2014

Measuring Center for Android

User manual

Software for analyzing sound signals

Spl-Lab

Version 2.2

Table of Contents

General Information

Starting Operation

For installing the free version of the Measuring Center for Android, please use the CD that is included with the Spl-Lab equipment or download the latest version of the application from the site: www.spl-lab.ru or www.spllabusa.com. Copy the contents of the SPL-LAB_MC_Android folder from the CD, or unpack the archive, downloaded from the website, onto the Android device.

For installing the full version of the application, use the play.google.com application store. Before purchasing the paid version of the application, it is recommended to install the free version for testing compatibility with your equipment.

For using equipment like the USB BASS METER or the USB RTA Meter, there should be a USB-Host in the Android device. Connect the Spl-Lab equipment to the Android device using a USB OTG cable.

When using equipment like the WIRELESS BASS METER that utilizes Bluetooth, configure the device in the Bluetooth Android settings beforehand. **Pairing code "1234".**

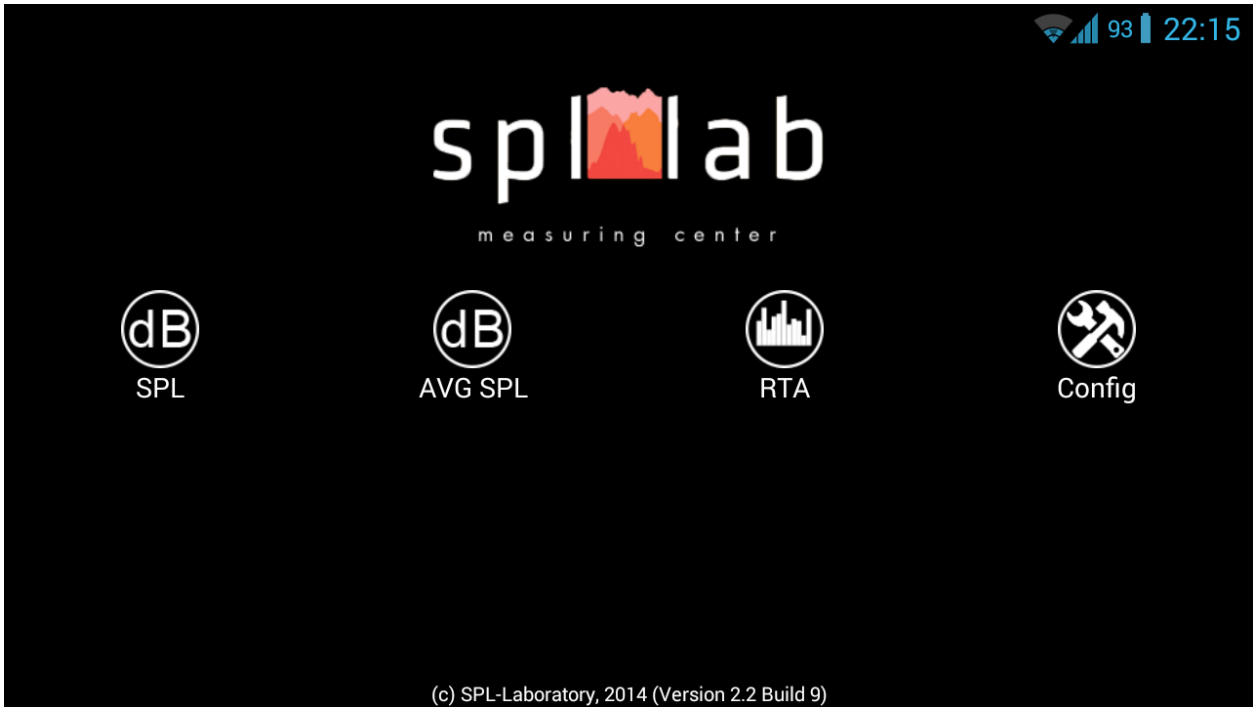
The Measuring Center will be unable to start operation unless a supported device is connected to the Android device and configured by the operating system in advance.

After installation and connecting the equipment, start the Spl-Lab application from the application folder.

Program Interface

The Measuring Center has an easy-to-use, simple and intuitive interface. Operation of the application is available both in portrait and landscape modes. For changing the view mode, simply rotate your device - interface will be changed automatically in any operation mode of the application. Current version of the application supports Russian and English languages; the interface language is selected automatically according to the regional settings of the device.

After starting the Measuring Center, the Start page is opened (depicted below):



If it is the first launch of the program after it was installed or after the list of connected equipment was changed, the configuration page will open automatically.

