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Test specification for the

Single Wire Protocol (SWP) interface;

Part 1: Terminal features

(Release 11)

**Technical Specification**

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The present document is part 1 of a multi-part deliverable covering the Test specification for the Single Wire Protocol (SWP) interface, as identified below:

**Part 1: "Terminal features";**

Part 2: "UICC features".

# Modal verbs terminology

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# Introduction

The present document defines test cases for the terminal relating to Single Wire Protocol (SWP). SWP is the communication interface between the UICC and a contactless frontend (CLF) as specified in ETSI TS 102 613 [].

The aim of the present document is to ensure interoperability between the terminal and the UICC independently of the respective manufacturer, card issuer or operator.

# 1 Scope

The present document covers the minimum characteristics which are considered necessary for the terminal in order to provide compliance to ETSI TS 102 613 [].

The present document specifies the test cases for:

* the physical layer of the interface CLF - UICC;
* the electrical interface of the CLF;
* the initial communication establishment CLF - UICC;
* the data link layer.

Test cases for the UICC relating to ETSI TS 102 613 [] and test cases for the host controller interface (HCI) covering both terminal and UICC are out of scope of this document.

# 2 References

## 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non‑specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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[1] ETSI TS 102 613: "Smart Cards; UICC - Contactless Front-end (CLF) Interface; Part 1: Physical and data link layer characteristics".

[2] ETSI TS 102 221: "Smart Cards; UICC-Terminal interface; Physical and logical characteristics".

[3] ETSI TS 102 600: "Smart Cards; UICC-Terminal interface; Characteristics of the USB interface".

[4] ETSI TS 102 622: "Smart Cards; UICC - Contactless Front-end (CLF) Interface; Host Controller Interface (HCI)".

[5] ISO/IEC 14443-3: "Identification cards -- Contactless integrated circuit cards -- Proximity cards -- Part 3: Initialization and anticollision".

[6] ISO/IEC 14443-4: "Identification cards -- Contactless integrated circuit cards -- Proximity cards -- Part 4: Transmission protocol".

[7] ISO/IEC 9646-7: "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 7: Implementation Conformance Statements".

[8] ISO/IEC 18092: "Information technology -- Telecommunications and information exchange between systems -- Near Field Communication -- Interface and Protocol (NFCIP-1)".

[9] ISO/IEC 13239: "Information technology -- Telecommunications and information exchange between systems -- High-level data link control (HDLC) procedures".

[10] ISO/IEC 14443-2: "Identification cards -- Contactless integrated circuit cards -- Proximity cards -- Part 2: Radio frequency power and signal interface".

## 2.2 Informative references

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

Not applicable.

# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions apply given in ETSI TS 102 613 [] and the following apply:

**corrupted frame:** SWP frame which is well-formed with respect to the MAC layer, with the exception that the CRC16 in the frame does not match with the CRC16 result calculated over the payload

NOTE: This frame has at least 1 byte payload. Used by the TE to represent the situation where the DUT receives a corrupted frame (unless otherwise specified).

**nomenclature used for tests involving SHDLC LLC:**

For SHDLC link establishment, following definitions apply:

* ES transmits RSET:
* RSET(): RSET frame without payload.
* RSET(Ws=w): RSET frame with one byte payload.
* RSET(Ws=w, SREJ=S): RSET frame with two bytes payload. For the endpoint capabilities byte, SREJ=0 represents the value 0x00, SREJ=1 represents the value 0x01.
* ES receives RSET:
* RSET: RSET frame with any valid payload.
* RSET(): RSET frame without payload.
* RSET(Ws=w): RSET frame with one byte payload.
* RSET(Ws=w, SREJ=S): RSET frame with two bytes payload. For the endpoint capabilities byte, SREJ=0 represents the value 0x00, SREJ=1 represents the value 0x01.

For every calculation on NS0\_T, NS0\_S or NR in the test procedures use modulo 8.

**non-occurrence RQ:** RQ which has been extracted from ETSI TS 102 613 [], but which indicates a situation which should never occur

NOTE: The consequence is that such RQs can not be explicitly tested.

**representative SWP frame exchange procedure:** sequence of SWP frames exchanged between TE and DUT

NOTE: Used by the TE to cause SWP communication traffic where needed in test procedures. This sequence shall provide the following characteristics, unless otherwise specified or more precisely stated in test procedures:

* Amount of data exchanged between TE and DUT at least 500 byte (with respect to the MAC layer), valid for both directions.
* Some half-duplex SWP communication.
* Some full-duplex SWP communication.
* Frame transmission started by the TE while the DUT yet sends a frame.
* Exchanged data shall enforce occurrence of some bit stuffing in both directions.
* Some variation of frame length sent from the TE.

The DUT provider shall provide sufficient information to allow this procedure to be defined.

**user:** describes any logical or physical entity which controls the test equipment in a way that it is able to trigger activities of the DUT

## 3.2 Symbols

For the purposes of the present document, the symbols given in ETSI TS 102 613 [] and the following apply:

The characters x, y, z represent any values for the current test, unless otherwise specified

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 102 613 [] and the following apply:

(U)SIM Universal Subscriber Identity Module

ACT ACTivation protocol

CLF ContactLess Frontend

CLT ContactLess Tunnelling

CRC Cyclic Redundancy Code

DUT Device under test

ES SHDLC endpoint of test equipment (i.e. the UICC simulator)

FFS For further study

FSC Frame Size for proximity Card

HCI Host Controller Interface

HCP Host Controller Protocol

LLC Logical Link Control

NAA Network Access Application

NR Number of next information frame to Receive

NS Number of next information frame to Send

PCD Proximity Coupling Device

RQ Conformance requirement

SHDLC Simplified High Level Data Link Control

SWIO Single Wire protocol Input/Output

SWP Single Wire Protocol

T Terminal, i.e. the DUT (shortcut used only in test procedure tables)

TE Test equipment

TSN Time Slot Number

WS Window Size

## 3.4 Formats

### 3.4.1 Format of the table of optional features

The columns in table 4.1 have the following meaning:

|  |  |
| --- | --- |
| Column | Meaning |
| Option: | The optional feature supported or not by the implementation. |
| Status: | See clause 3.4.3 'Status and Notations' |
| Support: | The support columns are to be filled in by the supplier of the implementation. The following common notations, defined in ISO/IEC 9646‑7 [], are used for the support column in table 4.1.  Y or y supported by the implementation.  N or n not supported by the implementation.  N/A, n/a or - no answer required (allowed only if the status is N/A, directly or after evaluation of a conditional status). |
| Mnemonic: | The mnemonic column contains mnemonic identifiers for each item. |

### 3.4.2 Format of the applicability table

The applicability of every test in table 4.2 a) is formally expressed by the use of Boolean expression defined in the following clause.

The columns in table 4.2 have the following meaning:

|  |  |
| --- | --- |
| Column | Meaning |
| Test case: | The "Test case" column gives a reference to the test case number(s) detailed in the present document and required to validate the implementation of the corresponding item in the "Description" column |
| Description: | In the "Description" column a short non-exhaustive description of the requirement is found. |
| Release: | The "Release" column gives the Release applicable and onwards, for the item in the "Description" column |
| Execution requirements | The usage of the "Execution requirements" column is described in clause 4.5.2. |
| Rel-x Terminal: | For a given Release, the corresponding "Rel-x Terminal" column lists the tests required for a Terminal to be declared compliant to this Release. |
| Support: | The "Support" column is blank in the proforma, and is to be completed by the manufacturer in respect of each particular requirement to indicate the choices, which have been made in the implementation. |

### 3.4.3 Status and Notations

The "Rel-x Terminal" columns show the status of the entries as follows:

The following notations, defined in ISO/IEC 9646‑7 [], are used for the status column:

M mandatory - the capability is required to be supported.

O optional - the capability may be supported or not.

N/A not applicable - in the given context, it is impossible to use the capability.

X prohibited (excluded) - there is a requirement not to use this capability in the given context.

O.i qualified optional - for mutually exclusive or selectable options from a set. "i" is an integer which identifies an unique group of related optional items and the logic of their selection which is defined immediately following the table.

Ci conditional - the requirement on the capability ("M", "O", "X" or "N/A") depends on the support of other optional or conditional items. "i" is an integer identifying an unique conditional status expression which is defined immediately following the table. For nested conditional expressions, the syntax "IF ... THEN (IF ... THEN ... ELSE...) ELSE ..." is to be used to avoid ambiguities.

References to items

For each possible item answer (answer in the support column) there exists a unique reference, used, for example, in the conditional expressions. It is defined as the table identifier, followed by a solidus character "/", followed by the item number in the table. If there is more than one support column in a table, the columns are to be discriminated by letters (a, b, etc.), respectively.

EXAMPLE: A.1/4 is the reference to the answer of item 4 in table A.1.

# 4 Test environment

## 4.1 Table of optional features

The supplier of the implementation shall state the support of possible options in table 4.1. See clause 3.4 for the format of table 4.1. Items indicated as O\_XYZ (for example, O\_SREJ) refer to features supported by the device; items indicated as B\_XYZ (for example, B\_STREAM\_IFRAMES) refer to behaviour of the device.

Table 4.1 a): Options

| Item | Option | Status | Support | Mnemonic |
| --- | --- | --- | --- | --- |
| 1 | Class B | O |  | O\_CLASS\_B |
| 2 | Class C full power mode | O |  | O\_CLASS\_C\_FULL |
| 3 | Class C low power mode | O |  | O\_CLASS\_C\_LOW |
| 4 | Extended bit durations | **O** |  | **O\_EXTENDED\_T** |
| 5 | SREJ supported | O |  | O\_SREJ |
| 6 | Terminal supports **DEACTIVATED** followed by subsequent SWP interface activation in full power mode | C001 |  | O\_DEAC\_SUBACT\_FULL |
| 7 | Window size of 3 | O |  | O\_WS\_3 |
| 8 | Window size of 4 (see note 1) | O |  | O\_WS\_4 |
| 9 | HCI as per ETSI TS 102 622 [] | O |  | O\_102\_622 |
| 10 | void |  |  |  |
| 11 | CLT, ISO/IEC 18092 [] | O |  | O\_CLT\_F |
| 12 | Void |  |  |  |
| 13 | Void |  |  |  |
| 14 | Void |  |  |  |
| 15 | Void |  |  |  |
| 16 | Terminal can be switched from full power mode directly to low power mode without disconnecting the antenna or removing the power supply | O |  | O\_FULL\_TO\_LOW |
| 17 | Terminal can be switched from low power mode with the power supply connected directly to full power mode without disconnecting the antenna | O |  | O\_LOW\_TO\_FULL |
| 18 | Card Emulation, ISO/IEC 14443-4 [] type A | O |  | O\_CE\_A |
| 19 | Card Emulation, ISO/IEC 14443-4 [] type B | O |  | O\_CE\_B |
| 20 | Terminal streams I-frames - i.e. sends I‑frames without waiting for the acknowledge of previously sent I-frames | O |  | B\_STREAM\_IFRAMES |
| 21 | Terminal supports CLT, ISO/IEC 14443-3 [] Type A independently of whether the UICC indicates support of extended bit durations (see note 2) | O |  | O\_CLT\_A\_FULL |
| 22 | Terminal supports CLT, ISO/IEC 14443-3 [] Type A only when the UICC indicates support of extended bit durations down to 0,590 µs (see note 2) | O |  | O\_CLT\_A\_EXTENDED\_ONLY |
| NOTE 1: If the terminal supports O\_WS\_4, then it also shall support O\_WS\_3.  NOTE 2: It is not valid for the terminal to support both O\_CLT\_A\_FULL and O\_CLT\_A\_EXTENDED\_ONLY. | | | | |

Table 4.1 b): Conditional items referenced by table 4.1 a)

| Conditional item | Condition |
| --- | --- |
| C001 | IF (Release 9 or later) THEN N/A ELSE O (see note). |
| NOTE: Usage of an upper layer indication that the UICC requires no more activity on this interface can be used to trigger a subsequent SWP interface activation. | |

## 4.2 Applicability table

Table 4.2 a) specifies the applicability of each test case to the device under test. See clause 3.4 for the format of table 4.2 a).

Table 4.2 a): Applicability of tests

| Test case | Description | | Release | Execution requirements | Rel-7  Terminal | Rel-8  Terminal | Rel-9 Terminal | Rel-10 Terminal | Rel-11 Terminal | Support |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | System architecture tests | |  |  |  |  |  |  |  |  |
|  | (Test cases for this clause are FFS) | |  |  |  |  |  |  |  |  |
|  | Physical characteristics tests | |  |  |  |  |  |  |  |  |
| 5.3.2.2.2 | Activation of SWP additionally to other interface | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
| 5.3.2.2.3 | Activation of SWP in low power mode | | Rel-7 |  | C002 | C002 | C002 | C002 | C002 |  |
| 5.3.2.3.2 | SWP initial activation in full power mode - normal procedure | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
| 5.3.2.3.4 | SWP initial activation in full power mode - corrupted ACT\_SYNC frame (repeat the last frame) | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
| 5.3.2.3.5 | SWP initial activation in full power mode - no ACT\_SYNC frame (repeat the last frame) | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
| 5.3.2.3.6 | SWP initial activation failed in full power mode - corrupted ACT\_SYNC frame (multiple) | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
| 5.3.2.3.7 | SWP initial activation failed in full power mode - no ACT\_SYNC frame (multiple) | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
| 5.3.2.3.8 | SWP Initial activation in full power mode - corrupted ACT\_READY frame (repeat last frame) | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
| 5.3.2.3.9 | Void | |  |  |  |  |  |  |  |  |
| 5.3.2.3.9a | SWP Initial activation in full power mode - no ACT\_READY frame (repeat last frame) | | Rel-10 |  | N/A | N/A | N/A | C001 | C001 |  |
| 5.3.2.3.10 | SWP initial activation failed in full power mode - corrupted ACT\_READY frame (multiple) | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
| 5.3.2.3.11 | SWP initial activation failed in full power mode - no ACT\_READY frame (multiple) | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
| 5.3.2.3.12 | SWP initial activation in low power mode | | Rel-7 |  | C002 | C002 | C002 | C002 | C002 |  |
| 5.3.2.3.13 | SWP initial activation in low power mode - corrupted ACT\_SYNC frame (repeat the last frame) | | Rel-7 |  | C002 | C002 | C002 | C002 | C002 |  |
| 5.3.2.3.14 | SWP initial activation in low power mode - no ACT\_SYNC frame (repeat the last frame) | | Rel-7 |  | C002 | C002 | C002 | C002 | C002 |  |
| 5.3.2.3.15 | SWP initial activation failed in low power mode - corrupted ACT\_SYNC frame (multiple) | | Rel-7 |  | C002 | C002 | C002 | C002 | C002 |  |
| 5.3.2.3.16 | SWP initial activation failed in low power mode - no ACT\_SYNC frame (multiple) | | Rel-7 |  | C002 | C002 | C002 | C002 | C002 |  |
| 5.3.2.3.17 | SWP subsequent activation in full power mode | | Rel-7 |  | C115 | C115 | C001 | C001 | C001 |  |
| 5.3.2.3.19 | SWP initial activation in full power mode - send ACT frames in wrong order, ACT\_READY frame after activation (repeat the last frame) | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
|  | Electrical characteristics tests | |  |  |  |  |  |  |  |  |
| 5.4.1.3.2 | Current provided in low power mode, no spikes | | Rel-7 |  | C002 | C002 | C002 | C002 | C002 |  |
| 5.4.1.3.3 | Current provided in low power mode, with spikes | | Rel-7 |  | C002 | C002 | C002 | C002 | C002 |  |
| 5.4.1.4.2 | Communication with S2 variation in full power mode | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
| 5.4.1.4.3 | Communication with S2 variation in low power mode | | Rel-7 |  | C002 | C002 | C002 | C002 | C002 |  |
| 5.4.1.5.2.2 | Communication with S2 variation in full power mode | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
| 5.4.1.5.2.3 | Communication with S2 variation in low power mode | | Rel-7 |  | C002 | C002 | C002 | C002 | C002 |  |
|  | Physical transmission layer tests | |  |  |  |  |  |  |  |  |
| 5.5.1.2 | S1 waveforms, default bit duration | | Rel-7 |  | M | M | M | M | M |  |
| 5.5.1.3 | S1 waveforms, extended bit durations | | Rel-7 |  | C013 | C013 | C013 | C013 | C013 |  |
| 5.5.3.2 | SWP states and transitions, communication | | Rel-7 |  | M | M |  |  |  |  |
| 5.5.3.3 | SWP resume after upper layer indication that the UICC requires no more activity on this interface | | Rel-7 | TR2 | N/A | N/A | C116 | C116 | C116 |  |
| 5.5.4.2 | Power provided in full power mode, SWP | | Rel-7 |  | C001 | C001 | C001 | C001 | C001 |  |
| 5.5.4.3 | Switching from full to low power mode | | Rel-7 |  | C110 | C110 | C110 | C110 | C110 |  |
| 5.5.4.4 | Switching from low to full power mode | | Rel-7 |  | C111 | C111 | C111 | C111 | C111 |  |
|  | Data link layer tests | |  |  |  |  |  |  |  |  |
| 5.6.2.2.2 | Interpretation of incorrectly formed frames - SHDLC RSET frames | | Rel-7 |  | M | M | M | M | M |  |
| 5.6.2.2.3 | Interpretation of incorrectly formed frames - SHDLC I-frames | | Rel-7 |  | M | M | M | M | M |  |
| 5.6.2.3.2 | Behavior of CLF with bit stuffing in frame | | Rel-7 |  | M | M | M | M | M |  |
| 5.6.3.2.2 | Ignore ACT LLC frame reception after the SHDLC link establishment | | Rel-7 |  | M | M | M | M | M |  |
| 5.6.3.2.3 | Ignore ACT LLC frame reception in CLT session | | Rel-7 | TR3 | C008 | C008 | C008 | C008 | C008 |  |
| 5.6.3.2.5 | Closing condition of CLT session whereas SHDLC link has been established before CLT session | | Rel-7 | TR3 | C011 | C011 | C011 | C011 | C011 |  |
| 5.6.4.2.2 | Not matching SYNC\_ID verification in low power mode | | Rel-7 | TR3 | C117 | C117 | C117 | C117 | C117 |  |
|  | SHDLC LLC definition tests | |  |  |  |  |  |  |  |  |
| 5.7.1.2 | Data passed up to the next layer | | Rel-7 |  | C009 | C009 | C009 | C009 | C009 |  |
| 5.7.1.3 | Error management - corrupted I-frame | | Rel-7 |  | M | M | M | M | M |  |
| 5.7.1.4 | Error management - corrupted RR frame | | Rel-7 | TR1 | M | M | M | M | M |  |
| 5.7.6.4.2 | Initial state at link reset - reset by the UICC | | Rel-7 | TR1 | M | M | M | M | M |  |
| 5.7.7.3.2 | Link establishment by the UICC | | Rel-7 |  | M | M | M | M | M |  |
| 5.7.7.3.3 | Link establishment and connection time out | | Rel-7 |  | M | M | M | M | M |  |
| 5.7.7.3.4 | Requesting unsupported window size and/or SREJ support - link establishment by UICC | | Rel-7 |  | C107 | C107 | C107 | C107 | C107 |  |
| 5.7.7.3.5 | Forcing lower window size and SREJ not used - link establishment by the T | | Rel-7 |  | C108 | C108 | C108 | C108 | C108 |  |
| 5.7.7.3.6 | Discard buffered frames on link re-establishment | | Rel-7 |  | C102 | C102 | C102 | C102 | C102 |  |
| 5.7.7.5.2 | I-frame transmission | | Rel-7 | TR2/TR1 (see note) | M | M | M | M | M |  |
| 5.7.7.5.3 | I-frame reception - single I-Frame reception | | Rel-7 | TR2/TR1 (see note) | M | M | M | M | M |  |
| 5.7.7.5.4 | I-frame reception - multiple I-Frame reception | | Rel-7 | TR2/TR1 (see note) | M | M | M | M | M |  |
| 5.7.7.6.2 | REJ transmission - multiple I-frames received | | Rel-7 |  | C101 | C101 | C101 | C101 | C101 |  |
| 5.7.7.6.3 | REJ reception | | Rel-7 | TR2/TR1 (see note) | C114 | C114 | C114 | C114 | C114 |  |
| 5.7.7.7.2 | Retransmission of multiple frames | | Rel-7 | TR2/TR1 (see note) | M | M | M | M | M |  |
| 5.7.7.8.2 | RNR reception | | Rel-7 | TR2/TR1 (see note) | M | M | M | M | M |  |
| 5.7.7.8.3 | Empty I-frame transmission | | Rel-7 | TR1 | M | M | M | M | M |  |
| 5.7.7.9.2 | SREJ transmission | | Rel-7 |  | C102 | C102 | C102 | C102 | C102 |  |
| 5.7.7.9.4 | SREJ reception | | Rel-7 | TR2/TR1 (see note) | C102 | C102 | C102 | C102 | C102 |  |
|  | CLT LLC definition tests | |  |  |  |  |  |  |  |  |
| 5.8.5.2 | ISO/IEC 14443-3 [] Type A, no administrative command | | Rel-7 | TR1, TR3 | C008 | C008 | C008 | C008 | C008 |  |
| 5.8.6.3.1.2 | Opening a CLT session with CL\_PROTO\_INF(A) | | Rel-7 | TR1 | C008 | C008 | C008 | C008 | C008 |  |
| 5.8.6.3.2.2 | Opening a CLT session with CL\_PROTO\_INF(F) | | Rel-7 | TR1 | N/A | N/A | C113 | C113 | C113 |  |
| 5.8.6.3.2.3 | Empty CLT(F) Frame | | Rel-7 | TR1 | N/A | N/A | C113 | C113 | C113 |  |
| 5.8.6.3.2.4 | RF off during CLT session not expecting Empty CLT | | Rel-7 | TR1 | N/A | N/A | C113 | C113 | C113 |  |
| 5.8.6.3.2.5 | RF off during CLT session expecting Empty CLT | | Rel-7 | TR1 | N/A | N/A | C113 | C113 | C113 |  |
|  | Timing and performance tests | |  |  |  |  |  |  |  |  |
| 5.9.1.2.2 | Transceiving non-chained data over RF in Card Emulation | | Rel-7 | TR2 | N/A | N/A | C112 | C112 | C112 |  |
| 5.9.2.1.2 | CLF processing time - Type A aligned communication, with RF response | | Rel-7 | TR1, TR3 | C008 | C008 | C008 | C008 | C008 |  |
| 5.9.2.1.3 | CLF processing time, no RF response | | Rel-7 | TR1, TR3 | C008 | C008 | C008 | C008 | C008 |  |
| 5.9.2.2.2 | CLF processing time, Request Guard Time from IDLE state - Type A state transition | | Rel-7 | TR1, TR3 | C008 | C008 | C008 | C008 | C008 |  |
| 5.9.2.2.3 | CLF processing time, Request Guard Time from HALT state - Type A state transition | | Rel-7 | TR1, TR3 | C008 | C008 | C008 | C008 | C008 |  |
|  | | NOTE: The test case shall be executed with TR2 if available, otherwise TR1 shall be used. | | | | | | | | |

Table 4.2 b): Conditional items referenced by table 4.2 a)

| Conditional item | Condition |
| --- | --- |
| C001 | IF (O\_CLASS\_B OR O\_CLASS\_C\_FULL) THEN M ELSE N/A |
| C002 | IF O\_CLASS\_C\_LOW THEN M ELSE N/A |
| C003 | Void |
| C004 | Void |
| C005 |  |
| C006 |  |
| C007 | Void |
| C008 | IF (O\_CLT\_A FULL OR O\_CLT\_A\_EXTENDED\_ONLY) THEN M ELSE N/A |
| C009 | IF O\_102\_622 THEN M ELSE N/A |
| C010 | Void |
| C011 | IF (O\_CLT\_A FULL OR O\_CLT\_A\_EXTENDED\_ONLY OR CLT\_F) THEN M ELSE N/A |
| C012 | Void |
| C013 | IF O\_EXTENDED\_T THEN M ELSE N/A |
| C101 | IF O\_WS\_3 THEN M ELSE N/A |
| C102 | IF O\_SREJ THEN M ELSE N/A |
| C103 | Void |
| C104 | Void |
| C105 | Void |
| C106 | IF O\_SREJ AND O\_WS\_3 THEN M ELSE N/A |
| C107 | IF NOT (O\_SREJ AND O\_WS\_4) THEN M ELSE N/A |
| C108 | IF (O\_CLASS\_B OR O\_CLASS\_C\_FULL) AND (O\_WS\_3 OR O\_SREJ) THEN M ELSE N/A |
| C109 | Void |
| C110 | IF (O\_CLASS\_C\_LOW AND (O\_CLASS\_B OR O\_CLASS\_C\_FULL)) AND O\_FULL\_TO\_LOW THEN M ELSE N/A |
| C111 | IF (O\_CLASS\_C\_LOW AND (O\_CLASS\_B OR O\_CLASS\_C\_FULL)) AND O\_LOW\_TO\_FULL THEN M ELSE N/A |
| C112 | IF(O\_CE\_A OR O\_CE\_B)THEN M ELSE N/A |
| C113 | IF O\_CLT\_F THEN M ELSE N/A |
| C114 | IF B\_STREAM\_IFRAMES THEN M ELSE N/A |
| C115 | IF ((O\_CLASS\_B OR O\_CLASS\_C\_FULL) AND O\_DEAC\_SUBACT\_FULL) THEN M ELSE N/A (see NOTE) |
| C116 | IF ((O\_CLASS\_B OR O\_CLASS\_C\_FULL) AND O\_102\_622) THEN M ELSE N/A |
| C117 | IF (O\_CLASS\_C\_LOW AND (O\_CLT\_A\_FULL OR O\_CLT\_A\_EXTENDED\_ONLY) AND O\_102\_622) THEN M ELSE N/A |
| NOTE: C115 is only defined for Release 8 and earlier. | |

Table 4.2 c): Execution requirements referenced by table 4.2 a)

| Execution requirement | Description |
| --- | --- |
| TR1 | HCI is used if available |
| TR2 | If the terminal supports HCI-based Card Emulation using the UICC for either technology A or B, then card emulation (ISO/IEC 14443-4 [] compliant) for one of the supported technologies shall be used. |
| TR3 | If the terminal supports O\_CLT\_A\_FULL, then the UICC simulator shall indicate in ACT\_SYNC frames that extended bit durations are not supported.  If the terminal supports O\_CLT\_A\_EXTENDED\_ONLY, the UICC simulator shall indicate support of extended bit duration down to 0,590 µs in ACT\_SYNC frames. |

The details for setting up the execution requirements are specified in clause 4.4.4.

