ETSI TS 102 694-1 V12.0.0 (2022-01)

Smart Cards;
Test specification for the
Single Wire Protocol (SWP) interface;
Part 1: Terminal features
(Release 12)

Reference
RTS/SCP-00SWPTvc00

Keywords
smart card, terminal

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Contents

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM**® and the GSM logo are trademarks registered and owned by the GSM Association.

Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Secure Element Technologies (SET).

The contents of the present document are subject to continuing work within TC SET and may change following formal TC SET approval. If TC SET modifies the contents of the present document, it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 0 early working draft;
  - 1 presented to TC SET for information;
  - 2 presented to TC SET for approval;
  - 3 or greater indicates TC SET approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

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

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

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 [1].

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 [1].

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 [1] and test cases for the host controller interface (HCI) covering both terminal and UICC are out of scope of the present 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 referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference/.

- In the case of a reference to a TC SET document, a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[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: "Cards and security devices for personal identification -- Contactless proximity objects -- Part 3: Initialization and anticollision".

[6] ISO/IEC 14443-4: "Cards and security devices for personal identification -- Contactless proximity objects -- 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

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.

- In the case of a reference to a TC SET document, a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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 Definition of terms, symbols, abbreviations and formats

3.1 Terms

For the purposes of the present document, the terms given in ETSI TS 102 613 [1] 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, the 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 [1], but which indicates a situation which should never occur

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

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

NOTE 1: Used by the TE to cause SWP communication traffic where needed in test procedures. This sequence has to 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 have to enforce occurrence of some bit stuffing in both directions.
- Some variation of frame length sent from the TE.

NOTE 2 The DUT provider have to 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 [1] 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 [1] 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
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 a) 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 [7], are used for the support column in table 4.1 a): 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 a) 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 [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 a). See clause 3.4 for the format of table 4.1 a). 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 [4]	O		O_102_622
10	void			
11	CLT, ISO/IEC 18092 [8]	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 [6] type A	O		O_CE_A
19	Card Emulation, ISO/IEC 14443-4 [6] 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 [5] Type A independently of whether the UICC indicates support of extended bit durations (see note 2)	O		O_CLT_A_FULL

Item	Option	Status	Support	Mnemonic
22	Terminal supports CLT, ISO/IEC 14443-3 [5] 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
23	Terminal keeps SWP in SUSPENDED state	O		O_TERMINAL_KEEPS_SWP_ SUSPENDED
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. NOTE 3: Support of this option by the terminal indicates that, when the UICC supports extended resume, and after the terminal receives the upper layer indication that the UICC requires no more activity on this interface, the terminal will keep SWP in SUSPENDED state and will not deactivate SWP.				

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	Rel-12 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	C001	
5.3.2.2.3	Activation of SWP in low power mode	Rel-7		C002	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	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	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	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	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	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	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	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	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	C001	
5.3.2.3.12	SWP initial activation in low power mode	Rel-7		C002	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	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	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	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	C002	
5.3.2.3.17	SWP subsequent activation in full power mode	Rel-7		C115	C115	C001	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	C001	

