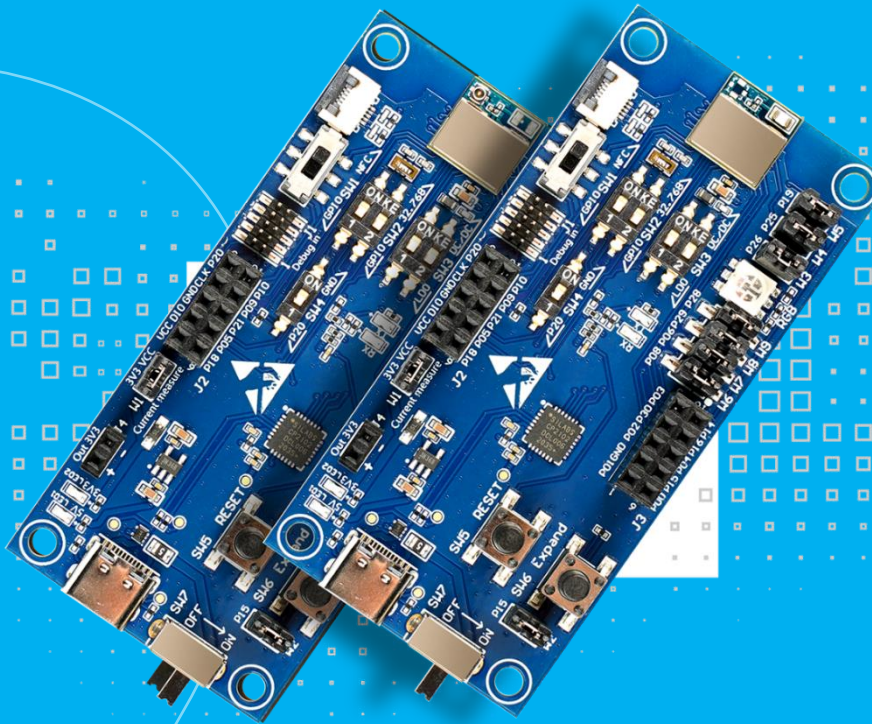# User Guide

## MK01-KIT Evaluation Board

*Version 1.2*



*MOKO TECHNOLOGY LTD.*

# Revision History

| Version | Data | Notes | Contributor(s) |
|---------|------|-------|----------------|
| V1.0 | Oct 15 2020 | Initial version | Kevin Huang |
| V1.1 | Jan 18 2021 | Update the picture and description of the development board | Victor Chow |
| V1.2 | Sep 18 2021 | Modify some parameters errors | Kevin Huang |

# Table of Contents

# 1. Overview

**MK01-KIT** evaluation board is a universal development tool that highlights the capabilities of the **MOKO MK01 series (MK01A & MK01B)** Bluetooth Module. This board provides you with a quick and easy way to develop MK01 series module or even Nordic® nRF52832 solution.

The evaluation board is a full featured evaluation board that provides a complete I/O pin of MK01 series Bluetooth Module, on-board programming and debugging pins (SWD), external 32.768 kHz crystal setup, DC/DC regulator setup, power port over USB Type-C cable, NFC antenna FPC connector, one RESET button, one user button and one user RGB-LED.

The board also provides the option to be powered from a CR2032 coin cell battery and have current sense hole to allow for convenient current measurements.
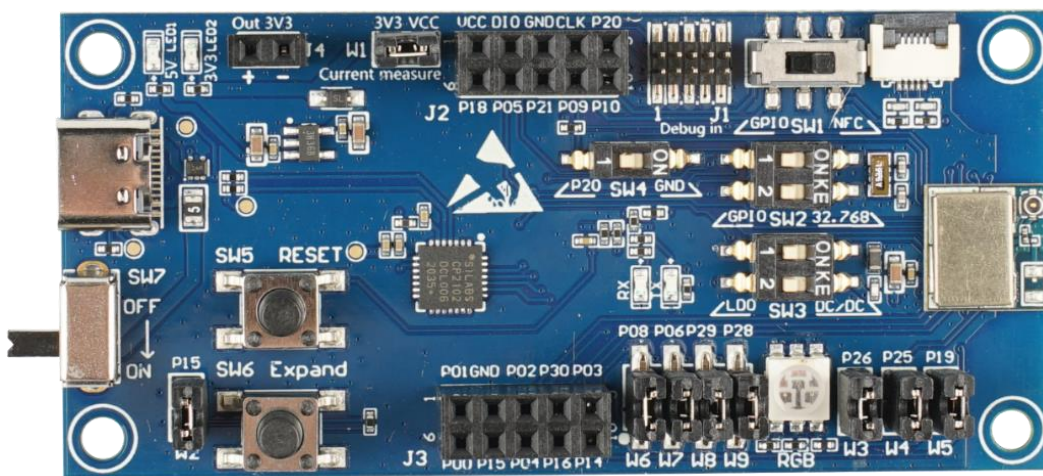


