Richard P. Feynman Center for Innovation

Technology Snapshot

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Los Alamos NATIONAL LABORATORY

KM200

Configurable Amplifier for Radiation Detection Applications

Applications

The KM200 is specifically designed for nuclear safeguards, focusing on radiation detection for security, nonproliferation, and material accountability.

Partnership Opportunities

Industry partners for development, validation, and integration.

Licensing opportunities for commercialization and market expansion.

Technology Readiness Level 6

The KM200 amplifiers have been tested and used for several years in deployed neutron detectors, replacing the discontinued Amptek A-111.

IP Information

U.S. Patent No. 10,422,896

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Overview

The KM200 is a configurable amplifier for radiation detection, replacing the discontinued Amptek A-111. It supports high count rates, compact integration, and multiple detector types, improving sensitivity, reliability, and efficiency. Designed for nuclear safeguards, medical imaging, and radiation monitoring, it enhances measurement accuracy and reduces signal distortion. With modern circuitry and advanced signal processing, the KM200 provides stable, high-resolution measurements, making it suitable for applications requiring precise radiation detection.

Advantages

High Count Rate Capabilities: Achieves a 10-fold improvement in count rate over existing systems, supporting high-throughput applications such as spent fuel measurement.

Enhanced Measurement Precision: Improves neutron detection sensitivity and accuracy, even in high-pressure or slow gas admixture environments.

Compact and Versatile Design: Supports denser detector integration, reducing the number of tubes per amplifier while maintaining reliable performance in a smaller footprint.

Seamless System Integration: Built with widely available components and tested for compatibility as a drop-in replacement for legacy systems.

Extended Application Range: Adaptable to various detector types, improving stability in diverse radiation detection environments and reducing high voltage drift effects.

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NNSA National Nuclear Security Administration

Technology Description

The KM200 is a high-efficiency pre-amplifier designed to replace the discontinued Amptek A-111, providing improved signal processing for radiation detection systems. It features a faster bipolar shaper and advanced discriminator circuitry, eliminating double pulsing and reducing noise while maintaining signal integrity at high count rates.

Its optimized circuit design allows for precise pulse shaping, improving measurement resolution and neutron detection efficiency. The KM200 is also configurable for different detector types, enabling adjustments for varying signal conditions. These enhancements make it a reliable alternative to legacy amplifiers, ensuring stable and accurate performance in demanding radiation detection environments.

Market Application

The KM200 is poised to meet critical needs in

- **Nuclear Safeguards and Security:** Enhancing accuracy in neutron and gamma-ray detection for plutonium assays, fuel cycle analysis, and waste management.
- **Medical Imaging:** Augmenting PET and SPECT systems by amplifying low-level radiation signals.
- **Radiation Monitoring:** Improving compliance in radiation monitoring where Amptek A-111 was previously used.
- **Research Labs:** Supporting experiments in particle physics and nuclear research, ensuring sensitive and precise measurements.
- **Security and Defense:** Detecting radioactive materials for border security, emergency response, and critical infrastructure protection.
- **Industrial Quality Control:** Enabling non-destructive testing in manufacturing, critical for detecting minimal radiation levels.
- **Space and Astronomy:** Detecting cosmic rays and high-energy particles in space exploration and research.

Next Steps

Further validation of the KM200 is underway in high-EMI environments and extreme temperature conditions to ensure reliability across diverse applications.

We are seeking licensing and partnership opportunities with radiation detection companies, instrumentation manufacturers, and detector system integrators to manufacture and deploy the KM200.

Ideal partners will support continued development by

- enhancing system performance through improved power regulation, filtration, and differential output options;
- optimizing usability by pre-configuring pulse shapers for different detector types; and
- manufacturing and scaling production for integration into radiation detection systems used in nuclear safeguards, medical imaging, radiation monitoring, and security applications.

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