LifeVibes™ VoiceEngine Equalizer User Guide v2.02

NXP Software
August 2011

LifeVibes™ VoiceEngine Equalizer – Parameter Tuning Training

Objective of the equalizer tuning

- Make the frequency response be compliant with the specification
- Give the “desired taste” to the speech signal
- Compensate acoustic electro-mechanical imperfection

Equalizer tuning methodology

For tuning the FIR-equalizer, the equalizer GUI is used.

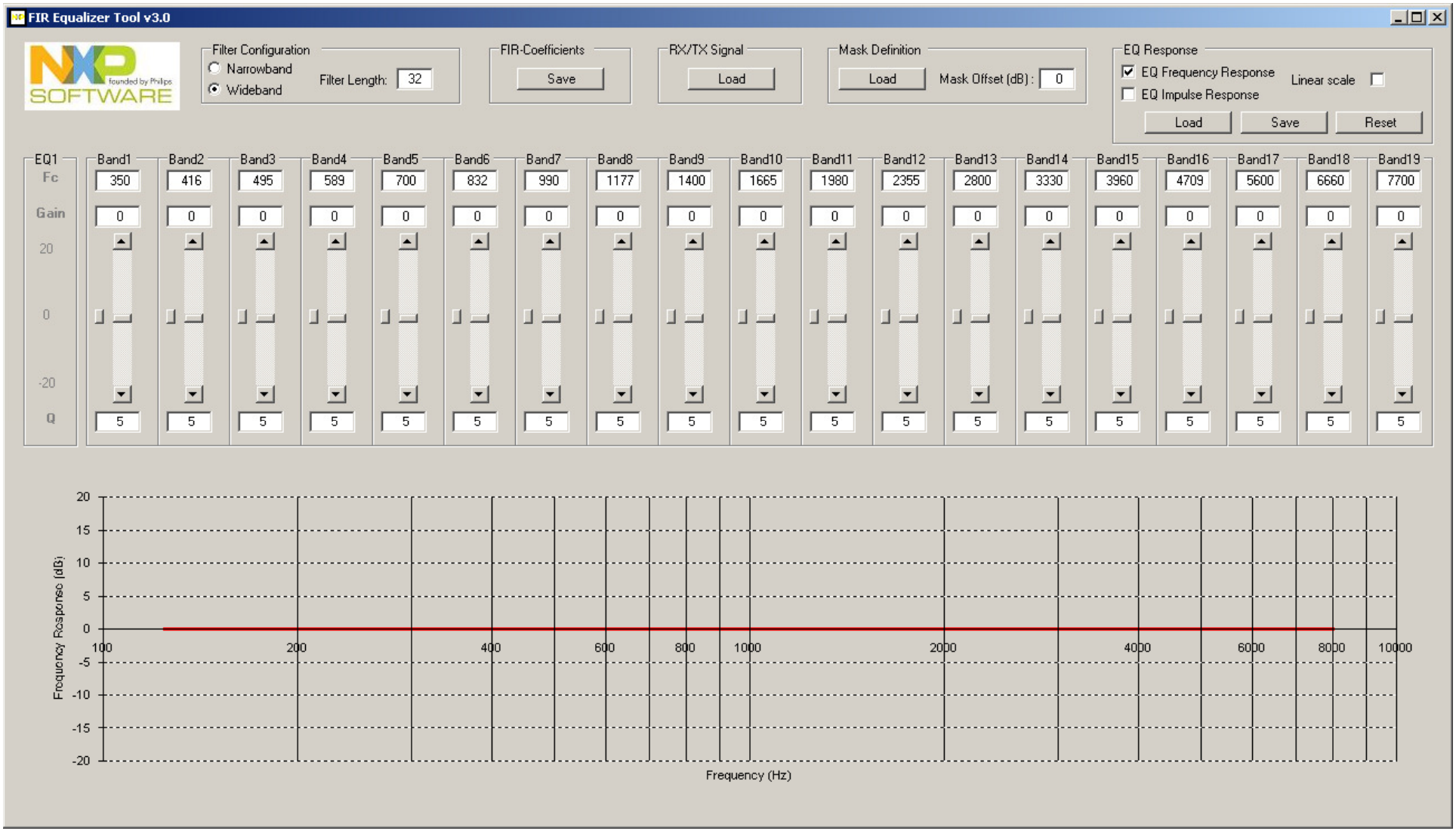
Feature of the equalizer GUI

- Selection between narrowband (8kHz) and wideband (16kHz) configuration
- Different bands with center frequency, gain and Q-factor to be specified
- Configuration of the filter length
- Load wav-file containing the speaker or microphone frequency response
- Load frequency mask that can be defined according to specifications
- Save fixed-point filter coefficients (format Q3.12) in a text file
- Display the EQ frequency response or the impulse response in linear or logarithmic scale
- Load, save and reset the frequency and impulse responses
- Automatic saving of the configuration (center frequency, gain and Q-factor) for all the frequency bands