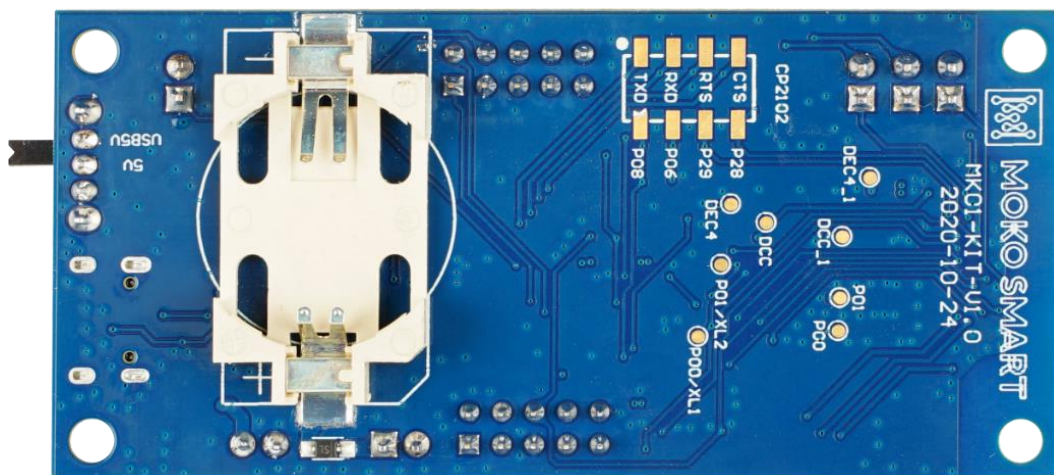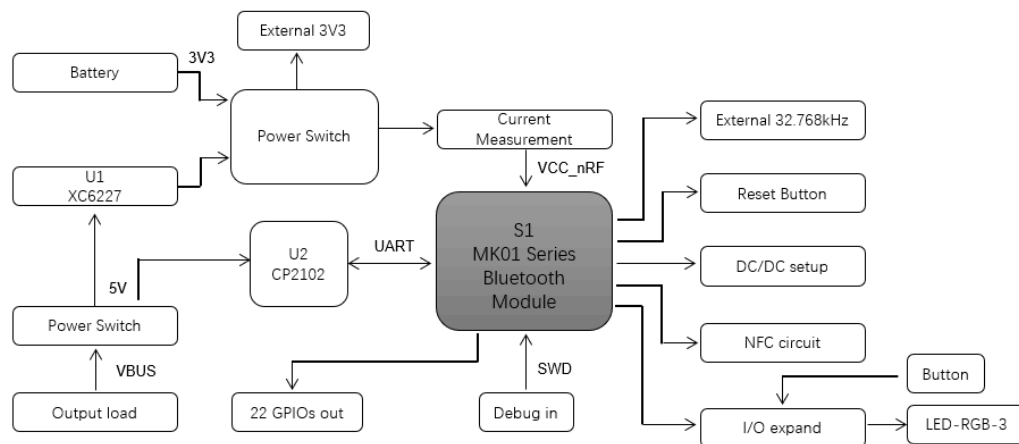*Figure 