NT4H GUI example user manual

v1.1

Digital Logic Ltd.

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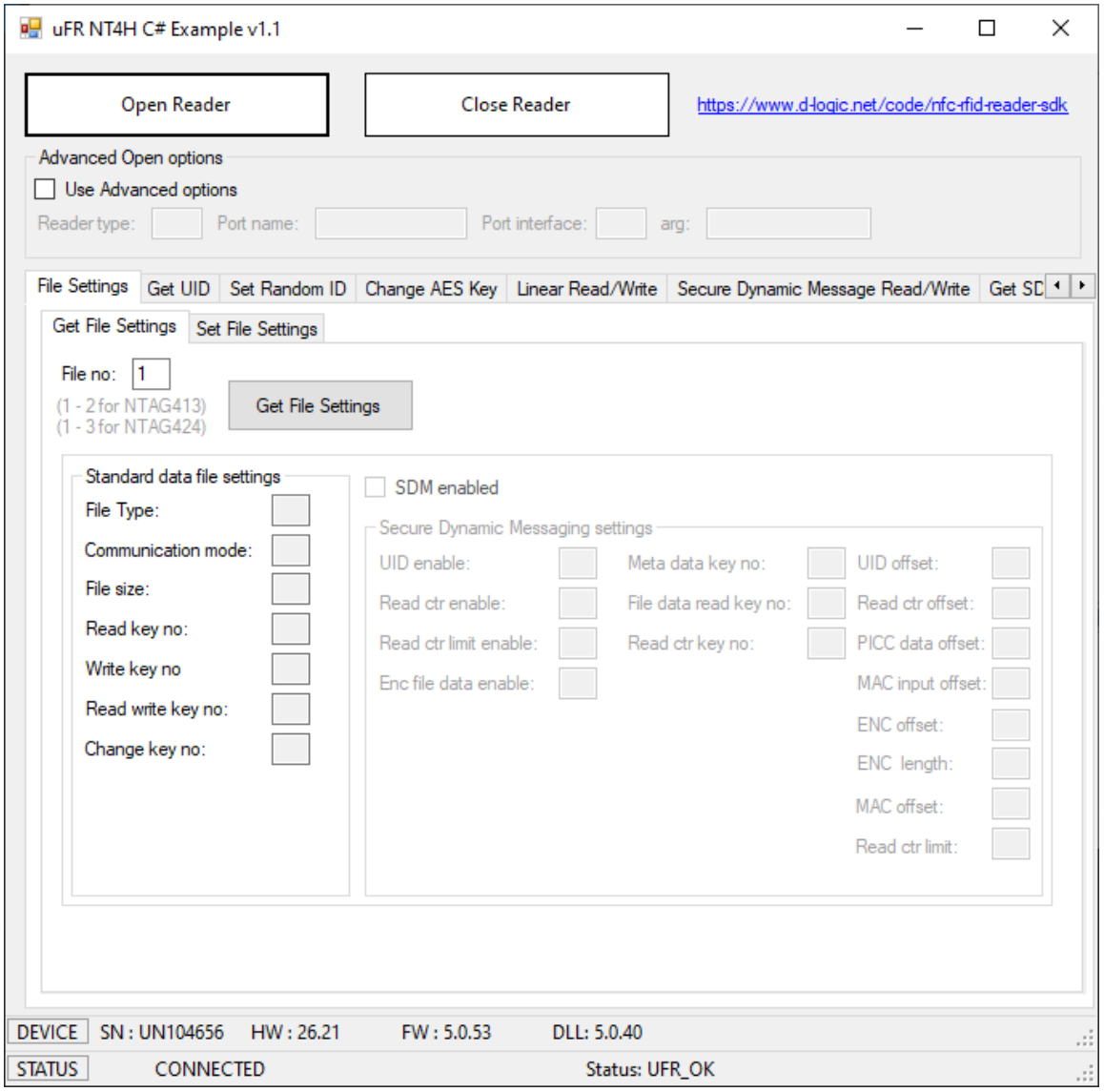
Table of contents

1. Introduction

The NT4H is a new series of NX NTAG® cards.
There is NTAG413 DNA, NTAG424 DNA, and NTAG424 TT DNA.
NTAG424 DNA is fully compliant with the NFC Forum Type 4 Tag IC.
They come with AES-128 cryptographic operation and a new Secure Unique NFC (SUN) Message.

2. Application overview

Link: https://www.d-logic.net/code/nfc-rfid-reader-sdk/ufr-examples-c_sharp-nt4h
In the following picture, is the layout for the application where simple reader opening mode was used..



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2.1 Get File Settings

The NTAG413 has two standard data files:

- File number 1 is Capability Container file (32 bytes)
- File number 2 is NDEF file (128 bytes)

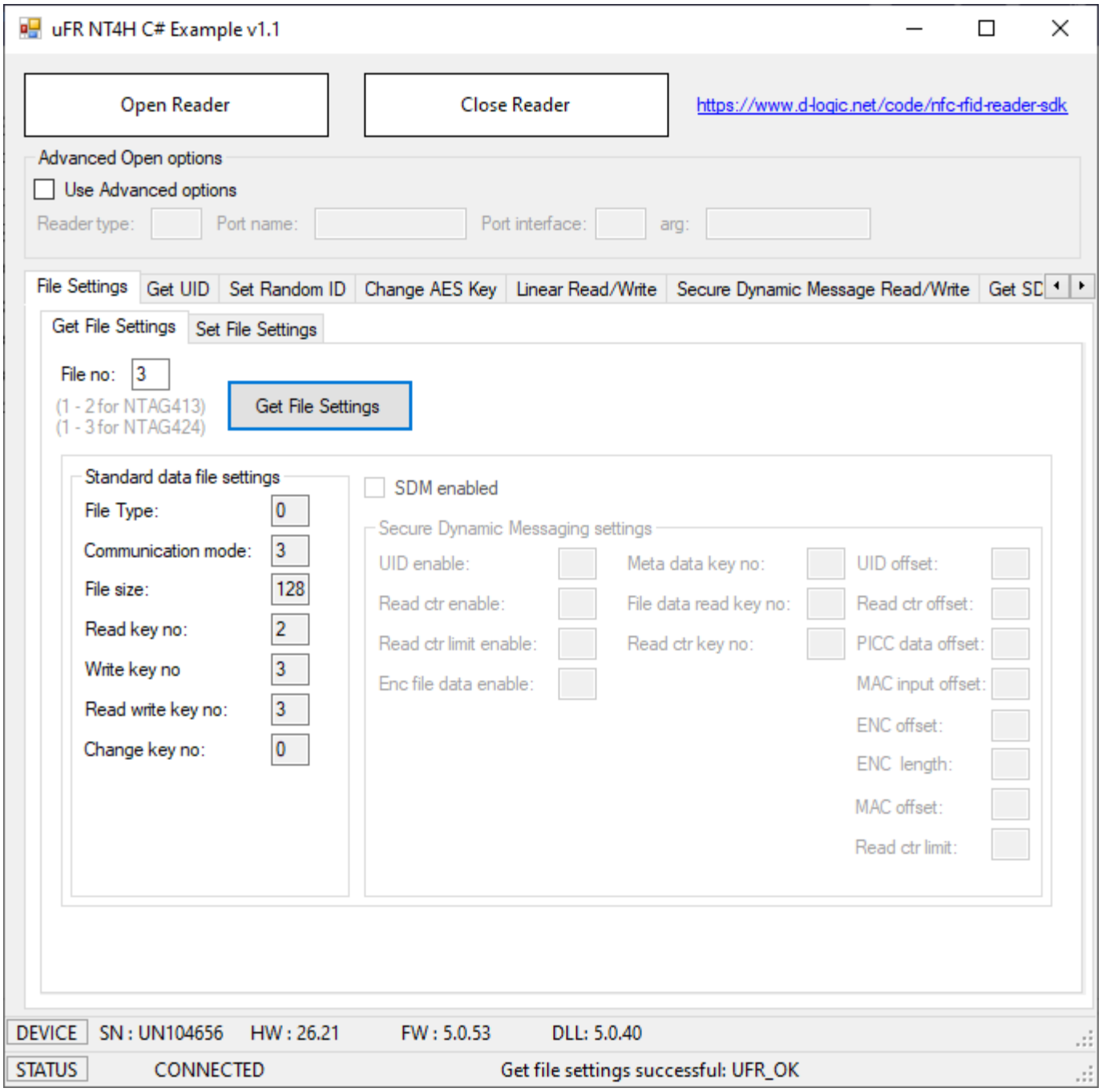
The NTAG424 has three standard data files:

- File number 1 is Capability Container file (32 bytes)
- File number 2 is NDEF file (256 bytes)
- File number 3 is proprietary file (128 bytes)

Number of returned parameters varies.
If the current file is standard data file with AES secure messaging, then the following information is obtained:

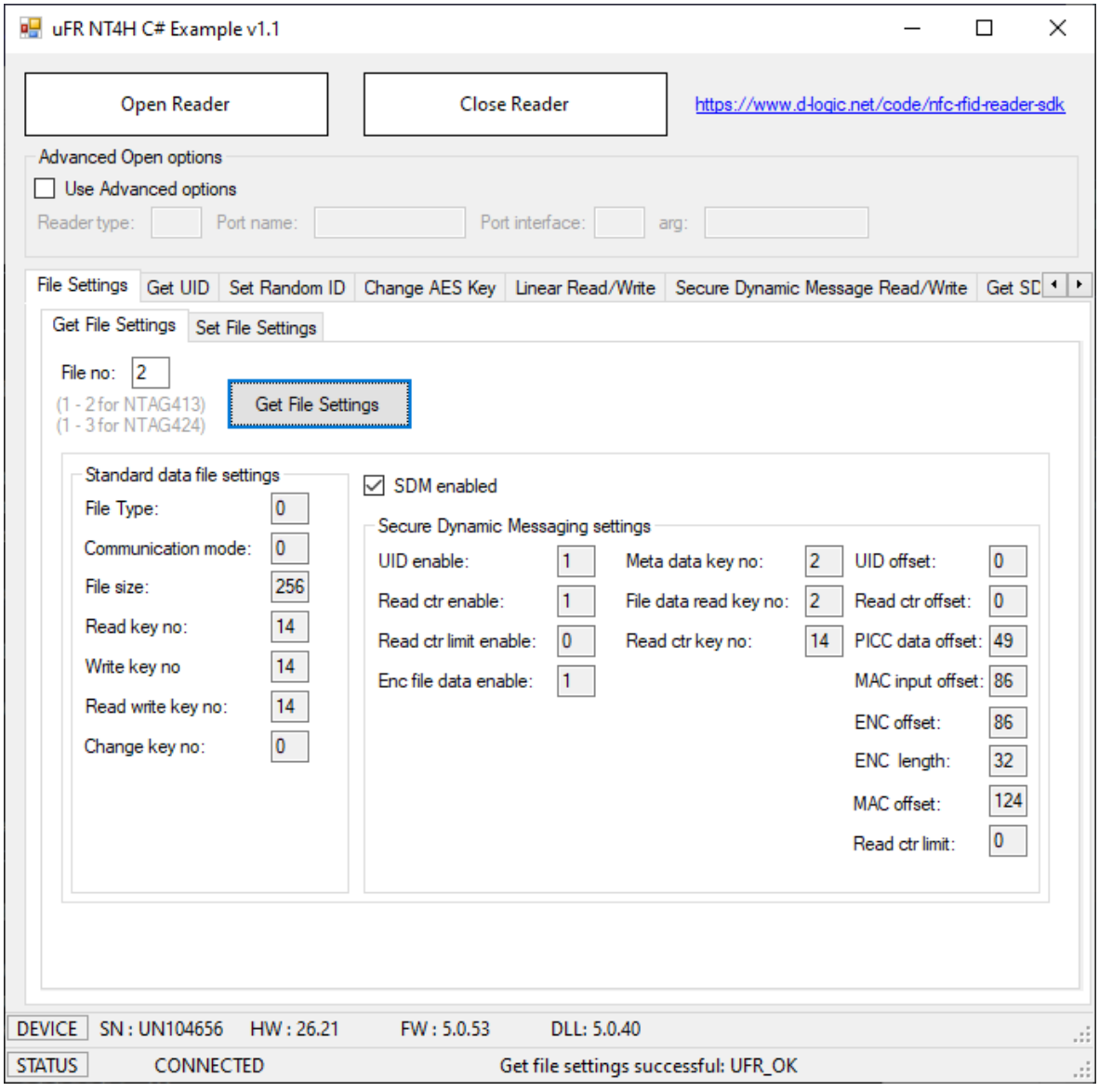
- File type
- Communication mode
- File access rights
- File size

