How to use FPU

Introduction

This application note describes how to use FPU feature on At32 series MCUs.

Applicable products:

	AT32F403
	AT32F403A
	AT32F407
Part number	AT32F413
	AT32F435
	AT32F437

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1 Necessary preparations

1.1 Enable FPU in the program

Open the *system_at32f4xx.c* file and find the *void SystemInit (void)* function to confirm that the FPU is enabled in the core, as shown in the black italics in Figure 1.

Note: It is necessary to enable FPU in the program. If the FPU is only set in Keil or IAR but not enabled in the program, the hardfault will happen.

Figure 1. Enable FPU in the program

```
void SystemInit (void)
{
#if defined (__FPU_USED) && (__FPU_USED == 1U)
  SCB->CPACR |= ((3U << 10U * 2U) |            /* set cp10 full access */
                 (3U << 11U * 2U)   );         /* set cp11 full access */
#endif

  /* reset the crm clock configuration to the default reset state(for debug purpose) */
  /* set hicken bit */
  CRM->ctrl_bit.hicken = TRUE;

  /* wait hick stable */
  while(CRM->ctrl_bit.hickstbl != SET);

  /* hick used as system clock */
  CRM->cfg_bit.sclksel = CRM_SCLK_HICK;

  /* wait sclk switch status */
  while(CRM->cfg_bit.sclksts != CRM_SCLK_HICK);

  ..................................................................
  ..................................................................
}
```
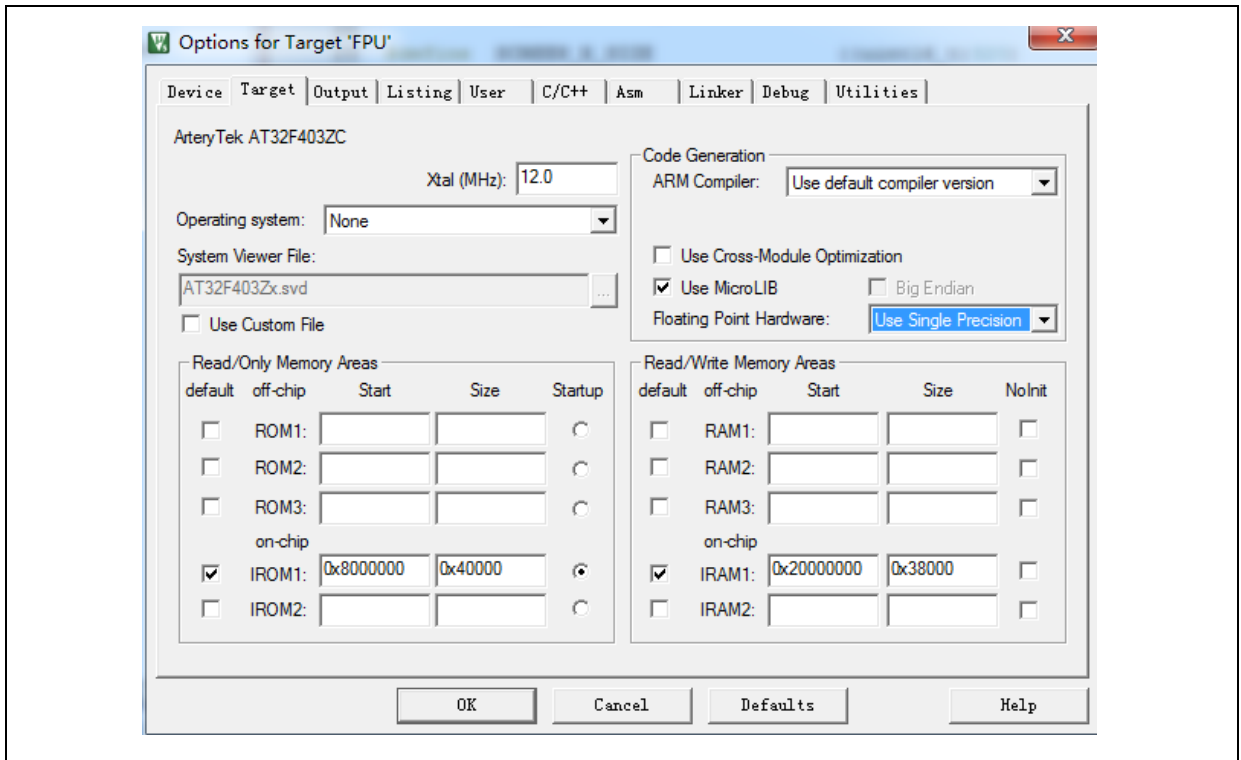
2   Set FPU in Keil