1: MK01-KIT evaluation board (top view)*
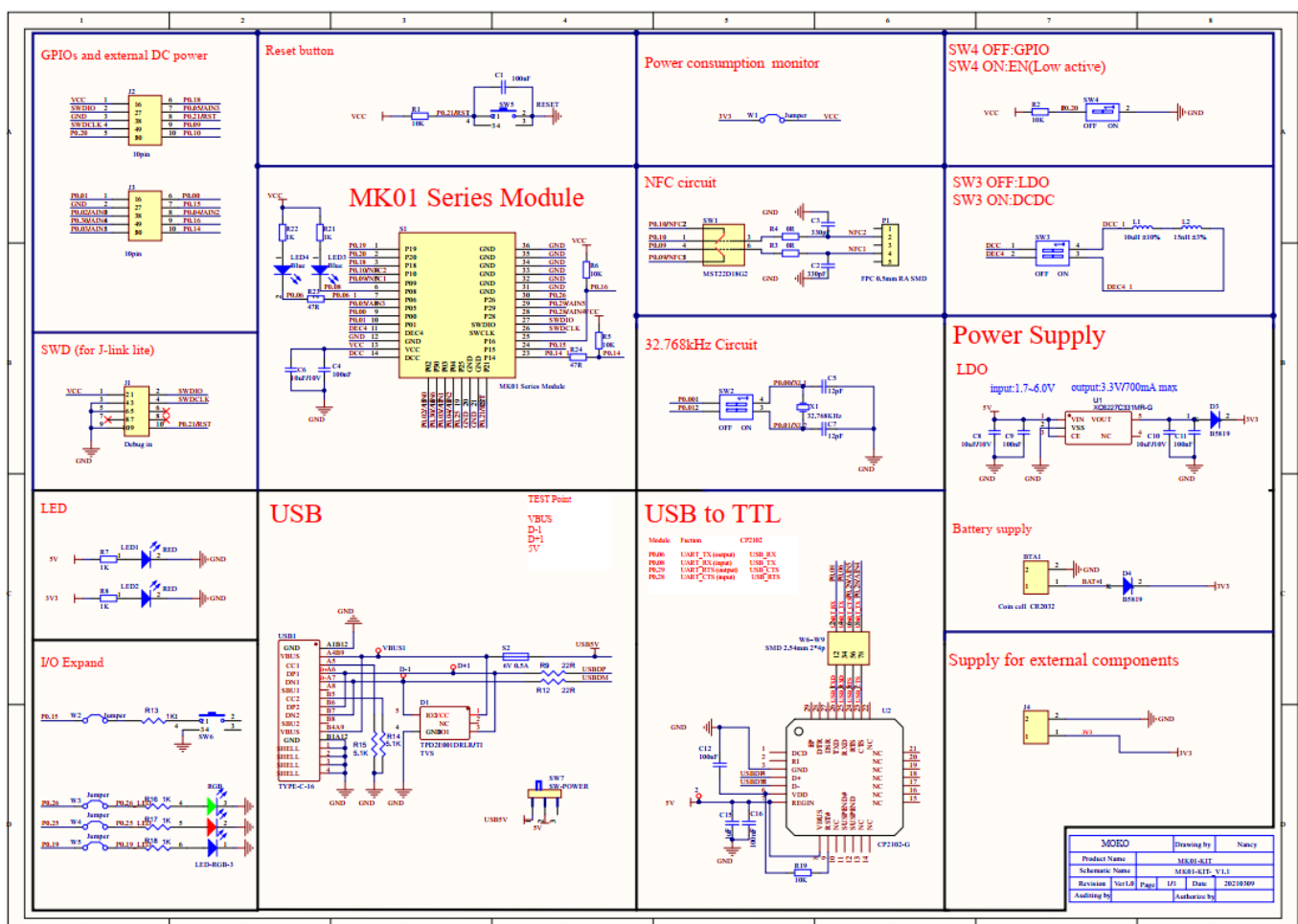


