Production test

The production test features of WinAudioMLS contains a set of very versatile tools, which allows verifying devices in an efficient way.

Overview

With the default production test you can check the following parameters:

- Frequency response
- Noise and distortion THD+N
- Harmonic distortion THD
- Sensitivity
- Balance
- Polarity

Measurement techniques

The default production test contains the following measurement phases:

- Frequency response via MLS
- Single tone measurements
- Polarity check

Frequency response via MLS

This test measures the complete frequency responses within fractions of second. It uses pseude noise signals (MLS) as a stimulus signal. Allthough it is possible to measure the frequency response with single tones, MLS is much faster. With a single tone measurement the generator has to be set to a certain frequency. Then the signal has to stabilize. This requires at least 100ms per step. With the MLS technique you get a frequency response at e.g 2048points within 200ms. With single tone measurements this would take minutes.
The MLS test uses a seperate set of limit file for the frequency response.

Single tone measurements

Single tone measurements are used for distortion analysis. You can analyse THD,THD+N and the level at arbitrary frequency. In most cases it is sufficient to measure at 10 points. Measurements at low frequencies are more time consuming, because the settling time must be larger. Therefore WinAudioMLS allows setting the settling time depending on the frequency.

Polarity check

This test case uses a special test signal (impulse train) to identify the polarity.

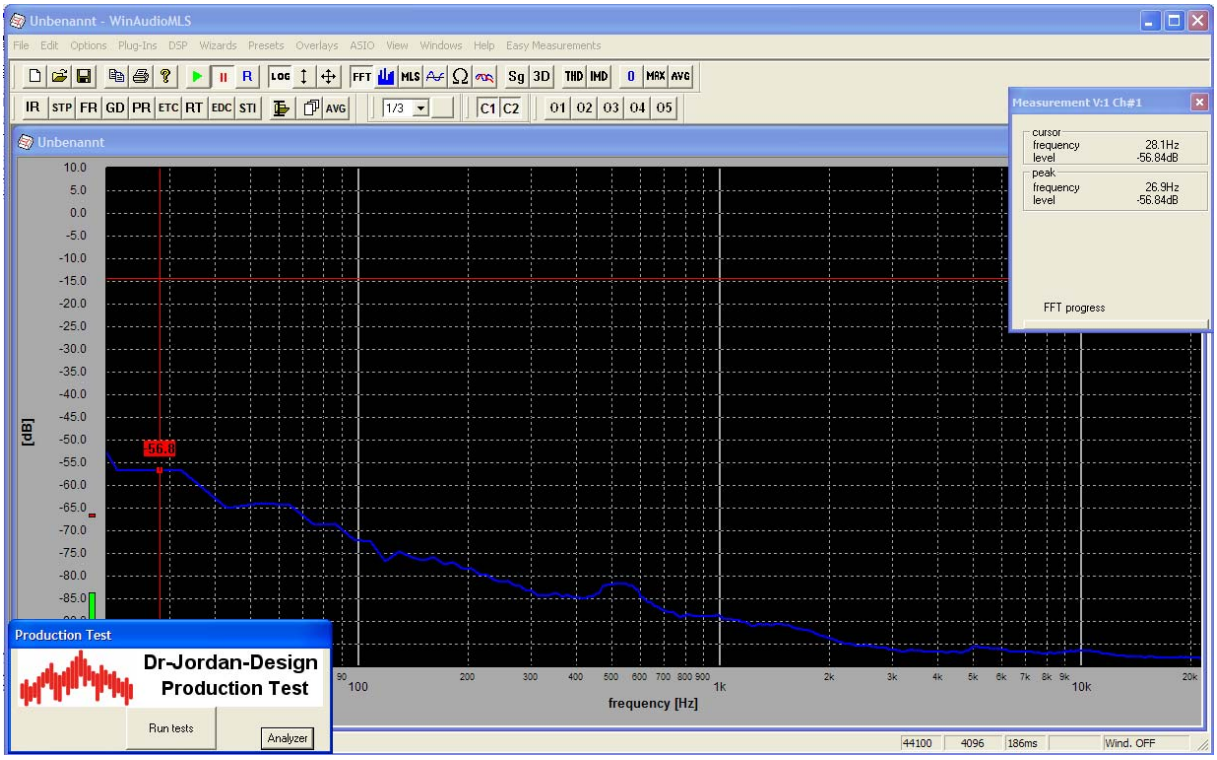
First steps

We recommend to copy our default example settings file to the default production test location. This is typically your personal data folder with the subdirectory Messungen\ProductionTest
This directory is created automatically during start up.

