

The LWP-Series Lightwave probe delivers an optical signal from your fiber-optic source to the device-under-test (DUT) via a field-replaceable fiber-optic pigtail. The probe enables you to test top-illuminated photodiodes and optoelectronic integrated circuits (OEICs) on the wafer. The Lightwave probe is ideal for many applications such as network analysis, spectrum analysis, and time-domain characterization.

Two versions of the fiber-launch end are available: lensed and cleaved. The lensed fiber provides you with precise illumination down to a 5-mm diameter for probing ultra-high speed devices. The cleaved fiber illuminates a spot down to 25 mm in diameter. The fiber-optic pigtails also come in single-mode and multi-mode versions for additional flexibility.

The Lightwave probe features a contact-protection design. This design allows the fiber to recoil slightly in the event of accidental contact with the DUT. The slight recoil helps protect both the probe tip and the DUT.



## Safety Summary

The information contained in this manual enables you to operate the equipment effectively and safely. Any deviation from recommended practices; any modification or use for which the equipment is not designed or which departs from good industry practice, may create a hazardous or unsatisfactory operating situation. Cascade Microtech, Inc. disclaims any responsibility for consequences resulting from any such deviation, modification, or application.



### WARNING

*Do not use the Lightwave probe with a laser source greater than the CDRH Class 1 limit. The eyepiece filters are not sufficient protection for radiation more powerful than Class 1.*

*Never look through the microscope of a probe station that has a Lightwave probe installed unless eyepiece filters are in place. Laser radiation reflecting back through the optics can cause severe eye injury.*

*The use of controls or adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.*

*Carefully follow the procedures in this guide to avoid injury. See Laser Safety for information on the maximum allowable power.*

## Unpacking the Lightwave Probe

The Lightwave probe is shipped in a sturdy metal box. Make sure you save all shipping materials, in case you want to ship the probe back to the factory. Your warranty is void if you return the probe in shipping materials other than the original shipping materials. If you need to obtain or replace shipping materials, contact your Cascade representative before packing the probe for shipment. Use the Lightwave probe shipping box to store the probe when it is not installed on your test station.

You will need a 3/16 flat-tip screwdriver and a 9/64 hex key to unpack the Lightwave probe.

1. Using the screwdriver, remove the (4) screws securing the halves of the shipping box together.
2. Remove the top of the shipping box.
3. With the hex key, remove the (2) hex screws holding the probe onto the mounting post.
4. Grasp the probe firmly and pull straight up to remove from the mounting post.
5. Visually inspect the probe for damage.
6. Unpack the fiber-optic pigtail by grasping the connector and gently pulling the pigtail from its shipping tube.
7. Remove the plastic cover from the connector end of the pigtail.

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8. Visually inspect the pigtail for damage. In particular, examine the launch tip of the fiber-optic pigtail under magnification. Make sure that the tip is not cracked, pitted, or otherwise damaged.

- A cleaved pigtail should have a flat, angled tip.
- A lensed pigtail should have a smooth, conical tip.

Immediately report any damage to the carrier and a Cascade Microtech representative.

If there is no evidence of damage, you are ready to install the fiber-optic pigtail in the probe.

## Installing the Probe

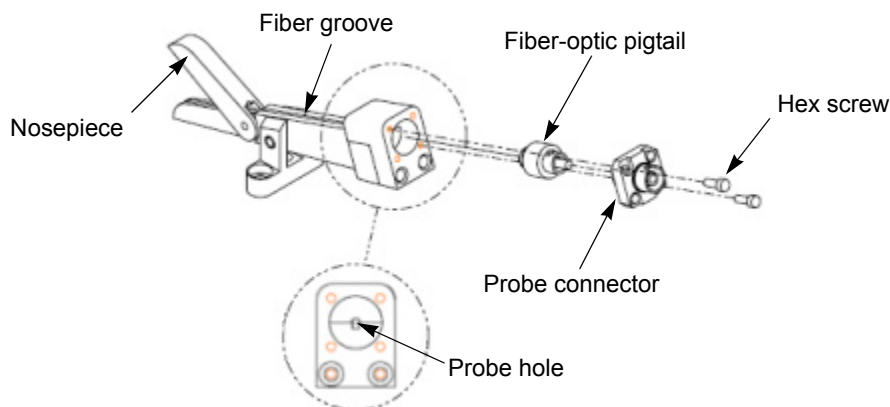
This installation section contains procedures for installing the fiber-optic pigtail in the probe, and for installing the probe on a positioner.

