

Dual logarithmic photodetector



Koheron PD10R is a dual logarithmic photodetector for general purpose optical power measurements. In addition to two analog outputs $\log(A)$ and $\log(B)$, the PD10R gives the log-ratio $\log(A/B)$ with an adjustable offset and two gain settings (x1 and x10). The PD10R provides a fully-analog solution for direct absorption measurement in spectroscopy setups.

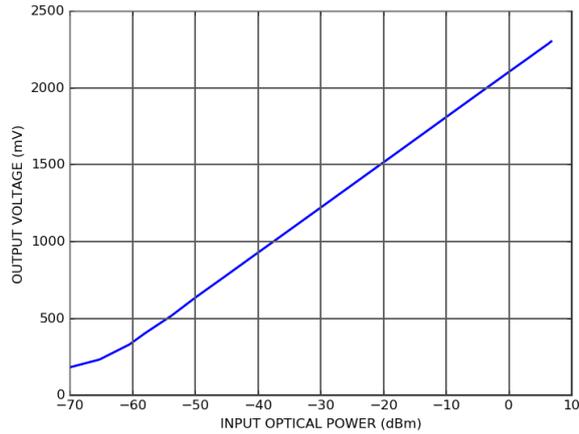
Specifications

	PD10R
Small signal bandwidth	1.2 MHz at 3 dB (for input current > 100 μ A)
Logarithmic slope	300 mV / decade
Supply voltage	3.3 - 15 V
Dimensions	38 mm x 53 mm x 12 mm
InGaAs photodiodes	
Wavelength range	900 - 1700 nm
Optical input power	-67 to 7 dBm (0 dBm = 1 mW)
Photodiode connector	FC
Photodiode active diameter	300 μ m
Photodiode peak responsivity	0.90 A / W
Operating temperature	0 $^{\circ}$ C - 50 $^{\circ}$ C

Characterization

Output voltage vs Optical power

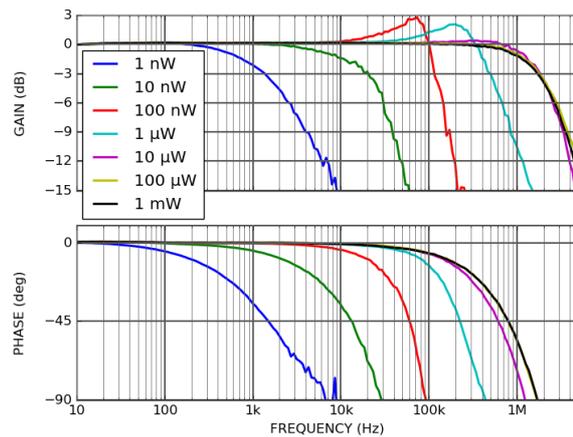
Optical source is a [Koheron LD101](#) 1550 nm DFB laser followed by a variable optical attenuator and measured with a Thorlabs PM100D / S155C power meter.



We observe a linear behavior between -50 dBm (10 nW) and 7 dBm (5 mW).

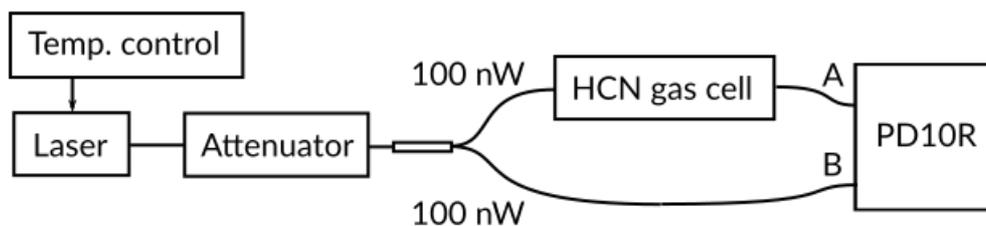
Frequency response

Frequency response of the logarithmic amplifier for several input optical powers:

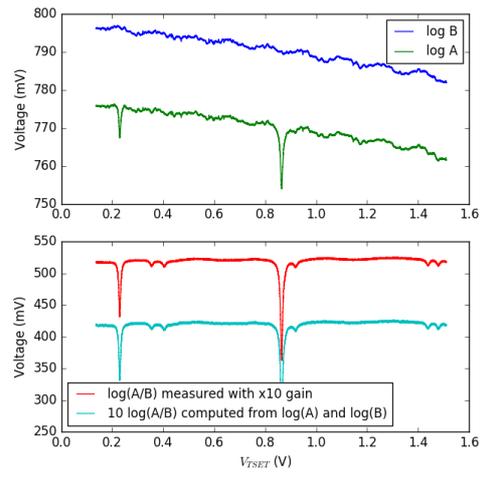


Absorption measurement

The PD10R can perform accurate absorption measurements with small amounts of optical power. We used the setup below to observe the absorption lines of a HCN gas cell with 200 nW of total optical power. Optical source is a DFB laser whose temperature is increased linearly from 10 to 25 °C in 60 s. The absorption path and the reference path are connected respectively to the A and B inputs of the PD10R.



The three outputs $\log(A)$, $\log(B)$ and $\log(A/B)$ have been recorded simultaneously during the 60 s temperature sweep. Intensity variation observed on the $\log(A)$ and $\log(B)$ channels are nicely rejected on the $\log(A/B)$ output. Numerical computation of $\log(A/B)$ from $\log(A)$ and $\log(B)$ is represented in the cyan curve.



Ordering codes

- PD10R: InGaAs photodiodes mounted
- PD10R-NOP: No photodiodes