

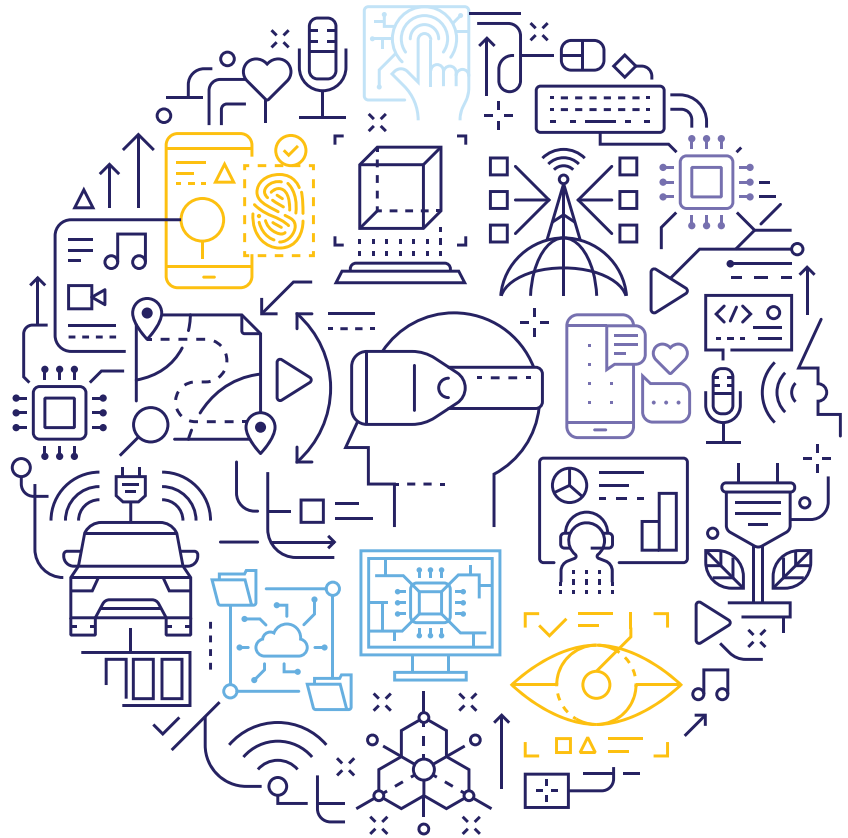


USER MANUAL

SIC43S1 Development Kit

Rev 2.0 (11, 2020)

This document describes how to use SIC43S1 Writer Android Application with SIC43S1 Development Kit. This manual consists of how to read tag and how to write tag.



Revision History

Revision	Date	Description
1.0	May 2020	1 st Release
1.1	July 2020	Check mode in NDEF message write
2.0	November 2020	Revise template

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1. Introduction

SIC43S1 is an NFC Type 2Tag that offer AES encryption for high-security applications. The tag has 3 distinct security features based on AES128 cryptography.

- NDEF Authentication
- Mutual Authentication
- Encrypted Communication

Silicon Craft Technology PLC. (SIC) creates this document to describe about how to install and how to use SIC43S1 configure application on Android.



2. Instrument

To use this application, there are instruments required as below.

1. NFC Phone with Android operation version 5 (Lollipop) or above.
2. SIC43S1 Tag

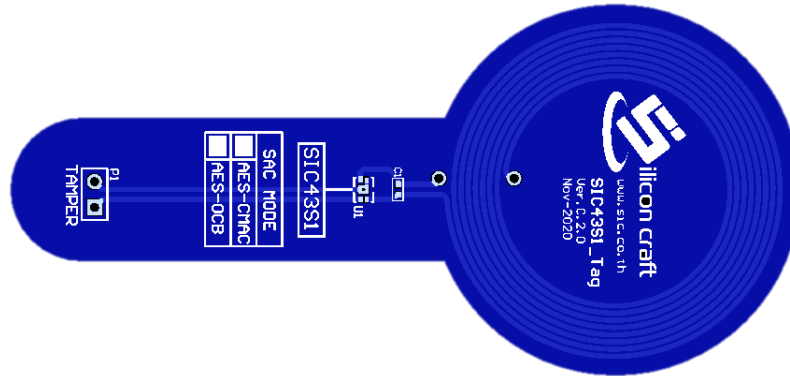


Figure 2-1 SIC43S1 Tag



3. Demonstration Application

This part demonstrates how to use SIC43S1 Demo with SIC43S1 Writer Application both read information and configure transponder. This application is developed by using Android Studio version v3.6.x.

