Atmel AVR32841: AVR UC3 Audio Player SPIRIT MP3 Decoder

Features

- Software SPIRIT MP3 decoder implementation
 - Player implementation
 - Player configuration
 - Licensing

1. Introduction

This application note is an extension of the application note Atmel[®] AVR32839: AVR[®] UC3 Audio Player.

The aim is to give the reader all he needs about implementation and configuration of the SPIRIT MP3 decoder in the Atmel AVR UC3 Audio Player.

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32-bit Atmel Microcontroller

Application Note





2. Atmel AVR UC3 Audio Player

2.1 Overview

The UC3 audio player is a generic audio player interface and is designed to support multiple audio formats like MP3, WMA, AAC...

This document details the implementation of the SPIRIT MP3 decoder in this player.

2.2 Package

The UC3 audio player package implementing the SPIRIT decoder is the: audio_player-evk1104-evk1105-spirit_mp3-<version>.zip file.

It can be requested from the Atmel SPIRIT MP3 registration page: http://www.atmel.com/forms/mp3_reg.asp.

2.3 SPIRIT decoder

2.3.1 Overview

SPIRIT MP3 Decoder supports MPEG 1, 2 Audio Layers I, II and III standards and their low bit rate extension MPEG 2.5. Smart algorithmic solutions allow decreasing CPU load and memory footprint.

More information can be retrieved from the SPIRIT audio home page: http://www.spiritdsp.com/products/audio.php.

2.3.2 Supported devices

The SPIRIT decoder can only be executed on Atmel AVR UC3 Audio devices.

Currently supported Atmel devices include:

- AT32UC3A0512AU-ALUT
- AT32UC3A0512AU-ALTRA
- AT32UC3A0256AU-ALUT
- AT32UC3A0128AU-ALUT
- AT32UC3A1512AU-AUR
- AT32UC3A1256AU-AUR
- AT32UC3A3256AU-ALUT
- AT32UC3B0512AU-Z2UR
- AT32UC3B0128AU-A2UTAT32UC3B0128AU-Z2UR
- AT32UC3C0512CAU-ALUT

2.4 Player implementation

2.4.1 Source code

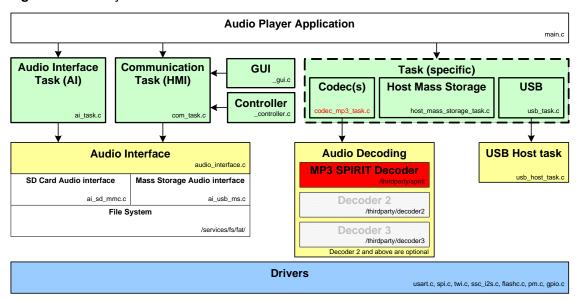
The SPIRIT decoder is delivered in binary form as an optimized UC3 library available in /third-party/spirit/libs directory. Three optimized GCC and IAR^{TM} versions are delivered:

- Speed optimization
- Size optimization
- Balanced optimization

2.4.2 Player layer

The MP3 player layer is located in /avr32/services/audio/players/mp3/mp3_spirit_player.[c,h].

Figure 2-1. Player software architecture.



2.5 Player configuration

As detailed in the Atmel AVR32839: AVR UC3 Audio Player application note, the task() function is in charge of calling the software "tasks" to perform audio decoding.

The task() is macro based and defined in /config/conf_audio_player.h file where the call to the MP3 task is defined:

```
#define task()
{
    task_usb();
    task_usb_ms();
    task_mp3();
}
```

The MP3 support is then enabled by defining the MP3_SUPPORT to true:

```
#define SUPPORT_MP3 true
```

The MP3 file extension filtering is enabled in the following section of the conf_audio_player.h file:





2.6 Decoder license

The SPIRIT MP3 decoder implementation is subject to software licence agreement acceptance from the Atmel SPIRIT registration page: http://www.atmel.com/forms/mp3_reg.asp.

2.7 Performance

Table 2-1 shows the memory requirement for the MP3 SPIRIT decoder implementation.

 Table 2-1.
 MP3 SPIRIT decoder performance

Compiler	Flash [KB] ⁽¹⁾	RAM [KB] (2)
GCC 4.4.3 ⁽³⁾	25.0 / 20.0	18.7 / 18.7
IAR EWAVR32 3.31.1	20.9 / 18.7	19.6 / 19.6

- 1. Speed / Size optimization
- 2. Speed / Size optimization
- 3. AVR 32-bit GNU Toolchain 3.3.1 build 285



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