
Keysight 86120D and 86122C Multi-Wavelength Meters

Notices

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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.

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Keysight Cybersecurity

Product and Solution Cybersecurity

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<https://www.keysight.com/find/86120D>

<https://www.keysight.com/find/86122C>

User Documentation

User documentation includes comprehensive information on features that may impact the secure deployment, use, and decommissioning of our products. This includes details on exposed network ports, the use of cryptography and authentication, and firmware security settings, if necessary.

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 overvoltage category II, pollution degree 2 environment. It is designed to operate at a maximum relative humidity of 95% 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>
External Connections	<p>Any other instruments connected to this instrument shall be approved to a suitable safety standard and must include reinforced insulation from hazardous voltages, in particular mains.</p>

Safety Symbols

Table 1 Safety Symbols

Symbol	Description
	KC is the Korean certification mark to demonstrate that the equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.
	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.
	The RCM Mark is a compliance mark to the ACMA (Australian Spectrum Management Agency). This indicates compliance with all Australian EMC regulatory information.
	Indicates that the product was tested and has met the certification requirements for electrical, plumbing and/or mechanical products.
	<p>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.</p> <p>CAN ICES/NMB-001(A) - This ISM device complies with the Canadian ICES-001(A). Cet appareil ISM est conforme a la norme NMB-001(A) du Canada.</p> <p>ISM GRP 1-A - This is an Industrial Scientific and Medical (ISM) Group 1 Class A product.</p>
	This symbol on all primary and secondary packaging indicates compliance to China standard GB 18455-2001.

Compliance and Environmental Information

Table 2 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>

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1 Getting Started

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General Safety Considerations

This product has been designed and tested in accordance with the standards listed in the Manufacturer's Declaration of Conformity, and has been supplied in a safe condition. The documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

Warnings and Notices

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 negate this protective action by the using an extension cord without a protective conductor.

WARNING

Never look directly into the end of a fiber or a connector, unless you are absolutely certain that there is no signal in the fiber.

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 AC symbol is used to indicate the required nature of the line module input power.



The ON symbols are used to mark the positions of the instrument power line switch.



The OFF symbols are used to mark the positions of the instrument power line switch.



The CE Marking to state compliance within the European Union. This product is in conformity with the relevant European Directives. This text denotes the instrument is an Industrial Scientific and Medical Group 1 Class A product.



The Safety Mark of the Canadian Standards Association CSA.



The RCM Conformity Mark of the Australian ACA for safety and EMC compliance.

ISM1-A

This text denotes the instrument is an Industrial Scientific and Medical Group 1 Class A product.



This marking is for China only and states compliance with the Chinese Toxic or Hazardous Substances and Elements requirements.



General Recycling Mark.



This product complies with the WEEE Directive (2002/96/EC) marketing requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.

Product category: With reference to the equipment types in the WEEE Directive Annexure I, this product is classed as a “Monitoring and Control instrumentation” product.

Do not dispose in domestic household waste.

To return unwanted products, contact your local Keysight office, or see <http://about.keysight.com/en/companyinfo/environment/takeback.shtml> for more information.

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.

CAUTION

This product complies with Overvoltage Category II and Pollution Degree 2. It has been designed for indoor use only.

CAUTION

Always use the three-prong AC power cord supplied with this instrument. Failure to ensure adequate earth grounding by not using this cord may cause instrument damage.

CAUTION

This instrument has auto-ranging line voltage input. Be sure the supply voltage is within the specified range.

CAUTION

Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

CAUTION

This Multi-Wavelength Meter uses a specially designed Windows application program (Windows® is a U.S. registered trademark of Microsoft Corp.) All Multi-Wavelength Meter functionality is directly available from within the Multi-Wavelength Meter application. Windows configuration changes made outside of the Multi-Wavelength Meter application may not work correctly and could cause the instrument to become inoperable. Do not try to access or make changes to the Windows Operating system. Repairs caused by the improper use of the Multi-Wavelength Meter will not be covered under warranty.

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 detachable power cord is readily identifiable and is easily reached by the operator. The detachable power cord is the instrument disconnecting device. It disconnects the mains circuit 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.

There is no output laser aperture

The Keysight 86120D and 86122C do not have an output laser aperture. However, light less than 1 nW escapes out of the front- panel OPTICAL INPUT connector. Operator maintenance or precautions are not necessary to maintain safety. No controls, adjustments, or performance of procedures result in hazardous radiation exposure.

Laser Safety Information

The laser sources contained in the product specified by this user guide are classified according to IEC 60825- 1 (2014).

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

Table 3 Safety Information for Wavelength Meter

86120D, 86122C	
Laser type	HeNe Laser
Wavelength (± 0.1 nm)	632.8 nm
Max. CW output power ¹	< 1 nW
Beam waist diameter	9 μ m
Numerical aperture	0.1
Laser Class according to IEC 60825-1 (2014)	Class 1
Max. permissible CW output power	0.39 mW

¹Max. CW output power is defined as the highest possible optical power that the laser source can produce at its output connector.

Setting Up the Multi-Wavelength Meter

This section describes the steps required to properly set up your instrument.

Step 1. Inspect the Shipment

- 1 Use proper lifting techniques to remove the items from the shipping container.

NOTE

Keep the shipping container and cushioning material until you have inspected the contents of the shipment for completeness and have inspected the instrument.

- 2 Inspect the shipment
 - Inspect the shipping container for damage.
 - Inspect the instrument.
 - Verify that you received the options and accessories you ordered.

If anything is missing or defective, contact your nearest Keysight Technologies Service Office. Refer to [Keysight Technologies Service Offices](#) on page 69. If the shipment was damaged, contact the carrier, then contact the nearest Keysight Sales Office. Keep the shipping materials for the carrier's inspection. The Keysight Sales Office will arrange for repair or replacement at Keysight's option without waiting for claim settlement.

Options and Accessories

The following table lists the accessories that may be on the shipping list. The information on your actual shipping list is more accurate and should supersede the information in this table.

Table 4 Accessories Included

Accessories	Part Number
Stylus	1150-7997
Getting Started	86122-90A02
Power Cord	depends on country
86120D-UK6 or 86122C-UK6	Commercial Calibration Certificate with Test Data

Table 5 Instrument Options

Option	Description
86120D	Multi-Wavelength Meter, 700 nm to 1650 nm, +/-1.5 ppm
Optical Connectors	
86120D-021	Straight Contact Interface-PC
86120D-022	Angled Contact Interface-APC
Accessories	
86122A-1CM	Rack Mount Kit without Handles
86122A-1CN	Rack Handle Kit
86122A-1CP	Mount Kit plus Handles

The following table lists the available product options. Make sure that you received all of the options that you ordered.

Table 6 Instrument Options

Option	Description
86122C	Multi-Wavelength Meter
86122C-100	Wavelengths 1270 nm to 1650 nm, +/-0.2 ppm
86122C-110	Wavelengths 1270 nm to 1650 nm, Fast Update, +/-0.2 ppm
Optical Connectors	
86122C-021	Straight (non-angled) Contact Interface-PC (default)
86122C-022	Angled Contact Interface-APC
Accessories	
86122A-1CM	Rack Mount Kit without Handles
86122A-1CN	Rack Handle Kit
86122A-1CP	Mount Kit plus Handles

Table 7 Fiber-Optic Adapters

Keysight Part Number	Description
81000FI	Connector Interface FC/PC/SPC
81000HI	Connector Interface E-2000(PHYSICAL CONTACT)
81000KI	Connector Interface SC
81000LI	Connector Interface LC
81000NI	Connector Interface FC/APC, narrow key
81000SI	Connector Interface DIN 47256/4108
81000VI	Connector Interface ST
81000MI	Connector Interface MU

Step 2. Consider Environmental Specifications

Review the following specifications to ensure that your operating or storage environment is suitable for the instrument.

Table 8

	86120D	86122C	Notes
General	Indoor use only	Indoor use only	
Operational			
Temperature	0 to +55 °C	+15 to +35 °C	
Humidity	< 80% R.H. for temperatures up to 31 °C decreasing linearly to 50% R.H. at +40 °C	< 75% R.H. at 35 °C	non-condensing
Altitude	up to 2000 m (6600 ft)	up to 2000 m (6600 ft)	
Storage			
Temperature	-40 °C to +70 °C	-40 °C to +70 °C	
Humidity	< 90% R.H.	< 90% R.H.	non-condensing

NOTE

Humidity is type tested. Type tested means tested, but not warranted, for continuous operation.

Shock

120 g, half sine, 2 ms pulse

NOTE

Shock is type tested.

Vibration

- Random, 2 g rms, 5-500 Hz, 10 minutes per axis
- Sine, 0.5 g (0 to peak), 5 to 500 Hz, 1 octave per minute.

NOTE

Vibration is type tested.

Table 9

86120D, 86122C	
Power Requirements	
Voltage	100-240 V~
Frequency	50-60 Hz
Maximum Power	240 W
Weight	14.5 kg (32 lb)
Dimensions	
Height	138 mm (5.2 in)
Width	425 mm (16.7 in)
Depth	520 mm (20.5 in)

Step 3. Configure for Bench Top or Rack Mount Use

The multi-wavelength meter is shipped ready for bench-top use. To configure the instrument for rack mount use, follow the steps below.

NOTE

You must have a rack mount kit to continue with this procedure. Refer to [Accessories](#) on page 18.

- 1 Ensure that the rack mount kit is complete

NOTE

If any items are damaged or missing from the kit, contact the nearest Keysight Technologies sales or service office to order a replacement kit. Items within the kit are not individually available.

Table 10

Qty	Description
2	Rack Mount Flange
6	Screws
4	Dress screws
2	Front Handle Assembly (86122A-1CP only)

- 2 Remove the side trim strips.
- 3 Attach rack mount flange with three screws per side.

WARNING

Use only the screws the come with the rack mount kit. Longer screws may damage the instrument, and shorter screws may be unsafe.

