GigaDevice Semiconductor Inc.

Migration from GD32E230 series to GD32E235 series

Application Note
AN169

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1. Introduction

The GD32E235xx device is a new 32-bit general-purpose microcontroller based on the Arm® Cortex®-M23 core. It has very high resource similarity with the GD32E230xx series, and this application note aims to help you quickly port applications from the GD32E230xx series microcontroller to the GD32E235xx series microcontroller.

In order to make better use of the information in this application note, you need to download it from the website www.GD32MCU.com, such as datasheet, user manual, official code and various development tools.

2. Introduction to hardware differences

The definition of pins for GD32E235xx series chips and GD32E230xx series devices in the same packaging is completely the same.

3. Comparison of resource and peripheral

The internal resources of GD32E235xx and GD32E230xx devices with the same suffix are consistent. In addition, GD32E235 has added a chip model with a FLASH capacity of 128KB and a RAM capacity of 16KB: GD32E235xB. As shown in ***Table 3-1. GD32E235xB devices features and peripheral list***.

Table 3-1. GD32E235xB devices features and peripheral list

Part Number		GD32E235xx		
		KBU6	KBT6	CBT6
FLASH(KB)		128(1)	128(1)	128(1)
SRAM(KB)		16(1)	16(1)	16(1)
Timers	General timer(16bit)	5 (2, 13-16)	5 (2, 13-16)	5 (2, 13-16)
	Advanced timer(16bit)	1 (0)	1 (0)	1 (0)
	SysTick	1	1	1
	Basic timer(16bit)	1 (5)	1 (5)	1 (5)
	Watchdog	2	2	2
	RTC	1	1	1
Connectivity	USART	2 (0-1)	2 (0-1)	2 (0-1)
	I2C	2 (0-1)	2 (0-1)	2 (0-1)
	SPI/I2S	2/1 (0-1)/(0)	2/1 (0-1)/(0)	2/1 (0-1)/(0)
GPIO		27	25	39
CMP		1	1	1
EXTI		16	16	16
ADC	Units	1	1	1
	Channels (External)	10	10	10
	Channels (Internal)	2	2	2
Package		QFN32	LQFP32	LQFP48

Note: (1) Compared with GD32E230x8 devices with the same packaging, these three new devices have the same resources except for the difference in FLASH capacity and SRAM capacity.

4. Program Migration

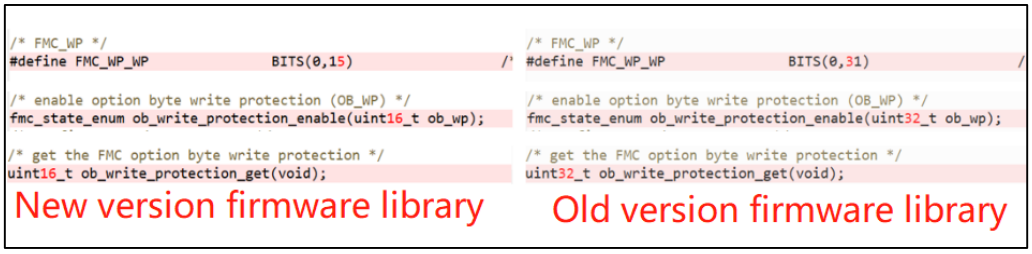
4.1 Differences in FMC

From the previous section, it can be seen that the FLASH capacity of GD32E235xB is larger, and there is a difference in the number of bits in the write protect register (FMC_WP) between GD32E235xx and GD32E230xx devices. As shown in ***Figure 4-1. Comparison of Write Protect Registers (FMC_WP) Differences between GD32E230xx and GD32E235xx devices***.

Figure 4- 1. Comparison of Write Protect Registers (FMC_WP) Differences between GD32E230xx and GD32E235xx devices

The new version firmware library GD32E23x_Firmware_Library(Version 2.0.0 and above) has made modifications to the "gd32e23x_fmc.h" and "gd32e23x_fmc.c" documents in order to be compatible with GD32E235xB. As shown in ***Figure 4-2. The difference of "gd32e23x_fmc. h" document***.The detailed functions can be found in the "gd32e23x_fmc. c" document.

