

# **SIGMA300 NOISE REDUCTION (NR) 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 Noise Reduction (NR) Plug-in for SigmaStudio.

## 1.1 Scope

The document is intended to assist software developers integrating the Sigma300 NR Plug-in into a SigmaStudio schematic application. A basic understanding of SigmaStudio is recommended.

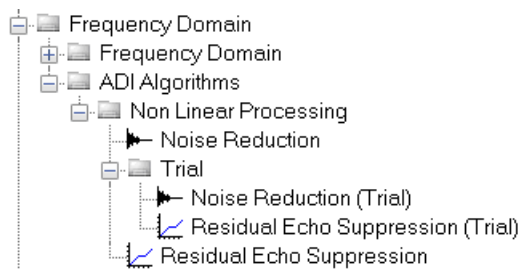
## 1.2 Integration

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 **FRNoiseReduction.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 **FRNoiseReduction.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 Block 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 NR 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 NR Plug-in. Several GUI controls are provided to allow the user to configure the Plug-in in SigmaStudio.

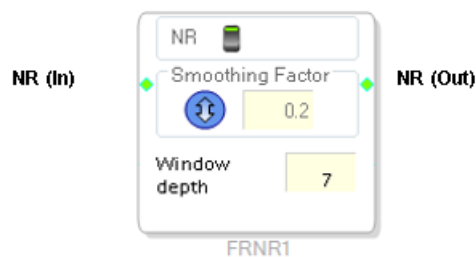


Figure 2: NR GUI

### 2.4 I/O pins

#### 2.4.1 Inputs

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

NR (In)	Input signal. Note this is a complex frequency domain block input.
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Table 2: Inputs

## 2.4.2 Outputs

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

NR (Out)	Output signal. Note this is a complex frequency domain block output.
----------	----------------------------------------------------------------------

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
NR on/off switch	On: NR enabled, Off: NR bypassed	
Smoothing factor	Controls amount of temporal smoothing	0.01 to 0.5 (default is 0.2)
Window depth	Depth of noise statistics buffer	7 to 15 Note: compile time parameter

Table 4: GUI controls

## 2.6 Resource Usage

### 2.6.1 Memory

The amount of data memory required depends on the block size of the input and the window depth:

$$\text{Memory} = \text{InputBlockSize} * (\text{WindowDepth} + 5)$$

Typically  $\text{InputBlockSize} = 256$ .

For the minimum  $\text{WindowDepth} = 7$ ,  $256 * (7 + 5) = 3\text{K}$  words.

For the maximum  $\text{WindowDepth} = 15$ ,  $256 * (15 + 5) = 5\text{K}$  words

### 2.6.2 MIPS

The amount of MIPS depends on the sample rate and the block size of the input:

$$\text{MIPS} = \text{SampleRate} * 250$$

For 8 kHz sample rate the plug-in requires 2 MIPS.

## 3 Example Usage

The NR plug-in operates in the block domain, and its inputs and outputs are complex frequency domain signals, so its inputs come from an FFT and its outputs go to an IFFT. The NR typically operates at 8 kHz sample rate. For a system with 48 kHz I/O this requires decimation and interpolation. Figure 2 shows a wideband implementation that uses two NR plug-ins at 8 kHz sample rate, with an effective sample rate of 16 kHz.

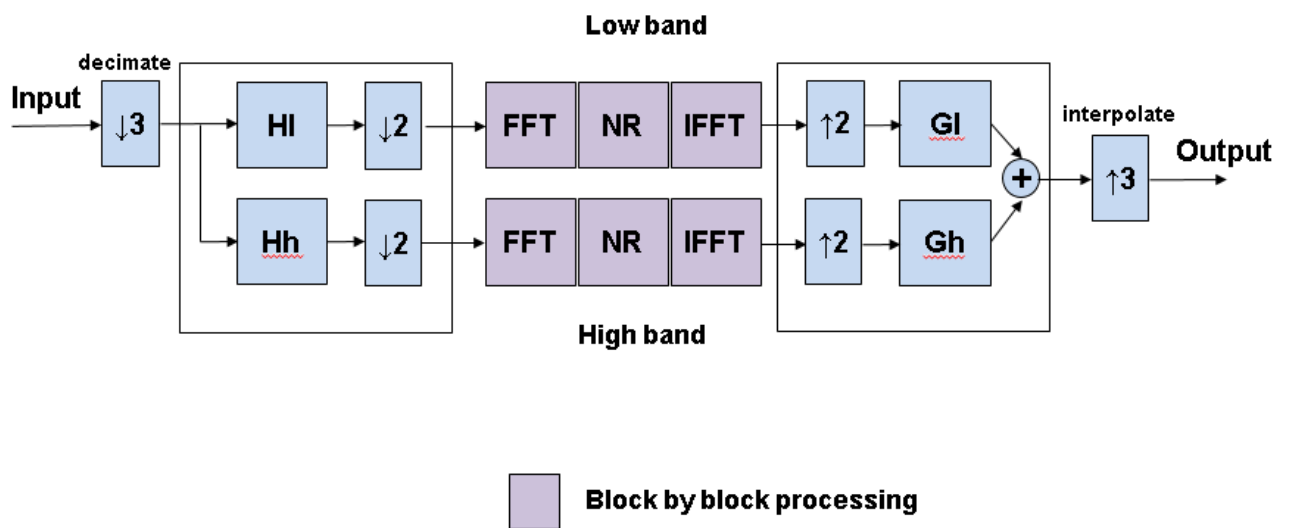


Figure 2: Wideband NR

### 3.1 Example Project

Refer to the provided example project Sigma300\_NR\_Wideband\_GUI.dspproj.