Test case	Description	Release	Execution requirements	Rel-7 Terminal	Rel-8 Terminal	Rel-9 Terminal	Rel-10 Terminal	Rel-11 Terminal	Rel-12 Terminal	Support
	Electrical characteristics tests									
5.4.1.3.2	Current provided in low power mode, no spikes	Rel-7		C002	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	C002	
5.4.1.4.2	Communication with S2 variation in full power mode	Rel-7		C001	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	C002	
5.4.1.5.2.2	Communication with S2 variation in full power mode	Rel-7		C001	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	C002	
	Physical transmission layer tests									
5.5.1.2	S1 waveforms, default bit duration	Rel-7		M	M	M	M	M	M	
5.5.1.3	S1 waveforms, extended bit durations	Rel-7		C013	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	C116	
5.5.4.2	Power provided in full power mode, SWP	Rel-7		C001	C001	C001	C001	C001	C001	
5.5.4.3	Switching from full to low power mode	Rel-7		C110	C110	C110	C110	C110	C110	
5.5.4.4	Switching from low to full power mode	Rel-7		C111	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	M	
5.6.2.2.3	Interpretation of incorrectly formed frames - SHDLC I-frames	Rel-7		M	M	M	M	M	M	
5.6.2.3.2	Behaviour of CLF with bit stuffing in frame	Rel-7		M	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	M	
5.6.3.2.3	Ignore ACT LLC frame reception in CLT session	Rel-7	TR3	C008	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	C011	
5.6.4.2.2	Not matching SYNC_ID verification in low power mode	Rel-7	TR3	C117	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	C009	
5.7.1.3	Error management - corrupted I-frame	Rel-7		M	M	M	M	M	M	
5.7.1.4	Error management - corrupted RR frame	Rel-7	TR1	M	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	M	
5.7.7.3.2	Link establishment by the UICC	Rel-7		M	M	M	M	M	M	
5.7.7.3.3	Link establishment and connection time out	Rel-7		M	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	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	C108	
5.7.7.3.6	Discard buffered frames on link re-establishment	Rel-7		C102	C102	C102	C102	C102	C102	
5.7.7.5.2	I-frame transmission	Rel-7	TR2/TR1 (see note)	M	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	M	

Test case	Description	Release	Execution requirements	Rel-7 Terminal	Rel-8 Terminal	Rel-9 Terminal	Rel-10 Terminal	Rel-11 Terminal	Rel-12 Terminal	Support
5.7.7.5.4	I-frame reception - multiple I-Frame reception	Rel-7	TR2/TR1 (see note)	M	M	M	M	M	M	
5.7.7.6.2	REJ transmission - multiple I-frames received	Rel-7		C101	C101	C101	C101	C101	C101	
5.7.7.6.3	REJ reception	Rel-7	TR2/TR1 (see note)	C114	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	M	
5.7.7.8.2	RNR reception	Rel-7	TR2/TR1 (see note)	M	M	M	M	M	M	
5.7.7.8.3	Empty I-frame transmission	Rel-7	TR1	M	M	M	M	M	M	
5.7.7.9.2	SREJ transmission	Rel-7		C102	C102	C102	C102	C102	C102	
5.7.7.9.4	SREJ reception	Rel-7	TR2/TR1 (see note)	C102	C102	C102	C102	C102	C102	
	CLT LLC definition tests									
5.8.5.2	ISO/IEC 14443-3 [5] Type A, no administrative command	Rel-7	TR1, TR3	C008	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	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	C113	
5.8.6.3.2.3	Empty CLT(F) Frame	Rel-7	TR1	N/A	N/A	C113	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	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	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	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	C008	
5.9.2.1.3	CLF processing time, no RF response	Rel-7	TR1, TR3	C008	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	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	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	Void
C006	Void
C007	Void
C008	IF (O_CLT_A FULL OR O_CLT_A_EXTENDED_ONLY) THEN M ELSE N/A

Conditional item	Condition
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 [6] 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 [6])		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 [5])		C	V_FRAME_SIZE_CEB
NOTE: Conditional values shall be provided if the corresponding option is supported in the table 4.1 a).				

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 [1], ETSI TS 102 221 [2], and ETSI TS 102 600 [3] (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 [1], ETSI TS 102 221 [2] and ETSI TS 102 600 [3]. 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 initializing 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 [4]). The test equipment shall provide this layer if required. Any HCI session initialization shall comply to the procedure defined in ETSI TS 102 622 [4]. 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	
V_{OH}, V_{OL}	±15 mV	
T	±25 ns	
tr, tf	±5 ns, if tr/f ≤ 100 ns ±10 ns, if tr/f > 100 ns (see note)	
$T_{S1\_HIGH\_V}$	±20 µs	
P3	±100 ns	
P4	±1 µs	
T2, T3	±100 µs	
Acknowledgements for I-frames	±100 µs	
$T_{CLF,shdlc,receive}$, $T_{CLF,shdlc,transmit}$, 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
I_{CC}	±0,1 mA	
I_H	±25 µA	
I_L	±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 [1], 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 [1], 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 [1], 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 I_H (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 [3] 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 [1]. 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 [1].

