

**my-d™ vicinity plain**

**SRF 55V02P**

**SRF 55V02P HC**

**SRF 55V10P**

**SRF 55V10P HC**

**Intelligent EEPROM with  
Contactless Interface compliant to  
ISO/IEC 15693 or  
ISO/IEC 18000-3 Mode 1**

**Chip Card & Security**



Never stop thinking

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**my-d™ vicinity plain - SRF 55VxxP Short Product Information**

**Revision History: Current Version 2009-03-31**

**Previous Release: 2007-07-02**

<b>Page</b>	<b>Subjects (major changes since last revision)</b>
all	editorial changes
<b>5</b>	update of ordering information
	EAS feature removed

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my-d™

## Features

**Intelligent EEPROM with  
Contactless Interface compliant to ISO/IEC 15693 or ISO/IEC 18000-3 Mode 1**

### Contactless Interface

- Physical interface and Anticollision compliant to ISO/IEC 15693
  - contactless transmission of data and supply energy
  - data rate up to 26 kbit/s
  - operation frequency: 13.56 MHz
  - anticollision logic: several cards may be operated in the field simultaneously with identification of up to 30 Tags per second
- Read / write distance up to 150 cm (influenced by external circuitry i.e. reader and inlay design)

### EEPROM

- Up to 10 kbit EEPROM memory
- ISO mode - block organization of memory, accessible with ISO optional commands
  - up to 248 blocks of user memory (block size 4 bytes) applicable for plain memory only
- Custom mode - page organization of memory, accessible with ISO custom commands
  - up to 128 pages of user memory (page size 8 bytes for data storage and 2 bytes for administration purposes)
- Unique IDentification number (UID)
- EEPROM programming time per page < 4 ms
- EEPROM endurance minimum 100,000 erase/write cycles<sup>1)</sup>
- Data retention minimum 10 years<sup>1)</sup>

**Value Counters: up to 65536 (value range from 0 to 2<sup>16</sup>-1)**

- Each page in the User Area is configurable as a Value Counter
- Support of Anti-Tearing

### Electrical characteristics

- ESD protection minimum 2 kV
- Ambient temperature -25°C ... +70°C (for the chip)
- Chip capacitance 23.5 pF ± 5%
- High on-chip capacitance chip available (97pF ± 5%) allowing small tag antenna designs

### Development Tool

- Evaluation Kit my-d™ including my-d™ Manager Software

<sup>1)</sup> Values are temperature dependent

# 1 Ordering and packaging information

**Table 1-1 Ordering Information my-d™ vicinity**

Type	Package	Total <sup>1)</sup> /User Memory [bytes]	Total / User Pages <sup>2)</sup>	User Blocks <sup>3)</sup>	Ordering code
SRF 55V02P C	wafer unsawn/sawn	320 / 232	32 / 29	56	on request
SRF 55V02P NB	NiAu Bumped				on request
SRF 55V02P MCC2	P-MCC2-2-1				on request
SRF 55V02P MCC8	P-MCC8-2-3				on request
SRF 55V10P C	wafer unsawn/sawn	1280 / 1000	128 / 125	248	on request
SRF 55V10P NB	NiAu Bumped				on request
SRF 55V10P MCC2	P-MCC2-2-1				on request
SRF 55V10P MCC8	P-MCC8-2-3				on request

1) Total memory size and page count includes the Service Area and the 2 administrative bytes per page whereas user memory size and page count is freely programmable for user data.

2) Page size 8 bytes, accessible via ISO custom commands

3) Block size 4 bytes, accessible via ISO optional commands

**Table 1-2 Ordering Information my-d™ vicinity High on-chip capacitance**

Type	Package	Total <sup>1)</sup> /User Memory [bytes]	Total / User Pages <sup>2)</sup>	User Blocks <sup>3)</sup>	Ordering code
SRF 55V02P HC C	wafer unsawn/sawn	320 / 232	32 / 29	56	on request
SRF 55V02P HC NB	NiAu Bumped				on request
SRF 55V10P HC C	wafer unsawn/sawn	1280 / 1000	128 / 125	248	on request
SRF 55V10P HC NB	NiAu Bumped				on request

1) Total memory size and page count includes the Service Area and the 2 administrative bytes per page whereas user memory size and page count is freely programmable for user data.

