

Keysight N4391B Optical Modulation Analyzer

Getting Started
Guide

Notices

© Keysight Technologies 2022

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Keysight Technologies as governed by United States and international copyright laws.

Manual Part Number

N4391-90A02

Edition

Edition 3.0, January 2022

Keysight Technologies Deutschland GmbH
Herrenberger Strasse 130,
71034 Böblingen, Germany

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

U.S. Government Rights

The Software is “commercial computer software,” as defined by Federal Acquisition Regulation (“FAR”) 2.101. Pursuant to FAR 12.212 and 27.405-3 and Department of Defense FAR Supplement (“DFARS”) 227.7202, the U.S. government acquires commercial computer software under the same terms by which the software is customarily provided to the public. Accordingly, Keysight provides the Software to U.S. government customers under its standard commercial license, which is embodied in its End User License Agreement (EULA), a copy of which can be found at <http://www.keysight.com/find/sweula>. The license set forth in the EULA represents the exclusive authority by which the U.S. government may use, modify, distribute, or

disclose the Software. The EULA and the license set forth therein, does not require or permit, among other things, that Keysight: (1) Furnish technical information related to commercial computer software or commercial computer software documentation that is not customarily provided to the public; or (2) Relinquish to, or otherwise provide, the government rights in excess of these rights customarily provided to the public to use, modify, reproduce, release, perform, display, or disclose commercial computer software or commercial computer software documentation. No additional government requirements beyond those set forth in the EULA shall apply, except to the extent that those terms, rights, or licenses are explicitly required from all providers of commercial computer software pursuant to the FAR and the DFARS and are set forth specifically in writing elsewhere in the EULA. Keysight shall be under no obligation to update, revise or otherwise modify the Software. With respect to any technical data as defined by FAR 2.101, pursuant to FAR 12.211 and 27.404.2 and DFARS 227.7102, the U.S. government acquires no greater than Limited Rights as defined in FAR 27.401 or DFAR 227.7103-5 (c), as applicable in any technical data.

Warranty

THE MATERIAL CONTAINED IN THIS DOCUMENT IS PROVIDED "AS IS," AND IS SUBJECT TO BEING CHANGED, WITHOUT NOTICE, IN FUTURE EDITIONS. FURTHER, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, KEYSIGHT DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED WITH REGARD TO THIS MANUAL AND ANY INFORMATION CONTAINED HEREIN, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. KEYSIGHT SHALL NOT BE LIABLE FOR ERRORS OR FOR

INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE FURNISHING, USE, OR PERFORMANCE OF THIS DOCUMENT OR ANY INFORMATION CONTAINED HEREIN. SHOULD KEYSIGHT AND THE USER HAVE A SEPARATE WRITTEN AGREEMENT WITH WARRANTY TERMS COVERING THE MATERIAL IN THIS DOCUMENT THAT CONFLICT WITH THESE TERMS, THE WARRANTY TERMS IN THE SEPARATE AGREEMENT WILL CONTROL.

Safety Notices

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 Summary

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings or operating instructions in the product manuals violates safety standards of design, manufacture, and intended use of the instrument. Keysight Technologies assumes no liability for the customer's failure to comply with these requirements. Product manuals are provided with your instrument on CD-ROM and/or in printed form. Printed manuals are an option for many products. Manuals may also be available on the Web. Go to www.keysight.com and type in your product number in the Search field at the top of the page.

General	<p>This product is a Safety Class 1 instrument (provided with a protective earth terminal). The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.</p> <p>All Light Emitting Diodes (LEDs) used in this product are Class 1 LEDs as per IEC 60825-1.</p>
Environment Conditions	<p>This instrument is intended for indoor use in an installation category II, pollution degree 2 environment. It is designed to operate at a maximum relative humidity of 80% and at altitudes of up to 2000 meters.</p> <p>Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.</p>
Before Applying Power	<p>Verify that all safety precautions are taken. The power cable inlet of the instrument serves as a device to disconnect from the mains in case of hazard. The instrument must be positioned so that the operator can easily access the power cable inlet. When the instrument is rack mounted the rack must be provided with an easily accessible mains switch.</p>
Ground the Instrument	<p>To minimize shock hazard, the instrument chassis and cover must be connected to an electrical protective earth ground. The instrument must be connected to the ac power mains through a grounded power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.</p>
Do Not Operate in an Explosive Atmosphere	<p>Do not operate the instrument in the presence of flammable gases or fumes.</p>
Do Not Remove the Instrument Cover	<p>Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made only by qualified personnel.</p> <p>Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.</p>

Compliance and Environmental Information

Table 1 Compliance and Environmental Information

Safety Symbol	Description
	<p>The crossed out wheeled bin symbol indicates that separate collection for waste electric and electronic equipment (WEEE) is required, as obligated by DIRECTIVE 2012/19/EU and other National legislation.</p> <p>See http://about.keysight.com/en/companyinfo/environment/takeback.shtml to understand your Trade in options with Keysight in addition to product takeback instructions.</p>

Contents

Safety Summary	3
Compliance and Environmental Information	4

1 Introduction

Documentation	8
N4391B Documentation	8
Instructions for use	8
General Safety Considerations	9
Intended use	9
Safety symbols	9
Instrument markings	9
Initial Safety Information	12
Line power requirements	14
Environmental Information	15
N4391B Shipping Contents	16

2 Getting Started

N4391B Optical Modulation Analyzer Setup	20
Introduction	20
Integrating the UXRXXX4A(P) High-Performance Oscilloscope	20
Connecting the System	28
Using the correct connectors	28
Enabling and disabling the laser output	29
Creating Your First Trace on the OMA	30

Installing Software Components	34
Downloading the Photonic Application Suite Package Manager	35
Installing the Keysight OMA Software	37

3 Returning the Instrument for Maintenance

Returning the Instrument	39
---------------------------------	----

4 Rack Mount

Rack Mounting the N4391B	42
---------------------------------	----

5 Regulatory Information

Declaration of Conformity	48
Compliance with German Noise Requirements	48
Compliance with Canadian EMC Requirements	48

1 Introduction

[Documentation](#) / 8

[General Safety Considerations](#) / 9

[N4391B Shipping Contents](#) / 16

Documentation

N4391B Documentation

The documentation for the Keysight N4391B Optical Modulation Analyzer consists of

- The documentation for the Keysight UXR-Series oscilloscope. This documentation is supplied with the oscilloscope, including extensive online help. Refer to it for using the UXR-Series oscilloscope for modulation measurements, or for configuring the oscilloscope.
- The documentation for the optical modulation analyzer and the software application.

This consists of

- This booklet, which contains the information you need to get your Optical Modulation Analyzer running, and to perform a first measurement.
- The online help, which provides the instructions for use.
- The online help for the 89601B vector signal analysis software.

Instructions for use

For further information, please refer to the online help.

You can refer to the online help for the Optical Modulation Analyzer by selecting “Help/Show OMA Help” in the 89600 VSA software interface.

General Safety Considerations

This product has been designed and tested in accordance with the standards listed on the manufacturer's Declaration of Conformity (see [Declaration of Conformity](#) on page 48), 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.

Intended use

This instrument is intended to use in an office or laboratory environment, under the environmental conditions listed in the specifications.

Safety symbols

CAUTION

The *caution* sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in damage to or destruction of the product. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

WARNING

The *warning* sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning sign until the indicated conditions are fully understood and met.

Instrument markings



The instruction manual symbol. The product is marked with this warning symbol when it is necessary for the user to refer to the instructions in the manual.



The laser radiation symbol. This warning symbol is marked on products which have a laser output.



The electrostatic discharge symbol. This warning symbol is marked on products which have components that can be damaged by an electrostatic discharge.



The recycling symbol indicates the general ease with which the instrument can be recycled.



The C-Tick mark is the certification mark of the Australian Communications Authority.



The CE mark is the conformity marking of the European Community.



The CSA mark is the certification mark of the Canadian Standards Association.



The earthing symbol marks a connection that is connected, through the instrument, to the earth of the line power.

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.

WARNING

No operator serviceable parts inside. Refer servicing to qualified service personnel. To prevent electrical shock do not remove covers.

WARNING

This is a Safety Class 1 Product (provided with protective earth). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the instrument is likely to make the instrument dangerous. Intentional interruption is prohibited.