2.1   Enable FPU

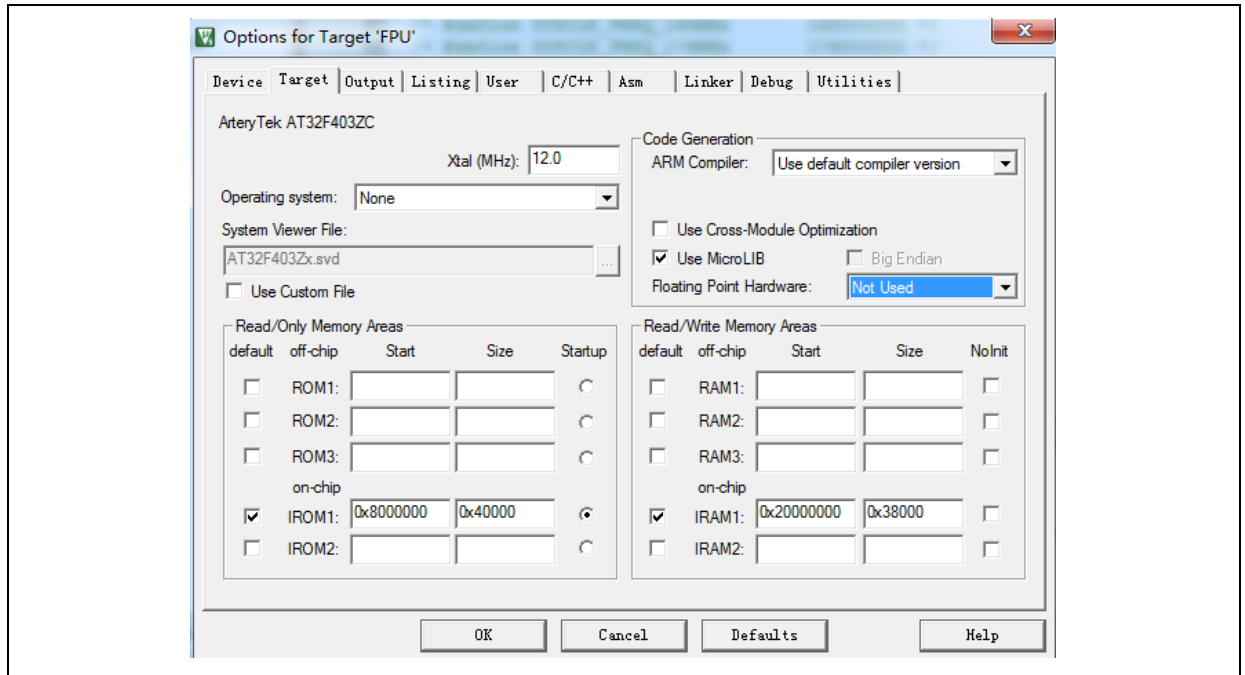Options for Target->Target->Floating Point Hardware->Use Single Precision

Figure 2. Enable FPU in Keil

2.2 Disable FPU

Options for Target->Target->Floating Point Hardware->Not Used
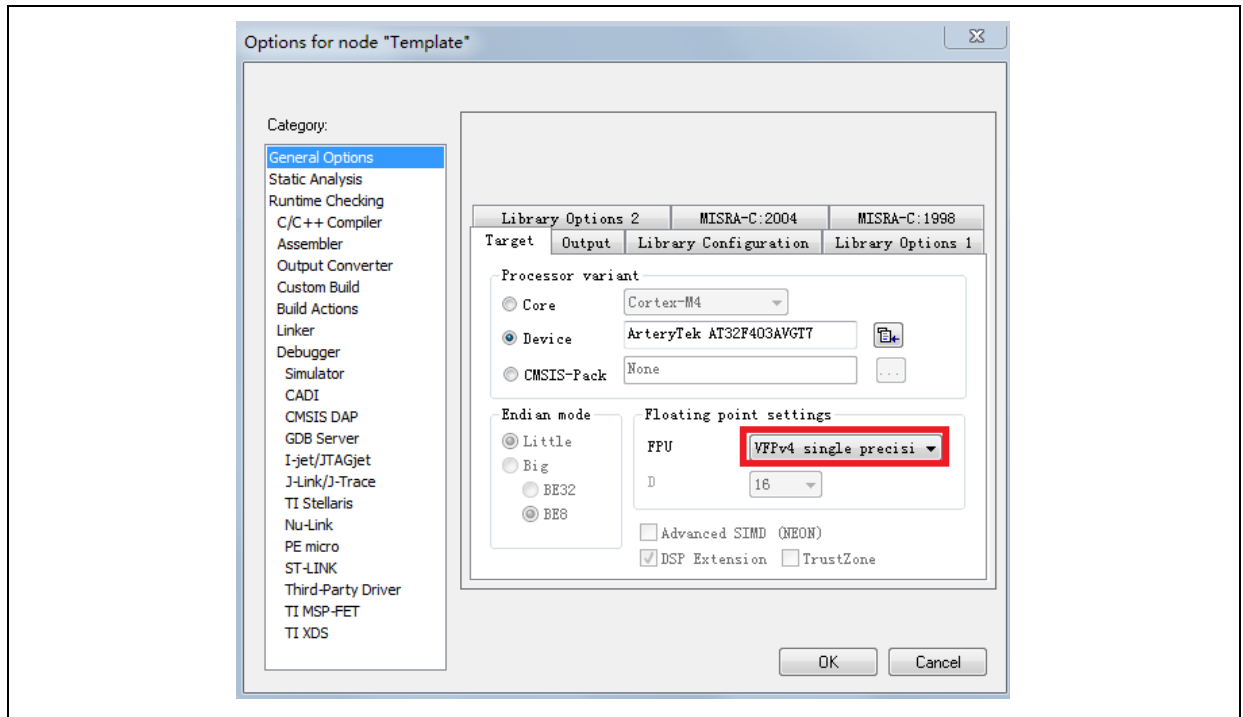
Figure 3. Disable FPU in Keil