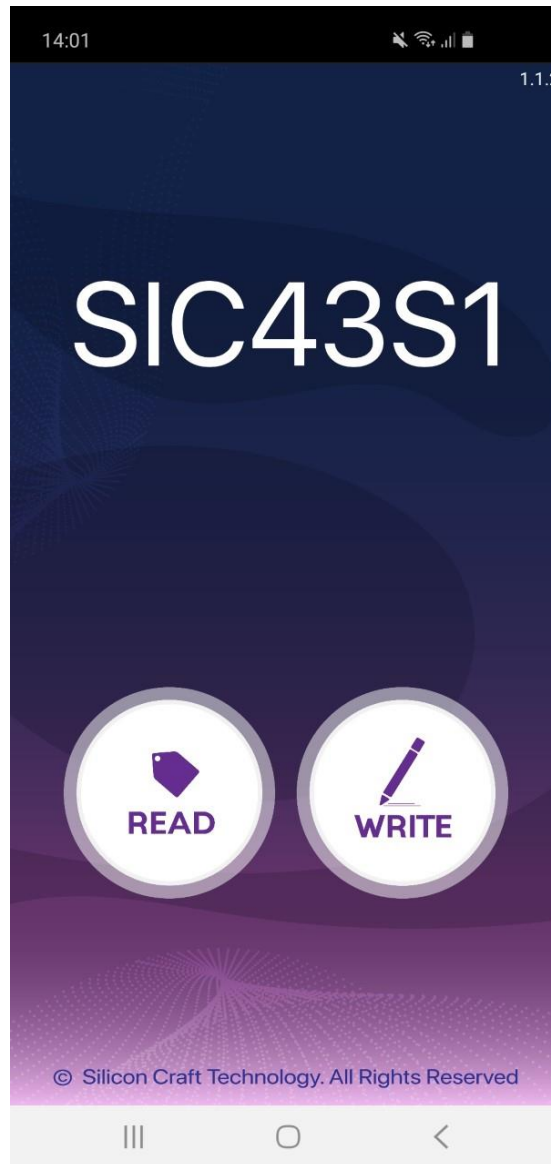


Figure 3-1 SIC43S1 Application



3.1. Read Information

Click 'READ' button to read tag information and tap the mobile on the tag.

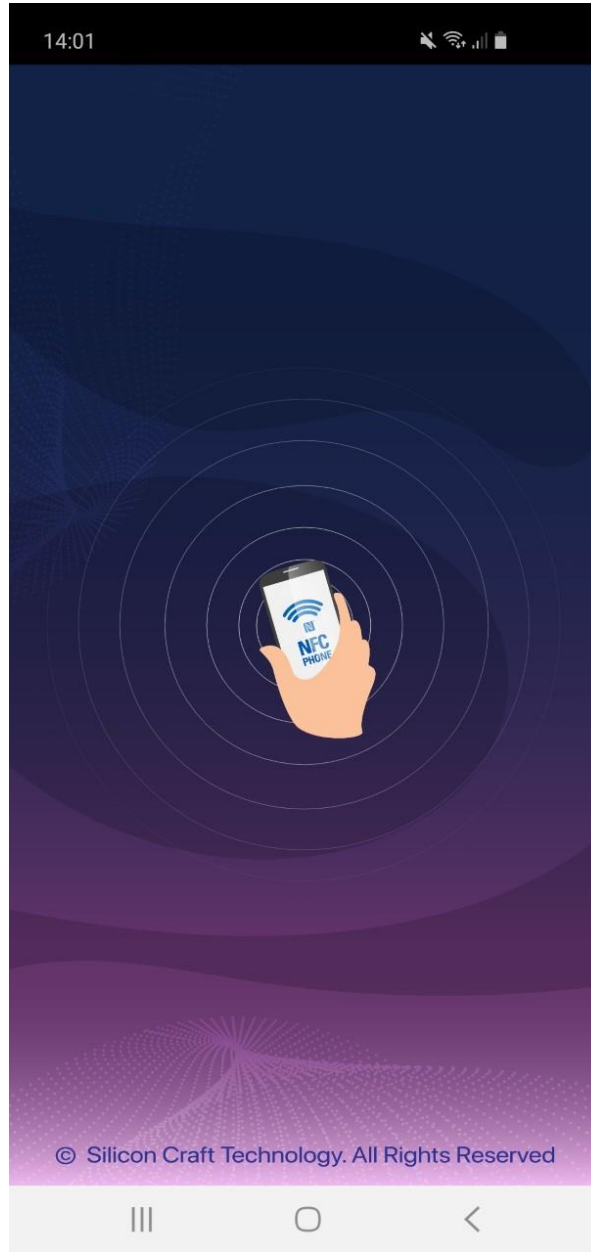


Figure 3-2 Screen for tap a tag



3.1.1. Data Memory

This function shows the mode of IC whether it works in CMAC mode or OCB mode. Figure 3-3 (a) shows all the data in SIC43S1's memory and Figure 3-3 (b) shows the output type of each memory address.