WARNING

To prevent electrical shock, disconnect the 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.

WARNING

Using controls or adjustments or performing procedures other than those specified in the documentation supplied with your equipment can result in hazardous radiation exposure.

CAUTION

This product complies with over-voltage Category II and Pollution Degree 2.

CAUTION

Ventilation requirements: When installing the product in a cabinet, the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the product by 4 °C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.

CAUTION

Install the instrument so that the power cords are readily identifiable and is easily reached by the operator. This is how the instruments are disconnected. They disconnect the mains circuit from the mains supply before other parts of the instrument.

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 three-prong AC power cords supplied with this instrument. Failure to ensure adequate earth grounding by not using these cords may cause instrument damage.

CAUTION

This instrument has autoranging line voltage input. Be sure the supply voltage is within the specified range.

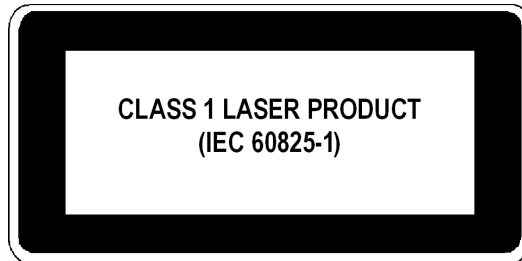
Initial Safety Information

The laser sources classified by this guide are classified as Class 1M according to IEC 60825-1.

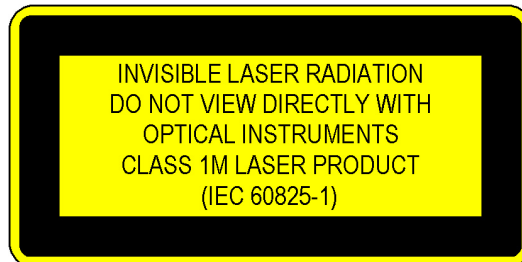
All laser sources comply with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated 2007-June-24.

Laser Safety

Laser class 1 label (not applied to the product)



Laser class 1M label



A sheet of laser safety labels is included. In order to meet the requirements of IEC 60825-1 we recommend that you stick the laser safety labels, in your language, onto a suitable location on the outside of the instrument where they are clearly visible to anyone using the instrument

N4391B	
Laser wavelength range	1528 nm to 1630 nm
Laser Type	Booster Optical Amplifier
Laser Class according to IEC 60825-1	1M
Maximum CW output power of the Optical Modulation Analyzer ^{*†}	< 100 mW
Maximum permissible CW output power	163 mW
Numerical aperture	0.1
Beam waist diameter	< 10 μm

* CW output power is defined as the highest possible optical output power that the laser source can produce at the output connector

† For power levels at "LOInput" \leq 20 dBm

WARNING

Please pay attention to the following laser safety warnings:

- Under no circumstances look into the end of an optical cable attached to the optical output when the device is operational. The laser radiation can seriously damage your eyesight.
- Do not enable the laser when there is no fiber attached to the optical output connector.
- The laser is enabled by the software. The laser is on when the green LED above the LO Output connector is lit.
- The use of the instruments, such as microscopes or spectacles, with this product will increase the hazard to your eyes.
- The laser module has built-in safety circuitry which will disable the optical output in the case of a fault condition.
- Refer servicing only to qualified and authorized personnel.

Line power requirements

CAUTION

The optical receiver complies with overvoltage category II and pollution degree 2. It can operate from the single-phase AC power source that supplies between 100 V and 240 V (max. voltage fluctuation 10%) at a frequency in the range of 50 to 60 Hz. The maximum power consumption of the optical receiver is 300 VA.

Please refer to the documentation for your UXR-Series oscilloscope for information on its line power requirements.

Line power connectors

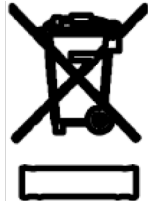
In accordance with international safety standards, the instrument has a three-wire power cable. When connected to an appropriate AC power receptacle, this cable earths the instrument cabinet. The type of power cable shipped with each instrument depends on the country of destination.

WARNING

To avoid the possibility of injury or death, you must observe the following precautions before switching on the instrument.

- Insert the power cable plug only into a socket outlet provided with a protective earth contact. Do not use an extension cord without a protective conductor. Using an extension cord without a protective conductor means the instrument is not earthed.
 - Do not interrupt the protective earth connection intentionally.
 - Do not remove protective covers. Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made only by qualified service personnel.
 - Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.
 - Defective, damaged, or malfunctioning instruments must be returned to an Keysight Technologies Service Center.
 - Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.
-

Environmental Information



This product is intended for indoor use only.

The crossed out wheeled bin symbol indicates that separate collection for waste electric and electronic equipment (WEEE) is required, as obligated by DIRECTIVE 2012/19/EU and other National legislation.

For details, visit

<http://about.keysight.com/en/companyinfo/environment/takeback.shtml> to understand your Trade in options with Keysight in addition to product takeback instructions.

N4391B Shipping Contents

Unpack your shipment.

- Inspect the shipping containers for damage.
- Inspect the instruments.
- Verify that you received the options and accessories that you ordered.

Keep the shipping containers and cushioning material until you have inspected the contents of the shipment for completeness and have checked the equipment mechanically and electrically.

Contents for all options

Qty	Part number	Description
1	0960-2929	OEM Mini Keyboard 319X157X20-mm
1	0960-3246	Optical Mouse USB 2-Buttons 1-Scroll Wheel
1	5061-5311	Connector Assembly - 3.5mm Female to Female
1	54919-92006	Tips for Preventing Damage to Oscilloscopes
1	54964-92007	Pre-Power-On Safety Notes
1	5972-3312	ESD Warning Sticker Sheet
2	9300-1308	Heel ground strap
1	9300-1484	ESD MAT Cord
1	9320-6678	China RoHS Addendum for Oscilloscope
1	9320-6797	Keysight safety leaflet
3	08154-61723	Connector Adapter FC
1	5962-0476	Calibration certificate
1	5962-5955	Test Data Sheet
1	5967-7169	Envelope-Entitlement Certificate (241.3 mm X 317.5 mm)
1	8121-1695	Cable-Assembly USB-Plug A TO B 4-COND 500 mm
1	9230-0333	Envelope-calibration certificate (241.3 mm x 317.5 mm)
1	9320-6654	China RoHS Addendum for Photonic Test and Measurement Products
1	N4373-90159	Virus Information Sheet

1	N4391-00232	Cover Front
1	N4391-61032	Assembly Rear Foot Right
1	N4391-00433	Interface Bracket Front
1	N4391-00432	Interface Bracket Right
1	N4391-61031	Assembly Rear Foot Left
1	N4391-00431	Interface Bracket Left
17	0515-2044	Screw-Machine with Patch-LK 90-DEG-Flat-HD Torx-T20 M4X0.7 10-mm-LG SST-300 Passivated
4	0515-1402	Screw-Machine W/Patch-LK Pan-HD TORX-T15 M3.5X0.6 8 mm-LG SST-302 Passivated
4	0515-0433	Screw-Machine W/Crest-Cup-Con-Washer Pan-HD Torx-T20 M4X0.7 8 mm-LG SST-300 Passivated

Instrument with 1.85 mm connectors

Qty	Part number	Description
1	1250-3782	Adapter-Coaxial Straight 2.92 mm Jack 2.40 mm Jack 50-Ohm 40 GHz
2	54932-68712	Adaptor Assembly- 1.85 Female-Female-kit of 2
1	8710-1765	Wrench - Torque 8lb-in, 5/16 Inch
1	N4391-61667	RF Cable Kit 70 G
1	N4391-60123	Assembly Testhead 70 G
1	UXRXXXXX	Oscilloscope with 4 input channels and 1.85 mm connectors

Instrument with 1 mm connectors

Qty	Part number	Description
1	54964-03801	Wrench - 2 mm thick, dual-ended, fits 6 mm and 7 mm
1	8710-2812	Wrench-Torque 4-in-lb 6 mm-open end Gold-Handle
1	8710-2819	Wrench-Torque Special Double-end 14 mm-open end 4 and 10-in-lb
1	N4391-61668	RF Cable Kit 100 G
1	N4391-60124	Assembly Testhead 110 G
1	UXRXXXXX	Oscilloscope with 4 input channels and 1 mm connectors

Adapter accessory kit for instrument with 1 mm connectors, option N4391B-801

Qty	Part number	Description
4	5067-1390	Adapter - 1 mm Ruggedized Female to 1 mm Female
4	5067-1392	Adapter - 1 mm Ruggedized Female to 1.85 mm Female
4	5067-1393	Adapter - 1 mm Ruggedized Female to 2.92 mm Female

Rack mount kit for N4391B Optical Modulation Analyzer, option N4391B-RK1

Qty	Part number	Description
1	1CM104A	132.6H Rack Mount Kit without Handles, Phantom Gray
1	E3663AC	Rail Standard (2 Pieces with Mounting Material)
1	N4391-24104	Trim Plate with Mounting Points for Cable Cover
1	N2156-60001	Rack Mount Kit for UXR Scopes

If anything is missing or defective, contact your nearest Keysight Technologies sales office. If the shipment was damaged, contact the carrier, then contact the nearest Keysight Technologies sales office.

