
A. Stratilatov, S. Cornaby

Moxtek, Inc. 452 West 1260 North, Orem, Utah 84057, USA

E-mail: astratilatov@moxtek.com

In practice, the high resolution semiconductor detectors often function very close to different sources of mechanical vibrations and electromagnetic interference that affect the detectors and the very sensitive front-end electronics. Many efforts have been made over several years and several groups to develop different methods of the microphonic noise minimization and filtering. However we didn’t find detailed study of the influence of the external interference on the detector energy resolution, and in this work we present our approach to the problem.

This work was devoted to the experimental study and development of the semi-empirical mathematical model of the effect of microphonic and other types of external periodic disturbances on high resolution semiconductor detectors performance.

We found that the periodic external interference not only affects the detector energy resolution much greater than the intrinsic noise sources, but additionally changes the shape of the detector energy resolution dependence as a function of the peaking time.

We propose the mathematical model that was tested on several detectors affected by external interferences of different frequencies and nature, namely electrical periodic interferences and mechanical vibrations (microphonics), and demonstrated a good agreement with the experimental results.

This model can be useful for the detector systems diagnostics, and for the search of a source of the external disturbance.