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

CW32L052R8T6 StartKit User Manual

Rev 1.0

www.whxy.com

Introduction

CW32L052R8T6 StartKit evaluation board provides users with an economical and flexible way to build system prototypes using the CW32L052R8T6 chip. All aspects of performance, power consumption, and functionality can be quickly verified.

The CW32L052R8T6 StartKit evaluation board needs to be used with the CW-DAPLINK debugger.

The CW32L052R8T6 StartKit evaluation board comes with the CW32L052 StartKit software package and the CW32L052-StdPeriph-Lib firmware library and routines.

The CW32L052R8T6 StartKit evaluation board is shown in the following figure:

Contents

1 Features

- CW32L052R8T6 microcontroller (ARM® Cortex®-M0+ up to 48MHz), LQFP64 package, 64Kbytes FLASH, 8Kbytes RAM
- Three LEDs :
  - Power indicator (LED3), User indicator (LED1, LED2)
- Three switches:
  - Reset switch (S3), User switch (S1, S2)
- 4x16 segment code LCD display: 8 bit 8 type
- USB to serial port chip (CH340N)
- FLASH chip (CW25Q64A)
- EEPROM chip (CW24C02AD)
- Buzzer Circuit
- Infrared transceiver circuit
- 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 (LD33AF236), external 1.65V-5.5V power supply
- The CW32L052-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 CW32L052R8T6 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
CW32L052R8T6 StartKit	CW32L052R8T6

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 CW32L052 StartKit package that corresponds to the on-board microcontroller and is pre-installed in the CW32L052 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 CW32L052R8T6 StartKit evaluation board is a low-cost development kit for quickly evaluating the performance and functionality of the CW32L052 family of microcontrollers in the LQFP64 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 CW32L052R8T6 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 CW32L052 StartKit demo software can be downloaded from the official website to help you quickly understand the CW32L052R8T6 StartKit evaluation board features;
8. Develop your own programs based on the provided routines.

Table 5-1 Jumper Configuration

Jumper	Definition	ON/OFF	Function
J1[5-6]	VDDLDO	ON	Powering the system with a VDDLDO step-down power supply
J23		ON	Shorting without system current measurement

6 Hardware layout

The CW32L052R8T6 StartKit evaluation board is based on the CW32 microcontroller design in the LQFP100 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, LCD, buzzer, IR emitter and receiver, debugger interface). *Figure 6-2 CW32L052R8T6 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

