



V2820A-SPI
Single Port Interface
Option

Installation Guide



Agilent Technologies

Notices

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- www.agilent.com/find/V2820A (product-specific information and support)
- www.agilent.com/find/assist (worldwide contact information for repair and service)

Information on preventing damage to your Agilent equipment can be found at www.agilent.com/find/tips.

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Regulatory Compliance

This product has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition. The documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

EMC COMPLIANCE:

- Complies with European EMC Directive 2004/108/EC
- IEC/EN 61326-1 or IEC/EN 61326-2-1
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11
- ICES/NMB-001: This ISM device complies with Canadian ICES-001. (Cet appareil ISM est conforme a la norme NMB du Canada.)

SAFETY COMPLIANCE:

- Complies with European Low Voltage Directive 2006/95/EC
- IEC/EN 61010-1, 2nd Edition
- Canada: CSA C22.2 No. 61010-1-04
- USA: UL std no. 61010-1, 2nd Edition

- This instrument is in conformance with the German Regulation on Noise Declaration for Machines (Laermangabe nach der Maschinenlaermrerordnung -3.GSGV Deutschland).

Acoustic noise emission	Geraeuschemission
LpA < 70 dB	LpA < 70 dB
Operator position	Am Arbeitsplatz
Normal position	Normaler Betrieb
Per ISO 7779	Nach DIN 45635 t.19

Safety Notices

The following safety precautions should be observed before using this product and any associated instrumentation.

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product. Refer to the user documentation for complete product specifications.

WARNING If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

The types of product users are:

- **Responsible body** is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring that operators are adequately trained.
- **Operators** use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.
- **Maintenance personnel** perform routine procedures on the product to keep it operating properly (for example, setting the line voltage or replacing consumable materials). Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.

- **Service personnel** are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

Agilent products are designed for use with electrical signals that are rated Measurement Category I and Measurement Category II, as described in the International Electrotechnical Commission (IEC) Standard IEC 60664. Most measurement, control, and data I/O signals are Measurement Category I and must not be directly connected to mains voltage or to voltage sources with high transient over-voltages. Measurement Category II connections require protection for high transient over-voltages often associated with local AC mains connections. Assume all measurement, control, and data I/O connections are for connection to Category I sources unless otherwise marked or described in the user documentation.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30V RMS, 42.4V peak, or 60VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000V, no conductive part of the circuit may be exposed.

Do not connect switching cards directly to unlimited power circuits. They are intended to be used with impedance-limited sources. NEVER connect switching cards directly to AC mains. When connecting sources to switching cards, install protective devices to limit fault current and voltage to the card.

Before operating an instrument, ensure that the line cord is connected to a properly-grounded power receptacle. Inspect the connecting cables, test leads, and jumpers for possible wear, cracks, or breaks before each use.

When installing equipment where access to the main power cord is restricted, such as rack mounting, a separate main input power disconnect device must be provided in close proximity to the equipment and within easy reach of the operator.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before: connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground.

Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.

The instrument and accessories must be used in accordance with its specifications and operating instructions, or the safety of the equipment may be impaired.

Do not exceed the maximum signal levels of the instruments and accessories, as defined in the specifications and operating information, and as shown on the instrument or test fixture panels, or switching card.

When fuses are used in a product, replace with the same type and rating for continued protection against fire hazard.

Chassis connections must only be used as shield connections for measuring circuits, NOT as safety earth ground connections.

If you are using a test fixture, keep the lid closed while power is applied to the device under test. Safe operation requires the use of a lid interlock.

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

Instrumentation and accessories shall not be connected to humans.

Before performing any maintenance, disconnect the line cord and all test cables.

To maintain protection from electric shock and fire, replacement components in mains circuits – including the power transformer, test leads, and input jacks – must be purchased from Agilent. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Agilent to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call an Agilent office for information.

WARNING No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers. For continued protection against fire hazard, replace fuse with same type and rating.

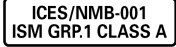
FRONT AND REAR PANEL SYMBOLS:



The CE mark is a registered trademark of the European Community.



N10149 The C-Tick mark is a registered trademark of the Australian Spectrum Management Agency.



This symbol indicates product compliance with the Canadian Interference-Causing Equipment Standard (ICES-001). It also identifies the product is an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4).



This symbol indicates separate collection for electrical and electronic equipment, mandated under EU law as of August 13, 2005. All electric and electronic equipment are required to be separated from normal waste for disposal (Reference WEEE Directive, 2002/96/EC).



This symbol on an instrument means caution, risk of danger. You should refer to the operating instructions located in the user documentation in all cases where the symbol is marked on the instrument.



This symbol indicates the instrument requires AC input power.



This symbol on the rear panel power switch indicates that power is turned OFF when the rocker switch is pushed in that direction.



This symbol on the rear panel power switch indicates that power is turned ON when the rocker switch is pushed in that direction. The rear panel power (LINE) switch disconnects the mains circuits from the mains supply.