The Start page has four elements

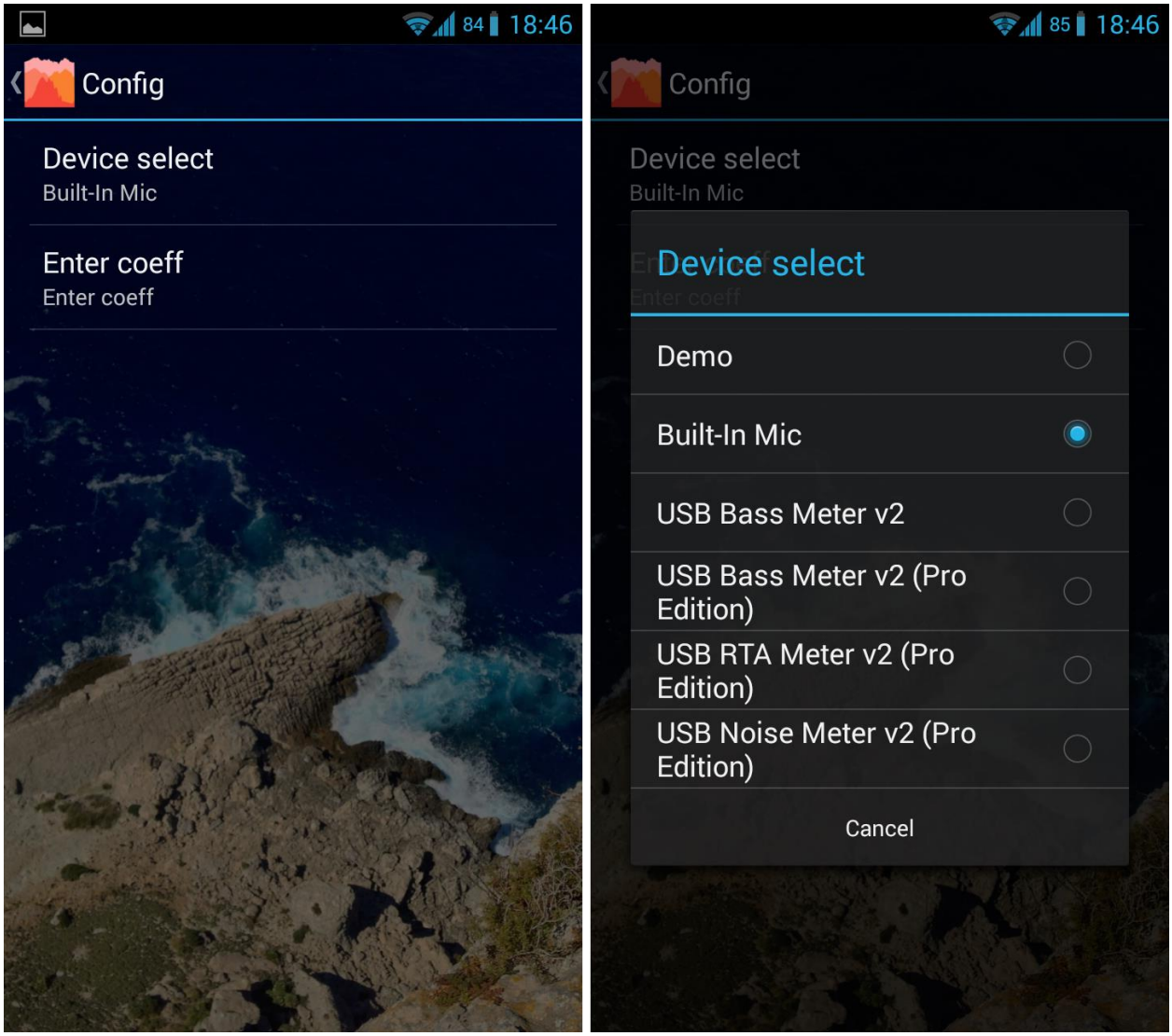
- **“SPL”** - opens the SPL measuring mode.
- **“AVG SPL”** - opens the AVG SPL measuring mode.
- **“RTA”** - opens the RTA measuring mode.
- **“Config”** - opens the application configuration

The elements that are unavailable for use with the current equipment are highlighted in gray.

Start work with the Measuring Center by pressing the “Config” button.

