

Microphone Testing with 10-bands Equalizer

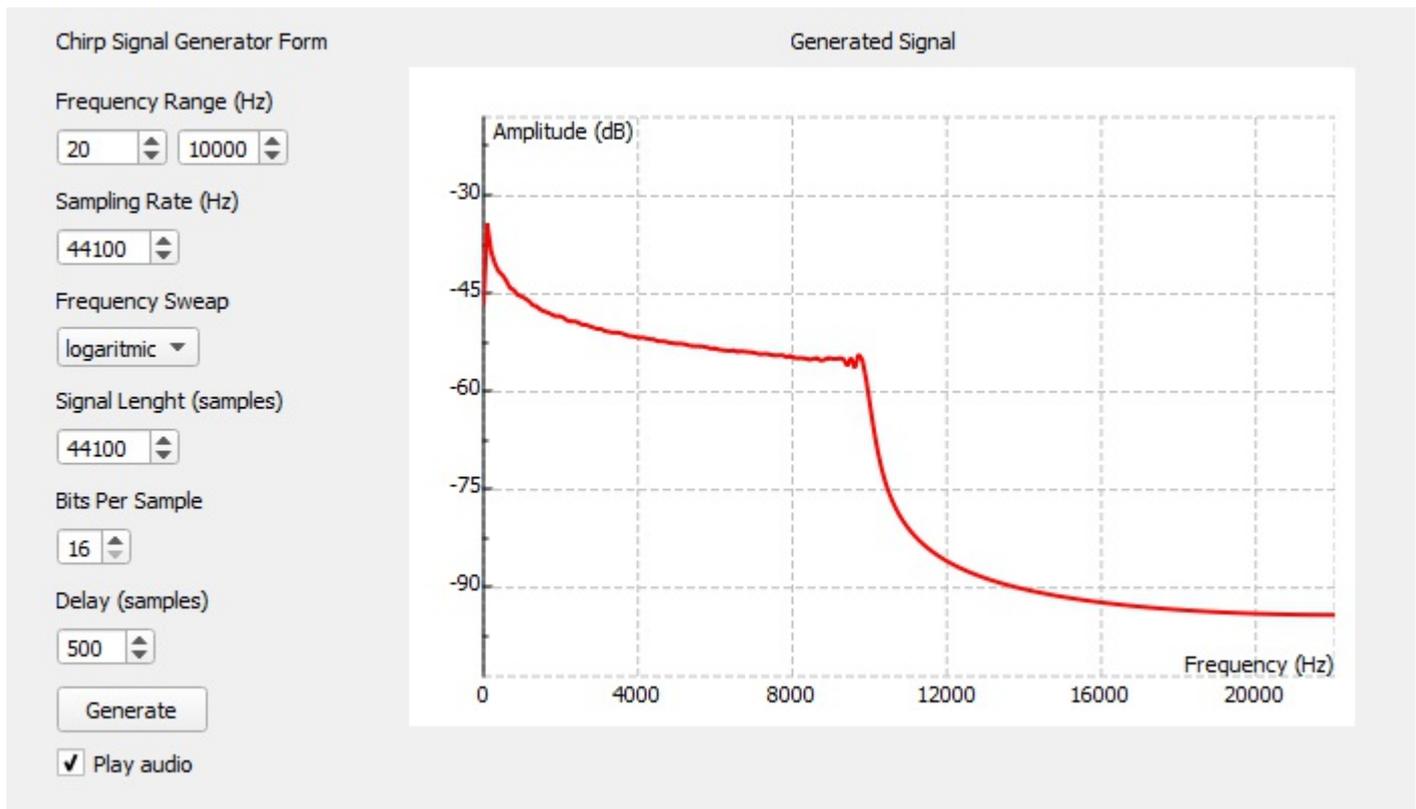
Description

In this example, we illustrate how MatDeck can be used in audio equipment testing. In the particular case, we test the quality of the given microphone by recording a test sound. The test sound is a chirp signal whose frequency is swept through the hearing range from 20Hz up to 20000Hz. The recorded sound signal is corrected by using Graphic Equalizer with 10 bands which is adjusted to reverse the frequency response of the microphone. MatDeck components which are used in this example are: Chirp Signal Generator Toolkit, Signal Frequency Analysis Toolkit, Equalizer 10 Bands Form.