Example:
File number = 3 (NTAG424 proprietary file)
Communication mode is enciphered (0x03)
Secure dynamic messaging is disabled
Key number for read is 2
Key number for write is 3
Key number for read/write is 3
Key number for change file settings is 0
File size is 128 bytes



If the current file is a standard data file **with secure dynamic messaging** then there is more information.
Example:
File number is 2 (NDEF file)
Secure dynamic messaging is enabled
Free access for reading and writing operations (key 0x0E)
UID mirroring is enabled
SDM reading counter is enabled

SDM reading counter limit is disabled.
Encrypted part of file data used.
Key number for SDM meta read is 2 (UID, SDM reading counter, PICC data, MAC)
Key number for encrypted part of file data is 2
SDM reading counter can read without authentication
PICC data offset (encrypted UID and SDM reading counter) is 49
MAC input offset is 86
Encrypted part of the file data offset is 86
Encrypted part of the file data length is 32
MAC offset is 124



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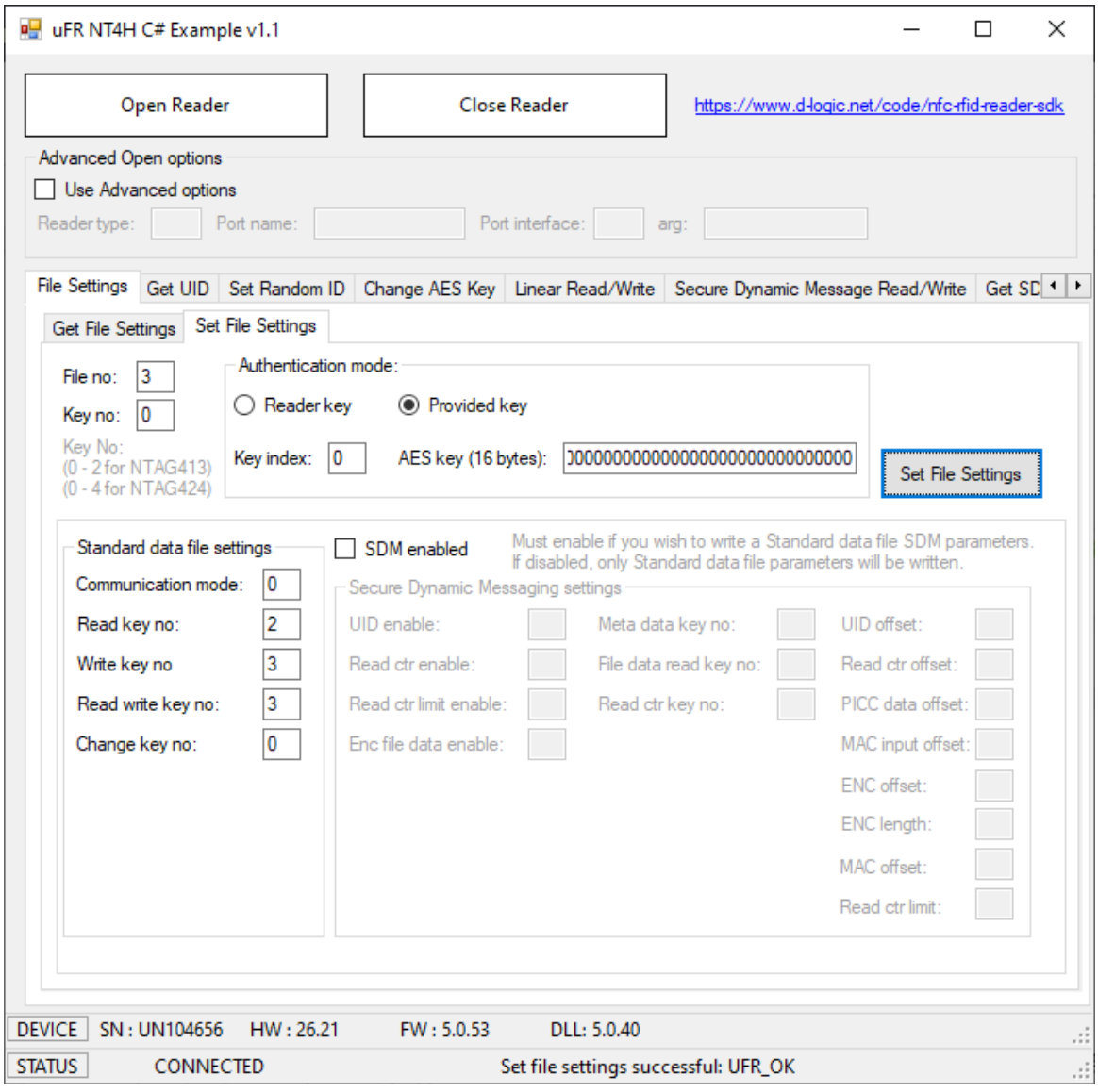
2.2 Set file settings

Due to the large number of parameters, there are two functions for setting file parameters.
Example 1:
Standard data file
File number (Proprietary file)
Current communication mode is enciphered and the change key number is 0.
New settings are: plain communication mode, read key 2, write key 3, read/write key 3, change key 0, and authentication mode provided key.



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Example 2:
Standard data file with secure dynamic messaging. NTAG424 TT.
File number 2.
Communication mode plain, SDM enabled, Read key 14 (free access), Write key 14, Read/Write key 14, and the Change key 0.
SDM options:
UID mirroring: enabled
Read counter: enabled
Read counter limit: disabled
Encrypted part of file data: disabled
SDM access rights (0x0E free/plain, 0x0F no access/no data):
SDM meta read: 0x0E
SDM file key: 0x00
SDM reading counter read key: 0x0E
UID offset: 26
Read counter offset: 41
Mac input data offset: 57
MAC offset: 57

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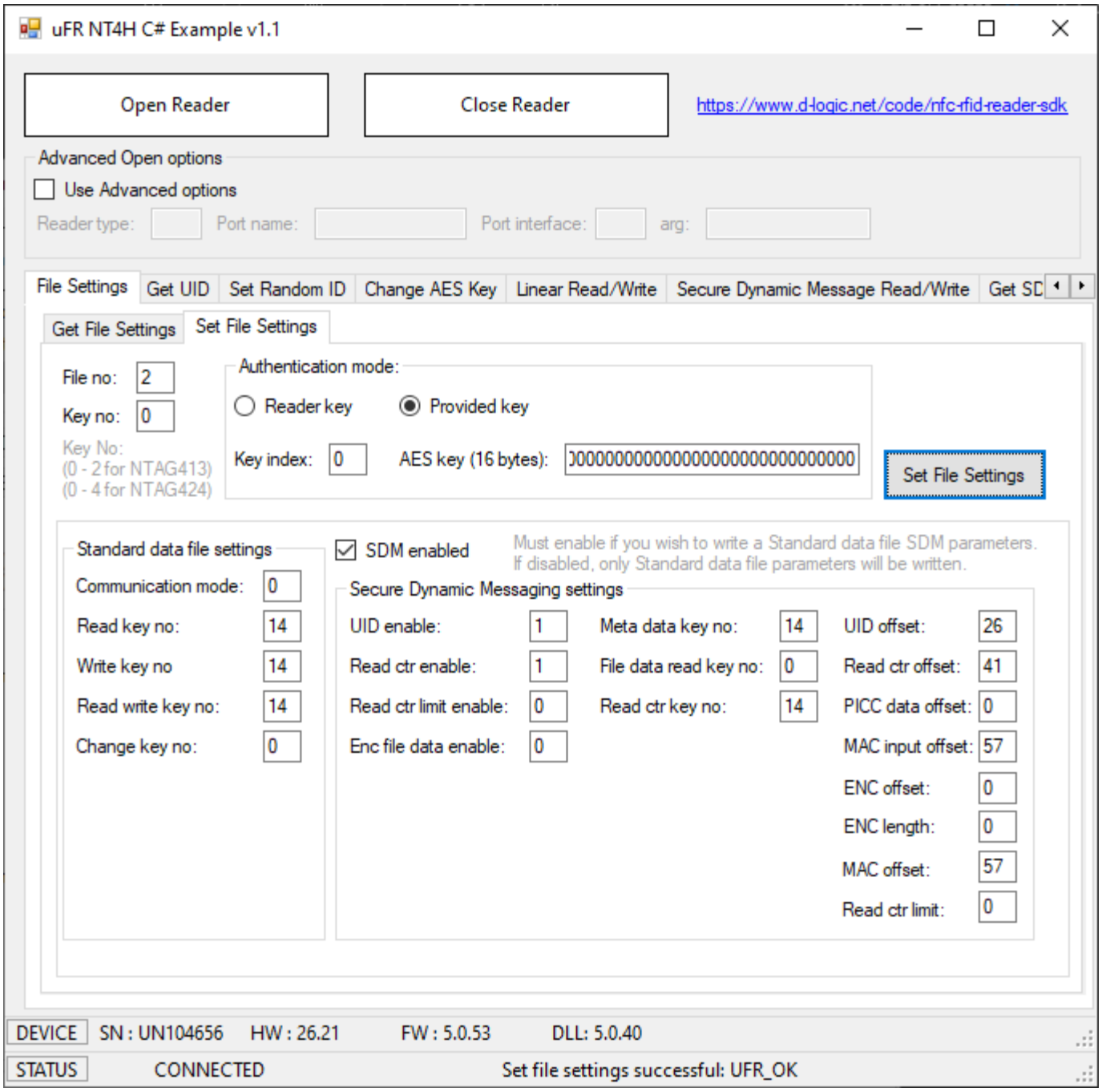

