



**STM32 F4xx Discovery Board
Setup Guide**

**Audio Weaver
May 2017**

Copyright Information

© 2014-2017 DSP Concepts, Inc., ALL RIGHTS RESERVED. This document may not be reproduced in any form without prior, express written consent from DSP Concepts, Inc.

Printed in the USA.

Disclaimer

DSP Concepts, Inc reserves the right to change this product without prior notice. Information furnished by DSP Concepts is believed to be accurate and reliable. However, no responsibility is assumed by DSP Concepts for its use; nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under the patent rights of DSP Concepts, Inc.

Change Log

Version	Date	Description	Author
01	2017.Mar.16	Original document + TOC	AN
02	2017.May.15	Updated with new version information.	CHP

Table of Contents

Overview	4
Features	4
Setup	5
Connecting Audio Weaver to the Target	8
Using GPIO Inputs and Outputs	11

Overview

This document describes how to use Audio Weaver with the STM32F407 Discovery board. This is a low cost evaluation board for the STM32F4 series of Cortex-M4 processors.

Features

Audio I/O:	2-in USB. mono-Mic. 2 out via DAC. @ 48 kHz
CPU clock speed	84 MHz (STM32F401) 168 MHz (STM32F407)
Tuning interface:	USB HID device
Flash file system support:	Yes
Booting from flash:	Yes
Fundamental block size:	32 samples
Native data type:	Floating-point



Setup

First, download the ST Board Support Package (BSP) for the appropriate target. These BSPs are provided on the DSP Concepts website at: <https://www.dspconcepts.com>. After running the installer and accepting the licensing agreement, the BSP will be installed to a directory in C:\DSP Concepts.

Once BSP software is installed on your computer, connect the ST Discovery board to your computer. The board has two USB connections:

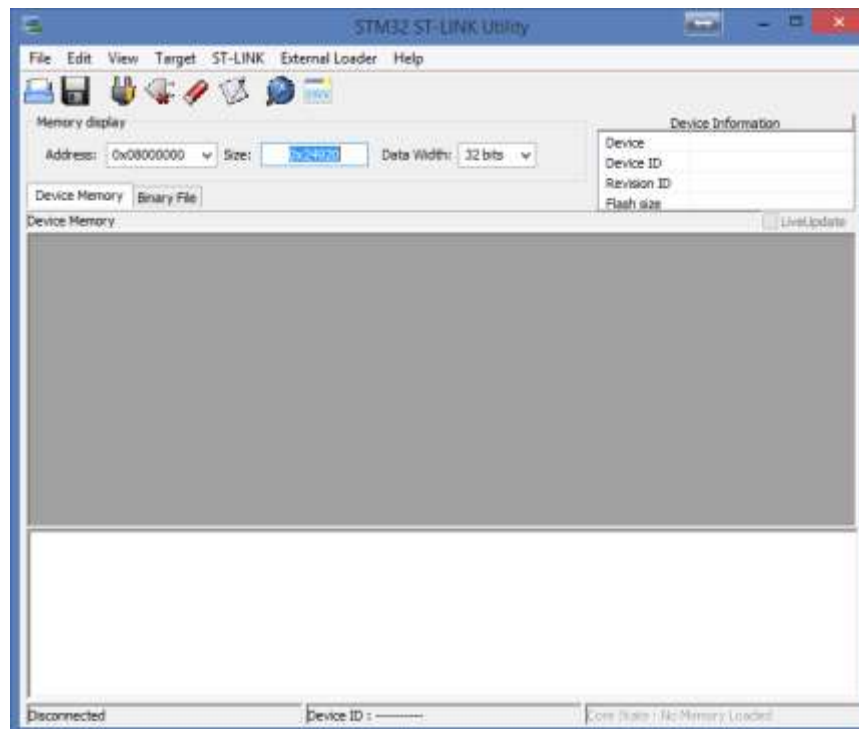
- Mini-USB – for power and programming
- Micro-USB – for audio and control

Connect both USB connections to your PC. This will power on the board and several LEDs will light.

