

WATERPROOF GAMMA RAY DETECTION PROBE MODEL SO16-S



INSTRUCTION'S MANUAL



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MAIN CHARACTERISTICS OF THE CDTE GAMMA RAY PROBE

The SO16-S probe (CdTe detector) was developed for a large volume CdTe planar detector (Fig. 1). It incorporates the detector and the charge sensitive preamplifier. The standard probe housing (inox alloy) has a diameter of 16 mm and a length of 111 mm. It is waterproof and can operate under humid atmosphere conditions.

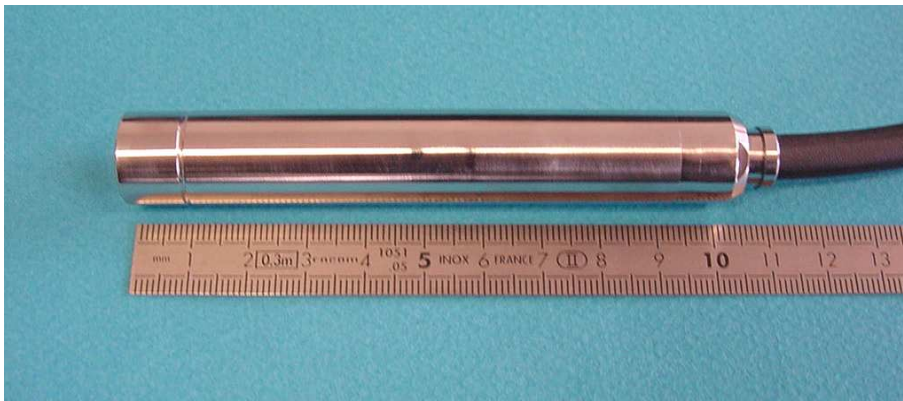


Fig. 1. Photo of SO16-S probe.

WARNING

Wait 30mn before performing measurements at the maximum voltage.
Do not shock or move the probe during the measurement.
Turn off the power supply when you connect the probe
Use the furnished 50ohm adapter at the probe output

TECHNICAL SPECIFICATIONS

TYPE : SO16-S

DETECTOR

Type : CdTe detector
Volume : 125mm^3 (5x5x5mm)
Detector bias voltage : polarity POSITIVE
High Voltage : +500V

PREAMPLIFIER

Type : SMD technology charge sensitive preamplifier
Size : 70x11mm
Noise : 1.3keV (Si, 0pF)
Sensitivity : 350mV/MeV (CdTe)
500mV/MeV(Si)

Rise-time : 50ns (0pF)
Feedback network : $1000\text{M}\Omega$ / 0.5pF
Output resistance : 50Ω
Supply voltage : $\pm 12\text{V}$ ($\pm 20\%$)
Output polarity: POSITIVE

CONNECTOR

SUPPLY VOLTAGES

Amphenol 9 contacts (DB9), male

Detector BIAS voltage : SHV connector, female

Output : BNC connector male

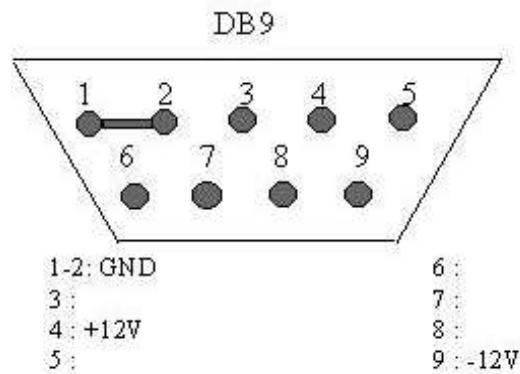


Fig. 2. DB9 pins assignments.

