

Description

For the hearing impaired, everyday tasks like a telephone call can be a hurdle difficult to overcome. A viable solution is magnetic coupling of a telephone handset's earpiece into the person's hearing aid. Through this coupling, the conversation partner's voice is transmitted directly into the hearing aid. Obviously, intelligibility strongly depends on the quality of this transmission route. Over time, several standards have been created describing how to measure and evaluate the magnetic and acoustic output of telephone handsets in regards to hearing aid compatibility. HEAD acoustics gathered the methods laid out in the standards in this easy-to-use test suite – HAC-Suite.

The magnetic tests in HAC-Suite examine the coupling ability of handsets with the help of the HEAD acoustics handset positioners HAC II or HAC III. Both contain a coil probing the magnetic output of the handset under test. HAC III offers more space for large handsets and more versa-

tile options for DUTs difficult to mount due to their size or shape.

Acoustic tests are performed with the help of a suitable HEAD acoustics HMS artificial head system and the motorized handset positioner HHP IV. They comprise of typical telecommunication handset tests such as frequency response, harmonic distortion, signal-to-noise ratio and more.

Test Signals

HAC-Suite applies several different types of signals to analyze the DUT like artificial voice according to Recommendation ITU-T P.50, stepped sine sweeps and 1000 Hz sine tones. The standards TIA-5050 and TIA-4965 laid out by the Telecommunications Industry Association add conversational gain to the list of acoustic measurements in HAC-Suite. This value aims at evaluating how well the DUT in a hands-free call scenario can replicate the volume of a real talker at a distance of 1 meter. This test is conducted with real speech as laid out in IEEE 269.

DATA SHEET

HAC-Suite (Code 60021)

Hearing Aid Compatibility Test Suite

Overview

HAC-Suite is a measurement suite for the HEAD acoustics analysis software ACQUA. The tests contained in the suite verify fixed and mobile telephone handsets for compliance with major hearing aid compatibility standards (see table below).

HAC-Suite contains two types of tests – probing the DUT's magnetic coupling ability with the handset positioners HAC II or HAC III as well as acoustic measurements with an artificial head.

HAC-Suite is ideally suited for manufacturers of fixed and mobile telephone handsets to easily test, qualify and optimize the hearing aid compatibility of their devices for compliance with the respective standards.

Key Features

- Easily applicable all-in-one solution for hearing aid compatibility testing
- Supports numerous standards
- Contains magnetic as well as acoustic measurements

Applications

- Testing telecommunication devices for compliance with hearing aid compatibility standards:
 - ETSI ES 200 381-1 V1.2.1
 - FCC 68.316/317
 - ANSI C63.19
 - TIA-1083-B
 - ITU-T P.370
 - TIA-5050
 - TIA-4965
- Experimental optimization of magnetic coil coupling in fixed and mobile telephone handsets

Overview of database revisions and specification versions		
Database Revision	Based on Specification Versions	Min. ACQUA Version
3	ETSI ES 200 381-1 V1.2.1 (2012-10)	4.2.100
	FCC 68.316/317 (2012-10)	
	ANSI C63.19 (2011-05)	
	TIA-1083-B (2015-10)	
	ITU-T P.370 (1996-08)	
	TIA-5050 (2018-01)	
	TIA-4965 (2012-10)	

(Older releases are available upon request)

General Requirements

Software

- **ACQUA (Code 6810 etc.)**, Advanced Communication Analysis System

Hardware

- **labCORE (Code 7700)**, Modular multi-channel hardware platform

Options

Please also see the adjoining decision tree to identify the appropriate options for your use case(s).

- **ACOPT 20 (Code 6843)**, ACQUA Option Quality Pie according to ITU-T P.505 (only for result representation using the "Quality Pie Wizard")

For magnetic measurements

- One of the following **handset positioners with probe coil**
 - **HAC II (Code 6594)**, Coil for Hearing Aid Compatibility Tests acc. to TIA 504 A, incl. Positioner for Classic Handsets
- or
- **HAC III (Code 6596)**, Coil for Hearing Aid Compatibility Tests acc. to TIA 504 A, incl. Positioner for Large Handsets

- One of the following **telephone interfaces** (depending on application):

