TECH NOTE

Power Handling Capability of the OMH-67452 Power and Wavelength Head

PURPOSE

This technical note describes the power handling capability of the OMH-67452B 30W Silicon Power and Wavelength head, when operated without cooling water.

BACKGROUND

The OMH-67452B is a water cooled, 30W, integrating sphere based optical power and wavelength measurement head designed to measure fiber coupled laser diodes. The OMH-67452B is compatible with the OMM-6810B Optical Power and Wavelength Meter. It was designed to achieve maximum stability and accuracy using cooling water, but it is capable of accurate measurements without water, when operated for short periods of time.

MEASUREMENT SETUP

A resistive thermal load was mounted to the integrating sphere of the OMH-67452B. The thermal load was used so that optical input power could be held constant while varying the thermal load. The optical signal was a constant 30mW at 975nm from a fiber coupled laser diode, powered and temperature controlled by an LDC-3724B Laser Diode Controller. The thermal load was varied from 0W to 7W in 1W increments, while optical power was measured with an OMM-6810B and recorded with a PC. The thermal load was also operated in pulsed mode to determine maximum pulse energy and duty cycle.

RESULTS

The error budget for the OMH-67452B allows for a ±0.5% fluctuation in photocurrent due to temperature deviation of the photodiodes. This value was used to establish the maximum power handling capability of the head.

It was determined that the OMH-67452B can be operated up to 5W continuous, or 5W average under pulsed conditions, where the pulses are less than 30W, lasting on the order of several minutes. The maximum pulse energy was found to be 3kJ, and the maximum average power 5W. When pulses on the order of 3kJ are applied to the head, it takes considerably longer to cool down than it does to heat up, meaning that care should be taken to allow it to sufficiently cool between pulses.

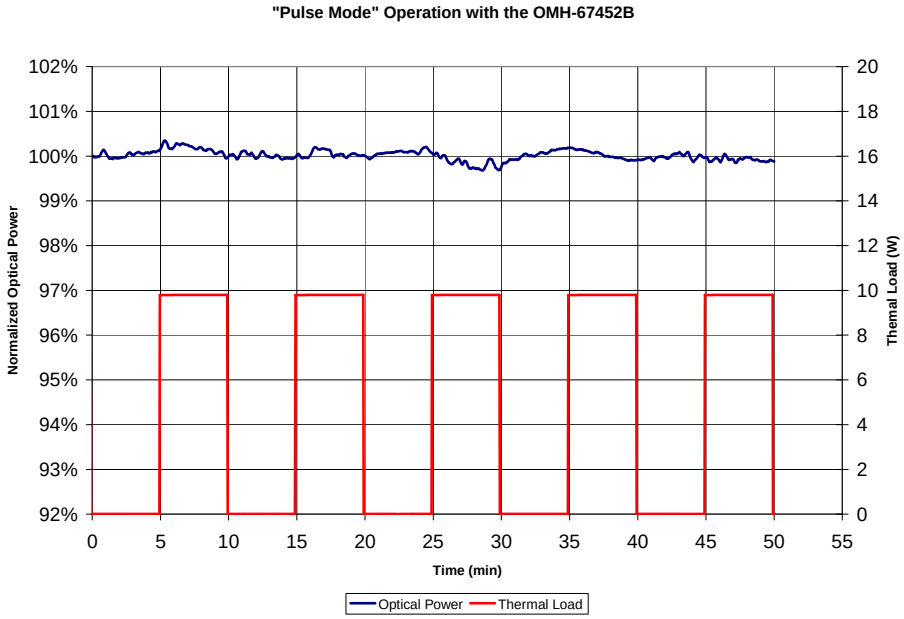

FIGURE 1 – Example power measurement stability under pulsed conditions

ILX Lightwave
Laser Diode Instrumentation & Test Systems

Figure 1 shows the optical signal during one of the pulse mode tests. In this case, the measured optical power fluctuated by about ±0.3% due to the variation in thermal load. The pulse parameters were: 10W peak power, 5 minute pulse duration, and 50% duty cycle; in other words, the maximum pulse width and duty cycle for a 10W pulse.

CONCLUSION

With care, the OMH-67452B can be configured to measure optical power and wavelength up to 30W, without the aid of water cooling, thus greatly extending the flexibility of the head. When operated within the recommended envelope, users can expect power measurement stability of approximately ±0.25%. This value can be improved by reducing pulse width and/or average power. For peak performance, the head should be operated with cooling water.

Figure 2 can be used as a guide in determining maximum pulse width and duty cycle for a given input power. It should be noted that the values shown in Figure 2 are absolute maximum ratings for the operation of the OMH-67452B without cooling water. To achieve the best stability and accuracy in air-cooled applications, pulse energy should remain below 1.5kJ and average power should not exceed 2.5W.

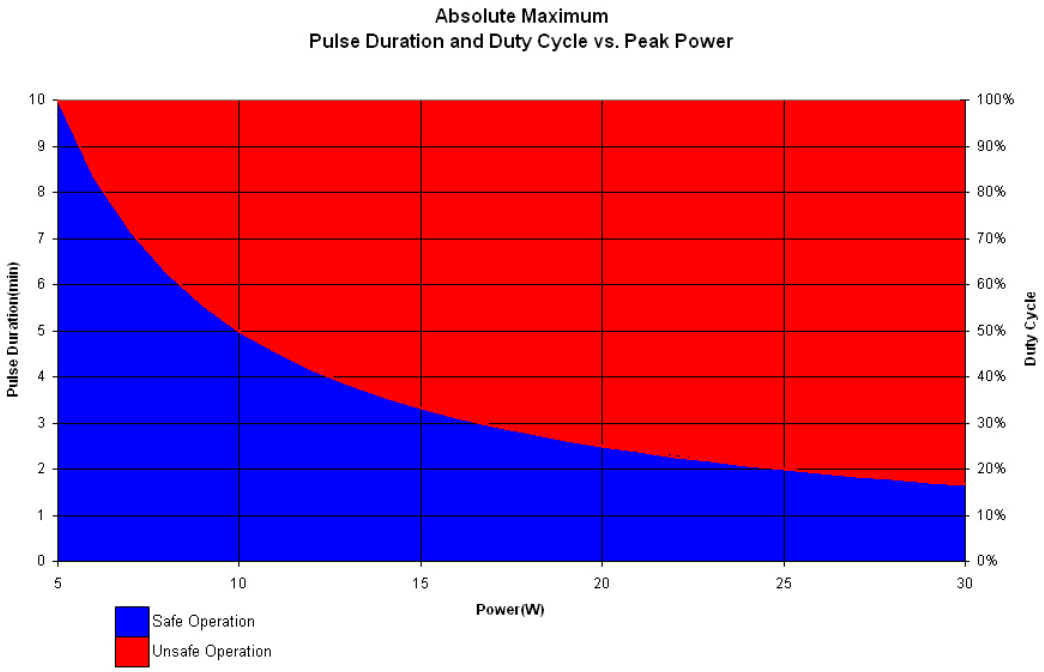

FIGURE 2 – Absolute maximum pulse energy and duty cycle vs. input power