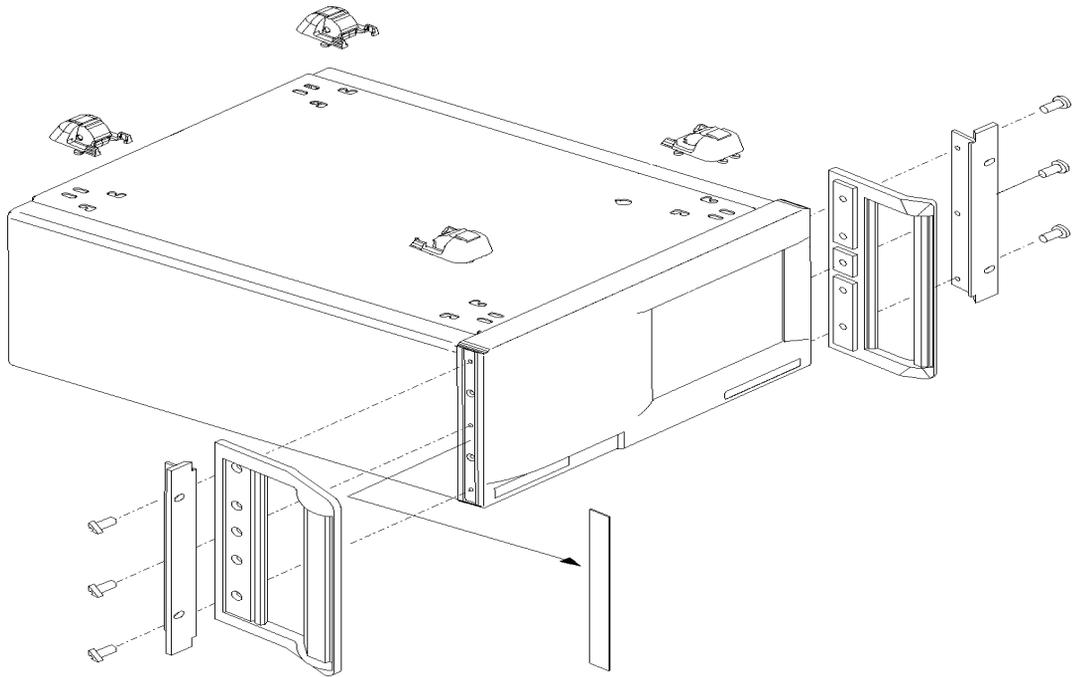


Figure 1

NOTE

Front Handle Assembly are included with Option 86122A-1CP only.

Step 4. Connect a Keyboard and Mouse (Optional)

You can use the USB ports on the front and rear panels of the instrument to connect a USB keyboard and mouse.

NOTE

A keyboard and mouse are not supplied with the multi-wavelength meter.

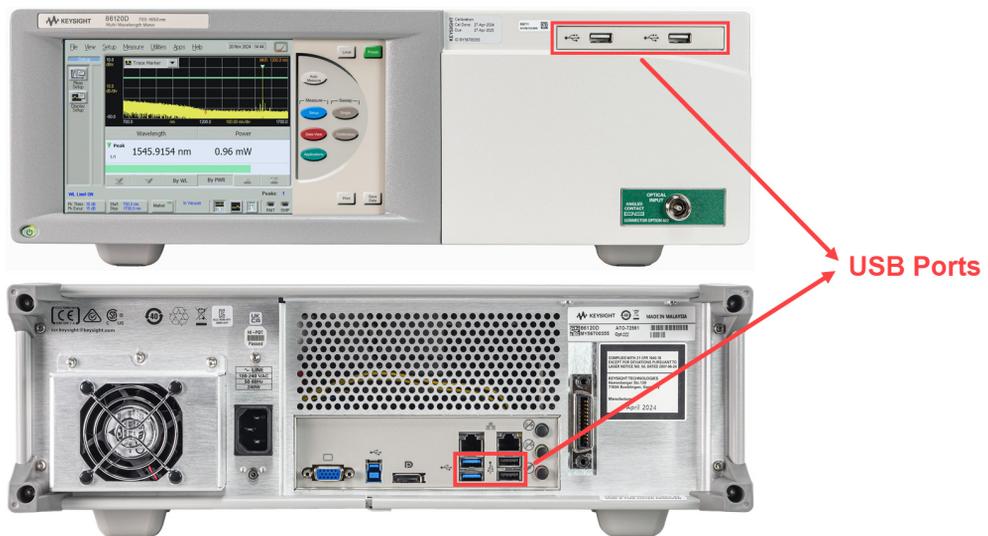


Figure 2

NOTE

Do not stack other objects on the keyboard; this will cause self-test failures at power-on

Step 5. Connect the Line Cord

Connect the line cord as shown in the figure below:

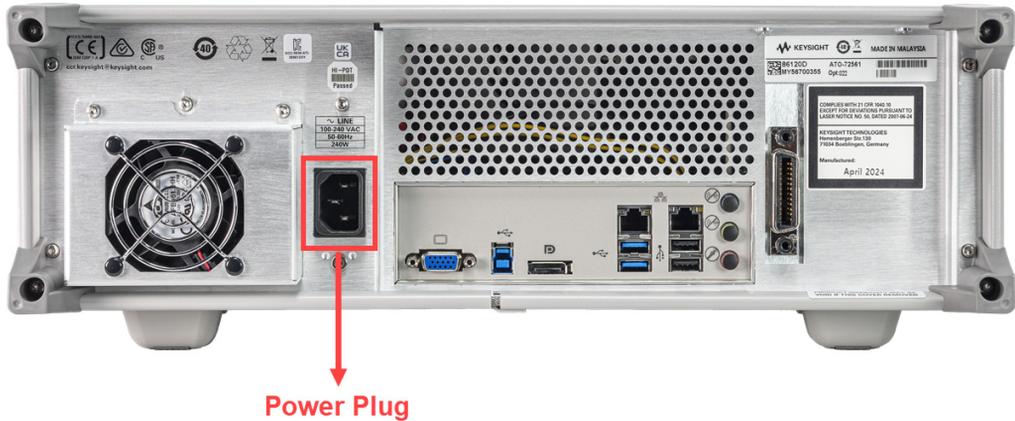


Figure 3

The product can operate from any single-phase AC power source supplying 100 – 240 V in the frequency range from 50 – 60 Hz. The maximum power consumption is 240 W. The power supply automatically adapts to the applied AC power (Auto Selection) and monitors the AC power range. The mains supply voltage fluctuation shall not exceed 10% of the specified supply voltage.

CAUTION

The product must be operated from a power source providing Line, grounded Neutral and Protective Earth (PE) connections. The instrument is not intended for operation from two phases of a multiphase ac system or across the legs of a single-phase, three-wire AC power system. Crest factor (ratio of peak voltage to rms.) should be typically within the range of 1.3 to 1.6 at 10% of the nominal rms. mains voltage.

Step 6. Turn On the Line Power

Press the power switch at the lower left-hand corner of the front panel. After stabilization of the internal reference laser the instrument will show application screen and is ready to use.

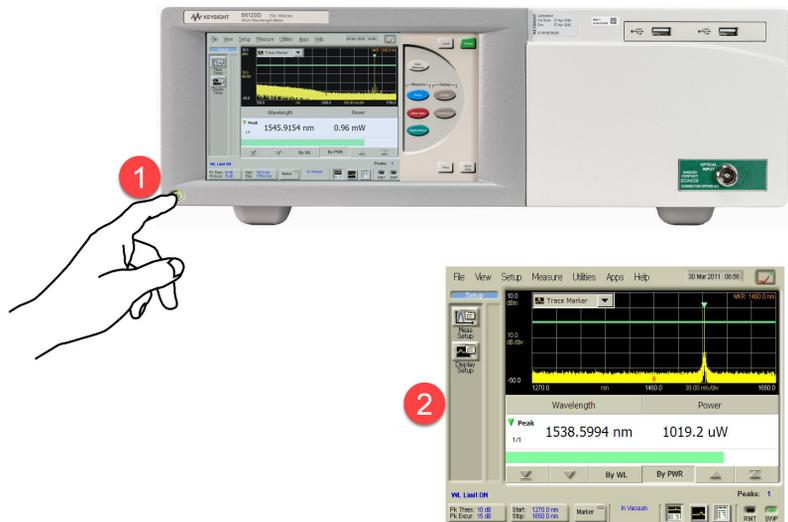


Figure 4

Interacting With the Display

The multi-wavelength meter is equipped with a touch screen display. You can explore the instrument's functions and settings by touching elements on the display (such as menus, buttons, and other controls) with your finger or the supplied stylus.

You can also operate the instrument by using an optional mouse. For simplicity, the term "click" is used throughout this book to represent clicking or touching an element on the display. When you see the term "click," please remember that you can always touch with your finger or stylus instead.

NOTE

The display will always function as a touch screen, even when a mouse and keyboard are connected.

CAUTION

Avoid touching the screen with a sharp object, as this could result in damage to the display. Use your finger or the supplied stylus.

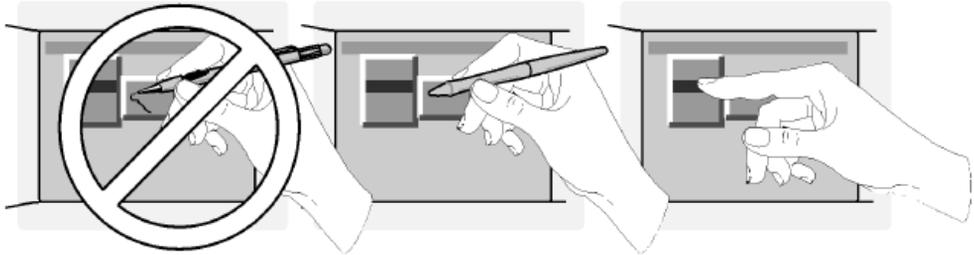


Figure 5

Step 7. Calibrate the Touch Screen (Optional)

NOTE

The touch screen calibration rarely needs to be performed.

Touch screen calibration ensures that the touch screen is both accurately aligned and orientated with the display. Therefore, when you touch an element on the display screen, the instrument can detect the task you want to perform.

- 1 On the Utility menu, click Touch Screen Calibration. The touch screen calibration utility opens.

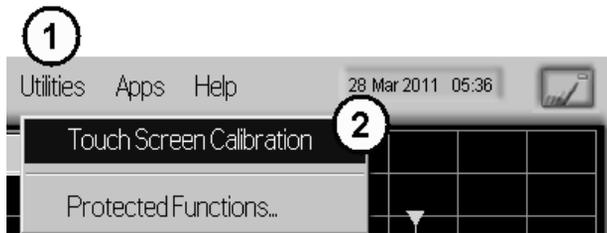


Figure 6

- 2 Touch the center of the X with your finger or a stylus. Several X will appear on different positions of the display screen. Touch them precisely as the first one.
When the display is calibrated, the touch screen configuration utility closes.