## 4.3 Information provided by the device supplier

Some test cases require that the test equipment triggers the terminal to perform further communication over SHDLC or CLT after performing an SWP activation.

Some other test cases require the modification of the power supply during the test execution.

The device supplier shall provide enough information to allow this to be carried out.

SHDLC timings measurements require the following information.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item | Description | Presence/Value | Status | Mnemonic |
| 1 | Frame size used by the CLF in Card Emulation for technology A (FSC parameter defined in ISO/IEC 14443-4 []) |  | C | V\_FRAME\_SIZE\_CEA |
| 2 | Frame size used by the CLF in Card Emulation for technology B  (Max\_Frame\_Size in Protocol Info, as defined in ISO/IEC 14443-3 []) |  | C | V\_FRAME\_SIZE\_CEB |
| NOTE: Conditional values shall be provided if the corresponding option is supported in the table 4.1. | | | | |

## 4.4 Test equipment

### 4.4.0 General requirements

The test equipment shall provide a UICC simulator which is connected to the DUT during test procedure execution, unless otherwise specified.

With respect to the Terminal and CLF, the UICC simulator shall act as a valid UICC according to ETSI TS 102 613 [], ETSI TS 102 221 [], and ETSI TS 102 600 [] (if this interface is present at the UICC), unless otherwise specified. In particular, during test procedure execution, the UICC simulator shall respect the electrical and signalling conditions for all UICC contacts within the limits given by ETSI TS 102 613 [], ETSI TS 102 221 [] and ETSI TS 102 600 []). The accuracy of the UICC simulator's settings shall be taken into account when ensuring this.

For some test cases, usage of a PCD is required. In particular the test equipment shall provide a trigger mechanism based on a PCD, for performing test cases with terminal activation in low power mode. The registry definitions in clause 4.4.4.2 for RF type A and RF type B shall be used when initialising the terminal in full power mode.

For some test cases, the test equipment shall provide a PCD capable to perform ISO/IEC 14443-3 [5] type A RF communication, with RF frame reception length of at least 32 bytes.

For some test cases, the test equipment shall provide a PCD capable to perform ISO/IEC 18092 [8] Type F RF communication.

In full power mode, the PCD shall not start sending the first polling command before the upper layer is fully initialized. If the PCD fails to receive a response to the first polling command sent after the upper layer is fully initialized, it shall continue to resend polling commands for 10 seconds. If during this time frame the PCD does not receive any response which can be used to verify the RQ(s), it shall be considered a failure of the Terminal.

The test equipment shall ensure that a matching SYNC\_ID is used during test case execution, unless otherwise specified.

Some test cases might require the presence of an upper layer, such as HCI (as specified in ETSI TS 102 622 []). The test equipment shall provide this layer if required. Any HCI session initialization shall comply to the procedure defined in ETSI TS 102 622 []. If message fragmentation is used, all HCP packets, with the possible exception of the last packet, shall contain the maximum amount of data possible for HCP packets. Additionally, some test cases might require the presence of an NAA (e.g. (U)SIM), which shall be provided by the test equipment.

NOTE: The implementation of the terminal may imply certain activities or settings on the HCI layer. This should be taken into account when testing the SWP interface (e.g. activity after initialization, already open pipes, etc.).

### 4.4.1 Measurement/setting uncertainties

The following accuracy applies for measurement and setting of electrical parameter for the test equipment.

Table 4.3 a): Measurement accuracy

|  |  |  |
| --- | --- | --- |
| Parameter | Tolerance | Remark |
| Vcc | ±50 mV |  |
| VOH,  VOL | ±15 mV |  |
| T | ±25 ns |  |
| tr, tf | ±5 ns, if tr/f ≤ 100 ns  ±10 ns, if tr/f > 100 ns  (see note) |  |
| TS1\_HIGH\_V | ±20 µs |  |
| P3 | ±100 ns |  |
| P4 | ±1 µs |  |
| T2, T3 | ±100 µs |  |
| Acknowledgements  for I-frames | ±100 µs |  |
| TCLF,shdlc,receive,  TCLF,shdlc,transmit,  TCLF,delay | ±10 µs |  |
| NOTE: In the present document, the validation of rise/fall times against the minimum allowed value (5 ns) shall not be carried out by the test equipment. | | |

Table 4.3 b): Setting uncertainty

|  |  |  |
| --- | --- | --- |
| Parameter | Tolerance | Remark |
| ICC | ±0,1 mA |  |
| IH | ±25 µA |  |
| IL | ±5 µA |  |
| Spike duration (see clause 5.4.1.3.3) | ±25 ns |  |
| UICC processing time for CLT | ±5 µs |  |

For settings which specify the maximum or minimum allowed values according to ETSI TS 102 613 [], the requirements of table 4.3 b) are modified as follows:

* For setting a value X which is a minimum allowed value according to ETSI TS 102 613 [], the test equipment shall set the nearest available value which is guaranteed to not be smaller than X, within the setting uncertainty of the test equipment.
* For setting a value X which is a maximum allowed value according to ETSI TS 102 613 [], the test equipment shall set the nearest available value which is guaranteed to not be larger than X, within the setting uncertainty of the test equipment.

For example, when setting a value for IH (where the allowed values are from 600 µA to 1 000 µA) and when the accuracy of the test equipment is 20 µA:

* If a value of 600 µA is required, the test equipment shall set a value of 620 µA.
* If a value of 1 000 µA is required, the test equipment shall set a value of 980 µA.

### 4.4.2 Default conditions for DUT operation

#### 4.4.2.0 General

Unless otherwise specified, the test equipment shall apply the default conditions described in the following clauses during test procedure execution.

#### 4.4.2.1 Temperature

Void.

#### 4.4.2.2 ETSI TS 102 221 interface contacts (CLK, RST, I/O) and contact Vcc

Tables 4.4 and 4.5 give the electrical conditions that shall be applied by the UICC simulator to all contacts during a test if not stated otherwise.

Table 4.4: Nominal test conditions on 3 V UICC-Terminal interface

|  |  |  |  |
| --- | --- | --- | --- |
| Contacts | Low level | High level | Max. capacitive load |
| C1 (VCC) | --- | I = 7.5 mA |  |
| C2 (RST) | I = -200 µA | I = +20 µA | 30 pF |
| C3 (CLK) | I = -20 µA | I = +20 µA | 30 pF |
| C5 (GND) | --- | --- |  |
| C7 (I/O)  Terminal input  Terminal output | I = +1 mA  I = ‑1 mA | I = +20 µA  I = +20 µA | 30 pF |

Table 4.5: Nominal test conditions on 1,8 V UICC-Terminal interface

| Contacts | Low level | High level | Max. capacitive load |
| --- | --- | --- | --- |
| C1 (VCC) | --- | I = 5 mA |  |
| C2 (RST) | I = -200 µA | I = +20 µA | 30 pF |
| C3 (CLK) | I = -20 µA | I = +20 µA | 30 pF |
| C5 (GND) | --- | --- |  |
| C7 (I/O)  Terminal input  Terminal output | I = +1 mA  I = ‑1 mA | I = +20 µA  I = +20 µA | 30 pF |

#### 4.4.2.3 ETSI TS 102 600 interface contacts (IC\_DP, IC\_DM)

Void.

#### 4.4.2.4 ETSI TS 102 613 interface contact (SWIO)

When activated, the UICC simulator shall maintain the characteristics on this contact in following range:

* S2 signal levels applied:
* State H between 650 µA and 950 µA.
* State L between 0 µA and 15 µA.

Following each resume by the UICC simulator, the test equipment shall use the following S2 bit pattern: "R | 1 | W | 1st bit of SOF" unless otherwise specified (see clause 5.5.3 for the meaning of this pattern).

#### 4.4.2.5 Status of UICC interfaces

The UICC simulator shall not attach on the ETSI TS 102 600 [] interface.

#### 4.4.2.6 Characteristics of LLC's

##### 4.4.2.6.1 ACT LLC

ACT\_SYNC frames sent by the UICC simulator during initial interface activation shall contain an ACT\_INFORMATION field, as specified in ETSI TS 102 613 []. This field shall indicate that extended bit durations are not supported unless otherwise specified within the test case.

ACT\_READY frames sent by the UICC simulator during initial interface activation shall not contain an ACT\_INFORMATION field.

ACT frames sent by the UICC simulator during subsequent interface activation shall not contain an ACT\_INFORMATION field, as specified in ETSI TS 102 613 [].

##### 4.4.2.6.2 SHDLC LLC

For SHDLC link establishment, the UICC simulator shall send RSET().

I-frames sent by the UICC simulator shall contain at least 1 byte and shall contain valid messages according to the context of the upper layer, i.e. the contents of the I-frames shall not provoke error conditions in the upper layer of the DUT.

If the upper layer is HCI according to ETSI TS 102 622 [], then simultaneous fragmentation of HCI messages over more than one pipe shall not be used.

When the test equipment is checking for an acknowledgement of an I-frame:- For terminals supporting release 10 or later:

- When establishing the initial conditions (including the initial conditions for TR1 and TR2 defined in clause 4.4.4) the test equipment shall wait for up to 14 ms. If the DUT does not acknowledge, the test equipment shall resend the I-Frame up to 3 times until it gets an acknowledgement, using 14 ms as timeout. If the DUT still does not acknowledge, an inconclusive verdict shall be reported.

When the representative SWP frame exchange procedure is used: the test equipment shall wait for up to 14 ms. If the DUT does not acknowledge, the test equipment shall resend the I-Frame up to 3 times until it gets an acknowledgement, using 14 ms as timeout. If the DUT still does not acknowledge, this is a failure of the DUT.- For terminals supporting release 9 or earlier, the behaviour of the test equipment is not specified in the current version of this specification.

##### 4.4.2.6.3 CLT LLC

For test cases involving CLT communication for Type A, a value of SAK of '28' shall be used during upper layer (for example HCI) initialisation.

The following convention applies: For ISO/IEC 14443-3 [] communication, the number of RF bytes in the test cases include the CRC, but not the framing and parity bits (i.e. when referring "4 RF bytes", the resulting RF frame consists of SOF, 4 bytes + 1 bit parity for each, EOF).

The test tool shall respond to CLT\_A commands within 5 ms.

### 4.4.3 Minimum/maximum conditions for DUT operation

Void.

### 4.4.4 Execution requirements

#### 4.4.4.0 Overview

Table 4.2, Applicability of tests, specifies trigger requirement (TRn) for several test cases, to trigger the DUT to perform a particular operation in order to test a certain feature, since the core specification (ETSI TS 102 613 []) does not provide a standardized mechanism to trigger that operation.

#### 4.4.4.1 Definition of TR1

The choice of the implementation for this trigger requirement is left up to the test tool provider. However, as a guideline, it is expected that the implementation only relies on the 2 interfaces available (SWP/HCI and RF) such that the test tool can have a full control of the mechanism and does not require any user action.

#### 4.4.4.2 Definition of TR2

If the terminal supports HCI-based Card Emulation for technology A or B, a Proximity Coupling Device (PCD, ISO/IEC 14443-4 [] compliant) shall be used to perform the trigger requirement TR2 for test execution with one of the supported RF technologies.

The test procedure shall be performed from ISO/IEC 14443-3 [] ACTIVE state with the following parameters:

* For terminal supporting ISO/IEC 14443-3 [] type A, the following registry entries shall apply for the RF gate type A, ETSI TS 102 622 []:
* UID\_REG = '01 02 03 04' (single UID).
* SAK = '20' (ISO/IEC 14443-4 [] compliant).
* ATQA = '0100' (single UID, anti-collision bit).
* APPLICATION\_DATA = null (no historical bytes).
* FWI, SFGI = '81' (SFGT = 604 µs & FWT = 77,33 ms).
* CID\_SUPPORT = '00' (default value, CID support not required).
* DATARATE\_MAX = '000000' (106 kb/s only).
* MODE = '02'.
* For terminal supporting ISO/IEC 14443-3 [] type B the following registry entries shall apply for the RF gate type B, ETSI TS 102 622 []:
* PUPI = '01 02 03 04'.
* AFI = '40'.
* ATQB is coded for the following values: PROTO\_INFO = '70' & NUMBER\_APLI = 0 -15.
* HIGHER\_LAYER\_RESPONSE = null (no bytes).
* MODE = '02'.

The frame exchange shall be performed on the selected RF gate, and the C-APDU size shall be adapted to each test case, to generate the right number of I-Frames on SWP.

## 4.5 Test execution

### 4.5.1 Parameter variations

Unless otherwise specified, all tests shall be carried out once for each voltage class and power mode available in the terminal in addition to the parameter variations specified individually for each test case.

### 4.5.2 Execution requirements

Table 4.2, Applicability of tests, specifies "execution requirements" for several test cases.

An example of test requirements is:

* The test case requires the DUT to perform a particular operation in order to test that feature, but the core specification (ETSI TS 102 613 []) does not provide a standardized mechanism to trigger that operation to be executed by the DUT.

The test requirements have been split into various categories, as indicated by table 4.2 c):

* Static requirements (SRx): information about, for example, particular parameters which can be used in the test procedure execution.
* Trigger requirements (TRx): mechanisms for triggering the DUT to perform certain operations.
* Initial condition requirements (ICRx): information about how to establish initial condition states.

The DUT supplier should make every effort to provide appropriate information or mechanisms to allow these execution requirements to be satisfied for the DUT.

It is recognised that this might not always be possible. For example, if the configuration of the DUT does not allow for the required state to be present; or if it is not possible to provide a particular trigger mechanism for the DUT. In these cases, it is acceptable that the test case is not carried out. However, it should be recognised that the consequence is that the particular feature will not be tested.

## 4.6 Pass criterion

A test shall only be considered as successful if the test procedure was carried out successfully under all parameter variations with the DUT respecting all conformance requirements referenced in the test procedure.

NOTE: Within the test procedures, the RQs are referenced in the step where they are observable. In some cases, this is different from the step where they occur with respect to the DUT.

# 5 Test cases

## 5.1 Principle of the Single Wire Protocol

Reference: ETSI TS 102 613 [], clause 4.

There are no conformance requirements for the terminal for the referenced clause.

## 5.2 System architecture

### 5.2.1 General overview

Reference: ETSI TS 102 613 [], clause 5.1.

There are no conformance requirements for the terminal for the referenced clause.

### 5.2.2 ETSI TS 102 221 support

#### 5.2.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 5.2.

|  |  |
| --- | --- |
| RQ1 | A terminal supporting SWP shall remain compliant with ETSI TS 102 221 []. |
| NOTE: The validation of RQ1 is out of scope of the present document. Compliancy to RQ1 can be verified by running testcases described in other related test specifications. | |

### 5.2.3 Configurations

#### 5.2.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 5.3.

|  |  |
| --- | --- |
| RQ1 | The terminal shall indicate the support of SWP interface in the terminal capability as defined in ETSI TS 102 221 []. |
| RQ2 | If the SWP interface is activated while a session on ETSI TS 102 600 [] interface is in progress, actions on the SWP interface shall not disturb the terminal-UICC exchange on the ETSI TS 102 600 [] interface. |
| RQ3 | If the SWP interface is activated while a session on the ETSI TS 102 600 [] interface is in progress actions on the ETSI TS 102 600 [] interface shall not disturb the terminal-UICC exchange on the SWP interface. |
| RQ4 | If the SWP interface is activated while a session on the ETSI TS 102 221 [] interface is in progress actions on the SWP interface shall not disturb the terminal-UICC exchange on the ETSI TS 102 221 [] interface. |
| RQ5 | If the SWP interface is activated while a session on the ETSI TS 102 221 [] interface is in progress actions on the ETSI TS 102 221 [] interface shall not disturb the terminal-UICC exchange on the SWP interface. |
| NOTE: Development of test cases for RQ1to RQ5 is FFS. | |

### 5.2.4 Interaction with other interfaces

#### 5.2.4.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 5.4.

|  |  |
| --- | --- |
| RQ1 | Signaling on a contact assigned to one interface shall not affect the state of other contacts assigned to another interface. This also applies to the activation sequence of the UICC. |
| RQ2 | Operation of the SWP interface after activation shall be independent from operation of other interfaces (e.g. the ETSI TS 102 221 [] or ETSI TS 102 600 [] interface) that may be implemented on the UICC. |
| RQ3 | A logical reset signaling on the data link layer (SHDLC RSET) over the SWP interface shall not affect any of the other interfaces. |
| RQ4 | Activation and deactivation of SWP interface shall not affect any of the other interfaces. |
| NOTE: Test cases for these requirements will not be provided, as independency of the interfaces cannot be ensured. | |

## 5.3 Physical characteristics

### 5.3.1 Temperature range for card operations

#### 5.3.1.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 6.1.

There are no conformance requirements for the terminal for the referenced clause.

### 5.3.2 Contacts

#### 5.3.2.1 Provision of contacts

##### 5.3.2.1.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 6.2.1.

All conformance requirements for the referenced clause are included in clause 5.3.2.2 of the present document.

#### 5.3.2.2 Contact activation and deactivation

##### 5.3.2.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 6.2.1.

|  |  |
| --- | --- |
| RQ101 | The terminal shall reuse the VCC (contact C1) and Gnd (contact C5) provided in the UICC to provide power supply. |
| RQ102 | The terminal shall use SWIO (contact C6) for data exchange (i.e. SWP) between UICC and the CLF. |

Reference: ETSI TS 102 613 [], clause 6.2.3.1, RQ6 and RQ7 refers to clause 8.1 and RQ 7 refers also to clause 8.3.

|  |  |
| --- | --- |
| RQ1 | The terminal shall connect, activate and deactivate contacts C2, C3 and C7 of the UICC in accordance with the operating procedures specified in ETSI TS 102 221 []. |
| RQ2 | The terminal shall connect, activate and deactivate contacts C4 and C8 in accordance with the operating procedures specified in ETSI TS 102 600 []. |
| RQ3 | The terminal shall activate the contact C1 (VCC) according to ETSI TS 102 221 []. |
| RQ4 | As long as VCC (Contact C1) is not activated, the terminal shall keep SWIO (contact C6) deactivated (S1 state L). |
| RQ5 | The terminal shall activate the VCC (Contact C1) in order to activate SWP interface or another interface on the UICC. |
| RQ6 | The terminal shall activate the SWIO (Contact C6) by setting the SWIO signal from state L to state H not sooner than TS1\_HIGH\_V after VCC (Contact C1) activation, with a rise time of tr = 5 ns to 250 ns. |
| RQ7 | The terminal shall deactivate SWIO (contact C6) by setting SWP to the DEACTIVATED state with a fall time of tf = 5 ns to 250 ns, that is by maintaining SWIO in state L for longer than deactivation time P4. |
| RQ8 | The terminal shall deactivate SWIO (contact C6) before or at the same time as deactivating VCC (Contact C1). |

##### 5.3.2.2.2 Test case 1: activation of SWP additionally to other interfaces

5.3.2.2.2.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

The test procedure shall be performed with the following parameters:

* The UICC indicating the support of the ETSI TS 102 600 [] interface in the ATR, if sent.
* The UICC not indicating the support of the ETSI TS 102 600 [] interface in the ATR, if sent.

5.3.2.2.2.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.2.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the terminal to activate the UICC |  |
| 2 | T 🡪 UICC | Depending on the terminal capability and status one of the following shall occur:   * Activate Vcc (contact C1), contacts C2, C3 and C7 for ETSI TS 102 221 [] interface activation and SWIO (contact C6) * Activate Vcc (contact C1), contacts C4 and C8 for USB interface activation and SWIO (contact C6) * Activate Vcc (contact C1), contacts C2, C3 and C7 for ETSI TS 102 221 [] interface activation followed by activation of contact C4 and C8 and SWIO (contact C6) * Activate Vcc (contact C1) and SWIO (contact C6) | RQ101  RQ1  RQ2  RQ3,  RQ4, RQ5  RQ6 |
| 3 | UICC 🡨🡪 T | Perform initial SWP interface activation | RQ102 |
| 4 | User🡪 T | Trigger the terminal to deactivate the UICC |  |
| 5 | T 🡪 UICC | Deactivate the UICC | RQ7, RQ8 |

##### 5.3.2.2.3 Test case 2: activation of SWP in low power mode

5.3.2.2.3.1 Test execution

The test procedure shall only be performed for voltage class C, low power mode.

5.3.2.2.3.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.2.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪T | Trigger the terminal to activate contact VCC and SWIO |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) | RQ3,  RQ4,  RQ5 |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) | RQ6 |
| 4 | UICC 🡨🡪T | Perform initial SWP interface activation (see note) |  |
| 5 | User 🡪T | Trigger the terminal to deactivate contacts VCC and SWIO |  |
| 6 | T 🡪 UICC | Deactivate SWIO (contact C6) | RQ7, RQ8 |
| NOTE: The initial SWP interface activation is complete when UICC has sent the ACT\_SYNC frame. There could be more frames exchanged, but this is not a failure of the terminal. | | | |

#### 5.3.2.3 Interface activation

##### 5.3.2.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 6.2.3 and subclauses.

The following conformance requirements apply to initial interface activation as specified in ETSI TS 102 613 [], clause 6.2.3.1. The conformance requirements also apply to subsequent interface activation, as specified in RQ13.

|  |  |
| --- | --- |
| RQ1 | In case the CLF does not detect a SWP resume by the UICC, the CLF shall deactivate SWIO (contact C6). |
| RQ2 | In case the CLF detects a SWP resume by the UICC, the CLF shall put SWP into ACTIVATED state. |
| NOTE: Development of test cases for RQ1 is FFS. | |

The following conformance requirements apply to initial interface activation as specified in ETSI TS 102 613 [], clause 6.2.3.1.

|  |  |
| --- | --- |
| RQ3 | If the CLF has received a correct ACT\_SYNC frame and the terminal provides low power mode, the CLF shall consider the initial interface activation as being successful and shall not send further ACT frames. |
| RQ4 | If the CLF has received a correct ACT\_SYNC frame and the terminal provides full power mode, the CLF shall send an ACT\_POWER\_MODE frame with FR bit set to 0 indicating full power mode. |
| RQ7 | If the CLF has received a correct ACT\_READY frame in the case that the CLF has previously correctly received the first ACT\_SYNC frame from the UICC, it shall consider the initial interface activation as being successful and shall not send further ACT frames. |

The following conformance requirements apply to initial interface activation as specified in ETSI TS 102 613 [], clause 6.2.3.1. The conformance requirements also apply to subsequent interface activation, as specified in RQ13.

|  |  |
| --- | --- |
| RQ5 | When the CLF has received a corrupted frame or no frame the CLF shall request the UICC to repeat the last ACT\_SYNC frame by sending an ACT\_POWER\_MODE frame with FR bit set to 1 indicating the terminal power mode. |
| RQ6 | If the CLF has received a correct ACT\_SYNC frame in response to an ACT\_POWER\_MODE frame with FR bit set to 1, it shall consider that the initial interface activation as being successful and shall not send further ACT frames. |
| RQ8 | When the CLF has received a corrupted ACT frame in response to an ACT\_POWER\_MODE frame it shall request the UICC to repeat the last ACT frame by sending an ACT\_POWER\_MODE frame with FR bit set to 1 indicating the terminal power mode. |
| RQ9 | When the CLF has not received an ACT frame in response to the ACT\_POWER\_MODE frame it shall request the UICC to repeat the last ACT frame by sending the ACT\_POWER\_MODE with FR bit set to 1 indicating the terminal power mode. |
| RQ10 | The CLF shall not send more than three ACT\_POWER\_MODE frames with the FR bit set to 1. |
| RQ11 | If the interface activation was not successful the CLF shall assume that the UICC doesn't support SWP and shall deactivate SWIO (contact C6). |
| RQ12 | The CLF shall treat a received ACT frame like a corrupted frame when it does not occur in the order defined in the sequence above. |
| NOTE: Development of test cases for RQ5 to RQ12 for the case of subsequent interface activation is FFS. | |

The following conformance requirements apply to subsequent interface activation as specified in ETSI TS 102 613 [], clause 6.2.3.2.

|  |  |
| --- | --- |
| RQ13 | The initial interface activation sequence as specified in RQ1 to RQ2 and RQ5 to RQ12 shall also be applied after the transition of S1 to state H from the state DEACTIVATED. |
| RQ14 | If the CLF has received a correct ACT\_SYNC frame, the CLF shall immediately consider the subsequent interface activation as being successful and shall not send further ACT frames. |
| NOTE 1: RQ13 is not tested directly, but is tested indirectly in the testing of RQ1 to RQ2 and RQ5 to RQ12.  NOTE 2: These RQs are not tested for low power mode, as it is not possible to trigger a subsequent activation in low power mode. | |

The following conformance requirements apply to initial and/or subsequent interface activation as specified in ETSI TS 102 613 [], clause 6.2.3.3.

|  |  |
| --- | --- |
| RQ15 | For initial interface activation, the CLF shall be able to detect an SWP resume by the UICC between 0 µs and 700 µs (TS2\_ACT\_RES\_V). |
| RQ16 | The CLF shall be able to detect UICC responses to ACT\_POWER\_MODE frames where the SWP resume or wakeup sequence starts between 0 µs and 2000 µs (TS2\_ACT\_FRP). |
| RQ17 | For subsequent interface activation the CLF shall be able to detect an SWP resume by the UICC between 0 µs and 500 µs (TS2\_ACT\_RES\_D). |
| NOTE: RQ17 is not tested for low power mode, as it is not possible to trigger a subsequent activation in low power mode. | |

The following conformance requirements apply to initial and/or subsequent interface activation as specified in ETSI TS 102 613 [], clause 6.2.3.4.

|  |  |
| --- | --- |
| RQ18 | If the terminal operates the UICC in "low power mode" the terminal shall not activate the ETSI TS 102 221 [] interface. |
| RQ19 | If the terminal has activated the UICC according to ETSI TS 102 221 [], the terminal shall consider the activation of the SWP interface as a selected application on the UICC. |
| NOTE: Testing RQ19 is out of scope of the present document. | |

The following conformance requirements apply to subsequent interface activation as specified in ETSI TS 102 613 [], clause 8.1.

|  |  |
| --- | --- |
| RQ20 | For a transition from **DEACTIVATED** state or for SWIO contact activation (preceeding the SWP interface activation procedure), the terminal shall apply a rise time tr of the signal S1 in the range of 5 ns to 250 ns. |
| NOTE: This RQ is not tested for low power mode, as it is not possible to trigger a subsequent activation in low power mode. | |

The following conformance requirements are referenced to ETSI TS 102 613 [], clause 9.3.1.

|  |  |
| --- | --- |
| RQ21 | After the SWIO activation or after the transition of S1 to state H from DEACTIVATED state, the ACT LLC shall be used by the CLF. |
| RQ22 | On receiving a corrupted SWP frame, the CLF shall use the error recovery procedure defined for LLC of the last correctly received SWP frame. |
| RQ23 | Immediately after SWIO Activation or after the transition of S1 to state H from DEACTIVATED state, the error handling of the ACT LLC shall apply. |

Reference: ETSI TS 102 613 [], clause 8.3.

|  |  |
| --- | --- |
| RQ24 | For a transition from SWP **DEACTIVATED** state to any other SWP state, the terminal shall initiate the subsequent interface activation sequence as per ETSI TS 102 613 []. |
| NOTE: This RQ is not tested for low power mode, as it is not possible to trigger a subsequent activation in low power mode. | |

Reference: ETSI TS 102 613 [], clause 9.4.

|  |  |
| --- | --- |
| RQ25 | The ACT LPDU shall be structured according to ETSI TS 102 613 []. |
| RQ26 | The CLF shall set the INF bit to 0 in all ACT frames sent to the UICC. |
| RQ27 | When the CLF indicates low power mode by sending a ACT\_POWER\_MODE frame then the ACT\_DATA\_FIELD byte shall be set to '00'. |
| RQ28 | When the CLF indicates full power mode by sending a ACT\_POWER\_MODE frame then the ACT\_DATA\_FIELD byte shall be set to '01'. |
| RQ29 | RFU values for ACT\_CTRL and ACT\_DATA shall not be set by the CLF when transmitting frames. |

Reference: ETSI TS 102 613 [], clause 6.2.5.

|  |  |  |
| --- | --- | --- |
| RQ30 | Rel-7 to Rel-10 | When the terminal detects that the UICC does not support SWP, it shall keep SWIO in the deactivated state (state L). |
| RQ31 | Rel-11 onwards | When the terminal detects that the UICC does not support SWP, it shall keep SWIO in the deactivated state (state L) or it shall present a high impedance on contact C6. |
| NOTE: Development of test cases for RQ30 and RQ31 are FFS. | | |

##### 5.3.2.3.2 Test case 1: SWP initial activation in full power mode - normal procedure

5.3.2.3.2.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

The test procedure shall be performed with variation in the parameters TS2\_ACT\_RES\_V and TS2\_ACT\_FRP, in following values and combinations:

* TS2\_ACT\_RES\_V between 10 µs and 50 µs; TS2\_ACT\_FRP between 1 950 µs and 2 000 µs.
* TS2\_ACT\_RES\_V between 650 µs and 700 µs; TS2\_ACT\_FRP between 0 µs and 50 µs.