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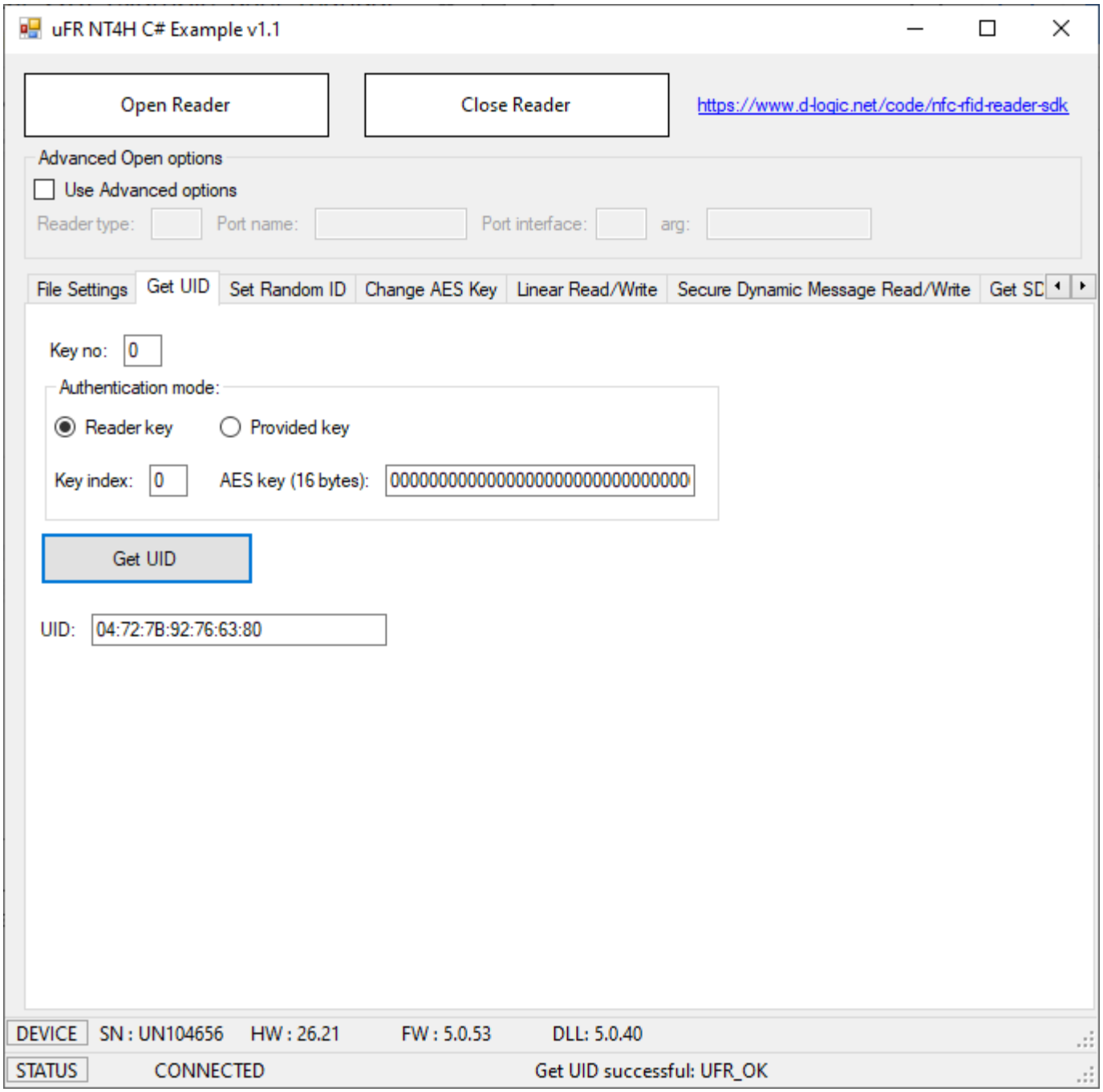
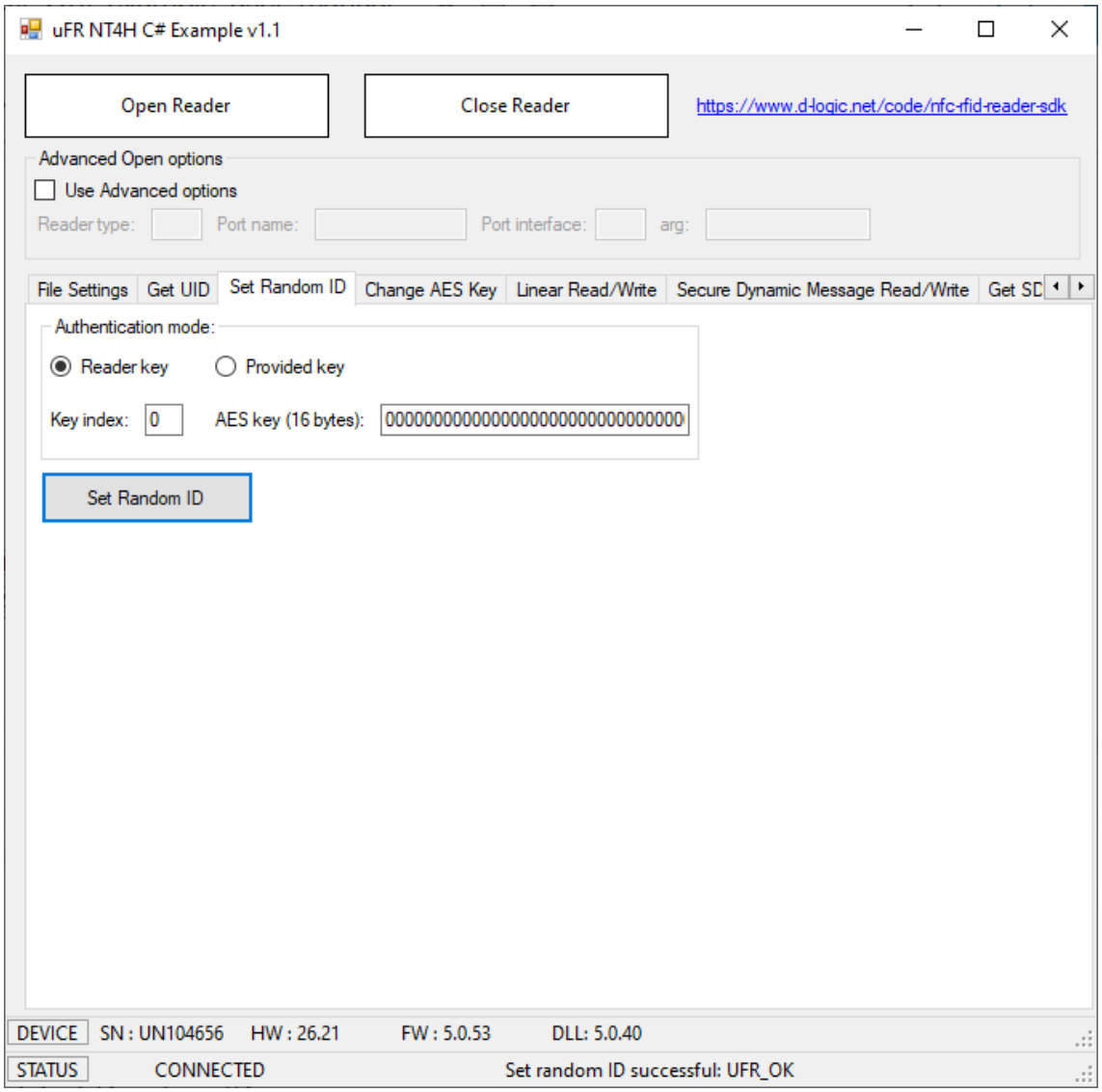
2.3 Get UID

NTAG424 DNA only.
Function returns 7 bytes long card UID. This is useful if the Random ID option is activated.
Valid authentication with any card key is required.



2.4 Set Random ID

NTAG424 DNA only.
The card returns 4 bytes random ID instead of 7 bytes unique ID.
Warning: this operation is irreversible.
Authentication with application master key (number 0) is required.



2.5 Change AES key

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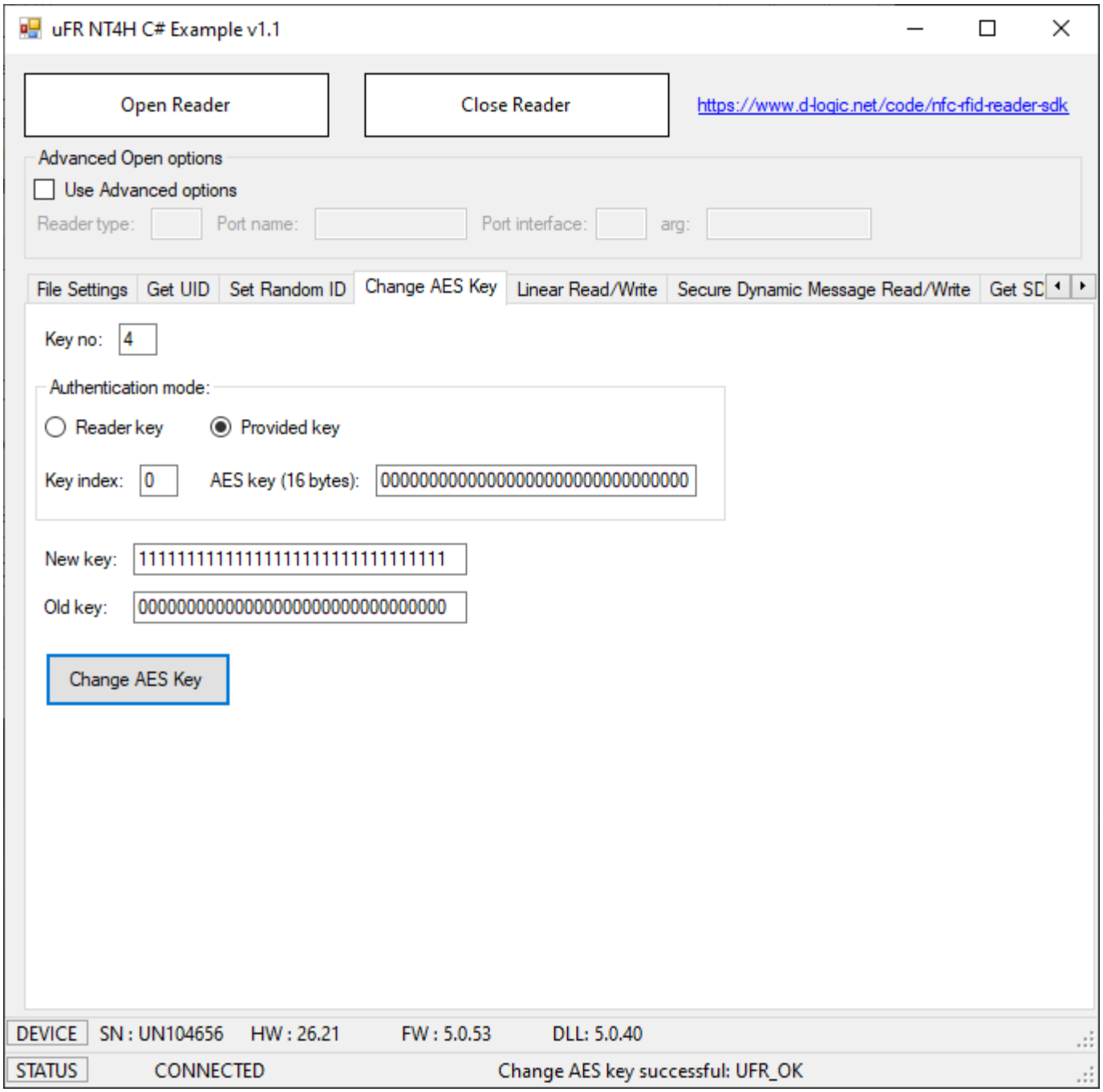
Authentication with application master key (number 0) is required.
If the key which will be changed is not the master key, then the old key value is required.
Example:
Key number 4.
Application master key value: 0x
Old key 4 value: 0x00000000000000000000000000000000
New key 4 value: 0x11111111111111111111111111111111



