SLOVENSKI STANDARD
oSIST prEN IEC 63364-1:2022

01-marec-2022

Polprevodniški elementi - Polprevodniški elementi za sistem IOT - 1. del: Preskusna metoda zaznavanja zvočnih variacij

Semiconductor devices - Semiconductor devices for IOT system - Part 1: Test method of sound variation detection

Dispositifs à semiconducteurs - Dispositifs à semiconducteurs pour système IOT - Partie 1: Méthode d'essai de détection de variation acoustique

Ta slovenski standard je istoveten z: prEN IEC 63364-1:2021

ICS:

31.080.01	Polprevodniški elementi (naprave) na splošno	Semiconductor devices in general

oSIST prEN IEC 63364-1:2022 **en**

47/2742/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 63364-1 ED1**	
DATE OF CIRCULATION: **2021-12-24**	CLOSING DATE FOR VOTING: **2022-03-18**
SUPERSEDES DOCUMENTS: **47/2701/CD, 47/2741/CC**	

IEC TC 47 : SEMICONDUCTOR DEVICES

SECRETARIAT: Korea, Republic of	SECRETARY: Mr Cheolung Cha
OF INTEREST TO THE FOLLOWING COMMITTEES: ISO/IEC JTC 1/SC 41	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

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TITLE:

Semiconductor devices – Semiconductor devices for IOT system – Part 1: Test method of sound variation detection

PROPOSED STABILITY DATE: 2027

NOTE FROM TC/SC OFFICERS:

At the WG 6 online meeting on 2021-10-05, the project leader presented a resolution on the CD document and proceeding to the next stage (CDV) was approved.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SEMICONDUCTOR DEVICES – SEMICONDUCTOR DEVICES FOR IOT SYSTEM –

Part 1: Test method of sound variation detection

FOREWORD

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International Standard IEC 63364-1 has been prepared by IEC technical committee 47:Semiconductor devices.

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

CD	Report on voting
47/XXXX/CD	47/XXXX/RVD

Full information on the voting for the approval of this International Standard 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 http://www.iec.ch/standardsdev/publications.

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,
- replaced by a revised edition, or
- amended.

SEMICONDUCTOR DEVICES –

SEMICONDUCTOR DEVICES FOR IOT SYSTEM

Part 1: Test method of sound variation detection

1 Scope

This part of IEC 63364-1 provides terms, test method, and report of sound variation detection system based on IoT. It provides the evaluation method for each part of the sound variation detection system based on IoT in the block diagram, the characterization parameters, symbols, test setups and the conditions. In addition, this document defines the configuration items and criteria of standard space and firing situation for the quality evaluation measurement of sound field variation detection system with IoT.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

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

3.1
transfer function
response characteristics function of sound pressure which transfers to microphone in the securing sound space

3.2
standard space
securing sound space which is controlled and frequency pre-scanned for the occurrence of event

3.3
SNR
signal to noise ratio value which is defined by the ratio of the value of event occurred and without the event

3.4
frequency shift index
characteristic frequency shift value for the event occurred

4 Evaluation method and test setup

4.1 General

Changing sound field composed of low-cost speaker and microphone in the sensor module, a sound field is generated by the speaker in the standard space. The extent to which the generated sound field is distorted by firing objects that measures and detects with a microphone, in a dark environment. The extent is about the primary space when events are monitored. In this securing space the modelling is described by governing equation of acoustic wave propagation and boundary conditions of wave source, speed and wave pressure. Figure 1 show a sound field sphere.

