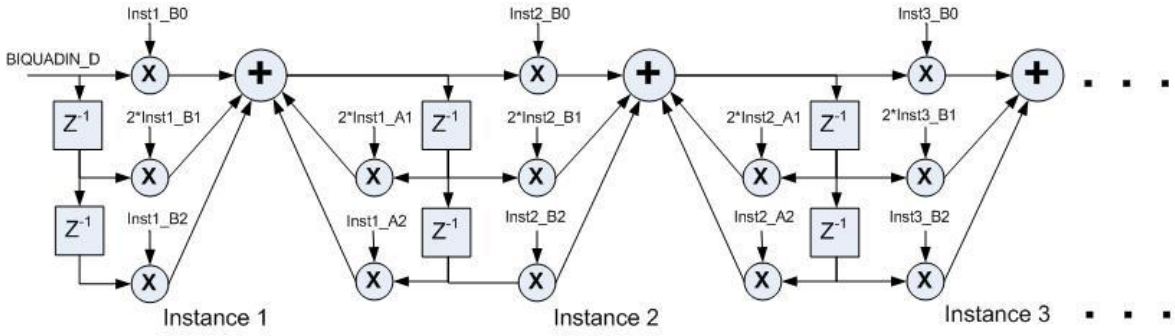
Extended Precision Biquad Filter

Overview

The Extended Precision Biquad Filter component contains an optimized implementation of 10 IIR biquad filters connected in series. Depending on the miniDSP used, the coefficient format could be Q1.31 (16-bit miniDSP) or Q1.47 (24-bit miniDSP).

Description

The Biquad filter component allows the user to easily implement IIR filters (Direct Form I, 2nd Order) in the DSP. There are a total of 10 cascaded biquad structures which provides the user with enough capability for advanced audio functions.



Note that the middle taps of the B and A coefficients are multiplied by 2 in the component. So, the coefficient values should be configured as ½ the original value.

Configurable Properties

Property	Description
Instances	The number of cascaded biquad filters to produce
Inst*N*_B0	The B0 Coefficient for the Biquad Instance *N*
Inst*N*_B1	The B1 Coefficient for the Biquad Instance *N (should be ½ the original value)*
Inst*N*_B2	The B2 Coefficient for the Biquad Instance *N*
Inst*N*_A1	The A1 Coefficient for the Biquad Instance *N (should be ½ the original value)*
Inst*N*_A2	The A2 Coefficient for the Biquad Instance *N*

I2C Interface

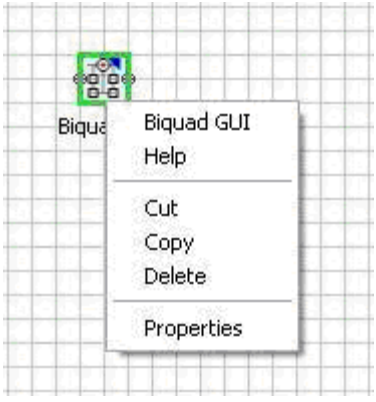
The I2C interface to Biquad is as follows:

I2C Address	DSP Memory Address	Size (Byte)	Description

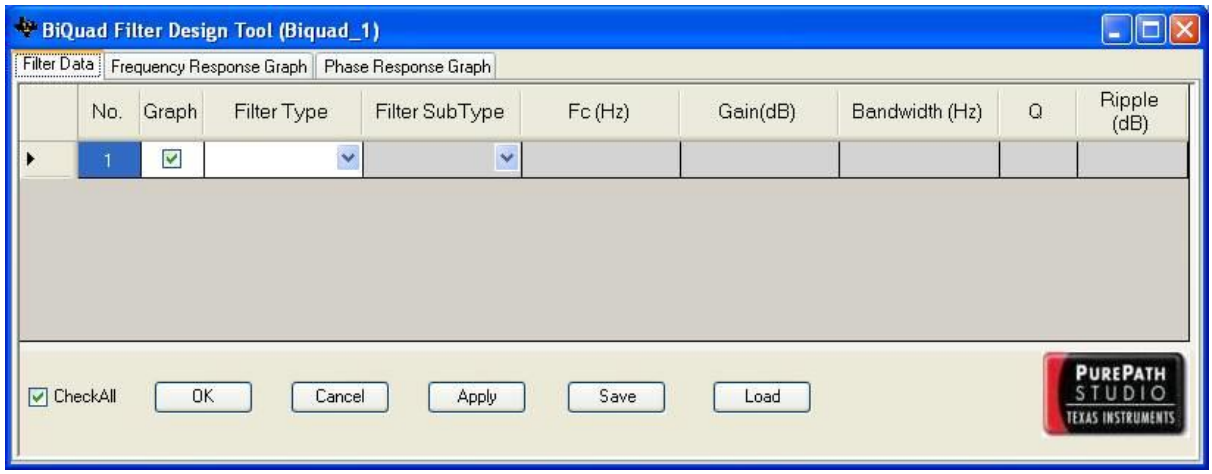
I2CAddress1	DspCoefBlockStart1	40	Coefficients B0, B1, B2, A1, A2 for Biquad instance 1
I2CAddress2	DspCoefBlockStart2	40	Coefficients B0, B1, B2, A1, A2 for Biquad instance 2
I2CAddress3	DspCoefBlockStart3	40	Coefficients B0, B1, B2, A1, A2 for Biquad instance 3
I2CAddress4	DspCoefBlockStart4	40	Coefficients B0, B1, B2, A1, A2 for Biquad instance 4
I2CAddress5	DspCoefBlockStart5	40	Coefficients B0, B1, B2, A1, A2 for Biquad instance 5
I2CAddress6	DspCoefBlockStart6	40	Coefficients B0, B1, B2, A1, A2 for Biquad instance 6
I2CAddress7	DspCoefBlockStart7	40	Coefficients B0, B1, B2, A1, A2 for Biquad instance 7
I2CAddress8	DspCoefBlockStart8	40	Coefficients B0, B1, B2, A1, A2 for Biquad instance 8
I2CAddress9	DspCoefBlockStart9	40	Coefficients B0, B1, B2, A1, A2 for Biquad instance 9
I2CAddress10	DspCoefBlockStart10	40	Coefficients B0, B1, B2, A1, A2 for Biquad instance 10

