Keysight Multi-Channel Attenuation Control Unit:

J7204A 4-channel, DC to 6 GHz

J7204B 4-channel, DC to 18 GHz

J7205A 5-channel, DC to 6 GHz

J7205B 5-channel, DC to 18 GHz

KEYSIGHT
TECHNOLOGIES

Operating and
Service Manual

Notices

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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.

Safety Symbols

The following symbols on the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

The following symbols on the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

⚠	When you see this symbol on your instrument, you should refer to the instrument's instruction manual for important information.	∼	This symbol indicates that the instrument requires alternating current (ac) input.
⏚	This symbol indicates the protective earth (ground) terminal.		

Safety Considerations

Read the information below before using this instrument.

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards for design, manufacture, and intended use of the instrument. Keysight Technologies assumes no liability for the customer's failure to comply with these requirements.

Safety earth ground

WARNING   This is a Safety Class I Product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall be only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.

CAUTION   Always use the 3-prong AC power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage and the risk of electrical shock.

NOTE   The J7204/5/A/B comply with Overvoltage Category II and Pollution Degree 2 in IEC61010-1. The J7204/5/A/B are for indoor use.

Before applying power

Verify that the premises electrical supply is within the range of the instrument. The instrument has an autoranging power supply.

| **WARNING** | – If this instrument is not used as specified, the protection provided by the instrument could be impaired. This instrument must be used in a normal condition (in which all means for protection are intact) only. |
| | – Servicing should only be performed by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so. |

| **WARNING** | – No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers. |
| | – The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel button is only a standby switch and is not a LINE switch (disconnecting device). |

CAUTION	– The mains wiring and connectors shall be compatible with the connector used in the premise electrical system. Failure to ensure adequate earth grounding by not using the correct components may cause instrument damage and serious injury.
	– Before switching on this instrument, make sure the supply voltage is in the specified range.
	– Verify that the premise electrical voltage supply is within the range specified on the instrument.

Regulatory Markings

CE	The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.	ⓢ ® C US	The CSA mark is a registered trademark of the Canadian Standards Association.
	The RCM mark is a registered trademark of the Australian Communications and Media Authority.	40	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.
CE ICES/NMB-001 ISM GRP 1-A	ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada. ISM GRP 1-A indicates that the instrument is an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4).		This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.
KC MSIP-REM-Kst-WNJ7205B	This instrument is Class A suitable for professional use and is for use in electromagnetic environments outside of the home. 이 기기는 업무용 (A 급) 전자파적합기기로서 판 매자 또는 사용자는 이 점을 주의하시기 바라 며 , 가정외의 지역에서 사용하는 것을 목적으 로 합니다 .		

South Korean Class A EMC Declaration

Information to the user:

This instrument has been conformity assessed for use in business environments. In a residential environment, this equipment may cause radio interference.

This EMC statement applies to the equipment only for use in business environment.

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이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가 정 에서 사용하는 경우 전파간섭의 우려가 있습니다.

사용자 안내문은"업무용 방송통신기자재"에만 적용한다.

Safety and EMC Requirements

This instrument is designed to comply with the following safety and EMC (Electromagnetic Compatibility) requirements:

– Low Voltage Directive 2014/35/EU

– EMC Directive 2014/30/EU

Waste Electrical and Electronic Equipment (WEEE) Directive

This instrument complies with the WEEE Directive marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.

Product category:

With reference to the equipment types in the WEEE directive Annex 1, this instrument is classified as a "Monitoring and Control Instrument" product.

The affixed product label is as shown below.

Do not dispose in domestic household waste.

To return this unwanted instrument, contact your nearest Keysight Service Center, or visit http://about.keysight.com/en/companyinfo/environment/takeback.shtml for more information.

Sales and Technical Support

To contact Keysight for sales and technical support, refer to the support links on the following Keysight websites:

– www.keysight.com/find/attenuators
  (product-specific information and support, software and documentation updates)

– www.keysight.com/find/assist
  (worldwide contact information for repair and service)

Table of Contents

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1 Introduction

This chapter provides an overview of the Keysight J7204/5/A/B Multi-Channel Attenuation Control Unit.

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Product Overview

The Keysight J7204A/B and J7205A/B multi-channel attenuation control units are used for signal attenuation or conditioning. The J7204A/B consists of four attenuation channels while the J7205A/B consists of five attenuation channels, whereby the RF signal is routed through the front panel.

The J7204/5/A/B attenuation control unit is made up of a 2U, full-rack chassis. The J7204A/B is equipped with four sets of 11 dB/110 dB attenuator pairs while the J7205A/B is equipped with five sets of 11 dB/110 dB attenuator pairs, with a DC to 6 GHz/18 GHz frequency range.

All external RF connections are SMA (f) or N-Type and are at the front of the unit.

The J7204/5/A/B is controlled through the GPIB or LAN interface. In addition, the bundled soft front panel provides an alternative virtual interface to control the J7204/5/A/B.

Figure 1-1   J7204/5/A/B attenuation control unit

Key features of the J7204/5/A/B attenuation control unit

– Exceptional 0.03 dB insertion loss repeatability per section for the entire 5 million cycles ensures accuracy and reduces calibration intervals

– Excellent attenuation accuracy and flatness ensure precise measurements

– Multi-channel attenuation path up to five channels enable multi-DUT measurements at one time

– LAN and GPIB interfaces with soft front panel provide easy connectivity, programming flexibility, and control

Instrument options

There are two connector options available for the J7204/5/A/B as follows:

Table 1-1   J7204/5/A/B connector options

Option number	Description
J7204A-001	Type-N connector
J7204A-002	SMA connector
J7204B-001	Type-N connector
J7204B-002	SMA connector
J7205A-001	Type-N connector
J7205A-002	SMA connector
J7205B-001	Type-N connector
J7205B-002	SMA connector

Front and rear panel features

This section provides an overview of the front and rear panels of the J7204/5/A/B.

CAUTION	Refer to the standard instrument documentation for damage limits to the ports. Verify that your test setup will not cause those limits to be exceeded.

Front panel

Instrument state LEDs

Standby button

Figure 1-2   J7204/5/A/B front panel

Standby button	Note that this button is Standby only, not a line switch. The main power cord can be used as the system disconnecting device. It disconnects the mains circuits from the mains supply.
Instrument state LEDs	When power is applied to the J7204/5/A/B, the J7204/5/A/B enters its power-on sequence which requires several seconds to complete. The LEDs provide information on the state of the J7204/5/A/B during power on and during upgrades of the J7204/5/A/B's firmware. Table 1-2 on page 19 identifies the J7204/5/A/B's states based on the color and functionality of the LEDs.
Ports	– For J7204A/B: There are four channels, with two ports per channel: Port 1 and Port 2. Each channel has one input port and one output port. The front panel RF connector is either SMA (female) or Type-N. – For J7205A/B: There are five channels, with two ports per channel: Port 1 and Port 2. Each channel has one input port and one output port. The front panel RF connector is either SMA (female) or Type-N.