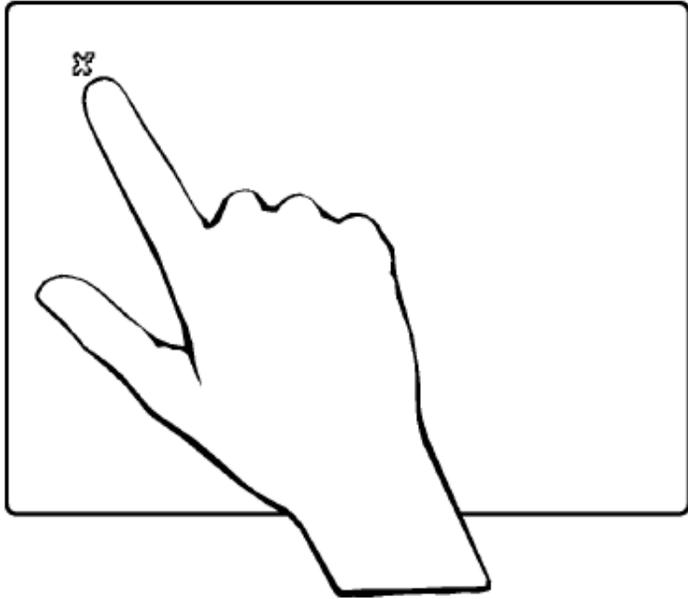


Figure 7

The calibration will time out within 10 seconds if you do not touch the center of the X. You can also press Esc on an optional keyboard to exit the touch screen calibration.

NOTE

If you miss the center of the X by a significant amount, the instrument will display an error message and revert back to the previous calibration. This will prevent the touch screen from being rendered useless due to a poor calibration.

In case a failed touch screen calibration leads to a non-working condition, you can restart the touch screen calibration by using a USB mouse.

Step 8. Set the Time and Date

- 1 Click the current time and date shown near the top of the display. The Set Time and Date dialog box opens.
- 2 Enter the current time and date in one of the following ways:
 - Click the time and date text boxes, and enter the desired number.
 - Click the up or down arrows next to the time and date text boxes until the desired number is displayed.
- 3 Click Set Time & Date Now to apply the changes and close the dialog box.

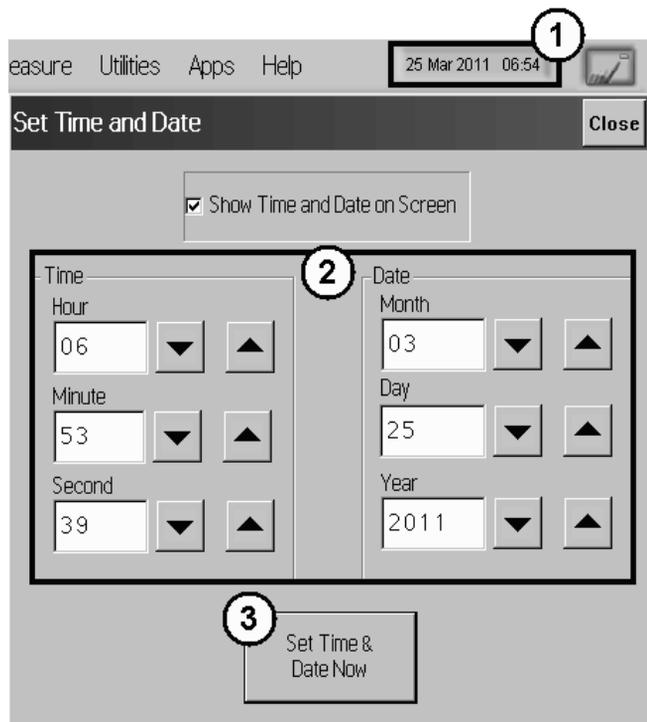


Figure 8

Step 9. Set the System Standby Mode

If the multi-wavelength meter has been inactive for a specified period of time, it will be switched into standby mode. When this happens, two things will occur:

- The LCD display indicates the standby mode.
- If the instrument is in Continuous sweep mode, the motor movement, and any related data collection, will be suspended.

NOTE

The internal reference laser is always on to allow the instrument to immediately make accurate measurements when it is reactivated.

Any subsequent activity, front-panel or remote, will reactivate the instrument and return it to its previous state. Using this feature can help extend the life of your instrument. To extend the life of the reference laser, you should turn off the instrument during long periods of inactivity (e.g. several hours or over night).

To configure standby mode

- 1 On the Setup menu, click Preferences.
- 2 Select a time-out period from the System Standby list. You can choose 15 min., 30 min., 1 hr., 4 hrs., or Never. Selecting **Never** disables this feature.

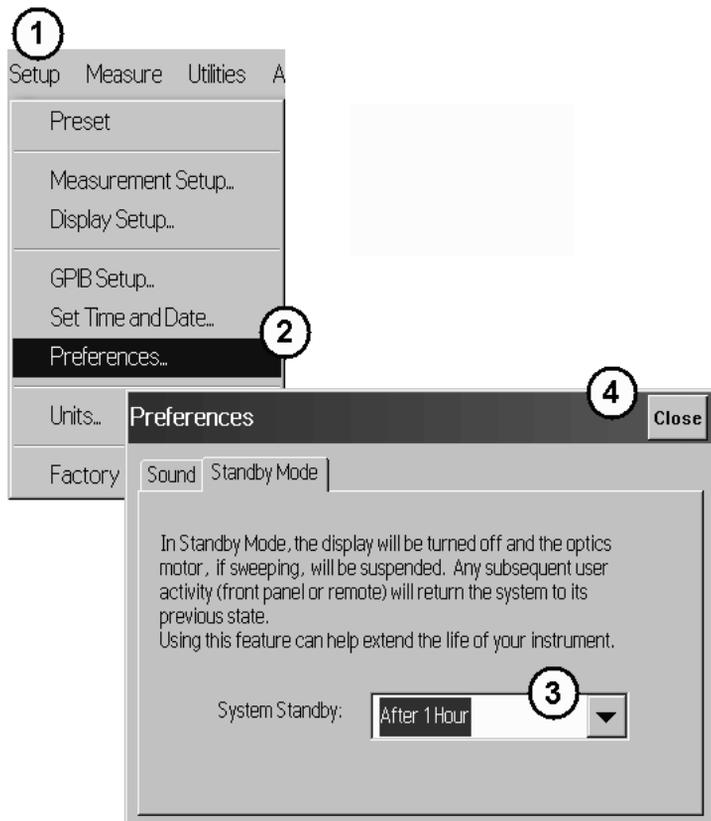


Figure 9

To reactivate the display

- Touch the display screen or a front panel button
- Move the mouse or press a key on the external keyboard (if attached)
- Send a remote command

Step 10. Add a Printer

Use of a printer with the instrument is optional. Follow the steps of your printer's documentation.

NOTE

The multi-wavelength meter only supports USB and LAN printers (no parallel printer port).

- 1 In the File menu of the multi-wavelength meter software, click Print Setup.

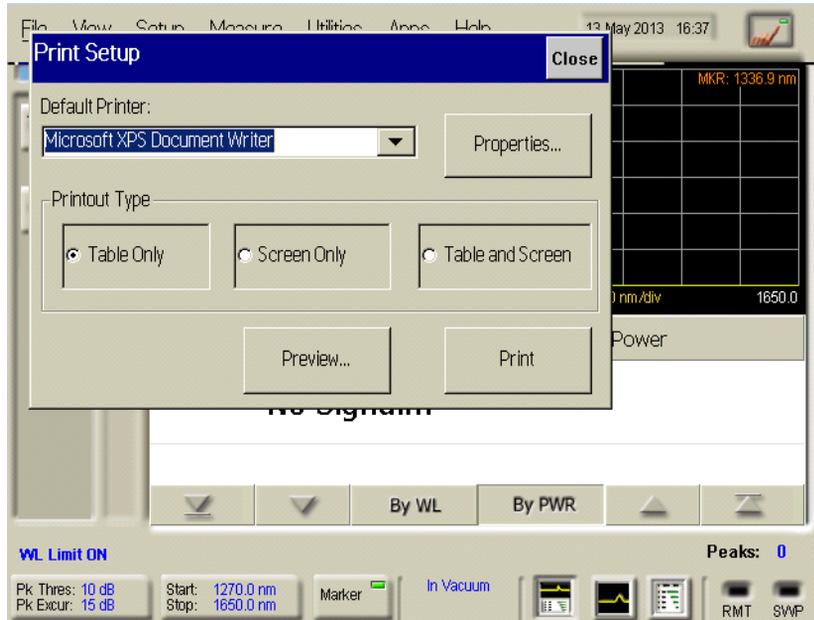


Figure 10

- 2 In the Print Setup window, click Properties...
 - a If the setup window is not fully visible, move the cursor to the lower edge of the display to pan and scan the window within the visible area of the display.

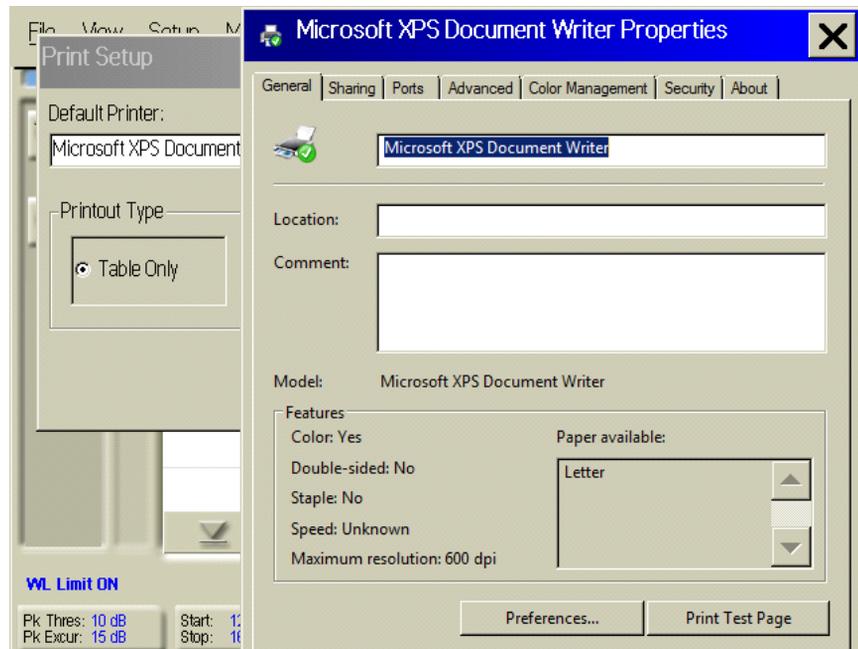


Figure 11

- b Using the pan and scan function, the lower end of the Printer Properties window becomes accessible.
- c Click OK /Cancel/Apply button to confirm, cancel or apply your changes.