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 [4], 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 (see note 1). 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.
  - Otherwise:
    - the DUT shall be considered as failing if it does not acknowledge an I-Frame in less than 15 ms (see note 2).

NOTE 1: 14 ms was chosen in order to be less than P5 (SWP inactivity timeout).

NOTE 2: 15 ms was chosen as a value which is larger than the SHDLC timings T1 and T2.

- For terminals supporting release 9 or earlier, the behaviour of the test equipment is not specified in the current version of the present document.

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) initialization.

The following convention applies: For ISO/IEC 14443-3 [5] 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 a), 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 [1]) 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 [6] 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 [5] ACTIVE state with the following parameters:

- For terminal supporting ISO/IEC 14443-3 [5] type A, the following registry entries shall apply for the RF gate type A, ETSI TS 102 622 [4]:
  - UID_REG = '01 02 03 04' (single UID).
  - SAK = '20' (ISO/IEC 14443-4 [6] 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 [5] type B the following registry entries shall apply for the RF gate type B, ETSI TS 102 622 [4]:
  - 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 a), 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 [1]) 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 recognized 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 recognized 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 [1], 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 [1], 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 [1], clause 5.2.

RQ1	A terminal supporting SWP shall remain compliant with ETSI TS 102 221 [2].
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 [1], clause 5.3.

RQ1	The terminal shall indicate the support of SWP interface in the terminal capability as defined in ETSI TS 102 221 [2].
RQ2	If the SWP interface is activated while a session on ETSI TS 102 600 [3] interface is in progress, actions on the SWP interface shall not disturb the terminal-UICC exchange on the ETSI TS 102 600 [3] interface.
RQ3	If the SWP interface is activated while a session on the ETSI TS 102 600 [3] interface is in progress actions on the ETSI TS 102 600 [3] 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 [2] interface is in progress actions on the SWP interface shall not disturb the terminal-UICC exchange on the ETSI TS 102 221 [2] interface.
RQ5	If the SWP interface is activated while a session on the ETSI TS 102 221 [2] interface is in progress actions on the ETSI TS 102 221 [2] 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 [1], 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 [2] or ETSI TS 102 600 [3] 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 [1], 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 [1], 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 [1], clause 6.2.1.

RQ101	The terminal shall reuse the V_{CC} (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 [1], 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 [2].
RQ2	The terminal shall connect, activate and deactivate contacts C4 and C8 in accordance with the operating procedures specified in ETSI TS 102 600 [3].
RQ3	The terminal shall activate the contact C1 (V_{CC}) according to ETSI TS 102 221 [2].
RQ4	As long as V_{CC} (Contact C1) is not activated, the terminal shall keep SWIO (contact C6) deactivated (S1 state L).
RQ5	The terminal shall activate the V_{CC} (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 $T_{S1\_HIGH\_V}$ after V_{CC} (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 V_{CC} (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 [3] interface in the ATR, if sent.
- The UICC not indicating the support of the ETSI TS 102 600 [3] 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 [2] 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 [2] 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 V_{CC} 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 V_{CC} 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 [1], clause 6.2.3 (from clause 6.2.3.1 to 6.2.3.4).

The following conformance requirements apply to initial interface activation as specified in ETSI TS 102 613 [1], 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 [1], 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 [1], 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 does not 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 [1], 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 [1], 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 ($T_{S2\_ACT\_RES\_V}$).
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 2 000 µs ($T_{S2\_ACT\_FRP}$).
RQ17	For subsequent interface activation the CLF shall be able to detect an SWP resume by the UICC between 0 µs and 500 µs ($T_{S2\_ACT\_RES\_D}$).
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 [1], 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 [2] interface.
RQ19	If the terminal has activated the UICC according to ETSI TS 102 221 [2], 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 [1], clause 8.1.