5.3.2.3.2.2 Initial conditions

* None of the UICC is activated.

5.3.2.3.2.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC and SWIO and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪 T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2,  RQ15 |
| 6 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power mode with FR = 0 | RQ4,  RQ16,  RQ21,  RQ25,  RQ26,  RQ28,  RQ29 |
| 8 | UICC 🡪 T | Respond with an ACT\_READY frame |  |
| 9 | T 🡪 UICC | Send RSET frame or send a CLT frame | RQ7 |

##### 5.3.2.3.3 Test case 2: SWP Initial activation - no resume

This test case is FFS.

##### 5.3.2.3.4 Test case 3: SWP initial activation in full power mode - corrupted ACT\_SYNC frame (repeat the last frame)

5.3.2.3.4.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

5.3.2.3.4.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.4.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2, RQ15 |
| 6 | UICC 🡪 T | Send corrupted ACT\_SYNC frame |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power modewith FR=1 | RQ5, RQ16,  RQ23 |
| 8 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 9 | T 🡪 UICC | Send RSET frame or send a CLT frame | RQ6 |

##### 5.3.2.3.5 Test case 4: SWP initial activation in full power mode - no ACT\_SYNC frame (repeat the last frame)

5.3.2.3.5.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

5.3.2.3.5.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.5.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2, RQ15 |
| 6 | UICC | No frame (set S2 to state L within 4 idle bits) |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power modewith FR=1 | RQ5, RQ16 |
| 8 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 9 | T 🡪 UICC | Send RSET frame or send a CLT frame | RQ6 |

##### 5.3.2.3.6 Test case 5: SWP initial activation failed in full power mode - corrupted ACT\_SYNC frame (multiple)

5.3.2.3.6.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

5.3.2.3.6.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.6.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪 T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2 |
| 6 | UICC 🡪 T | Send corrupted ACT\_SYNC frame |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power modewith FR=1 | RQ5, RQ16 |
| 8 | UICC 🡪 T | Send corrupted ACT\_SYNC frame |  |
| 9 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power modewith FR=1 | RQ8, RQ16 |
| 10 | UICC 🡪 T | Send corrupted ACT\_SYNC frame |  |
| 11 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power modewith FR=1 | RQ8, RQ16 |
| 12 | UICC 🡪 T | Send corrupted ACT\_SYNC frame |  |
| 13 | T 🡪 UICC | Deactivate SWIO (contact C6) | RQ10,  RQ11 |

##### 5.3.2.3.7 Test case 6: SWP initial activation failed in full power mode - no ACT\_SYNC frame (multiple)

5.3.2.3.7.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

5.3.2.3.7.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.7.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪 T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2,  RQ15 |
| 6 | UICC | No frame (set S2 to state L within 4 idle bits) |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power modewith FR=1 | RQ5,  RQ16 |
| 8 | UICC | No frame |  |
| 9 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power modewith FR=1 | RQ9,  RQ16 |
| 10 | UICC | No frame |  |
| 11 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power modewith FR=1 | RQ9,  RQ16 |
| 12 | UICC | No frame |  |
| 13 | T 🡪 UICC | Deactivate SWIO (contact C6) | RQ10  RQ11 |

##### 5.3.2.3.8 Test case 7: SWP Initial activation in full power mode - corrupted ACT\_READY frame (repeat last frame)

5.3.2.3.8.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

5.3.2.3.8.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.8.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪 T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2,  RQ15 |
| 6 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power mode with FR = 0 | RQ4,  RQ16 |
| 8 | UICC 🡪 T | Respond with corrupted ACT\_READY frame |  |
| 9 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power modewith FR=1 | RQ8,  RQ16,  RQ22 |
| 10 | UICC 🡪 T | Send a correct ACT\_READY frame |  |
| 11 | T 🡪 UICC | Send RSET frame or send a CLT frame | RQ7 |

##### 5.3.2.3.9 Void

##### 5.3.2.3.9a Test case 8a: SWP Initial activation in full power mode - no ACT\_READY frame (repeat last frame)

5.3.2.3.9a.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

5.3.2.3.9a.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.9a.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪 T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2,  RQ15 |
| 6 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power mode with FR = 0 | RQ4,  RQ16 |
| 8 | UICC | No frame |  |
| 9 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power modewith FR=1 | RQ9,  RQ16 |
| 10 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 11 | T 🡪 UICC | Send RSET frame or send a CLT frame | RQ6 |

##### 5.3.2.3.10 Test case 9: SWP initial activation failed in full power mode - corrupted ACT\_READY frame (multiple)

5.3.2.3.10.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

5.3.2.3.10.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.10.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪 T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2,  RQ15 |
| 6 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power mode with FR = 0 |  |
| 8 | UICC 🡪 T | Respond with corrupted ACT\_READY frame |  |
| 9 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power mode with FR=1 | RQ8,  RQ16 |
| 10 | UICC 🡪 T | Respond with corrupted ACT\_READY frame |  |
| 11 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power mode with FR=1 | RQ8,  RQ16 |
| 12 | UICC 🡪 T | Respond with corrupted ACT\_READY frame |  |
| 13 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power mode with FR=1 | RQ8,  RQ16 |
| 14 | UICC 🡪 T | Respond with corrupted ACT\_READY frame |  |
| 15 | T 🡪 UICC | Deactivate SWIO (contact C6) | RQ10  RQ11 |

##### 5.3.2.3.11 Test case 10: SWP initial activation failed in full power mode - no ACT\_READY frame (multiple)

5.3.2.3.11.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

5.3.2.3.11.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.11.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪 T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2,  RQ15 |
| 6 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power mode with FR = 0 | RQ4,  RQ16 |
| 8 | UICC | No frame |  |
| 9 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power mode with FR=1 | RQ9,  RQ16 |
| 10 | UICC | No frame |  |
| 11 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power mode with FR=1 | RQ9,  RQ16 |
| 12 | UICC | No frame |  |
| 13 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power mode with FR=1 | RQ9,  RQ16 |
| 14 | UICC | No frame |  |
| 15 | T 🡪 UICC | Deactivate SWIO (contact C6) | RQ10,  RQ11 |

##### 5.3.2.3.12 Test case 11: SWP initial activation in low power mode

5.3.2.3.12.1 Test execution

The test procedure shall be performed only for voltage class C, low power mode.

5.3.2.3.12.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.12.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪 T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2,  RQ15 |
| 6 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 7 | T 🡪 UICC | Send RSET frame or send a CLT frame | RQ3 |
| NOTE: RQ 18 applies to all steps. | | | |

##### 5.3.2.3.13 Test case 12:SWP initial activation in low power mode - corrupted ACT\_SYNC frame (repeat the last frame)

5.3.2.3.13.1 Test execution

The test procedure shall be performed only for voltage class C, low power mode.

5.3.2.3.13.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.13.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) | RQ18 |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪 T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2,  RQ15 |
| 6 | UICC 🡪 T | Send corrupted ACT\_SYNC frame |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating low power modewith FR=1 | RQ5,  RQ16,  RQ23,  RQ25,  RQ26,  RQ27,  RQ29 |
| 8 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 9 | T 🡪 UICC | Send RSET frame or send a CLT frame | RQ6 |

##### 5.3.2.3.14 Test case 13: SWP initial activation in low power mode - no ACT\_SYNC frame (repeat the last frame)

5.3.2.3.14.1 Test execution

The test procedure shall be performed only for voltage class C, low power mode.

The test procedure shall be performed with variation in the parameters TS2\_ACT\_RES\_V and TS2\_ACT\_FRP, in following values and combinations:

* TS2\_ACT\_RES\_V between 10 µs and 50 µs; TS2\_ACT\_FRP between 1 950 µs and 2 000 µs.
* TS2\_ACT\_RES\_V between 650 µs and 700 µs; TS2\_ACT\_FRP between 0 µs and 50 µs.

5.3.2.3.14.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.14.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) | RQ18 |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪 T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2,  RQ15 |
| 6 | UICC | No frame (set S2 to state L within 4 idle bits) |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating low power modewith FR=1 | RQ5,  RQ16 |
| 8 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 9 | T 🡪 UICC | Send RSET frame or send a CLT frame | RQ6 |

##### 5.3.2.3.15 Test case 14: SWP initial activation failed in low power mode - corrupted ACT\_SYNC frame (multiple)

5.3.2.3.15.1 Test execution

The test procedure shall be performed only for voltage class C, power mode.

5.3.2.3.15.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.15.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) | RQ18 |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪 T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2,  RQ15 |
| 6 | UICC 🡪 T | Send corrupted ACT\_SYNC frame |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating low power modewith FR=1 | RQ5,  RQ16 |
| 8 | UICC 🡪 T | Send corrupted ACT\_SYNC frame |  |
| 9 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating low power modewith FR=1 | RQ8,  RQ16 |
| 10 | UICC 🡪 T | Send corrupted ACT\_SYNC frame |  |
| 11 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating low power modewith FR=1 | RQ8,  RQ16 |
| 12 | UICC 🡪 T | Send corrupted ACT\_SYNC frame |  |
| 13 | T 🡪 UICC | Deactivate SWIO (contact C6) | RQ10,  RQ11 |

##### 5.3.2.3.16 Test case 15: SWP initial activation failed in low power mode - no ACT\_SYNC frame (multiple)

5.3.2.3.16.1 Test execution

The test procedure shall be performed only for voltage class C, low power mode.

5.3.2.3.16.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.16.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) | RQ18 |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪 T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2,  RQ15 |
| 6 | UICC | No frame (set S2 to state L within 4 idle bits) |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating low power modewith FR=1 | RQ5,  RQ16 |
| 8 | UICC | No frame |  |
| 9 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating low power modewith FR=1 | RQ9,  RQ16 |
| 10 | UICC | No frame |  |
| 11 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating low power modewith FR=1 | RQ9,  RQ16 |
| 12 | UICC | No frame |  |
| 13 | T 🡪 UICC | Deactivate SWIO (contact C6) | RQ10,  RQ11 |

##### 5.3.2.3.17 Test case 16: SWP subsequent activation in full power mode

5.3.2.3.17.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

The test procedure shall be executed once for each of following parameters:

* TS2\_ACT\_RES\_D between 10 µs and 50 µs.
* TS2\_ACT\_RES\_D between 400 µs and 500 µs.

5.3.2.3.17.2 Initial conditions

* The SWP resides in **DEACTIVATED** state, and previously an initial SWP interface activation has been successful.

5.3.2.3.17.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the terminal to activate SWIO and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Transition of S1 to state H from the state DEACTIVATED | RQ20,  RQ24 |
| 3 | UICC 🡪 T | Resume SWP |  |
| 4 | T 🡪 UICC | Send transition sequence | RQ2,  RQ17 |
| 5 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 6 | T 🡪 UICC | Send RSET frame or send a CLT frame | RQ14 |

##### 5.3.2.3.18 Void

##### 5.3.2.3.19 Test case 18: SWP initial activation in full power mode - send ACT frames in wrong order, ACT\_READY frame after activation (repeat the last frame)

5.3.2.3.19.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

5.3.2.3.19.2 Initial conditions

* None of the UICC contacts is activated.

5.3.2.3.19.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡪T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ2,  RQ15 |
| 6 | UICC 🡪 T | Send ACT\_READY frame |  |
| 7 | T 🡪 UICC | Send an ACT\_POWER\_MODE frame indicating full power modewith FR=1 | RQ12,  RQ16 |
| 8 | UICC 🡪 T | Send ACT\_SYNC frame |  |
| 9 | T 🡪 UICC | Send RSET frame or send a CLT frame | RQ6 |

#### 5.3.2.4 Behavior of a UICC in a terminal not supporting SWP

##### 5.3.2.4.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 6.2.4.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.3.2.5 Behavior of terminal connected to a UICC not supporting SWP

##### 5.3.2.5.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 6.2.5.

All conformance requirements for the referenced clause are included in clause 5.3.2.3 of the present document.

##### 5.3.2.5.2 Void

#### 5.3.2.6 Inactive contacts

##### 5.3.2.6.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 6.2.6.

|  |  |
| --- | --- |
| RQ1 | The conditions for inactive contacts as defined in ETSI TS 102 221 [] shall apply to contact C6. |
| NOTE: There is no explicite test case for RQ1 in the present document (fully covered by other test cases). | |

## 5.4 Electrical characteristics

### 5.4.1 Operating conditions and sub-clauses

#### 5.4.1.1 Operating conditions

Reference: ETSI TS 102 613 [], clause 7.1.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.4.1.2 Supply voltage classes

Reference: ETSI TS 102 613 [], clause 7.1.1.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.4.1.3 VCC(C1) low power mode definition

##### 5.4.1.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 7.1.2.

|  |  |
| --- | --- |
| RQ1 | A terminal shall provide a supply voltage VCC in the range 1,62 V to 1,98 V. |
| RQ2 | A terminal shall maintain VCC in the specified range despite transient power consumption (spikes on ICC) of maximum 6 nAs. The maximum duration of these spikes shall be 400 ns and their maximum variation shall be 30 mA. |
| RQ3 | A terminal shall provide a minimum current ICC of 5 mA. The current value is averaged over a period of 1 ms. |

##### 5.4.1.3.2 Test case 1: current provided in low power mode, no spikes

5.4.1.3.2.1 Test execution

The test procedure shall only be executed in voltage class C, low power mode.

The test procedure shall apply for the following parameters:

* UICC's current consumption is 5 mA (after activation of contact VCC).
* UICC's current consumption is 0 mA (after activation of contact VCC).

5.4.1.3.2.2 Initial conditions

* None of the UICC contacts is activated.

5.4.1.3.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the terminal to activate contact VCC and contact SWIO in low power mode and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) | RQ1,  RQ3 |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) | RQ1,  RQ3 |
| 4 | UICC 🡨🡪 T | Perform initial SWP interface activation (low power mode) | RQ1,  RQ3 |
| 5 | T 🡨🡪 UICC | Perform SHDLC link establishment or send a CLT frame | RQ1,  RQ3 |

##### 5.4.1.3.3 Test case 2: current provided in low power mode, with spikes

5.4.1.3.3.1 Test execution

The test procedure shall only be executed in voltage class C, low power mode.

The test procedure shall apply for the following parameters:

* After activation of contact Vcc, the UICC's current consumption shall be varied with following spike profiles:
* random spikes:
* current amplitude 10 mA;
* current offset 0 mA;
* duration 400 ns;
* pause between 0,1 ms and 500 ms, randomly varied.
* random spikes:
* current amplitude 30 mA;
* current offset 0 mA;
* duration 200 ns;
* pause between 0,1 ms and 500 ms, randomly varied.
* random spikes:
* current amplitude 30 mA;
* current offset 4,9 mA;
* duration 200 ns;
* pause between 0,1 ms and 500 ms, randomly varied.
* random spikes:
* current amplitude 30 mA;
* current offset 0 mA;
* duration 100 ns;
* pause between 0,1 ms and 500 ms, randomly varied.
* random spikes:
* current amplitude 30 mA;
* current offset 4.9 mA;
* duration 100 ns;
* pause between 0,1 ms and 500 ms, randomly varied.

5.4.1.3.3.2 Initial conditions

* None of the UICC contacts is activated.

5.4.1.3.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the terminal to activate contact VCC and contact SWIO in low power mode |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) | RQ1,  RQ2,  RQ3 |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) | RQ1,  RQ2,  RQ3 |
| 4 | UICC 🡨🡪 T | Perform initial SWP interface activation (low power mode) and SHDLC link establishment | RQ1,  RQ2,  RQ3 |
| 5 | T 🡨🡪 UICC | Run the representative SWP frame exchange procedure | RQ1,  RQ2,  RQ3 |

#### 5.4.1.4 Signal S1

##### 5.4.1.4.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 7.1.3.

|  |  |
| --- | --- |
| RQ1 | In voltage class B, the terminal output voltage on SWIO with S1 in state H (VOH) shall be in the range of 1,40 V to 1,98 V (see note 1). This range shall be maintained for currents between 0 µA and 1 000 µA. |
| RQ2 | In voltage class B, the terminal output voltage on SWIO with S1 in state L (VOL) shall be in the range of 0 V (see note 3) to 0,3 V. This range shall be maintained for currents between 0 µA and -20 µA. |
| RQ3 | In voltage class C, the terminal output voltage on SWIO with S1 in state H (VOH) shall be in the range of 0,85 x VCC to VCC (see note 2). This range shall be maintained for currents between 0 µA and 1 000 µA. |
| RQ4 | In voltage class C, the terminal output voltage on SWIO with S1 in state L (VOL) shall be in the range of 0 V (see note 3) to 0,15 x VCC. This range shall be maintained for currents between 0 µA and -20 µA. |
| NOTE 1: The upper limit of S1 (1.98 V) is extended to VOH max + 0,3V (applying the values defined for dynamic operation in ETSI TS 102 613 [] to all periods).  NOTE 2: The upper limit of S1 (VCC) is extended to VCC + 0,3V (applying the values defined for dynamic operation in ETSI TS 102 613 [] to all periods).  NOTE 3: The lower limit of S1 (0 V) is extended to -0,3 V (applying the values defined for dynamic operation in ETSI TS 102 613 [] to all periods). | |

##### 5.4.1.4.2 Test case 1: communication with S2 variation in full power mode

5.4.1.4.2.1 Test execution

The test procedure shall only be executed in voltage class C and voltage class B if available in full power mode.

The test procedure shall be executed once for each of following parameters:

* Load current for S1 in state H, S2 signal: State L 0 µA/state H 1 000 µA.
* Load current for S1 in state L: -20 µA.

5.4.1.4.2.2 Initial conditions

* None of the UICC contacts is activated.

5.4.1.4.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the terminal to activate contact VCC and contact SWIO and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) | RQ1,  RQ2,  RQ3,  RQ4 |
| 4 | UICC 🡨🡪 T | Perform initial SWP interface activation | RQ1,  RQ2,  RQ3,  RQ4 |
| 5 | T 🡨🡪 UICC | Perform SHDLC link establishment or send a CLT frame | RQ1,  RQ2,  RQ3,  RQ4 |

##### 5.4.1.4.3 Test case 2: communication with S2 variation in low power mode

5.4.1.4.3.1 Test execution

The test procedure shall only be executed in voltage class C, low power mode.

The test procedure shall be executed once for each of following parameters:

* Load current for S1 in state H, S2 signal: State L 0 µA/state H 1 000 µA.
* Load current for S1 in state L: -20 µA.

5.4.1.4.3.2 Initial conditions

* None of the UICC contacts is activated.

5.4.1.4.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the terminal to activate VCC and SWIO in low power mode and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) | RQ3,  RQ4 |
| 4 | UICC 🡪 T | Perform initial SWP interface activation (low power mode) | RQ3,  RQ4 |
| 5 | T 🡨🡪 UICC | Perform SHDLC link establishment or send a CLT frame | RQ3,  RQ4 |

#### 5.4.1.5 Signal S2 and subclauses

##### 5.4.1.5.1 Signal S2

Reference: ETSI TS 102 613 [], clause 7.1.4.

There are no conformance requirements for the terminal for the referenced clause.

##### 5.4.1.5.2 Operating current for S2

5.4.1.5.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 7.1.4.1.

|  |  |
| --- | --- |
| RQ1 | In voltage class B and with S1 in the range between 1,13 V and 2,28 V, the terminal shall consider state H when the UICC draws a current between 600 µA and 1 000 µA |
| RQ2 | In voltage class B and with S1 in the range between 1,13 V and 2,28 V, the terminal shall consider state L when the UICC draws a current between 0 µA and 20 µA |
| RQ3 | In voltage class C and with S1 in the range between 0,7 x VCC and VCC + 0,3 V, the terminal shall consider state H when the UICC draws a current between 600 µA and 1 000 µA |
| RQ4 | In voltage class C and with S1 in the range between 0,7 x VCC and VCC + 0,3 V, the terminal shall consider state L when the UICC draws a current between 0 µA and 20 µA |

5.4.1.5.2.2 Test case 1: communication with S2 variation in full power mode

5.4.1.5.2.2.1 Test execution

The test procedure shall only be executed in voltage class C and voltage class B if available in full power mode.

The test procedure shall be executed once for each of following parameters:

* S2 signal: State L 20 µA/state H 600 µA.

5.4.1.5.2.2.2 Initial conditions

* None of the UICC contacts is activated.

5.4.1.5.2.2.3 Test Procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the terminal to activate VCC and SWIO and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) | RQ1,  RQ2,  RQ3,  RQ4 |
| 4 | UICC 🡨 🡪 T | Perform initial SWP interface activation | RQ1,  RQ2, RQ3,  RQ4 |
| 5 | T 🡨 🡪 UICC | SHDLC link establishment or send a CLT frame | RQ1,  RQ2, RQ3,  RQ4 |

5.4.1.5.2.3 Test case 2: communication with S2 variation in low power mode

5.4.1.5.2.3.1 Test execution

The test procedure shall only be executed in voltage class C, low power mode.

The test procedure shall be executed once for each of following parameters:

* S2 signal: State L 20 µA/state H 600 µA.

5.4.1.5.2.3.2 Initial conditions

* None of the UICC contacts is activated.

