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Application-specific microcontrollers are engineered to

Details	
Product Status	Obsolete
Applications	Security
Core Processor	-
Program Memory Type	-
Controller Series	-
RAM Size	-
Interface	ISO14443-3 Type A, NFC Forum Type 2
Number of I/O	-
Voltage - Supply	-
Operating Temperature	-25°C ~ 70°C
Mounting Type	-
Package / Case	-
Supplier Device Package	-
Purchase URL	https://www.e-xfl.com/product-detail/infineon-technologies/sle66r01pnbx1sa1

my-d™ move / my-d™ move NFC - SLE 66R01P / SLE 66R01PN Data Book
The information in this document is subject to change without notice.

Revision History: Current Version 2011-11-24

Previous Release: Preliminary 2011-11-18

Page	Subjects (major changes since last revision)
All	Editorial changes; removed “Preliminary” status; update of figures (memory organization)

List of Tables

Features

Intelligent 1216 bit EEPROM with Contactless Interface compliant to ISO/IEC 14443-3 Type A and support of NFC Forum™ Type 2 Tag Operation

Contactless Interface

- Physical Interface and Anticollision compliant to ISO/IEC 14443-3 Type A
  - Operation frequency 13.56 MHz
  - Data rate 106 kbit/s in both direction
  - Contactless transmission of data and supply energy
  - Anticollision logic: several cards may be operated in the field simultaneously
- Unique IDentification number (7-byte double-size UID) according to ISO/IEC 14443-3 Type A
- Read and Write Distance up to 10 cm and more (influenced by external circuitry i.e. reader and inlay design)

152 byte EEPROM

- Organized in 38 blocks of 4 bytes each
- 128 bytes freely programmable User Memory
- 24 bytes of Service Area reserved for UID, Configuration, LOCK Bytes, OTP Block and Manufacturer Data
- Read and Write of 128 bytes of User Memory in less than 100 ms
- Programming time per block < 4 ms
- Endurance minimum 10,000 erase/write cycles[1)]
- Data Retention minimum 5 years[1)]

Privacy Features

- 32 bit of One Time Programmable (OTP) memory area
- Locking mechanism for each block
- Block Lock mechanism
- Optional 32 bit Password for Read/Write or Write access
- Optional Password Retry Counter
- Optional 16 bit Value Counter

Data Protection

- Data Integrity supported by 16 bit CRC, parity bit, command length check
- Anti-tearing mechanism for OTP, Password Retry Counter and Value Counter

NFC Forum™ Operation

- Compliant to NFC Forum™ Type 2 Tag Operation
- Support of Static and Dynamic Memory Structure according to NFC Forum™ Type 2 Tag Operation
- SLE 66R01PN: pre-configured NFC memory with empty NDEF message (INITIALIZED state, non-reversible)
- SLE 66R01P: UNINITIALIZED state, may be configured to INITIALIZED state

Electrical Characteristics

- On-Chip capacitance 17 pF $\pm$ 5%
- ESD protection minimum 2 kV
- Ambient Temperature -25℃ … +70℃ (for the chip)

1) Values are temperature dependent

2 my-d™ Product Family

my-d™ products are available both in plain mode with open memory access and in secure mode with memory access controlled by authentication procedures. The my-d™ product family provides users with different memory sizes, features NFC Forum™ Type 2 Tag functionality and incorporates security features to enable considerable flexibility in the application design.

Flexible controls within the my-d™ devices start with plain mode operation featuring individual page locking; for more complex applications various settings in secure mode can be set for multi user / multi application configurations.

In plain mode access to the memory is supported by both 4-byte block as well as 8-byte page structure.

In secure mode a cryptographic algorithm based on a 64-bit key is available. Mutual authentication, message authentication codes (MAC) and customized access conditions protect the memory against unauthorized access.

The functional architecture, meaning the memory organization and authentication of my-d™ products is the same for both my-d™ proximity (ISO/IEC 14443) and my-d™ vicinity (ISO/IEC 18000-3 mode 1 or ISO/IEC 15693). This eases the system design and allows simple adaptation between applications.

Configurable Value Counters featuring anti-tearing functionality are suitable for value token applications, such as limited use transportation tickets.

Architectural interoperability of my-d™ products enables an easy migration from simple to more demanding applications.

The my-d™ move family is designed for cost optimized applications and its implemented command set eases the usage in existing applications and infrastructures.

In addition, the my-d™ light (ISO/IEC 18000-3 mode 1 or ISO/IEC 15693) is part of the my-d™ family. Its optimized command set and memory expands the range of applications to cost sensitive segments.

2.1 my-d™ move and my-d™ move NFC

The my-d™ move and my-d™ move NFC are part of Infineon's my-d™ product family and are designed to meet the requirements of the increasing NFC market demanding smart memories. They are compliant to ISO/IEC 14443-3 Type A, to ISO/IEC 18092 and to NFC Forum™ Type 2 Tag Operation.

128 Bytes of memory can be arranged in static or dynamic memory structures for NFC applications.

my-d™ move and my-d™ move NFC products also feature configurable Value Counters which support anti-tearing protection.

Privacy features like a password protection including password retry counter provide basic security to the applications.

Based on SLE 66R01P the SLE 66R01PN already contains a pre-configuration of the NFC memory indicating the INITIALIZED state according to the definition of the NFC Forum™ Type 2 Tag life cycle. Due to that the my-d™ move NFC is ready to be used in NFC infrastructures.

my-d™ move and my-d™ move NFC products are suited for a broad range of applications like public transport, event ticketing or smart posters.

2.2 Application Segments

my-d™ products are optimized for personal and object identification. Please find in the following table some dedicated examples

Table 3 my-d™ family product overview

Product	Application
my-d™ move - SLE 66R01P	Public Transport, Smart Posters, NFC Device Pairing
my-d™ move NFC - SLE 66R01PN	Public Transport, Smart Posters, NFC Device Pairing, NFC INITIALIZED state
my-d™ move lean - SLE 66R01L	Public Transport, Smart Posters, NFC Device Pairing
my-d™ NFC - SLE 66RxxP	Smart Posters and Maps, NFC Device Pairing, Loyalty Schemes, Consumer Good Information, Healthcare Monitoring
my-d™ proximity 2 - SLE 66RxxS	Access Control, Entertainment, Public Transport, Customer Loyalty Schemes, Micro Payment
my-d™ proximity enhanced - SLE 55RxxE	Access Control, Gaming, Entertainment, Customer Loyalty Schemes
my-d™ light - SRF 55V01P	Libraries, Laundry, Factory Automation, Media Management, Event Ticketing, Leisure Park Access
my-d™ vicinity plain - SRF 55VxxP	Factory Automation, Healthcare, Ticketing, Access Control
my-d™ vicinity plain HC - SRF 55VxxP HC	Ticketing, Brand Protection, Loyalty Schemes, Ski passes
my-d™ vicinity secure - SRF 55VxxS	Ticketing, Brand protection, Loyalty Schemes, Access Control

3.3 Memory Principle for NFC Forum™ Type 2 Tag

The memory organization is configurable according to the NFC Forum™ Type 2 Tag Operation specification. Static or dynamic memory structures are supported.