RQ20	For a transition from **DEACTIVATED** state or for SWIO contact activation (preceding 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 [1], 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 [1], 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 [1].
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 [1], clause 9.4.

RQ25	The ACT LPDU shall be structured according to ETSI TS 102 613 [1].
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 [1], 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 upwards	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 is 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 $T_{S2\_ACT\_RES\_V}$ and $T_{S2\_ACT\_FRP}$, in following values and combinations:

- $T_{S2\_ACT\_RES\_V}$ between 10 µs and 50 µs; $T_{S2\_ACT\_FRP}$ between 1 950 µs and 2 000 µs.
- $T_{S2\_ACT\_RES\_V}$ between 650 µs and 700 µs; $T_{S2\_ACT\_FRP}$ 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 V_{CC} 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 [4])	
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 V_{CC}, 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 [4])	
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 mode with 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 V_{CC}, 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 [4])	
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 mode with 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 V_{CC}, 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 mode with FR=1	RQ5, RQ16
8	UICC → T	Send corrupted ACT_SYNC frame	
9	T → UICC	Send an ACT_POWER_MODE frame indicating full power mode with FR=1	RQ8, RQ16
10	UICC → T	Send corrupted ACT_SYNC frame	
11	T → UICC	Send an ACT_POWER_MODE frame indicating full power mode with 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 V_{CC}, 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 mode with FR=1	RQ5, 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	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 V_{CC}, 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 [4])	
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 mode with 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 V_{CC}, 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 [4])	
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 → 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 V_{CC}, 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 V_{CC}, 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 V_{CC}, 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 [4])	
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 V_{CC}, 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 [4])	
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 mode with 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 $T_{S2\_ACT\_RES\_V}$ and $T_{S2\_ACT\_FRP}$, in following values and combinations:

- $T_{S2\_ACT\_RES\_V}$ between 10 µs and 50 µs; $T_{S2\_ACT\_FRP}$ between 1 950 µs and 2 000 µs.

- $T_{S2\_ACT\_RES\_V}$ between 650 µs and 700 µs; $T_{S2\_ACT\_FRP}$ 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 V_{CC}, 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 [4])	
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 mode with 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, low 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 V_{CC}, 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 mode with FR=1	RQ5, RQ16
8	UICC → T	Send corrupted ACT_SYNC frame	
9	T → UICC	Send an ACT_POWER_MODE frame indicating low power mode with FR=1	RQ8, RQ16
10	UICC → T	Send corrupted ACT_SYNC frame	
11	T → UICC	Send an ACT_POWER_MODE frame indicating low power mode with 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 V_{CC}, 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 mode with FR=1	RQ5, RQ16
8	UICC	No frame	
9	T → UICC	Send an ACT_POWER_MODE frame indicating low power mode with FR=1	RQ9, RQ16
10	UICC	No frame	
11	T → UICC	Send an ACT_POWER_MODE frame indicating low power mode with 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:

- $T_{S2\_ACT\_RES\_D}$ between 10 µs and 50 µs.
- $T_{S2\_ACT\_RES\_D}$ 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 [4])	
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 V_{CC}, 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 [4])	
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 mode with 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 Behaviour of a UICC in a terminal not supporting SWP

5.3.2.4.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 6.2.4.

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

5.3.2.5 Behaviour of terminal connected to a UICC not supporting SWP

5.3.2.5.1 Conformance requirements

Reference: ETSI TS 102 613 [1], 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 [1], clause 6.2.6.

RQ1	The conditions for inactive contacts as defined in ETSI TS 102 221 [2] shall apply to contact C6.
NOTE:	There is no explicit test case for RQ1 in the present document (fully covered by other test cases).

