

The Portable Isotopic Neutron-Spectroscopy GAMMA-X (PINS-GMX) detector was created from a joint development of ORTEC and the Idaho National Engineering Laboratory* (INEEL) in response to the growing worldwide need to determine *in situ* the specific nature of the contents of a variety of containers of munitions or potential chemical weapons. Such applications require a detector with high resolution over a large range of energy, portability, neutron damage resistance, reliability, and ease of use. The performance of the PINS-GMX detector has been verified in real-world use by the U.S. Army. The detector is a component of the ORTEC PINS System.



- High purity germanium (HPGe) detector with high-neutron damage resistance characteristics.
- Relative efficiency >40% for 1.33-MeV gamma ray of ⁶⁰Co, relative to a 3-in. x 3-in. NaI(Tl) crystal at a 25-cm source-to-detector distance.
- Rugged 0.3-microns thick boron implant contact on all outer surfaces.
- Rugged all aluminum endcap with front window thickness of ≤1 mm.
- Detector crystal to endcap front distance ≤5 mm.
- Horizontal concentric type preamplifier.
- Preamplifier outputs capable of driving 150 feet of coaxial cable without measurable degradation to the pulse shape or resolution.
- Minimum operating bias of -3000 volts, and typically operates at bias between -4000 and -5000 volts.
- All attitude portable style cryostat and dewar providing adequate cooling in any orientation if any liquid nitrogen is in the dewar.
- Dewar capacity of 1.2 liters liquid nitrogen, with nominal 20-hour holding time.
- High-rate indicator for excessive count rate.
- Internal temperature sensor providing necessary signal for high-voltage shutdown in the event of accidental warm up.
- A sensor is incorporated into the cryostat in such a way that if the detector warms up, a logic signal to gate off the high-voltage power supply will be generated.
- Can be safely thermal cycled to room temperature.

*CRADA 93-ST-12

PINS-GMX

Portable Isotopic Neutron-Spectroscopy GAMMA-X Detector

Specifications

- Resolution:
 - FWHM: ≤ 1.95 keV at 1.33 MeV
 - FWTM: ≤ 3.90 keV at 1.33 MeV
 - FWFM: ≤ 5.85 keV at 1.33 MeV
 - Peak-to Compton (pC) ratio: $>55:1$
 - FWHM: ≤ 825 eV at 88 keV
 - FWHM ≤ 750 eV at 22 keV
 - Peak area ratio from ^{109}Cd at 22-keV to 88-keV >7
 - Ratio of 2.6-MeV to 1.33-MeV FWHM resolutions <1.5
- The FWHM of a time spectrum taken with the detector and an 1-in. x 1-in. plastic scintillator with an energy window 100 keV wide and constant-fraction timing:

Energy Window Centroid (keV)	FWHM (Nanoseconds)
150	≤ 15.0
250	≤ 12.0
350	≤ 8.5
511	≤ 6.5
1170	≤ 3.0

- Capable of operating at energy rates $>50,000$ MeV/sec without preamplifier lockup and without deterioration in resolution beyond that contributed by the main amplifier.

Ordering Information

Model No.	Description
PINS-GMX	GAMMA-X Detector for PINS-2 System. Includes CFG-MG4-1.2 Dewar/Cryostat and SMART-1 option for negative bias detector.

Options

B/PFA-1.2L	Bayonet Pressure Fill
DWR-S/F	Storage Fill Dewar

Specifications subject to change
083017

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