You can download our template at
http://www.dr-jordan-design.de/Download/ProductionTest_limits.zip

The configuration files contain a basic setup file „ProductionTest.ini“ and several limit files (*.lim). WinAudioMLS will load „ProductionTest.ini“ during startup of the production test. You will get a warning message if this file does not exist.

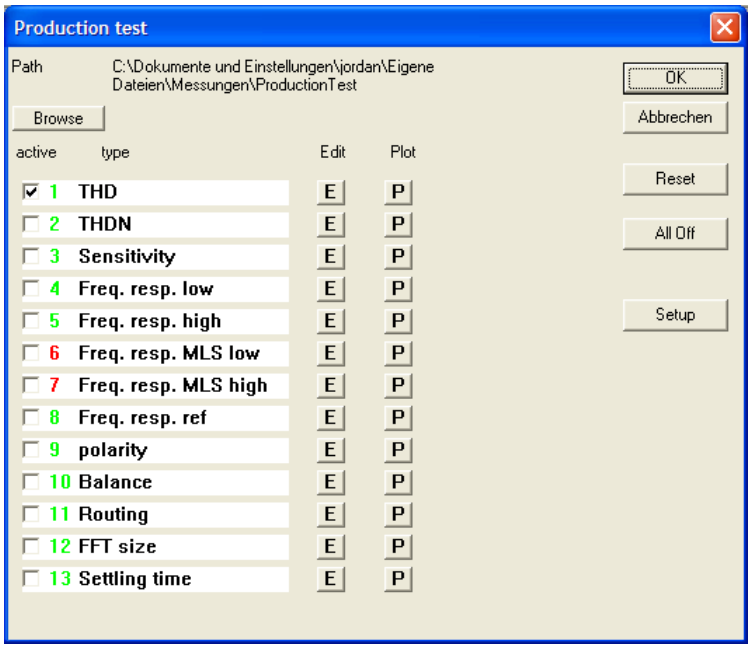
Start the **special production test** version of WinAudioMLS.



Press analyzer to configure the test. Enter „sofimax“ as the password.

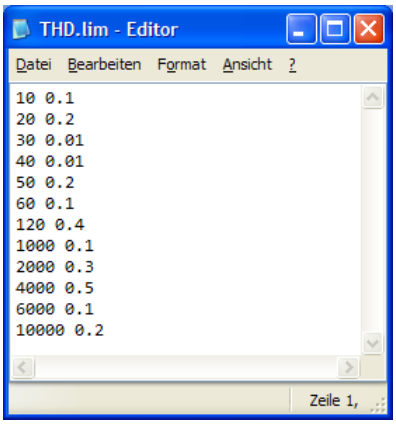
A normal user can not change any settings since the the menus are not accessible. You can use the analyzer features, but this is password protected.
A test operator can only start a test.

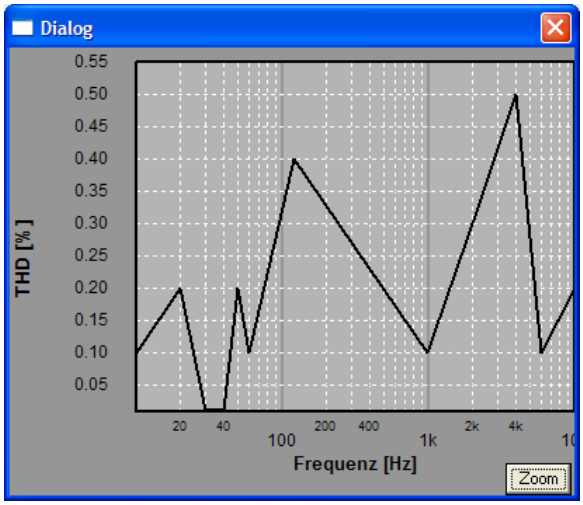
Use form the Menu Modules->ProductionTest



