

How to use AT32 core DWT register to set delay time

Introduction

This sample code presents how to use AT32 core DWT register to set latency. Similar to SysTick, DWT can be also be used to get Cortex-M-based accurate latency.

Note: This sample code is written based on Artery's V2.x.x BSP. For other versions of BSP, users should pay attention to the differences in use.

Applicable products:

Product series	AT32 MCU Family
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List of major peripherals used:

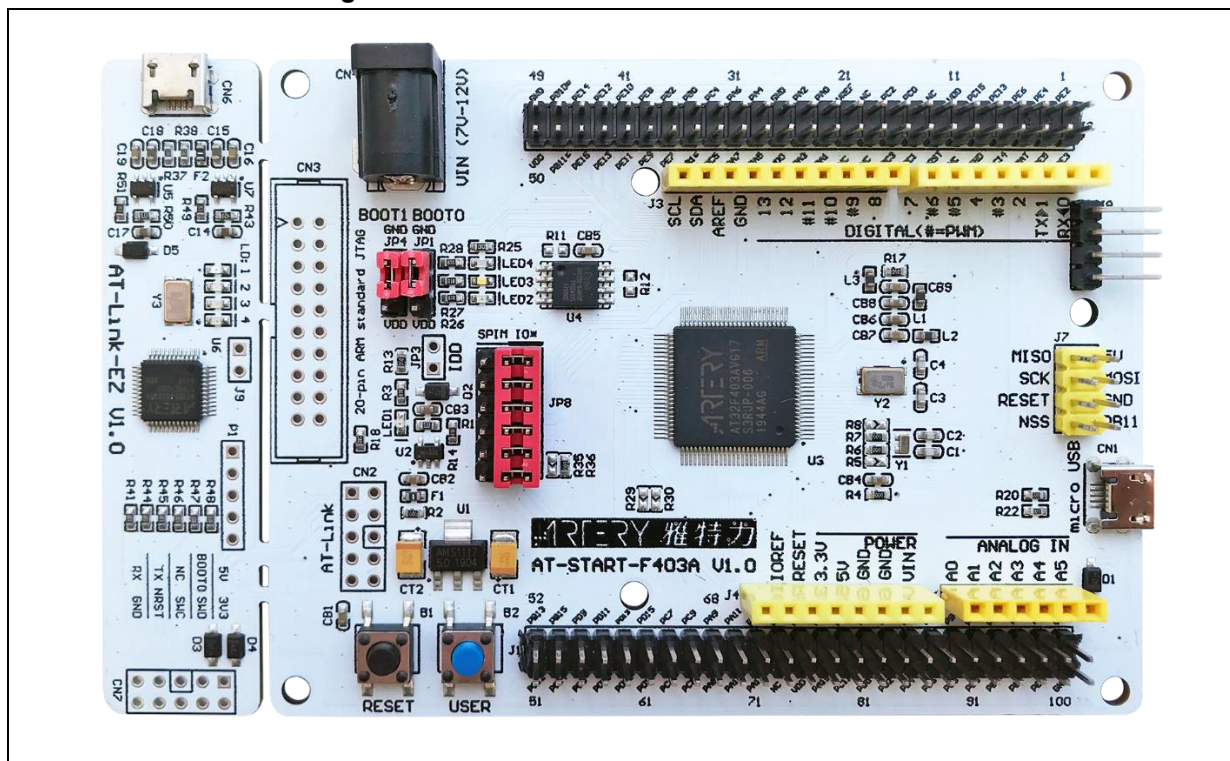
Peripherals	DWT (Cortex-M core)
	GPIO

1 Quick start

1.1 Hardware resources

- 1) AT-START-F403A V1.x evaluation board

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



1.2 Software resources

- 1) This Demo uses AT32F403A, and AT32F403A_407_Firmware_Library_V2.0.6 (BSP version)
- 2) In "at32f403a_407_board.c", it adds DWT configuration to program dwt_delay function:
 - DWT initialization function: void dwt_delay_init(void);
 - DWT microsecond delay function: void dwt_delay_us(uint32_t nus);
 - DWT millisecond delay function: void dwt_delay_ms(uint16_t nms);
 - DWT second delay function: void dwt_delay_sec(uint16_t sec);

Note: when at 240MHz, the parameter of DWT millisecond delay function can only be set with a maximum of 0x45EF (17895 in decimal system, 17sec). Else an overflow will be generated. For the cases of more than 10s, DWT second delay function is recommended.

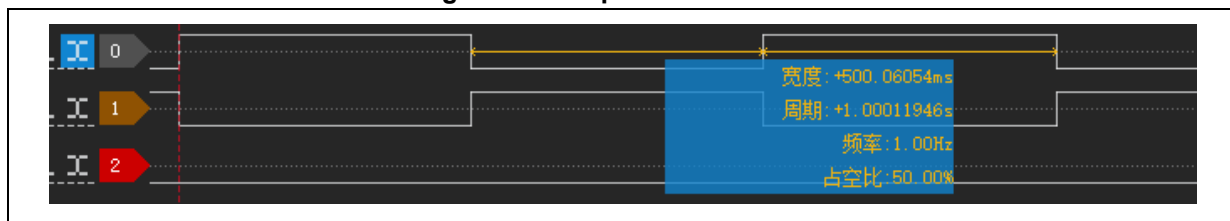
- 3) In "main.c", for every 500ms, LED2 (red) will toggle once through SysTick, and LED4 (green) will toggle once through DWT, in order to check test result.

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 case

- 1) Open the following source code, compile and download it to the evaluation board.
`\SourceCode\SC0080_SourceCode_V2.0.0\utilities\SC0080_Demo\mdk_v5\DWT.uvprojx`
- 2) Check LED2/LED4 to verify test result. Logic analysis or oscilloscope can also be used to capture waveforms for further verification.

Figure2. LA captures waveforms



2 Revision history

Table 1. Document revision history

Date	Revision	Changes
2022.01.26	2.0.0	Initial release

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