Next, install the STM32 ST-LINK Utility (STSW-LINK004) programming utility provided by STMicroelectronics on their website (www.st.com).

http://www.st.com/content/st_com/en/products/embedded-software/development-tool-software/stsw-link004.html

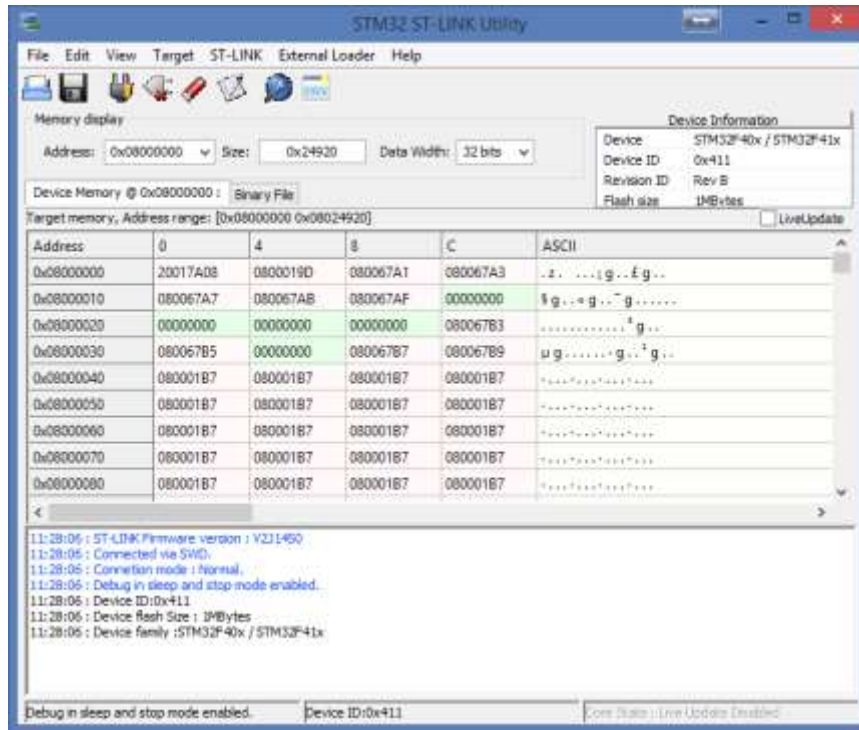
After installation, start the utility and the following window will appear:



From the toolbar, click on the



button to connect to the target. After a few seconds, the window will update to:



Click on the “Full Chip Erase” button to completely erase the flash contents.



Then Click on the “Program and Verify” button:

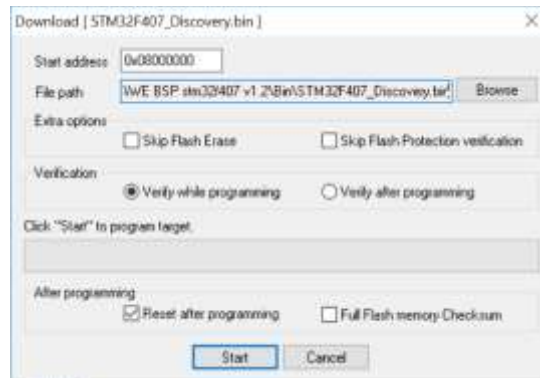


Then browse and select a binary loader file to program.

<BSP-Folder>/Bin/STM32F407_Discovery.bin

You’ll then advance to the next window.

Click the “Start” button to begin updating the flash memory.

