



MS32C001B series

32-bit ARM® Cortex®-M0+ microcontroller

LL Library Sample Manual

1 ADC

1.1 ADC_AnalogWatchdog

此样例演示了 ADC 的模拟看门狗功能，当开启模拟看门狗通道的电压值超过上下限时，会进入看门狗中断。

This example demonstrates the analog watchdog function of ADC. When the voltage value of the analog watchdog channel exceeds the upper and lower limits, it will enter the watchdog interrupt.

1.2 ADC_SingleConversion_TriggerSW_IT

此样例演示了 ADC 的中断功能，在 ADC 的中断中打印当前的电压值。

This example demonstrates the interrupt function of ADC, which prints the current voltage value in the interrupt of ADC.

1.3 ADC_SingleConversion_TriggerTimer_Polling

此样例演示了 ADC 的 TIM 触发功能, TIM 每隔 1s 触发 ADC 进行采样, 并通过串口打印出来。

This example demonstrates the TIM triggering function of ADC. TIM triggers ADC for sampling every 1 second and prints it out through the serial port.

1.4 ADC_TempSensor

此样例演示了 ADC 模块的 Tempsensor 功能，并通过串口打印出温度值。

This example demonstrates the Tempsensor function of the ADC module and prints the temperature value through the serial port.

1.5 ADC_Vrefbuf

此样例演示了 ADC 模块的 Vrefbuf 功能，利用 vrefbuf 作为基准去采样通道的值，并转换成电压通过串口打印出来。

This example demonstrates the Vrefbuf function of the ADC module, which uses Vrefbuf as the reference to sample channel values and convert them into voltage. Print it out through the serial port.

1.6 ADC_Vrefint

此样例演示了 ADC 模块的 Vrefint 采样功能，通过采样 Vrefint 的值，计算得出 VCC 的值，并通过串口

打印出来。

This example demonstrates the Vrefint sampling function of the ADC module. By sampling the value of Vrefint, the VCC value is calculated and printed through the serial port.

2 EXTI

2.1 EXTI_ToggleLed_IT_Init

此样例演示了 GPIO 外部中断功能，PB0 引脚上的每一个下降沿都会产生中断，中断函数中 LED 灯会翻转一次。

This example demonstrates the GPIO external interrupt function, each falling edge on the PB0 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 sample 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 sample 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.

4.3 GPIO_Toggle_Init

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_ContinuousMode_WakeUp_WFE

此样例演示了 LPTIM 连续模式事件唤醒 STOP 模式。

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

6.2 LPTIM_ContinuousMode_WakeUp_WFI

此样例演示了 LPTIM 连续模式中断唤醒 STOP 模式。

This sample demonstrates waking up from stop mode by LPTIM(contiunus mode) interrupt request.

7 PWM

7.1 PWM_PWM_Init

此样例演示了使用 PWM PWM2 模式输出一路频率为 40Hz 占空比分别为 60%的 PWM 波形。

This example demonstrates the use of PWM PWM2 mode to output PWM wave with a frequency of 40Hz 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 from deepstop 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 中断唤醒。

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

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 event.

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 from 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 sample demonstrates the clock output function, which can output HSE waveforms.

9.2 RCC_HSI_OUTPUT

此样例演示了时钟输出功能，可输出 HSI 波形。

This sample demonstrates the clock output function, which can output the HSI waveform.

9.3 RCC_LSE_OUTPUT

此样例演示了将系统时钟设置为 LSI，并通过 MCO 引脚输出系统时钟。

This example demonstrates setting the system clock to LSI and outputting the system clock through the MCO pin.

9.4 RCC_LSI_OUTPUT

此样例演示了将系统时钟设置为 LSI，并通过 MCO 引脚输出系统时钟。

This example demonstrates setting the system clock to LSI and outputting the system clock through the MCO pin.

10 TIM

10.1 TIM1_6Step_Init

此样例演示了使用 TIM1 产生“六步 PWM 信号”，每间隔 1ms 在 SysTick 中断中触发换向，实现无刷电机的换向。

This sample demonstrates how TIM1 can be used to generate a "six-step PWM signal." The commutation is triggered in the SysTick interrupt every 1ms to realize the commutation of the brushless motor.

10.2 TIM1_InputCapture_Init

此样例演示了 TIM1 的输入捕获功能，配置 PB7 作为输入捕获引脚，PB7 每检测到一个下降沿触发捕获中断在捕获中断回调函数中翻转 LED 灯。

This sample demonstrates the input capture function of TIM1. Configure PB7 as input capture pin. Whenever PB7 detects a falling edge it triggers a capture interrupt and toggle the LED in the capture interrupt callback function.

10.3 TIM1_OnePulseOutput

此样例演示了 TIM1 的单脉冲模式。配置 TIM1 为从模式触发模式，触发源为 TI2FP2，通道 1 为 PWM2 模式，映射到 PB7，通道 2 为输入模式，映射到 PB0。当 PB0 上检测到一个上升沿时，PB7 延迟 20ms 后产生一个宽度为 80ms 的脉冲。

This sample demonstrates the single pulse mode of TIM1. TIM1 is configured in slave mode trigger mode with TI2FP2 as the trigger source. Channel 1 is configured as PWM mode 2 and mapped to pin PB7, while channel 2 is configured as input mode and mapped to pin PB0. When an rising edge is detected on PB0, a 20ms delay is applied, and then PB7 will output a pulse with a width of 80ms.

10.4 TIM1_PWM_Init

此样例演示了使用 TIM1 PWM2 模式输出三路频率为 10Hz 占空比分别为 25%、50%、75%的 PWM 波形。

This example demonstrates the use of TIM1 PWM2 mode to output three PWM waves with a frequency of 10Hz and a duty cycle of 25%, 50% and 75%, respectively.

10.5 TIM1_TimeBase_Init

此样例演示了 TIM1 的更新中断功能，在更新中断中翻转 LED。

This sample demonstrates the UPDATE interrupt function , LED toggled when the update interrupt is generated.

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