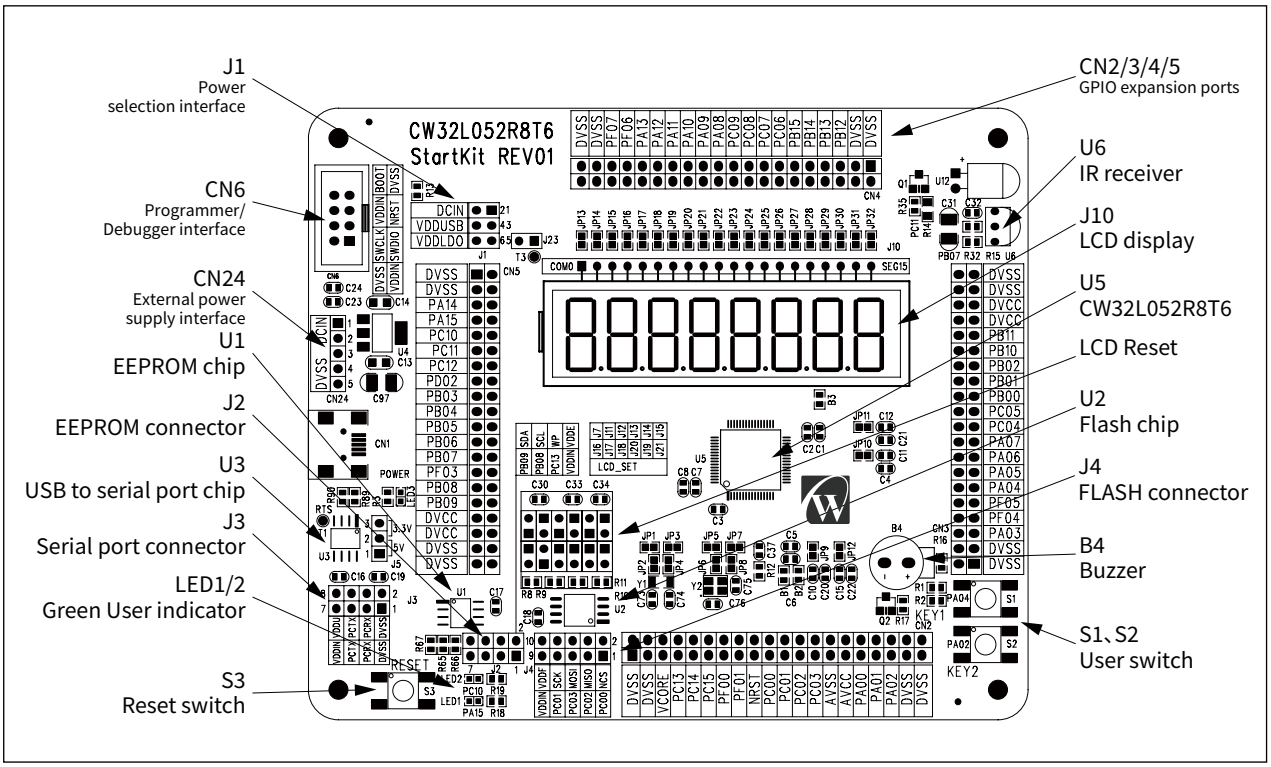
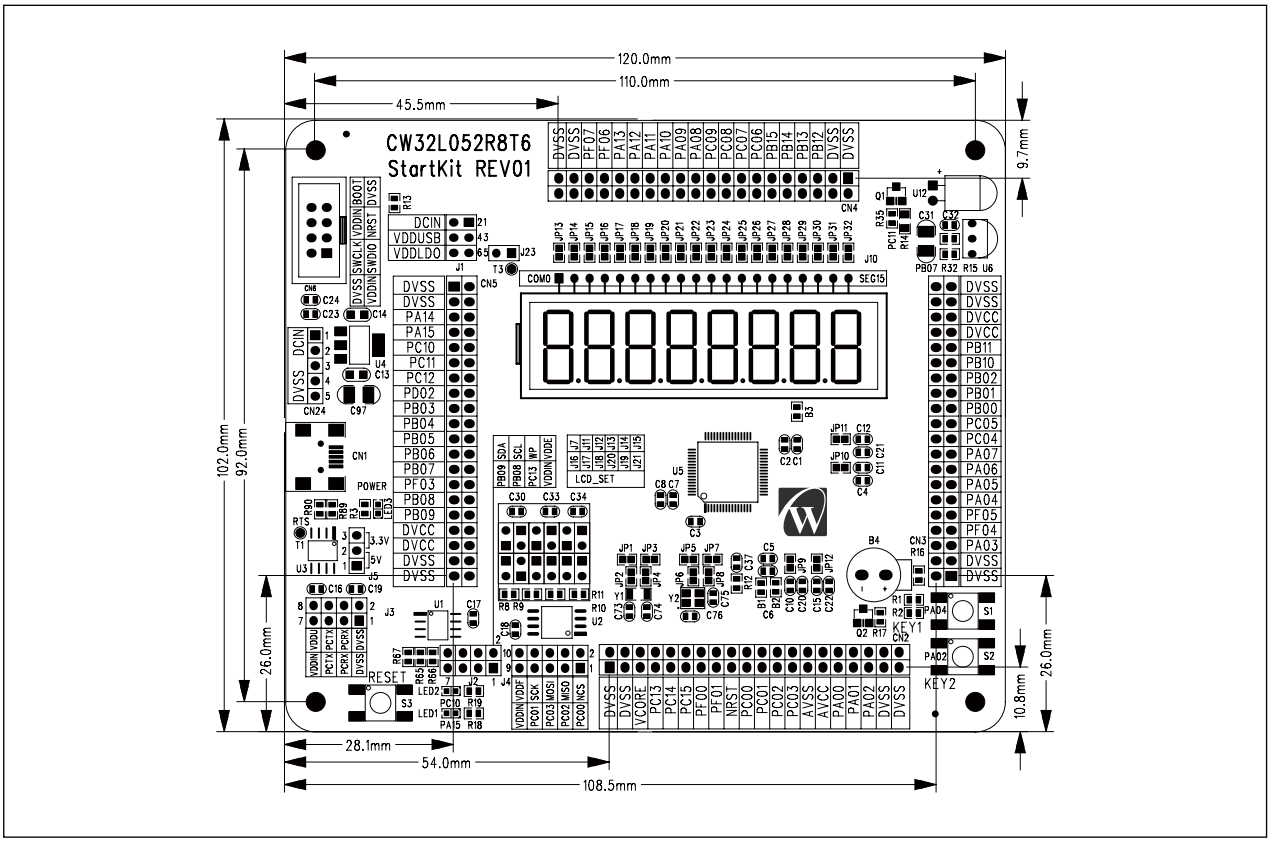


