

INTERNATIONAL STANDARD

ISO/IEC
23008-9

First edition
2019-01

Information technology — High efficiency coding and media delivery in heterogeneous environments —

Part 9: 3D Audio conformance testing

Technologies de l'information — Codage à haut rendement et fourniture de supports dans les environnements hétérogènes —

Partie 9: Essais de conformité 3D Audio

WITH WHICH



Reference number
ISO/IEC 23008-9:2019(E)

© ISO/IEC 2019

Withdrawn



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	vii
Introduction	viii
1 Scope	1
2 Normative references	1
3 Terms, definitions and abbreviated terms	1
3.1 Terms and definitions	1
3.2 Abbreviated terms	2
4 MPEG-H 3D audio conformance testing	3
4.1 General	3
4.2 Profiles	3
4.3 Test procedure	3
4.3.1 General	3
4.3.2 Naming convention	4
4.3.3 Conformance test tools	6
5 MPEG-H 3D audio bitstreams	6
5.1 Characteristics, test procedure	6
5.2 MPEG-H 3D audio general configuration	7
5.2.1 mpegh3daConfig()	7
5.2.2 FrameworkConfig3d()	7
5.2.3 Signals3d()	7
5.2.4 SpeakerConfig3d()	7
5.2.5 mpegh3daFlexibleSpeakerConfig()	8
5.2.6 mpegh3daSpeakerDescription()	8
5.3 MPEG-H 3D core audio configuration	8
5.3.1 mpegh3daDecoderConfig()	8
5.3.2 mpegh3daSingleChannelElementConfig()	8
5.3.3 mpegh3daChannelPairElementConfig()	8
5.3.4 mpegh3daCoreConfig()	9
5.3.5 mpegh3daLfeElementConfig()	9
5.3.6 mpegh3daExtElementConfig()	9
5.3.7 mpegh3daConfigExtension()	10
5.3.8 SbrConfig()	10
5.3.9 Mps212Config()	10
5.4 MPEG-H 3D core audio frame	10
5.4.1 mpegh3daFrame()	10
5.4.2 mpegh3daSingleChannelElement()	11
5.4.3 mpegh3daChannelPairElement()	11
5.4.4 mpegh3daLfeElement()	11
5.4.5 mpegh3daExtElement()	11
5.4.6 ics_info()	12
5.4.7 mpegh3daCoreCoderData()	12
5.4.8 StereoCoreToolInfo()	12
5.4.9 fd_channel_stream()	13
5.4.10 lpd_channel_stream()	13
5.4.11 acelp_coding()	14
5.4.12 tcx_coding()	14
5.4.13 lpd_stereo_stream()	15
5.4.14 igf_stereo_pred_data()	15
5.4.15 igf_data()	15
5.4.16 tbe_data()	16
5.4.17 tw_data()	16
5.4.18 scale_factor_data()	16

5.4.19	tns_data()	16
5.4.20	ac_spectral_data()	16
5.4.21	arith_data()	16
5.4.22	fac_data()	16
5.4.23	code_book_indices()	17
5.4.24	UsacSbrData()	17
5.4.25	Mps212Data()	17
5.5	Fill element	17
5.6	MPEG surround configuration, SpatialSpecificConfig()	17
5.7	MPEG surround frame, SpatialFrame()	17
5.8	SAOC configuration, SAOCspecificConfig()	17
5.9	SAOC frame, SAOCFrame()	17
5.10	AudioPreRoll	17
5.10.1	Recursive presence of AudioPreRoll extension payload	17
5.10.2	AudioPreRoll()	18
5.11	Dynamic range control configuration	18
5.11.1	mpegh3daUniDrcConfig()	18
5.11.2	mpegh3daUniDrcChannelLayout()	18
5.11.3	drcCoefficientsUniDrc()	18
5.11.4	drcInstructionsUniDrc()	18
5.11.5	uniDrcConfigExtension()	18
5.12	Dynamic range control frame, uniDrcGain()	18
5.13	Object metadata configuration, ObjectMetadataConfig()	19
5.14	Object metadata frame	19
5.14.1	object_metadata_efficient()	19
5.14.2	object_metadata()	19
5.14.3	object_metadata_efficient()	19
5.14.4	intracoded_object_metadata_efficient()	19
5.14.5	differential_object_metadata()	20
5.14.6	offset_data()	21
5.14.7	object_metadata_low_delay()	21
5.14.8	intracoded_object_metadata_low_delay()	21
5.14.9	dynamic_object_metadata()	23
5.14.10	single_dynamic_object_metadata()	23
5.15	EnhancedObjectMetadataConfig()	24
5.16	EnhancedObjectMetadataFrame()	24
5.17	SAOC 3D Config	25
5.17.1	SAOC3DSpecificConfig()	25
5.17.2	SAOC3DgetNumChannels()	26
5.17.3	SAOC3DExtensionConfig()	26
5.17.4	SAOC3DExtensionConfigData()	26
5.17.5	SAOCExtensionConfig()	26
5.18	SAOC 3D frame	26
5.18.1	Saoc3DFrame()	26
5.18.2	SAOC3DFramingInfo()	26
5.18.3	EcDataSaoc()	26
5.18.4	ByteAlign()	26
5.18.5	SAOC3DExtensionFrame()	26
5.18.6	SAOC3DExtensionFrameData()	26
5.18.7	SAOCExtensionFrame()	27
5.18.8	HOAConfig()	27
5.18.9	HOADecoderConfig()	27
5.18.10	HOAEnhConfig()	27
5.18.11	HOADecoderEnhConfig()	27
5.18.12	getSubbandWidths()	28
5.19	HOA frame	28
5.19.1	HOAFrame()	28
5.19.2	HOAEnhFrame()	28

