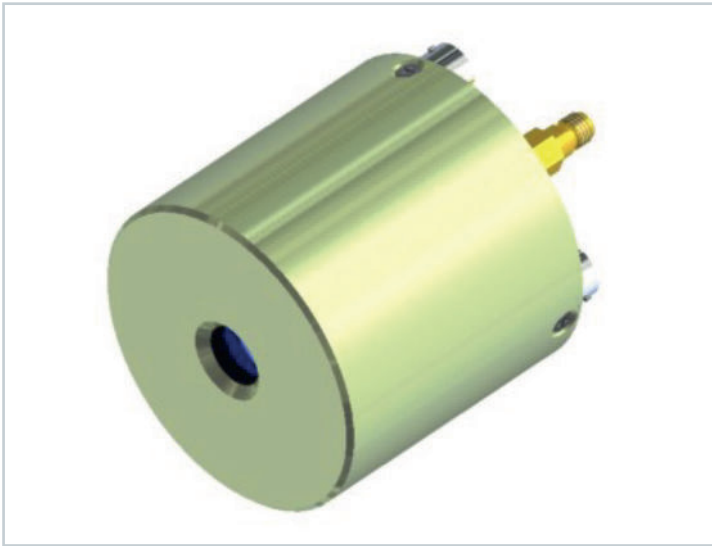


# Photodiode

Vacuum based photodiode



**Photek is the world leading manufacturer of vacuum based photodiodes for analysis of ultra-fast optical phenomena in a range of applications.**

The vacuum photodiode is a sealed vacuum tube with a much faster response than solid state photodiodes. Vacuum Photodiodes do not contain the MicroChannel Plate electron multipliers used in our Photomultiplier Tubes, resulting in unity gain devices. A benefit of this is the vacuum photodiode's high dynamic range, enabling measurement of extremely high light signals without degradation.

Photek's photodiodes are available in 10 mm, 25 mm and 40 mm formats for use in the UV, visible and NIR spectrum. Photek's photodiodes are the fastest in the world with pulse rise times to 36\* ps and pulse FWHM to 55\* ps.

## Key Attributes

- > 10, 25 and 40 mm active areas, other sizes available on request
- > Unity gain
- > Wide range of photocathodes including UV, solar blind, visible and NIR response
- > High dynamic range
- > Rise time <math><36^\* \text{ ps}</math>
- > Integral 50 ohm output

## Applications

- > Analysis of fast optical pulses
- > Cherenkov light detection
- > Fluorescence spectroscopy
- > LiDAR
- > Particle and nuclear physics
- > Measurement of broadband optical phenomena including extreme ultra-violet and vacuum-ultraviolet emission

**Options Available**

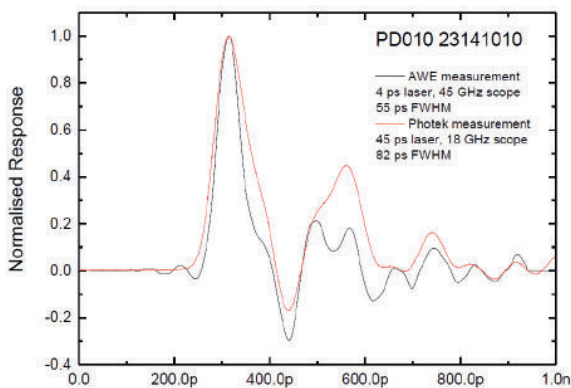
**TIME RESPONSE**

Time response characteristics are very important when choosing a photodiode (PD) for a particular application, particularly when observing and measuring ultra-fast optical pulses. With the PD010 having the fastest response times, it is the most recommended size. However, 25 mm and 40 mm versions are also available. The pulse rise times and pulse full width half maximum (FWHM) for different sizes of photodiodes are shown below.

Pulse Rise Time			
Diameter (mm)	Minimum (ps)	Typical (ps)	Maximum (ps)
10	36*	50	60
25	60	80	100
40	60	80	100

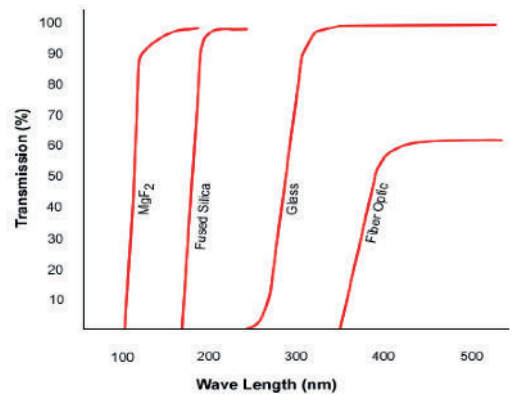
Pulse FWHM			
Diameter (mm)	Minimum (ps)	Typical (ps)	Maximum (ps)
10	55*	60	100
25	100	150	200
40	100	150	200

\* Results taken from J. Milnes et al., Recent Developments in Ultra-High Speed and Large Area Photomultiplier Tubes, PoS(ECPD2015)005. The figure below is taken from the paper and shows the influence of the laser pulse width and measurement bandwidth on the observed result:



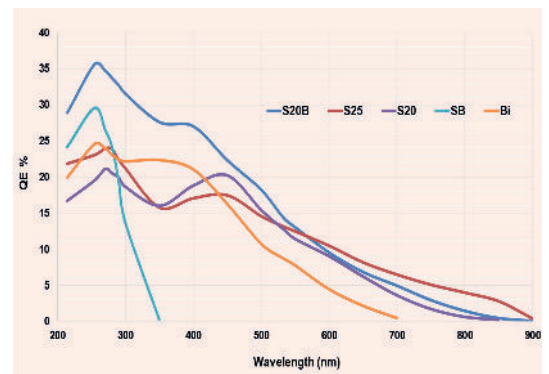
**INPUT WINDOW**

Photek photodiodes are available with a choice of input window materials. These include MgF<sub>2</sub>, fused silica and fibre optic.