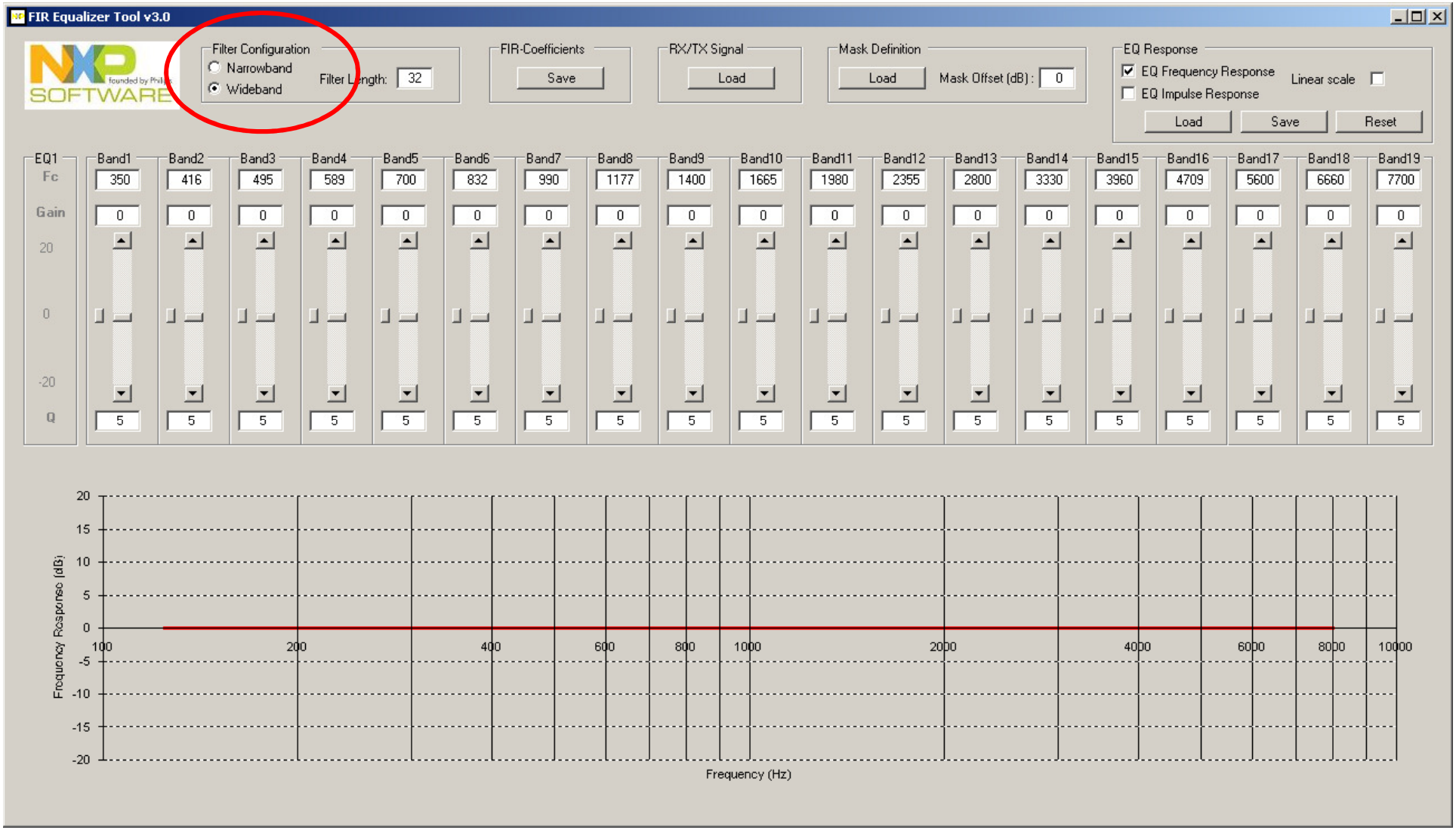
Narrowband and wideband configuration

	Narrowband	Wideband
Frequency bands	14	19
Frequency range	100 to 3700Hz	100 to 7700Hz
Gain range	-20 to 20dB	-20 to 20dB
Q-factor range	1 to 50	1 to 50
Filter length max.	32	64
Offset on the mask	-15dB to 5dB	-15dB to 5dB