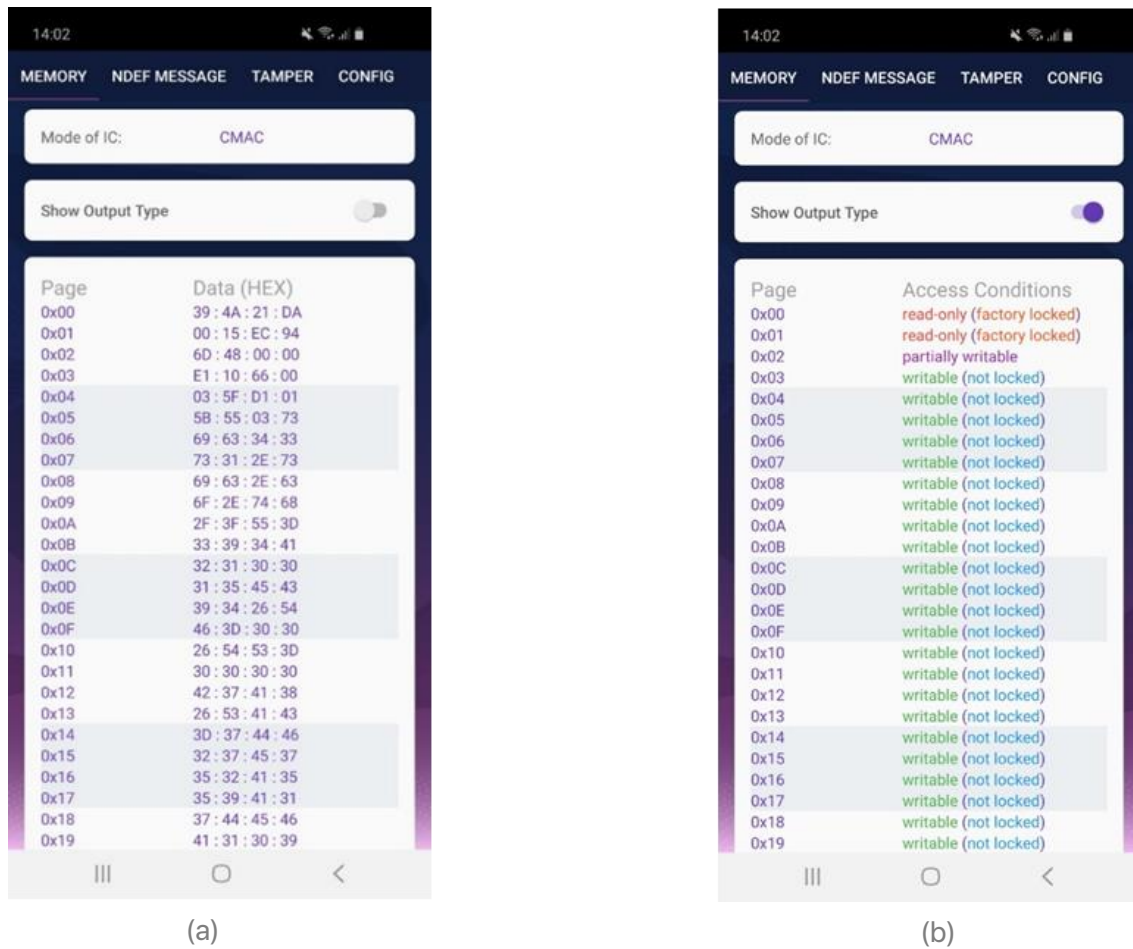


Figure 3-3 Data Memory



3.1.2. NDEF Message

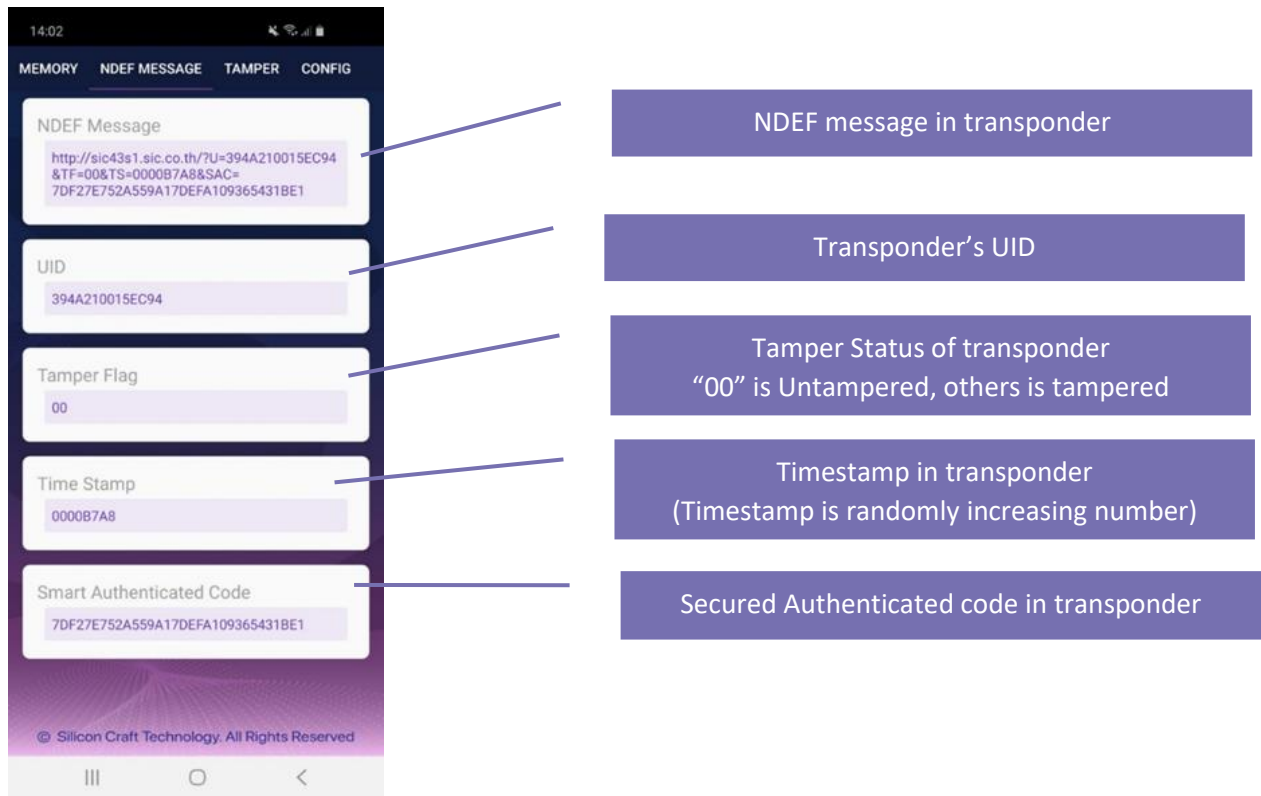


Figure 3-4 NDEF Message

3.1.3. Tamper Status

Tamper status of transponder is shown in Figure 5 (a) and (b).



Figure 3-5 Tamper Status



3.1.4. Configuration

Show configuration of SIC43S1 tag which includes Tdata, Authentication, Dynamic Data, and Dynamic pointer. Tdata is the configuration of tamper status to be shown when tag is tampered.