2 Getting Started

[N4391B Optical Modulation Analyzer Setup](#) / 20

[Connecting the System](#) / 28

[Creating Your First Trace on the OMA](#) / 30

[Installing Software Components](#) / 34

N4391B Optical Modulation Analyzer Setup

Introduction

The Keysight N4391B Optical Modulation Analyzer consists of a coherent receiver unit and a high-performance oscilloscope. For the instrument to operate, the receiver unit and the oscilloscope need to be assembled according to the procedure described in this section.

For new installations and in case of changes of the environmental conditions, a 24h burn-in time is recommended for stable operation of the system.

Integrating the UXRXXX4A(P) High-Performance Oscilloscope

This section describes the integration procedure with an UXRXXX4A(P) High-Performance Oscilloscope.

- 1 Preparing the Frame
- 2 Preparing the Oscilloscope
- 3 Preparing the Coherent Receiver Unit
- 4 Combining Oscilloscope and Coherent Receiver Unit
- 5 Finalizing the System

Preparing the Frame

- 1 According to **Figure 1** on page -21, join the left and the right bracket using a Torx T20 screwdriver and 5 screws: M4x0.7 10mm counter sink, part number 0515-2044, torque 3 Nm (26-in-lb).
- 2 Mount the front bracket with 4 additional screws of the same type.

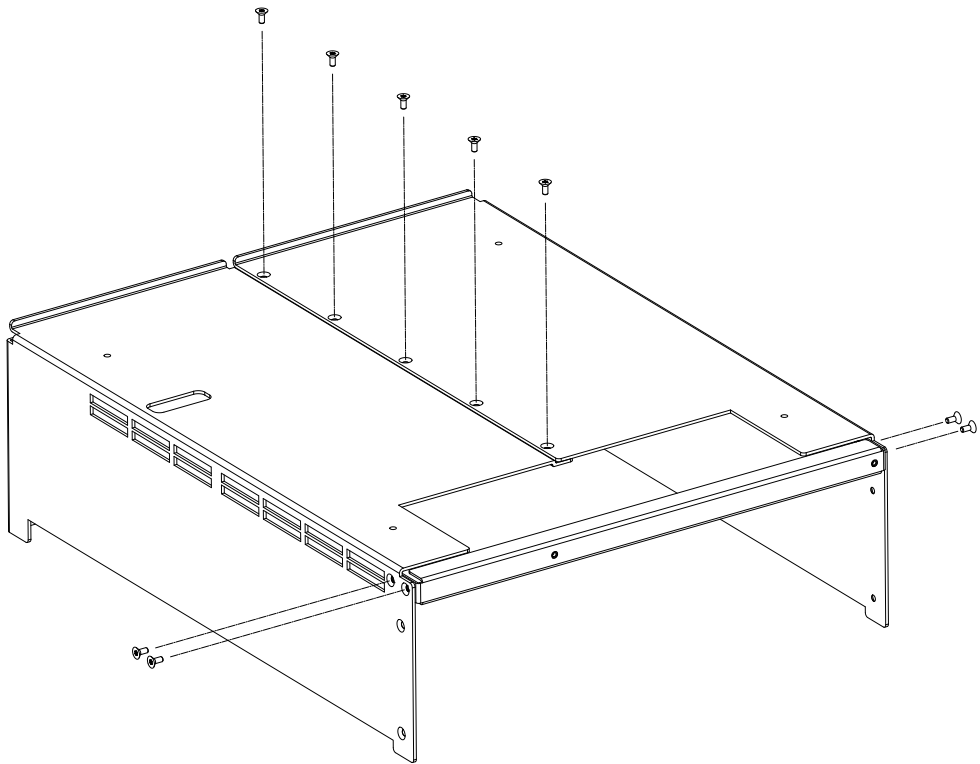


Figure 1 Preparing the frame

Preparing the Oscilloscope

- 1 Place the oscilloscope upside down on your work surface.
- 2 Remove the feet from the oscilloscope.
- 3 Using 4 screws: M4x0.7 8mm, part number 0515-0433, torque 3 Nm (26-in-lb), attach the frame prepared in step 2.1 to the oscilloscope.

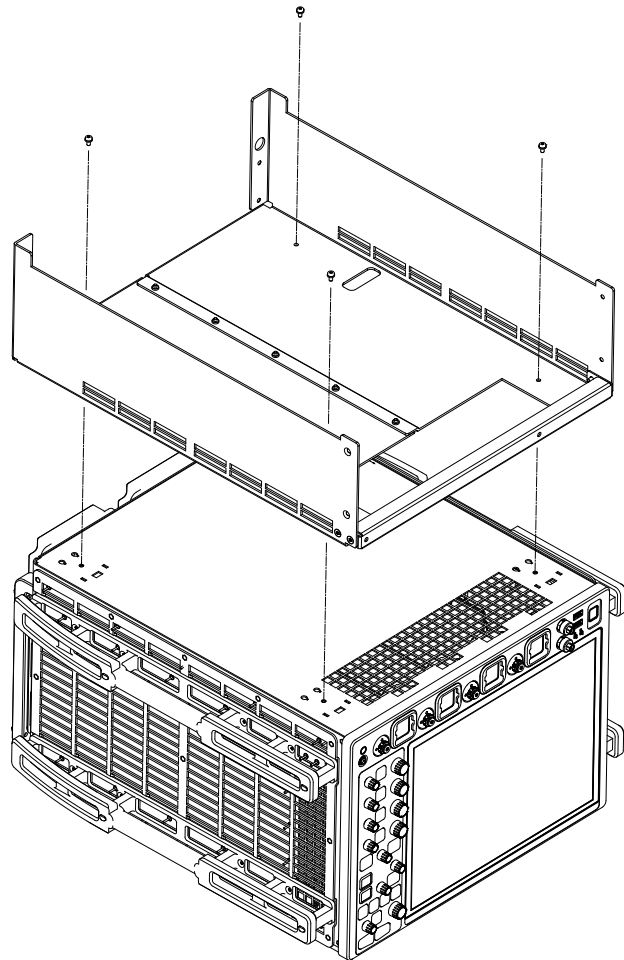


Figure 2 Preparing the oscilloscope

Preparing the Coherent Receiver Unit

- 1 a. Mount the left and right foot according to [Figure 3](#) on page -23 using a Torx T15 screw driver and 2 screws: M3.5x0.6 8mm, part number 0515-1402, torque 2 Nm (17-in-lb), for each foot.