MECHANICAL CHARACTERISTICS

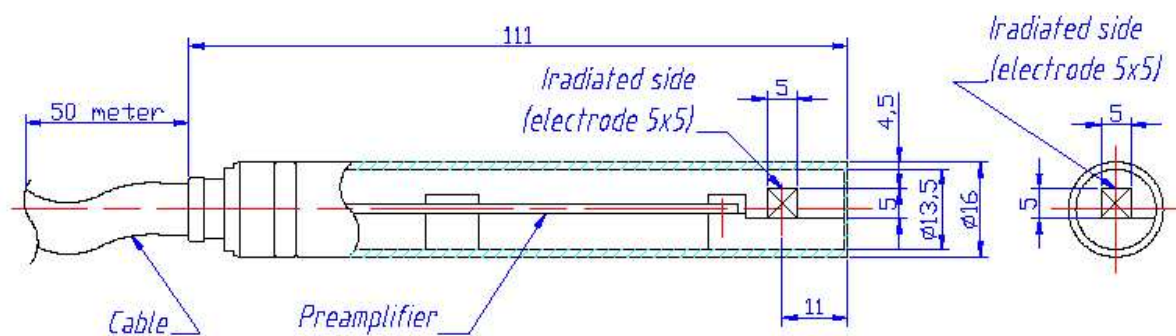


Fig. 3. Technical plan of the mechanical arrangement for SO16-S probe.

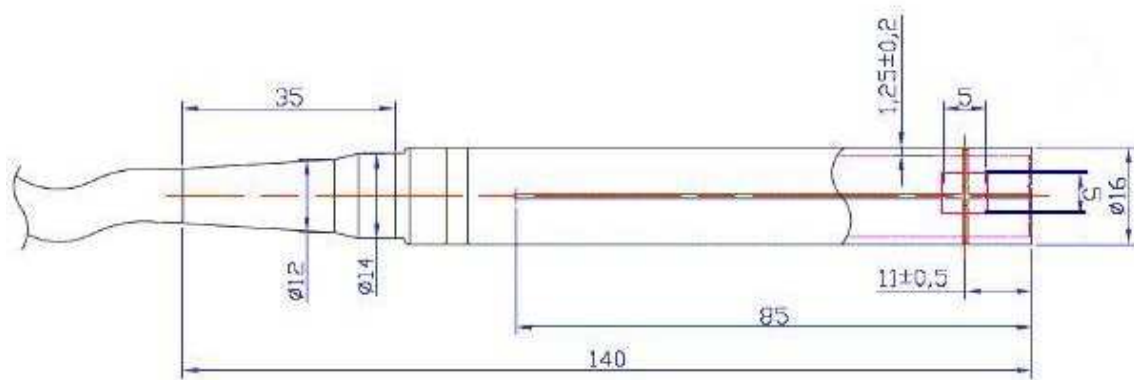


Fig. 4. Cross position.

Size : cylindrical shaped, $L = 111 \pm 1\text{mm}$, $\varnothing = 16\text{mm}$

Material of housing : Stainless steel

Cables : standard length 50 meters

- 1 power supply shielded cable
- 1 probe output coaxial cable
- 1 detector high voltage coaxial cable
- 1 BNC T with a 50Ohm adapter

SIGNAL PROCESSING

Common spectroscopic amplifier with gaussian / triangular shaping or EURORAD Compact Pulse Processor (CPP) Amplifier.