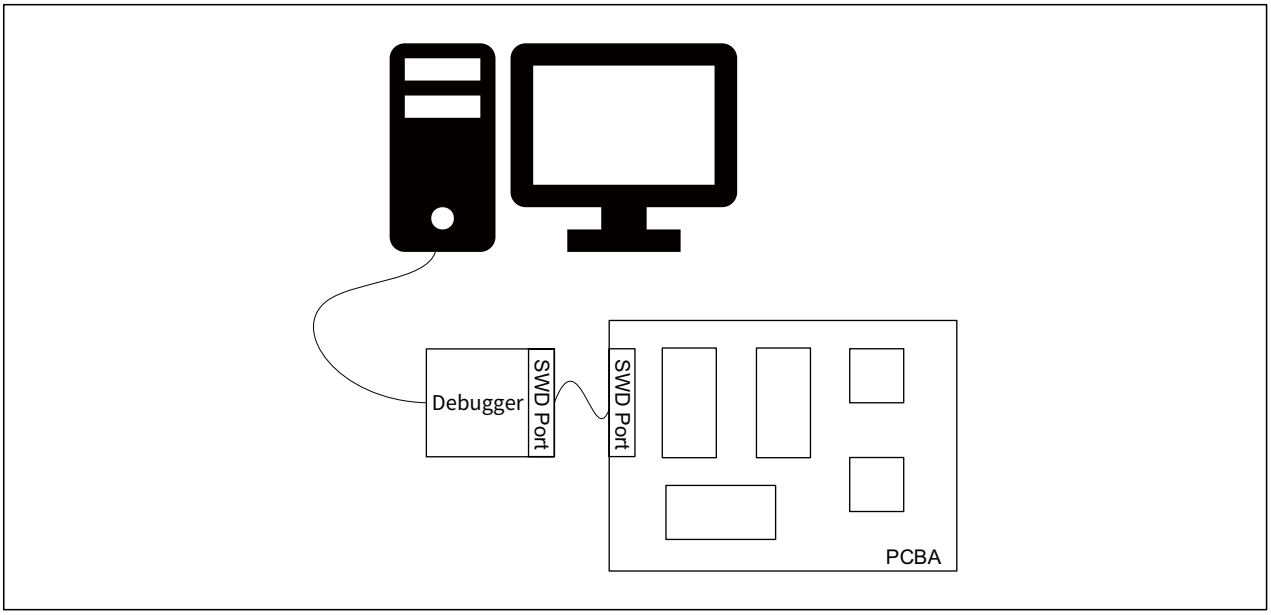
Figure 6-2 CW32L052R8T6 StartKit Mechanical Dimensions



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 J1, which is configured as shown in the following table:

Table 6-1 J24 configuration

Jumper connections	Operating Voltage
J1[1-2]	DCIN input voltage
J1[3-4]	5V (USB input voltage)
J1[5-6]	3.3V (LD33AF236)

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 CW32L052R8T6 I/O:

  - PA15 connected to LED1 anode
  - PC10 connected to LED2 anode

Switches

- Reset switch (S3)

  This switch is connected to the NRST pin and is used to reset the CW32L052R8T6 microcontroller.

