

GigaDevice Semiconductor Inc.

GD32M531C-START

Arm[®] Cortex[®]-M33 32-bit MCU

User Guide

Revision 1.0

(Mar. 2026)

Tables of Contents

TABLES OF CONTENTS	1
LIST OF FIGURES	2
LIST OF TABLES	3
1. SUMMARY	4
2. FUNCTION PIN ASSIGN	4
3. GETTING STARTED	4
4. HARDWARE LAYOUT OVERVIEW	5
4.1. Power supply	5
4.2. Boot option	5
4.3. LED	6
4.4. KEY	6
4.5. UART	7
4.6. Extension	7
4.7. GD-Link	8
4.8. Arduino.....	8
4.9. MCU	9
5. ROUTINE USE GUIDE	10
5.1. GPIO_Running_LED	10
5.1.1. DEMO purpose	10
5.1.2. DEMO running result	10
5.2. GPIO_Key_Polling_mode.....	10
5.2.1. DEMO purpose	10
5.2.2. DEMO running result	10
5.3. EXTI_Key_Interrupt_mode.....	11
5.3.1. DEMO purpose	11
5.3.2. DEMO running result	11
5.4. UART_Printf	11
5.4.1. DEMO purpose	11
5.4.2. DEMO running result	11
5.5. TIMER_Breath_LED	12
5.5.1. DEMO purpose	12
5.5.2. DEMO running result	12
6. REVISION HISTORY	13

List of Figures

Figure 4-1. Schematic diagram of power supply.....	5
Figure 4-2. Schematic diagram of boot option	5
Figure 4-3. Schematic diagram of LED function	6
Figure 4-4. Schematic diagram of Key function	6
Figure 4-5. Schematic diagram of UART	7
Figure 4-6. Schematic diagram of Extension.....	7
Figure 4-7. Schematic diagram of GD-Link.....	8
Figure 4-8. Schematic diagram of Arduino	8
Figure 4-9. Schematic diagram of MCU	9

List of Tables

Table 2-1. Function pin assignment.....	4
Table 6-1. Revision history	13

1. Summary

GD32M531C-START uses GD32M531CBT7 as the main controller. It uses GD-Link Type-C interface to supply 5V power. Reset, Boot, Wakeup KEY, LED, UART to USB interface are also included. For more details please refer to GD32M531C-START-V1.1 schematic.

2. Function Pin Assign

Table 2-1. Function pin assignment

Function	Pin	Description
LED	PD9	LED1
	PD10	LED2
	PD11	LED3
	PD12	LED4
RESET	PN5	K1-Reset
KEY	PA0	K2-Wakeup
UART	UART1_TX	PF13
	UART1_RX	PF14

3. Getting started

The EVAL board uses GD-Link Type-C interface to get power DC +5V, which is the hardware system normal work voltage. A J-Link tool or GD-Link tool on board is necessary in order to download and debug programs. Select the correct boot mode and then power on, the LEDPWR will turn on, which indicates the power supply is OK.

