

User Guide

N32H765IIL7_STB Development Board Hardware User Guide

Introduction

The purpose of this document is to enable users to quickly familiarize themselves with the N32H765IIL7_STB development board, understand its functions, usage instructions, and precautions, so as to conduct MCU debugging and development based on the development board.

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1 Hardware Development Notes

1.1 Brief

The N32H765IIL7_STB development board is used for sample development of NSING TECHNOLOGIES INC. 32-bit N32H765IIL7 chip. This document details the functions, usage instructions, and precautions of the N32H765IIL7_STB development board.

1.2 Development board functions

The main MCU chip on the development board is N32H765IIL7, in an LQFP176 pin package. The development board provides all functional interfaces for customer development.

1.3 Development board layout

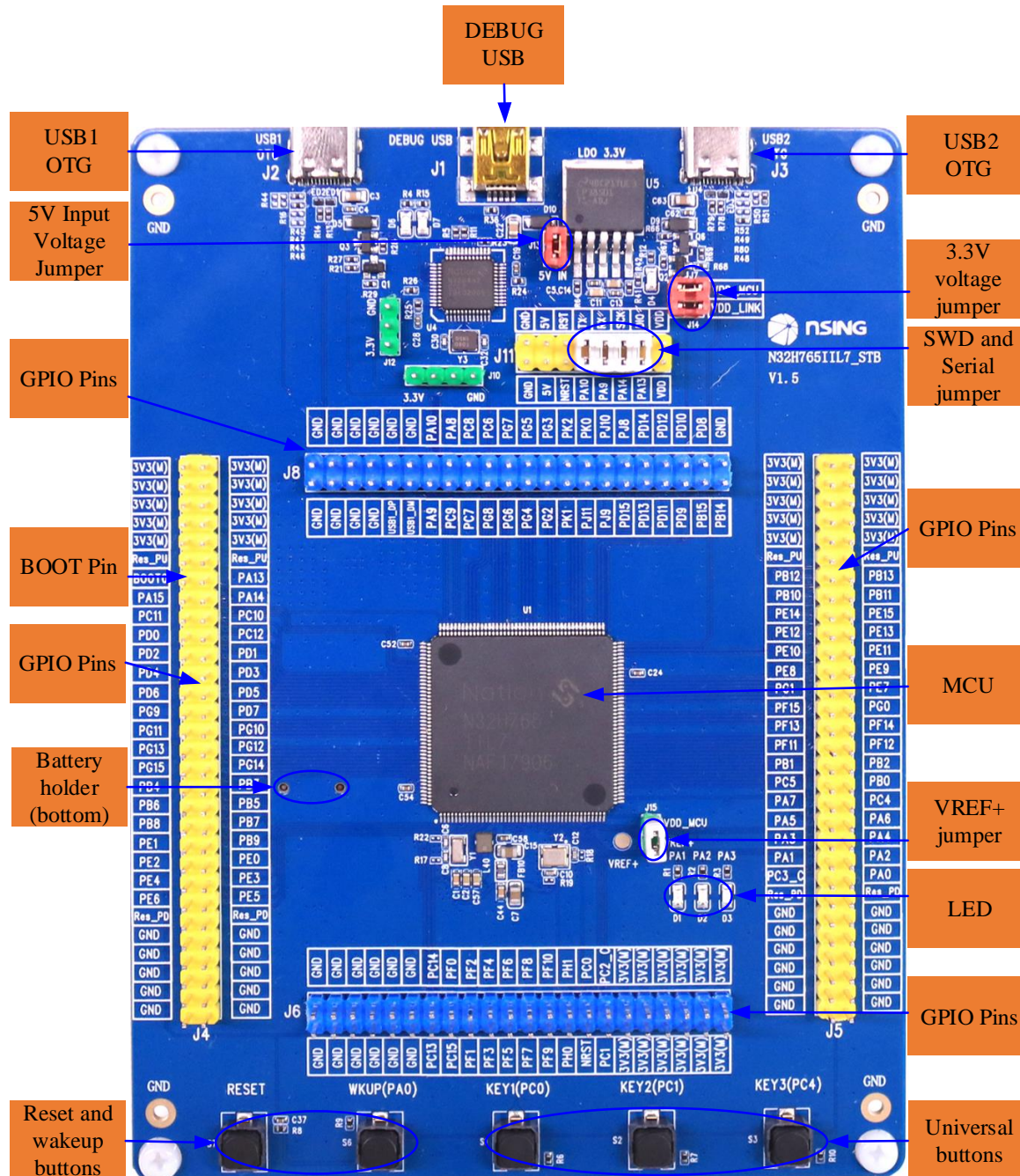


Figure 1-1 Development board layout

1) Power supply for development board

The development board can be powered via a USB1 OTG interface (J2), a USB2 OTG interface (J3), and a DEBUG USB (J1), and is connected to the 3.3V LDO input port via jumper J13.

