UG10039 CLRD730 Quick start guide Rev. 1.3 — 22 April 2025

User guide

Document information

Information	Content
Keywords	Reader, CLRD730, MFEV730, User Guide, Quick startup guide, MIFARE SAM AV3, PN7642, Design In Kit MFEV730, Pegoda, NFC Cockpit, RFIDDiscover, Card Test Framework
Abstract	This document is intended for new users to start working with the Design-In Kit. It shows the basic functionality with RFIDDiscover GUI and its support to NFC Cockpit GUI and Card Test Framework GUI.



1 Introduction

The purpose of this document is to provide a set of guidelines to aid in the first operation of the CLRD730 reader, simply named Pegoda from now onwards. RFIDDiscover (ver.5.3.0) will be used as a guided user interface to communicate to the Pegoda and between this reader to cards. A complete description of Pegoda is shown in the CLRD730 data sheet (see ref.[1]). Also, other application software is mentioned to support Pegoda (like NFC Cockpit tool ref.[3] and Card Test Framework ref.[5]), including Pegoda operation mode as "mass storage device" (allowing to update the binary application stored in PN7642 built-in M33 flash memory).

The default operation of Pegoda does not require any special installation of USB drivers since by default Windows OS identifies it as a PC/SC reader. For more details, see <u>ref.[1]</u>.

In this document, the terms "MIFARE Classic card" and "MIFARE DESFire card" refer to a MIFARE Classic or a MIFARE DESFire IC-based contactless card.

1.1 Firmware information

The Pegoda is based on the PN7642 NFC controller with the FW version v01.00.

Note: Do not update the PN7642 firmware to a version greater than 1.x. or the Pegoda reader will become unusable.

More info can be found in the PN7642 data sheet <u>ref.[4]</u>. All PN7642 product support package can be found on the <u>https://nxp.com/PN7642</u> landing page. Updated firmware can be downloaded from the NXP website: <u>PN7642 Firmware</u>.

1.1.1 Firmware version installed on the reader

You can check the firmware version on Pegoda reader by following instructions described in ref.[1].

1.1.2 Pegoda firmware update

For new projects and implementations, the usage of the latest Pegoda firmware is recommended. Pegoda firmware can be found under Software on <u>https://www.nxp.com/design/:CLRD730</u>.

This is as well the case for projects using the reader both in PC/SC mode and in VCOM mode (see ref.[1]).

Note: Some firmware upgrades will overwrite the EEPROM settings of the PN7642 NFC controller in order to convey necessary changes to existing CLRD730 readers. However, this will only be done once for each firmware version. In case the EEPROM values are changed, for example, by using the NFC Cockpit, it is recommended to rewrite the changes after upgrading the firmware to a higher version. Reflashing the same version that was already present before will not rewrite the EEPROM settings.

CLRD730 Quick start guide

2 Installation

2.1 Required items

In order to use the RFIDDiscover GUI, the following items are required:

- MIFARE sample cards, such as MIFARE Classic, MIFARE Plus, MIFARE DESFire, MIFARE Ultralight or NTAG products (NTAG I²C *plus*, NTAG 21x tags, NTAG 424 DNA) or vicinity products (NTAG 5, ICODE family).
- Pegoda (CLRD730), which are available for ordering from buy direct website:

https://www.nxp.com/webapp/ecommerce.secure_home.framework

 RFIDDiscover version 5.3.0 or later (NDA protected version) available at "Secure Files", through the My NXP Account portal: <u>https://www.nxp.com/security/login</u>

Also, it is possible to test Pegoda with Card Test Framework GUI while in PC/SC mode. More information can be found in <u>ref.[5]</u>. More information about Card Test Framework usage can be found in <u>Section 3.6</u>.

Alternatively, it is possible to test Pegoda with NFC Cockpit GUI; it is suggested to:

- Install NFC Cockpit version 7.1.0.0 or superior; such GUI can be downloaded from: <u>https://www.nxp.com/</u> webapp/swlicensing/sso/NFC-COCKPIT
- Use MIFARE sample cards as mentioned above.
- Follow the instructions in <u>Section 3.7</u> and <u>Section 3.8</u>, to upload Pegoda with suitable binary firmware to test it with the NFC Cockpit tool. Such a binary can be found at the NFC Cockpit installation directory.

2.2 Installing USB driver for the reader

As mentioned before, by default CLRD730 works as a PC/SC reader, therefore Windows detects it without the need to manually install its driver. In order to verify the presence of CLRD730, consider that it will be identified by Windows as contactless (multi-ISO/IEC standard reader) as well as contact (ISO/IEC7816 reader) ports.

2.2.1 Steps to detect the Pegoda connected via USB-Type C cable to Windows OS PC/tablet/ laptop

1. Run Windows Device Manager and check the presence of the USB port, see below:



Figure 1. Running Windows Device Manager for USBCCID Reader detection

2. Check in tab smart card readers the presence of any reader:



CLRD730 Quick start guide

As seen above, many laptops often also have a built-in reader which is shown as "Smart card reader", generally to allow user authentication with an ISO/IEC7816 contact card.

3. Connect Pegoda to your computer: by default, connect a USB-Type C cable to port "USB 1" (explanation is given in <u>ref.[1]</u>)



Figure 3. Connecting Pegoda using USB-Type C on USB 1 port

4. Check again in the Device Manager after refreshing: you should see two extra smart card readers, named as "Microsoft USBCCID Smartcard Reader (WUDF)". One of them will be a contactless reader, the other one will be ISO/IEC7816 contact reader, both of them built in Pegoda HW.



Figure 4. Inspection of new USBCCID Smartcard Readers detected by Windows OS

5. In terms of hardware, the contactless reader antenna is located below the top surface, the contact reader is the slot found in short side area below the NXP logo.

CLRD730 Quick start guide



2.3 Installing RFIDDiscover

So far, there have been two different versions of RFIDDiscover; the full version, protected by NDA and working with former CLRD710 (former Pegoda version), which can be retrieved by registering and entering in My NXP Account portal.

On the other hand, RFIDDiscover full version (released only under NDA) also supports the functionalities of strong authentication products (like MIFARE DESFire, MIFARE Plus at security level 3, MIFARE Ultralight AES, NTAG 424 DNA, NTAG 22x DNA, and ICODE DNA).

RFIDDiscover 5.3.1 and above currently supports CLRD730 and it is available through My NXP Account portal, at the tab "Secure Files" (see <u>ref.[2]</u>).

Customers that would like to qualify to download confidential documents and software available in My NXP Account, should follow instructions available on these links:

https://www.nxp.com/docs/en/user-guide/nxp-secure-access-rights-registration.pdf

https://www.nxp.com/support/support/secure-access-rights-overview:SEC-ACCESS

2.3.1 System requirements

- Microsoft Windows 10 or higher
- Pegoda (CLRD730) connected via USB-Type C
- Optional MIFARE SAM AV3 sample (in ID1 card format) to test the ISO/IEC7816 interface.
- MIFARE product-based card samples, which may be requested to your local NXP Sales representative.

CLRD730 Quick start guide

2.3.2 Installation process

- 1. Download the PDF containing the RFIDDiscover.exe package encapsulated in it
- 2. Select "attached file" logo and highlight zip file, which has been uploaded in PDF with a file extension different than "*.zip" (this is necessary to avoid email spam/junk filtering actions)
- 3. Save the encapsulated file, by changing the extension to zip
- 4. unzip it in any temporary directory
- 5. Double click *.exe to install the "RFIDDiscover" package

Install the package and follow the instructions. The whole installation process requires administration rights. After you have successfully installed the program "RFIDDiscover" and all of its required components, you can start "RFIDDiscover" via the respective shortcut link created in the Windows desktop.



Figure 6. RFIDDiscover shortcut link after installation under Windows OS

Alternatively you can browse this path to get to RFIDDiscover.exe.