*Figure 2: MK01-KIT evaluation board (bottom view)*

# 2. Circuit Design

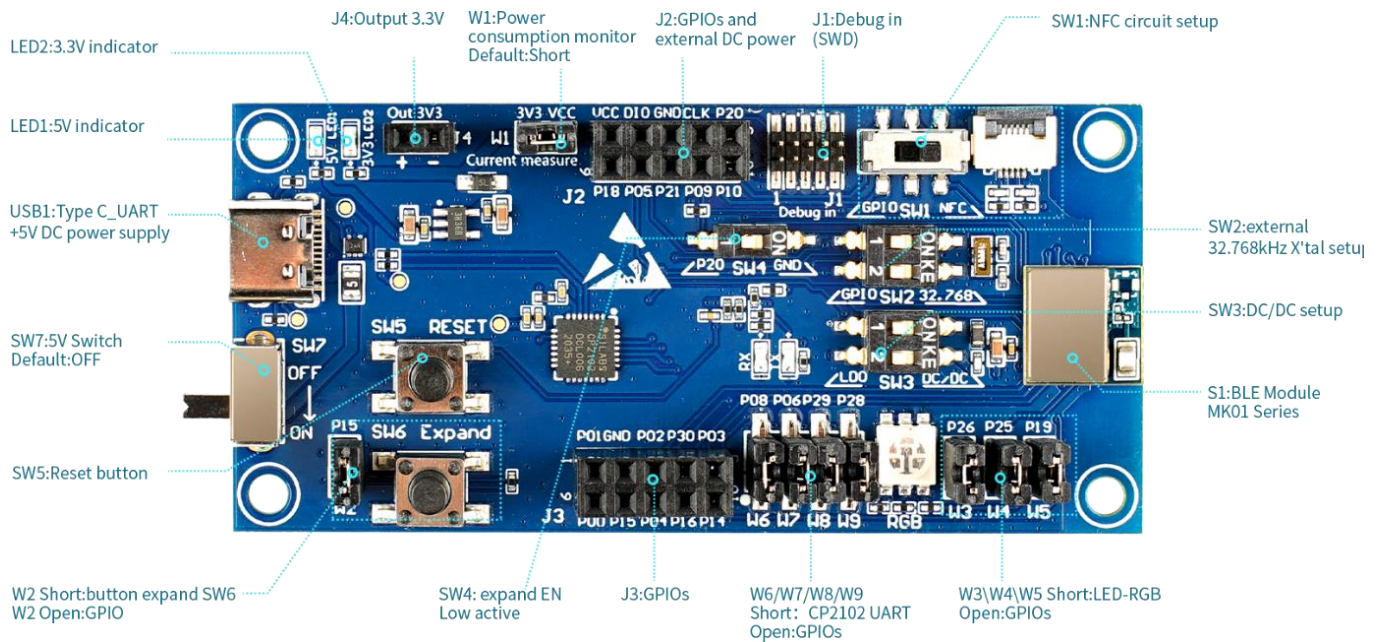## 2.1 Block Diagram



*Figure 3: Block diagram of MK01-KIT*

## 2.2 Schematic



*Figure 4: Schematic of MK01-KIT*

# 3. Functional Blocks



*Figure 5: The functional blocks of MK01-KIT*

**Descriptions:**

- J1: 2x5 1.27mm pitch vertical pin header

- J2 and J3: 2x5 2.54mm pitch vertical female header

- J4: 1x2 2.54mm pitch vertical female header

- W1-W9: 1x2 2.54mm pitch vertical pin header and all jumper caps are mounted

- LED1: 5V indicator

- LED2: 3.3V indicator

- SW5 (push button) for module Reset (active low)

- SW6 (push button) for expand function

- SW1-SW4, SW7 (toggle switch) for circuit selection

## 3.1 Power Supply

There are three power supply options:

- 5V from the USB Type-C
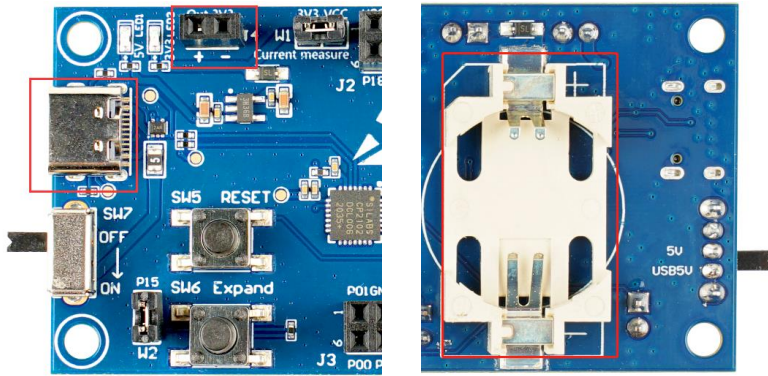
- 3.3V power output

- CR2032 coin cell battery

*Figure 6: Interfaces of power supply for MK01-KIT*

**Note:** The power sources are routed through a set of diodes (D3 and D4 in schematic) for reverse voltage protection, where the circuit is supplied from the source with the highest voltage.

### 3.1.1  Inserting the Coin Cell Battery

To insert the coin cell, follow these steps:

**Step 1:** Push the coin cell against positive contact spring of holder (on the back side of the evaluation board). The coin cell sits below the positive contact spring (as shown with arrow).

**Step 2:** Push the coin cell down into the holder.

### 3.1.2  Removing the Coin Cell Battery

Use an insulated tool in the position shown in picture below, to gently remove the coin cell from the coin cell holder (as shown with arrow). This is the correct method to remove coin-cell from holder.

**Note:** Due to tight fit of coin cell in the coin-cell holder, care should be taken prevent damage to the holder.
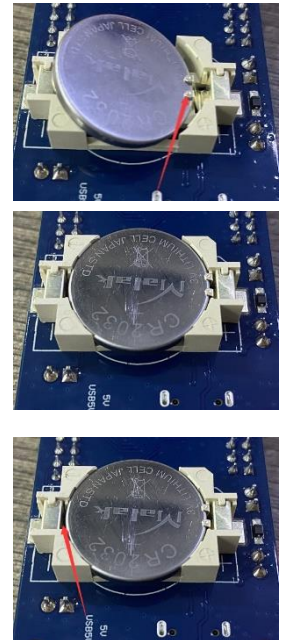
## 3.2    Current Measurement

To measure the current, please take off the jumper cap of W1, and connect an ampere-meter between the pins of W1 to monitor the current directly.

