武汉芯源半导体有限公司
WUHAN XINYUAN SEMICONDUCTOR CO., LTD

CW32F003ExPx StartKit User Manual

Rev 1.0

www.whxy.com

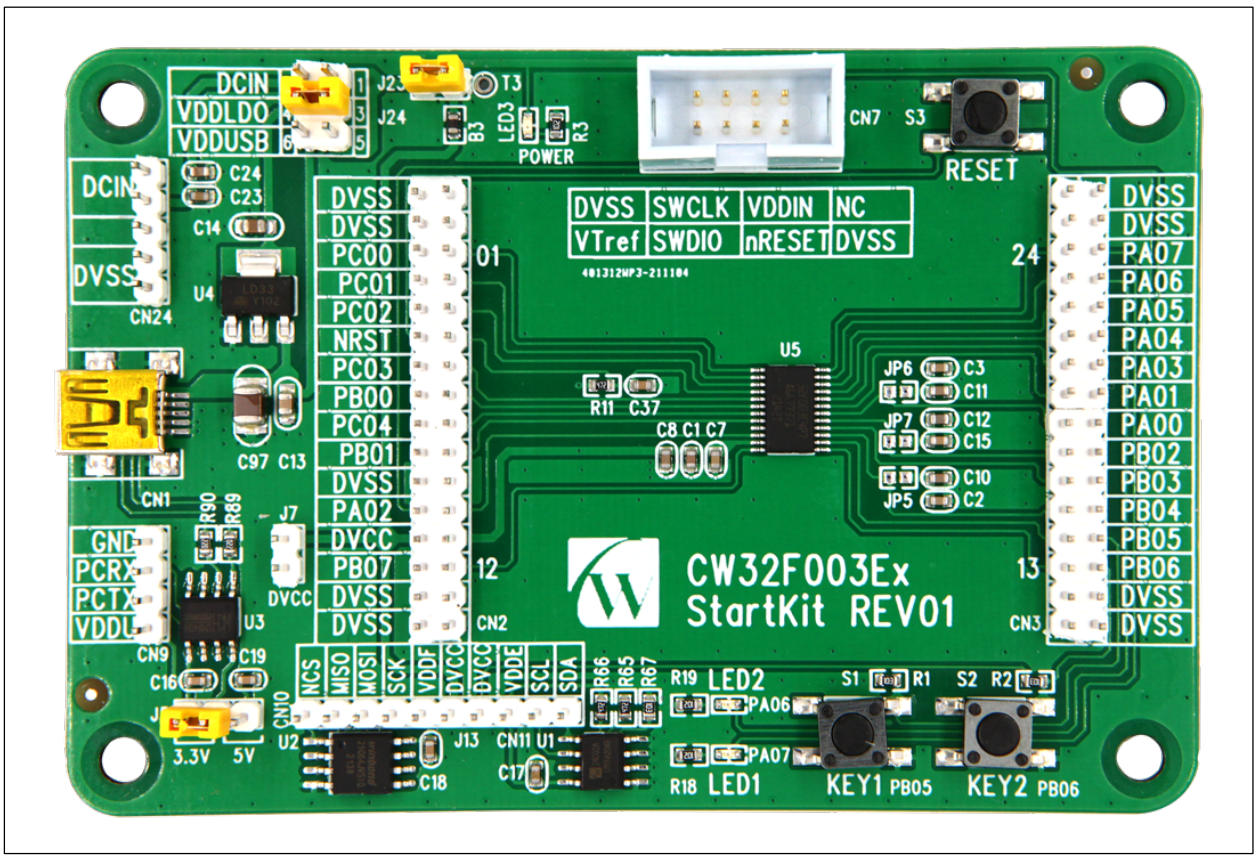
Introduction

The CW32F003ExPx StartKit evaluation board provides users with an economical and flexible way to build system prototypes using the CW32F003ExPx chip. All aspects of performance, power consumption, and functionality can be quickly verified.

The CW32F003ExPx StartKit evaluation board needs to be used with the CW-DAPLINK debugger.

The CW32F003ExPx StartKit evaluation board comes with the CW32F003 StartKit software package and the CW32F003-StdPeriph-Lib firmware library and routines.