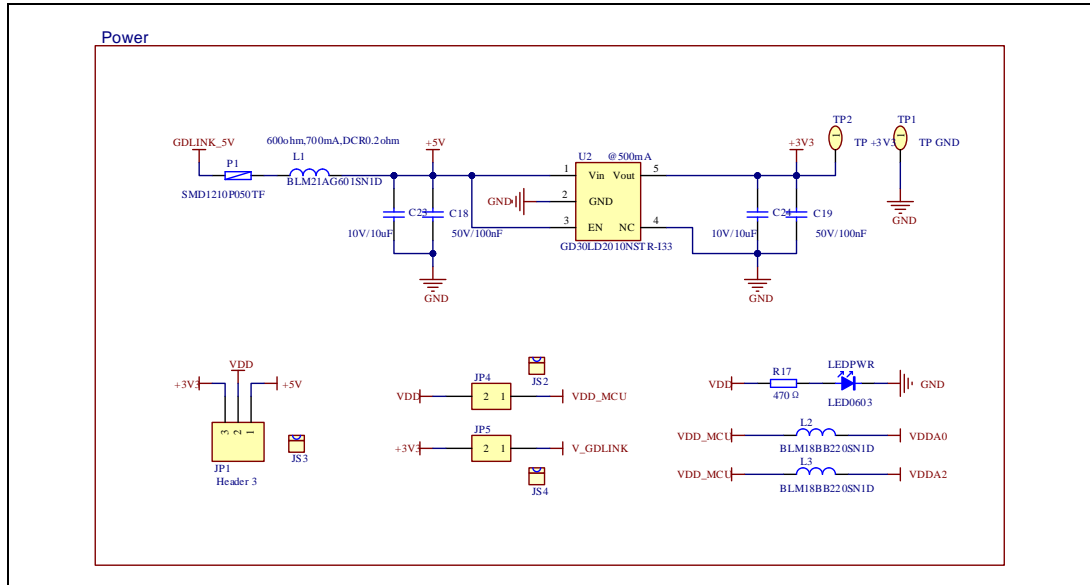
There are Keil version, IAR version and GD32EBuilder version of all projects. Keil version of the projects are created based on Keil MDK-ARM 5.29 uVision5. IAR version of the projects are created based on IAR Embedded Workbench for ARM 8.32.1 and GD32EBuilder version of the projects are created based on GD32EmbeddedBuilder_v1.5.5_Rel. During use, the following points should be noted:

1. If you use Keil uVision5 to open the project. In order to solve the "Device Missing (s)" problem, the latest version of GigaDevice.GD32M53x_DFP (URL: <https://www.gd32mcu.com>) should be installed to load related files.
2. If you use IAR to open the project, the latest version of IAR_GD32M53x_ADDON(URL: <https://www.gd32mcu.com>) should be installed to load related files.

