GigaDevice Semiconductor Inc.

Differences between GD32L235 and GD32L233 products

Application Note
AN179

Revision 1.0

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1. Introduction

This application note introduces the characteristic differences between GD32L235 and GD32L233 product series, mainly for electric characteristics and peripheral function characteristics. The differences are described in the following paragraphs.

2. Electric characteristic differences

For details about the electrical characteristics, refer to the GD32L233xx Datasheet and GD32L235xx Datasheet.

3. Peripheral function differences

3.1. Flash memory controller (FMC)

The FMC function differences are reflected in the programming width, fast programming, Flash ECC function, page size and LVE sequence, which refers to ***Table 3-1. Differences of FMC function***.

Table 3-1. Differences of FMC function

Part Numbers	Programming width	Fast program	Flash ECC check	Page size	LVE sequence
GD32L233xx	32bit	Supported	Not supported	4KB(GD32L233xC) 2KB(GD32L233xB) 1KB(GD32L233x8)	Supported
GD32L235xx	64bit	Not supported	Supported	1KB	Not supported

3.2. Power management unit (PMU)

The PMU function differences are reflected in the NPLDO supplies, power saving modes, EFLASH power domain configuration and COREOFF1 power domain configuration, which refers to ***Table 3-2. Differences of PMU function***.

Table 3-2. Differences of PMU function

Part Numbers	NPLDO supplies	Power saving modes	EFLASH power domain	COREOFF1 power domain
GD32L233xx	1.1V / 0.9V (configurable)	Run, Run1, Run2, Sleep, Sleep1, Sleep2, Deep-sleep, Deep-sleep 1, Deep-sleep 2 and Standby mode	Not configurable	Configurable
GD32L235xx	1.1V	Run, Sleep, Deep-sleep, Deep-sleep 1, Deep-sleep 2 and Standby mode	Configurable	Not configurable

3.3. Reset and clock unit (RCU)

The RCU function differences are reflected in the selection of the system clock (CK_SYS) source, which refers to ***Table 3-1. Differences of FMC***.

Table 3-3. Differences of RCU function

Part Numbers	Select the system clock source
GD32L233xx	CK_IRC16M / CK_HXTAL / CK_PLL / CK_IRC48M
GD32L235xx	CK_IRC16M / CK_HXTAL / CK_PLL / CK_IRC48M / CK_IRC32K

3.4. Analog to digital converter (ADC)

The ADC function differences are reflected in the Single-ended and differential input channels, external trigger configuration and the internal temperature sensor output voltage ($V_{temperature}$), which refers to ***Table 3-4. Differences of ADC***.

Table 3-4. Differences of ADC function

Part Numbers	Single-ended and differential input channels	External trigger configuration	Internal temperature sensor output voltage (Vtemperature)
GD32L233xx	Not supported	Not supported	Temperature (°C) = ((V_{30} – $V_{temperature}$) / Avg_Slope) + 30
GD32L235xx	Supported	Supported	Temperature (°C) = ((V_{25} – $V_{temperature}$) / Avg_Slope) + 25

Note: V_{30} / V_{25}: Internal temperature sensor output voltage at 30°C / 25°C

3.5. Low power timer (LPTIMER)

The LPTIMER function differences are reflected in the counter width, which refers to ***Table 3-5. Differences of LPTIMER function***

Table 3-5. Differences of LPTIMER function

Part Numbers	Counter width
GD32L233xx	32bit
GD32L235xx	16bit

3.6. VREF

The VREF function differences are reflected in the internal reference voltage, which refers to ***Table 3-6. Differences of VREF function***.

Table 3-6. Differences of VREF function

Part Numbers	Reference voltage
GD32L233xx	2.5V
GD32L235xx	2.5V / 1.5V (configurable)

3.7. Segment LCD controller (SLCD)

The SLCD function differences are reflected in the enhance mode and Internal voltage source, which refers to ***Table 3-7. Differences of SLCD function***.

Table 3-7. Differences of SLCD function

Part Numbers	Enhance mode	Internal voltage source
GD32L233xx	Supported	Use an internal charge pump
GD32L235xx	Not supported	Use the VDD voltage

3.8. Universal Serial Bus full-speed device interface (USBD)

The USBD function differences are reflected in the clock frequency requirements and endpoint buffers, which refers to ***Table 3-8. Differences of USBD function***.

Table 3-8. Differences of USBD function

Part Numbers	Clock frequency requirements	Endpoint buffers
GD32L233xx	CK_APB1≥24MHz	USBD has the dedicated 512-byte SRAM memory
GD32L235xx	CK_APB1≥12MHz	USBD and CAN share the dedicated 512-byte SRAM memory

4. Other differences

4.1. Memory

Memory size difference refers to ***Table 4-1. Differences of memory size***.

Table 4-1. Differences of memory size

Part Numbers	FLASH	SRAM
GD32L233xx	Up to 256KB	Up to 32KB
GD32L235xx	Up to 128KB	Up to 24KB

4.2. Number of peripherals

Number of peripherals difference refers to ***Table 4-2. Differences of number of peripherals***.

Table 4-2. Differences of number of peripherals

Part Numbers	CAN	LPUART	LPTIMER	TIMER
GD32L233xx	None	LPUART	LPTIMER	TIMER1/2/5/6/8/11
GD32L235xx	CAN	LPUART0/1	LPTIMER0/1	TIMER0/1/2/5/6/8/11/14/40

4.3. SRAM parity check function

SRAM parity check function difference refers to ***Table 4-3. Differences of SRAM parity check***.

Table 4-3. Differences of SRAM parity check

Part Numbers	SRAM parity check function
GD32L233xx	Not supported
GD32L235xx	Supported

5. Revision history

Table 5-1. Revision history

Revision No.	Description	Date
1.0	Initial Release	Apr.2, 2024

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