# CLRC663 READER MODULE V1 – PRODUCT MANUAL
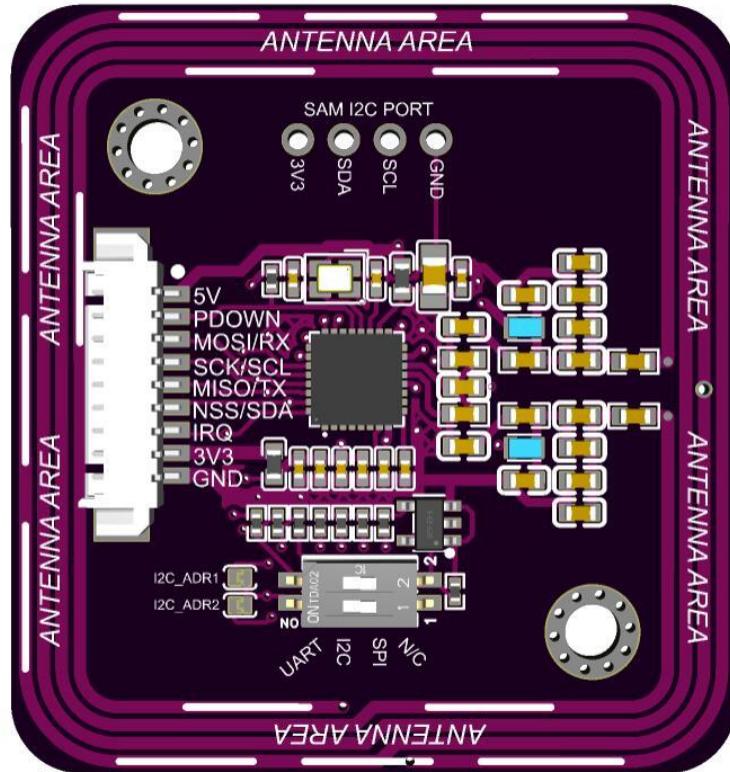
1. PRODUCT OVERVIEW

The **CLRC663 Reader Module V1** is a robust, multi-protocol 13.56 MHz HF/NFC reader module designed for seamless integration into industrial and consumer electronics. Powered by the NXP **CLRC66303** IC, it features a high-efficiency 4-turn PCB antenna and supports **ISO/IEC 14443A/B**, **ISO/IEC 15693**, and **NFC** protocols.

The module offers ultimate flexibility with three selectable host interfaces (**SPI**, **I2C**, **UART**) and includes a "SAM-ready" port for high-security applications. To accelerate development, an open-source ESP32 Arduino library is provided.

2. INTERFACE CONFIGURATION (DIP SWITCH)

IMPORTANT: Configure the interface mode **before** applying power.

2.1 VISUAL ALIGNMENT METHOD (RECOMMENDED)

The module is designed for intuitive configuration using the on-board 2-position DIP switch and the PCB silkscreen.

• **Look at the PCB:** Next to the DIP switch, you will see printed labels for **UART**, **I2C**, and **SPI**.

• **Action:** Simply toggle the switches to visibly align with the printed mode label corresponding to your desired interface.

  ◦ *Note: Ensure the switches are fully seated in the ON or OFF position as indicated by the diagram/text on the board.*
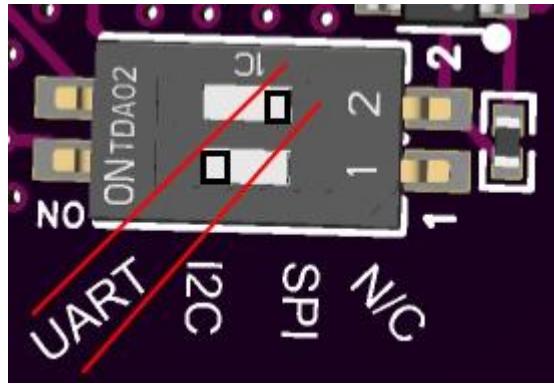
2.2 LOGIC TABLE (TECHNICAL REFERENCE)

If the silkscreen is obstructed, use the following logic table to set the switches:

Switch 1	Switch 2	Interface Mode
OFF	OFF	**SPI** (Default)
ON	OFF	**UART**
ON	ON	**I2C**
OFF	ON	*Reserved (Do Not Use)*

Note: Please power cycle the module after changing the DIP switch settings for the changes to take effect.

3. TECHNICAL SPECIFICATIONS

3.1 MECHANICAL SPECIFICATIONS

• **Dimensions:** 40.02 mm x 42.36 mm

• **Antenna Area:** ~39 mm x 42 mm (Integrated 4-turn PCB coil)

• **Mounting:** 2x Mounting holes

• [3D Model DOWNLOAD](#)

3.2 Chip-Level Pin Mapping

For developers using **STM32, Linux, or other MCUs**, the table below maps the module header pins directly to the NXP CLRC66303 chip pins. This allows you to use the standard NXP datasheet for register configuration.