5.4.1.5.2.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the terminal to activate VCC and SWIO in low power mode and to perform further communication over SHDLC or CLT (for example, by initiating a contactless card emulation session as specified in ETSI TS 102 622 []) |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) | RQ3,  RQ4 |
| 4 | UICC 🡪 T | Perform initial SWP interface activation (low power mode) | RQ3,  RQ4 |
| 5 | T 🡨 🡪 UICC | SHDLC link establishment or send a CLT frame | RQ3,  RQ4 |

## 5.5 Physical transmission layer

### 5.5.1 S1 Bit coding and sampling time

#### 5.5.1.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 8.1; additional clause 3.1 for RQ12.

|  |  |
| --- | --- |
| RQ1 | When sending a bit on S1 with the logical value 0 and the bit duration T, the terminal shall apply a leading rising edge to state H, maintain S1 in state high for a time TH0 with the minimum of 0,20 x T and the maximum of 0,30 x T, then apply a falling edge to state L, then apply a trailing rising edge to state H after T. The timing reference point for T and TH0 shall be 50 % of the S1 signal amplitude. |
| RQ2 | When sending a bit on S1 with the logical value 1 and the bit duration T, the terminal shall apply a leading rising edge to state H, maintain S1 in state high for a time TH1 with the minimum of 0,70 x T and the maximum of 0,80 x T, then apply a falling edge to state L, then apply a trailing rising edge to state H after T. The timing reference point for T and TH1 shall be 50 % of the S1 signal amplitude. |
| RQ3 | When sending a bit on S1 with the bit duration T in the range of 0,590 µs ≤ T ≤ 5,0 µs, the rise time of the S1 signal for both the leading and the trailing rising edge shall be in the range tr with a minimum of 5 ns and a maximum of 0,05 x T, where the timing reference points for the rise time are 10 % and 90 % of the signal amplitude. |
| RQ4 | When sending a bit on S1 with the bit duration T in the range of greater than 5,0 µs < T ≤ 10,0 µs, the rise time of the S1 signal for both the leading and the trailing rising edge shall be in the range tr with a minimum of 5ns and a maximum of 250 ns, where the timing reference points for the rise time are 10 % and 90 % of the signal amplitude. |
| RQ5 | When sending a bit on S1 with the bit duration T in the range of 0,590 µs ≤ T ≤ 5,0 µs, the fall time of the S1 signal shall be in the range tf with a minimum of 5 ns and a maximum of 0,05 x T, where the timing reference points for the fall time are 10 % and 90 % of the signal amplitude. |
| RQ6 | When sending a bit on S1 with the bit duration T in the range of 5,0 µs < T ≤ 10,0 µs, the fall time of the S1 signal shall be in the range tf with a minimum of 5ns and a maximum of 250 ns, where the timing reference points for the fall time are 10 % and 90 % of the signal amplitude. |
| RQ7 | Before the CLF has received an ACT\_SYNC frame during initial interface activation, it shall only send bits with a default bit duration T. |
| RQ8 | Void. |
| RQ9 | After the CLF has received an ACT\_SYNC frame during initial interface activation, it shall only send bits with a duration T within the limits indicated in the ACT\_INFORMATION field; this applies until Vcc is deactivated. |
| RQ10 | For a transition from **DEACTIVATED** state or for SWIO contact activation (preceeding the SWP interface activation procedure), the terminal shall apply a rise time tr of the signal S1 in the range of 5 ns to 250 ns. |
| RQ11 | For a transition to **DEACTIVATED** state, the terminal shall apply a fall time tf of the signal S1 in the range of 5 ns to 250 ns. |
| RQ12 | When sending a transition sequence, consisting of the falling edge, the state L period and the rising edge of an idle bit, the definitions as described in RQ3, RQ4, RQ5, RQ6 for the fall time tf for the leading edge and the rise time tr for the trailing edge shall apply. The value of T shall result from the length of the state L period, where the timing reference point shall be 50 % of the S1 signal amplitude. |
| NOTE: Test cases for RQ10 are given in clause 5.3.2.3.17. | |

#### 5.5.1.2 Test case 1: S1 waveforms, default bit duration

##### 5.5.1.2.1 Test execution

The test procedure shall be executed for the following parameters:

* S2 signal, IH = 1 000 µA, S2 signal, IL = 0 µA.

In case the terminal provides means to be configured for certain bit rate ranges on S1 (and this information is provided by the DUT manufacturer), the test procedure shall be performed with variation to the minimum and the maximum bit duration within the bit duration range supported, for frame exchange in the ACT LLC or the SHDLC LLC, or both.

##### 5.5.1.2.2 Initial conditions

* None of the UICC contacts is activated.

##### 5.5.1.2.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate Vcc (contact C1) and SWIO (contact C6), and SWP interface activation in the requested power mode |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) (see note) | RQ10 |
| 4 | UICC 🡪T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ12 |
| 6 | UICC 🡪 T | Send ACT\_SYNC frame, with ACT\_INFORMATION field indicating that extended bit durations are not supported | RQ1,  RQ3,  RQ5  RQ7 |
| 7 | T 🡨🡪 UICC | If the terminal performs initial SWP interface activation in full power mode, complete initial SWP interface activation | RQ1,  RQ2,  RQ3,  RQ5,  RQ9 |
| 8 | T 🡨 🡪 UICC | Perform SHDLC link establishment | RQ1,  RQ2,  RQ3,  RQ5,  RQ9 |
| 9 | UICC 🡨 🡪 T | Run the representative SWP frame exchange procedure  The frame exchange shall be performed in such a way, that the referenced RQs can be fully validated. The procedure shall contain full-duplex communication, where the crossover combination of bits with "S1 = logical 1/S2 = logical 1" shall occur at least 20 times. Since the occurrence of situations related to RQ12 depends on the terminal implementation, non-occurrence of these situations shall not lead to a fail of this step | RQ1,  RQ2,  RQ3,  RQ5,  RQ9,  RQ12 |
| 10 | User 🡪 T | Trigger the terminal to put SWP into **DEACTIVATED** state |  |
| 11 | T 🡪 UICC | Put SWP into **DEACTIVATED** state | RQ11 |
| NOTE: SWP in SUSPENDED state. | | | |

#### 5.5.1.3 Test case 2: S1 waveforms, extended bit durations

##### 5.5.1.3.1 Test execution

The test procedure shall be executed once for each of the following parameters:

* S2 signal, IH = 1 000 µA, S2 signal, IL = 0 µA.

In case the terminal provides means to be configured for certain bit rate ranges on S1 (and this information is provided by the DUT manufacturer), the test procedure shall be performed with variation to the minimum and the maximum bit duration within the bit duration range supported, for frame exchange in the ACT LLC or the SHDLC LLC, or both.

##### 5.5.1.3.2 Initial conditions

* None of the UICC contacts is activated.

##### 5.5.1.3.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate Vcc (contact C1) and SWIO (contact C6), and SWP interface activation in the requested power mode |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) (see note) | RQ10 |
| 4 | UICC 🡪T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ12 |
| 6 | UICC 🡪 T | Send ACT\_SYNC frame, with ACT\_INFORMATION field indicating bit durations supported down to 0,590 µs and up to 10 µs | RQ1,  RQ3,  RQ5  RQ7 |
| 7 | T 🡨🡪 UICC | If the terminal performs initial SWP interface activation in full power mode, complete initial SWP interface activation | RQ1,  RQ2,  RQ3,  RQ4,  RQ5,  RQ6,  RQ9 |
| 8 | T 🡨 🡪 UICC | Perform SHDLC link establishment | RQ1,  RQ2,  RQ3,  RQ4,  RQ5,  RQ6,  RQ9 |
| 9 | UICC 🡨 🡪 T | Run the representative SWP frame exchange procedure  The frame exchange shall be performed in such a way, that the referenced RQs can be fully validated. The procedure shall contain full-duplex communication, where the crossover combination of bits with "S1 = logical 1/S2 = logical 1" shall occur at least 20 times. Since the occurrence of situations related to RQ12 depends on the terminal implementation, non-occurrence of these situations shall not lead to a fail of this step | RQ1,  RQ2,  RQ3,  RQ4,  RQ5,  RQ6  RQ9,  RQ12 |
| 10 | User 🡪 T | Trigger the terminal to put SWP into **DEACTIVATED** state |  |
| 11 | T 🡪 UICC | Put SWP into **DEACTIVATED** state | RQ11 |
| NOTE: SWP in SUSPENDED state. | | | |

### 5.5.2 S2 switching management

#### 5.5.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 8.2.

There are no conformance requirements for the terminal for the referenced clause.

### 5.5.3 SWP interface states management

#### 5.5.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 8.3.

|  |  |  |
| --- | --- | --- |
| RQ1 |  | For a transition from SWP **SUSPENDED** state to SWP **DEACTIVATED** state, the terminal shall maintain S1 in state L for at least P4 = 100 µs. |
| RQ2 |  | For a transition from SWP **ACTIVATED** state to SWP **SUSPENDED** state, the terminal shall issue at least P1 = 7 idle bits on S1. If there are only idle bits on S2, the SWP **SUSPENDED** state shall be valid after maintaining S1 in state H. |
| RQ3 |  | If the terminal has not received an upper layer indication that the UICC requires no more activity on this interface, the terminal shall resume by sending a transition sequence consisting of the state L period of an idle bit. Then the terminal shall issue idle bits on S1. After subsequent P2 = 8 idle bits, and if there are no other than idle bits on S2, the SWP state **ACTIVATED** shall be valid. |
| RQ4 |  | When the terminal resumes the SWP (as described in RQ3), the terminal shall issue a transition sequence consisting of the falling edge, the state L period and the rising edge of an idle bit. Then the terminal shall issue at least P2 = 8 idle bits on S1. The terminal shall be capable of receiving bits sent by the UICC during the P2 idle bits. |
| RQ5 |  | When SWP resides in **SUSPENDED** state, and the slave resumes by drawing a current (S2 in state H), within P3 ≤ 5 µs the terminal shall issue a transition sequence consisting of the state L period of an idle bit. At the end of the transition sequence the SWP state **ACTIVATED** shall be valid. |
| RQ6 |  | Subsequently to the procedure as described in RQ5, the terminal shall accept SOF sent by the slave after a delay of 0 to 4 bits after the transition sequence. Following S2 pattern shall be considered as valid:  W=R/T | 1st bit of SOF  R/T | W | 1st bit of SOF  R/T | X | W | 1st bit of SOF  R/T | X | X | W | 1st bit of SOF  R/T | X | X | X | W | 1st bit of SOF.  Where R is the slave resume, W the wakeup sequence, T is the transition sequence, X represents either 0 or 1. |
| RQ7 |  | The CLF shall be capable of receiving frames in the **ACTIVATED** state. |
| RQ8 |  | If the last information sent by the master was the SHDLC acknowledgement to an indication via an upper layer that the UICC requires no more activity on this interface then the master resumes switching SWP to the **DEACTIVATED** state as described in *DEACTIVATE* followed by switching SWP to the **ACTIVATED** state as described in *ACTIVATE*.  See note 4. |
| RQ9 |  | The terminal may switch from SWP **SUSPENDED** to the **DEACTIVATED** state if the UICC has indicated on a higher layer that no more activity is required on this interface. |
| RQ10 |  | The terminal may switch from SWP **SUSPENDED** to the **DEACTIVATED** state if the SWP is in **SUSPENDED** state for a time of P5 = 15 ms and the CLF does not detect an RF field compliant with ISO/IEC 14443-2 [] or ISO/IEC 18092 []; not generate an RF field on request from the UICC. |
| RQ11 | Rel-9  onwards | The terminal shall respond by sending a transition sequence in less than P6 = 20 ms if all the following conditions are met:   * the UICC has indicated support of extended resume (see clause 9.4); and * the last information the terminal has received is an indication via an upper layer that the UICC requires no more activity on this interface; and * the SWP is in SUSPENDED state for at least a time of P7 = 20 ms.   Else the terminal shall respond by sending a transition sequence in less than P3max time. |
| NOTE 1: Further conformance requirements for ETSI TS 102 613 [], clause 8.3, are listed in clause 5.3.2.3.  NOTE 2: How to test for RQ9 and RQ10 is FFS.  NOTE 3: Development of test cases for RQ11 is FFS.  NOTE 4: RQ8 is also effectively present in releases of ETSI TS 102 613 [], prior to Release 9, with the same meaning but different text: "If the master has received an upper layer indication that the UICC requires no more activity on this interface then the master resumes by operating a SWIO deactivation and SWIO activation". | | |

#### 5.5.3.2 Test case 1: SWP states and transitions, communication

##### 5.5.3.2.1 Test execution

There are no test case-specific parameters for this test case.

##### 5.5.3.2.2 Initial conditions

* None of the UICC contacts is activated.

##### 5.5.3.2.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate Vcc (contact C1) and SWIO (contact C6), and SWP interface activation in the requested power mode |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) (see note) |  |
| 4 | UICC 🡪T | Resume SWP |  |
| 5 | T 🡪 UICC | Send transition sequence | RQ5 |
| 6 | UICC 🡪 T | Send ACT\_SYNC frame, with ACT\_INFORMATION field indicating bit durations supported down to 0,590 µs and up to 10 µs | RQ6,  RQ7 |
| 7 | T 🡨 🡪 UICC | If the terminal performs initial SWP interface activation in full power mode, complete initial SWP interface activation | RQ7 |
| 8 | T 🡨 🡪 UICC | Perform SHDLC link establishment | RQ7 |
| 9 | UICC 🡨 🡪 T | Run the representative SWP frame exchange procedure  The frame exchange shall be performed in such a way, that the referenced RQs can be fully validated. Since the occurrence of situations related to RQ3, RQ4, RQ5, RQ6 and RQ7 depends on the terminal implementation, non‑occurrence of these situations shall not lead to a fail of this step  When validating the last part of RQ4 (sending a frame during the P2 idle bits after a terminal resume), the UICC simulator shall ensure that each of the following scenarios occurs at least once (where W is the wakeup sequence):   * The UICC sends a frame with W at the 1st P2 idle bit. * The UICC sends a frame with W at the 4th P2 idle bit. * The UICC sends a frame with W at the 8th P2 idle bit.   When validating RQ6, the UICC simulator shall apply each of the following S2 patterns at least once:   * W=R/T | 1st bit of SOF * R/T | W | 1st bit of SOF * R/T | 1 | W | 1st bit of SOF * R/T | 0 | 0 | W | 1st bit of SOF. * R/T | 0 | 0 | 0 | W | 1st bit of SOF. | RQ2,  RQ3,  RQ4,  RQ5  RQ6  RQ7 |
| 10 | User 🡪 T | Trigger the terminal to put SWP into **DEACTIVATED** state |  |
| 11 | T | SWP in **SUSPENDED** state | RQ2 |
| 12 | T 🡪 UICC | Put SWP into **DEACTIVATED** state | RQ1 |
| NOTE: SWP in SUSPENDED state. | | | |

#### 5.5.3.3 Test Case 2: SWP resume after upper layer indication that the UICC requires no more activity on this interface

##### 5.5.3.3.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

##### 5.5.3.3.2 Initial Conditions

* SHDLC link is established.
* SHDLC link is idle, i.e. no further communication is expected.

##### 5.5.3.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | PCD 🡨🡪 T  T 🡨🡪 UICC | Perform a contactless card emulation session. |  |
| 2 | PCD  T | Turn off RF field. |  |
| 3 | T 🡨🡪 UICC | Send EVT\_FIELD\_OFF the card emulation gate. |  |
| 4 | UICC 🡪 T | Not later than P5 after the end of step 3 (see table 8.2 of TS 102 613 []), send the upper layer indication that the UICC requires no more activity on this interface, i.e. the EVT\_HCI\_END\_OF\_OPERATION as specified in ETSI TS 102 622 []. |  |
| 5 | T 🡪 UICC | Send SHDLC acknowledgement. |  |
| 6 | T | Either, the CLF maintains SWP in state **SUSPENDED** without occurrence of resume SWP by sending a transition sequence, or, the CLF puts SWP into **DEACTIVATED** state. | RQ1 |
| 7 | User 🡪 T | 5 to 10 ms after end of step 5, trigger the terminal to perform further communication over SWP (for example: by initiating a contactless card emulation session as specified in ETSI TS 102 622 []). |  |
| 8 | T 🡪 UICC | Put SWP into **DEACTIVATED** state.  In case the terminal has put SWP into **DEACTIVATED** state during one of the steps 6 or 7, skip this step and continue with step 9. | RQ1  RQ8 |
| 9 | T 🡨🡪 UICC | Perform subsequent SWP interface activation. | RQ1  RQ8 |

### 5.5.4 Power mode states/transitions and Power saving mode

#### 5.5.4.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 8.4.

|  |  |
| --- | --- |
| RQ1 | The CLF shall indicate full power mode if sufficient power from the terminal's power supply (e.g. battery) is available. |
| RQ2 | The terminal shall provide sufficient power for the UICC in low power mode. |
| RQ3 | The terminal shall provide sufficient power for the UICC in full power mode. |
| RQ4 | The terminal shall not switch from full power mode to low power mode or vice versa without deactivation of Vcc. |
| NOTE: Test cases for RQ2 are given in clause 5.4.1.3 (VCC(C1) low power mode definition). | |

#### 5.5.4.2 Test case 1: power provided in full power mode

##### 5.5.4.2.1 Test execution

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available.

During the test procedure, for each power mode/state the UICC shall vary the current drawn between 0 mA and the maximum current specified for the terminal to be delivered in this particular power mode/state.

##### 5.5.4.2.2 Initial conditions

* None of the UICC contacts is activated.
* The terminal's power supply provides sufficient power for full power mode operation.

##### 5.5.4.2.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Trigger the terminal to activate VCC (contact C1) and SWIO (contact C6), and SWP interface activation in full power mode |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) (see note 2) | RQ3 |
| 4 | UICC 🡪T | Resume SWP | RQ3 |
| 5 | T 🡪 UICC | Send transition sequence | RQ3 |
| 6 | UICC 🡪 T | Send ACT\_SYNC frame | RQ3 |
| 7 | T 🡪 UICC | Send ACT\_POWER\_MODE frame (full power mode) (see note 1) | RQ1  RQ3 |
| 8 | UICC 🡪 T | Respond ACT\_READY frame | RQ3 |
| 9 | T 🡨 🡪 UICC | Perform SHDLC link establishment | RQ3 |
| 10 | UICC 🡨 🡪 T | Run the representative SWP frame exchange procedure | RQ3 |
| NOTE 1: UICC power consumption for full power mode applies.  NOTE 2: Full power mode applies if one of the other UICC interfaces is activated. | | | |

#### 5.5.4.3 Test case 2: switching from full to low power mode

##### 5.5.4.3.1 Test execution

The test procedure shall be executed in voltage class B, if available, and voltage class C, full power mode, if available, each in combination with voltage class C, low power mode.

##### 5.5.4.3.2 Initial conditions

* Initial SWP interface activation in full power mode was successfully performed.
* The terminal's power supply provides sufficient power for full power mode operation.

##### 5.5.4.3.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Change the terminal's power supply condition to provide sufficient power for low power mode, but not sufficient power for full power mode operation |  |
| 2 | T 🡪 UICC | The Terminal deactivates VCC  Upon reactivating VCC, the Terminal performs an initial SWP interface activation in low power mode | RQ4 |

#### 5.5.4.4 Test case 3: switching from low to full power mode

##### 5.5.4.4.1 Test execution

The test procedure shall be executed in voltage class B, if available, and voltage class C, full power mode, if available, each in combination with voltage class C, low power mode.

##### 5.5.4.4.2 Initial conditions

* Initial SWP interface activation in low power mode was successfully performed.
* The terminal's power supply provides sufficient power for low power mode operation, but not for full power mode operation.

##### 5.5.4.4.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User 🡪 T | Change the terminal's power supply condition to provide sufficient power for full power mode |  |
| 2 | T 🡪 UICC | The Terminal deactivates VCC  Upon reactivating VCC, the Terminal performs an initial SWP interface activation in full power mode | RQ4 |

## 5.6 Data link layer

### 5.6.1 Overview

Reference: ETSI TS 102 613 [], clause 9.1.

There are no conformance requirements for the terminal for the referenced clause.

### 5.6.2 Medium Access Control (MAC) layer

#### 5.6.2.1 Bit order

##### 5.6.2.1.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 9.2.1.

|  |  |
| --- | --- |
| RQ1 | The CLF shall send payload data with MSB first. |
| RQ2 | The CLF shall interpret payload data received from the UICC with MSB first. |
| NOTE: RQ1 and RQ2 are validated implicitly in other testcases within the present document. | |

#### 5.6.2.2 Structure

##### 5.6.2.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 9.2.2.

|  |  |
| --- | --- |
| RQ1 | The CLF shall correctly interpret error free frames sent by UICC with at least one idle bit between the frames. |
| RQ2 | Between frames, idle bits (logical value 0) are sent. There is at least one idle bit between frames. |
| RQ3 | The master shall accept a wakeup sequence, consisting of a bit with logical value 1 insertedimmediately beforethe SOF FLAG of each frame sent from the slave. |
| RQ4 | The CLF shall reject incorrectly formed frames sent by UICC. |
| RQ5 | The CLF shall send only correctly formed frames to the UICC. |
| NOTE 1: RQ2 is tested in clause 5.7.7.5.2.  NOTE 2: RQ3 is validated implicitly in other testcases within the present document.  NOTE 3: Part of RQ1 (related to idle bits between frames) is tested in clause 5.7.7.5. | |

The following conformance requirement is referenced to ETSI TS 102 613 [], clause 9.2.1.4.

|  |  |
| --- | --- |
| RQ6 | The CLF shall detect errors on the received frame using the 16 bit frame checking sequence as given in ISO/IEC 13239 [] on bits between SOF and EOF, which are both excluded. |

The following conformance requirement is referenced to ETSI TS 102 613 [], clause 9.3.1.

|  |  |
| --- | --- |
| RQ7 | On receiving a corrupted SWP frame, the CLF shall use the error recovery procedure defined for LLC of the last correctly received SWP frame. |

##### 5.6.2.2.2 Test case 1: interpretation of incorrectly formed frames - SHDLC RSET frames

5.6.2.2.2.1 Test execution

The test procedure shall be executed once for each of following parameters, i.e. types of incorrectly formed frames:

* RSET frame with wrong CRC16.
* RSET frame, no SOF.
* Frame with no payload and no CRC16 (only SOF and EOF), followed by 2 Bytes with value 'A5'.

5.6.2.2.2.2 Initial conditions

* The SHDLC link is established.
* No further communication is expected.

5.6.2.2.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC🡪T | Send incorrectly formed SHDLC LLC - RSET frame |  |
| 2 | T | No response | RQ4,  RQ6,  RQ7 |
| 3 | UICC🡪T | Send RSET |  |
| 4 | T🡨🡪UICC | Complete SHDLC link re-establishment | RQ1,  RQ5 |

##### 5.6.2.2.3 Test case 2: interpretation of incorrectly formed frames - SHDLC I-frames

5.6.2.2.3.1 Test execution

The test procedure shall be executed once for each of following parameters, i.e. types of incorrectly formed frames:

* I-Frame with wrong CRC16.
* I-Frame, no SOF.
* Frame with no payload and no CRC16 (only SOF and EOF), followed by 2 Bytes with value 'A5'.

5.6.2.2.3.2 Initial conditions

* The SHDLC link is established without support for SREJ; no further communication is expected.

5.6.2.2.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC🡪T | Send corrupted frame followed immediately by I-frame(NS0\_S+2,x), where NS0\_S is the sequence number of the last I-frame sent by the UICC simulator which was successfully acknowledged by the terminal. |  |
| 2 | T🡪UICC | Send REJ(NS0\_S+1) | RQ4,  RQ5,  RQ6,  RQ7 |

#### 5.6.2.3 Bit stuffing

##### 5.6.2.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 9.2.3.

|  |  |
| --- | --- |
| RQ1 | Zero bit stuffing shall be employed by the transmitting entity when sending the payload and the CRC on SWP. After five consecutive bits with the logical value 1, a bit with the logical value 0 is inserted. |
| RQ2 | If the last five bits of the CRC contain the logical value 1, then no bit with the logical value 0 shall be added. |
| RQ3 | In a received frame the CLF shall recognize stuffed bits and discard them. |

##### 5.6.2.3.2 Test case 1: behavior of CLF with bit stuffing in frame

5.6.2.3.2.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.6.2.3.2.2 Initial conditions

* The SHDLC link is established and idle, i.e. no further communication is expected.

5.6.2.3.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | T🡨🡪UICC | Run the representative SWP frame exchange procedure.  The following patterns (specified before bit stuffing has been applied) shall be generated in both directions (to the terminal and from the terminal), and using a separate I-frame for each pattern:   * '011111111110'b during the SWP frame payload; * '011111'b at the end of the SWP frame payload; * '0111110'b where the second "1" is the last bit of the SWP frame payload and the third "1" is the first bit of the CRC; * '011111'b at the end of the CRC; * '0111110'b at the end of the CRC.   For I-frames transmitted by the terminal, validate that the correct bits are transmitted.  For I-frames transmitted by the simulator, validate that the terminal acknowledges these I-frames. | RQ1,  RQ2,  RQ3 |
| NOTE: The pattern of '111110b' at the start of the SWP frame payload is implicitly tested in every RSET frame. | | | |

#### 5.6.2.4 Error detection

##### 5.6.2.4.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 9.2.1.4.

|  |  |
| --- | --- |
| RQ1 | The frame transmitted by CLF shall use the 16 bit frame checking sequence as given in ISO/IEC 13239 [] on bits between SOF and EOF, which are both excluded, to compute the CRCs. |
| NOTE 1: There is no explicite test case for RQ1 in the present document (fully covered by other test cases).  NOTE 2: Further conformance requirements for ETSI TS 102 613 [], clause 9.2.1.4, are listed in clause 5.6.2.2. | |

### 5.6.3 Supported LLC layers and sub clauses

#### 5.6.3.1 Supported LLC layers

##### 5.6.3.1.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 9.3.

|  |  |
| --- | --- |
| RQ1 | The CLF shall support the SHDLC layer. |
| RQ2 | The CLF shall support the ACT layer. |
| RQ3 | The LPDU shall be structured according to ETSI TS 102 613 []. |
| NOTE: RQ1, RQ2 and RQ3 are validated implicitly in other testcases within the present document. | |

#### 5.6.3.2 Interworking of the LLC layers

##### 5.6.3.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 9.3.1.

|  |  |
| --- | --- |
| RQ1 | On receiving a corrupted SWP frame, the CLF shall use the error recovery procedure defined for LLC of the last correctly received SWP frame. |
| RQ2 | After successful activation of the SWP, if the CLF has data to be sent to the UICC that requires the use of the CLT LLC, it shall initiate a CLT LLC session. |
| RQ3 | After successful activation of the SWP, if the CLF has no data to be sent to the UICC that require the use of the CLT LLC, the CLF shall establish the SHDLC link as soon as possible. |
| RQ4 | After the UICC and CLF have established the SHDLC link the CLF shall not send ACT LLC frames. |
| RQ5 | After the UICC and CLF have opened a CLT session the CLF shall not send ACT LLC frames. |
| RQ6 | After the UICC and the CLF have established the SHDLC link the CLF shall ignore received ACT LLC frames. |
| RQ7 | After the UICC and the CLF have opened a CLT session the CLF shall ignore received ACT LLC frames. |
| RQ8 | To enter the SHDLC LLC for the first time after SWP interface activation, the link establishment procedure (as described in ETSI TS 102 613 [], clauses 10.7.2 and 10.7.3) shall apply. |
| RQ9 | Once the SHDLC link is established, a CLT session shall not invalidate the SHDLC context and the endpoint capabilities negotiated during the SHDLC link establishments. |
| RQ10 | To enter the CLT LLC from ACT LLC or SHDLC LLC, the CLT session shall be opened (as described in ETSI TS 102 613 [], clause 11.6). |
| RQ11 | The CLF shall open a CLT session only when all SHDLC I-frames are acknowledged. |
| RQ12 | During a CLT session, if SHDLC LLC frames are received by the CLF, then CLF shall consider the CLT session as closed. |
| NOTE 1: Test cases for RQ3 are given in clause 5.7 of the present document.  NOTE 2: Further conformance requirements for ETSI TS 102 613 [], clause 9.3.1, are listed in clause 5.3.2.3.  NOTE 3: RQ4, RQ5 are non-occurrence RQ. There are no test cases for RQ4 and RQ5 in the present document. Addition of test cases for RQ4 and RQ5 is FFS.  NOTE 4: The core specification currently doesn't mandate clearly RQ2, it is currently present for information only.  NOTE 5: The addition of test cases for RQ2 and RQ3 is FFS.  NOTE 6: Test cases for RQ8 are given in clause 5.7 of the present document.  NOTE 7: Test cases for RQ10 are given in clause 5.8 of the present document. | |

##### 5.6.3.2.2 Test case 1: ignore ACT LLC frame reception after the SHDLC link establishment

5.6.3.2.2.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.6.3.2.2.2 Initial conditions

* The SHDLC link is established.