Table 1-2   J7204/5/A/B's state LED definitions

LED	Color	Instrument state
ATTN	Off	Instrument in the "ready" state
LAN	Green	LAN connection established
PWR	Green	– instrument has an IP address firmware download complete
ATTN	flashing	Power-on/boot-up. ATTN and LAN will flash red and then green during the power-on self-test.
LAN	flashing	
PWR	Green	
ATTN	Off	No LAN connection due to:
LAN	Red	– disconnected LAN cable
PWR	Green	– failure to acquire an IP address
		– waiting for DHCP-assigned address
ATTN	Green (flashing)	Instrument busy state
LAN	Green	– firmware download (LAN LED red if download over GPIB)
PWR	Green	– lengthy instrument operation in progress
ATTN	Red (flashing)	Instrument programming error or self-test error.
LAN	Green	Error queue is read using `SYSTem:ERRor?`
PWR	Green	
ATTN	Off	Instrument identification. Activated from the instrument's Web interface:
LAN	Green (flashing)	– ON: Turn on the Front Panel Interface Indicator
PWR	Green	– OFF: Turn off the Front Panel Interface Indicator
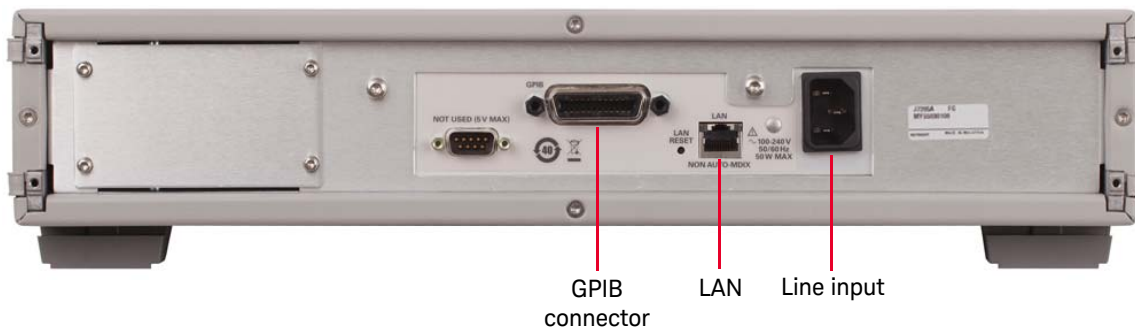
Rear panel

Figure 1-3   J7204/5/A/B rear panel

GPIB connector	This connector allows the J7204/5/A/B to be connected directly to a controller.
LAN	The J7204/5/A/B is controlled over the Local Area Network (LAN).
Line input	The line input contains the power cord receptacle. Install the J7204/5/A/B so that the detachable power cord is readily identifiable and is easily reached. The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch. Alternatively, an externally installed switch or circuit breaker (which is readily identifiable and is easily reached by the operator) may be used as a disconnecting device.

CAUTION   Always use the 3-prong AC power cord supplied with the J7204/5/A/B. Failure to ensure adequate grounding by not using this cord may cause damage to the J7204/5/A/B.

2 Installation

This chapter provides you important information on how to check and prepare your instrument for operation.

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Initial Inspection

1 Unpack and inspect the shipping container and its contents throughly to ensure that nothing was damaged during shipment. If the shipping container or cushioning material is damaged, the contents should be checked both mechanically and electrically.

   – Check for mechanical damage such as scratches or dents.

   – Procedures for checking electrical performance are given under "Operator's check" on page 40.

2 If the contents are damaged or defective, contact your nearest Keysight Technologies Service and Support Office. Refer to "Sales and Technical Support" on page 8 of this manual. Keysight Technologies will arrange for repair or replacement of the damaged or defective equipment. Keep the shipping materials for the carrier's inspection.

3 If you are returning the instrument under warranty or for service, repackaging the instrument requires original shipping containers and material or their equivalents. Keysight Technologies can provide packaging materials identical to the original materials. Refer to "Sales and Technical Support" on page 8 of this manual for the Keysight Technologies nearest to you. Attach a tag indicating the type of service required, return address, model number, and serial number. Mark the container **FRAGILE** to insure careful handling. In any correspondence, refer to the instrument by model number and serial number.

Verify the J7204/5/A/B Shipment Contents

The following table lists the items that are shipped with the J7204/5/A/B.

Table 2-1   J7204/5/A/B shipment contents

Quantity	Description	Part number
1	Certificate of Calibration	5962-0476
1	CD-ROM, IO Libraries Media Suite	E2094-60003
1	English, Product Software and Information CD, CD-ROM	J7205-10002
1	CD-ROM – Commercial Calibration Data/UK6[a]	J7205-10003

[a]   Only available with purchase of Option UK6.

Service and Recalibration

If your J7204/5/A/B requires service or repair, contact the nearest Keysight office for information on where to send it. Refer to "Sales and Technical Support" on page 8 of this manual. The performance of the J7204/5/A/B can only be verified by specially-manufactured equipment and calibration standard from Keysight. The recommended interval for recalibration is 12 months.

Related Documentation

This Operating and Service Manual and the Keysight J7204/5/A/B Attenuation Control Unit Soft Front Panel can be located on the product CD that is shipped with the product. They are also available at www.keysight.com/find/attenuators.

System Requirements

Prior to any installation or configuration, ensure that the following system requirements are met.

Operating system	Windows 7 (32-bit and 64-bit), Windows 8 (32-bit and 64-bit), or Windows 10 (32-bit and 64-bit)
Processor speed	1 GHz 32-bit (x86), 1 GHz 64-bit (x64), no support for Itanium 64
Available memory	1 GB minimum
Available hard-disk space[a]	1.5 GB, includes: – 1 GB for Microsoft .NET Framework 3.5 SP1 – 100 MB for Keysight IO Libraries Suite[b]
Video	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics supported)
Browser	Microsoft Internet Explorer 7 or higher

[a]   Because of the installation procedure, less memory may be required for operation than is required for installation.

[b]   Version 16.0 (or later) of the Keysight IO Libraries Suite is required.

Software Installation

The J7204/5/A/B software is located on the J720xA/B Product Software and Information CD (J7205-10002). This software is also available for download at www.keysight.com/find/attenuators.

The Keysight IO Libraries Suite (which includes the Keysight Connection Expert) is located on the Keysight IO Libraries Suite CD (E2094-60003).

The software installation includes the following items:

– Keysight IO Libraries Suite
– Soft front panel (SFP) software and related user documentation for the J7204/5/A/B

Use the following procedure to install the software:

1 From the Keysight IO Libraries Suite CD (E2094-60003) browser, launch the installer.

2 Follow the installer prompts to install the IO Libraries Suite.

3 From the J720xA/B Product Software and Information CD (J7205-10002) browser, launch the installer.

4 Follow the installer prompts to install all software and documentation for the J7204/5/A/B.

Operating and Safety Precautions

Observe the following guidelines before connecting or operating the J7204/5/A/B attenuation control unit. For further safety information, refer to "Safety Considerations" on page 4.

ESD damage

Protection against electrostatic discharge (ESD) is important while handling and operating the J7204/5/A/B.

Static electricity can build up on your body and can easily damage sensitive components when discharged.

Static discharges too small to be felt can cause permanent damage to the unit.

To prevent damage from ESD:

– **Use** a grounded antistatic mat in front of your test equipment and wear a grounded wrist strap attached to it when handling or operating the J7204/5/A/B.

– **Wear** a heel strap when working in an area with a conductive floor.

– **Ground** yourself before you clean, inspect, or make a connection to the J7204/5/A/B. You can, for example, grasp the grounded outer shell of the analyzer test port or cable connector briefly.

– **Avoid** touching the exposed connector pins.

Connector care and cleaning precautions

Because connectors can become defective due to wear during normal use, all connectors should be inspected and maintained to maximize their service life.

– Inspect the mating surface each time a connection is made. Metal particles from connector threads often find their way onto the mating surface when a connection is made or disconnected.

– Clean dirt and contamination from the connector mating surface and threads. This simple step can extend the service life of the connector and improve the quality of your calibration and measurements.

 – Gage connectors periodically. This not only provides assurance of proper mechanical tolerances and thus connector performance, but can also indicate situations where the potential for damage to another connector may exist.

CAUTION   The J7204/5/A/B can be damaged if excessive torque is applied to the connectors.

The recommended torque value is 8 lb-in torque for SMA and 12 lb-in torque for N-type.

WARNING   To prevent electrical shock, disconnect the instrument from the mains electrical supply before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.

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3 Specifications

This chapter provides the specifications of the J7204/5/A/B Attenuation Control Unit.

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General Specifications

NOTE	The J7204/5/A/B's performance is specified for a standalone instrument.

CAUTION	The J7204/5/A/B has an autoranging line voltage input. Be sure the supply voltage is within the specified range.

Specifications

Specifications refer to the performance standards or limits against which the J7204/5/A/B is tested.