Configuration

The appearance of the configuration page of the Measuring Center (on the left) and the list of detected devices (on the right):



Designation of the interface elements (from left to right):

"Device select" - the button for selecting the detected Measuring Center devices that displays the currently used device. Certain devices can have several types. In such case, select the required device type from the **"Device Select"** list. The following devices are supported:

- **"Built-in Mic"** – the built in Android device microphone supported only in full version of the Measuring Center. For applying changes, it is necessary to input the reference coefficient. This value is unique for each model and often even the device. Use the Spl-Lab measuring equipment or equipment from a third-party for calibration and defining the coefficient of your microphone.
- **"Demo"** – the virtual input device. It is used for demonstrating the principle of the application operation. The sine signal of 35 Hz is being generated.

- **USB Bass Meter**
- **USB Bass Meter (Pro Edition)**
- **USB RTA Meter (Pro Edition)**
- **USB Noise Meter (Pro Edition)** – requires inputting the coefficient indicated on the device for use.
- **“Wireless Bass Meter” -** requires previous configuration in the OS settings.

“Enter coeff” - the button for selecting the reference coefficient of the used device. It is not required for all devices. Input the value indicated on the equipment or identify the reference coefficient by calibration.

Measuring Modes

General Information

At the Measuring Center Starting page, there are three buttons that correspond to three major measuring modes. Each mode has a unique algorithm for conducting measurements that is supported by certain types of equipment. In case the used equipment is not supported by the mode, the mode button will be highlighted in gray and will be inactive.

The list of the modes is depicted below:

"SPL" - is the mode used for measuring the peak value of the sound pressure level for signals with frequency ranging from 10 to 120 Hz with a resolution of 1 Hz. In this mode, the waveform, spectrum, level and harmonic distortion coefficient of the measured signal are reflected. The length of the analyzed part of the signal equals to one second. The resulted value of the sound pressure level is calculated from several spectral components for each analyzed part of the signal separately. It is possible to use two channels in this mode. This mode supports the following devices:

- Demo
- USB Bass Meter
- USB Bass Meter (PRO Edition)
- Wireless Bass Meter

"AVG" – is the mode used for measuring time-average peak value of the sound pressure level of the signal with frequency ranging from 10 to 120 Hz with resolution of 2 Hz. In this mode, the waveform, spectrum, level and harmonic distortion coefficient of the measured signal are reflected. The length of the analyzed part of the signal equals to 1/2 second. Current value of the sound pressure level is calculated from several spectral components separately for each analyzed part of the signal. The resulted value is an arithmetic average of the maximum values selected within the number of analyzable parts of the signal specified in the **"Period"** parameter. It is possible to use two channels in this mode. This mode supports the following devices:

- Demo

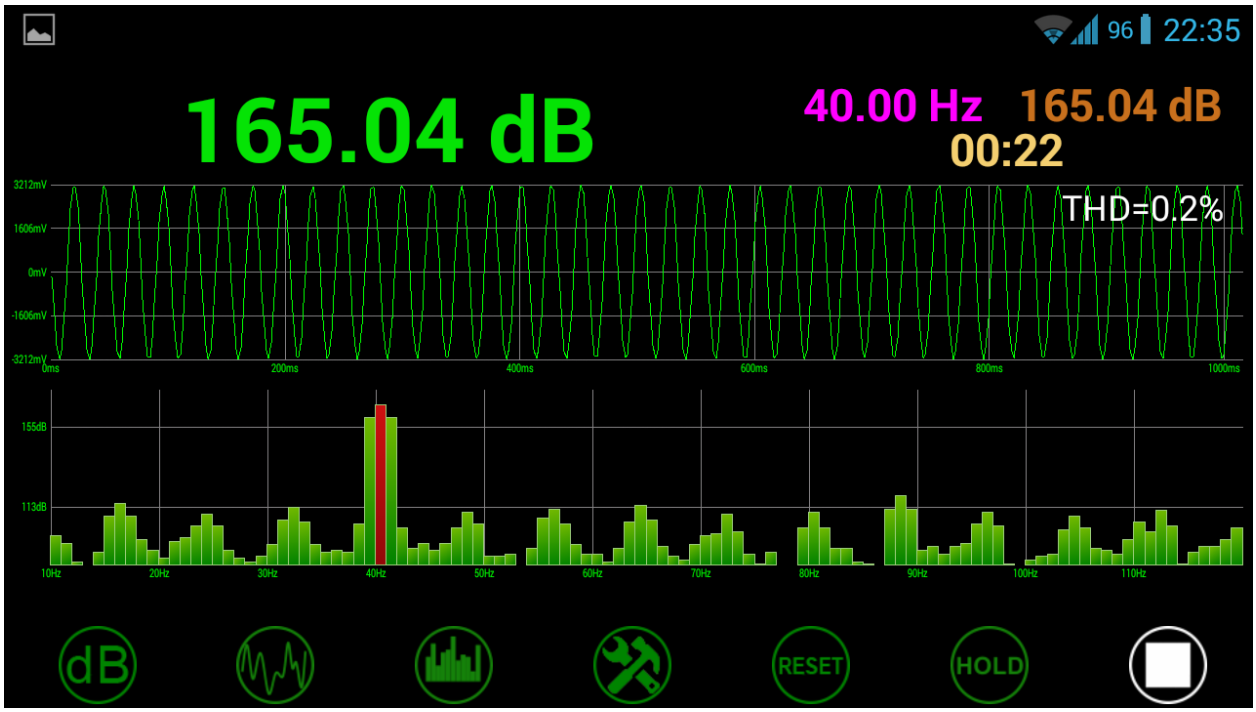
- USB Bass Meter
- USB Bass Meter (PRO Edition)
- Wireless Bass Meter

