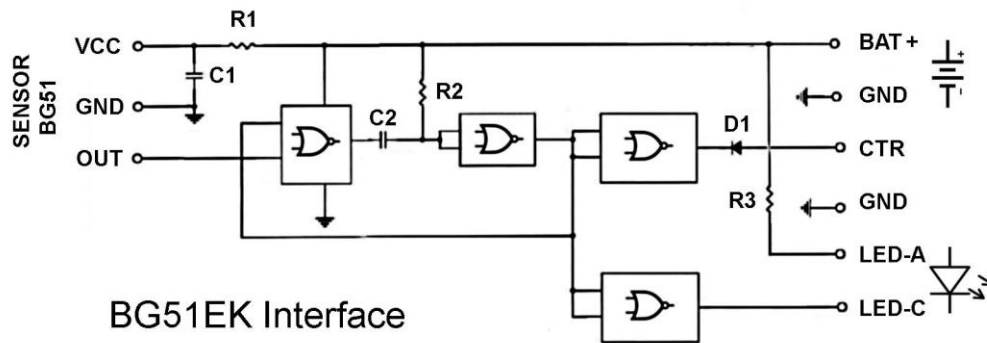


BG51 Sensor Functional Test

In case you suspect a malfunction of your sensor BG51/ BG51-OEM, we recommend to build the test circuit described below. The same circuit is also part of the BG51EK Sensor Evaluation Kit, providing important features for a reliable operation of the sensor such as:

- Stable and clean DC power for the sensor.
- Decoupled VCC for the BG51 from the external circuit.
- stretching the brief sensor output signal (50-100 μ s) into a 20ms pulse for a visible LED flash.
- Outputs capable of driving an LED, a digital counter, or a microprocessor input (20ms HIGH-LOW-HIGH pulse).



R1	1K Ω $\pm$ 1% 1/8W 0805 Carbon Film Resistor
R2	156K Ω $\pm$ 1% 1/8W 0805 Carbon Film Resistor
R3	4.7K Ω $\pm$ 1% 1/8W 0805 Carbon Film
C1	10 μ F $\pm$ 10% 25V X7R 0805 Ceramic capacitor
C2	1 μ F $\pm$ 10% 25 X7R 0805 Ceramic capacitor
D1	Schottky diode BAT46
U1	IC MC14001B
BAT+	3x 1,5V AAA Battery

Your first Nuclear Radiation Dosimeter Experiment

By turning the 4.5V Power on, you will notice a short flash of the LED. This verifies the correct functioning of the interface.

The typical background radiation to be expected from ground and cosmic sources is approximately 0.1 $\mu\text{Sv/h}$. For an initial performance test, the device should detect about 30 counts per hour.

For more advanced testing, a calibrated radiation source such as Co-60 (gamma), Sr-90 (beta), or Cs-137 (beta, gamma) is required.

How to Prevent False Measurements

Noisy Power Sources

When designing a new product, it is essential to identify the potential sources of false signals. Undesired output pulses often originate from noisy power sources, particularly switching power supplies.

To locate the source of undesired signals, first disconnect the current power source and replace it with a battery (preferably rated between 3 and 5 Volts). If this test confirms the power source is the problem, replace it with a higher-quality alternative.

Internal Noise Sources

Internal components like microprocessors, RF generators, or oscillators can introduce noise into the power signal line. To mitigate this, implement an RC filter in the power line between the sensor and the other components (such as R1 and C2 on the Interface board). This resolves most internal noise issues.

You can also provide additional shielding for the BG51 sensor.

Microwave Signals

Strong microwave signals from sources like WLAN repeaters, RF transmitters, and cellular phones can trigger undesired sensor output pulses. How to manage interference:

Maintain a Safe Distance: Keep the sensor at least 30 cm (1 foot) away from powerful microwave sources.

Implement Additional Shielding: Shield the entire instrument by wrapping it in standard household aluminum foil (approx. 10 μm thick), ensuring it covers the sensor's active window and the circuit. This shield does not necessarily need to be grounded. This approach is also applicable in your future custom circuit designs.