4. Hardware layout overview

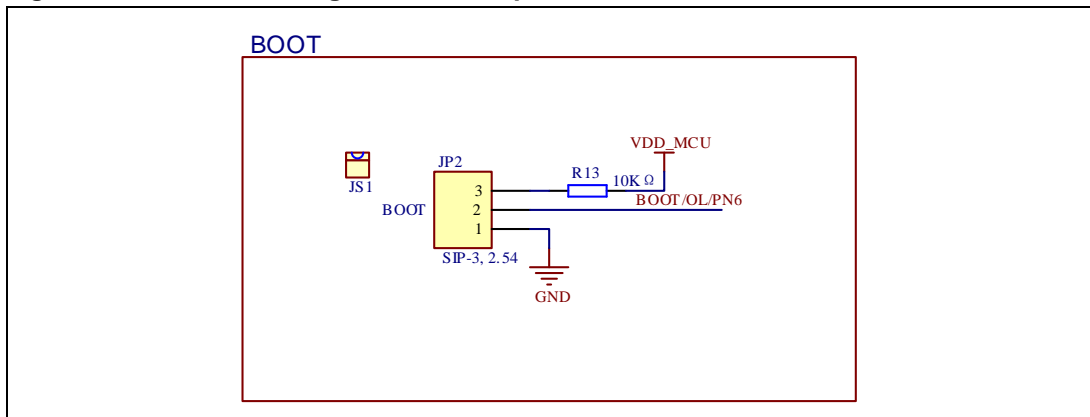
4.1. Power supply

Figure 4-1. Schematic diagram of power supply



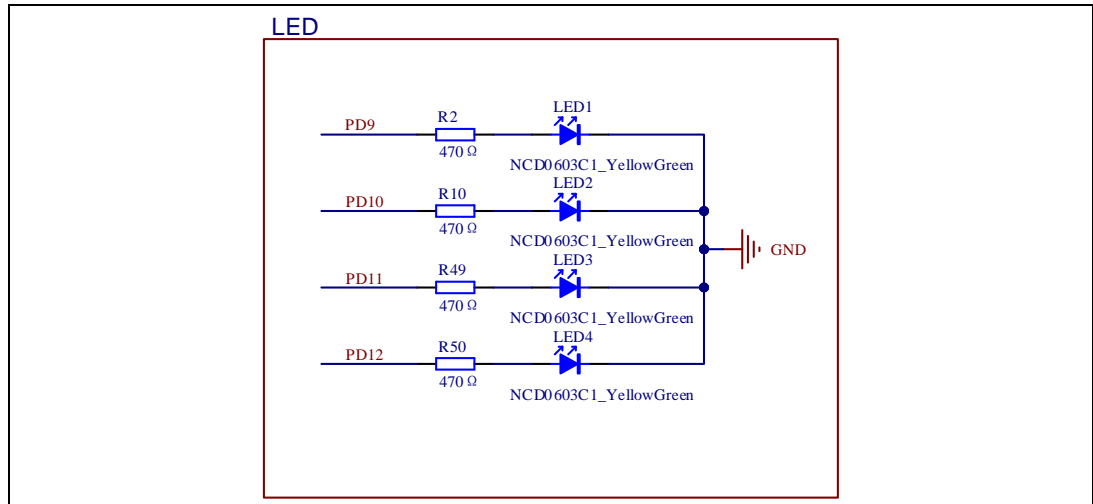
4.2. Boot option

Figure 4-2. Schematic diagram of boot option



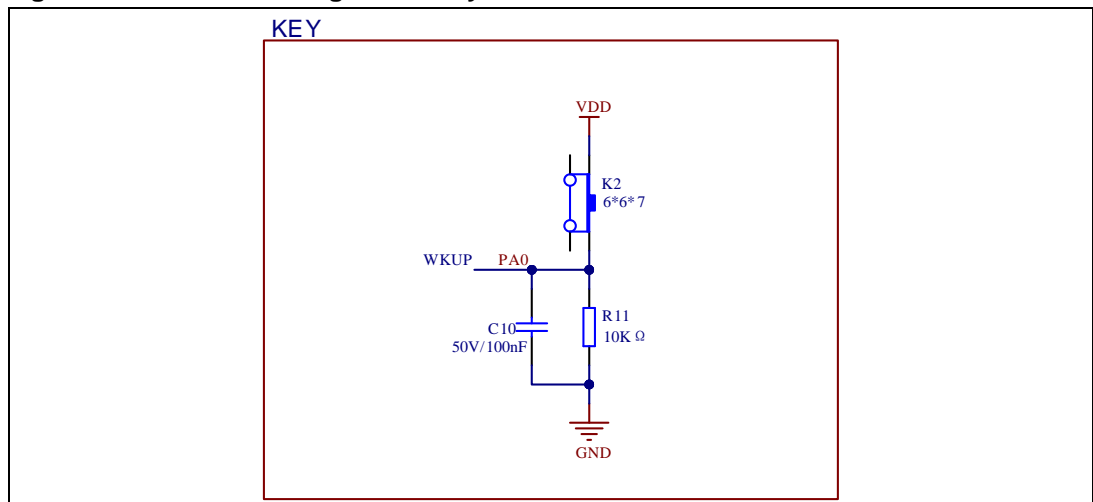
4.3. LED

Figure 4-3. Schematic diagram of LED function



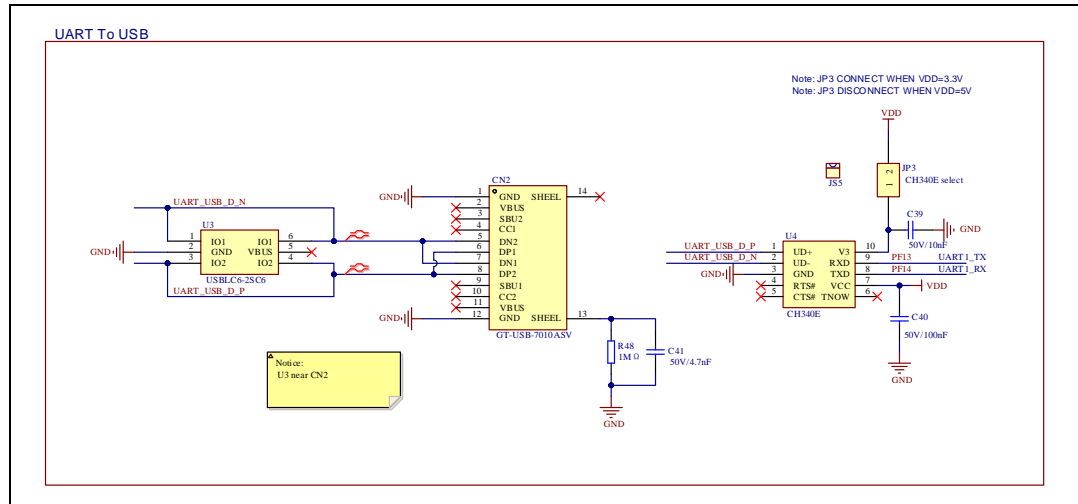
4.4. KEY

Figure 4-4. Schematic diagram of Key function



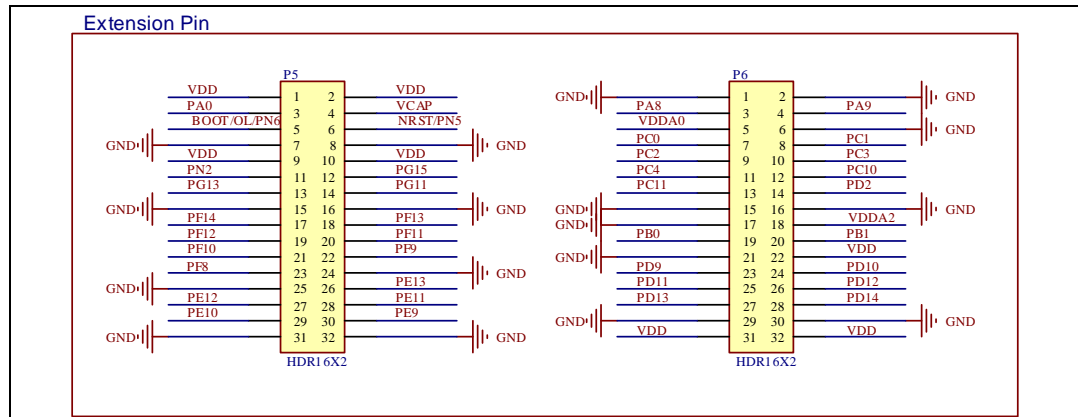
4.5. UART

Figure 4-5. Schematic diagram of UART



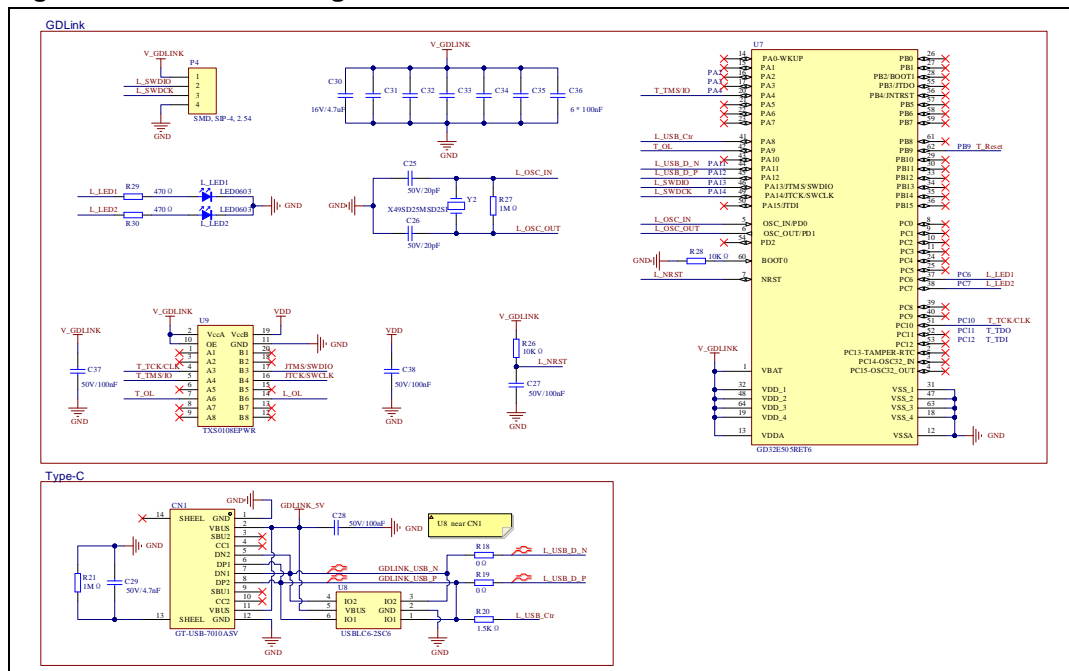
4.6. Extension

Figure 4-6. Schematic diagram of Extension



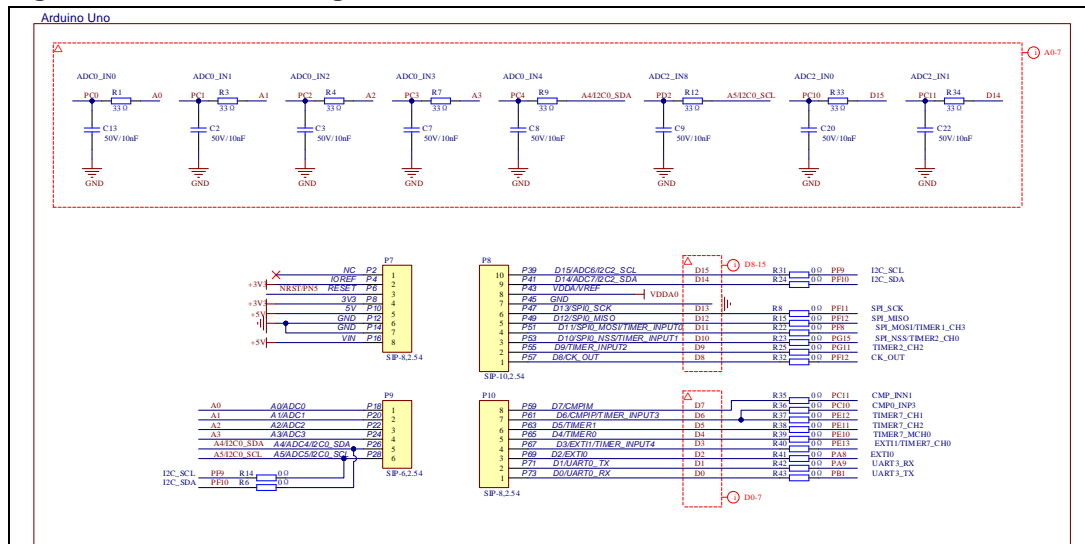
GD-Link

Figure 4-7. Schematic diagram of GD-Link