C:\Program Files (x86)\NXP Semiconductors\RFIDDiscover\V5.3.1.0\Bin\RFIDDiscover.exe

Read the "ReleaseNotes.txt" file that you have received with the RFIDDiscover package.

As soon as you double click previously mentioned desktop link, you see the following message:

News from MIFARE.net The NXP MIFARE team welcomes Plasticard-ZFT as a new MIFARE Advance Tue, 01 Feb 2022 13:35:55 +0000 NXP® Semiconductors is pleased to announce that Germany-based Plasticard-ZFT GmbH Send More Send Mor	Arran Contract and Arrange
NXP and Google Pay bring Mobile Fare Payments to Android [™] Users in the Wed, 03 Jun 2021 08:37:13 +0000 NXP Semiconductors announced that it is helping to digitize the Washington Metropolitan The post <a <="" href="https://www.mifare.net/nxp-and-google-pay-bring-mobile-fare-paymer
Read More" th=""><th>e Washington D.C. Metro Area Transit Authority's SmarT nts-to-android-users-in-the-we</th>	e Washington D.C. Metro Area Transit Authority's SmarT nts-to-android-users-in-the-we
NXP Digitizes San Francisco Bay Area's Clipper Card for Mobile Transit Tick Wed, 19 May 2021 17:25:57 +0000 The San Francisco Bay Area, home to the Golden Gate Bridge, hand-operated cable cars an The post <a <="" href="https://www.mifare.net/nxp-digitizes-san-francisco-bay-areas-clipper-ca
Read More" td=""><td>ceting Id Silicon Valley, is also at the fr ard-for-mobile-transit-ticketing</td>	ceting Id Silicon Valley, is also at the fr ard-for-mobile-transit-ticketing
Mobile Transit Ticketing Launches in Slovakia Tue, 13 Apr 2021 09:12:07 +0000 Two regional transit systems in Slovakia have used NXP's MIFARE 2GO digitalization service	a to enable mobile transit ticke! 💛 >
Show News on Start of Application	Ok

This News snapshot keeps the audience aware about important NXP press releases and SW updates. You can remove it from every RFIDDiscover start, by unticking the bottom-left corner square.

3 Manual insertion of the Pegoda name in reader list of RFIDDiscover

doc um Poc Inder Picit P doc um Poc Inder Picit P	Kon Parke X	
	Hole Eifer convertige VEC and kings for card on for made and the convert Construction lister lists: Or analisation lists: Convertige VEC and lists for lists: Convertige VEC and lists: Conver	
	Teoryble © FF © G	
NP	Greet	
Visitory Satushio Module Command Processing ✓ Ok SUCCESS SAM GetReaderList	Ime Sent data Received data ReaderList Broadcom Corp Contacted SmartCard 0, NOP Se	*0.2
Ok SUCCESS RWD GetReaderList	ReaderList: NOP Semiconductors NOP Pegoda 3 (CL) 0;	

3.1 First run of RFIDDiscover, CLRD730 in PC/SC mode

The first time you run RFIDDiscover, GUI prompts for presence of smart card readers attached to your laptop/ PC.

3.2 Getting available readers

Since the Pegoda is by default delivered in PC/SC mode, it is possible to interact only with ISO/IEC-14443-4 cards (like MIFARE DESFire family, MIFARE Plus in SL3, NTAG DNA family tags (NTAG 424 DNA, NTAG 223 DNA, NTAG 224 DNA), JCOP etc. cards by default. Therefore it is necessary to place a contactless card on top of Pegoda antenna before opening a "New (reader) Profile" (top-left button in RFIDDiscover GUI). After a card is placed on the Pegoda antenna, you will see the "COMM" LED turned from on to green on the readers top side. In the default mode, the ISO/IEC 14443-4A activation loop is performed each time one card is detected.

You can recognize that Pegoda is in PS/SC mode by looking to POWER LED (constantly red colored), MODE LED (white colored) and COMM LED, which is off, when no card is in the field, and green colored when there is an ISO/IEC14443-4 card in the field (see below):

CLRD730 Quick start guide



Figure 9. Aspect of Pegoda leds when in default (PS/SC) mode. Presence of card both in contactless interface as well as in contact interface turns COMM LED from off to colored green

This functionality can be extended to other cards (ISO/IEC-14443-3, ISO15693 and other non-ISO14443-4 contactless products) by changing operation mode (see <u>Section 3.4</u>).

Pay attention to the dialog area, named "History" (choice by default). The GUI gets automatic response from "Get available readers" and shows the following:



Notice that on the first "History" line there are two silicon vendor names, including NXP. The main reason is that this Windows laptop also contains an ISO/IEC7816 slot allowing use of contact smartcards.

On the second "History" line, you see the text description "ReaderList: NXP Semiconductors NXP Pegoda 3 (CL) 0;" (bottom right). This means that a contactless reader has been detected (it refers to PN7642 open NFC controller, operating in contactless active interface).

CLRD730 Quick start guide

C RHDDiscover					- 1	o ×
Main Menu View SeyStore	Window Options	MIFARE MIFARE			MIFARE	Key Store
Men Discover	Ultralight Classic	Plus DESFire		Protocol Readers	SAM	Manager
👫 New Profile 🕺 🕬	e Profile				۰ 🕥	Help 🔻
Connand Sector	NP					
1						
History						• a ×
History Status Statusint	lo Module Command	ProcessingTime Se	nt data ReaderList: NXP SEMICOND	Received data DUCTORS CL 0;		• a ×
History Status Statusini Ok SUCCESS Ok SUCCESS	b Module Command RWD GetReaderList SAM GetReaderList	ProcessingTime Se	nt data ReaderList: NXP SEMICONI ReaderList: Broadcom Corp	Received data DUCTORS CL 0; Contacted SmartCard 0, NXP SEMICON	DUCTORS CT 0;	• \$ X
Satus Satusin CR SUCCESS CR SUCCESS CR SUCCESS	b Modue Command RND GetReadeList SAM GetReadeList	ProcessingTime Sc	et data ReaderList: NXP SEMICOND ReaderList: Broadcom Corp	Received data DUCTORS CL Q Contacted SmanCard Q, NOP SEMICON	DUCTORS CT Q	* # X
Satus Satusin CR SUCCESS CR SUCCESS CR SUCCESS Im History I Log	b Modue Command RNO GetReadeList SAM GetReadeList	ProcessingTime Se	et data ResderList: NXP SEMICOND ResderList: Broadcom Corp	Received data DUCTORS CL Q Contracted SmanCard Q, NOP SEMICON	DUCTORS CT 0;	* 0 X

Besides this automatic detection, you see also a prompt for a "New Profile" each time you run RFIDDiscover; place a ISO14443-4 card on the reader antenna, select "NXP Semiconductors NXP Pegoda 3 (CL) 0", then press OK (see below).