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2.6 Linear read

Function reads data from the file.
Required parameters are

- File number
- Key number for read, or read/write access
- Communication mode
- Authentication mode (if read key is 14 then no authentication required)
- Start address (0 - max address)
- Length of data

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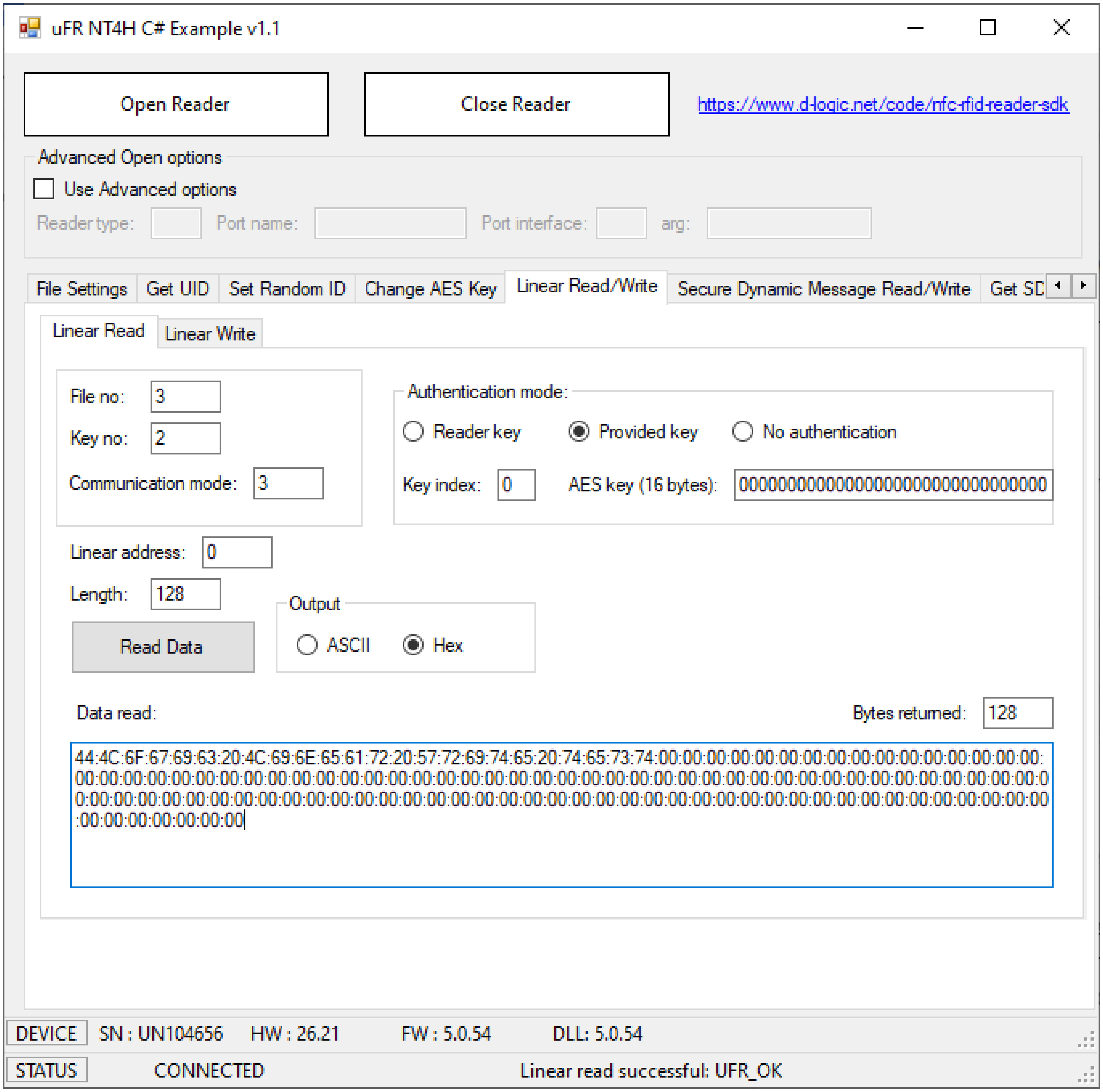


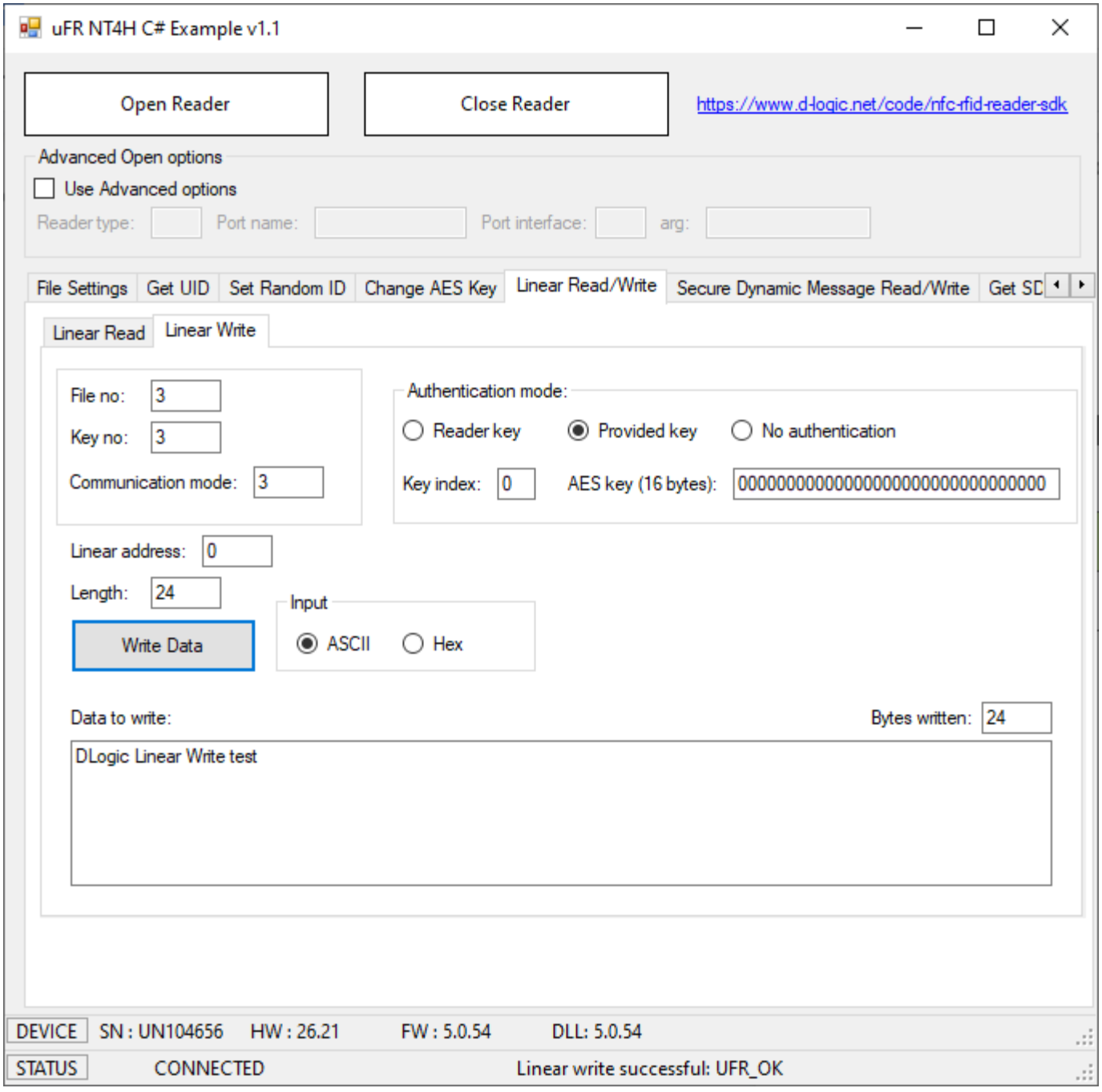
2.7 Linear write

Function writes data to the file.

Required parameters are

- File number
- Key number for read, or read/write access
- Communication mode

- Authentication mode (if read key is 14 then no authentication required)
- Start address (0 - max address)
- Length of data



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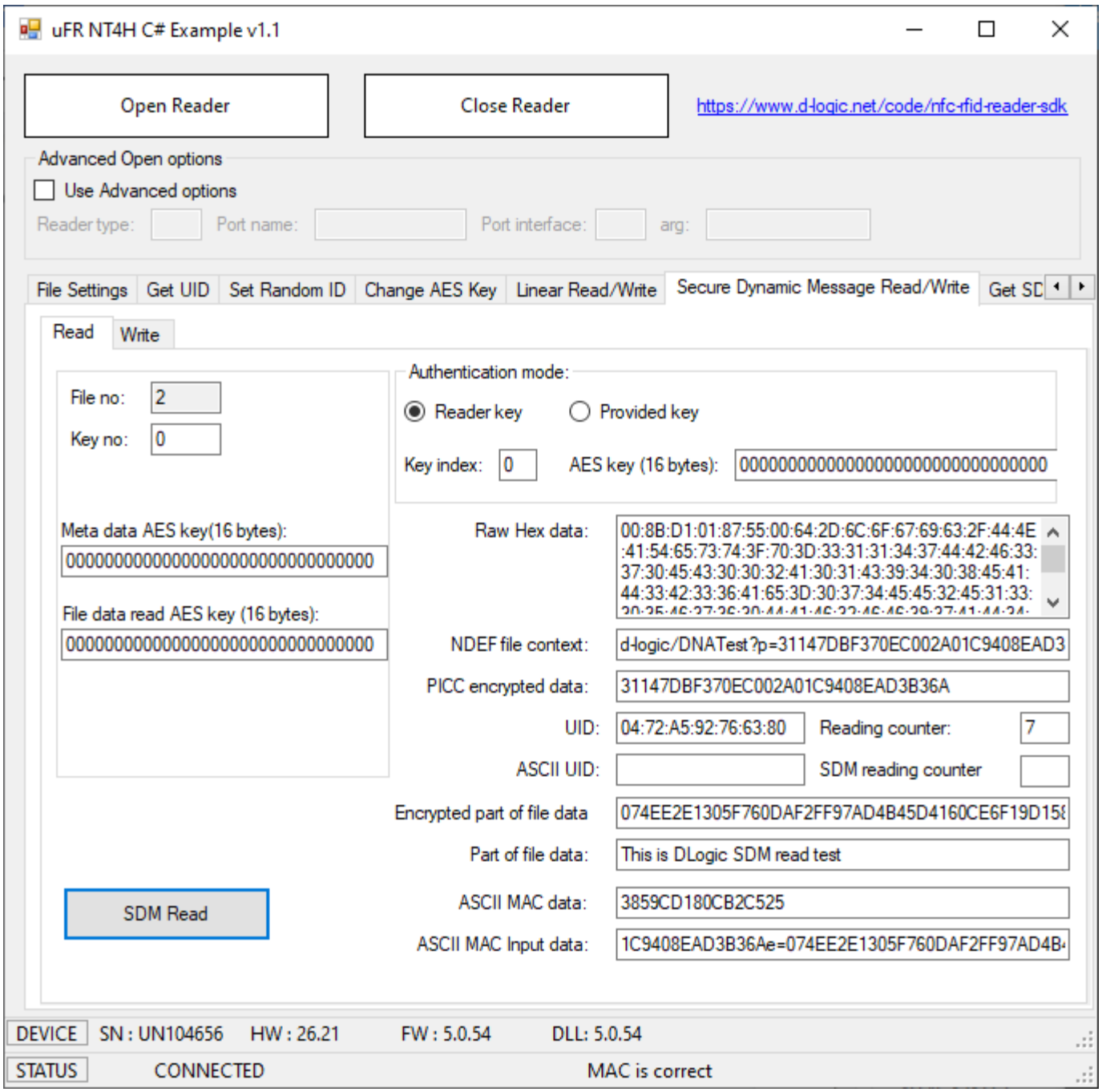
2.8 Secure Dynamic Message Read

