

Revision History

Revision	Date	Description	Software Version
1.0	May 2017	1 st Release	1.2.0
2.0	November 2020	Revise Template	1.2.8

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1. Introduction

SIC43NT is a NFC Forum Type 2 Tag IC with a RF detection pin RFD. This pin can be configured to operate in tamper evidence detection mode where a tear-able conductor normally connects between the RF detection pin and the tag's ground pin. The SIC43NT NDEF response can be configured to include Dynamic NDEF data, which contains tamper status of the tag and a rolling code. These two data will be mirrored into the NDEF message at the position corresponding to the dynamic data pointer set by users.

Silicon Craft Technology PLC. (SIC) creates this document to describe about how to install and how to use SIC43NT 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. SIC43NT Tag



3. Demonstration Application

This part demonstrates about how to use SIC43NT Development with SIC43NT Writer both of read information and write transponder. This application is developed by using Android Studio version 2.3.2.



Figure 3-1 SIC43NT Writer



3.1. Read Information

Click "Read" to read SIC43NT Tag Information.

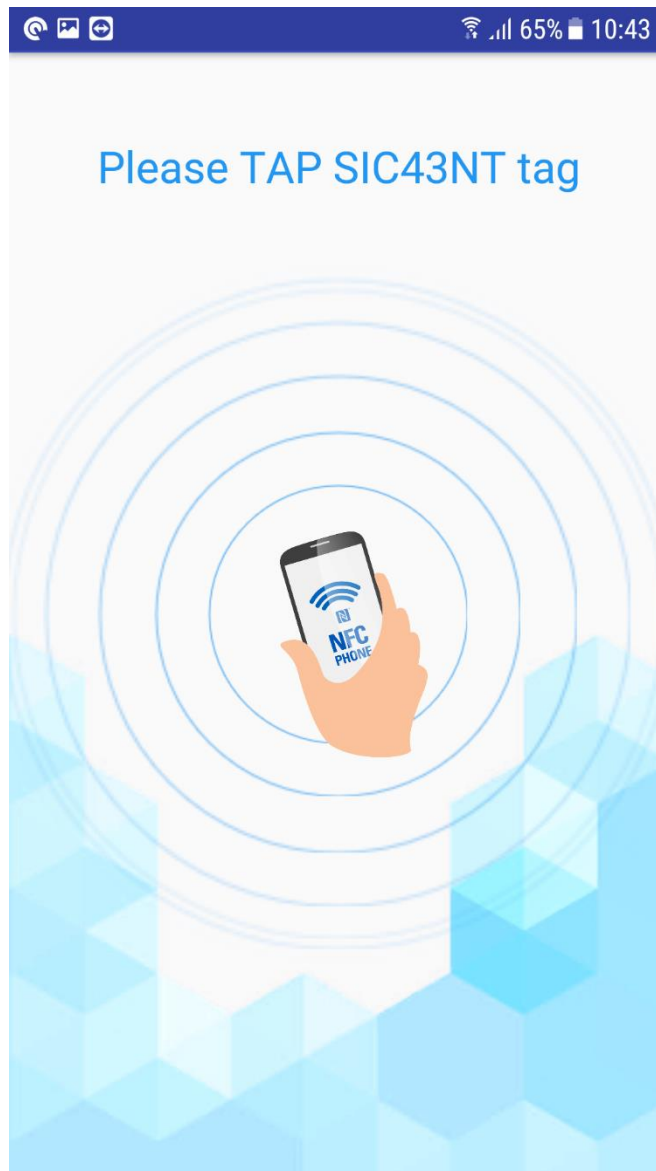


Figure 3-2 SIC43NT Writer Read Dialog



3.1.1. Configuration

Show configured in SIC43NT consists of Tdata (Tamper data), Authentication, RFD Pin configured, Dynamic, Pointer, Dynamic Data Configured.

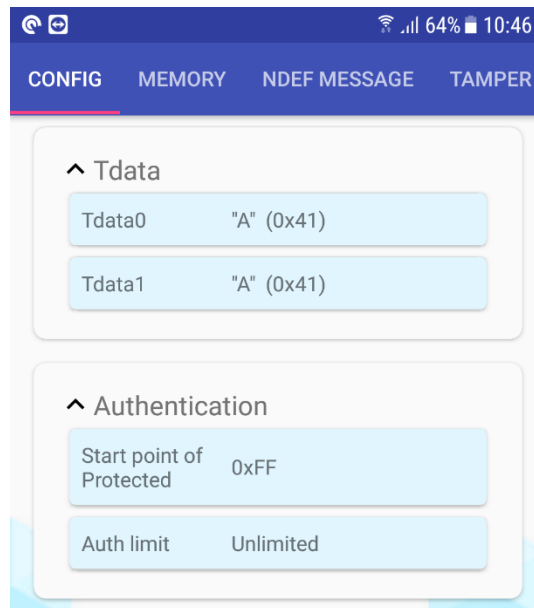


Figure 3-3 Tdata and Authentication of tag

For RF detection mode, pin's configuration is shown as **Figure 3-4**: Trigger Mode, Mode of RFD Pin, Automatic Programming setup, Tampering Check evident and Tamper Bias Current check.

