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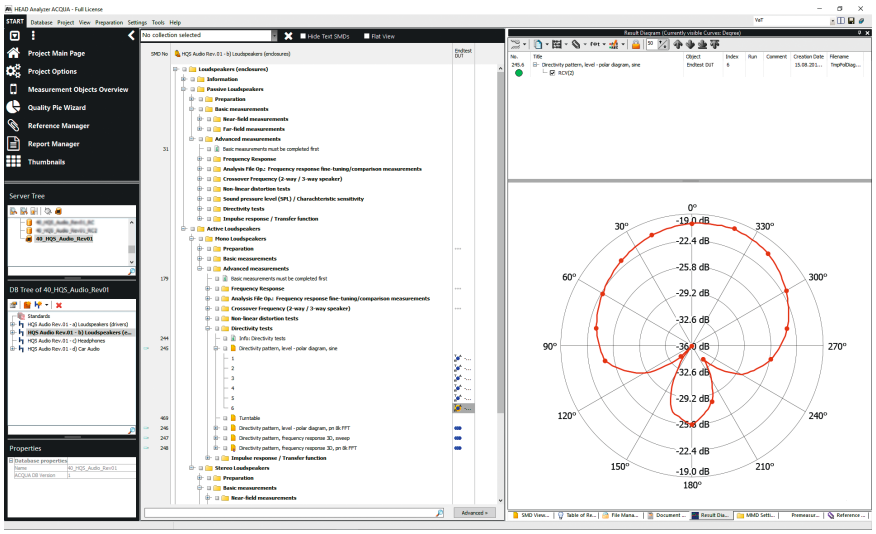
DATA SHEET

HQS-Audio (Code 60051)

HEAD acoustics Quality Standard, Electroacoustic tests of audio devices



Directivity pattern in ACQUA (polar diagram, exemplary)

Overview

HEAD acoustics developed the quality standard HQS-Audio for the analysis of electroacoustical parameters of loudspeakers, smart speakers, in-car systems or headphones. The key features within the included measurements are:

- Automated measurement sequences for all applications
- Tests of directivity characteristics for enclosed loudspeakers
- Calculation of Thiele/Small parameters of loudspeaker drivers
- Relative Approach analysis for all applications
- Performance test for passive noise isolation and active noise cancellation of headphones

The database of HQS-Audio is implemented in the advanced communication quality analysis software ACQUA.

Description

HQS-Audio is a measurement standard that has been developed exclusively by HEAD acoustics to test and analyze electroacoustical parameters of audio devices. It contains four projects for different applications (loudspeaker drivers, loudspeaker enclosures, headphones, in-car audio systems). The projects are subdivided into basic and advanced measurements. Convenient and informative instructions guide the user through the measurement sequence. Implemented scripts with graphical user interfaces simplify the definition of customized variables and documentation.

Execute, control and set up the measurements via the analysis software ACQUA. The hardware platform *lab*CORE is equipped with various interfaces for signal transmission. HEAD acoustics provides all necessary measurement equipment for the different applications.

Applications

- Testing of speaker drivers
- Testing of enclosed speaker drivers
- Testing of smart speakers
- Testing of headphones
- Testing of in-car audio systems

Measurement projects

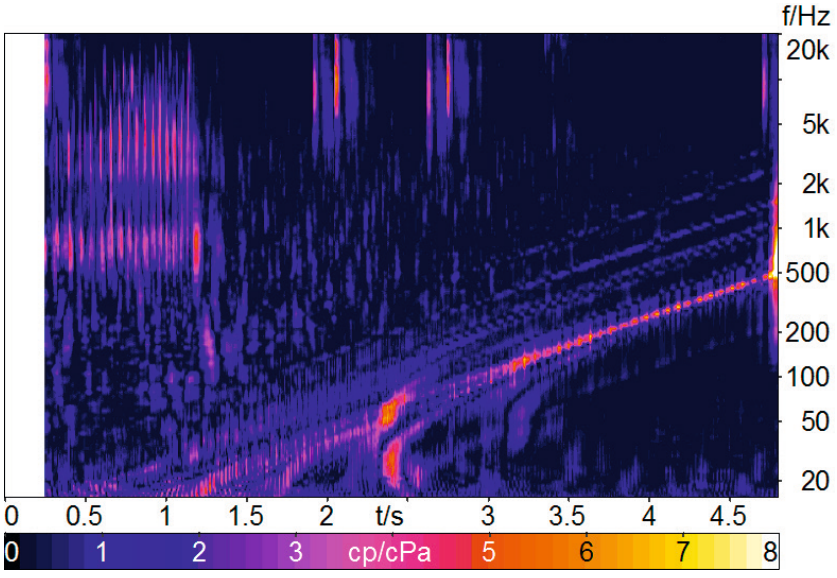
There are four measurement projects following the same pattern. Each project contains preparatory, basic and advanced measurements. Some of the basic measurements are necessary prerequisites for the advanced measurements.