UG10039 User guide

CLRD730 Quick start guide

Main Menu View KeyStor RFIDDiscover	e Window Options MIFARE MIFARE Classic Plus Ultralight Classic Plus d Off RF Reset Activate Idle	MIFARE DESFIRE ICODE NTAG	Protocol	Readers MIFAR SAM	
Command Selection MIFARE Plus MFP Service and 0	Get Version Get Version		×	.	×
Security Level 0 Security Level 1 Virtual Card Security Level 2 Orbec Security Level 3 Check Security Level 3 Security Level 0 Security Level 0 Security Level 3 Virtual Card Sector Switch Get Version Decrypt ReaderID TML and TMV	Note: Before connecting to PC Contactless Reader Selection Get available Readers Contact Reader Selection (for S Get available Readers Don't use SAM Key file Browse Timing Mode FDT O	SC reader, keep the card on the reader and then conn sda 3 (CL) 0 AM) T T Ok	Load Req 80 ~	rersion 🕡	
History Status Statusinfo ✓ Ok SUCCESS ✓ Ok SUCCESS	Module Command ProcessingTime Sent data SAM GetReaderList	Received da ReaderList: Broadcom Corp Contacted SmartCard 0, ReaderList: NXP Semiconductors NXP Pegoda 3 (CL)	ata NXP Semiconduc 0;	etors NXP Pegoda 3 (CT) 0;	×
Ready	No F	Reader + No SAM			

3.3 In case RFIDDiscover does not list Pegoda reader

If you cannot find the Pegoda reader in the list in the "New Profile" dropdown, then follow these instructions. Select the button named "Readers" (top 9th button from left to right, or third from top right to left):

S RFIDDiscover		– 🗆 X
Main Menu View KeyStore Window Options		MIFARE Key Store
Ultralight	Classic Plus DESFire ICODE NING Protocol Readers	SAM Manager
Kommitto Secolo 4 4 4 Facader MICORE 1, 2 Show Cards RD701 Register Set (RC632) RD710 Register Set (RC523) PCSC Readers (PR533, PN533 & SCM)		
Figure 13. "Readers" button and ava	ilable menu on left part – Pegoda belongs to "PC/S	SC Readers (PR533, PN5

Now, on the left corner, select the last position menu, named "PCSC Readers (PR533, PN533, and SCM).

You see a scrollable window; by clicking the right sliding tab, scroll it until the extreme bottom.

There you find a list of Readers.

CLRD730 Quick start guide

			MIEADE Key Store
FIDDiscover WEARE Ultralight Classi	c Plus DESFire	ICODE NTAG Protoco	Readers SAM Manager
New Profile			
(*************************************			
Command Selection 🗢 🖣 🗙 🛃	Show Cards PCSC Readers (PR533, PN	533 & SCM) MICORE 1, 2	⇒ ×
Reader MICORE 1.2	PCSC Readers List		^
Show Cards	Reader Name	Reader Type]
RD701 Register Set (RC632)	OMNIKEY CardMan 5x21-CL 0	Contactless	
RD710 Register Set (RC523)	HID Global OMNIKEY 5022 Smart Card	Reader 0 Contactless	
rese neares (rnsss, rnsss & sem)	Identiv CLOUD 3700 F Contactless Read	er 0 Contactless	
	Identiv CLOUD 3701 F Contactless Read	er 0 Contactless	
	NXP MIFARE RI E 0	Contactless	
	SCM Microsystems Inc. SDI010 Contact	ess Reader 0 Contactless	
	NXP NFC CARD READER	Contactless	
	NXP PN7462AU CCID	Contactless	
	BROADCOM NFC Smartcard Reader 1	Contactless	
	GMMC Pocket NEC CCID 0	0 Contactless	
	Broadcom Corp Contacted SmartCard 0	Contact	
	NXP Semiconductors NXP Pegoda 3 (CL) 0 Contactless	
	NXP Semiconductors NXP Pegoda 3 (CT) 0 Contact	
NP I		-	
		Update	
History	d DescentionTime Controlete	D-	÷ ų ×
Status Statusmio Module Comman	riocessing infle Sent data	Reader list: Broadcom Corp Contacted Smart	Card 0. NXP Semiconductors NXP Perioda 3 (CT) 0
Ok SUCCESS SAM GetReaderLis	t	Redentist producin corp contacted smart	curd o, two Seniconductors two regoda 5 (cr) o,
✓ Ok SUCCESS RWD GetReaderLis		ReaderList: NXP Semiconductors NXP Pegoda	a 3 (CL) 0;

Figure 14. Table containing PC/SC Readers – Pegoda includes one contactless interface and one contact interface.

If you do not find "**NXP Semiconductors NXP Pegoda 3 (CL) 0**" on the left part of referred table click the line and start writing exactly this reader text (it is case-sensitive); on the right part of the table (under "Reader Type") select option "Contactless" for (CL) 0.

Go to the below line, and do the same with text "**NXP Semiconductors NXP Pegoda 3 (CT) 0**" (consider it is case-sensitive too). On the right part of the table, select "Contact" for (CT) 0.

Then press "Update". You notice that these two smart card reader descriptors will univocally detect Pegoda respectively contactless and contact part.

3.4 Support to other products (ISO/IEC 14443-3, ISO/IEC 15693, etc.)

The CLRD730 Pegoda reader has a small hole on the lateral side of the plastic case, which gives access to different operation modes. Use a needle or tip of a paper clip to access this pushbutton through the hole. When the Pegoda is attached to USB, the pushbutton toggles between two modes of operation, VCOM mode and PS/ SC mode. When pressed during a power cycle of the reader, this allows the Pegoda to be identified as "mass storage device" by a Windows computer. This allows flashing of different binaries and using the CLRC730 also with the NFC Cockpit tool (see Section 3.8).

CLRD730 Quick start guide



toggles VCOM mode with PC/SC mode.

3.4.1 Pegoda in VCOM mode

After pressing the push dbutton, notice that all three leds will blink for a while (between dark blue and red) and will toggle to VCOM operation (see new LED status below). In this operation mode, the CLRD730 can also support interaction with ISO14443-3 products (non-secure MIFARE products, for example, MIFARE Ultralight family), NTAG products (like NTAG21x family, NTAG I²C Plus family, NTAG 5 family), ICODE products (SLIX family, DNA, ILT, etc.).

This mode of operation will be recognized by Device Manager with a different USB descriptor (see below).

As this mode provides the most flexibility, it is recommended to use VCOM mode as much as possible.



3.4.2 Pegoda support of ISO/IEC14443-3 products and ISO/IEC15693 on RFIDDiscover

While in VCOM mode, RFIDDiscover supports all 13.56 MHz transponder supplied by NXP (including ISO/ IEX14443-4 cards). After the mode switch is done (<u>Section 3.4.1</u>) is done, if you inspect the Device Manager, you will find a USB descriptor like "USB Serial Device (COMxy)".

3.4.3 RFIDDiscover using Pegoda in VCOM mode

If you run again RFIDDiscover, one is able to notice the following reader detection window.

On the top drop-down list, select "PEGODA 3: USB Serial Device COMxy" and press ok. Note, that in VCOM mode, no card must be on top of the reader to establish the connection.

	Note: Before connecting to PCSC reader, keep the card on the reader and then o	onnect.	
	Contactless Reader Selection		
Get available Readers	PEGODA 3: USB Serial Device COM16		~
	Contact Reader Selection (for SAM)	Load	Reg
Get available Readers	Don't use SAM	~ 80	¥
	Key file		
Browse			
	Timing Mode OFDT OT		
		Ok	
		ancel	-
		ancei	

Place a card on the reader antenna, for instance, a MIFARE Ultralight EV1 card. Select MIFARE Ultralight button (first selectable rectangular tab from top left to right). Then select MIFARE Ultralight EV1, press Activate Idle (fourth tab from middle top left to right). Check the 7 bytes UID of card shown in central window (see picture below).

CLRD730 Quick start guide

RFIDDiscover <u>Main Menu View KeyStore Window</u> RFIDDiscover MIFARE	v Options MIFARE MIFARE MIFARE Classic Plus	MIFARE ICODE NTAG	- C X
Field On Field Off	RF Reset	UID 040C94C2373081	Readers Share
Command Selection ▼ MIFARE Ultralight Ultralight C Ultralight AES Ultralight NANO	AFC Counter Counter No Data Access Page Data (1	Ref Key No Ref Key Version 00 00 Key S No S No Password [Hex] Description 2 00000000 Description 2 00000000 Description Counter Value [Dec] 1 CHECK_TEARING Hey Data [ASCI	Password Ackno
History	00 000000	00	* 1 ×
Status Statusinfo I ✓ Ok SUCCESS R' ✓ Ok SUCCESS R'	Module Command ProcessingTime WD Open WD Reset	Sent data LoadReg=00; PEGODA 3: USB Serial Device COM16; UID=040C9 SAT=00-	Received data
✓ Ok SUCCESS IS	50layers Activateldle	SMA:EUC More: 4400;	, `
Ready	[Rea	der = PEGODA 3 + No SAM]	

Now try to place a MIFARE Classic card on Pegoda antenna and try to interact with it (see below example with 1 kbit 7 bytes UID). In SW Keystore tab, it is possible to set keys on specified table address. In this case, Crypto1 keys were set to 0xFFFFFFFFF, at address 0A, on Software Key storage.

