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ARTICLE
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Selecting CC or CP Mode for Laser Diodes

The decision to operate in CC or CP mode depends on the application.

In Constant Current mode (CC) the laser diode current source drives a constant current through the laser diode, never varying. Feedback is taken from a resistor in series with the current source.

In Constant Power mode (CP) the laser diode current source increases and decreases current through the laser diode, to keep the feedback from the photodiode constant. The photodiode monitors a fixed portion of the light generated by the laser diode. The laser diode manufacturer can provide a transfer function relating the photodiode current to the laser diode power output [usually with units of mA/mW or µA/mW. This transfer function can vary wildly from laser diode to laser diode, so the specifications are usually very wide. If operating at a constant, known power is critical, calibrating the photodiode response with an external power meter may be necessary.

In some cases, constant wavelength is critical, but having a wavelength meter provide feedback is not practical. Often, the laser diode is run in Constant Current mode and a thermoelectric is used to keep the die at a constant temperature. The temperature is scanned to achieve the correct wavelength then held constant.

Constant Power may be required if the laser diode is used in a sensing application to illuminate a sample and absorption, reflection, or scatter is being measured. Here the detector senses power, so a constant input power is necessary to maintain calibrated measurements.

Constant Power may also be required in communications applications when signal degradation affects signal to noise ratio and system performance. Laser diodes lose power as they age. More current is required to achieve the same power over time. To insure constant power output, feedback from the integrated photodiode is monitored and the laser diode current source increases its output until it reaches a pre-set current limit.

Article adapted from **Wavelengths Electronics**. For more information, contact **Warsash Scientific** on +61 2 9319 0122 or sales@warsash.com.au.