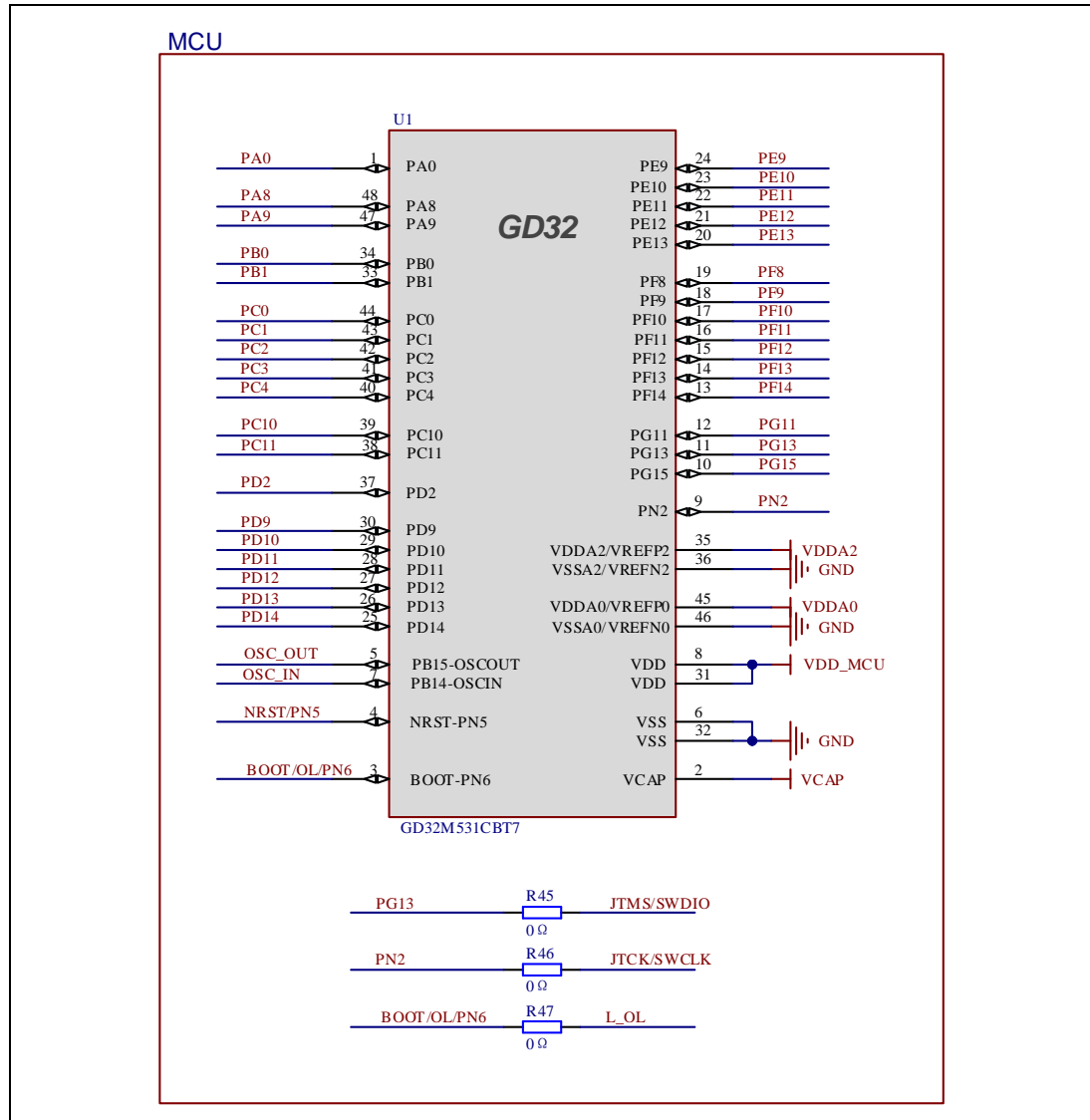
Arduino

Figure 4-8. Schematic diagram of Arduino



4.9. MCU

Figure 4-9. Schematic diagram of MCU



5. Routine use guide

5.1. GPIO_Running_LED

5.1.1. DEMO purpose

This demo includes the following functions of GD32 MCU:

- Learn to use GPIO control the LED.
- Learn to use SysTick to generate 1ms delay.

GD32M531C-START board has four LEDs. The LED1, LED2, LED3 and LED4 are controlled by GPIO. This demo will show how to light the LEDs.

5.1.2. DEMO running result

Download the program <01_GPIO_Running_LED> to the START board, LED1, LED2, LED3 and LED4 will change the state like running water and then repeat the whole process over and over again.