This symbol on the front panel power button is illuminated amber if the instrument is in STANDBY power mode, green if the power button is turned on, or OFF (not illuminated) if the rear panel power switch is turned OFF or the mains power is removed to the instrument.



This symbol indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.

IP20 As defined by IEC 60529, IP20 indicates that the enclosure protects a finger or similar object (12 mm in diameter and 80 mm long) from entering any opening and touching dangerous internal parts, and there is no protection against water intrusion.



The CSA mark is a registered trademark of the CSA International.

CLEANING PRECAUTIONS:

WARNING To prevent electrical shock, disconnect the Agilent Technologies instrument from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally. To clean the connectors, use alcohol in a well-ventilated area. Allow all residual alcohol moisture to evaporate, and the fumes to dissipate prior to energizing the instrument.

NOTE: This installation guide is a supplement to the *Agilent V2820A Installation and Quick Start Guide* (p/n/ V2820-90001). For additional detail about installing the V2820A instrument, refer to the *Agilent V2820A Installation and Quick Start Guide*, which is provided in print form in your ship kit, and is available from the product CD and [website](#). For details on using the instrument for your application needs, refer to the instrument online help system.

Agilent V2820A-SPI Description

The single-port interface (SPI) is available as model option V2820A-SPI for the Agilent V2820A Vector Signal Analyzer. The single-port interface allows you to employ a complete RF test configuration for testing of RFIC transceivers (receiver-transmitters) or end products such as mobile phones. See Figure 1 for a front panel view and a block diagram of the internal hardware modification for SPI. See Figure 2 for the SPI RF configuration.

Figure 1 Front view

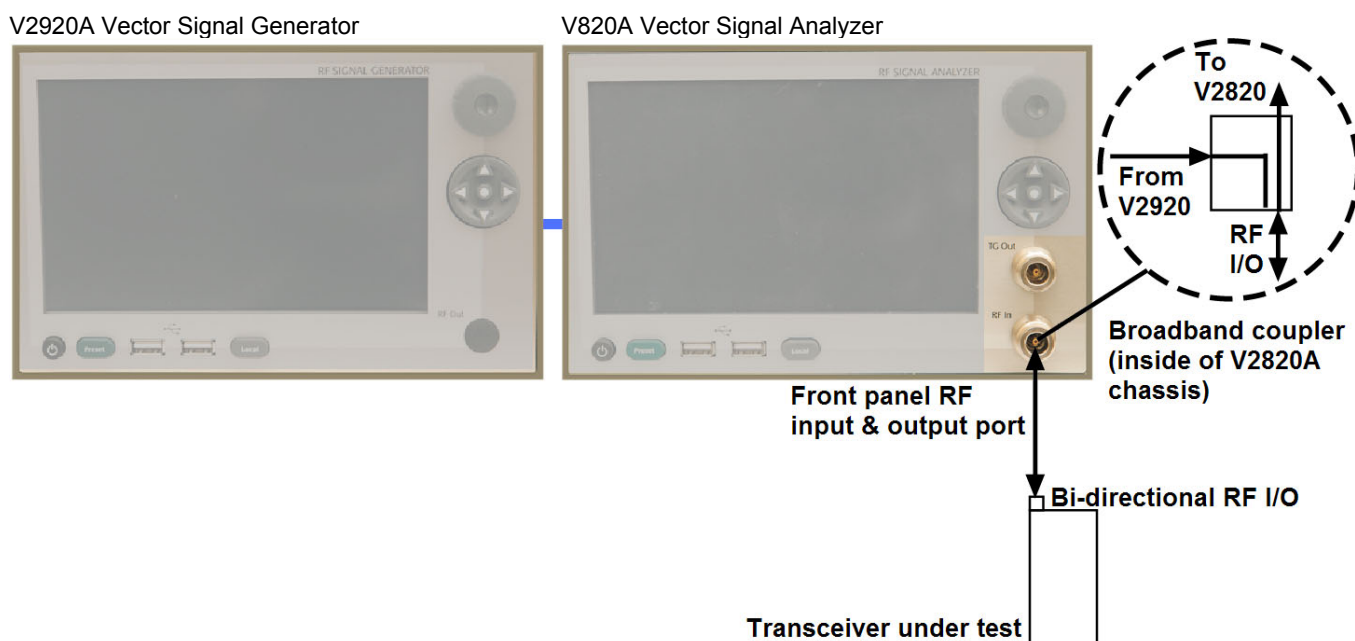
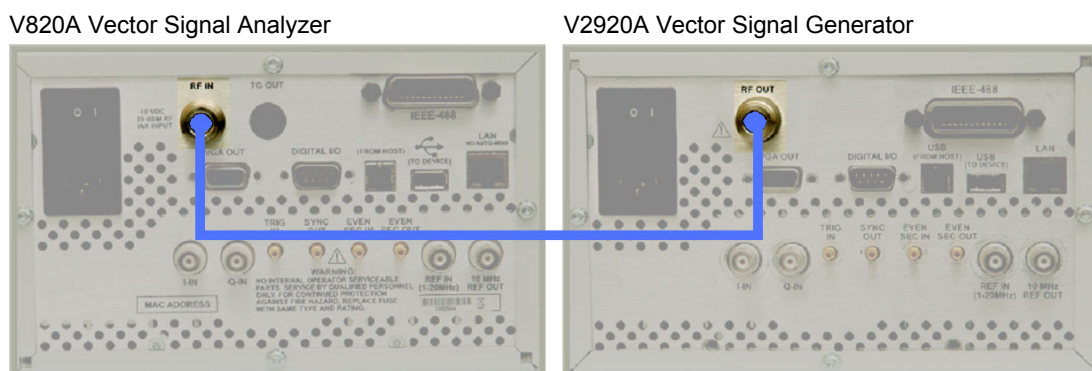