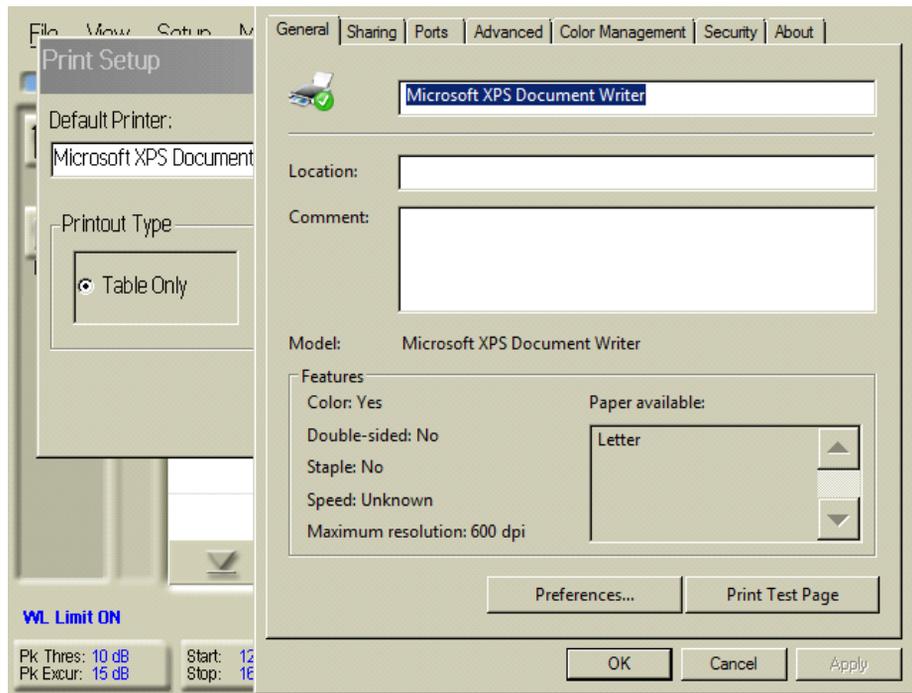


Figure 12

CAUTION

Installation of programs other than drivers necessary for your printer is not recommended or supported. Installation of additional software could render the 86120D or 86122C multi-wavelength meter software inoperable.

Step 11. Change Region and Language Settings

Follow the steps to change the region and language settings.

- 1 Exit the multi-wavelength meter software.
 - a On the Utilities menu, click Protected Functions.
 - b Enter the protected functions password “exit to windows” and click Activate.

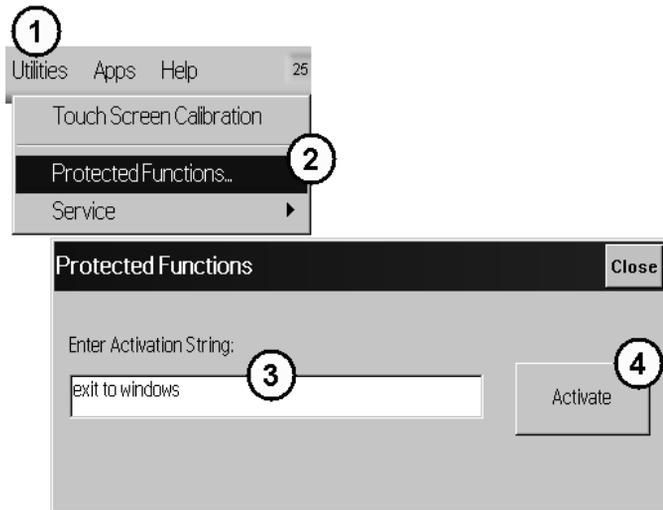


Figure 13

- 2 From the Windows Start menu, open the Control Panel.
- 3 In the Control Panel, click Clock, Language and Region.



Figure 14

- a The Region and Language window is not fully visible. Move the cursor to the lower edge of the display to pan and scan the window within the visible area of the display.

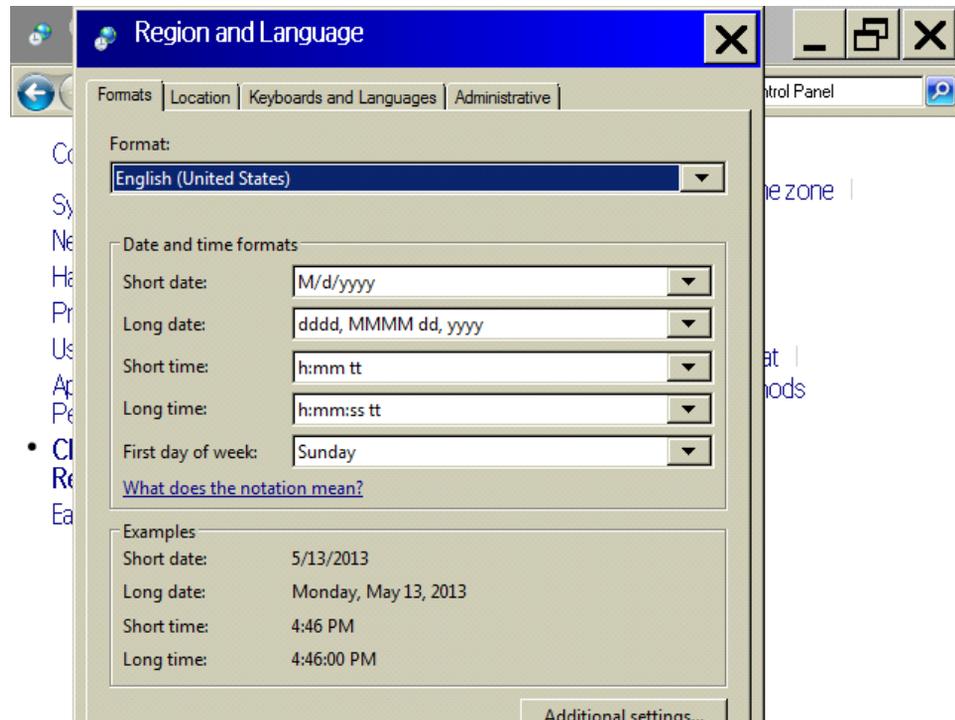


Figure 15

- b The Windows task-bar may come up. In that case, move the cursor slightly upwards until the task-bar disappears, and the lower edge of the active window becomes visible again.

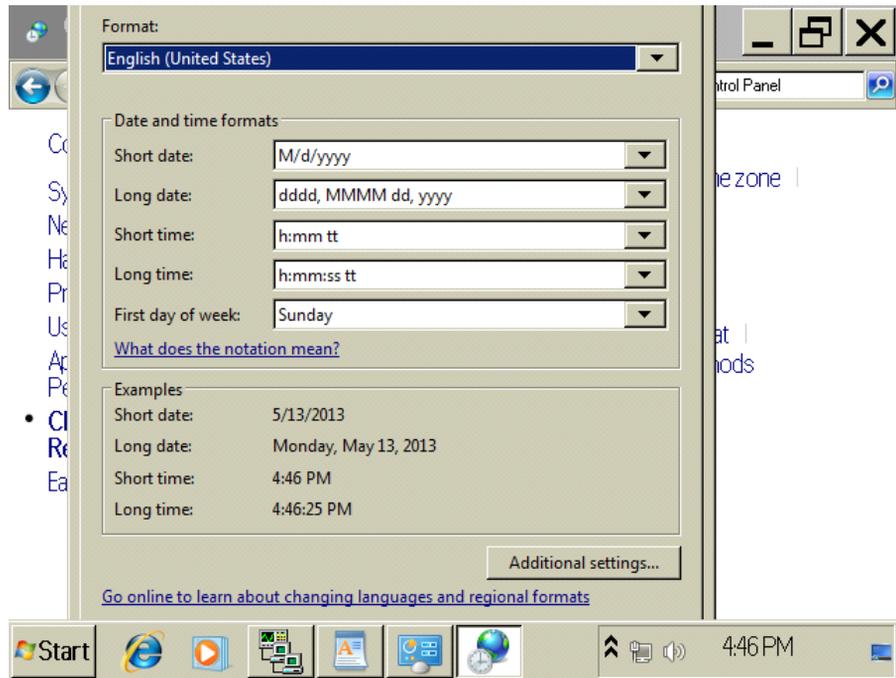


Figure 16

- c Click OK /Cancel/Apply button to confirm, cancel or apply your changes.

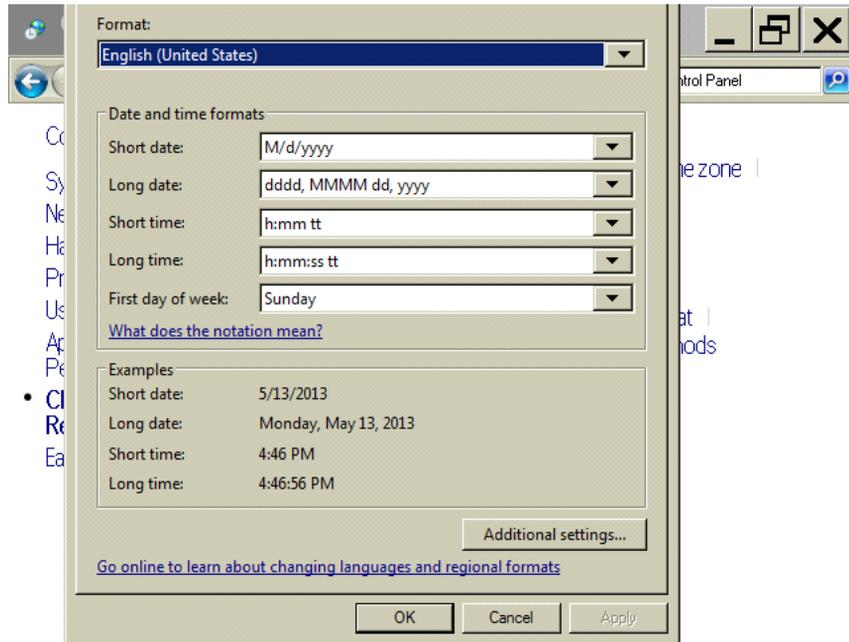


Figure 17

Step 12. Change the Password

Password Change

The factory-default password for the account 'Instrument' is 'Measure4u!' and the instrument is configured for automatic login.