- User switch (S1, S2)

  PA04 connected to S1, external pull-up resistor

  PA02 connected to S2, external pull-up resistor

LCD and setup interface

The CW32L052R8T6 StartKit evaluation board has a 4x16 segmented 8 bit 8 type LCD with decimal point for displaying various numeric and English characters. The LCD can be driven in 3 ways: internal drive mode, external capacitor drive mode and external resistor drive mode, the different modes require the following jumper settings:

Table 6-2 External capacitor drive mode LCD interface settings

Capacitor mode	J7	J11	J12	J13	J14	J15
Statics	Open	Open	Short	Open	Short	Open
1/2 BIAS	Short	Short	Short	Open	Open	Short
1/3 BIAS	Short	Short	Open	Short	Open	Short

Table 6-3 External resistor drive mode LCD interface settings

Resistor mode	J16	J17	J18	J20	J19	J21
Statics	Open	Open	Short	Short	Open	Open
1/2 BIAS	Short	Short	Short	Open	Open	Short
1/3 BIAS	Short	Short	Open	Open	Short	Short

USB to serial port

The CW32L052R8T6 StartKit evaluation board has the CH340N USB to serial chip soldered on it. Users can use the VDDU pin of the J3 pin header to configure the CH340N operating voltage ((depending on the VDDIN configuration of J1 when J3[7-8] is directly shorted), 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 (J3 VDDU is connected to a different power supply, and J3[7-8] is directly short-circuited depending on the VDDIN configuration of J1).

Table 6-4 J5 Connection Description

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

Table 6-5 J3 Connection Description

J3	Connection Description
J3[1-2]	May not be connected
J3[3-4]	Port PC12 connects to serial port PCRXD
J3[5-6]	Port PD02 connects to serial port PCTXD
J3[7-8]	VDDIN connects to the VDDU power supply of the CH340N

FLASH chip and connection interface

The CW32L052R8T6 StartKit evaluation board has the CW25Q64A FLASH chip soldered on it, and the user can configure the CW25Q64A operating voltage, SPI_NCS pin, SPI_MISO pin, SPI_MOSI pin, and SPI_SCK pin using the J4 pin header.

Table 6-6 J4 Connection Description

J3	Connection Description
J4[1-2]	Port PE03 connects to the SPI_CS of the FLASH SPI interface
J4[3-4]	Port PE05 connects to the SPI_MISO of the FLASH SPI interface
J4[5-6]	Port PE06 connects to the SPI_MOSI of the FLASH SPI interface
J4[7-8]	Port PE04 connects to the SPI_SCK of the FLASH SPI interface
J4[9-10]	VDDIN connects to the FVDD power supply of the FLASH

EEPROM chip and connection interface

The CW32L052R8T6 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 J2 pin header.

Table 6-7 J2 Connection Description

J3	Connection Description
J2[1-2]	VDDIN connects to the EVDD power supply of the EEPROM
J2[3-4]	May not be connected
J2[5-6]	Port PC00 connects to the SCL of the EEPROM I2C interface
J2[7-8]	Port PC01 connects to the SDA of the EEPROM I2C interface

Buzzer

The CW32L052R8T6 StartKit evaluation board has a passive buzzer that can be used for simple tone control.

IR emitter and receiver

The CW32L052R8T6 StartKit evaluation board has IR emitter and IR receiver and can be used to demonstrate the IR modulated transmit function of the board.

Programmer Interface

The CW32L052R8T6 StartKit evaluation board leads to the programmer interface, which allows users to connect the programmer to the CN6 programmer interface for offline programming.

