HEAD acoustics

DATA SHEET

Code 68nn

ACQUA Options

ACOPTs – Options for specific measurements, calculations, and functions in ACQUA

OVERVIEW

ACQUA Options

Code 68nn

Options for specific measurements, calculations, and functions in ACQUA

ACQUA options, so-called ACOPTs, allow individual tailoring and extending ACQUA with functions fitting to specific user requirements. There are various types of ACOPTs:

- Additional applications such as ACOPT 01 – Signal Editor.
- Implemented functions in ACQUA such as ACOPT 19 – Online Analysis.
- Sophisticated calculation methods such as ACOPT 21/35 – 3QUEST.
- Result presentation tools such as ACOPT 20 – Quality Pie.

Applying any ACOPT on an ACQUA system requires the respective ACOPT license on the provided ACQUA dongle.

Many ACOPTs are also available as network licenses. Existing ACOPT licenses may be upgraded to network licenses.

SCOPE OF DELIVERY

- For new customers: Each ACOPT is delivered together with ACQUA on the provided license dongle
- For existing customers: ACOPT licenses are delivered as V2C file
- ACOPT 16 (PESQ) and ACOPT 30 (POLQA) each require a separate dongle

TABLE OF CONTENTS

Continued on next page

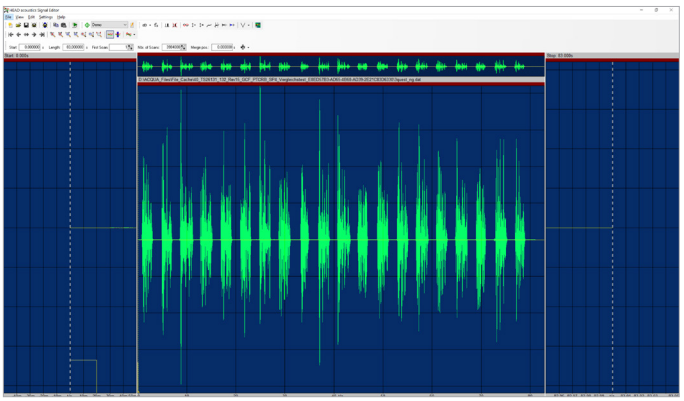
DETAILS

DESCRIPTION

ACOPT 01 (Code 6811)
Signal Generator and Editor

ACQUA option for generating and editing of many signal types.

- Signal generator for the following basis signals: Sine, square, triangle, sweep, stepped sweep, white and pink noise, pseudo noise for different FFT lengths, Fourier generator.
- Generate signals according to mathematical formulas.
- Signal editor for processing time signals, e.g. speech signals.
- Automatically process signals in a very powerful batch mode.
- Level adjustment of signals also on the basis of the optional (see ACOPT 09) speech level (active speech level).
- Copy signal parts across any number of channels.
- All effects of changes to time signals are immediately visible in the frequency spectrum.



ACOPT 02 (Code 6812)
Signal Analysis

ACQUA option for applying different analyses and calculations on already recorded and analyzed signals. Without this ACQUA option, post-analysis and parameter changes are only possible for one single initially applied analysis.

TABLE OF CONTENTS

ACQUA OPTIONS

ACOPT 01 (Code 6811)
- Option Signal Generator and Editor

ACOPT 02 (Code 6812)
- Option Signal Analysis

ACOPT 09 (Code 6819)
- Option SLVM P.56

ACOPT 10 (Code 6820)
- Option TOSQA

ACOPT 12 (Code 6822)
- Option DTMF

ACOPT 16 (Code 6836)
- Option PESQ according to ITU-T P.862

ACOPT 17 (Code 6839)
- Option Relative Approach

ACOPT 18 (Code 6840)
- Option ACQUA COM Remote Control

ACOPT 19 (Code 6842)
- Option Online Analysis

ACOPT 20 (Code 6843)
- Option Quality Pie according to ITU-T P.505

ACOPT 21 (Code 6844)
- Option 3QUEST – 3fold Quality Evaluation of Speech in Telecommunication (Narrowband/ Wideband)

Continued on next page

ACOPT 09 (Code 6819) SLVM P.56

ACQUA option including a speech level voltmeter according to Recommendation ITU-T P.56 (method B). It allows calculation of the ASL (active speech level) value.