5.4 Electrical characteristics

5.4.1 Operating conditions

5.4.1.1 Voltage and current definitions

Reference: ETSI TS 102 613 [1], clause 7.1.0.

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

5.4.1.2 Supply voltage classes

Reference: ETSI TS 102 613 [1], clause 7.1.1.

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

5.4.1.3 V_{CC}(C1) low power mode definition

5.4.1.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 7.1.2.

RQ1	A terminal shall provide a supply voltage V_{CC} in the range 1,62 V to 1,98 V.
RQ2	A terminal shall maintain V_{CC} in the specified range despite transient power consumption (spikes on I_{CC}) 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 I_{CC} 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 V_{CC}).
- UICC's current consumption is 0 mA (after activation of contact V_{CC}).

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 V_{CC} 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 [4])	
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 V_{CC} 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 [1], clause 7.1.3.

RQ1	In voltage class B, the terminal output voltage on SWIO with S1 in state H (V_{OH}) 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 (V_{OL}) 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 (V_{OH}) shall be in the range of 0,85 x V_{CC} to V_{CC} (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 (V_{OL}) shall be in the range of 0 V (see note 3) to 0,15 x V_{CC}. 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 $V_{OH\ max}$ + 0,3 V (applying the values defined for dynamic operation in ETSI TS 102 613 [1] to all periods).
NOTE 2:	The upper limit of S1 (V_{CC}) is extended to V_{CC} + 0,3V (applying the values defined for dynamic operation in ETSI TS 102 613 [1] 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 [1] 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 V_{CC} 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 [4])	
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 V_{CC} 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 [4])	
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

5.4.1.5.1 Definition

Reference: ETSI TS 102 613 [1], clause 7.1.4.0.

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 [1], 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 V_{CC} and V_{CC} + 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 V_{CC} and V_{CC} + 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 V_{CC} 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 [4])	
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 V_{CC} 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 [4])	
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 [1], 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 T_{H0} 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 T_{H0} 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 T_{H1} 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 T_{H1} 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 (preceding 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, I_H = 1 000 µA, S2 signal, I_L = 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, I_H = 1 000 µA, S2 signal, I_L = 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 [1], 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 [1], 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 [10] or ISO/IEC 18092 [8]; and does not generate an RF field on request from the UICC.
RQ11	Rel-9 upwards	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 [1], 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 [1], 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 ETSI TS 102 613 [1]), 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 [4].	
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 [4]).	
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 [1], 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 (V_{CC}(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 V_{CC} (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 V_{CC} Upon reactivating V_{CC}, 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 V_{CC} Upon reactivating V_{CC}, 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 [1], 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 [1], 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 [1], 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 inserted immediately before the 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 [1], 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 [9] on bits between SOF and EOF, which are both excluded.

The following conformance requirement is referenced to ETSI TS 102 613 [1], 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 [1], 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: behaviour 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 [1], 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 [9] on bits between SOF and EOF, which are both excluded, to compute the CRCs.
NOTE 1: There is no explicit test case for RQ1 in the present document (fully covered by other test cases). NOTE 2: Further conformance requirements for ETSI TS 102 613 [1], clause 9.2.1.4, are listed in clause 5.6.2.2.	

5.6.3 Supported LLC layers

5.6.3.1 LPDU structures

5.6.3.1.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 9.3.0.

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 [1].
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 [1], 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 [1], 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 [1], 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 [1], 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 does not 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 [5] 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 [5] 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 [5] type A data, if available, and CLT LLC transporting ISO/IEC 18092 [8] 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

5.6.4.1 ACT LPDU structure

5.6.4.1.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 9.4.0.

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-occurrence 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 [1], 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 [1], 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 [6] Type A" as described in ETSI TS 102 622 [4], 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 [6] Type A" as described in ETSI TS 102 622 [4]	
6	T	The 2nd bullet point of the procedure described in "Non ISO/IEC 14443-4 [6] Type A" as described in ETSI TS 102 622 [4] 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 [1], 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 received 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 do not 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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-occurrence 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 [1], clause 10.4.3.

