Automatic Wavelength Compensation of Photodiode Power Measurements using the OMM-6810B Optical Multimeter

TECH NOTE

To accurately measure optical power with a photodiode, the wavelength of the source must be known. This Technical Note describes the advantages of measuring wavelength and power simultaneously.

TYPICAL CURVES

The responsivity curves for typical Silicon and InGaAs type detectors are shown in Graphs 1 and 2. These graphs also show the percent change in responsivity per nanometer.

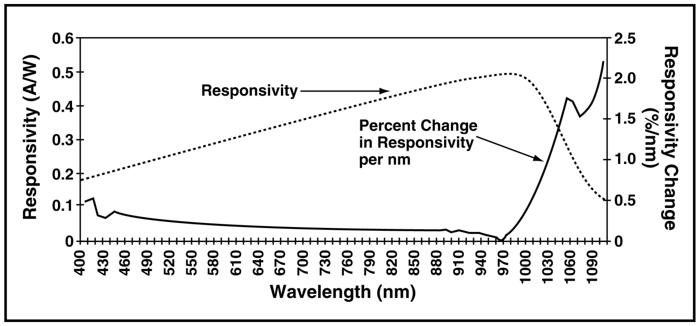
This information may be used to calculate the power reading error due to inaccuracy in wavelength measurement. For example, if measuring a 1555 nm source and the wavelength is entered into a conventional power meter as 1550 nm, this could cause a power reading error as high as 5%.

MEASURING LASER DIODES

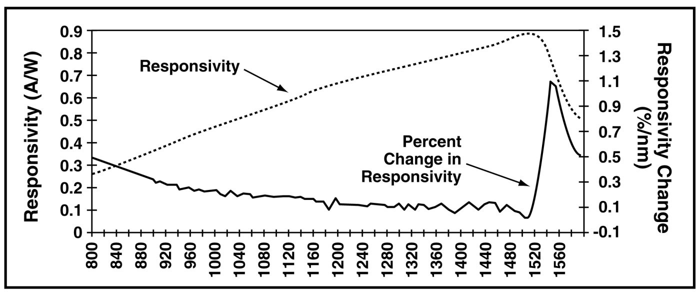
Although the laser diode vendors specify the wavelength of their lasers at specific temperatures and drive currents, this wavelength can vary significantly as conditions change. Also, when measuring the power of multimode lasers, the power-averaged wavelength should be used to figure the responsivity and this wavelength may be difficult to obtain. Graph 3 shows the difference between the peak wavelength and the power-averaged wavelength of a typical 1550 nm Fabry-Perot Laser. The OMM-6810B, coupled to a power/wavelength measurement head, will automatically measure the power-averaged wavelength and use this wavelength to calculate the appropriate detector responsivity.

RESULTS

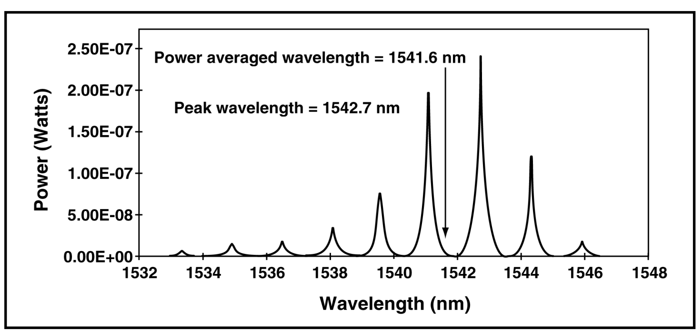
Using an OMM-6810B Optical Multimeter with a measurement head that offers both wavelength and power measurement provides the convenience of self-calibration, eliminating the need to manually enter the wavelength. Furthermore, the capability to measure the wavelength can actually improve the accuracy of the power measurement as compared to a power meter that requires manual setting of the wavelength.



Graph 1. Responsivity of a silicon detector and the percent change in responsivity per nm.



Graph 2. Responsivity of an InGaAs detector and the percent change in responsivity per nm.



Graph 3. Typical spectrum of a 1550 nm laser.

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