



## Alpha Particle Sensor AL53

- Detects Alpha Particles, Electrons and Photons
- Ultra-Low Power Requirement

### Description

The core of the AL53 radiation sensor is a customized PIN diode, covered with a thin aluminum foil to render it insensitive to light. Alpha particles interact with the aluminum foil and generate electrons and photons, which are detectable by the PIN diode. Electrons (beta) and photons (gamma) easily pass through the aluminum foil. An integrated pulse discriminator with a temperature-compensated threshold level provides a true TTL signal output.

The performance of the AL53 solid-state sensor, combined with its ultra-low power requirements, makes it an excellent choice for physics lab experiments as well as cutting-edge designs.

### Features and Benefits

- Detects alpha (Am-241), beta (C-14, Co-60), and gamma (K-40)
- Ultra-low power requirement (25  $\mu$ A)
- Detector sensitivity: 5 cpm/ $\mu$ Sv/h
- High immunity to RF and electrostatic fields
- Linear response over a wide temperature range (-30 °C to 60 °C)
- Swiss-made

### Application Areas

- Equipment for detecting radioactivity in the medical environment
- Radiation monitors for nuclear safeguards and security
- Detection of illicit substances
- Natural sciences courses and practical lab experiments
- Radon experiments (collecting the decay products Po-218 and Po-214)

## Absolute Maximum Ratings

Supply voltage, $V_{CC}$ to GND	18.0 V
Output short-circuit current	continuous
Storage temperature range	-65 °C to 100 °C

## Electrical Characteristics

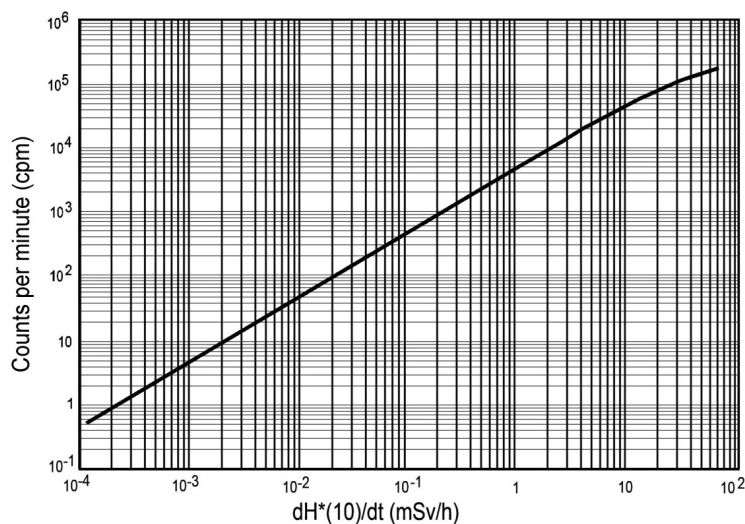
Unless otherwise indicated specified at:  
 $V_{CC} = 4.0$  V,  $T_A = 25$  °C

Measurement range of dose rate	0.1 $\mu$ Sv/h to 100 mSv/h
Pulse count rate	5 cpm $\pm$ 15% for 1 $\mu$ Sv/h radiation dose rate
Energy response	70 keV to 10 MeV
Output pulse level	Equal to supply voltage (positive going)
Output pulse width	50 $\mu$ s to 200 $\mu$ s (LOW→HIGH→LOW)
Supply voltage range, $V_{CC}$	2.5 V to 10.0 V
Supply current, $I_S$	25 $\mu$ A TYP
Operating temperature range	-30 °C to 60 °C

## Sensor Characteristics

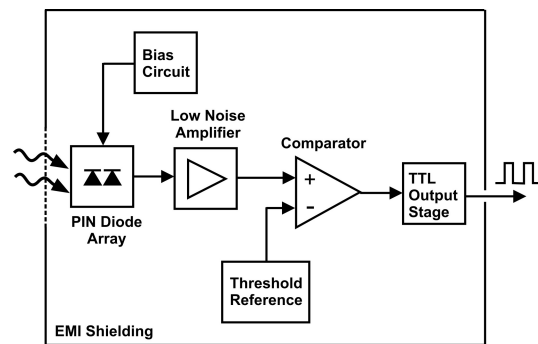
PIN diode active area	13 mm <sup>2</sup>
Window	Aluminum 9.5 x 9.5 x 0.01 mm

## AL53 Sensor Linearity

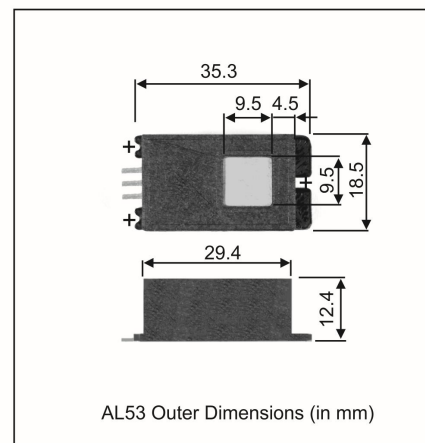


$dH^*(10) / dt$  = Radiation dose equivalent rate for Cs-137 and Co-60 (mSv/h)

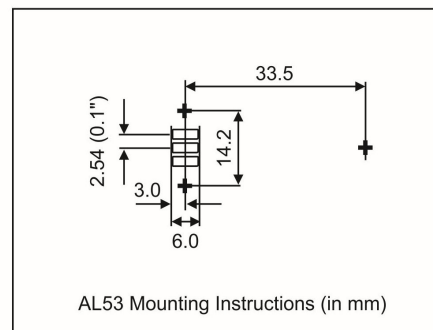
## AL53 Functional Block Diagram



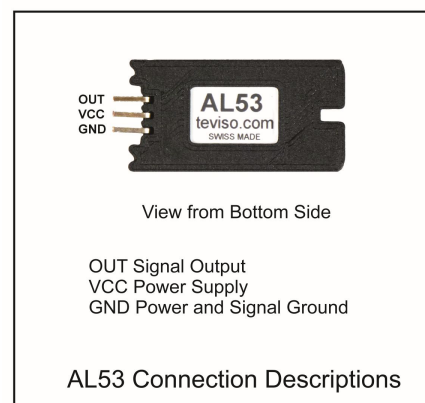
## AL53 Outer Dimensions



## AL53 Mounting Instructions



## AL53 Connection Descriptions



## AL53 Soldering Recommendations

Hand soldering is recommended. Maximum temperature: 360°C, maximum duration: 5 seconds.

## Application Information

### Window

Do not touch or clean the window! A scratched or damaged window can impair the function of the PIN diode or even destroy it.

### Facts About Radioactivity

<https://www.teviso.com/file/pdf/facts-about-radioactivity.pdf>

### Preventing Undesired Pulses

<https://www.teviso.com/file/pdf/bg51-preventing-undesired-pulses.pdf>

### Measuring the AL53 Pulse Rate Performance

<https://www.teviso.com/file/pdf/measuring-the-pulse-rate-performance.pdf>

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