3 Set FPU in IAR

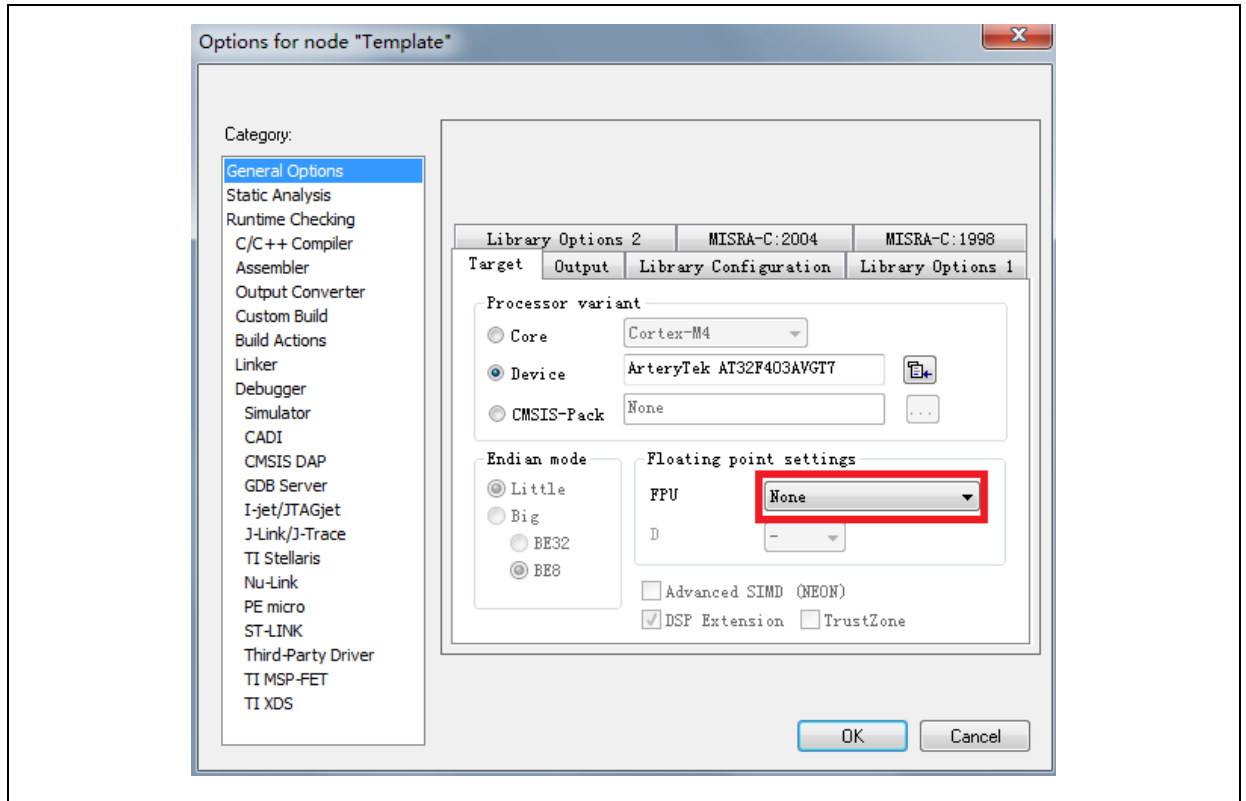## 3.1 Enable FPU

Options ->General Options->FPU->VFPv4 single precision

Figure 4. Enable FPU in IAR

3.2   Disable FPU

Options ->General Options->FPU->None

Figure 5. Disable FPU in IAR

4   Revision history

Table 1. Document revision history

Date	Version	Revision note
2021.09.18	2.0.0	Initial release

IMPORTANT NOTICE – **PLEASE READ CAREFULLY**