Figure 4 illustrates the principle of the SLE 66R01P and SLE 66R01PN as a NFC Forum™ Type 2 Tag compatible chip. The memory can be accessed with NFC Forum™ Type 2 Tag commands.

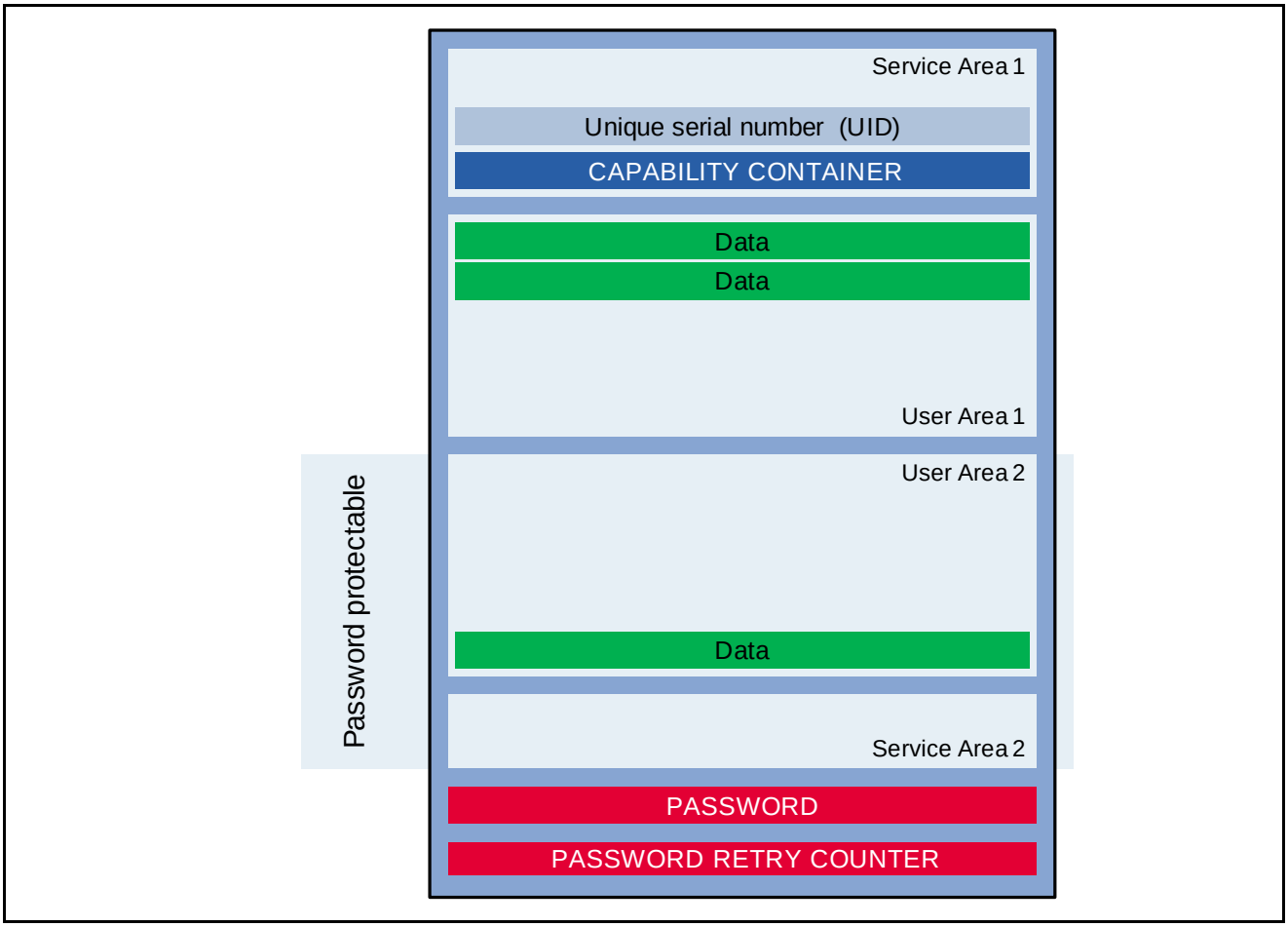

Figure 4 SLE 66R01P and SLE 66R01PN NFC Forum™ Type 2 Tag memory structure

Based on SLE 66R01P the SLE 66R01PN already contains a pre-configuration of the NFC memory indicating the INITIALIZED state according to the definition of the NFC Forum™ Type 2 Tag life cycle. With this pre-configuration the my-d™ move NFC can be immediately used in NFC infrastructures.

For details regarding the NFC initialization of my-d™ move and my-d™ move NFC please refer the the Application Note “How to operate my-d™ move and my-d™ move NFC devices in NFC Forum™ Type 2 Tag infrastructures” available at Chip Card & Security security.chipcard.ics@infineon.com.

Attention: The pre-configuration of SLE 66R01PN is nonreversible and the my-d™ move NFC cannot be overwritten and used as plain, standard my-d™ move anymore.

3.5 UID Coding

To identify a SLE 66R01P and SLE 66R01PN chip the manufacturer code and a chip family identifier are coded into the UID as described in the **Table 4**. The chip family identifier can be used to determine the basic command set for the chip.