Extended Interface

The CW32L052R8T6 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

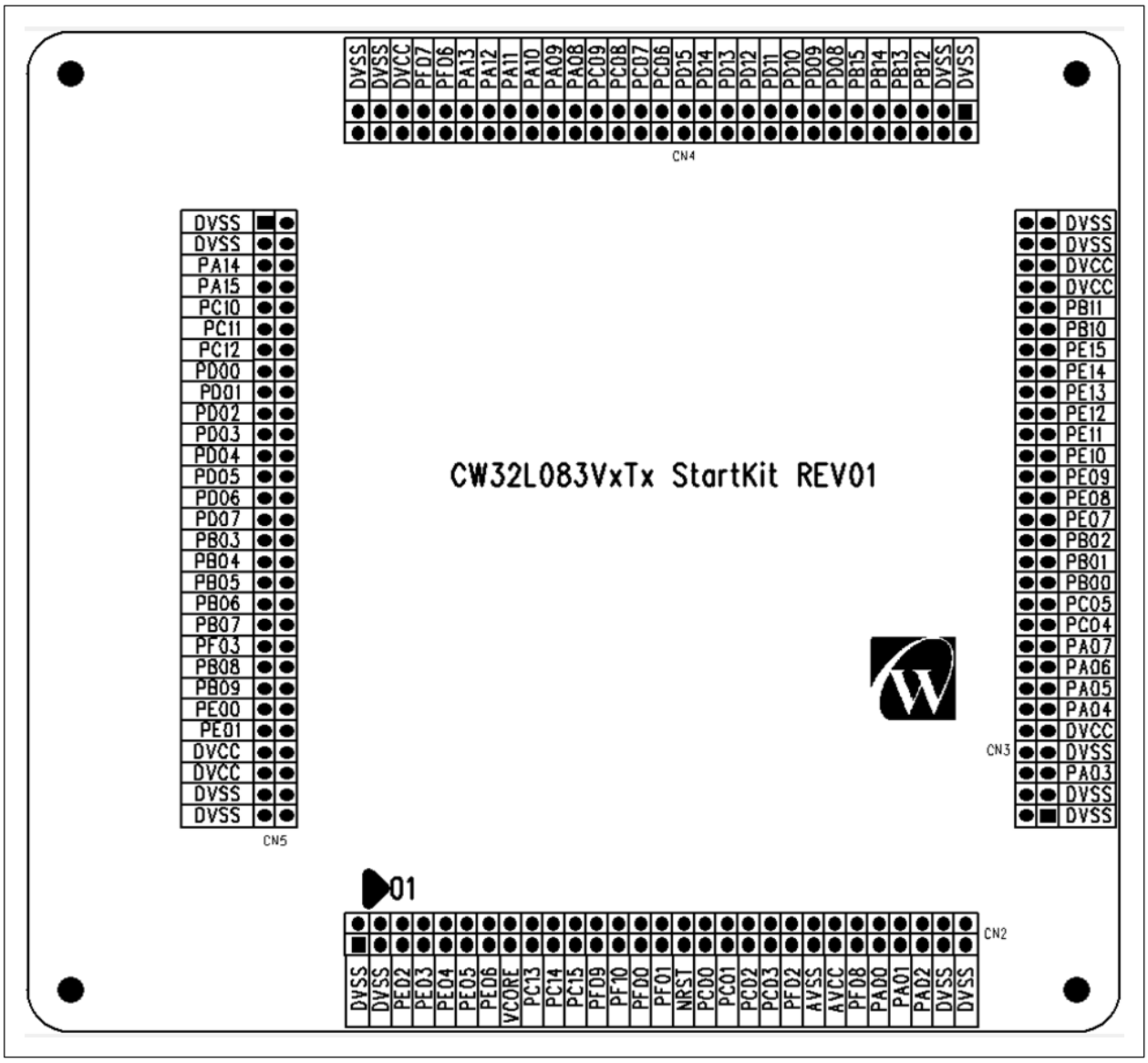


Table 6-8 Pin Function

Connector	Pin No.	CW32 pin	Function
CN2	1-4	DVSS	Digital power ground
	5,6	VCORE	Chip core power output
	7,8	PC13	RTC_1Hz, UART1_CTS, RTC_OUT, BTIM_ETR, GTIM3_ETR, RTC_TAMP
	9,10	PC14	AUTOTRIM_ETR, GTIM1_CH4, UART1_RTS, UART1_TXD, SPI2_MISO, GTIM3_TOGP, GTIM3_CH1
	11,12	PC15	HSE_OUT, GTIM1_CH3, GTIM1_ETR, UART1_RXD, SPI2_MOSI, GTIM3_TOGN, GTIM3_CH2
	13,14	PF00	AUTOTRIM_, ETR, GTIM1_CH2, I2C1_SDA, BTIM1_TOGN, SPI2_SCK, GTIM2_TOGP, GTIM3_CH3
	15,16	PF01	LSE_OUT, GTIM1_CH1, I2C1_SCL, BTIM1_TOGP, SPI2_CS, GTIM2_TOGN, GTIM3_CH4
	17,18	NRST	Chip reset input
	19,20	PC00	UART1_CTS, GTIM2_CH4, SPI1_CS, LPTIM_CH1, UART2_RXD, ATIM_CH1A, I2C2_SCL
	21,22	PC01	UART1_RTS, GTIM2_CH3, SPI1_SCK, LPTIM_OUT, UART2_TXD, ATIM_CH2A, I2C2_SDA
	23,24	PC02	UART1_RXD, GTIM2_CH2, SPI1_MISO, LPTIM_CH2, UART1_TXD, ATIM_CH3A
	25,26	PC03	UART1_TXD, GTIM2_CH1, SPI1_MOSI, LPTIM_ETR, UART1_RXD, ATIM_BK
	27,28	AVSS	Analog power ground
	29,30	AVCC	Analog power supply
	31,32	PA00	UART3_CTS, UART2_CTS, RTC_TAMP, VC1_OUT, SPI2_MISO, GTIM2_CH1, GTIM2_ETR
	33,34	PA01	UART3_RTS, UART2_RTS, I2C2_SCL, LVD_OUT, SPI2_MOSI, GTIM2_CH2, RTC_TAMP
	35,36	PA02	UART3_TXD, UART2_TXD, I2C2_SDA, VC2_OUT, SPI2_SCK, GTIM2_CH3, AUTOTRIM_, ETR
