GigaDevice Semiconductor Inc.

GD32C2x1 软件开发指南

应用笔记

AN235

1.0 版本

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目录

表索引

1. 前言

本文是专为 GD32C2x1xx 系列 MCU 提供，介绍了如何搭建基于 GD32C2x1xx 芯片的工程并调试，以及如何使用各个模块。该应用笔记的目的是对 GD32C2x1xx 系列 MCU 上的外设资源进行示例性的功能介绍，使用户能了解如何使用 GD32C2x1xxx 系列芯片进行快速软件开发。

表 1-1. 适用产品

类型	型号
MCU	GD32C231xx系列

2. 软件功能开发

2.1. Boot 方式选择和配置

当配置 BOOT0 引脚从主 Flash 启动时,通过检查 FMC_WS 寄存器中的 MFPE 位,对原始设备进行编程变得更加方便。当设置 MFPE 位时,设备被认为是空的,并且引导装载程序从系统内存开始,允许在此时进行 Flash 编程。在加载选项字节期间,如果地址 0x0800 0000 处的内容被读取为 0xFFFF FFFF,则会设置 MFPE 标志;否则,它将被清除。在对原始设备编程后,MFPE 标志可以通过电源复位或设置 FMC_CTL 寄存器中的 OBRLD 位来清除,使设备在系统复位后执行用户代码。MFPE 标志也可以通过软件修改。

注意:如果设备是首次编程,但没有重新加载选项字节,在系统复位后,设备仍然会选择系统内存作为启动区。

GD32C2x1系列微控制器提供了三种引导源,可以通过BOOT0和用户选项字节中的引导模式配置位nBOOT1,nBOOT_SEL,nBOOT0)来进行选择,详细说明见**表2-1. 引导模式**。该引脚的电平状态会在复位后的第四个CK_SYS(系统时钟)的上升沿进行锁存。上电复位或系统复位后,由用户设置引导模式配置,选择所需的启动源。。一旦这个引脚电平被采样,它们可以被释放并用于其他用途。

表 2-1. 引导模式

引导源选择	启动模式配置				
	BOOTLK	**nBOOT1 位**	**BOOT0 引脚**	**SWBT0 位**	**nBOOT0 位**
主 Flash 存储器	0	x	0	0	x
System 存储器	0	1	1	0	x
片上 SRAM	0	0	1	0	x
主 Flash 存储器	0	x	x	1	1
System 存储器	0	1	x	1	0
片上 SRAM	0	0	x	1	0
主 Flash 存储器	1	x	x	x	x

2.2. Option byte 修改

在 option byte 修改过程中要确保工作环境的正常稳定,否则修改过程中复位或掉电会导致芯片报 OBERR 并进入强保护状态。

2.3. Flash 模拟 EEPROM

Flash 模拟 EEPROM 具体内容请参考 *《AN213 GD32C2x1 系列 FLASH 模拟 EEPROM》*, *《AN213 FLASH emulate EEPROM for GD32C2x1 series》*。

2.4. **RCU** 使用说明

有些外设的时钟是可配置的，用户可以根据需要选择指定的时钟进行配置。但在配置外设时钟之前，应保证相应的时钟已打开且稳定运行。对于支持时钟动态切换的外设，也应保证在切换目标时钟之前，目标时钟已经稳定运行。时钟可配置的外设如下：

1. ADC 时钟由 CK_IRC48MDIV_PER 或由 CK_SYS 时钟经 2、4、6、8、10、12、14、16、32、64/128/256 分频获得；
2. USART 时钟可以选择由 CK_APB、CK_SYS、CK_IRC48MDIV_PER 或 CK_LXTAL 时钟提供，USART 支持时钟动态切换；
3. I2C 时钟可以选择由 CK_APB、CK_SYS 或 CK_IRC48MDIV_PER 时钟提供，I2C 支持时钟动态切换；
4. I2S 时钟可以选择由 CK_SYS，CK_IRC48MDIV_PER 或 I2S_CKIN 时钟提供，I2S 支持时钟动态切换；
5. RTC 时钟可以选择由 LXTAL 时钟、IRC32K 时钟或 HXTAL 时钟的 32 分频提供。

3. 版本历史

表 3-1. 版本历史

版本号	说明	日期
1.0	首次发布	2025 年 06 月 03 日

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