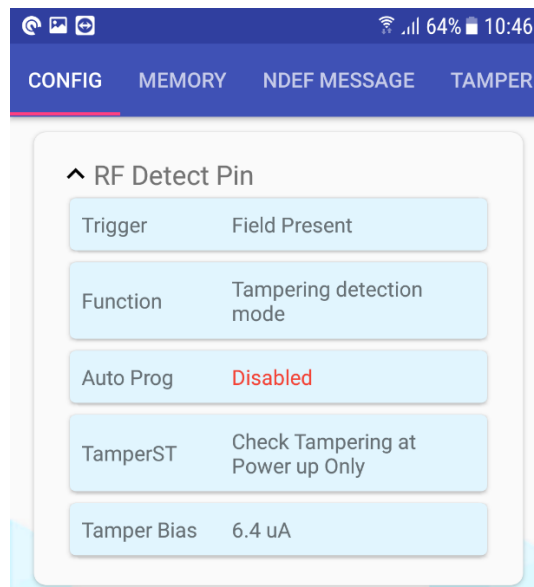


Figure 3-4 RF Detect Pin Information



There are 2 parts of dynamic data configuration per **Figure 3-5** as Position of Dynamic Data, RLC Mode and Status of each dynamic data.

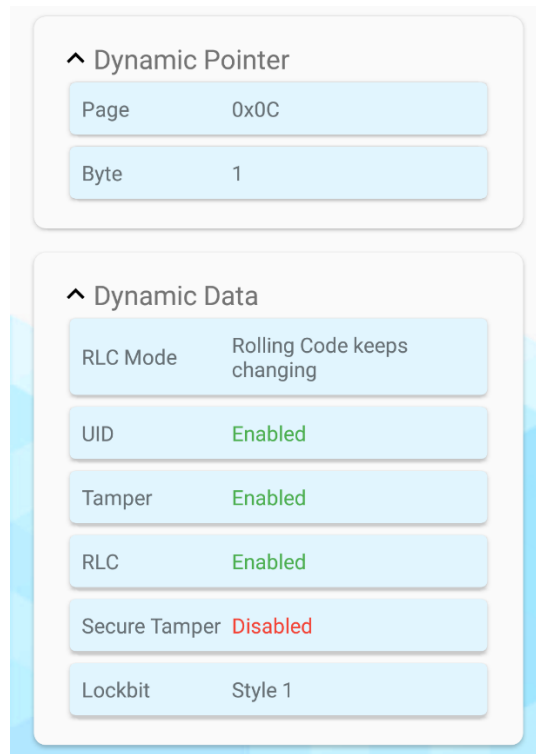


Figure 3-5 Dynamic Data Configuration



3.1.2. Memory

This part is shown SIC43NT memory content and memory accessible status.

