Development Board Hardware User Guide

Introduction

The purpose of this document is to allow users to quickly get familiar with the N32G401C8L7-STB development board, understand the function of the development board, usage instructions, precautions, and facilitate MCU debugging and development based on the development board.

CONTENTS

# 1 Hardware Development Instructions

1.1 Overview

The N32G401C8L7-STB development board is used for sample development of 32-bit high-performance N32G401C8L7 series chips of Nsing Technologies Inc. This document describes the functions, usage instructions, and precautions of the N32G401C8L7-STB development board in detail.

1.2 Development Board Function

The part number of the main MCU chip model in the development board is N32G401C8L7 and packaged with LQFP48 pins. The development board connects all functional interfaces to facilitate customer development.

1.3 Development Board Layout

Figure 1-1 Development Board Layout1
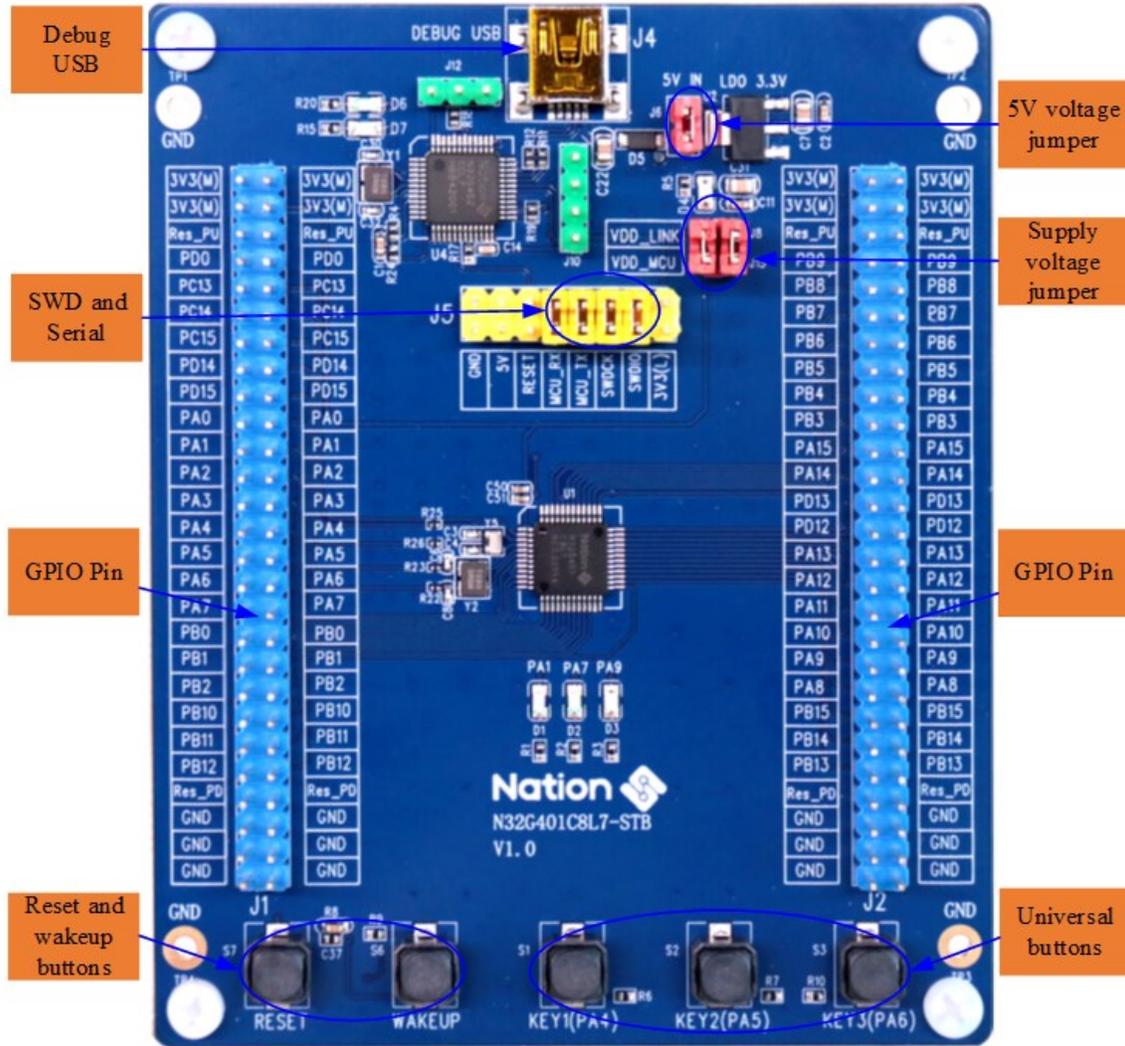
- **Power supply for development board**

The development board can be powered via Debug USB (J4) and connected to 3.3V LDO input port via J6 jumper.