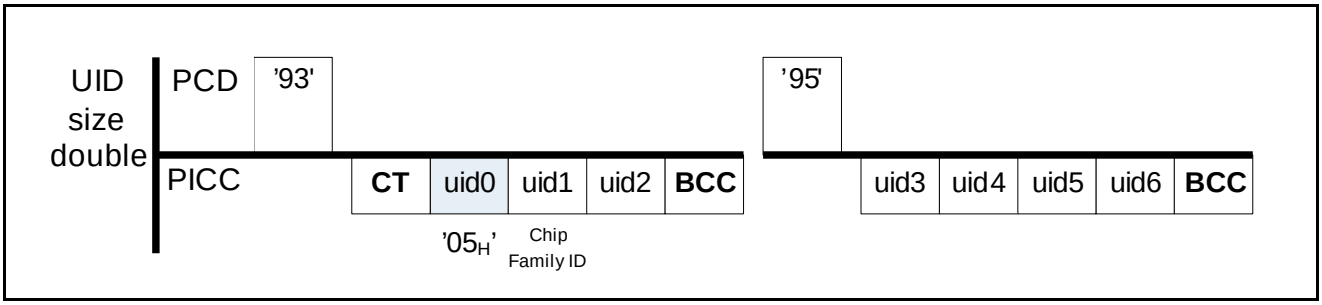

Figure 6 SLE 66R01P and SLE 66R01PN double-size UID

Table 4 UID Coding

UID Field	Value	Description
uid0	05_H	IC Manufacturer Code according to ISO/IEC 7816-6
uid1	$3x_H$	Chip Family Identifier Higher Nibble: 0011_B: my-d™ move and my-d™ move NFC Lower Nibble: part of the UID number

3.6 Supported Standards

the SLE 66R01P and SLE 66R01PN support the following standards:

- ISO/IEC 14443 Type A (Parts 1, 2 and 3)
  tested according to ISO/IEC 10373-6 (PICC Test & Validation)
- ISO/IEC 14443-3 Type A
- NFC Forum™ Type 2 Tag Operation

3.7 Command Set

The SLE 66R01P and SLE 66R01PN is compliant to the ISO/IEC 14443-3 Type A standard.

A set of standard ISO/IEC 14443-3 Type A commands is implemented to operate the chip.

Additionally NFC Forum™ Type 2 Tag commands and a my-d™ move and my-d™ move NFC specific command set is implemented. This facilitates the access to the on-chip integrated memory and supports the execution of password and counter functionality.

4.2 Service Area 1 and 2

The Service Area 1 (block address 00_H to 03_H) contains

- 7-byte double-size UID (plus two bytes of UID BCC information)
- Configuration Byte
- LOCK0 and LOCK1 to lock the OTP block and blocks in User Area 1
- 32 bit OTP memory

The Service Area 2 (block address 24_H to 25_H) contains

- LOCK2 - LOCK5 to lock blocks in User Area 2
- Manufacturer Data

4.2.1 Unique Identifier (UID)

The 9 bytes of the UID (7 byte UID + 2 bytes BCC information) are allocated in Block 00_H, Block 01_H and Byte 1 of Block 02_H of the my-d™ move and my-d™ move NFC memory. All bytes are programmed and locked during the manufacturing process. These bytes cannot be changed.

For the content of the UID the following definitions apply:

- SLE 66R01P and SLE 66R01PN support Cascade Level 2 UID according to the ISO/IEC 14443-3 Type A which is a 7 byte unique number

The table below describes the content of the UID including the BCC information.

Table 5 UID Description

Cascade Level 2 - double-size UID										
UID Byte	CT[1)]	uid0[2)]	uid1[3)]	uid2	BCC0[4)]	uid3	uid4	uid5	uid6	BCC1[4)]

1) CT is the Cascade Tag and designates CL2. It has a value of 88_H. Please note that CT is hardwired and not stored in the memory.

2) uid0 is the Manufacturer Code: 05_H according to ISO/IEC 7816-6

3) uid1 is the Chip Family Identifier.
The higher significant nibble identifies a my-d™ move and my-d™ move NFC chip (0011_B).
The lower significant nibble of uid1 is part of the serial number.

4) BCCx are the UID CLn checkbytes calculated as Exclusive-OR over the four previous bytes (as described in ISO/IEC 14443-3 Type A). BCCx is stored in the memory and read-out during the anti-collision.

  - LOCK2 - LOCK5 set to 00_H
  - Manufacturer Data; read-only
- Password set to 00_H 00_H 00_H 00_H
- Password Retry Counter
  - deactivated by the setting of the CONFIG byte

The SLE 66R01P may be configured to INITIALIZED state according to the definition to the NFC Forum™ Type 2 Tag life cycle by writing

- Capability Container bytes (see **Table 9**) to Block 03_H
- empty NDEF message TLV incl. Terminator TLV (see **Table 10**) to Block 04_H

4.4.2 Transport Configuration my-d™ move NFC

SLE 66R01PN is delivered in INITIALIZED state (life cycle) according to the NFC Forum™ Type 2 Tag specification.

