

will'tek

Willtek 4400

Audio, Basic Codec, Codec Extension Options



Direct connection of microphone and loudspeaker

Built-in generator stimulates the loudspeaker or microphone of the mobile

Frequency, voltage, distortion and SINAD measured at the same time

Spectrum Analyzer displays audio frequency spectrum

Full and Enhanced Full Rate speech codec options available to test Audio quality

Complete testing with Audio and Codec options

With Willtek's 4400 Series and the Audio and Codec options, Willtek provides complete testing solutions for mobile phone testing.

The Audio and Codec Options for the Willtek 4400 Series help to measure and test the audio capabilities of the mobile phone, ensuring its high quality. These options have been designed for the particular needs of R&D, production, repair/service and quality assurance.

The options can be easily integrated in the Willtek 4400 Mobile Phone Tester, resulting in a compact RF and AF test system.

Audio

The Audio Option can test and evaluate the individual audio components or the complete audio path of the mobile. There are different ways to stimulate the mobile phone and to verify the audio quality.

The generated signal can be fed into a loudspeaker to stimulate the microphone; it can also stimulate the mobile at the headset input or, using the Codec Options, over the traffic channel.

The audio signal from the mobile can be evaluated, either using the basic audio analyzer or the unique audio spectrum analyzer. A high impedance AF input, an auxiliary input for the microphone and the traffic channel (using the additional Codec Options) can be used as sources for the analysis.

Codec

There are two different codecs available: Full Rate (FR) and Enhanced Full Rate (EFR). These codecs supplement the audio measurements, allowing audio signals to be generated and tested via the air interface.

Audio applications

Both RF and Audio tests with one test set – no additional test equipment necessary!

Audio circuitry can be tested piece by piece using the analog input/output connectors.

Applications with Audio and Codec Options

D/A converter and analog circuitry can be tested by stimulation through the traffic channel.

Feed an analog signal into the input connector (e.g. headset microphone) at the mobile and measure the signal quality over the whole path, including the RF channel.

Template Check

Audio Signals also need to stick to certain limits, which can be described similarly as the power/time template in an audio template. Since the form of this template differs greatly depending on the test set-up the user can define his own template with up to 10 pairs of upper and lower limits.

Wavefile Replay

The 4400 allows a very easy way to create multitones, by simply allowing to replay wavefiles, previously generated with a dedicated tool or simply recorded on a PC.

Specifications

Audio Specifications

Specifications refer to a frequency range of 50 Hz to 15 kHz

AF Generator

Frequency	
Range (sinusoidal signal)	50 Hz to 15 kHz
Resolution	0.1 Hz
Accuracy	0.01%

Output "AF out" ¹⁾

Output type	unbalanced
Sinusoidal signals	
Level range	10 mV _{rms} to 3.5 V _{rms}
Level resolution	
(< 0.1 V)	0.1 mV
(≥ 0.1 V)	1 mV
Level accuracy on 600 Ω load, at >10 mV	
(50 Hz to 15 kHz)	3%
(300 Hz to 3 kHz)	2%
Output current	< 10 mA
Distortion (100 Hz to 10kHz)	< 0.3%
Other signals	
Level range	10 mV _{pp} to 10 V _{pp}

Output "AUX out"

Connector	25-pin D-sub
Output type	Push-pull
Allowable load impedance	4 to 16 Ω
Maximum output power	1 W

Single Tone Generation

Waveform	sinusoidal, rectangle, triangle
Wavefile	8 kHz sampling 8/16 Bit wide (Codec input) 48 kHz sampling 8/16 Bit wide (AF out)

AF Analyzer

Input "AF in"	
Input	balanced, unbalanced
Input impedance	250 kΩ/20 pF
DC coupling level range	0 to ±20 V
AC coupling frequency range	50 Hz to 20 kHz
AC coupling level range	0 to 30 V _{rms}

Input "AUX in"