File must be in Secure dynamic message mode (SDM enabled), and read access must be free (key no 14, no authentication required)

Example for NTAG424



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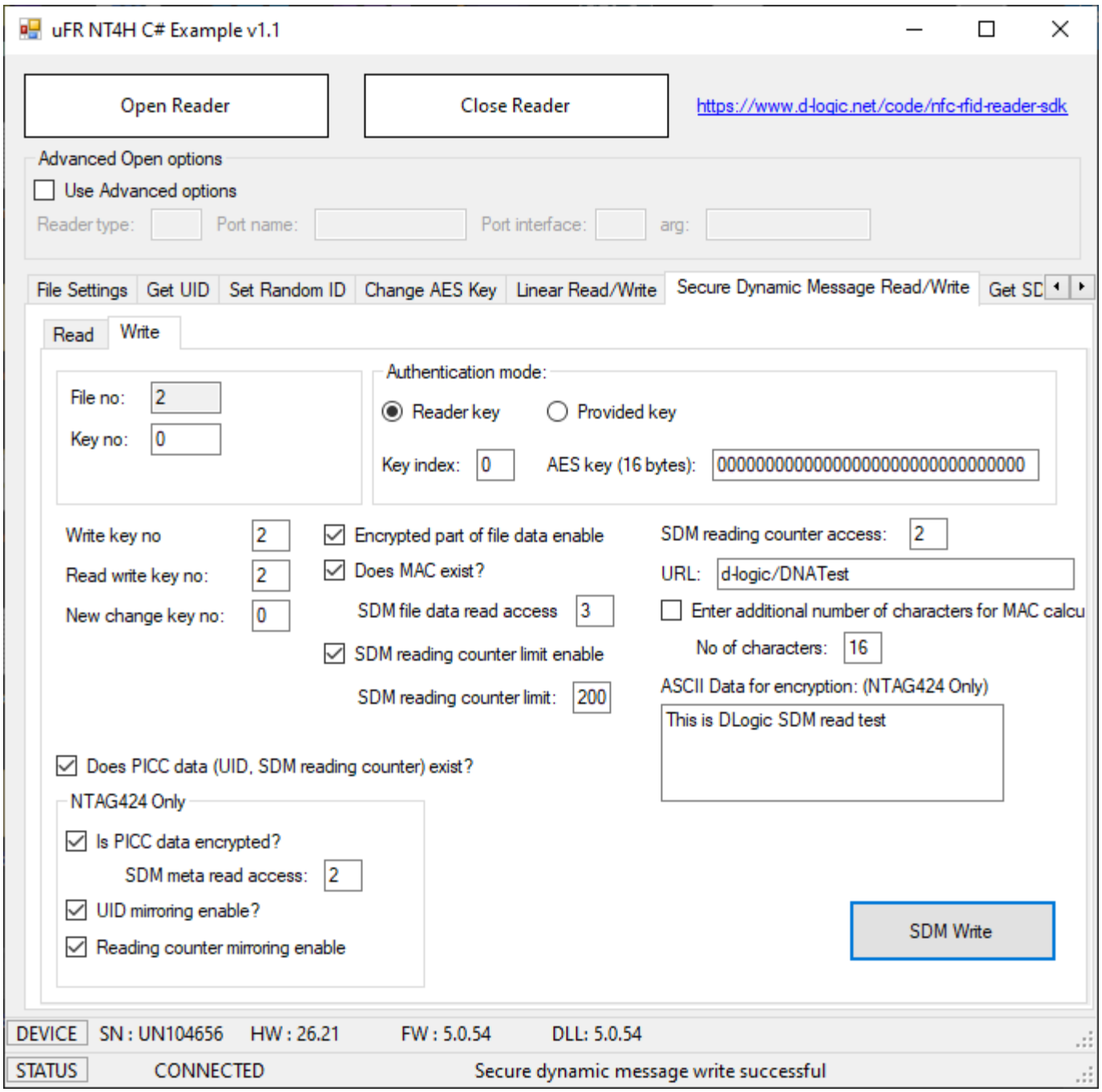
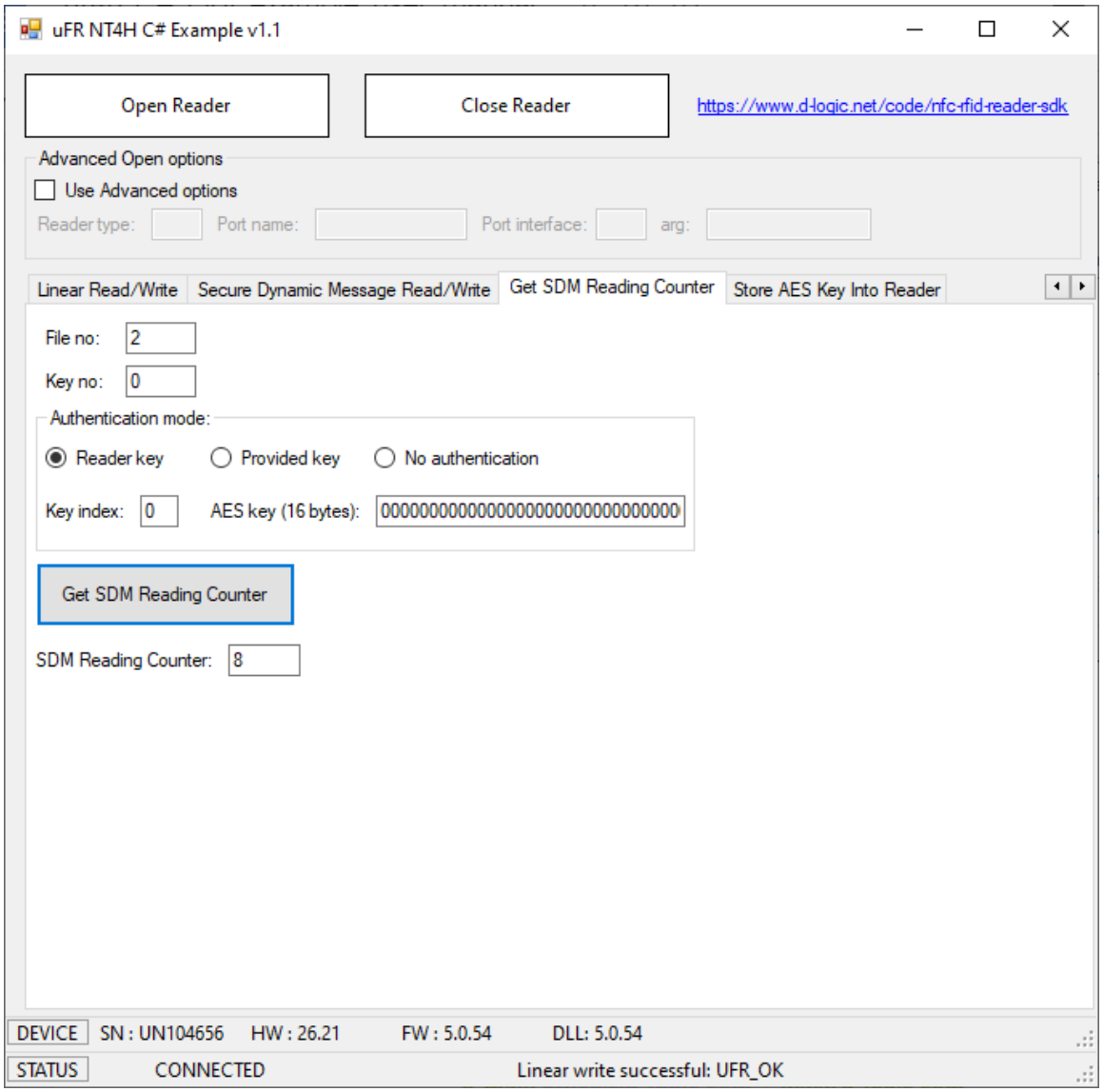
2.9 Secure Dynamic Message Write

File must be in Secure dynamic message mode (SDM enabled), and read access must be free (key no 14, no authentication required)



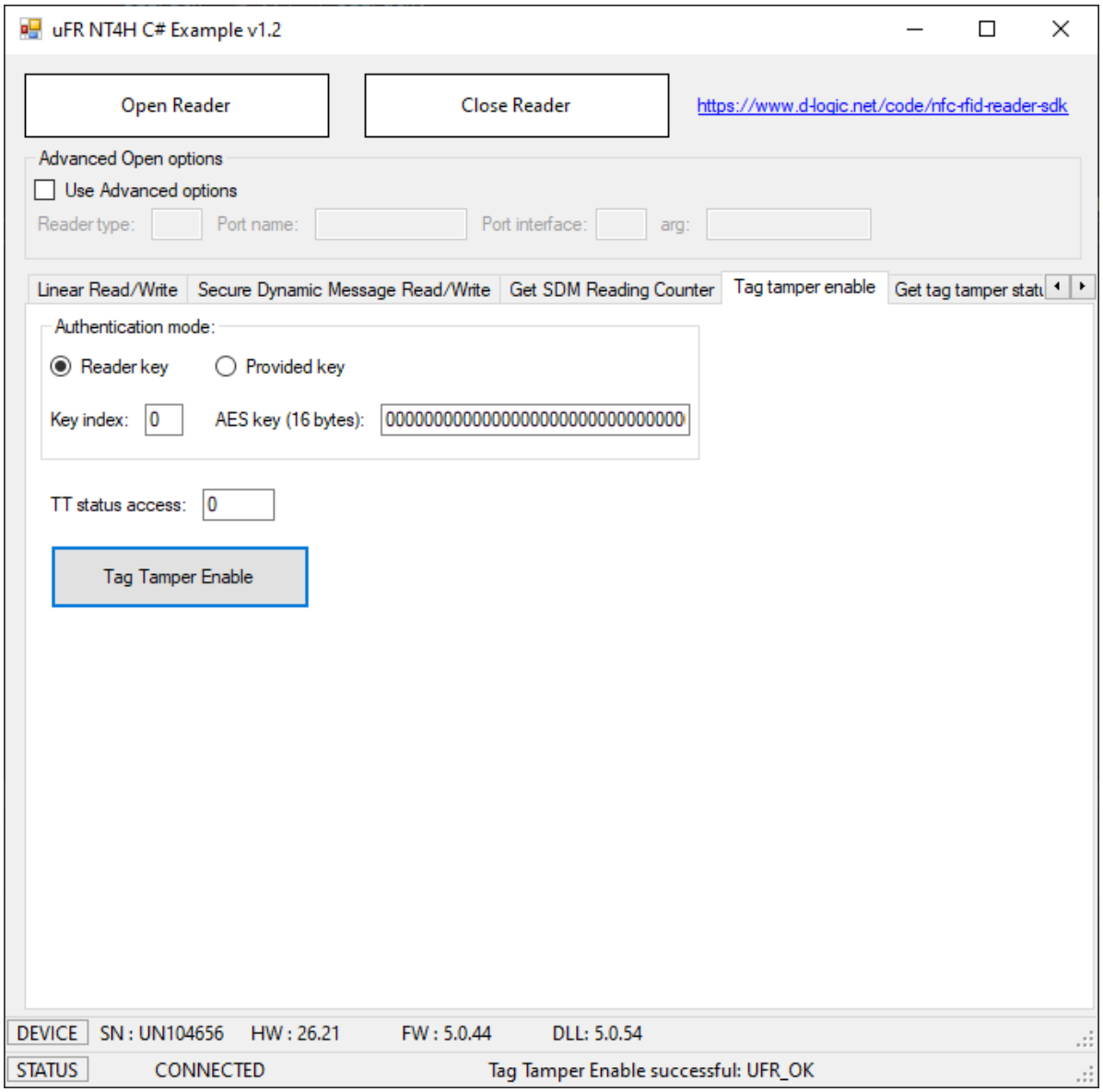
2.10 Get SDM Reading Counter

The Secure dynamic message reading counter exists only if SDM is enabled in file settings. It depends on the setting of SDM reading counter acces, authentication required or not.