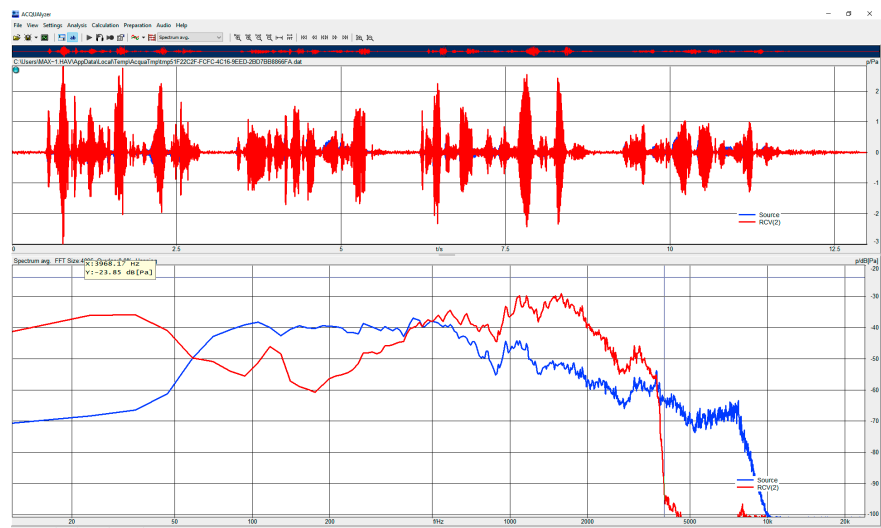
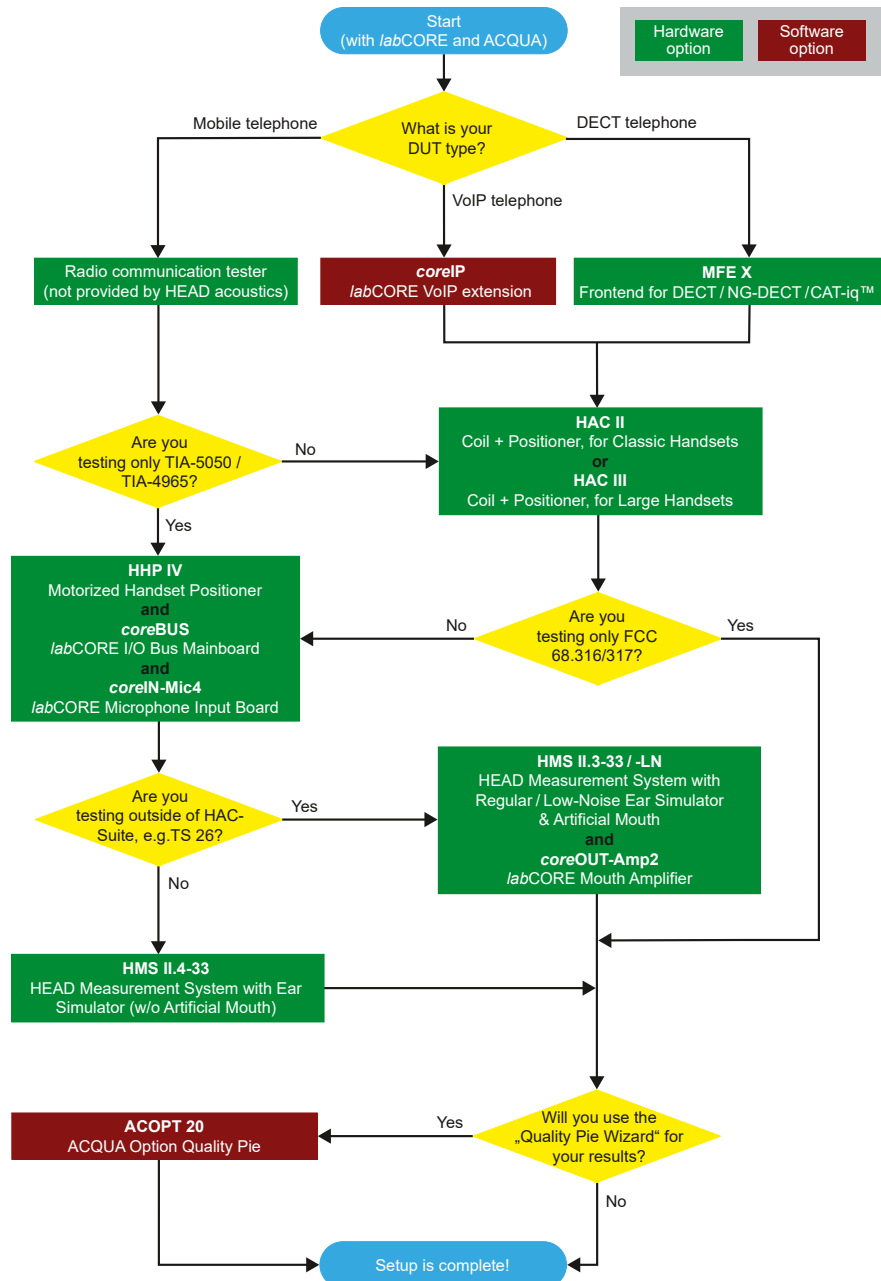
- **Radio communication tester** (not provided by HEAD acoustics), for mobile phones
- **coreIP (Code 7770)**, labCORE VoIP gateway extension, for VoIP telephony
- **MFE X (Code 6481)**, frontend for DECT/NG-DECT/CAT-iq™