Loudspeaker drivers

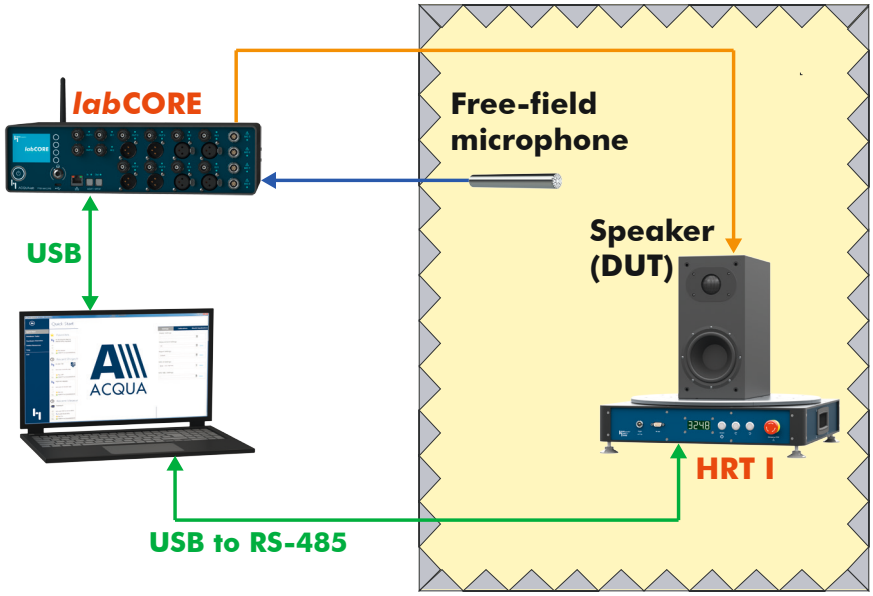
The project provides measurements for single speaker drivers without enclosure. Hence, it is suited for tests in an early development stadium of single speaker drivers (woofer, mid-range driver, tweeter, full-range speaker). Standard loudspeaker driver measurements like Thiele/Small parameters are included.

Loudspeaker enclosures

This project contains measurement sequences to assess loudspeaker drivers within enclosures. Measurements address passive loudspeakers, active mono loudspeakers and active stereo loudspeakers.



Relative Approach spectrogram - Rub & buzz (exemplary)



Measurement configuration for enclosured loudspeaker (exemplary)

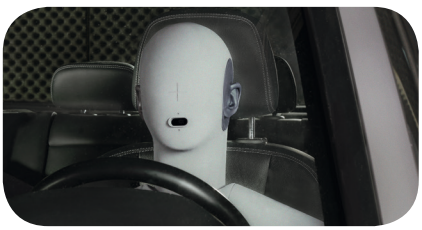
Especially directivity measurements of loudspeakers are fast and convenient due to the automated interaction of ACQUA and the turntable HRT I. Wireless measurements via Bluetooth® are easily performed with the suitable *lab*CORE module.

Headphones

Assess and test the quality of headphones. Unique features of this project are passive noise isolation / active noise cancellation and sound leakage measurements.

Car audio

The measurements of this project are designed to test and analyze audio signals of in-car audio systems (e.g. head-units, loudspeakers for vehicles). The usage of an artificial head ensures the realistic binaural reception of the audio signals.



General requirements

Software

- **ACQUA (Code 6810)**, Advanced Communication Quality Analysis, Version 4.0.50 or later
- **ACOPT 17 (Code 6839)**, option Relative Approach
- **ACOPT 26 (Code 6853)**, option Roomacoustics

Hardware

- ***lab*CORE (Code 7700)**, modular multi-channel hardware platform
- ***core*BUS (Code 7710)**, I/O bus mainboard
- ***core*IN-Mic4 (Code 7730)**, microphone input module (four channels)
- ***core*IN-A2 (Code 7760)**, analog input module
- **Audio output:**
  - ***core*OUT-Amp2 (Code 7720)**, power amplifier output module (two channels) **or**
  - ***core*OUT-A2 (Code 7750)**, analog output module