CONNECTION DIAGRAM

NIM Gaussian amplifier

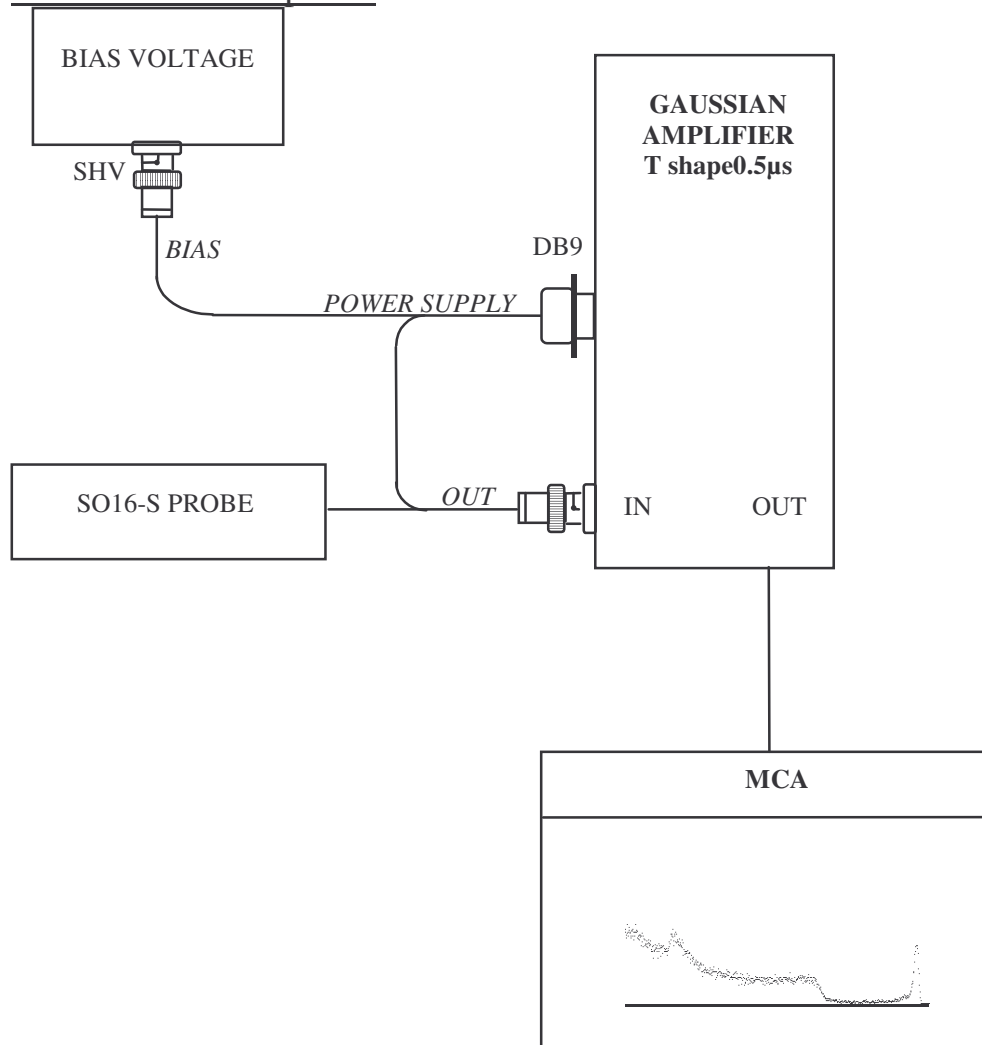
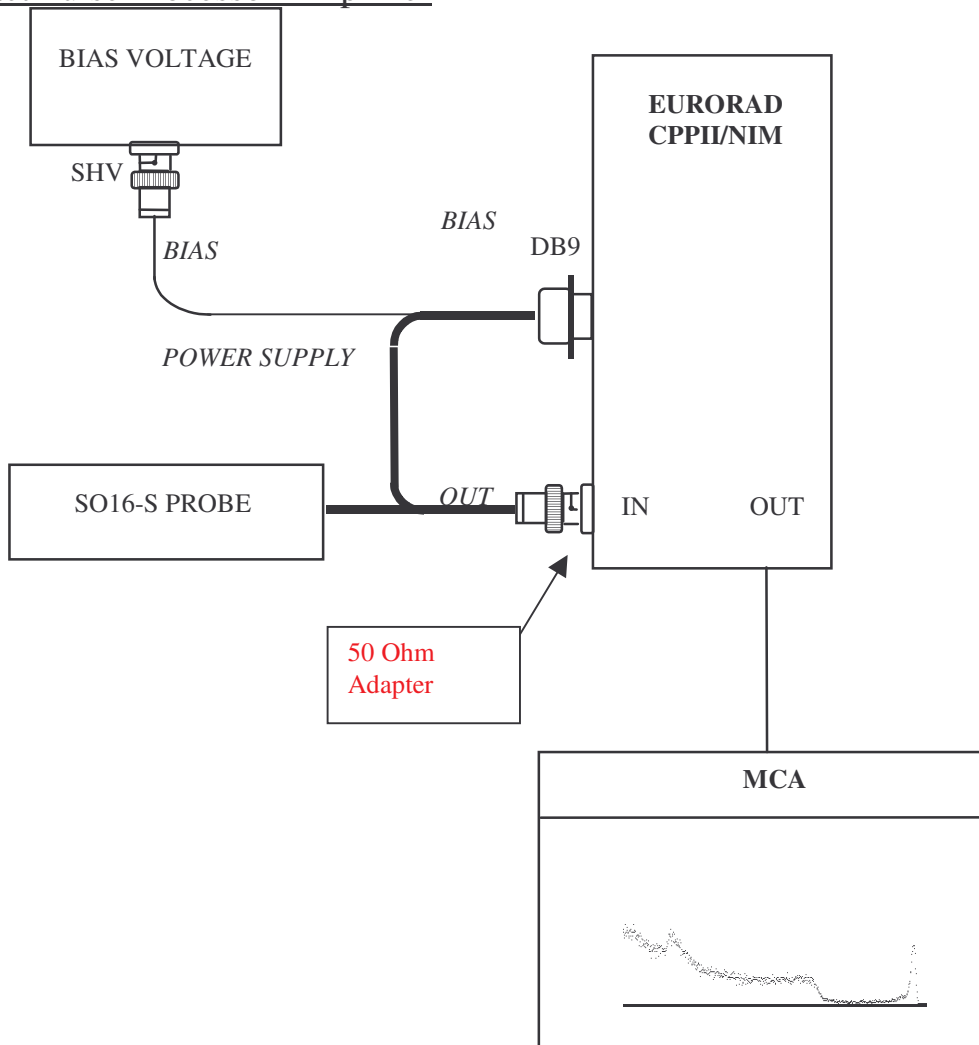