**Note:**

1. Do not use the USB connector to power the board during current measurements. Power the board from a coin cell battery, or use an external power supply on the external supply connector J4.

2. The current measurements will become unreliable when a serial terminal is connected to the virtual COM port.
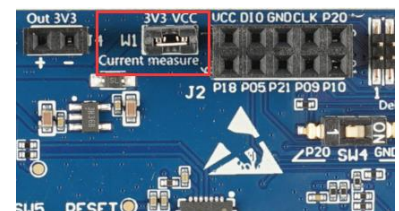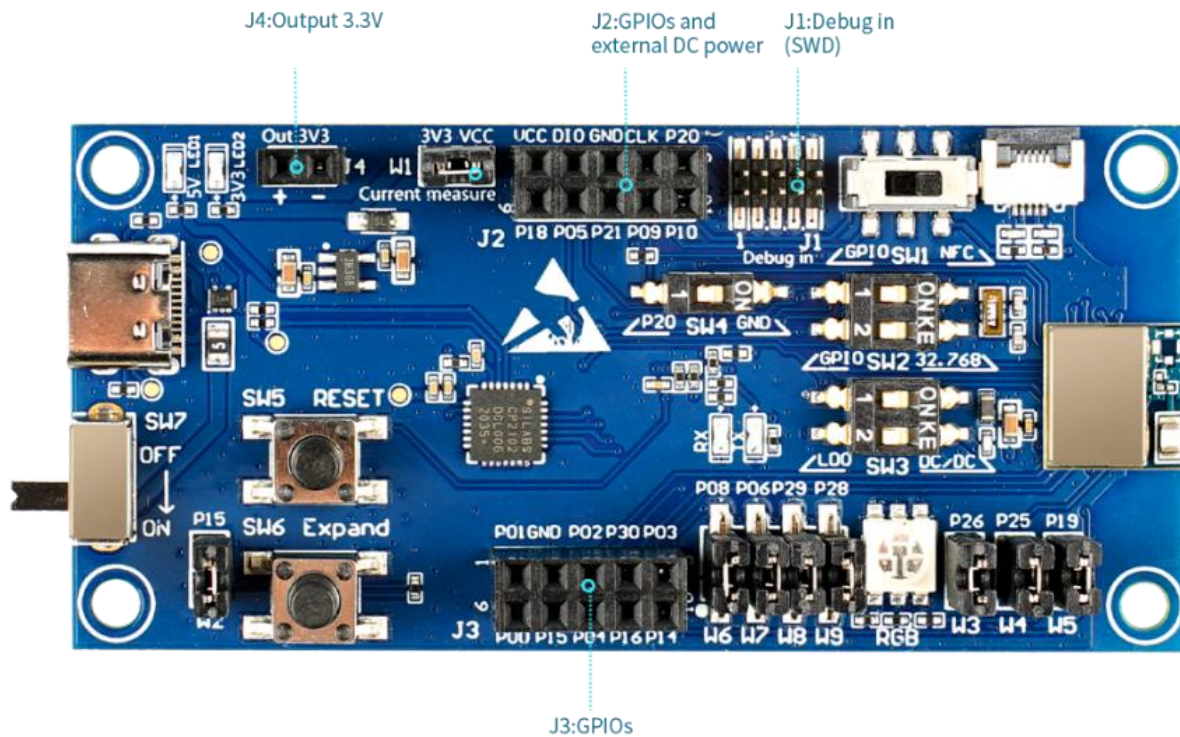
# 3.3 Pin Assignment



*Figure 7: J1 – J4 of MK01-KIT*

*Table 1: The pin assignments of J1 – J4*

| Pin No. | J1 | J2 | J3 | J4 (3.3V output) |
|---------|-----|-----|-----|------------------|
| 1 | VCC | VCC | P01 | 3.3V (+) |
| 2 | SWDIO | SWDIO | GND | GND (-) |
| 3 | GND | GND | P02/AIN0 | |
| 4 | SWDCLK | SWDCLK | P30/AIN6 | |
| 5 | GND | P20/EN | P03/AIN1 | |
| 6 | NC | P18 | P00 | |
| 7 | NC | P05/AIN3 | P15 | |
| 8 | NC | P21/RST | P04/AIN2 | |
| 9 | GND | P09 | P16 | |
| 10 | P0.21/RST | P10 | P14 | |