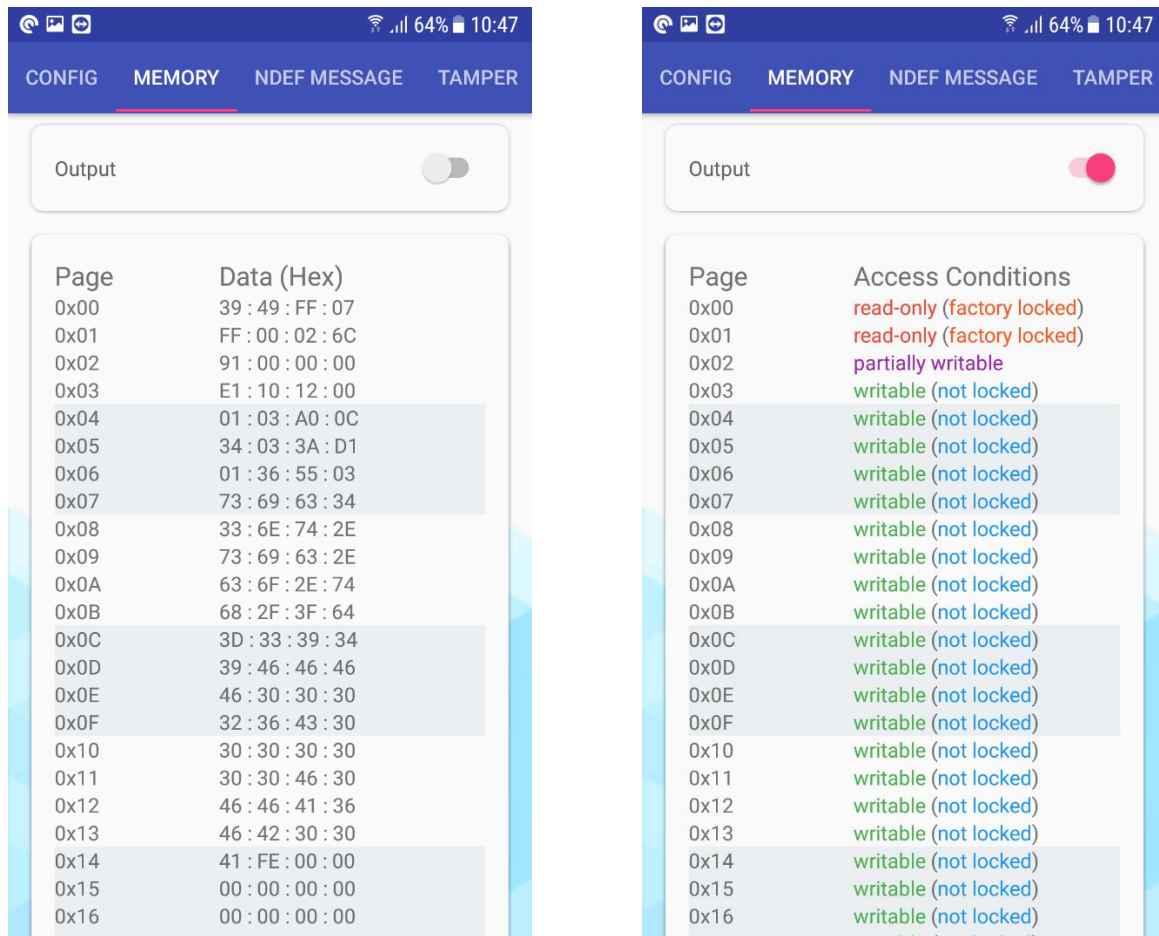


Figure 3-6 SIC43NT Memory



3.1.3. NDEF Message

NDEF Message in SIC43NT memory is consist of URL link, UID, Tamper Status and Rolling Code depending on tag's configuration.

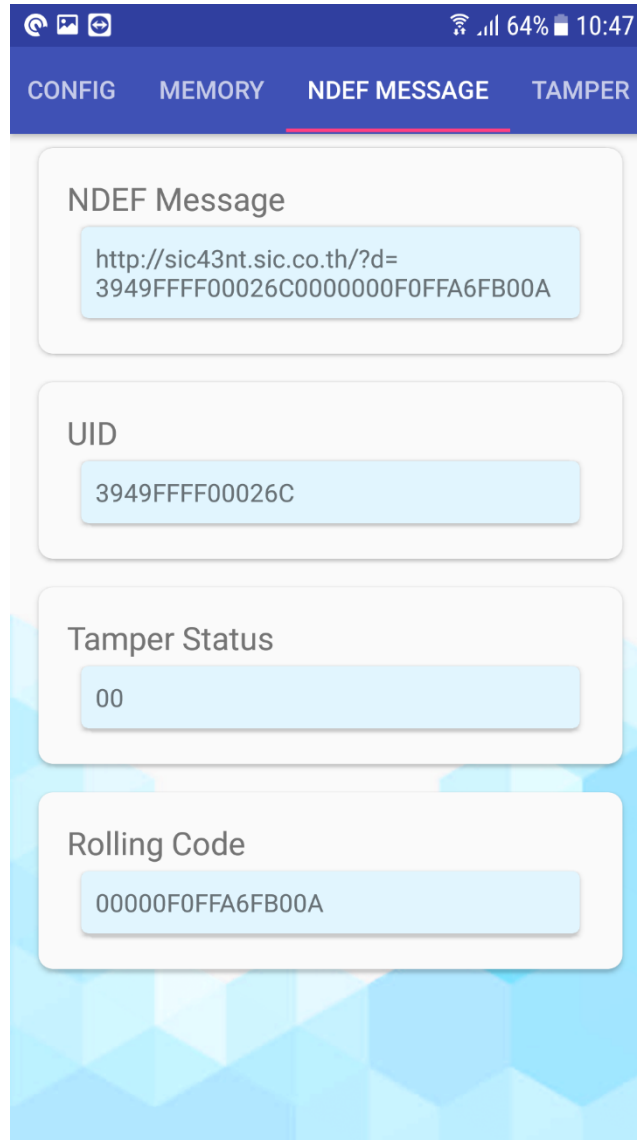


Figure 3-7 NDEF Message Example



3.1.4. Tamper Status

Tamper status of SIC43NT is shown per **Figure 3-8**, SEAL for untampered tag and VOID for tampered tag.