5.6.3.2.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC 🡪 T | Send ACT\_SYNC frame. |  |
| 2 | T | No response or response not based on ACT LLC. | RQ6 |
| 3 | UICC 🡪 T | Send I-frame. |  |
| 4 | T 🡪 UICC | Acknowledge I-frame. | RQ6 |

##### 5.6.3.2.3 Test case 2: ignore ACT LLC frame reception in CLT session

5.6.3.2.3.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.6.3.2.3.2 Initial conditions

* CLT session for ISO/IEC 14443-3 [] type A is established.

5.6.3.2.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC 🡪 T | Send ACT\_SYNC frame. |  |
| 2 | T | No response or response not based on ACT LLC. | RQ7 |
| 3 | PCD 🡪 T | Transmit ISO/IEC 14443-3 [] type A RF frame with payload of 4 RF bytes (arbitrary chosen) to the terminal. |  |
| 4 | T 🡪 UICC | Send CLT frame. | RQ7 |

##### 5.6.3.2.4 Test case 3: CLT session during SHDLC communication

This test case is FFS.

##### 5.6.3.2.5 Test case 4: closing condition of CLT session whereas SHDLC link has been established before CLT session

5.6.3.2.5.1 Test execution

The test procedure shall be executed once for each of following parameters:

* CLT LLC transporting ISO/IEC 14443-3 [] type A data, if available, and CLT LLC transporting ISO/IEC 18092 [] data, if available.

5.6.3.2.5.2 Initial conditions

* The SHDLC link is established before opening of CLT session.
* CLT session is established.

5.6.3.2.5.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC 🡪 T | Send I-frame. |  |
| 2 | T 🡪 UICC | Acknowledge I-frame. |  |
| 3 | UICC 🡪 T | Send CLT frame. |  |
| 4 | T | No response or response not based on CLT session. | RQ12 |

### 5.6.4 ACT LLC definition and sub clauses

#### 5.6.4.1 ACT LLC definition

##### 5.6.4.1.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 9.4.

|  |  |
| --- | --- |
| RQ1 | The CLF shall ignore the FR bit in frames received from the UICC. |
| RQ2 | The CLF shall ignore b8 to b3 in the ACT\_INFORMATION field. |
| RQ3 | The CLF shall not use extended SWP bit durations before it has received an ACT\_SYNC frame with an ACT\_INFORMATION field which indicates support of extended SWP bit durations during the initial interface activation. |
| NOTE 1: RQ3 is a non-ocurrence requirement. There are no test cases for RQ3 in present document, addition of test cases for RQ3 is FFS.  NOTE 2: The addition of test cases for RQ1 and RQ2 is FFS.  NOTE 3: Further conformance requirements for ETSI TS 102 613 [], clause 9.4, are listed in clause 5.3.2.3. | |

#### 5.6.4.2 SYNC\_ID verification process

##### 5.6.4.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 9.4.1.

|  |  |
| --- | --- |
| RQ1 | The CLF shall support SYNC\_ID verification. |
| RQ2 | The SYNC\_ID verification shall always be executed when SWP interface is activated. |
| RQ3 | The CLF shall perform the SYNC\_ID verification process using the ACT\_DATA field of the received ACT\_SYNC frame as *verification data* to compare it with *identity reference data*. |
| RQ4 | If the CLF evaluates that *verification data* and *identity reference data* values are equal, then the identity check is successful. |
| RQ5 | If the *verification data* and *identity reference data* are not equal, then the identity check failed and the CLF shall not open a CLT session. |
| NOTE: SYNC\_ID verification is tested in clause 5.8 of the present document. | |

##### 5.6.4.2.2 Test case 1: not matching SYNC\_ID verification in low power mode

5.6.4.2.2.1 Test Execution

The test procedure shall only be executed in voltage class C, low power mode.

5.6.4.2.2.2 Initial conditions

After performing a contactless card application according to "Non ISO/IEC 14443-4 [] Type A" as described in ETSI TS 102 622 [], where a corresponding CLT session was opened, the terminal has deactivated the UICC. The verification data of the previously performed SWP interface activation is referenced as SYNC\_ID\_1.

5.6.4.2.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the terminal to activate VCC, SWIO |  |
| 2 | T 🡪 UICC | Activate Vcc (contact C1) |  |
| 3 | T 🡪 UICC | Activate SWIO (contact C6) |  |
| 4 | UICC 🡨🡪 T | Perform SWP interface activation, where the UICC sends a SYNC\_ID different to SYNC\_ID\_1 | RQ1,  RQ2 |
| 5 | User 🡪 T | Attempting to launch a contactless card application according to "Non ISO/IEC 14443-4 [] Type A" as described in ETSI TS 102 622 [] |  |
| 6 | T | The 2nd bullet point of the procedure described in "Non ISO/IEC 14443-4 [] Type A" as described in ETSI TS 102 622 [] is not executed | RQ1,  RQ2,  RQ3,  RQ5 |

## 5.7 SHDLC LLC definition

### 5.7.1 SHDLC overview

#### 5.7.1.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.1.

|  |  |
| --- | --- |
| RQ1 | The SHDLC layer in an endpoint shall ensure that data passed up to the next layer has been received exactly as transmitted (i.e. error free, without loss and in the correct order). |
| RQ2 | If an endpoint receives a corrupted frame, it shall discard the frame. |
| NOTE: RQ1 is out of scope of the present document. | |

#### 5.7.1.2 Test Case 1: data passed up to the next layer

##### 5.7.1.2.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

##### 5.7.1.2.2 Initial conditions

* SHDLC link is established.
* A pipe (PIPE\_LOOP\_BACK) has been created to the HCI host's loopback gate, and is currently open.

##### 5.7.1.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC 🡪 T | Send an EVT\_POST\_DATA containing '01 02 03 04' on PIPE\_LOOP\_BACK. |  |
| 2 | T 🡪 UICC | Send an EVT\_POST\_DATA containing '01 02 03 04' on PIPE\_LOOP\_BACK. | RQ1 |

#### 5.7.1.3 Test Case 2: error management - corrupted I-frame

##### 5.7.1.3.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

##### 5.7.1.3.2 Initial Conditions

* SHDLC link is established and idle, i.e. no further communication is expected.

##### 5.7.1.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC 🡪 T | Send a corrupted I-frame (NS0\_S,x) |  |
| 2 | T 🡪 UICC | The T does not send an acknowledgment | RQ2 |
| 3 | UICC 🡪 T | UICC waits 10 ms and sends a correct I-frame (NS0\_S,x) |  |
| 4 | T 🡪 UICC | Acknowledge the receiced I-frame |  |

#### 5.7.1.4 Test Case 3: error management - corrupted RR frame

##### 5.7.1.4.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

##### 5.7.1.4.2 Initial Conditions

* SHDLC link is established and idle, i.e. no further communication is expected.

##### 5.7.1.4.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC 🡪 T | Trigger the T to send an I-frame |  |
| 2 | T 🡪 UICC | Send I(NS0\_T,x) | RQ2 |
| 3 | UICC 🡪 T | Send a corrupted RR(NS0\_T+1) frame |  |
| 4 | UICC | Wait T2 time and don't acknowledge the received frame |  |
| 5 | T 🡪 UICC | Send I(NS0\_T,x) | RQ2 |

### 5.7.2 Endpoints

#### 5.7.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.2.

There are no conformance requirements for the terminal for the referenced clause.

### 5.7.3 SHDLC frames types

#### 5.7.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.3.

There are no conformance requirements for the terminal for the referenced clause.

### 5.7.4 Control Field

#### 5.7.4.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.4.

All conformance requirements for the referenced clause are included in clause 5.7.7.3.1 of the present document.

#### 5.7.4.2 I-Frames coding

##### 5.7.4.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.4.1.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.7.4.3 S-Frames coding

##### 5.7.4.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.4.2.

|  |  |
| --- | --- |
| RQ1 | Optional type of frame shall not be used before capability negotiation is defined during initialization. |
| RQ2 | Only one SREJ shall remain outstanding on each link direction at any one time. |
| RQ3 | An endpoint shall not send a S-frame with an information field. |
| RQ4 | An SREJ shall be transmitted for each erroneous frame; each frame is treated as a separate error. |
| NOTE 1: RQ1, RQ2 and RQ4 for the referenced clause are included in clause 5.7.7.9.1 of the present document.  NOTE 2: RQ3is a non-occurence RQ and therefore is not tested. | |

#### 5.7.4.4 U-Frames coding

##### 5.7.4.4.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.4.3.

|  |  |
| --- | --- |
| RQ1 | An endpoint shall only send U-Frames using modifiers specified in ETSI TS 102 613 []. |
| NOTE: RQ1 is not tested, as it is a non-occurrence RQ. | |

### 5.7.5 Changing sliding window size and endpoint capabilities

#### 5.7.5.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.5.

All conformance requirements for the referenced clause are included in clause 5.7.7.3.1 of the present document.

#### 5.7.5.2 RSET frame payload

##### 5.7.5.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.5.1.

All conformance requirements for the referenced clause are included in clause 5.7.7.3.1 of the present document.

#### 5.7.5.3 UA frame payload

##### 5.7.5.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.5.2.

All conformance requirements for the referenced clause are included in clause 5.7.7.3.1 of the present document.

### 5.7.6 SHDLC context

#### 5.7.6.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.6.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.7.6.2 Constants

##### 5.7.6.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.6.1.

|  |  |
| --- | --- |
| RQ1 | I-frames shall be acknowledged within T1. |
| RQ2 | If the I-frames are not acknowledged, an endpoint shall retransmit these frames not sooner than T2. |
| RQ3 | An endpoint shall retry to setup link if the targeted endpoint did not answer with a UA or a RSET frame to a RSET frame within T3 (5 ms). |
| NOTE 1: RQ1 for the referenced clause is included in clause 5.7.7.5.1 of the present document.  NOTE 2: RQ2 for the referenced clause is included in clause 5.7.7.7.1 of the present document.  NOTE 3: RQ3 for the referenced clause is included in clause 5.7.7.3.1 of the present document. | |

#### 5.7.6.3 Variables

##### 5.7.6.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.6.2.

All conformance requirements for the referenced clause are included in clause 5.7.7.5.1 of the present document.

#### 5.7.6.4 Initial Reset state

##### 5.7.6.4.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.6.3.

|  |  |
| --- | --- |
| RQ1 | The following initial states shall apply in every endpoint after successful link establishment: N(S) = N(R) = DN(R) = 0. |

##### 5.7.6.4.2 Test case 1: initial state at link reset - reset by the UICC

5.7.6.4.2.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.7.6.4.2.2 Initial conditions

* SHDLC link is established and idle, i.e. no further communication is expected.

5.7.6.4.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC 🡪 T | Send RSET(Ws=2, SREJ=0) |  |
| 2 | T 🡪 UICC | Send UA |  |
| 3 | Conditional | If the T does not immediately send I-frames after SHDLC link establishment, trigger the T to send an I-frame.  If the trigger involves sending I-frames to the terminal, only one I-frame shall be sent. |  |
| 4 | T 🡪 UICC | Send I-frame(0, NR).  If the trigger in step 3 involved sending an I-frame to the terminal, NR = 1, else NR = 0. | RQ1 |
| 5 | UICC 🡪 T | Send RR(1) |  |
| 6 | Conditional | If the T continue to send I-frames, acknowledge them |  |
| 7 | UICC 🡪 T | Send I-frame(NS, NR) |  |
| 8 | T 🡪 UICC | Acknowledge the previously sent I-frame | RQ1 |

### 5.7.7 SHDLC sequence of frames

#### 5.7.7.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.7.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.7.7.2 Nomenclature

##### 5.7.7.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.7.1.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.7.7.3 Link establishment with default sliding window size

##### 5.7.7.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.7.2, 10.7.4, 10.4, 10.5, 10.1 and 10.5.2.

|  |  |  |
| --- | --- | --- |
| RQ1 | 10.7.2 | An endpoint establishing an SHDLC link shall initiate link establishment by sending a RSET frame. |
| RQ2 | 10.7.2 | If an endpoint supports the sliding window size and SREJ value in the RSET frame, it shall acknowledge that frame with a UA frame. |
| RQ3 | 10.7.2 | An endpoint receiving a RSET frame without window size and/or endpoint capabilities field shall interpret the RSET frame as if it contained the default values. |
| RQ4 | 10.7.2 | Before link establishment, all SHDLC frames except RSET from other endpoint shall be discarded. |
| RQ5 | 10.7.2 | If the link is re-established, all buffered frames (received out of order or stored in the retransmission queue) shall be discarded. |
| RQ6 | 10.7.2 | If the link is re-established, an endpoint shall inform the upper layer of a link reset. |
| RQ7 | 10.7.2 | An endpoint shall support a link re-establishment which is initiated by the peer endpoint. |
| RQ8 | 10.4 | An endpoint's default size of sliding window shall be four frames. |
| RQ9 | 10.5 | If the initial sliding window size is too large or SREJ support is requested and the receiving endpoint can not handle (at least one) of those features, it shall not acknowledge the RSET frame. Instead, the receiver shall send a RSET frame with an appropriate sliding window size and/or SREJ frame support bit. |
| RQ10 | 10.5 | An endpoint shall obey to window size reconfiguration and/or SREJ support if the requested window size is lower than its default configuration or the peer endpoint does not support SREJ frames. |
| RQ11 | 10.5.1 | The number provided for the endpoint sliding window size shall be between 2 to 4 inclusive. |
| RQ12 | 10.5.1 | In case this RSET frame is sent in response to a received RSET frame, the window size value shall be equal or lower than the previously provided value. |
| RQ13 | 10.5.1 | If an RSET frame is received without the second optional byte the default value of SREJ not supported should be used. |
| RQ14 | 10.6.1 | An endpoint shall retry to setup link if the targeted endpoint did not answer with a UA or a RSET frame to a RSET frame within T3 (5 ms). |
| RQ15 | 10.7.4 | Once the link is established, an endpoint shall be able to receive data. |
| RQ16 | 10.5.2 | The endpoint shall not include a payload in UA frames. |
| RQ17 | 10.5 | If one or more of the indicated endpoint capabilities are not supported by the receiving endpoint, it shall answer with a RSET frame indicating only the supported endpoint capabilities. In this case the RSET response may contain the same window size. |
| RQ18 | 10.5.1 | A RSET frame response shall not indicate the same window size and the same endpoint capabilities as the received RSET frame; in such a case a UA frame shall be sent. |
| NOTE 1: Tests for RQ6 are out of scope of the present document.  NOTE 2: Part of RQ5 related to discarding frame in the retransmission buffer when the link is re-establish will not be tested.  NOTE 3: RQ4 is not tested as it is not possible to guarantee that an SHDLC frame sent by the UICC simulator will be sent before the first RSET frame sent by the terminal. | | |

##### 5.7.7.3.2 Test Case 1: link establishment by the UICC

5.7.7.3.2.1 Test execution

The test procedure shall only be executed for RSET values, from the following table, that are supported by the terminal.

|  |
| --- |
| RSET() |
| RSET(2) |
| RSET(3) |
| RSET(4) |
| RSET(2, SREJ=0) |
| RSET(2, SREJ=1) |
| RSET(3, SREJ=0) |
| RSET(3, SREJ=1) |
| RSET(4, SREJ=0) |
| RSET(4, SREJ=1) |

SREJ should be tested only for the biggest window size supported by the terminal.

5.7.7.3.2.2 Initial conditions

* SHDLC link is established and idle, i.e. no further communication is expected.

5.7.7.3.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC 🡪 T | Send the RSET frame indicated in the test execution clause |  |
| 2 | T 🡪 UICC | Send UA | RQ2,  RQ3  RQ7,  RQ13,  RQ16, RQ18 |
| 3 | UICC 🡪 T | Send an I-frame |  |
| 4 | T 🡪 UICC | Acknowledges the previously sent I-frame | RQ15 |
| NOTE 1: if Terminal sends I-frames between steps 2 and 3, they shall be acknowledged by the UICC.  NOTE 2: RQ3 is only validated when RSET() is sent in step 1. | | | |

##### 5.7.7.3.3 Test case 2: Link establishment and connection time out

5.7.7.3.3.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.7.7.3.3.2 Initial conditions

None of the UICC contacts is activated.

5.7.7.3.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the terminal to activate SWP interface |  |
| 2 | UICC 🡨🡪 T | Perform SWP interface activation |  |
| 3 | T 🡪 UICC | Send RSET | RQ1 |
| 4 | UICC | Do not send a UA frame |  |
| 5 | T 🡪 UICC | Send RSET after at least T3 time after execution of step 3 | RQ14 |
| 6 | UICC 🡪 T | Send an I-frame (0,0) |  |
| 7 | T 🡪 UICC | Send RSET after at least T3 time after execution of step 5 | RQ14 |
| 8 | UICC 🡪 T | Send UA |  |
| 9 | UICC 🡪 T | Send an I-frame |  |
| 10 | T 🡪 UICC | Acknowledge the previously sent I-frame | RQ15 |

##### 5.7.7.3.4 Test Case 3: requesting unsupported window size and/or SREJ support - link establishment by UICC

5.7.7.3.4.1 Test execution

Run the test procedure for every row in the table below. If the terminal supports window size 4, the first row (RSET()) shall be skipped.

|  |  |
| --- | --- |
| **RSET frame to be sent in step 1** | **Valid RSET frames which can be received in step 2** |
| RSET() | RSET(3)  RSET(2)  RSET(3, SREJ=0)  RSET(2, SREJ=0) |
| RSET(4, SREJ=1) | RSET()  RSET(4)  RSET(4, SREJ=0)  RSET(3)  RSET(3, SREJ=0)  RSET(3, SREJ=1)  RSET(2)  RSET(2, SREJ=0)  RSET(2, SREJ=1) |

5.7.7.3.4.2 Initial conditions

* SHDLC link is established.

5.7.7.3.4.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC 🡪 T | Send the RSET frame indicated in the test execution clause for step 1. |  |
| 2 | T 🡪 UICC | Send RSET frame containing values which are supported by the terminal and are indicated as valid in the test execution clause for step 2. | RQ3,  RQ9,  RQ11,  RQ12, RQ17 |
| 3 | UICC 🡪 T | Respond UA. |  |
| NOTE: RQ3 is only validated when RSET() is sent in step 1. | | | |

##### 5.7.7.3.5 Test Case 4: forcing lower window size and SREJ not used - link establishment by the T

5.7.7.3.5.1 Test execution

The test procedure shall be executed once for each of following parameters:

The test procedure shall only be executed in voltage class B, if available, and voltage class C, full power mode, if available (see note).

NOTE: In low power mode, some terminals will only perform SHDLC link establishment if the RF initialisation has been completed. As the test case uses a different SYNC\_ID, the terminal will not complete the RF initialisation, and will therefore not perform SHDLC link establishment, meaning that it will not proceed to step 3. The test case cannot be completed for such a terminal. Testing in full power mode only is considered sufficient for this test case.

* There are no test case-specific parameters for this test case.

5.7.7.3.5.2 Initial conditions

None of the UICC contacts is activated.

5.7.7.3.5.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the terminal to activate SWP interface |  |
| 2 | UICC 🡨🡪 T | Perform SWP interface activation using a SYNC\_ID which is different from the last SYNC\_ID used by the UICC simulator (see note) |  |
| 3 | T 🡪 UICC | Send RSET frame |  |
| 4 | UICC 🡪 T | Send RSET(WS=2, SREJ=0) frame |  |
| 5 | T 🡪 UICC | Send UA | RQ2,  RQ10, RQ18 |
| NOTE: Some terminals might optimise a link establishment by remembering the window size and endpoint capabilities from the previous session and potentially using smaller values than it supports. The use of a different SYNC\_ID will avoid this scenario. | | | |

##### 5.7.7.3.6 Test case 5: discard buffered frames on link re-establishment

5.7.7.3.6.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.7.7.3.6.2 Initial conditions

* The SHDLC link is established with SREJ support
* SHDLC link is idle, i.e. no further communication expected

5.7.7.3.6.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC 🡪 T | Send I-frame(NS0\_S,x) |  |
| 2 | T 🡪 UICC | Acknowledges I-frame(NS0\_S,x) |  |
| 3 | UICC 🡪 T | Send I-frame(NS0\_S+2,x) |  |
| 4 | T 🡪 UICC | Send SREJ(NS0\_S+1) |  |
| 5 | UICC 🡨🡪 T | Re-establish SHDLC link |  |
| 6 | UICC 🡨 🡪 T | UICC sends I-frame(0,NR) to I-frame(NS0\_S+1,NR)  T acknowledges these I-frames | RQ5 |

#### 5.7.7.4 Link establishment with custom sliding window size

##### 5.7.7.4.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.7.3.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.7.7.5 Data flow

##### 5.7.7.5.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.7.4, 10.6.1, 10.6.2 and 9.2.2.

|  |  |  |
| --- | --- | --- |
| RQ1 | 10.7.4 | An endpoint shall acknowledge frame reception regularly. |
| RQ2 | 10.7.4 | The acknowledgement timeout shall not be too long. |
| RQ3 | 10.7.4 | If the number of unacknowledged I-frames on the link equals the negotiated window size, then the endpoint shall not transmit any further I-frames until reception of an acknowledgement. |
| RQ4 | 10.6.1 | I-frames shall be acknowledged within T1. |
| RQ5 | 10.6.2 | An endpoint shall increment its value of the N(S) field after emission of an I-Frame. |
| RQ6 | 10.6.2, 10.8.2 | N(R) shall be set as described in ETSI TS 102 613 []. |
| RQ7 | 10.6.2 | During full duplex data transmission or by emission of a S type frame, all received frames with a sequence number lower than N(R) are acknowledged. |
| RQ8 | 9.2.2 | Between frames, idle bits (logical value 0) are sent. There is at least one idle bit between frames. |
| RQ9 | 9.2.2 | The CLF shall correctly interpret error free frames sent by UICC with at least one idle bit between the frames. |
| NOTE 1: RQ2 is covered by RQ1 and therefore will not be mentioned explicitly in test procedures.  NOTE 2: Conformance to T1 in RQ4 is not tested. However, the provisions of clause 4.4.2.6.2 apply for checking for acknowledgements.  NOTE 3: RQ3 is tested in clause 5.7.7.7. | | |

##### 5.7.7.5.2 Test case 1: I-frame transmission

5.7.7.5.2.1 Test execution

Run this test procedure for:

* Every supported window size:
* Every I-frame is acknowledged individually by the ES.

5.7.7.5.2.2 Initial conditions

* SHDLC link is established with the window size indicated in the test execution clause.
* SHDLC link is idle, i.e. no further communication is expected.

5.7.7.5.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the T to send 9 I-frames |  |
| 2 | T  UICC  UICC  T | T send I-Frames as indicated in step 1  UICC acknowledges these frames using the acknowledgement mechanism indicated in the test execution clause, using RR frames. | RQ5,  RQ6,  RQ7,  RQ8 |

##### 5.7.7.5.3 Test case 2: I-frame reception - single I-Frame reception

5.7.7.5.3.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.7.7.5.3.2 Initial conditions

* SHDLC link is established and idle, i.e. no further communication is expected.

5.7.7.5.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC T | Send 10 I-frames, waiting the acknowledgement of the previously sent I‑frame before sending the next I-frame |  |
| 2 | T  UICC | T acknowledges these I-frames | RQ1,  RQ6 |
| 3 | conditional | If retransmission occurs, perform steps 4 and 5 |  |
| 4 | UICC T | Send 10 I-frames, waiting the acknowledgement of the previously sent I‑frame before sending the next I-frame |  |
| 5 | T  UICC | T acknowledges these I-frames, without requiring retransmission by the UICC | RQ1,  RQ6 |

##### 5.7.7.5.4 Test case 3: I-frame reception - multiple I-Frame reception

5.7.7.5.4.1 Test execution

* Run this test procedure for every supported window size.

5.7.7.5.4.2 Initial conditions

* SHDLC link is established with the window size indicated in the test execution clause.
* SHDLC link is idle, i.e. no further communication is expected.