The CW32F003ExPx StartKit evaluation board is shown in the following figure:



Contents

1 Features

- CW32F003ExPx microcontroller (ARM® Cortex®-M0+ up to 48MHz), TSSOP24 package, 20Kbytes FLASH, 3Kbytes RAM
- Three LEDs :
  - Power indicator (LED3), User indicator (LED1, LED2)
- Three switches:
  - Reset switch (S3), User switch (S1, S2)
- USB to serial port chip (CH340N)
- FLASH chip (W25Q64JVSSIQ)
- EEPROM chip （CW24C02AD）
- On-board interfaces:
  - Mini USB interface (serial communication, USB powered)
  - Downloader debug interface
  - All GPIO ports are pin-out via pin header
- Multiple power supply methods: USB VBUS power supply, 3.3V power supply (LD1117AS33TR), external 1.65V-5.5V power supply
- The CW32F003-StdPeriph-Lib package provides a comprehensive set of free firmware libraries and routines
- Support for multiple IDEs, IAR ™， Keil®

2 Ordering Information

To order the CW32F003ExPx StartKit evaluation board, please refer to the table below. For more information, refer to the CW32 series MCU datasheet and User Manuals.

Table 2-1 Ordering Information

Evaluation Board Code	Microcontroller Model
CW32F003ExPx StartKit	CW32F003ExPx

3 Development Environment

3.1 System Requirements

Windows® OS (7,8,10), CW-DAPLINK debugger

Note: Windows® OS 7 and Windows® OS 8 require the CW-DAPLINK driver to be installed.

3.2 Integrated Development Environment

- EWARM v7.70 or higher
  - 30-day evaluation version
  - 32-Kb upper limit Quick Start version (ARM® Cortex®-M0 limited to 16-Kb)
- MDK-ARM v5.17 or higher
  - MDK-Lite (32-Kb code size limit)

Note: Only Windows® is supported

3.3 Demo Software

The demo software is included in the CW32F003 StartKit package that corresponds to the on-board microcontroller and is pre-installed in the CW32 flash memory for demonstrating device peripherals in standalone mode. The demo software source code and related documentation can be downloaded from the website (*www.whxy.com*).

4 Special Conventions

The conventions for ON and OFF settings in this document are shown in the following table:

Table 4-1 ON/OFF conventions

Conventions	Definitions
Jumper Jx ON	Jumper cap connected
Jumper Jx OFF	Jumper cap not connected
Jumper Jx [1-2]	Jumper caps connect Pin1 and Pin2
Resistor JPx ON	Solder 0Ω resistor
Resistor JPx OFF	Unsoldered 0Ω resistor

5 Quick Start

The CW32F003ExPx StartKit evaluation board is a low-cost development kit for quickly evaluating the performance and functionality of the CW32F0 family of microcontrollers in the TSSOP24 package. Before installing and using the product, please accept the license agreement for the evaluation product from the website.

5.1 Getting Started Guide

Follow the steps below to configure the CW32F003ExPx StartKit evaluation board:

1. Confirm the location of the jumper caps on the evaluation board (See *Table 5-1 Jumper Configuration*);
2. Connect the CW-DAPLINK debugger, confirm that the host-side driver has been properly installed, and connect the debug interface cable to the evaluation board properly;
3. Powering the evaluation board by connecting to the evaluation board USB connector CN1 using a USB cable (Type-A to Mini USB);
4. Red LED3 is lit (power indicator) and green LED1 and LED2 are flashing alternately;
5. Press the S1 button to observe LED1 flashing and LED2 going off;
6. Press the S2 button to observe LED2 flashing and LED1 going off;
7. The CW32F003 StartKit demo software can be downloaded from the official website to help you quickly understand the CW32F003ExPx StartKit evaluation board features;
8. Develop your own programs based on the provided routines.

Table 5-1 Jumper Configuration

Jumper	Definition	ON/OFF	Function
J24[3-4]	VDDLDO	ON	Powering the system with a VDDLDO step-down power supply
J23		ON	Shorting without system current measurement

6 Hardware layout

The CW32F003ExPx StartKit evaluation board is based on the CW32 microcontroller design in the TSSOP24 package. *Figure 6-1 Top-level device layout* shows the placement of the CW32 microcontroller chip with its peripherals (buttons, LEDs, FLASH, EEPROM, USB to serial port, debugger interface). *Figure 6-2 CW32F003ExPx StartKit Mechanical Dimensions* shows the mechanical dimensions of the evaluation board.

