

## AT32 PWM Output With Programmable Duty Cycle and Fixed Phase Shift

### Introduction

This sample code is based on AT32F403A demonstrating how to use TMR to generate PWM waves with programmable duty cycle and phase shift.

In the example, TMR1 channel 1 outputs PWM waves. It also acts as a master timer to trigger TMR2 to count through its channel 2, so as to achieve phase shift of PWM waves between TMR1 channel 1 and TMR2 channel output. And such two-channel PWM is configurable in duty cycle.

*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 all series
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List of major peripherals used:

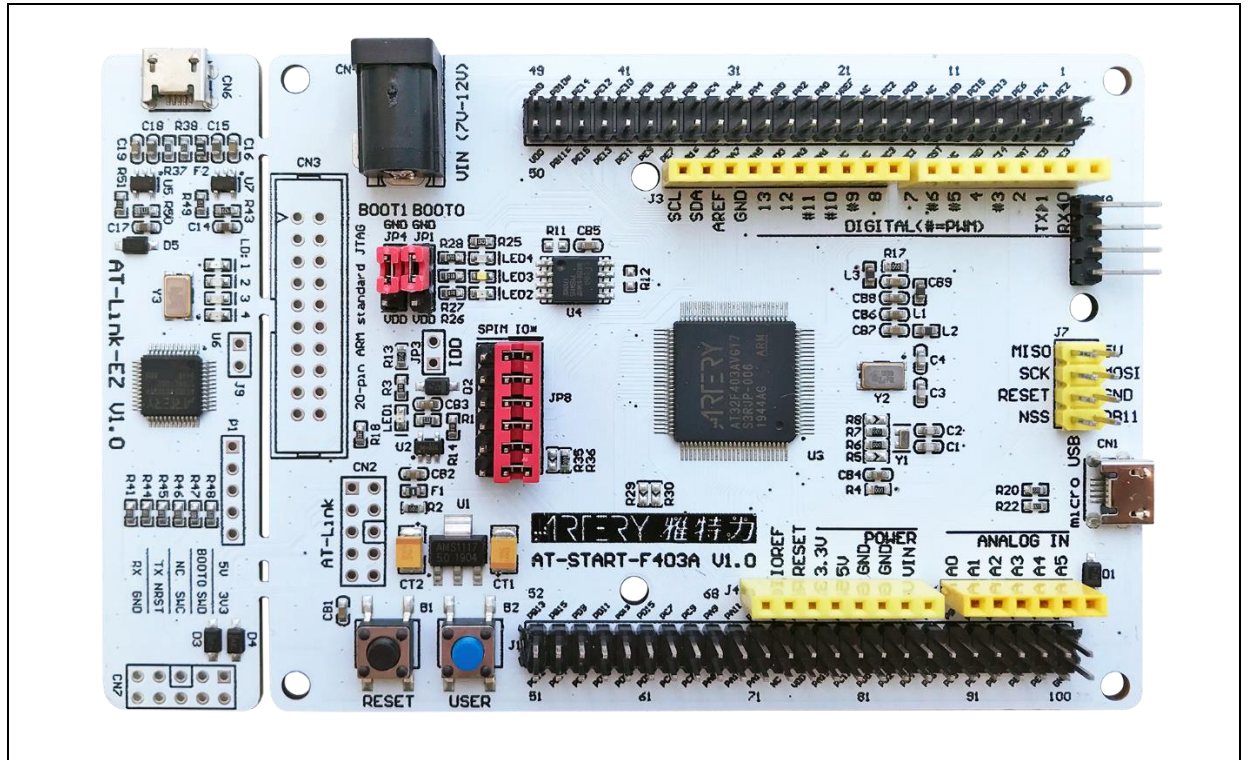
Peripherals	TIMER
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# 1 Quick start

## 1.1 Hardware resources

- 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 resources

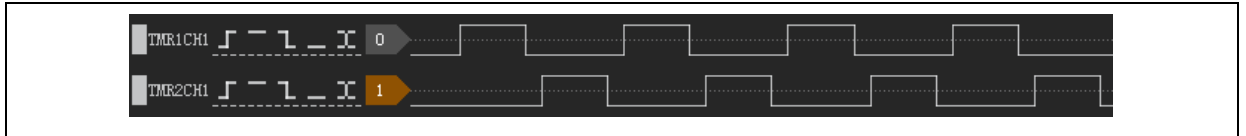
- 1) AT32F403A, and AT32F403A\_407\_Firmware\_Library\_V2.1.0 (BSP)
- 2) TMR configurations:
  - Set TMR1 channel 1 (PA8) to generate PWM with configurable duty cycle
  - Set TMR1 as master mode, and TMR2 as slave mode. TMR1\_CH2 is used to trigger TMR2 to count, so as to achieve phase shift of PWM waves between them. Such phase shift is adjustable through TMR1 channel 2 register.
  - Set TMR2 channel 1 (PA0) to generate PWM with configurable duty cycle.

*Note: All of projects are built based on Keil 5. For the need to run them 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) Connect PA8(TMR1\_CH1) and PA0(TMR2\_CH1) to a logic analyzer or oscilloscope
- 2) Open SC0094\_SourceCode\_V2.0.0\utilities\SC0094\_Demo\mdk\_v5\pwm\_output.uvprojx, compile and download it to the evaluation board
- 3) Capture waveforms of PA8 and PA1. When in normal run mode, these two channels output PWM waves with a 90 degree of phase shift difference and 40% of duty cycle, as shown below:

Figure 2. LA-captured waveform



## 2 Revision history

Table 1. Document revision history

Date	Revision	Changes
2022.07.20	2.0.0	Initial release

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