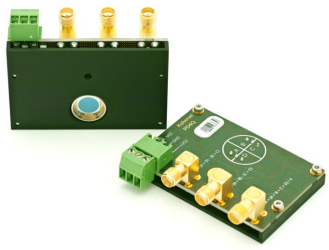
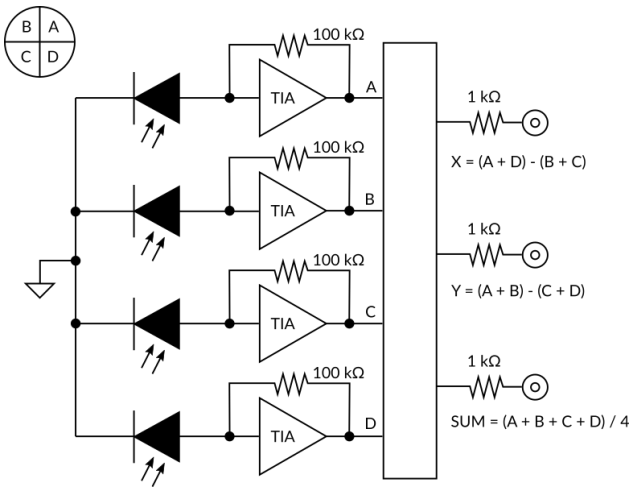


Koheron PD4Q is a 4-quadrant photodetector with 100 kV/A transimpedance gain and 250 kHz bandwidth. The PD4Q outputs three voltages: X = (A+D)-(B+C), Y = (A+B)-(C+D) and SUM = (A+B+C+D)/4. Thanks to its low noise and high dynamic range, the PD4Q can measure laser beam position with a resolution below 20 nm in a 10 kHz bandwidth.

Specifications

	PD4Q-10k	PD4Q-100k
Detector		
Wavelength range	400 nm to 1050 nm	400 nm to 1050 nm
Active area per quadrant	12.3 mm²	12.3 mm²
Photodiode peak responsivity 900 nm	0.64 A/W	0.64 A/W
Maximum photocurrent per quadrant	1 mA	100 µA
Electronics		
3 dB bandwidth	500 kHz	250 kHz
Transimpedance gain	10 kV/A	100 kV/A
Noise Equivalent Power at 10 kHz	8.3 pW/√Hz	1.6 pW/√Hz
Output impedance	1 kΩ	1 kΩ
Output voltage range	-10 V to 10 V	-10 V to 10 V
Output	SMA female connector	SMA female connector
Power supplies		
Positive supply voltage	11.5 V to 13 V, nom. 12 V	11.5 V to 13 V, nom. 12 V
Negative supply voltage	-13 V to -11.5 V, nom. -12 V	-13 V to -11.5 V, nom. -12 V
Quiescent current per rail	20 mA	20 mA
Maximum current per rail	75 mA	75 mA
Other		
Outside dimensions	60 mm x 49 mm x 18 mm	60 mm x 49 mm x 18 mm
Operating temperature	0 °C to 50 °C	0 °C to 50 °C
Weight	43 g	43 g