2) Page size 8 bytes, accessible via ISO custom commands

3) Block size 4 bytes, accessible via ISO optional commands

For more ordering information (wafer thickness and height of NiAu-Bump) please contact your local Infineon sales office.

## Pin description

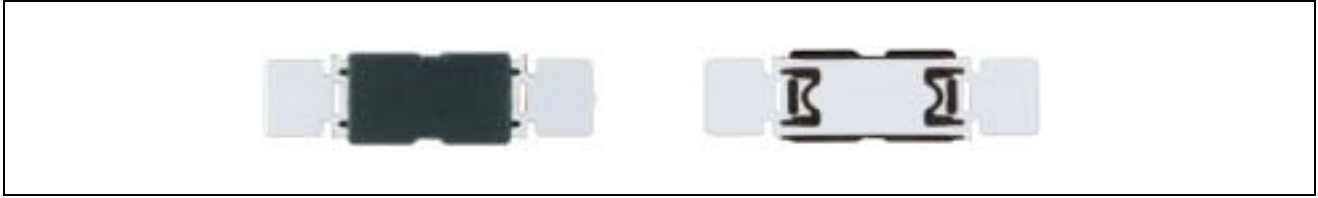


Figure 1-1 Pin configuration Module Contactless Card - MCC2 (top / bottom view)



Figure 1-2 Pin configuration Module Contactless Card - MCC8 (top / bottom view)

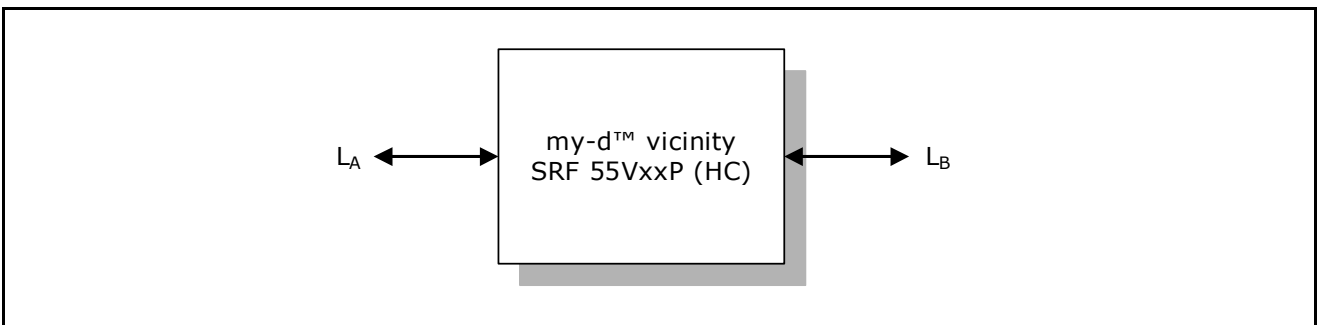


Figure 1-3 Pad configuration die my-d™ vicinity Plain

Table 1-3 Pin description and function

Symbol	Function
L <sub>A</sub>	Antenna connection
L <sub>B</sub>	Antenna connection

## 2 my-d™ Product Family

The my-d™ products are designed to meet increased demands for basic security and design flexibility. The my-d™ family of contactless memories supplies the user with different memory sizes and incorporates security features to enable considerable flexibility in the application design.

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 15693 or ISO/IEC 18000-3 Mode 1). This eases the system design and allows simple adaptation between applications.