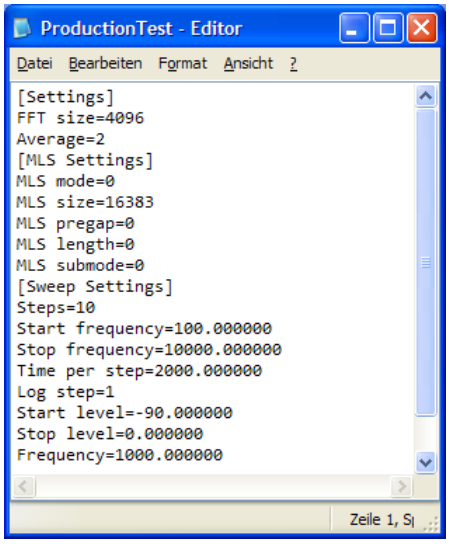
Each line is one test. You can deactive all test individually. Red tests mean, that a test file does not exist. With „E“ you can edit the corresponding text file. With „P“ you can plot the limits.

The sample THD file has the following content. The right picture shows corresponding plot with THD in % vs. frequency.





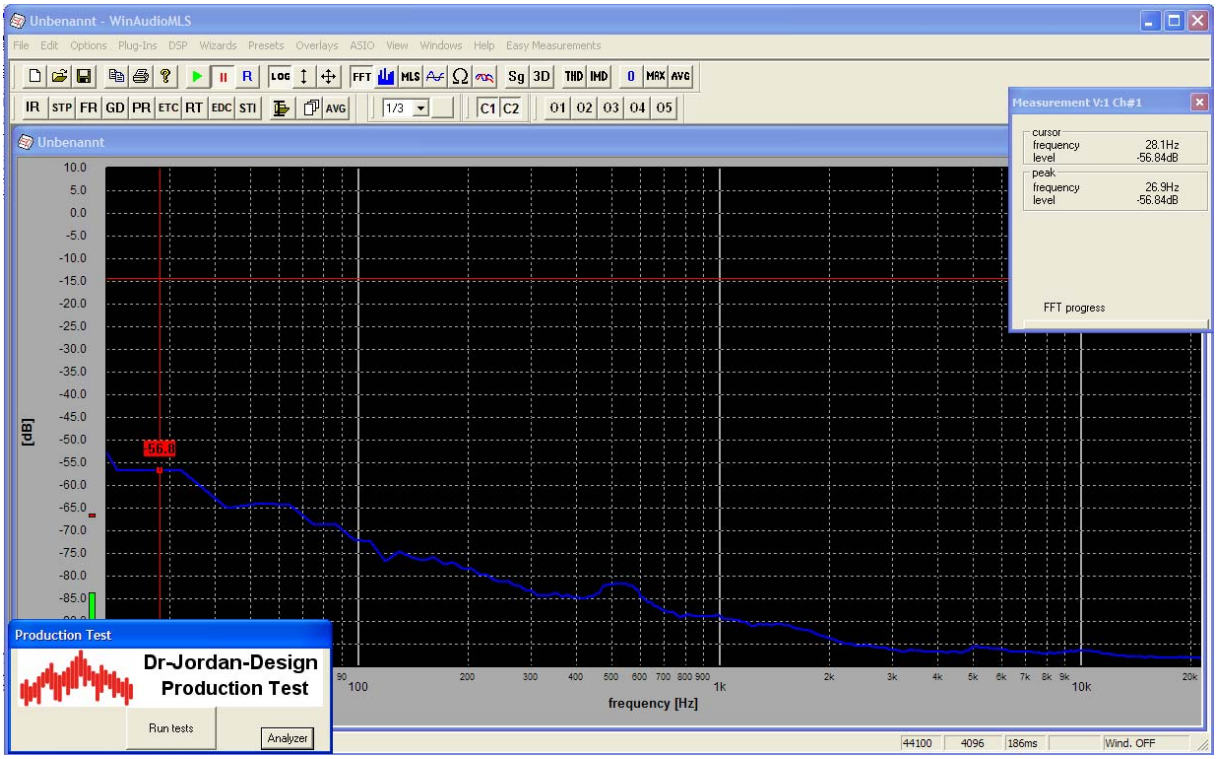
You can edit the main configuration file via the button setup.