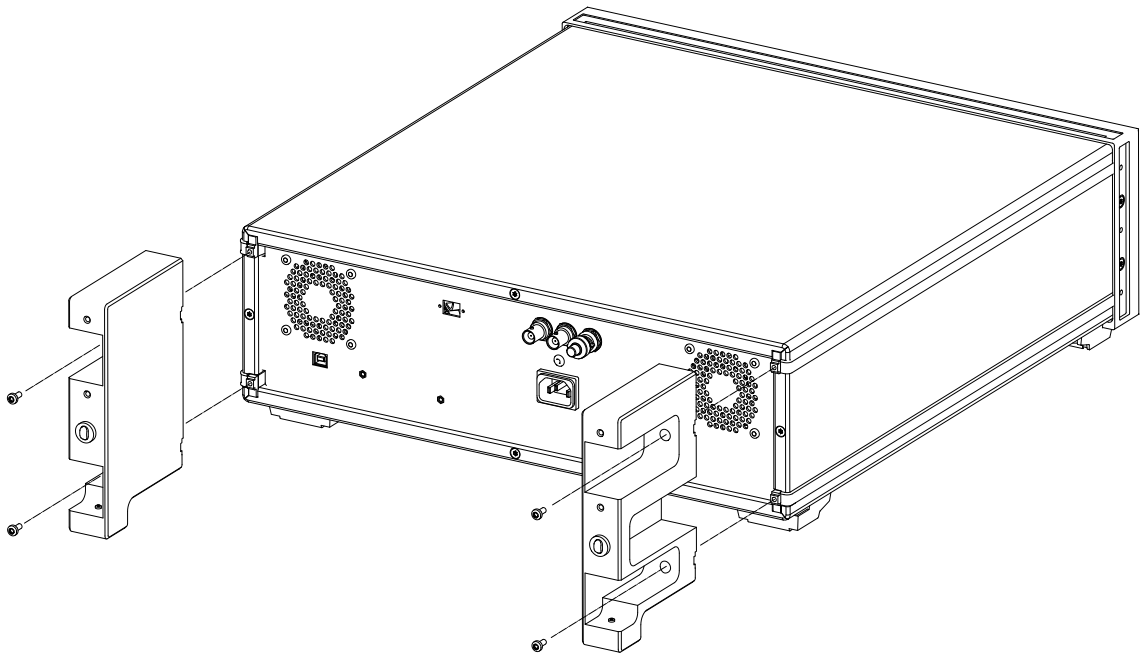


Figure 3 Preparing the coherent receiver unit

Combining Oscilloscope and Coherent Receiver Unit

- 1 Position the coherent receiver unit in between the brackets with the front flush to the bracket. Insert all 8 screws: M4x0.7 10mm, part number 0515-2044, torque 3 Nm (26-in-lb), according to Figure 4, but do not yet tighten them.
- 2 After all screws are inserted, tighten them completely.

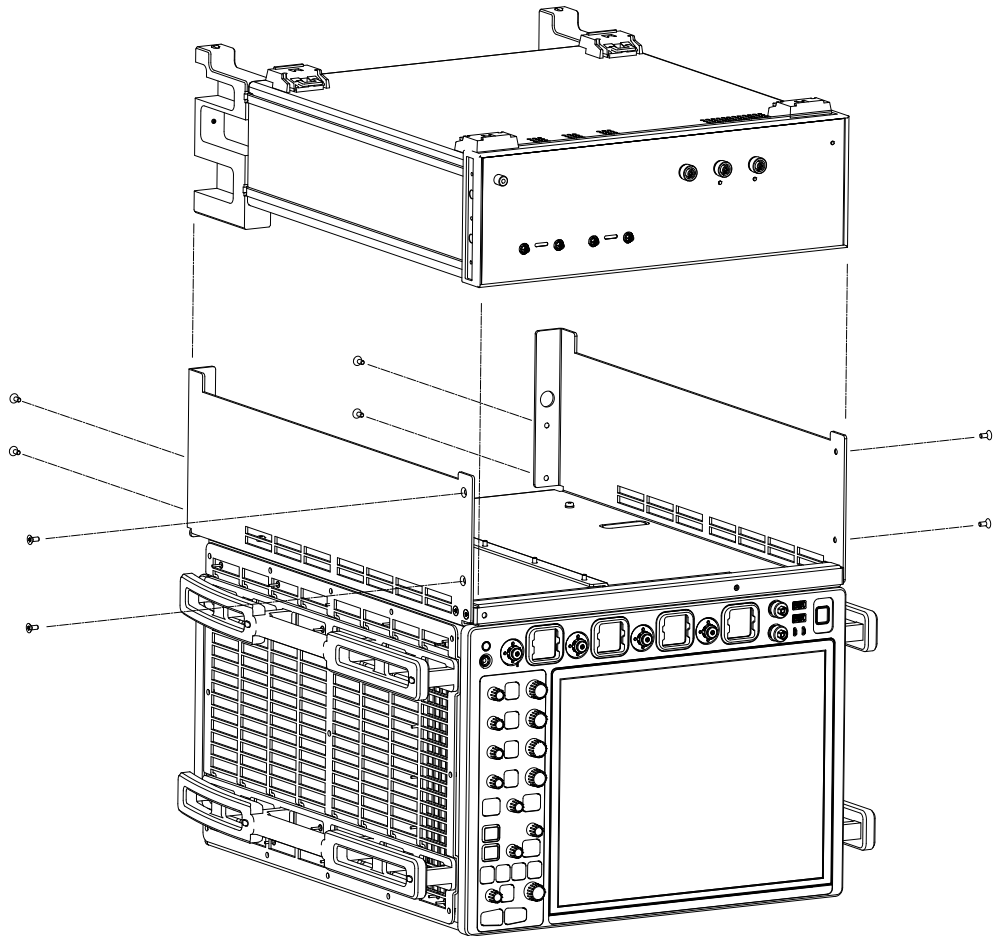


Figure 4 Combining oscilloscope and coherent receiver unit

Finalizing the System

WARNING

Use two persons to lift the system!

CAUTION

The semi-rigid cables are extremely sensitive! Handle them very carefully!

- 1 Use two persons to turn the system back to upright position.
Do not yet have the semi rigid connector cables installed.
- 2 Starting from the left, very carefully attach the semi-rigid cables as shown in [Figure 5](#) on page -27. Tighten with the supplied torque wrench.
 - For instruments with 1 mm connectors: torque 0.5 Nm (4-in-lb)
 - For instruments with 1.85 mm connectors: torque 0.9 Nm (8-in-lb)
- 3 To protect the semi-rigid cables from unintended impact, mount the protective cover as shown in [Figure 5](#) on page -27.

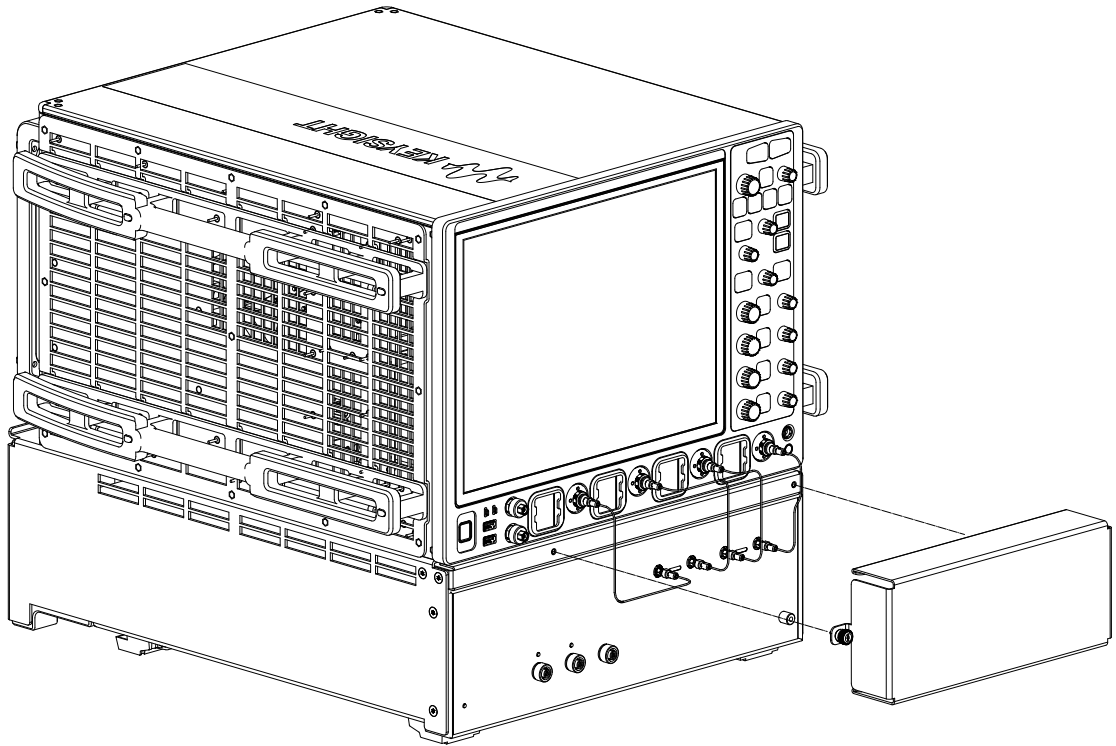


Figure 5 Finalizing the system

Connecting the System

- 1 At the rear of the instrument,
 - a Connect the mouse and keyboard to the oscilloscope.
 - b Using the USB cable supplied, connect the coherent receiver unit to the oscilloscope.
 - c Using the two power cables supplied, connect the power cables to the oscilloscope (the power socket with the notch), and the coherent receiver unit.
 - d If necessary, connect your LAN cable to the oscilloscope.
- 2 Put on the ESD wrist strap and connect it to the ground connector on the front of the instrument.
- 3 Remove the protective covers from the connector interfaces on the front of the instrument and from the patchcord connectors.
- 4 Connect the optical patchcord.
- 5 Turn on the instrument, by pressing the power button at the lower left corner of the front panel.