RQ1	An endpoint shall only send U-Frames using modifiers specified in ETSI TS 102 613 [1].
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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 cannot 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 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 initialization has been completed. As the test case uses a different SYNC_ID, the terminal will not complete the RF initialization, 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.

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

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

5.7.7.3.5.2 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 optimize 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 [1], 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 [1], 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 [1].
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 [1], 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 [1], 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	Acknowledges 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], 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 [1], clause 11.2a.

RQ1	For ISO/IEC 14443-3 [5] 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 [8] 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 [1], 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 [1], 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 [5] 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 [5] Type A protocol was successfully performed; a CLT session (ISO/IEC 14443-3 [5] 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 [1], 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 [1].
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 [1] 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 $1 \leq N \leq 25$.
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 [1], clause 11.5.2.

RQ1	For ISO/IEC 14443-3 [5] 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 [5] 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 [1], clauses 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 [5] Type A RF protocol initialization.
RQ2	After the CLF has sent the SAK as per ISO/IEC 14443-3 [5], 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 [5] 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 [5], on reception of the 1st RF frame, if the first byte is equal to 'E0' (command "RATS" as per ISO/IEC 14443-4 [6]), then the CLF shall continue ISO/IEC 14443-4 [6] 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 [5], 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 [5] 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 [5] 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 value of 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 [4]	
3	PCD ←→ T	Perform initialization of the RF ISO/IEC 14443-3 [5] 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 [5] 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 [5] 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 [5] 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 [1], 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 [8] 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 [8] 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 [8] 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'	1 145 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	1 150 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'	1 145 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 [4]	
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 [8] 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 [8] 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	1 145 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 [4]	
3	PCD → T	Transmit RF frame with payload of the initialization command (POLLING REQUEST) as defined in ISO/IEC 18092 [8] 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 [8] 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 [8] 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 [8] 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, 1 200, 1 600, 2 000, 2 400, 2 800, 3 200, 3 600, 4 000 µs after the beginning of sending the command in step 3.

NOTE: As specified in ISO/IEC 18092 [8], the start of the frame is defined as the start of the Preamble.

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 [4].	
3	PCD → T	Transmit RF frame with payload of the initialization command (POLLING REQUEST) as defined in ISO/IEC 18092 [8] 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 (see note).	
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 [8] 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 [4].	
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 [4].	
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 [8] 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 [8] 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 [8] for 212 kbps/424 kbps passive mode at 212 kbps.	RQ3
14	PCD → T	Turn off RF field.	
NOTE: Depending on the timing of RF field off (as specified in the Test execution clause), the frame might be only partially sent before the RF field is powered off.			

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, 1 200, 1 600, 2 000, 2 400, 2 800, 3 200, 3 600, 4 000 µs after the beginning of sending the command in step 3.

NOTE: As specified in ISO/IEC 18092 [8], the start of the frame is defined as the start of the Preamble.

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 [4].	
3	PCD → T	Transmit RF frame with payload of the initialization command (POLLING REQUEST) as defined in ISO/IEC 18092 [8] 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 (see note).	
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 [8] 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 [4].	
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 [4].	
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 [8] 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 [8] 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 [8] for 212 kbps/424 kbps passive mode at 212 kbps.	RQ3
14	PCD → T	Turn off RF field.	
NOTE: Depending on the timing of RF field off (as specified in the Test execution clause), the frame might be only partially sent before the RF field is powered off.			