5.7.7.5.4.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC  T | Send 10 I-frames.  The UICC shall send each I-frame within T1, without waiting for the acknowledgement of the previously sent I-frame, while still complying to the negotiated window size. There shall be at least two occurrences of consecutive I-frames transmitted with a single idle bit between the frames. |  |
| 2 | T  UICC | T acknowledges these frames. | RQ1,  RQ6, RQ9 |
| 3 | conditional | If retransmission occurs, perform steps 4 and 5. |  |
| 4 | UICC  T | Send 10 I-frames.  The UICC shall send each I-frame within T1, without waiting for the acknowledgement of the previously sent I-frame, while still complying to the negotiated window size. There shall be at least two occurrences of consecutive I-frames transmitted with a single idle bit between the frames. |  |
| 5 | T  UICC | T acknowledges these frames, without requiring retransmission by the UICC. | RQ1,  RQ6, RQ9 |

#### 5.7.7.6 Reject (go N back)

##### 5.7.7.6.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.7.5 and 10.1.

|  |  |  |
| --- | --- | --- |
| RQ1 | 10.7.5 | If an endpoint detects missing I-frame sequence numbers and if SREJ is not supported or if several frames got lost, the endpoint shall send a REJ frame as soon as possible. |
| RQ2 | 10.7.5 | When an endpoint receives a REJ frame with a sequence number which identifies an unacknowledged I-frame previously sent within the sliding window size it shall restart the stream at the first missing frame. |
| RQ3 | 10.7.5 | After sending REJ, an endpoint shall accept the peer endpoint restarting the stream at the first missing frame. |

##### 5.7.7.6.2 Test case 1: REJ transmission - multiple I-frames received

5.7.7.6.2.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.7.7.6.2.2 Initial conditions

* SHDLC link is established with WS=3 and without SREJ support.
* SHDLC link is idle, i.e. no further communication is expected.

5.7.7.6.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC 🡪 T | Send I-frame(NS0\_S,x) |  |
| 2 | T 🡪 UICC | Acknowledge I-frame(NS0\_S,x) |  |
| 3 | UICC 🡪 T | Send I-frame(NS0\_S+2,x) followed immediately by I-frame(NS0\_S+3,x) |  |
| 4 | T 🡪 UICC | Send REJ(NS0\_S+1)  The DUT is allowed to send additional REJ(NS0\_S+1), in response to any additional I-frame(NS0\_S+x,x) | RQ1 |
| 5 | UICC 🡨🡪 T | UICC send 10 I-frames starting at I-frame(NS0\_S+1,x)  T acknowledge I-frames | RQ3 |

##### 5.7.7.6.3 Test case 2: REJ reception

5.7.7.6.3.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.7.7.6.3.2 Initial conditions

* SHDLC link is established without SREJ support.
* SHDLC link is idle, i.e. no further communication is expected.

5.7.7.6.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the T to send I-frames.  The terminal shall be triggered such that it streams I-frames, as described in B\_STREAM\_IFRAMES. |  |
| 2 | T 🡪 UICC | Send I-frame(NS0\_T, y). |  |
| 3 | UICC | Do not acknowledge I-frame(NS0\_T,y). |  |
| 4 | T 🡪 UICC | Send I-frame(NS0\_T+1,y). |  |
| 5 | UICC 🡪 T | Send REJ(NS0\_T).  The UICC is required to send additional REJ(NS0\_T), in response to any additional I-frame(NS0\_T+x,y). |  |
| 6 | T 🡪 UICC | Send I-frame(NS0\_T,y). | RQ2 |
| 7 | UICC 🡪 T | acknowledge I-frame(NS0\_T,y). |  |
| 8 | T 🡪 UICC | Send I-frame(NS0\_T+1,y). | RQ2 |
| 9 | UICC 🡪 T | acknowledge I-frame(NS0\_T+1,y). |  |

#### 5.7.7.7 Last Frame Loss

##### 5.7.7.7.1 Conformance requirements

Reference: ETSI TS 102 613 [], clauses 10.7.4, 10.7.6 and 10.6.1.

|  |  |  |
| --- | --- | --- |
| RQ1 | 10.7.6 | Each frame shall have a guarding/transmit timeout in order to retransmit frames if the destination does not notice a loss. |
| RQ2 | 10.6.1 | If the I-frames are not acknowledged, an endpoint shall retransmit these frames not sooner than T2. |
| RQ3 | 10.7.4 | If the number of unacknowledged I-frames on the link equals the negotiated window size, then the endpoint shall not transmit any further I-frames until reception of an acknowledgement. |

##### 5.7.7.7.2 Test Case 1: retransmission of multiple frames

5.7.7.7.2.1 Test execution

Run this test procedure for:

* Every supported window size:
* I-frames are acknowledged by the ES just before T1 expires and using the maximum allowed value for NR.

5.7.7.7.2.2 Initial conditions

* SHDLC link is established without SREJ support.
* SHDLC link is idle, i.e. no further communication is expected.

5.7.7.7.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the T to send 9 I-frames |  |
| 2 | T 🡪 UICC | T send I-frames as indicated in step 1, respecting the negotiated window size | RQ3 |
| 3 | UICC | UICC does not acknowledge the I-frame(s) within T1 |  |
| 4 | T 🡪 UICC | After T2 (calculated from the first non acknowledge frame), the terminal retransmits the I-frame(s) respecting the window size | RQ1,  RQ2,  RQ3 |
| 5 | UICC 🡪 T | Acknoledges the received I-frame(s) within T1 |  |

#### 5.7.7.8 Receive and not ready

##### 5.7.7.8.1 Conformance requirements

Reference: ETSI TS 102 613 [], clauses 10.7.7 and 10.1.

|  |  |  |
| --- | --- | --- |
| RQ1 | 10.7.7 | When an endpoint transmits a RNR and is now ready to receive an I-Frame, it shall send a RR frame every 5 ms to 20 ms until it receives a new I-frame. |
| RQ2 | 10.7.7 | If an endpoint receives a RR in a context described in RQ1 and has no data to send, it shall send an I‑Frame with empty information field to signal the proper reception of the RR frame. |
| RQ3 | 10.7.7 | If an endpoint receives RNR frame then it shall suspend transmission of I-frames within the negotiated WS. |
| RQ4 | 10.7.7 | If an endpoint receives a RR in a context described in RQ1 and still has data to send, it shall resume the I‑Frame(s) transmission. |
| NOTE: RQ1 will not be tested as it is not possible to trigger the T to transmit a RNR. | | |

##### 5.7.7.8.2 Test case 1: RNR reception

5.7.7.8.2.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.7.7.8.2.2 Initial conditions

* SHDLC link is established and idle, i.e. no further communication is expected.

5.7.7.8.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the T to send 9 **non-empty** I-frames |  |
| 2 | T 🡪 UICC | Start sending I-frames |  |
| 3 | UICC 🡪 T | Acknowledge the first received I-frame(NSa\_T,x) with RNR(NSa\_T+1) |  |
| 4 | UICC  T 🡪 UICC | Wait 100 ms  The terminal may send further I-frames within the negotiated WS; in this case the UICC should not acknowledge these I-frames. | RQ3 |
| 5 | UICC 🡪 T | Send RR, every 5 ms to 20 ms until a new I-Frame is received where N(R) = NSa\_T+1 |  |
| 6 | T 🡪 UICC  UICC 🡪 T | T sends remaining I-frames, where N(S) of the first I-frame = NSa\_T+1. All of the I-frames shall be non-empty.  UICC acknowledges remaining I-frames | RQ3 |

##### 5.7.7.8.3 Test case 2: Empty I-frame transmission

5.7.7.8.3.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.7.7.8.3.2 Initial conditions

* SHDLC link is established and idle, i.e. no further communication is expected.

5.7.7.8.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the T to send 1 I-frame |  |
| 2 | T 🡪 UICC | Send I-frame(NSa\_T,x) |  |
| 3 | UICC 🡪 T | Acknowledge I-frames(NSa\_T,x) with RNR(NSa\_T+1) |  |
| 4 | UICC🡪 T | Send RR(NSa\_T+1) |  |
| 5 | T 🡪 UICC | Send empty I-frame(NSa\_T+1,x) | RQ2 |
| 6 | UICC 🡪 T | Send acknowledgement of frame(NSa\_T+1) |  |

#### 5.7.7.9 Selective reject

##### 5.7.7.9.1 Conformance requirements

Reference: ETSI TS 102 613 [], clauses 10.7.8, 10.8.2, 10.1 and 10.4.2.

|  |  |  |
| --- | --- | --- |
| RQ1 | 10.8.2 | If an I-frame (x,y) is received by an endpoint and support for Selective Reject S frames was negotiated for the link and X is exactly one higher than N(R), a SREJn(r) shall be sent instead of the REJn(r). The received I-frame shall be buffered. |
| RQ2 | 10.8.2 | Once the retransmitted I-frame with X = N(R) is received in the context of RQ3, the buffered I-frame shall also be processed. |
| RQ3 | 10.7.8 | If an endpoint receives a SREJ frame and supports for SREJ was agreed at link establishment, it shall retransmit the corresponding I-Frame. |
| RQ4 | 10.4.2 | Only one SREJ shall remain outstanding on each link direction at any one time. |
| RQ5 | 10.4.2 | An SREJ shall be transmitted for each erroneous frame; each frame is treated as a separate error. |
| RQ6 | 10.4.2 | Optional type of frame shall not be used before capability negotiation is defined during initialization. |
| NOTE: RQ6 is a non-occurrence RQ. There are no test cases for RQ6. | | |

##### 5.7.7.9.2 Test case 1: SREJ transmission

5.7.7.9.2.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.7.7.9.2.2 Initial conditions

* The SHDLC link is established with SREJ support.
* SHDLC link is idle, i.e. no further communication is expected.

5.7.7.9.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | UICC 🡪 T | Send I-frame(NS0\_S,x) |  |
| 2 | T 🡪 UICC | Acknowledge I-frame(NS0\_S,x) |  |
| 3 | UICC 🡪 T | Send I-frame(NS0\_S+2,x) |  |
| 4 | T 🡪 UICC | Send SREJ(NS0\_S+1) | RQ1 |
| 5 | UICC 🡪 T | Sends I-frame(NS0\_S+1,x) |  |
| 6 | T 🡪 UICC | Acknowledges I-frame(NS0\_S+1,x) and I-frame(NS0\_S+2,x) |  |
| 7 | UICC 🡪 T | Send I-frame(NS0\_S+3, x) |  |
| 8 | T 🡪 UICC | Acknowledges I-frame(NS0\_S+3,x) | RQ2 |

##### 5.7.7.9.3 Test case 2: SREJ transmission - multiple I-frames received

FFS

##### 5.7.7.9.4 Test case 3: SREJ reception

5.7.7.9.4.1 Test execution

The test procedure shall be executed once for each of following parameters:

* There are no test case-specific parameters for this test case.

5.7.7.9.4.2 Initial conditions

* SHDLC link is established with SREJ support.
* SHDLC link is idle, i.e. no further communication is expected.

5.7.7.9.4.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | User 🡪 T | Trigger the T to send 9 I-frames with as small a delay between subsequent I‑frames as possible |  |
| 2 | T 🡪 UICC | Send I-frame(NS0\_T,x) |  |
| 3 | UICC 🡪 T | Do not acknowledge the received I-frame |  |
| 4 | T 🡪 UICC | If the T retransmits I-frame(NS0\_T,x), then stop the test procedure, as it is not possible for the UICC to send a valid REJ. This is not a failure of the T  If the T transmits I-frame(NS0\_T+1,x), then continue the test procedure |  |
| 5 | UICC 🡪 T | Send SREJ(NS0\_T) |  |
| 6 | T 🡪 UICC | Retransmit only the rejected I-Frame and continue sending remaining I‑frames  UICC acknowledges remaining I-frames | RQ3 |

##### 5.7.7.9.5 Void

### 5.7.8 Implementation

#### 5.7.8.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.8.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.7.8.2 Information Frame emission

##### 5.7.8.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.8.1.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.7.8.3 Information Frame reception

##### 5.7.8.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.8.2.

All conformance requirements for the referenced clause are included in clause 5.7.7.9.1 of the present document.

#### 5.7.8.4 Reception Ready Frame reception

##### 5.7.8.4.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.8.3.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.7.8.5 Reject Frame reception

##### 5.7.8.5.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.8.4.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.7.8.6 Selective Reject Frame reception

##### 5.7.8.6.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.8.5.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.7.8.7 Acknowledge timeout

##### 5.7.8.7.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.8.6.

There are no conformance requirements for the terminal for the referenced clause.

#### 5.7.8.8 Guarding/transmit timeout

##### 5.7.8.8.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 10.8.7.

There are no conformance requirements for the terminal for the referenced clause.

## 5.8 CLT LLC definition

### 5.8.1 System Assumptions

Reference: ETSI TS 102 613 [], clause 11.1.

There are no conformance requirements for the terminal for the referenced clause.

### 5.8.2 Overview

#### 5.8.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 11.2.

There are no conformance requirements for the terminal for the referenced clause.

### 5.8.3 Supported RF protocols

#### 5.8.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 11.2a.

|  |  |
| --- | --- |
| RQ1 | For ISO/IEC 14443-3 [] Type A, initialization (anti-collision and selection) of the RF protocol is performed by the CLF without UICC involvement. |
| RQ2 | The UICC provides initialization data to the CLF, which performs RF protocol initialization for ISO/IEC 18092 [] 212 kbps/424 kbps passive mode based card emulation protocol. |
| NOTE 1: Development of test cases for RQ2 is FFS.  NOTE 2: Test case for RQ1 is in clause 5.8.5.2. | |

### 5.8.4 CLT Frame Format

#### 5.8.4.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 11.3.

Conformance requirements for this clause are given in clause 5.9.2.1.1.

### 5.8.5 CLT Command Set

#### 5.8.5.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 11.4.

|  |  |
| --- | --- |
| RQ1 | The CLF shall interpret received data in the DATA\_FIELD as Type A aligned data structure if bit 5 in CLT\_CMD field is 0. |
| RQ2 | The CLF shall interpret received data in the DATA\_FIELD as byte aligned data structure if bit 5 in CLT\_CMD field is 1. |
| RQ3 | Bits 1 through 4 of the CLT CMD field shall contain the ADMIN\_FIELD. |
| RQ4 | The CLF shall indicate a CLT frame representing "no administrative command" by setting the ADMIN\_FIELD in the CLT frame to 0000. |
| RQ5 | The CLF shall indicate a CLT frame representing the administrative CL\_PROTO\_INF(A) command by setting the ADMIN\_FIELD in the CLT frame to 1000. |
| RQ6 | The CLF shall indicate a CLT frame representing the administrative CL\_PROTO\_INF(F) command by setting the ADMIN\_FIELD in the CLT frame to 1001. |
| RQ7 | The CLF shall not send a CLT frame containing ADMIN\_FIELD with RFU values. |
| RQ8 | The CLF shall interpret a CLT frame containing an ADMIN\_FIELD with the value 0000 as "no administrative command". |
| RQ9 | The CLF shall interpret a CLT frame containing an ADMIN\_FIELD with the value 0001 as an administrative command CL\_GOTO\_INIT to enter the initial state of the RF protocol initialization sequence. |
| RQ10 | The CLF shall interpret a CLT frame containing an ADMIN\_FIELD with the value 0010 as an administrative command CL\_GOTO\_HALT to enter the "HALT" state of the RF protocol initialization sequence. |
| NOTE 1: RQ7 is a non-occurrence requirement and therefore is not tested.  NOTE 2: Development of test cases for RQ1, RQ2, RQ6, RQ9 and RQ10 is FFS. | |

#### 5.8.5.2 Test case 1: ISO/IEC 14443-3 Type A, no administrative command

##### 5.8.5.2.1 Test execution

Execution of this test case might require the support of an upper layer (e.g. HCI as per ETSI TS 102 622 [4]). This information shall be provided by the DUT manufacturer.

The test procedure shall be executed once for each of following parameters:

* There are no test case specific parameters for this test case.

##### 5.8.5.2.2 Initial conditions

* Initialization of ISO/IEC 14443-3 [] Type A protocol was successfully performed; a CLT session (ISO/IEC 14443-3 [] Type A) is opened, and no further CLT frame exchange is expected.

##### 5.8.5.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | PCD 🡪 T | Transmit RF frame with payload of 4 RF bytes (arbitrary chosen) to the terminal |  |
| 2 | T 🡪 UICC | Send a "no administrative command" CLT frame in Type A aligned format containing the given RF data | RQ3,  RQ4 |
| 3 | UICC 🡪 T | Respond a "no administrative command" CLT frame in Type A aligned format containing 18 bytes (arbitrary chosen) of RF data (encoded in CLT PAYLOAD) |  |
| 4 | T 🡪 PCD | Transmit RF frame to the terminal containing the resulting RF data | RQ8 |

### 5.8.6 CLT Frame Interpretation

#### 5.8.6.1 CLT frames with Type A aligned DATA\_FIELD

##### 5.8.6.1.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 11.5.1.

|  |  |
| --- | --- |
| RQ1 | When the CLF receives a CLT frame with Type A aligned DATA\_FIELD, the bit count shall be retrieved implicitly from the length of the CLT PAYLOAD, where the interpretation rule is defined as table 11.3 in ETSI TS 102 613 []. |
| RQ2 | When the CLF sends a CLT frame with Type A aligned DATA\_FIELD, the size of the CLT PAYLOAD shall be determined according to table 11.2 in ETSI TS 102 613 [] and the number of RF bits to be sent. |
| RQ3 | When the CLF receives a CLT frame with Type A aligned DATA\_FIELD it shall interpret it as an instruction to send N full bytes plus N parity bits over the RF where N is determined from the size of the DATA\_FIELD according to table 11.3, for 1 ≤ N ≤ 25. |
| RQ4 | When the CLF receives a CLT frame with a Type A aligned DATA\_FIELD of a size of one byte it shall interpret it as an instruction to send the least significant 4 bits over the RF. |
| NOTE: RQ1to RQ4 are tested in clause 5.9.2.1. | |

#### 5.8.6.2 Handling of DATA\_FIELD by the CLF

##### 5.8.6.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 11.5.2.

|  |  |
| --- | --- |
| RQ1 | For ISO/IEC 14443-3 [] Type A, after the CLF has received an RF frame, a CLT frame with all RF data in the DATA\_FIELD shall be composed and sent to the UICC except for the first frame after RF protocol initialization. |
| RQ2 | For ISO/IEC 14443-3 [] Type A, after reception of a CLT frame from the UICC, the CLF shall transmit the received data via RF if the CLT frame included a DATA\_FIELD, if no DATA\_FIELD was present then no data shall be transmitted via RF. |
| NOTE 1: The 2nd part of RQ1 is covered in clause 5.8.6.3.1.  NOTE 2: RQ1 is tested in clause 5.9.2.1.2.  NOTE 3: RQ2 is tested in clause 5.9.2.2.2. | |

#### 5.8.6.3 Handling of ADMIN\_FIELD

##### 5.8.6.3.1 CL\_PROTO\_INF(A)

5.8.6.3.1.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 11.5.3.1 and 11.2a.

|  |  |
| --- | --- |
| RQ1 | CL\_PROTO\_INF(A) shall be sent by the CLF to the UICC after every successful ISO/IEC 14443‑3 [] Type A RF protocol initialization. |
| RQ2 | After the CLF has sent the SAK as per ISO/IEC 14443-3 [], on reception of the 1st RF frame, if the error detection code is correct and the RF frame is a Type A standard frame as per ISO/IEC 14443-3 [] with CRC\_A appended, and the first byte is not 'E0', '50', '93', '95' or '97', the CLF shall compose a CLT frame with ADMIN\_FIELD set to CL\_PROTO\_INF(A) and shall attach the received RF data as DATA\_FIELD. The RF-type specific error detection code shall not be included and the DATA\_FIELD shall be coded in "byte‑aligned" manner. |
| RQ3 | After the CLF has sent the SAK as per ISO/IEC 14443-3 [], on reception of the 1st RF frame,if the first byte is equal to 'E0' (command "RATS" as per ISO/IEC 14443-4 []), then the CLF shall continue ISO/IEC 14443-4 [] processing using a higher level protocol out of scope of the present document, no CLT frame shall be sent to the UICC. |
| RQ4 | After the CLF has sent the SAK as per ISO/IEC 14443-3 [], on reception of the 1st RF frame, if the length of the RF data exceeds the maximum size of the DATA\_FIELD, no CLT frame shall be sent to the UICC. |
| RQ5 | For ISO/IEC 14443-3 [] Type A, initialization (anti-collision and selection) of the RF protocol is performed by the CLF without UICC involvement. |
| RQ6 | During ISO/IEC 14443-3 [] Type A RF protocol initialization, the CLF shall not send CLT frames. |
| NOTE 1: Development of test cases for RQ4 is FFS.  NOTE 2: Test cases for RQ3 are out of scope of the present document.  NOTE 3: RQ6 is FFS. | |

5.8.6.3.1.2 Test case 1: opening a CLT session with CL\_PROTO\_INF(A)

5.8.6.3.1.2.1 Test execution

Execution of this test case might require the support of an upper layer (e.g. HCI as per ETSI TS 102 622 [4]). This information shall be provided by the DUT manufacturer.

The test procedure shall be executed once for each valueof the following parameters:

* The UICC simulator shall indicate in ACT\_SYNC frames that extended bit durations are not supported. (Value 1).
* The UICC simulator shall indicate support of extended bit duration down to 0,590 µs in the ACT\_INFORMATION field of ACT\_SYNC frames. (Value 2).

5.8.6.3.1.2.2 Initial conditions

* The SWP interface is idle (in any state), i.e. no further communication is expected.
* The RF field is not on.

5.8.6.3.1.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | PCD 🡪 T | Turn on RF field |  |
| 2 | T 🡪 UICC | Terminal may communicate with UICC as required; for example, activate the SWP interface if necessary, and send EVT\_FIELD\_ON as specified in ETSI TS 102 622 [] |  |
| 3 | PCD 🡨🡪 T | Perform initialization of the RF ISO/IEC 14443-3 [] Type A protocol (with anti‑collision and selection) | RQ5 |
| 4 | PCD 🡪 T | Transmit RF frame with payload of 4 RF bytes to the terminal, where the 1st byte is set to '30', the 2nd byte to '00', and the bytes 3 and 4 represent the correct CRC as per ISO/IEC 14443-3 [] Type A | RQ1 |
| 5 | T 🡪 UICC | If Value 1 is being executed and the terminal supports O\_CLT\_A\_EXTENDED\_ONLY, then any CLT frame sent over SWP is a failure of the terminal. If no CLT frame is sent during 1 s, the test procedure is stopped and considered as passed.  Otherwise, send CLT frame with administrative command CL\_PROTO\_INF(A) in byte aligned format containing the 1st and 2nd byte of the given RF data | RQ2 |
| 6 | UICC 🡪 T | Respond "no administrative command" CLT frame in Type A aligned format containing 18 (arbitrary chosen) RF bytes (encoded in CLT PAYLOAD) |  |
| 7 | T 🡪 PCD | Transmit RF frame to the terminal containing the resulting RF data |  |
| 8 | PCD 🡪 T | Send REQA to the terminal |  |
| 9 | T 🡪 UICC | Forward the RF data to the UICC by means of a CLT frame with ADMIN\_FIELD set to 0000 and having a DATA\_FIELD length of 1 byte |  |
| 10 | UICC 🡪 T | Respond CLT frame with the ADMIN\_FIELD CL\_GOTO\_INIT and no DATA\_FIELD present. |  |
| 11 | T | Send no RF frame to the PCD |  |
| 12 | PCD 🡨🡪 T | Perform initialization of the RF ISO/IEC 14443-3 [] Type A protocol (with anti‑collision and selection) (see note) |  |
| 13 | PCD 🡪 T | Transmit RF frame with payload of 4 RF bytes to the terminal, where the 1st byte is set to '60', the 2nd byte to '04', and the bytes 3 and 4 represent the correct CRC as per ISO/IEC 14443-3 [] Type A |  |
| 14 | T 🡪 UICC | Send CLT frame with administrative command CL\_PROTO\_INF(A) in byte aligned format containing the 1st and 2nd byte of the given RF data | RQ1 |
| NOTE: The PCD starts with REQA without cutting off the RF field. | | | |

##### 5.8.6.3.2 CL\_PROTO\_INF(F)

5.8.6.3.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 11.5.3.2.

|  |  |
| --- | --- |
| RQ1 | A CLT frame with the ADMIN\_FIELD CL\_PROTO\_INF(F) shall be sent by the CLF to the UICC after every reception of an anticollision command ("POLLING REQUEST" command) from RF if the CLF is configured to do so. |
| RQ2 | When the CLF has received the initialization command as defined in ISO/IEC 18092 [] for 212 kbps/424 kbps passive mode ("POLLING REQUEST", command code '00'), it shall forward the received RF data (including the LEN and RF CRC field) to the UICC encapsulated as byte aligned DATA\_FIELD in a CLT frame with the ADMIN\_FIELD CL\_PROTO\_INF(F) |
| RQ3 | On reception of a CLT frame with ADMIN\_FIELD (0000)b, the CLF shall interpret the DATA\_FIELD as initialization response ("POLLING RESPONSE", Command Code '01', including the LEN and RF CRC field), and send it out on RF side according to the initialization procedure as defined in ISO/IEC 18092 [] for 212 kbps/424 kbps passive mode |
| RQ4 | If the CLF has received a CLT frame without a DATA\_FIELD with respect to ISO/IEC 18092 [] and 212 kbps/424 kbps passive mode, the CLF shall not transmit any data via RF |

5.8.6.3.2.2 Test case 1: opening a CLT session with CL\_PROTO\_INF(F)

5.8.6.3.2.2.1 Test execution

Execution of this test case might require the support of an upper layer (e.g. HCI as per ETSI TS 102 622 [4]). This information shall be provided by the DUT manufacturer.

