M451 1KHz Buzzer

Example Code Introduction for 32-bit NuMicro® Family

Information

Application	M451 1KHz Buzzer Sample Code.
BSP Version	M451 Series BSP CMSIS V3.01.001
Hardware	NuTiny-M451V

1 Function Description

1.1 Introduction

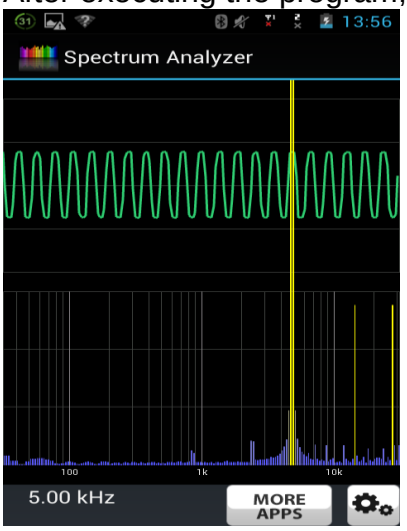
Implement an 1KHz sound on M451 MCU chip with Buzzer function

1.2 Principle

This project is to generate 1KHz waveform through PWM function. User can use this example code to generate the 1KHz music through PWM output pin.

1.3 Demo Result

After executing the program, PWM will output the 1 KHz waveform.



2 Code Description

PWM initialize setting:

1. Set PC9~PC11 as PWM output
2. Select PCLK as PWM module clock source

```
// ------------------------------------------------------------------------------------
//  PWM initialize setting
//   Set PC9~PC11 as PWM output
//  Select PCLK as PWM module clock source
// ------------------------------------------------------------------------------------
void Buzzer_Init()
{
    /* Enable PWM module clock */
    CLK_EnableModuleClock(PWM0_MODULE);

    /* Select PWM module clock source */
    CLK_SetModuleClock(PWM0_MODULE, CLK_CLKSEL2_PWM0SEL_PCLK0, 0);

    /* Reset PWM0 channel 0~5 */
    SYS_ResetModule(PWM0_RST);

    /* Set PC0 multi-function pins for PWM0 Channel0  */
    SYS->GPC_MFPL &= ~(SYS_GPC_MFPL_PC0MFP_Msk);
    SYS->GPC_MFPL |= SYS_GPC_MFPL_PC0MFP_PWM0_CH0;

    /* set PWMA channel 0 output configuration */
    PWM_ConfigOutputChannel(PWM0, 0, 40000, 50);

    /* Enable load mode of selected channel */
    PWM_EnableLoadMode(PWM0, 0, 0);
    /* set PWM to up-down count type */
    PWM0->CTL1 = (PWM0->CTL1 & ~(PWM_CTL1_CNTTYPE0_Msk << 0)) | (2UL << 0);
    /* SET CMR: 71884800/40000 = 898 */
    PWM_SET_CNR(PWM0, 0, 900);
    /* SET PWM0 ch0 period and zero point no action, compare up point output Low and
compare down point output High */
    PWM_SET_OUTPUT_LEVEL(PWM0, 0x1, PWM_OUTPUT_NOTHING, PWM_OUTPUT_TOGGLE,
PWM_OUTPUT_NOTHING, PWM_OUTPUT_TOGGLE);

    /* Enable PWM interrupt for PWM0 channel 0 */
```

```
    //PWM_EnablePeriodInt(PWM0, 0, 0);
    PWM_EnableZeroInt(PWM0, 0);
    /* Enable PWM0 NVIC interrupt */
    NVIC_EnableIRQ(PWM0P0_IRQn);

    /* Enable PWM Output path for PWM0 channel 0 */
    PWM_EnableOutput(PWM0, PWM_CH_0_MASK);
    // Start
    PWM_Start(PWM0, PWM_CH_0_MASK);

    /* Buzzer freq = 100Hz */
    BuzzerFreq = 100;
}
```

```
void PWM0P0_IRQHandler(void)
{
    /* PWM interrupt counter */
    PWMCounter = PWMCounter + 1;
    FreqCounter = 40000/BuzzerFreq;
    FreqCounter = 2000/FreqCounter;

    //CurrentFreqCounter = FreqCounter + CurrentFreqCounter;
    CurrentFreqCounter = CurrentFreqCounter + 50;       //1KHz:50, 5KHz:250, 500Hz:25
    if(CurrentFreqCounter > 2000)
        CurrentFreqCounter = CurrentFreqCounter - 2000;
    PWM_SET_CMR(PWM0, 0, SineTable[CurrentFreqCounter]);
    PWM_ClearPeriodIntFlag(PWM0, 0);
    PWM_ClearZeroIntFlag(PWM0, 0);
}
```

3 Hardware and Software environment

- **Software Environment**
  - BSP version
    - M451 Series BSP CMSIS V3.01.001
  - IDE version
    - Keil uVersion 5.26
- **Hardware Environment**
  - Circuit components
    - NuTiny-M451V
  - Diagram
    - N/A

4 Directory Information

EC_ M451_1KHz_Buzzer_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

5 How to execute a sample code

1. Enter Keil compile mode
    a. Build
    b. Download
    c. Start/Stop debug session
2. Enter debug mode
    a. Run

6 Revision History

Date	Revision	Description
Nov 14, 2019	1.00	1. Initially issued.