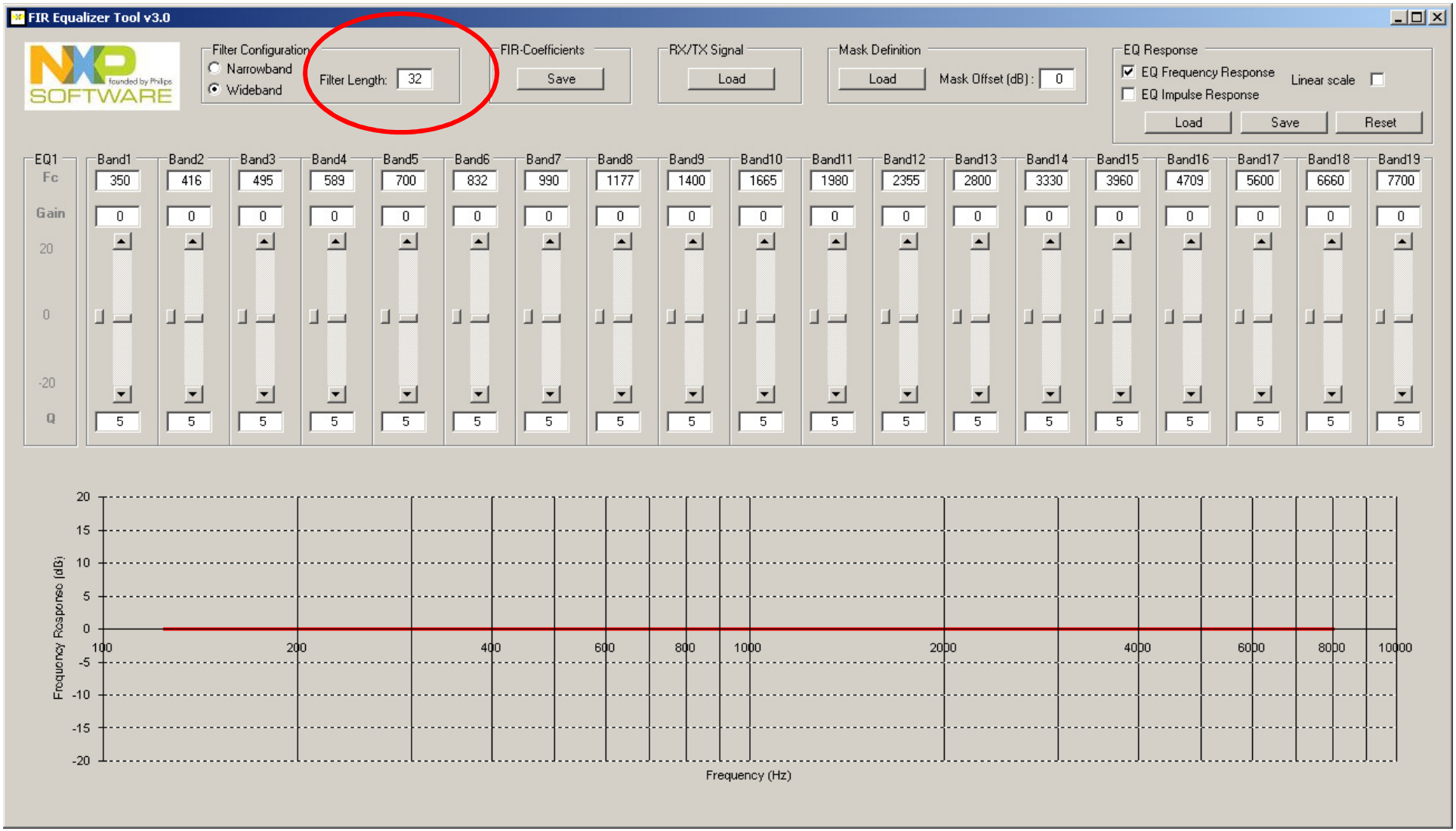
Equalizer tuning methodology



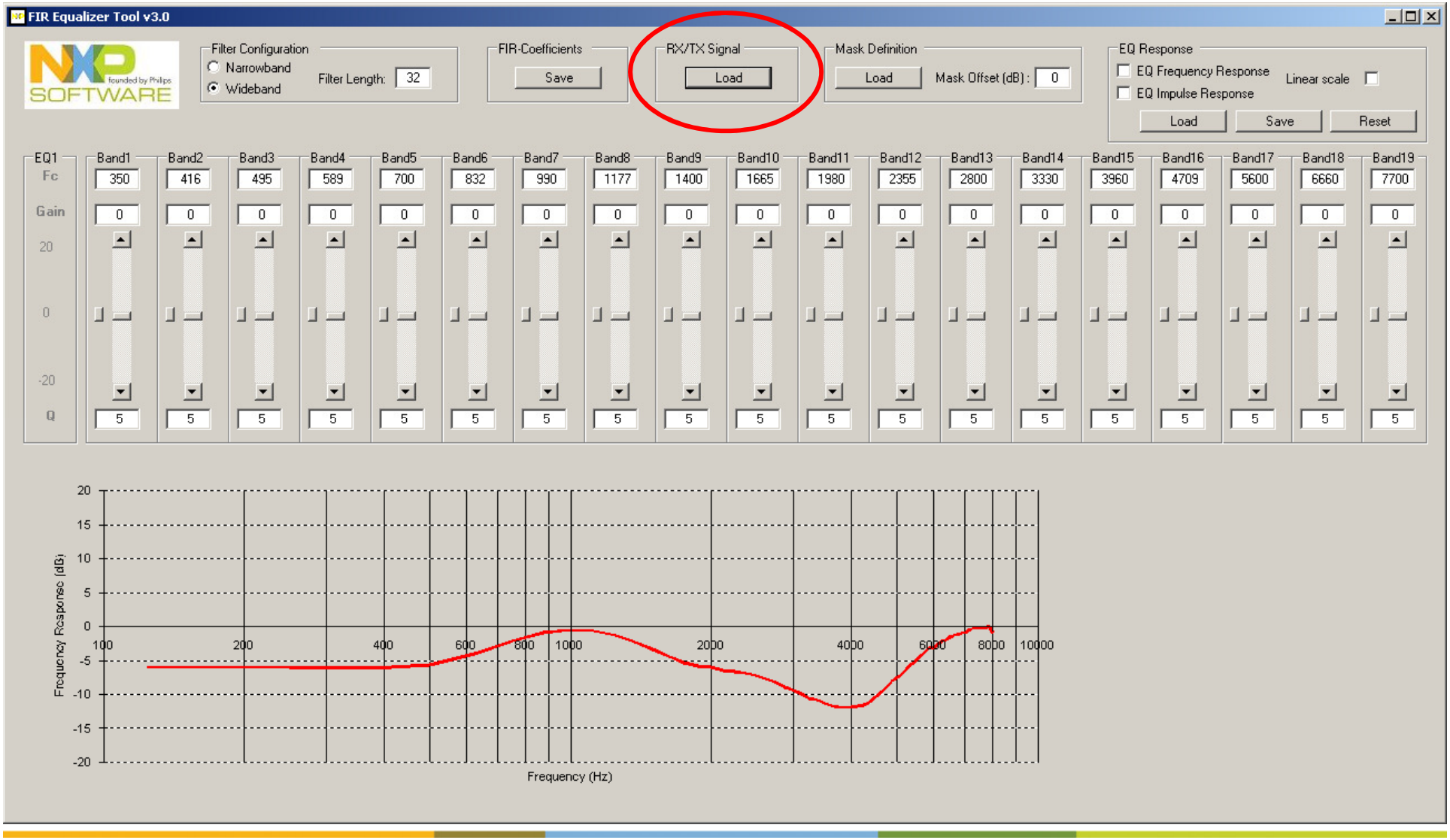
