

M031 Play WAV File from SPI Flash

Example Code Introduction for 32-bit NuMicro® Family

Information

| | |
|-------------|---|
| Application | This sample code uses external codec NAU88L25 to play WAV file stored in external SPI Flash W25Q32. |
| BSP Version | M031 BSP CMSIS V3.00.001 |
| Hardware | NuMaker-M032KG Ver1.0 |

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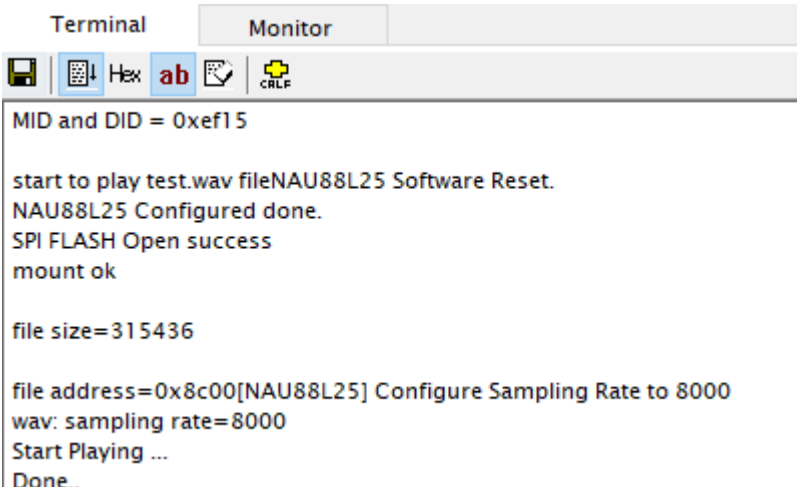
1 Overview

This sample code uses external codec NAU88L25 to play WAV file stored in external SPI Flash W25Q32. First, user needs to store the WAV file into SPI Flash first with file system. Then, the user can run the USBD_Mass_Storage_QSPI_Flash sample code first and put the WAV file into QSPI Flash.

The Play WAV file supports mono/stereo mode. The data length is 16 bits and sampling rate is 8 kHz.

1.1 Demo Result

The demo result is shown below.



```

MID and DID = 0xef15

start to play test.wav fileNAU88L25 Software Reset.
NAU88L25 Configured done.
SPI FLASH Open success
mount ok

file size=315436

file address=0x8c00[NAU88L25] Configure Sampling Rate to 8000
wav: sampling rate=8000
Start Playing ...
Done..
    
```

Figure 1-1 Demo Result

2 Code Description

First, initialize the M031 in main.c, initial I²C, UART, SPI-I2S, QSPI and NAU88L25. Then, call play wave function.

```
int32_t main(void)
{
    uint32_t MidDid;
    TCHAR sd_path[] = { '0', ':', 0 };    /* SD drive started from 0 */
    /* Unlock protected registers */
    SYS_UnlockReg();
    /* Init System, IP clock and multi-function I/O. */
    SYS_Init();

    /* Init UART to 115200-8n1 for print message */
    UART_Open(UART0, 115200);
    QSpiInit();
    MidDid = QSpiReadMidDid();
    printf("\nMID and DID = 0x%x\n\r", MidDid);
    printf("\nstart to play test.wav file");
    f_chdrive(sd_path);    /* set default path */
    /* Init I2C1 to access NAU8822 */
    I2C1_Init();

    /* Reset NAU88L25 codec */
    NAU88L25_Reset();

    /* Set PE.13 low to enable phone jack on NuMaker board. */
    SYS->GPE_MFPH &= ~(SYS_GPE_MFPH_PE13MFP_Msk);
    GPIO_SetMode(PE, BIT13, GPIO_MODE_OUTPUT);
    PE13 = 0;

    /* Initialize NAU88L25 codec */
    CLK_SysTickDelay(20000);
    NAU88L25_Setup();

    /* Configure PDMA and use Scatter-Gather mode */
    PDMA_Init();

    WAVPlayer();
    while(1);
}
```

3 Software and Hardware Requirements

3.1 Software Requirements

- BSP version
 - ◆ M031 Series BSP CMSIS v3.00.001
- IDE version
 - ◆ Keil uVersion 5.26

3.2 Hardware Requirements

- Circuit components
 - ◆ NuMaker-M032KG Ver1.0
 - ◆ SPI FLASH W25Q32
 - ◆ Audio codec NAU88L25

- Pin Connect

| | | | |
|----------------|-----------------|---|-----------------|
| QSPI | V _{DD} | ↔ | V _{DD} |
| | GND | ↔ | GND |
| | PA.5 | ↔ | WP |
| | PA.4 | ↔ | HOLD |
| | PA.3 | ↔ | SPI_FLASH_SS |
| | PA.2 | ↔ | SPI_FLASH_CLOCK |
| | PA.0 | ↔ | SPI_FLASH_SI |
| | PA.1 | ↔ | SPI_FLASH_SO |
| | | | SPI Flash |
| NuMaker-M032KG | V _{DD} | ↔ | V _{DD} |
| | GND | ↔ | GND |
| | PB0 | ↔ | I2C_DAT |
| | PB1 | ↔ | I2C_CLK |
| | PF10 | ↔ | I2S_MCLK |
| | PF9 | ↔ | I2S_LRCLK |
| | PF8 | ↔ | I2S_BCLK |
| | PF7 | ↔ | I2S_DO |
| | PF6 | ↔ | I2S_DI |
| | | | NAU88L25 |

Figure 3-1 Pin Connect

4 Directory Information

The directory structure is shown below.








| | | |
|---|--|---|
|  | EC_M031_Play_Wav_file_from_SPI_Flash_V1.00 | |
|  | Library | Sample code header and source files |
|  | CMSIS | Cortex® Microcontroller Software Interface Standard (CMSIS) by Arm® Corp. |
|  | Device | CMSIS compliant device header file |
|  | StdDriver | All peripheral driver header and source files |
|  | SampleCode | |
|  | ExampleCode | Source file of example code |

Figure 4-1 Directory Structure

5 Example Code Execution

1. Browse the sample code folder as described in the Directory Information section and double-click *I2S_PDMA_NAU88L25_QSPI_FATFS.uvproj*.
2. Enter Keil compile mode.
 - Build
 - Download
 - Start/Stop debug session
3. Enter debug mode.
 - Run

6 Revision History

| Date | Revision | Description |
|------------|----------|----------------------|
| 2021.05.18 | 1.00 | 1. Initially issued. |

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