Project requirements

Loudspeaker drivers

- **Free-field microphone**

Loudspeaker enclosures

- **Free-field microphone**
- **HRT I (Code 6498)**, HEAD acoustics remote-operated turntable

Headphones

- **HMS II.4 (Code 1240)**, HEAD measurement system with ear simulator, pinna type 3.3 or 3.4
- **HIS L (Code 1231)**, HEAD impedance simulator, left ear
- ***core*BEQ (Code 7740)**, binaural equalization
- **3PASS *flex* (Code 6995)**, background noise simulation software
- **ACOPT 25 (Code 6852)**, option Psychosacoustics
- **ACOPT 34 (Code 6865)**, option Speech Intelligibility Index
- **Free-field microphone**

Car audio

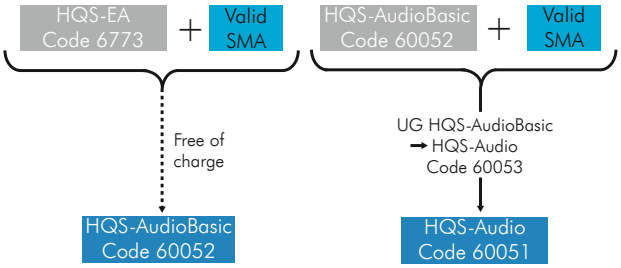
- **HMS II.6 (Code 1240)**, HEAD measurement system with artificial mouth and free-field microphones
- ***core*BEQ (Code 7740)**, binaural equalization

Options

- ***core*BT (Code 7780),** *lab*CORE I/O module, Bluetooth reference access point
- ***core*BT-EXT (Code 7781),** *lab*CORE Bluetooth extended codec option

Delivery Items

- **HQS-Audio (Code 60051)**, delivered as ACQUA database
- **V2C file**
- **Manual** as PDF
- **Test signals** in .wav and .mp3 format for **car audio** measurements



Upgrade paths for HQS-AudioBasic and HQS-Audio

Measurements

The table gives an overview of the measurements included in HQS-Audio.

Project / SMD	Loudspeaker (drivers)	Loudspeaker (enclosures)			Headphones	Car audio
		Passive LS	Active mono LS	Active stereo LS		
Frequency response	•	•	•	•	•	•
Frequency response consistency	n/a	n/a	n/a	n/a	•	•
Target frequency response	n/a	n/a	n/a	n/a	•	•
Signal/Noise Ratio (SNR) at level of max. desired distortion	•	•	•	•	•	•
Sound Pressure Level, sine, user defined parameter	•	•	•	•	•	•
Sound Pressure Level, broadband noise (acc. to EN standards)	•	•	•	•	•	n/a
Sound Pressure Level max. desired distortion (sine, broadband noise)	•	•	•	•	n/a	n/a
Sound Pressure Level MAX (rated power), Sine, broadband noise	•	•	•	•	n/a	n/a
Visualize crossover frequency (2-way, 3-way loudspeakers)	n/a	•	•	•	n/a	n/a
Directivity pattern, level-polar plot (sine/ broadband noise), frequency response 3D (broadband noise)	n/a	•	•	•	n/a	n/a
Impulse response, sweep, 262k FFT	•	•	•	•	•	•
Transfer function, H1, sweep, 262k FFT	•	•	•	•	•	•
Phase response, H1, sweep, 262k FFT	•	•	•	•	•	•
Group delay, sweep, 262k FFT	•	•	•	•	•	•
Coherence, sweep, 262k FFT	•	•	•	•	•	•
Impulse response time windowing	•	•	•	•	n/a	n/a
Cumulative spectral decay	•	•	•	•	•	•
Total harmonic distortion (THD)	•	•	•	•	•	•
Total harmonic distortion & Noise (THD+N)	n/a	n/a	•	•	•	•
Intermodulation distortion, two-tone, 2nd & 3rd order	•	•	•	•	•	•
Distortion - Rub & Buzz	•	•	•	•	•	•
Relative approach, impulsive distortion	•	•	•	•	•	•
Electrical polarity of EUT connection	•	•	n/a	n/a	n/a	n/a
Electrical impedance, resonance frequency of EUT	•	n/a	n/a	n/a	n/a	n/a
Calculate Thiele/Small parameters	•	n/a	n/a	n/a	n/a	n/a
Passive noise isolation & active noise cancellation	n/a	n/a	n/a	n/a	•	n/a
Sound leakage measurements	n/a	n/a	n/a	n/a	•	n/a
Triggered measurements (removable media devices)	n/a	n/a	n/a	n/a	n/a	•