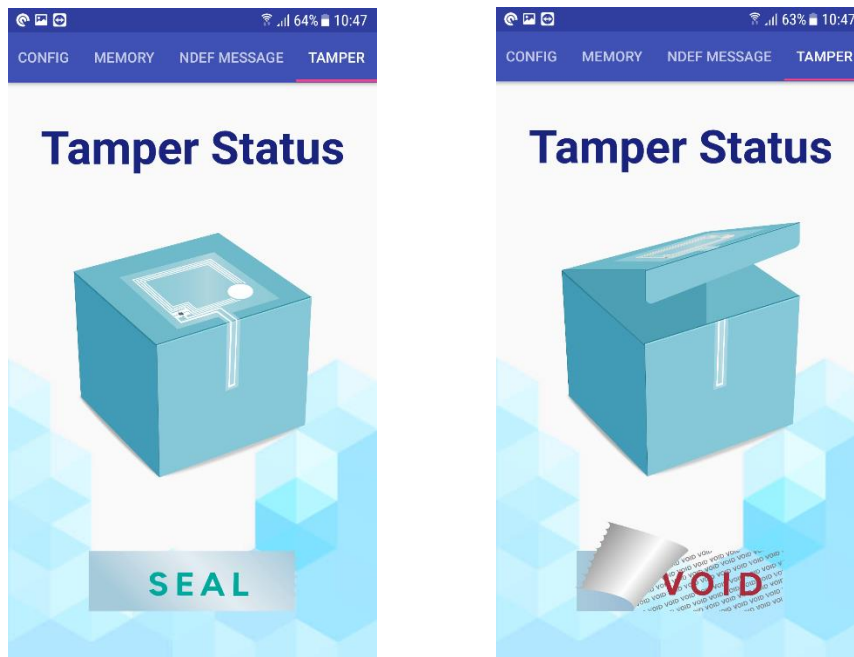


Figure 3-8 Tamper Status

If NFC phone cannot read tamper status, it will show per **Figure 3-9**.



Figure 3-9 Read Tamper status error



3.2. Write Transponder

When enter write process dialog about data protection will be shown **Figure 3-10**.

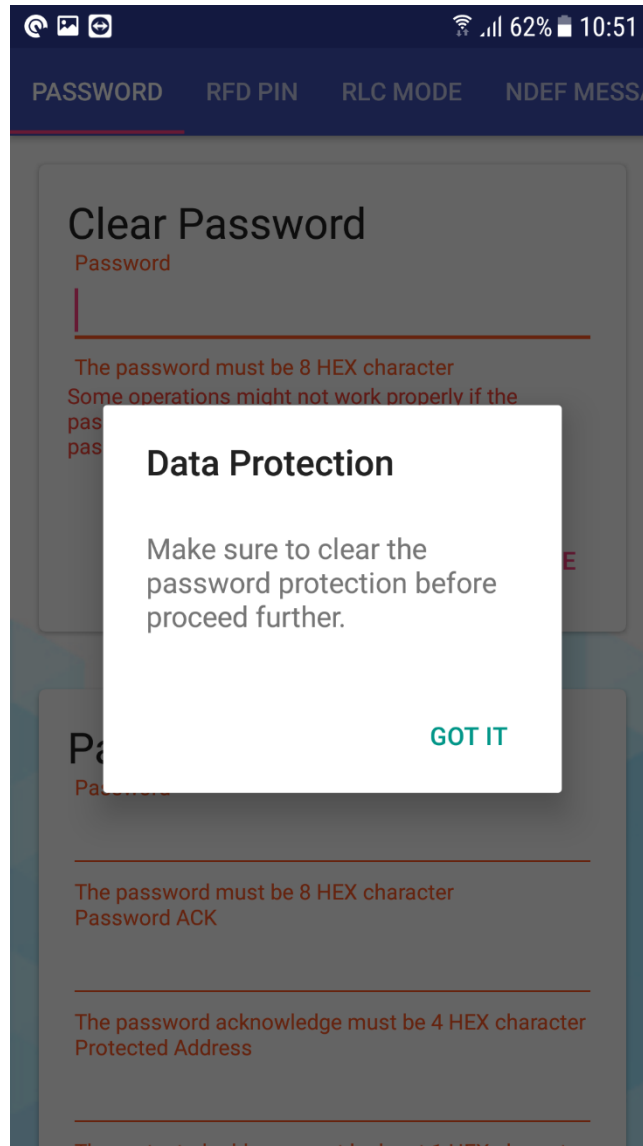


Figure 3-10 Warning Dialog about Data Protection



3.2.1. Password

If tag has password protection, clear password if need in case changing other tag's configurations.

