

AT32_TMR and DMA Update PWM Duty Cycle Dynamically

Introduction

This document takes AT32F403A as an example to introduces how to use AT32 TMR and DMA to update PWM duty cycle dynamically.

This sample code use TMR4 update event to trigger DMA1 to transmit data to TMR4 channel 2 data register (TMRx_C2DT), so that to dynamically output PWM waveforms with different duty cycles in the TMR4 channel 2 (PB7).

Note: This document is written based on V2.X.X version of BSP software developed by ARTERY. For other versions, users need to pay attention to their differences in use.

Applicable products:

| | |
|-------------|--------------------|
| Part number | ARTERY AT32 family |
|-------------|--------------------|

List of peripherals:

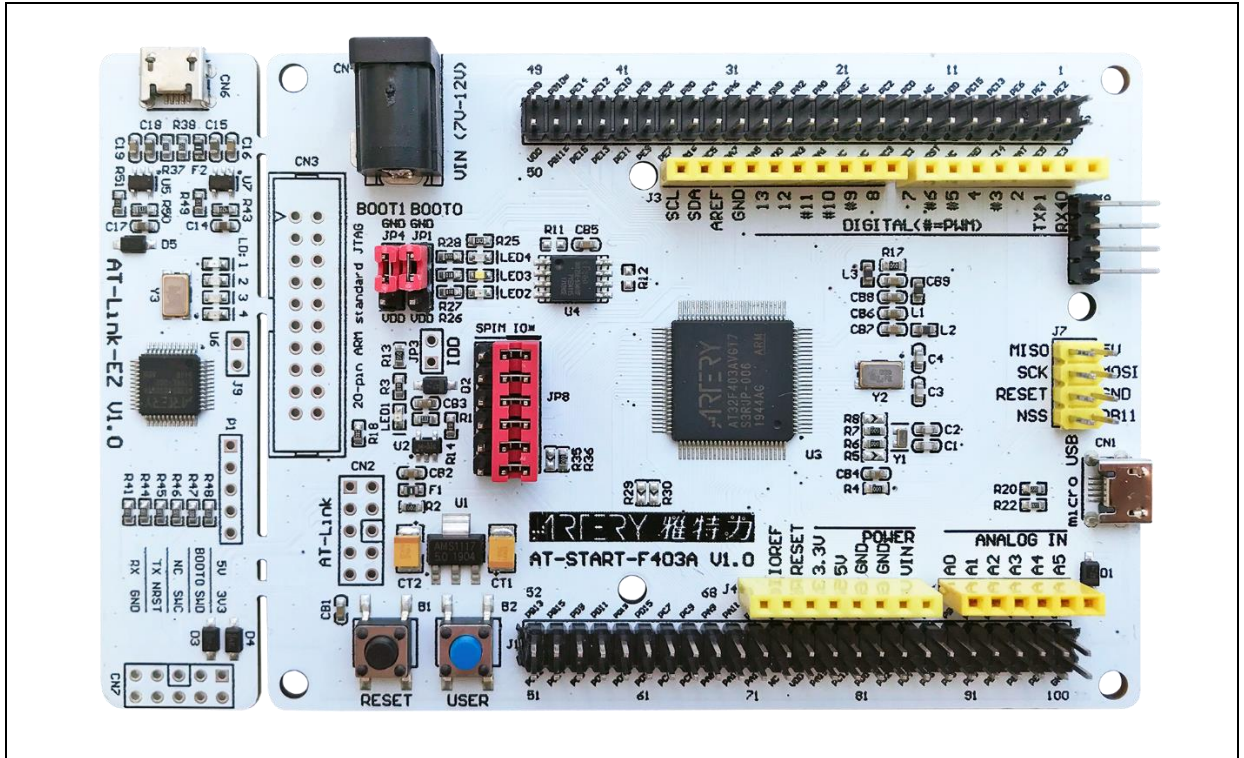
| | |
|------------------|-------|
| Main peripherals | TIMER |
| | DMA |

1 Application method

1.1 Hardware requirements

- 1) AT-START-F403A V1.x evaluation board;
- 2) Logic analyzer or oscilloscope

Figure 1. AT-START-F403A V1.0 evaluation board



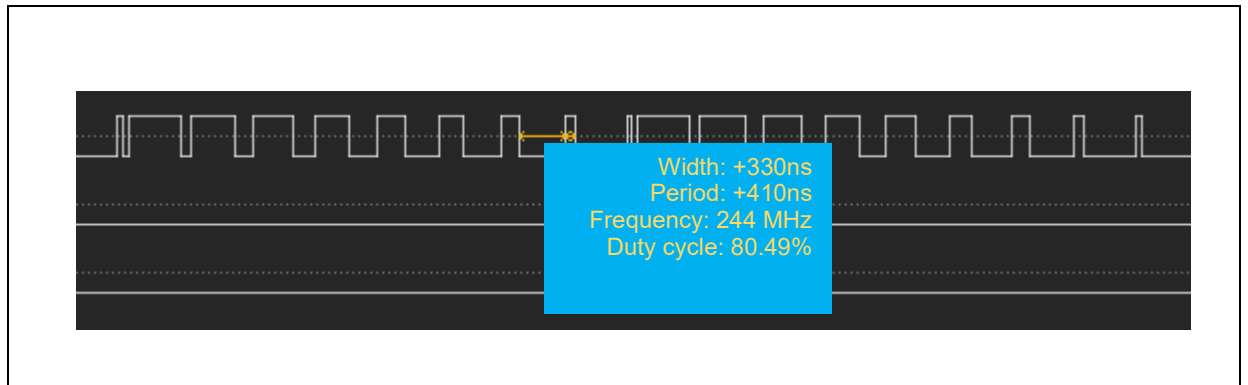
1.2 Software requirements

- 1) This demo uses AT32F403A, and the BSP version is AT32F403A_407_Firmware_Library_V2.0.6.
- 2) TMR configuration:
 - Configure the TMR4 channel 2(PB7) to generate PWM waveforms.
 - Configure DMA1 and set channel 7 (TMR4 update event) for request mapping; transmit different duty cycles in the memory to the TMR4 channel 2 data register (TMRx_C2DT) to update the duty cycle dynamically.
- 3) Modify the "src_buffer[]" array in *main.c* to set the required duty cycle; the array length is calculated by software automatically.
- 4) *Note: All of projects are built based on Keil 5. For the need to run in other compiling environments, user can make simple adjustments according to AT32xxx_Firmware_Library_V2.x.x\project\at_start_xxx\templates.*

1.3 Example of application

- 1) Hardware connection: Connect PB7(TMR4_CH2) to logic analyzer or oscilloscope;
- 2) Open \SourceCode\SC0069_SourceCode_V2.0.0\utilities\SC0069_Demo\mdk_v5\Duty.uvprojx then compile and download to the evaluation board;
- 3) Capture the PB7 waveform and verify the effect. In normal operation, TMR4_CH2 (PB7) outputs the PWM waveform with corresponding duty cycle according to the variables in "uint16_t src_buffer[] = {10,20,30,40,50,60,70,80,90,10,20,30,40,50,60,70,80,90};". The PWM waveform in this Demo is shown in Figure 2.

Figure 2. LA captures waveform



2 Revision history

Table 1. Document revision history

| Date | Version | Revision note |
|------------|---------|------------------|
| 2022.01.25 | 2.0.0 | Initial release. |

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