CAUTION

The maximum input voltage of the UXR-Series oscilloscope is range-dependent. So to avoid damaging the instrument, make sure to select a suitable input power range before applying optical power to the optical modulation analyzer.

Using the correct connectors

Using the patchcords also keeps service costs down, as the adaptor patchcord can be exchanged easily.

Angled contact connectors have up to 30dB higher return loss than straight connectors, and we recommend them for best performance results. With angled fiber endfaces, reflected light tends to reflect into the cladding, reducing the amount of light that reflects back to the source.

CAUTION

Always use patchcords to connect to your DUT. This protects the connectors of the optical modulation analyzer, by minimizing the number of connector changes.

CAUTION

The contact connector on the optical modulation analyzer is angled. If you are using a patchcord with straight and angled connectors, make sure you connect the angled connector to the optical modulation analyzer. Connecting to the optical modulation analyzer with a straight connector will damage it.

CAUTION

Before you connect any fiber-optic cable to the Optical Modulation Analyzer, please ensure it has been properly cleaned. Fiber-optic connectors are easily damaged when connected to dirty or damaged cables and accessories. When you use improper cleaning and handling techniques, you risk expensive instrument repairs, damaged cables, and compromised measurements.

Enabling and disabling the laser output

After the Optical Modulation Analyzer application running on the UXR-Series oscilloscope has initialized it, the green LED above the laser output indicates whether the laser is emitting radiation.


The laser is enabled and disabled by the software.

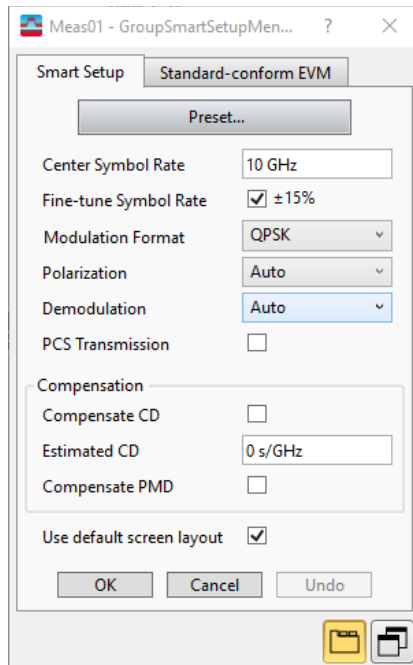
If the Laser output is on, the green LED on the front panel of the module is lit. If the Laser output is off, the green LED on the front panel of the module is not lit.

Creating Your First Trace on the OMA

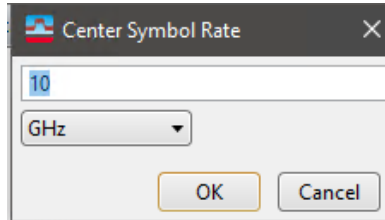
The following procedure will familiarize you with the OMA by loading a recorded demo then using the Smart Setup dialog to ensure that the parameters are set properly.

The recorded demo is a PRBS 15 dual polarization signal with a performance that is typically achieved on optical coherent long-haul transmitters. This signal has incorporated bit errors inserted into the transmitter PRBS generation.

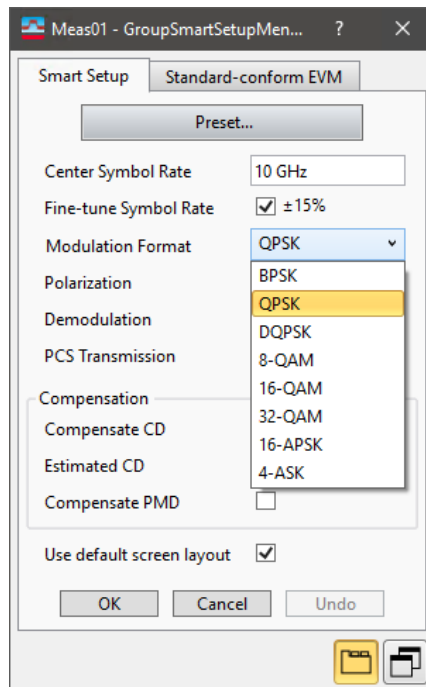
- 1 Power on the equipment.
- 2 Start the Keysight 89600 VSA Software interface by double-clicking on the Keysight OMA icon ().
- 3 In the Keysight 89600 VSA Software interface, select **File > Recall > Recall Demo**.
- 4 In the **Recall Demo** dialog, open the **\Optical Signals\Generic\DP-QPSK_10.12 GHz_with_errors.htm** file.
- 5 Select the **Smart Setup** menu.



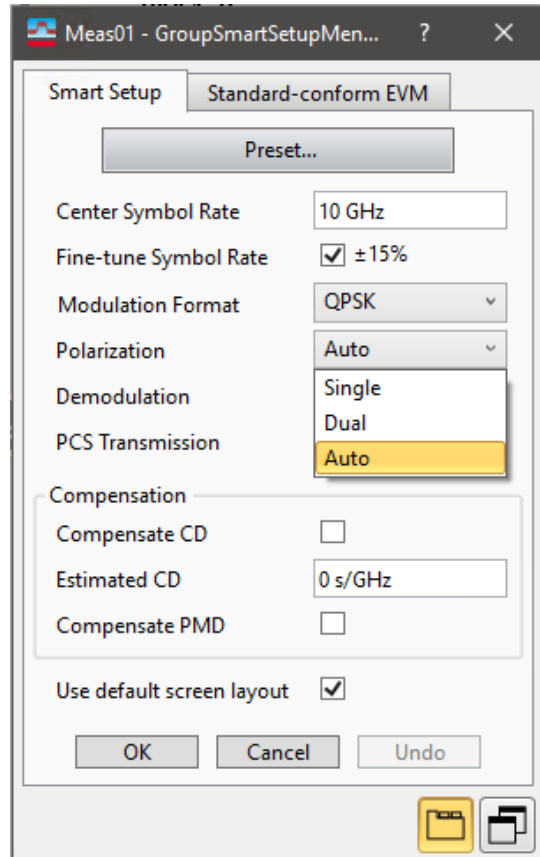
- 6 Ensure that the **Center Symbol Rate** is set to 10 GHz. If not, double-click in the **Center Symbol Rate** field then enter the value. The **Fine-tune symbol Rate** selection ensures that the symbol rate is adjusted to within the displayed range.



- 7 Ensure that the **Modulation Format** is set to **QPSK**. If not, select it from the **Modulation Format** list.