1: Select Filter Configuration



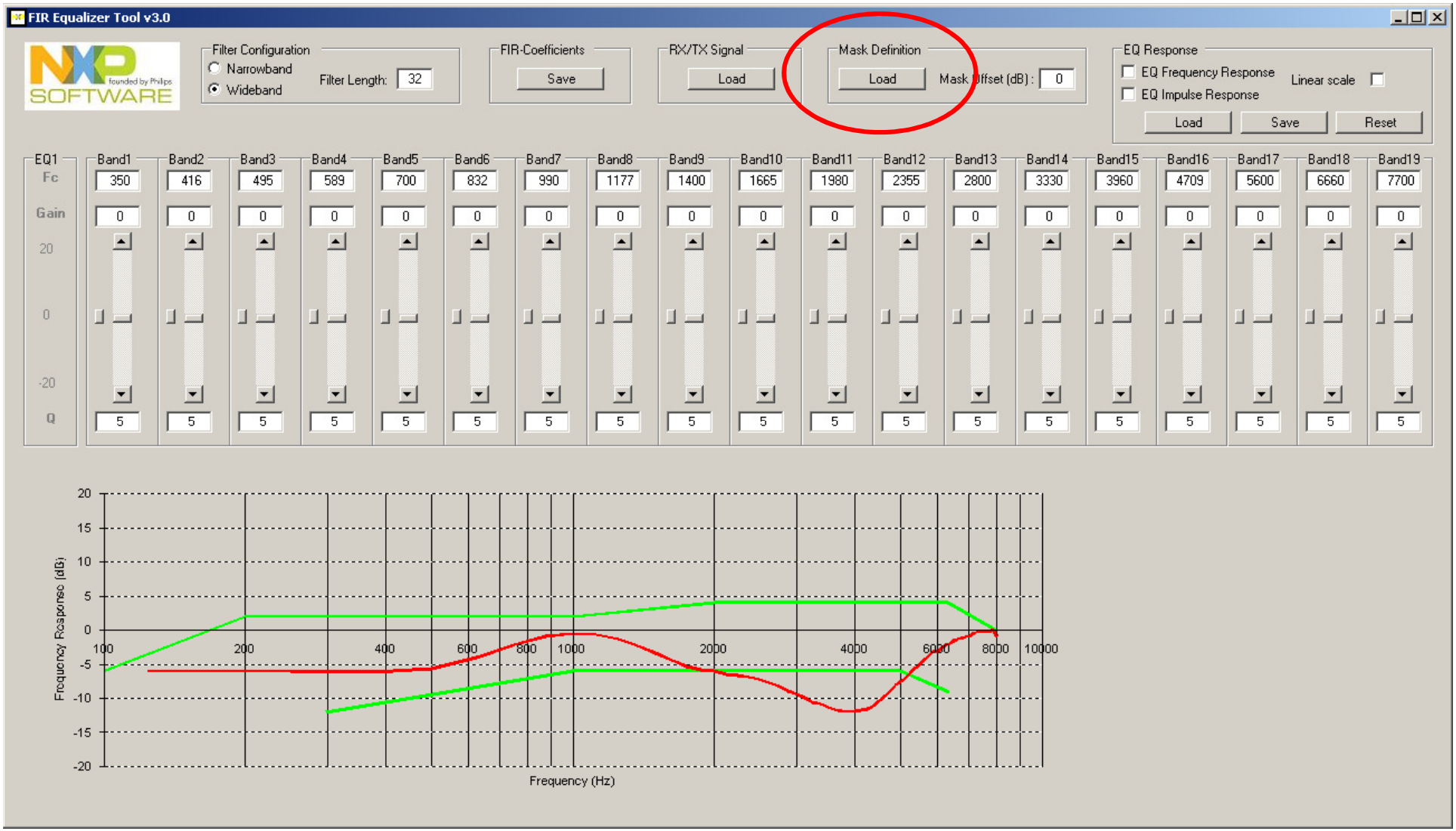