Table 3-1 Tamper Status

ASCII data	Description
00	Untampered
Others	Tampered

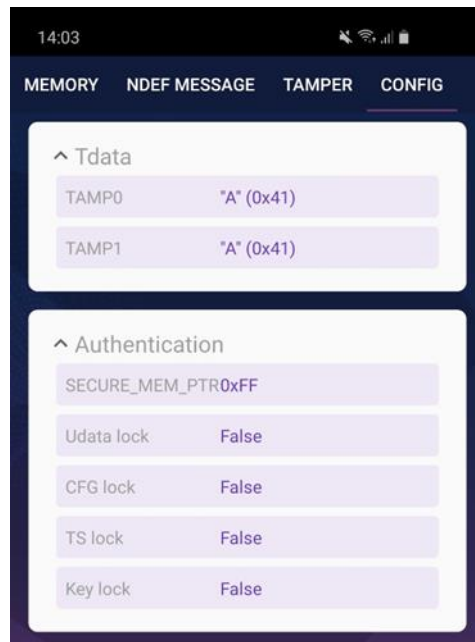


Figure 3-6 Tdata and Authentication

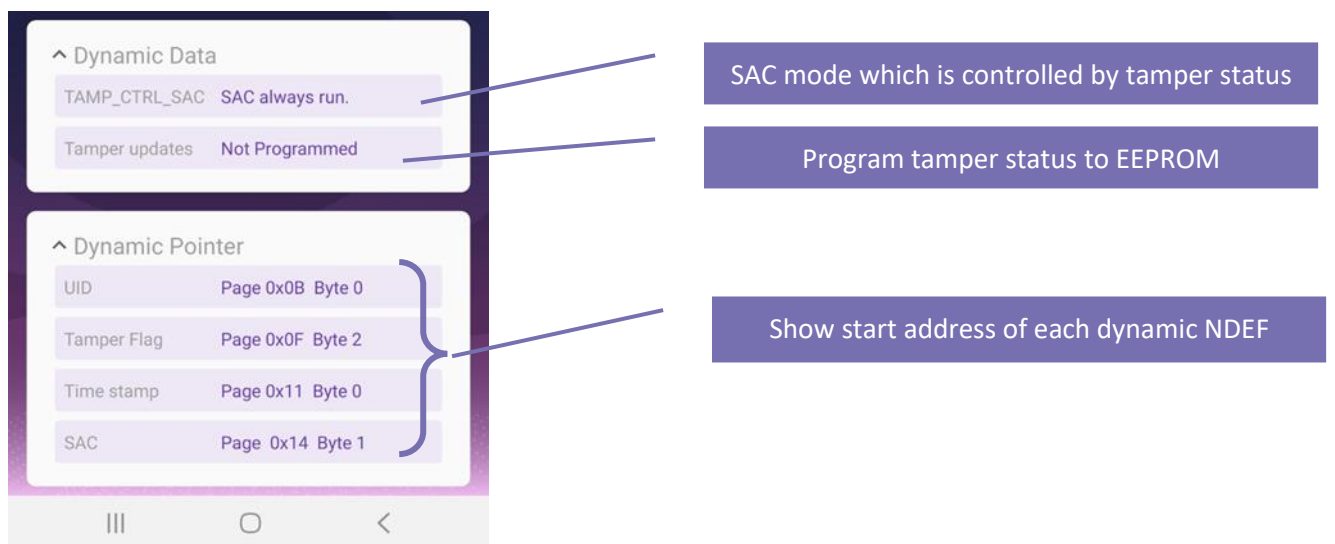


Figure 3-7 Dynamic Data and Dynamic Pointer



3.2. Write Transponder

Click 'WRITE' button to configure the tag.

3.2.1. Clear Mutual Authentication

Use this configuration to clear the memory protection from mutual authentication. SIC43S1 requires 2 keys to unlock the memory access. Each key contains 16-bytes length.

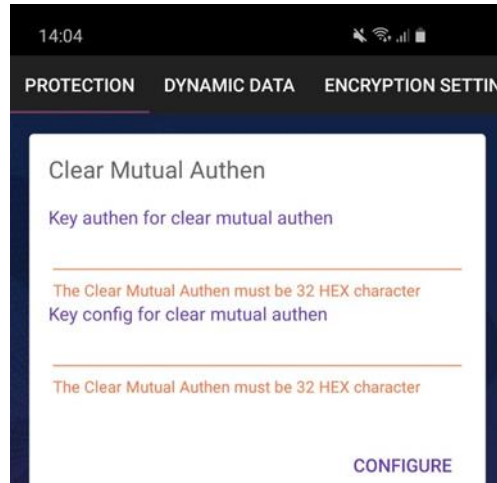


Figure 3-8 Clear Mutual Authentication

3.2.2. Secure Memory Point

Secure Memory Point is set for data protection from both read and write access.

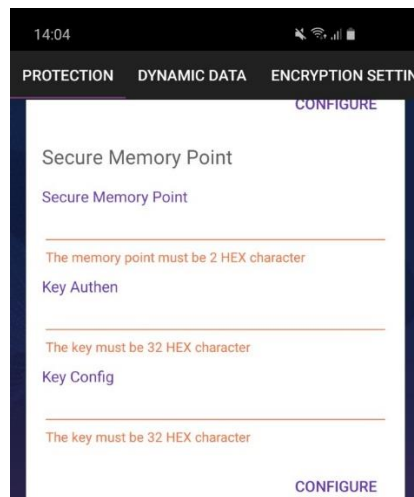


Figure 3-9 Secure Memory Point

- Secure Memory Point Start protected address.
- Key Authen 16 Bytes data used to unlock the tag.
- Key Config 16 Bytes data used to unlock the tag.



3.2.3. Write Access Lock

Write access lock is set to protect each memory section from write access.

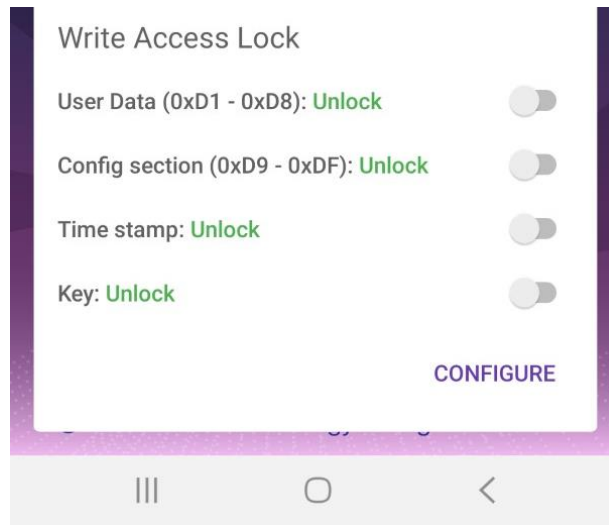


Figure 3-10 Write Access Lock

3.2.4. Smart Authenticated Code Mode

Smart Authenticated Code mode can be set to control the dynamic NDEF data depend on the tampering event.

