

**APPLICATION
EXAMPLES
INCLUDED**



Code 60071

P.381-3 Headsets

ITU-T P.381-3, Tests for Digital and Analog Headsets

OVERVIEW

P.381-3 Headsets

Code 60071

ITU-T P.381-3, Tests for Digital and Analog Headsets

P.381-3 Headsets is an ACQUA standard containing specified measurements and requirements of Recommendations ITU-T P.381/P.382/P.383 for headsets. The ACQUA standard provides comprehensive tests for manufacturers to evaluate the signal and voice quality of analog and digital headsets (wired/wireless). It supports various types of connectivity – analog (TRRS), digital wired (USB), and digital wireless (Bluetooth® wireless technology).

KEY FEATURES

Implementation as ACQUA standard of:

- › Recommendation ITU-T P.381 (03/2023), Clause 8
- › Recommendation ITU-T P.382 (03/2023), Clause 8
- › Recommendation ITU-T P.383 (03/2023), Clause 9

Testing of analog headsets/headphones with 3.5 mm jack (TRS and TRRS)

Testing of headsets/headphones with digital interfaces:

- › USB
- › Bluetooth® wireless technology

Measurements for all bandwidths: narrowband, wideband, super-wideband, fullband

Testing of audio and voice call communication quality

APPLICATIONS

Automated testing of wired analog headsets and wired/wireless digital headsets according to Recommendations ITU-T P.381/P.382/P.383 (03/2023)

DETAILS

State-of-the-art headsets or headphones have analog or digital interfaces for connecting to terminals. While headphones are limited to media playback, headsets additionally support communication. This introduces additional challenges typically associated with telecommunication. ITU-T Recommendations P.381/P.328/P.383 specify test methods and performance requirements for both communication and media playback scenarios. The measurements and requirements for headsets in Recommendation ITU-T P.381/P.382/P.383 have been adopted in ACQUA standard P.381-3 Headsets for compliance assessment of appropriate devices.

DESCRIPTION

Equipment

The P.381-3 Headsets test suite is applied in the ACQUA software and provides measurements and analyses for headsets according to Recommendation ITU-T P.381/P.382/P.383. The *labCORE* and HIB I hardware platforms transmit signals from devices to ACQUA for recording and analysis, and transmit signals from ACQUA to devices for playback. For over-ear headsets and on-ear headsets, HMS II.3 and HMS II.3 LN artificial heads are sufficient. If testing earbuds or in-ear headsets, the application of HMS II.3 LN HEC is recommended because of its type 4.4 pinna according to Recommendation ITU-T P.57. The type 4.4 pinna provides a human-like ear canal which makes in-ear headsets or earbuds fit even better. The 3PASS *lab* background noise simulation software generates realistic background noise for the performance of voice call communication of the headset under test.

Structure

The ACQUA standard divides into two ACQUA projects according to the specifications of the device under test. One project (Analog P.381-2) covers measurements and requirements for wired analog headsets according to Recommendation ITU-T P.381/P.382. The other project (Digital P.383) provides measurements and requirements for wired or wireless digital headsets according to Recommendation ITU-T P.383.

DATABASE CONTENTS

Measurements with Requirements According to Recommendation ITU-T P.381

Communication mode:

- › Frequency response
- › Sensitivity
- › Idle channel noise
- › Distortion
- › Headset terminal coupling loss (echo performance)

Multimedia playback mode:

- › Sensitivity
- › Distortion
- › Crosstalk

Measurements with Requirements According to Recommendation ITU-T P.382

Communication mode:

- › Frequency response
- › Sensitivity
- › Idle channel noise
- › Distortion
- › Headset terminal coupling loss (echo performance)

Multimedia playback mode:

- › Sensitivity
- › Distortion
- › Crosstalk

Multimedia record mode:

- › Frequency response
- › Maximum acoustic input (frequency response)
- › Distortion at maximum acoustic input

Measurements with Requirements According to Recommendation ITU-T P.383

Headset without Signal Processing

Communication mode:

- › Frequency response
- › Idle channel noise
- › Distortion
- › Weighted terminal coupling loss (echo performance)

Multimedia playback mode:

- › Sensitivity
- › Distortion
- › Crosstalk

Headset with Signal Processing

Communication mode:

- › Loudness rating
- › Frequency response
- › Idle channel noise
- › Sidetone masking rating
- › Sidetone delay
- › Distortion
- › Noise cancellation
- › Terminal coupling loss (echo performance)

GENERAL REQUIREMENTS

All ACQUA Projects

Hardware Platform

*lab*CORE (Code 7700)