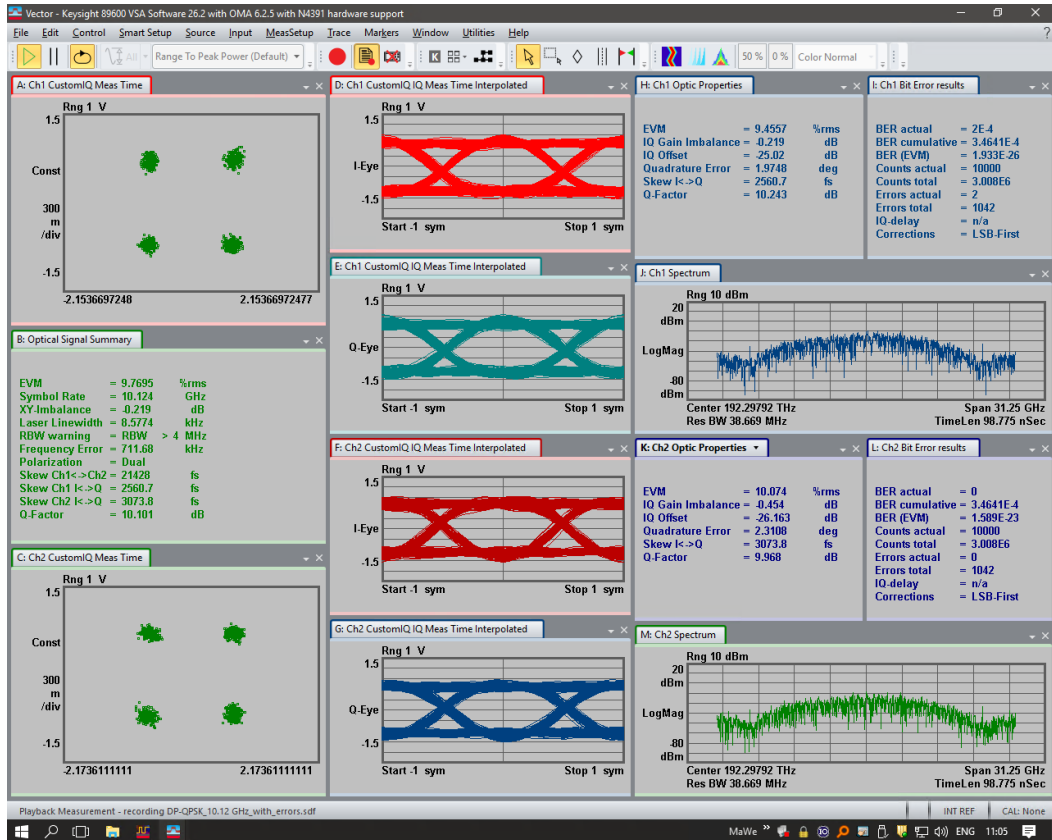


- 8 Ensure that **Polarization** is set to **Auto**. If not, select it from the **Polarization** list. **Smart Setup** will determine the polarization automatically (single or dual) when set to **Auto**.



- 9 Ensure that **Compensate CD** (chromatic dispersion) and **Compensate PMD** (polarization mode dispersion) are deselected.
- 10 Ensure that **Use default screen layout** is selected to use the default layout which provides a wide variety of results. If not selected, the current layout will be used. Click on the **OK** button. Select the **Restart** button (▶) in the tool bar to start the measurement.

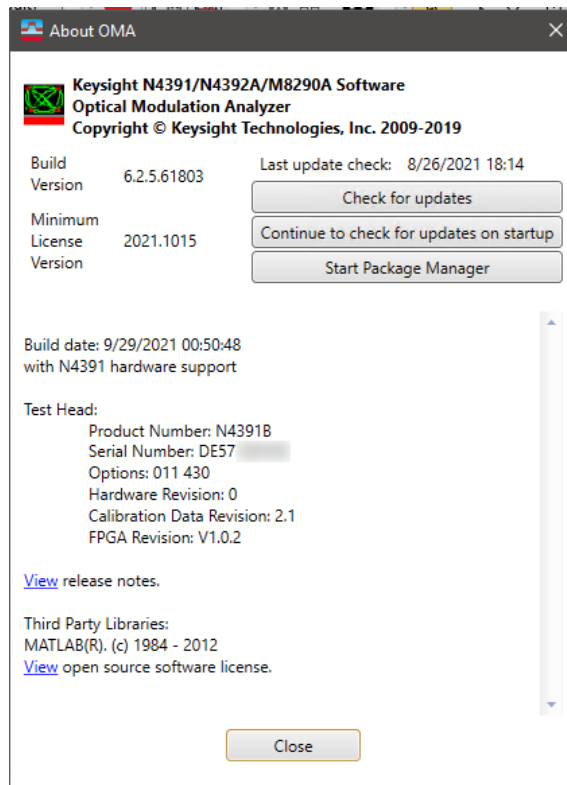
11 You should see results similar to the following.



Installing Software Components

All software components are pre-installed at the factory. However, this section provides installation instructions if it becomes necessary to reinstall some or all of the software components.

You can search for updates through the VSA interface by selecting **Help** > **About OMA** then clicking on the **Check** for updates button. Refer to the following screen.



Downloading the Photonic Application Suite Package Manager

The Photonic Application Suite (PAS) Package Manager is used to select and download software packages for proper operation of the OMA.

- 1 Visit the PAS Package Manager web page at www.keysight.com/find/N7700A, click on the View Technical Support link, select the Drivers, Firmware & Software tab, then click on the Download button to start the download process.

This software manages your optical application programs on your PC. It will show you what is installed and if there are newer installations available on the Keysight server. The installation is completed through a step by step guide. By having this program on your PC, you can use it to check for new updates as well as additional optical application programs available

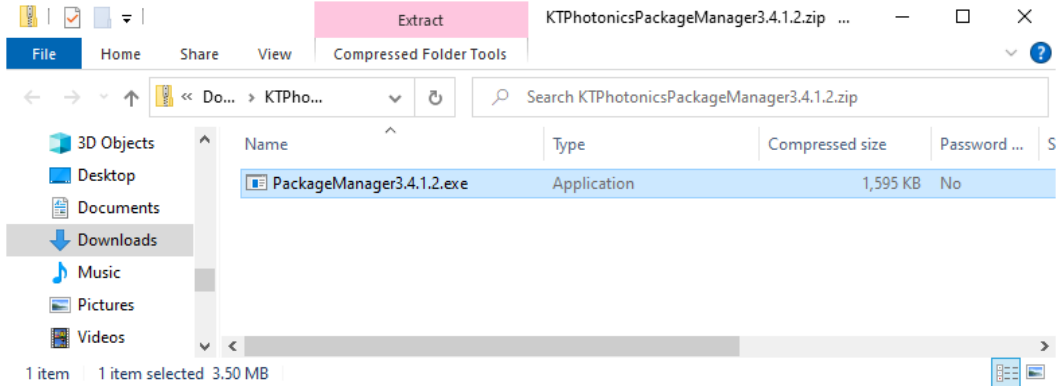
Some software packages require purchase of a license.

A free evaluation license can be requested for:

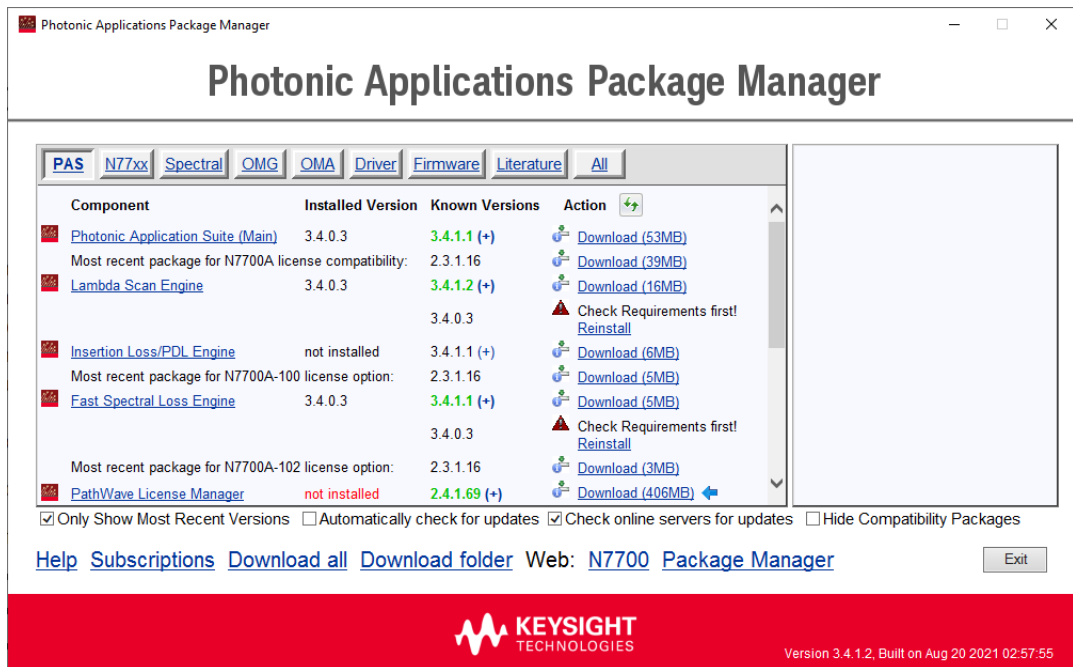
- [N7700100C PLS](#)
- [N7700101C DWDM](#)
- [N7700102C FLS](#)
- [N7700103C PMD](#)
- [N7700A](#)
- [N4391SALC](#)
- [N4391AU](#)
- [81195A](#)

- 2 Click on the **Open** button to open the zip file.