ACOPT 10 (Code 6820) TOSQA

ACQUA option for determination of speech quality according to the TOSQA method (Telecommunications Objective Speech Quality Assessment). TOSQA measurement results comprise the TOSQA value, the MOS value as well as the impairment factor of the device under test.

ACOPT 12 (Code 6822) DTMF

ACQUA option for analyzing dual-tone multi-frequency (DTMF) signals according to ETSI standard TBR 21.

- Output of all recognized signals
- Check of following parameters:
  - min./max. level of high/low frequency
  - min./max. level difference
  - min. signal-to-noise ratio
  - max. frequency deviation
  - min./max. dial/pause time
  - max. rise/fall time

ACOPT 16 (Code 6836) PESQ

ACQUA option for determination of MOS values according to PESQ (Perceptual Evaluation of Speech Quality). It provides advanced quality measurements to determine perceived speech quality in telecommunication according to Recommendation ITU-T P.862.

ACQUA OPTIONS

ACOPT 23 (Code 6848)
- Option GCF

ACOPT 24 (Code 6849)
- Option PTCRB

ACOPT 25 (Code 6852)
- Option Psychoacoustics

ACOPT 26 (Code 6853)
- Option Room Acoustics

ACOPT 27 (Code 6854)
- Option Speech Transmission Index: RASTI / STIPA / STITEL

ACOPT 28 (Code 6855)
- Option SNRI and TNLR Calculation according to ITU-T G.160

ACOPT 29 (Code 6856)
- Option EQUEST - Echo Quality Evaluation of Speech in Telecommunication

ACOPT 30 (Code 6857)
- Option POLQA - Perceptual Objective Listening Quality Analysis

ACOPT 31 (Code 6858)
- Option ACQUA Batch Processing (respective ACOPT required)

ACOPT 32 (Code 6859)
- Option Speech-based Double Talk Analysis

ACOPT 34 (Code 6865)
- Option Speech Intelligibility Index according to ANSI S3.5-1997

ACOPT 35 (Code 6866)
- Option 3QUEST Super-wideband/Fullband according to ETSI TS 103 281, Model A

ACOPT 36 (Code 6867)
- Option MDAQS – Multi-Dimensional Audio Quality Score

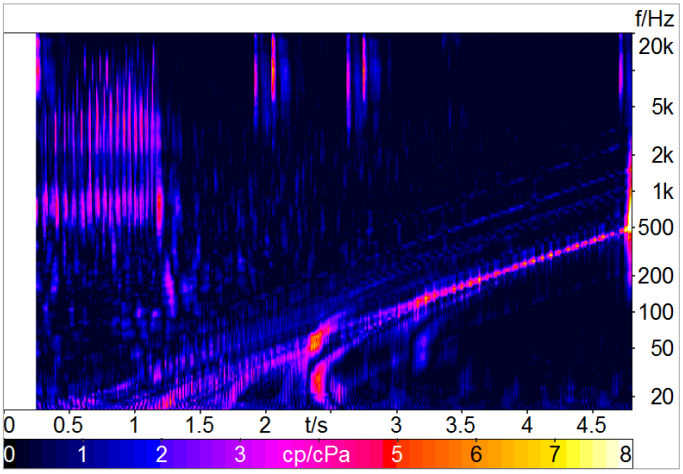
ACOPT 37 (Code 6869)
- Option ABLE – Assessment of Binaural Listening Effort according to ETSI TS 103 558

ACOPT 38 (Code 6871)
- Option LEAP – Listening Effort from Acoustic Parameters

ACOPT 39 (Code 6872)
- Option Steady State Analyses for Level, Distortion, Intermodulation

ACOPT 17 (Code 6839) Relative Approach

Optional psychoacoustic method – developed by HEAD acoustics – for the analysis of audible impairments in the time and frequency domain. It enables the evaluation of dominant time and spectrum structures based on the sensitivity of the human ear.



ACOPT 18 (Code 6840) Remote Control ACQUA via COM Interface

ACQUA option for external control of automated measurement sequences.

- List and select prepared ACQUA projects via the COM interface and start these projects completely or partly.
- Data storage: Select existing ACQUA measurement objects or create new ones together with their descriptors.
- Feedback on the progress of the measurement sequence and the measurement results via COM events.
- Generate ACQUA reports for selected measurement object.