2) Debug USB (J1)

The NS-LINK chip (U4) provides a DEBUG USB interface for downloading and debugging the main MCU program, and can also be connected to the MCU's serial port to provide a USB-to-serial function.

3) USB OTG (J2 , J3)

The development board has two onboard USB OTG interfaces (J2 and J3), which enable upgrades and debugging between master and slave devices.

4) SWD interface and serial port (J11)

SWD Interface: PA13 (SWDIO) and PA14 (SWDCK) are used for downloading and debugging the main MCU program. ULINK2 or JLINK can be used to download and debug the MCU, or jumpers can be used to short the SWDIO and SWDCK signal pins to download and debug the MCU via DEBUG USB.

Serial ports: MCU_TX and MCU_RX are used as external serial signals. PA9 (TX) and PA10 (RX) of the MCU are used as serial ports. They can be used to connect serial devices independently, or jumpers can be used to short the MCU_TX and MCU_RX signal pins to convert the USB port to a serial port via the NS-LINK on the development board for customer convenience.

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

S7 and S6 are the reset and wake-up buttons, respectively, connected to the chip's NRST and PA0 pins, and used for chip reset and wake-up functions.

6) General-purpose buttons (S1, S2, S3)

S1, S2, and S3 are general-purpose buttons, which are connected to the PC0, PC1, and PC4 pins of the chip, respectively.

7) LED

D1, D2, and D3 are LEDs, which are connected to pins PA1, PA2, and PA3 of the chip, respectively.

8) BOOT (J4 PIN13)

J4 PIN13 is the BOOT0 connector, which can be shorted to power or ground via a jumper as needed.

9) GPIO ports (J4, J5 , J6 , J8)

All GPIO interfaces of the chip are brought out, with 3.3V and GND pins provided, as well as pull-up and pull-down pins with series resistors for easy testing. For detailed definitions of the GPIO interfaces, please refer to the "UM_N32H76X Series User Manual".