### Installing the Fiber-Optic Pigtail

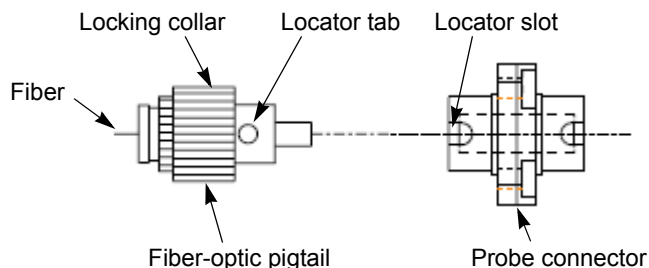
Before installing the Lightwave probe on your probe station, install the fiber-optic pigtail in the probe. Cascade Microtech ships the Lightwave probe in a shipping box and the pigtail in a shipping tube. This helps ensure that the pigtail will not be damaged in transit.

You will need a 5/64 hex key to install the fiber-optic pigtail. Do not remove the Phillips-head screws on the connector.

1. With a 5/64 hex key, remove the (2) hex screws holding the connector onto the back of the probe.
2. Pull the connector out of the probe.



3. Slide the locking collar on the pigtail connector back and insert the male pigtail connector into the female connector on the probe connector (see Fig. 2). There is a locator tab on the pigtail that must line up with the slot in the probe connector.
4. Tighten the locking collar to hold the pigtail firmly to the probe connector.
5. Flip up the nosepiece on the probe.
6. Thread the tip of the pigtail through the hole in the end of the probe and insert it in the probe. Make sure the fiber stays in the groove in the top of the probe and slides under the nosepiece.



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## CAUTION

*Thread the fiber carefully to avoid damaging the tip by bumping it against the base of the probe or nosepiece.*

7. Flip down the nosepiece, making sure the fiber lines up with the groove in the nosepiece as well as the groove on the top of the probe.

Once you have installed the fiber-optic pigtail in the probe, you are ready to install the probe on your probe station.

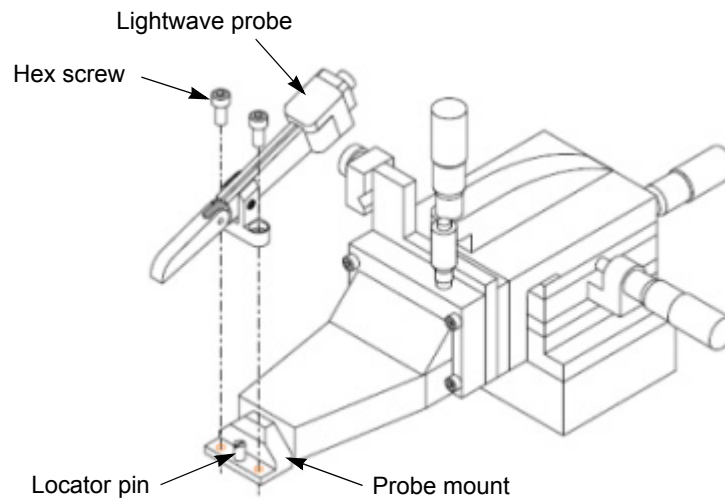
## Installing the Probe on the Probe Station

The Lightwave probe is considerably longer than other Cascade Microtech probes. Summit probe stations allow you to slide the probe positioners back to accommodate the extra length of the Lightwave probe.

You will need a 9/64 hex key to install the probe on a Cascade positioner.

Be sure the fiber-optic pigtail is installed in the probe before you install the probe on the probe station.

1. Position the probe on the locator pin on the top of the probe mount, lining up the screw holes in the probe with the screw holes on the probe mount.



## NOTE

*You might need to move the positioner to accommodate the length of the Lightwave probe before installing the probe.*

*If you are installing your Lightwave probe on an MPH Series Microprobe Handler:*

- Mount the probe with only (1) screw as shown below.

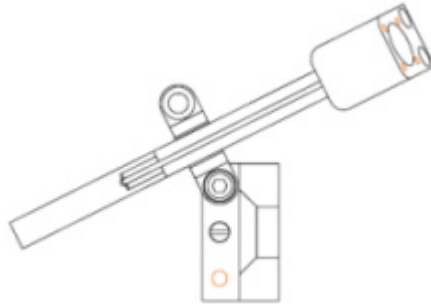
*If you are mounting the probe on an east-west positioner:*

- Mount the probe so that the fiber tip is centered along the x-axis.