### 2.1 Product Variants - Plain / Secure Operation, High On-Chip Capacitance

my-d™ products are available in

- plain mode with open memory access,
- secure mode with both memory access controlled by authentication procedures (up to 14 sectors) and plain mode operation (plain sector).
- additional small tag antenna designs are possible with the HC variant providing high on-chip capacitance chip for small communication distances

Applications may start with the my-d™ ICs in plain mode operation and individual page locking; for more complex applications various settings in secure mode can be used for multi user or multi application configurations.

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.

Configurable value counters, featuring anti-tearing functionality, are suitable for value token applications such as limited use applications.

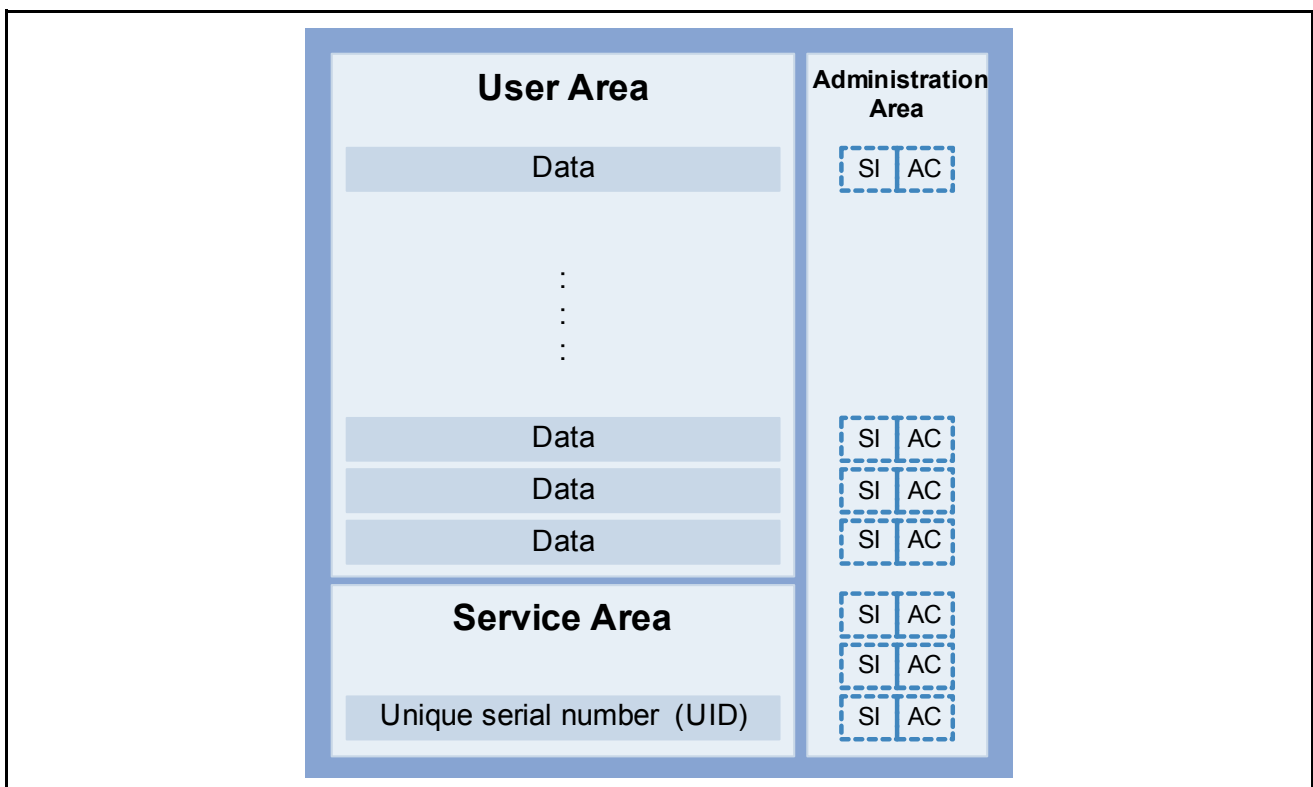
Architectural interoperability of all my-d™ products enables an easy migration from simple to more demanding applications.

