

em|echo-T Configure Tamper (NDEF SWAP)

Product Family: **em|echo-T**

Part Number: EM4423T

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1. INTRODUCTION

The purpose of this document is to provide a step-by-step approach to the configuration of the NDEF SWAP function of em|echo-T.

Since the configuration can be done either by NFC or UHF interface, each method will be described in a separate chapter.

2. PREPARATION

Before starting any operation, it is important to define how you want to use the tamper detection in your application. Here below is a list of question you may need to answers:

- Is an open loop or a close loop the default and genuine state of tamper detection?
- Is reporting tamper to smartphone without app an important feature?
- If yes what form will take the message?
- Would my application needs to activate definitive tamper at the different time than the encoding is done?

Example:

Close loop is default value and genuine value.

The alarm will report if the loop is broken.

Yes, we want to report tamper status without dedicated NFC app.

Message will be

<http://echo.emmicroelectronic.com/test-echo-t-ok> if the product is in the default state.

Message will be

<http://echo.emmicroelectronic.com/test-echo-t-ko> if the loop has been broken.

Activation of the permanent tamper detection will be done just after encoding.

3. CONFIGURATION FROM NFC

3.1 WRITE NDEF MESSAGE

<http://echo.emmicroelectronic.com/test-echo-t-ok> will be written from bloc 04h to bloc 11h.

Command Sequence:

```
A2 04 01 03 A0 0C + CRC
A2 05 45 03 2E D1 + CRC
A2 06 01 2A 55 03 + CRC
A2 07 65 63 68 6F + CRC
A2 08 2E 65 6D 6D + CRC
A2 09 69 63 72 6F + CRC
A2 0A 65 6C 65 63 + CRC
A2 0B 74 72 6F 6E + CRC
```

```
A2 0C 69 63 2E 63 + CRC
```

```
A2 0D 6F 6D 2F 74 + CRC
```

```
A2 0E 65 73 74 2D + CRC
```

```
A2 0F 65 63 68 6F + CRC
```

```
A2 10 2D 74 2D 6F + CRC
```

```
A2 11 6B FE 00 00 + CRC
```

<http://echo.emmicroelectronic.com/test-echo-t-ko> will be written from bloc 22h to bloc 2Fh.

Command Sequence:

```
A2 22 01 03 A0 0C + CRC
```

```
A2 23 45 03 2E D1 + CRC
```

```
A2 24 01 2A 55 03 + CRC
```

```
A2 25 65 63 68 6F + CRC
```

```
A2 26 2E 65 6D 6D + CRC
```

```
A2 27 69 63 72 6F + CRC
```

```
A2 28 65 6C 65 63 + CRC
```

```
A2 29 74 72 6F 6E + CRC
```

```
A2 2A 69 63 2E 63 + CRC
```

```
A2 2B 6F 6D 2F 74 + CRC
```

```
A2 2C 65 73 74 2D + CRC
```

```
A2 2D 65 63 68 6F + CRC
```

```
A2 2E 2D 74 2D 6B + CRC
```

```
A2 2F 6F FE 00 00 + CRC
```

3.2 LOCK NDEF MESSAGES (RECOMMENDED)

To have NDEF message as read-only, you should proceed to the following command sequence:

```
A2 02 00 00 FF FF + CRC
```

```
A2 50 FF 0F 00 00 + CRC
```

Please note that this sequence will lock all NFC Data memory.

3.3 LOCK NFC SHARING (RECOMMENDED)

To avoid change of NDEF message by the UHF you should execute the following command sequence:

```
A2 5F F0 0F F0 33 + CRC
```

```
A2 60 F3 0F F0 30 + CRC
```

3.4 IC CONFIGURATION 1 WORD

This word configure a lot of things, but here we will just change what is needed for the tamper swap i.e.: set PWD_LIM#0 and configure the NFC_TAMPER_SWAP.

Command sequence:

```
A2 52 03 62 00 00 + CRC
```



3.5 REBOOT

An important step is to stop the field for a small amount of time. It is needed to ensure a power-up sequence for the IC to accept the new configuration.