NOTE

For security reasons, we recommend changing the account password on the first login.

To perform any operating system tasks, it's advisable to connect an external monitor to the instrument and extend the display to the external monitor. The instruments built-in display is very limited and some dialogs will not fit onto the screen. If using an external display connecting a keyboard and a mouse significantly eases the task.

- 1 Exit the multi-wavelength meter software.
 - a On the **Utilities** menu, click **Protected Functions**.
 - a Enter the protected functions password “exit to windows” and click **Activate**.
- 2 Press **Windows key + i** simultaneously.

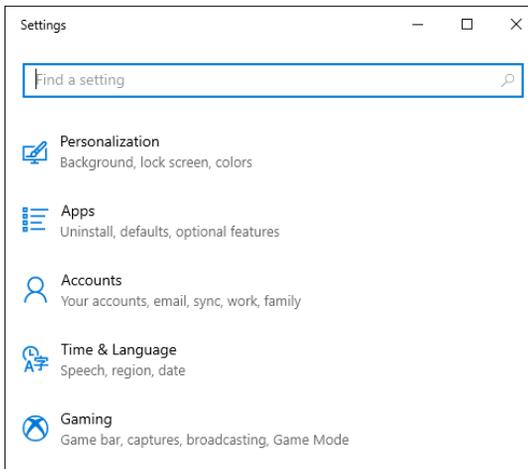


Figure 18

3 Scroll down to **Accounts** and select it.

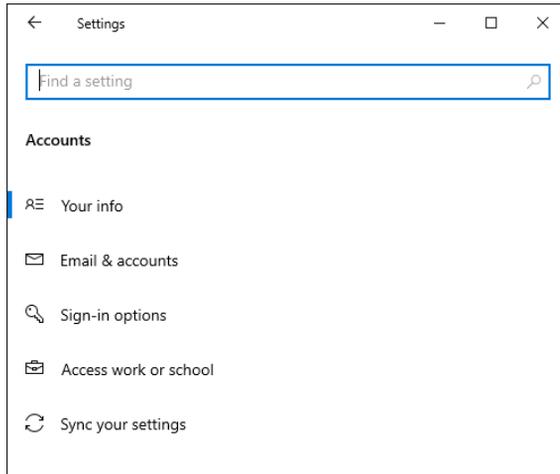


Figure 19

4 Select **Sign-in options**.

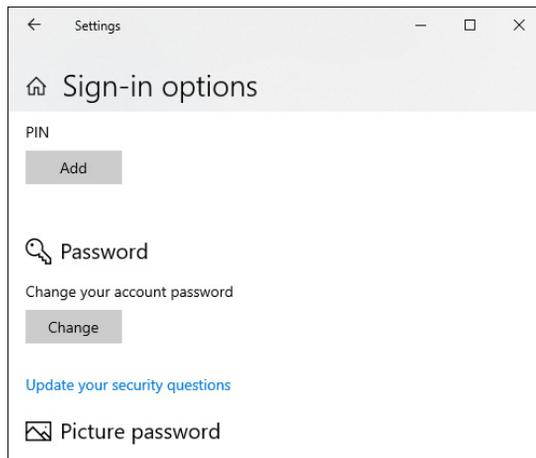


Figure 20

- 5 Click on the **Change** button under the **Password** option. The following **Change your password** dialog will appear:

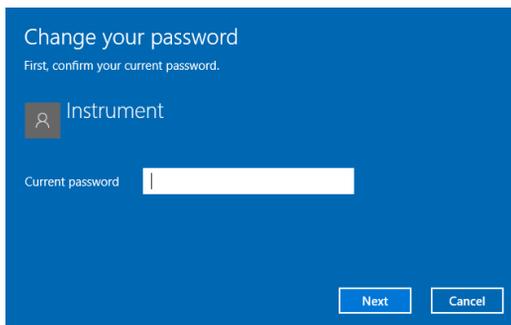


Figure 21

- 6 Use the **Change your password** dialog to change the password.

WARNING

Changing the password disables the automatic login feature. If this feature is desired, it needs to be reconfigured.

Configuring the automatic login feature

To configure the automatic login feature you have to log into the operating systems as administrator or with an account with administrator privileges.

The factory-configured account is 'administrator' and the password is 'Keysight4u!'.

NOTE

For security reasons, we recommend changing the account password on the first login.

- 1 Press **Windows key + r** simultaneously and enter **NetPLWiz**.

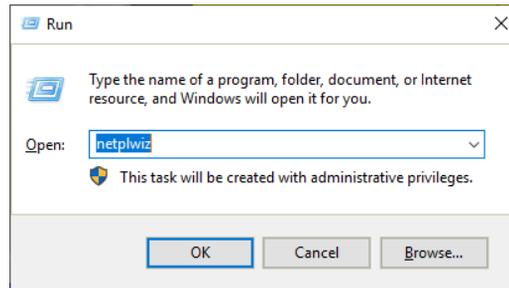


Figure 22

- 2 Choose **Instrument** and uncheck the option "Users must enter a user name and password to use this computer".

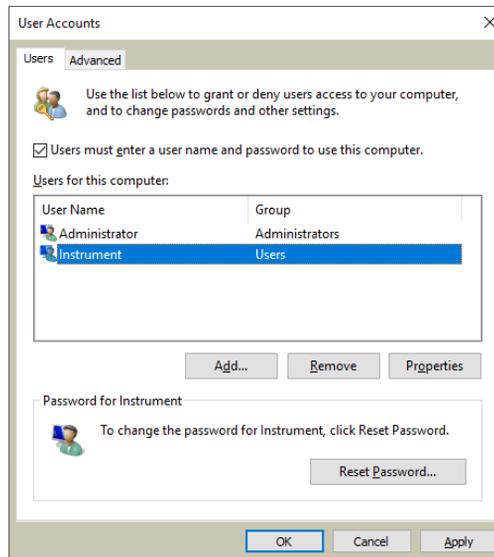


Figure 23

3 The dialog will change to this, as shown below. Click on **OK** or **Apply**.

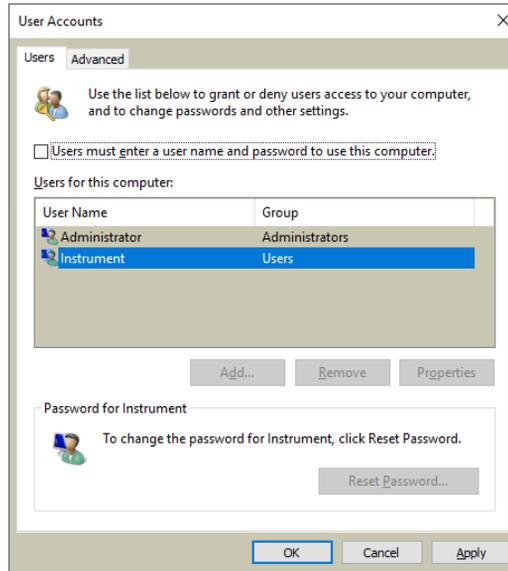


Figure 24

4 Enter the password for the account **Instrument** and re-enter it twice to confirm.

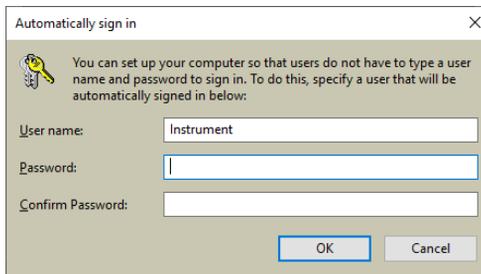


Figure 25

5 Restart the instrument. It should now boot up into the wavemeter application without requiring any user interaction.

Step 13. Avoid Costly Repairs

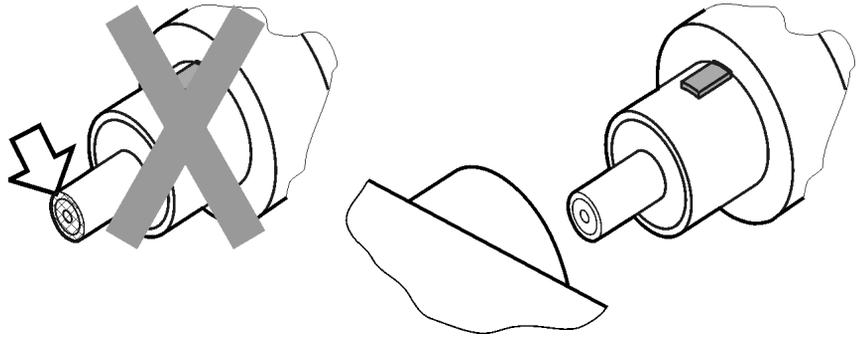


Figure 26

CAUTION

Optical channel 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. Before you connect any fiber-optic cable to the instrument, refer to the "Cleaning Instructions" chapter in the User's Guide.

Step 14. For More Information

There are several ways to learn more about your multi-wavelength meter.

- Continue reading this book. Refer to the chapter "Using the Multi-Wavelength Meter" in the User's Guide. It will help you get started using this instrument.
- Refer to the Help. The Help opens the user's and programmer's guide in PDF format.
- Visit our website at <http://www.keysight.com>. Use the keyword "86120D" or "86122C" in your search.

Making Measurements

This chapter explains the steps required to make a measurement.

Step 1. Consider Measurement Limitations

Before connecting a signal and making a measurement, please consider the following measurement limitations:

NOTE

The front-panel OPTICAL INPUT connector uses a single-mode input fiber.

CAUTION

+10 dBm is the maximum total displayed input power. Do not exceed +18 dBm source power. The Keysight 86120D or 86122C's input circuitry can be damaged when total input power exceeds this level.



Figure 27

CAUTION

Optical channel 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. Before you connect any fiber-optic cable to the Keysight Variable Optical Attenuator modules and Keysight Variable Optical Attenuator modules with Power Control, refer to chapter "Cleaning Instructions" in the User's Guide.

