

Program Audio-Mojo board using Quickfilter Pro Software

1) Introduction

The Audio-Mojo is a development board for the QF1D512 SavFIRe™ digital filter chip. It features analog audio inputs and outputs, an audio codec, two QF1D512s and an ATtiny85 microcontroller to provide non-volatile storage of settings and automatic load and run at power up. This document describes the process of export the designed filters to the Audio-Mojo board using Quickfilter Pro Software Verison 2.0.

2) Programming Audio-Mojo using Quickfilter Pro Software version 2.0

a. Requirements:

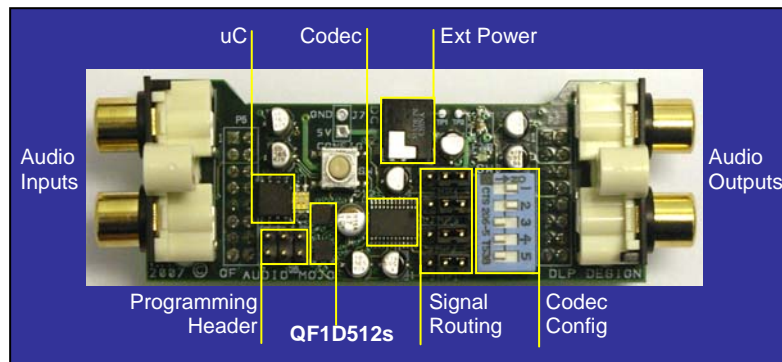
- The Quickfilter Pro Software version has to be version 2.0.49 or later. You can download the latest software at http://www.quickfiltertech.com/files/QFPRO_QF1D512.exe
- Debug WIRE mode on AVR on Audio-Mojo board MUST BE DISABLED.

b. Procedure:

- Attach the Audio Mojo board onto QF1D512 Dev Kit board.