Window Optio	t Classic Plus	MIFARE DESFire	AG	Protocol Readers	IIFARE	Key Store Manager
r 🔳	RF Reset 💽 Activate Idle	UID 048F3FBA1F1D80		\$		Help 🔻
Key Store	e Data Processing Originality Check	(MFC1C14_x)				≠×
Key No N	lame Key Type	Entry PartA	Version A	Entry PartB	Version B	Entry Part
(00 na	ame TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	00000000 ^
01 na	ame TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	00000000
02 na	ame TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	00000000
03 na	ame TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	00000000
04 na	ame TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000
05 na	ame TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	00000000
06 na	ame TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000
07 na	ame TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	00000000
08 na	ame TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000
09 na	ame TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000
0A na	ame MIFARE	FFFFFFFFFF	00	FFFFFFFFFFF	01	00000000

User guide

CLRD730 Quick start guide

	MIFARE Ultralight	MIFARE Classic	MIFARE MIFARE IC		Protocol	Readers	MIFARE	Key Stor Manage
Field On Field Off		leset 📘	Activate Idle UID 048F3FBA1F1D8	0			۲	Help 🔻
Command Selection 🗢 🖣 🗙	Key Store	Data Processing	Originality Check (MFC1C14_x)					÷
MIFARE Classic Data Processing Originality Check (MFC1C14_x	Personalization Type 00	 Personali; 	ze UID Usage					Í
e	Authentication BlockNo 0003 MFC Auth Key	~ (HW - KeyStore Ref Key No R 00 V SW - KeyStore Key No: 0A, Version:	ef Key Version 00 ~ A ~				
E	MFC Auth Key	B						
	Data Access MIFARE Data							
	Block [Dec]	Block [Hex]	Data [Hex]	Data [ASCii]	Value [[Dec] DstBlock	Description	
	0	0000	048F3FBA1F1D80084400020111001710	?°D	???	0000	Data	^
	1	0001	000000000000000000000000000000000000000		???	0001	Data	-
	3	0002	000000000000FF078069FFFFFFFFFFF	0000000	???	0002	Trailer	-
	4	0004	000000000000000000000000000000000000000	//////	???	0004	Data	
	5	0005	000000000000000000000000000000000000000		???	0005	Data	
	6	0006	000000000000000000000000000000000000000		???	0006	Data	-
< >	7	0007	000000000000000000000000000000000000000		222	0007	Data	
NP	9	0009	000000000000000000000000000000000000000		???	0009	Data	\sim
	Read	0		Value [Dec]	nt 🚺 Decrer	nent	Restore	0
History	Ma Carried	December 7	an Contractor	Deser	and data			~ û
V OK SUCCESS MFP	MFC Authent	Frocessing In	ute Jestit Gata UseSVKr25tre= 1; BiockNo=00; KeyTypeArB=0A; KeyVsino=000; KeyVerion=0000; UID=048F3FBA1F1D80; MIFARE; SVKkey=FFFFFFFFF;	Kecer	veu uata			
✓ Ok SUCCESS MFP	MFC Read		BlockNo=00;	Data=048F3FBA1F1D800844	00020111001710;			
✓ Ok SUCCESS MFP	MFC Read		BlockNo=01;	Data=00000000000000000000000000000000000	0000000000000;			
✓ Ok SUCCESS MFP	MFC Read		BlockNo=02;	Data=00000000000000000000000000000000000	0000000000000;			
			01.101.00		COEFFEFEFEFEFEFEFE			

Figure 20. MIFARE Classic detection and authentication of first sector blocks with Pegoda in VCOM mode.

CLRD730 Quick start guide

	MIFARE	MIFARE	MIFARE	DDE N	NTAG			MIFARE	Key St	tore
	Ultralight	Classic Plus	DESFire		Protoco	Read	iers	SAM	Mana	ger
Field On Field Off	RF Reset	t Activate Idl	UID 048F3FBA1F1D8	0					Help	•
Command Selection 🛛 🔫 🛠	Key Store Data	Processing Originality	Theck (MFC1C14_x)						-	F X
MIFARE Classic	Personalization									^
Originality Check (MFC1C14_x	Туре	-								
	00 ~	Personalize UID Usage	3							
	Authentication									
	BlockNo	0	Ref Key No Re	ef Key Version						
	0003 ~	HW - KeySt	ore 00 V 0	00 V						
			Ref Key							
		SW - Keyst	Key No: 0A, Version: A	• •						
	MFC Auth Key A	0								
	MFC Auth Key B	A								
	Data Access									
	MIFARE Data	lask Bland Data Bland		Data (AC	C11	Malue (Dec)	DetBlack	Description		
	0 00	00 048E3EBA1E1D	80084400020111001710	2ºD		222	0000	Data		
	1 00	01 00000000000	000000000000000000000000000000000000000			???	0001	Data		
	2 00	02 00000000000	000000000000000000000000000000000000000			???	0002	Data		
	3 00	03 00000000000	F078069FFFFFFFFFFFF	ÿiÿÿÿÿÿÿ		???	0003	Trailer	-	
	5 00	04 000000000000000000000000000000000000	000000000000000000000000000000000000000			777	0004	Data	-	
	6 00	06 00000000000	000000000000000000000000000000000000000			???	0006	Data		
< >	7 00	07 00000000000	000000000000000000000000000000000000000			???	0007	Trailer	\exists	
NP	8 00	000000000000000000000000000000000000000	000000000000000000000000000000000000000			???	8000	Data	~	
	Pead	A	000000000000000000000000000000000000000		Increment	Docromont		Restore		
		0		Value [Dec]	increment	Decrement		Nestore		~
History Status StatusInfo Mode	le Command Pr	ocorringTime	Sont data		Received data				~ ų	
Status Statusinio Mou	ie Command Pr	UseSWKev	Store=1:		Received data					- ^
		BlockNo=0	Э;							
		KeyNumbe	r=000A;							
 Ok SUCCESS MFP 	MFC Authenti	KeyVersion	=0000; FRA1F1D80:							
		MIFARE;	BATT 1000,							
		SWKey=FF	FFFFFFFFF;							
V OK SUCCESS MEP	MFC Read	BlockNo=0	0;	Data=048F3FB/	A1F1D8008440002011100	1710;				
		Blockblo-0	1.	Data=0000000	000000000000000000000000000000000000000	000				
✓ Ok SUCCESS MFP	MFC Read	BIOCKINO=U	1;	Data=0000000		000;				
✓ Ok SUCCESS MFP	MFC Read	BlockNo=0	2	Data=00000000	000000000000000000000000000000000000000	000;				
✓ Ok SUCCESS MFP	MFC Read	BlockNo=0	3;	Data=00000000	00000FF078069FFFFFFFFF	FF;				~
adv			IReader = PEGODA 3 + N	SAM1			_		_	-

3.5 Main frame general overview

RFIDDiscover supports the functions for all MIFARE, NTAG, and ICODE product families.

Therefore, the user interface is divided into functional blocks which are shown in different tabs in Figure 22 (1).

They open the so-called 'Command selection' window (2) which allows to select a command window in (3).

At the bottom (4) <u>Figure 22</u> shows the history field where all the operations are displayed. For a more detailed view on the sent data and received data, a switch to the log window is possible. Both fields can be cleared, or can be stored in a text file.