“RTA” – is the mode used for measuring the amplitude and the weighted average sound pressure of the sound signal with frequency ranging from 10 to 20000 Hz with a resolution of 2.7 Hz. In this mode, the waveform, spectrum, amplitude and harmonic distortion coefficient of the measured signal are reflected. The length of the analyzed part of the signal is approximately equals to 1/2.7 second. In the RTA mode, the amplitude of the spectral peak component, the weighted average sound pressure and the coefficient of harmonic distortion of the analyzed signal can be measured. This mode supports the following devices:

- Demo
- USB RTA Meter (Pro Edition)
- USB Noise Meter (Pro Edition)

Measuring Mode Interface

All the modes have a similar interface depicted below:



There are four groups of elements on-screen:

- **“Panel”** - data of current measurement in digital form. In **green**, the overall result is displayed, in **pink** - the frequency, in **brown** - current result, in **beige** - time from the beginning of the measurement.

- **“Oscilloscope”** - displays the signal waveform of the currently measured signal segment and the coefficient of the harmonic distortion (in white).
- **“Spectrograph”** - displays the spectrum of the current signal or spectrum of the signal collected in the peak hold mode. The peak component of the entire spectrum is highlighted in red.
- **“Control Panel”** - the group of buttons, intended for managing the mode operation.

When the device is used that supports work in dual channel mode, the screen will be divided into two parts.

Control Panel of the Mode

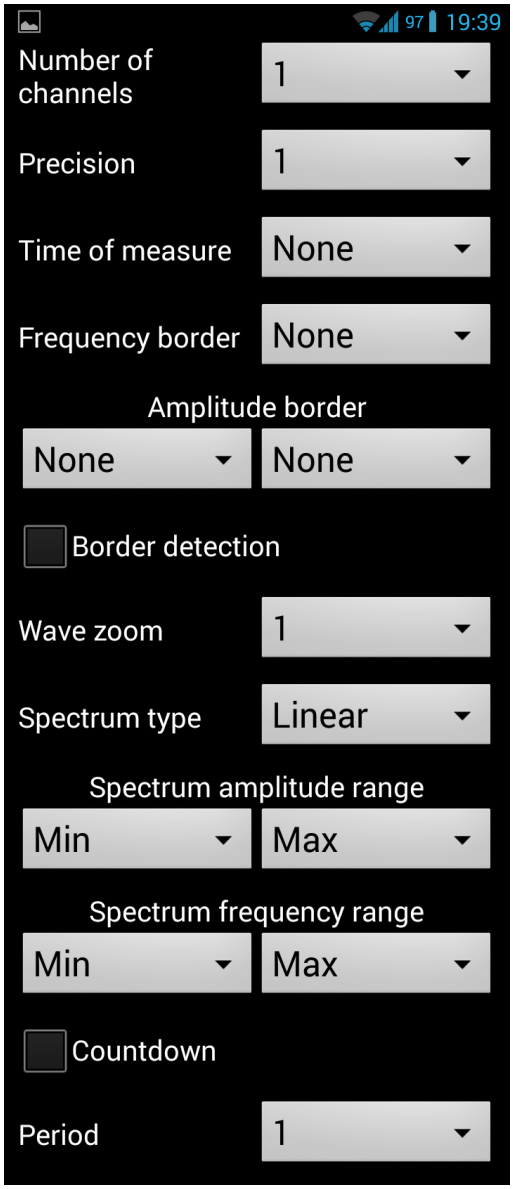
In the bottom part of the screen, there are the control elements.