1.4 Development Board Jumper Usage Instructions

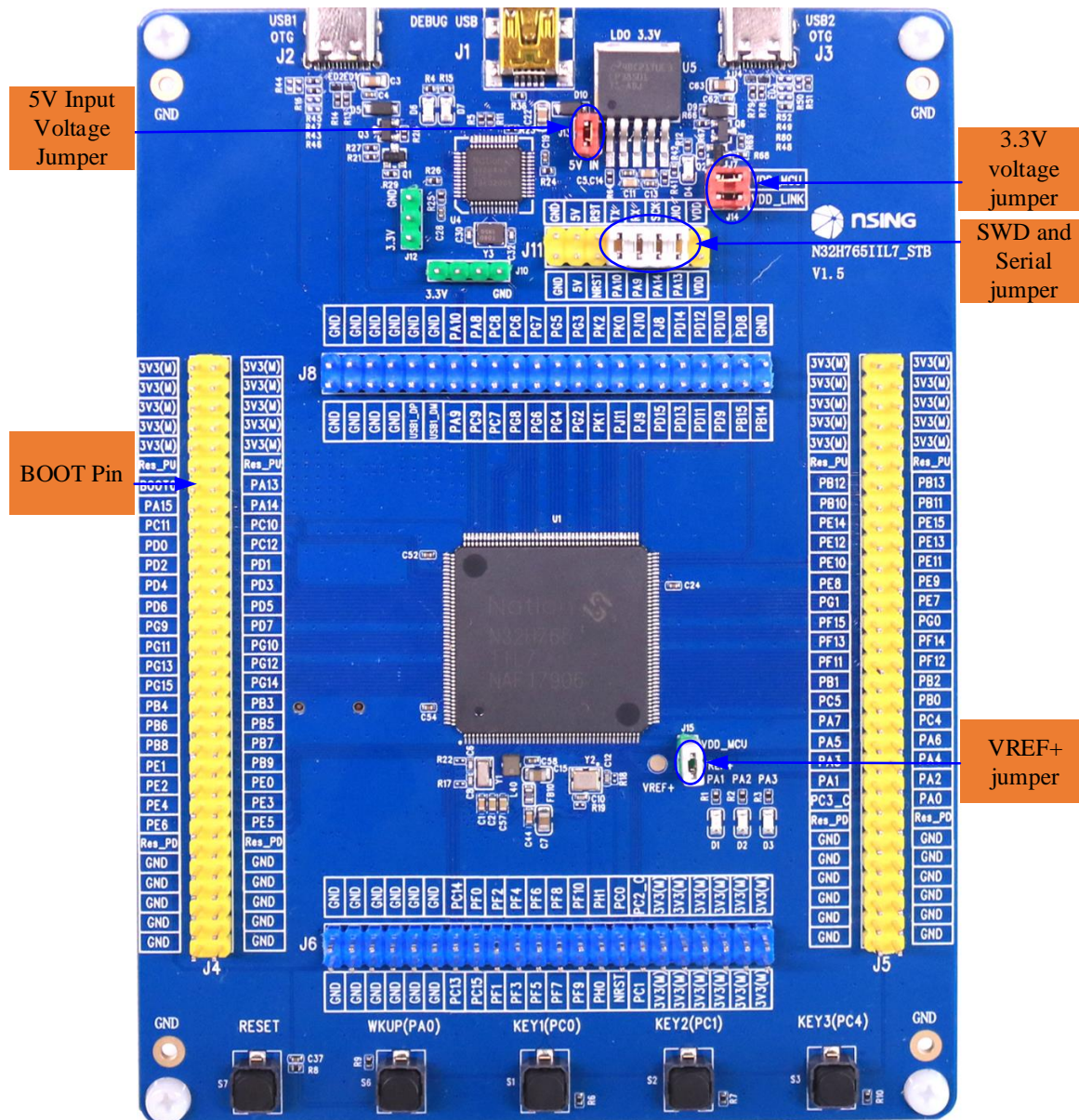


Figure 1-2 Development board jumper instructions

surface 1-1 Development Board Jumper Specifications

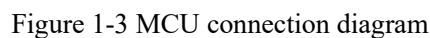
No.	jumper number	Jumper function	Instructions for use
1	J13	5V input voltage jumper	The J13 jumper is used to connect the three USB OTG (J2, J3) and DEBUG USB (J1) interfaces to the 3.3V LDO input port.
2	J7, J14	3.3V power supply jumper	J7: 3.3V power supply to the main MCU chip. J14 : 3.3V power supply to the NS-LINK MCU chip.
3	J11	SWD jumper	To download the program to the MCU using NS-LINK via the USB DEBUG port, you need to short the SWDIO and SWDCK signal pins.
	J11	Serial jumper	When using NS-LINK as a serial port via the USB DEBUG port, it is necessary to short the MCU_TX signal pin and the MCU_RX signal pin.
4	J4 PIN 13	BOOT jumper	J4 PIN 13 : BOOT0.
5	J15	VREF+ jumper	J15: Shorting this jumper allows VREF to use the external VDD_MCU voltage as a reference source.

1.5 Development board schematic

The schematic diagram of the N32H765IIL7_STB development board is described below (see "N32H765IIL7_STB_V1.5" for details).

1) MCU connection

Referring to Figure 1-3, which shows the MCU connection schematic, each VDD pin of the MCU is connected to a capacitor, and all GPIO pins are led out and connected to the J4, J5, J6 and J8 connectors for easy debugging.



Referring to Figure 1-4, which shows the power supply design schematic, the development board can be powered at 5V via USB OTG (J2, J3) or DEBUG USB (J1), and then the LDO outputs 3.3V to power the entire PCB board.



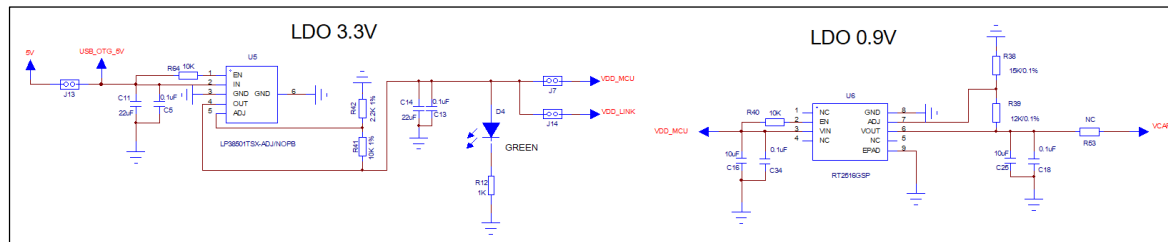


Figure 1-4 Power supply design

3) Button Design

Referring to Figure 1-5, which shows the button design schematic, there are a total of 5 buttons: 3 general-purpose buttons, an MCU wake-up button, and a reset button.