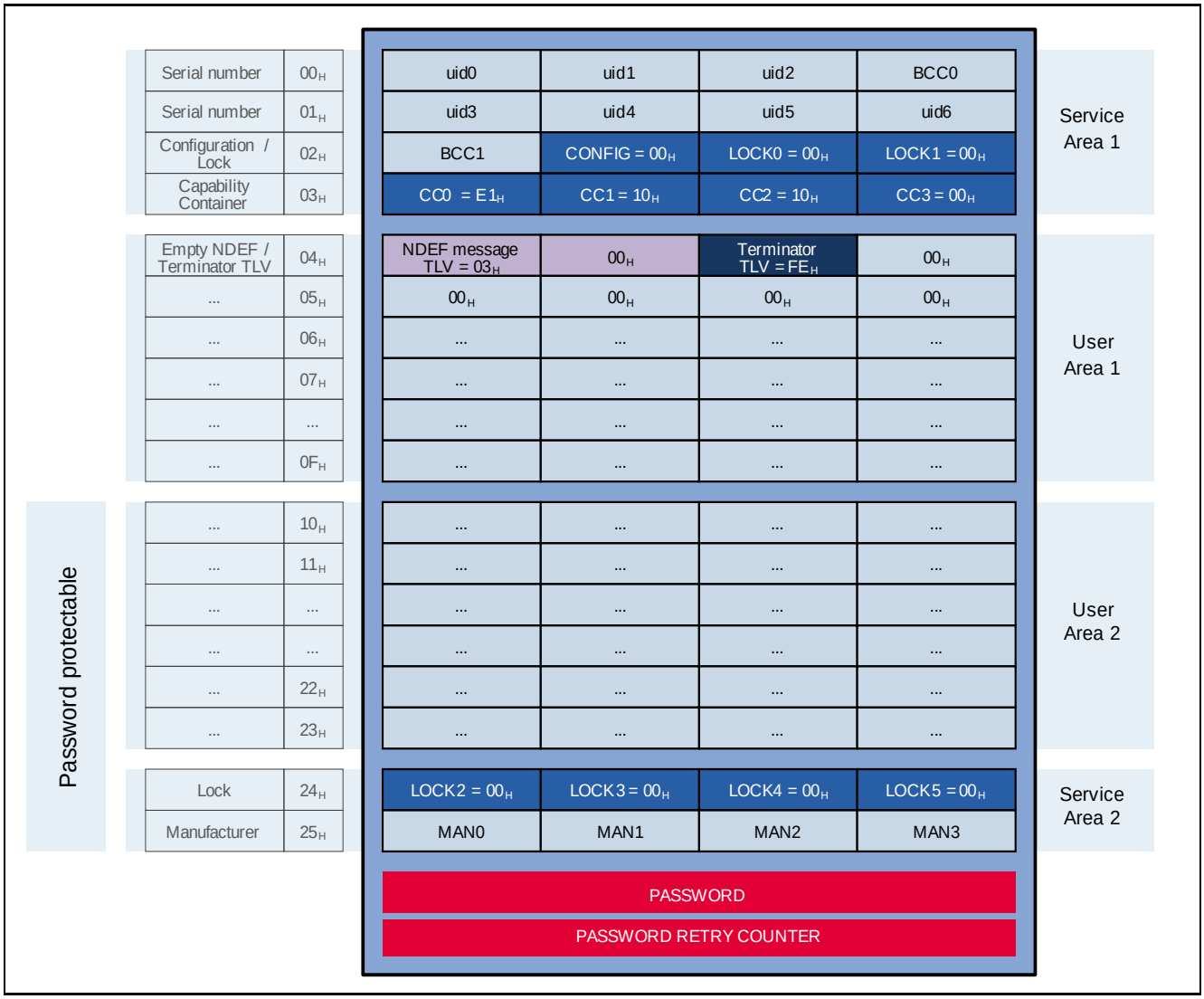

Figure 14 my-d™ move NFC Transport Configuration

- Service Area 1 contains
  - predefined UID, read-only
  - CONFIG, LOCK0 and LOCK1 set to 00_H

  - OTP0 - OTP3 contains the CAPABILITY CONTAINER (see **Table 9**)
- User Area 1:
  - contains empty NDEF message TLV including Terminator TLV (= FE_H) as indicated in **Table 10**
  - all other data bytes set to 00_H
- User Area 2
  - all data bytes set to 00_H
- Service Area 2 contains
  - LOCK2 - LOCK5 set to 00_H
  - Manufacturer Data; read-only
- Password set to 00_H 00_H 00_H 00_H
- Password Retry Counter
  - deactivated by the setting of the CONFIG byte

Table 9 Capability Container settings for my-d™ move and my-d™ move NFC

Chip Type	CC0	CC1[1)]	CC2[2)]	CC3
SLE 66R01PN	$E1_H$	10_H (may be changed to 11_H if needed)	10_H	00_H

1) my-d™ move and my-d™ move NFC also support Version 1.1 of the NFC Forum™ Type 2 Tag specification.

2) CC2 indicates the memory size of the data area of the Type 2 Tag; the given values represent the maximum values for the chips

Table 10 defines the empty NDEF Message TLV (identified with the Tag field value of 03_H). The Length field value is set to 00_H; due to that the Value field is not present.

The Terminator TLV (FE_H) is the last TLV block in the data area.

Table 10 Empty NDEF message

NDEF Message TLV			Terminator TLV		
Tag field	**Length field**	**Value field**	**Tag Field**	**Length field**	**Value field**
03_H	00_H	-	FE_H	-	-

Note: The pre-configuration of SLE 66R01PN is nonreversible and the my-d™ move NFC cannot be overwritten and used as plain, standard my-d™ move anymore.

7 Communication Principle

This chapter describes the functionality of the SLE 66R01P and SLE 66R01PN.

7.1 Communication between a card (PICC) and a reader (PCD)

It is recommended to read the ISO/IEC 14443-3 Type A and NFC Forum™ Type 2 Tag specifications in conjunction with this document in order to understand the communication protocol as well as the functionality of the SLE 66R01P and SLE 66R01PN as it is based on these specifications.

7.2 State Diagram

The SLE 66R01P and SLE 66R01PN is fully compliant to ISO/IEC 14443-3 Type A. All operations on this IC are initiated by an appropriate reader and controlled by the internal logic of the my-d™ move and my-d™ move NFC.

Prior to any memory access the card has to be selected according to the ISO/IEC 14443-3 Type A. If the my-d™ move and my-d™ move NFC is configured to be password protected, a password verification is required to access the memory.

The following figure presents the state diagram of SLE 66R01P and SLE 66R01PN.

If an unexpected command is received, the chip always returns to IDLE or HALT state, depending from which path it came from (the red paths in the state diagram).

7.2.1 IDLE/HALT State

After Power On, the SLE 66R01P and SLE 66R01PN is in IDLE state.

If REQA or WUPA is executed in this state, the SLE 66R01P and SLE 66R01PN transits to READY1 state. Any other command is interpreted as an error and the chip stays in IDLE state without any response.

If the HLTA command is executed in ACTIVE/ACTIVE* State, the SLE 66R01P and SLE 66R01PN will transit to HALT state. The HALT state can be left only if the chip receives a WUPA command. Any other command is interpreted as an error and the SLE 66R01P and SLE 66R01PN stays in the HALT state without any response.

7.2.2 READY1/READY1* State

In READY1/READY1* state the first part of the UID can be resolved by using ISO/IEC 14443-3 Type A anticollision and/or Select commands.

After the Select command is executed properly the IC transits to READY2/READY2* state in which the second part of the UID can be resolved. The answer to a Select command in READY1/READY1* state is Select Acknowledge (SAK) for cascade level 1, which indicates that the UID is incomplete and the next cascade level has to be started to resolve the whole UID (see also ISO/IEC 14443-3 Type A).

However the SLE 66R01P and SLE 66R01PN can directly transit from READY1/ READY1* state to ACTIVE/ACTIVE* state if a read command RD2B or R4BD with a valid address is executed. Note if more than one SLE 66R01P and SLE 66R01PN is in the reader field, all ICs are selected after the execution of the read command, although all of them have different UIDs.

Any other command or any other interruption is interpreted as an error and the SLE 66R01P and SLE 66R01PN returns back to IDLE or HALT state without any response, depending from which state it has come from.

7.2.3 READY2/READY2* State

In READY2/READY2* state the second part of the UID can be resolved using ISO/IEC 14443-3 Type A anticollision and/or Select commands.

After the Select command is executed properly the IC transits to ACTIVE/ACTIVE* state in which memory can be accessed. The answer to a Select command in READY2/READY2* state is SAK for cascade level 2, which indicates that the UID is complete and the selection process is finished.

However the SLE 66R01P and SLE 66R01PN can directly transit from READY2/READY2* state to ACTIVE/ACTIVE* state if a read command RD2B or RD4B is executed. Any valid block address can be used in the read command. Note if more than one SLE 66R01P and SLE 66R01PN is in the reader field, all ICs are selected after the execution of the read command, although all of them have different UIDs.