- › Modular multi-channel hardware platform
- core*BUS (Code 7710)
- › *lab*CORE I/O bus mainboard
- core*OUT-Amp2 (Code 7720)
- › *lab*CORE power amplifier board
- core*IN-Mic4 (Code 7730)
- › *lab*CORE microphone input board

Head and Torso Simulator

One of the following Head Measurement Systems:

HMS II.3 (Code 1703)

- › Head Measurement System, basic version with right ear simulator, 3.3 pinna, and artificial mouth

HMS II.3 LN (Code 1703.1)

- › Head Measurement System, low-noise version with right ear simulator, 3.3 pinna, and artificial mouth

HMS II.3 LN HEC (Code 1703.2)

- › Head Measurement System, low-noise version with right human-like ear canal simulator, and artificial mouth

HMS II.3 ViBRIDGE (Code 1703.3)

- › Head Measurement System, low-noise, with human-like ViBRIDGE (bone conduction simulation) ear simulators (left and right), and artificial mouth

Left Ear Simulator for Testing Binaural Headsets

One of the following Head Impedance Simulators:

For HMS II.3

- › HIS L (Code 1701)
 - » Head Impedance Simulator, left

For HMS II.3 LN

- › HIS L LN (Code 1701.1)
 - » Head Impedance Simulator, left, low-noise version

For HMS II.3 LN HEC

- › HIS L LN HEC (Code 1701.2)
 - » Head Impedance Simulator, left, low noise, human-like ear canal version

Continued on next page

- › Activation
- › Temporal echo effects
- › Double Talk performance

Multimedia playback mode:

- › Sensitivity
- › Frequency response
- › Noise level
- › Distortion
- › Crosstalk

HEADSET FIT

Online Analysis

Online analysis is available with ACOPT 19 in ACQUA. It provides the feature to display an FFT of the live recording from sensors connected to *labCORE*. The FFT live view of the ear microphones supports finding the ideal headset position for sealing the ear canal and synchronizing the input level of left and right ear.

OPTIONS

Hardware

- HRT I (Code 6498)
- › HEAD acoustics Remote-operated Turntable

Software

- ACOPT 19 (Code 6842)
- › Option Online analysis
- coreBT2-AAC-LDAC (Code 7783)
- › *labCORE* Bluetooth AAC and LDAC Codec Option (coreBT2 required)
- coreBT2-LC3plus-A2DP (Code 7784)
- › *labCORE* Bluetooth LC3plus Option for A2DP (coreBT2 required)
- coreBT2-LC3-HFP (Code 7785)
- › *labCORE* Bluetooth LC3 Option for HFP (coreBT2 required)
- coreBT2HID (Code 7786)
- › *labCORE* Bluetooth Human Interface Device (coreBT2 required)

GENERAL REQUIREMENTS

Operating Software

One of the following software applications:

- ACQUA (Code 6810)
- › Advanced Communication Quality Analysis Software, full license version
- ACQUA Compact (Code 6860)
- › Compact test system

Analog P.381-2

Headset Interface

- HIB I (Code 6002)
- › Headset interface box

Third-Party Equipment for Multimedia Record Mode

- 2 × Measurement microphone
- Reference loudspeaker or artificial mouth

Digital P.383

Headset Interface

One of the following interfaces for connecting the headset:

- USB
- › Included in *labCORE* (Code 7700)
- Bluetooth
- › coreBT2 (Code 7782)
 - › *labCORE* I/O module, Bluetooth reference access point, version 2

Noise Cancellation Tests

- 3PASS *lab* (Code 6990)
- › Advanced background noise simulation system with automated equalization – *lab* version
- Narrowband and wideband measurements
- › ACOPT 21 (Code 6844)
 - › Option 3QUEST – 3fold Quality Evaluation of Speech in Telecommunication (narrowband/wideband)
 - › Measurement microphone (third party equipment)

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RELEASE NOTES

Database revision and specification version		
Database revision	Based on specification	ACQUA version
Revision 01	ITU-T P.381 (03/2023) ITU-T P.382 (03/2023) ITU-T P.383 (03/2023)	at least 6.1.100 + Update 2

GENERAL REQUIREMENTS

Super-wideband and fullband measurements

- › ACOPT 09 (Code 6819)
 - » Option SLVM P.56
- › ACOPT 35 (Code 6866)
 - » Option 3QUEST super-wideband/fullband according to ETSI TS 103 281, Model A

Echo During Double Talk

ACOPT 32 (Code 6859)

- › Option Speech-based Double Talk analysis

SCOPE OF DELIVERY

ITU-T P.381-3 Headsets (Code 60071)