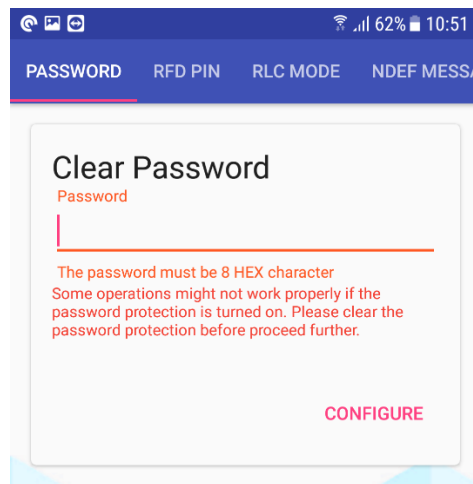


Figure 3-11 Clear Password part

Password setting is for protection data in SIC43NT cannot be changed.

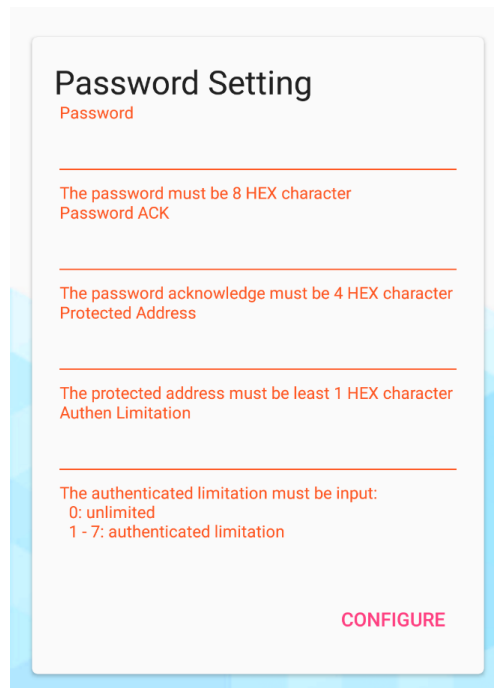


Figure 3-12 Password Setting page

- **Password** 4 Bytes data
- **Password ACK** the respond when SIC43NT receive a matched password
- **Protected Address** Start protected area
- **Authenticate Limitation** Limitation of negative password



3.2.2. RFD Pin

Resonant Frequency Detection Pin can be set in to 2 modes: RF Detection mode and Tamper Detection mode.

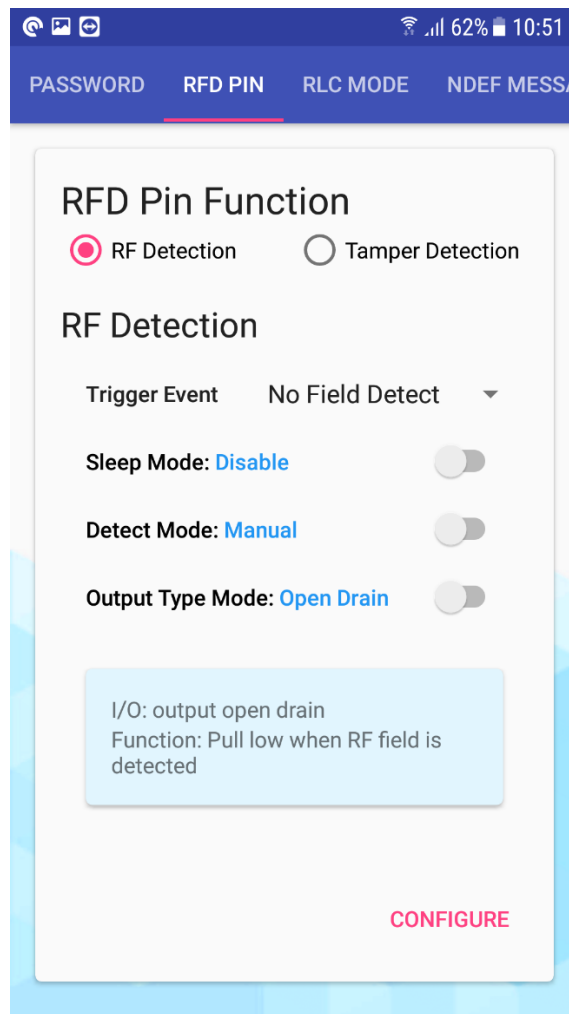


Figure 3-13 Field Detection Set up

Table 3-1 RF Detection Feature

RF Detection	Features	Description
Trigger Event	No Field Detect	No RF field present
	1 st SOF	First Start of frame
	Select	Select state
Sleep Mode	Field Present	RF field present
	Disable	None sleep
Detect Mode	Enable	Sleep enable
	Manual	Manual Configuration behavior define from Output type
Output Type Mode	Auto	Auto Detect
	Open Drain	Pull low when RF field is detected
	Push Pull	Logic high when RF field is detected



