



Application Note

AN_276

FT800 Audio File Conversion

Version 1.0

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This document shows how to change an audio file into the correct format for the FT800 audio player.

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1 Introduction

This applications note documents how to convert audio files (mp3, ogg Vorbis, AIFF) to an FT800 compatible format.

1.1 Scope

This document covers the basic file conversion process and how to access the converted audio files with the FT800.

1.2 Software Required

- [Audacity](#) (open source, available for free download)
- [Aud_Cvt](#) (EVE Audio Converter)

1.3 FT800 Audio Requirements

The FT800 can use the following audio formats for monaural playback:

- 8 bit signed PCM
- 8 bit u-Law
- 4 bit IMA ADPCM

Figure 1.1 shows the audio file conversion flow:

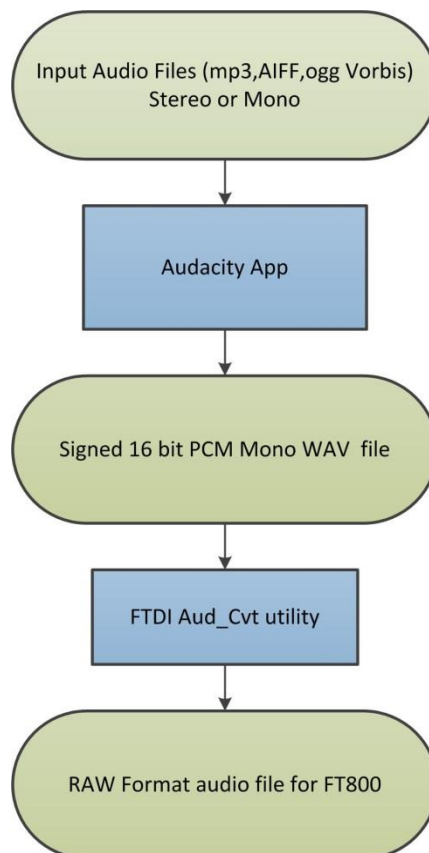


Figure 1.1 File Conversion Flow

2 Working with Audacity

Start the Audacity tool and open an existing mp3 music file by using the **File/Open** pull down menu. In this example, **I.Allegro.mp3** is selected.

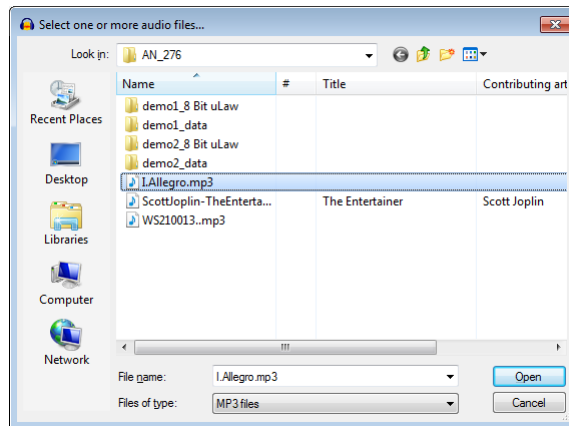


Table 2.1 Audacity file selection

The mp3 file will be read into Audacity. The file must be converted from stereo to mono by clicking on the options icon in the margin and selecting "Split Stereo to Mono" in the pull down menu.

Make a note of the sampling rate, since this will be used in the FT800 application.

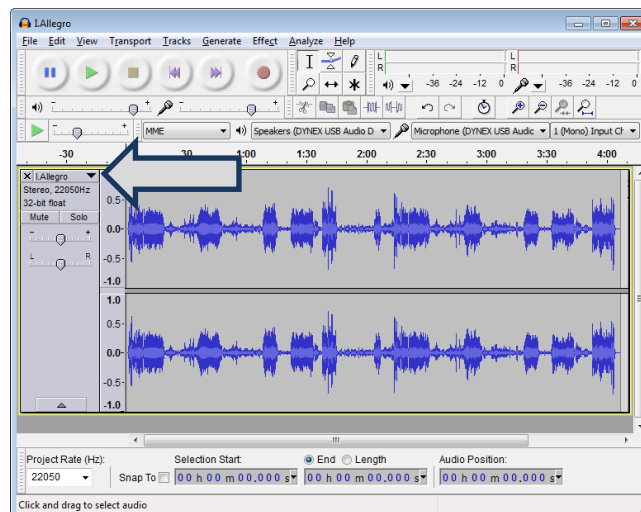


Table 2.2 Audacity audio options

The Audacity screen will look like this after Mono mode is selected:

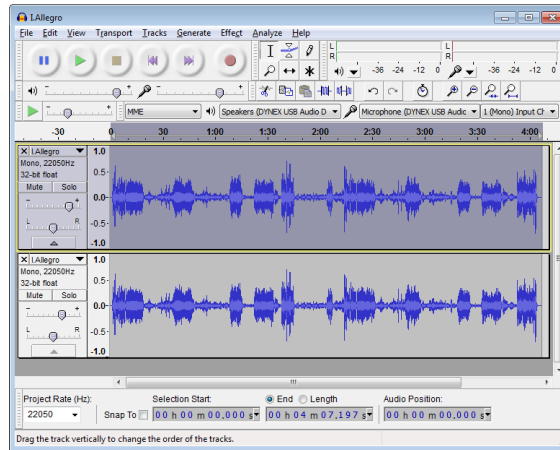


Table 2.3 Mono mode enabled

In the File pull down menu, select “Export” and save the file as a 16 bit signed PCM wav file:

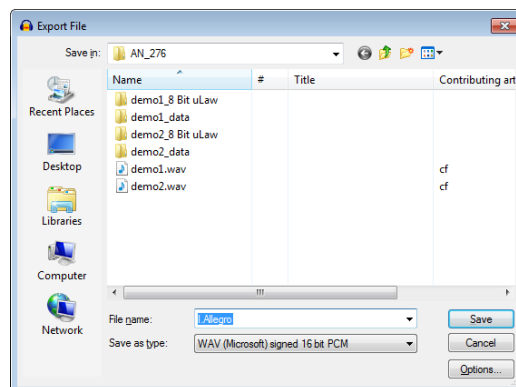


Table 2.4 Save WAV as 16 bit PCM

Click “OK” on the succeeding pop-up menus. The WAV file is now in the correct 16 bit signed PCM wav format for the next conversion step.

3 Working with the FT800 Audio Converter

The FT800 audio conversion utility is `aud_cvt`. This utility only works with 16 bit PCM coded WAV files.

Open a command prompt window (DOS window) and change the working directory to the folder containing the `aud_cvt.exe`. It is also advisable to copy the file to be converted to this folder.

Command line format:

```
aud_cvt -i input_filename -f format <ret>
```

Output format options:

0 : 8 Bit signed PCM

1 : 8 Bit u-Law

2 : 4 Bit IMA ADPCM

In most cases, 8 Bit u-Law is the target format.

For the `I.Allegro` WAV file, the command is as follows:

```
aud_cvt -i I.Allegro.wav -f 1 <ret>
```

This will create a subdirectory called `I_8 Bit uLaw`. The target file in this subdirectory will be **I.raw**. The sampling rate will also be displayed when `aud_cvt` runs.

This raw format audio file is now ready for use with the FT800.

4 Configuring FT800 Audio Playback Properties

Set the sampling rate of the input audio file by using the REG_PLAYBACK_FREQ register. The sampling rate may change based on the structure of the audio file. Refer to the output from Audacity or aud_cvt to get the sampling rate.

```
Ft_Gpu_Hal_Wr32(phost,REG_PLAYBACK_FREQ,44100); //16 bit PCM wav sampling rate 44.1kHz
```

Set the starting location of audio in GRAM by using the REG_PLAYBACK_START register.

```
Ft_Gpu_Hal_Wr32(phost,REG_PLAYBACK_START,0); //begin at start of .raw file
```

Set the size of the GRAM allocated for audio by using the REG_PLAYBACK_LENGTH register.

```
Ft_Gpu_Hal_Wr32(phost,REG_PLAYBACK_LENGTH,8192L); //default is 8192L
```

In this demo application, the allocated size of GRAM is 8KB.

Set the audio file type to u-Law by using the REG_PLAYBACK_FORMAT register.

```
Ft_Gpu_Hal_Wr32(phost,REG_PLAYBACK_FORMAT,1); // default is ULAW_SAMPLES
```

Set the speaker volume by using the REG_VOL_PB register. Default volume is 100.

```
Ft_Gpu_Hal_Wr8(phost,REG_VOL_PB,100);
```

Read in the audio file from the project subdirectory as follows:

```
afile = fopen("../..\\Test\\filename.raw","rb"); //read binary (rb) filename.raw
```

In this example, the size of the audio file is about 9 MB. The 8KB of GRAM is looped for 9MB audio by setting the register REG_PLAYBACK_LOOP to 1:

```
Ft_Gpu_Hal_Wr32(phost,REG_PLAYBACK_LOOP,1); //default is 1 loop
```

If the audio file is less than 8KB, set the register REG_PLAYBACK_LOOP to 0.

The 9 MB audio file will be processed by performing multiple read/writes of GRAM memory. The REG_PLAYBACK_READPTR command keeps track of how much of the audio file has been read.

```
fseek(afile,0,SEEK_END);
ftsize = ftell(afile);
fseek(afile,0,SEEK_SET);
Load_afile(0,afile);
wp = 512L;
Ft_Gpu_Hal_Wr8(phost,REG_PLAYBACK_PLAY,1);
while(ftsize > 0)
{
    rp = Ft_Gpu_Hal_Rd16(phost,REG_PLAYBACK_READPTR);
    val = 8191L & (rp-wp);
    if (val > 512L)
    {
        n = min(512L,ftsize);
        Load_afile(wp,afile);
        wp = (wp +512L) & 8191L;
        ftsize-=n;
    }
}
Ft_Gpu_Hal_Wr8(phost,REG_VOL_PB,0);
Ft_Gpu_Hal_Wr8(phost,REG_PLAYBACK_PLAY,0);
```

5 Conclusion

The conversion procedure described in this application note can be used to create audio files for playback within the FT800. This expands the audio capability of the FT800 beyond the range of the in-built polyphonic tones helping to create a rich and feature filled HMI solution.

6 Contact Information

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Appendix A – References

Document References

Replace this text. List FTDI and external datasheets, application notes, website links and other documents. Notice the hyperlink in the example.

[AN_146 USB Hardware Design Guides for FTDI ICs](#)

[AN_267 FT App Player](#)

Acronyms and Abbreviations

Terms	Description
AD-PCM	Adaptive pulse code modulation varies the quantization of the analog source to improve sound quality and reduce file size.
PCM	Pulse Code modulation is used to digitally sample analog signals.
u-Law PCM	Type of PCM format using a 16-bit signed linear audio sample as input, outputs an 8 bit sample.

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Appendix C – Revision History

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1.0	Initial Release	2014-02-10