The test procedure shall be executed once, using the following parameters within the test procedure.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| POLLING REQUEST | | | | | POLLING RESPONSE | | | | | |
| LEN | Payload | | | | LEN | Payload | | | | UICC processing time |
| 1st | 2nd~3rd | 4th | 5th | 1st | 2nd~9th | 10th~17th | 18th~19th |
| '06' | '00' | 'FFFF' | '01' | '00' | '14' | '01' | '02FE000000000000' | 'FFFFFFFFFFFFFFFF' | '8EFC' | 1145 µs |
| '06' | '00' | 'FFFF' | '01' | '03' | '14' | '01' | '02FE000000000000' | 'FFFFFFFFFFFFFFFF' | '8EFC' | 500 µs |
| '06' | '00' | 'FFFF' | '01' | '0F' | '14' | '01' | '02FE000000000000' | 'FFFFFFFFFFFFFFFF' | '8EFC' | 100 µs |
| '06' | '00' | '8EFC' | '00' | '00' | '12' | '01' | '02FE000000000000' | 'FFFFFFFFFFFFFFFF' | none | 1150 µs |
| '06' | '00' | '8EFC' | '00' | '03' | '12' | '01' | '02FE000000000000' | 'FFFFFFFFFFFFFFFF' | none | 500 µs |
| '06' | '00' | '8EFC' | '00' | '0F' | '12' | '01' | '02FE000000000000' | 'FFFFFFFFFFFFFFFF' | none | 100 µs |
| '06' | '00' | '8EFC' | '01' | '00' | '14' | '01' | '02FE000000000000' | 'FFFFFFFFFFFFFFFF' | '8EFC' | 1150 µs |
| '06' | '00' | '8EFC' | '01' | '03' | '14' | '01' | '02FE000000000000' | 'FFFFFFFFFFFFFFFF' | '8EFC' | 500 µs |
| '06' | '00' | '8EFC' | '01' | '0F' | '14' | '01' | '02FE000000000000' | 'FFFFFFFFFFFFFFFF' | '8EFC' | 100 µs |
| NOTE: The UICC processing time is defined as the time between the last data bit received over SWP and the first bit sent over SWP where: - The last data bit received over SWP is the end of the last bit of EOF on signal S1. - The first bit sent over SWP is the start of the resume on signal S2. | | | | | | | | | | |

5.8.6.3.2.2.2 Initial conditions

* The SWP interface is idle (in any state), i.e. no further communication is expected.
* The RF field is not on.

5.8.6.3.2.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 0 |  | For each parameter in the test execution clause, perform steps 1 to 7 |  |
| 1 | PCD 🡪 T | Turn on RF field |  |
| 2 | T 🡪 UICC | Terminal may communicate with UICC as required; for example, activate the SWP interface if necessary, or send EVT\_FIELD\_ON as specified in ETSI TS 102 622 [] |  |
| 3 | PCD 🡪 T | Transmit RF initialization command (POLLING REQUEST) frame |  |
| 4 | T 🡪 UICC | Send CLT frame with administrative command CL\_PROTO\_INF(F)  containing the given RF data | RQ1,  RQ2 |
| 5 | UICC 🡪 T | Respond "no administrative command" CLT frame in byte aligned format  containing RF bytes as defined in ISO/IEC 18092 [] for 212 kbps/424 kbps passive mode using the UICC processing time specified in the test execution clause |  |
| 6 | T 🡪 PCD | Transmit RF frame (POLLING RESPONSE ) to PCD in one of the available time slot(s) according to the initialization procedure as defined in ISO/IEC 18092 [] for 212 kbps/424 kbps passive mode | RQ3 |
| 7 | PCD  T | Turn off RF field |  |

5.8.6.3.2.3 Test case 2: empty CLT(F) Frame

5.8.6.3.2.3.1 Test execution

Execution of this test case might require the support of an upper layer (e.g. HCI as per ETSI TS 102 622 [4]). This information shall be provided by the DUT manufacturer.

The test procedure shall be executed once, using the following parameters within the test procedure.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| POLLING REQUEST in step 7 | | | | | POLLING RESPONSE in step 9 | | | | | |
| LEN | Payload | | | | LEN | Payload | | | | UICC processing time in steps 5 and 9 |
| 1st | 2nd~3rd | 4th | 5th | 1st | 2nd~9th | 10th~17th | 18th~19th |
| '06' | '00' | '8EFC' | '00' | '00' | '12' | '01' | '02FE000000000000' | 'FFFFFFFFFFFFFFFF' | none | 1145 µs |
| '06' | '00' | '8EFC' | '00' | '00' | '12' | '01' | '02FE000000000000' | 'FFFFFFFFFFFFFFFF' | none | 500 µs |
| '06' | '00' | '8EFC' | '00' | '00' | '12' | '01' | '02FE000000000000' | 'FFFFFFFFFFFFFFFF' | none | 100 µs |
| NOTE: The UICC processing time is defined as the time between the last data bit received over SWP and the first bit sent over SWP where: - The last data bit received over SWP is the end of the last bit of EOF on signal S1. - The first bit sent over SWP is the start of the resume on signal S2. | | | | | | | | | | |

5.8.6.3.2.3.2 Initial conditions

* The SWP interface is idle (in any state), i.e. no further communication is expected.
* The RF field is not on.

5.8.6.3.2.3.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 0 |  | For each parameter in the test execution clause, perform steps 1 to 11 |  |
| 1 | PCD 🡪 T | Turn on RF field |  |
| 2 | T 🡪 UICC | Terminal may communicate with UICC as required; for example, activate the SWP interface if necessary, and send EVT\_FIELD\_ON as specified in ETSI TS 102 622 [] |  |
| 3 | PCD 🡪 T | Transmit RF frame with payload of the initialization command (POLLING REQUEST) as defined in ISO/IEC 18092 [] 212 kbps/424 kbps passive mode, where the Length is set to '06', 1st byte to '00', 2nd and 3rd bytes to '8EFD', 4th byte to '00', TSN to '00', and bytes 5 and 6 represent the correct CRC |  |
| 4 | T 🡪 UICC | Send CLT frame with administrative command CL\_PROTO\_INF(F)  containing the given RF data | RQ1,RQ2 |
| 5 | UICC 🡪 T | Respond "no administrative command" CLT frame in byte aligned format without a DATA\_FIELD with respect to ISO/IEC 18092 [] and 212 kbps/424 kbps passive mode using the UICC processing time specified in the test execution clause |  |
| 6 | T 🡪 PCD | Send no RF frame to the PCD | RQ4 |
| 7 | PCD 🡪 T | Transmit RF initialization command (POLLING REQUEST) frame |  |
| 8 | T 🡪 UICC | Send CLT frame with administrative command CL\_PROTO\_INF(F)  containing the given RF data as defined in the test execution | RQ1,  RQ2 |
| 9 | UICC 🡪 T | Respond "no administrative command" CLT frame in byte aligned format  containing RF bytes as defined in the test execution as defined in ISO/IEC 18092 [] for 212 kbps/424 kbps passive mode using the UICC processing time specified in the test execution clause |  |
| 10 | T 🡪 PCD | Transmit RF frame (POLLING RESPONSE ) to PCD in one of the available time slot(s) according to the initialization procedure as defined in ISO/IEC 18092 [] for 212 kbps/424 kbps passive mode. | RQ3 |
| 11 | PCD  T | Turn off RF field. |  |

5.8.6.3.2.4 Test case 3: RF off during CLT session not expecting Empty CLT

5.8.6.3.2.4.1 Test execution

Execution of this test case might require the support of an upper layer (e.g. HCI as per ETSI TS 102 622 [4]). This information shall be provided by the DUT manufacturer.

The test procedure shall be executed once for each of the following parameters:

The timings of RF off in step 6 are 400, 800, 1200, 1600, 2000, 2400, 2800, 3200, 3600, 4000 µs after the beginning of sending the command in step 3.

5.8.6.3.2.4.2 Initial conditions

* The SWP interface is idle (in any state), i.e. no further communication is expected.
* The RF field is not on.

5.8.6.3.2.4.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | PCD 🡪 T | Turn on RF field |  |
| 2 | T 🡪 UICC | Terminal may communicate with UICC as required; for example, activate the SWP interface if necessary, and send EVT\_FIELD\_ON as specified in ETSI TS 102 622 [] |  |
| 3 | PCD 🡪 T | Transmit RF frame with payload of the initialization command (POLLING REQUEST) as defined in ISO/IEC 18092 [] 212 kbps/424 kbps passive mode, where the Length is set to '06', 1st byte to '00', 2nd and 3rd bytes to 'FFFF', 4th byte to '01', 5th byte to '00', and bytes 6 and 7 represent the correct CRC at 212 kbps. |  |
| 4 | Conditional | Depending on the timing for the RF field off as defined in the test execution, step 4 may happen.  A CLT frame with administrative command CL\_PROTO\_INF(F) containing the given RF data as defined in step 3 may be sent by the terminal to the UICC.  If the UICC receives this CLT frame it shall respond "no administrative command" CLT frame in byte aligned format containing RF bytes as defined in ISO/IEC 18092 [] for 212 kbps/424 kbps passive mode, where the Length is set to '14', 1st byte to '01', 2nd to 9th bytes to '02FE000000000000', 10th to 17th bytes to 'FFFFFFFFFFFFFFFF', 18th and 19th bytes to '8EFC', bytes 20 and 21 represent the correct CRC, and UICC shall use a processing time of 1 150 µs. |  |
| 5 | Conditional | If the terminal have the time to receive the CLT frame described above it may start the polling response to the PCD. |  |
| 6 | PCD 🡪 T | Turn off RF field after the time as defined in the test execution. |  |
| 7 | T 🡪 UICC | Terminal may communicate with UICC as required; for example, send EVT\_FIELD\_OFF as specified in ETSI TS 102 622 [] |  |
| 8 | PCD 🡪 T | Wait 5ms and turn on RF field. |  |
| 9 | T 🡪 UICC | Terminal may communicate with UICC as required; for example, send EVT\_FIELD\_ON as specified in ETSI TS 102 622 [] |  |
| 10 | PCD 🡪 T | 20.4ms after step 8, transmit RF frame with payload of the initialization command (POLLING REQUEST) as defined in ISO/IEC 18092 [] 212 kbps/424 kbps passive mode, where the Length is set to '06', 1st byte to '00', 2nd and 3rd bytes to '8EFC', 4th byte to '00', 5th byte to '00', and bytes 6 and 7 represent the correct CRC at 212 kbps. |  |
| 11 | T 🡪 UICC | Send CLT frame with administrative command CL\_PROTO\_INF(F)  containing the given RF data as defined in the test execution | RQ1,  RQ2 |
| 12 | UICC 🡪 T | Respond “no administrative command” CLT frame in byte aligned format  containing RF bytes as defined in ISO/IEC 18092 [] for 212 kbps/424 kbps passive mode, where the Length is set to '12', 1st byte to '01', 2nd to 9th bytes to '02FE000000000000', 10th to 17th bytes to 'FFFFFFFFFFFFFFFF', bytes 18 and 19 represent the correct CRC, and UICC processing time to 1 150 µs. |  |
| 13 | T 🡪 PCD | Transmit RF frame (POLLING RESPONSE ) to PCD in the first time slot according to the initialization procedure as defined in ISO/IEC 18092 [] for 212 kbps/424 kbps passive mode at 212 kbps. | RQ3 |
| 14 | PCD  T | Turn off RF field. |  |

5.8.6.3.2.5 Test case 4: RF off during CLT session expecting Empty CLT

5.8.6.3.2.5.1 Test execution

Execution of this test case might require the support of an upper layer (e.g. HCI as per ETSI TS 102 622 [4]). This information shall be provided by the DUT manufacturer.

The test procedure shall be executed once for each of the following parameters:

The timings of RF off in step 6 are 400, 800, 1200, 1600, 2000, 2400, 2800, 3200, 3600, 4000 µs after the beginning of sending the command in step 3.

5.8.6.3.2.5.2 Initial conditions

* The SWP interface is idle (in any state), i.e. no further communication is expected.
* The RF field is not on.

5.8.6.3.2.5.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | PCD 🡪 T | Turn on RF field |  |
| 2 | T 🡪 UICC | Terminal may communicate with UICC as required; for example, activate the SWP interface if necessary, and send EVT\_FIELD\_ON as specified in ETSI TS 102 622 [] |  |
| 3 | PCD 🡪 T | Transmit RF frame with payload of the initialization command (POLLING REQUEST) as defined in ISO/IEC 18092 [] 212 kbps/424 kbps passive mode, where the Length is set to '06', 1st byte to '00', 2nd and 3rd bytes to '8EFD', 4th byte to '00', 5th byte to '00', and bytes 6 and 7 represent the correct CRC at 212 kbps. |  |
| 4 | Conditional | Depending on the timing for the RF field off as defined in the test execution, step 4 may happen.  A CLT frame with administrative command CL\_PROTO\_INF(F) containing the given RF data as defined in step 3 may be sent by the terminal to the UICC.  If the UICC receives this CLT frame it shall respond "no administrative command" CLT frame in byte aligned format without a DATA\_FIELD with respect to ISO/IEC 18092 [] and 212 kbps/424 kbps passive mode, where UICC processing time to 1 150 µs. |  |
| 5 | Conditional | Even if the terminal receives the CLT frame described above it shall not send anything to the PCD. |  |
| 6 | PCD 🡪 T | Turn off RF field after the time as defined in the test execution. |  |
| 7 | T 🡪 UICC | Terminal may communicate with UICC as required; for example, send EVT\_FIELD\_OFF as specified in ETSI TS 102 622 [] |  |
| 8 | PCD 🡪 T | Wait 5ms and turn on RF field. |  |
| 9 | T 🡪 UICC | Terminal may communicate with UICC as required; for example, send EVT\_FIELD\_ON as specified in ETSI TS 102 622 [] |  |
| 10 | PCD 🡪 T | 20.4ms after step 8, transmit RF frame with payload of the initialization command (POLLING REQUEST) as defined in ISO/IEC 18092 [] 212 kbps/424 kbps passive mode, where the Length is set to '06', 1st byte to '00', 2nd and 3rd bytes to '8EFC', 4th byte to '00', 5th byte to '00', and bytes 6 and 7 represent the correct CRC at 212 kbps. |  |
| 11 | T 🡪 UICC | Send CLT frame with administrative command CL\_PROTO\_INF(F)  containing the given RF data as defined in the test execution | RQ1,  RQ2 |
| 12 | UICC 🡪 T | Respond "no administrative command" CLT frame in byte aligned format  containing RF bytes as defined in ISO/IEC 18092 [] for 212 kbps/424 kbps passive mode, where the Length is set to '12', 1st byte to '01', 2nd to 9th bytes to '02FE000000000000', 10th to 17th bytes to 'FFFFFFFFFFFFFFFF', bytes 18 and 19 represent the correct CRC, and UICC processing time to 1 150 µs. |  |
| 13 | T 🡪 PCD | Transmit RF frame (POLLING RESPONSE ) to PCD in the first time slot according to the initialization procedure as defined in ISO/IEC 18092 [] for 212 kbps/424 kbps passive mode at 212 kbps. | RQ3 |
| 14 | PCD  T | Turn off RF field. |  |

##### 5.8.6.3.3 CL\_GOTO\_INIT and CL\_GOTO\_HALT

5.8.6.3.3.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 11.5.3.3.

|  |  |
| --- | --- |
| RQ1 | If the CLF was selected from IDLE state and the CLF receives a ADMIN\_FIELD containing CL\_GOTO\_INIT the CLF shall enter the IDLE state. |
| RQ2 | If the CLF was selected from HALT state and the CLF receives a ADMIN\_FIELD containing CL\_GOTO\_INIT the CLF shall enter the HALT state. |
| RQ3 | If the CLF receives a ADMIN\_FIELD containing CL\_GOTO\_HALT the CLF shall enter the HALT state. |
| RQ4 | After the transition to ISO/IEC 14443-3 [] "IDLE" or "HALT" state, the CLF shall process ISO/IEC 14443‑3 [] Type A RF protocol initialization, and proceed as described in clause 11.5.3.1 in ETSI TS 102 613 []. |
| NOTE: These RQs are tested in clause 5.9.2.2.2. | |

### 5.8.7 CLT Protocol Rules

#### 5.8.7.1 Rules for the CLF

##### 5.8.7.1.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 11.6.

|  |  |
| --- | --- |
| RQ1 | In order to open a new CLT session, the CLF shall send a CLT frame with ADMIN\_FIELD set to CL\_PROTO\_INF(A) or CL\_PROTO\_INF(F) to the UICC and shall close also any former CLT session. |
| RQ2 | After having sent a CLT frame with ADMIN\_FIELD set to CL\_PROTO\_INF(A), subsequently sent CLT frames within the CLT session shall be coded in Type A aligned manner. |
| RQ3 | During a CLT session, on reception of a corrupted SWP frame or a CLT frame which contains an ADMIN\_FIELD set to a value which is reserved for future use, the CLF shall maintain the CLT LLC layer. |
| NOTE: Development of test cases for RQ1 to RQ3 is FFS. | |

#### 5.8.7.2 Rules for the UICC

Reference: ETSI TS 102 613 [], clause 11.6.2.

There are no conformance requirements for the terminal for the referenced clause.

## 5.9 Timing and performance

### 5.9.1 SHDLC Data transmission mode

#### 5.9.1.1 CLF processing delay when receiving data over an RF-link

##### 5.9.1.1.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 12.1.1.

|  |  |
| --- | --- |
| RQ1 | The CLF shall be able to send one or multiple I-frames over the SWP link to the UICC. |
| RQ2 | The CLF shall respect TCLF,Shdlc,Receive as specified in ETSI TS 102 613 []. |
| RQ3 | The CLF shall start the transmission of the RF acknowledgement, where required by the RF protocol, before the last bit of data related to it has been sent over SWP. |
| NOTE: RQ1 to RQ3 are tested in clause 5.9.1.2.2. | |

#### 5.9.1.2 CLF processing delay when sending data over an RF-link

##### 5.9.1.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 12.1.2.

|  |  |
| --- | --- |
| RQ1 | When receiving data from the UICC in one or multiple I-frames; the CLF shall remove the frame fragmentation. |
| RQ2 | The CLF shall transmit the data conveyed by those I-frames over RF, fragmenting where necessary. |
| RQ3 | The CLF shall respect TCLF,Shdlc,Transmit as specified in ETSI TS 102 613 []. |
| NOTE: In the current version of the specification RQ1 to RQ3 are only tested for non chained RF frames. | |

Reference: ETSI TS 102 613 [], clause 12.1.1.

|  |  |
| --- | --- |
| RQ4 | The CLF shall be able to send one or multiple I-frames over the SWP link to the UICC. |
| RQ5 | The CLF shall respect TCLF,Shdlc,Receive as specified in ETSI TS 102 613 []. |
| RQ6 | The CLF shall start the transmission of the RF acknowledgement, where required by the RF protocol, before the last bit of data related to it has been sent over SWP. |
| NOTE: In the current version of the specification RQ4 to RQ6 are only tested for non chained RF frames. | |

##### 5.9.1.2.2 Test case 1: Transceiving non-chained data over RF in Card Emulation

5.9.1.2.2.1 Test execution

Run this test procedure for:

* Each of the supported card emulation types (A and B).
* Each of the scenario described below.

|  |  |
| --- | --- |
| Scenario number | Number of Bytes transferred over RF |
| 1 | INT(V\_FRAME\_SIZE\_CE\*/4) |
| 2 | INT(V\_FRAME\_SIZE\_CE\*/3) |
| 3 | INT(V\_FRAME\_SIZE\_CE\*/2) |
| 4 | INT(V\_FRAME\_SIZE\_CE\*) |
| NOTE 1: V\_FRAME\_SIZE\_CE equals V\_FRAME\_SIZE\_CEA for type A and V\_FRAME\_SIZE\_CEB for type B.  NOTE 2: INT(x) refers here to the integer value of 'x'. | |

5.9.1.2.2.2 Initial conditions

* SHDLC link is established with the window size indicated in the test execution clause.
* SHDLC link is idle, i.e. no further communication is expected.

5.9.1.2.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | PCD 🡪 T | Send 1 RF frame (I-Block), with length as defined in the execution clause  As defined by ISO/IEC 14443-3 [], the end of the RF Frame is:   * For Type A: End of 'End of communication'. * For Type B: End of EOF if present, or end of last character if EOF is not present. |  |
| 2 | T  UICC  T 🡪 PCD | Forward the data payload extracted from the I-Block received on RF.  The UICC simulator shall acknowledge I-frames before the number of unacknowledged I‑frames equals the sliding window size. Acknowledge the received RF frame | RQ4, RQ5,RQ6 |
| 3 | UICC 🡪 T | Send I-Frame(s), transporting the RF data to be sent to the PCD, as defined in the execution clause.  The UICC simulator should attempt to ensure that I-frames are sent with no more than one idle bit between each I-frame. If there is any additional delay between each I-frame due to the UICC simulator, then this additional delay in the SWP transmission shall be added to the value of TCLF,shdlc,transmit. |  |
| 4 | T  PCD | Forward the I-Block(s) built from the payload of the I-Frames received on SWP from the UICC  As defined by ISO/IEC 14443-3 [], the start of the RF Frame for Type A is the start of 'Start of communication'.  The start of the RF Frame for Type B is the beginning of TR1 (see definition of TR1 in ISO/IEC 14443-3 []). | RQ1, RQ2, RQ3 |
| 5 | PCD 🡪 T | Acknowledge the received RF frame |  |

### 5.9.2 CLT data transmission mode for ISO/IEC 14443-3 Type A

#### 5.9.2.1 CLF processing delay (three subclauses)

##### 5.9.2.1.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 12.2.1.

|  |  |
| --- | --- |
| RQ1 | The CLF receives data from RF and sends it to the UICC over SWP. |
| RQ2 | When receiving from RF, the CLF shall deliver the received RF data block as DATA\_FIELD within exactly one CLT frame.  In the case where the incoming RF data block exceeds the length limit of CLT LLC, an error on the RF side or wrong RF protocol type shall be assumed and proper error handling shall be executed. |

Reference: ETSI TS 102 613 [], clause 12.2.2.

|  |  |
| --- | --- |
| RQ3 | The CLF receives data from UICC over SWP and sends it to RF. |
| RQ4 | The CLF shall deliver each received SWP data block as exactly one RF data block. |
| RQ5 | Within a CLT session, upon reception of a CLT frame, if the CRC is not correct, the CLF shall follow the rules given in clause 11.6.2 (ETSI TS 102 613 []) and in case of non-pipelining, the CLF shall not modulate the RF field. |

Reference: ETSI TS 102 613 [], clause 12.2.3.

|  |  |
| --- | --- |
| RQ6 | The total processing delay shall respect *TCLF,delay* as specified in ETSI TS 102 613 []. |

Reference: ETSI TS 102 613 [], clause 11.3.

|  |  |
| --- | --- |
| RQ7 | When sending a frame with the CLT PAYLOAD in Type A aligned structure, meaningless bits in the last byte of the CLT PAYLOAD shall be padded with 0. |

Reference: ETSI TS 102 613 [], clause 11.5.1.

|  |  |
| --- | --- |
| RQ8 | When the CLF receives a CLT frame with Type A aligned DATA\_FIELD, the bit count shall be retrieved implicitly from the length of the CLT PAYLOAD, where the interpretation rule is defined as table 11.3 in ETSI TS 102 613 []. |
| RQ9 | When the CLF sends a CLT frame with Type A aligned DATA\_FIELD, the size of the CLT PAYLOAD shall be determined according to table 11.2 in ETSI TS 102 613 [] and the number of RF bits to be sent. |
| RQ10 | When the CLF receives a CLT frame with Type A aligned DATA\_FIELD it shall interpret it as an instruction to send N full bytes plus N parity bits over the RF where N is determined from the size of the DATA\_FIELD according to table 11.3, for 1 ≤ N ≤ 25. |
| RQ11 | When the CLF receives a CLT frame with a Type A aligned DATA\_FIELD of a size of one byte it shall interpret it as an instruction to send the least significant 4 bits over the RF. |

Reference: ETSI TS 102 613 [], clause 11.5.2.

|  |  |
| --- | --- |
| RQ12 | For ISO/IEC 14443-3 [] Type A, after the CLF has received an RF frame, a CLT frame with all RF data in the DATA\_FIELD shall be composed and sent to the UICC except for the first frame after RF protocol initialization. |

NOTE 1: Test cases for RQ2, 2nd part (error situations) are out of scope of the present document.

NOTE 2: Test cases for RQ5, 2nd part (reference to clause 11.6.2 of ETSI TS 102 613 []) are given in clause 5.8.7.2 of the present document, test cases for the error situations in case of non-pipeling are out of scope of the present document.

##### 5.9.2.1.2 Test case 1: CLF processing time - Type A aligned communication, with RF response

5.9.2.1.2.1 Test execution

Execution of this test case might require the support of an upper layer (e.g. HCI as per ETSI TS 102 622 [4]). This information shall be provided by the DUT manufacturer.

The test procedure shall be executed once for each of following parameter sets:

* Payload length in RF bytes of RF frame sent from PCD to CLF.
* CLT\_PAYLOAD length of CLT frame sent from UICC to CLF.
* The combination of the two parameter above shall be as follows:

|  |  |  |
| --- | --- | --- |
| Combination number | CLT\_PAYLOAD | RF bytes |
| 1 | 29 | 1 |
| 2 | 21 | 4 |
| 3 | 16 | 10 |
| 4 | 9 | 15 |
| 5 | 5 | 18 |
| 6 | 2 | 24 |
| 7 | 1 | 25 |

5.9.2.1.2.2 Initial conditions

* CLT session (ISO/IEC 14443-3 [] Type A) is established, and no further CLT frame exchange is expected.

5.9.2.1.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | PCD 🡪 T | Send a RF frames to the terminal |  |
| 2 | T 🡪 UICC | Forward the RF data to the UICC by sending "no administrative command" CLT frame in Type A aligned format containing the given RF data | RQ1,  RQ2,  RQ6,  RQ7,  RQ9,  RQ12 |
| 3 | UICC 🡪 T | Respond "no administrative command" CLT frame in Type A aligned format containing CLT PAYLOAD (see note 2) | RQ5 |
| 4 | T 🡪 PCD | Send RF frame containing the RF response data to the PCD | RQ3,  RQ4,  RQ5,  RQ6,  RQ8,  RQ10,  RQ11 |
| NOTE 1: There may be overlapping of steps 1 and 2, and of steps 3 and 4.  NOTE 2: RQ5 shall only be validated in pipelining case. | | | |

##### 5.9.2.1.3 Test case 2: CLF processing time, no RF response

5.9.2.1.3.1 Test execution

Execution of this test case might require the support of an upper layer (e.g. HCI as per ETSI TS 102 622 [4]). This information shall be provided by the DUT manufacturer.