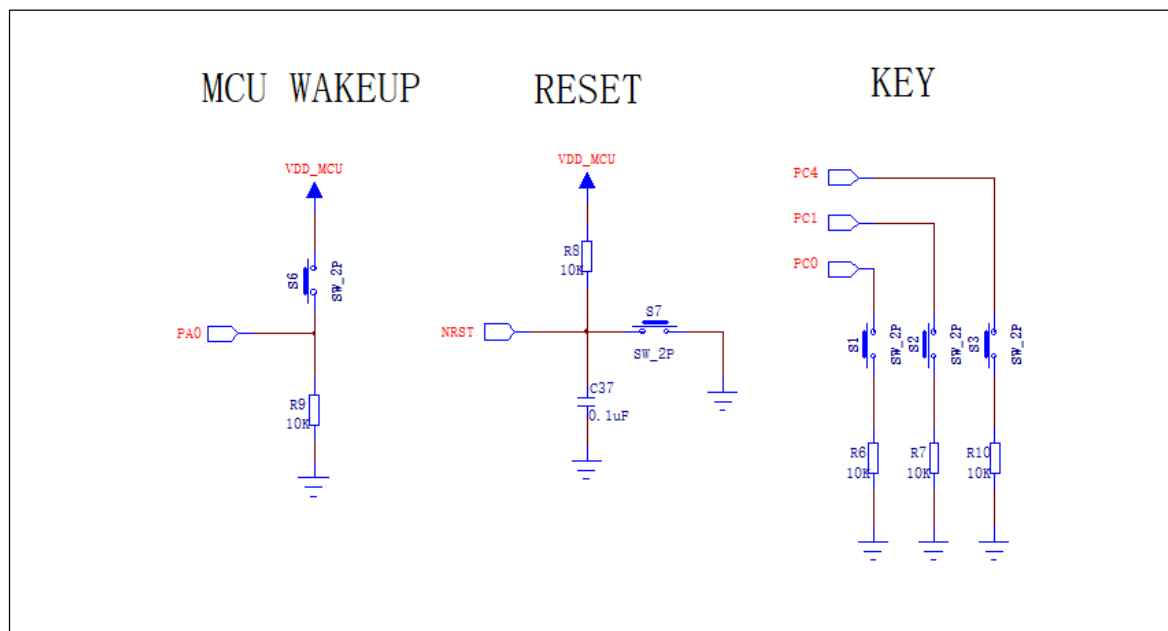


Figure 1-5 Button Design

4) LED design

Referring to Figure 1-6, which shows the schematic diagram of the LED design, there are a total of 5 LEDs. D1, D2, and D3 are connected to PA1, PA2, and PA3 of the main MCU, respectively, and can be used for debugging. D6 and D7 are used for NS-LINK MCU control to monitor the NS-LINK's operating status.