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 [1], 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 [5] "IDLE" or "HALT" state, the CLF shall process ISO/IEC 14443-3 [5] Type A RF protocol initialization, and proceed as described in clause 11.5.3.1 in ETSI TS 102 613 [1].
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 [1], 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 [1], 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 [1], 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 $T_{CLF,Shdlc,Receive}$ as specified in ETSI TS 102 613 [1].
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 [1], 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 $T_{CLF,Shdlc,Transmit}$ as specified in ETSI TS 102 613 [1].
NOTE: In the current version of ETSI TS 102 694-1 RQ1 to RQ3 are only tested for non chained RF frames.	

Reference: ETSI TS 102 613 [1], 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 $T_{CLF,Shdlc,Receive}$ as specified in ETSI TS 102 613 [1].
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 ETSI TS 102 694-1 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 [5], 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 $T_{CLF,shdlc,transmit}$.	
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 [5], 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 [5]).	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

5.9.2.1.1 Conformance requirements

Reference: ETSI TS 102 613 [1], 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 [1], 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 [1]) and in case of non-pipelining, the CLF shall not modulate the RF field.

Reference: ETSI TS 102 613 [1], clause 12.2.3.

RQ6	The total processing delay shall respect $T_{CLF,delay}$ as specified in ETSI TS 102 613 [1].

Reference: ETSI TS 102 613 [1], 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 [1], 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 [1].
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 [1] 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 in ETSI TS 102 613 [1], for $1 \leq N \leq 25$.
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 [1], clause 11.5.2.

RQ12	For ISO/IEC 14443-3 [5] 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 [1]) 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 [5] 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 [5] 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 = ($T_{CLF,delay}$ + UICC processing time used in step 4) related to the 1st RF frame has elapsed Where $T_{CLF,delay}$ = 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 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	

Step	Direction	Description	RQ
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 [1], clause 12.2.4.

RQ1	The CLF shall respect $T_{CLF,delay}$ as described in ETSI TS 102 613 [1].
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 [1], clause 11.5.2.

RQ4	For ISO/IEC 14443-3 [5] 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 [1], 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 [5] "IDLE" or "HALT" state, the CLF shall process ISO/IEC 14443-3 [5] Type A RF protocol initialization, and proceed as described in clause 11.5.3.1 in ETSI TS 102 613 [1].
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 [5].
- All RF frames provide WUPA command, as per ISO/IEC 14443-3 [5].

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 [5] 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 [5] 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 [5]) related to the 1st REQA/WUPA has elapsed (see step 9)	
6	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	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 [5] to the PCD	RQ1, RQ3
12	PCD ← → T	Complete the initialization of the RF ISO/IEC 14443-3 [5] 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 [1].
NOTE 2: 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.

5.9.2.2.3 Test case 2: 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 [5] 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 [5] 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 [5]) related to the 1st WUPA has elapsed (see step 9)	
6	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	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 [5] to the PCD	RQ1, RQ3
12	PCD ← → T	Complete the initialization of the RF ISO/IEC 14443-3 [5] 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 [5] Type A HALT state	
20	PCD ← → T	Verify the HALT state by applying ISO/IEC 14443-3 [5] anticollision commands	RQ7

NOTE 1: Action on reception of CL_GOTO_INIT as per ETSI TS 102 613 [1].
NOTE 2: 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.

5.9.3 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 (normative): Additional test cases

B.1 Overview

This Annex provides tests cases that cannot be implemented in a standardized way. The execution of those test is optional because some information is manufacturer dependant.

B.2 Applicability table

Table B.1 specifies the applicability of each test case introduced in this Annex. See clause 3.4 for the format of tables B.1 and B.2.

Table B.1: Applicability of tests

Clause	Test case number and description	Release	Execution requirements	Rel-7 Terminal	Rel-8 Terminal	Rel-9 Terminal	Rel-10 Terminal	Rel-11 Terminal	Support
B.5.1	Keep SWP in SUSPENDED state	Rel-9		N/A	N/A	N/A	N/A	C901	

NOTE: Although this test is applicable only from release 11 onwards it may be useful for device manufacturers evaluating terminals implemented to an earlier releases.