2.11 Tag Tamper Enable

Added in software v1.2
NTAG424 DNA TT only.
Used for enabling the Tag Tamper feature.
Warning: this operation is irreversible.
Authentication with application master key (0) is required.
Example for free tag tamper status read.



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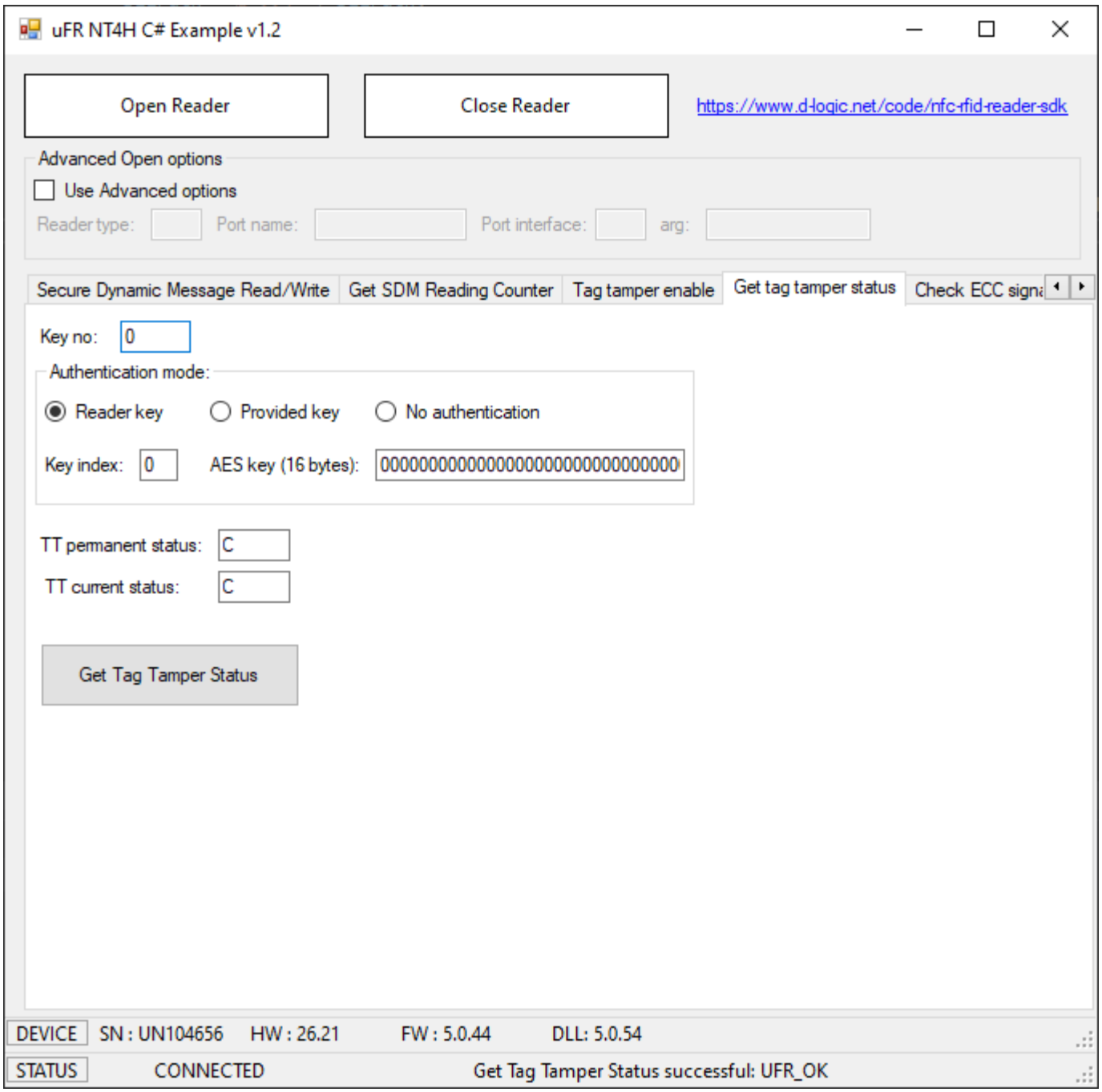
2.12 Get tag tamper status

Added in software v1.2
NTAG424 DNA TT only.
Example when the seal is still closed.



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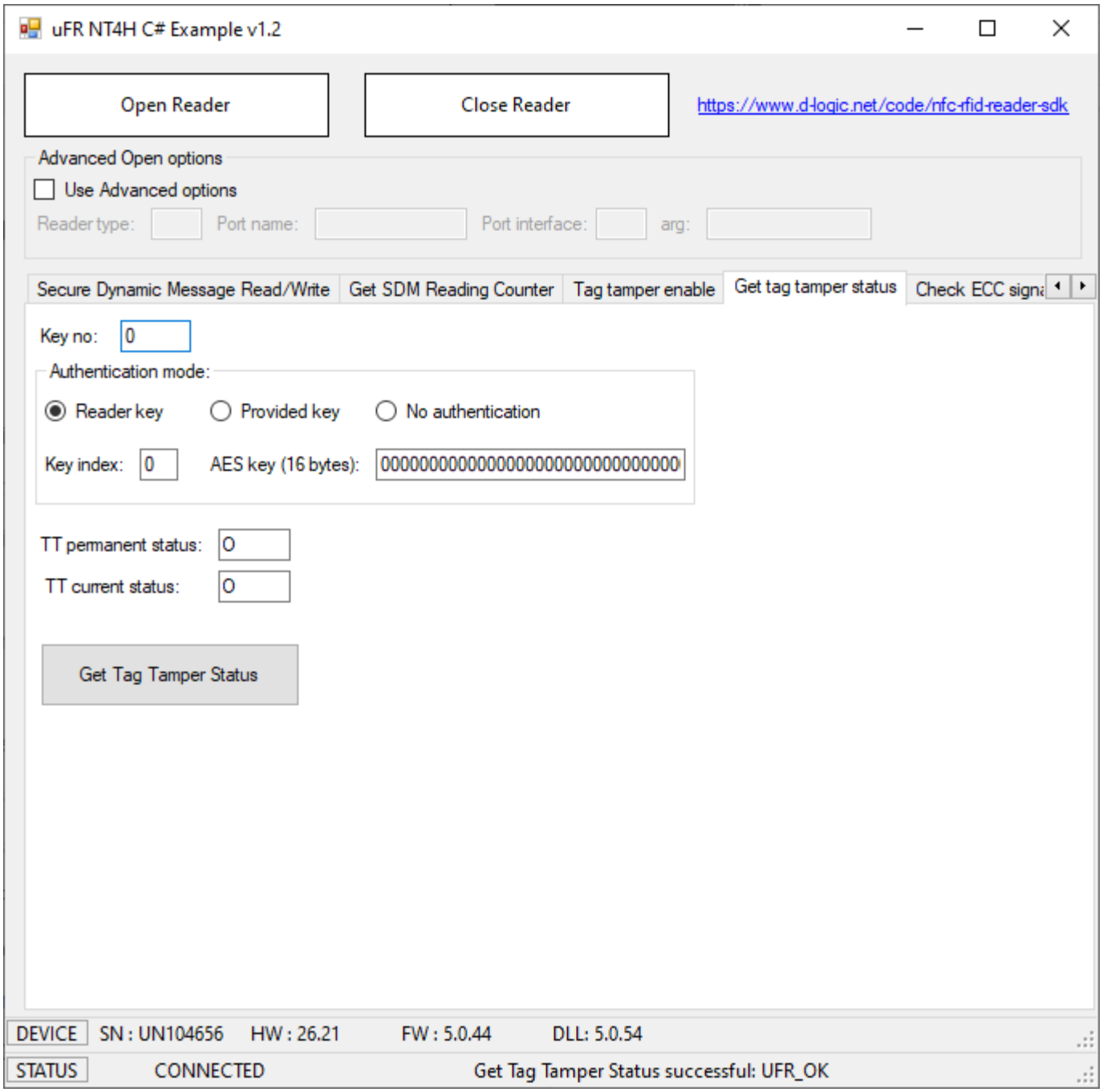
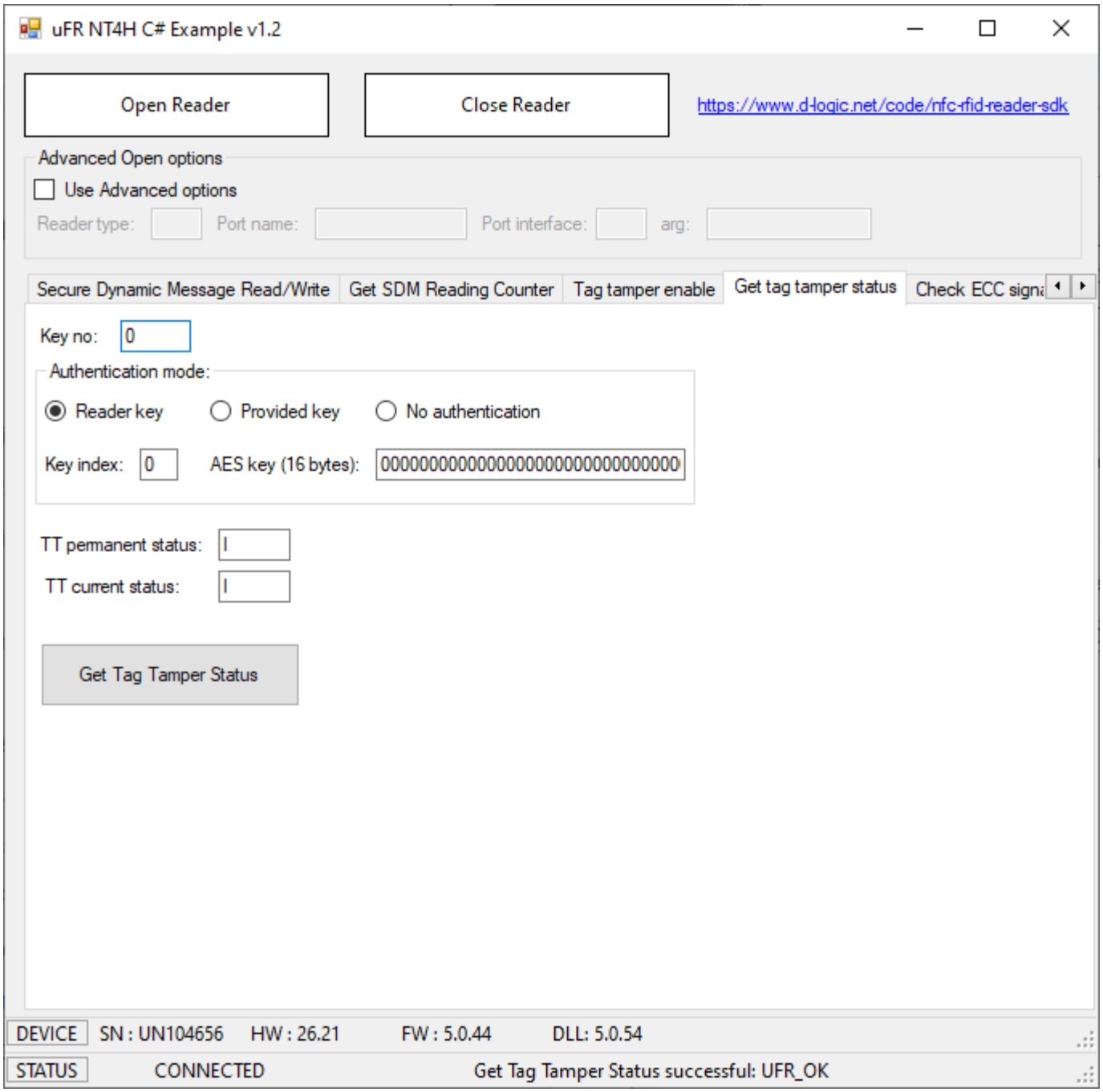
Open