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

## 2.2 General Memory Structure

The fundamental structure of my-d™ vicinity and my-d™ proximity products consists of a

- **User Area** for storing user data
- **Service Area** storing the Unique serial number UID and manufacturer data
- **Administration Area** for storing
  - Sector Index (SI), defining either plain or secure memory access
  - Access Condition (AC) holding information on access rights (e.g. read/write, read only)



**Figure 2-1 General Memory Structure of my-d™ products**

### Communication

The physical contactless interface and communication protocol is defined for proximity by ISO/IEC 14443 and for vicinity by ISO/IEC 15693 respectively.

my-d™ products support a set of standardized commands. Additionally Custom commands are implemented providing e.g. 8-byte page memory access and optionally authentication (secure variant).

### Security

The memory can be accessed without security precaution (i.e. authentication) in plain mode. The secure variants additionally require the mutual authentication procedure before memory access is granted.



## 2.3 Application Segments

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

**Table 2-1 my-d™ products overview**

Product	Features	Application
my-d™ vicinity plain – SRF 55V02P SRF 55V10P	<ul style="list-style-type: none"> <li>• ISO/IEC 15693 or ISO/IEC 18000-3 Mode 1</li> <li>• up to 1000 byte free user memory</li> <li>• Plain access</li> </ul>	Factory Automation, Health Care, Ticketing, Access Control
my-d™ vicinity plain HC – SRF 55V02P HC SRF 55V10P HC	<ul style="list-style-type: none"> <li>• ISO/IEC 15693 or ISO/IEC 18000-3 Mode 1</li> <li>• High on-chip capacitance</li> <li>• up to 1000 byte free user memory</li> <li>• Plain access</li> </ul>	Ticketing, Brand Protection, Loyalty Schemes, Ski passes
my-d™ vicinity secure – SRF 55V02S SRF 55V10S	<ul style="list-style-type: none"> <li>• ISO/IEC 15693 or ISO/IEC 18000-3 Mode 1</li> <li>• up to 992 byte free user memory</li> <li>• Secure access</li> </ul>	Ticketing, Brand protection, Loyalty Schemes, Access Control
my-d™ vicinity secure HC – SRF 55V02S HC SRF 55V10S HC	<ul style="list-style-type: none"> <li>• ISO/IEC 15693 or ISO/IEC 18000-3 Mode 1</li> <li>• High on-chip capacitance</li> <li>• up to 992 byte free user memory</li> <li>• Secure access</li> </ul>	Ticketing, Brand protection, Loyalty Schemes, Access Control
my-d™ light – SRF 55V01P	<ul style="list-style-type: none"> <li>• ISO/IEC 15693 or ISO/IEC 18000-3 Mode 1</li> <li>• 52 byte free user memory</li> <li>• Plain access</li> </ul>	Libraries, Laundry, Factory Automation, Media Management, Event Ticketing, Leisure Park Access
my-d™ NFC – SLE 66R04P SLE 66R16P SLE 66R32P	<ul style="list-style-type: none"> <li>• ISO/IEC 14443</li> <li>• up to 4072 byte free user memory (up to 2048 bytes NFC Memory)</li> <li>• Plain access</li> </ul>	Smart Poster, Public Transport, Event Ticketing, Access Control, Consumer Goods information
my-d™ proximity 2 – SLE 66R04S SLE 66R16S SLE 66R32S	<ul style="list-style-type: none"> <li>• ISO/IEC 14443</li> <li>• up to 4056 byte free user memory</li> <li>• Secure access</li> </ul>	Access Control, Entertainment, Public Transport, Customer Loyalty Schemes, Micro Payment

### 3 my-d™ vicinity plain - SRF 55VxxP

The my-d™ vicinity products are based on ISO/IEC 15693 or ISO/IEC 18000-3 Mode 1 standards for contactless vicinity cards.

The my-d™ vicinity focuses on applications with memory demands of up to 10 kbit EEPROM.