Table 3-1   Specifications of the J7204/5/A/B

Specifications	J7204/5A	J7204/5B
Frequency range	DC to 6 GHz	DC to 18 GHz
Attenuation range	0 to 121 dB	0 to 121 dB
Insertion loss (at 0 dB)	2.5 dB	DC to 6 GHz: 2.5 dB 6 to 18 GHz: 5.0 dB
Return loss (VSWR)	14 dB (1.50)	DC to 6 GHz: 14 dB (1.50) 6 to 18 GHz: 10 dB (1.90)
RF repeatability (per section)	0.03 dB	
Maximum input power	1 W (+30 dBm)	
Maximum switching speed per channel	100 ms	
Operating life (per section)	5 million cycles	
Connectivity	GPIB, LAN	
Connector type	SMA or Type N	

Table 3-2   Attenuation accuracy of the J7204/5/A/B

Attenuation setting for step range (dB)	DC to 6 GHz	6 to 18 GHz
1 to 2	0.3	0.7
3 to 4	0.4	0.7
5 to 6	0.5	0.8
7 to 10	0.6	0.8
11 to 20	0.7	1.4
21 to 40	1.2	2.0
41 to 60	1.8	2.8
61 to 80	2.4	3.6
81 to 100	3.0	4.4
101 to 121	3.3	5.3

Power requirements

– 100 to 240 VAC (50/60 Hz)

– The instruments can operate with mains supply voltage fluctuations of up to ±10% of the nominal voltage.

– Air conditioning equipment (or other motor-operated equipment) should not be placed on the same AC line that powers the J7204/5/A/B.

– The J7204/5/A/B's maximum power is 50 W.

Physical specifications

Table 3-3   Physical specifications of the J7204/5/A/B

Specifications	J7204A	J7204B	J7205A	J7205B
Net weight	11 kg	11 kg	11.5 kg	11.5 kg
Shipping weight	17 kg	17 kg	17.5 kg	17.5 kg
Shipping dimensions:				
Length	770 mm	770 mm	770 mm	770 mm
Width	620 mm	620 mm	620 mm	620 mm
Height	390 mm	390 mm	390 mm	390 mm

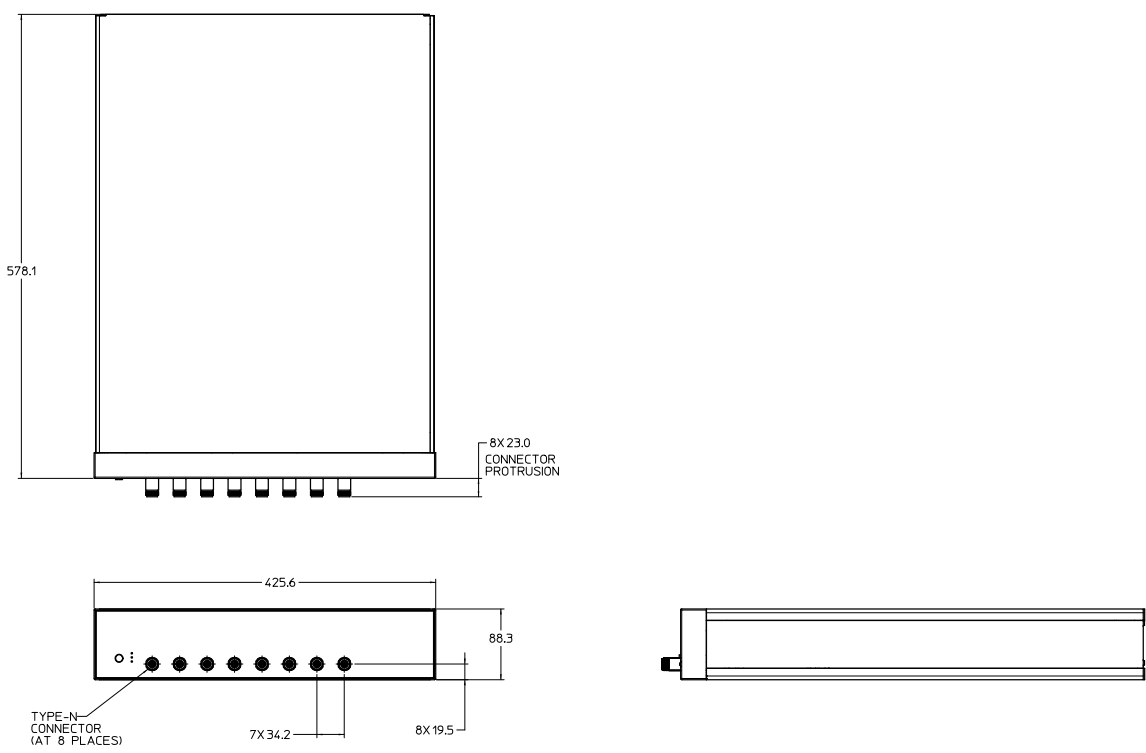# Mechanical Dimensions

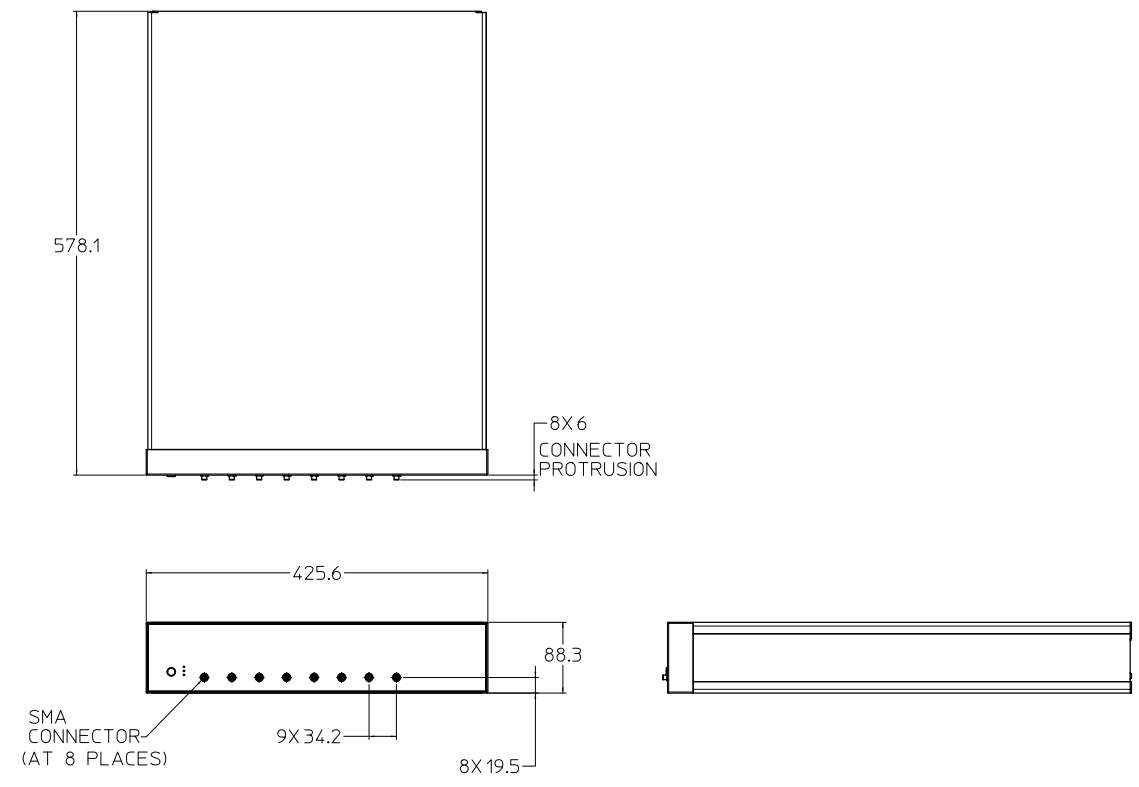**Figure 3-1**   Mechanical dimensions of the J7204A/B with Type-N connector