3 Double-click on the executable file to run the **PAS Package Manager**.

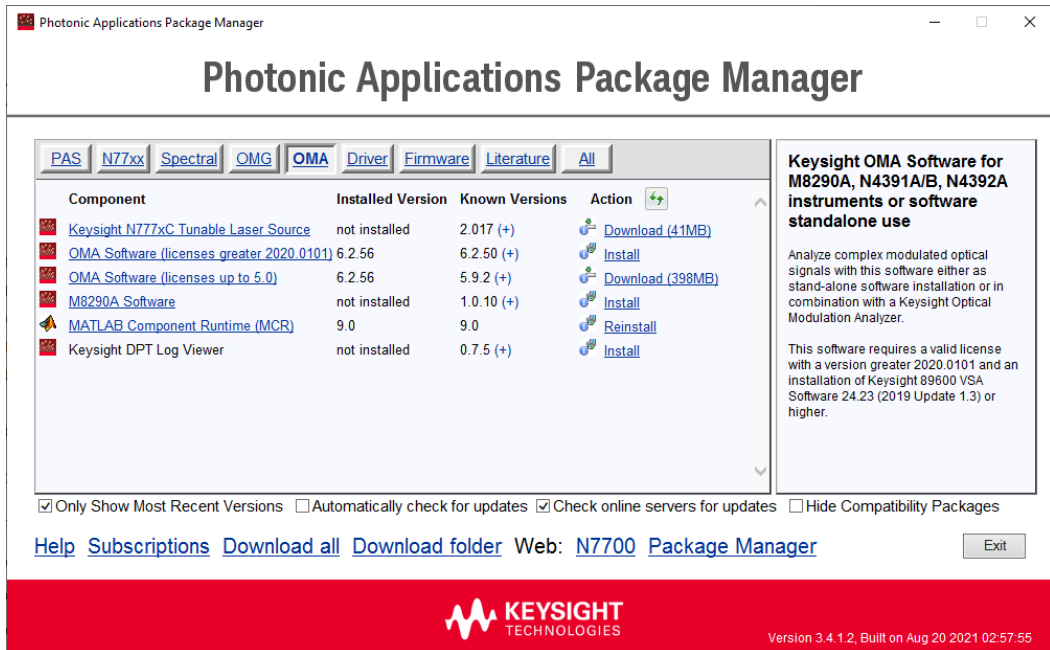


4 Start the **PAS Package Manager** as administrator and select the **OMA** tab to see all possible OMA packages.



Installing the Keysight OMA Software

- 1 Select the OMA software package which matches your licensed version.
- 2 Click on the **Download** link.



- 3 Continue following the installation instructions and always select the default settings. The **PAS Package Manager** will install drivers and software which are required to install the **OMA** software. During the **OMA** installation itself select your installation type. You can postpone system restarts until the complete installation is finished.
- 4 After all installations have been finished, verify that the **PAS Package Manager** lists them with an **"Installed Version"**. If the installations are not listed, launch the installation of the missing package again. Likely it was interrupted by a system restart.

3 Returning the Instrument for Maintenance

Returning the Instrument / 39

Returning the Instrument

If the performance verification fails and you cannot correct the problem, return the N4391B to Keysight for repair following the steps shown below:

- 1 Record all symptoms.
- 2 Contact Keysight at <http://www.keysight.com/find/assist>.
- 3 Use the original packing material or comparable packing material to ship the instrument to Keysight.

Please consider that for new installations and in case of changes of the environmental conditions, a 24h burn-in time is recommended for stable operation of the system.

NOTE

The optical receiver and the UXR-Series oscilloscope are two parts of one instrument.

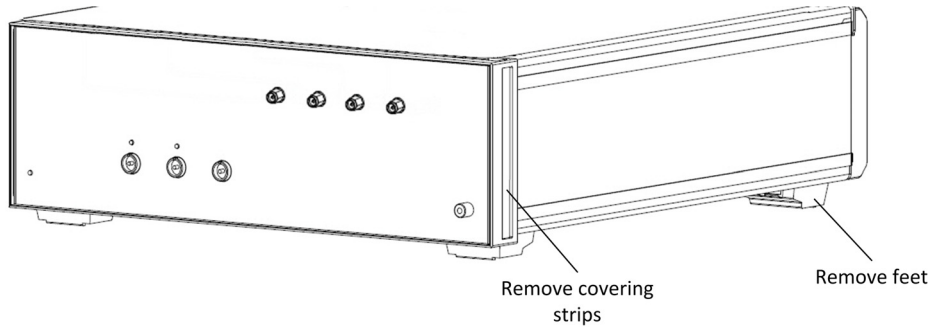
If you are returning the N4391B to Keysight support, you must return the full instrument, consisting of both parts.

4 Rack Mount

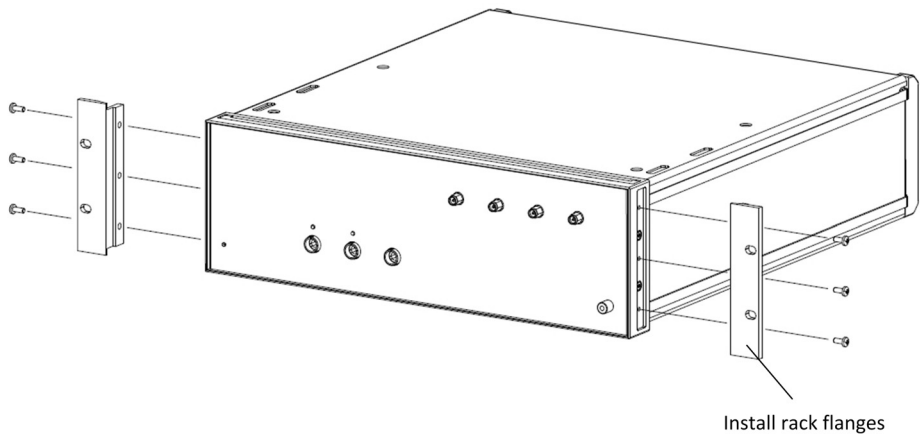
Rack Mounting the N4391B / 42

Rack Mounting the N4391B

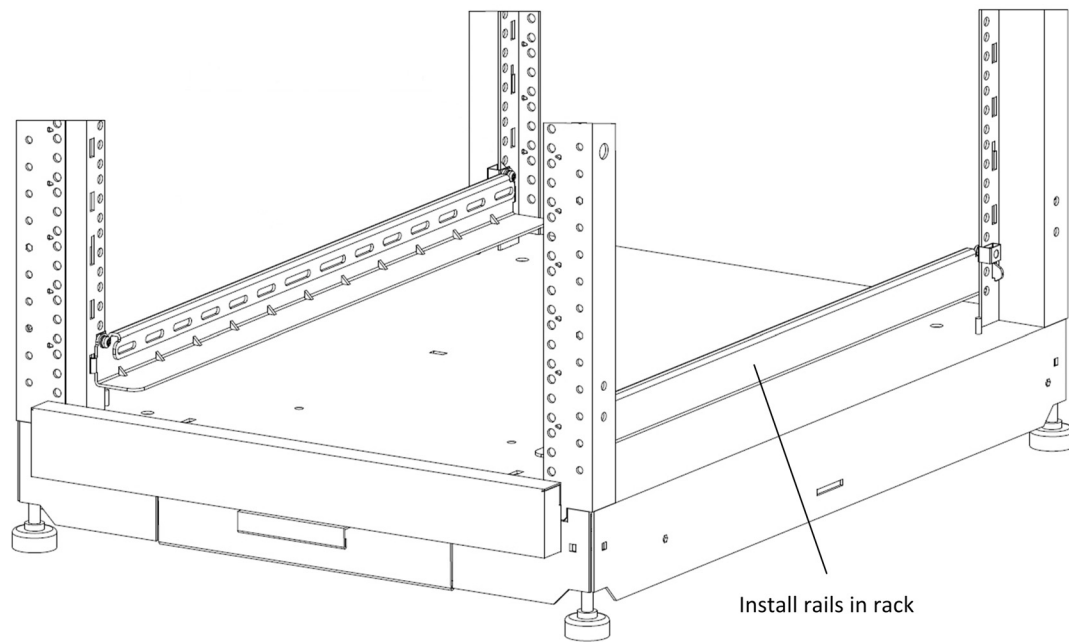
- 1 Prepare the optical receiver unit for rack mounting.
 - a Remove the four feet from the bottom of the optical receiver unit.