2: Select Filter Length



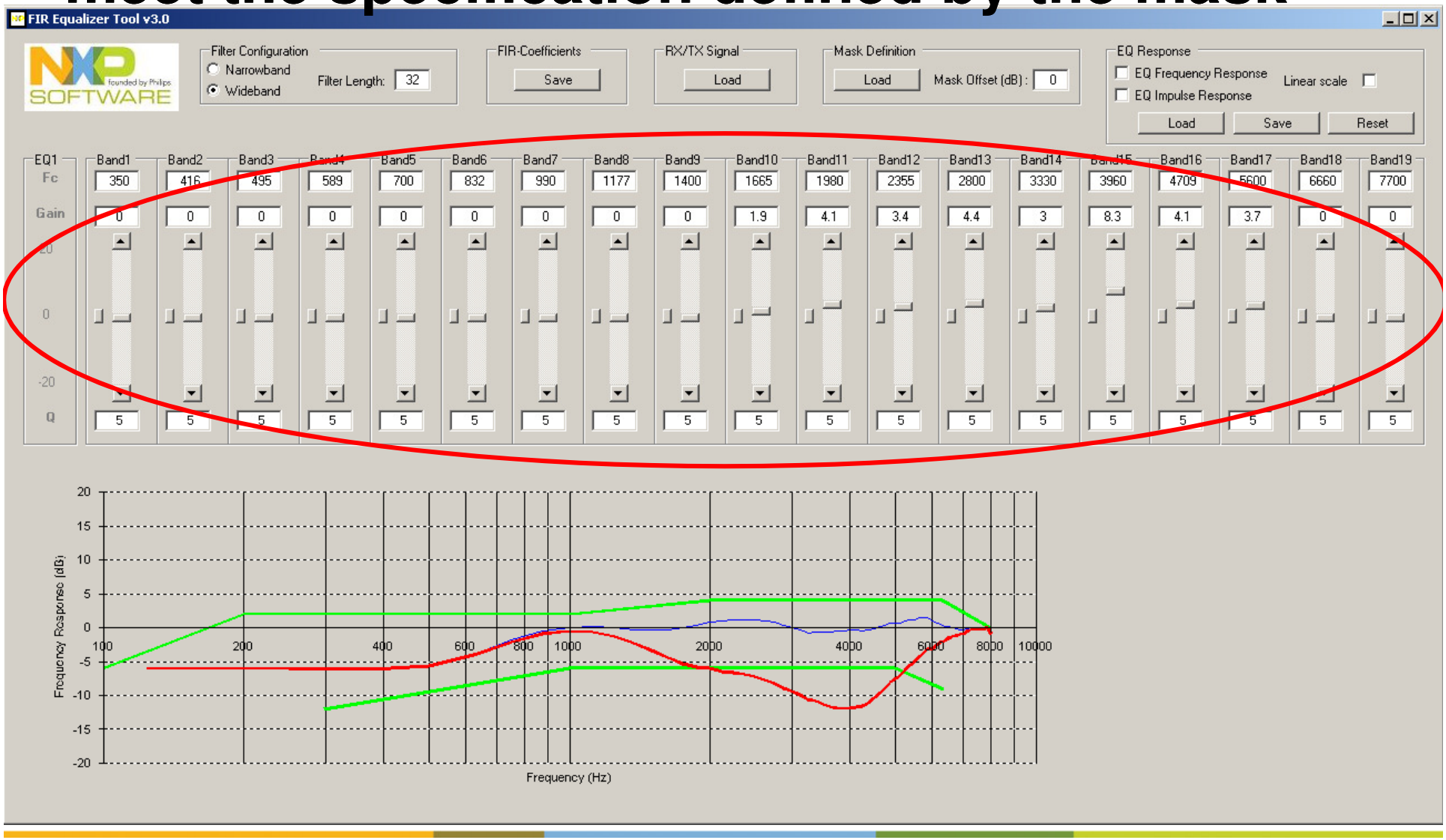
3: Load Speaker or Mic Frequency Response