Figure 3-2   Mechanical dimensions of the J7204A/B with SMA connector
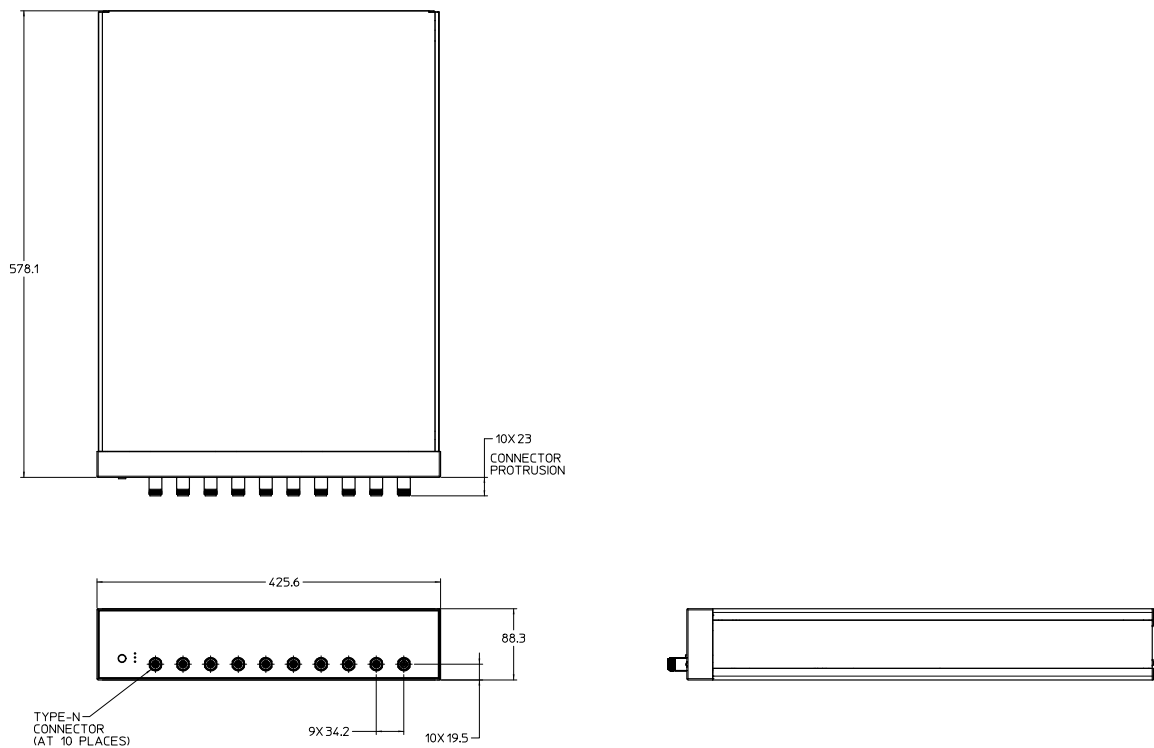
Figure 3-3   Mechanical dimensions of the J7205A/B with Type-N connector
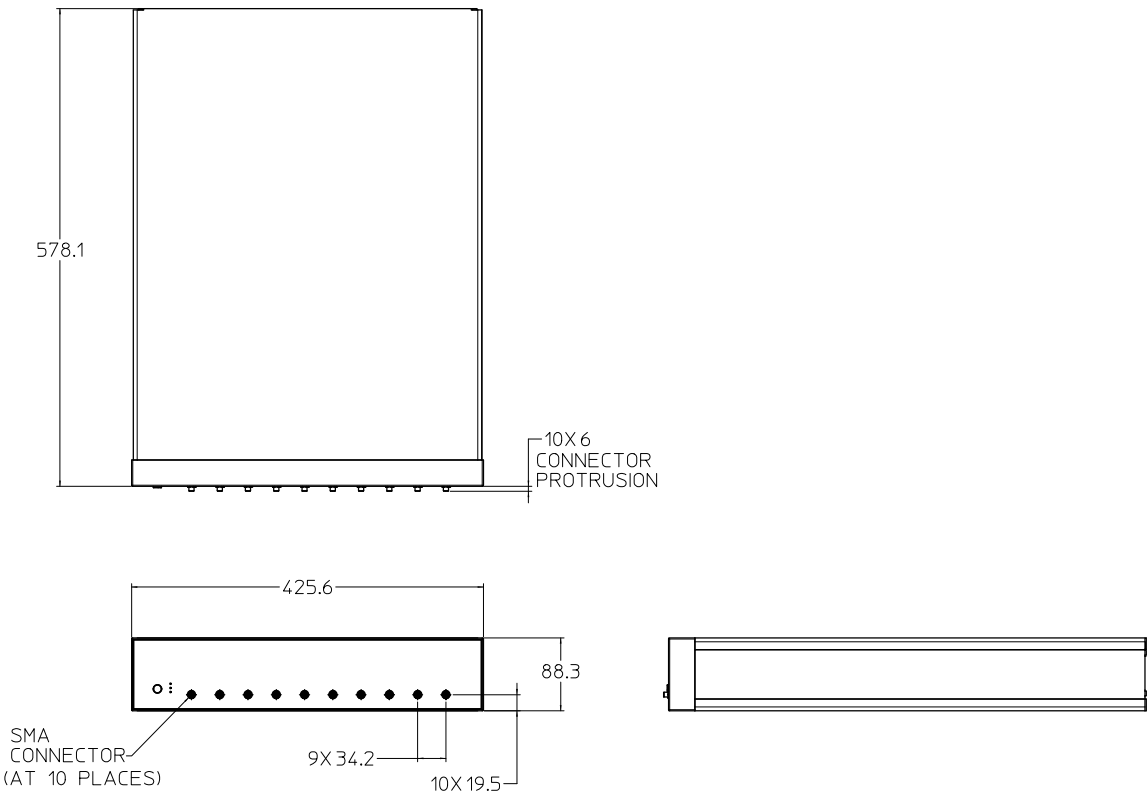
Figure 3-4   Mechanical dimensions of the J7205A/B with SMA connector

Environmental Specifications

The J7204/5/A/B is designed to fully comply with Keysight Technologies's product operating environment specifications. The following table shows the summarized environmental specifications for this product.

Table 3-4   J7204/5/A/B environmental specifications

Temperature	
– Operating	0 to +55 °C
– Storage	–40 °C to +70 °C
Vibration	
– Operating random	5 to 500 Hz, 0.21 g RMS
– Survival random	5 to 500 Hz, 2.09 g RMS
– Survival swept sine	5 Hz to 500 Hz to 5 Hz, 0.5 g
Shock	
– End-user handling	Delta-V 1.6 m/s, duration < 3 ms
– Transportation	11.34 < m < 27.22 kg: 30 G, delta-V 6.76 m/s
Humidity	
– Operating	95% Relative Humidity (RH) at 40°C, decreases to 45% RH at 55°C, non condensing, 5-day cycles
– Storage	90% RH at 65 °C, 24 hours
Altitude	
– Operating	2000 meters (6561 feet)
– Storage	4572 meters (15000 feet)
ESD immunity	
– Direct discharge	4 kV per IEC/EN61000-4-2
– Air discharge	8 kV per IEC/EN61000-4-2

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4   Operating Guide

This chapter provides simple quick-check instructions to verify the J7204/5/A/B attenuation control unit's functionality prior to usage. It also provides information to get you started on the Soft Front Panel (SFP) of the J7204/5/A/B.

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Operating Instructions

Operator's check

The operator's check is supplied to allow the operator to make a quick check of the J7204/5/A/B prior to usage or if a failure is suspected.

CAUTION	ESD exceeding the level specified in Table 3-4 or the RF power applied is greater than the maximum specified as in Power requirements may cause permanent damage to the device.

