

# lamaPLC: RadiationD Geiger counter module

The **RadiationD-v1.1** is a popular DIY Geiger counter module for measuring ionising radiation, often paired with microcontrollers like the ESP32 or Arduino. It typically utilizes a **Miller tube** (*Geiger-Müller tube*) to detect gamma rays and some beta particles.



The RadiationD-v1.1 module's measuring limits are primarily determined by the specific Geiger-Müller (GM) tube installed on the board. Most kits use either the J305 or M4011 glass tubes.

## ☢ Radiation Type Limits

- **Gamma ( $\Gamma$ ):** Excellent detection. It is most accurate for Gamma rays (like those from Cesium-137).
- **Beta ( $\beta$ ):** Detects high-energy (*"hard"*) Beta particles. Low-energy Beta may not penetrate the glass tube wall.
- **Alpha ( $\alpha$ ):** Not detectable. The glass wall of the J305/M4011 tubes is too thick for Alpha particles to enter; they are blocked by the glass or even a few centimeters of air

## RadiationD Recommended and Compatible Tubes

The RadiationD-v1.1 (also known as the CAJOE module) is highly versatile and supports most Geiger-Müller (GM) tubes that operate with an anode voltage between 350V and 500V.

Parameter	J305	J321	M4011	SBM-20	STS-5	LND-712
<b>Material</b>	Glass	Glass	Glass	Metal (Stainless)	Metal (Stainless)	Metal / Mica Window
<b>Sensitivity</b>	Moderate	Low-Moderate	Moderate	High	High	Very High
<b>Alpha</b>	No	No	No	No	No	Yes (via window)
<b>Beta</b>	Yes (High energy)	Yes (High energy)	Yes (High energy)	Yes (Excellent)	Yes (Excellent)	Yes (Excellent)
<b>Gamma</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>Dose Limit</b>	~1.2 mSv/h	~1.0 mSv/h	~1.2 mSv/h	~1.44 mSv/h	~1.44 mSv/h	~2.0 mSv/h
<b>Op. Voltage</b>	350V - 450V	350V - 450V	350V - 450V	350V - 475V	350V - 475V	450V - 500V
<b>Light Sens.</b>	High (Needs tape)	High (Needs tape)	High (Needs tape)	None	None	None
<b>Notes</b>	Standard DIY tube; very fragile.	Similar to J305; often shorter.	Very common in Chinese kits.	Industry standard; very durable.	Soviet version of SBM-20; longer.	Professional; detects all types.

## Detailed Comparison Notes

### The Glass Tubes (J305, J321, M4011)

- **Light Sensitivity:** These act like solar cells. If you don't wrap them in black tape or put them in a dark box, the sun will cause thousands of "fake" counts.
- **Beta Detection:** They can only detect "hard" Beta. The glass walls are too thick for Beta particles to penetrate.

### The Soviet Workhorses (SBM-20, STS-5)

- **Durability:** These are metal tubes. They won't break if you drop them, and they are completely immune to light interference.
- **Size:** The STS-5 is longer than the SBM-20. Neither usually fits the standard "clips" on the RadiationD board without modification or the use of wires.

### The Professional Choice (LND-712)

- **Alpha Detection:** This is the only tube on your list with a Mica end-window. This window is thin enough to let Alpha particles through.
- **Voltage:** It requires the higher end of the RadiationD's power range (near 500V). You must adjust the blue potentiometer (P1) while measuring the voltage with a high-impedance multimeter.

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