Connector	25-pin D-sub
Input type	unbalanced
Input impedance	> 1 kΩ
Frequency range	50 Hz to 20 kHz
Level range	0 to 0.9 Vrms

AF Counter

Frequency range	50 Hz to 15 kHz
Resolution	1 Hz
Accuracy	1 Hz ±1 digit

Distortion Meter (THD + N) ¹⁾

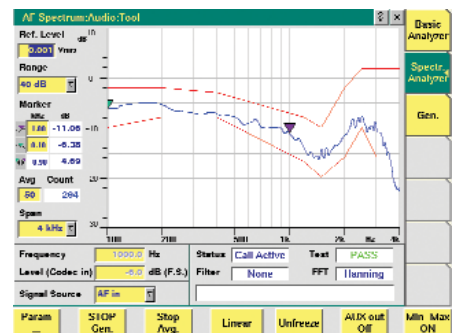
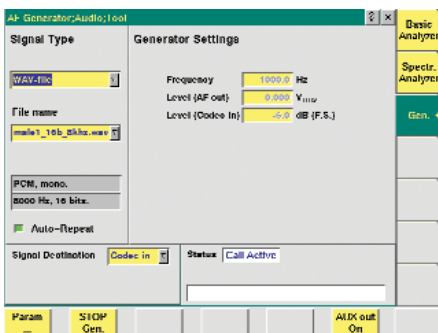
(1 kHz measurement frequency)	
Range	0 to 50%
Resolution	0.01%
Accuracy	(0 to 10% range) 5%
Residual accuracy	
Input voltage < 100 mV	0.6%
Input voltage > 100 mV	0.1%

Voltmeter ²⁾

AC measurement	
Resolution on input level range	
(< 30 V)	100 mV
(< 10 V)	10 mV
(< 1 V)	1 mV
Accuracy (300 Hz to 10 kHz)	3% ±1 digit

¹⁾ Measured at nominal impedance of 600 Ω

²⁾ On "AF in", level range 20 mV to 10 V



AF generator provides for different frequency and level settings or for multitone the usage of wavefiles. The audio signal can be sent either to the AF out, the codec input (internal) or to the auxiliary connector.

The Basic Analyzer provides numeric results of the measured audio signal. In the analyzer mask it is possible to set basic generator settings, such as the frequency and level or to completely switch off the generator.

The audio template allows thorough testing of frequency responses from mobile phones. A simple PASS/FAIL allows a quick check of the mobile's performance. The template can be created and saved by the user depending on the test set-up used.

DC measurement ("AF in" only)

Resolution	1 mV
Accuracy	10% ±1 digit

SINAD Meter ²⁾

(1 kHz measurement frequency)

Range	0 to 60 dB
Resolution	0.1 dB
Accuracy	(6 to 35 dB range) 0.5 dB

AF Spectrum Analyzer ²⁾

Dynamic range	> 60 dB
Windowing	Rectangle, Hanning, Hamming, Bartlett, Blackman, Blackman-Harris, Flat Top
Display range	40, 80, 120 dB
Measurement filters	CCITT-like filter, C-message-like filter

GSM Codec Specifications

Basic Codec

Speech coding	Full Rate (FR)
Input	AF Generator
Output	AF Analyzer

Codec Extension

Speech coding	Enhanced Full Rate (EFR)
Input	AF Generator
Output	AF Analyzer

Ordering details

Audio Option	M 248 360
Basic Codec Option ³⁾	M 361 854
Codec Extension Option ⁴⁾	M 897 156
Willtek Mobile Phone Tester 4403	M 101 105
Willtek Mobile Phone Tester 4405	M 101 104
Willtek Mobile Phone Tester 4407	M 101 103
Willtek RF Shield Box Audio Package with Antenna Coupler	M 248 419
Willtek RF Shield Box Audio Package without Antenna Coupler	M 248 421

³⁾ Requires the Audio Option

⁴⁾ Requires the Audio Option and the Basic Codec Option

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