



MS32C001B series

32-bit ARM® Cortex®-M0+ microcontroller

REG Library Sample Manual

1 ADC

1.1 ADC_AnalogWatchdog

此样例演示了 ADC 的模拟看门狗功能，当开启看门狗的通道的电压值不在设定的上下限中，会进入看门狗中断。

This example demonstrates the analog watchdog function of ADC. When the voltage value of the channel that opens the watchdog is not within the set upper or lower limits, Will enter watchdog interrupt.

1.2 ADC_SingleConversionHW_Trig_IT

此样例演示了 ADC 的 TIM 触发和中断功能。

This example demonstrates the TIM trigger and interrupt functions of the ADC

1.3 ADC_SingleConversionSW_Trig

此样例演示了 ADC 的软件触发功能。

This example demonstrates the software triggering function of ADC.

1.4 ADC_TemperatureSensor

此样例演示了 ADC 的温度采样功能。

This example demonstrates the temperature sampling function of ADC

1.5 ADC_Vrefbuf

此样例演示了通过 ADC 的 Vrefbuf 的功能，通过 Vrefbuf 电压去采样。

This example demonstrates the function of using ADC's Vref buf to sample through the Vref buf voltage.

1.6 ADC_Vrefint

此样例演示了 ADC 的 vrefint 功能,通过采样 vrefint 计算出 VCC。

This example demonstrates the vrefint function of ADC, which calculates VCC by sampling vrefint.

2 EXTI

2.1 EXTI_ToggleLed_IT

此样例演示了 GPIO 外部中断功能，PA0 引脚上的每一个上升沿都会产生中断，中断函数中 LED 灯会翻转一次。

This example demonstrates the GPIO external interrupt function, each rising edge on the PA0 pin will generate an interrupt, and the LED will toggle once in the interrupt handle function.

2.2 EXTI_WakeUp_Event

此样例演示了通过 PA6 引脚唤醒 MCU 的功能。下载程序并运行后，LED 灯处于常亮状态；按下用户按键后，LED 灯处于常暗状态，且 MCU 进入 STOP 模式；拉低 PA6 引脚后，MCU 唤醒，LED 灯处于闪烁状态。

This sample demonstrates the function to wake up the MCU via the PA6 pin. After downloading the program and running, the LED remains on; After pressing the user button, the LED remains off, and the MCU enters the STOP mode; After pulling down the PA6 pin, the MCU wakes up and the LED light is toggling.

3 FLASH

3.1 FLASH_PageEraseAndWrite

此样例演示了 flash page 擦除和 page 写功能。

This example demonstrates the flash page erase and page write functions.

3.2 FLASH_SectorEraseAndWrite

此样例演示了 flash sector 擦除和 page 写功能。

This example demonstrates the flash sector erase and page write functions.

4 GPIO

4.1 GPIO_FastIO

本样例主要展示 GPIO 的 FAST IO 输出功能，FAST IO 速度可以达到单周期翻转速度。

This sample demonstrates the FAST IO output function of GPIO, and the FAST IO speed can reach the single cycle toggled speed.

4.2 GPIO_Toggle

此样例演示了 GPIO 输出模式，配置 LED 引脚为数字输出模式，并且每隔 100ms 翻转一次 LED 引脚电平，运行程序，可以看到 LED 灯闪烁。

This sample demonstrates the GPIO output mode, configure the LED pin as digital output mode and toggle the LED pin level every 100ms, run the program, you can see the LED toggle.

5 IWDG

5.1 IWDG_RESET

此样例演示了 IWDG 看门狗功能，配置看门狗重载计数值，计数 1s 后复位，然后通过调整每次喂狗的时间（main 函数 while 循环中代码），可以观察到，如果每次喂狗时间小于 1s，程序能一直正常运行（LED 灯闪烁），如果喂狗时间超过 1s，程序会一直复位（LED 灯不亮）。

This sample demonstrates the IWDG watchdog function. Configure the watchdog to count for 1s and then reset. By adjusting the time of each feed dog (code in the while loop of the main function), it can be observed following situation: if each dog feeding time is less than 1s, the program can always run normally (LED toggle). if the dog feeding time is more than 1s, the program will always reset (LED off)

6 LPTIM

6.1 LPTIM_ContinusMode_Wakeup_WFI

此样例演示了 LPTIM 连续模式中中断唤醒 STOP 模式。

This example demonstrates the LPTIM continuous mode interrupt wake-up STOP mode.