Chirp Signal Generation

For the testing purposed, the chirp audio signal is generated with frequency sweeping in the range from 20Hz up to 20000Hz. The frequency is swept in a logarithmic manner across the frequency range. The sampling frequency is set to 44100Hz, with 16 bits per sample. The total signal length is two seconds, or 88200 samples. The audio signal explained above is generated using Chirp Signal Generator Form which allows users to set all the parameters mentioned. We also set short delay, in order to enable the recording function to grasp all the signal components. The audio chirp signal is played on system speakers, and recorded by using the microphone under consideration.

```
ff1 := chsiggenform(0, "Gen01")
```



```
Xchirp := chsiggenresult(ff1)
```

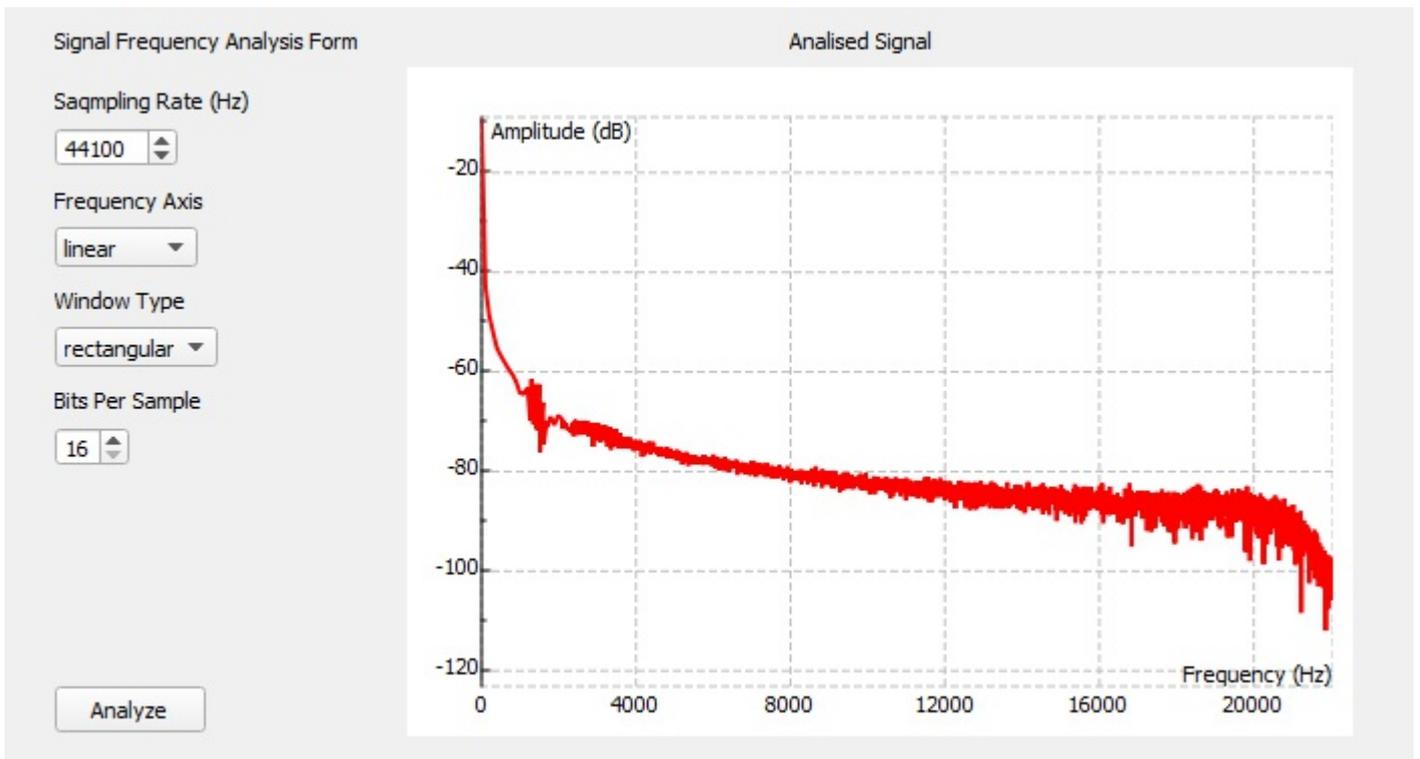
```
Xrec := audio record(44100, 16, 8000) Record test signal
```

The testing scenario with a single microphone is given in Figure.