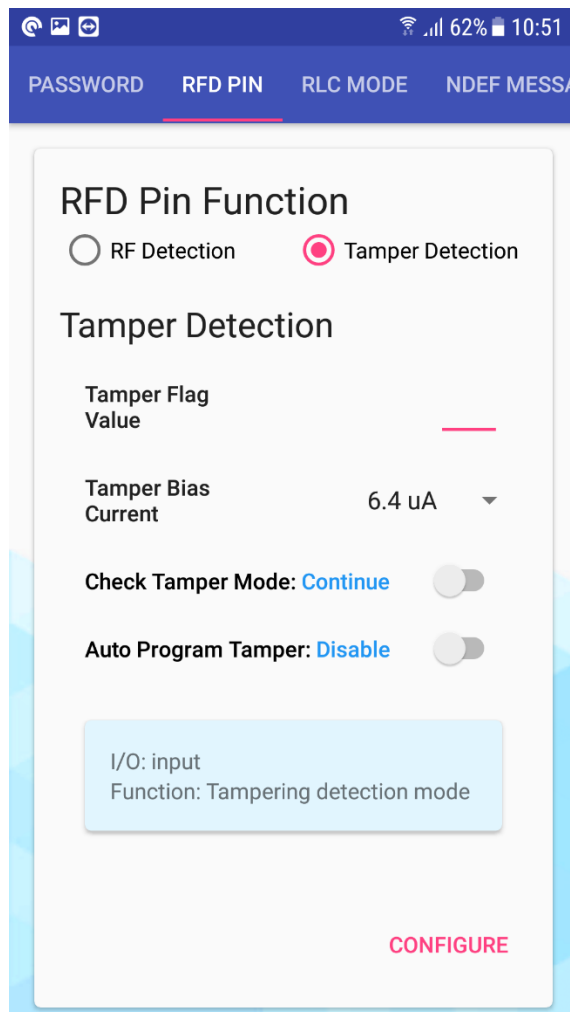


Figure 3-14 Tamper Detection Set up

Table 3-2 RF Detection Feature

RF Detection	Features	Description
Tamper Flag	-	HEX data for tamper status
Tamper Bias Current	6.4 uA	Current detect tamper status
	3.2 uA	
	1.6 uA	
	0.8 uA	
Check Tamper Mode	Enable	Always check tamper pin
	Manual	Check only power up
Auto Programing Tamper	Auto	Does not program status to EEPROM
	Open Drain	Program status to EEPROM



3.2.3. RLC Mode

Configure rolling code mode to control Dynamic NDEF Message.

