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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 23729-2009

Photodiodes for scintillation detectors -- Test procedures

闪烁探测器用光电二极管 试验方法

(English Translation)

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Table of Contents

- Foreword
- Introduction
- 1 Scope
- 2 General principles
- 3 Normative References

Foreword

This standard is identical with IEC 62088:2001 "Nuclear Instruments --- scintillation detector test methods photodiode" (Nuclear instrumentation-Photodiodesforscintillationdetectors-Testprocedures, the English version 1).

For ease of use, this standard made the following editorial changes.

--- Deleting IEC 62088:2001 Foreword and directory;

--- Adjustment of a few parameters on the symbol, subscript, and use the decimal symbol instead of as a decimal comma " , " . " , " ;

--- In the calculation formula parameters description, with a long dashes "---" instead of "yes";

--- Chapter 8, the heading "General requirements --- Data Sheet" to "supplier shall provide the data," and in the "operating temperature range $T_{max} \sim T_{min}$ and storage temperature range "after an increase in" Operating humidity range $H_{max} \sim H_{min}$ and storage humidity range "and" Working pressure Range $P_{max} \sim P_{min}$ and storage pressure range "(symbol corresponding increase in 4.2).

The standard proposed by China National Nuclear Corporation.

This standard by the National Standardization Technical Committee on nuclear instrumentation.

This standard was drafted. Nuclear Industry Standardization Institute, China Institute of Atomic Energy, Beijing Nuclear Instrument Factory.

Introduction

Scintillation detector photodiode is a semiconductor photodiode (usually silicon PD) scintillation detector, when the incident radiation (charged Particles, gamma rays, X-rays) in the scintillator releases energy for detecting scintillator (usually crystals) scintillation light

generated (see Fig. 1).

Photomultiplier tube (PMT) have been generally used for this purpose (for decimal notation), but with low noise and a relatively large area photodiode Tube latest in which an increase in the number of applications to obtain certain advantages inherent performance and other aspects of working with the photomultiplier tube fierce competition.

- Small size;
- Insensitive to magnetic fields;
- Low operating voltage and low power consumption;
- Higher seismic capacity.

GB/T 23729-2009/IEC 62088:2001 Photodiode scintillation detectors with Test Method

1 Scope

This standard is applicable for use in scintillation detectors or solid Cherenkov detector photodiode (PD) or a photodiode array (PDA). Standard Test Method for this recommendation also applies to the avalanche diode (APD), but require additional special tests described in this standard method.

Test described in this standard is not mandatory, but the program should be tested according to the provisions described herein properties.

This standard is intended for use in photovoltaic scintillation detector diode to establish standard test method also provides the supplier shall provide each data type photodiode.

2 General principles

Silicon photodiodes readily available and widely used in scintillation detectors. However, their response to peak around 900nm with common scintillator [NaI (TI), CsI (TI), BGO, CdWO₄, ZnSe (Te)] does not match the maximum emission at a shorter wavelength. Ongoing research is open Hair having a scintillator and a wider bandgap semiconductor longer wavelength light emission.

Photodiode scintillation detector has no internal amplifier (except in the case of APD), which is coupled to a similar need for a semiconductor probe the low-noise preamplifier. Noise photodiode/preamplifier combinations limit its measured low energy gamma-ray and X-ray spectroscopy in use. The noise generated by the area with the increased noise PD series capacitance and leakage current and the preamplifier input impedance Parallel noise determined. Preferably a photodiode/preamplifier combination, sometimes preamplifier integrated with PD. At this Under case, certain tests described herein may be difficult to perform.

Solid state photodiodes can also be used as direct ionization of semiconductor detectors, but this does not apply to standard IEC 60333 has been included in this of applications.

This standard does not apply to hybrid photodetector that with conventional photo-cathode, an electric field to accelerate the vacuum tube and solid-state devices.

Figure 1 photodiode scintillation detector system block diagram

3 Normative References

The following documents contain provisions which, through reference in this standard and become the standard terms. For dated references, subsequent Amendments (not including errata content) or revisions do not apply to this standard, however, encourage the parties to the agreement are based on research GB/T 23729-2009/IEC 62088:2001