Note: The sequence of commands as described in ISO/IEC 14443 or in the relevant data sheet must be kept to be able to activate and operate a card. The RFIDDiscover does not cross-check the logical command flow.

CLRD730 Quick start guide

Main Menu View KeyStore Window Options RFIDDiscover MicARE Uttralight WirARE Close Profile	MIFARE MIFARE DESFire CODE	NTAG 1 Protocol	- C X Readers SAM Key Store SAM Manager Performance Performance
Command Selection • 9 × Reader McCoE 1, 2 Show Cards R0701 Register Set (RC52) R0710 Register Set (RC523) PCSC Readers (PR533, PN533 & SCM) 2	Show Cards MICORE 1, 2 PCSC Readers (PR533, PN533 & S	M)	Start Detection
Status Statusinfo Module V Ok SUCCESS SAM Get V Ok SUCCESS RWD Get	Command ProcessingTime ReaderList ReaderList	Sent data	Received data ReaderList: Broadcom Corp Contacted ReaderList: NXP SEMICONDUCTORS CL
			,

Figure 22. Interface to reader has been opened successfully

3.5.1 Readers window

Start Detection	9
Stop Detection	8

The 'Show Cards' command window in <u>Figure 23</u> allows you to detect all cards which are present in the reader field. With 'Start Detection', the reader starts to poll for cards (ISO 14443 Type A and B) and you get the UID of the cards presented to the Pegoda as well as the card type. With 'Stop Detection', the polling is stopped again.

3.5.2 Protocol window

The command window related to the protocol is shown in Figure 24.

- 1. This part of the panel allows you to activate a number of cards and perform the anti-collision protocol according to ISO/IEC 14443. The most convenient method is to push the 'Activate Idle' button. After that, in the table a UID appears in section 2 and its State is 'Active'.
- 2. This section allows you to manage multiple cards in the reader field. Select a specific card that you want to communicate with. Therefore, this card has to be in 'Active' State. To switch to another card in the reader field choose the current 'Active' card and with 'Halt' you can change the State from 'Active' to 'Halt' state (and work with another card in the meantime). Pick a 'Halt' UID and the button 'Act.Wakeup' changes the State back to 'Active' and you can work with the card again. 'Clear List' deletes all data in the table
- 3. With the control elements in (3) section, you can send individual commands and data to the card in an ISO 14443-3 message frame. Thereby the input format is hex coded. The checkboxes there indicate if you want to append a CRC code to the command and if you expect that the card to append a CRC to the response. The answer of the card is then displayed in the log windows. For a list of available command, refer to cards data sheet.



This view is ideal to understand the basic concepts from ISO14443-3 and can be used to evaluate scenarios on a very low level.

3.5.3 MIFARE Classic window

After pressing "MIFARE Classic" on the middle text area (on right side of MIFARE logo), the dialogue with MIFARE Classic cards is opened on the left side. It includes Data Processing and Originality Check tabs.

<u>Figure 25</u> shows the "Data Processing" window. With this window you can process the data stored on the MIFARE Classic card:

- 1. "Personalization UID Usage" allows you to configure the type of UID the card should use.
- To gain access to the different storage sectors of the card, you first must authenticate with a Key. Therefore, you can choose a "BlockNo" and the "Ref Key" (prepared in the KeyStore <u>Section 3.5.6</u>) and use the button "MFC Auth Key A" or "MFC Auth Key B".
- 3. With "Read", you can read a block from the card and with "Write" you can write the block on the card that is selected in the data grid. Use "Increment" to increase and "Decrement" to decrease the contents of a block.

CLRD730 Quick start guide

The results are stored in an internal data-register. The "Restore" button move the contents of a block into an internal data-register. Use "Transfer" to write the contents of the temporary internal data-register to a value block.

	MIFARE MIFARE MIFARE DESFire ICODE NTAG	Protocol Readers SAM Key Store Manager
Field On Field Off	RF Reset CALCULATE Idle UID 046D4D62FC2880	🔇 😢 Help 🔻
Command Selection * (I) X • MIFARE Classic Data Processing Originality Check (MFC1C14_x)	Data Processing Originality Check (MFC1C14,x) Personalization 1 00 Personalize UID Usage 0000 Personalize UID Usage </th <th>× ×</th>	× ×
	Data Access MIFARE Data Biock [Dec] Biock [Hed] Data [ASCii] 0 0000 000000000000000000000000000000000000	Best Best <th< th=""></th<>
NP	8 0008 000000000000000000000000000000000000	277 0008 Data 277 0009 Data Decrement Itestore Itestore Edit AC Itransfer V
gure 25. Data Processing		

3.5.4 MIFARE Ultralight windows

By pressing the MIFARE Ultralight button, then it is possible to operate with all MIFARE Ultralight product types. It is necessary to execute the following commands in order to perform 'ISO14443A Layer 3' sequence and operate with one of above mentioned technologies: "Field On" (or "RF Reset") and "Activate Idle".

The "Ultralight AES" command window allows:

- 1. To read and write data on a chosen page of the card.
- 2. To edit lock bits/user configuration (refer to MIFARE Ultralight AES data sheet).

CLRD730 Quick start guide

Main Menu View KeyStore V	Indow Options	Store
	Uttralight Classic Plus DESFire Cast Protocol Readers SAM Ma	nager
🔵 Field On 🦳 🥚 Field Off	RF Reset 🕞 Activate Idle UID 🔤	•
Commenced Colorition 🚽 🛛 🗙		
MIEADE Litralight	/ Utraignt ALS	× ^
Ultralight C	Authentication	^
Ultralight EV1	HW - KeyStore Ref Key No Ref Key Version Ram Key No Ram Key Version	
Ultralight AES	00 00 E0 00 00 U	
Ultralight NANO	Ref Key From SW KeyStore Diversification	
	SW - KeyStore Key No: 00, Version: A • 0x ·	
	Card Key No.	
	On DataProtifiery v Altitud and Altitud an	
	AUTITAES OF AUTITAES	
	AFC Counter	
	Counter No. Increment Value (Dec)	
	INCREMI	
	Counter Value [Dec] READ_CNT	
	Data Access	
	Page Data (Havi) Data (ASCII) Edit Lock Bite	
A A A A A A A A A A A A A A A A A A A		
NP		
1	Edit Oser Configuration	

3.5.5 Protocol button and ISO14443-4 tab

This tab provides all the functionality to work with ISO14443-4 and the command window is shown in Figure 27.

- 1. This part can be used to activate a card to Layer 4 and control the date exchange rate.
- 2. The textbox shows the state of the cards. Control which card is the active one.
- 3. Use the blue marked part to send commands to the card in a ISO14443-4 message frame format.

For more information on the provided commands of this window, refer to RFIDDiscover user manual.

CLRD730 Quick start guide

RFIDDiscover MIFARE Ultralight Classic Plus DESFire ICODE NTAG	Protocol Readers
Field On Field Off	🔇 🕄 Help 🔻
Command Sele ~ # × ISO14443A Layer 3) ISO14443AL4 Layer 4 ISO15693	÷×
ISO1443A Layer 3 Current L3 activated UID 1	
ISO15693 CID Reader Buf Sz. 00 V 256 V RATS RATS+PPS (1)	
DRI (PCD to PICC) DSI (PICC to PCD) 106k V 106k V Deselect	
Activate Idle+RATS () Activate WakeUp+RATS ()	
State CID DRI DSI ATS UID 2	
Unknown 01 106k 106k Unknown 02 106k 106k V	
Clear List	
	RX Buffer
<	→ >

3.5.6 Key Store Manager

The Key Store Manager window as shown in <u>Figure 28</u> allows you to define a number of Keys to be used for the authentication of, for example, memory sectors.

Each key block can have a nickname and a certain type. It is divided in 3 keys, A, B, and C with individual Versions.