Frequency domain analysis of the recorded signal.

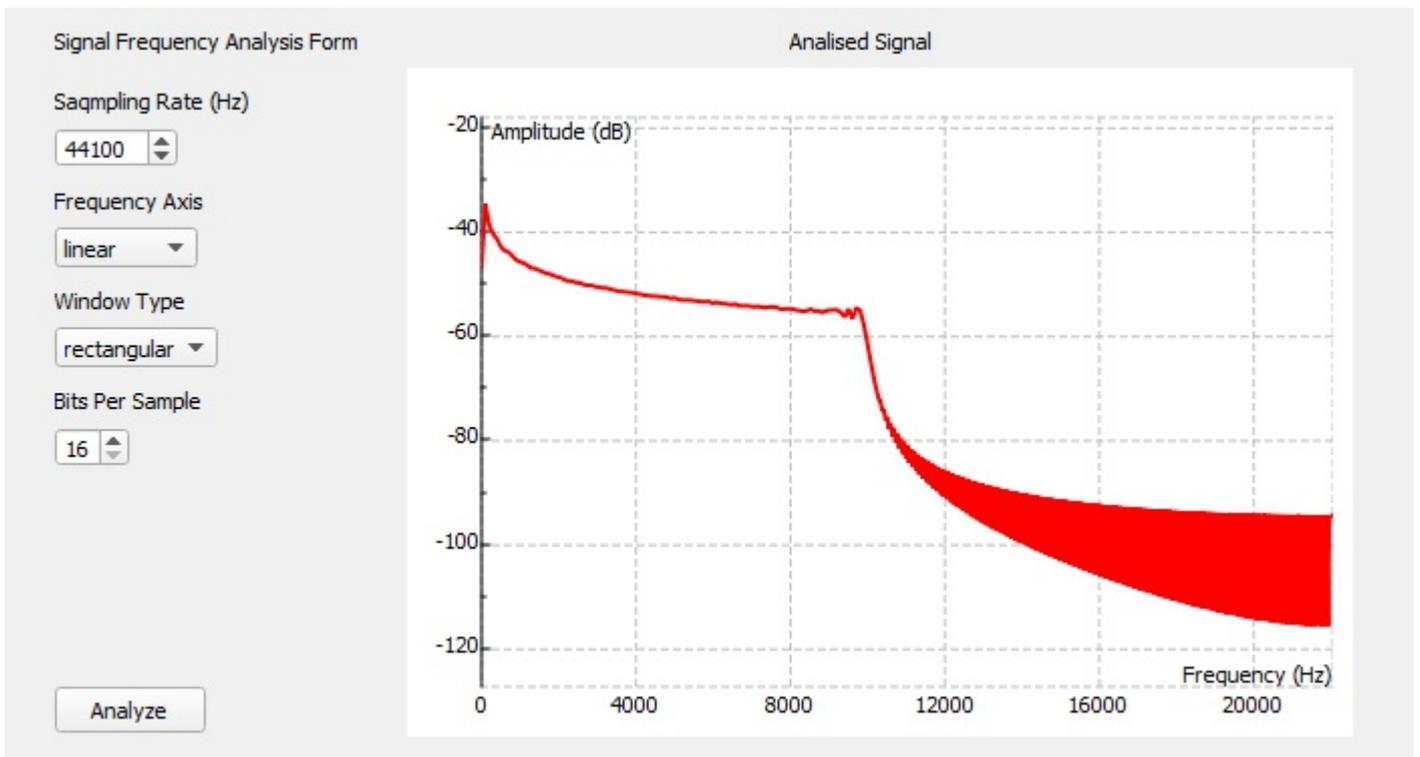
The recorded test signal is then analyzed in the frequency domain and compared to the original signal. For that purpose we use Signal Frequency Analysis Form.

```
ff2 := sigfreanaform(0, "Analysis01")
```



```
Xrecspectar := sigfreanareult(ff2, Xrec)
```

```
ff3 := sigfreanaform(0, "Analysis02")
```