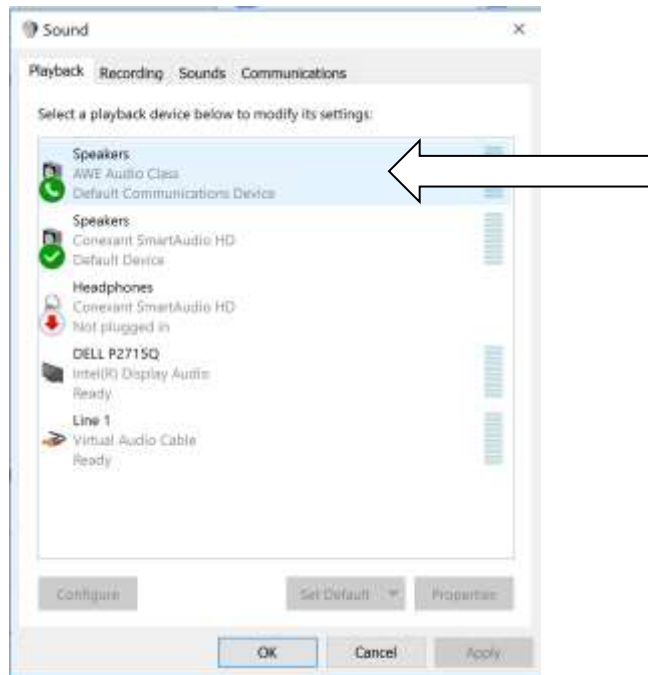


After a few seconds, the programming operation will complete.

If the firmware image update was successful you should now see LED4 flashing green.

The board should now appear as two new USB devices and driver installation should happen automatically on Windows 7 and Windows 8. That is, the board uses default Windows drivers. No special drivers need to be installed¹.

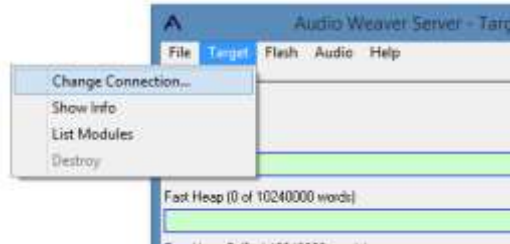
The board appears as a USB audio device. Select this under your Windows audio playback device settings. On Windows 10, it appears as:



¹ Windows XP is currently not supported.

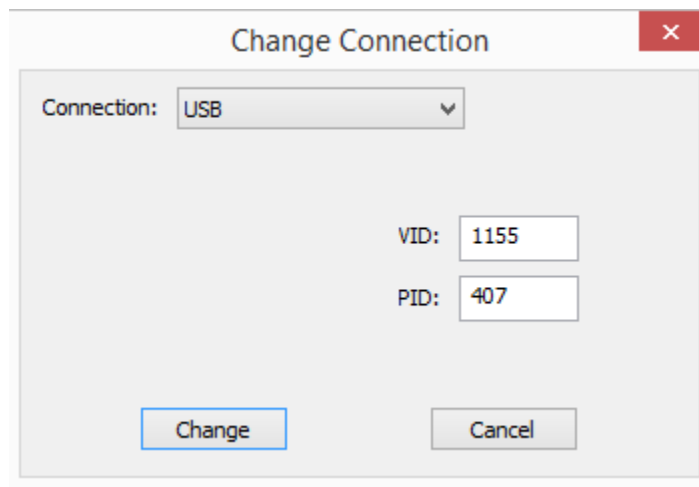
Connecting Audio Weaver to the Target

Launch Audio Weaver Designer application. Then from the Server Window (not from the Designer window) select the menu item Target→Change Connection



In the drop list select “USB” and change the PID and VID settings if necessary as shown below

For the STM32F407 board




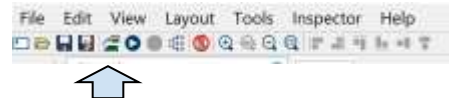
Click on the “Change” button. This window will dismiss and the Server window will update to reflect the connection to the Discovery board.

For the STM32F407 Discovery board, the following information should now be displayed in AWE_Server.