uFR NT4H C# Example v1.2
Open Reader
Close Reader
https://www.d-logic.net/code/nfc-rfid-reader-sdk
Advanced Open options
Use Advanced options
Reader type:
Port name:
Port interface:
arg:
Secure Dynamic Message Read/Write
Get SDM Reading Counter
Tag tamper enable
Get tag tamper status
Check ECC signa
Key no: 0
Authentication mode:
Reader key
Provided key
No authentication
Key index: 0
AES key (16 bytes): 00000000000000000000000000000000
TT permanent status: 0
TT current status: 0
Get Tag Tamper Status
DEVICE
SN : UN104656
HW : 26.21
FW : 5.0.44
DLL: 5.0.54
STATUS
CONNECTED
Get Tag Tamper Status successful: UFR_OK

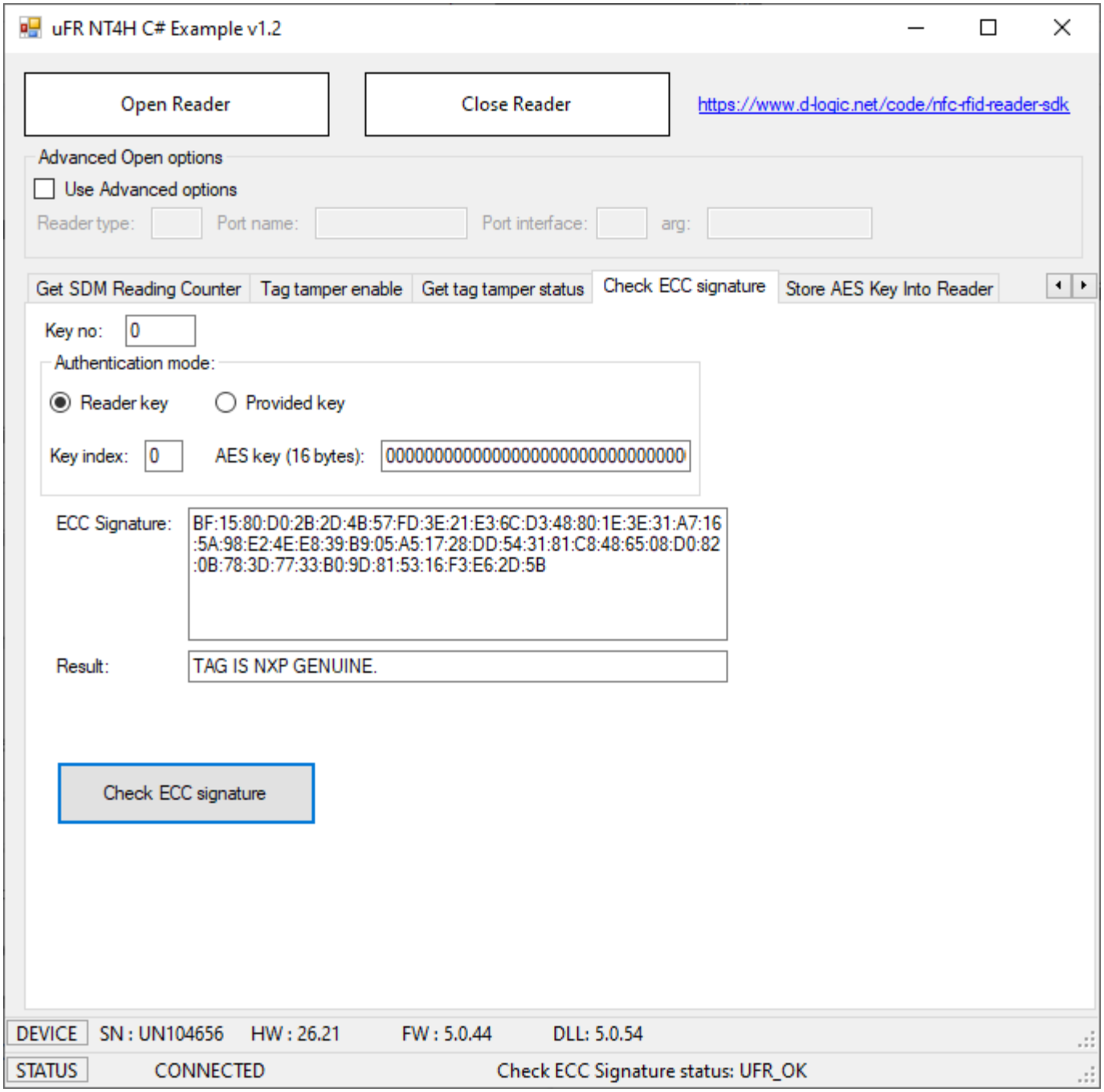
Invalid


uFR NT4H C# Example v1.2
Open Reader
Close Reader
https://www.d-logic.net/code/nfc-rfid-reader-sdk
Advanced Open options
Use Advanced options
Reader type:
Port name:
Port interface:
arg:
Secure Dynamic Message Read/Write
Get SDM Reading Counter
Tag tamper enable
Get tag tamper status
Check ECC signa
Key no: 0
Authentication mode:
Reader key
Provided key
No authentication
Key index: 0
AES key (16 bytes): 00000000000000000000000000000000
TT permanent status: I
TT current status: I
Get Tag Tamper Status
DEVICE
SN : UN104656
HW : 26.21
FW : 5.0.44
DLL: 5.0.54
STATUS
CONNECTED
Get Tag Tamper Status successful: UFR_OK

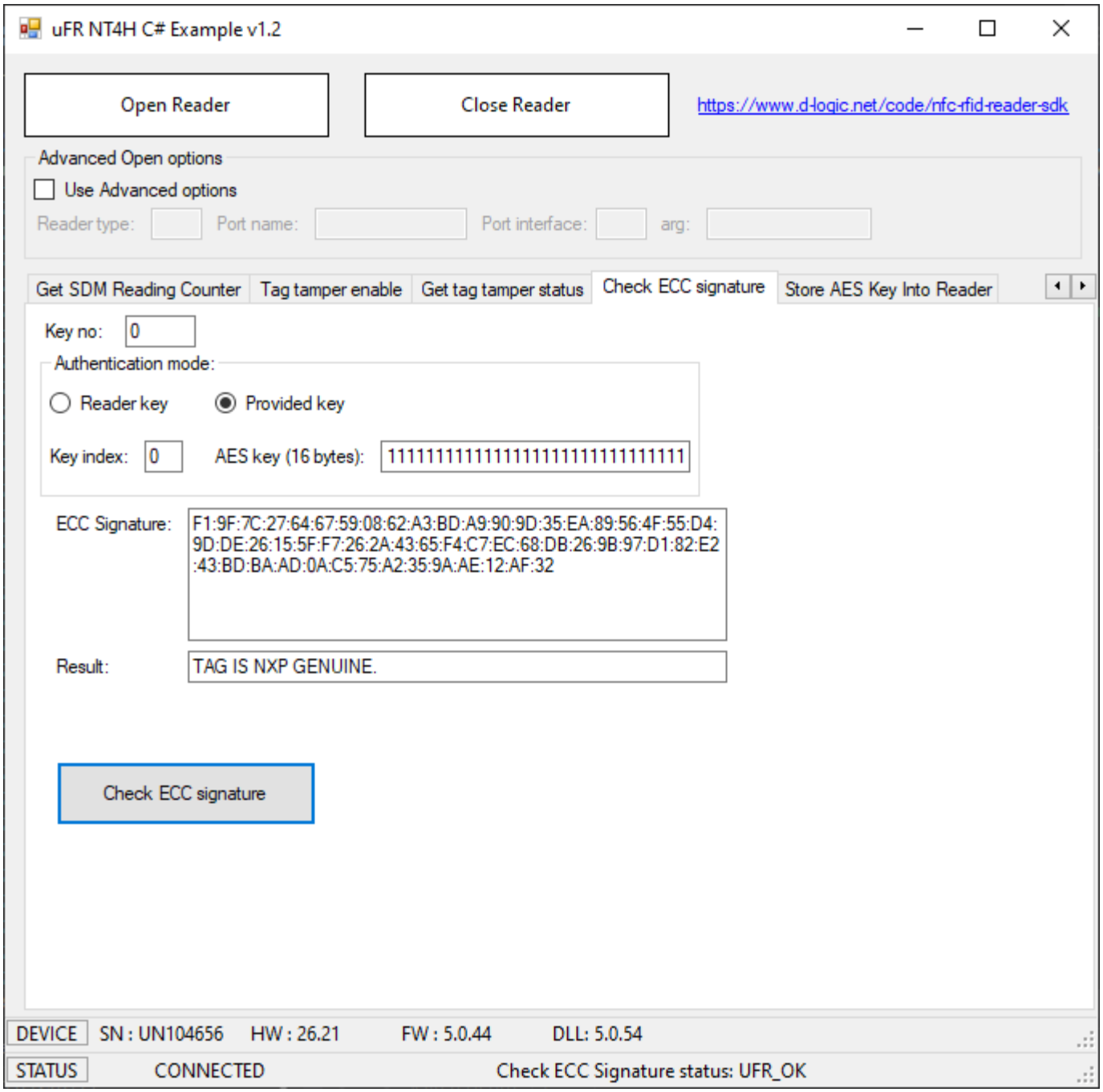
2.13 Check ECC signature

Added in software v1.2

Example for cards with UID. Authentication isn't required.