5.2. GPIO_Key_Polling_mode

5.2.1. DEMO purpose

This demo includes the following functions of GD32 MCU:

- Learn to use GPIO control the LED and the Key.
- Learn to use SysTick to generate 1ms delay.

GD32M531C-START board has two keys and four LEDs. The two keys are Reset key and Wakeup key. The LED1, LED2, LED3 and LED4 are controlled by GPIO.

This demo will show how to use the Wakeup key to control the LED1. When press down the Wakeup Key, it will check the input value of the IO port. If the value is 1 and will wait for 100ms. Check the input value of the IO port again. If the value still is 1, it indicates that the button is pressed successfully and toggle LED1.

5.2.2. DEMO running result

Download the program <02_GPIO_Key_Polling_mode> to the START board. Press down the Wakeup Key, LED1 will be turned on. Press down the Wakeup Key again, LED1 will be turned off.

5.3. EXTI_Key_Interrupt_mode

5.3.1. DEMO purpose

This demo includes the following functions of GD32 MCU:

- Learn to use GPIO control the LED and the KEY
- Learn to use EXTI to generate external interrupt

GD32M531C-START board has two keys and four LEDs. The two keys are Reset key and Wakeup key. The LED1, LED2, LED3 and LED4 are controlled by GPIO.

This demo will show how to use the EXTI interrupt line to control the LED1. When press down the Wakeup key, it will produce an interrupt. In the interrupt service function, the demo will toggle LED1.

