



C4 Red Legic Demo App Notes for App Development

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Issue 0.3
– 25. October 2021 –

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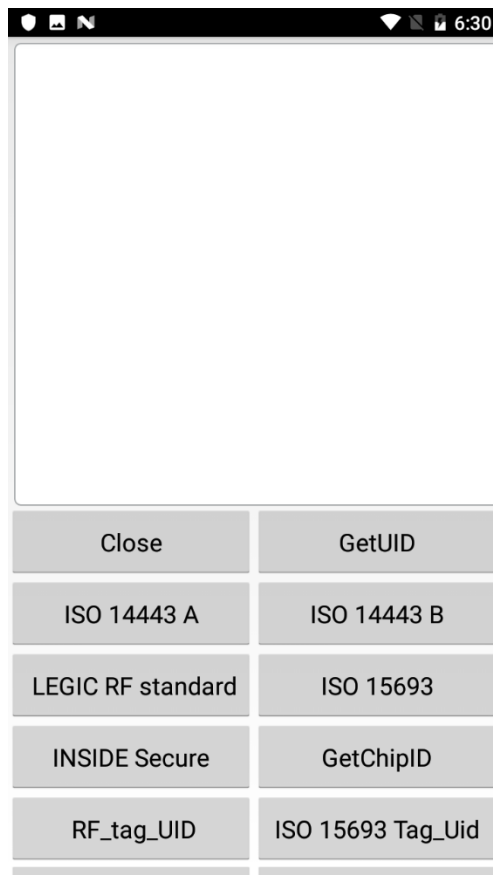
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1 Start the pre-installed Demo Application



Change from the start screen to the application screen. Here open “HF V1.4”.

2 Using the Demo App



Button	Function
[Open / Close]	Before using the RFID hardware, please open the Com Port. This will also power up the RFID module inside. Close the RFID hardware when not needed to save battery energy.
[Get UID]	This retrieves the RFID hardware status using the Legic command APPL_STATE
[ISO 14443 A]	This retrieves the UID of an ISO 14443 A type RFID tag using the Legic command SEARCH_TXP
[ISO 14443 B]	This retrieves the UID of an ISO 14443 B type RFID tag using the Legic command SEARCH_TXP
[LEGIC RF standard]	This retrieves the UID of an ISO Legic type RFID tag using the Legic command SEARCH_TXP Please note, that some Legic tag types communicate using ISO 15693 and will not reply to this function.
[ISO 15693]	This retrieves the UID of an ISO 15693 type RFID tag using the Legic command SEARCH_TXP
[INSIDE Secure]	This retrieves the UID of an ISO 14443 A type RFID tag using the Legic command SEARCH_TXP
[GetChipID]	This reads the 10 Byte chip ID of the Legic IC.
[RF_tag_UID]	No function, reserved for future use.
[ISO 15693 Tag_Uid]	This retrieves the UID of an ISO 15693 type RFID tag using the Legic command SEARCH_TXP_2

3 Communication Examples

All values are hexadecimal

3.1 Checksum

The checksum is calculated over all Bytes excl. the CRC itself. The calculation is according to CRC-CCITT (CRC-16) using generator polynomial $x^{16} + x^{12} + x^5 + 1$ with start value 0xFFFF, Big Endian, Reversed 0x8408

For test purposes, it is allowed to use 0000 as checksum value.

Online calculation: <http://crccalc.com> => CRC-16/MCRF4XX

3.2 Get Application Status

Normally it takes approx. 350 ms until the Legic chip is fully functional. In rare cases this time can go up to 3 secs. Therefore it is recommended to get the current operating status before sending any commands to the device.

Example 1

Command: 04 00 00 5A 52

The Bytes in Detail:

- 04 = Number of Bytes to follow
- 00 = Command code
- 00 = Subcommand, 00 = no state change
- 5A 52 = CRC

Reply 1: 05 00 00 01 7C FF

The Bytes in Detail:

- 05 = Number of Bytes to follow
- 00 = Command code
- 000 = Status, 00 = no error
- 01 = Application State, 01 = Idle
- 7C FF = CRC

Reply 2: 050000024E64

The Bytes in Detail:

- 05 = 5 Bytes to follow
- 00 = Command code
- 00 = Status, No error
- 02 = Current state is RF on
- 4E 64 = CRC-16/MCRF4XX

Example 2

Command: 04 00 02 79 40

The Bytes in Detail:

- 04 = Number of Bytes to follow
- 00 = Command code
- 02 = Subcommand, 02 = change to idle state
- 79 40 = CRC

Expected Reply: 05 00 00 01 7C FF

The Bytes in Detail:

- 05 = Number of Bytes to follow

00 = Command code
 000 = Status, 00 = no error
 01 = Application State, 01 = Idle
 7C FF = CRC

3.3 Get UID of RFID Tag

Use the Legic command SEARCH_TXP.