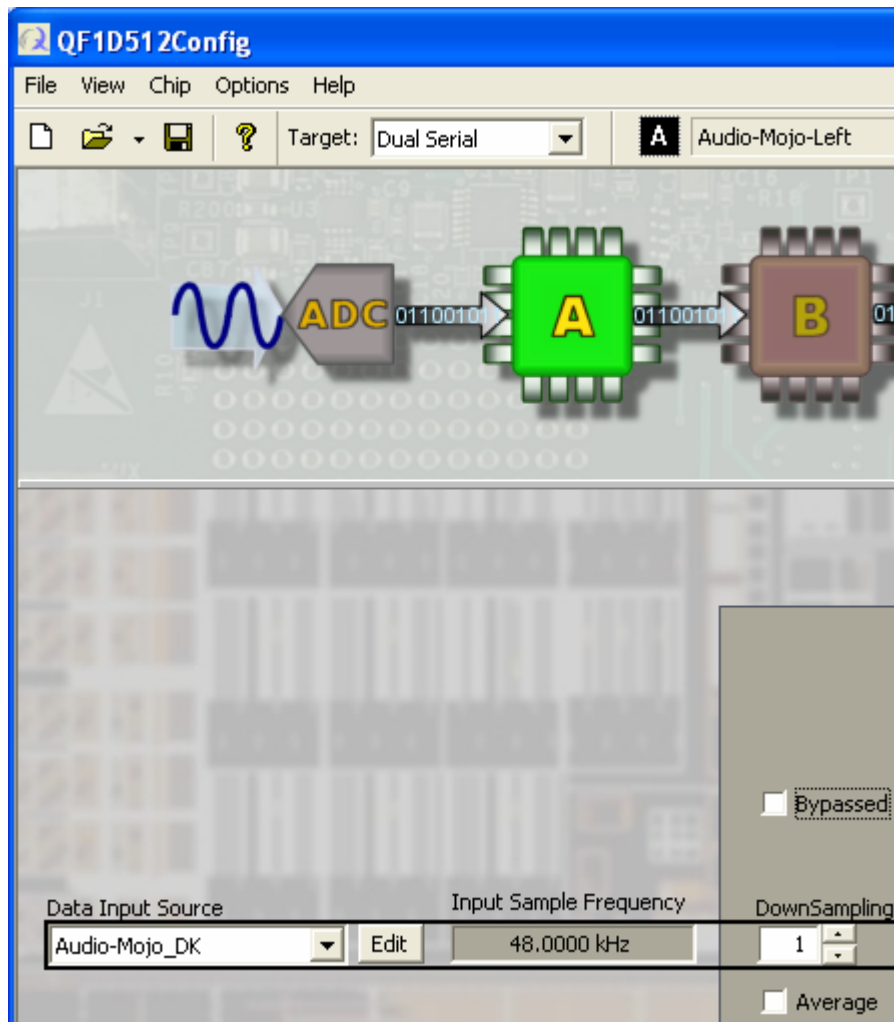


- Make sure Audio-Mojo Jumper 4 is set to use QF1D512 Dev Kit Power (pins 2 and 3 connected). See App Note for more details.

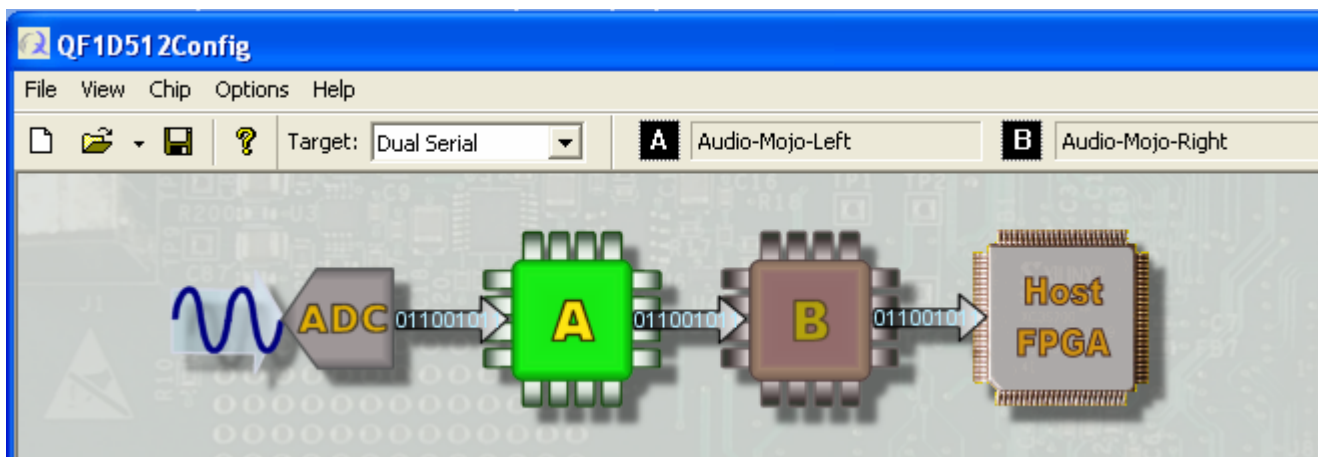


- Connect QF1D512 Dev Kit to the PC's USB port.
- Start Quickfilter Pro Software.