	37,38	DVSS	Digital power ground
	39.40	DVSS	Digital power ground

Connector	Pin No.	CW32 pin	Function
CN3	1-4	DVSS	Digital power ground
	5,6	PA03	UART3_RXD, UART2_RXD, GTIM2_CH2, PCLK_OUT, SPI2_CS, GTIM2_CH4, ATIM_CH3A
	7,8	PF04	UART1_TXD, GTIM1_CH2, UART2_RXD
	9,10	PF05	UART1_RXD, BTIM_ETR, UART2_TXD, AUTOTRIM_, ETR
	11,12	PA04	UART1_TXD, UART2_CTS, I2C2_SCL, HCLK_OUT, SPI1_CS, GTIM2_ETR, ATIM_CH2A
	13,14	PA05	GTIM2_ETR, UART2_RTS, I2C2_SDA, BTIM2_TOGN, SPI1_SCK, GTIM2_CH1, ATIM_CH1A
	15,16	PA06	GTIM3_CH1, UART2_TXD, VC1_OUT, BTIM2_TOGP, SPI1_MISO, GTIM1_CH1, ATIM_BK
	17,18	PA07	GTIM2_CH1, UART2_RXD, VC2_OUT, BTIM1_TOGN, SPI1_MOSI, GTIM1_CH2, ATIM_CH1B
	19,20	PC04	UART1_TXD, UART3_RXD, IR_OUT, LSI_OUT
	21,22	PC05	UART1_RXD, UART3_TXD, MCO, LPTIM_ETR, LPTIM_OUT
	23,24	PB00	UART2_RXD, UART1_CTS, I2C2_SCL, BTIM1_TOGP, HSI_OUT, GTIM1_CH3, ATIM_CH2B
	25,26	PB01	UART2_TXD, UART1_RTS, I2C2_SDA, GTIM2_TOGP, BTIM3_ TOGN, GTIM1_CH4, ATIM_CH3B
	27,28	PB02	UART2_CTS, UART1_TXD, LPTIM_OUT, GTIM2_TOGN, BTIM3_TOGP, GTIM1_ETR, ATIM_CH1A
	29,30	PB10	UART2_RTS, UART1_RXD, I2C1_SCL, I2C2_SCL, SPI2_SCK, GTIM2_CH3, ATIM_CH2A
	31,32	PB11	GTIM3_ETR, UART1_TXD, I2C1_SDA, I2C2_SDA, BTIM_ETR, GTIM2_CH4, ATIM_CH3A
	33,34	DVCC	Digital power supply
	35.36	DVCC	Digital power supply
	37,38	DVSS	Digital power ground
	39.40	DVSS	Digital power ground