5.3.2. DEMO running result

Download the program <03_EXTI_Key_Interrupt_mode> to the START board. After startup, the LED1 flash once, press down the Wakeup key, LED1 will be turned on, press down the Wakeup key again, LED1 will be turned off.

5.4. UART_Printf

5.4.1. DEMO purpose

This demo includes the following functions of GD32 MCU:

- Learn to use GPIO control the LED
- Learn to retarget the C library printf function to the UART

5.4.2. DEMO running result

Download the program <04_UART_Printf> to the EVAL board, and then connect serial cable to UART. Firstly, all the LEDs flash 2 times for test. Then, this implementation outputs "UART printf example: please press the Wakeup key" on the HyperTerminal using UART. Press the Wakeup key, the serial port will output "UART printf example".

The output information via the HyperTerminal is as following:

```
UART printf example: please press the Wakeup key
UART printf example
```

5.5. TIMER_Breath_LED

5.5.1. DEMO purpose

This demo includes the following functions of GD32 MCU:

- Learn to use TIMER output PWM wave
- Learn to update channel value

5.5.2. DEMO running result

Download the program <05_TIMER_Breath_LED> to the board and run. When the program is running, you can see LED1 lighting from dark to bright gradually and then gradually darken, ad infinitum, just like breathing as rhythm.

6. Revision history

Table 6-1. Revision history

Revision No.	Description	Date
1.0	Initial Release	Mar.4, 2026

Important Notice

This document is the property of GigaDevice Semiconductor Inc. and its subsidiaries (the "Company"). This document, including any product of the Company described in this document (the "Product"), is owned by the Company according to the laws of the People's Republic of China and other applicable laws. The Company reserves all rights under such laws and no Intellectual Property Rights are transferred (either wholly or partially) or licensed by the Company (either expressly or impliedly) herein. The names and brands of third party referred thereto (if any) are the property of their respective owner and referred to for identification purposes only.

To the maximum extent permitted by applicable law, the Company makes no representations or warranties of any kind, express or implied, with regard to the merchantability and the fitness for a particular purpose of the Product, nor does the Company assume any liability arising out of the application or use of any Product. Any information provided in this document is provided only for reference purposes. It is the sole responsibility of the user of this document to determine whether the Product is suitable and fit for its applications and products planned, and properly design, program, and test the functionality and safety of its applications and products planned using the Product. The Product is designed, developed, and/or manufactured for ordinary business, industrial, personal, and/or household applications only, and the Product is not designed or intended for use in (i) safety critical applications such as weapons systems, nuclear facilities, atomic energy controller, combustion controller, aeronautic or aerospace applications, traffic signal instruments, pollution control or hazardous substance management; (ii) life-support systems, other medical equipment or systems (including life support equipment and surgical implants); (iii) automotive applications or environments, including but not limited to applications for active and passive safety of automobiles (regardless of front market or aftermarket), for example, EPS, braking, ADAS (camera/fusion), EMS, TCU, BMS, BSG, TPMS, Airbag, Suspension, DMS, ICMS, Domain, ESC, DCDC, e-clutch, advanced-lighting, etc.. Automobile herein means a vehicle propelled by a self-contained motor, engine or the like, such as, without limitation, cars, trucks, motorcycles, electric cars, and other transportation devices; and/or (iv) other uses where the failure of the device or the Product can reasonably be expected to result in personal injury, death, or severe property or environmental damage (collectively "Unintended Uses"). Customers shall take any and all actions to ensure the Product meets the applicable laws and regulations. The Company is not liable for, in whole or in part, and customers shall hereby release the Company as well as its suppliers and/or distributors from, any claim, damage, or other liability arising from or related to all Unintended Uses of the Product. Customers shall indemnify and hold the Company, and its officers, employees, subsidiaries, affiliates as well as its suppliers and/or distributors harmless from and against all claims, costs, damages, and other liabilities, including claims for personal injury or death, arising from or related to any Unintended Uses of the Product.

Information in this document is provided solely in connection with the Product. The Company reserves the right to make changes, corrections, modifications or improvements to this document and the Product described herein at any time without notice. The Company shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them. Information in this document supersedes and replaces information previously supplied in any prior versions of this document.