From more information on keys and how to be used with cards refer to the individual card IC data sheets.

Key No	Name	Key Type	Entry PartA	Version A	Entry PartB	Version B	Entry PartC	Version C	
00	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	^
01	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
02	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
03	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
04	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
05	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
06	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
07	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
08	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
09	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
0A	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
OB	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
0C	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
0D	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
OE	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	
OF	name	TDEA - DESFire	000000000000000000000000000000000000000	00	000000000000000000000000000000000000000	01	000000000000000000000000000000000000000	02	

Figure 28. Key Store Manager

3.6 Support of Pegoda to Card Test Framework GUI

NXP delivers another Software GUI consisting of a Windows application which runs scripts containing transponder commands. It is named Card Test Framework and it is particularly useful to test key provisioning

and personalization of smartcards, because a script may contain all necessary operations to initialize/configure cards that are received with default keys and their memory completely empty.

One can obtain a Card Test Framework if you have a valid NDA with NXP. Like all other NDA-protected documents and application software, One may download Card Test Framework by enrolling and qualifying to <u>My NXP Account</u>. Installation and documentation can be obtained by clicking "Secure Files" and by selecting option "Product", then type "Card Test Framework" on space and press "ok". You see three secure files that you may download: Card Test Framework application executable (SW installation under Windows computers), user manual, and application note.

	Secure Files		
	Secure documentation and software for which you r	nave se	cure access rights.
	View your design resources by:		
	Product O File		
	Product Name		Product Category
			Product category
	Card Test Framework		Select
	RESET SEARCH		
	APPLICATION DEVELOPMENT TOOLS		
	SW5434 Card Test Framework		
	DDE Rev 2.6 Jun 14 2022 25.5 MB SW543426 English F	Previous Re	visions
	Access Granted ①	1011040110	
	USER MANUAL		
	UM5433 Card Test Framework - Software	version	2.6
	UM5433 Card Test Framework - Software version 2.6		
	PDF Rev 2.0 Jun 14, 2022 1.9 MB UM543320 English Pr	evious Rev	isions
	Access Granted ①		
	APPLICATION NOTE		
	AN5435 Card Test Framework Usage Instr	uctions	
	PDF Rev 1.1 Mar 21, 2022 2.1 MB AN543511 English Pre	evious Rev	isions
	Access Granted ①		
Figure 29. Card Test Frame	ework search in Secure Files.		

Then, after configuring the reader in "equipment list", (Configuration \rightarrow Equipment) it is possible to select a script, and run it.

NXP Card Test Framework V2.6 -	Administrator		
File Configuration Tools Help Program Equipment Tests Scripts	Test Execution	Results Graph	Test Results
Peterm Default Patform Default Patform Default	BP +/- Line	Command	Para
	Output Normal Apds	Error	

User guide

CLRD730 Quick start guide

Equipment	Selection			Properties	
▲ Reader CLEV6630B				PCSC	Туре
PCSC: Broadcom Corp Contacted SmartCard 0	I Equipment	Туре	Name	NXP Semiconductors NXP Pegoda 3 (CL) 0	Name
PCSC: NXP Semiconductors NXP Pegoda 3 (CL) 0 PCSC: NXP Semiconductors NXP Pegoda 3 (CL) 0	1 🔲 Reader	PCSC	NXP Semiconductors NXP Pegoda 3 (CL) 0	Description	
PCSC: Windows Hello for Business 1					
Pegoda Pegoda2				 Equipment Parameters 	
RdCardSim				NXP Semiconductors NXP Pegoda 3 (CL) 0	PCSC Port
				0	Additional Delay [ms]
				Auto ~	Protocol
				Normal Mode *	Communication Mode
	_			Info:	
Refresh					

Figure 30. How to configure "equipment" before using Card Test Framework

Certificate Propagation service is by default enabled on Windows computers, therefore you might get a Service Warning advising the user to disable it to avoid interference with operation of the PCSC smart card reader. You can access this service and disable it, by opening Control Panel \rightarrow Administrative Tools \rightarrow Services.

	Tell Configuration Tach Hell Configuration Tach Hell Exponent Exercised Sectors Sectors Search Edward Sectors Pattorn Dena	Test Seculion Results Graph Test Results Per	
The Equipment Configuration	Selection	Nemal Apou Error	– – ×
Clupment A Reader CLEV66308 PCSC: Broadcom Corp Contacted SmartCard 0 PCSC: NXP Semiconductors NXP Pegoda 3 (CL) 0 PCSC: NXP Semiconductors NXP Pegoda 3 (CL) 0	I Equipment Type Reader PCSC	Name NXP Semiconductors NXP Pegoda 3 (CL) 0	Properties PCSC Type Type Type NNP Semiconductors NXP Pegoda 3 (CL) 0 Name Oescription
PCSC Way Semicinducting row regional 3 (C1) 0 PCSC Windows Hello for Business 1 Pegoda Pegoda2 RdCardSim			Compared Parameters Compared Parameters NXP Semiconductors NXP Pegoda 3 (CL) 0 PCSC Port Additional Delay [ms] Auto Protocol Normal Mode Communication Mode
Refresh			Info:
	Import Export	Test OK Ca	incel

	NXP Card Test Framework	×	
	Service Warning The service 'Certificate Propagation' is running. This service can interfere with the operation of PCSC smart card readers, which can lead to incorrect test results. To ensure the accurate execution of tests with the Card Test Framework, please stop this service. The service can be found under 'Control Panel -> Administrative Tools -> Services'. If you would not like to see this warning again (until a restart of the application), please select the cancel button.		
	OK Cancel		
1			

CLRD730 Quick start guide

File Home Share	View			- L	^ [
Pin to Quick Copy Paste	Cut Move to → Delete → Copy path Copy to → Copy to → Action Copy to → Action Copy to → Copy to	New folder	Properties	Select	t all t none t selection
Clipboard	Organize	New	Open	Se	lect
← → ` ↑ ¹ / ₁ / ₂ → Co	ontrol Panel > System and Security > Administra	tive Tools	5 V		م ر
^	Name	Date	modified	Type	Size ^
📌 Quick access				960	0120
🔮 Documents 🖈	Component Services	12/7	/2019 10:09 AM	Shortcut	
🕹 Downloads 🖈	Computer Management	12/7	/2019 10:09 AM	Shortcut	
E Pictures 🖈	Dirk Cleanup	12/1	72019 10:09 AIVI	Shortcut	
infortunio	Event Viewer	12/7	/2019 10:09 AM	Shortcut	
Pegoda3	🔝 iSCSI Initiator	12/7	/2019 10:09 AM	Shortcut	
Stella	Local Security Policy	12/7	/2019 10:10 AM	Shortcut	
WORK	📷 ODBC Data Sources (32-bit)	12/7	7/2019 10:10 AM	Shortcut	
- WORK	📷 ODBC Data Sources (64-bit)	12/7	/2019 10:09 AM	Shortcut	
oneDrive - NXP	Performance Monitor	12/7	/2019 10:09 AM	Shortcut	
NXL27971	汩 Print Management	12/6	6/2019 10:46 PM	Shortcut	
3D Objects	Recovery Drive	12/7	/2019 10:09 AM	Shortcut	
Desktop	Registry Editor	12/7	/2019 10:09 AM	Shortcut	
Desktop	Nesource Monitor	12/7	/2019 10:09 AM	Shortcut	
Develoads	Services	12/7	/2019 10:09 AM	Shortcut	~
- Downloads	<				>
20 items					

As an example, a MIFARE DESFire card formatting script is demonstrated in the picture below, after having placed one MIFARE DESFire EV3 card on top of Pegoda.



One may find instructions on how to detect/include Pegoda in the reader list and on how to use Card Test

Framework in this application note: <u>AN5435 Card Test Framework Usage Instructions</u>. For more info, see <u>ref.[5]</u>.