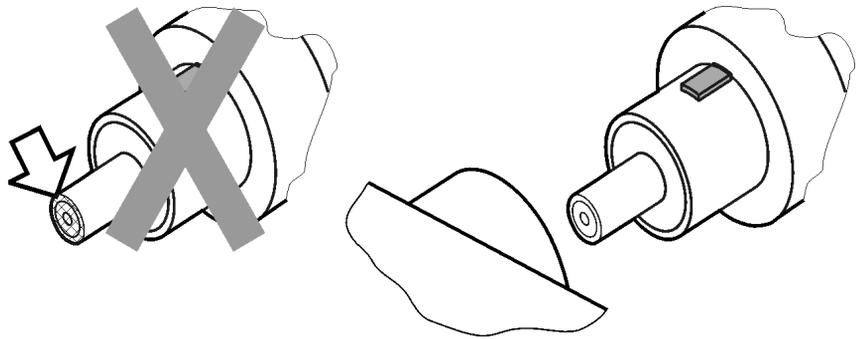


Figure 28

WARNING

Always remove both ends of fiber-optic cables from any instrument, system, or device before visually inspecting the fiber ends. Disable all optical sources before disconnecting fiber-optic cables. Failure to do so may result in permanent injury to your eyes.

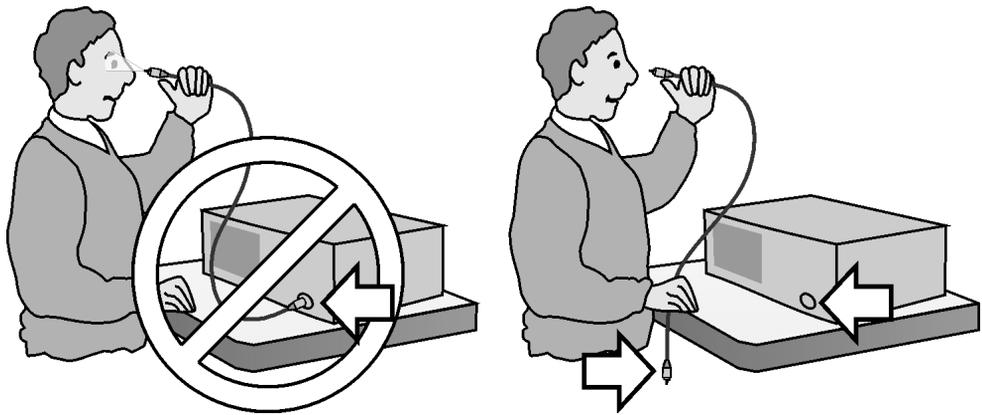


Figure 29

- If the measured amplitudes are low, clean the front-panel OPTICAL INPUT connector.
- The maximum input range for 86120D is 700-1700 nm and the maximum input range for is 700 - 1650 nm.
- Laser line widths are assumed to be less than 10 GHz for 86120D, and less than 2.5 GHz for 86122C.

Step 2. Select Basic Measurement Setup Parameters

Basic measurement setup parameters that you should choose before making a measurement are medium, device type, units, and sweep mode.

Select the Medium

The multi-wavelength meter can display wavelength values in a vacuum, or in standard air

- 1 Press  and click .
- 2 Click the Medium tab, and select In Air or In Vacuum.
- 3 Click Close.

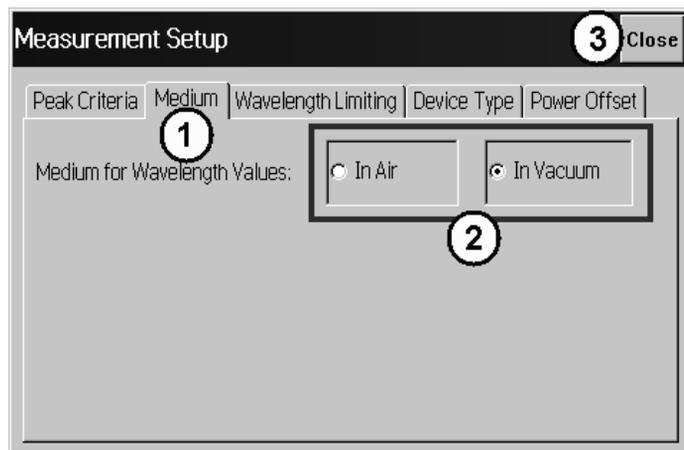


Figure 30

Select the Units

The instrument can display wavelength and amplitude values in several types of measurement units.

- 1 Press  and click .
- 2 Click the Units tab, and select the wavelength and amplitude units.
- 3 Click Close.

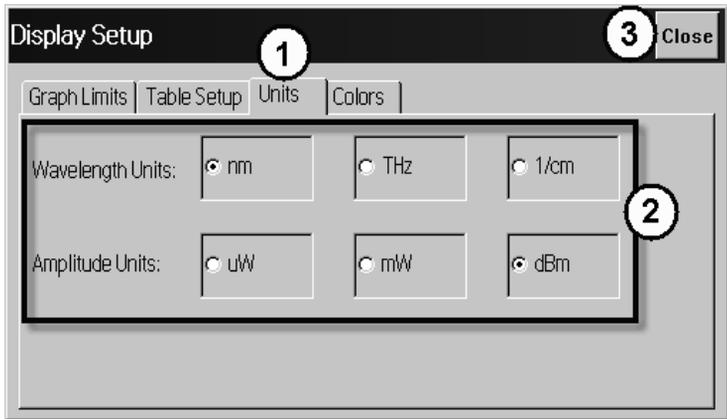


Figure 31

Select the Device Type

You can optimize (or match) the measurement technique of the multi-wavelength meter to the type of device you are measuring – narrowband or broadband. Narrowband devices include DFB lasers and modes of Fabry-Perot lasers. Broadband devices include LEDs, optical filters, and chirped lasers.⁴

- 1 Press  and click .
- 2 Click the Device Type tab, and select Narrowband or Broadband.
- 3 Click Close.

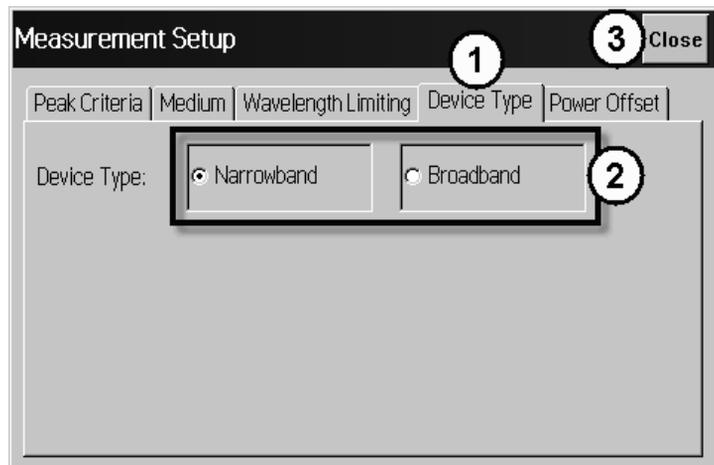


Figure 32

Select the Sweep Mode

- Press **Single** to initiate one measurement sweep. This is useful if you want the data to remain static for saving results or printing.
- Press to **Continuous** continuously measure the input spectrum. In this mode, a measurement sweeps occurs approximately every 0.3 seconds (86122C Option 110) or every 0.5 seconds (86122C Option 100) or every 0.6 seconds (86120D). This is useful if you want the data to be continuously updated.

You can also set up data logging to perform measurement sweeps at any desired interval. The green SWP indicator in the lower right-hand corner is lit when a measurement is being acquired.

Step 3. Define Laser-Line Peaks

Peak criteria settings and wavelength limiting allow you to define how laser line peaks are measured.

How Laser-Line Peaks are Defined

A laser line will only be measured as a peak if the amplitude is greater than the peak threshold limit and the rise-and-fall (excursion) is greater than or equal to the peak excursion. In addition, peaks are only measured within the wavelength limits that you specify.

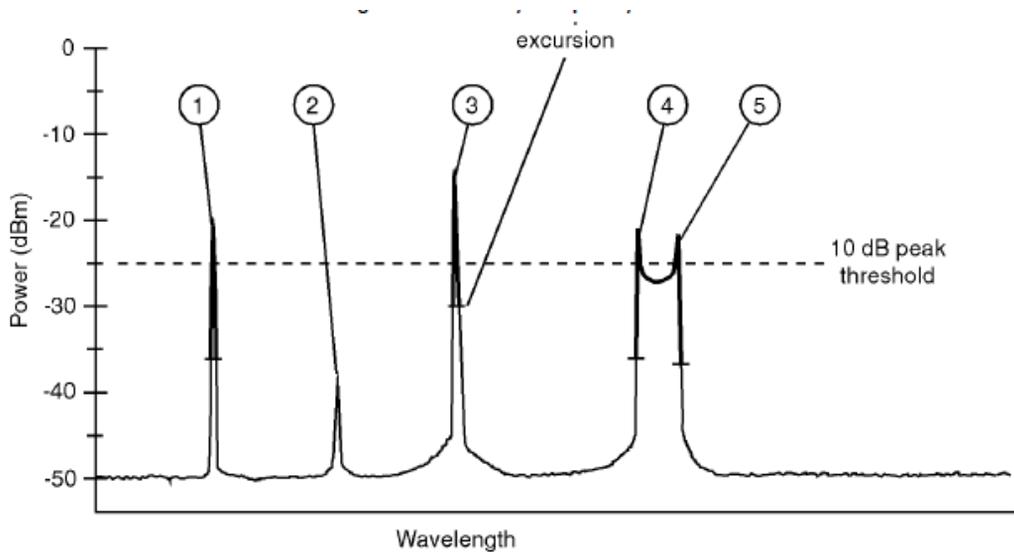


Figure 33

- In this figure, only three laser lines are identified as peaks: responses 1, 3, and 4.
- Response 2 is not identified as a peak because it is below the peak threshold.
- Responses 4 and 5 are identified as one peak laser line. This is because the minimum point between 4 and 5 does not drop to the peak excursion limit.

Use Peak Criteria to Define Peaks

- 1 Click .
- 2 Click the Peak Criteria tab.
- 3 Select Relative or Absolute threshold type.
- 4 Click the Threshold Value box and enter the threshold value.
- 5 Click the Peak Excursion box and enter the excursion value.
- 6 Click Close.

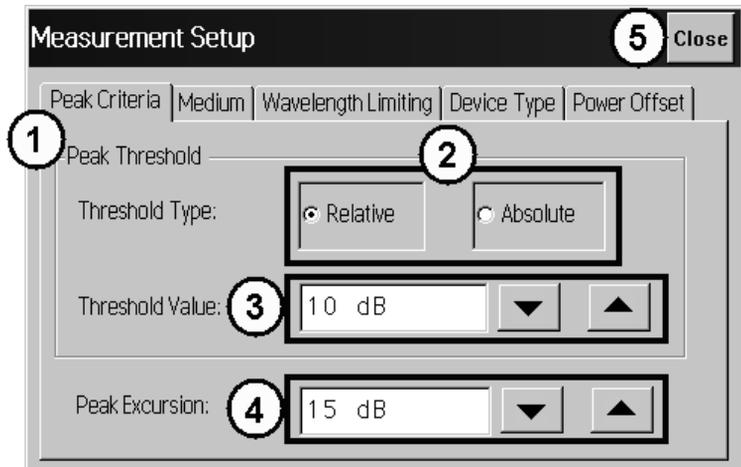


Figure 34

Use Wavelength Limiting to Define Peaks

- 1 Press  and click .
- 2 Click the Wavelength Limiting tab.
- 3 Select On
- 4 Click the Limit Start Wavelength box and enter the start wavelength value.