6.1 PCB layout and mechanical dimensions

Figure 6-1 Top-level device layout

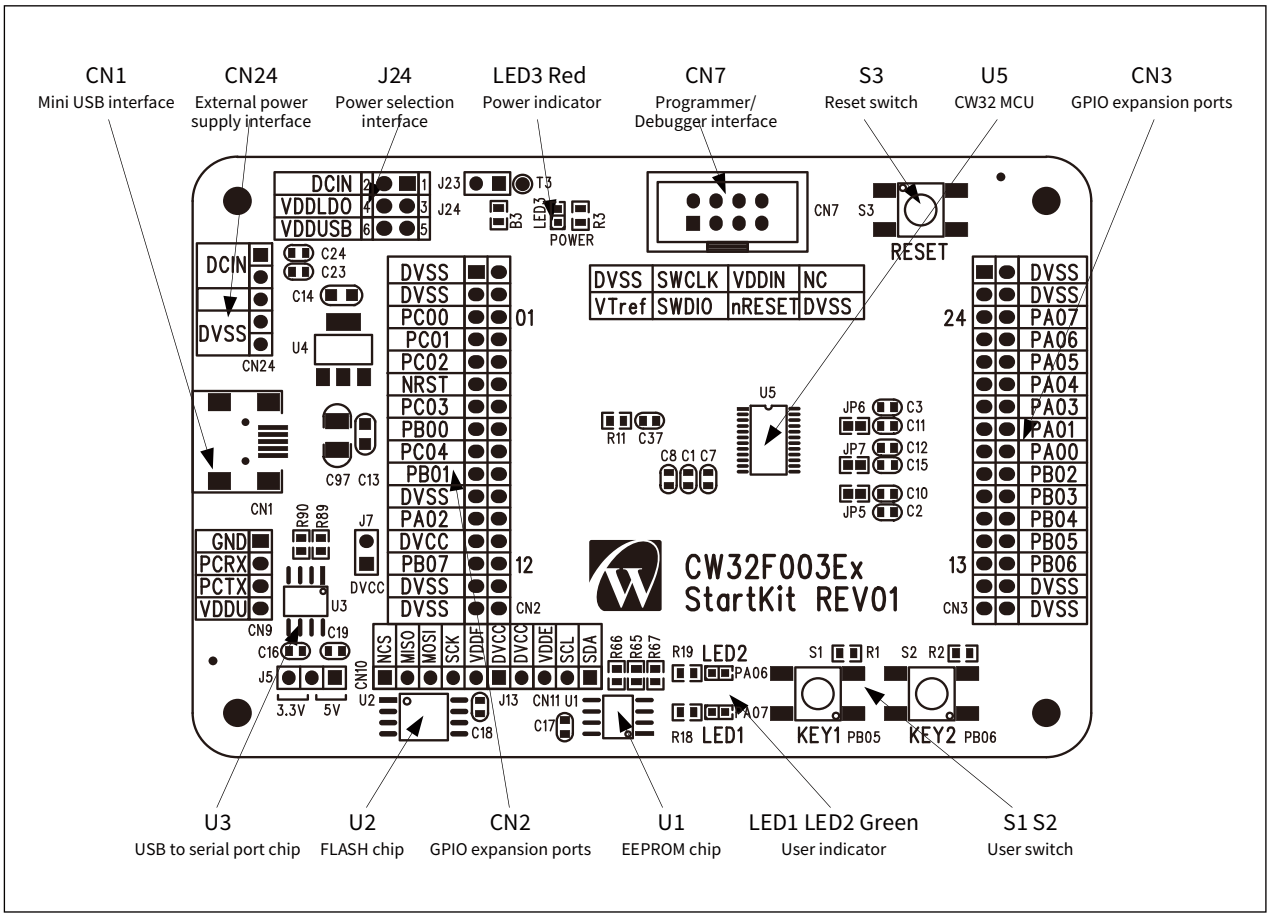
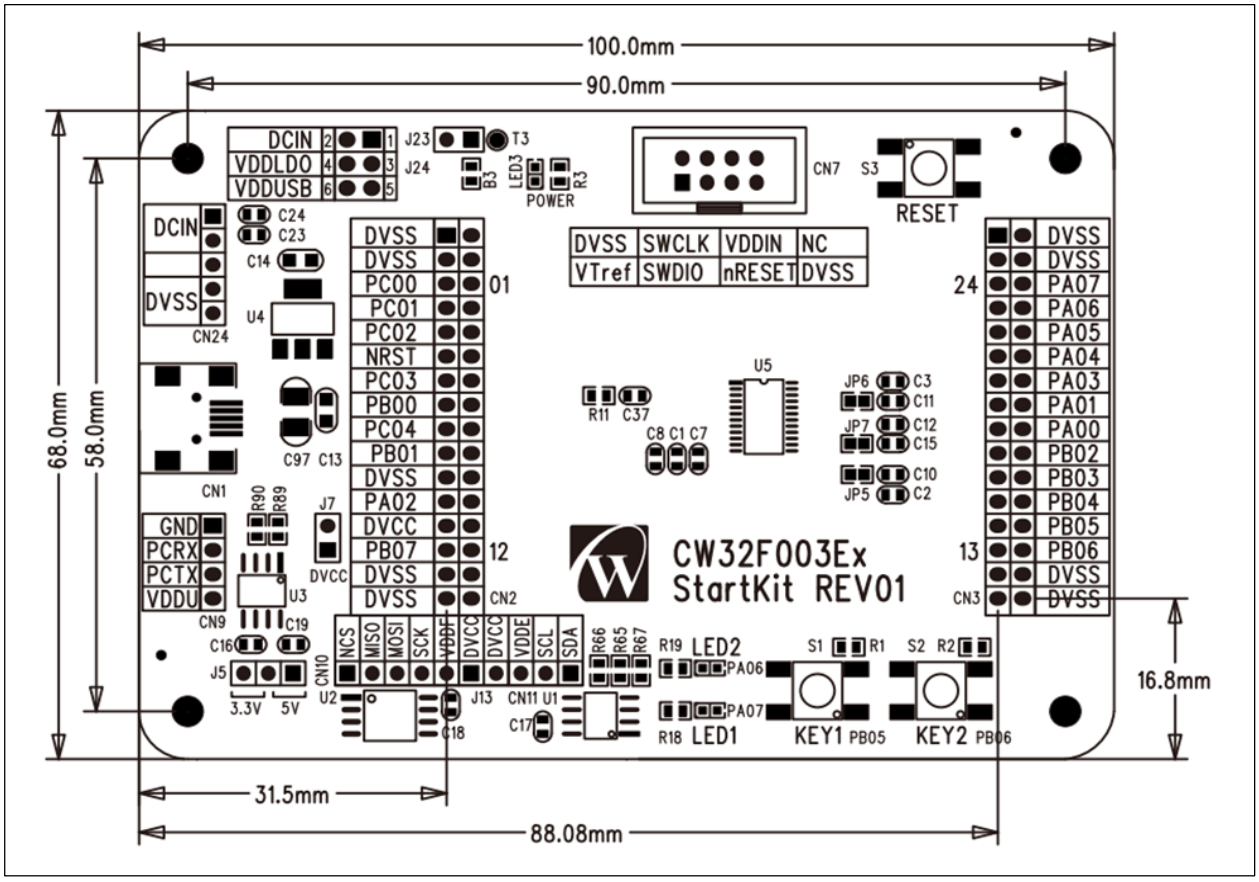


