instruments and accessories use various volatile and nonvolatile memory components. The Memory devices (on page 4) section gives detailed instructions specific to each product listed in the Products (on page 2) section.

The following list of products that can be found installed in the 4200A-SCS system or shipped as accessories with the 4200A-SCS system contain volatile and nonvolatile memory individually listed for each product.

4200A-SCS single-board computer: BIOS devices, CPU cache RAM, and DDR3 RAM SO-DIMM modules that contain nonvolatile and volatile memory used for the main computer.

4200A-SCS solid-state drive: The SSD nonvolatile memory that contains files and data for the Windows® 7 operating system; programs, files, and data for the 4200A-SCS Clarius+ software factory- and user-created projects and tests; and calibration data, readings, and other data.

Trigger utility module: Nonvolatile NOR flash memory that contains trigger logic.

4200-SMU, 4210-SMU, 4201-SMU, and 4211-SMU products: Nonvolatile flash memory, EEPROM, and volatile static RAM that contains instrument logic, calibration data, readings, and other data.

4210-CVU and 4215-CVU products: Nonvolatile flash memory and volatile SDRAM and RAM memory that contains instrument logic, calibration data, readings, and other data.

4220-PGU and 4225-PMU products: Nonvolatile flash memory and volatile SDRAM and RAM memory that contains instrument logic, calibration data, readings, and other data.

4225-PMU product: Nonvolatile flash memory and volatile SDRAM, RAM, and DDR2 SO_DIMM memory that contains instrument logic, calibration data, readings, and other data.

4200-PA product: A microcontroller with nonvolatile flash and EEPROM memory and volatile static RAM memory that contains instrument logic and calibration data. The microcontroller contains:

- 16 KB nonvolatile flash memory
- 768 bytes volatile static RAM memory
- 256 bytes nonvolatile EEPROM memory

4225-RPM product: A microcontroller with nonvolatile flash memory and volatile static RAM memory that contains instrument logic and calibration data. The microcontroller contains:

- 64 KB nonvolatile flash memory
- 16 KB of volatile static RAM memory

4200A-CVIV multi-switch product: A microcontroller with nonvolatile flash and volatile static RAM memory; four microcontrollers with nonvolatile flash memory, volatile static RAM memory, and nonvolatile EEPROM memory; all contain instrument logic and calibration data.

The single microcontroller contains:

- 256 KB nonvolatile flash memory
- 64 KB of volatile static RAM memory

The four microcontrollers contain:

- 16 KB nonvolatile flash memory
- 768 bytes volatile static RAM memory
- 256 bytes nonvolatile EEPROM memory

Memory devices

The following tables list the volatile and nonvolatile memory devices in the standard instrument and listed options.

WARNING

Turn off the system and disconnect the power cord and measurement cables before removing the instrument cover. Failure to do so may result in electrical shock that could cause injury or death.

Volatile memory devices

The following tables list 4200A-SCS system, instrument, and accessory volatile memory devices and relevant memory-related information.

4200A-SCS single-board computer

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
BIOS settings volatile battery-backed RAM device	Battery-backed temporary memory used to store BIOS settings for proper computer operation in the product.	Yes	BIOS setup	BIOS1 – SPI U1	Use BIOS setup to restore factory defaults or remove coin cell battery from its socket	Remove coin cell battery from its socket
Intel CPU with volatile cache RAM	Temporary memory used by the Intel microprocessor to run the operating system and application software	Yes	Use of operating system and included application software	CN1	Turn instrument power off	Turn instrument power off
4 GB volatile DDR3 RAM SO-DIMM modules	Temporary memory used by the Intel microprocessor to run the operating system and application software	Yes	Use of operating system and included application software	SODIMM_A1 and SODIMM_B1	Turn instrument power off	Turn instrument power off

