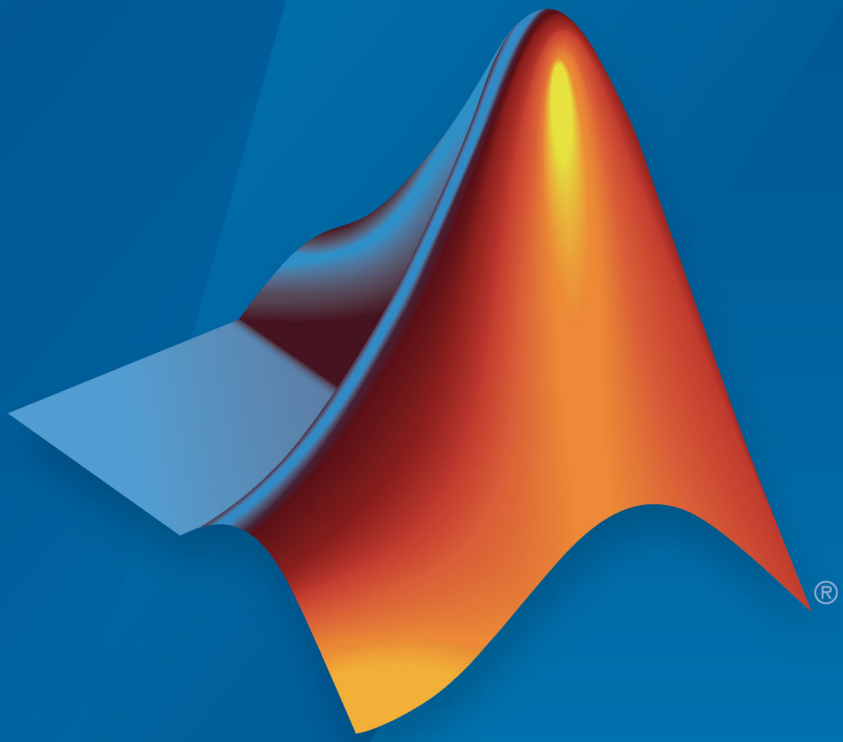
Audio System Toolbox™ Release Notes



MATLAB® & SIMULINK®

MathWorks®

How to Contact MathWorks

Latest news: www.mathworks.com

Sales and services: www.mathworks.com/sales_and_services

User community: www.mathworks.com/matlabcentral

Technical support: www.mathworks.com/support/contact_us

Phone: 508-647-7000

The MathWorks, Inc.
3 Apple Hill Drive
Natick, MA 01760-2098

Audio System Toolbox™ Release Notes

Contents

R2017b

R2017a

R2016b

R2016a

R2017b

Version: 1.3

New Features

AU Plugin Hosting: Run and test Audio Units (AU) plugins in MATLAB on macOS

You can now load Audio Units (AU) plugins into MATLAB® using the `loadAudioPlugin` function. You can interact with the hosted plugin graphically using the **Audio Test Bench**.

Graphic Equalization: Boost and cut standard octave or fractional octave frequency bands in MATLAB and Simulink

You can use the `graphicEQ` System object™ to perform equalization. The graphic equalizer uses the ANSI S1.11-2004 and ISO 266:1997(E) standards to determine and label the center frequencies of individual bandpass filters.

In the Simulink® environment, use the Graphic EQ block.

Real-World Parameter Values for Hosted Plugins: Set and get values of hosted plugin parameters directly, using standard dot notation

Plugins loaded into the MATLAB environment using `loadAudioPlugin` are now populated with properties with real-world values. You can interact with the properties directly using standard dot notation.

See “Host External Audio Plugins” for a description of how normalized parameter values are heuristically interpreted as real-world values.

VST and AU plugins continue to support interaction through normalized parameter values.

MATLAB Code Generation from Audio Test Bench: Automatically generate MATLAB code for real-time audio streaming and processing

You can now generate MATLAB code from the **Audio Test Bench**. The generated MATLAB code is the script implementation of your **Audio Test Bench**. Settings in the **Audio Test Bench**, such as plugin parameter values and scopes opened through the test bench, are also ported to the MATLAB code.

Direct Access to ASIO Configuration Panel: Open configuration panel of ASIO drivers directly from MATLAB

You can now open an ASIO settings user interface directly from MATLAB using the `asiosettings` function.

