CENTRE FOR SKILL AND ENTREPRENEURSHIP DEVELOPMENT
TOPIC – RFID - RC522
IIOT - 3

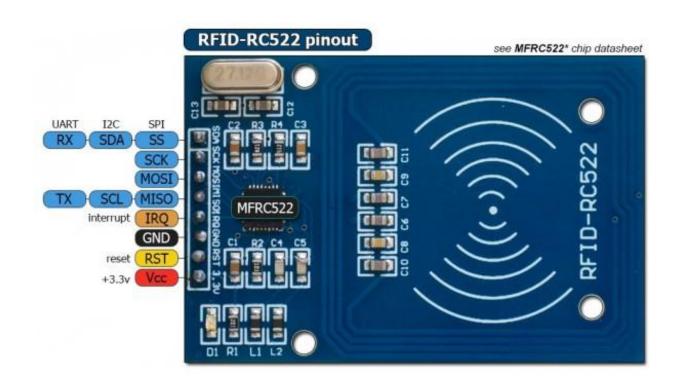**DCS**
Power To Design The Desired

Radio Frequency Identification systems consist of an RFID tag (typically many tags) and an interrogator or reader. The interrogator emits a field of electromagnetic waves from an antenna, which are absorbed by the tag.

A. Tag

B. Reader

RFID-RC522 pinout

see MFRC522* chip datasheet

The **RC522** is a **13.56MHz RFID module** that is based on the **MFRC522 controller from NXP semiconductors.**

The module can supports I2C, SPI and UART and normally is shipped with a RFID card and key fob.

It is commonly used in attendance systems and other person/object identification applications.

Pin Number	Pin Name	Description
1	Vcc	Used to Power the module, typically 3.3V is used
2	RST	Reset pin – used to reset or power down the module
3	Ground	Connected to Ground of system
4	IRQ	Interrupt pin – used to wake up the module when a device comes into range
5	MISO/SCL/Tx	MISO pin when used for SPI communication, acts as SCL for I2c and Tx for UART.
6	MOSI	Master out slave in pin for SPI communication
7	SCK	Serial Clock pin – used to provide clock source
8	SS/SDA/Rx	Acts as Serial input (SS) for SPI communication, SDA for IIC and Rx during UART

RC522 Features:

- Operating Frequency : 13.56MHz (ISM Band)

- Operating voltage: 2.5V to 3.3V

- Communication : SPI(10Mbps), I2C protocol, UART

- Maximum Data Rate: 10Mbps

- Read Range: 5cm

- Current Consumption: 13-26mA

- Power down mode consumption: 10uA (min)

- 14443A compatible transponder signals.

- ISO14443A frames and error detection.

- Supports rapid CRYPTO1 encryption algorithm, terminology validation MIFARE products.

- MFRC522 support MIFARE series of high-speed non-contact communication, two-way data transmission rate up to 424kbit/s.

- The module operates at13.56MHz which is industrial (ISM) band and hence can be used without any license problem.

- The keychain has 1kB memory in it which can be used to stored unique data.

- The RC522 reader module can both read and write data into these memory elements.

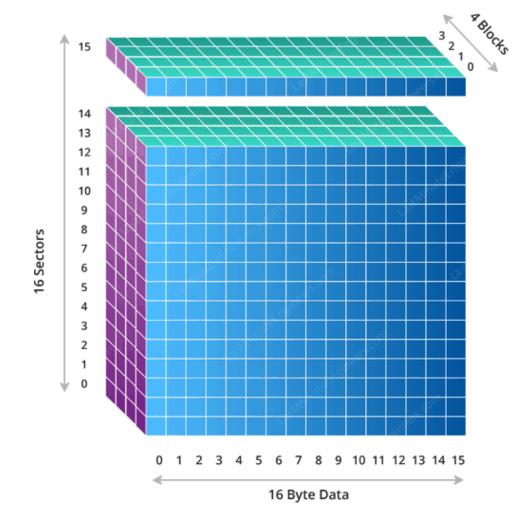- The reader can read data only from passive tags that operate on 13.56MHz.

MIFARE Classic 1K Memory Layout:

The 1K memory of the Tag is organized in **16 sectors (from 0 to 15),** Each sector is further divided in to **4 blocks (block 0 to 3).**Each block can store **16 bytes of data (from 0 to 15).**
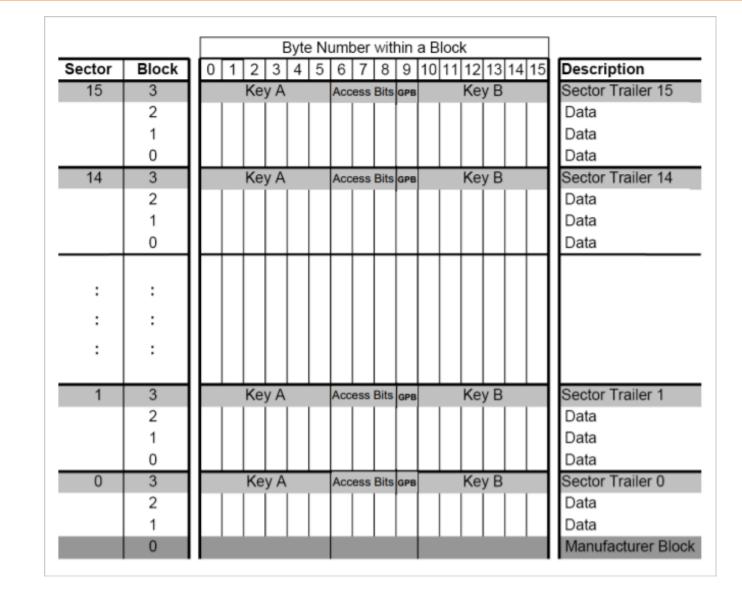
That surely tells us we have:

16 sectors x 4 blocks x 16 bytes of data = 1024 bytes = 1K memory

- The Block 3 of each sector is called Sector Trailer and contains information called Access Bits to grant read and write access to remaining blocks in a sector.

- That means only the bottom 3 blocks (block 0, 1 & 2) of each sector are actually available for data storage, meaning we have 48 bytes per 64 byte sector available for our own use.

- Also The Block 0 of sector 0 is known as Manufacturer Block/Manufacturer Data contains the IC manufacturer data, and the Unique IDentifier (UID). The Manufacturer Block is highlighted in red below.

Sector	Block	Byte Number within a Block		Description
		0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15		
15	3	Key A Access Bits GPB Key B		Sector Trailer 15
	2			Data
	1			Data
	0			Data
14	3	Key A Access Bits GPB Key B		Sector Trailer 14
	2			Data
	1			Data
	0			Data
:	:			
:	:			
:	:			
1	3	Key A Access Bits GPB Key B		Sector Trailer 1
	2			Data
	1			Data
	0			Data
0	3	Key A Access Bits GPB Key B		Sector Trailer 0
	2			Data
	1			Data
	0			Manufacturer Block

- Automatic billing systems

- Attendance systems

- Verification/Identification system

- Access control systems