Designation of the buttons (from left to right):

- **“Show/Hide Panel”** - press the button and the panel will be hidden from the screen. In doing so, the button will be highlighted in white.
- **“Show/Hide Oscilloscope”** - press the button and the oscilloscope will be hidden from the screen. In doing so, the button will be highlighted in white.
- **“Show/Hide Spectrograph”** - press the button and the spectrograph will be hidden from the screen. In doing so, the button will be highlighted in white.
- **“Open the page of mode settings”** - press the button and the page of mode settings for the current mode will be open. Set the necessary settings and press the “Back” button.
- **“Reset”** – the button for resetting the values on-screen. It includes the values collected in the Peak Hold mode.

- **“Enable/Disable the peak hold mode”** - this button is unavailable in **“AVG SPL”** mode! Press this button for enabling the mode. The button will be highlighted in white. The panel in the main area holds the maximum amplitude reached during the entire duration of the measurement and in the frequency area (the frequency at which the maximum amplitude value was reached). In **“SPL”** mode, only the peak component of the signal at the corresponding frequency is reflected on the spectrum, but in **“RTA”** mode, all components of the signal are reflected on the spectrum. In both cases, the amplitude value for each frequency changes only in case they exceed the previous maximum. Disabling the Peak Hold Mode automatically resets the collected data. Values on the oscilloscope are not retained.
- **“Start/Stop”** – the button for starting/stopping a measurement process.

“SPL” and “AVG SPL” Mode Settings



“Number of channels” – selecting a number of channels used if the equipment used supports operation in dual-channel mode. If the dual-channel mode is used, the screen is divided into two equal parts.

“Precision” – the dropdown list for selecting up to how many digits the measurement results on the panel will be rounded. Also known as resolution.

“Time of measure” – the dropdown list for selecting the duration of the measurement in seconds. In case the **«none»** value is selected, the measurement will continue until it is stopped manually.

“Frequency border” – the dropdown list for setting the threshold frequency of the measured signal. The signals with frequency that exceed the specified one will not be considered. The spectrum will be limited by the selected value.

“Amplitude border” - only for **«AVG SPL»** mode! Two dropdown lists that define the range of acceptable resulted values of the amplitude. In case the resulted amplitude of measured signal exceeds the specified range, the amplitude of overshoot will be fixated in the main part of the panel highlighted in red. The part of the panel that displays current amplitude will be highlighted in red without fixation of value. Measurement will be possible only after resetting the results or stopping the measurement.

“Border detection” – the checkbox that enables/disables the detection of the threshold frequency overstepping. In case the measured signal frequency oversteps the threshold frequency, the amplitude and frequency will be fixated on the panel with a red background. Measurement will be possible only after resetting the results or stopping the measurement.

“Wave zoom” - the dropdown list for selecting a displaying scale of the signal waveform on the oscilloscope.

“Spectrum type” - the dropdown list for selecting a type of view of the spectrum frequency scale. The linear or logarithmic views are available.

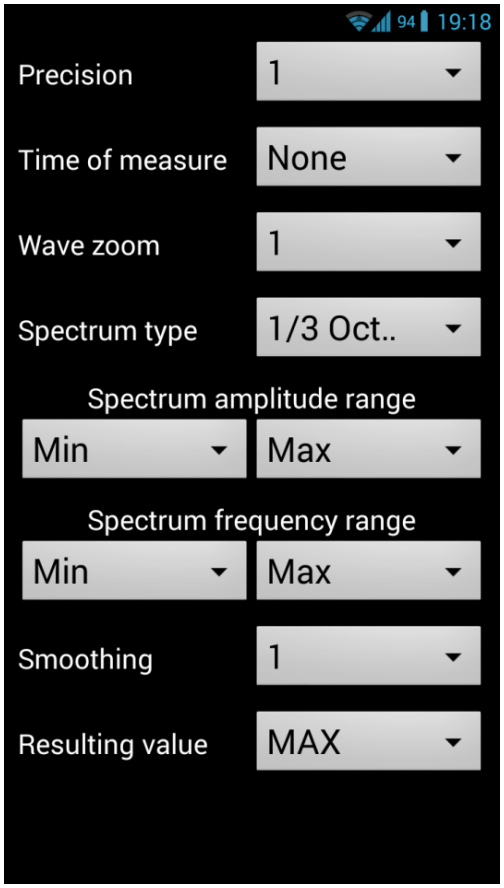
“Spectrum amplitude range” - two dropdown lists defining the spectrum amplitude display range.