- **Debug USB (J4)**

Through the DEBUG_USB interface of NS-LINK chip (U4), it can provide main MCU program download and debugging functions, and can also connect to the MCU's serial port to provide USB to serial conversion function.

- **SWD and Serial Port (J5)**

SWD interface: SWDIO and SWDCK are used to download and debug the main MCU program. You can use ULINK2 or JLINK to download and debug the MCU, or you can short the SWDIO signal pin and the SWDCK signal pin with the jumper cap, and perform MCU downloading and debugging   through DEBUG USB.

Serial port: MCU_TX and MCU_RX are used as serial port external signals. PA2 (TX) and PA3 (RX) of MCU are used as serial port, which can be connected to external serial port device separately, or by shorting the MCU_TX signal pin and MCU_RX signal pin with the jumper cap. Customers can use the NS-LINK on the development board to convert the USB port to a serial port for convenience.

- **Reset and wake up buttons (S7, S6)**

S7 and S6 are reset buttons and wake buttons respectively, which are connected to NRST pins and PA0-WKUP pins of the chip respectively for chip reset and wake functions.

- **Universal keys (S1, S2, S3)**

S1, S2 and S3 are connected to chip PA4, PA6 and PA7 pins respectively as universal keys.

- **BOOT (J1 PIN7/8)**

J1 PIN7/8 is BOOT0 pin, which can be shorted to power and ground through jumper as needed.

- **GPIO port (J1, J2)**

All the GPIO interfaces of the chip are elicited, and 3.3V voltage and GND pins are reserved on the pins for easy testing. Refer to DS_N32G401C8L7 Series Datasheet for the specific definition of the GPIOs.

1.4 Development Board Jumper Usage Instructions

**Figure 1-2 Development Board Jumper Description**
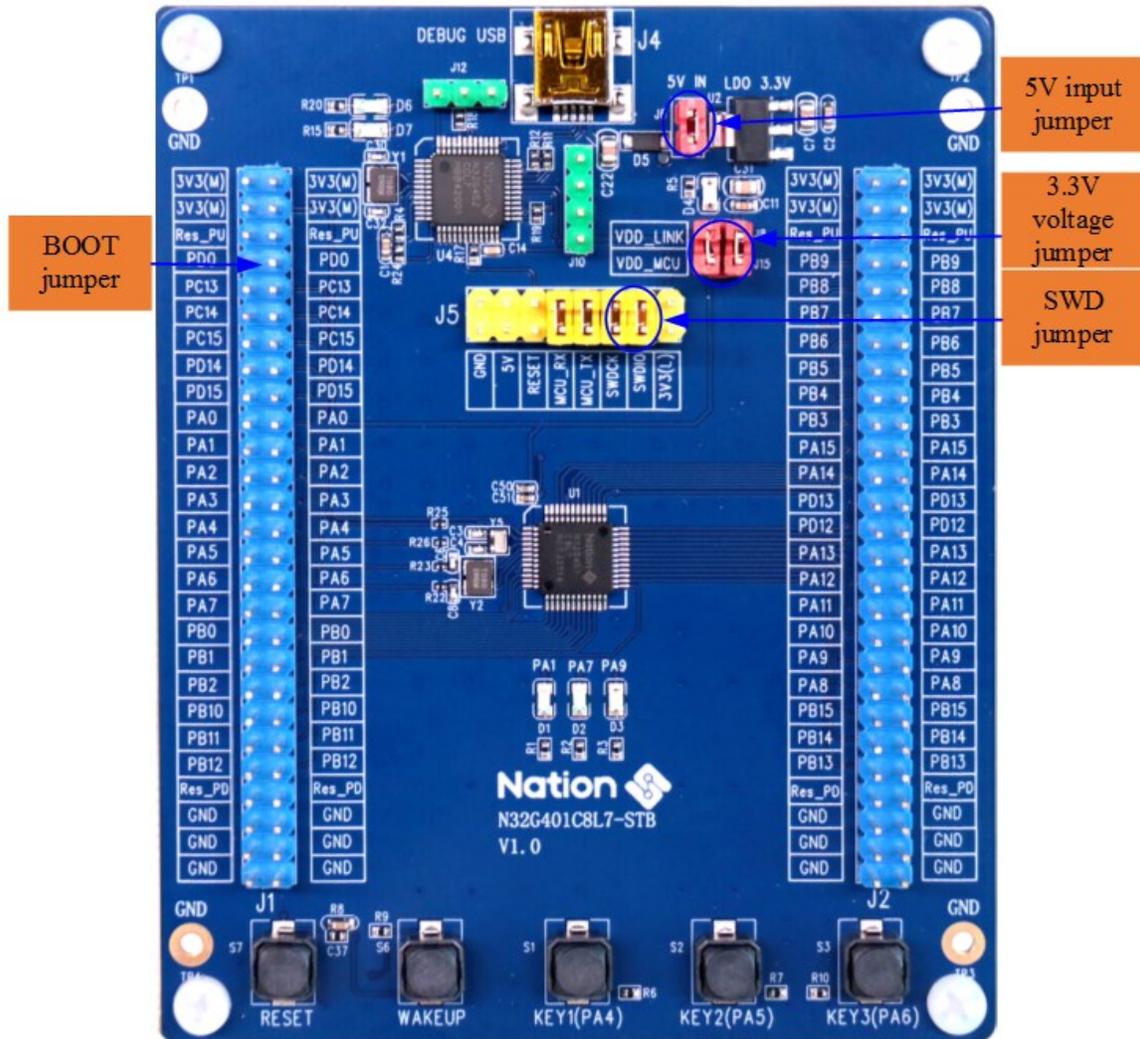
Table 1-1 Development Board Jumper Description List