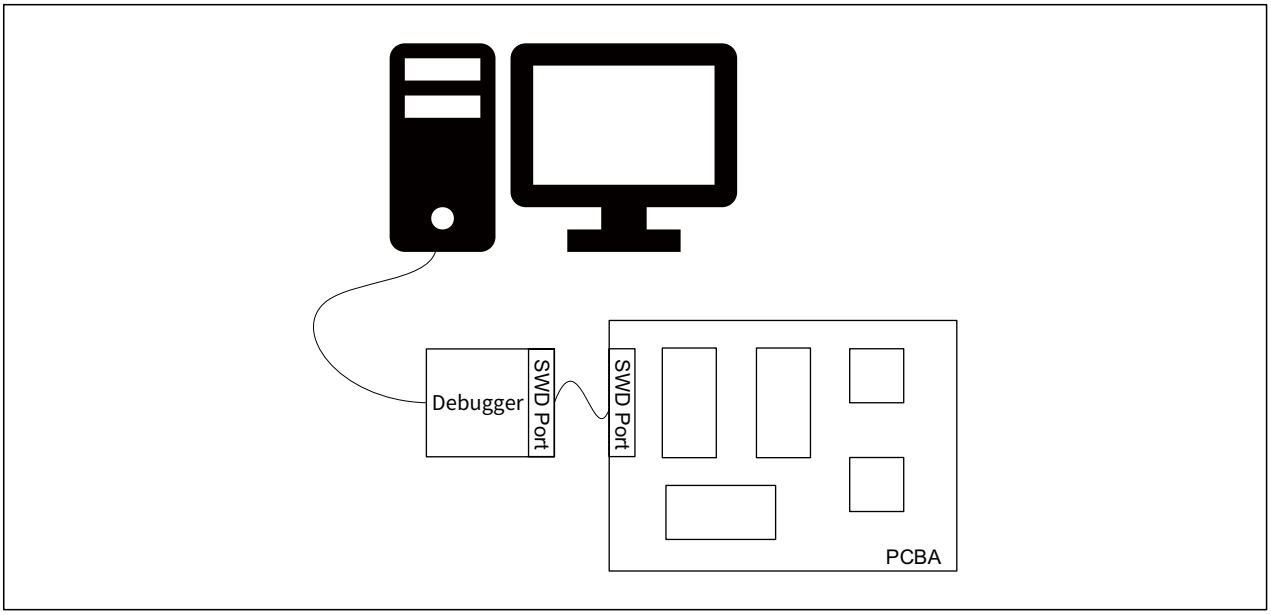
Figure 6-2 CW32F003ExPx StartKit Mechanical Dimensions