Operator's check for the S-parameter test

Any network analyzer which can support up to 18 GHz can be used for performance test verification. The equipment setup is illustrated in Figure 4-1.
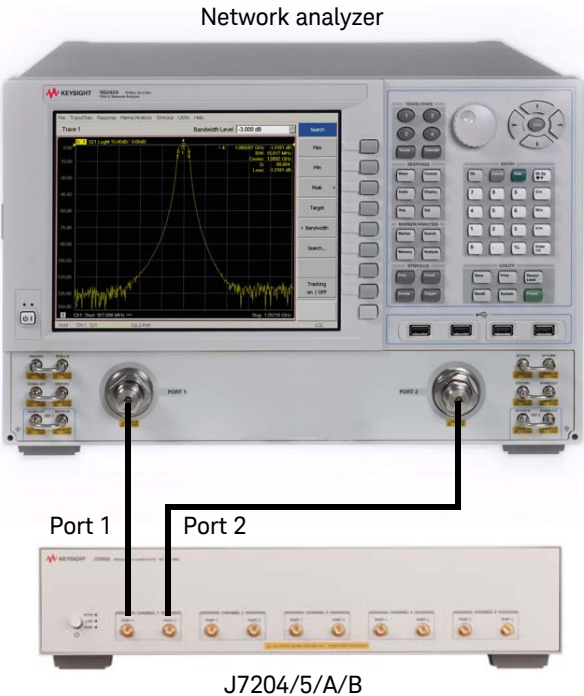
Network analyzer

Port 1   Port 2

J7204/5/A/B

Figure 4-1   Quick-check configuration for the S-parameter test

Quick-check procedure

1 Set the following parameters on the network analyzer to perform 2-port measurements:

Parameter	J7204A / J7205A	J7204B / J7205B
Start frequency	200 MHz	200 MHz
Stop frequency	6 GHz	18 GHz
IF bandwidth	100 Hz	100 Hz

2 Calibrate the network analyzer with full 2-port calibration using the appropriate electronic or mechanical calibration kit.

3 Turn on the J7204/5/A/B attenuation control unit. The LED indicator on the J7204/5/A/B should indicate **PWR**: On.

4 Connect the network analyzer's Port 1 cable to the J7204/5/A/B's channel X Port 1.

5 Connect the network analyzer's Port 2 cable to the J7204/5/A/B's channel X Port 2.

6 Launch the soft front panel (SFP) and select the product **Model** and **Communication Method** accordingly. Refer to "Getting Started with the Soft Front Panel (SFP)" on page 43 for details.

7 To verify that the J7204/5/A/B is working properly, change the attenuation value by entering the value or clicking the up/down button to increase or decrease the value, as shown in **Figure 4-2** on page 42. You will hear a 'click' sound from the J7204/5/A/B when changing the attenuation value.

8 Obtain the measurement results for Input Return Loss and Insertion Loss for the J7204/5/A/B.

9 Compare the measurement results to the specifications in Table 3-1.

10 To verify Channel 1 to Channel 5 of the J7204/5/A/B, connect the network analyzer's Port 1 cable to each channel's Port 1, and the network analyzer's Port 2 cable to each channel's Port 2.
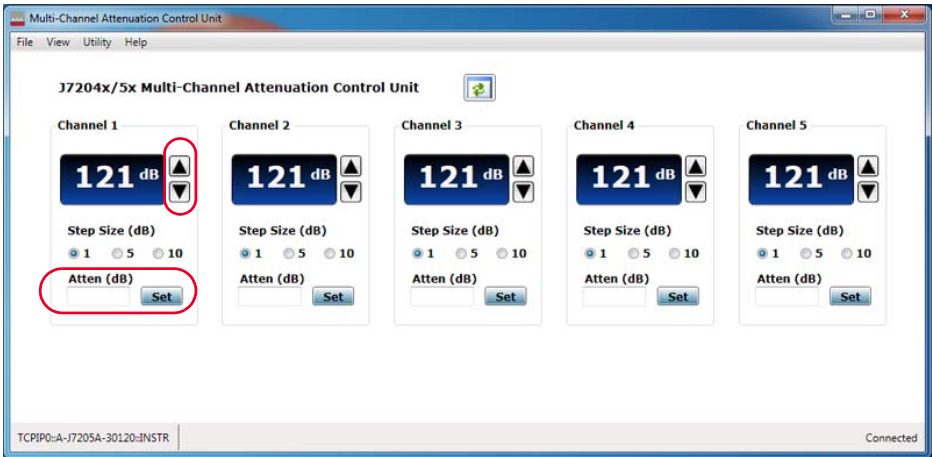
Figure 4-2   Setting the attenuation value

Getting Started with the Soft Front Panel (SFP)

This section guides you through the SFP that provides an easy-to-use interface for controlling the J7204/5/A/B.

1 Refer to Chapter 2, "Software Installation" to install the SFP.

2 Launch the SFP software from the desktop by double-clicking the SFP icon, or from **Start > All Programs > Keysight > J720xx > J720xx SFP**.

3 The SFP window will appear as shown below.
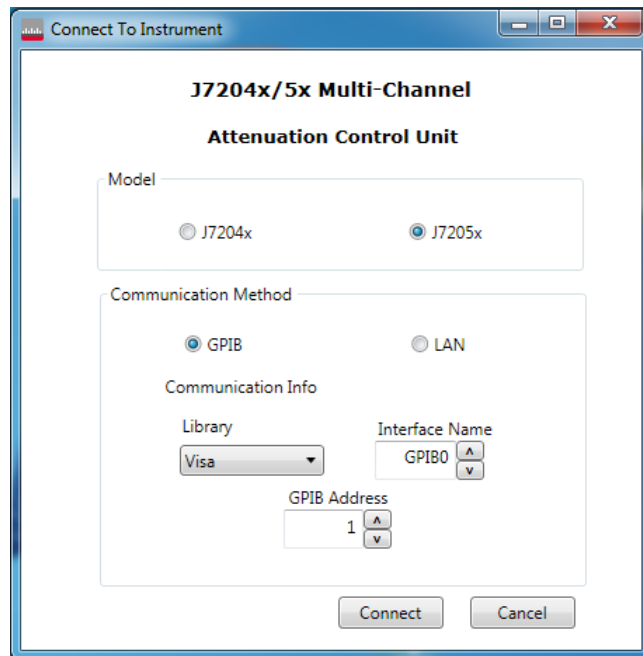
Figure 4-3   J7204/5/A/B SFP window

4 The main SFP interface for J7205x is shown in Figure 4-4 and described in Table 4-1.
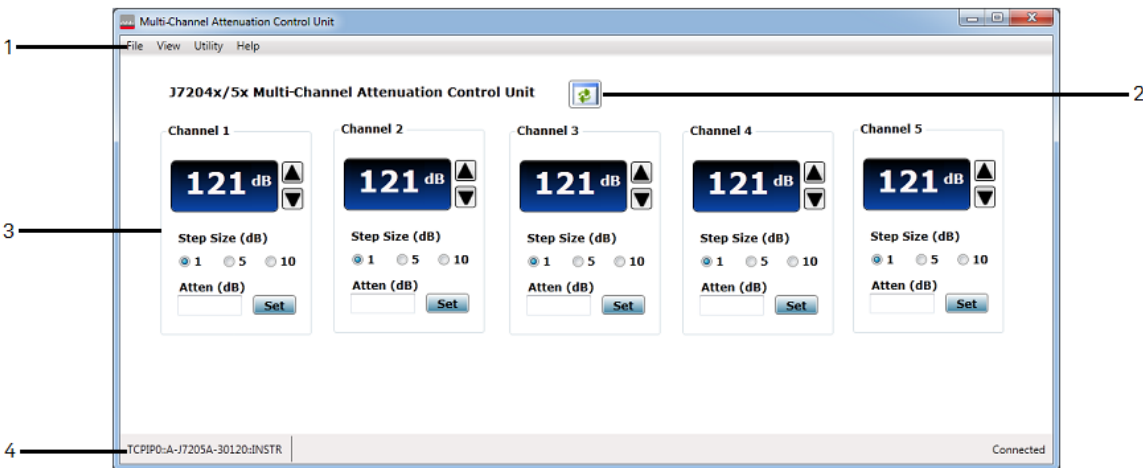
Figure 4-4   J7205x main SFP interface

Table 4-1   Overview of the main SFP interface

No.	Item	Description

1	Menu bar	– The File menu consists of the following functions:
		  – Connect: Opens the Connect To Instrument window. This window also appears when you launch the SFP.
		  – Exit: Exits the SFP.
		