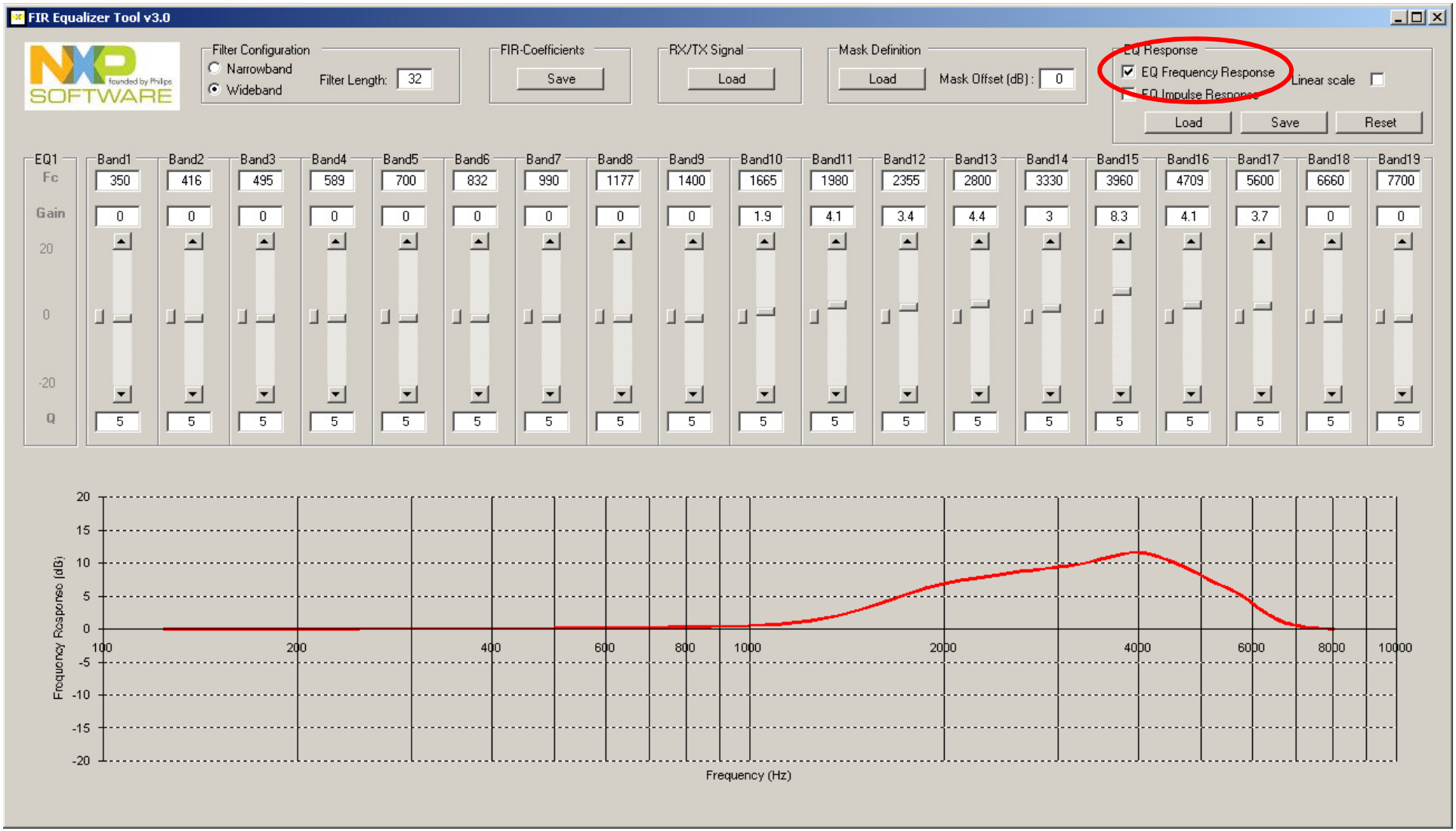
4: Load the Frequency Mask for Rx or Tx



5: Set the Gain, Q-factor, and Frequencies to meet the specification defined by the mask