- › delivered as ACQUA database backup
- V2C file
- › License file for ACQUA dongle

Revision history

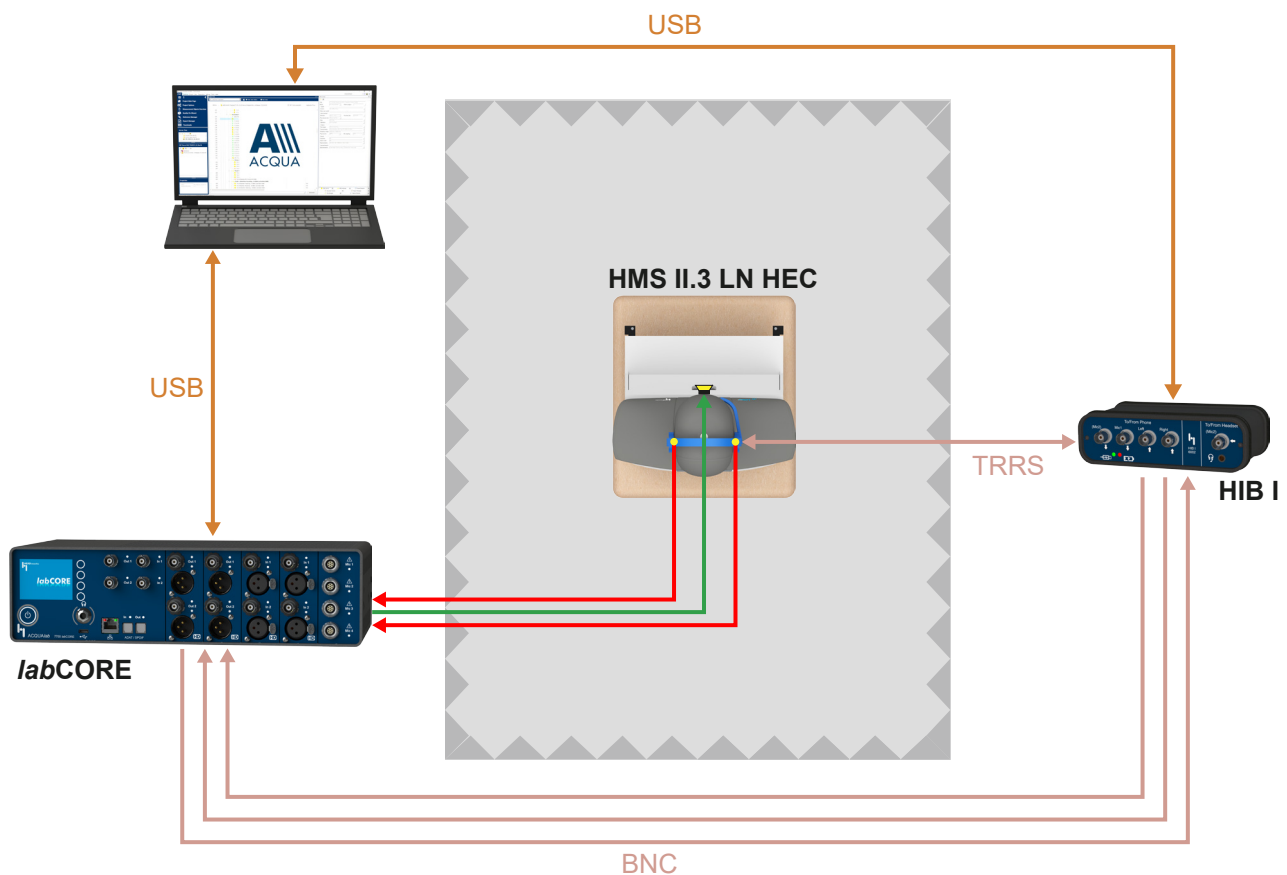
- › PDF file

IN PRACTICE

APPLICATION EXAMPLES

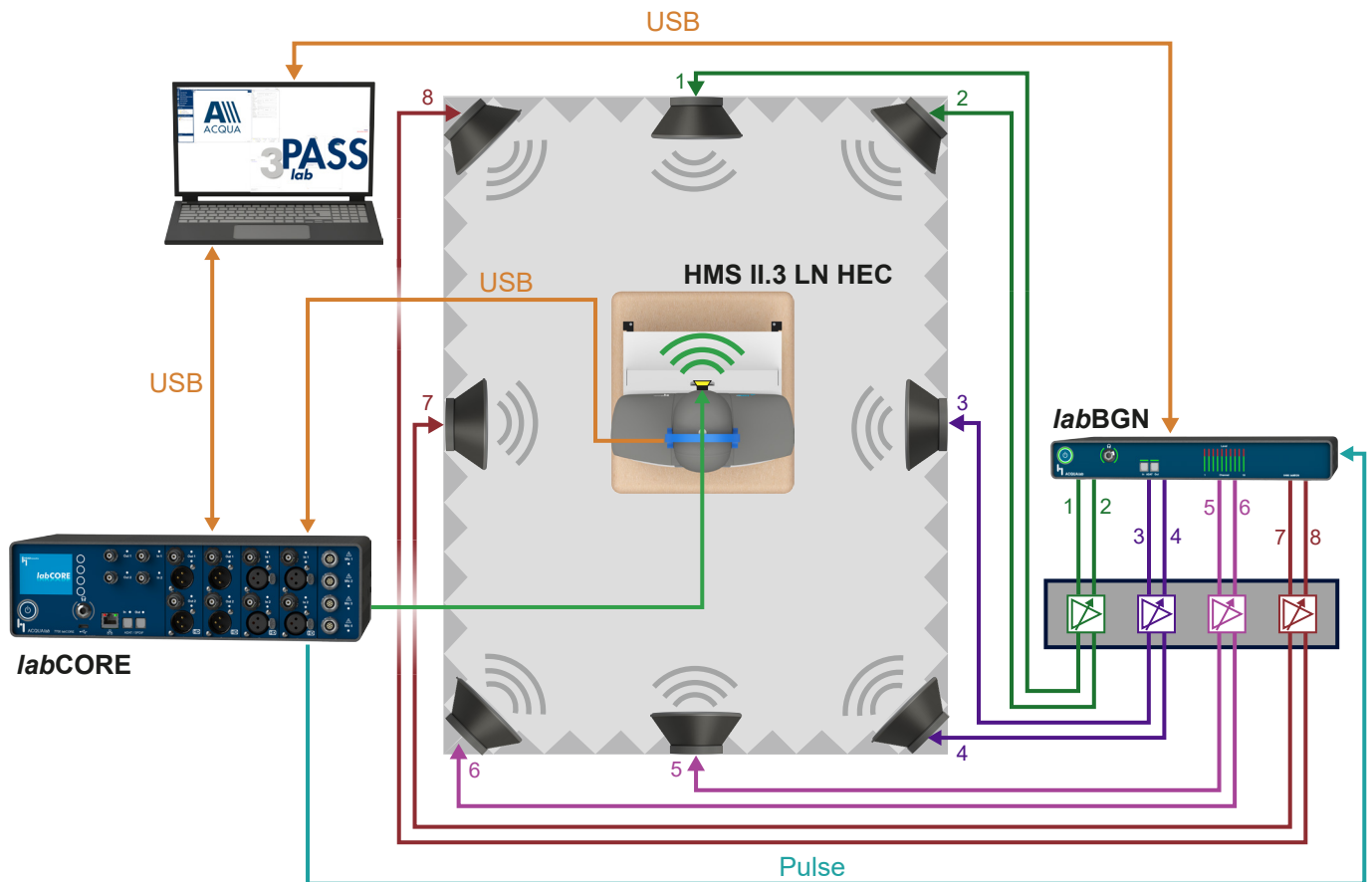
Testing Configuration for an Analog Headset according to Recommendations ITU-T P.381/P.382

This configuration presents testing of an analog headset. The headset is connected to the Headset Interface Box (HIB I) via TRRS (3.5 mm jack). HIB I receives signals from the headset microphone and forwards them to *labCORE*. Vice versa, *labCORE* transmits signals to HIB I which forwards them to the headset. Furthermore, *labCORE* is connected to HMS II.3 LN HEC for recording (artificial ears) and playback (artificial mouth). ACQUA controls *labCORE* and HIB I. It generates signals for playback and analyzes recorded signals.



Testing Configuration for a Digital Headset according to Recommendation ITU-T P.383

This configuration presents testing of a digital headset that includes (advanced) signal processing capabilities. The headset connects via Bluetooth to *labCORE*. *labCORE* transmits generated signals from ACQUA to HMS II.3LN HEC (artificial mouth). Further, *labCORE* receives signals via USB recorded by the headset and forwards them to ACQUA for analysis. Background noise is simulated by 3PASS *lab*. For full repeatability of measurements, background noise playback is synchronized by *labCORE* through a pulse connection to *labBGN*. ACQUA is the control software for generating, recording, and analyzing signals. The recorded signal is analyzed by the 3QUEST (3-fold Quality Evaluation of Speech in Telecommunications) algorithm according to ETSI TS 103 281 (Model A).



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