Fig. 5. Principle of connections for SO16-S probe with a gaussian amplifier.

Compact Pulse Processor Amplifier**RESULTS**TEST RESULTS WITH A STANDARD GAUSSIAN AMPLIFIERTest conditions:

- The detector is irradiate from the **5x5mm side**
- The shaping time of amplifier is $0.5\mu\text{s}$
- Coarse gain adapted to isotope

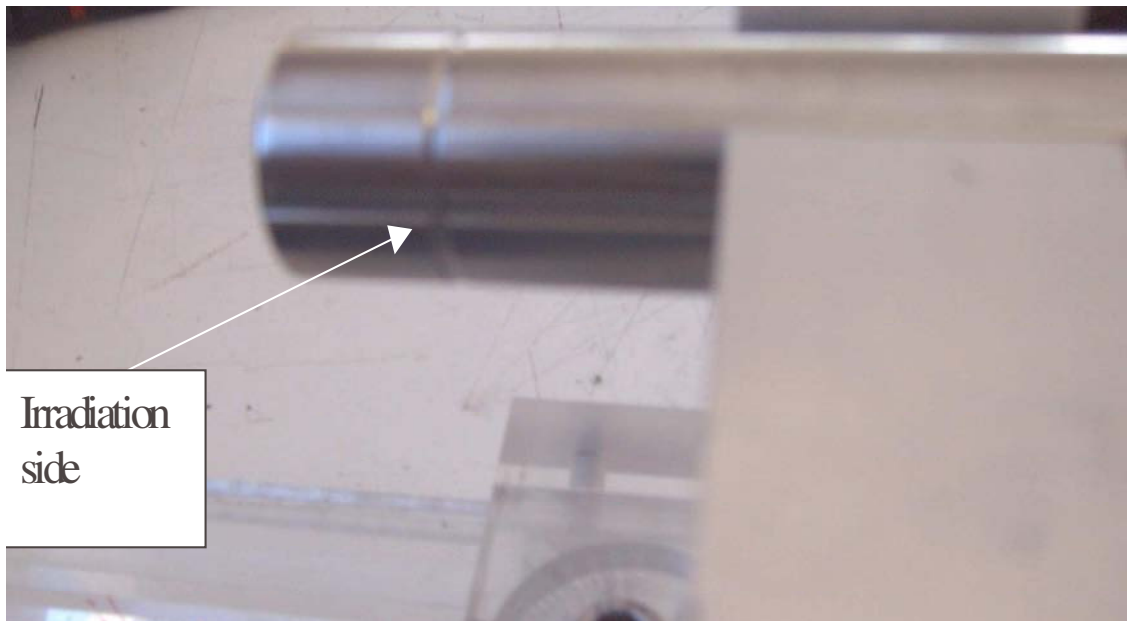


Fig. 7. Irradiation side.

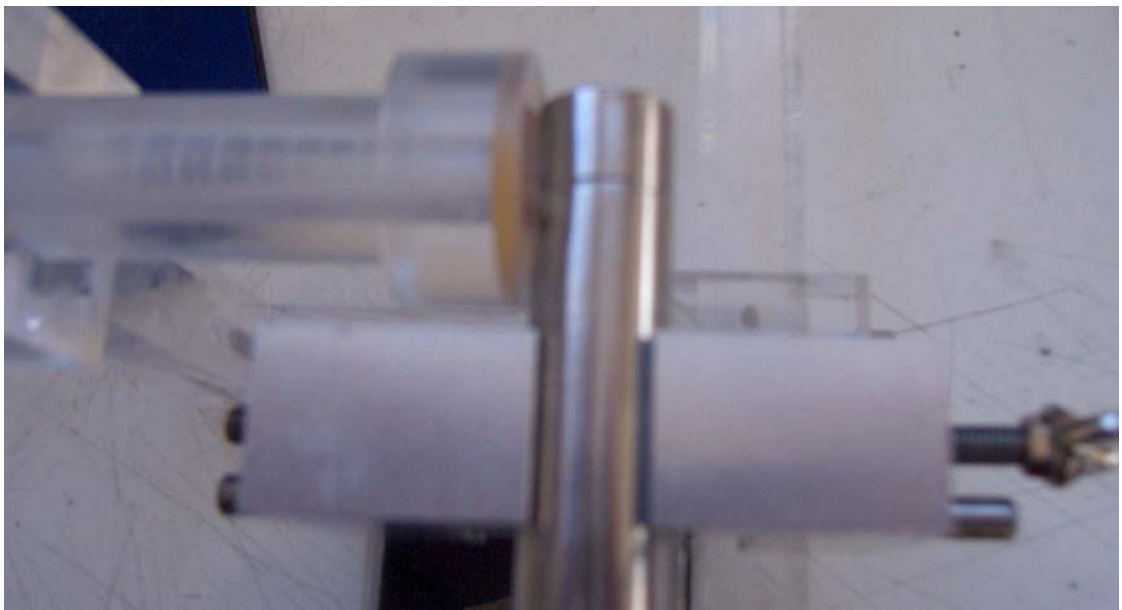
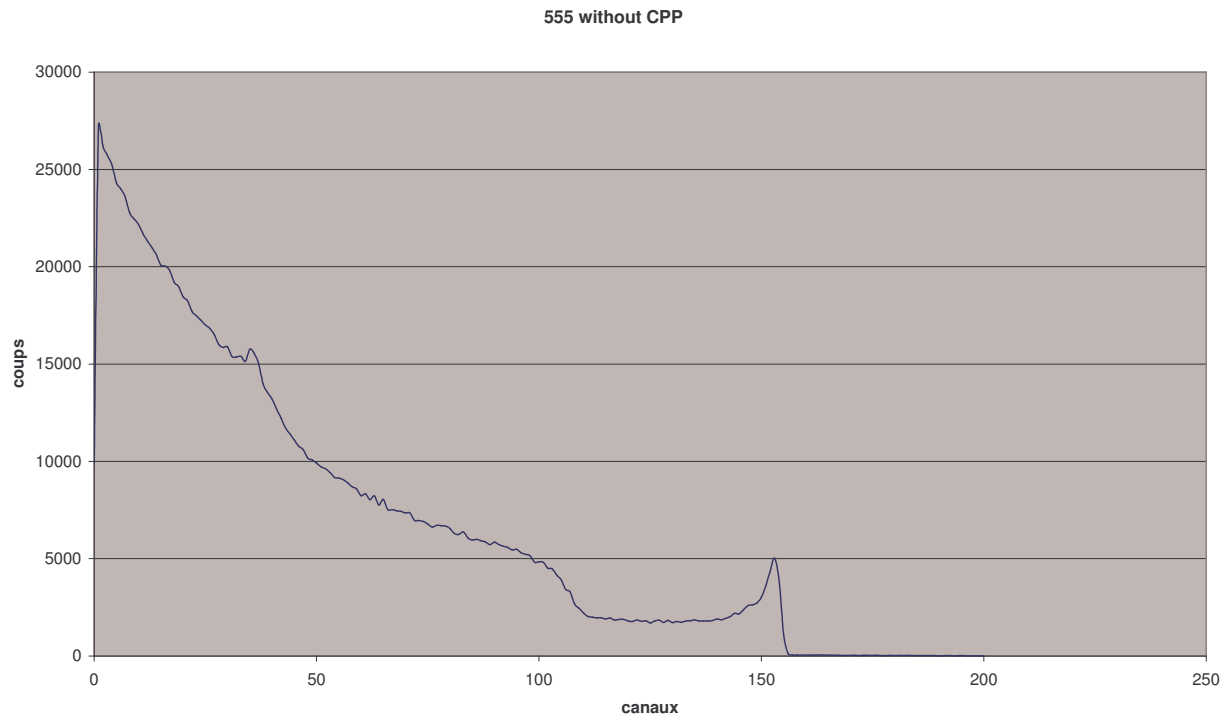