**QUANTUM EFFICIENCY CURVES**

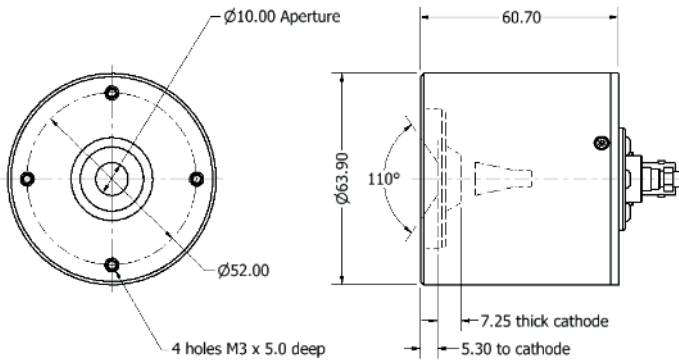
Photek offer a full range of Gen II photocathodes, these include CsI, Solar Blind, Bialkali, S20 and S25 which demonstrate the broad spectral response that you can achieve as seen below. Please contact the Sales office to discuss your exact requirements.



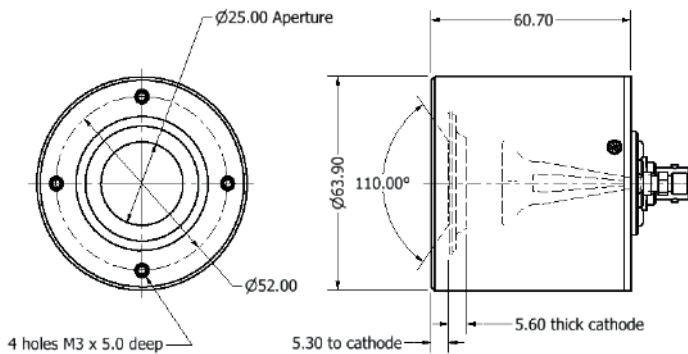
**Mechanical**

**OUTLINE DRAWING**

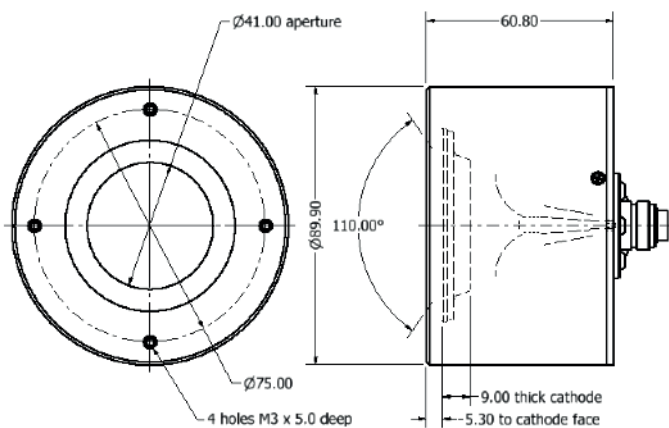
**PD010**



**PD025**



**PD040**



**Electrical**

-5 kV

**Environmental**

Operational Limits: -40°C to +45°C  
Storage: -40°C to +60°C

**ENVIRONMENTAL TESTING**

For applications where the photodiode is exposed to temperature and shock conditions Photek has the appropriate facilities to offer environmental stress screening. Our vibration system offers shock, sine, random, and sine-on-random testing. Our thermal chamber has a temperature range of -75°C to +160°C and can control humidity from 10% to 98%.

**Power Supply**

Photek manufactures a range of power supplies for our photodiodes. Our power supplies use the very latest in power supply design and are available in a bench top format.

**Pre-Amplifier**

Photek manufactures a 2 GHz bandwidth 20 dB gain pre-amplifier, the PA200-10 that is designed to be used with Photek's photodiodes. The PA200-10 is used in close conjunction with the photodiode to amplify the timing pulses for connection by a 50 ohm cable to oscilloscopes or other fast timing electronics.

**About Photek**

**Photek is a specialist manufacturer of vacuum based tubes and camera systems for photon detection.**

Our product range includes; Camera Systems, Image Intensifiers, Photomultiplier Tubes, Streak Tubes plus a range of associated electronics.

We are experts in large area and ultra-high speed imaging and advanced photon counting camera systems.

Our continuing success is built upon continuous innovation and product development, and by harnessing and applying knowledge to find solutions for all of our customers' applications.

**Photek is accredited to ISO 9001 and ISO 14001.**

**Contact Us**

**Our team of specialist engineers and scientists are ready to discuss your application requirements in depth.**

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**Photek Ltd** reserves the right to update and improve this document without prior notice.