Any other command or any other interruption is interpreted as an error and the SLE 66R01P and SLE 66R01PN returns back to IDLE or HALT state without any response, depending from which part it has come from.

7.2.4 ACTIVE/ACTIVE* State

In the ACTIVE/ACTIVE* state memory access commands can be executed.

If a SLE 66R01P and SLE 66R01PN is configured to have read/write or write password protection, a password verification is required to access the protected memory pages. In case of a successful password verification, read/write access to the whole memory is possible. If no verification is done or the password verification fails, the memory area above block $0F_H$ is locked according to the access rights in the Configuration Byte.

The ACTIVE/ACTIVE* state is left if the HLTA command is executed properly; the SLE 66R01P and SLE 66R01PN then transits to HALT state and waits until a WUPA command is received.

If any error command is received, the SLE 66R01P and SLE 66R01PN sends “No Response” (NR) or “Not Acknowledge” (NACK) and transits to IDLE or HALT state, depending from which state it has come from.

7.2.5 HALT State

The HLTA command sets the SLE 66R01P and SLE 66R01PN in the HALT state. The SLE 66R01P and SLE 66R01PN sends no response to the HLTA command. In the HALT state the IC can be activated again by a Wake-UP command (WUPA).

Any other data received is interpreted as an error, the SLE 66R01P and SLE 66R01PN sends no response and remains in HALT state.

The exact behavior of a particular command in any of the states above is also described in the specific command description.

Note: The response timing of a particular SLE 66R01P and SLE 66R01PN command is given in the specific command description. However, the timing values are rounded and are not on a grid according the ISO/IEC 14443-3 Type A.

7.5 Error Handling

The SLE 66R01P and SLE 66R01PN responds to valid frames only. The table below describes the behavior for different error cases.

Table 12 Behavior in case of an Error

Current States	Command or Error	Response SLE 66R01P and SLE 66R01PN	Next State
IDLE/HALT READY1/READY1* READY2/READY2*	Invalid Opcode	NR[1)]	IDLE/HALT[2)]
	Parity, Miller Error, CRC	NR	IDLE/HALT
	Command too short or too long	NR	IDLE/HALT
	Invalid Address	NR	IDLE/HALT
	Other Errors	NR	IDLE/HALT
ACTIVE/ACTIVE*	Invalid Opcode	NR	IDLE/HALT
	Parity, Miller Error, CRC	NACK1	IDLE/HALT
	Command too short or too long	NR	IDLE/HALT
	Invalid Address	NACK0	IDLE/HALT
	Other Errors	NACK0	IDLE/HALT

1) RD4B and RD2B commands in READY1/READY1* and READY2/READY2* exceptionally behave as in ACTIVE/ACTIVE* state.

2) The SLE 66R01P and SLE 66R01PN returns to IDLE or HALT state depending on the state where it has come from.

8 Command Set

8.1 Supported ISO/IEC 14443-3 Type A Command Set

The following table describes the ISO/IEC 14443-3 Type A command set which is supported by the SLE 66R01P and SLE 66R01PN.

For a detailed command description refer to the ISO/IEC 14443-3 Type A functional specification.

Table 13 ISO/IEC 14443-3 Type A Command Set

Command	Abbreviation	Op-Code	Description
Request A	REQA	26_H	Short Frame Command Type A request to all ISO/IEC 14443-3 Type A compatible chips in IDLE State
Wake Up A	WUPA	52_H	Short Frame Command,Type A Wake Up request to all ISO/IEC 14443-3 Type A compatible chips
Anticollision	AC	93_H NVB_H 95_H NVB_H	Cascade level 1 with the Number of Valid Bits Cascade level 2 with the Number of Valid Bits
Select	SELA	93_H 70_H, 95_H 70_H	Select the UID of Cascade level 1 Select the UID of Cascade level 2
HaltA	HLTA	50_H	Set a chip to a HALT State Important remark: The parameter field of the HLTA command represents the valid address range which is 00_H -25_H.

8.2 Memory Access Command Set

The command set of the SLE 66R01P and SLE 66R01PN comprises the NFC Forum™ Type 2 Tag commands as well as proprietary commands which are additionally implemented to increase data transaction time and increase the protection of the data stored in the memory.

The following table lists the memory access command set of the SLE 66R01P and SLE 66R01PN.

Table 14 my-d™ move and my-d™ move NFC memory access command set

Command	Abbreviation	Op-Code	Description
Read 4 Blocks[1)]	RD4B	30_H	This command reads 16 bytes data out of the memory starting from the specified address. A Roll-Back mechanism is implemented: - if block $0F_H$ is reached the read continues from block 00_H - if block 25_H is reached the read continues from block 00_H
Write 1 Block[2)]	WR1B	$A2_H$	If write access is granted, this command programs 4 bytes data to the specified memory address.
Compatibility Write Command	CPTWR	$A0_H$	This command sends 16 bytes to the SLE 66R01P and SLE 66R01PN but writes only the first 4 bytes of the incoming data to the specified memory address.
Read 2 Blocks[3)]	RD2B	31_H	This command reads 8 bytes out of the memory, starting from the specified address. A Roll-Back mechanism is implemented: - if block $0F_H$ is addressed, the read continues from block 00_H - if block 25_H is addressed, the read continues from block 00_H

Table 14 my-d™ move and my-d™ move NFC memory access command set

Command	Abbreviation	Op-Code	Description
Write 2 Blocks	WR2B	$A1_H$	If write access is granted, this command writes 8 bytes to the specified address memory. Note that the programming time is 4ms.
Set Password	SPWD	$B1_H$	This command sets the 4 byte password to the my-d™ move and my-d™ move NFC.
Access[4)]	ACS	$B2_H$	This command verifies the password of the my-d™ move my-d™ move NFC.
Decrement	DCR16	$D0_H$	This command decrements an existing Value Counter value to a lower value and writes the result to the Value Counter block.

1) NFC Forum™ Type 2 Tag Read Command
2) NFC Forum™ Type 2 Tag Write Command
3) By using RD2B and WR2B commands, total user memory of 128 bytes can be written and re-read within approximately 100 ms (excluding anti-collision and taking into account a short reader turnaround time, less then 100 µs).
4) If the my-d™ move and my-d™ move NFC is configured to use a write or read/write password, the appropriate memory access operations are possible only after password verification.

8.2.1 Read 4 Blocks (RD4B)

RD4B command reads 16 bytes data out of the memory starting from the specified address.