“Spectrum frequency range” - two dropdown lists defining the spectrum frequency display range. The upper value is limited by the **“Frequency border”** parameter.

“Countdown” - only for **«AVG SPL»** mode! The checkbox that enables/disables five second long countdown before beginning the measurement.

“Period” - only for **«AVG SPL»** mode! The dropdown list for specifying a number of analyzable parts of the signal from which the maximum will be selected when calculating the resulted value. For example, the period equal to four means that the maximum value for calculating the arithmetic average will be selected from four analyzable parts of the signal with total duration of two seconds.

“RTA” Mode Settings



“Precision” – the dropdown list for selecting up to how many digits the measurement results on the panel will be rounded. Also known as resolution.

“Time of measure” – the dropdown list for selecting the duration of the measurement in seconds. In case the «none» value is selected, the measurement will continue until it is stopped manually.

“Wave zoom” - the dropdown list for selecting a displaying scale of the signal waveform on the oscilloscope.

“Spectrum type” - the dropdown list for selecting a type of view of the spectrum frequency scale. Linear, logarithmic and octave view of the spectrum are available with detailing up to 1/6 of an octave. The octave view is effective for use when measuring the pink noise. In this case, the AFC should tend to flat line. With a disabled octave view, to get a flat AFC, use a sweep-tone or white noise.

“Spectrum amplitude range” - two dropdown lists defining the spectrum amplitude display range.

“Spectrum frequency range” - two dropdown lists defining the spectrum frequency display range. The upper value is limited by the **“Frequency border”** parameter.

“Smoothing” - the dropdown list for selecting the spectrum smoothing in time. This setting is useful for stabilizing the results when measuring sound signals.

“Resulting value” – the dropdown list for selecting the type of value displayed on-screen. The following types can be set:

- **“MAX”** - displaying the amplitude of the maximum spectrum component of the measured signal. When using the peak hold mode, the maximum received amplitude for all the measurement time and its frequency will be reflected.
- **“SQL”** - displaying the weighted average sound pressure level. Current value of the sound pressure level is calculated from the entire spectrum for each analyzed part of the signal separately. The resulted value is an arithmetic average of all current values. For getting a good result, the measured signal should have high density both in time and through the entire spectrum.

Description of the CD tracks:

The CD included with the Spl-Lab equipment alongside with the software contains specialized audio tracks with test signals for adjusting the sound system. Consider that these tracks are recorded not in file format but as tracks in Audio-CD format. For playing back the tracks from the CD, use specialized software or a CD player. It is possible that some CD player models will not read the audio content of the CD. In such case or if it is more convenient for the user to use the audio files, download the archive with test signals from **"Support"** at the Spl-Lab web site. Table with track description below:

No. of track	**Contents**
Track 1	Pink noise 20-20000 Hz
Track 2	Pink noise 40-80 Hz
Track 3	Pink noise 60-80 Hz
Track 4	Pink noise 80-100 Hz
Track 5	Pink noise 100-120 Hz
Track 6	Pink noise 120-140 Hz
Track 7	Pink noise 140-160 Hz
Track 8	Pink noise 160-180 Hz
Track 9	Sweep-tone 30-20 HZ Level 0 dB
Track 10	Sweep-tone 35-25 HZ Level 0 dB
Track 11	Sweep-tone 40-30 HZ Level 0 dB
Track 12	Sweep-tone 45-35 HZ Level 0 dB
Track 13	Sweep-tone 50-40 HZ Level 0 dB
Track 14	Sweep-tone 55-45 HZ Level 0 dB
Track 15	Sweep-tone 60-50 HZ Level 0 dB
Track 16	Sweep-tone 65-55 HZ Level 0 dB
Track 17	Sweep-tone 70-60 HZ Level 0 dB
Track 18	Sweep-tone 75-65 HZ Level 0 dB
Track 19	Sweep-tone 80-70 HZ Level 0 dB
Track 20-80	Sine signal. The number of track corresponds to the signal frequency. Level – 0dB.
Track 81	Sweep-tone: 20-20000 Hz. Level 0 dB
Track 82	Sine signal with frequency of 100 Hz

Track 83	Sine signal with frequency of 200 Hz
Track 84	Sine signal with frequency of 1000 Hz
Track 85	Sine signal with frequency of 2000 Hz