No.	Jumper Wire Number	Jumper Wire Function	Instructions For Use
1	J6	5V voltage jumper	The J6 jumper is used to connect the two USB ports (J4 and J3) to supply power to the LDO3.3V input port.
2	J8 and J15	3.3V power supply jumper	J8: supply 3.3V power to NS-LINK MCU chip. J15: supply 3.3V power to main MCU chip.
3	J5	SWD jumper	Use NS-LINK to download programs to MCU through USB DEBUG port, and need to short-circuit SWDIO and SWDCK pins.
		Serial jumper	When using NS-LINK as a serial port via the USB DEBUG port, it it necessary to short the MCU_TX pin and MCU_RX pin.
4	J1 PIN7、8	BOOT jumper	J1 PIN7、PIN8：BOOT0.

1.5 Development Board Schematic Diagram

The schematic diagram of the N32G401C8L7-STB development board is described as follows (please refer to N32G401C8L7-STB_V1.0 for details).

- **MCU connection**

Refer to Figure 1-3 for the schematic diagram of MCU connection. Each VDD pin of the MCU is connected with a capacitor. All GPIOs are elicited and connected to J1 and J2 pins for easy debugging.

Figure 1-3 MCU Connection Diagram
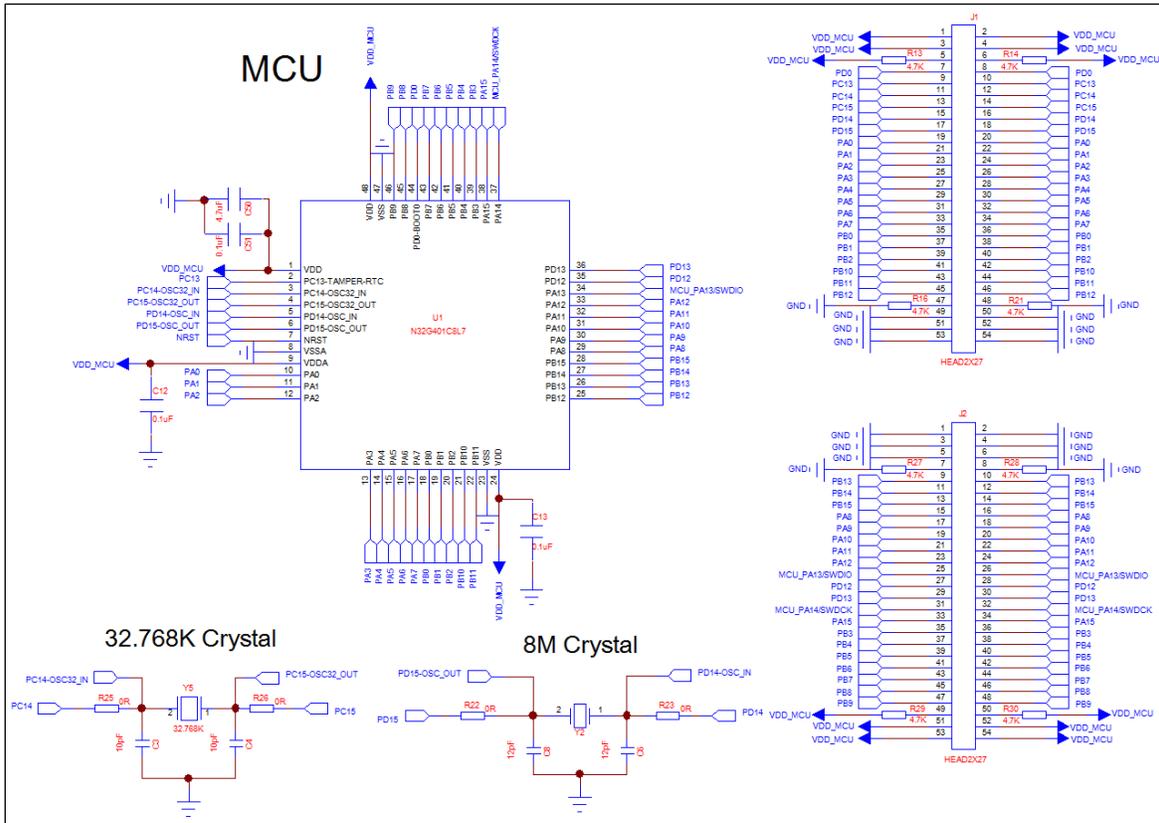
- **Power supply design**

    Refer to Figure 1-4 for the schematic diagram of power supply design. The PCB is powered by 5V through USB, and then outputs 3.3V voltage through LDO to power the entire PCB board.

Figure 1-4 Power Supply Design
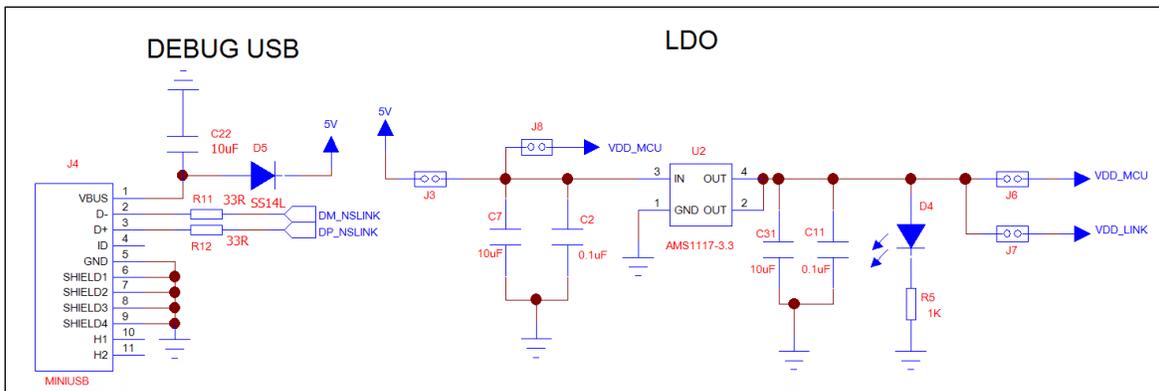
- **The key design**

    Refer to Figure 1-5 for the schematic diagram of key design. There are five keys in total, which are MCU reset key, wake up key and three universal keys.