6.2 Use of debugger

Xinyuan Semiconductor provides the CW-DAPLINK debugger for users to use to connect the host computer to the debugger (Type-A to Type-C) using a USB cable. The evaluation board also supports the use of ST-LINK and J-LINK debuggers. The connection is shown in the following figure:

Figure 6-3 Typical connection



CW-DAPLINK Driver

For Windows® 10 systems, CW-DAPLINK is driver free. For some Windows® 7 or Windows® 8 systems, the CW-DAPLINK virtual serial port is not available, so you need to add the driver manually.

The driver can be downloaded from the official website. Refer to the CW-DAPLINK User Manual for details of the driver installation procedure.

6.3 Power supply and power selection

Power can be provided via USB or from an external power supply: DCIN pin of CN24 pin header (1.65V to 5.5V). Microcontroller operating voltage can be selected via J24, which is configured as shown in the following table:

Table 6-1 J24 configuration

Jumper connections	Operating Voltage
J24[1-2]	DCIN input voltage
J24[3-4]	3.3V（LD1117AS33TR）
J24[5-6]	5V (USB input voltage)

6.4 Evaluation board functions

LEDs

- Power indicator (LED3)

  Red LED3 is on to indicate that the evaluation board is powered on, if J23 is connected, the microcontroller is powered on at this time.

- User indicators (LED1, LED2)

  Green LED1 and LED2 connected to CW32F003ExPx I/O:

  - PA07 connected to LED1 anode
  - PA06 connected to LED2 anode

Switches

- Reset switch (S3)

  This switch is connected to the NRST pin and is used to reset the CW32F0 microcontroller.

- User switch (S1, S2)

  PB05 connected to S1, external pull-up resistor

  PB06 connected to S2, external pull-up resistor

USB to serial port

The CW32F003ExPx StartKit evaluation board has the CH340N USB to serial chip soldered on it. Users can use the CN9 pin header to configure the CH340N operating voltage, the serial transmit pins to I/O, and the serial receive pins to I/O. The following table describes how to connect J5 when the CH340N is operating at 3.3V or 5V (CN9 VDDU is connected to a different power supply).

Table 6-2 J5 Connection Description

CH340N Operating Voltage	J5 Connection
3.3V	J5[2-3]
5V	J5[1-2]

FLASH chip

The CW32F003ExPx StartKit evaluation board has the W25Q64JVSSIQ FLASH chip soldered on it, and the user can configure the W25Q64 operating voltage, SPI_NCS pin, SPI_MISO pin, SPI_MOSI pin, and SPI_SCK pin using the CN10 pin header.

EEPROM chip

The CW32F003ExPx StartKit evaluation board has the CW24C02AD EEPROM chip already soldered in it, and the user can configure the CW24C02AD operating voltage, SDA pins, and SCL pins using the CN11 pin header.