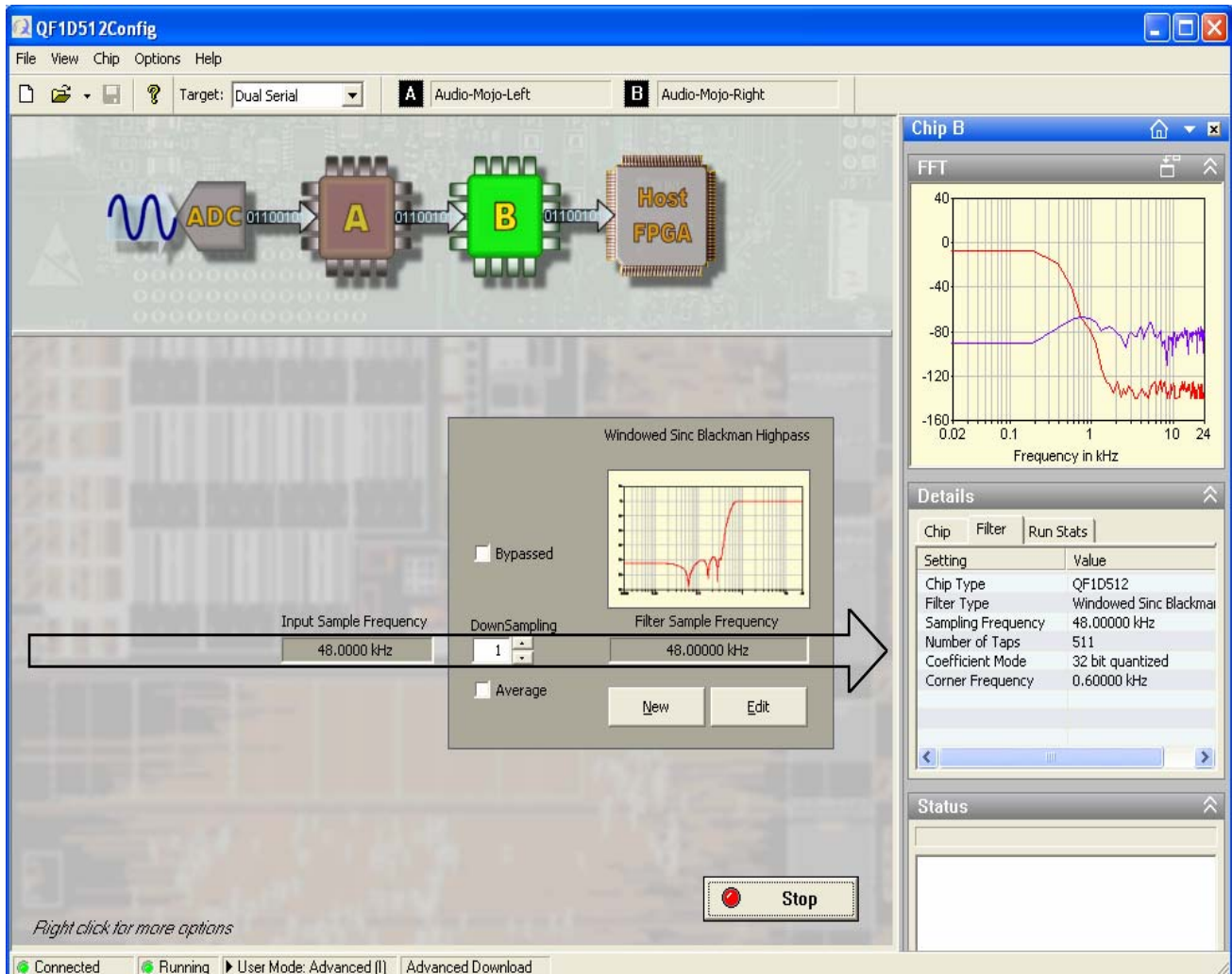
- Click on *Target* dropdown list box and select *Dual Serial*.
- Select *Audio-Mojo_DK* on the *Data Input Source* dropdown listbox.



- Select Chip A; browse to folder "...\program files\Quickfilter Technologies\QF1D512\Sample Files" and double-click the "Audio-Mojo-Left.q1d2" file.

