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**General methods of measuring the
performance of ultrasonic pulse-echo
diagnostic equipment**

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Foreword

This Japanese Industrial Standard has been revised by the Minister of Health, Labour and Welfare and the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Electronics and Information Technology Industries Association (JEITA) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS T 1501 : 2005**), which has been technically revised.

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General methods of measuring the performance of ultrasonic pulse-echo diagnostic equipment

1 Scope

This Japanese Industrial Standard specifies the basic requirements for methods of measuring the performance of real-time medical ultrasonic imaging diagnostic equipment (hereafter referred to as **ultrasonic diagnostic equipment**) by **pulse-echo technique**.

2 Normative references

Part or all of the provisions of the following standards, through reference in this text, constitute provisions of this Standard. For standards indicated below, only the editions of the indicated year shall be applied and any revisions (including amendments) made thereafter shall not be applied.

JIS T 0601-2-37 : 2018 *Medical electrical equipment — Part 2-37 : Particular requirements for the basic safety and essential performance of ultrasonic medical diagnostic and monitoring equipment*

3 Terms and definitions

For the purpose of this Standard, the following terms and definitions, and those given in **JIS T 0601-2-37 : 2018**, Clause **201.3** apply.

The terms in bold letters in this Standard are those defined in this Standard and **JIS T 0601-2-37 : 2018**, Clause **201.3**.

3.1

echo

ultrasonic pulse reflected from the acoustic discontinuous part or acoustic inhomogeneous part of the test object

3.2

sensitivity time control, STC

change in amplifier gain with time by synchronizing with the transmitting and receiving cycles, introduced to compensate for loss in **echo** amplitude with increasing depth due to attenuation in tissue

Note 1 to entry It is also called time gain compensation (TGC).

3.3

M-mode

method of presentation of information in which the motion of structures along arbitrary lines on a **scan plane** is depicted to show the variation with time of the **echo** sig-

nal intensity

3.4

acoustic working frequency

principal frequency calculated on the acoustic pressure spectrum at the position corresponding to the spatial peak and temporal peak acoustic pressure

3.5

acoustic working frequency bandwidth

difference between frequencies f_1 and f_2 at which the amplitude of the acoustic pressure spectrum is 3 dB below the peak amplitude

3.6

acoustic scan line

linear basic unit of **echo** acquisition performed to form an **ultrasonic tomographic image**

3.7

axial resolution

minimum distance at which two targets at different depths on the **ultrasonic tomographic plane** can be displayed discretely

3.8

sample volume

domain in the **ultrasound beam**, which is sensitive to the Doppler signal to be measured

3.9

field-of-view

display domain of **ultrasonic tomographic image**

3.10

speckle pattern

image pattern produced by the interference of **echoes** from the scattering centres in **tissue-mimicking material**

3.11

slice thickness

width of the **ultrasound beam** in a direction perpendicular to the **ultrasonic tomographic image**

3.12

tissue-mimicking material

material in which the propagation velocity (speed of sound), reflection, scattering and attenuation characteristics of **ultrasound** are similar to those of the tissues of interest for the main application

3.13

scan plane

acquired image plane containing the **acoustic scan lines**

3.14

ultrasound

acoustic oscillation whose frequency is above the high-frequency limit of audible sound for humans (generally 20 kHz or higher)

3.15

ultrasonic tomographic image

image obtained by visualising a cross-section of the test object using **ultrasound**

3.16

transducer assembly

those parts of **ultrasonic diagnostic equipment** comprising the **ultrasonic transducer** and/or **ultrasonic transducer** element group, together with any integral components, such as an acoustic lens or integral stand-off

Note 1 to entry The **transducer assembly** is usually separable from the **ultrasonic diagnostic equipment** body.

3.17

nominal frequency of transducer assembly

ultrasonic frequency of operation of a **transducer assembly** specified by the manufacturer

3.18

ultrasound beam

acoustic energy emitted from a **transducer assembly** propagating through space with directivity

3.19

B-mode

method for displaying **ultrasonic tomographic image** by luminance according to the intensity distribution of the **echo** signal

3.20

pulse-echo technique

technique in which an **ultrasonic** pulse is transmitted to a test object and any **echo**