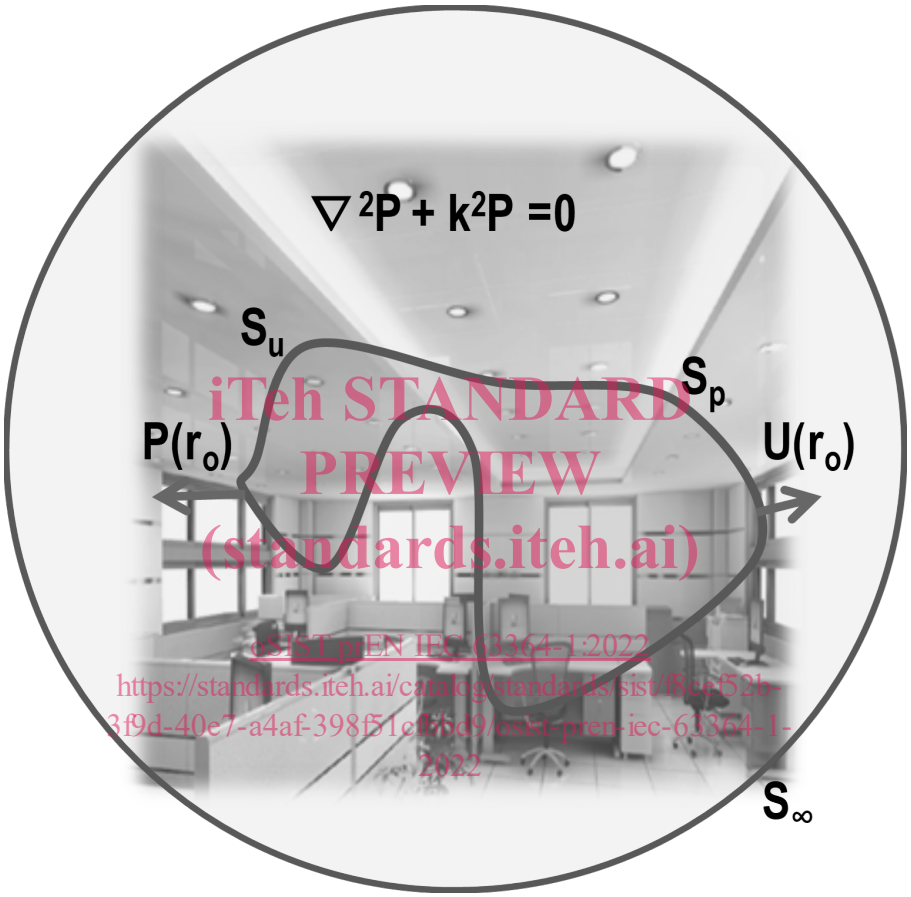

Figure 1 – Sound field space with boundary conditions and governing equation

4.2 Equipment and tools

The equipment for a sound variation detection system requires a set of the speaker and microphone which are placed on each corner of the securing space. An event is located at the arbitrary position as shown in Fig. 2 (left). The multi-tone sound source composed of 17 sine waves around a central frequency of 4 kHz with an interval. The sound pressure data are acquired by a data acquisition module, and the data are processed simultaneously. A sound signal with a 0.5 s duration are measured and 25600 sampling data are used to obtain the sound pressure level data with a sampling frequency of 51200 Hz. In addition, the frequency resolution is 2 Hz for the FFT spectra. The sound pressure level spectra are measured at multi-tone frequencies of 17 channel ranging from3968 to 4032 Hz with a frequency step of 4 Hz. The sound pressure level in the position of the distance of 10 cm from the front of a speaker is set to be 94 dB by controlling the volume of the speaker. The sound pressure level for the multi-tone frequencies is measured with a time interval of 0.5 min after the event source such as sound, temperature have been occurred.