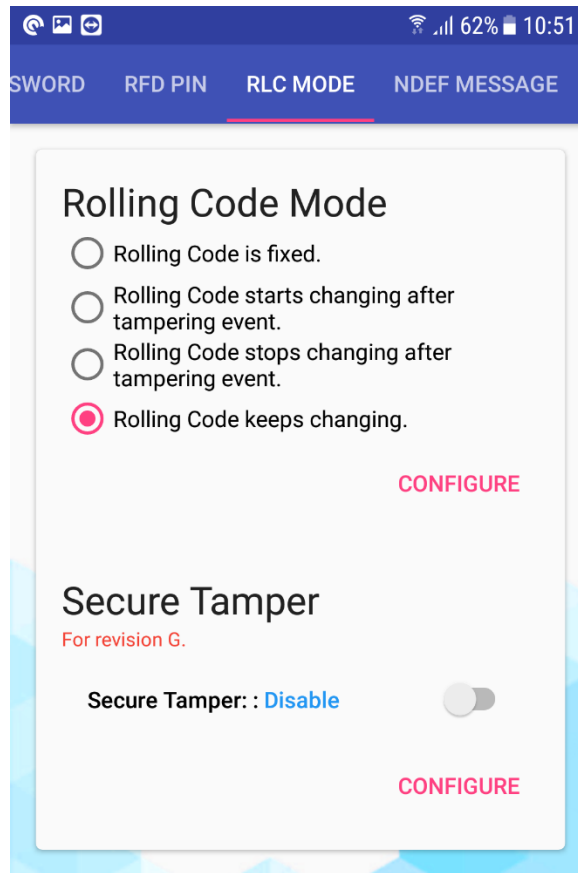


Figure 3-15 Rolling code and Secure tamper setup

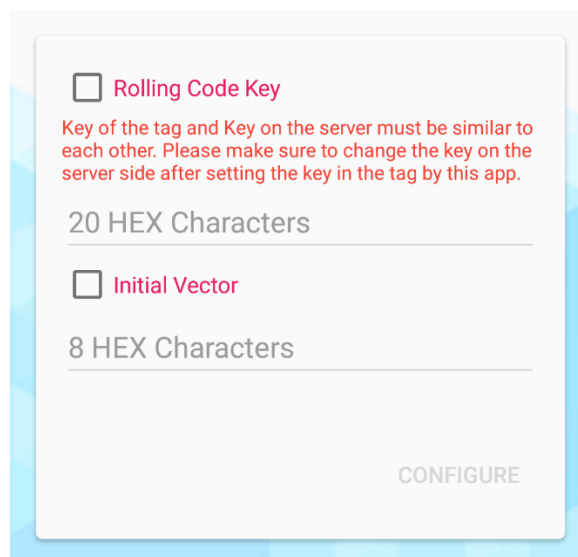


Figure 3-16 Rolling Code Key and Initial Vector



3.2.4. NDEF Message

This part is to initial NDEF information which consist of MIME as NDEF type, Message and Configuration of dynamic data.

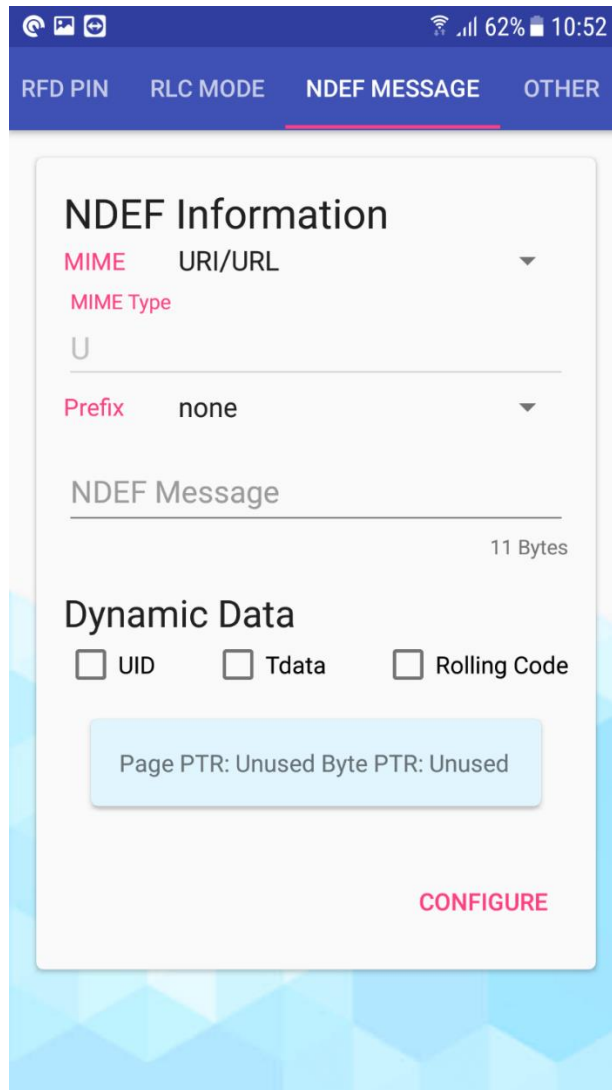


Figure 3-17 NDEF Information



3.2.5. Others

Extension of application to copy content from a tag to other tag.