3.7 Pegoda configured as mass storage device

When in mass storage mode, it is possible to overwrite the current Pegoda binary, which actually is the PN7642 binary contained in built-in MCU flash. By default, CLRD730 is delivered with PS/SC-VCOM binary, which is used to support RFIDDiscover, aiming to allow customers to get familiarity with NXP transponder technologies at 13.56 MHz (ISO/IEC 14443A - proximity tags - and ISO/IEC 15693 - vicinity transponders).

Nevertheless, it is possible to upload the binary delivered with NFC Cockpit and available inside its installation directory:

C:\nxp\NxpNfcCockpit_v7.1.0.0\firmware\PN7642\

Currently it is named NxpNfcCockpit_05_03_00_Flash.bin.

Before writing new binary, it is necessary to delete the previous one (see next picture).



Figure 34. How to change Pegoda application – first delete current binary file then drag and drop new binary.



\NxpNfcCockpit_v7.1.0.0\firmware\PN7642\

You recognize that Pegoda is in mass storage mode by looking to all three leds which are on: "POWER" LED is blue colored on; "MODE" LED is white-colored on and "COMM" LED is white-colored on (see below).

CLRD730 Quick start guide



3.8 Pegoda configured to support NFC Cockpit

Note: Do not update the PN7642 firmware to a version greater than 1.x. or the Pegoda reader will become unusable.

When the NFC Cockpit binary is dragged and dropped to "mass storage" location, it is necessary to reset CLRD730 (unplug and plug again USB-C cable).

Then one notices that the Device Manager changes the USB description as shown below.

🛃 Device Manager — 🗆 🗅	×
<u>File</u> <u>Action</u> <u>V</u> iew <u>H</u> elp	
> 🛄 Monitors	^
> 🔄 Network adapters	
 Forts (COM & LPT) Intel(R) Active Management Technology - SOL (COM3) 	
PN76XX VCOM (COM28)	¥
Figure 37. Device manager USB descriptor: there is no entry when CLRC730 is in	mass-storage mode but there is

It is possible to recognize Pegoda in VCOM functionality looking to RED POWER LED always on (while the other two leds are off). Under this condition, it is possible to run NFC Cockpit and get familiarity with all functionality of PN7642 NFC controller (all documentation, SDK, and product support package is available on

this landing page https://nxp.com/PN7642)

"PN76XX VCOM", able to support NFC Cockpit GUI

CLRD730 Quick start guide

Registers/EEProm access	Operation V FFPROM	Type A Type B Ty	pe F ISO15693 Icode ILT	Test Signal PRBS AA	Rx Matrix Scripting Extra
Register address: Register Set General * Read	Register	Protocol Layer			
Bit selection: Encry Encry Write Operation ③ 別は た 。 Single bit		18000 Load Proto Protocol RM TimeSlots 0 (18000 Inventory UII 00 (col 4_I180003m3_TX_TARI_9_44us_ Slots = 1) ~ ~	RX_Manch848_4_106	Load Protocol
EFROM Single Byte Access Address Doctool Bead EFROM Data DoC Write EFROM Config SECURE LIB CONFIG Config SECURE LIB CONFIG Config SECURE LIB CONFIG Config SECURE CONFIG CONFIG CONFIG CONFIG CONFIG CONFIG CONFIG CONFIG CONFIG CONFIG CONFIG CONFIG CONFIG CONFIG CONFIG CONFIG CONFIG	Control sion Avoidance: Enabled Milled Off Rifeld Reset PNT642 @\\\\COM28 201000 Q0221121 Sol00 (Compiled on Dec 19 2022 11:156) bit RM 196000m3; Tx TARI 9.44us, RX Manch648.4, 106 ARI 9.44us, RX Manch640, 4, 106 Protocol Isaded successfully.	Tag Inventory Single/Endless © Single Cycle Time RFRESET RF Off Duratic No Of Tags Do	Multiple Card Detection C Endless m 0 ms tected 0 mgle CardDetect	Single/Endless Begi © Single Cycle Time RFRESET RF Off Duration Single	nRound C Endless ms ms BeginRound

As mentioned before, NFC Cockpit can be downloaded from the NXP public website (see ref.[3]):

Figure 38. Aspect of NFC Cockpit GUI – it is important to have a display resolution equal or bigger than 1920x1080 to have full GUI window inside screen

4 Electromagnetic compatibility

4.1 FCC Compliance Statement

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, according to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution!

The Federal Communications Commission warns the users that changes or modifications to the unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The accessories associated with this equipment are as follows:

• Shielded communication cable

These accessories are required to be used in order to ensure compliance with FCC rules.

4.2 Compliance information according to 47 CFR Part 15, Subpart B

NXP declares that the product

CLRC730,

FCC ID: 2ADMJCLRD730

are in conformity with

- 47 CFR Part 15, Subpart B (Clause 15.107 and 15.109) in conjunction with ANSI C63.4:2014
- ICES-003, Issue 7 in conjunction with ANSI C63.4:2014

Operation of this product is subject to the following conditions:

- 1. this device may not cause harmful interference
- 2. this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

4.3 Compliance information according to Article 10.8 of the Radio Equipment Directive 2014/53/EU

The following information is provided per Article 10.8 of the Radio Equipment Directive 2014/53/EU:

(a) Frequency bands in which the equipment operates.

(b) The maximum RF power transmitted.

PN	RF Technology	Freq. Ranges	Max. Transmitted Power
CLRD730	RFID	13.553 – 13.567 MHz	30 dBm

EUROPEAN DECLARATION OF CONFORMITY (Simplified DoC per Article 10.9 of the Radio Equipment Directive 2014/53/EU).

This apparatus, namely CLRD730 Contactless Reader, conforms to the Radio Equipment Directive 2014/53/EU.

The full EU Declaration of Conformity for this apparatus can be delivered on request via <u>https://www.nxp.com/</u><u>mynxp/secure-files</u>.

5 References

- [1] **Data sheet –** CLRD730, PEGODA contactless smart card reader based on open-controller NFC reader PN7642 with optional contact interface, available on <u>https://www.nxp.com/products/:CLRD730</u>
- [2] **RFIDDiscover user manual** <u>UM10616 RFIDDiscover User Manual</u> (available in My NXP Portal, Secure Files).
- [3] NFC Cockpit Tool GUI NFC Cockpit configuration tools for NFC IC's
- [4] **PN7642 data sheet** <u>Single chip solution with high performance NFC reader, customizable MCU and security toolbox</u>
- [5] **Card Test Framework GUI** Installation, user manual and usage instructions, available in My NXP Portal, under Secure Files.

6 Revision history

Table 1. Revision history			
Document ID	Date	Description	
UG10039 v.1.3	22 April 2025	Editorial changes.Update in <u>Section 1.1.2</u>: Note about EEPROM writing added	
UG10039 v.1.2	09 September 2024	References to RFIDDiscover Lite was not removed properly. Is now corrected	
UG10039 v.1.1	05 September 2024	 Removed the references to RFIDDiscover Lite, as this is not existing any more 	
UG10039 v.1.0	06 July 2023	Initial version	

CLRD730 Quick start guide

Legal information

Definitions

Draft — A draft status on a document indicates that the content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included in a draft version of a document and shall have no liability for the consequences of use of such information.

Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of NXP Semiconductors.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect. Terms and conditions of commercial sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at https://www.nxp.com/profile/terms, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Suitability for use in non-automotive qualified products — Unless this document expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

HTML publications — An HTML version, if available, of this document is provided as a courtesy. Definitive information is contained in the applicable document in PDF format. If there is a discrepancy between the HTML document and the PDF document, the PDF document has priority.