Figure 1-5 Key Design
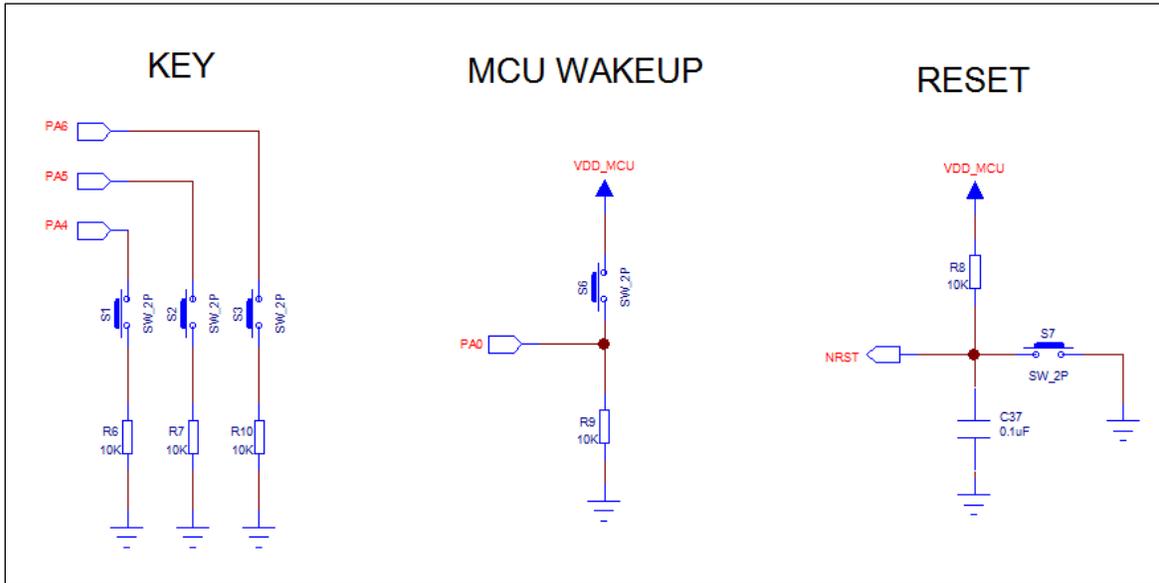
- **LED light design**

    Refer to Figure 1-6 for the schematic diagram of LED light design. There are 5 LED lights in total. D1, D2 and D3 are connected to PA1, PA7 and PA9 of main MCU respectively, which can be used for debugging. D6 and D7 are used for NS-LINK MCU control to monitor the running status of NS-LINK.

Figure 1-6 LED Light Design
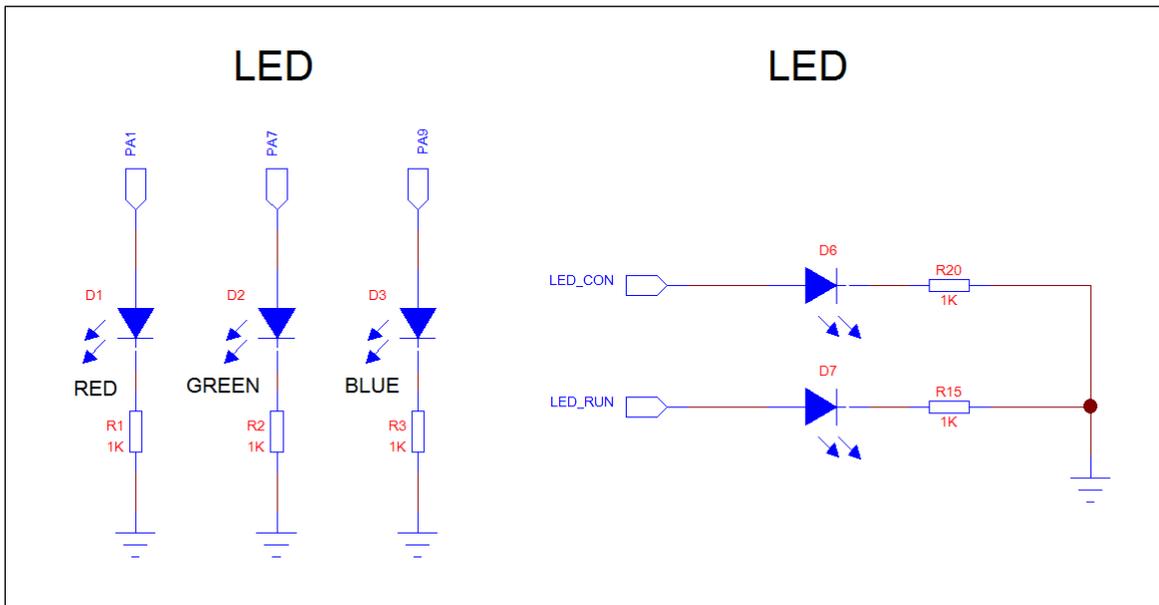
- **Crystal**

Refer to Figure 1-7 for the crystal connection diagram. The chip has two external crystals, which are 8MHz and 32.768KHz respectively.