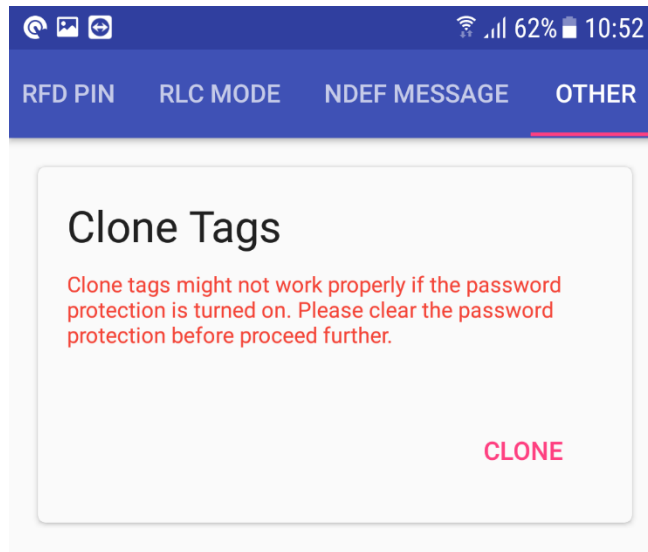


Figure 3-18 Clone Tags feature

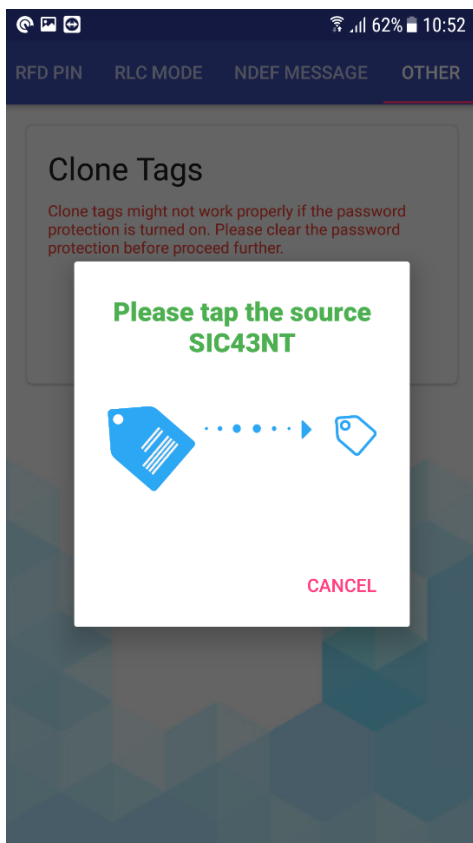


Figure 3-193-19 Read Tag information tag

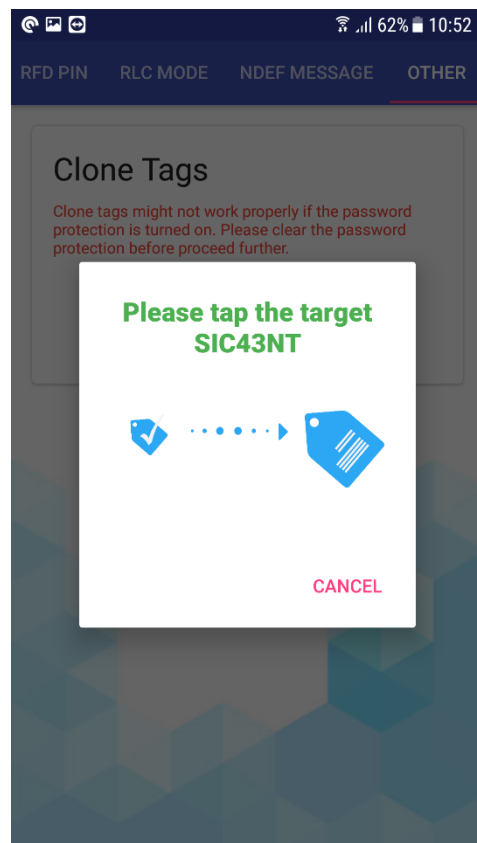


Figure 3-20 Write data to other



3.2.6. Configuration Status

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



Figure 3-20 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 SIC43NT'.

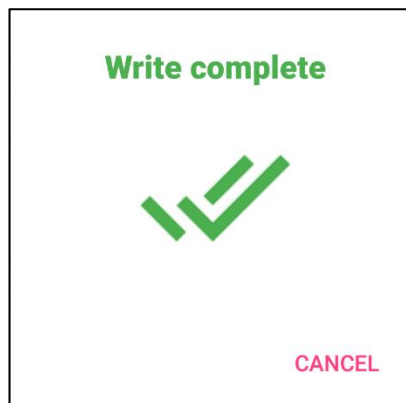


Figure 3-21 Write tag complete



Figure 3-22 Write tag error



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.

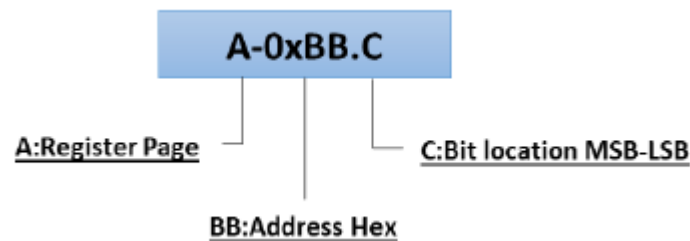


Figure 4-1 Register Definition

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
<i>Command</i>	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

Development Kit and Reference Design

4.3 Documentation Support

Datasheet and Factsheet

- [SIC43NT Data Sheet](#)

- [SIC43NT Fact Sheet](#)

Application Note

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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