*If you are mounting the probe on a north-south positioner:*

- Mount the probe so that the fiber tip is centered along the y-axis.

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2. Secure the probe to the probe mount with the (2) hex screws that came with the probe. Use a 9/64 hex key to tighten the hex screws.



## WARNING

*Never look through the Microscope of a probe station that has a Lightwave probe installed unless eyepiece filters are in place. Laser radiation reflecting back through the optics can cause severe eye injury. Verify that the eyepiece safety filters are installed at all times.*

3. Remove the eyepieces from the microscope on the probe station.
4. Drop the eyepiece filters into the microscope tubes.
5. Use the blunt end of a pencil to seat the filter horizontally in the tube.
6. Replace the microscope eyepieces.
7. Affix the following label to a clearly visible location on the probe station: "Warning: Invisible radiation. Consult manual for allowable output power levels of optical sources. Verify that laser safety eyepiece filters are installed at all times."



## WARNING

*Do not use the Lightwave probe with a laser source greater than the CDRH Class 1 limit. The eyepiece filters are not sufficient protection for radiation more powerful than Class 1. See Laser Safety on page 11 for more information.*

8. Connect the fiber-optic cable from your tester to the connector on the probe. The Lightwave probe uses a standard FC-type fiber-optic connector.

Now that your Lightwave probe is installed, you are ready to start using it to make measurements. If signal noise occurs as a result of light being reflected back at the probe-launch end, you can change the angle of the light slightly by rotating the probe arm on its mounting post. Changing the probe angle can eliminate unwanted signal oscillations caused by reflected laser radiation.

## Maintenance

To keep your Lightwave probe in good working order, inspect the fiber tip under a microscope periodically. Make sure the tip is clean and glossy without cracks or jagged edges. If the launch tip is dirty, you can clean it by gently touching the tip to the adhesive side of cellophane tape. If the launch tip is damaged, replace the fiber-optic pigtail in the probe.

If you suspect problems, you can use photo-sensitive paper to get an image of the illumination spot. The resulting image can help verify that the tip meets your measurement requirements.

## Laser Safety

Using the Lightwave probe with microscopes or other optical viewing equipment will increase eye hazard. However, the installation of the eyepiece filters provided by Cascade Microtech will allow the probe station microscope to be safely used with CDRH Class 1 laser sources which have wavelengths in the range of 88 nm to 1550 nm. The maximum allowable power depends on the wavelength and the fiber type, as summarized in the table below.

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## WARNING

Cascade Microtech, Inc. can provide you with eyepiece filters (for CDRH Class 1 laser sources) for safe viewing of the Lightwave probe during probing. These eyepiece filters, however, are NOT sufficient protection for radiation more powerful than Class 1.

Wavelength	Fiber type	Maximum allowable power with eyepiece filters (mW)
850	CLV-MM	6.7
	LEN-MM	17.8
1300 nm	CLV-SM	2.7
	CLV-MM	16.7
	LEN-SM	18.5
	LEN-MM	44.7
1550 nm	CLV-SM	15.5
	SLV-MM	68.1
	LEN-SM	75
	LEN-MM	181.1

Do not attempt to utilize the LWP Series probe with laser sources that have outputs which exceed the limits of the CDRH Class 1 or that are outside of the 88 nm to 1550 nm range. If you use other laser sources, you must take additional laser safety precautions and this product certification will not apply.

## Specifications

Minimum illumination diameter	<ul style="list-style-type: none"><li>• Cleaved fiber: 25 mm</li><li>• Lensed fiber: 5 mm</li></ul>
Illumination angle	<ul style="list-style-type: none"><li>• Adjustable from 2° to 18° (9° nominal)</li></ul>
Supported wavelengths for Cleaved and Lensed Fibers	<ul style="list-style-type: none"><li>• Cleaved, single-mode: 1300 or 1550 nm (NA = 0.13)</li><li>• Cleaved, multi-mode: 850 to 1300 nm (NA = 0.275)</li><li>• Lensed, single-mode: 1300 or 1550 nm</li><li>• Lensed, multi-mode: 850 to 1300 nm</li></ul>
Insertion loss	<ul style="list-style-type: none"><li>• 0.5 dB, typical</li></ul>

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