

# **SIGMA300 ACOUSTIC ECHO CANCELLATION (AEC) PLUG-IN FOR SIGMASTUDIO USER GUIDE**

ANALOG DEVICES, INC.

[www.analog.com](http://www.analog.com)

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# 1 Introduction

This document describes how to use the Sigma300 AEC Plug-In for SigmaStudio.

## 1.1 Scope

The document is intended to assist software developers integrating the Sigma300 AEC Plug-in for SigmaStudio into a SigmaStudio schematic application. A basic understanding of SigmaStudio is recommended. Also, a basic understanding of acoustic echo cancellation is recommended.

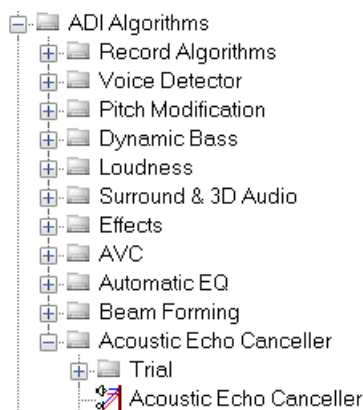
## 1.2 Integration

Previous versions of this Plug-in must be removed from SigmaStudio before adding a new version.

To remove an old version of this Plug-in, launch SigmaStudio and select **Add-Ins Browser** from the **Tools** menu. Within the **Add-Ins Browser** window, highlight **AECNB.dll** if it exists, and click **Delete Item** to remove. Save the settings by selecting **Save** from the **File** menu.

To register this Plug-in into the SigmaStudio development environment, select the **Add-Ins Browser** from the **Tools** menu. Within the **Add-Ins Browser** window, select **Add DLL** from the **File** menu. Browse to the location of **AECNB.dll** and add the DLL. Save the settings by selecting **Save** from the **File** menu.

Upon successful registration, the Plug-in can be found in the Schematic tab in the **Tree ToolBox** window as shown below.



## 1.3 Organisation of this Guide

Section 1 : This section contains the introduction.

Section 2 : Lists the specifications of the Plug-In.

Section 3 : Describes the example schematics.

## 1.4 Acronyms

ADI	Analog Devices Inc.
AEC	Acoustic Echo Cancellation
DLL	Dynamic Link Library
DM	Data Memory
GUI	Graphical User Interface
HPF	High pass filter
PM	Program Memory

Table 1: Acronyms

## 1.5 References

Refer to SigmaStudio and SigmaDSP documentation available on the Analog Devices website.

## 1.6 Additional Information

### 1.6.1 Other Information

For more information on the latest ADI processors, silicon errata, code examples, development tools, system services and devices drivers, technical support and any other additional information, please visit our website at [www.analog.com/processors](http://www.analog.com/processors).

## 2 Specifications

### 2.1 Version Information

The AEC Plug-in for SigmaStudio is developed and tested under SigmaStudio version 3.14 and will work with later versions.

### 2.2 Target Platform

Sigma300 and Sigma350 series family of processors.

### 2.3 Overview

The figure below shows the AEC Plug-in. Several GUI controls are provided to allow the user to configure the Plug-in in SigmaStudio.



Figure 2: AEC GUI

### 2.4 I/O pins

#### 2.4.1 Inputs

The Plug-in inputs are shown in Figure 1 and described in the following table.

FarIn	Input signal from far end
MicIn	Input signal from near end microphone

Table 2: Inputs

## 2.4.2 Outputs

The Plug-in outputs are shown in Figure 1 and described in the following table.

FarOut	Output signal to far end
FIROut	Output signal from adaptive filter, used by Sigma300 NLP plug-in

Table 3: Outputs

## 2.5 GUI Controls

The Plug-in provides the following GUI controls to set the compile-time and run-time parameters of the module.

GUI control	Description	Range
Taps	Number of taps of adaptive filter	320-640 Note: compile time parameter
AEC on/off switch	On: AEC enabled, Off: AEC bypassed	
HPF on/off switch	On: HPF enabled, Off: HPF bypassed	
HPF cut-off frequency	Cut-off frequency of the HPF on the Mic input	20-300 Hz

Table 4: GUI controls

## 2.6 Resource Usage

### 2.6.1 Memory

The plug-in requires 3K words of data memory.

### 2.6.2 MIPS

The plug-in uses 12 MIPS at 8 kHz sample rate.

### 3 Example Usage

The AEC plug-in typically operates at 8 kHz sample rate. For a system with 48 kHz I/O this requires decimation and interpolation. Also, two example implementations are provided: standard and wideband. Standard uses one AEC plug-in at 8 kHz sample rate as shown in Figure 2. Wideband uses two AEC plug-ins at 8 kHz sample rate, with an effective sample rate of 16 kHz as shown in Figure 3. To implement a complete AEC solution, both example implementations include RES plug-in for residual echo suppression and NR plug-in for noise reduction. These can be removed or bypassed if necessary. Note in the figures RES is shown as NLP.

