

Radiation Sensor BG51, BG51OEM, AL53, AL54

## How to Prevent Undesired Output Pulses

### Noisy Power Sources

Undesired output pulses often stem from noisy power sources, notably switching power supplies. To identify the issue, follow these steps:

Start by disconnecting the power source and replace it with a battery, preferably rated between 4 and 6 Volts. If this test confirms the power source as the problem, replace it with a better alternative.

### Internal Noise Sources

Internal devices like microprocessors, speakers, or oscillators can introduce noise through the power signal line. To counter this:

Implement an RC Filter: Utilize an RC filter as illustrated in Fig. 2 (R1, C1, C2). This filter effectively resolves most internal noise issues.

### Microwave Signals

Strong microwave signals from sources like WLAN transmitters and cellular phones can trigger undesired sensor output pulses. Here's how to handle it:

Maintain a Safe Distance: Keep the sensor at least 30 cm (1 foot) away from powerful microwave sources. Common culprits include WLAN repeaters and active microwave ovens.

Implement Additional Shielding: Shield the entire instrument by wrapping it in standard household aluminum foil (10 $\mu$ m thickness). This shield, encompassing the sensor's active window and circuit, doesn't necessarily need to be grounded. This approach is also applicable in custom circuit designs.



Fig. 1  
Test circuit with microwave shielding

## Basic Circuit for a Functional Test of the BG51 / AL53

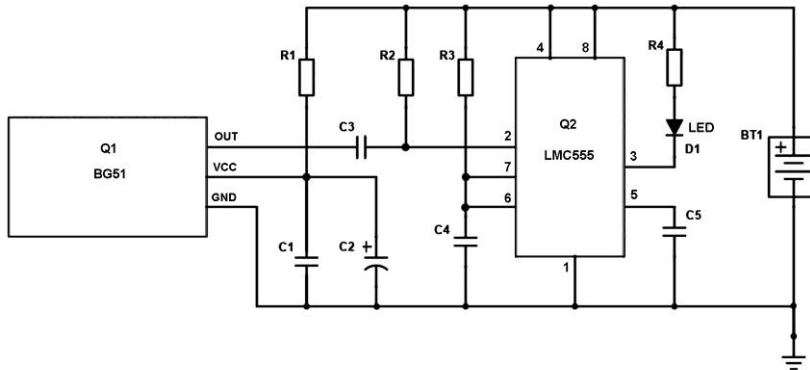


Fig. 2  
Circuit diagram for basic functional sensor tests

Q1	BG51 / AL53 Sensor	C1	0.1 $\mu$ F
Q2	LMC555 CMOS Timer	C2	100 $\mu$ F
R1	1.2k $\Omega$	C3	1000pF
R2	100k $\Omega$	C4	0.1 $\mu$ F
R3	220k $\Omega$	C5	0.01 $\mu$ F
R4	1k $\Omega$	D1	LED red
		BT1	5V (4-6V)

List of components

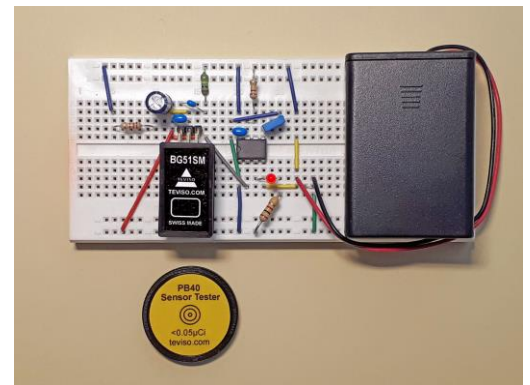


Fig. 3, Breadboard for the test circuit

### Understanding the Test Circuit:

The Test Circuit provides:

- A stable DC power source (battery!), free of noise,
- Decoupling of VCC from external circuit by R1, C1 and C2
- Stretching duration of output signal (50-100 $\mu$ s) to 20ms for a visible flash of the LED.

The test circuit demonstrates the following scenarios:

**Background Radiation:** In the absence of any nearby radioactive source, the LED exhibits a brief flash (20ms) every 1 to 2 minutes due to general background radiation.

**Proximity to Radiation Source:** When a radiation source like the PB40 Sensor Tester is introduced, the LED displays a continuous series of pulses. The frequency of these pulses depends on the activity of the source and distance between the source and the sensor.

**Microwave Interference:** If the LED flashes without any radioactive source nearby, it suggests that potent microwave signals from devices such as WLAN transmitters or cellular phones are likely causing the undesired pulses.

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