#### 3.1 Circuit Description

The my-d™ vicinity is made up of an EEPROM memory unit, an analog interface for contactless energy and data transmission and a control unit.

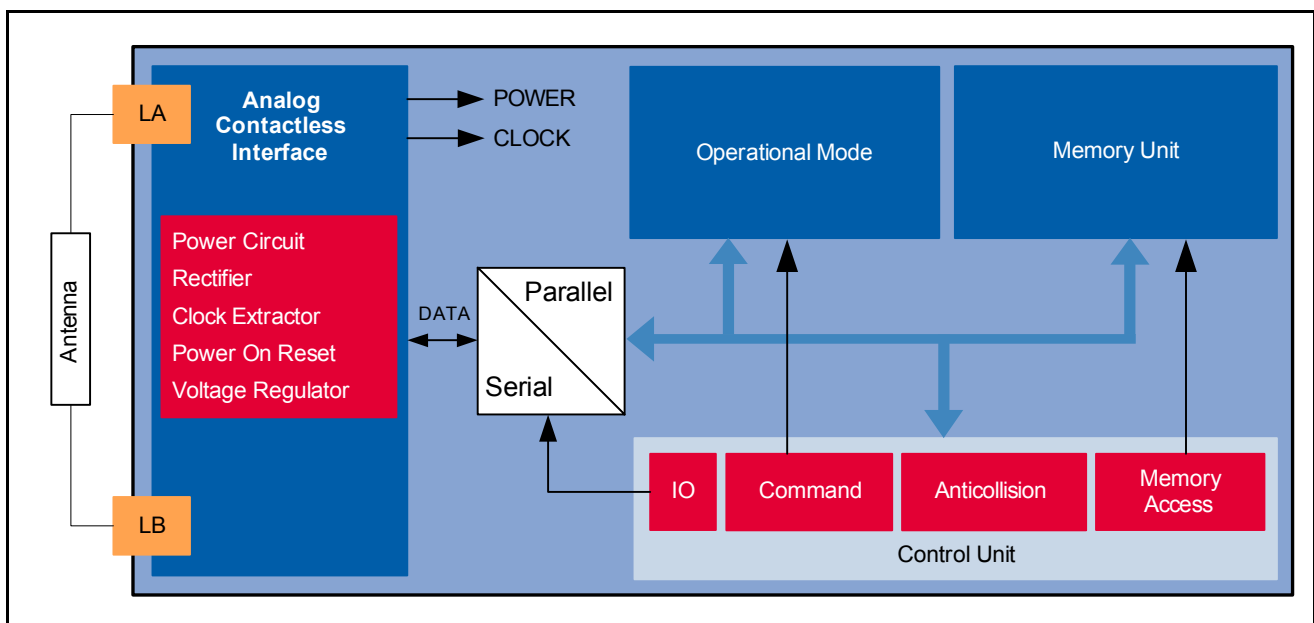


Figure 3-1 Block diagram of the my-d™ vicinity Plain

- **Analog Contactless Interface**
  - The Analog Contactless Interface comprises the voltage rectifier, voltage regulator and system clock to supply the IC with appropriate power. Additionally the data stream is modulated and demodulated.
- **Operational mode**
  - The access to the memory depends on the actual configuration of the my-d™ vicinity. The memory is accessible after the VICC is selected.
- **Memory Unit**
  - The Memory Unit consists of up to 1280 bytes of memory organized in up to 128 pages each of 8 user and 2 administration bytes.
- **Control Unit**
  - The Control Unit decodes and executes all commands. Additionally the control unit is responsible for the correct anticollision flow.

### 3.2 Memory Access

**Organization:** Using ISO optional commands the memory is accessed in 4 byte blocks, whereas ISO custom commands support 8 byte page accesses and further my-d™ vicinity commands. Write protection is possible for each page respectively each block.