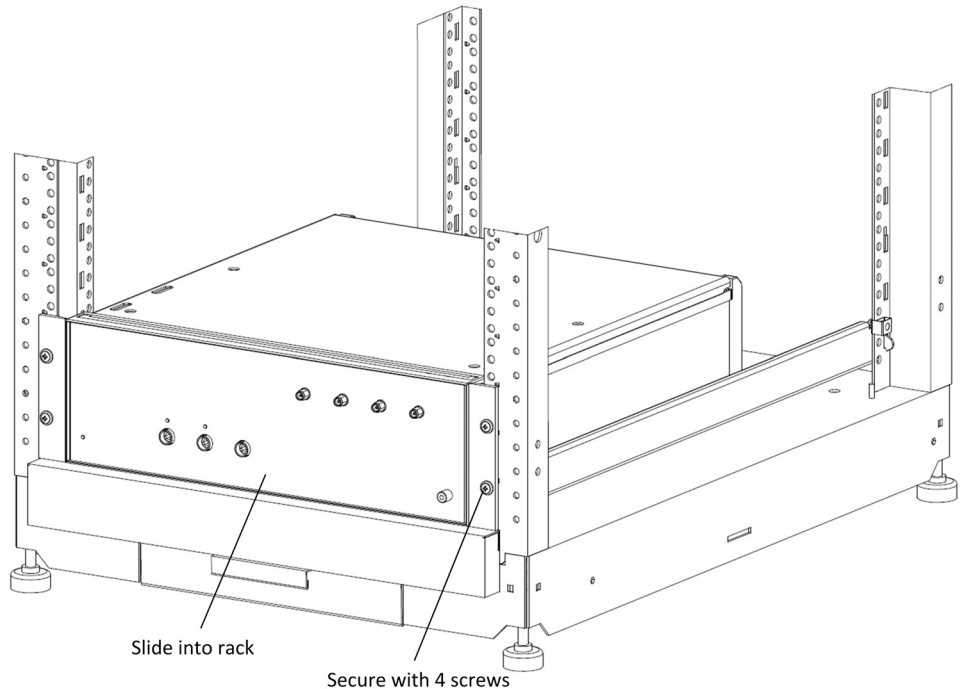
- b At the front of the optical receiver unit, remove the covering strips at the left and right edges of the front panel.
 - c Using parts from the rack mount kit (part number 1CM104A), mount a rack flange at the left and right of the optical receiver unit.



- Using a Torx T25 screwdriver, mount the rails in the rack.

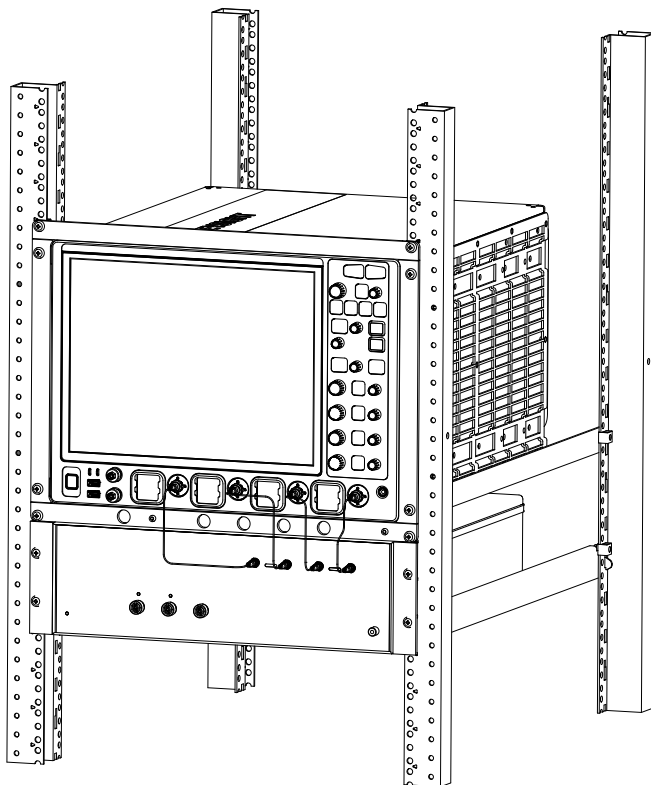


- 3 Mount the optical receiver unit in the rack.
 - a Slide the optical receiver unit onto the rails in the rack.
 - b Using a cross-recess Phillips screwdriver, and the screws from the rack mount kit (screw part number 0570-1577), screw the flanges at the left and right of the optical receiver unit to the rack.

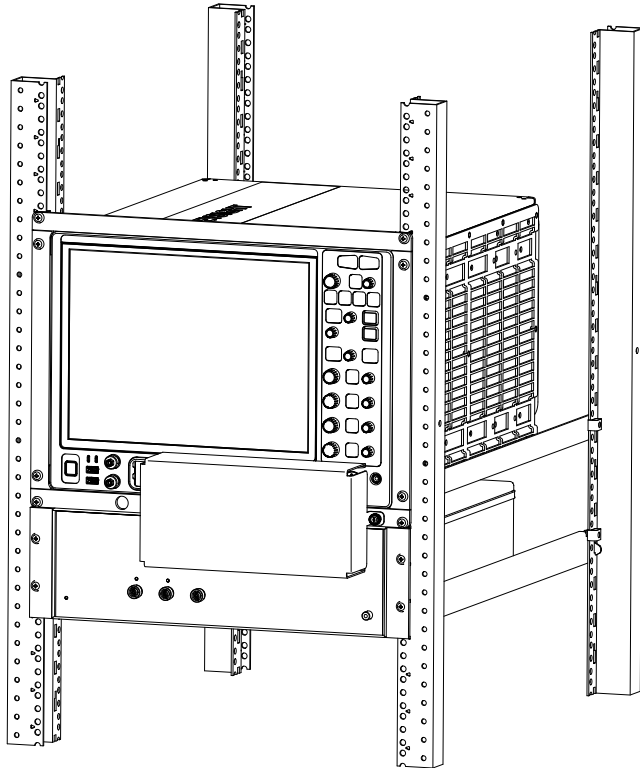


- 4 Swap the bottom trim plate of the UXR-Series Oscilloscope Rack Mount Kit (N2156-24104) for the one supplied with the N4391B Rack Mount Kit (N4391-24104).
- 5 Mount the oscilloscope in the rack according to the procedure in the UXR-Series Oscilloscope Rack Mount Kit Installation Guide (N2156-97000). Mount the oscilloscope directly above the optical receiver unit.

- 6 Starting from the left, attach the semi-rigid cables very carefully. Tighten with the supplied torque wrench.
- For instruments with 1 mm connectors: torque 0.5 Nm (4-in-lb)
 - For instruments with 1.85 mm connectors: torque 0.9 Nm (8-in-lb)



- 7 To protect the semi-rigid cables from unintended impact, mount the protective cover.



5 Regulatory Information

[Declaration of Conformity](#) / 48

[Compliance with German Noise Requirements](#) / 48

[Compliance with Canadian EMC Requirements](#) / 48

Declaration of Conformity

For latest DoC (Declaration of Conformity), please visit the web link:

<http://www.keysight.com/go/conformity>

Compliance with German Noise Requirements

This is to declare that this instrument is in conformance with the German Regulation on Noise Declaration for Machines (Lärmangabe nach der Maschinenlärmmverordnung–3.GSGV Deutschland).

Acoustic Noise Emission	Geräuschemission
LpA < 70 dB	LpA < 70 dB
Operator position	am Arbeitsplatz
Normal operation	normaler Betrieb
Per ISO 7779/ISO 3744	nach ISO 7779/ISO 3744

Compliance with Canadian EMC Requirements

This ISM device complies with Canadian ICES- 001.
Cet appareil ISM est conforme a la norme NMB-001 du Canada.