ACOPT 19 (Code 6842) Online Analysis

The ACQUA option provides the Online Analysis function within the Play and Record interface. It provides two analyses: FFT and distortion. During these two real-time analyses, users can simultaneously play back continuous excitation signals. The analyses are adjustable, e.g. the resolution of the spectral analysis as well as the type of distortion calculation can be selected. Special distortion calculation methods like "Rub & Buzz" and "Total Distortion" according to Recommendation ITU-T O.132 are also available. The time constants of the analyses is selectable in such a way that the effects of changes in the measurement chain (e.g., compression

NETWORK OPTIONS

ACOPT 01-N (Code 6811N)
- Network Option Signal Generator and Editor

ACOPT 02-N (Code 6812N)
- Network Option Signal Analysis

ACOPT 09-N (Code 6819N)
- Network Option SLVM P.56

ACOPT 10-N (Code 6820N)
- Network Option TOSQA

ACOPT 12-N (Code 6822N)
- Network Option DTMF

ACOPT 17-N (Code 6839N)
- Network Option Relative Approach

ACOPT 18-N (Code 6840N)
- Network Option ACQUA COM Remote Control

ACOPT 19-N (Code 6842N)
- Network Option Online Analysis

ACOPT 20-N (Code 6843N)
- Network Option Quality Pie according to ITU-T P.505

ACOPT 25-N (Code 6852N)
- Network Option Psychoacoustics

ACOPT 26-N (Code 6853N)
- Network Option Room Acoustics

ACOPT 27-N (Code 6854N)
- Network Option Speech Transmission Index: RASTI/STIPA/STITEL

ACOPT 28-N (Code 6855N)
- Network Option SNRI & TNLR Calculation according to ITU-T G.160

ACOPT 32-N (Code 6859N)
- Network Option Speech-based Double Talk Analysis

ACOPT 34-N (Code 6865N)
- Network Option Speech Intelligibility Index according to ANSI S3.5-1997

UPGRADE OPTIONS

ACOPT 01-UGN (Code 6811UGN)
- Upgrade ACOPT 01 > ACOPT 01-N

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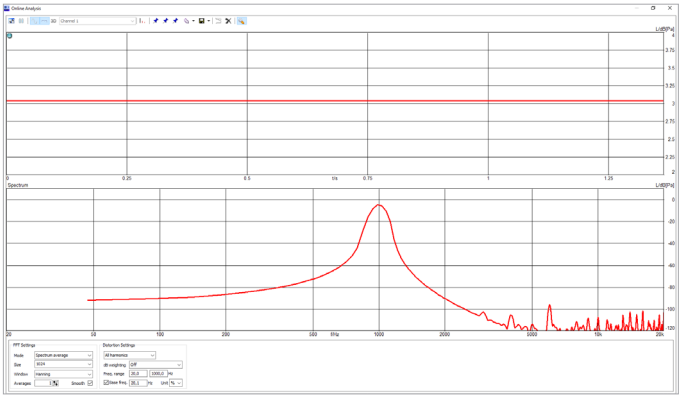
force-dependent transfer functions between the handset and the artificial ear, etc.) are evaluable interactively and directly.



ACOPT 20 (Code 6843) Quality Pie

ACOPT 20 enables a very clear presentation of even complex measurement results in the form of pie diagrams according to Recommendation ITU-T P.505. These one view visualization diagrams allow to compare and to evaluate multidimensional results of different measurement objects at a glance. Predefined templates with all parameter settings and limit values are available for numerous test scenarios (e.g., IP telephony, gateways, mobile phones, hands-free terminals). It is possible to generate and to save own templates for individual test evaluations.

ACOPT 21 (Code 6844) 3QUEST

3QUEST (3-fold Quality Evaluation of Speech in Telecommunications) is a calculation method which allows the instrumental speech quality evaluation of telecommunication terminals in the presence of background noise. It is based on the ETSI standards EG 202 396-3 and TS 103 106, covering both narrowband and wideband scenarios and providing background noise signals.

3QUEST

ACOPT 23 (Code 6848) GCF

The Global Certification Forum (GCF) defines test criteria for certification of 2G, 3G and 4G mobile equipment. As a member of GCF, HEAD acoustics offers the GCF-approved test platforms TP 89, TP 90 and TP 190, which cover audio test cases for narrowband, wideband, and super-wideband scenarios according to 3GPP standards TS 26.131, TS 26.132, and TS 51.010-1.

