

USER MANUAL SIC43NT Development Kit

Rev 2.0 (11, 2020)

This document describes how to use SIC43NT Writer Android Application with SIC43NT Development Kit. This manual consists of how to read tag and how to write tag.



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



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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.

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CON	IFIG	MEMORY	NDEF MESSA	GE TAMPER
	^ Td	ata		
	Tdat	a0	"A" (0x41)	
	Tdat	a1	"A" (0x41)	
	^ Au	thentica	tion	
	Star Prot	t point of ected	0xFF	
	Auth	limit	Unlimited	
	Aux Star Prote	thentica t point of ected	tion 0xFF Unlimited	

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.

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CON	IFIG MEMOR	Y NDEF MESSAGE	TAMPER
	∧ RF Detect	Pin	
	Trigger	Field Present	
	Function	Tampering detection mode	
	Auto Prog	Disabled	
	TamperST	Check Tampering at Power up Only	
	Tamper Bias	6.4 uA	

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.

Dynamic i v	ointer
Page	0x0C
Byte	1
• Dynamic Da	ata
RLC Mode	Rolling Code keeps changing
UID	Enabled
Tamper	Enabled
RLC	Enabled
Secure Tamper	Disabled

Figure 3-5 Dynamic Data Configuration



3.1.2. Memory

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

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CONFIG	MEMORY	NDEF MESSAGE	TAMPER
Output			
Page 0x00 0x01 0x02 0x03 0x04 0x05 0x06	D 39 FF 91 E1 01 34	ata (Hex) 0:49:FF:07 F:00:02:6C 1:00:00:00 1:10:12:00 1:03:A0:0C 4:03:3A:01 1:22:02	
0x06 0x07 0x08 0x09 0x0A 0x0B 0x0C	73 33 73 63 68 31	3 : 69 : 63 : 34 3 : 69 : 63 : 34 3 : 66 : 74 : 2E 3 : 69 : 63 : 2E 3 : 6F : 2E : 74 3 : 2F : 3F : 64 0 : 33 : 39 : 34	
0x0D 0x0E 0x0F 0x10 0x11	39 46 32 30 30	2:46:46:46 5:30:30:30 2:36:43:30 0:30:30:30 0:30:30:30	
0x12 0x13 0x14 0x15 0x16	46 46 47 00 00	5:46:41:36 5:42:30:30 1:FE:00:00 0:00:00:00 0:00:00:00	

0	e 🖂 🖸) III. 🗟	54% 🖥 10:47
	CONFIG	MEMORY	NDEF MESSAGE	TAMPER
	Output			
	Page 0x00 0x01	A re re	ccess Conditior ad-only (factory lock ad-only (factory lock	IS (ed) (ed)
	0x02 0x03 0x04 0x05 0x06	pa wi wi wi wi	ritable (not locked) ritable (not locked) ritable (not locked) ritable (not locked) ritable (not locked)	
	0x07 0x08 0x09 0x0A 0x0B		ritable (not locked) ritable (not locked) ritable (not locked) ritable (not locked) ritable (not locked)	
	0x0C 0x0D 0x0E 0x0F	WI WI WI	ritable (not locked) ritable (not locked) ritable (not locked) ritable (not locked)	
	0x10 0x11 0x12 0x13	WI WI WI	ritable (not locked) ritable (not locked) ritable (not locked) ritable (not locked)	_
	0x14 0x15 0x16	WI	ritable (not locked) ritable (not locked)	

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.

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CONFIG	MEMORY	NDEF MESSAGE	TAMPER
NDEI http 394	F Message p://sic43nt.sic. 9FFFF00026C	.co.th/?d= 20000000F0FFA6FB	00A
UID 394	9FFFF00026C	>	
Tam 00	oer Status		
Rollin	ng Code 000F0FFA6FB0	00A	

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.







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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.

Pass	word
The p	bassword must be 8 HEX character
Pass	word ACK
The p	bassword acknowledge must be 4 HEX character
Prote	acted Address
The p	protected address must be least 1 HEX character
Auth	en Limitation
The a	authenticated limitation must be input:
0: u	nlimited
1 - 7	7: authenticated limitation
	CONFICUE

Figure 3-12 Password Setting page

- Password .
- 4 Bytes data
- Password ACK

- **Protected Address** •
- the respond when SIC43NT receive a matched password Start protected area Limitation of negative password
- Authenticate Limitation



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
	Field Present	RF field present
Sleep Mode	Disable	None sleep
	Enable	Sleep enable
Detect Mode	Manual	Manual Configuration behavior define from Output type
	Auto	Auto Detect
Output Type Mode	Open Drain	Pull low when RF field is detected
	Push Pull	Logic high when RF field is detected



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PASSWORD	RFD PIN	RLC MODE	NDEF MESSA	
RFD P O RF Da Tampe	in Func etection er Detect	tion	Detection	
Tamper Value	Flag		_	
Tamper Current	Bias	6.4 uA	4 -	
Check T	Check Tamper Mode: Continue			
Auto Program Tamper: Disable				
I/O: ir Funct	nput tion: Tamper	ing detection m	ode	
		CON	IFIGURE	

Figure 3-14 Tamper Detection Set up

Т	able	3-2	RF	Detection	Feature
-					

RF Detection	Features	Description	
Tamper Flag	-	HEX data for tamper status	
Tamper Bias Current	6.4 uA		
	3.2 uA	Current detect temper statue	
	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

	Rolling Code Key	
Key of the tag and Key on the server must be similar to each other. Please make sure to change the key on the server side after setting the key in the tag by this app.		
20 HEX Characters		
	Initial Vector	
	8 HEX Characters	
	CONFIGURE	





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.

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RFD PIN	RLC MODE	NDEF MESSA	GE OTHER
NDE MIME MIME	EF Inform URI/URL Type	nation	•
Prefix	none		•
NDE	F Message		11 Bytes
Dyna Du	amic Data) lata 🗌 R	olling Code
P	age PTR: Unus	ed Byte PTR: Ur	nused
		CO	NFIGURE

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.

Please tap SIC43NT	Writing
	u[]h
CANCEL	CANCEL

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
Signal	Signal name
Register	Register name or Bit name
pin RX	Pin name
"State of Operation"	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 7, 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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Fax: +66 2 589 8881

Email: info@sic.co.th



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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