The Valid Address Range is 00_H to 25_H.

If any other address is specified the SLE 66R01P and SLE 66R01PN responds with a NACK. A roll back mechanism is implemented:

- if e.g. block $0E_H$ is addressed blocks $0E_H$, $0F_H$, 00_H and 01_H are replied
- if e.g. block 25_H is addressed blocks 25_H, 00_H, 01_H and 02_H are replied

Table 15 Read 4 Blocks (RD4B)

Command Length	Code	Parameter	Data	Integrity Mechanism	Response
4 bytes	30_H	Valid Address Range 00_H - 25_H	n.a.	2 bytes CRC (1 parity bit per byte)	16 bytes data + 2 bytes CRC or NACK or NR

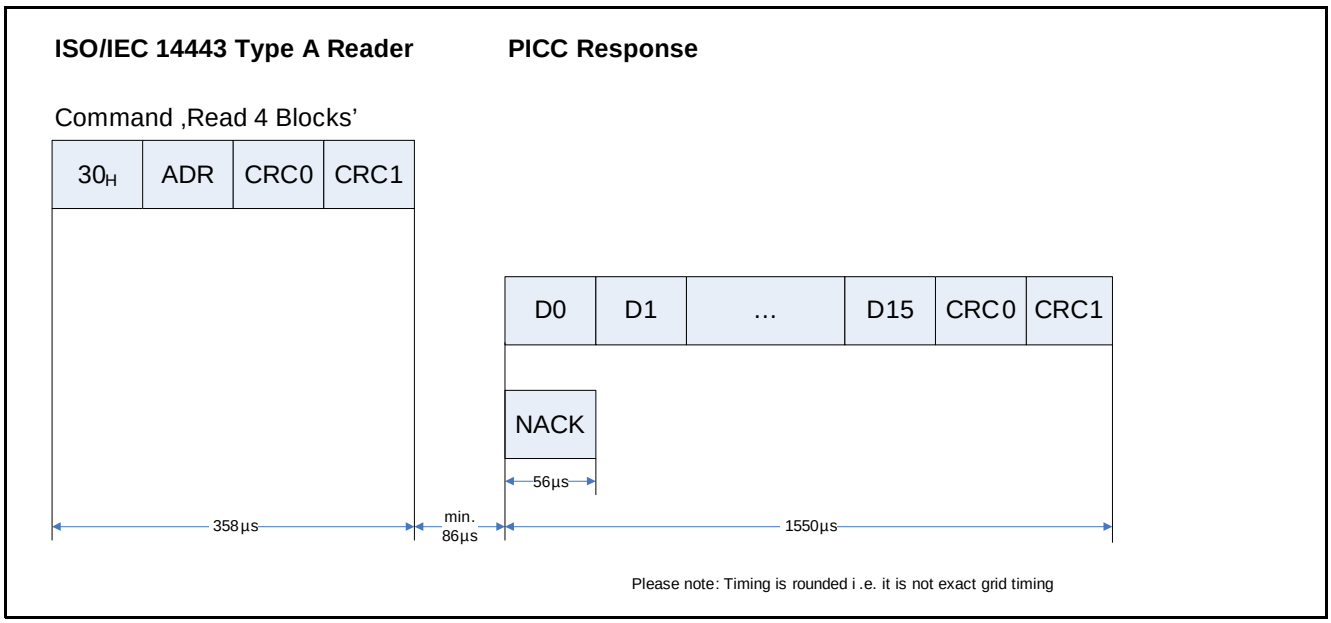

Figure 19 Read 4 Blocks Command

8.2.2 Write 1 Block (WR1B)

If the write access is granted the WR1B command is used to program 4 bytes of data to the specified address in the memory. This command should be used to program OTP block and Locking Bytes as well.

The Valid Address Range is from 02_H to 24_H. If any other address is specified the SLE 66R01P and SLE 66R01PN responds with a NACK.

Table 16 Write 1 Block (WR1B)

Command Length	Code	Parameter	Data	Integrity Mechanism	Response
8 bytes	$A2_H$	Valid Address Range 02_H - 24_H	4 bytes data	2 bytes CRC (1 parity bit per byte)	ACK or NACK or NR

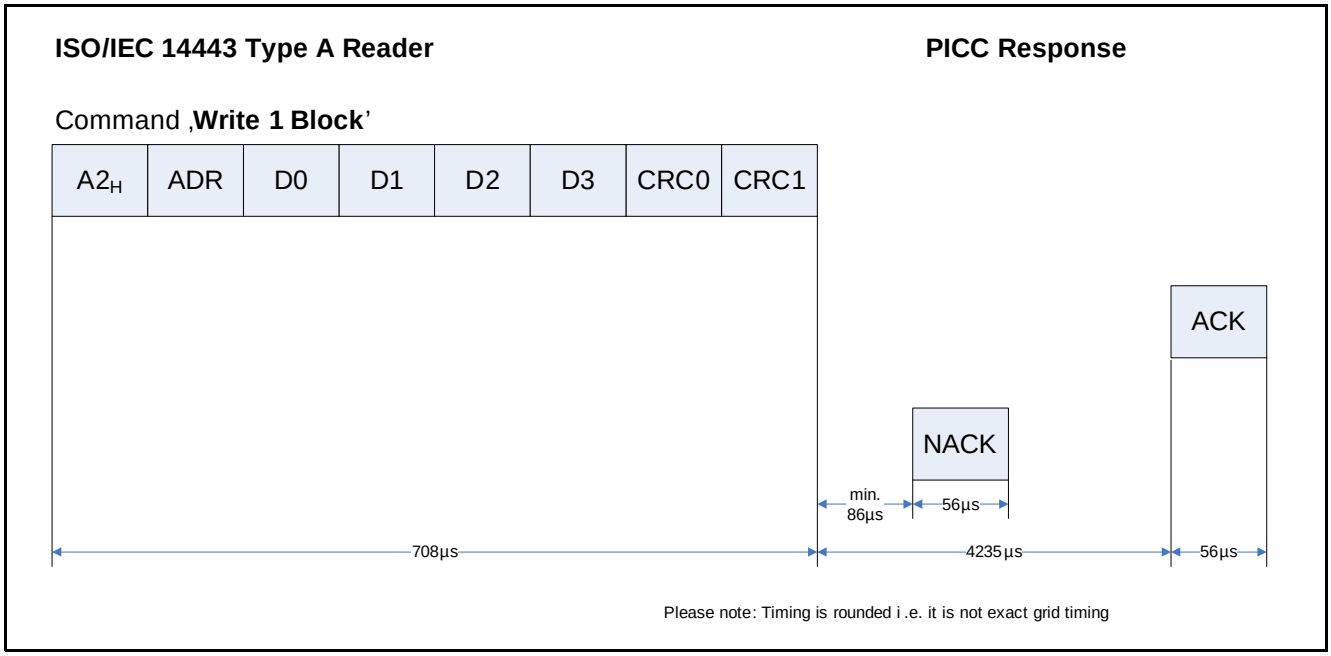

Figure 20 Write 1 Block Command

8.2.5 Write 2 Blocks (WR2B)

If write access is granted, i.e. if both addressed blocks are writable, the WR2B command is used to program two blocks (8 bytes of data) to the specified address in the memory.