Translations — A non-English (translated) version of a document, including the legal information in that document, is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

Security — Customer understands that all NXP products may be subject to unidentified vulnerabilities or may support established security standards or specifications with known limitations. Customer is responsible for the design and operation of its applications and products throughout their lifecycles to reduce the effect of these vulnerabilities on customer's applications and products. Customer's responsibility also extends to other open and/or proprietary technologies supported by NXP products for use in customer's applications. NXP accepts no liability for any vulnerability. Customer should regularly check security updates from NXP and follow up appropriately. Customer shall select products with security features that best meet rules, regulations, and standards of the intended application and make the ultimate design decisions regarding its products and is solely responsible for compliance with all legal, regulatory, and security related requirements concerning its products, regardless of any information or support that may be provided by NXP.

NXP has a Product Security Incident Response Team (PSIRT) (reachable at <u>PSIRT@nxp.com</u>) that manages the investigation, reporting, and solution release to security vulnerabilities of NXP products.

 $\ensuremath{\mathsf{NXP}}\xspace$ B.V. — NXP B.V. is not an operating company and it does not distribute or sell products.

CLRD730 Quick start guide

Licenses

Purchase of NXP ICs with NFC technology — Purchase of an NXP Semiconductors IC that complies with one of the Near Field Communication (NFC) standards ISO/IEC 18092 and ISO/IEC 21481 does not convey an implied license under any patent right infringed by implementation of any of those standards. Purchase of NXP Semiconductors IC does not include a license to any NXP patent (or other IP right) covering combinations of those products with other products, whether hardware or software.

Trademarks

Notice: All referenced brands, product names, service names, and trademarks are the property of their respective owners.

NXP — wordmark and logo are trademarks of NXP B.V. DESFire — is a trademark of NXP B.V. EdgeVerse — is a trademark of NXP B.V. ICODE — is a trademark of NXP B.V. MIFARE — is a trademark of NXP B.V. MIFARE Classic — is a trademark of NXP B.V. MIFARE Plus — is a trademark of NXP B.V. MIFARE Ultralight — is a trademark of NXP B.V. NTAG — is a trademark of NXP B.V.

Tables

Tab. 1. Revision history	32
--------------------------	----

Figures

Fig. 1.	Running Windows Device Manager for USBCCID Reader detection
Fig. 2.	Running Windows Device Manager for USBCCID Reader detection – Smart card
	reader section3
Fig. 3.	Connecting Pegoda using USB-Type C on USB 1 port
Fig. 4.	Inspection of new USBCCID Smartcard Readers detected by Windows OS
Fig. 5.	Frontal aspect of Pegoda CLRD730, showing ISO/IEC7816 slot and contactless antenna pear NXP logo
Fig. 6.	RFIDDiscover shortcut link after installation under Windows OS
Fig. 7.	News from MIFARE.net at first run of RFIDDiscover
Fig. 8.	Aspect of RFIDDiscover at first run7
Fig. 9.	Aspect of Pegoda leds when in default
	(PS/SC) mode. Presence of card both in
	contactless interface as well as in contact
	interface turns COMM LED from off to
Fig. 40	colored green
Fig. 10.	History dialogue window and detection of
Fig 11	History dialogue window and detection of
1 ig. 11.	two smart card readers
Fig. 12.	Contactless interface selected for Pegoda.
5	Example of MIFARE DESFire EV2
	detection9
Fig. 13.	"Readers" button and available menu on
	left part – Pegoda belongs to "PC/SC
	Readers (PR533, PN533 and SCM)" 10
Fig. 14.	Table containing PC/SC Readers – Pegoda
	includes one contactless interface and one
	contact interface
Fig. 15.	Pegoda has a lateral access to an internal
	PCB pushbutton: while in PS/SC, pressing
	this button toggles VCOM mode with PC/
Fig. 16	Peroda in VCOM mode (POW/ER ED
r ig. 10.	is red_MODE LED is light blue_COMM
	LED is dark blue): on the right USB
	descriptor while in VCOM Mode (in this
	case. COM16)
	, · · · · · · · · · · · · · · · · ·

Fig. 17. Fig. 18	RFIDDiscover in VCOM mode	14
r ig. 10.	VCOM mode.	15
Fig. 19.	MIFARE Classic Crypto1 keys set in	
Fig. 20	Address AU	15
1 lg. 20.	authentication of first sector blocks with	
	Pegoda in VCOM mode.	16
Fig. 21.	MIFARE Classic reading of first sector	
	blocks with Pegoda in VCOM mode	17
Fig. 22.	Interface to reader has been opened	4.0
Fig. 00	successfully	18
FIG. 23.	Show Cards command window	10
Fig. 24. Fig. 25	Data Processing	20
Fig. 25.	MIFARE Ultralight AFS	20
Fig. 20.	ISO14443A Laver 4	. 22
Fig. 28.	Kev Store Manager	22
Fig. 29.	Card Test Framework search in Secure	
•	Files	23
Fig. 30.	How to configure "equipment" before using	
	Card Test Framework	23
Fig. 31.	How to configure "equipment" before using	~ .
F : 00	Card lest Framework	24
FIG. 32.	"Propagation of Certificates" warning and	24
Fig 33	Simple MIEARE DESEire card formatting	24
i ig. 55.	example to demonstrate CTF usage	25
Fia. 34.	How to change Pegoda application – first	
g. e	delete current binary file then drag and	
	drop new binary.	26
Fig. 35.	Example above shows uploading	
	PN7642 binary available in NFC	
	Cockpit installation directory: C:\nxp	
- : 00	\NxpNfcCockpit_v7.1.0.0\firmware\PN7642\	26
Fig. 36.	Pegoda in mass-storage mode	27
Fig. 37.	Device manager USB descriptor: there is	
	storage mode but there is "PN76XX	
	VCOM [®] able to support NEC Cocknit GUI	27
Fig. 38	Aspect of NEC Cockpit GUI – it is important	21
g. 00.	to have a display resolution equal or bigger	
	than 1920x1080 to have full GUI window	
	inside screen	28

Contents

1	Introduction	2
1.1	Firmware information	2
1.1.1	Firmware version installed on the reader	2
1.1.2	Pegoda firmware update	2
2	Installation	3
2.1	Required items	3
2.2	Installing USB driver for the reader	3
2.2.1	Steps to detect the Pegoda connected via	
	USB-Type C cable to Windows OS PC/	
	tablet/laptop	3
2.3	Installing RFIDDiscover	5
2.3.1	System requirements	5
2.3.2	Installation process	6
3	Manual insertion of the Pegoda name in	
	reader list of RFIDDiscover	7
3.1	First run of RFIDDiscover, CLRD730 in PC/	
	SC mode	7
3.2	Getting available readers	
3.3	In case RFIDDiscover does not list Pegoda	
	reader	10
3.4	Support to other products (ISO/IFC	
••••	14443-3 ISO/IEC 15693 etc.)	11
341	Pegoda in VCOM mode	13
342	Pegoda support of ISO/IEC14443-3	
0	products and ISO/IFC15693 on	
	REIDDiscover	13
343	REIDDiscover using Pegoda in VCOM	
0.1.0	mode	14
35	Main frame general overview	
351	Readers window	18
352	Protocol window	19
353	MIFARE Classic window	19
354	MIFARE Ultralight windows	20
355	Protocol button and ISO14443-4 tab	21
356	Key Store Manager	22
36	Support of Perioda to Card Test Framework	. 22
0.0	GIII	22
37	Peroda configured as mass storage device	22
3.8	Pegoda configured to support NEC Cocknit	20
J.U A	Electromagnetic compatibility	21
	ECC Compliance Statement	20
 12	Compliance information according to 47	23
4.2	CER Part 15 Subpart B	20
13	Compliance information according to Article	23
T. 0	10.8 of the Radio Equipment Directive	
		30
5	References	21
6	Revision history	
•	Logal information	
	Leyai แก่งเกิดสมบท	

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© 2025 NXP B.V.

All rights reserved.

For more information, please visit: https://www.nxp.com