4200-SMU, 4210-SMU, 4201-SMU, and 4211-SMU instrument cards

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
128 KB volatile static RAM	Temporary memory used by the microprocessor controller for internal processor operations (on the microprocessor chip)	No	None	U12 and U14	Turn instrument power off	Turn instrument power off

4210-CVU and 4215-CVU instrument cards

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
8 MB volatile SDRAM memory	Temporary memory used by the microprocessor controller for internal processor operations (on the microprocessor chip)	No	None	U114	Turn instrument power off	Turn instrument power off
512 KB volatile static RAM memory	Temporary memory used by the instrument logic to facilitate instrument sourcing and measuring capabilities	No	None	U910, U911, U912, U913	Turn instrument power off	Turn instrument power off

4220-PGU instrument card

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
8 MB volatile SDRAM memory	Temporary memory used by the microprocessor controller for internal processor operations (on the microprocessor chip)	No	None	U114	Turn instrument power off	Turn instrument power off
512 KB volatile static RAM memory	Temporary memory used by the instrument logic to facilitate instrument sourcing and measuring capabilities	No	None	U714, U715	Turn instrument power off	Turn instrument power off

4225-PMU instrument card

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
8 MB volatile SDRAM memory	Temporary memory used by the microprocessor controller for internal processor operations (on the microprocessor chip)	No	None	U114 on 4220-PGU board	Turn instrument power off	Turn instrument power off
512 KB volatile static RAM memory	Temporary memory used by the instrument logic to facilitate instrument sourcing and measuring capabilities	No	None	U714, U715 on 4220-PGU board	Turn instrument power off	Turn instrument power off
1 GB volatile DDR2 SO-DIMM memory modules	Temporary memory used by the instrument logic to facilitate instrument sourcing and measuring capabilities	No	None	Installed in sockets U951 and U952 on 4225-PMU board	Turn instrument power off	Turn instrument power off

4200-PA accessory

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
Microcontroller internal 768 bytes volatile static RAM	Temporary memory used by the microprocessor controller for internal processor operations (on the microprocessor chip)	No	None	U1	Turn instrument power off	Turn instrument power off

4225-RPM accessory

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
Microcontroller internal 16 KB static RAM	Temporary memory used by the microprocessor controller for internal processor operations (on the microprocessor chip)	No	None	U500	Turn instrument power off	Turn instrument power off

4200A-CVIV Multi-Switch accessory

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
Microcontroller internal 64 KB of volatile Static RAM memory	Temporary memory used by the microprocessor controller for internal processor operations (on the microprocessor chip)	No	None	U800	Turn instrument power off by unplugging USB cable	Turn instrument power off by unplugging USB cable
Microcontroller internal 768 bytes volatile Static RAM memory	Temporary memory used by the microprocessor controller for internal processor operations (on the microprocessor chip)	No	None	U100, U200, U300, U400	Turn instrument power off by unplugging USB cable	Turn instrument power off by unplugging USB cable

Nonvolatile memory devices

The following table lists nonvolatile memory devices and relevant memory-related information for all products listed in the Products (on page 2) section. If the table indicates that a device can be cleared by the user, see the detailed instructions in Clearing data on the 4200A-SCS solid state drive (on page 11).

4200A-SCS single-board computer

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
BIOS nonvolatile flash device	Contains BIOS boot program	No	n/a	BIOS1 – SPI U1	Not clearable using any methods available to customer or vendor	Remove chip

4200A-SCS solid-state drive

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
256 GB nonvolatile solid state drive (SSD)	Contains calibration data and user settings	Yes	Normal use of embedded computer using Operating System or application software	Vertically mounted on internal bulkhead wall opposite the front panel integrated LCD	Follow the Clearing Data procedures	Follow the Sanitizing data procedures

Trigger utility module

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
16 MB nonvolatile NOR flash memory	Contains trigger logic	No	n/a	U101 on 878111702 hardware build	Not clearable using any methods available to customer or vendor	Remove chip
128 MB nonvolatile NOR flash memory	Contains trigger logic	No	n/a	U101 on 878111705 hardware build	Not clearable using any methods available to customer or vendor	Remove chip

