

- **Nuclear Radiation Sensor: Low Voltage, SMD/SMT**
- **Detects Beta and Gamma Radiation and X-Rays**

Description

The function of the RD3024 radiation sensor is based on an array of customized PIN diodes. The integrated pulse discriminator with a temperature compensated threshold level provides true TTL signal output. The RD3024 is capable of detecting beta radiation (electrons), gamma radiation (photons) and X-rays.

The RD3024 low voltage solid state radiation sensor, in combination with high immunity to RF fields make it a good choice for new state-of-the-art designs of battery powered applications using WiFi, GSM and Bluetooth communication.

Features and Benefits

- Detects beta and gamma radiation and X-rays
- Low power requirement (3.0V to 5.0V; 400 μ A) for battery powered applications
- Detector sensitivity: 5.8 cpm/ μ Sv/h
- High immunity to RF and electrostatic fields
- Linear response over wide temperature range (-30°C to 50°C)
- Surface-mount package allows compact designs
- Swiss made

Application Areas

- Equipment for detecting radioactivity in medical environment
- Radiation monitors for nuclear safeguards and security
- Gamma detector to detect illicit nuclear material
- Student projects

Absolute Maximum Ratings

Supply voltage, V_{CC}	6.0 V
Output short-circuit current	continuous
Storage temperature range	-65°C to 110°C

Electrical characteristics

at $V_{CC} = 4.0V$, $T_A = 25^\circ C$ (unless otherwise noted)

Measurement range of radiation dose equivalent rate (Cs-137 & Co-60) 0.1 $\mu Sv/h$ to 100 mSv/h

Sensitivity 5.8 cpm \pm 15% for 1 $\mu Sv/h$ radiation dose rate

Energy response: 50 KeV to above 2 MeV

Output pulse level Equal to supply voltage (positive going)

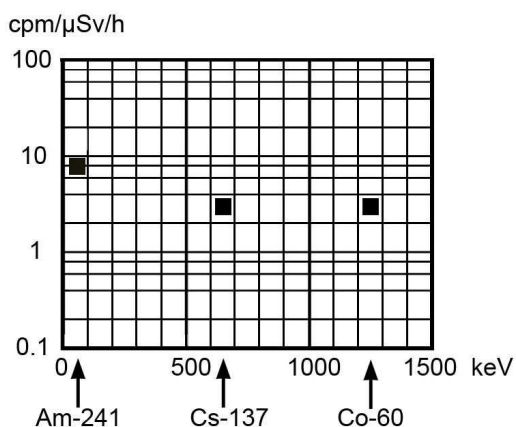
Output pulse width 40 μs to 150 μs

Supply voltage range, V_{CC} 3.0 V to 5.0 V

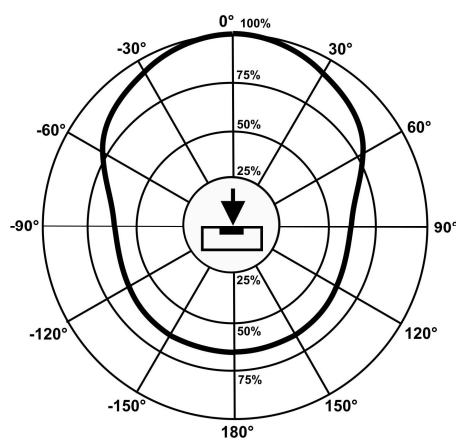
Supply current, I_S 400 μA TYP, 450 μA MAX

Linear temperature range -30°C to 50°C

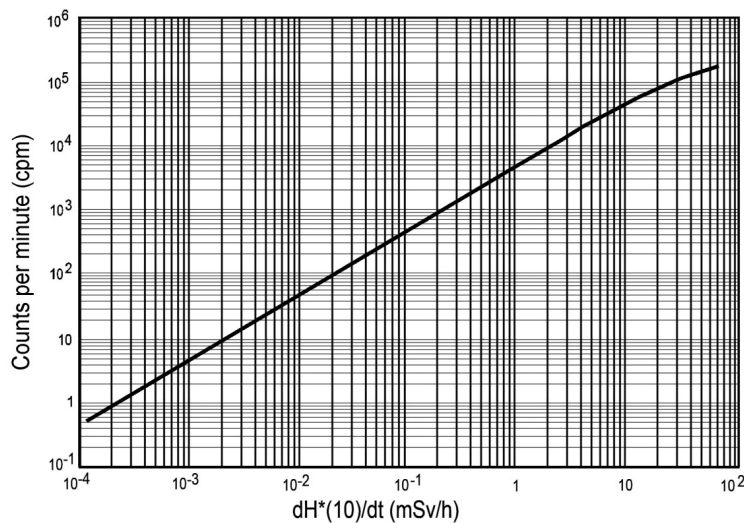
Typical Sensor Energy Response



Standard Sensitivity Response upon Gamma Radiation Incidence Angle with respect to Calibration Direction

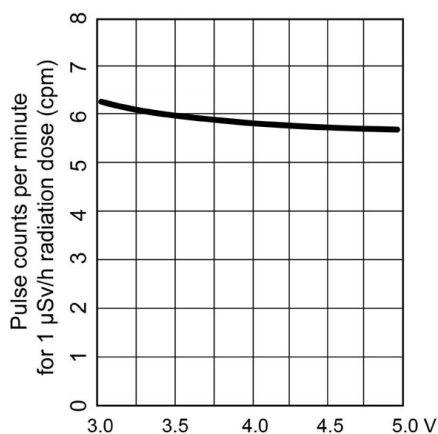


RD3024 Sensor Linearity

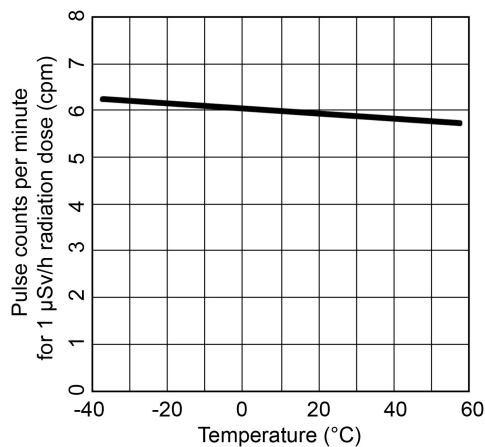


$dH^*(10) / dt$ = Radiation dose equivalent rate for Cs-137 and Co-60 (mSv/h)