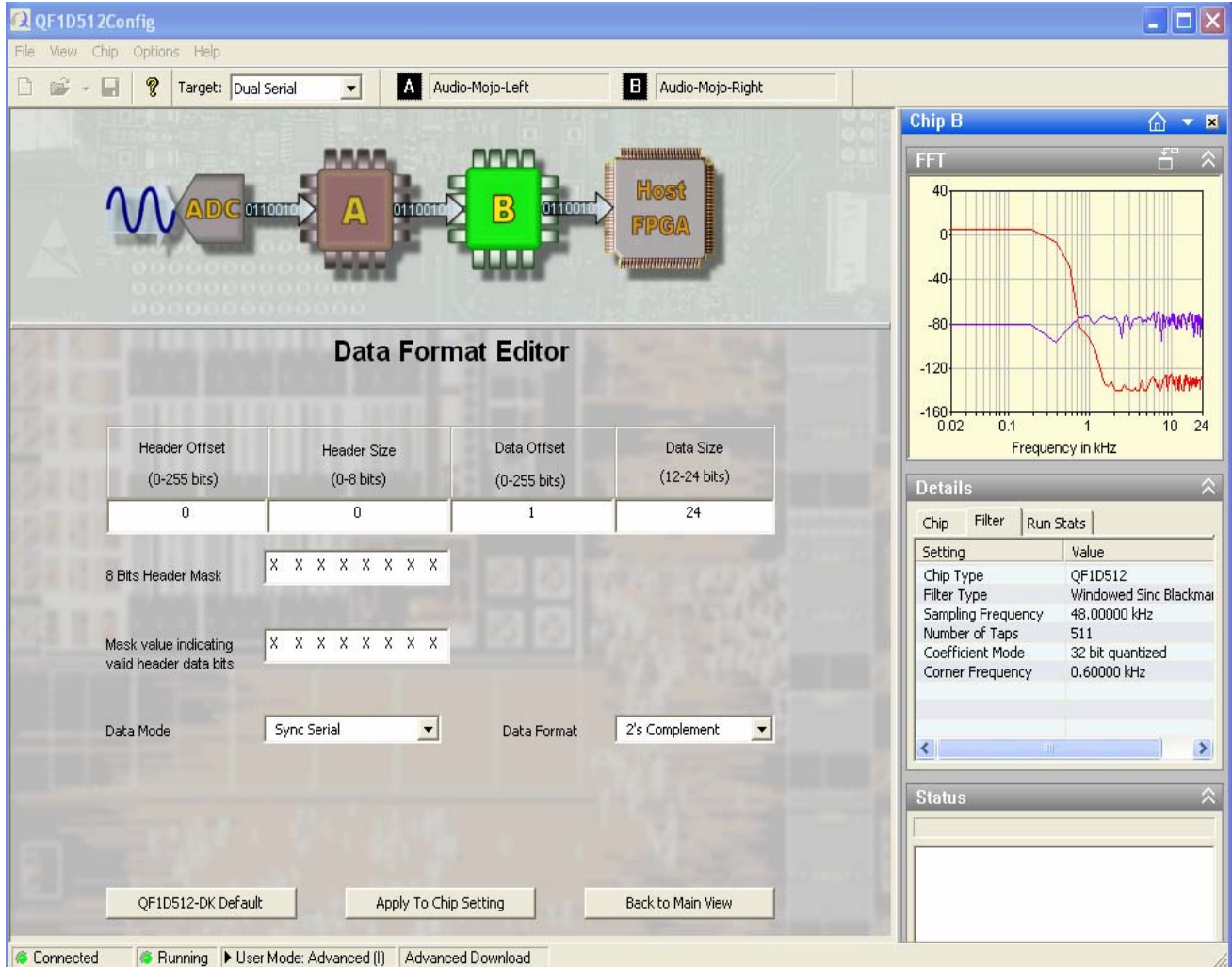


- Select Chip B; browse to folder "...\program files\Quickfilter Technologies\QF1D512\Sample Files" and double-click the "Audio-Mojo-Right.q1d2" file.
- Make sure jumpers 1, 2, 3 are set to run on QFF1D512 Dev Board (pins 2 and 3 connected). See App Note for more details.
- Click on *Start* button to download the configurations to the SavFIRE chips on QF1D512 Dev Kit board.
- View FFT charts; they should look similar to those pictured below.



Setting	Value
Chip Type	QF1D512
Filter Type	Windowed Sinc Blackma
Sampling Frequency	48.00000 kHz
Number of Taps	511
Coefficient Mode	32 bit quantized
Corner Frequency	0.60000 kHz

- Click on *Stop* button to stop the operation.
- Edit filters on Chip A and Chip B as needed by clicking on *New* button or *Edit* button.
- Make sure the data format and pin settings for Chip A and Chip B are not changed from those downloaded with the "Audio-Mojo-Left.q1d2" and "Audio-Mojo-Right.q1d2" configuration files (see 3 screenshots below)



The screenshot displays the QF1D512Config software interface. At the top, a menu bar includes File, View, Chip, Options, and Help. Below the menu, the 'Target' is set to 'Dual Serial', and two chips are selected: 'A Audio-Mojo-Left' and 'B Audio-Mojo-Right'.

The central diagram illustrates the data flow: an input signal (represented by a blue sine wave) is processed by an ADC, then passes through chip A, then chip B, and finally to a Host FPGA. Each stage is connected via a serial link labeled '0110010'.