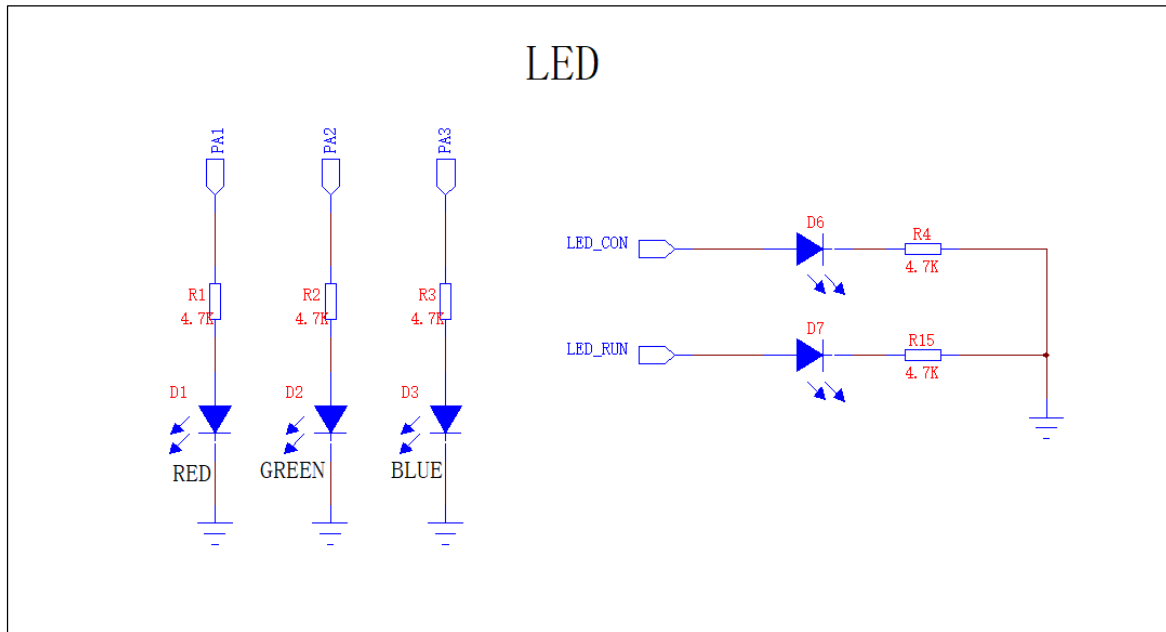


Figure 1-6 LED design

5) crystal

Referring to Figure 1-7, which shows the crystal connection diagram, the chip has two external crystals, one at 32.768 kHz and the other at 25 MHz.

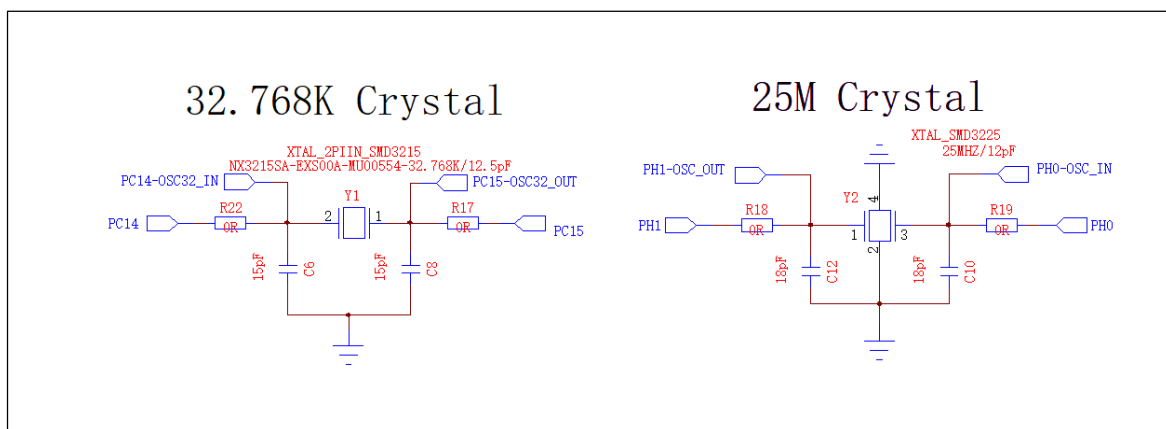


Figure 1-7 Crystal Design

6) BAT

Referring to Figure 1-8, which shows the schematic diagram of an external battery for the BAT pin, power can be supplied to the VBAT pin via an external CR1220 battery connected to the external battery holder on the PCB board.