Figure 4- 2. The difference of "gd32e23x_fmc. h" document

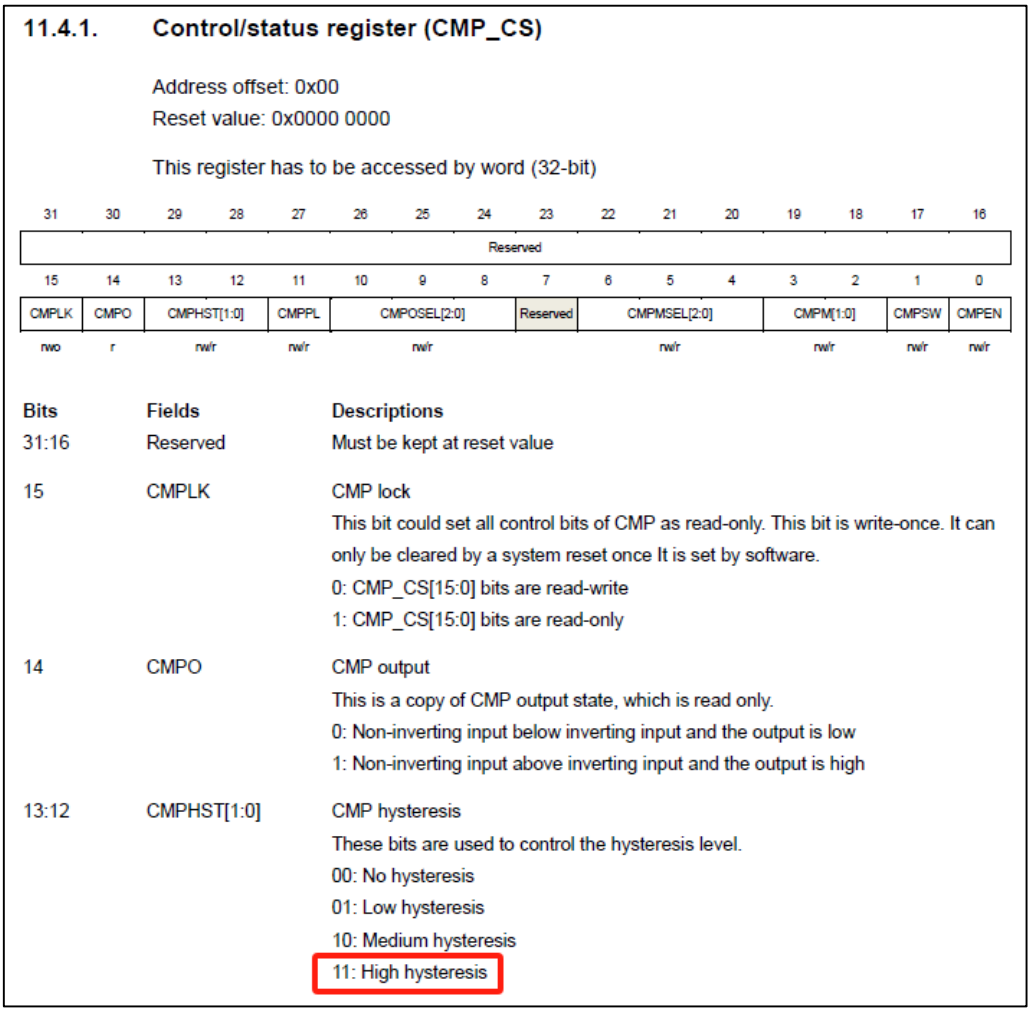


When porting from GD32E230xx to GD32E235xx or from GD32E235xx to GD32E230xx, it is necessary to pay attention to whether the flash size is compatible and modify the two documents "gd32e23x_fmc. h" and "gd32e23x_fmc. c". When replacing chips with flash capacities below 128KB, if the files "gd32e23x_fmc. h" and "gd32e23x_fmc. c" are not modified, it will not affect the functionality of the chip.

4.2 Differences in Comparator

The hysteresis levels of the GD32E235xx series and GD32E230xx series comparators can be configured, but the GD32E235xx series cannot be configured as high hysteresis mode. If the GD32E235xx comparator operates in high hysteresis mode, it will result in functional errors with incorrect comparator results, When porting from GD32E230xx to GD32E235xx, this issue needs to be noted.

Figure 4- 3. The GD32E233xx series comparator can be configured in high hysteresis mode, while the GD32E235xx series comparator cannot be configured in high hysteresis mode



11.4.1. Control/status register (CMP_CS)

Address offset: 0x00
Reset value: 0x0000 0000

This register has to be accessed by word (32-bit)

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Reserved															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CMPLK	CMPO	CMPHST[1:0]		CMPPL	CMPOSEL[2:0]			Reserved	CMPMSEL[2:0]			CMPM[1:0]		CMPSW	CMPEN
rwo	r	rw/r		rw/r	rw/r				rw/r			rw/r		rw/r	rw/r

Bits	Fields	Descriptions
31:16	Reserved	Must be kept at reset value
15	CMPLK	CMP lock This bit could set all control bits of CMP as read-only. This bit is write-once. It can only be cleared by a system reset once It is set by software. 0: CMP_CS[15:0] bits are read-write 1: CMP_CS[15:0] bits are read-only
14	CMPO	CMP output This is a copy of CMP output state, which is read only. 0: Non-inverting input below inverting input and the output is low 1: Non-inverting input above inverting input and the output is high
13:12	CMPHST[1:0]	CMP hysteresis These bits are used to control the hysteresis level. 00: No hysteresis 01: Low hysteresis 10: Medium hysteresis 11: High hysteresis

5. Revision history

Table 5-1. Revision history

Revision No.	Description	Date
1.0	Initial Release	Aug.8 2023

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