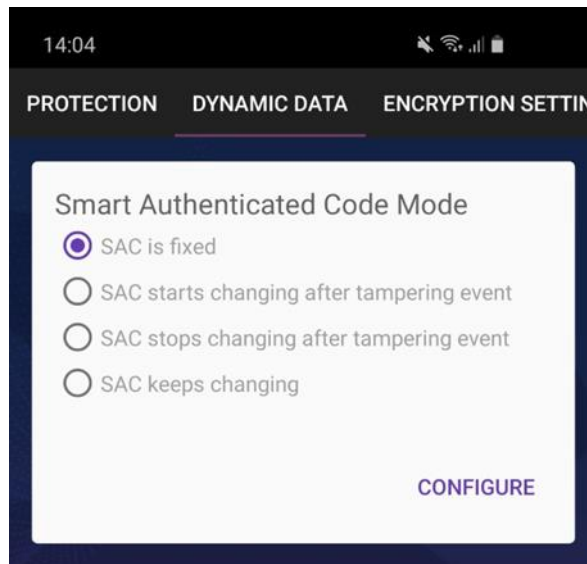


Figure 3-11 Smart Authentication Code Mode



3.2.5. Tamper Status

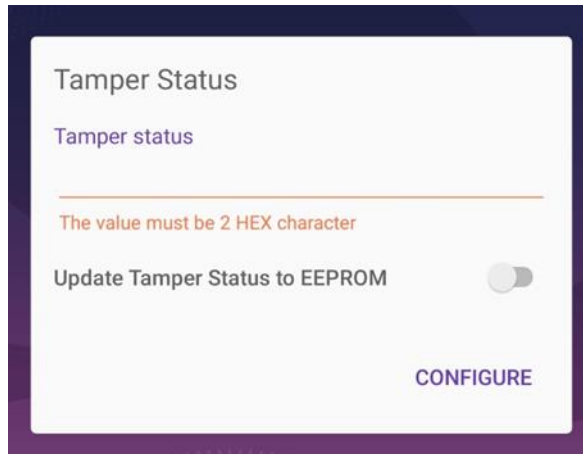


Figure 3-12 Tamper Status

- Tamper Status: 2 Hex data to be shown when tag is tampered.
- Update Tamper status to EEPROM: Enable to permanently store tampered event in EEPROM.

3.2.6. Encrypt Parameter

Set SAC Key and timestamp which are used in SAC calculation.

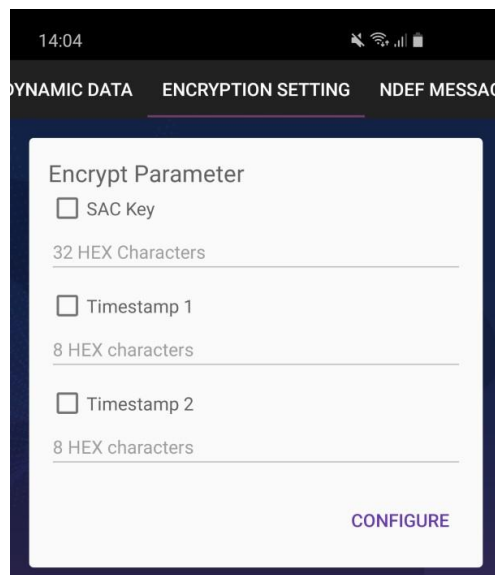


Figure 3-13 Encrypt Parameter



3.2.7. User Data

Set the data which is contained in memory page 0xD1 – 0xD8. This user data is used in SAC calculation of SIC43S1 OCB mode.

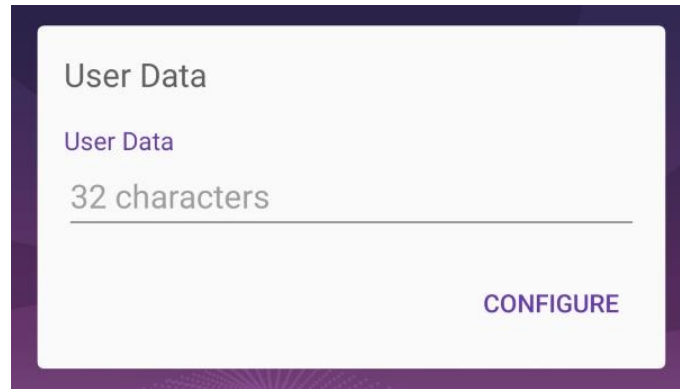


Figure 3-14 User Data

3.2.8. NDEF Information

Set the NDEF message for SIC43S1. This application support only URL type which can enable each dynamic NDEF message of SIC43S1. This mode requires the mode of IC checking before configuring the NDEF message.