Connector	Pin No.	CW32 pin	Function
CN4	1-4	DVSS	Digital power ground
	5,6	PB12	GTIM2_TOGP, GTIM3_CH4, LSE_OUT, SPI2_CS, SPI1_CS, GTIM1_TOGP, ATIM_BK
	7,8	PB13	GTIM2_TOGN, GTIM3_CH3, I2C2_SCL, SPI2_SCK, SPI1_SCK, GTIM1_TOGN, ATIM_CH1B
	9,10	PB14	GTIM2_CH1, GTIM3_CH2, I2C2_SDA, SPI2_MISO, SPI1_MISO, RTC_OUT, ATIM_CH2B
	11,12	PB15	GTIM2_CH2, GTIM3_CH1, BTIM2_TOGN, SPI2_MOSI, SPI1_MOSI, RTC_1Hz, ATIM_CH3B
	13,14	PC06	UART1_RXD, UART3_TXD, BTIM2_TOGP, GTIM2_CH4, ATIM_CH1B
	15,16	PC07	UART1_TXD, UART3_RXD, BTIM2_TOGN, GTIM2_CH3, ATIM_CH2B
	17,18	PC08	UART1_CTS, UART3_TXD, GTIM3_ETR, GTIM2_CH2, ATIM_CH3B
	19,20	PC09	UART1_RTS, UART3_RXD, I2C1_SDA, GTIM2_CH1, ATIM_ETR
	21,22	PA08	LPTIM_ETR, UART1_TXD, BTIM2_TOGP, MCO_OUT, LVD_OUT, GTIM3_ETR, ATIM_CH1A
	23,24	PA09	UART3_TXD, UART1_RXD, I2C1_SCL, BTIM1_TOGN, SPI1_CS, GTIM3_CH1, ATIM_CH2A
	25,26	PA10	UART3_RXD, UART1_CTS, I2C1_SDA, BTIM1_TOGP, SPI1_SCK, GTIM3_CH2, ATIM_CH3A
	27,28	PA11	UART3_CTS, UART1_RTS, I2C2_SCL, VC1_OUT, SPI1_MISO, GTIM3_CH3
	29,30	PA12	UART3_RTS, BTIM_ETR, I2C2_SDA, VC2_OUT, SPI1_MOSI, GTIM3_CH4, ATIM_ETR
	31,32	PA13	I2C1_SDA, UART1_RXD, UART2_TXD, I2C2_SCL, IR_OUT
	33,34	PF06	UART3_CTS, I2C1_SCL, GTIM1_TOGP, UART2_CTS, I2C2_SCL, GTIM3_TOGP, BTIM3_TOGN
	35,36	PF07	UART3_RTS, I2C1_SDA, GTIM1_TOGN, UART2_RTS, I2C2_SDA, GTIM3_TOGN, BTIM3_TOGP
	37,38	DVSS	Digital power ground
	39.40	DVSS	Digital power ground