Figure 1-7 Crystal Design
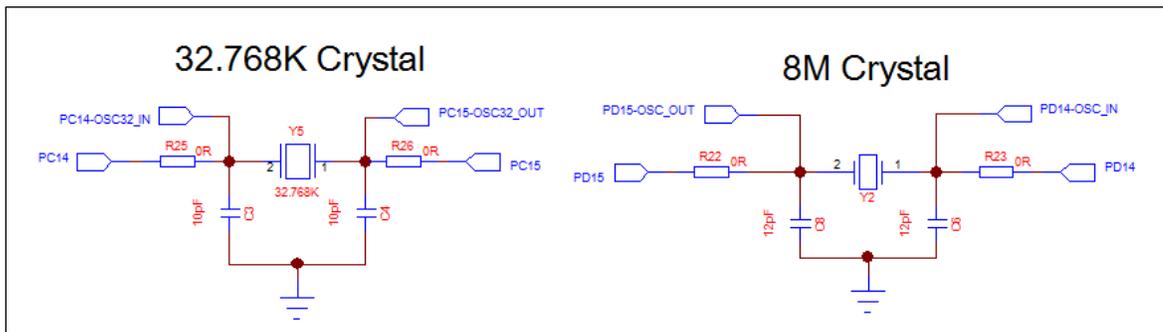
- **NS-LINK**

Refer to Figure 1-8 for the NS-Link schematic diagram. Users can download programs by directly connecting the USB cable through the DEBUG USB port, without ULINK or JLINK debugger. You can also use the DEBUG USB virtual serial port to debug.

Figure 1-8 NS – LINK
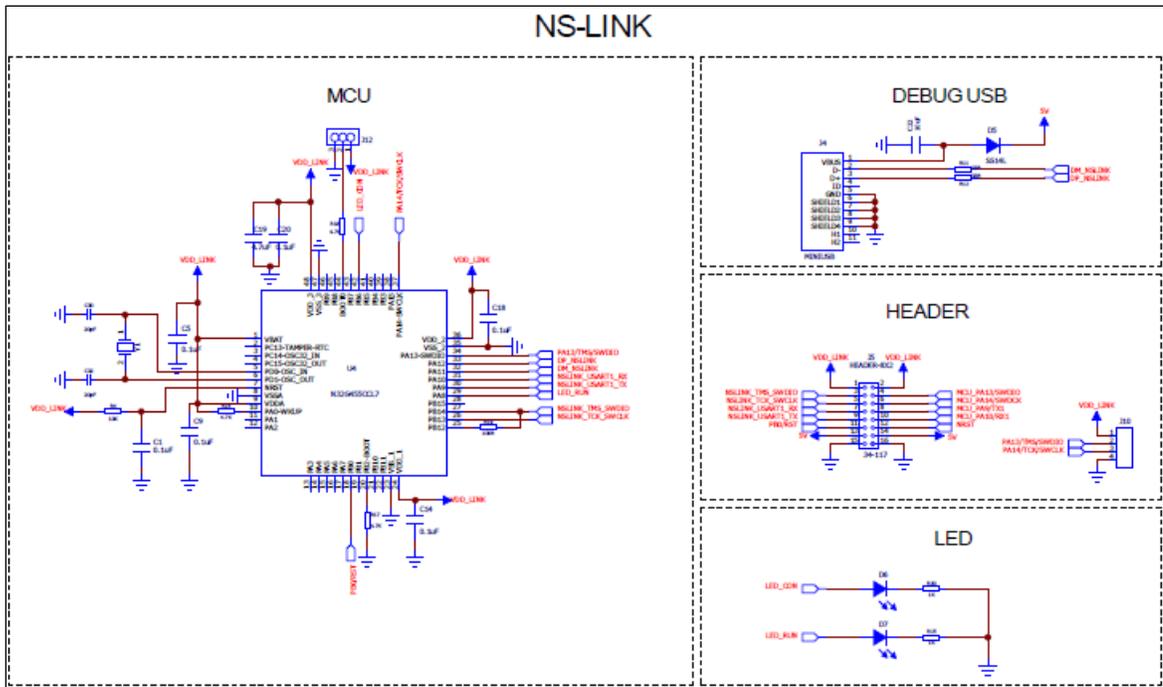
- **Description of peripheral devices:**
  1) When designing PCB LAYOUT, place two capacitors near VDD (PIN1), 4.7uF and 0.1uF respectively, and place 0.1uF capacitors near the other VDD pins.
  2) PC14-OSC32_IN, PC15-OSC32_OUT: when there is a need for an external high-precision RTC clock, a 32.768KHz crystal needs to be connected close to the two pins, and it can be omitted if there is no need.

2 Version History

Version	Date	Changes
V1.0.0	2023.05.25	Initial release

3 Disclaimer

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