5.19.3	ChannelSideInfoData()	28
5.19.4	AddAmbHoaInfoChannel()	29
5.19.5	HOAGainCorrectionData()	29
5.19.6	VVectorData()	29
5.19.7	HOAPredictionInfo()	29
5.19.8	HOADirectionalPredictionInfo()	30
5.19.9	readDirPredDiffValues()	30
5.19.10	HOAParInfo()	30
5.19.11	readParDiffValues()	30
5.20	FMT converter frame, FormatConverterFrame()	31
5.21	Multi-channel coding tool config, MCTConfig()	31
5.22	Multi-channel coding tool frame	31
5.22.1	MultichannelCodingBoxRotation()	31
5.22.2	MultichannelCodingBoxPrediction()	31
5.22.3	MultichannelCodingFrame()	32
5.23	Tonal component coding configuration, TccConfig()	32
5.24	Tonal component coding frame	32
5.24.1	General	32
5.24.2	TccGroupOfSegments()	32
5.25	HREP config, HREPConfig()	33
5.26	HREP frame, HREPFframe()	33
5.27	ICG config, ICGConfig()	33
5.28	SignalGroupInformation Config, SignalGroupInformation()	34
5.29	DownmixMatrix	34
5.29.1	downmixConfig()	34
5.29.2	DownmixMatrixSet()	34
5.29.3	DownmixMatrix()	34
5.29.4	DecoderGainValue()	35
5.29.5	ReadRange()	35
5.29.6	EqualizerConfig()	35
5.30	Loudness info	36
5.30.1	mpegh3daLoudnessInfoSet()	36
5.30.2	loudnessInfo()	36
5.30.3	loudnessInfoSetExtension()	36
5.31	Audioscene info	36
5.31.1	mae_AudioSceneInfo	36
5.31.2	mae_Data()	37
5.31.3	mae_GroupDefinition()	37
5.31.4	mae_SwitchGroupDefinition()	38
5.31.5	mae_Description()	38
5.31.6	mae_ContentData()	38
5.31.7	mae_CompositePair()	38
5.31.8	mae_GroupPresetDefinition()	39
5.31.9	mae_ProductionScreenSizeData()	39
5.31.10	mae_LoudnessCompensationData()	40
5.31.11	mae_ProductionScreenSizeDataExtension()	40
5.31.12	mae_GroupPresetDefinitionExtension()	40
5.31.13	mae_DrcUserInterfaceInfo()	41
5.32	HOA matrix	42
5.32.1	HoaRenderingMatrixSet()	42
5.32.2	HoaRenderingMatrix()	42
5.32.3	DecoderHoaMatrixData()	42
5.32.4	DecoderHoaGainValue()	43
5.33	Restrictions depending on profiles and levels	43
5.33.1	General	43
5.33.2	Low complexity profile	43
6	MPEG-H 3D audio interfaces to the MPEG-H 3D audio decoder	47
6.1	Characteristics and test procedure	47

