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Smart Cards;
UICC-Terminal interface;
Physical, electrical and logical test specification;
Part 1: Terminal features
(Release 17)

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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
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The present document is part 1 of a multi-part deliverable covering the UICC-Terminal interface; Physical, electrical and logical test specification, 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).

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Introduction

The present document defines the interface tests for the Terminal/UICC interface.

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

Application specific tests for applications residing on an UICC are specified in ETSI TS 131 121 [4].

1 Scope

The present document specifies the interface test for the Terminal/UICC.

The present document specifies the tests of:

- physical characteristics of the UICC;
- the electrical interface between the UICC and the Terminal;
- the initial communication establishment and the transport protocols;
- the application independent procedures.

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.

- 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.

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

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 102 221: "Smart Cards; UICC-Terminal interface; Physical and logical characteristics".

[2] ISO/IEC 7816-3: "Identification cards -- Integrated circuit cards -- Part 3: Cards with contacts -- Electrical interface and transmission protocols".

[3] ETSI TS 121 111: "Universal Mobile Telecommunications System (UMTS); LTE; 5G; USIM and IC card requirements (3GPP TS 21.111)".

[4] ETSI TS 131 121: "Universal Mobile Telecommunications System (UMTS); LTE; 5G; UICC-terminal interface; Universal Subscriber Identity Module (USIM) application test specification (3GPP TS 31.121)".

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

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

[7] ETSI TS 102 223: "Smart Cards; Card Application Toolkit (CAT)".

[8] GSMA SGP.22: "RSP Technical Specification".

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 referenced document (including any amendments) applies.

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

Not applicable.

3 Definition of terms, symbols, abbreviations and coding conventions

3.1 Terms

For the purposes of the present document, the following terms apply:

access conditions: set of security attributes associated with a file

data object: information coded as TLV objects, i.e. consisting of a Tag, a Length and a Value part

Dedicated File (DF): file containing access conditions and, optionally, Elementary Files (EFs) or other Dedicated Files (DFs)

directory: general term for MF, DF and ADF

Elementary File (EF): file containing access conditions and data and no other files

file: directory or an organized set of bytes or records in the UICC

file identifier: 2 bytes which address a file in the UICC

Master File (MF): unique mandatory file containing access conditions and optionally DFs and/or EFs

plug-in UICC: second format of UICC

soft power off: Terminal ends operation in a graceful way (i.e. without abruptly removing the battery/power)

SWP interface: UICC-CLF interface according to ETSI TS 102 613 [6]

3.2 Symbols

For the purposes of the present document, the following symbols apply:

f	frequency
Fi	Clock rate conversion factor
I	Current
Icc	Current at supply voltage
Lc	Length of Command data sent by the application layer in a case 3 or 4 Command
Le	Maximum length of data Expected by the application layer in response to a case 2 or 4 Command
Luicc	Exact Length of data available in the UICC to be returned in response to the case 2 or 4 Command received by the UICC
t_F	fall time

t_R	rise time
V_{CC}	Voltage at V_{CC}

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACK	ACKnowledge
ADF	Application Dedicated File
AID	Application IDentifier
ATR	Answer To Reset
BGT	Block Guard Time
BWI	Block Waiting Integer
BWT	Block Waiting Time
CLF	ContactLess Frontend
CLK	CLocK
CWI	Character Waiting Integer
CWT	Character Waiting Time
DF	Dedicated File
EDC	Error Detection Code byte
EF	Elementary File
etu	elementary time unit
FCP	File Control Parameters
GND	GrouND
GSM	Global System for Mobile communications
I/O	Input/Output
I-Block	Information-Block
ID	IDentifier
IEC	International Electrotechnical Commission
IFSC	Information Field Size for the UICC
IFSD	Information Field Size for the Terminal
INS	INStruction
ISO	International Organization for Standardization
LEN	LENgth
LSB	Least Significant Bit
LSE	Logical Secure Element
LSI	Logical Secure element Interface
MF	Master File
MSB	Most Significant Bit
N/A	Not Applicable
NAD	Node ADdress byte
PCB	Protocol Control Byte
PIN	Personal Identification Number
PPS	Protocol and Parameter Selection
R-Block	Receive-ready Block
RFU	Reserved for Future Use
RST	ReSeT
S-Block	Supervisory-Block
SFI	Short (elementary) File Identifier
SWP	Single Wire Protocol
TBD	To Be Defined
TE	Terminal Equipment
TLV	Tag Length Value
TT	Test Tool
UE	User Equipment
USIM	Universal Subscriber Identity Module
V_{CC}	Power supply input
WI	Waiting time Integer
WTX	Waiting Time eXtension
WWT	Work Waiting Time

3.4 Coding conventions

For the purposes of the present document, the following coding conventions apply.