In combination with TP 89, TP 90 or TP 190, ACOPT 23 enables manufacturers and test laboratories to submit test cases of 2G, 3G and 4G mobile equipment validated on any of these three test platforms to the Global Certification Forum for official GCF approval.

ACOPT 24 (Code 6849) PTCRB

The PCS Type Certification Review Board (PTCRB) defines test criteria for certification of 2G, 3G, and 4G mobile equipment. HEAD acoustics offers the PTCRB-approved test platforms TP 89, TP 90 and, TP 190, which cover audio test cases for narrowband,

UPGRADE OPTIONS

ACOPT 02-UGN (Code 6812UGN)
› Upgrade ACOPT 02 > ACOPT 02-N
ACOPT 09-UGN (Code 6819UGN)
› Upgrade ACOPT 09 > ACOPT 09-N
ACOPT 10-UGN (Code 6820UGN)
› Upgrade ACOPT 10 > ACOPT 10-N
ACOPT 12-UGN (Code 6822UGN)
› Upgrade ACOPT 12 > ACOPT 12-N
ACOPT 17-UGN (Code 6839UGN)
› Upgrade ACOPT 17 > ACOPT 17-N
ACOPT 18-UGN (Code 6840UGN)
› Upgrade ACOPT 18 > ACOPT 18-N
ACOPT 19-UGN (Code 6842UGN)
› Upgrade ACOPT 19 > ACOPT 19-N
ACOPT 20-UGN (Code 6843UGN)
› Upgrade ACOPT 20 > ACOPT 20-N
ACOPT 25-UGN (Code 6852UGN)
› Upgrade ACOPT 25 > ACOPT 25-N
ACOPT 26-UGN (Code 6853UGN)
› Upgrade ACOPT 26 > ACOPT 26-N
ACOPT 27-UGN (Code 6854UGN)
› Upgrade ACOPT 27 > ACOPT 27-N
ACOPT 28-UGN (Code 6855UGN)
› Upgrade ACOPT 28 > ACOPT 28-N
ACOPT 32-UGN (Code 6859UGN)
› Upgrade ACOPT 32 > ACOPT 32-N
ACOPT 34-UGN (Code 6865UGN)
› Upgrade ACOPT 34 > ACOPT 34-N

wideband, and super-wideband scenarios according to 3GPP TS 26.131, 3GPP TS 26.132 and 3GPP TS 51.010-1.

In combination with TP 89, TP 90, or TP 190, ACOPT 24 enables manufacturers and test laboratories to submit test cases of 2G, 3G, and 4G mobile equipment validated on any of these three test platforms to the PCS Type Certification Review Board for official PTCRB approval.

ACOPT 25 (Code 6852) Psychoacoustics

ACOPT 25 provides calculations for conducting various psychoacoustic analyses. The ACQUA option provides following analysis methods:

- Loudness vs. time
- Specific loudness
- Specific loudness vs. time
- Sharpness vs. time
- Roughness vs. time (Hearing model)
- Specific roughness (Hearing model)
- Specific roughness vs. time (Hearing model)
- Fluctuation strength vs. time
- Specific fluctuation strength
- Specific fluctuation strength vs. time
- Specific prominence ratio
- Specific prominence ratio vs. time
- Articulation index
- Tonality DIN 45681
- Tonality DIN 45681 vs. time

ACOPT 26 (Code 6853) Room Acoustics

ACOPT 26 provides calculations for conducting room acoustics measurements based on maximum length sequence signals. In addition to impulse response, there are calculations of the *reverb*eration time (RT60, EDT), the *reverb*eration time over frequency bands and the cumulative decay spectrum.

ACOPT 27 (Code 6854) Speech Transmission Index

ACOPT 27 provides the calculation of speech transmission index variants STITEL, STIPA, RASTI according to IEC 60268-16:2020.

ACOPT 28 (Code 6855) SNRI & TLNR Calculation

ACOPT 28 provides the calculation of values according to Recommendation ITU-T G.160 (Appendix II, Amendment 2, 08/2011).

