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White Paper

Using Newport 1936-R/2936-R Power Meters for Low-Power, Pulsed or Modulated Light Sources

Jay Jiang, Ph.D.
Senior Manager, Product Marketing

Recent advancements in photonics technologies have broadened their applications into many different areas. An increasingly larger number of complex and diverse forms of light sources are designed into various systems and experimental setups. These complex light sources drive the need for more sensitive and versatile power measurement capabilities with high accuracy.

Traditionally, power meters have been used for continuous-wave (CW) light sources in conjunction with calibrated photodiode or thermopile detectors for average power measurements, while energy meters and pyroelectric detectors have been used for pulsed laser beam applications. The pyroelectric detectors are strictly measuring pulse energy, so they are not usually suitable for observing the pulse train of the light source.

It is particularly challenging to characterize a low average power, pulsed or modulated light source, especially when the electrical designers do not know the detailed optical characteristics of the light source. In addition to average optical power, many other parameters about the light source are important to obtain. Key information such as spatial and temporal shapes, frequency, and power or energy level is needed to determine the system power budget and the overall system performance, as well as to validate the effectiveness of lower cost components. It is also important to identify which signal characteristics the detector or the detection system will measure. Researchers and engineers are interested in the pulse width and pulse shape of the signal. A biased detector, connected to an oscilloscope, would be used to determine the pulse shape and to measure frequency and other temporal information.

Newport's Model 1936-R or 2936-R allows reasonable temporal signal measurements, eliminating the need for multiple instruments in some cases (Figure 1). Available as a single or a dual channel model, these optical power meters has several sophisticated features that allow the user to achieve various measurements, including frequency measurements of pulses up to 200 kHz, depending on the signal range and the pulse shape.

Figure 1: Newport Corporation's optical power meter Model 2936-R with the 918D Series Photodiodes allows various measurements for pulsed or modulated light input as well as continuous wave.

Bandwidth

The most fundamental requirement to make any high speed measurement is to have high enough bandwidth of the measurement system for the pulses or modulation. Since photodiode detectors used for the power measurements

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