# 3.4  Switch Positions
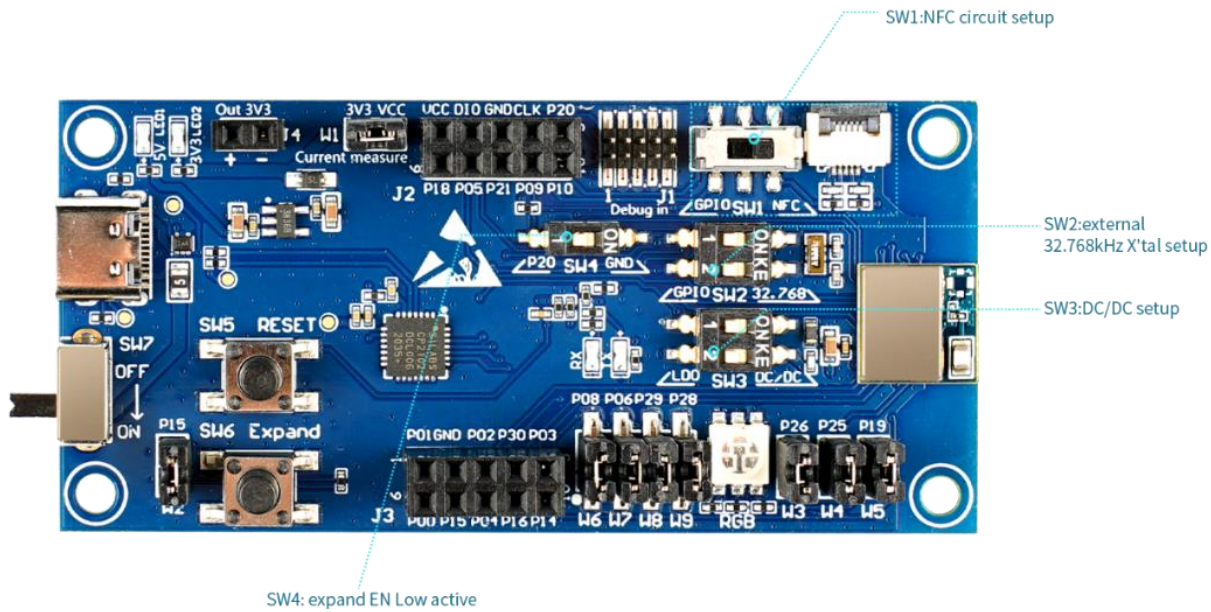


*Figure 8: SW1 – SW4 of MK01-KIT*

*Table 2: Use of SW1 – SW4*

| Part Name | Description | State | Selected Circuit |
|---|---|---|---|
| **SW1** | Toggle switch | Left | P09/P10 |
| | | Right | NFC circuit |
| **SW2** | Toggle switch | Left | P00/P01 |
| | | Right | External 32.768kHz crystal circuit |
| **SW3** | Toggle switch | Left | Default internal LDO regulator setup |
| | | Right | External DC/DC regulator setup |
| **SW4** | Toggle switch | Left | P20 |
| | | Right | P20/EN, pull-down to low level |

## 3.4.1  NFC

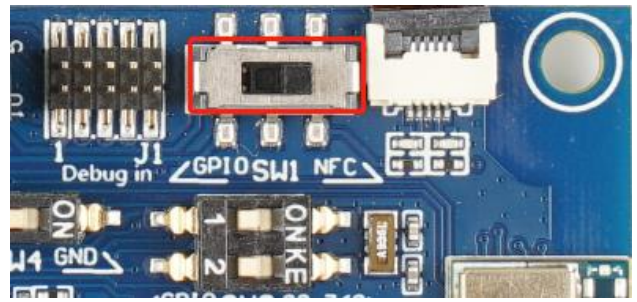MK01-KIT evaluation board has a FPC connector, which can be inserted into a NFC antenna.
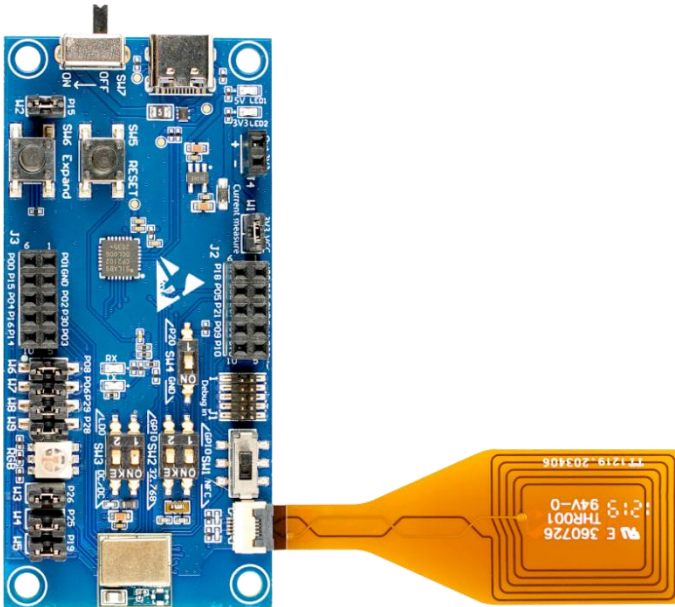
*Figure 9: FPC NFC antenna inserted to MK01-KIT*