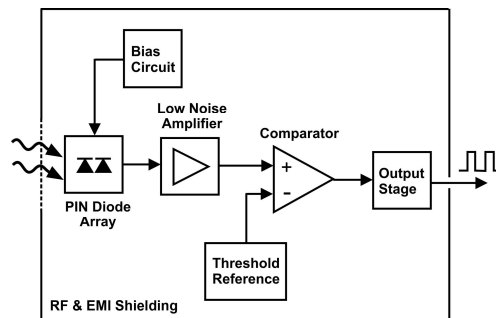
Typical Sensor Sensitivity vs. Supply Voltage



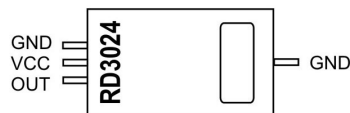
RD3024 Typical Sensor Sensitivity vs. Temperature



RD3024 Functional Block Diagram



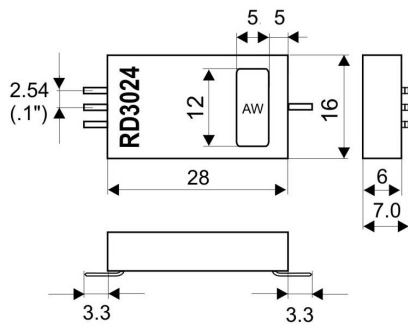
Connection Descriptions



View from top

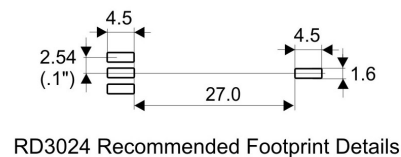
GND Power supply and output signal ground
 VCC +3.0 to +5.0V power supply
 OUT Output signal

Dimensions and Footprint Details (in millimeters)



Weight: 3.4g AW = Active Window

RD3024 Outer Dimensions



Application Information

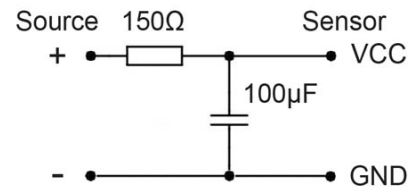
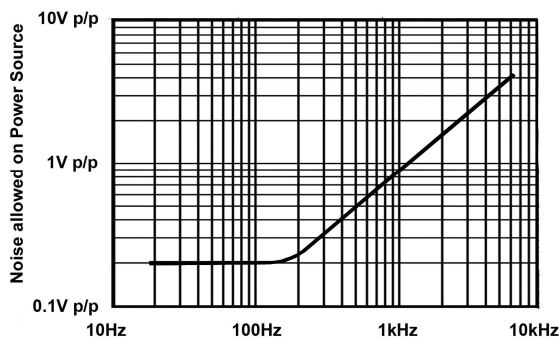
Susceptibility to Strong Microwave Signals

In order to prevent generation of false output pulses by strong microwave signals

- connect a 0.01 μ F capacitor as close as possible to the sensor between the pins GND and VCC
- keep the sensor at least 30 cm (1 foot) away from microwave, cellular phone, etc.

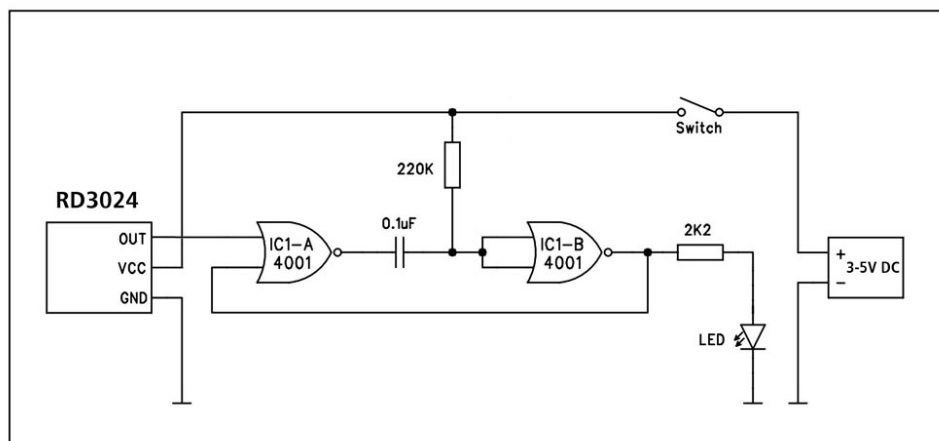
Susceptibility to Noise on Power Source

In situations where a high noise level on the power source could be a problem, an RC filter as shown below is recommended.



Simple Nuclear Radiation Detector using the RD3024

This simple battery-powered monitoring device with a LED diode indicates beta and gamma radiation, and X-rays. Output pulses from the RD3024 (40 μ s to 150 μ s) are converted into 10ms pulses (IC1-A & IC1-B) to provide a suitable drive for the LED. The LED can optionally be replaced by a headphone, a loudspeaker or a pulse counter. This experimental nuclear radiation detector runs on stand-by for eight months on three AA batteries.



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