ACOPT 29 (Code 6856) EQUEST

EQUEST (Echo Quality Evaluation of Speech in Telecommunications) provides standardized calculation methods according to ETSI TS 103 802 for assessing the echo performance of terminals. It applies to narrowband, wideband and super-wideband scenarios. In particular, masking effects that are neglected by other established methods are also taken into account in this process.

EQUEST

ACOPT 30 (Code 6857) POLQA

ACOPT 30 provides the calculation method for determining MOS values according to POLQA (Perceptual Objective Listening Quality Analysis).

POLQA is a voice quality testing technology for fixed, mobile, and IP-based networks. It was standardized as Recommendation ITU-T P.863 and can be applied, e.g., for speech quality analysis of HD Voice, HD Voice+, 3G, and 4G/LTE networks.

POLQA®

ACOPT 31 (Code 6858) Batch Processing

ACOPT 31 provides the HEAD Batch Processor for automatic batch calculation of signals with TOSQA, 3QUEST, 3QUEST-SWB/FB, POLQA, G.160 (SNRI), EQUEST, speech-based double talk, automated Double Talk, and listening effort (ABLE). Except for automated double talk, the respective ACOPTs of the calculation methods are required for application.

ACOPT 32 (Code 6859)
Speech-based Double Talk

ACOPT 32 provides two speech-based methods for measuring and analyzing double talk, primarily to evaluate the performance of echo cancellation:

1. Automated double talk analysis with speech signals according to Recommendation ITU-T P.502.
2. Speech-based double talk analysis according to 3GPP TS 26.132.

ACOPT 34 (Code 6865)
Speech Intelligibility Index

The Speech Intelligibility Index (SII) is a measure for speech intelligibility in situations with background noise. ACOPT 34 enables calculating the speech intelligibility index of a combination of a noise and a speech signal according to ANSI S3.5-1997. The speech signal is specified spectrally. Users can use a special speech spectrum according to ANSI S3.5 or their own.

ACOPT 35 (Code 6866)
3QUEST SWB/FB

ACOPT 35 implements the standardized methods according to ETSI TS 103 281 (Model A) for calculation of S-MOS (Speech Quality), N-MOS (Noise Influence) and G-MOS (Overall Quality) for super-wideband and fullband scenarios.

ACOPT 36 (Code 6867)
MDAQS

MDAQS (Multi-Dimensional Audio Quality Score) is an AI-based method developed by HEAD acoustics for instrumental evaluation of audio quality. The method is based on an algorithm trained with test results from a tailor-made auditory test design. MDAQS calculates MOS values for four quality criteria determining audio quality as perceived by naïve listeners of arbitrary playback systems and devices such as loudspeakers, headphones, headsets, in-vehicle audio systems, mobile and smart speakers. This allows quick and convenient assessment of audio playback quality during and after development.

MDAQS

ACOPT 37 (Code 6869)
ABLE/Listening Effort

ABLE (Assessment of Binaural Listening Effort) extends ACQUA with the capability to assess the effort for perceiving speech signals from communication devices automatically and reproducibly. For simulation of realistic scenarios, the speech signals are impaired by a background noise simulation system. The analysis and the assessment process of ABLE follow the specifications according to ETSI TS 103 558. The results of the assessment are presented as plain MOS (Mean Opinion Score) value.

ABLE

ACOPT 38 (Code 6871)
LEAP

For acoustic test scenarios where no reference signal is available, Listening Effort Prediction from Acoustic Parameters (LEAP) is the single-ended algorithm to predict the listening effort of a degraded speech signal. LEAP is a software solution that has been developed by Fraunhofer IDMT-HSA.

LEAP evaluates perceived listening effort in situations where a clean speech signal is not available, e.g., synthetic speech from smart speakers, vehicle navigation or text-to-speech engines. Additionally, LEAP is applicable where a clean speech signal is technically available, but is overly difficult to obtain, e.g., in announcements via loudspeaker at train stations, airports, and similar places.

LEAP

ACOPT 39 (Code 6872)
Option Steady-State Analyses for Level, Distortion, Intermodulation

ACOPT 39 provides steady-state analyses for determining:

- Level with tracking filter.
- Distortion.
- Intermodulation/difference frequency distortion.

These analysis methods are basic requirements and applicable for hearing aid tests or general electroacoustic measurements.

HEAD acoustics

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