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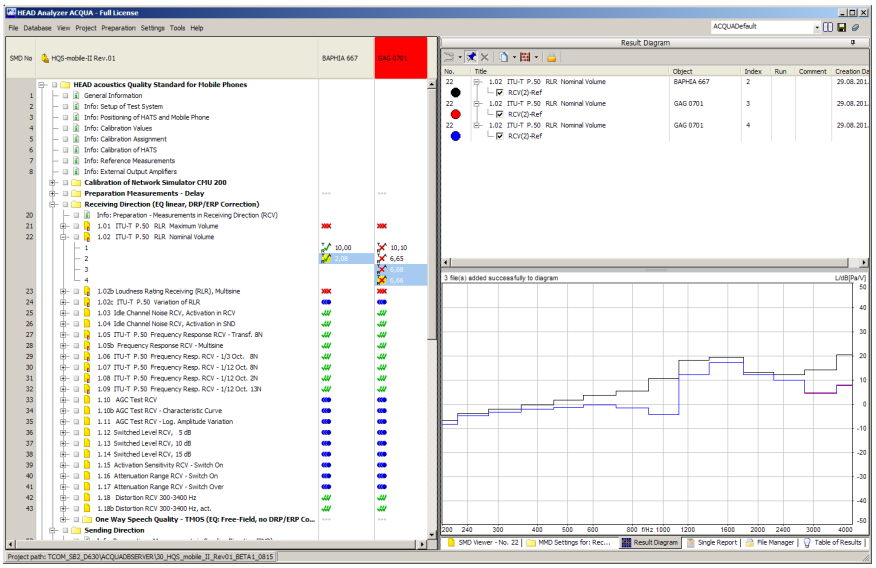
DATA SHEET

HQS-Mobile-II

(Code 60011)

HEAD Quality Standard

Mobile Phone Handsets



Measurement tree and result diagram for HQS-Mobile-II in communication analysis system ACQUA

Overview

Speech quality assessment of mobile phones is quite a challenge due to the various kinds of signal processing involved (e.g. noise reduction algorithms, various kinds of speech processing and the transmission delay itself). All these aspects have a significant influence on conversational speech quality. Current standards, however, are insufficient to assess all relevant parameters.

To solve this problem HQS-Mobile-II has been developed by HEAD acoustics, providing **comprehensive tests** for the analysis of **handsets**, e.g.:

- ***Delay***
- ***Speech transmission quality***
- ***Echo***
- ***Quality during double talk***
- ***Quality of background noise transmission***

For manufacturers HQS-Mobile-II provides objective guidelines to optimize their mobile phones. For administrations and network providers it offers selection criteria to ensure a high quality level.

DESCRIPTION

The tests implemented in HQS-Mobile-II cover all **conversational speech quality** aspects of handsets such as

- delay measurements in sending and receiving direction
- objective speech quality assessment under single talk conditions in sending and receiving direction
- echo tests
- detailed evaluation of quality during double talk
- quality of background noise transmission.

In addition, **recordings using real speech** under single talk, echo and double talk conditions are implemented. Apart from the measured parameters these recordings also provide listening examples which can be used for audio demonstrations.

For determination of the quality of background noise transmission a standardized arrangement consisting of four loudspeakers and one subwoofer is used in a separate test room setup. It allows a **close-to-reality noise playback** and can be used for all types of background noise.

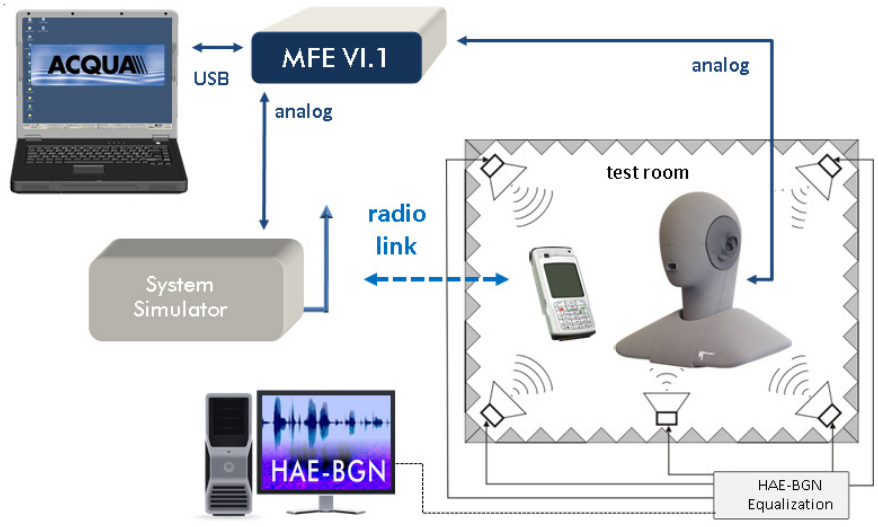
Some of the measurements check the analyzed results based on current **ITU-T** Recommendations or **ETSI** standards. The main references for HQS-Mobile-II are:

- **ITU-T P.50**, Artificial Voice
- **ITU-T P.501**, Test Signals for Use in Telephonometry
- **ITU-T P.502**, Objective analysis methods for speech communication systems, using complex test signals
- **ITU-T P.340**, Transmission Characteristics and Speech Quality Parameters of Hands-free Telephones
- **3GPP TS 26.131**, Terminal Acoustic Characteristics for Telephony Requirements
- **3GPP TS 26.132**, Narrow band (3.1 kHz) speech and video telephony terminal acoustic test specification
- **ETSI EG 202 396-1**, Speech quality performance in the presence of background noise; Part 1: Background noise simulation technique and background noise database

Other tests determine speech quality parameters to analyze the performance of the equipment under test without reference to ITU-T or ETSI standards. These measurements do not check requirements or limits, but can be used to optimize mobile phones.