The 'Data Format Editor' section contains the following fields and controls:

Header Offset (0-255 bits)	Header Size (0-8 bits)	Data Offset (0-255 bits)	Data Size (12-24 bits)
0	0	1	24

Below the table, there are two rows of 'X' characters representing masks:

8 Bits Header Mask: X X X X X X X X

Mask value indicating valid header data bits: X X X X X X X X

Data Mode: Sync Serial (dropdown menu)

Data Format: 2's Complement (dropdown menu)

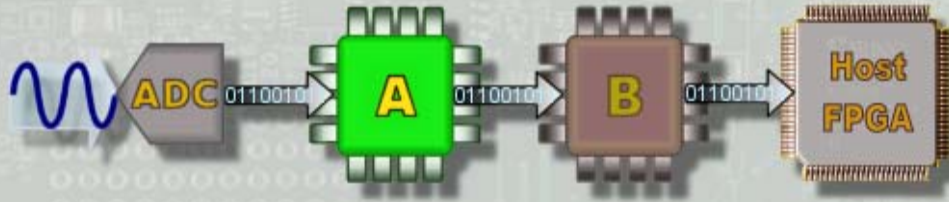
At the bottom of the editor, there are three buttons: 'QF1D512-DK Default', 'Apply To Chip Setting', and 'Back to Main View'.

On the right side, the 'Chip B' window is active, showing an FFT plot. The x-axis is 'Frequency in kHz' on a logarithmic scale from 0.02 to 24. The y-axis represents amplitude from -160 to 40. The plot shows a sharp peak at approximately 0.6 kHz, with a red line for the magnitude and a purple line for the phase.

Below the FFT plot is the 'Details' section, which lists various settings and their values:

Setting	Value
Chip Type	QF1D512
Filter Type	Windowed Sinc Blackma
Sampling Frequency	48.00000 kHz
Number of Taps	511
Coefficient Mode	32 bit quantized
Corner Frequency	0.60000 kHz

At the bottom of the interface, a status bar shows: Connected, Running, User Mode: Advanced (I), and Advanced Download.



Input Level and Type

Pin Number	Pin Name	Pull Up	Pull Down	None	Schmitt Triggered	Active Polarity
3	TST	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	
4	RSTN	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	
5	DSEL	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>	Low ▾
6	DIN	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>	
7	DCLK	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>	Rise ▾
9	SCLK	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>	Rise ▾
10	SDI	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>	
11	CSN	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	

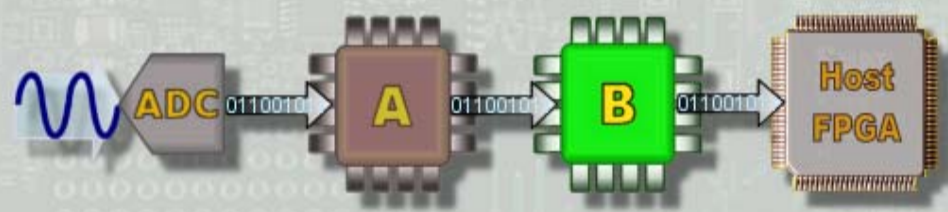
Output Drive and Slew

		Drive	Slew
8	SDO	4 mA ▾	Slow ▾

QF1D512-DK Default

Apply To Chip Setting

Back to Main View



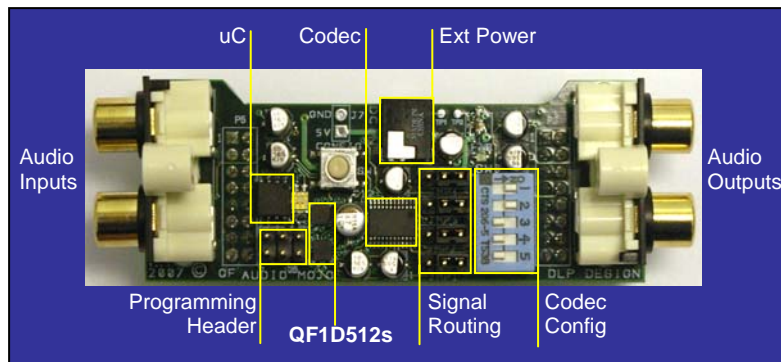
Input Level and Type

Pin Number	Pin Name	Pull Up	Pull Down	None	Schmitt Triggered	Active Polarity
3	TST	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	
4	RSTN	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	
5	DSEL	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>	High
6	DIN	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>	
7	DCLK	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>	Rise
9	SCLK	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>	Rise
10	SDI	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>	
11	CSN	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	