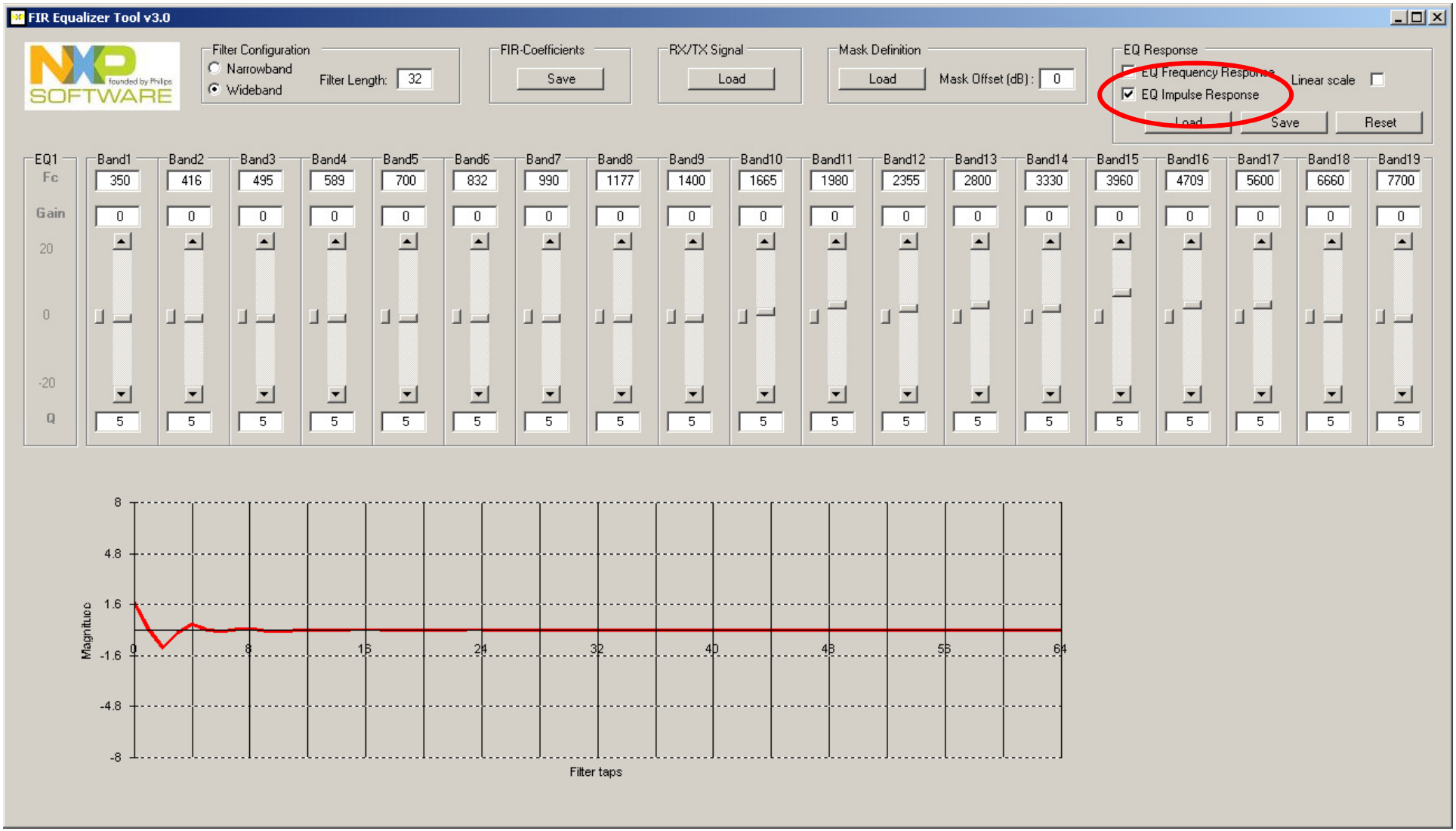


6: Frequency response of the filter

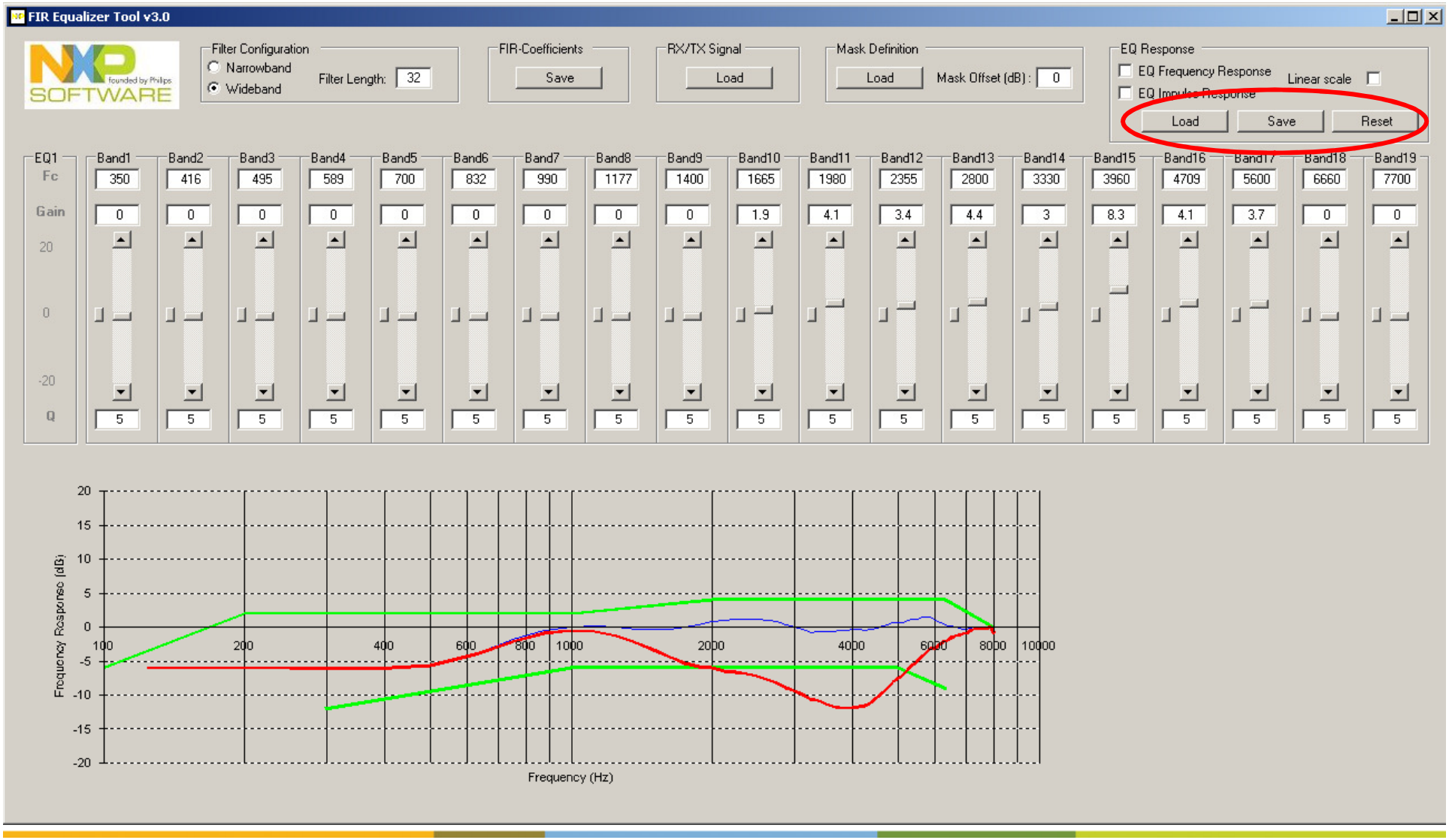


Note: the gain at 4kHz is higher than the gain defined in band15 (8.3dB). This is due to the bandwidth of the frequency bands 14 and 16.