APPLICATIONS

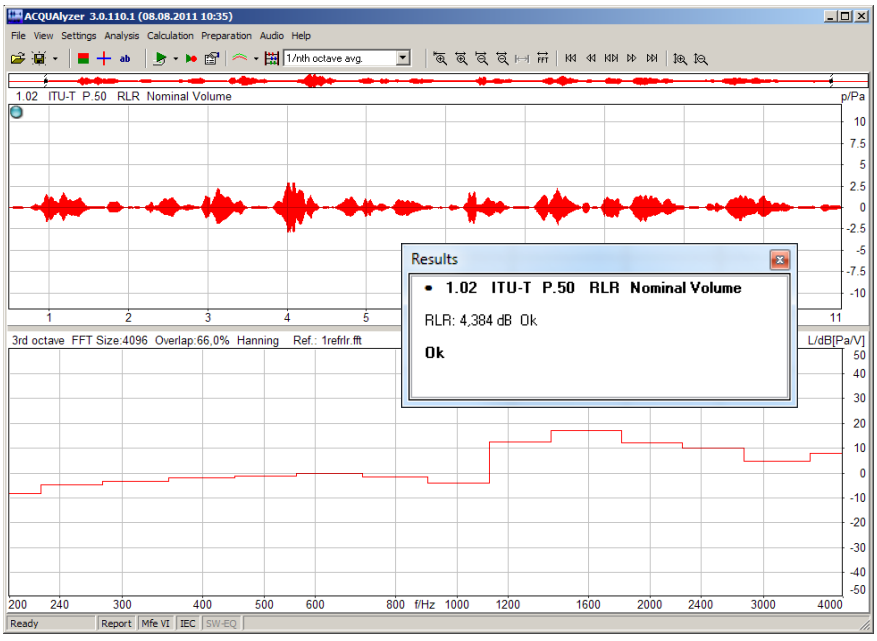
- **Automated analysis** of mobile phones (handsets)
- **Experimental development and optimization** of mobile phones with objective evaluation of speech quality



Typical test setup

Handsets	
CMU Calibration Routine	X
Delay SND/ RCV/ Echo	X
Loudness Rating*	RCV, SND
Loudness Rating Multisine	RCV, SND
Variation of LR	RCV, SND
Idle Channel Noise RCV, Activation in RCV	RCV, SND
Idle Channel Noise RCV, Activation in SND	RCV, SND
Frequency Response*	RCV, SND
Frequency Response RCV - Multisine	RCV, SND
AGC Test	RCV, SND
AGC Test - Characteristic Curve	RCV, SND
AGC Test - Log. Amplitude Variation	RCV, SND
Switched Level*	RCV, SND
Activation Sensitivity - Switch On	RCV, SND
Attenuation Range - Switch On	RCV, SND
Attenuation Range - Switch Over	RCV, SND
Distortion 300-3400 Hz*	RCV, SND
One Way Speech Quality in (TMOS)*	RCV, SND
Minimum Activation Level	SND
Echo Loss (G.122), Single Talk*	X
Convergence (Level vs. Time)	X
Convergence (Spectrography)	X
Echo Level vs. Time*	X
Spectral Echo Attenuation	X
ITU-T P.340 Echo Attenuation DT	X
TU-T P.501 Comparison to Near End Signal	X
ITU-T P.501 Comparison to Far End Signal	X
ITU-T P.340 Attenuation - Double Talk	RCV, SND
ITU-T P.501 Simulated Double Talk	RCV, SND
Sensitivity Double Talk	SND
Direct Sound Sensitivity (Speech)	X
Diffuse Sound Sensitivity*	X
Calculation of D-Value*	X
Calculation of ANR*	X
Background Noise with Near End CSS*	X
Background Noise with Far End CSS*	X
Comfort Noise: Spectral Adjustment	X
Comfort Noise: Level Adjustment	X
Comfort Noise: Relative Approach	X
Speech - Single Talk	RCV, SND
Speech - Double Talk	RCV, SND
Speech - Single Talk Echo	X

*comprises several measurement variants, e.g. varying application forces



Example of an RLR measurement and analysis with result window

MEASUREMENTS

The table on the left lists all measurements that can be performed with HQS-Mobile-II.

SYSTEM REQUIREMENTS

HQS-Mobile-II requires the following system components:

- **ACQUA** Communication Analysis System as one of the following variants (versions 3.0.100 or later):
  - Full-license (Code 6810)
  - Workplace (Code 6830, for post-analysis and documentation only)
  - Compact Systems (Code 6860.xx)
- **ACOPT 10** TOSQA2001 Telecommunications Objective Speech Quality Assessment (Code 6820), required for TMOS tests
- **HAE-BGN** Background Noise Simulation (Code 6971), required for background noise tests
- **HMS II.3** HEAD Measurement System (Code 1230)
- **HHP III** Handset Positioner (Code 1400)
- **MFE VI.1** Measurement Frontend (Code 6462) with option **MFEVI-BEQ** (Code 6461)
- **System Simulator** e.g. R&S CMU200 (not delivered by HEAD acoustics)

OPTIONS

- **ACOPT 17** "Relative Approach" Hearing model based analysis of time-variant or spectral components (Code 6839)
- **ACOPT 20** Quality Pie (Code 6843)
- **HQS-Mobile-Additions-II** Extension for hands-free and MP3 headsets (Code 60012)

DELIVERY ITEMS

- **HQS-Mobile-II** measurement standard, delivered as ACQUA database on CD (Code 60011)
- **V2C file** (for ACQUA 3.0.100 or later), on CD
- **Manual** as PDF on CD

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