SCIONIX

Data Sheet

# Miniature photodiode detectors for medical applications

Miniature photodiode detectors are ideal tools to monitor the local radioactivity in, for example, blood flow measurements. Nuclides like I-131 and Tc-99 emit 354 and 140 keV X-rays which are detected by a small CsI(Tl) scintillation crystal, read out with a PIN photodiode / preamplifier combination.

These devices are operated with a DC voltage of +6 and +35 Volts (120 mW) and are a few cm in diameter and height. Optionally, collimators can be mounted.


The signals need to be processed by a follow-up amplifier. The lowest energy that can be detected is 40 keV.

Photodiode detectors are intrinsically insensitive to magnetic fields.

## Specifications

**Detector model** : V10P10/10M-E2-Cs

**Scintillation crystal** : CsI(Tl)

**Readout** : Si PIN photodiode S3590-08

**Detector diameter:** 23 mm

**Detector height:** 24 mm

**Entrance window:** 0.4 mm aluminum

**Power supply:**
+6 V (max. +12 V) 50 mW
+35 V bias voltage (<1 nA)

**Preamplifier** : Charge sensitive, 50 Ω output impedance

**Pulse form and gain:** Approx. 700 µs fall time, 20 mV / MeV gamma

**Connections:**
Flying leads LIYCI cable
Brown - +6 V (12V max.)
Braid - Ground
White - 35 V bias voltage
Green - Signal output

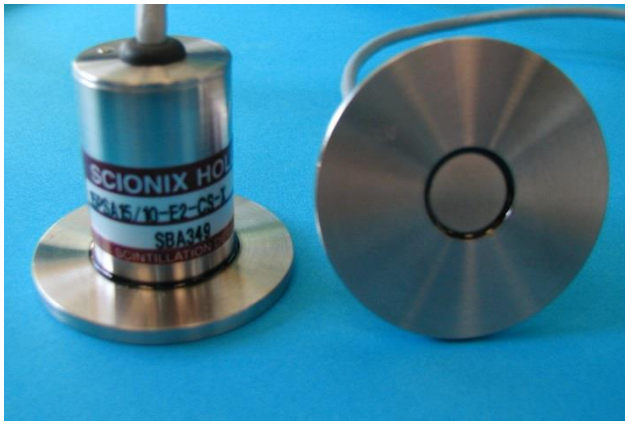
**Cable length:** 2.0 m

**Test method:** Connect +6 V and +35 V. Connect output to spectroscopic amplifier (positive input). Set gain to 100 x. Shaping time 3 µs. Gain is approx. 10 mV / 662 keV

**Energy resolution:** approx. 7% FWHM for 662 keV

**Note:** The exact power supply voltage may vary between +6 and +12 V. The exact BIAS supply may vary between +24 and +50 V. A too low bias voltage will lead to an energy resolution degradation.

Photodiode scintillation detectors are not suited to operate at very high count rates due to their relative slow preamplifier. This limits the count rate to approx. 30 kHz.




CsI(Tl) crystals provide the highest signal to noise ratio of all scintillators operated in pulse counting mode due to the fact that the emission is located in the yellow part of the spectrum where the quantum efficiency of photodiodes is highest.

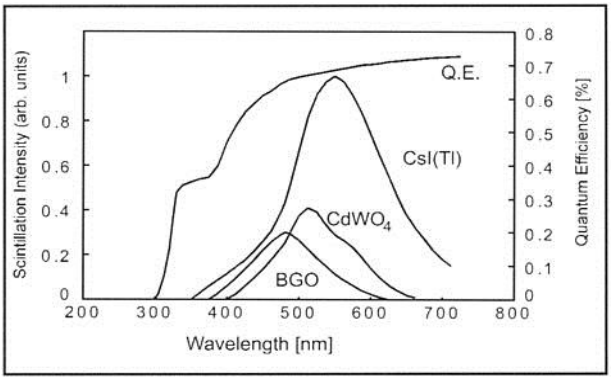



*Fig. 4.3* *Quantum efficiency curve of a silicon photodiode together with the emission spectrum of CsI(Tl), $CdWO_4$ and BGO.*

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