The test procedure shall be executed once for each of following parameter sets:

* There are no test case-specific parameters for this test case.

5.9.2.1.3.2 Initial conditions

* CLT session (ISO/IEC 14443-3 [] Type A) is established, and no further CLT frame exchange is expected.

5.9.2.1.3.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | User | Trigger the PCD to send a 1st RF frame with N = 24 bytes of RF data to the terminal, and a 2nd RF frame with N < 25 bytes of RF data immediately after delay = (TCLF,delay + UICC processing time used in step 4) related to the 1st RF frame has elapsed  Where TCLF,delay = 210 μs + (15 μs per received byte of RF data)  See note 2 |  |
| 2 | T | Receive 1st RF frame from PCD |  |
| 3 | T 🡪 UICC | Forward the the RF data of the 1st frame to the UICC by means of a CLT frame with ADMIN\_FIELD set to 0000 | RQ1,  RQ2,  RQ6 |
| 4 | UICC | Simulate the UICC processing time with a value of 150 μs between reception of the CLT command and the sending of the CLT response |  |
| 5 | UICC 🡪 T | Respond CLT frame with 0 bytes in the CLT\_PAYLOAD and with ADMIN\_FIELD set to 0000 |  |
| 6 | T | Send no RF frame to the PCD |  |
| 7 | T | Receive 2nd RF frame from PCD |  |
| 8 | T 🡪 UICC | Forward the RF data of the 2nd RF frame to the UICC by means of a CLT frame with ADMIN\_FIELD set to 0000 | RQ6 |
| NOTE 1: There may be overlapping of steps 2 and 3.  NOTE 2: The 1st RF frame is sized to 24 Bytes to be compatible with command sets used in the field, while avoiding overly constraining the CLF. | | | |

#### 5.9.2.2 Timing value for the CLF processing delay (Request Guard Time)

##### 5.9.2.2.1 Conformance requirements

Reference: ETSI TS 102 613 [], clause 12.2.4.

|  |  |
| --- | --- |
| RQ1 | The CLF shall respect TCLF,delay as described in 102 613 []. |
| RQ2 | If the PCD sends a REQA or WUPA to the CLF during a CLT session, the CLF shall forward the REQA or WUPA encapsulated in a CLT frame having a CLT\_PAYLOAD length of 1 byte to the UICC. |
| RQ3 | The CLF shall properly process a CLT frame with the ADMIN\_FIELD CL\_GOTO\_INIT and no DATA\_FIELD present. |

Reference: ETSI TS 102 613 [], clause 11.5.2.

|  |  |
| --- | --- |
| RQ4 | For ISO/IEC 14443-3 [] Type A, after reception of a CLT frame from the UICC, the CLF shall transmit the received data via RF if the CLT frame included a DATA\_FIELD, if no DATA\_FIELD was present then no data shall be transmitted via RF. |

Reference: ETSI TS 102 613 [], clause 11.5.3.3.

|  |  |
| --- | --- |
| RQ5 | If the CLF was selected from IDLE state and the CLF receives a ADMIN\_FIELD containing CL\_GOTO\_INIT the CLF shall enter the IDLE state. |
| RQ6 | If the CLF was selected from HALT state and the CLF receives a ADMIN\_FIELD containing CL\_GOTO\_INIT the CLF shall enter the HALT state. |
| RQ7 | If the CLF receives a ADMIN\_FIELD containing CL\_GOTO\_HALT the CLF shall enter the HALT state. |
| RQ8 | After the transition to ISO/IEC 14443-3 [] "IDLE" or "HALT" state, the CLF shall process ISO/IEC 14443‑3 [] Type A RF protocol initialization, and proceed as described in clause 11.5.3.1 in ETSI TS 102 613 []. |
| NOTE: How to test for RQ8 is FFS. | |

##### 5.9.2.2.2 Test case 1: CLF processing time, Request Guard Time from IDLE state - Type A state transition

5.9.2.2.2.1 Test execution

Execution of this test case might require the support of an upper layer (e.g. HCI as per ETSI TS 102 622 [4]). This information shall be provided by the DUT manufacturer.

The test procedure shall be executed once for each of following parameters:

* All RF frames provide REQA command, as per ISO/IEC 14443-3 [].
* All RF frames provide WUPA command, as per ISO/IEC 14443-3 [].

5.9.2.2.2.2 Initial conditions

* If the SHDLC link is established it shall be idle, i.e. no further communication is expected.
* The CLF is ready to perform the ISO/IEC 14443-3 [] Type A protocol initialization.

5.9.2.2.2.3 Test procedure

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Direction | Description | RQ |
| 1 | PCD 🡨 🡪 T | Perform the initialization of the RF ISO/IEC 14443-3 [] Type A protocol (with anti-collision and selection) from IDLE state |  |
| 2 | PCD 🡪 T | Send RF frame to trigger the CLF to open CLT session |  |
| 3 | T 🡪 UICC | Send CLT administrative command |  |
| 4 | UICC 🡪 T | Send response |  |
| 5 | PCD 🡪 T | Send a 1st REQA/WUPA to the terminal, and prepare to send a 2nd REQA/WUPA after Request Guard Time (ISO/IEC 14443-3 []) related to the 1st REQA/WUPA has elapsed (see step 9) |  |
| 6 | T 🡪 UICC | Forward the the RF data to the UICC by means of a CLT frame with ADMIN\_FIELD set to 0000 and having a DATA\_FIELD length of 1 byte | RQ1,  RQ2, |
| 7 | UICC | Simulate the UICC processing time between reception of the RF data and the sending of the response, with a processing time of 215 µs (see note 2). There shall not be more than 1 idle bit after the resume. The 215 µs is calculated to ensure that the CLF can respect the Request Guard Time |  |
| 8 | UICC 🡪 T | Respond CLT frame with the ADMIN\_FIELD CL\_GOTO\_INIT and no DATA\_FIELD present |  |
| 9 | T | Send no RF frame to the PCD (see note 1) | RQ4,  RQ5,  RQ6 |
| 10 | PCD 🡪 T | Send a 2nd REQA/WUPA after Request Guard Time related to the 1st REQA/WUPA has elapsed |  |
| 11 | T 🡪 PCD | Send RF frame containing the RF response ATQA as per ISO/IEC 14443‑3 [] to the PCD | RQ1,  RQ3 |
| 12 | PCD 🡨 🡪 T | Complete the initialization of the RF ISO/IEC 14443-3 [] Type A protocol (with anti-collision and selection) |  |
| 13 | PCD 🡪 T | Send RF frame to trigger the CLF to open CLT session |  |
| 14 | T 🡪 UICC | Send CLT administrative command |  |
| 15 | UICC 🡪 T | Send response |  |
| NOTE 1: Action on reception of CL\_GOTO\_INIT as per ETSI TS 102 613 [].  NOTE 2: The UICC processing time is defined as the time between the last data bit received over SWP and and the first bit sent over SWP where:  - The last data bit received over SWP is the end of the last bit of EOF on signal S1.  - The first bit sent over SWP is the start of the resume on signal S2. | | | |

##### 5.9.2.2.3 Test case y: CLF processing time, Request Guard Time from HALT state- Type A state transition

5.9.2.2.3.1 Test execution

Execution of this test case might require the support of an upper layer (e.g. HCI as per ETSI TS 102 622 [4]). This information shall be provided by the DUT manufacturer.

The test procedure shall be executed once for each of following parameters:

* none.

5.9.2.2.3.2 Initial conditions

* If the SHDLC link is established it shall be idle, i.e. no further communication is expected.
* The CLF is ready to perform the ISO/IEC 14443-3 [] Type A protocol initialization.

5.9.2.2.3.3 Test procedure

| Step | Direction | Description | RQ |
| --- | --- | --- | --- |
| 1 | PCD 🡨 🡪 T | Perform the initialization of the RF ISO/IEC 14443-3 [] Type A protocol (with anti-collision and selection) from HALT state |  |
| 2 | PCD 🡪 T | Send RF frame to trigger the CLF to open CLT session |  |
| 3 | T 🡪 UICC | Send CLT administrative command |  |
| 4 | UICC 🡪 T | Send response |  |
| 5 | PCD 🡪 T | Send a 1st WUPA to the terminal, and prepare to send a 2nd WUPA after Request Guard Time (ISO/IEC 14443-3 []) related to the 1st WUPA has elapsed (see step 9) |  |
| 6 | T 🡪 UICC | Forward the the RF data to the UICC by means of a CLT frame with ADMIN\_FIELD set to 0000 and having a DATA\_FIELD length of 1 byte | RQ1,  RQ2, |
| 7 | UICC | Simulate the UICC processing time between reception of the RF data and the sending of the response, with a processing time of 215 µs (see note 2). There shall not be more than 1 idle bit after the resume  The 215 µs is calculated to ensure that the CLF can respect the Request Guard Time |  |
| 8 | UICC 🡪 T | Respond CLT frame with the ADMIN\_FIELD CL\_GOTO\_INIT and no DATA\_FIELD present |  |
| 9 | T | Send no RF frame to the PCD (see note 1) | RQ4,  RQ5,  RQ6 |
| 10 | PCD 🡪 T | Send a 2nd WUPA after Request Guard Time related to the 1st WUPA has elapsed |  |
| 11 | T 🡪 PCD | Send RF frame containing the RF response ATQA as per ISO/IEC 14443‑3 [] to the PCD | RQ1,  RQ3 |
| 12 | PCD 🡨 🡪 T | Complete the initialization of the RF ISO/IEC 14443-3 [] Type A protocol (with anti-collision and selection) |  |
| 13 | PCD 🡪 T | Send RF frame to trigger the CLF to open CLT session |  |
| 14 | T 🡪 UICC | Send CLT administrative command |  |
| 15 | UICC 🡪 T | Send response |  |
| 16 | PCD 🡪 T | Send HLTA |  |
| 17 | T 🡪 UICC | Send "no administrative command" CLT frame in Type A aligned format containing the given RF data |  |
| 18 | UICC 🡪 T | Respond CLT frame in Type A aligned format with administrative command CL\_GOTO\_HALT and without CLT PAYLOAD |  |
| 19 | T | Enter ISO/IEC 14443-3 [] Type A HALT state |  |
| 20 | PCD 🡨 🡪 T | Verify the HALT state by applying ISO/IEC 14443-3 [] anticollision commands | RQ7 |
| NOTE 1: Action on reception of CL\_GOTO\_INIT as per ETSI TS 102 613 [].  NOTE 2: The UICC processing time is defined as the time between the last data bit received over SWP and and the first bit sent over SWP where:  - The last data bit received over SWP is the end of the last bit of EOF on signal S1.  - The first bit sent over SWP is the start of the resume on signal S2. | | | |

### 5.9.3 CLT data transmission mode for ISO/IEC 18092 212 kbps/424 kbps passive mode

Conformance requirements and test cases for this clause are FFS.

Annex A:  
Void

Annex B (informative):  
Core specification version information

Unless otherwise specified, the versions of ETSI TS 102 613 [] from which conformance requirements have been extracted are as follows.

| Release | Latest version from which conformance requirements have been extracted |
| --- | --- |
| 7 | V7.10.0 + SCP(12)000167, SCP(12)000211 |
| 8 | V8.3.0 + SCP(12)000207, SCP(12)000212 |
| 9 | V9.3.0 + SCP(12)000208, SCP(12)000213 |
| 10 | V10.0.0 + SCP(12)000209, SCP(12)000214 |
| 11 | V11.0.0 + SCP(12)000210, SCP(12)000215 |

Annex C (informative):  
Change history

This annex lists all Changes Requests (CR) applied to the present document.

| Change history | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Date | Meeting | Plenary Doc | CR | Rev | Cat | Subject/Comment | Old | New |
|  |  |  |  |  |  | Creation of the specification |  | 7.0.0 |
| 2010-07 | SCP #45 | SCP(10)0118 | 002 | - | F | Corrections to test case 5.9.2.2.2 | 7.0.0 | 7.1.0 |
| 2010-07 | SCP #45 | SCP(10)0118 | 003 | - | F | Modify test case 5.9.2.1.2 |
| SCP(10)0118 | 004 | - | F | Improved testing of idle bits |
| SCP(10)0118 | 005 | - | F | Test case 5.3.2.3.19: added RSET to last step of test case |
| SCP(10)0118 | 006 | - | F | Test case 5.6.2.2.3: clear specification of sequence numbers |
| SCP(10)0118 | 007 | - | F | Correction of specification regarding ACT\_INFORMATION |
| SCP(10)0118 | 008 | - | F | Test case 5.3.2.2.2: correction of applicability |
| SCP(10)0118 | 009 | - | F | Test case 5.3.2.5.2: removal due to redundancy |
| SCP(10)0118 | 010 | - | F | Test cases 5.6.3.2.X: Updated to send subsequent frames in order to check for response to invalid frame |
| SCP(10)0118 | 011 | - | F | Change of usage of 10 I-frames throughout specification to 9 I-frames |
| SCP(10)0118 | 014 | - | F | Removal of redundant applicability statements |
| SCP(10)0188 | 012 | 1 | F | HCP message fragmentation |
| SCP(10)0189 | 013 | 1 | F | Clarification of O\_WS\_3 |
| 2010-10 | SCP #46 | SCP(10)0221 | 015 | - | F | Clarification of Test cases 2: I-frame reception - single I-Frame reception and Test case 3: I-frame reception - multiple I-Frame reception | 7.1.0 | 7.2.0 |
| 2011-01 | SCP #47 | SCP(11)0014 | 016 |  | F | Removal of redundant options and conditional items | 7.2.0 | 7.3.0 |
| SCP(11)0015 | 017 |  | F | Removal of redundant requirement related to non-support of Class A |
| SCP(11)0016 | 019 |  | F | Correction on SHDLC link establishment |
| SCP(11)0017 | 021 |  | F | Test case 5.3.2.3.3: allow for terminals which activate ETSI TS 102 221 interface first |
| SCP(11)0018r1 | 022 | 1 | F | Correction of handling of CL\_PROTO\_INF(A) and of wrong specification of CLT\_PAYLOAD length |
| SCP(11)0019 | 023 |  | F | Corrections to test procedure 5.9.2.1.3 and 5.9.2.2.2 |
| SCP(11)0020r1 | 024 | 1 | F | Extended RESUME time and clarification of interface deactivation |
| SCP(11)0021 | 025 |  | F | Modify the applicability of test case 5.7.7.6.2 |
| SCP(11)0022 | 026 |  | F | Correction to 'only one SREJ at any one time' test case |
| SCP(11)0025 | 020 |  | F | Clarifications to CLT test cases related to REQA/WUPA |
| SCP(11)0026 | 018 |  | F | Correction of SHDLC window size negotiation |
| 2011-03 | SCP #48 | SCP(11)0102 | 029 |  | F | Correction to test case 5.4.1.5.2.2 - addition of text for activation |
| SCP(11)0103 | 030 |  | F | Corrections to test procedure 5.9.2.2.2 and add new test case 5.9.2.2.X |
| SCP(11)0104 | 031 |  | F | Addition of testing for reception of closely spaced frames |
| SCP(11)0105 | 032 |  | F | Corrections to test procedure 5.9.2.2.2 |
| 2011-03 | SCP #48 | SCP(11)0100 | 027 |  | F | Creation of Rel-8 of ETSI TS 102 694-1 to cover Rel-8 conformance requirements of ETSI TS 102 613 | 7.3.0 | 8.0.0 |
| 2011-07 | SCP #50 | SCP(11)0231r1 | 033 | 1 | F | Clarification of trigger requirements | 8.0.0 | 8.1.0 |
| SCP(11)0232 | 034 |  | F | Clarification of test execution parameters in test case 5.5.3.2 |
| 2011-12 | SCP#53 | SCP(11)0336 | 037 |  | F | Definition of the conditional item of test case 5.7.7.6.2 | 8.1.0 | 8.2.0 |
| SCP(11)0337 | 038 |  | F | Deletion of test case 5.7.7.9.3 |
| SCP(11)0339 | 040 |  | F | Correction of test procedure in clause 5.7.6.4.2 |
| SCP(11)0340 | 041 |  | C | Modification of TC 5.9.2.1.3 for better reproductibility over test tools |
| SCP(11)0341r1 | 042 | 1 | F | Correction of figure A.3.7 |
| 2012-03 | SCP#54 | SCP(12)000027r2 | 043 | 2 | F | Modify test procedure of test case 5.3.2.2.3.3 | 8.2.0 | 8.3.0 |
| SCP(12)000028r2 | 044 | 2 | F | Removal of test case 5.3.2.3.18 |
| SCP(12)000030r2 | 046 | 2 | F | Usage of PCD for low power mode TCs |
| SCP(12)000031r1 | 047 | 1 | F | Correction on TC 5.5.3.2. |
| 2012-06 | SCP#55 | SCP(12)000107 | 051 |  | F | Clarification on incorrectly formed frames | 8.2.0 | 8.3.0 |
| SCP(12)000108 | 052 |  | F | Correction of applicability of TC 5.5.4.3 and TC 5.5.4.4 |
| SCP(12)000109 | 053 |  | F | Clarification on reception of RNR vs. window size |
| SCP(12)000110 | 054 |  | F | Clarification of trigger requirements TR1 and TR2 |
| 2012-03 | SCP#54 | SCP(12)000034r1 | 048 | 1 | F | Creation of ETSI TS 102 694-1 Rel-9 | 8.3.0 | 9.0.0 |
| 2012-09 | SCP#56 | SCP(12)000178r1 | 035 | 2 | F | Correction of test execution for test case 5.7.7.3.4 | 9.0.0 | 9.1.0 |
| SCP(12)000171r1 | 045 | 3 | F | Modify the test procedure of TC 5.7.7.8.2 | 9.0.0 | 9.1.0 |
| SCP(12)000174r1 | 056 | 1 | F | Definition of rise/fall time measurement accuracy | 9.0.0 | 9.1.0 |
| SCP(12)000176r1 | 058 | 1 | F | Add missing correction to CR047rev1 (TC 5.5.3) | 9.0.0 | 9.1.0 |
| SCP(12)000177r1 | 059 | 1 | F | Addition of execution requirement TR2/TR1 to TC 5.7.7.5.3 and TC 5.7.7.5.4. | 9.0.0 | 9.1.0 |
| SCP(12)000178r1 | 035 | 2 | F | Correction of test execution for test case 5.7.7.3.4 | 9.0.0 | 9.1.0 |
| 2012-12 | SCP#57 | SCP(12)000231 | 060 |  | B | Addition of test case to check the SHDLC timings defined in ETSI TS 102 613 clause 12.1. | 9.1.0 | 9.2.0 |
| SCP(12)000232 | 061 |  | F | Clarification of communication conditions for SHDLC LLC | 9.1.0 | 9.2.0 |
| SCP(12)000236 | 063 |  | F | Correction of SWIO and Vcc deactivation requirement RQ8 according to changes in ETSI TS 102 613 | 9.1.0 | 9.2.0 |
| SCP(12)000235 | 064 |  | F | Correction of S1 measurement range for H and L states | 9.1.0 | 9.2.0 |
| SCP(12)000245 | 066 |  | F | Clarification of test case 5.7.7.3.4 to indicate allowed values in RSET frame from CLF | 9.1.0 | 9.2.0 |
| 2013-02 | SCP#58 | SCP(13)000022 | 067 |  | F | Clarification of the UICC processing time simulation | 9.1.0 | 9.2.0 |
| SCP(13)000023 | 068 |  | F | Clarification of setting uncertainty | 9.1.0 | 9.2.0 |
| SCP(13)000024 | 069 |  | F | Improved specification of UICC simulator behaviour | 9.1.0 | 9.2.0 |
| 2013-04 | SCP#59 | SCP(13)000065 | 070 |  | F | Clarification of test case 5.6.2.3.2 | 9.2.0 | 9.3.0 |
| SCP(13)000066 | 071 |  | B | Addition of test procedures for Type F | 9.2.0 | 9.3.0 |
| SCP(13)000067 | 072 |  | F | Improved definition of TR2 | 9.2.0 | 9.3.0 |
| SCP(13)000068 | 073 |  | F | Clarification of test case 5.7.7.8.2 to not allow empty I-frames | 9.2.0 | 9.3.0 |
| SCP(13)000069 | 074 |  | F | Make the content of test case 5.3.2.3.3 FFS | 9.2.0 | 9.3.0 |
| 2013-07 | SCP#60 | SCP(13)000126r1 | 076 | 1 | F | Test cases 5.5.4.3/4: clarification of interface activation | 9.3.0 | 9.4.0 |
| SCP(13)000127r1 | 077 | 1 | F | Test case 5.6.2.3.2: removal of invalid I-frame bit pattern | 9.3.0 | 9.4.0 |
| SCP(13)000128r1 | 078 | 1 | F | Test case 5.7.7.3.5: removal of unnecessary conditional statement | 9.3.0 | 9.4.0 |
| SCP(13)000130r1 | 062 | 3 | F | Modification of test case 5.7.7.6.3 to avoid inconclusive results | 9.3.0 | 9.4.0 |
| SCP(13)000147r1 | 080 | 1 | F | Section 5.5.3 correction of RQ4 and RQ8 and addition of an appropriate test case | 9.3.0 | 9.4.0 |
| 2013-10 | SCP#61 | SCP(13)000210 | 079 | 2 | B | Additional tests for Type F | 9.4.0 | 9.5.0 |
| SCP(13)000211 | 081 |  | F | Subsequent SWP interface activation no longer optional | 9.4.0 | 9.5.0 |
| SCP(13)000212 | 082 |  | F | Alignment of conditions for test case 5.5.3.3 | 9.4.0 | 9.5.0 |
| 2014-09 | SCP#62 | SCP(14)000014r2 | 085 | 2 | F | Clarification of requirements for subsequent interface activation | 9.5.0 | 9.6.0 |
| SCP(14)000015r1 | 086 | 1 | F | Modification of the SHDLC timings measurements | 9.5.0 | 9.6.0 |
| SCP(14)000016r1 | 087 | 1 | F | Correction of applicability of test case 5.3.2.3.17 | 9.5.0 | 9.6.0 |
| SCP #64 | SCP(14)000147 | 083 | 1 | F | Clarification of Start/End of RF Frame in SHDLC timings measurements. | 9.5.0 | 9.6.0 |
| SCP(14)000149r1 | 88 | 1 | F | Clarification of TR2 definition | 9.5.0 | 9.6.0 |
| 2014-09 | SCP #64 | SCP(14)000150r1 | 090 | 1 | C | Creation of Rel-10 for ETSI TS 102 694-1 | 9.6.0 | 10.0.0 |
| SCP(14)000152 | 092 |  | F | Correction of ATQA coding | 9.6.0 | 10.0.0 |
| 2014-12 | SCP #66 | SCP(14)000304 | 084 | 2 | F | CLT test cases: specification of SAK value(s) to be used | 10.0.0 | 10.1.0 |
| SCP(14)000299 | 093 |  | F | Removal of explicit ANDs in applicability table | 10.0.0 | 10.1.0 |
| SCP(14)000300r1 | 094 | 1 | F | Specification of polling commands resends | 10.0.0 | 10.1.0 |
| SCP(14)000301r1 | 095 | 1 | B | Clarification of time to wait and retransmission for response / acknowledgement | 10.0.0 | 10.1.0 |
| SCP(14)000302 | 096 |  |  | Test case 5.6.3.2.3: removal of Type F execution | 10.0.0 | 10.1.0 |
| SCP(14)000303r1 | 097 | 1 | F | Removal of a wrong test concerning SWP Initial activation in full power mode | 10.0.0 | 10.1.0 |
| 2015-02 | SCP#67 | SCP(15)000012r1 | 065 | 2 | F | Indication of bit duration support by test equipment | 10.1.0 | 10.2.0 |
| SCP(15)000013 | 098 |  | F | Test case 5.3.2.2.3: Modification of RQ8 testing | 10.1.0 | 10.2.0 |
| SCP(15)000014 | 099 |  | F | CLT test cases: modifications to allow for terminals only supporting CLT Type A with extended bit duration | 10.1.0 | 10.2.0 |
| SCP(15)000015 | 100 |  | F | Modification of TC 5.5.3.3 to avoid inconsistent results | 10.1.0 | 10.2.0 |
| 2015-04 | SCP#68 | SCP(15)000131 | 102 | - | D | Compliance with ETSI drafting rules regarding hanging paragraphs | 10.2.0 | 10.3.0 |
| 2015-07 | SCP#69 | SCPTEST(15)044014r1 | 103 | - | B | Creation of TS 102 694-1 REL-11 | 10.3.0 | 11.0.0 |
| 2015-10 | SCP#70 | SCP(15)000218r1 | 104 | 1 | F | Update of SHDLC checking to indicate inconclusive for initial conditions | 11.0.0 | 11.1.0 |
| 2015-10 | SCP#70 | SCP(15)000219r1 | 105 | 1 | F | Tidy-up of unused definitions, options and conditionals | 11.0.0 | 11.1.0 |
| 2015-10 | SCP#70 | SCP(15)000220r1 | 106 | 1 | F | Tidy-up of unused definitions, options and conditionals | 11.0.0 | 11.1.0 |
| 2015-07 | SCP#74 | SCP(16)000124r1 | 109 | 1 | F | Modification of test execution of TC 5.8.6.3.2.2 and 5.8.6.3.2.3 | 11.1.0 | 11.2.0 |
| 2016-10 | SCP#75 | SCP(16)000183r1 | 110 | 1 | F | Correction of references to accepted CRs in TS 102 613 | 11.2.0 | 11.3.0 |

# History

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| --- | --- | --- |
| **Document history** | | |
| V10.0.0 | November 2014 | Publication |
| V10.1.0 | February 2015 | Publication |
| V10.2.0 | March 2015 | Publication |
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