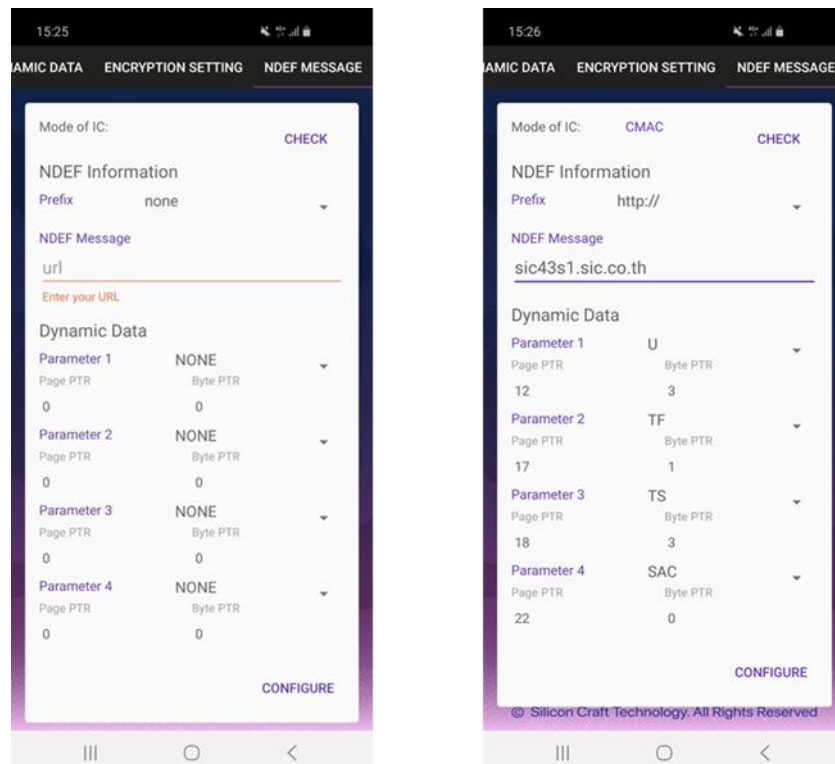


Figure 3-15 NDEF Information



3.2.9. Configuration Status

Click 'Configure' to program the tag and tap mobile on the tag.

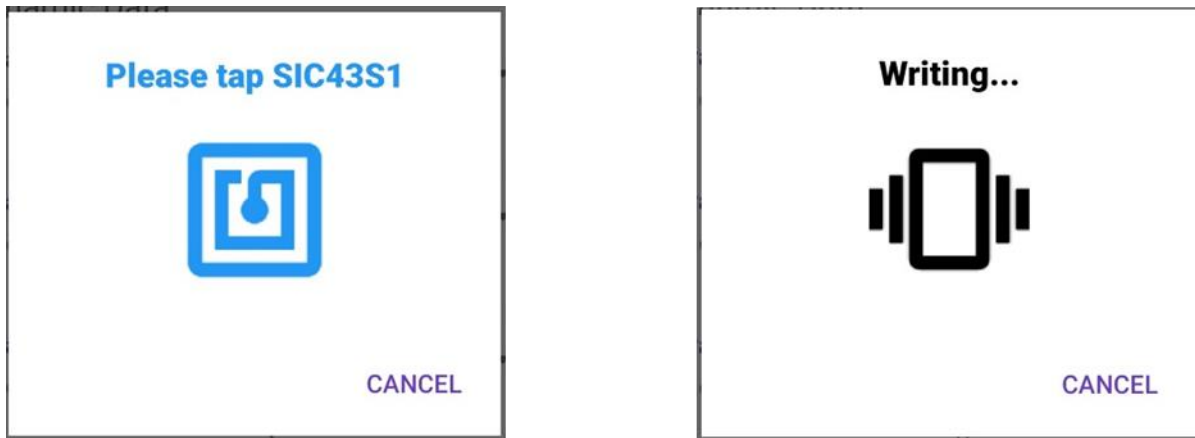


Figure 3-16 Dialog for SIC43S1 Writing

After tap the tag, the status will show 'Write complete'. If it is failed the status will shows 'Please re-tap SIC43S1'.