6.2 LPTIM_OnceMode_WakeUp_WFI

此样例演示了 LPTIM 单次模式中中断唤醒 STOP 模式。

This example demonstrates the LPTIM single mode interrupt wake-up STOP mode.

7 PWM

7.1 PWM

此样例演示了使用 PWM PWM2 模式输出一路频率为 1KHz 占空比分别为 60%的 PWM 波形。

This example demonstrates the use of PWM PWM2 mode to output one PWM waves with a frequency of 1kHz and a duty cycle of 60%, respectively.

8 PWR

8.1 PWR_DEEPSTOP_WFI

此样例演示了在 deepstop 模式下，使用 GPIO 中断唤醒。

This sample demonstrates waking up in stop mode using GPIO interrupt.

8.2 PWR_PVD

此样例演示了 PVD 电压检测功能。当供电电压低于 3.0V 时，LED 会点亮，高于 3.0V 时，LED 灯会熄灭。

This sample demonstrates the PVD (Programmable Voltage Detector) voltage detection functionality. When the supply voltage is lower than 3.0V, the LED will light up. When the supply voltage is higher than 3.0V, the LED will turn off.

8.3 PWR_SLEEP_WFE

此样例演示了在 sleep 模式下，使用 GPIO 事件唤醒。

This sample demonstrates waking up in sleep mode using GPIO events.

8.4 PWR_SLEEP_WFI

此样例演示了在 sleep 模式下，使用 GPIO 事件唤醒。

This sample demonstrates waking up in sleep mode using GPIO events.

8.5 PWR_STOP_WFE

此样例演示了在 stop 模式下，使用 GPIO 事件唤醒。

This sample demonstrates waking up in stop mode using GPIO events.

8.6 PWR_STOP_WFI

此样例演示了在 stop 模式下，使用 GPIO 中断唤醒。

This sample demonstrates waking up in stop mode using GPIO interrupt.

9 RCC

9.1 RCC_HSE_Bypass_Output

此样例演示了时钟输出功能，可输出 HSE 波形。

This example demonstrates the clock output function, which can output HSE waveforms.

9.2 RCC_HSI_Output

此样例配置系统时钟为 HSI，并通过 MCO (PA07) 引脚输出。

This example configures the system clock as HSI and outputs it through the MCO (PA07) pin.

9.3 RCC_LSE_Output

此样例使能 LSE，并通过 MCO (PA07) 引脚输出。

This sample enables LSE and outputs it on the MCO (PA07) pin.

9.4 RCC_LSI_Output

此样例使能 LSI，并通过 MCO (PA07) 引脚输出。

This sample enables the LSI and is output via the MCO (PA07) pin.

10 TIM

10.1 TIM1_InputCaptureOnTI1

此样例演示了 TIM1 的输入捕获功能，配置 PA5 作为输入捕获引脚，PA5 每检测到一个上升沿触发捕获中断，在捕获中断回调函数中翻转 LED 灯。

This example demonstrates the input capture function of TIM1, where PA5 is configured as the input capture pin. Every time PA5 detects a rising edge, it triggers a capture interrupt and flips the LED light in the capture interrupt callback function.

10.2 TIM1_OnePulseMode

此样例演示了 TIM1 的单脉冲模式。当 CH1 (PA5) 引脚上的上升沿触发计数器开始计数时，当计数值与 CCR2 匹配时，CH2 (PA3) 输出高电平，直到计数器溢出，CH2 再次输出低电平。计数器溢出后，定时器停止工作。本例程中脉冲宽度为 800us。

This sample demonstrates the single pulse mode of TIM1. When the rising edge is detected on CH1 (PA5) pin, the counter starts counting. When the counter value matches CCR2, CH2 (PA3) outputs a high level until the counter overflows. After the counter overflows, CH2 outputs a low level and the timer stops working. The pulse width in this example is 800us.