The Valid Address Range is 04_H-22_H. Only even start addresses are allowed. If any other address is specified, the SLE 66R01P and SLE 66R01PN responds with a NACK.

The WR2B command has the same programming time (approximately 4ms) for writing 8 bytes as the WR1B command which writes 4 bytes of data to the specified memory.

Table 19 Write 2 Block (WR2B)

Command Length	Code	Parameter	Data	Integrity Mechanism	Response
12 bytes	$A1_H$	Valid Address Range 04_H - 22_H; only even start addresses allowed	8 bytes data	2 bytes CRC (1 parity bit per byte)	ACK or NACK or NR

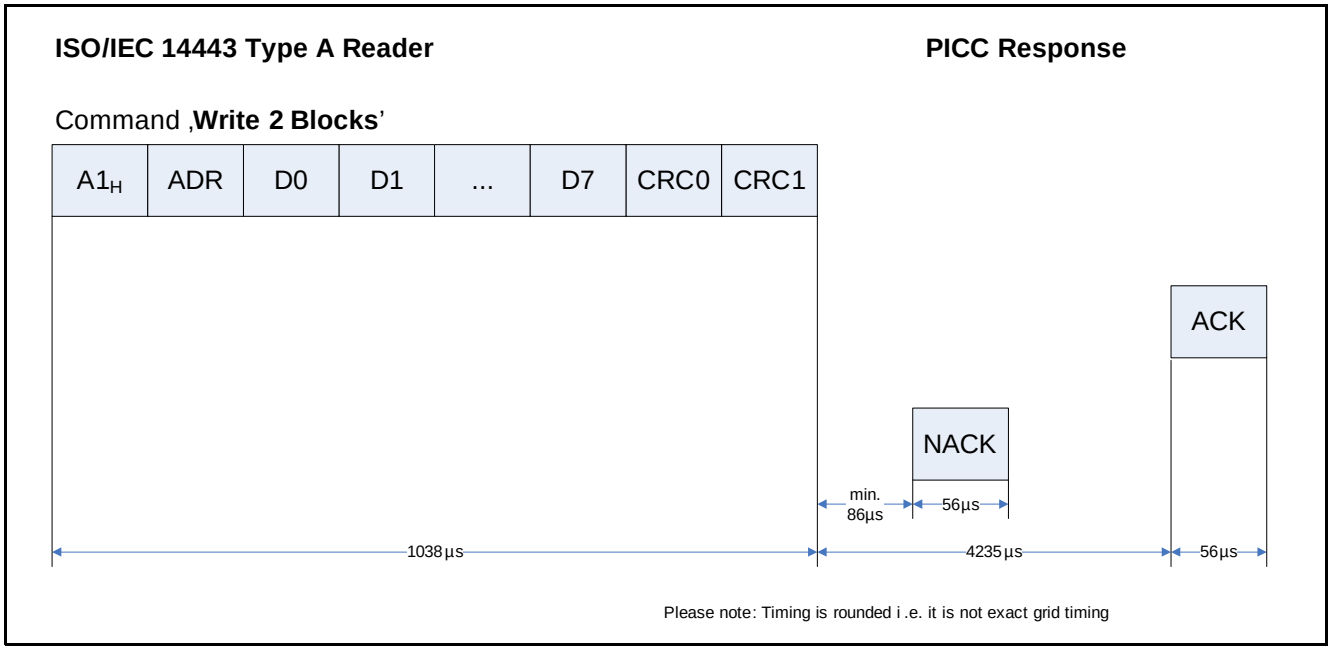

Figure 23 Write 2 Blocks Command

8.2.8 Decrement Command (DCR16)

The DCR16 command decrements the current Value Counter value by the received parameter and writes the new value to the Value Counter block. If this command is executed properly, the my-d™ move and my-d™ move NFC responds the new written value. Note that the parameter has to be lower or equal to the current Value Counter value.

Table 24 Decrement (DCR16)

Command Length	Code	Parameter	Data	Integrity Mechanism	Response
5 bytes	$D0_H$	2 bytes; LSByte = CNT0 MSByte = CNT1	n.a.	2 bytes CRC 1 parity bit per byte	• If the parameter is lower or equal to the current Value Counter Value, the response is the new decremented value: 2 bytes data + 2 bytes CRC • If the parameter is 0000_H the response is the current Value Counter value • If the parameter is higher than the current Value Counter value the response is a NACK