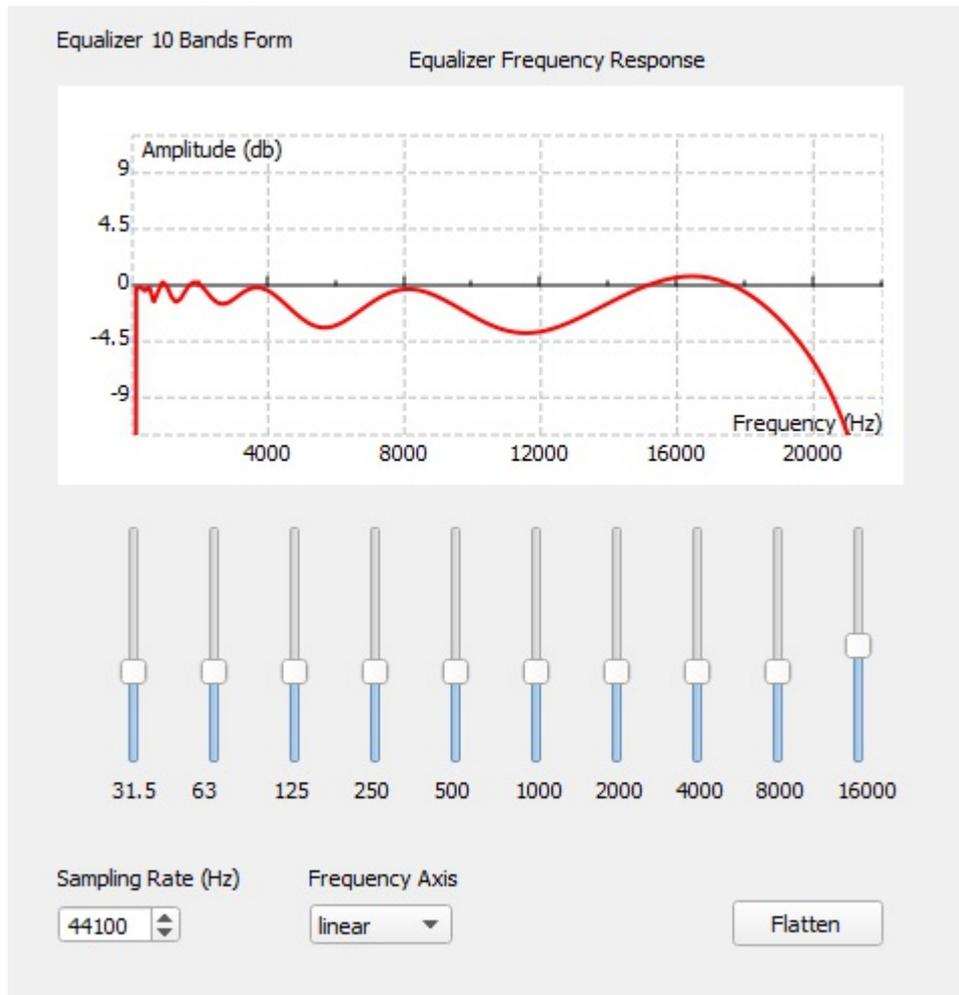
```
Xchirpectar := sigfreanareult(ff3, Xchirp)
```

10 Bands Graphic Equalizer

The 10 Bands Graphic Equalizer is used to correct the recorded signal in order to reverse the influence of the microphone.

```
ff4 := equalizer10bandsform(0, "Equalizer11")
```

```
Result := equalizer10bandsresult(ff4, Xrec)
```



What is left to check is the corrected audio signal after the equalizer. The corrected audio signal can be inspected by listening and by checking its frequency spectrum.

```
audio play(44100, 16, Result)
```

```
ff5 := sigfreaform(0, "Analysis13")
```

```
ResSpect := sigfrearesult(ff5, Result)
```

Signal Frequency Analysis Form

Analysed Signal

Sampling Rate (Hz)

44100

Frequency Axis

linear

Window Type

rectangular

Bits Per Sample

16

Analyze