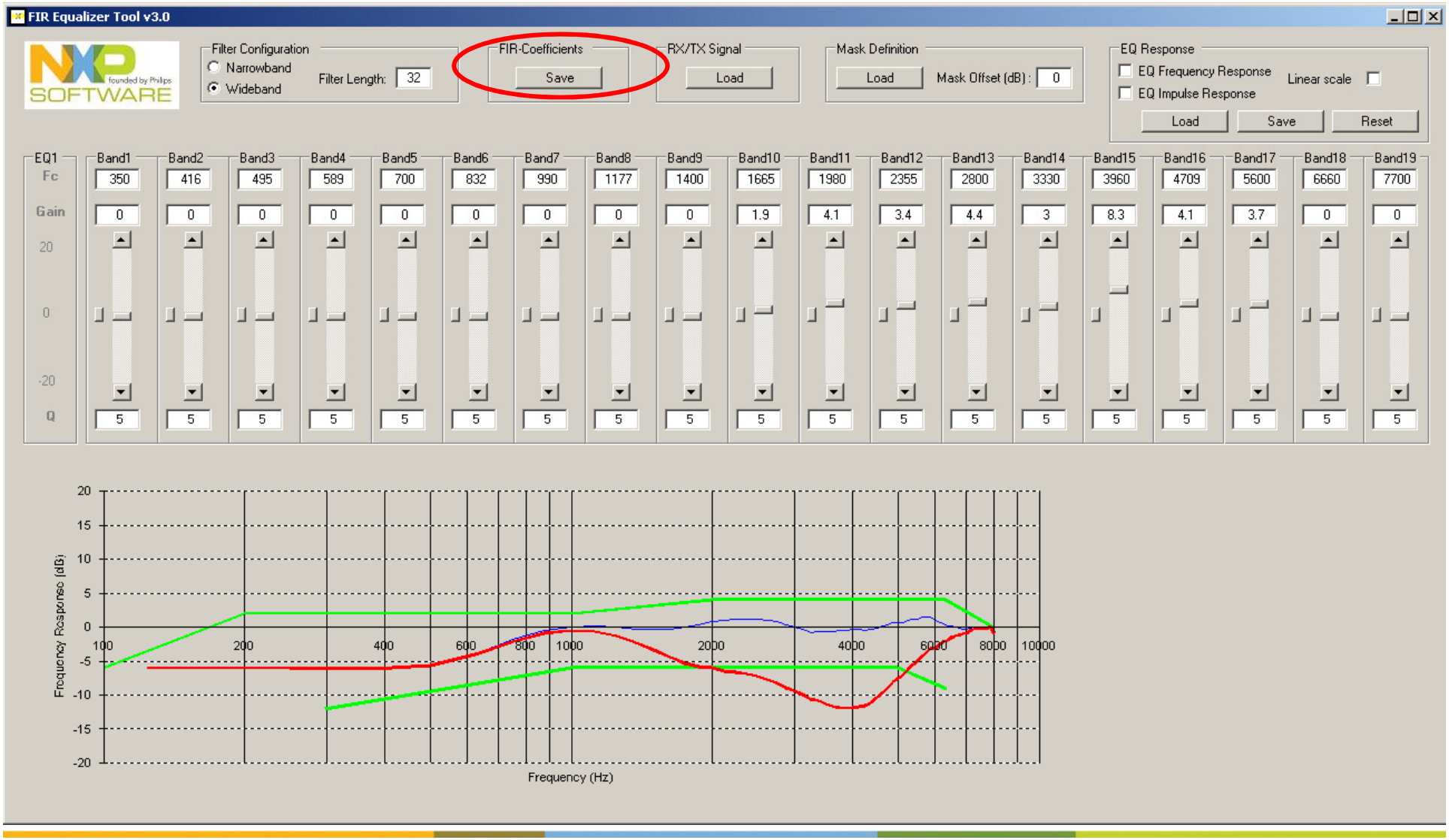
7: Impulse response of the filter



8: Load, Save and Reset EQ configuration



9: Save Filter Coefficients in text file



Important information (1)

- Saving the equalizer configuration:
  - XXX.fgq: contains the Q factor, Gain and frequency band, in case you want to load in the future your equalizer setting into the tool
  - Automatic savings of the equalizer configuration occurs every minutes. The configuration is saved in the text file 'AutomaticSavings.fgq' in the same folder as the executable of the EQ-GUI.
- Saving the equalizer coefficients :
  - XXX.coef: contains the fixed-point coefficients with format Q3.12 themselves to be loaded into the FIR of the VoiceEngine on your platform. The EQ-GUI cannot retrieve the EQ settings back from the coefficients, and thus it is important to store the equalizer configuration (see above).

Important information (2)

- The EQ-GUI detects when coefficients are saturated. An error message is displayed when saving the coefficients. When saturation occurs, the coefficients must be rescaled by decreasing the gain. This is compensated with volume control or internal digital gains.

- The EQ-GUI checks the format of the input files (sampling rate and mono channel) for the frequency response of the speaker or the microphone. An error message is displayed if the format is not correct when opening the wav-file.

Installation (1)

- The executable of the EQ-GUI (FIR_equalizer.exe) and the DLLs (Equalizer.dll, AxInterop.MSChart20Lib.dll and Interop.MSChart20Lib.dll) must be in the directory.
- The frequency mask can be in a different folder than the executable of the EQ-GUI:

3GPP_FreqMask_RX_Handset-Headset_NB.txt

3GPP_FreqMask_RX_Handset-Headset_WB.txt

3GPP_FreqMask_TX_Handset-Headset_NB.txt

3GPP_FreqMask_TX_Handset-Headset_WB.txt

These frequency masks can be modified by the user.

Installation (2)

- If the EQ-GUI does not start-up, the OCX control file ‘mschrt20.ocx ‘ must be installed on the PC:
  - Windows (XP, Vista) 32-bit:
    - Copy the file MSChart20.ocx (included in the delivery package) in c:\Windows\System32.
    - With Windows (XP, Vista…), select 'Start->Run' and write 'regsvr32 MSChart20.ocx' and click 'Ok‘.
  - Windows7, 64-bit:
    - Copy the file MSChart20.ocx (included in the delivery package) in c:\Windows\SysWOW64.
    - Start-up cmd.exe as administrator
    - Run ‘cd c:\Windows\SysWOW64’
    - Run: ‘regsvr32 MSChart20.ocx’