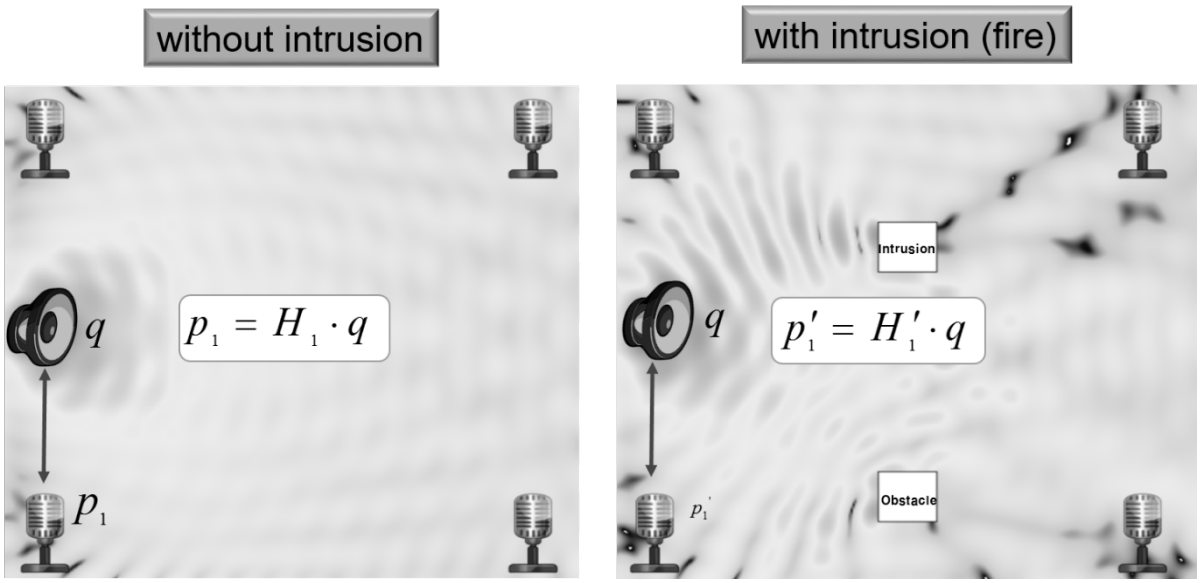

Figure 2 – Variation of transfer function due to obstacles in security area: Speaker and microphone are used to measure the transfer function of given space

4.3 Block diagram and semiconductor components

The sound detection system using sound variation field is consisted with detection sensor, sound source, and the electric circuit with microcontroller and DSP unit. Figure 3 shows a block diagram for sound variation detection system for IoT-based sound variation detection. The detection system should be tested for the uniformity of the sound source and fluctuation of the sound waves, the sensitivity of the sound detection sensors, data exchange rate between Amp. to DSP unit.

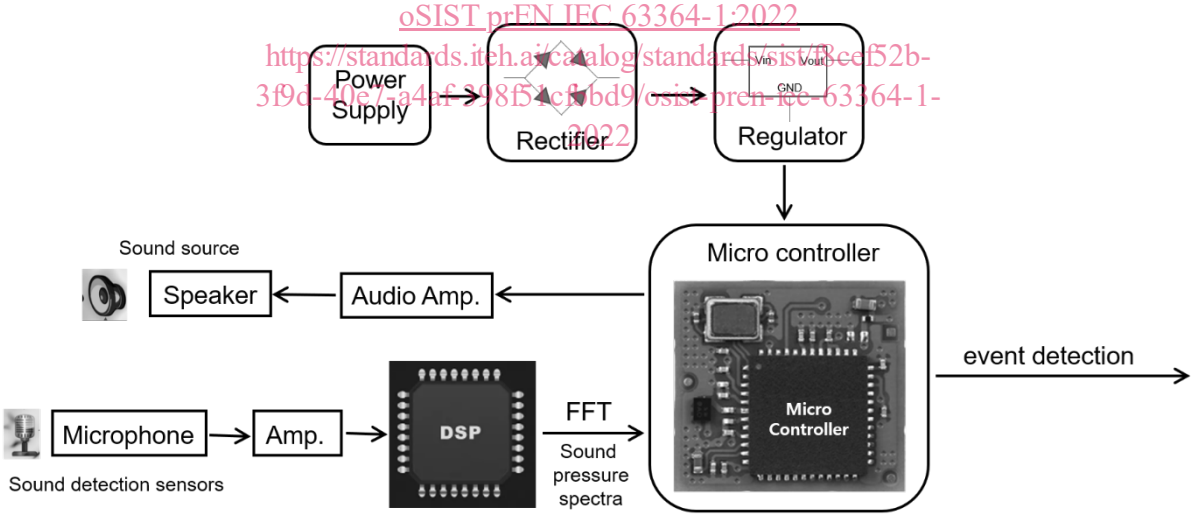

Figure 3 – The block diagram of the sound variation detection system for IoT-based event detection

4.3.1 Microphone sensor

Sound field variation detection system is consisted of microphone sensors for the sound variation detection. The microphone sensors are each required for a secured space such as closed room at least in order to get dependable data.