To connect the NFC circuit to the MK01 series module, toggle the SW2 toggle switch to the right. If the SW2 toggle switch is toggled to left, P09 and P10 will be enabled as GPIO pins on J2.
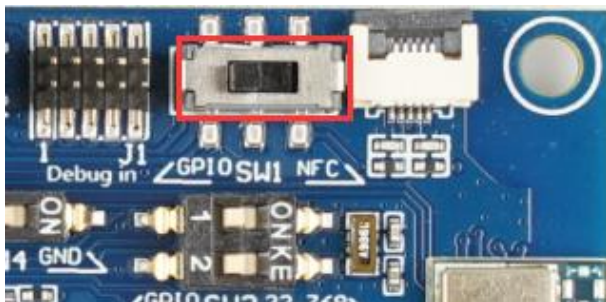


*Figure 10: Toggle to Left – GPIO enabled*



*Figure 11: Toggle to Right – NFC enabled*

## 3.4.2 DC/DC Regulator Setup

The MK01 series module uses LDO regulator setup by default. Connect 10uH and 15nH inductors to the module on the MK01-KIT evaluation board through DCC and DEC4 pins to enable DC/DC regulator setup.

To connect the DC/DC regulator setup circuit to the MK01 series module, toggle the SW3 toggle switch to the right. If toggle the SW3 toggle switch to the left, DCC and DEC4 will be enabled as GPIO pins on J3.

## 3.4.3 External 32.768 kHz Crystal Oscillator

The MK01 series module on-chip 32.768kHz RC oscillator provides the standard accuracy of ±250 ppm.

The MK01-KIT evaluation board connects an external higher accuracy (±20 ppm) 32.768 kHz crystal to the P00 and P01 pins of MK01 series module.

This provides improved protocol timing and helps with radio power consumption in the system standby doze/deep sleep modes by reducing the time that the Rx window must be open.

To connect the optional external 32.76kHz crystal oscillator circuit to the MK01 series module, toggle the SW2 toggle switch to the right. If toggle the SW2 toggle switch to the left, P00 and P01 will be enabled as GPIO pins on J3.
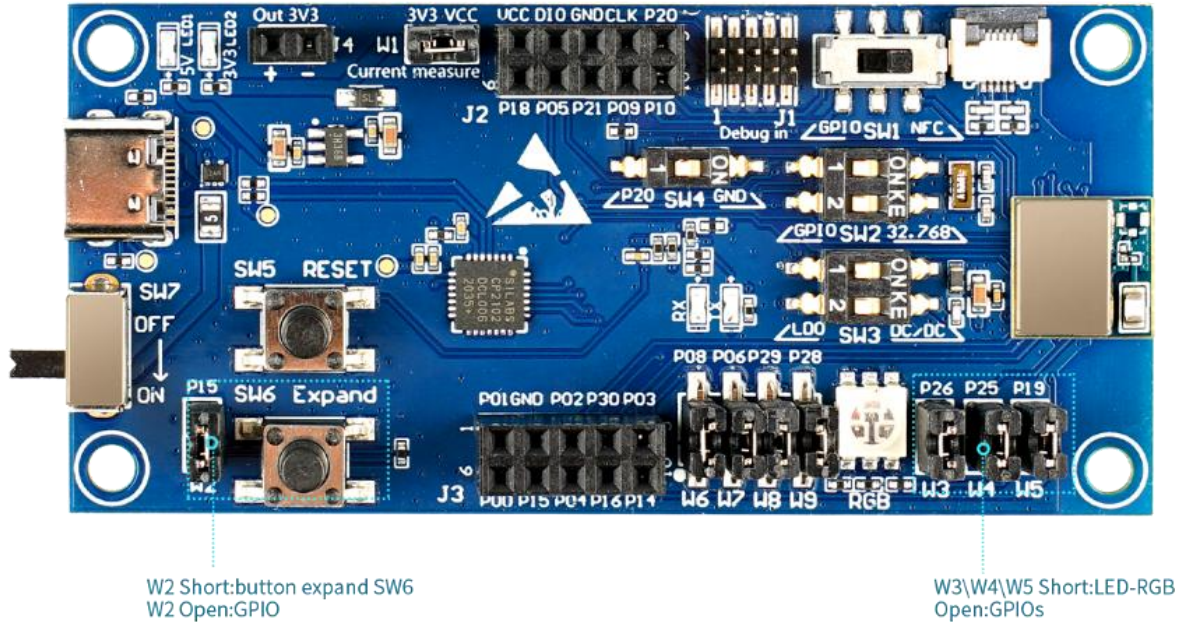
## 3.5 Jumper Position