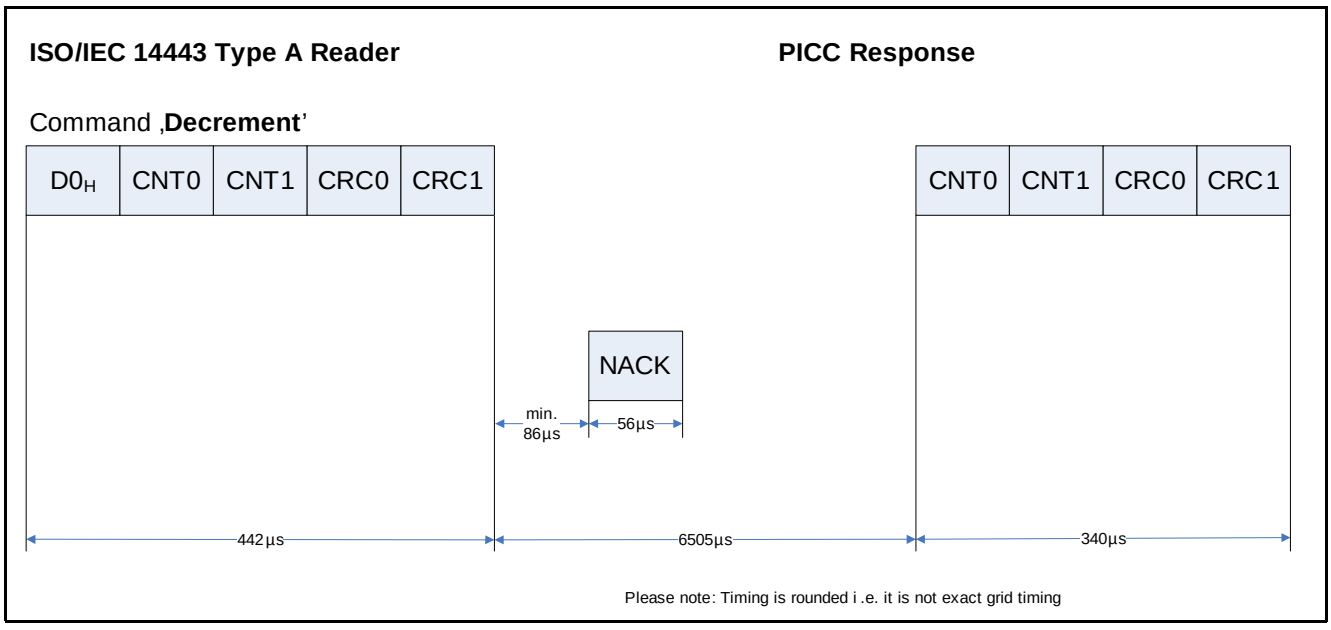

Figure 27 Decrement Command

After receiving the correct DCR16 command, the my-d™ move and my-d™ move NFC performs the following actions:

- checks the format of the current Value Counter by reading blocks 22_H and 23_H;
- determines the valid and the invalid Value Counter value;
- decrements the current valid value by the received parameter;
- expands the result to the correct Value Counter format;
- writes the new Value Counter value, in the correct format, to the previously determined invalid block
- erases the current valid Value Counter value to FF_H FF_H FF_H FF_H

In case of a successful programming of a Value Counter value, the my-d™ move and my-d™ move NFC sends the new written value of the Value Counter block back. If the programming was unsuccessful (due to insufficient power) “No Response” is replied.

In case of any other logical error or if the Value Counter block is corrupted (i.e. both blocks have an incorrect format) a NACK is replied.

Table 25 DCR16 - behaviour in error case

Error / State	Idle/Halt	Ready	Active	Protected
Invalid Opcode	NR	NR	NR	NR
Parity, Miller	NR	NR	NACK1	NACK1
Command Length	NR	NR	NR	NR
CRC	NR	NR	NACK1	NACK1
VCNTR16 not enabled	NR	NR	NACK0	NACK0
The selected chip is protected by password	NR	NR	NACK0	NACK0
Both counter blocks corrupted	NR	NR	NACK0	NACK0
Current VCNTR16 to low	NR	NR	NR	NR
HV not OK	NR	NR	NR	NR

The figure below presents the flow diagram of the Decrement command.

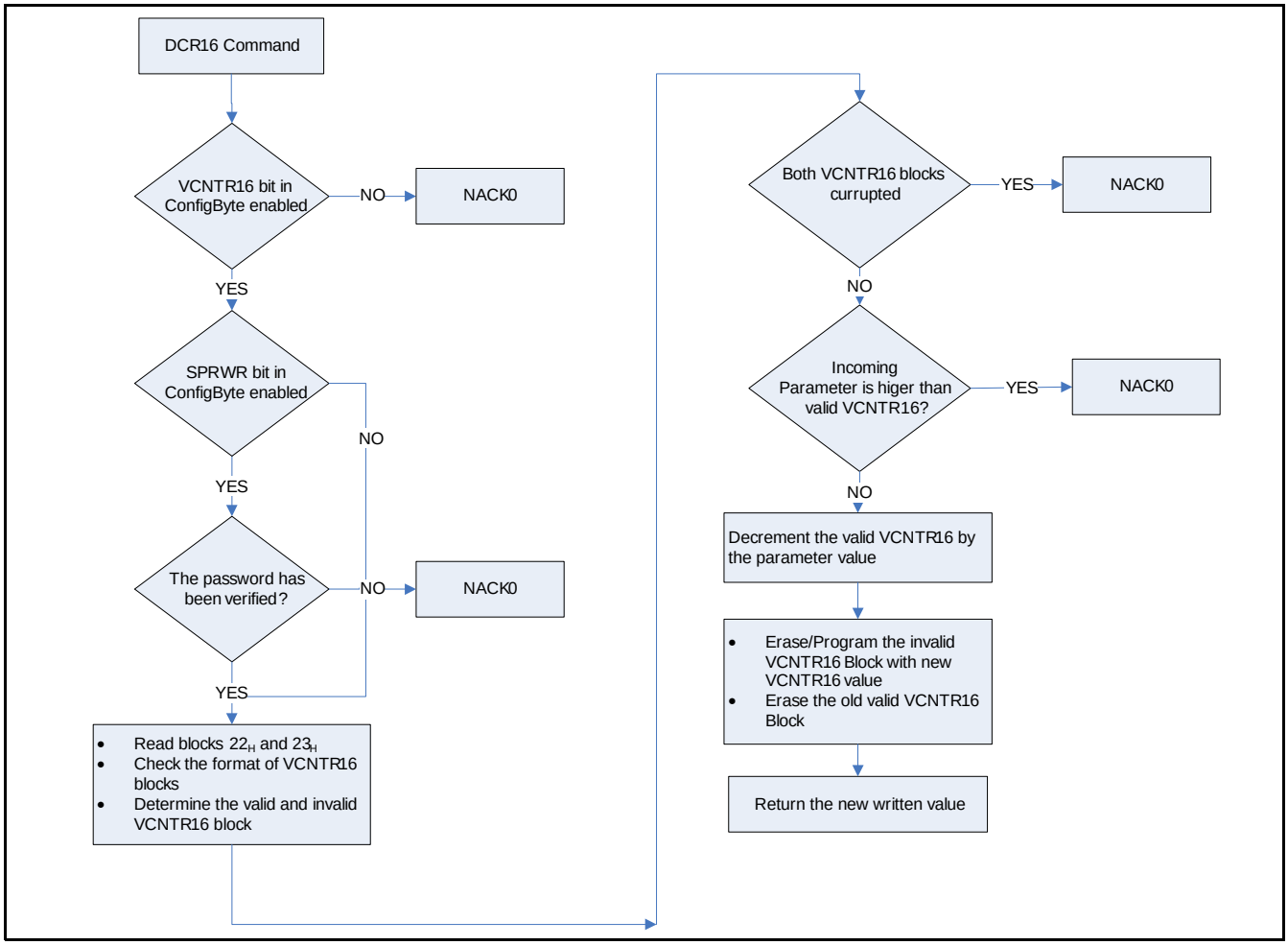

Figure 28 Decrement Command flow