All lengths are presented in bytes, unless otherwise stated. Each byte is represented by bits b8 to b1, where b8 is the Most Significant Bit (MSB) and b1 is the Least Significant Bit (LSB). In each representation, the leftmost bit is the MSB.

In the UICC, all bytes specified as RFU is to be set to '00' and all bits specified as RFU are to be set to 0. If the GSM and/or USIM application exists on a UICC or is built on a generic telecommunications card, then other values may apply for the non- GSM or non-USIM applications. The values will be defined in the appropriate specifications for such cards and applications. These bytes and bits are not to be interpreted by a Terminal in a GSM or 3G session.

The coding of all data objects in the present document is according to ETSI TS 102 221 [1]. All data objects are BER-TLV except if otherwise defined.

3.5 Applicability

3.5.1 Applicability of the present document

This present test specification applies to Terminal equipment that supports UICC according to ETSI TS 102 221 [1].

3.5.2 Applicability of the individual test cases

Table A.1 lists the optional features for which the supplier of the implementation states the support.

3.5.3 Applicability to Terminal equipment

The applicability to Terminal equipment specified in Table B.1a of the present document applies, unless otherwise specified.

3.6 Definitions

3.6.1 Format of table of the table of optional features

The columns in Table A.1 have the following meaning:

Column	Meaning
Option:	The optional feature supported or not by the implementation.
Status:	See clause 3.6.3 '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 [5], are used for the support column in Table A.1: Y or y supported by the implementation. N or n not supported by the implementation. N/A, n/a or - no answer required (allowed only if the status is N/A, directly or after evaluation of a conditional status).
Mnemonic:	The mnemonic column contains mnemonic identifiers for each item.

3.6.2 Format of the applicability table

The columns in Table B.1a 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 test case is found.
From Release:	The "From Release" column specifies the Release from which a test procedure is to be executed under the conditions specified in the "Applicability" column.
Up to Release:	The "Up to Release" column specifies the Release up which a test procedure is to be executed under the conditions specified in the "Applicability" column. Blank entries indicate the latest valid release at the time of publication of the present document.
Applicability	The "Applicability" column provides information about the conditions under which a test should be carried out.
Support:	The "Support" column is blank in the proforma, and shall be completed by the manufacturer in respect of each particular requirement to indicate the choices, which have been made in the implementation.

The applicability of tests, defined in Table B.1a and the conditions and options for the applicability of tests, defined in Table B.1c, are formally expressed by the use of Boolean expressions defined in the following clause.

3.6.3 Status and Notations

The "Release X Terminal" columns show the status of the entries as follows:

The following notations, defined in ISO/IEC 9646-7 [5], 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 a 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 a 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.

3.7 Table of optional features

Table A.1: Options

Item	Option	Status	Support	Mnemonic
1	Void	O		Void
2	Void	O		Void
3	Class A	O		O_CLASS_A
4	Class B	O		O_CLASS_B
5	Class C	O		O_CLASS_C
6	Compliant to ETSI TS 121 111 [3]	O		O_COMP_121_111
7	Low impedance buffer	O		O_LIB
8	SWP interface (see note 3)	O		O_SWP
9	Support of SUSPEND UICC (see note 1)	O		O_SUSPEND_UICC
10	Terminal supports keypad	C001		O_NO_TYPE_NK
11	Terminal supports T=1 NAD selection	O		O_LSI_T1_NAD
12	Terminal supports LSIs	O		O_LSI
13	LSI configuration is pre-agreed	O		O_LSI_CONFIG_PRE_AGREED
14	Class D	O		O_CLASS_D
15	UICC in a non-removable form factor	O		O_NOT_REMOVABLE_FORM_FACTOR
16	Terminal supports usage of MANAGE LSI (reset LSE) for all LSIs (see note 2)	O		O_MANAGE_LSI_RESET_LSE
17	Terminal supports usage of MANAGE LSI (retrieve SWP) (see note 2)	O		O_MANAGE_LSI_RETRIEVE_SWP
18	Terminal supports usage of MANAGE LSI (assign SWP) (see note 2)	O		O_MANAGE_LSI_ASSIGN_SWP

C001 If feature is implemented according to Rel-8 or later then O, else M.