4.3.2 Speaker

The role of speaker is making uniform sound field. The sound field variation detection system is surveilling the secure space by the change of the sound field. The speaker should generate uniform sound field in the secure space.

4.3.3 Micro controller

In the sound variation detection system, the micro controller is needed to analyse the spectrum. The sound pressure level (SPL) spectrum is fluctuated by frequency and shifted by event occurring. The micro controller can analyse the range of SPL shift to confirm the event has been occurred or not.

4.3.4 Transmitting module

The transmitting module is required to monitor or to control the sound field variation detection system at the outside of the secure space. The sound field variation detection system is used on behalf of human watching. Therefore, the constant monitoring of secure space, the detection system should communicate the signal to the surveillance server system. The transmitting module sends the signal which is detected by the sound field variation detection system in the secure space.

4.4 Test methods

4.4.1 Cubic box

In order to test the sound field variation detection system, a cubic box with a length of 60 cm is used for a comparison with the simulation results. A gas lighter is used to simulate a temperature changing event. A 6 W speaker with a diaphragm of 3.5 cm in diameter is installed at the central hole of the left-side plane of the cube as shown in figure 4.

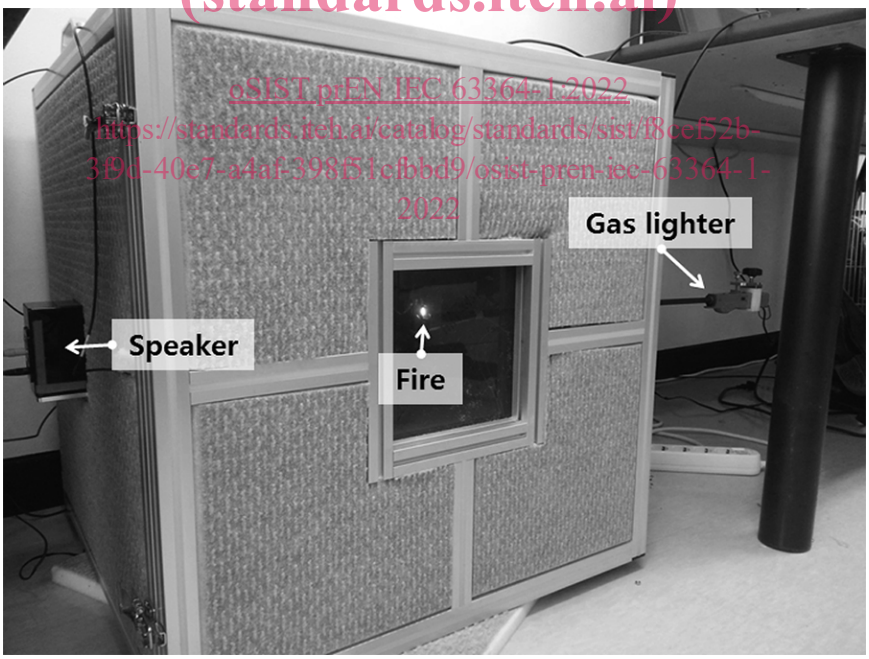

Figure 4 – A cubic box for experiment for sound field variation detection system

The detailed inner configuration is used for the experiment is shown in figure 5. A flame of the gas lighter is positioned at (10 cm, −10 cm) from the centre within the middle square plane of the cube. Two microphones (B&K 4958) are installed in the corners of the middle square plane, and are numbered from #1 to #2. Two thermometers are located 5 cm in front of the gas lighter and near the bottom plate to measure the air temperature of the boundary within the cubic box, as shown in Fig. 5. For measuring the temperature inside simultaneously the thermometer are placed in the cubic box.