3.6 LOGIN

In order to activate the definitive tamper, it is needed to be in SECURE state with PWD_LIM≠0. If password was not changed the default command is:
1B FF FF FF FF + CRC

3.7 ACTIVATE DEFINITIVE TAMPER

The last command to perform is to activate definitive tamper (TWEN=1).
Command sequence:
A2 4F 00 00 20 00 + CRC

4. CONFIGURATION FROM UHF

4.1 WRITE NDEF MESSAGE

<http://echo.emmicroelectronic.com/test-echo-t-ok> will be written from word 40d to word 66d of the user memory bank.

Note that command are structure as following: Write x yyy zz zz, where:
x is memory bank from 0 to 3,
yyy is the word address in decimal,
zz zz is the data in hexadecimal.

Command Sequence:

Write 3 040 01 03; Write 3 041 A0 0C
Write 3 042 45 03; Write 3 043 2E D1
Write 3 044 01 2A; Write 3 045 55 03
Write 3 046 65 63; Write 3 047 68 6F

Write 3 048 2E 65; Write 3 049 6D 6D
Write 3 050 69 63; Write 3 051 72 6F
Write 3 052 65 6C; Write 3 053 65 63
Write 3 054 74 72; Write 3 055 6F 6E

Write 3 056 69 63; Write 3 057 2E 63
Write 3 058 6F 6D; Write 3 059 2F 74
Write 3 060 65 73; Write 3 061 74 2D
Write 3 062 65 63; Write 3 063 68 6F

Write 3 064 2D 74; Write 3 065 2D 6F
Write 3 066 6B FE

<http://echo.emmicroelectronic.com/test-echo-t-ko> will be written from bloc 100d to bloc 126d.

Write 3 100 01 03; Write 3 101 A0 0C
Write 3 102 45 03; Write 3 103 2E D1
Write 3 104 01 2A; Write 3 105 55 03
Write 3 106 65 63; Write 3 107 68 6F

Write 3 108 2E 65; Write 3 109 6D 6D
Write 3 110 69 63; Write 3 111 72 6F
Write 3 112 65 6C; Write 3 113 65 63
Write 3 114 74 72; Write 3 115 6F 6E

Write 3 116 69 63; Write 3 117 2E 63
Write 3 118 6F 6D; Write 3 119 2F 74

Write 3 120 65 73; Write 3 121 74 2D
Write 3 122 65 63; Write 3 123 68 6F

Write 3 124 2D 74; Write 3 125 2D 6B
Write 3 126 6F FE;

4.2 LOCK NDEF MESSAGE (RECOMMENDED)

To have NDEF message as read-only, you should proceed to the following command sequence:

Write 3 037 FF FF;
Write 3 192 FF 0F;

Please note that this sequence will lock all NFC Data memory.

4.3 IC CONFIGURATION 1 WORD

This word configure a lot of things, but here we will just change what is needed for the tamper swap i.e.: configure the NFC_TAMPER_SWAP.

Command sequence:

Write 3 196 00 62

4.4 LOCK NFC SHARING (RECOMMENDED)

To avoid change of NDEF message by the UHF you should execute the following command sequence:

Write 3 222 F0 0F;
Write 3 223 F0 33;
Write 3 224 F3 0F;
Write 3 225 F0 30;

Please note that this will disable your possibility to change IC configuration word from UHF and you'll not be able to unlock that NFC sharing bit from the UHF.

4.5 REBOOT

An important step is to stop the field for a small amount of time. It is needed to ensure a power-up sequence for the IC to accept the new configuration.

4.6 ACTIVATE DEFINITIVE TAMPER

The last command to perform is to activate definitive tamper (TWEN=1).

Command sequence:

Write 1 033 08 00

NOTE, it is normal not to read 08 00 after this operation because SA bit is reporting the tamper status (writing SA bit = 1 is done to activate TWEN=1). If you want/need to check that TWEN=1 you have to use the HF interface.



APPLICATION NOTE **em|echo-T**

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