		– The View menu consists of the following function:
		  – Refresh: Refreshes the SFP.
		
		– The Utility menu consists of the following functions:
		  – Driver Call Log: Opens the Driver Log window.
		  – Reset: Resets the J7205x to its factory default settings.
		  – Error: Opens the Errors window.
		
		– The Help menu consists of the following functions:
		  – Help Contents: Opens the help file.
		  – Online Support: Opens the J7204x/5x product website.
		  – About: Opens the SFP and J7205x information window.

2	Refresh button	Refreshes the SFP when this button is clicked.

Table 4-1   Overview of the main SFP interface

No.	Item	Description
3	Attenuator control	Controls the attenuation for each channel via fixed step sizes or direct numeric input of the attenuation value.
4	Status indicator	Displays the connection string address and operating status of the unit.

5 The J7204/5/A/B SFP is a graphical interface that helps you with the following tasks:

a To connect to the J7204/5/A/B via the GPIB interface

-- Upon launching the SFP, the J7204/5/A/B SFP window will appear as shown in Figure 4-3.

-- Click to select a **J7204x** or **J7205x** unit to connect.

-- Select the **GPIB** communication method.

-- Select the library and the J7204x/5x interface name and GPIB address.

-- Click **Connect** to access the main interface of the selected J7204x or J7205x unit.

-- To select another unit to use when accessing the main interface, click **File > Connect** from the menu bar to open the Connect To Instrument window.

b To connect to the J7204/5/A/B via the LAN interface

-- Upon launching the SFP, the J7204/5/A/B SFP window will appear as shown in Figure 4-3.

-- Click to select a **J7204x** or **J7205x** unit to connect.

-- Select the **LAN** communication method.

-- Select the library and the interface name. Enter the J7204x/5x hostname or IP address.

> **NOTE**   The J7204x/5x has a default hostname in the form of A-J720xx-XXXXX, where "J720xx" is the model of the unit and "XXXXX" is the last five digits of the unit serial number.

-- Click **Connect** to access the main interface of the selected J7204x or J7205x unit.

-- To select another unit to use when accessing the main interface, click **File > Connect** from the menu bar to open the Connect To Instrument window.

c To operate the J7204/5/A/B

-- On the J7204/5/A/B main SFP interface as shown in Figure 4-5:

   i Under **Step Size (dB)**, set the attenuation level in fixed step of 1 dB, 5 dB, or 10 dB.

   ii Under **Atten (dB)**, enter the attenuation value of 0 to 121 dB and click **Set**. The value will be displayed on the above. You can use the up/down arrow keys to increase or decrease the value based on the step size you select.
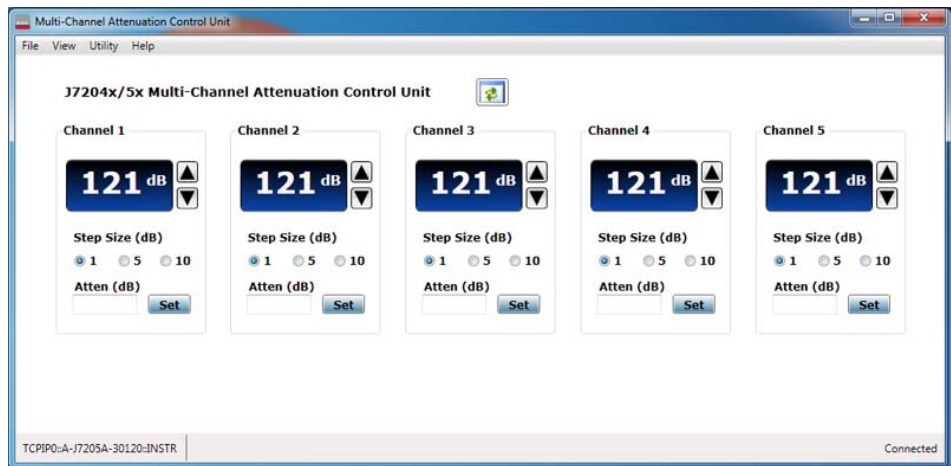
Figure 4-5   J7204/5/A/B main SFP interface

d To reset the J7204/5/A/B

-- On the main SFP interface as shown in Figure 4-5, click **Utility > Reset** from the menu bar to reset the J7204x/5x to the attenuation default setting of 121 dB.

e   To view error conditions

-- On the main SFP interface as shown in Figure 4-5, click **Utility > Error** from the menu bar to open the Errors window as shown in Figure 4-6.
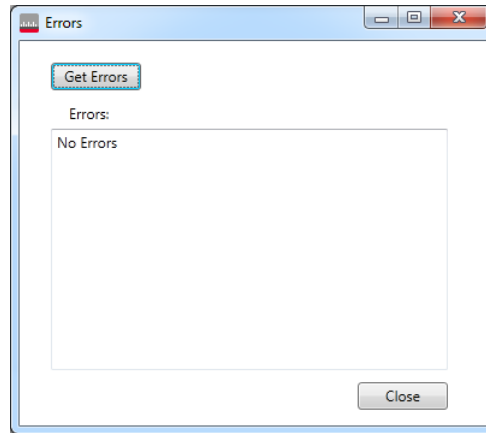
Figure 4-6   Errors window

-- Click **Get Errors** to display the list of errors that occurred when using the SFP.

f   To monitor driver calls

-- The Driver Call Log allows you to identify the various SCPI commands required to operate the J7204x/5x. Each log entry corresponds to an operation triggered via the SFP.

-- On the main SFP interface as shown in Figure 4-5, click **Utility > Driver Call Log** from the menu bar to open the Driver Log window as shown in Figure 4-7.
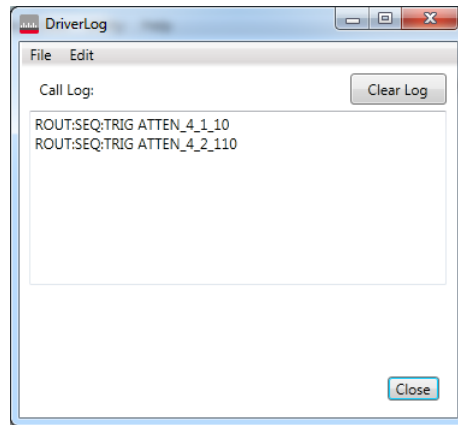
Figure 4-7   Driver Log window

> --   To save the driver call log to a file, click **File › Save As**.
> –   To select all the driver calls in the log, click **Edit › Select All**.
> –   To copy a selected driver call to your application, click **Edit › Copy**.
> --   To erase all the driver calls from the log, click **Clear Log**.

6   To get help using the SFP, refer to the Help file from the main SFP interface.

Controlling the J7204/5/A/B Attenuation Control Unit

Controlling the J7204/5/A/B and making measurements

The J7204/5/A/B attenuation control unit is a "secondary" instrument. A controller must be used to control the J7204/5/A/B. There are two methods that can be used to control the J7204/5/A/B.

– Using LAN connection

– Using GPIB connection

Once the connection between the controller and the J7204/5/A/B has been established (LAN or GPIB), the J7204/5/A/B can be controlled using SCPI commands.

LAN connection

This section contains information to configure the J7204/5/A/B using the Keysight IO Libraries Suite.

1 Run the Keysight Connection Expert from the desktop icon, or from **Start > All Programs > Keysight Connection Expert**.

2 Use the Connectivity Expert utility of the Keysight IO Libraries Suite to add the J7204/5/A/B and verify the connection.

3 To add an instrument, select **Manual Configuration**, and then **Add New Instrument/Interfaces**, and choose the **LAN instrument** from the list on the left as shown in **Figure 4-8** on page 50.

4 Enter the **Hostname** or **IP Address**, and click **Accept**.

– For the hostname: The J7204/5/A/B has a default hostname in the form of A-J720xx-XXXXX, where "J720xx" is the model of the unit and "XXXXX" is the last five digits of the unit serial number.