Programmer Interface

The CW32F003ExPx StartKit evaluation board leads to the programmer interface, which allows users to connect the programmer to the CN7 programmer interface for offline programming.

Extended Interface

The CW32F003ExPx StartKit evaluation board pins out the GPIO of the microcontroller to the pin header, the layout of which is shown in the following figure, and the pin functions are shown in the following table:

Figure 6-4 Expansion interface layout

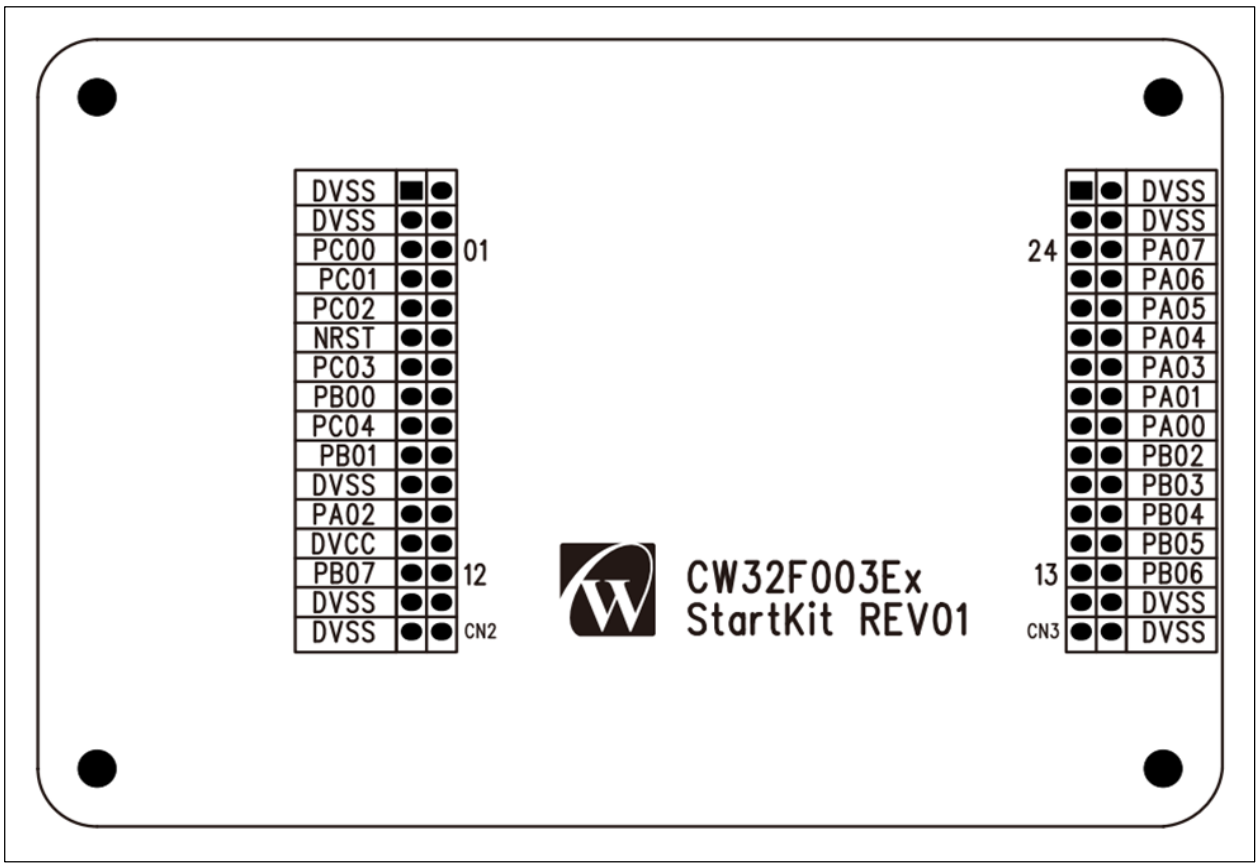


Table 6-3 Pin Function

Connector	Pin No.	CW32F0 pin	Function
CN2	1-4	DVSS	Ground
	5,6	PC00	UART2_RXD, UART1_TXD, SPI_SCK, ATIM_CH1A, GTIM_CH2, BTIM1_TOGP, HCLK_OUT
	7,8	PC01	UART2_TXD, GTIM_ETR, SPI_MISO, ATIM_CH2A, GTIM_CH3, BTIM1_TOGN, VC1_OUT
	9,10	PC02	UART2_RXD, IR_OUT, SPI_MOSI, ATIM_CH3A, GTIM_CH4, HCLK_OUT, AWT_ETR
	11,12	NRST	Device reset input
	13,14	PC03	UART1_TXD, SPI_CS, SPI_MISO, ATIM_CH3B, GTIM_CH3, GTIM_TOGP, ATIM_BK
	15,16	PB00	UART1_RXD, I2C_SDA, SPI_CS, ATIM_CH1B, GTIM_CH1, GTIM_TOGP, AWT_ETR
	17,18	PC04	UART1_RXD, IR_OUT, SPI_MOSI, ATIM_CH2B, GTIM_CH4, GTIM_TOGN, ATIM_GATE
	19,20	PB01	UART1_TXD, LVD_OUT, I2C_SCL, ATIM_BK, GTIM_CH2, GTIM_TOGN, AWT_ETR
	21,22	DVSS	Ground
	23,24	PA02	UART1_RXD, UART2_TXD, I2C_SDA, GTIM_ETR, GTIM_CH3, VC2_OUT, AWT_ETR
	25,26	DVCC	Power supply
	27,28	PB07	UART2_RXD, UART1_TXD, SPI_SCK, ATIM_GATE, GTIM_CH1, BTIM2_TOGN, BTIM_ETR
	29-32	DVSS	Ground

Connector	Pin No.	CW32F0 pin	Function