10.3 TIM1_OutputCompare

此样例演示了 TIM1 的输出比较功能，配置 PA5 作为输出比较引脚，PA5 输出的信号 1ms 翻转一次电平。

This sample demonstrates the output comparison function of TIM1, configuring PA5 as the output comparison pin, and the signal output from PA5 flips the level once in 1ms.

10.4 TIM1_PWM2

此样例演示了 TIM1 的输出比较功能，配置 PA5 作为 PWM2 引脚，PA5 输出 1kHz 占空比 60% 的波形。

This example demonstrates the output comparison function of TIM1, configuring PA5 as the PWM2 pin, with PA5 outputting a waveform with a 1kHz frequency and a 60% duty cycle.

10.5 TIM1_PWM_Input

此样例演示了 TIM1 的 PWM 信号输入捕获功能，配置 PA5 作为输入捕获引脚，同时将信号传到通道 1 和通道 2，其中通道 1 检测信号的上升沿，通道 2 检测信号的下降沿，上升沿同时作为 CNT 复位清零的触发信号。上升沿和下降沿触发记录到 CCR1 和 CCR2 中的 CNT 的值经过计算后得出信号的频率和

占空比会通过 Frequency 和 DutyCycle 两变量展现出来。

This sample demonstrates the PWM signal input capture function of TIM1, configuring PA5 as the input capture pin, and transmitting the signal to channel 1 and channel 2 at the same time, in which channel 1 detects the rising edge of the signal, and channel 2 detects the falling edge of the signal, and the rising edge is used as the trigger signal for the reset and clearing of the CNT at the same time. The rising and falling edge triggers are recorded into CCR1 and CCR2 and the value of CNT is calculated to get the frequency and duty cycle of the signal which will be shown by the two variables Frequency and DutyCycle.

10.6 TIM1_UpcounterOnRisingEdgeOnTI1

此样例演示了 TIM1 的外部时钟模式 1 功能，配置 PA5 作为输入捕获引脚，PA5 每检测到 100 个上升沿触发更新中断，在更新中断回调函数中翻转 LED 灯。

This sample demonstrates the external clock mode 1 function of the TIM1, configuring PA5 as the input capture pin, with PA5 detecting every 100 rising rising edge, PA5 triggers the update interrupt and flips the LED in the update interrupt callback function.

11 UART

11.1 UART_HyperTerminal_IndefiniteLengthData_IT

此样例演示了 UART 的中断方式发送和接收不定长数据，UART 配置为 115200，数据位 8，停止位 1，校验位 None,下载并运行程序后，然后通过上位机下发任意长度个数据（不超过 128bytes），例如 0x1~0xC,则 MCU 会把接收到的数据再次发送到上位机。

This example demonstrates the interrupt method of UART to send and receive variable length data. UART is configured as 115200, with data bit 8, stop bit 1, and check bit None. After downloading and running the program, the MCU will send any length of data (not exceeding 128bytes) through the upper computer, such as 0x1~0xC. The MCU will send the received data to the upper computer again.

11.2 UART_HyperTerminal_IT

此样例演示了 UART 的中断方式发送和接收数据，UART 配置为 115200，数据位 8，停止位 1，校验位 None,下载并运行程序后，打印提示信息，然后通过上位机下发 12 个数据，例如 0x1~0xC,则 MCU 会把接收到的数据再次发送到上位机，然后打印结束信息。

This example demonstrates how to use UART to send an amount of data in interrupt mode. UART configuration is 115200 baud rate, data bit 8, stop bit 1, check bit None. After download and run the program,Print the prompt message, and then send 12 data through the upper computer, such as 0x1~0xC, the MCU will send the received data to the upper computer again, Then print the end message.

11.3 UART_HyperTerminal_Polling

此样例演示了 UART 的轮询方式发送和接收数据，UART 配置为 115200，数据位 8，停止位 1，校验位 None,下载并运行程序后，打印提示信息，然后通过上位机下发 12 个数据，例如 0x1~0xC,则 MCU 会把接收到的数据再次发送到上位机，然后打印结束信息。

This example demonstrates how to use UART to send an amount of data in polling mode. UART configuration is 115200 baud rate, data bit 8, stop bit 1, check bit None. After download and run the program,Print the prompt message, and then send 12 data through the upper computer, such as 0x1~0xC, the MCU will send the received data to the upper computer again, Then print the end message.