**Security:** The memory can be accessed (e.g. read, write) without security (i.e. authentication) in plain mode.

**Commands:** my-d™ vicinity supports according to ISO/IEC 15693

- Mandatory commands (Inventory, Stay Quiet)
- Optional commands (e.g. read / write 4 byte blocks)
- Custom commands (e.g. read / write 8 byte pages)

### 3.3 Memory Principle

The memory is organized in 3 areas:

- User Area
- Service Area
- Administration Area

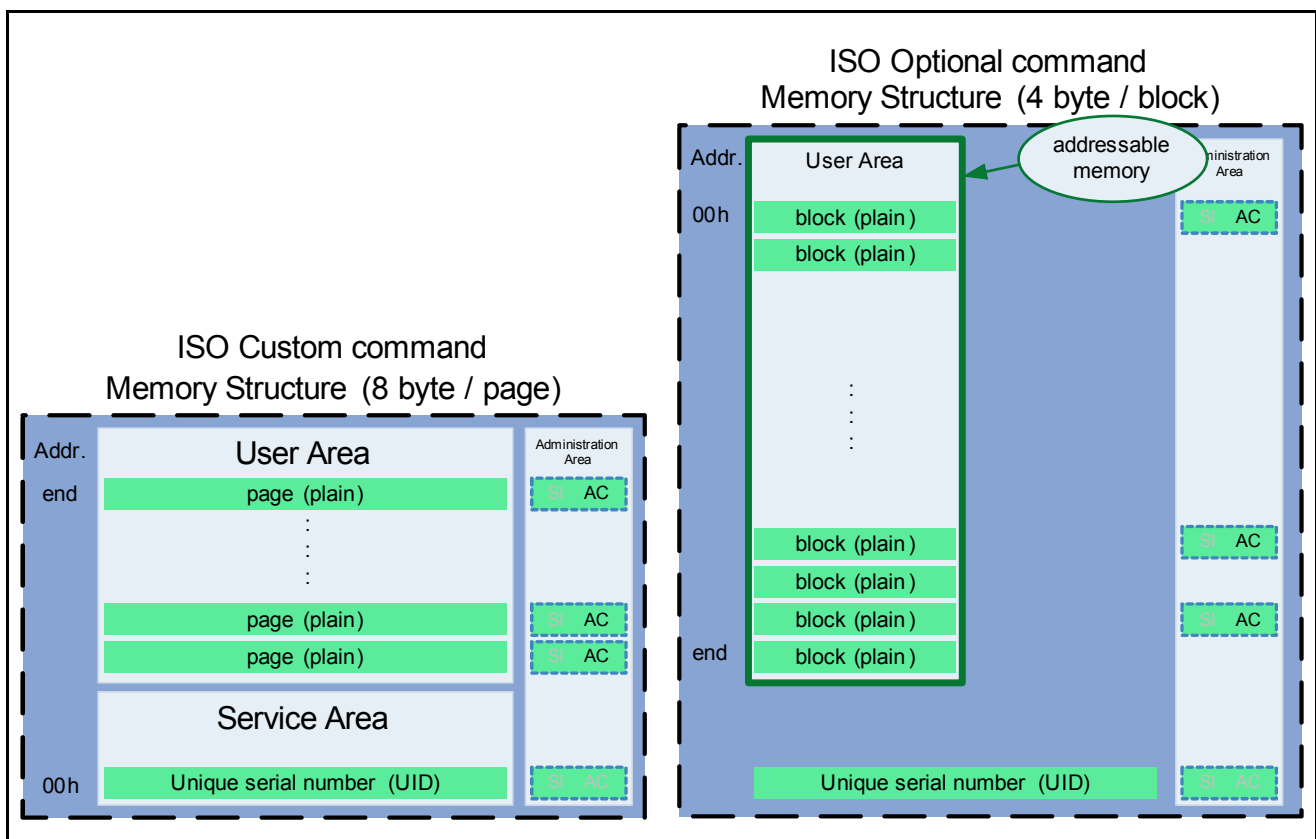


Figure 3-2 my-d™ vicinity plain Memory Organization

The **User Area** stores User Data in up to 125 pages. Data in the plain sector are accessible both via ISO optional and ISO custom commands.

