The dual-mode optical power detector – Self-calibration and SI traceability

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In the European project chipS·CALe [1], Justervesenet and partners around Europe have developed a self-calibrating dual-mode optical power detector, with room temperature measurement uncertainty as low as 0.04 % [2]. The detector combines a low-loss, induced-junction photodiode made by SINTEF [3], with a thermal detection design developed by the University of South-Eastern Norway [1]. By combining two measurement modes in one device, the thermal measurement can be used to calibrate the internal losses of the photodiode. The detector can hence be calibrated on-site, and is suitable for operation in remote locations.

The losses of the low-loss photodiodes can also be determined from charge-carrier computer simulations [4]. This independent method of calibrating the losses, in combination with the dual-mode self-calibration, provides a direct link to the International System of Units (SI) through the fundamental constants ratio *e/h*.

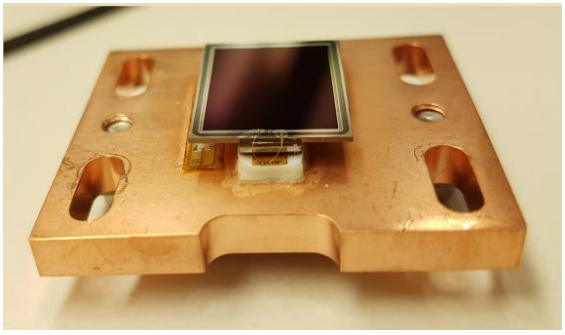

Figure 1: The self-calibrating dual-mode optical power detector, combining a low-loss photodiode with a thermal detection design.

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References

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