CN3	1-4	DVSS	Ground
	5,6	PA07	UART1_RTS, UART2_RXD, VC1_OUT, ATIM_CH1B, GTIM_CH4, BTIM3_TOGN, ATIM_BK
	7,8	PA06	UART1_CTS, UART2_TXD, I2C_SDA, ATIM_CH2B, GTIM_CH3, BTIM3_TOGP, LVD_OUT
	9,10	PA05	UART1_TXD, UART2_RXD, I2C_SCL, ATIM_GATE, GTIM_CH4, BTIM_ETR, MCO_OUT
	11,12	PA04	UART1_RXD, IR_OUT, SPI_MISO, ATIM_CH3B, GTIM_CH2, BTIM2_TOGN, GTIM_ETR
	13,14	PA03	UART2_TXD, UART1_RXD, PCLK_OUT, ATIM_BK, GTIM_ETR, BTIM2_TOGP, LVD_OUT
	15,16	PA01	UART2_TXD, VC2_OUT, SPI_MOSI, ATIM_CH3B, GTIM_CH1, BTIM2_TOGP, MCO_OUT
	17,18	PA00	UART1_RXD, UART2_RTS, SPI_SCK, ATIM_CH3A, GTIM_CH4, BTIM1_TOGN, VC1_OUT
	19,20	PB02	UART1_TXD, UART2_CTS, SPI_CS, ATIM_CH2B, GTIM_CH3, BTIM1_TOGP, MCO_OUT
	21,22	PB03	UART2_RXD, I2C_SDA, PCLK_OUT,ATIM_CH2A, GTIM_CH2, BTIM3_TOGP, IR_OUT
	23,24	PB04	UART2_TXD, I2C_SCL, GTIM_ETR, ATIM_ETR, GTIM_CH1, BTIM3_TOGN, ATIM_BK
	25,26	PB05	UART1_RXD, I2C_SDA, BTIM_ETR, ATIM_CH1B, GTIM_TOGN, BTIM2_TOGN, ATIM_BK
	27,28	PB06	UART1_TXD, I2C_SCL, SPI_CS, ATIM_CH1A, GTIM_TOGP, BTIM2_TOGP, HCLK_OUT
	29-32	DVSS	Ground

Additional Notes:

1. JP5, JP6, JP7 resistor bits description:

   When performing ADC sampling, the JP5, JP6, JP7 resistor bits can be soldered with 0Ω resistors, and the sampled signal can be filtered. When using other functions of GPIO, disconnect the 0Ω resistors connected to JP5, JP6, JP7.

7 Revision history

Table 7-1 Document revision history

Date	Revision	Changes
May 18, 2023	Rev 1.0	Initial release.