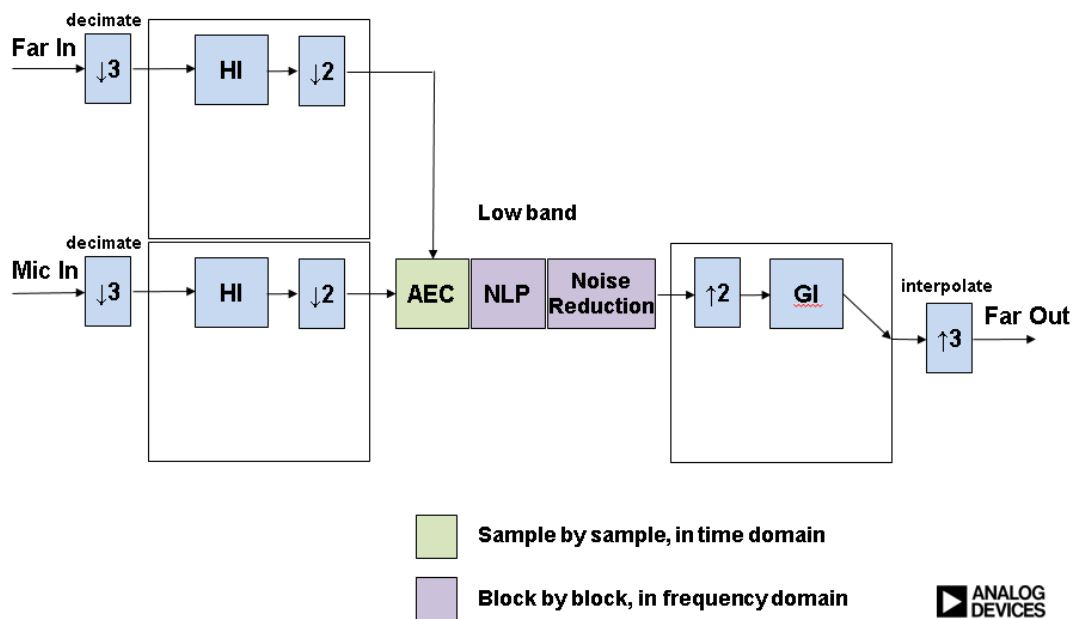


Figure 2: Standard AEC



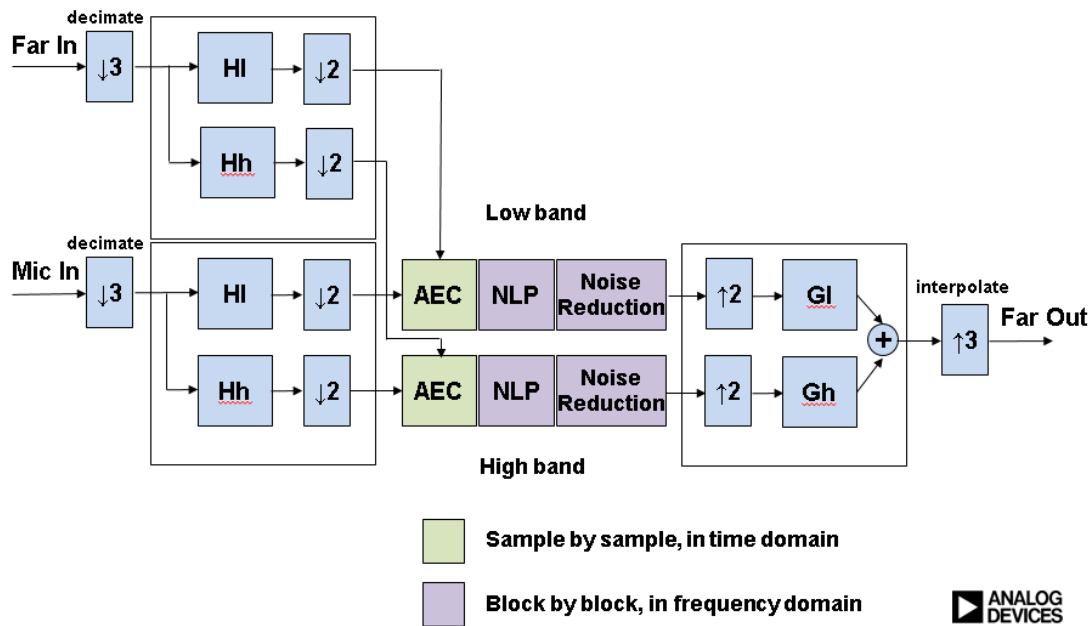


Figure 3: Wideband AEC

### 3.1 Example Projects

Refer to the provided example projects Sigma300\_AECNR\_Standard\_GUI.dsproj and Sigma300\_AECNR\_Wideband\_GUI.dsproj.