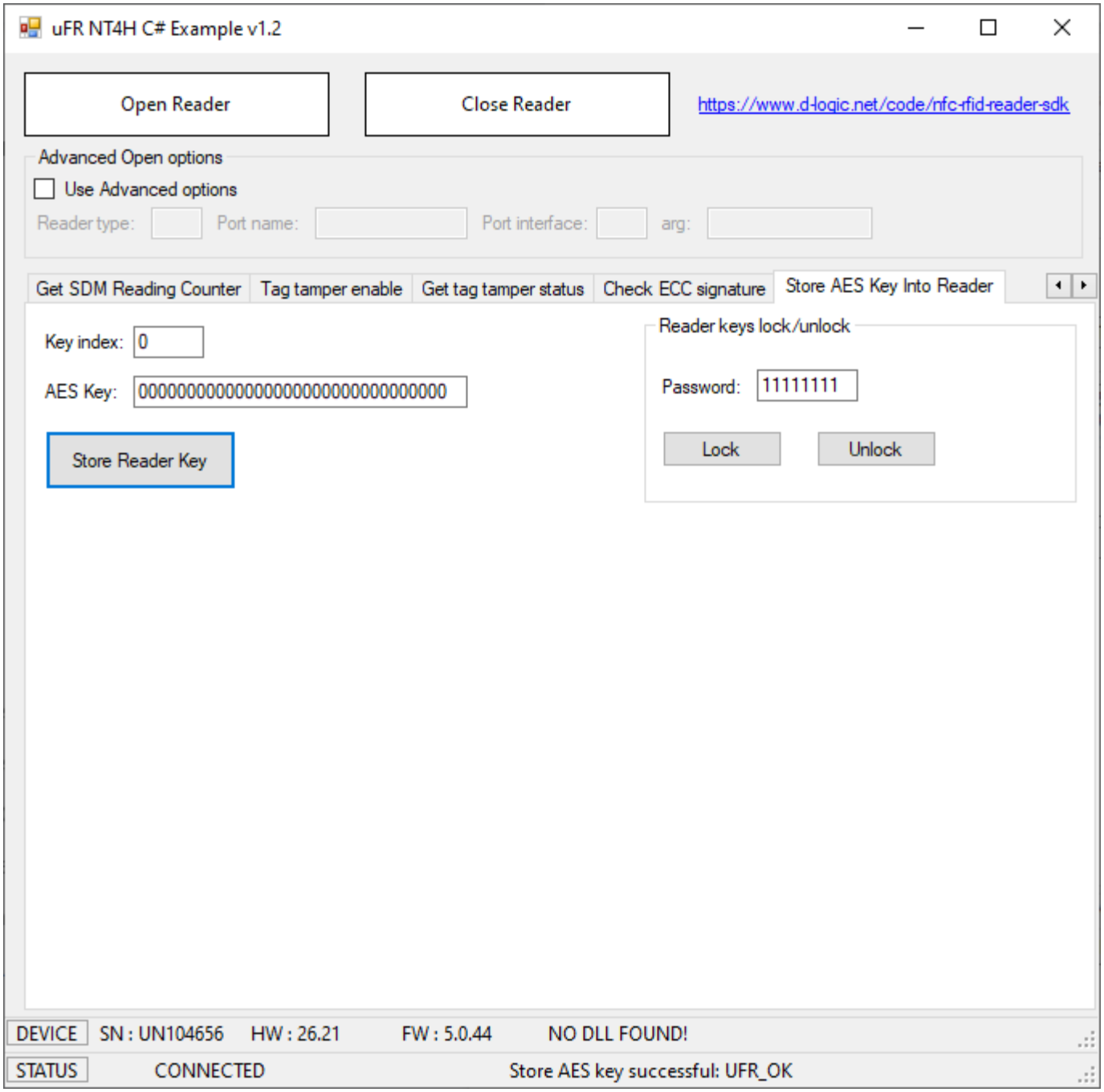


Example for cards with Random ID. Authentication with valid key required.



2.14 Store AES key into reader

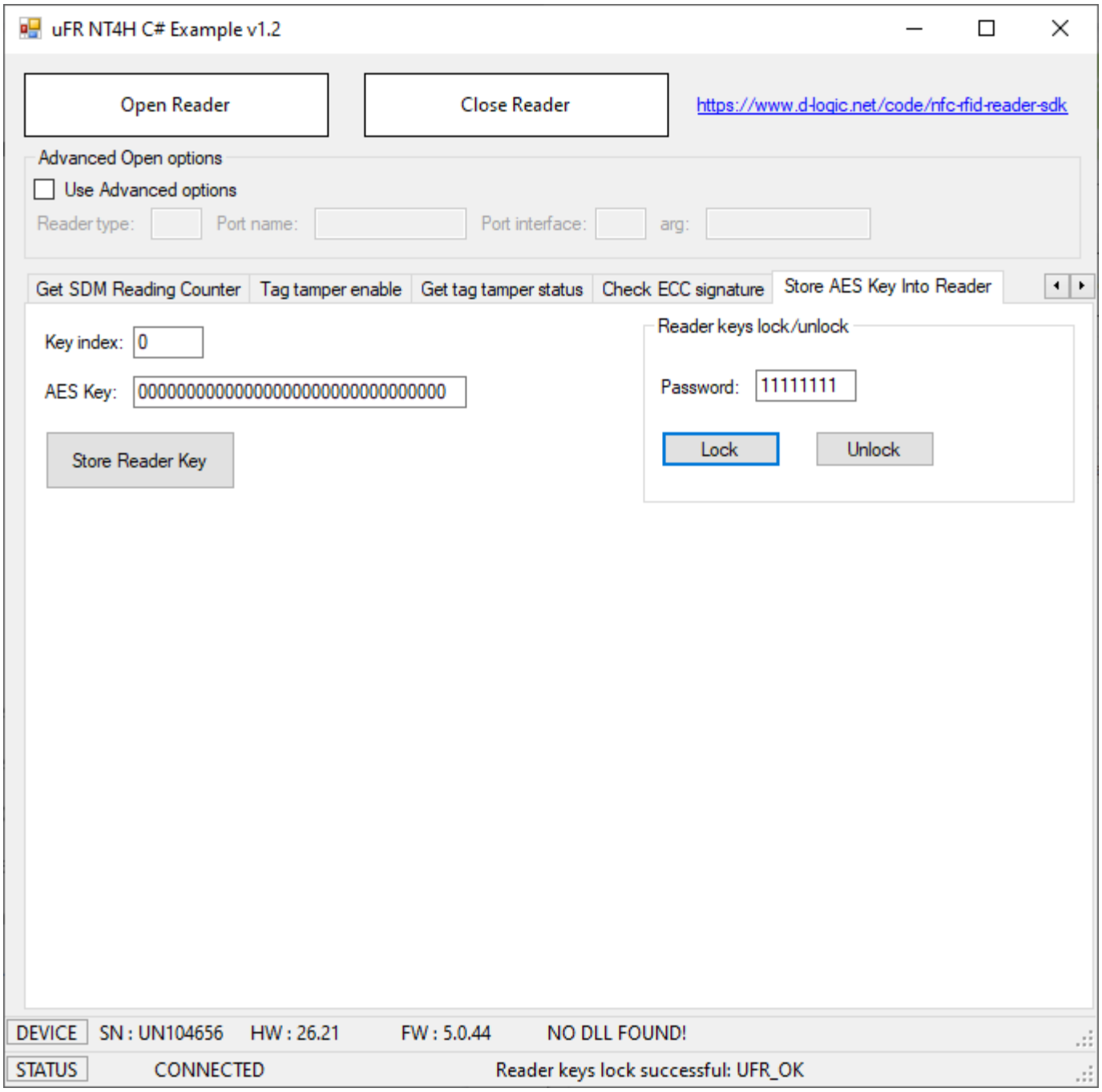
The reader may store 16 AES keys. Key index range 0-15
Example:
Store key 0x00000000000000000000000000000000 into reader on address 0.



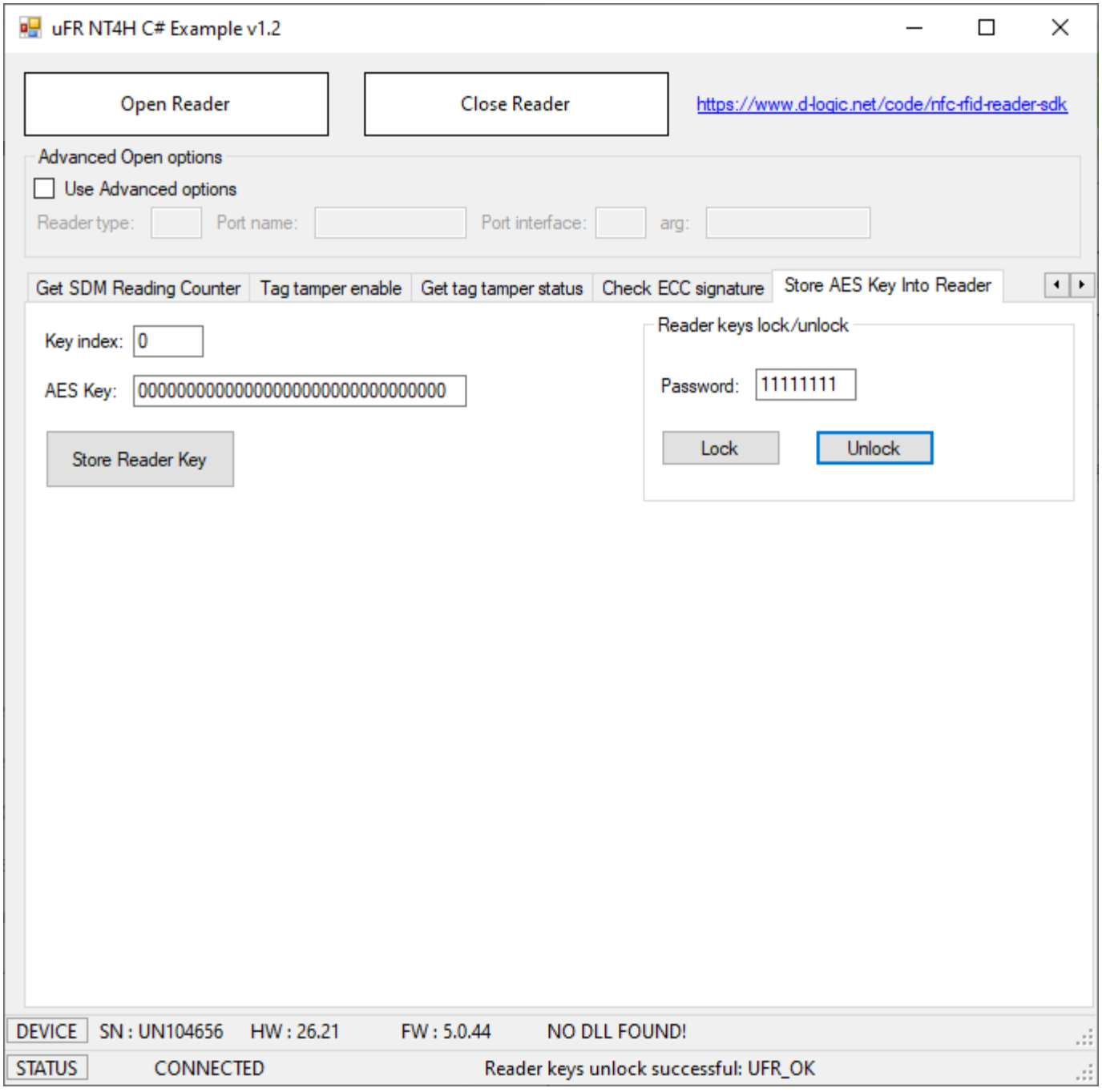
You can lock the key into the reader with an 8 character password. By default, keys are unlocked, and you can enter any password for locking.

Example:

Set password “11111111”



If the keys are locked, you must unlock them before inputting new keys into the reader.
To unlock the reader, you must use the same password that was used for locking the reader.
Example:
Unlock the reader keys with previously used password “11111111”



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Revision history

Date	Version	Comment
2021-09-16	1.1	Added NTAG424 DNA TT specific functions & examples
2021-09-14	1.0	Base document

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