The **Service Area** stores the UID, manufacturer data and configuration data. This information is programmed at manufacture of the chip and cannot be changed. Data are accessible via ISO custom commands only, except the UID being available also via the Inventory command.

The **Administration Area** stores 2 bytes of information about page administration (SI - Sector Index and AC - Access Condition).

- Sector Index (SI) defines plain memory access

- Access Condition (AC) holds information on access rights (e.g. read/write, read only)

The Sector Index and Access Condition of each page store each bit non-inverted and inverted to ensure data integrity.

Data are accessible via ISO custom commands only.

### 3.4 System Overview

The system consists of a host system (i.e. computer with data base), one or more my-d™ vicinity plain or other ISO/IEC 15693 compliant cards and tags (VICC) and an ISO/IEC 15693 compatible contactless reader (VCD) with an antenna.

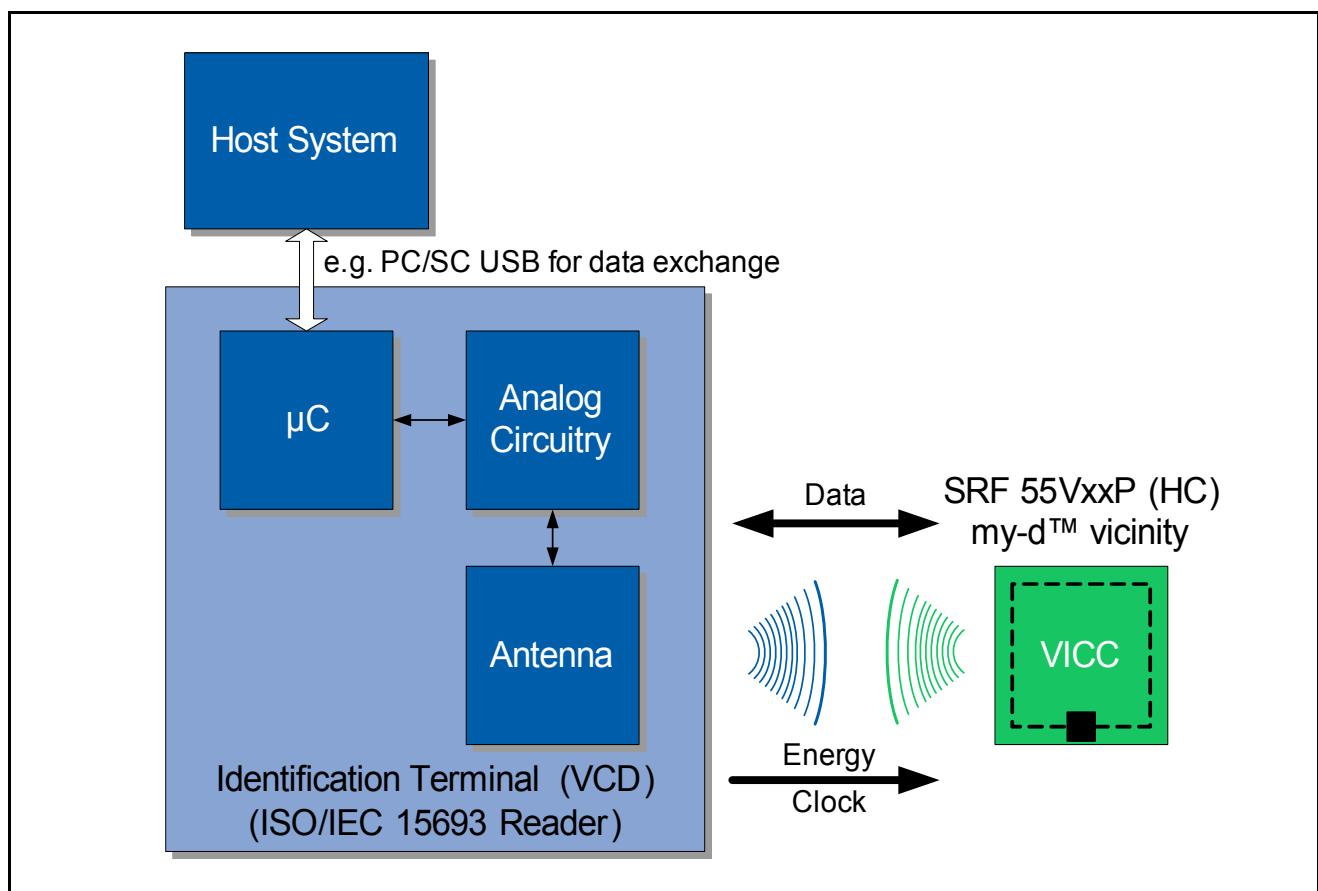


Figure 3-3 my-d™ vicinity Plain RFID System

### 3.5 Product Versions

ISO/IEC 15693 or ISO/IEC 18000-3 Mode 1 respectively define procedures to identify VICCs being in the reader field. The UID (Unique Identification number) is used to perform the anti-collision procedure identifying each VICC. Then a reader (VDC) is able to recognize the Infineon chip functionality based on the UID as described.

#### 3.5.1 UID Coding

To identify the different types of my-d™ vicinity contactless memories chip type information is coded into the UID according to the format defined in ISO/IEC 15693-3.

The table below briefly describes the values for the different chip versions.