Additional input ports for Audio System Toolbox blocks

The table describes the new optional input ports for tuning your block parameters.

Block	Parameters Tuned by New Optional Input Ports
Compressor	**Threshold (dB)**, **Ratio**, **Knee width (dB)**, **Attack time (s)**, **Release time (s)**
Expander	**Threshold (dB)**, **Ratio**, **Knee width (dB)**, **Attack time (s)**, **Release time (s)**, **Hold time (s)**
Limiter	**Threshold (dB)**, **Knee width (dB)**, **Attack time (s)**, **Release time (s)**, **Hold time (s)**
Noise Gate	**Threshold (dB)**, **Attack time (s)**, **Release time (s)**, **Hold time (s)**
Octave Filter	**Center frequency (Hz)**

Additional examples for machine learning, spatial audio, device measurements, and deployment to android

New examples include:

- “Speaker Identification Using Pitch and MFCC”
- “Acoustic Beamforming Using a Microphone Array”
- “Measure Frequency Response of an Audio Device”
- “Parametric Audio Equalizer for Android Devices”

Enhancements to existing examples include:

- “Measure Impulse Response of an Audio System”
- “Measure Audio Latency”

R2017a

Version: 1.2

New Features

Enhanced VST Workflow in Audio Test Bench: Interactively tune hosted VST plugins and test MATLAB objects in VST mode

The **Audio Test Bench** is a graphical debugging and testing suite for audio processing modules.

New abilities of the **Audio Test Bench** include:

- Host external VST and VST3 plugins. You can now interact with external plugins using the graphical UI of the **Audio Test Bench**, as you would in a DAW.
- Run audio plugins created in MATLAB as VST plugins.

Synchronized Playback and Acquisition: Play back and acquire audio signals synchronously in MATLAB via a single audioPlayerRecorder object

The `audioPlayerRecorder` System object reads and writes from an audio device simultaneously, enabling real-time system measurements when using ASIO, Core Audio, or ALSA drivers. Combining the play and record into a single object enables easy configuration and consistent latency between input and output.

WASAPI Driver Support on Windows: Stream signals from and to audio devices equipped with WASAPI drivers

The `audioDeviceWriter` and `audioDeviceReader` System objects and the Audio Device Reader and Audio Device Writer blocks now support WASAPI drivers on Windows machines.

File browsing in Audio Test Bench

You can now browse for audio input files and the object under test directly from the **Audio Test Bench**.

Additional fractional bandwidth option for octave filtering

The `octaveFilter` System object and Octave Filter block now support 2/3 octave bandwidth. This octave bandwidth is popular in graphic equalizer designs.

configureMIDI support for hosted audio plugins

You can now use the `configureMIDI` function to quickly synchronize your hosted audio plugins with MIDI devices.

Tab completion for parameter names and options

You can now use tab completion to complete parameter names and options for all System objects in Audio System Toolbox. Tab completions also work for the `validateAudioPlugin`, `loadAudioPlugin`, and `generateAudioPlugin` functions.

Additional audio plugin examples

The Audio Plugin Gallery contains audio plugin example code that can be used as building blocks in larger systems, as models for design patterns, or as benchmarks for comparison.

New plugins in the gallery include:

- `audiopluginexample.FastConvolver`
- `audiopluginexample.Phaser`
- `audiopluginexample.MultiNotchFilter`
- `audiopluginexample.SpeechPitchDetector`
- `audiopluginexample.BeatDetector`

Enhancements to existing plugins in the gallery include:

- The `audiopluginexample.SpectralSubtractor` example now includes an analysis and synthesis buffering object. The `audiopluginexample.private.AnalysisAndSynthesisBuffer` object enables easy input/output buffering for the audio plugin API so that you can concentrate on your algorithm.

R2016b

Version: 1.1

New Features

Audio Plugin Hosting: Run and test VST plugins directly in MATLAB

The `loadAudioPlugin` function enables you to host external VST and VST3 plugins in MATLAB. You can process audio using the algorithm of the hosted plugin. You can interact with the hosted plugin programmatically by getting and setting parameters.

Improved Audio Test Bench: Choose from a wider range of input signals, and generate VST plugins directly from the app

The Audio Test Bench is a graphical debugging and testing suite for audio processing modules.