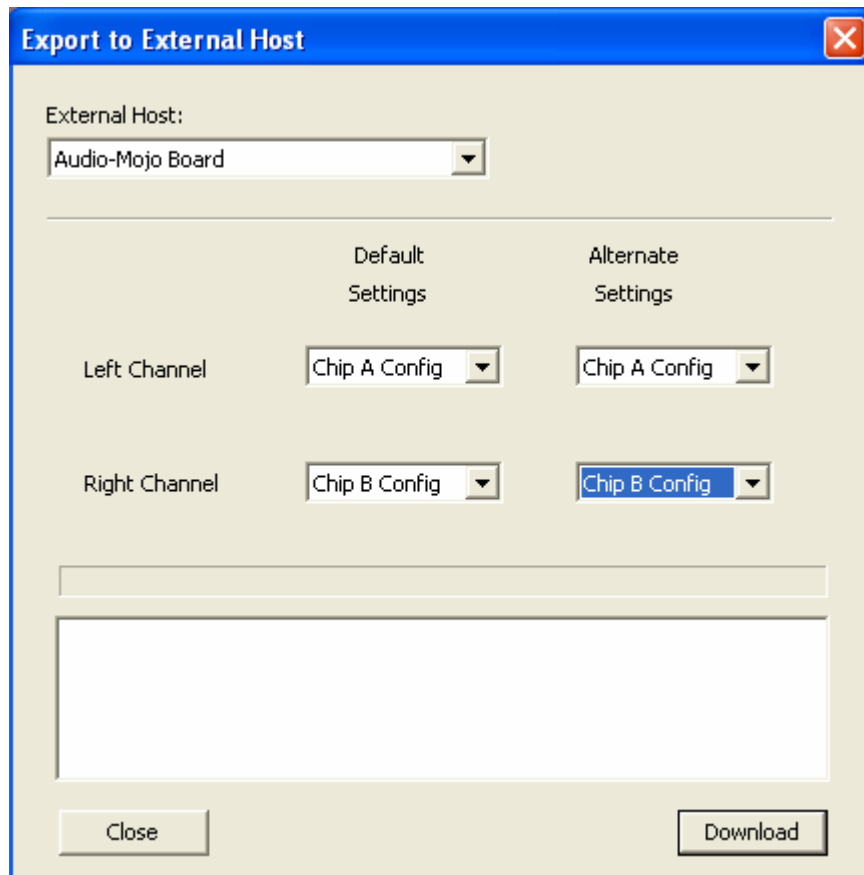
Output Drive and Slew

		Drive	Slew
8	SDO	4 mA	Slow

- Connect the Programming cable to QF1D512 board's J4 Header and to the Audio-Mojo's *Programming header*.



- On Quickfilter Pro Software, select *File -> Export To External Host*. A Warning dialog will be display to instruct you to connect the Audio-Mojo board to QF1D512 Dev Kit board. Click on OK button to dismiss the dialog. The “*Export to External Host*” Dialog should now be displayed. Any of 4 configurations may be loaded. The *Default Settings* are active on the Audio-Mojo board when the *Green LED* located next to the uC on the Audio-Mojo board is on. The *Alternate Settings* are active when the *Red LED* located next to the uC on the Audio-Mojo board is on. Select as below to load all 4 configurations.



- Click on *Download* to start the exporting the configuration to Audio-Mojo board. The process takes about 2 minutes (time depends on how many configurations you want to export to the host and how many taps of each filter)
- When finished, click on *Close* button to close the dialog.
- Unplug the USB connection on QF1D512 Dev Kit board and also unplug the programming cable from the Audio-Mojo header. Plug the USB back in to power cycle the Audio Mojo.
- Select *Chip -> Master Reset* and answer *Yes* to the popup dialog to perform a hardware and software reset.
- Make sure jumper 1, 2, and 3 are set to run SavFIRes on Audio-Mojo board (pins 1 and 2 connected). See App Note for more details.
- Click on *Target* dropdown list box and select *Pass-Through*. Make sure that *Audio-Mojo_DK* is selected for *Data Input Source* and *Data Sample Frequency* is *48 kHz*.
- Click on *Start* button to verify the FFT chart. Toggle the push-button on the Audio-Mojo to restart the microprocessor and load the next configuration. Again, the *Default* configuration is indicated by the *Green LED*, *Alternate* configuration by the *Red LED*.



Application Brief

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