- 5 Click the Limit Stop Wavelength box and enter the stop wavelength value.
- 6 Click Close.

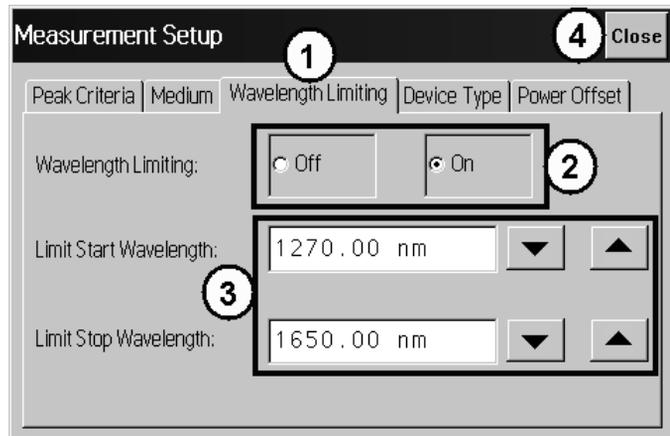


Figure 35

Step 4. Make Measurements

The instrument can make a wide variety of wavelength and power measurements.

Peak Wavelength and Power

Press  and click 

Multiple Laser Lines

Press  and click 

Average Wavelength and Total Power

Press  and click 

Laser Channel Separation

It is often important to measure the wavelength and power separation between multiple laser lines. This is especially true in wavelength-division multiplexed (WDM) systems where channel spacing must be adhered to.

The Keysight multi-wavelength meter can display the wavelength and amplitude of any laser line relative to another.

- 1 Press  and click 
- 2 Select a channel as the reference by clicking in the “Ref” column of the desired row.
- 3 To determine channel spacing from the reference, simply read the relative wavelength values in the “Delta WL” column.

Laser Channel Flatness

You can use relative power measurements to measure flatness (pre-emphasis) in a WDM system. Simply select one carrier as the reference and measure the remaining carriers relative to the reference level. The power differences represent the system flatness.

- 1 Press  and click 
- 2 Select the channel with the largest amplitude as the reference by clicking in the “Ref” column of that peak’s row.
- 3 To determine channel flatness from the reference, simply read the relative power values in the “Delta Pwr” column.

Laser Channel Separation/Flatness

You can also measure channel separation and flatness at the same time.

- Press  and click 

Laser Drift

Laser drift can be easily measured by using the drift application.

- Press  and click 

Signal-to-Noise Ratio

Signal-to-noise ratio can be easily measured by using the OSNR application.

- Press  and click 

Fabry-Perot Lasers

Fabry-Perot lasers can be easily measured by using the Fabry-Perot Laser application.

Press  and click 

Power Greater than 10 dBm

The maximum total input power that can be measured is 10 dBm. However, with the addition of an external attenuator, more power can be applied. This may be necessary at the transmit end of a wavelength-division multiplexed system where large signal levels are present. By entering a power offset equal to the amount of attenuation at the instrument's input, accurate amplitude measurements are shown on the display.

- 1 Connect an optical attenuator between the front-panel OPTICAL INPUT connector and the fiber-optic cable from your device. The attenuator must reduce the total input power to the Keysight multi-wavelength meter so that it is below +10 dBm.

2 Press  and click 

- 3 Click the Power Offset tab.
- 4 Click the Power Offset box, and enter a power offset value.
- 5 Click Close.

Power offset values are added to the display power readings. For example, if you placed a 10-dB attenuator on the front-panel connector, you should enter a power offset value of +10 dB. Negative values can also be entered if you connect an amplifier instead of an attenuator.

Step 5. Adjust the Graph to Your Preference

After you have set up your measurement, you may wish to adjust the graph x-axis or move markers.

Adjust the X-Axis

You can adjust the x-axis in any of the following ways:

- Click  and enter graph limits as start/stop or center/span.

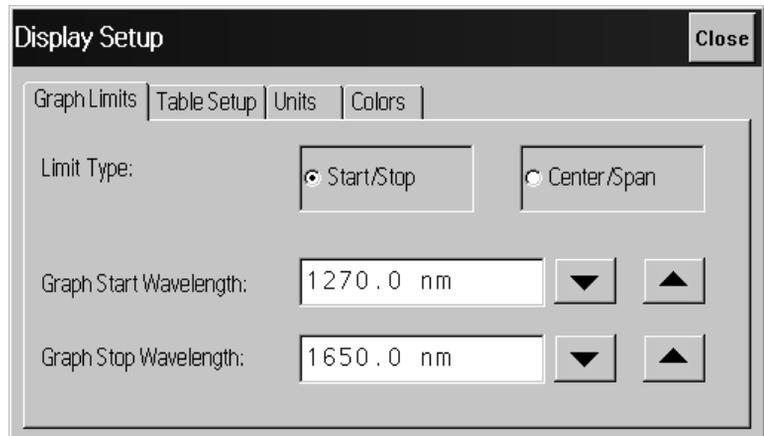


Figure 36

- Select an x-axis control from the Graph Control list. Click anywhere on the graph and drag to the left or right.

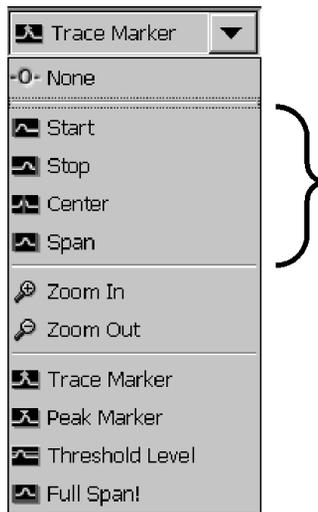


Figure 37

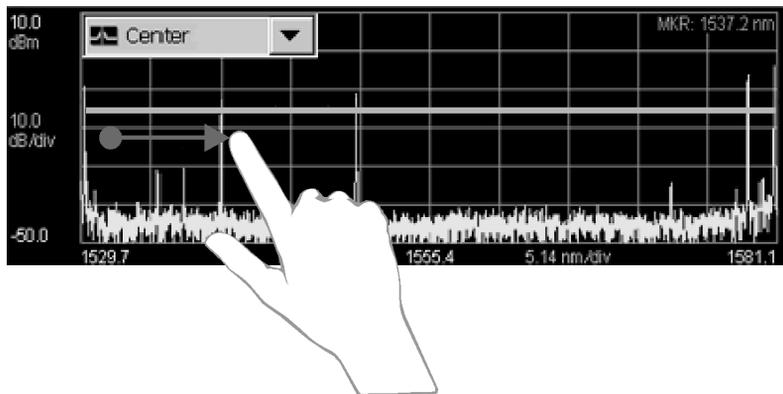


Figure 38

Move the Peak Marker

You can move the peak marker in any of the following ways:

- Click any cell in the “Peak” column of the table. The peak marker will move to the corresponding peak wavelength in the graph.

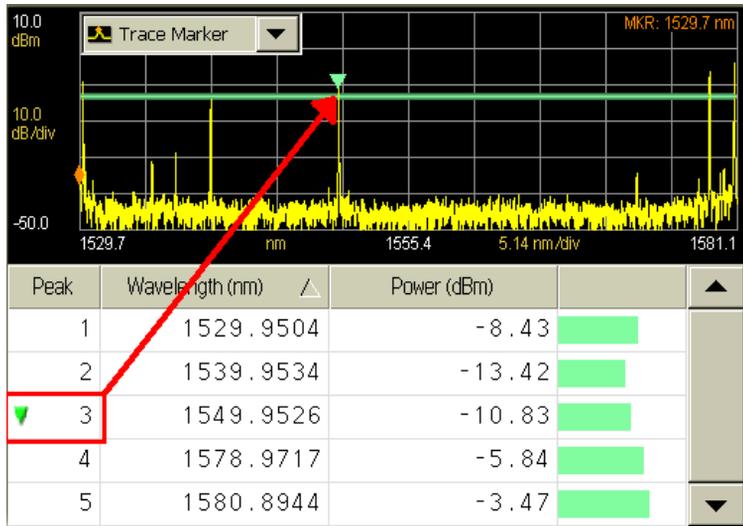


Figure 39

- If ClickZoom is enabled, click any cell in the “Wavelength” column of the table. The peak marker will move to the corresponding peak wavelength in the graph, and the graph will zoom in to that peak. To zoom out, click the “Wavelength” cell again.

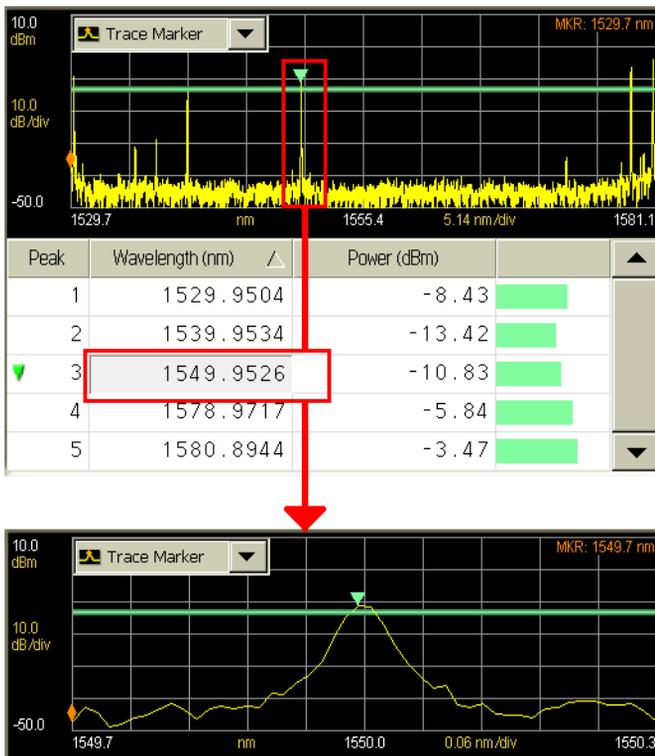


Figure 40

- Select Peak Marker from the Graph Control list. Click close to a peak on the graph.
- Select Peak Marker from the Graph Control list. Click anywhere on the graph and drag to the left or right.