Module Pin	Function	CLRC66303 Pin Name	Pin #	Notes
5V	Power Input	-	-	Input to onboard LDO, 3.0V~5.5V

PDOWN	Power Down	PDOWN	21	Active High (Hard Power Down)
MOSI / RX	SPI MOSI / UART RX	IF0	28	Also I2C Address Bit 0
MISO / TX	SPI MISO / UART TX	IF1	29	Also I2C Address Bit 1
SCK / SCL	SPI Clock	IF2	30	I2C SCL line
NSS / SDA	SPI CS / I2C SDA	IF3	31	I2C SDA line
IRQ	Interrupt	IRQ	32	Programmable Interrupt Output
3V3	Logic Ref / Output	TVDD / VDD	8, 25	Typical 3.3V (could be 2.5V~5.5V) Output from LDO / Logic Ref

3.3 ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_IN	3.0	5.0	5.5	V
Logic Voltage	V_IO	2.5	3.3	5.5	V
Typical Power Consumption	W_active	-	0.8	-	W
Operating Temp	T_op	-25	-	+85	°C

4. INTEGRATION GUIDE

4.1 I2C ADDRESS CONFIGURATION
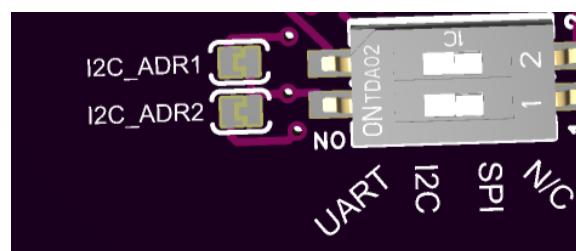
In I2C mode, the module acts as a slave. The 7-bit I2C address is configured via the logic states of:

- I2C_ADR1=MOSI/RX

- I2C_ADR2=MISO/TX

By Default, they are pulled to HIGH. So NC (not connected)/connecting to 3V3 means **HIGH**.

To set to **LOW** or **GND**, there are two methods:

1.   Connect **MOSI/RX** or **MISO/TX** to GND.

2.   Bridge the soldering pads of **I2C_ADR1 or I2C_ADR2 (this method will disable other mode like SPI or UART).**

I2C_ADR1	I2C_ADR2	7-Bit I2C Address (Hex)	8-Bit Read/Write
GND	GND	**0x28**	0x50 / 0x51
GND	NC	**0x29**	0x52 / 0x53
NC	GND	**0x2A**	0x54 / 0x55
NC	**NC**	**0x2B** (Default)	0x56 / 0x57

4.2 SAM INTERFACE (SECURITY EXTENSION)

The module includes a dedicated **SAM I2C PORT** header for connecting an external Secure Access Module (e.g., NXP SAM AV2/AV3).

• **Header Pinout:** 3V3, SDA, SCL, GND.

• **Internal Connection:** Connected directly to CLRC66303 pins **23 (SCL)** and **24 (SDA)**.

• **Usage:** Enables the reader to perform secure key storage and cryptographic operations (AES, 3DES) completely independent of the host MCU. Requires enabling "Host Interface" bits in the CLRC663 registers.

5. QUICK START: ESP32 + SPI MODE

STEP 1: WIRING

Connect the module to an ESP32 Development Board. Ensure DIP switches are set to **SPI Mode** (OFF/OFF).

CLRC663 Pin	ESP32 Pin (VSPI)
5V	5V / VIN
GND	GND
PDOWN	GND (Keep Low for Active)
MOSI	GPIO 23
MISO	GPIO 19

SCK	GPIO 18
NSS	GPIO 5

STEP 2: LIBRARY & CODE

1. **Download:** Get the CLRC663_ELECHOUSE Library from GitHub.

2. **Install:** In Arduino IDE, use Sketch -> Include Library -> Add .ZIP Library.

3. **Upload:**

   ◦ Open File -> Examples -> CLRC663_ELECHOUSE -> ReadUID.

   ◦ Select Board: **ESP32 Dev Module**.

   ◦ Upload and open Serial Monitor (115200 baud).

4. **Test:** Place a MIFARE card near the antenna. The UID will appear in the monitor.

6. APPLICATION NOTES

• **Supported Card Types (Library):** ISO14443A (MIFARE Classic, Ultralight, NTAG), ISO15693 (ICODE SLIX).

• **Installation:**

   ◦ Avoid placing the antenna directly against metal surfaces.

   ◦ If mounting on metal is necessary, a **ferrite sheet** must be placed between the antenna and the metal surface to prevent detuning.

• **Read Range:** Typical 2.5cm - 8.5cm (Front side). Within 0~2cm, the reading is not stable at some distance points. If in your application you require reading in low distance, please attach the following ferrite sheet at the back side of the antenna:

This ferrite will benefit in the following ways: 1. Make stable reading between 0~7cm.   2.prevent interference from metals or circuit from the backside.