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Semiconductor devices - Measurement and evaluation methods of kinetic energy harvesting devices under practical vibration environment - Part 3: Human foot impact motion

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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IEC 63150-3 has been prepared by IEC technical committee TC47: Semiconductor devices. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
47/2948/FDIS	47/2966/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 63150 series, published under the general title *Semiconductor devices Measurement and evaluation methods of kinetic energy harvesting devices under practical vibration environment*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,
– withdrawn, or
– revised.

1 Scope

This part of IEC 63150 specifies terms and definitions, and test methods of impact-driven energy harvesting devices of which electric energy is generated by impact force of human walking or running motion under practical human motion. This document is applicable to impact-driven energy harvesting devices embedded in wearables, especially, shoe-mounted energy harvesters, whose main element of the power generation is the impact energy. This measuring method is independent of power generation principles (such as piezoelectric, electrostatic, triboelectric, electromagnetic, etc.). According to typical human motion, power generation performance is measured in the condition of large-amplitude and low-frequency external mechanical excitation.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

– IEC Electropedia: available at https://www.electropedia.org/
– ISO Online browsing platform: available at https://www.iso.org/obp

3.1
impact-driven energy harvesting devices
miniaturized electric power generators by mechanical motion input

Note 1 to entry: Typical energy transforming methods are piezoelectric, electrostatic, triboelectric, and electromagnetic systems.

4 Test bed of impact-driven energy harvesting devices

4.1 General

This measurement method applies to the impact-driven energy harvesting devices which transform mechanical kinetic energy to electrical energy by energy conversion systems (e.g., piezoelectric, electrostatic, electromagnetic system). The power generation characteristics of output voltage and power are measured as a function of input parameters of impulsive forces (e.g. acceleration and duration of the half-cycle sine pulse). Input impulsive forces are determined by typical human foot motions of walking and running conditions. Figure 1 provides a fundamental configuration of test bed for impact-driven energy harvesting devices. Details of the functional blocks or components named in the key to Figure 1 are provided in 4.2 to 4.8.