Connector	Pin No.	CW32 pin	Function
CN5	1-4	DVSS	Digital power ground
	5,6	PA14	UART3_TXD, I2C1_SCL, UART1_TXD, UART2_RXD, I2C2_SDA
	7,8	PA15	UART3_RXD, GTIM2_CH1, UART1_RXD, UART2_TXD, SPI1_CS, GTIM2_ETR, ATIM_CH1B
	9,10	PC10	UART1_TXD, GTIM3_CH1, HCLK_OUT, BTIM1_TOGP, VC1_OUT, LPTIM_CH1, ATIM_CH2B
	11,12	PC11	UART1_RXD, GTIM3_CH2, IR_OUT, BTIM1_TOGN, VC2_OUT, LPTIM_CH2, ATIM_CH3B
	13,14	PC12	UART2_TXD, PCLK_OUT, LVD_OUT, UART3_RXD, HSI_OUT
	15,16	PD02	UART2_RXD, GTIM1_CH1, BTIM_ETR, UART3_TXD, RTC_1Hz, GTIM3_ETR, ATIM_ETR
	17,18	PB03	UART3_RTS, GTIM2_CH2, UART1_CTS, UART2_TXD, SPI1_SCK, GTIM1_ETR, ATIM_CH2B
	19,20	PB04	UART3_CTS, GTIM2_ETR, UART1_RTS, UART2_RXD, SPI1_MISO, GTIM1_CH1, ATIM_CH3B
	21,22	PB05	UART1_RXD, GTIM3_CH4, LPTIM_CH1, UART2_RTS, SPI1_MOSI, GTIM1_CH2, ATIM_CH1A
	23,24	PB06	UART3_TXD, GTIM3_CH3, LPTIM_ETR, I2C1_SCL, SPI2_MOSI, GTIM1_TOGP, ATIM_CH2A
	25,26	PB07	UART3_RXD, GTIM3_CH2, LPTIM_CH2, I2C1_SDA, SPI2_MISO, GTIM1_TOGN, ATIM_CH3A
	27,28	PF03	BOOT
	29,30	PB08	I2C1_SCL, GTIM3_CH1, UART2_TXD, GTIM2_CH2, SPI2_SCK, GTIM1_CH3, ATIM_ETR
	31,32	PB09	I2C1_SDA, GTIM2_CH1, UART2_RXD, IR_OUT, SPI2_CS, GTIM1_CH4, ATIM_BK
	33,34	DVCC	Digital power supply
	35.36	DVCC	Digital power supply
	37,38	DVSS	Digital power ground
	39.40	DVSS	Digital power ground

Connector	Pin No.	CW32 pin	Function
CN5	25,26	PD05	UART4_TXD, GTIM2_CH1, UART3_TXD, LPTIM_CH1, BTIM2_TOGP, LSI_OUT, ATIM_CH2A
	27,28	PD06	I2C1_SCL, GTIM2_CH4, UART3_RXD, LPTIM_CH2, BTIM2_TOGN, GTIM2_TOGP, ATIM_CH1A
	29,30	PD07	I2C1_SDA, GTIM2_CH3, MCO_OUT, UART2_RXD, SPI1_CS, GTIM2_TOGN, ATIM_CH1B
	31,32	PB03	UART3_RTS, GTIM2_CH2, UART4_CTS, UART2_TXD, SPI1_SCK, GTIM1_ETR, ATIM_CH2B
	33,34	PB04	UART3_CTS, GTIM4_ETR, UART4_RTS, UART2_RXD, SPI1_MISO, GTIM1_CH1, ATIM_CH3B
	35.36	PB05	UART4_RXD, GTIM3_CH4, LPTIM_CH1, UART2_RTS, SPI1_MOSI, GTIM1_CH2, ATIM_CH1A
	37,38	PB06	UART6_TXD, GTIM3_CH3, LPTIM_ETR, I2C1_SCL, SPI2_MOSI, GTIM1_TOGP, ATIM_CH2A
	39.40	PB07	UART6_RXD, GTIM3_CH2, LPTIM_CH2, I2C1_SDA, SPI2_MISO, GTIM1_TOGN, ATIM_CH3A
	41,42	PF03	BOOT
	43,44	PB08	I2C1_SCL, GTIM3_CH1, UART5_TXD, GTIM4_CH2, SPI2_SCK, GTIM1_CH3, ATIM_ETR
	45,46	PB09	I2C1_SDA, GTIM4_CH1, UART5_RXD, IR_OUT, SPI2_CS, GTIM1_CH4, ATIM_BK
	47,48	PE00	I2C2_SCL, GTIM4_CH2, LPTIM_ETR, PCLK_OUT, GTIM2_TOGP, GTIM1_CH1, GTIM4_TOGP
	49,50	PE01	I2C2_SDA, GTIM4_CH3, LPTIM_OUT, HCLK_OUT, GTIM2_TOGN, GTIM1_CH2, GTIM4_TOGN
	51-54	DVCC	Digital power supply
	55-58	DVSS	Digital power ground

7 Revision history

Table 7-1 Document revision history

Date	Revision	Changes
June 28, 2023	Rev 1.0	Initial release.