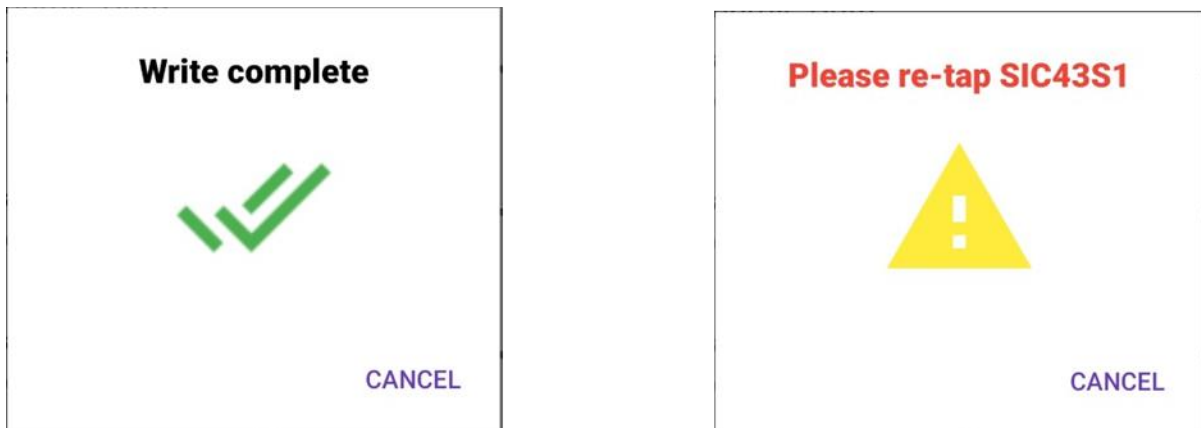


Figure 3-17 Configured Status



4. Product and Documentation Support

For more information of the SIC products, tools, and support that are available to help your development, please visit www.sic.co.th

4.1 Notation

The register definition is shown in the Figure 15.

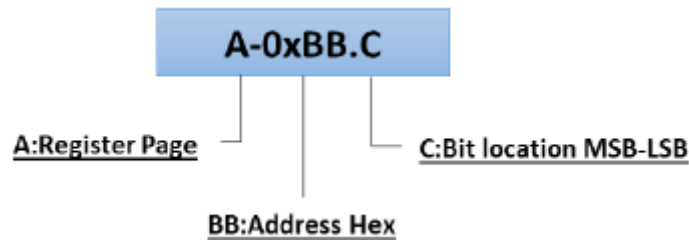


Figure 4-1 Register Definition

Styles and Fonts for key words

This part defines styles and fonts used for the key words throughout this document. The key words are names of signal, register and pin. The styles, fonts and their indications are shown in **Table 4-1**.

Table 4-1 Styles and Fonts for keywords

Symbol	Indication
<i>Signal</i>	Signal name
Register	Register name or Bit name
pin RX	Pin name
<i>"State of Operation"</i>	State of operation
Command	Command name in register 0x01 sector 0

To refer to a register address, a hexadecimal number proceeding with "0x" is used, for example 0x05 refer to a register address 0x05.

To refer to a bit located in a register address, a symbol "." following by a number reflecting the bit location starting from 0 to 7 is used. For example, 0x05.2 refers to bit 2, MSB, in the register address 0x05.

To refer to a set of consecutive bits located in a register address, a format ".[MSB:LSB]" is used after a register address. For example, a value of 0x05.[3:0] refers to bit 3, 2, 1 and 0 in the register 0x05.

To refer to a binary value in some registers, the letter "b" is placed at the end of binary number. For an example "0101b".

To refer to logic level, the number in single quote '1' and '0' are used to refer to binary logic level.



4.2 Tools and Software

- SIC43S1 Writer Software
- Reference Design

4.3 Documentation Support

Datasheet and Factsheet

- [SIC43S1 Data Sheet](#)

- [SIC43S1 Fact Sheet](#)

Application Note

- [SIC43S1 Writer](#)

4.4 Contact Information

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5. Legal Information

5.1 Disclaimer

- The information described herein is subject to change without notice.
- Although the IC contains a static electricity protection circuit, static electricity or voltage that exceeds the limit of the protection circuit should not be applied.
- SIC assumes no responsibility for how this IC is used in products created using this IC or for the specifications of that product, nor does SIC. Assume any responsibility for any infringement of patents or copyrights by-products that include this IC either in Thailand or in other countries.
- SIC is not responsible for any problems caused by circuits or diagrams described herein whose related industrial properties, patents, or other rights belong to third parties. The application circuit examples explain typical applications of the products and do not guarantee the success of any specific mass-production design.
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