Configuration GUI

After the Biquad Filter component has been designed into the processing flow, you must click the component to access the properties. The number of BiQuad filter blocks needed should be entered in the Instances property field (must be from 1 to 10 inclusive). Then you can access the Biquad Filter Design GUI by right-clicking the Biquad Component icon and selecting **Biquad GUI** (as shown below).



At this point, the design pop-up appears. Enter the required filter parameters for each filter. When completed, click on "Apply" or "OK" to tell the tool to calculate the filter coefficients. The Biquad filter design GUI will automatically apply the extended precision or double precision coefficients.



For more detail about Biquad filter design, please see:

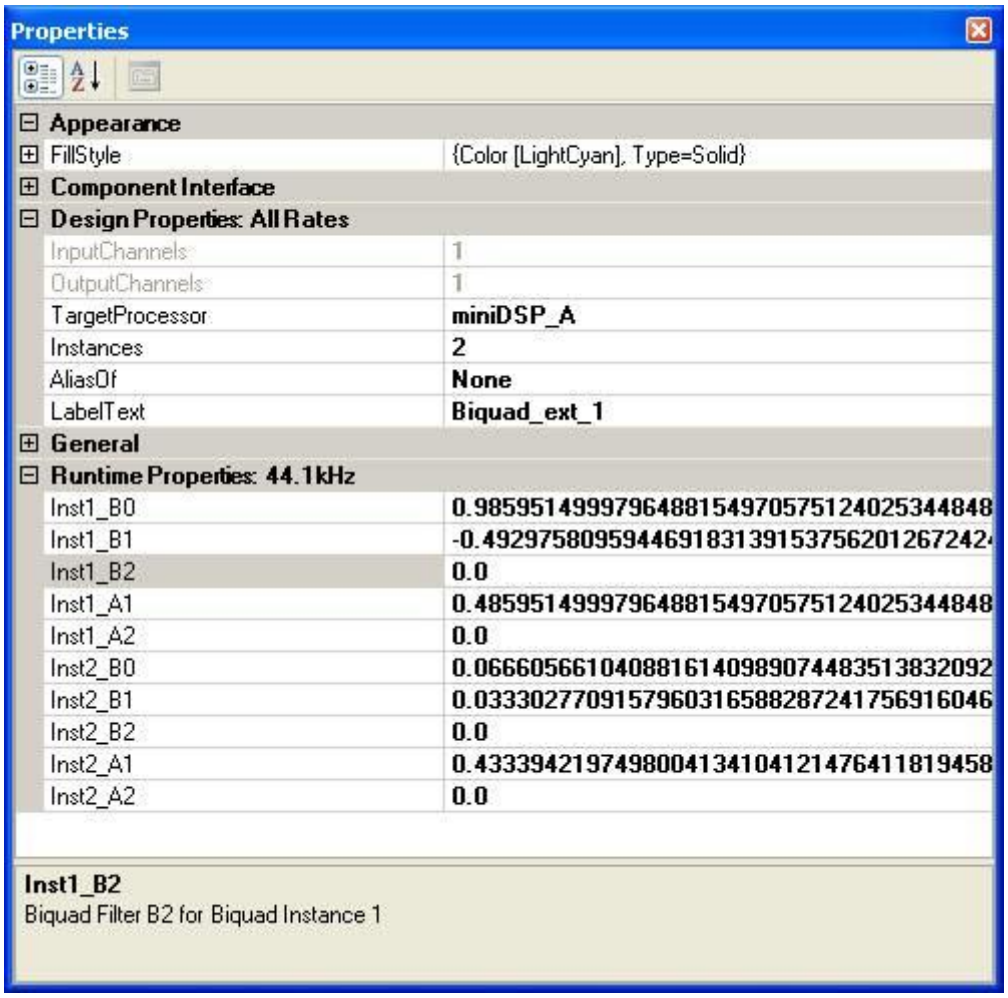
Biquad Filter Data Tab

Biquad Frequency Tab

Biquad Phase Tab

BiQuad Coefficients (extended precision or double precision)

This is the place where user can set the coefficients directly to the BiQuad component.



Note:

BiQuad GUI reads the runtime property names from BiQuad configuration file, that is “BiQuad_TI_VX.XML” (where VX is the version number). Configuration file “BiQuad_TI_VX.XML” resides in “BiQuad_TI_VX” folder in “ComponentCache” folder of GDE.

While modifying “BiQuad_TI_VX.XML” file using “Component Publisher” care must be taken while setting the property names as below

Instances must be in order. Say runtime properties of Instance 1 must come first, followed by Instance 2, Instance 3 etc.

All run time properties of an instance must be placed together.

Run time properties in an instance must be in the order of coefficients B0, B1, B2, A1 and A2