

## 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

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# 1 Function Description

## 1.1 Introduction

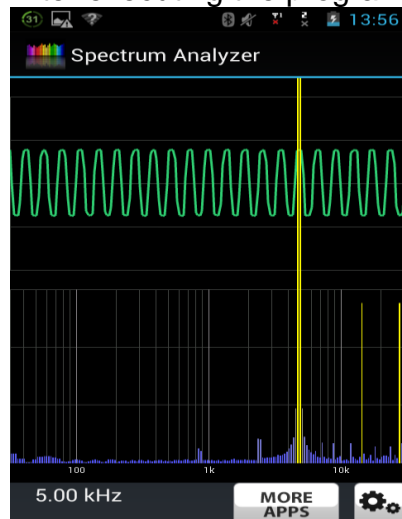
Implement an 1KHz sound on M451 MCU chip with Buzzer function

## 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.

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