Once you configured all parameter files press ok and restart the program. You can find a more detailed description of the limit files at the end of this document.

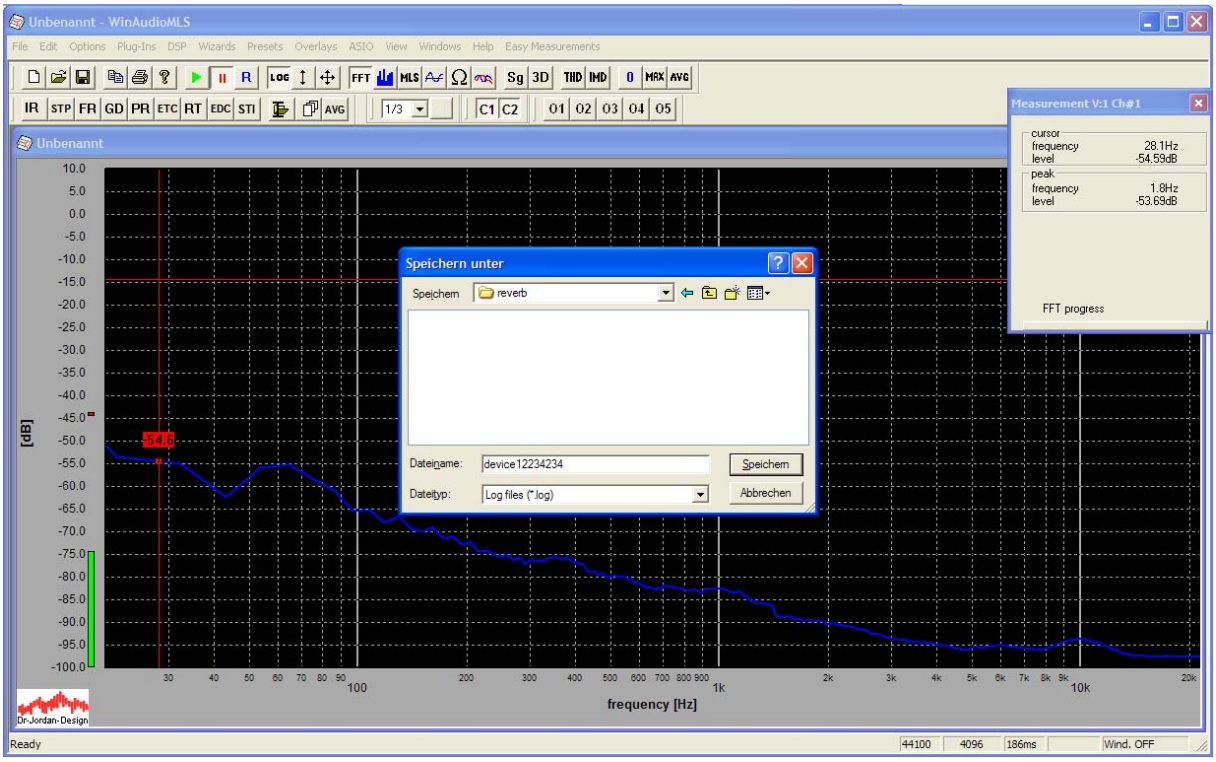
Running a test

You need to enter only a device name or serial number. The test runs automatically. All results are stored to simple text files, which you can easily parse to enter them to your database.



Press „run tests“.

You need to enter only a filename for logging the measurement results.



The program runs through all tests, wirtes all data to the log file and shows PASS or failed. Then it returns to the initial dialog to test the next device.

