TECH NOTE

LRS-9550 Spectral Probe

OVERVIEW

The LRS-9550 High Power Laser Diode Test System houses up to 32 removable laser diode fixtures. Individual fixtures can be designed to hold between 4 and 16 laser diodes, depending on package geometry and thermal characteristics. Optical output from each device enters a small integrating sphere containing two output ports to measure the device power and spectral characteristics. The LRS-9550-6012 Spectral Probe shown in Figure 1 is designed to couple light from the spectral port of an integrating sphere into a multimode fiber with a 100µm core diameter for delivery to a wavelength meter or optical spectrum analyzer.

Figure 1: LRS-9550-6012 Spectral Probe with 1m fiber pigtail.

USING THE SPECTRAL PROBE

The probe is inserted into a small slot on the front panel of an LRS-9550 shelf. The probe is marked with numbered lines that, when positioned flush with the front panel, indicates the device being measured (see Figure 2).

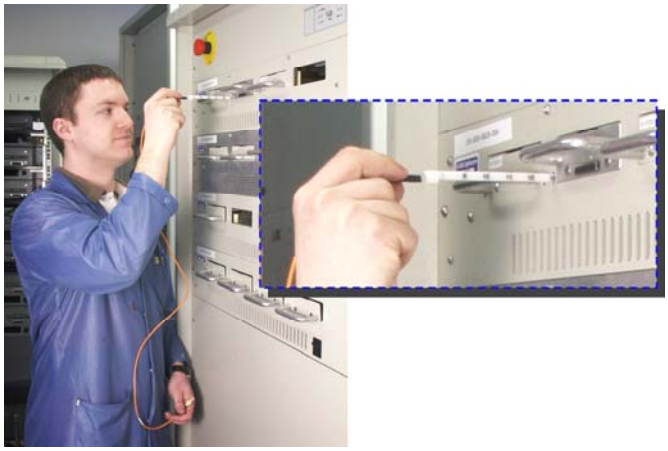

Figure 2: The spectral probe enters a vertical slot next to each fixture on the front panel of the LRS-9550 system. Numbered lines on the probe indicate which device the probe is measuring.

The spectral probe is equipped with a spring loaded ball plunger for user-friendly alignment of the probe to each test device in a quick and reliable manner. The probe "snaps" into place ensuring optical alignment to within 1dB of the maximum power achievable by the probe, satisfying most spectral measurement needs.

The user may also fine tune the position the spectral probe for optimal power output from the fiber as desired. Figure 3 plots the relative coupling efficiency into the fiber as the probe position is varied about its detent setting.

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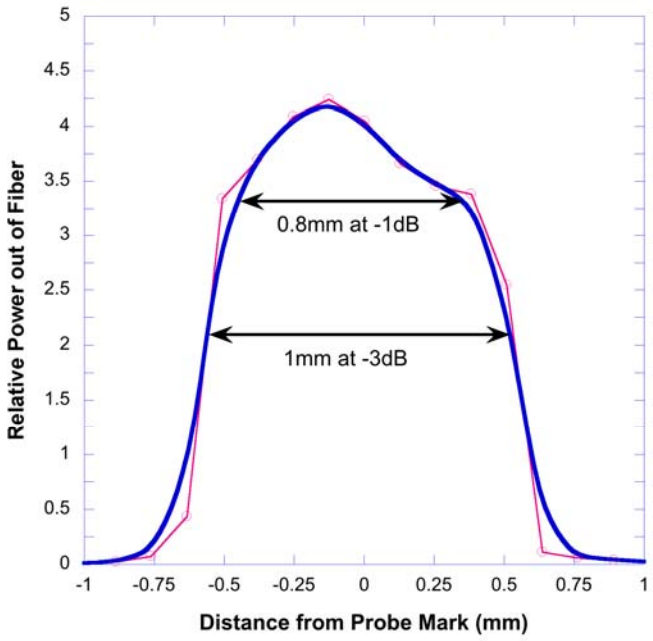

Figure 3: Positional tolerance of the spectral probe as a function of relative output power from the fiber.

This plot indicates a positional tolerance of the probe of +- 0.5 mm for 3dB of the maximum coupling efficiency. Note the position of the probe only affects the power output from the probe and not the spectral signature.

The output of the laser device is attenuated by a minimum of 43dB and maximum of 63dB by the time the light exits the output fiber of the spectral probe. A majority of this attenuation is due to the optical transmission of the small integrating sphere located inside LRS-9550 shelf collecting light from the laser diode under test. Attenuation values of 55-60dB are typical.

MAKING SPECTRAL MEASUREMENTS

Valuable spectral information about each laser device can be measured in situ without interruption of the ongoing burn-in test. For instance, a device's wavelength typically can be used to determine the laser diode's junction temperature and package thermal impedance (ref ILX Application Note #30). After inserting the spectral probe into the slot on the front panel of the LRS-9550 shelf, the opposite end of the spectral probe can be connected to a wavelength meter or optical spectrum analyzer (OSA) (see Figure 4).

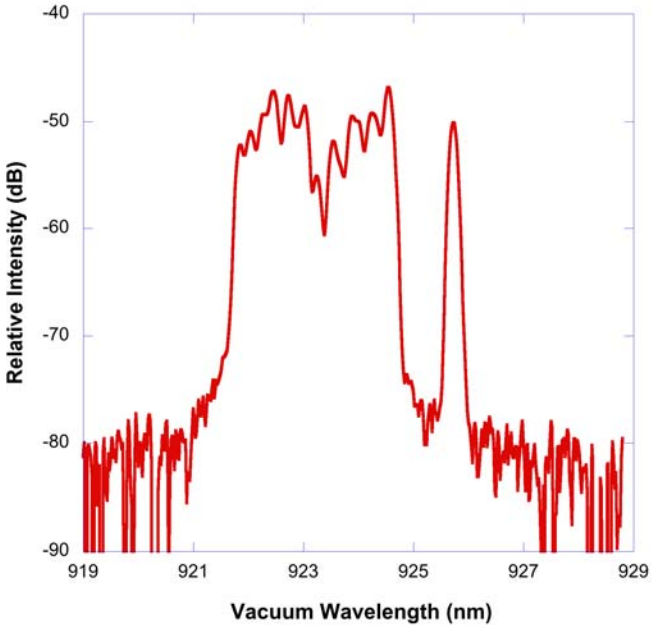

Figure 4: Typical spectral output from a 3W pump diode laser with center emission at 923nm as measured using the spectral probe.

The curve in Figure 4 resulted from the output of a high power, 923nm diode laser under test in the LRS-9550 system. The spectral probe was used to collect the signal and deliver it out of its 100µm core fiber directly into an Ando AQ6317 optical spectrum analyzer set to 0.1nm sweep resolution.

Due to the attenuation from the integrating spheres in the LRS-9550 shelf, the spectral probe can be safely positioned from one device to the next without turning off the lasers. This key feature allows the user to monitor the output of any laser without interrupting a test in progress.

CARE OF THE SPECTRAL PROBE

Care of the spectral probe can be accomplished using common procedures in caring for any fiber optic patch cord. Additional care must be taken to protect the end of the probe from scratches and/or dirt, which will reduce the throughput of the fiber probe. The end of the probe may be gently cleaned with lens tissue and isopropyl alcohol using standard cleaning practices.

CONCLUSION

The spectral probe provides a quick, reliable, in situ measurement of the spectral output of laser devices under test in the LRS-9550 system.