

THE DOMINO NEUTRON DETECTOR: UTILIZING MICROSTRUCTURED SEMICONDUCTOR NEUTRON DETECTOR (MSND®) TECHNOLOGY

Blog Post

Neutron detection is a critical component in various industries such as nuclear power, oil and gas exploration, and radiation safety. In recent years, there has been a strong demand for thin form factor neutron detectors with the flexibility to adjust the available detection area. To meet this demand, RDT has developed the [Domino® detector](#), which utilizes microstructured semiconductor neutron detector (MSND®) technology. Additionally, this technology is also used in BNC isotope identifiers, which are commonly used in nuclear power plants, nuclear medicine, and other applications where the identification of specific isotopes is required. BNC isotope identifiers using MSND® technology provide accurate and reliable neutron detection with a small form factor and low power consumption.

The MSND® technology is based on the ${}^6\text{Li}$ conversion process, which yields a thermal neutron detection efficiency of 30%. This high efficiency makes the Domino® detector ideal for use in applications where sensitivity and accuracy are critical. Additionally, the use of an optimum HDPE moderator for a ${}^{252}\text{Cf}$ neutron source at 1-m distance results in a 3-4 cm thickness in front and 3-6 cm behind the MSND® sensor, making the Domino® detector an excellent choice for applications where space is limited.

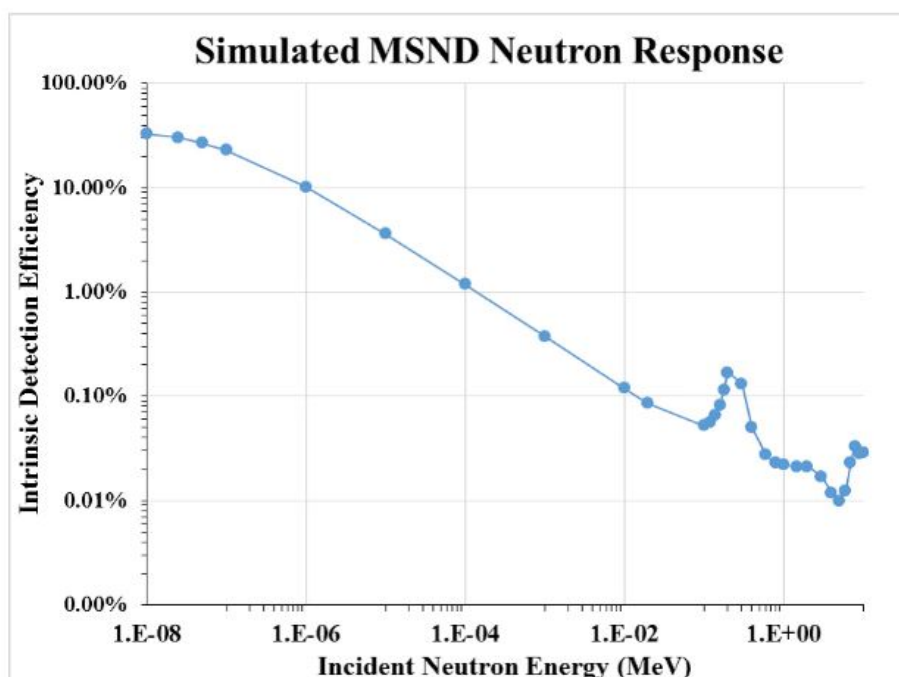


Figure 1 Simulated MSND Neutron Response

One of the key features of the Domino® detector is its small form factor. Each module has a 4 cm² detection area, making it easy to integrate into a wide range of applications. Additionally, the detector has a low power consumption of < 0.3 mW, making it an energy-efficient option. The detector also features a digital output per module, which allows for easy integration into existing systems. Additionally, the digital outputs of the Domino® may be tied together in a tiled format, which makes it easy to expand the detection area as needed.



Figure 2 Scale

"Scale." (n.d.) *Rotunda Scientific Technologies*, 23 January 2023 from <https://www.rotundascitech.com/products/domino-neutron-detector>

The onboard electronics package of the Domino® detector includes a preamplifier, shaping amplifier, discriminator, analog-to-digital converter, temperature sensor, and voltage regulator. This package provides a high level of functionality while keeping the overall size and power consumption of the detector low. The temperature sensor and voltage regulator also ensure that the detector is stable and reliable, even in harsh environments.

The Domino® detector is an excellent choice for a wide range of applications due to its high thermal neutron detection efficiency, small form factor, and low power consumption. The use of MSND® technology and an optimum HDPE moderator results in a detector that is sensitive and accurate, while the onboard electronics package provides a high level of functionality. Additionally, the digital output and tiled format make the Domino® detector easy to integrate into existing systems. RDT's Domino® detector is an ideal choice for those looking for a high-performance, flexible, and compact neutron detector.