Fig. 8. Source position.

137Cs spectrum with a standard gaussian amplifier :**RESULTS :**

| SOURCES | PARAMETERS | RESULTS |
|---------|-------------|------------------------|
| 137Cs | Fwhm P/C | 21keV ie 3.2% ≈ 0,9 |

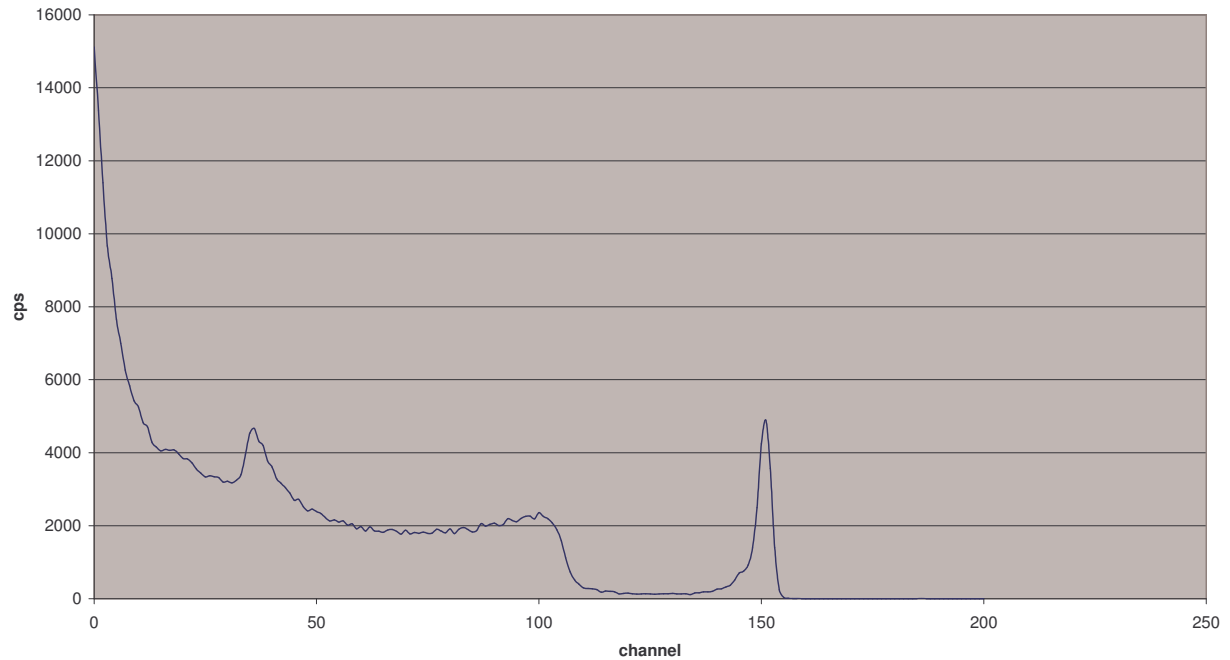
TEST RESULTS WITH THE CPP II AMPLIFIER

Test condition for the 137Cs spectrum:

- The detector is irradiate from the **5x5mm side**
- The source is in contact the probe
- The shaping time of amplifier is 1μs
- SELECTOR ON: 8,4
- COMPENSATOR ON :0,3

137Cs spectrum with the EURORAD CPPII:

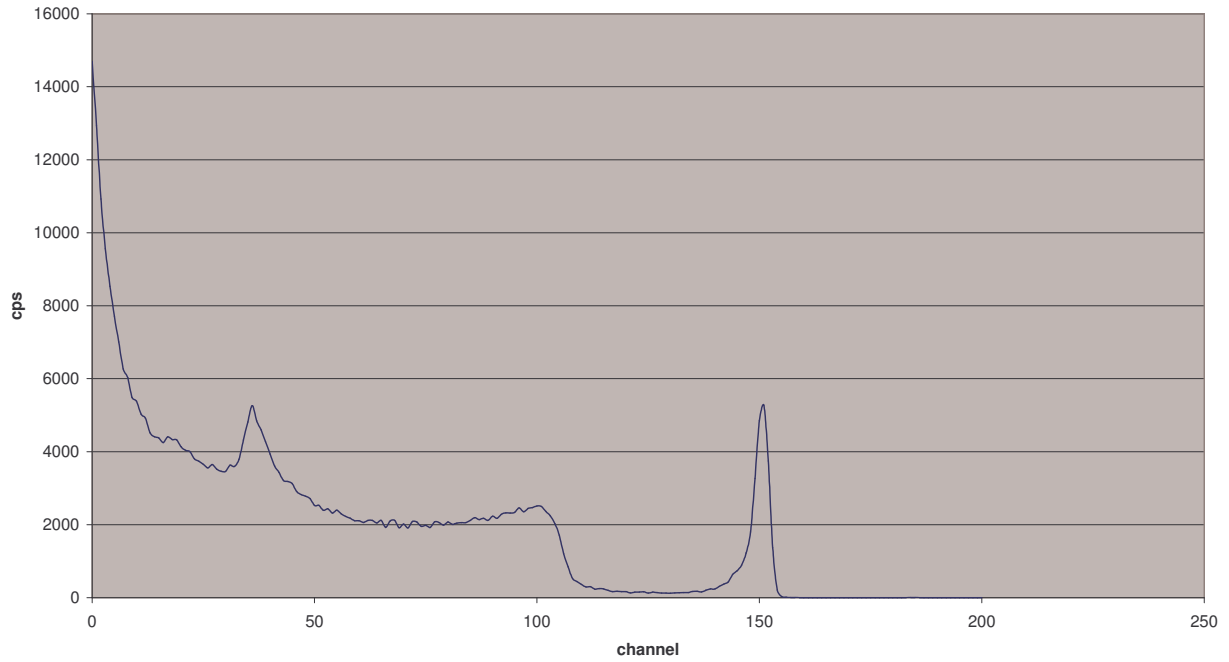
555 with CPP

**RESULTS :**

| SOURCES | PARAMETERS | RESULTS |
|---------|-------------|-------------------------|
| 137Cs | Fwhm P/C | 15 keV ie 2.3% ≈ 2,1 |

137Cs spectrum with the EURORAD CPPII after 72H:

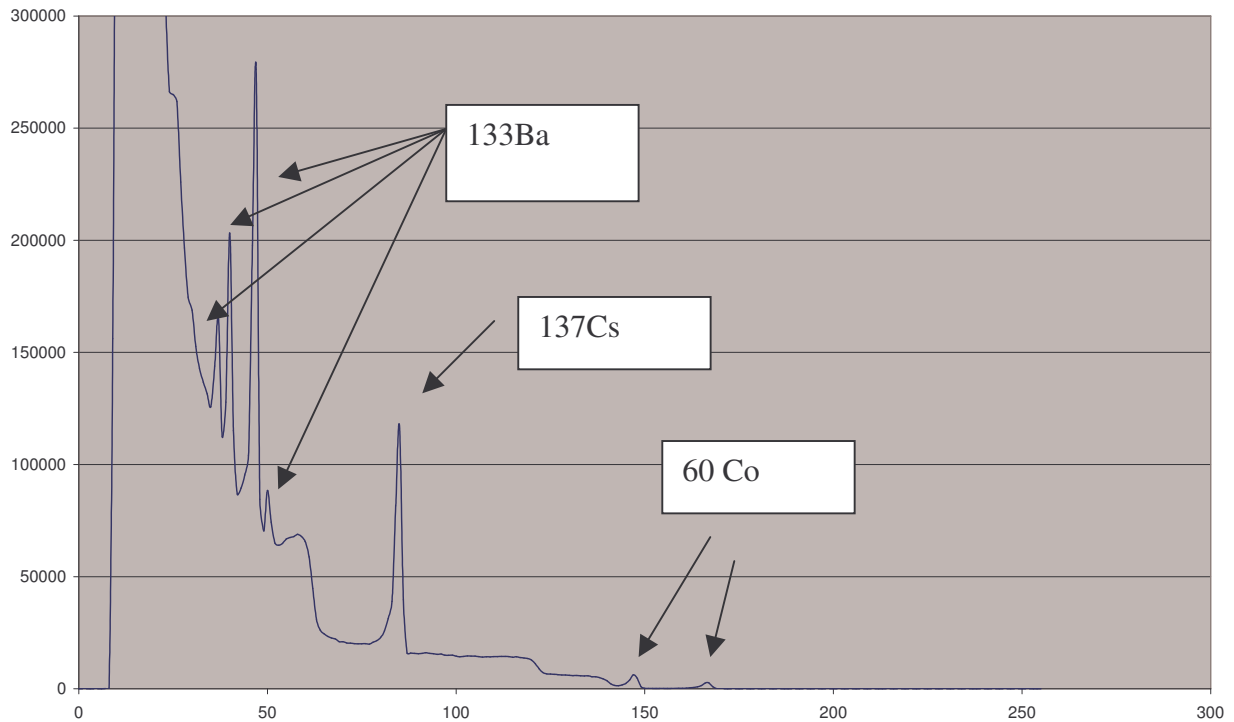
555 with CPP after 72h

**RESULTS :**

| PARAMETERS | RESULTS |
|-----------------|-------------|
| Peak @ t0 | Channel 151 |
| Peak @ t0 + 72H | Channel 151 |

Test condition for the three source spectrum:

- The detector is irradiate from the **5x5mm side**
- The shaping time of amplifier is 1 μ s
- SELECTOR ON: 8,4
- COMPENSATOR ON :0,3
- Acquisition during 64H

Three sources spectrum with the EURORAD CPPII :**RESULTS :**

| SOURCES | PARAMETERS | RESULTS |
|---------|-----------------------------|---------------------------------|
| 137Cs | Fwhm P/C | 15 keV ie 2,3% $\approx 2,1$ |
| 60 Co | Fwhm 1,17MeV P/C 1,17MeV | 20 keV ie 1,7% $\approx 0,5$ |
| | Fwhm 1,33MeV P/C 1,33MeV | 22 keV ie 1,6% $\approx 0,5$ |
| 133Ba | Fwhm 356 keV P/V | 12keV ie 3,3% ≈ 3 |