Table B.2: Conditional items referenced by table B.1

Conditional item	Condition
C901	IF (O_TERMINAL_KEEPS_SWP_SUSPENDED AND O_102_622) THEN M ELSE N/A

B.3 Information provided by the device supplier

The device supplier shall provide the following information:

Item	Description	Presence/Value	Status	Mnemonic
1	Time used by the CLF to wait before going into power saving mode		C	V_POWER_SAVING_TIME
NOTE: Conditional values shall be provided if the corresponding option is supported in table 4.1 a).				

B.4 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 8.3.

RQ1	8.3	REL-9	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.

B.5 Test cases

B.5.1 Test Case 1: Keep SWP in SUSPENDED state

B.5.1.1 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.

B.5.1.2 Initial conditions

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

B.5.1.3 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	
6	UICC → T	Send ACT_SYNC frame, with ACT_INFORMATION field indicating bit, The UICC support extended resume	
7	T ← → UICC	If the terminal performs initial SWP interface activation in full power mode, complete initial SWP interface activation	
8	T ← → UICC	Perform SHDLC link establishment	
9	UICC → T	Not later than P5 after the end of step 8 (see table 8.2 of ETSI TS 102 613 [1]), 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 [4]	
10	T → UICC	Send SHDLC acknowledgement	
11	T	The CLF maintains SWP in state **SUSPENDED** without occurrence of resume SWP by sending a transition sequence for at least V_POWER_SAVING_TIME (see note)	RQ1
12	UICC →T	Resume SWP	
13	T → UICC	Send transition sequence before P6 Max time	RQ1
14	UICC → T	Send I-frame	
15	T → UICC	Acknowledge I-frame	
NOTE: V_POWER_SAVING_TIME has been chosen to be able to enter into power saving mode.			

Annex C (informative): Core specification version information

Unless otherwise specified, the versions of ETSI TS 102 613 [1] from which conformance requirements have been extracted are as follows.

Release	Latest version from which conformance requirements have been extracted
7	V7.11.0
8	V8.4.0
9	V9.4.0
10	V10. 1.0
11	V11.1.0
12	V12.0.0

Annex D (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 reproducibility 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

Change history								
Date	**Meeting**	**Plenary Doc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	Old	New
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	11.0.0
2015-07	SCP#69	SCP(15)000156	103		B	Creation of ETSI TS 102 694-1 REL-11	10.2.0	11.0.0
2015-10	SCP#70	SCP(15)000218r1	104	1	F	Update of SHDLC checking to indicate inconclusive for initial conditions	10.2.0	11.0.0
2015-10	SCP#70	SCP(15)000219r1	105	1	F	Tidy-up of unused definitions, options and conditionals	10.2.0	11.0.0
2015-10	SCP#70	SCP(15)000220r1	106	1	F	Test case 5.7.7.3.5: removal of low power mode execution	10.2.0	11.0.0
2016-02	SCP#71	SCP(15)000280	101	1	F	Refinement of acknowledgement behaviour of test tool	10.2.0	11.0.0
2016-04	SCP#73	SCP(16)000063	107			Test cases 5.8.6.3.2.4/5: clarification of field off during transmitted frame	10.2.0	11.0.0
2016-04	SCP#73	SCP(16)000062	108		D	Test case 5.3.2.3.15: correction of typo – missing "low" in "power mode"	10.2.0	11.0.0
2016-07	SCP#73	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	10.2.0	11.0.0
2016-10	SCP#75	SCP(16)000183r1	110	1	F	Correction of references to accepted CRs in ETSI TS 102 613	10.2.0	11.0.0
2018-09	SCP#85	SCP(18)000152r1	111	1	B	Development of optional test case for SWP Extended Resume	10.2.0	11.0.0
2020-09	SCP#95	SCP(20)000115	114		B	Creation of Rel-12 of ETSI TS 102 694-1	11.0.0	12.0.0

History

Document history		
V12.0.0	January 2022	Publication