New abilities of the **Audio Test Bench** include:

- Switch the object under test in a single instance of the test bench.
- New input choices: `wavetableSynthesizer`, `audioOscillator`, `dsp.Chirp`, and `dsp.ColoredNoise`.
- Validate and generate VST plugins directly from the test bench.
- Track overrun and underrun in frames, seconds, or samples.

Loudness Metering: Measure standard-compliant loudness parameters

Measure integrated loudness and loudness range of an audio signal using the `integratedLoudness` function.

Measure momentary loudness, short-term loudness, integrated loudness, loudness range, and true-peak of streaming audio using the `loudnessMeter` System object. You can also open an 'EBU-Mode' visualization for loudness metering.

Measure momentary loudness, short-term loudness, and true-peak in the Simulink environment using the Loudness Meter block.

Octave-Band Filters: Select octave and fractional-octave signal bands using standard-compliant digital filters

Perform octave-band and fractional octave-band filtering for arbitrary center frequency using the `octaveFilter` System object. With this object, you can tune center frequency and bandwidth while the simulation is running. To check your compliance to the ANSI

S1.11-2004 standard, use the `isStandardCompliant` method. To visualize and validate your filter response, use the `visualize` method.

In the Simulink environment, use the Octave Filter block.

Audio Weighting Filters: Compensate signal magnitude for perceptual measurements using standard-compliant A-, C-, and K-weighted filters

Perform frequency-weighted filtering using the `weightingFilter` System object. With this object, you can design A-weighted and C-weighted filters based on the ANSI S1.42-2001 standard, or K-weighted filters based on the ITU-R BS.1770-4 standard. To check your compliance to the IEC 61672-1:2002 standard, use the `isStandardCompliant` method. To visualize and validate your filter response, use the `visualize` method.

In the Simulink environment, use the Weighting Filter block.

Plugin class creation and MIDI support for multiband parametric equalizer

New functionality for the `multibandParametricEQ` System object includes:

- Plugin class creation using `createAudioPluginClass`
- MIDI support using `configureMIDI`

`multibandParametricEQ` is now enabled for the **Audio Test Bench**.

Simpler way to call System objects

Instead of using the `step` method to perform the operation defined by a System object, you can call the object with arguments, as if it were a function. The `step` method will continue to work. This feature improves the readability of scripts and functions that use many different System objects.

For example, if you create a `weightingFilter` System object named `Cweight`, then you call the System object as a function with that name.

```
Cweight = weightingFilter('C-weighting');
Cweight(x)
```

The equivalent operation using the `step` method is:

```
Cweight = weightingFilter('C-weighting');
step(Cweight,x)
```

When the `step` method has the System object as its only argument, the function equivalent has no arguments. This function must be called with empty parentheses. For example, `step(sysobj)` and `sysobj()` perform equivalent operations.

R2016a

Version: 1.0

New Features

VST plugin generation for digital audio workstations

Audio System Toolbox enables the design and generation of VST plugins.

For more information, see Export a MATLAB Plugin to a DAW.

Interfaces to ASIO, ALSA, CoreAudio, and Windows Direct Sound

Audio System Toolbox enables real-time audio processing using low-latency audio drivers.

For more information, see Audio I/O: Buffering, Latency, and Throughput.

Interfaces to MIDI controls for real-time tuning of MATLAB and Simulink simulations

Audio System Toolbox enables real-time tuning in MATLAB and Simulink using MIDI controls.

For more information, see `configureMIDI` and Musical Instrument Digital Interface (MIDI).

Audio processing algorithms, sources, and measurements for MATLAB and Simulink

Audio System Toolbox provides algorithms and tools for the design, simulation, and desktop prototyping of audio processing systems.

For more information, see Audio Processing Algorithm Design.

Audio test bench to automatically generate an interactive audio simulation environment

Audio System Toolbox provides an all-in-one graphical debugging and testing suite.

For more information, see Audio Test Bench and Use the Audio Test Bench.

Support for C code generation

You can use MATLAB Coder™ to generate efficient C and C++ code for most Audio System Toolbox functions, classes, and System objects.

For a list of supported functions and objects, see Audio System Toolbox.

For a guide to developing code capable of C code generation, see MATLAB Programming for Code Generation.

Support for MATLAB Compiler

You can use MATLAB Compiler™ to share MATLAB programs as standalone applications.

For an example, see Deploy Audio Applications with MATLAB Compiler.