This example will search for an RFID transponder of type ISO 14443A: 04 01 02 CRC_H CRC_L

The Bytes in Detail:

04 = Number of Bytes to follow
 01 = Command code, 01 = SEARCH_TXP
 02 = Type of RFID transponder, 01 = ISO 14443A
 CRC_H = 00 is allowed as test value
 CRC_L = 00 is allowed as test value

3.3.1 Table of transponder type parameter values

00 = LEGIC RF standard
 01 = ISO 15693
 02 = ISO 14443 A
 03 = ISO 14443 B
 04 = INSIDE Secure
 05 = SONY FeliCa subset

3.3.2 Table of ready-to-use commands

04 01 00 43 8A = SEARCH_TXP for Legic
 04 01 01 52 03 = SEARCH_TXP for ISO 15693 (I-Code SLI, μ D, etc.)
 04 01 02 60 98 = SEARCH_TXP for ISO 14443 A (Mifare, Ultralight, etc.)
 04 01 03 71 11 = SEARCH_TXP for ISO 14443 B
 04 01 04 05 AE = SEARCH_TXP for INSIDE Secure
 04 01 05 14 27 = SEARCH_TXP for SONY FeliCa subset

3.3.3 Reply Examples

05 01 00 00 37 AA (no tag found)

ISO 14443A found

0D 01 00 01 07 80 2B 2B AA 69 49 04 A8 33 (7 Bytes Mifare Classic)

The Bytes in detail:

0D = Number of Bytes to follow
 01 = Command Code
 00 = Status, 00 = OK
 01 = Number of RFID Tags
 07 = UID Length
 80 2B
 2B AA
 69 49
 04 = UID of 7 Bytes Mifare Classic

A8 33 = CRC

ISO 15693 found

0E = Number of Bytes to follow

01 = Command Code

00 = Status Code

01 = Number of RFID Tags

08 = UID Length

E0 04

01 50

0B 4A

42 CB = 8 Bytes of UID from I-Code SLI-X

68 E6 = CRC

2 Tags of Type Iso 15693 found

17 = Number of Bytes to follow

01 = Command Code

00 = Status Code

02 = Number of RFID Tags

08 = 8 Bytes of UID from 1st tag

E0 05

00 00

01 E1

12 25 = 8 Bytes of UID from μ D

08 = 8 Bytes of UID from 2nd tag

E0 04

01 50

0B 4A

42 CB = 8 Bytes of UID from I-Code SLI-X

E2 38 = CRC

3.3.4 Monitor An RFID Tag

ISO15693 chip types can be monitored by repeating the SEARCH_TXP command.

ISO1443A and Legic chip types need the antenna to be switched off for the next successful SEARCH_TXP. Therefore this cycle is recommended:

Search_TXP: 04 01 02 60 98

SetApplicationState Idle: 04 00 02 79 40

Repeat Search_TXP

3.4 Get UID and Tag Info

Use the Legic command SEARCH_TXP_2.

This example will search for an RFID transponder of type ISO 14443A: 04 17 02 A1 D9

Example Reply

14 17 00 00 0E 01 07 80 4D 4D 3A 51 4D 04 02 03 08 00 44 0F 47

The Bytes in Detail:

14 = Number of Bytes to follow
 17 = Command code, 01 = SEARCH_TXP
 00 = Status Code
 00 = No sub tags
 0E = 14 Bytes to follow
 01 = Info Tag #01 = UID
 07 = UID Length
 80 4D
 4D 3A
 51 4D
 04 = 7 Bytes of UID
 02 = Info Tag #02 = SAK and ATQA values
 03 = Number fo SAK and ATQA Bytes
 08 = SAK
 00 = ATQA high
 44 = ATQA low
 0F 47 = CRC

3.5 Get Chip ID

This command outputs the chip ID of the SM4200 Legic RFID reader chip.

Command to RFID: 03 F3 1F C4 (LEN CMD CRC_H CRC_L)

The Bytes in Detail:

03 = Number of following bytes (3)
 F3 = Command code
 1F = 00 is allowed as test value
 C4 = 00 is allowed as test value

Reply from RFID: 0E F3 00 64 0C 5E 8A 12 CD 06 8D 54 4D C4 9D

0E = Number of following bytes (14)
 F3 = Command code
 00 = Status, 00 = OK number valid, 01 = general error, 02 = wrong command length
 64 0C
 5E 8A
 12 CD
 06 8D
 54 4D = 10 Bytes of Chip ID
 C4 9D = CRC