Figure 12: W2 – W5 of MK01-KIT

Table 3: Use of W2 – W5

| State | W2 | W3 | W4 | W5 |
|---|---|---|---|---|
| Open | P15 | P26 | P25 | P19 |
| Short | Push button SW6 | LED_Green | LED_Red | LED_Blue |

## 3.6 USB to UART

MK01-KIT evaluation board allows the MK01 series module to physically connect to a PC via the supplied USB Type-C cable for development purposes. The evaluation board provides USB-to-UART port conversion through a CP2102 bridge.

Table 4: Description of the UART pins

| GPIO (open) | UART (short) | CP2102 | Jumper |
|---|---|---|---|
| P08 | RX | USB_TXD | W6 |
| P06 | TX | USB_RXD | W7 |
| P29 | CTS | USB_RTS | W8 |
| P28 | RTS | USB_CTS | W9 |

# 4.   Packaging

You will find the following items in the packaging box:
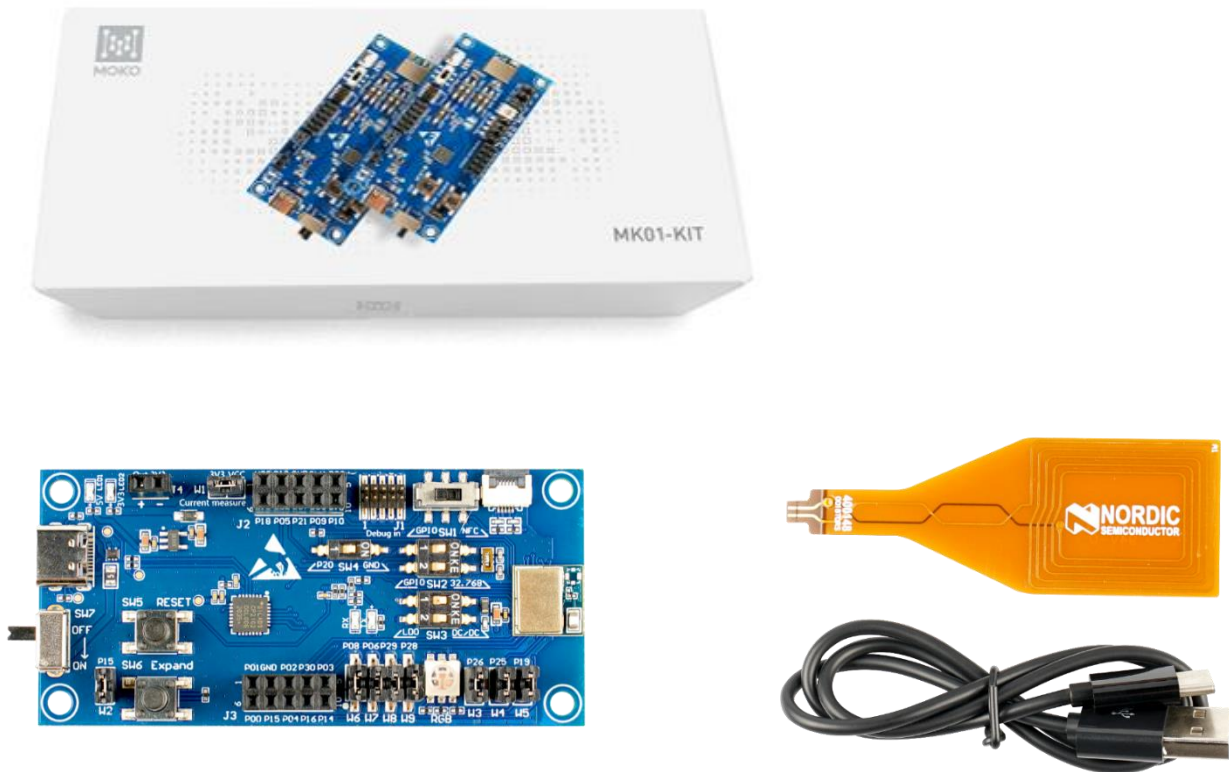






**Figure 13: MK01-KIT evaluation board packaging**

**Table 5: MK01-KIT packaging list**

| Item | Qty |
|---|---|
| MK01-KIT evaluation board | 1 |
| USB-C cable | 1 |
| NFC antenna | 1 |
| Two-pin jumper cap (mounted to the pins) | 9 |

# Contact

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