For acoustic measurements:

- **coreBUS (Code 7710)**, I/O bus mainboard
- **coreOUT-Amp2 (Code 7720)**, Power amplifier board, for sending direction (only for HMS II.3-33 and HMS II.3-LN)
- **coreIN-Mic4 (Code 7730)**, Microphone input board, for receiving direction
- **HHP IV (Code 1406)**, HEAD Handset Positioner for HMS II.3, MotoMount (Hexapod) Version
- One of the following **HEAD Measurement Systems:**
 - **HMS II.3-33 (Code 1230.1)**, HEAD Measurement System, basic version with 3.3 Pinna, right ear simulator & artificial mouth

or

Decision tree for HAC-Suite options



Exemplary measurement result of HAC Suite in ACQUAlyzer

Measurements in HAC-Suite							
<ul style="list-style-type: none"> • included - not available 	ETSI ES 200 381-1 V1.2.1 (2012-10)	FCC 68.316/317 (2012-10)	ANSI C63.19 (2011-05)	TIA-1083-B (2015-10)	ITU-T P.370 (1996-08)	TIA-5050 (2018-01)	TIA-4965 (2012-10)
Magnetic Measurements with HAC II/HAC III							
Magnetic Field Strength/Intensity	•	•	•	•	•	-	-
Linearity of Magnetic Field Strength/Intensity	•	•	-	-	•	-	-
Receive Objective Loudness Rating (ROLR)	-	•	-	-	-	-	-
Calibration of Acoustic Receive Level	•	•	-	-	•	-	-
Acoustic Measurements with HMS system and HHP IV							
Frequency Response	•	-	•	•	•	•	-
Total Harmonic Distortion (THD)	•	-	-	•	-	•	-
Idle Noise	-	-	-	•	-	-	-
Signal-to-Noise Ratio	•	-	•	•	-	•	-
Conversational Gain	-	-	-	-	-	•	•

– **HMS II.3-LN (Code 1230.3)**,
 HEAD Measurement System, low-noise version with 3.3 Pinna, right ear simulator & artificial mouth (based on IEC 60318-4, low-noise, high dynamics)

or

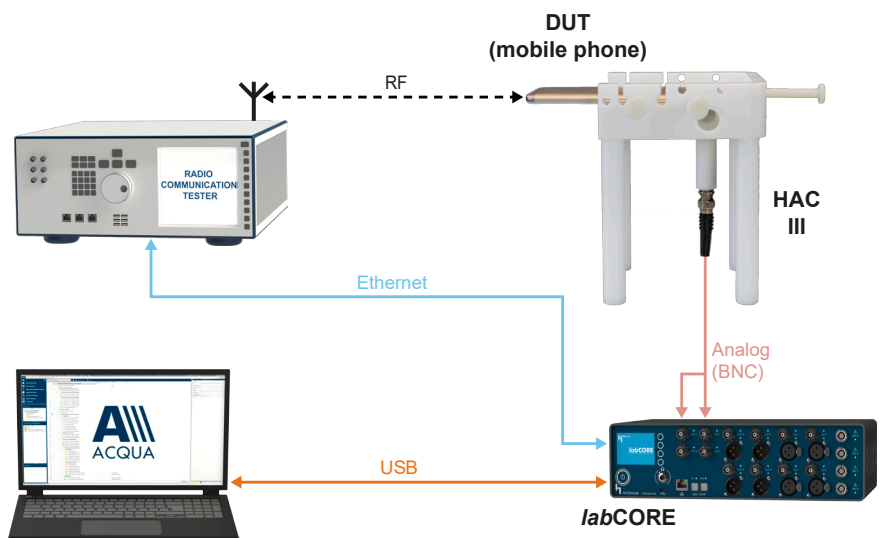
– **HMS II.4-33 (Code 1240.1)**,
 HEAD Measurement System, with 3.3 Pinna and right ear simulator (w/o artificial mouth)

Delivery Items

- **HAC-Suite (Code 60021)**, delivered as ACQUA database
- **V2C file**
- **Documentation** as PDF



HAC III handset positioner with mounted smartphone



Exemplary measurement configuration for HAC-Suite: magnetic measurements on a mobile phone with HAC III