Functional diagram

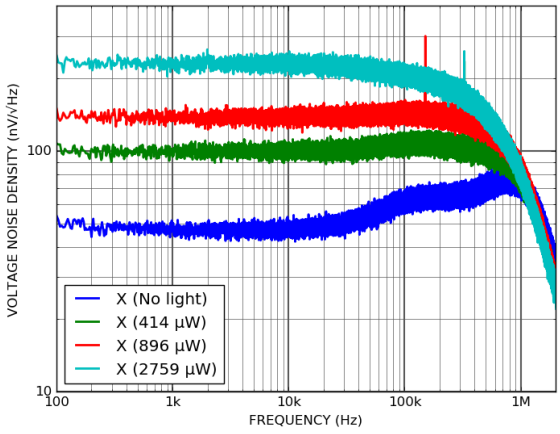


PD4Q functional diagram

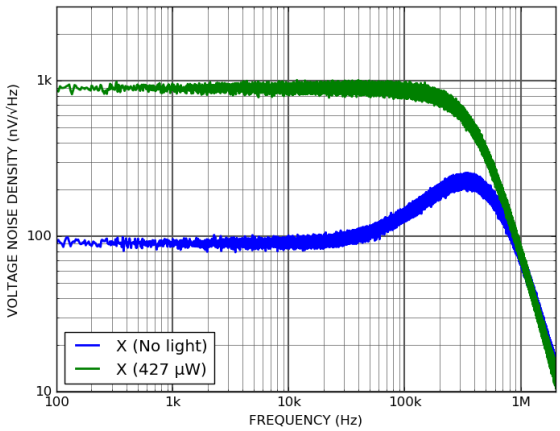
Characterization

Output noise

The figure below shows the X output (X = (A+D)-(B+C)) power spectral density, with and without light. The optical source is a 810 nm LED driven by a Koheron DRV110-A-375 laser driver.



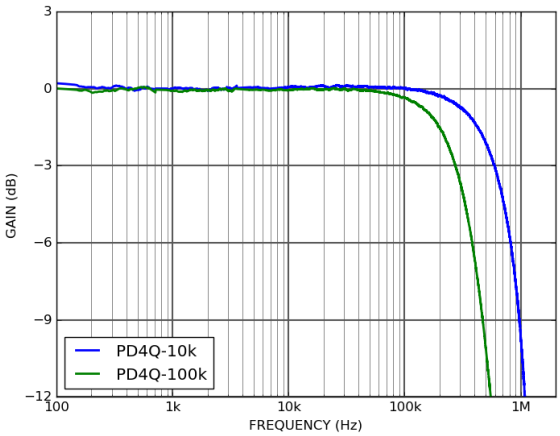
PD4Q-10k (10 kV/A) output power spectral density



PD4Q-100k (100 kV/A) output power spectral density

Frequency response

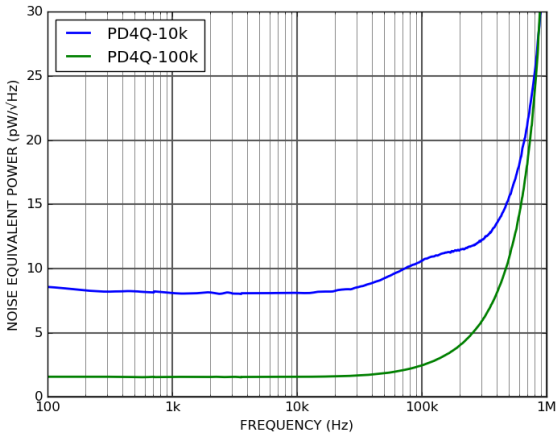
The figure below shows the frequency response of the PD4Q photodetector.



PD4Q frequency response

Noise Equivalent Power

The figure below shows the Noise Equivalent Power of the PD4Q photodetector measured at 810 nm.



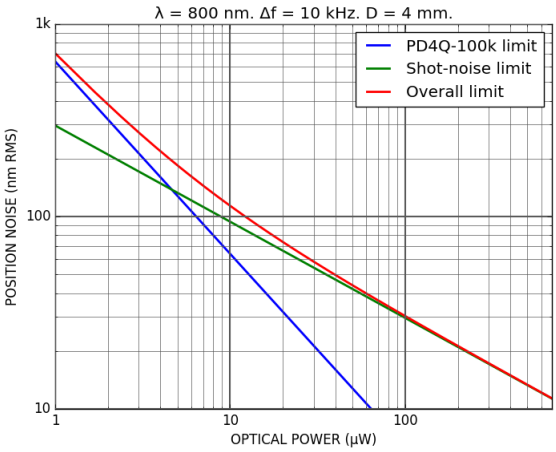
PD4Q noise equivalent power

Position noise

The Noise Equivalent Power (NEP) of the detector can be converted into a position noise spectral density:

$$ L_{n} = \sqrt{\mathrm{NEP}^{2} + \frac{2 e P_{\rm opt}}{S}} . \frac{D}{P_{\rm opt}}, $$

where D is the beam diameter, $P_{\rm opt}$ is the total input optical power and S is the photodiode responsivity. Below is the position noise over a Δf = 10 kHz bandwidth for a 800 nm laser with 4 mm beam diameter:



PD4Q-100k position noise

Ordering codes

PRODUCT NUMBER	ATTRIBUTE
PD4Q-10k	Transimpedance gain 10 kV/A
PD4Q-100k	Transimpedance gain 100 kV/A