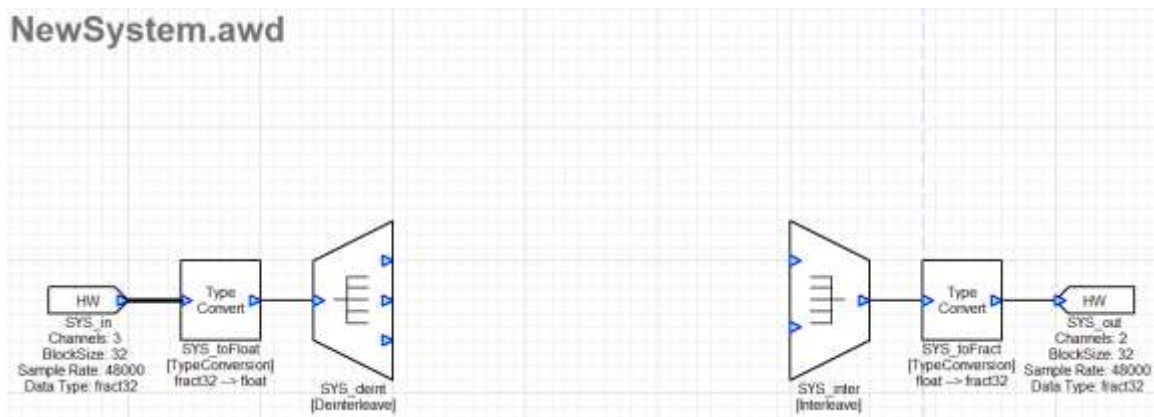
Target Information

Name: ST32F407
 Version: 5.2.4.17
 Processor type: CortexM4
 CPU clock rate: 168 MHz
 Profile clock rate: 168 MHz
 Sample rate: 48000Hz
 Basic block size: 32 samples
 Communication buffer size: 264 words
 Is floating point: Yes
 Is FLASH supported: Yes
 Size of 'int': 4
 Core ID: 0
 Static core: yes
 Threads: 2
 Number of primary inputs: 3
 Number of primary outputs: 2

At this point the Audio Weaver Server is able to communicate with the board. To make sure that the Audio Weaver Designer also sees this change, click on the “Reconnect to Server” button :



The default system drawn in Audio Weaver Designer is shown below.



The target has a fundamental block size of 32 samples and operates at a fixed sample rate of 48 kHz. The left input pin ‘SYS_in’ indicates 3 channels of input. The first two channels are stereo USB audio and this is the audio which is streaming from the PC. The

last channel is the mono mic. The right output pin 'SYS_out' is also stereo and this is the audio being output to the DAC. Real-time processing will only happen once an Audio Weaver model is running.

Create and run a simple model in Audio Weaver and plug in speakers to the STM32 Discovery board's 3.5 mm audio output jack. You should now hear audio being rendered by the STM32 Discovery board!

Using GPIO Inputs and Outputs

The Discovery boards have a variety of LEDs, I/O pins, and a blue user button. Audio Weaver has a GPIO block that allows either output to a GPIO pin or led or input from a GPIO pin or the blue user button. However, the block has to be setup to access the desired pin. Each pin and led on the board is labelled. The GPIO block numbers pins starting with pin 1 and these need to be mapped to the actual pins on the board.

STM32F407VG-Discovery Board Available GPIO Pin Map

GPIO Block Pin Number	Board Input Pin Name	Board Output Pin Name
1	Blue User Button	LED6
2	PA1	LED3
3	PA2	LED5
4	PA3	PA1
5	PA8	PA2
6	PA15	PA3
7	PB0	PA8
8	PB1	PA15
9	PB4	PB0
10	PB5	PB1
11	PB7	PB4
12	PB8	PB5
13	PB11	PB7
14	PB12	PB8
15	PB13	PB11
16	PB14	PB12
17	PB15	PB13
18	PC1	PB14
19	PC2	PB15
20	PC4	PC1
21	PC5	PC2
22	PC6	PC4
23	PC8	PC5
24	PC9	PC6
25	PC11	PC8
26	PC13	PC9
27	PC14	PC11
28	PC15	PC13
29	PD0	PC14
30	PD1	PC15
31	PD2	PD0
32	PD3	PD1
33	PD6	PD2

34	PD7	PD3
35	PD8	PD6
36	PD9	PD7
37	PD10	PD8
38	PD11	PD9
39	PE2	PD10
40	PE4	PD11
41	PE5	PE2
42	PE6	PE4
43	PE7	PE5
44	PE8	PE6
45	PE9	PE7
46	PE10	PE8
47	PE11	PE9
48	PE12	PE10
49	PE13	PE11
50	PE14	PE12
51	PE15	PE13
52		PE14
53		PE15