Figure 2 SPI RF configuration



To use your Agilent V2820A-SPI VSA in a conventional mode, it is necessary to install a Type-N, 50 Ω termination on the rear panel RF IN connector. See Figure 3.

Figure 3 V2820A-SPI with 50 Ω termination



User Flatness

Since there are signal level losses between the V2920A rear panel RF Output and the V2820A front panel RF Input and Output port, a user flatness utility is offered within the V2920A VSG and the V2820A VSA.

With the user flatness feature, you can create or open a user flatness data file to implement a level offset that compensates for cabling loss and coupler loss in the V2820A-SPI. The nominal loss from the rear panel RF IN connector to the DUT test port is 20 dB. The exact loss can be measured with a power meter such as the Agilent V3500A Portable RF PowerMeter.

Access the user flatness dialog box using one of the following methods:

- From the V2920A VSG front panel interface, select **Menu > Global Settings > User Flatness...**
- Once you have initiated a user flatness offset (by loading a file and activating the green On button), the word **(Offset)** appears in blue text in the right-hand pane next to the word **Amplitude:** on the V2920A. After closing the form, you may press, or left-click with a USB connected mouse, the blue word **(Offset)** to again display the user flatness data file form.
- The V2820A VSA has the same user flatness capability as the V2920A VSG. Select **Menu > Global Settings > User Flatness...** to load and activate a user flatness offset. There is no front panel indicator that a user flatness file is applied. To reopen the file once you have closed it select **Menu > Global Settings > User Flatness...**

When you open a data file or create a new one, the application checks for the following requirements:

- The maximum of 10 rows is not exceeded.
- The frequencies are listed in ascending order.
- The frequencies listed are within the limits of 0 Hz to 100 GHz.
- The minimum frequency spacing of 1 KHz is maintained.
- All offsets are within the limits of ± 100 dB.

The following control buttons are on the top of the user flatness dialog box:

- **Data File** allows manipulation of files with the following choices:
 - **Open...** opens a file browser window to enable you to select a file from the "user" folder, a USB memory stick, or a shared network folder. The name of the opened file appears (in brackets) in the title bar. If an open file is modified, an asterisk appears next to the file name. If you choose to create a new file or open another existing file, you are prompted to save the modified file. If you select "No," the new file table or the selected file is opened and your modifications to the last file are not saved.
 - **New...** opens a blank file table that you can modify by inserting and modifying rows. Once you have created a new frequency/offset table, you can save and name it.
 - **Save...** saves the current active file under the bracketed name displayed in the upper-left title bar (next to the label User Flatness). When no previously saved file is open, this choice is grayed out.
 - **Save as...** allows saving a new or modified file under a new name.
- **Insert Above** creates the first row in a table, or if you first select an existing row, a new row is inserted above it with data in the Frequency(Hz) and Offset(dB) columns. By default the new row is 1 KHz lower in frequency than the row below it and has the same offset.
- **Insert Below** creates the first row in a table or if you first select an existing row, a new row is inserted below it with data in the Frequency(Hz) and Offset(dB) columns. By default the new row is 1 KHz higher in frequency than the row below it and has the same offset.
- **Delete** deletes an existing row. As rows are deleted, the row above the deleted one becomes the selected row. If the user flatness file is turned On, you can delete all but the last row. If the last row is deleted, the user flatness feature is turned Off.
- **On/Off** toggles the amplitude offset On and Off.

You can use the standard controls (front panel knob, or puck) to modify the contents of any cell on the file table. If you double-click on any cell within the file table the number pad is called up to set the frequency or offset of that cell.

Once a file has been opened and modified, an asterisk appears next to the file name in the title bar.

There are two V2820A SCPI commands related to user flatness:

- `[:SENSE] :UFLatness :LOAD` selects and loads the user flatness data file. The default is to clear the list and turn off if on. The default file extension is .csv.
- `[:SENSE] :UFLatness :STATe` switches the user flatness on/off.

Also, there are two V2920A SCPI commands related to user flatness:

- `[:SOURce] :UFLatness :LOAD` selects and loads the user flatness data file. The default file extension is .csv.
- `[:SOURce] :UFLatness :STATe` switches the user flatness on/off.

Under remote programming, no courtesy messages (for example, "Do you want to save changes before continuing?") are present if a new file is called up after changes have been made to the previous file.