6.2	Interface for local setup information	47
6.2.1	mpegh3daLocalSetupInformation()	47
6.2.2	LoudspeakerRendering()	47
6.2.3	BinauralRendering()	48
6.2.4	LocalScreenSizeInformation()	48
6.3	Interface for user interaction	48
6.3.1	mpegh3daElementInteraction()	48
6.3.2	ElementInteractionData()	48
6.3.3	ei_GroupInteractivityStatus()	48
6.3.4	LocalZoomAreaSize()	49
6.4	Interface for loudness normalization and dynamic range control	49
6.5	Interface for scene displacement data, mpegh3daSceneDisplacementData()	49
7	MPEG-H 3D audio decoders	49
7.1	General	49
7.2	Basic conformance test conditions	50
7.2.1	Element configuration test condition	50
7.2.2	Sampling rate	51
7.2.3	Core mode tests [Fd Lpd Cct]	52
7.3	Additional test conditions	53
7.3.1	3D audio core (FD)	53
7.3.2	3D audio core (LPD)	60
7.3.3	3D audio core (FD and LPD)	64
7.3.4	Object rendering	71
7.3.5	Higher order ambisonics (HOA)	73
7.3.6	Signalling of HOA rendering matrix [Hmx]	78
7.3.7	Downmix matrix test condition (dwx)	78
7.3.8	Dynamic range and loudness control	80
7.3.9	AudioPreRoll() condition, immediate playout frame (IPF)	84
7.4	Decoder settings	84
7.4.1	Target layout(Lay-<x>)	84
7.4.2	Target loudness (Lou-<x>)	86
7.4.3	DRC effect type request (Eff-<x>)	87
7.4.4	Group preset request (Pr-<x>)	87
7.4.5	Conformance point (Cpo-<x>)	87
	Bibliography	88

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

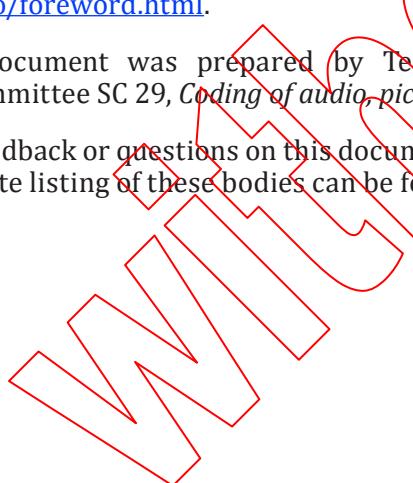
Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.



Introduction

This document specifies how tests can be designed to verify whether bitstreams and decoders meet the requirements as specified in ISO/IEC 23008-3 and allow interoperability with remote terminals in interactive, broadcast, streaming and local (with stored contents) sessions. These tests can be used for various purposes, such as:

- manufacturers of encoders, and their customers, can use the tests to verify whether the encoder produces bitstreams compliant with ISO/IEC 23008-3,
- manufacturers of decoders and their customers can use the tests to verify whether the decoder meets the requirements specified in ISO/IEC 23008-3 for the claimed decoder capabilities,
- manufacturers and customers of terminals supporting interactive, broadcast, streaming, and local sessions over a multitude of transport protocols and networks, can use the tests to verify whether the claimed functionalities are compliant with ISO/IEC 23008-3,
- manufacturers of test equipment, and their customers can use the tests to verify compliance with ISO/IEC 23008-3.



Information technology — High efficiency coding and media delivery in heterogeneous environments —

Part 9: 3D Audio conformance testing

1 Scope

This document specifies conformance criteria for both bitstreams and decoders compliant with the MPEG-H 3D audio standard as defined in ISO/IEC 23008-3. This is done to assist implementers and to ensure interoperability.

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.

ISO/IEC 23003-1:2007/Amd.1:2008, *Information technology — MPEG audio technologies — Part 1: MPEG Surround — Amendment 1: Conformance testing*

ISO/IEC 23003-2:2010/Amd.4:2016, *Information technology — MPEG audio technologies — Part 2: Spatial Audio Object Coding (SAOC) — Amendment 4: SAOC Conformance*

ISO/IEC 23003-3:2012, *Information technology — MPEG audio technologies — Part 3: Unified speech and audio coding*

ISO/IEC 23003-4:¹⁾, *Information technology — MPEG audio technologies — Part 4: Dynamic range control*

ISO/IEC 23008-3:²⁾, *Information technology — High efficient coding and media delivery in heterogeneous environments — Part 3: 3D audio*

ISO/IEC 23091-3, *Information technology — Coding-independent code points — Part 3: Audio*

1) Under preparation. Stage at the time of publication: ISO/IEC FDIS 23003-4:2018.

2) Under preparation. Stage at the time of publication: ISO/IEC FDIS 23008-3:2018.