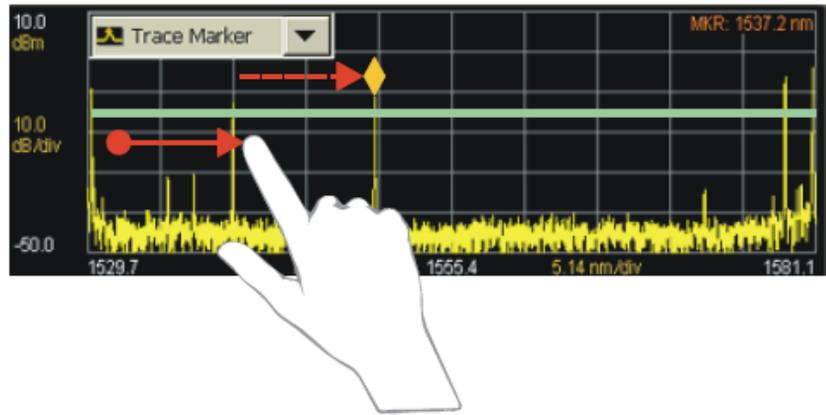


Figure 41

- Select Peak Marker from the Graph Control list. Click close to a peak on the graph.
- Select Peak Marker from the Graph Control list. Click anywhere on the graph and drag to the left or right.

Move the Trace Marker

You can move the trace marker in any of the following ways:

- Select Trace Marker from the Graph Control list. Click any point on the graph.
- Select Trace Marker from the Graph Control list. Click anywhere on the graph and drag to the left or right.

Step 6. Save Measurement Results

After you have set up your measurement and the graphical display, you may wish to save measurement results.

Save Data

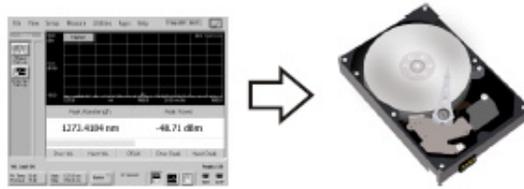


Figure 42

Press  to open the Save Meas Data dialog box. Select a file name and click **Save**.

Print Data

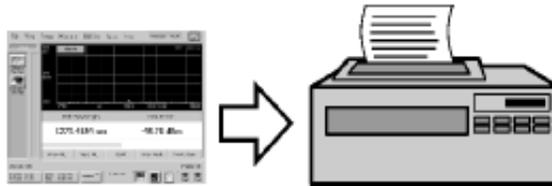


Figure 43

Press  to open the Print Setup dialog box. Select the Default Printer and Printout Type, and click Print.

Save Screen Image

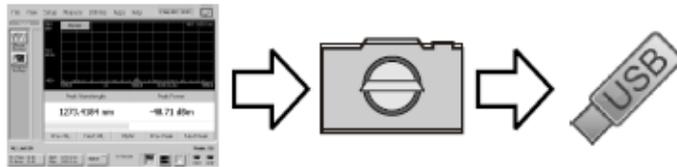


Figure 44

On the File menu, point to Save, and then click Save Screen Image. Select a file name and click Save.

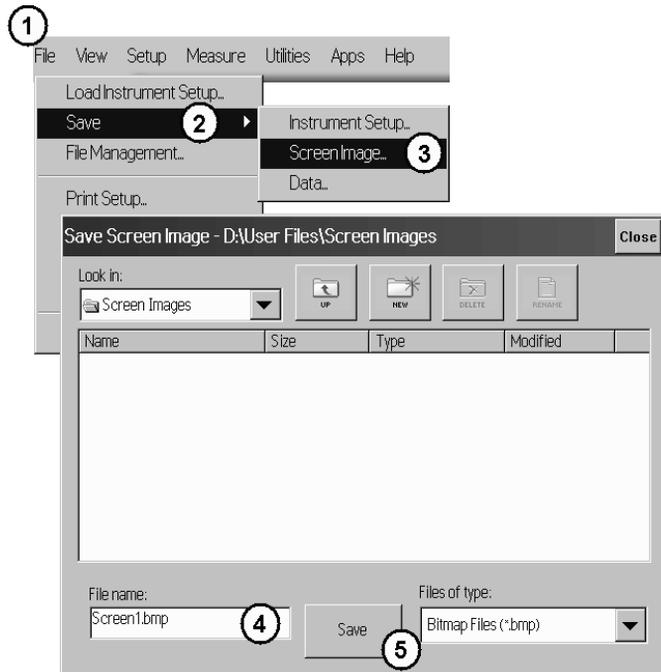


Figure 45

Data Logging

Data logging allows you to record measurement data over time for later analysis. Follow the steps below to set up data logging.

- 1 On the Measure menu, click Data Logging.
- 2 Enter the Logging Duration and Logging Interval time.
- 3 Click Start Data Logging.

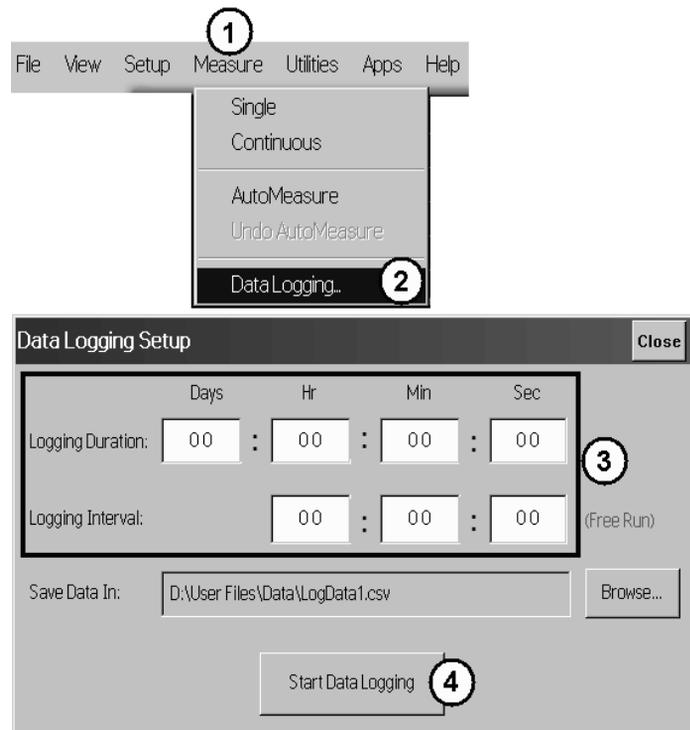


Figure 46

Consider the following example applications:

- To log data for a long-term stability/drift test, set the data logging duration to 24-hrs, and the interval to 5 minutes.
- To log data for a turn-on transient test (to observe how lasers change during warm-up), set the data logging duration to 5 minutes, and the interval to 0 time (free run).

Returning the Instrument for Service

The instructions in this section show you how to properly package the instrument for return to a Keysight Technologies service office. For a list of offices, refer to [Keysight Technologies Service Offices](#) on page 69.

If the instrument is still under warranty or is covered by a Keysight maintenance contract, it will be repaired under the terms of the warranty or contract (the warranty is at the front of this manual). If the instrument is no longer under warranty or is not covered by a Keysight maintenance plan, Keysight will notify you of the cost of the repair after examining the unit.

When an instrument is returned to a Keysight service office for servicing, it must be adequately packaged and have a complete description of the failure symptoms attached. When describing the failure, please be as specific as possible about the nature of the problem. Include copies of additional failure information (such as the instrument failure settings, data related to instrument failure, and error messages) with the instrument being returned. Backup your measurement related data before returning the instrument to Keysight service.

Please notify the service office before returning your instrument for service. Any special arrangements for the instrument can be discussed at his time. This will help the Keysight service office repair and return your instrument as quickly as possible.

Preparing the instrument for shipping

- 1 Write a complete description of the failure and attach it to the instrument. Include any specific performance details related to the problem. The following information should be returned with the instrument.
 - Type of service required.
 - Date instrument was returned for repair.
 - Description of the problem:
 - Whether problem is constant or intermittent.
 - Whether instrument is temperature-sensitive.
 - Whether instrument is vibration-sensitive.
 - Instrument settings required to reproduce the problem.
 - Performance data.

- Company name and return address.
 - Name and phone number of technical contact person.
 - Model number of returned instrument.
 - Full serial number of returned instrument.
 - List of any accessories returned with instrument.
- 2 Cover all front or rear-panel connectors that were originally covered when you first received the instrument.

CAUTION

Cover electrical connectors to protect sensitive components from electrostatic damage. Cover optical connectors to protect them from damage due to physical contact or dust.

CAUTION

Instrument damage can result from using packaging materials other than the original materials. Never use styrene pellets as packaging material. They do not adequately cushion the instrument or prevent it from shifting in the carton. They may also cause instrument damage by generating static electricity.

- 3 Pack the instrument in the original shipping containers. Original materials are available through any Keysight office. Or, use the following guidelines:
- Wrap the instrument in anti-static plastic to reduce the possibility of damage caused by electrostatic discharge.
 - For instruments weighing less than 54 kg (120 lb), use a double-walled, corrugated cardboard carton of 159 kg (350 lb) test strength.
 - The carton must be large enough to allow approximately 7 cm (3 inches) on all sides of the instrument for packing material, and strong enough to accommodate the weight of the instrument.

- Surround the equipment with approximately 7 cm (3 inches) of packing material, to protect the instrument and prevent it from moving in the carton. If packing foam is not available, the best alternative is S.D-240 Air Cap™ from Sealed Air Corporation (Commerce, California 90001). Air Cap looks like a plastic sheet filled with air bubbles. Use the pink (anti-static) Air Cap™ to reduce static electricity.
 - Wrapping the instrument several times in this material will protect the instrument and prevent it from moving in the carton.
- 4 Seal the carton with strong nylon adhesive tape.
 - 5 Mark the carton "FRAGILE, HANDLE WITH CARE".
 - 6 Retain copies of all shipping papers.

Keysight Technologies Service Offices

Call Center

For technical assistance, you can contact your local Keysight Call Center.

- Visit <http://www.keysight.com> and click Contact Us.

Service Center

Before returning an instrument for service, you must first call the Keysight Technologies Instrument Support Center.

- Visit <http://www.keysight.com> and click Contact Us.