How to debug you limit files?

We recommend to run a normal sweep run first. This normal measurement mode also considers any .lim files. You can access it via Modules->sweep measurements from the main menu. Please refer to the main manu for details.

Limit files

For each test item you can define a limit file. This simple text file defines thresholds. If a certain file doses not exist, this testcase is not considered. For example if both files frequency_response_upper.lim and frequency_response_lower.lim exist, the frequency response will be checked in both directions. If only frequency_response_lower.lim exist, then only this lower limit is considered.
All files must exist in the WinAudioMLS binary folder.

The following parameters can be configured:

- THD+N
- THD
- Frequency response with upper and lower limit
- Sensitivity
- Balance
- Polarity

Other parameters are supported on request.

THD.lim	THD Total Harmonic Distortion
THDN.lim	THD Total Harmonic Distortion plus noise
sensitivity.lim	Sensitivity
frequency_response_upper.lim	Frequency response upper limit for single tone
frequency_response_lower.lim	Frequency response lower limit for single tone
frequency_response_MLS_upper.lim	Frequency response upper limit for MLS
frequency_response_MLS_lower.lim	Frequency response lower limit for MLS
polarity.lim	Polarity
LR_routing.lim	Check routing between left and right channel
balance.lim	Balance between two channels
frequency_response_reference.lim	Reference point for relative frequency response mesurements

In most cases these text files contails pairs of frequencies and values. The frequencies must be monotonic increasing. All frequencies can be arbitrary and all measurement frequencies are interpolated. This means if a limit point exist at 900 and 1000 Hz and the current measurement frequency is 970Hz, the thresholds are computed automatically.

THD and THD+N

The limit files contains pairs of frequency and distortion in % e.g.

```
40        0.004
50        0.003
60        0.1
1000      0.1
```

```
2000      0.3
4000      0.5
```

The test fails, if any measurement value is above the thresholds.

Frequency response lower

The limit files contains pairs of frequency and level in dB.

```
40        -3.1
50        -2.1
400       -1
500       -1
2000      -0.3
4000      -2.5
```

The test fails, if any measurement value is below the thresholds.

Frequency response upper

The limit files contains pairs of frequency and level in dB.

```
40        4.1
50        3.1
400       1
500       0
2000      2
4000      1
```

The test fails, if any measurement value is above the thresholds.

Relative frequency response mesurements

Normally the frequency response is checked against absolute values. We can show this in an example. Let us assume a limit is set for –30dB as the lower frequency response limit. If any measured level is below that threshold the test is failed. In many cases you want to normalize it to measure a relative frequency response. A mesurement level depends on the frequency response itself and the gain. In a relative frequency response measurement we want to normalize it to the gain.
In this case you define the file “frequency_response_reference.lim”. It contains 3 values in one single line. The first value is the frequency and the other levels are the reference levels in dB for each channel.
The example

1000 0 0

mean. The system measures the output level at 1000Hz first and sets this level to 0dB. All frequency response tests are corrected by this offset. In total you can measure the frequency response corrected by any gain offset.

Sensitivity

The limit files contains the frequency and the lower and upper value in dB.

```
1000    -56     -40
```

For this line the sensitivity must be between –56dB and –40dB at 1000Hz.
The test fails, if the measurement level at the nearest frequency is outside the limits.

Balance

The limit files contains the frequency and the maximum allowed difference in dB between both channels.

```
1000    2.3
```

For this line the channel mismatch at 1000Hz must be below 2.3dB.
The test fails, if the measurement level at the nearest frequency is above the limit.

Polarity

The limit files contains either 1 or 0 to define the polarity.

```
1
```

The test fails, if the polarity does not match.

Simply connect a “good” device and run the production test. If the polarity fails, invert the polarity limit file. This step is necessary because the soundcard itself might invert the signal. Therefor you need to perform this reference step once.

Channel L and R routing

If the file exists the system checks if the right channel is connected to the left channel and the right channel is connected to the right channel. The file does not contain any data

The test fails, if the channel routing does not match.