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Ultrasonics – Measurements of electroacoustical parameters and acoustic output power of spherically curved transducers using the self-reciprocity method

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ULTRASONICS – MEASUREMENTS OF ELECTROACOUSTICAL PARAMETERS AND ACOUSTIC OUTPUT POWER OF SPHERICALLY CURVED TRANSDUCERS USING THE SELF-RECIPROCITY METHOD

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 62903, which is a Technical Specification, has been prepared by IEC technical committee 87: Ultrasonics.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
87/652/DTS	87/659/RVDTS

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this standard, the following print types are used:

- **terms defined in Clause 3: in bold type**.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://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- withdrawn,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.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

An ultrasonic transducer is an important acoustic device that can act as a transmitter or a receiver in the applications of medical ultrasound, non-destructive testing, and ultrasonic materials processing. The performance of a transducer is a decisive factor that governs the device's range of applicability, efficiency and quality control in the manufacturing. The mechanisms, transmitting fields, performances, and measurement methods used for these transducers have been studied over the past few decades. However, the electroacoustical characterization and measurement methods applied for spherically curved transducers have not been defined in standard documents for either terms or protocols.

This document defines the relevant electroacoustical parameters for these devices and establishes the self-reciprocity measurement method for spherically curved concave focusing transducers.

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1 Scope

This document, which is a Technical Specification,

a) establishes the free-field convergent spherical wave self-reciprocity method for ultrasonic transducer calibration,

b) establishes the measurement conditions and experimental procedure required to determine the transducer's electroacoustic parameters and acoustic output power using the self-reciprocity method,

c) establishes the criteria for checking the reciprocity of these transducers and the linear range of the focused field, and

d) provides guiding information for the assessment of the overall measurement uncertainties for radiation conductance.

This document is applicable to:

i) circular spherically curved concave focusing transducers without a centric hole working in the linear amplitude range,

ii) measurements in the frequency range 0,5 MHz to 15 MHz, and

iii) acoustic pressure amplitudes in the focused field within the linear amplitude range.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-801:1994, *International Electrotechnical Vocabulary – Chapter 801: Acoustics and electroacoustics*