– For the IP address: If there is no Dynamic Host Configuration Protocol (DHCP) server on the network, the J7204/5/A/B will try to acquire its default IP setting of 169.254.44.88.
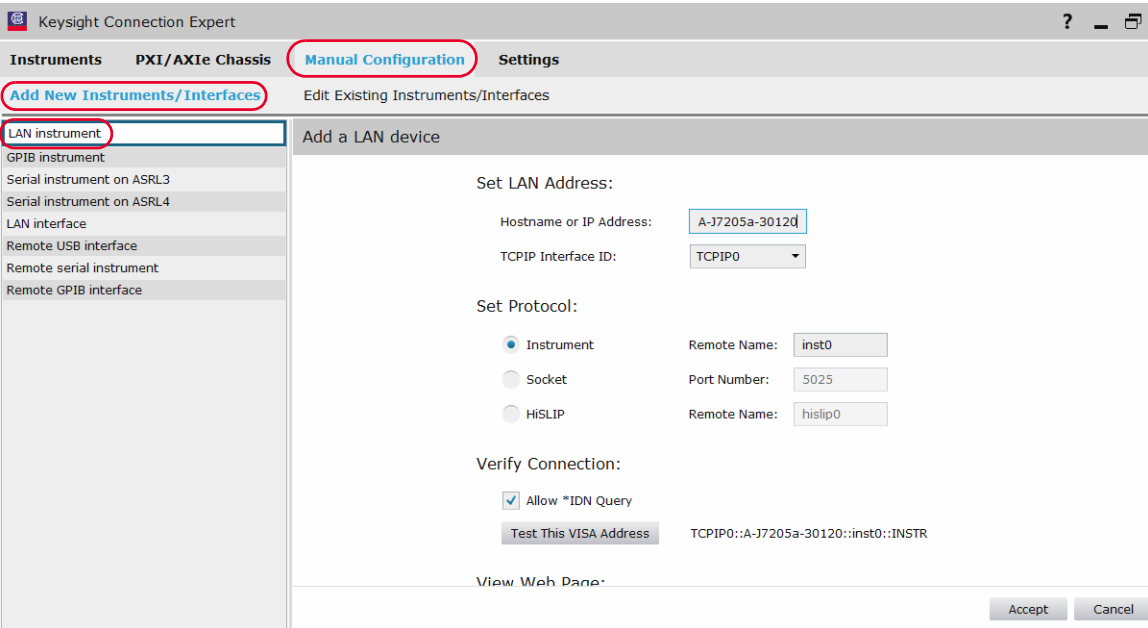
Figure 4-8   Add LAN instrument

5 The J7204/5/A/B is now added as shown in **Figure 4-9**
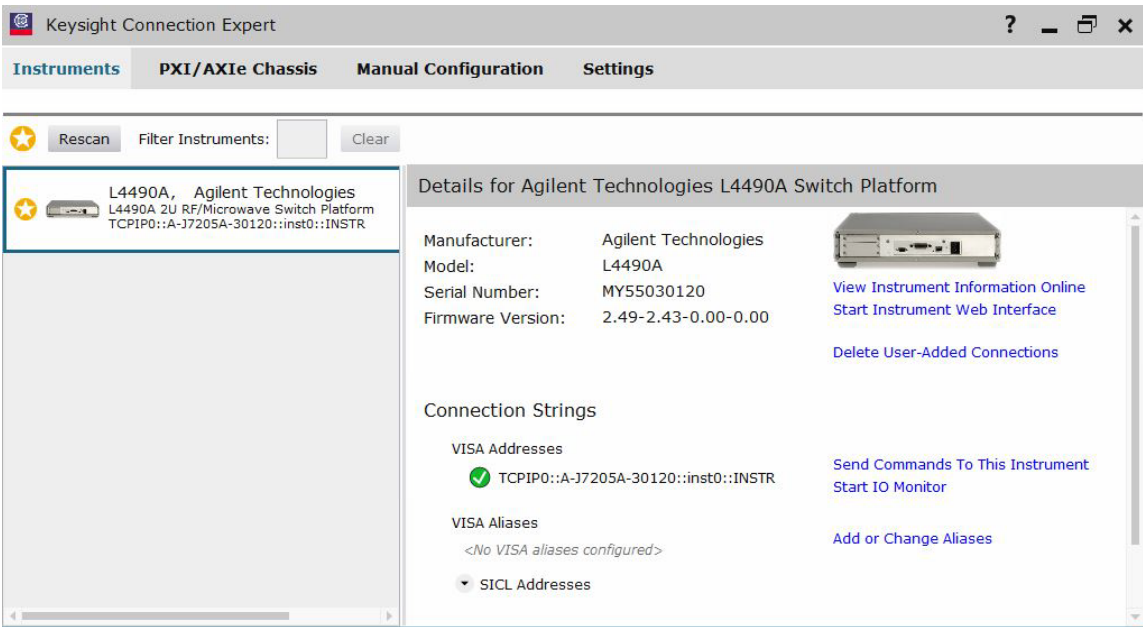
Figure 4-9   LAN instrument added

NOTE	The Keysight Connection Expert window will display the L4490A as the J7204/5/A/B is made up of the L4490-styled standard Keysight chassis.

GPIB connection

Programming access to the J7204/5/A/B is also available via its GPIB interface. The GPIB connector is located at the rear panel of the J7204/5/A/B.

1 Run the Keysight Connection Expert from the desktop icon, or from **Start > All Programs > Keysight Connection Expert**.

2 Use the Connectivity Expert utility of the Keysight IO Libraries Suite to add the J7204/5/A/B and verify the connection.

3 To add an instrument, select **Manual Configuration**, and then **Add New Instrument/Interfaces**, and choose the **GPIB instrument** from the list on the left.

4 Enter the **GPIB address** and click **Accept**. The J7204/5/A/B is shipped from the factory with a default GPIB address of 9 (factory-default setting).

5 The J7204/5/A/B is now added as shown in **Figure 4-10** on page 52.
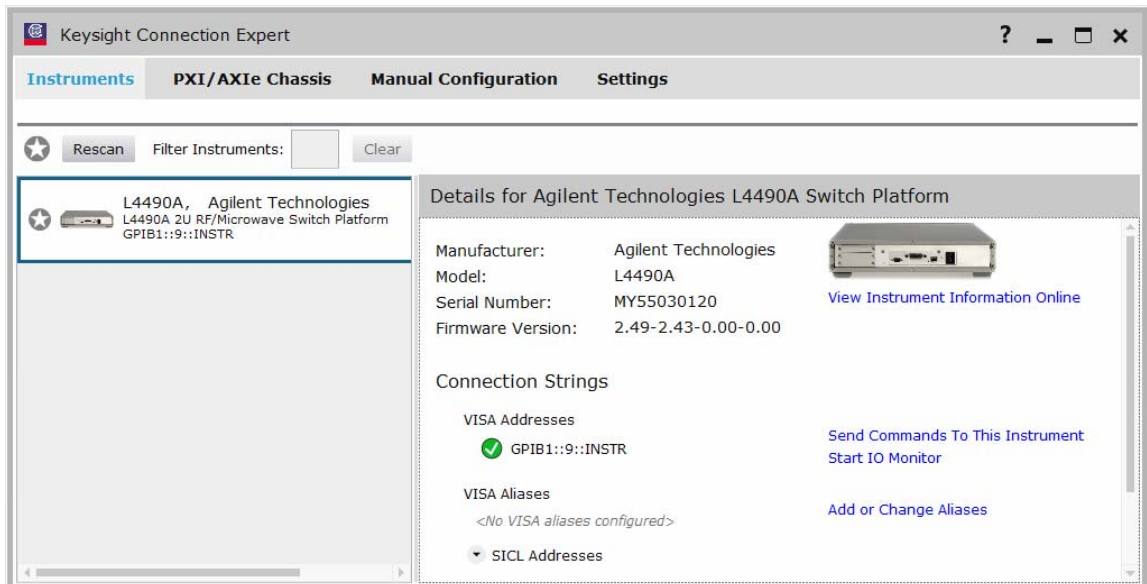
Figure 4-10   GPIB instrument added

Programming Guide

SCPI command syntax

The following conventions are used for SCPI command syntax for remote interface programming.