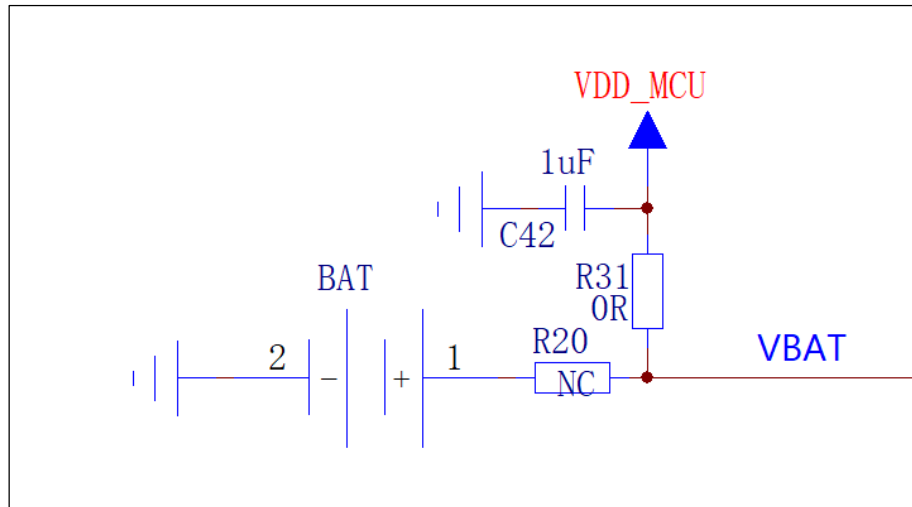


Figure 1-8 BAT

7) NS-LINK

Referring to Figure 1-9, which shows the NS-LINK schematic, users can directly connect a USB cable via the DEBUG USB port to download programs, eliminating the need for a ULINK or JLINK programmer. Debugging can also be performed via the DEBUG USB port, which simulates a serial port.

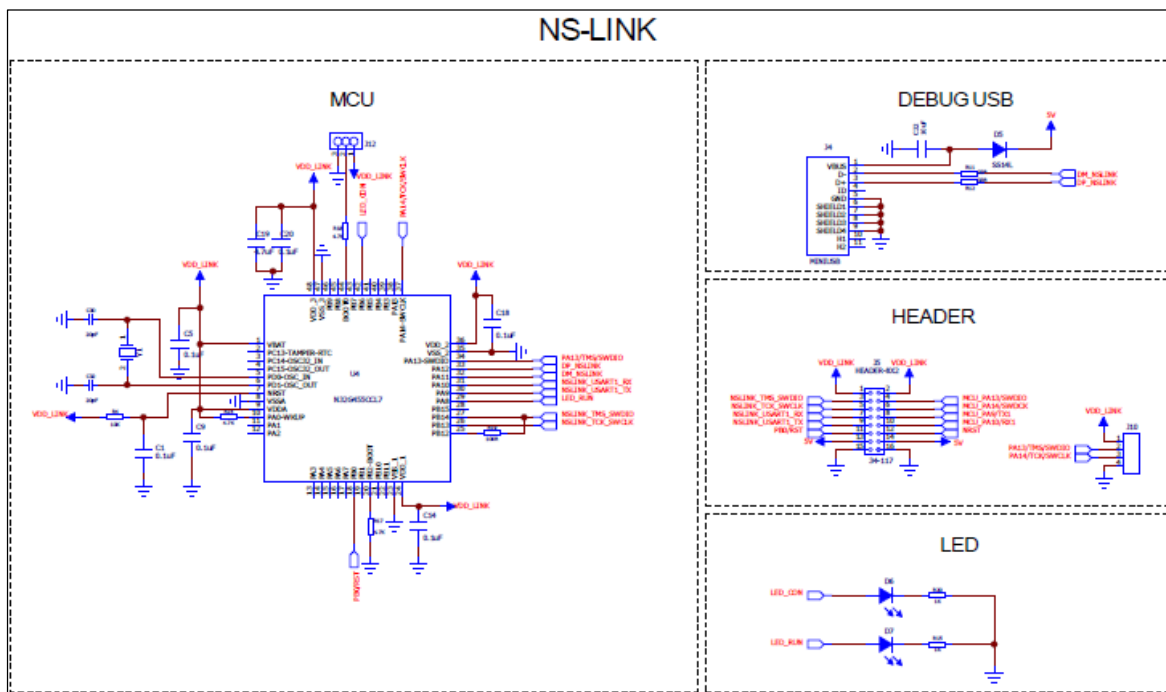


Figure 1-9 NS-LINK

- **MCU Peripheral Components Description:**

- 1) In the PCB layout design, for VDD power supply, place two decoupling capacitors (10uF + 0.1uF) on PIN 48 and PIN 136, and place a 0.1uF decoupling capacitor close to the other VDD pins.
- 2) It is recommended to place a 0.1uF and a 10uF capacitor on the VDDA input pin.
- 3) When VREF+ uses the built-in reference source VREFBUF, it is recommended to place a 0.1uF and a 1uF capacitor near the VREF+ pin. When VREF+ is externally powered, it is recommended to place a 0.1uF and a 10uF capacitor near the VREF+ pin.
- 4) PC14-OSC32_IN, PC15-OSC32_OUT: If an external high-precision RTC clock is required, a 32.768kHz crystal needs to be connected close to the pins. Otherwise, this step is not necessary.

2 Historical Versions

Version	Date	Remark
V1.0	2025-5-15	Create document
V 1.5	2025-9-10	1. Update the 0.9V LDO model to: RT2516GSP

3 Notice

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