**Table 3-1 UID Coding**

Type	Byte 7	Byte 6	Byte 5	Byte 4 ... Byte 0
	ISO	IC Mfg code	IC manufacturer serial number	
			Chip ID byte	Unique number
<b>SRF 55V02P (HC)</b>	E0 <sub>H</sub>	05 <sub>H</sub>	40 <sub>H</sub>	XX <sub>H</sub> XX <sub>H</sub> XX <sub>H</sub> XX <sub>H</sub> XX <sub>H</sub>
<b>SRF 55V10P (HC)</b>	E0 <sub>H</sub>	05 <sub>H</sub>	00 <sub>H</sub>	XX <sub>H</sub> XX <sub>H</sub> XX <sub>H</sub> XX <sub>H</sub> XX <sub>H</sub>
<b>SRF 55V02S (HC)</b>	E0 <sub>H</sub>	05 <sub>H</sub>	50 <sub>H</sub>	XX <sub>H</sub> XX <sub>H</sub> XX <sub>H</sub> XX <sub>H</sub> XX <sub>H</sub>
<b>SRF 55V10S (HC)</b>	E0 <sub>H</sub>	05 <sub>H</sub>	10 <sub>H</sub>	XX <sub>H</sub> XX <sub>H</sub> XX <sub>H</sub> XX <sub>H</sub> XX <sub>H</sub>

The 64 bit Unique Identification Number (UID) is stored in the Service Area in page 00<sub>H</sub> and programmed by the IC manufacturer. According to ISO/IEC 7816-6 the IC manufacturer Code (IC Mfg code) for Infineon is 05<sub>H</sub>. The UID is unique for each single IC within the ISO/IEC 15693 world and cannot be changed.

#### 3.5.2 Memory Sizes

my-d™ vicinity contactless memories are available with following memory sizes

**Table 3-2 Memory size of my-d™ vicinity (in bytes)**

Type	Memory			
	Total	Service Area <sup>1)</sup>	User Area (addressable memory)	
			ISO optional	ISO custom
<b>SRF 55V02P (HC)</b>	320	24	224	232
<b>SRF 55V10P (HC)</b>	1280	24	992	1000
<b>SRF 55V02S (HC)</b>	320	24	224	232
<b>SRF 55V10S (HC)</b>	1280	24	992	1000

1) Addressable only via ISO custom command

[www.infineon.com/rfid](http://www.infineon.com/rfid)

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