- Square brackets ([]) indicate optional keywords or parameters.
- Braces ({}) enclose parameter choices within a command string.
- Angle brackets (<>) enclose parameters for which you must specify a value.
- A vertical bar (|) separates multiple parameters.

Commands relevant to the J7204/5/A/B

To set the attenuation level

The following command is used to set the attenuation level of the J7204/5/A/B.

Syntax

`ROUTe:SEQuence:TRIGger <ATTEN_X_Y_Z>`

Parameter

`ATTEN_X_Y_Z`

- **a** `X` = attenuator channel number
- **b** `Y` = attenuator selection (each channel consists of one 11 dB and 110 dB attenuator pair)
  - **i** `1` = 11 dB attenuator in 1 dB step
  - **ii** `2` = 110 dB attenuator in 10 dB step
- **c** `Z` = attenuation value
  - **i** `0` = 0 dB attenuation
  - **ii** `80` = 8 dB attenuation
  - **iii** `100` = 100 dB attenuation

Example

   a If you want an 8 dB attenuation at Channel 3:

      Execute the command `ROUT:SEQ:TRIG ATTEN_3_1_8`

   b If you want a 75 dB attenuation at Channel 5:

      Execute the command `ROUT:SEQ:TRIG ATTEN_5_1_5` and `ATTEN 5_2_70`

To query the attenuation level

The following query is used to obtain the attenuation level of the J7204/5/A/B.

Syntax

`ROUTe:CLOSe? (@<sec_list>)`

Parameter

The following table provides the section list for each channel of the J7204/5/A/B.

Channel	Section list	Attenuation (dB)	
		0 (Atten)	1 (Thru)
1	1101	1	0
	1102	2	0
	1103	4	0
	1104	4	0
	1105	10	0
	1106	20	0
	1107	40	0
	1108	40	0

Channel	Section list	Attenuation (dB)	
		0 (Atten)	1 (Thru)
2	1121	1	0
	1122	2	0
	1123	4	0
	1124	4	0
	1125	10	0
	1126	20	0
	1127	40	0
	1128	40	0
3	1141	1	0
	1142	2	0
	1143	4	0
	1144	4	0
	1145	10	0
	1146	20	0
	1147	40	0
	1148	40	0
4	1161	1	0
	1162	2	0
	1163	4	0
	1164	4	0
	1165	10	0
	1166	20	0
	1167	40	0
	1168	40	0

| Channel | Section list | Attenuation (dB) | |
		0 (Atten)	1 (Thru)
5	2125	1	0
	2121	2	0
	2122	4	0
	2120	4	0
	2116	10	0
	2112	20	0
	2113	40	0
	2111	40	0

Example

If you want to query the attenuation level for Channel 5:

Execute the command
`ROUT:CLOS? (@2125,2121,2122,2120,2116,2112,2113,2111)`

The example returned value is `0,1,0,0,1,1,0,1`

The attenuation level of 49 dB for Channel 5 is listed as follows:

Channel	Section list	Returned value	Attenuation (dB)
5	2125	0	1
	2121	1	0
	2122	0	4
	2120	0	4
	2116	1	0
	2112	1	0
	2113	0	40
	2111	1	0

To query the cycle count

The following query is used to obtain the cycle count of the J7204/5/A/B.

Syntax

`DIAGnostic:RELay:CYCLes? (@<sec_list>)`

Parameter

The following table provides the section list for each channel of the J7204/5/A/B.

Channel	Section list	Attenuation (dB)	
		0 (Atten)	1 (Thru)
1	1101	1	0
	1102	2	0
	1103	4	0
	1104	4	0
	1105	10	0
	1106	20	0
	1107	40	0
	1108	40	0
2	1121	1	0
	1122	2	0
	1123	4	0
	1124	4	0
	1125	10	0
	1126	20	0
	1127	40	0
	1128	40	0

| Channel | Section list | Attenuation (dB) | |
		0 (Atten)	1 (Thru)
3	1141	1	0
	1142	2	0
	1143	4	0
	1144	4	0
	1145	10	0
	1146	20	0
	1147	40	0
	1148	40	0
4	1161	1	0
	1162	2	0
	1163	4	0
	1164	4	0
	1165	10	0
	1166	20	0
	1167	40	0
	1168	40	0
5	2125	1	0
	2121	2	0
	2122	4	0
	2120	4	0
	2116	10	0
	2112	20	0
	2113	40	0
	2111	40	0

NOTE	This query is not applicable for Channel 5.

To clear cycle count

The following command is used to clear cycle count of the J7204/5/A/B.

Syntax

`DIAGnostic:RELay:CYCLes:CLEar (@<sec_list>)`

Parameter

The following table provides the section list for each channel of the J7204/5/A/B.

Channel	Section list	Attenuation (dB)	
		0 (Atten)	1 (Thru)
1	1101	1	0
	1102	2	0
	1103	4	0
	1104	4	0
	1105	10	0
	1106	20	0
	1107	40	0
	1108	40	0
2	1121	1	0
	1122	2	0
	1123	4	0
	1124	4	0
	1125	10	0
	1126	20	0
	1127	40	0
	1128	40	0

Channel	Section list	Attenuation (dB)	
		0 (Atten)	1 (Thru)
3	1141	1	0
	1142	2	0
	1143	4	0
	1144	4	0
	1145	10	0
	1146	20	0
	1147	40	0
	1148	40	0
4	1161	1	0
	1162	2	0
	1163	4	0
	1164	4	0
	1165	10	0
	1166	20	0
	1167	40	0
	1168	40	0
5	2125	1	0
	2121	2	0
	2122	4	0
	2120	4	0
	2116	10	0
	2112	20	0
	2113	40	0
	2111	40	0

NOTE	This command is not applicable for Channel 5.

J7204/5/A/B SCPI commands

The following table lists the SCPI commands that apply to the J7204/5/A/B.

Table 4-2   J7204/5/A/B SCPI commands

Subsystem	Command
IEEE-488 commands	*CLS
	*ESE <enable_value>
	*ESE?
	*ESR?
	*IDN?
	*OPC
	*OPC?
	*RST
	*SRE <enable_value>
	*SRE?
	*STB?
	*TRG
	*TST?
	*WAI

Table 4-2   J7204/5/A/B SCPI commands (continued)

Subsystem	Command
	`SYSTem:COMMunicate:GPIB:ADDRess <address>`
	`SYSTem:COMMunicate:GPIB:ADDRess?`
	`SYSTem:COMMunicate:LAN:AUTOip {OFF|0|ON|1}`
	`SYSTem:COMMunicate:LAN:AUTOip?`
	`SYSTem:COMMunicate:LAN:DHCP {OFF|0|ON|1}`
	`SYSTem:COMMunicate:LAN:DHCP?`
	`SYSTem:COMMunicate:LAN:DNS "<address>"`
System-related commands	`SYSTem:COMMunicate:LAN:DNS?`
	`SYSTem:COMMunicate:LAN:DOMain "<name>"`
	`SYSTem:COMMunicate:LAN:DOMain? [{CURRent|STATic}]`
	`SYSTem:COMMunicate:LAN:GATEway <address>`
	`SYSTem:COMMunicate:LAN:GATEway? [{CURRent|STATic}]`
	`SYSTem:COMMunicate:LAN:HOSTname? [{CURRent|STATic}]`
	`SYSTem:COMMunicate:LAN:IPADdress "<address>"`
	`SYSTem:COMMunicate:LAN:IPADdress? [{CURRent|STATic}]`

Service and Maintenance

Service

The J7204/5/A/B does not have internal adjustments and should not be opened; it should only be repaired by service-trained personnel. Should it become necessary to return the J7204/5/A/B for repair or service, contact your nearest Keysight Sales and Service Center.

Maintenance

The connectors of the J7204/5/A/B, particularly the connector faces, must be kept clean. Keysight recommends that the connectors be periodically inspected and cleaned if necessary. For instructions on the connection and maintenance of your connectors, refer to the Connector Care Quick Reference Card (08510-90360).

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