4200-SMU, 4210-SMU, 4201-SMU, and 4211-SMU instrument cards

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
512 KB nonvolatile flash memory	Contains instrument logic	Yes	n/a	U22	Requires Xilinx IMPACT programming tool and JTAG connection to J8 on 4220-PGU board	Remove chip
16 KB nonvolatile EEPROM	Contains instrument logic	No	n/a	U17	Not clearable using any methods available to customer or vendor	Remove chip
256 KB nonvolatile flash memory	Contains calibration data	Yes		U15 and U16	Not clearable using any methods available to customer or vendor	Remove chip

4210-CVU and 4215-CVU instrument cards

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
512 KB nonvolatile flash memory	Contains instrument logic	No	n/a	U119	Requires Xilinx IMPACT programming tool and JTAG connection to J8 on 4220-PGU board	Remove chip
4 MB nonvolatile flash memory	Contains calibration data	Yes	n/a	U116	Not clearable via any methods available to customer or vendor	Remove chip

4220-PGU instrument card

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
512 KB nonvolatile flash memory	Contains instrument logic	Yes	n/a	U22	Requires Xilinx IMPACT programming tool and JTAG connection to J8 on 4220-PGU board	Remove chip
4 MB nonvolatile flash memory	Contains calibration data	Yes	n/a	U116	Not clearable using any methods available to customer or vendor	Remove chip

4225-PMU instrument card

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
512 KB nonvolatile flash memory	Contains instrument logic	Yes	n/a	U22	Requires Xilinx IMPACT programming tool and JTAG connection to J8 on 4220-PGU board	Remove chip
4 MB nonvolatile flash memory	Contains calibration data	Yes	n/a	U116	Not clearable via any methods available to customer or vendor	Remove chip

4200-PA accessory

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
Microcontroller internal 16 KB nonvolatile flash memory	Contains calibration data	No	n/a	U1	Not clearable using any methods available to customer or vendor	Remove chip
Microcontroller internal 256 bytes nonvolatile EEPROM memory	Contains calibration data	No	n/a	U1	Not clearable using any methods available to customer or vendor	Remove chip

4225-RPM accessory

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
Microcontroller internal 64 KB nonvolatile flash memory	Contains calibration data	No	n/a	U500	Not clearable using any methods available to customer or vendor	Remove chip

4200A-CVIV multi-switch accessory

Type and minimum size	Function	User modifiable	Data input method	Location	To clear	To sanitize
Microcontroller internal 256 KB nonvolatile flash memory	Contains calibration data	No	n/a	U800	Not clearable using any methods available to customer or vendor	Remove chip
Microcontroller internal 16 KB nonvolatile flash memory	Contains switching logic	No	n/a	U100, U200, U300, U400	Not clearable using any methods available to customer or vendor	Remove chip
Microcontroller internal 256 bytes nonvolatile EEPROM memory	Contains switching logic	No	n/a	U100, U200, U300, U400	Not clearable using any methods available to customer or vendor	Remove chip

Clearing data on the 4200A-SCS solid state drive

Follow clearing instructions found in NISPOM, DoD 5220.22-M, chapter 8.

Sanitizing data

The following subsections indicate how to sanitize data from the various individual nonvolatile storage devices found in the 4200A-SCS system, instrument cards, and accessories.

Sanitizing data on the 4200A-SCS solid state drive

Follow sanitization instructions found in NISPOM, DoD 5220.22-M, chapter 8.

Sanitizing data on a non-functional system

To sanitize a nonfunctional instrument, remove all of the following items from the system and return it to Keithley Instruments for installation of replacement boards.

- Instrument cards plugged into main backplane PCI slots
- Single board computer mounted inside the chassis
- Trigger utility module card plugged into main backplane ISA slot
- Solid-state drive