NOTE 1: The DUT manufacturer shall provide sufficient information for how to cause the Terminal to suspend the UICC and to resume the UICC. This could be active (e.g. a user action) or automatic (e.g. a timeout), and could involve suitable configuration of the Terminal.

NOTE 2: The DUT manufacturer shall provide information for how to cause the Terminal to send MANAGE LSI (reset LSE), MANAGE LSI (retrieve SWP) and MANAGE LSI (assign SWP).

NOTE 3: If the Terminal supports LSIs, then O_SWP shall be indicated as supported if SWP is supported on at least one of the LSEs.

3.8 Applicability table

Table B.1a: Applicability of tests

Test case	Description	From Release	Up to Release (see note 1)	Applicability	Support
4	**Physical characteristic tests**				
4.1	Contact pressure	R99		M	
4.2	Curvature of the contacting elements	R99		M	
5	**Electrical characteristic tests**				
5.1.1	Phase preceding Terminal power on	R99		M	
5.1.2.1	Phase during UICC power on: 3 V - 5 V	R99	Rel-12	C001	
		Rel-13		C009	
5.1.2.2	Phase during UICC power on: 1,8 V - 3 V	R99	Rel-12	C002	
		Rel-13		C010	
5.1.2.3	Phase during UICC power on: 1,2 V - 1,8 V	Rel-17		C016	
5.1.3.1	Phase during Terminal power off: 3 V - 5 V	R99	Rel-12	C001	
		Rel-13		C009	
5.1.3.2	Phase during Terminal power off: 1,8 V - 3 V	R99	Rel-12	C002	
		Rel-13		C010	
5.1.3.3	Phase during Terminal power off: 1,2 V - 1,2 V	Rel-17		C016	
5.1.4	Warm reset timing	R99		M	
5.1.5.1	Reaction of Terminals supporting voltage classes A and B on recognition of UICCs accepting voltage classes A and B (see note 2)	R99		C001	

Test case	Description	From Release	Up to Release (see note 1)	Applicability	Support
5.1.5.2	Reaction of Terminals supporting voltage classes A and B on recognition of UICCs accepting voltage classes B and C (see note 3)	R99		C001	
5.1.5.3	Reaction of Terminals supporting voltage classes B and C on recognition of UICCs accepting voltage classes B and C (see note 4)	R99		C002	
5.1.5.4	Reaction of Terminals supporting voltage classes B and C on recognition of UICCs accepting voltage classes A and B (see note 5)	R99		C002	
5.1.5.6.1	Reaction of Terminals receiving no ATR, 3 V - 5 V	R99		C001	
5.1.5.6.2	Reaction of Terminals receiving no ATR, 1,8 V - 3 V	R99		C002	
5.1.5.7	Reaction of Terminals supporting voltage classes C and D on recognition of UICCs accepting voltage classes C and D	Rel-17		C016	
5.1.5.8	Reaction of Terminals supporting voltage classes C and D on recognition of UICCs accepting voltage classes B and C	Rel-17		C016	
5.1.5.9	Reaction of Terminals not supporting any voltage class indicated in the ATR	Rel-14		M	
5.2.2.1	Electrical tests on contact C1, Test 1: 3 V - 5 V	R99	Rel-12	C001	
		Rel-13		C009	
5.2.2.2	Electrical tests on contact C1, Test 2: 3 V - 5 V	R99	Rel-12	C001	
		Rel-13		C009	
5.2.2.3	Electrical tests on contact C1, Test 1: 1,8 V - 3 V	R99	Rel-12	C002	
		Rel-13		C010	
5.2.2.4	Electrical tests on contact C1, Test 2: 1,8 V - 3 V	R99	Rel-12	C002	
		Rel-13		C010	
5.2.2.5	Electrical tests on contact C1, Test 1: 1,2 V - 1,8 V	Rel-17		C016	
5.2.2.6	Electrical tests on contact C1, Test 2: 1,2 V - 1,8 V	Rel-17		C016	
5.2.3.1	Electrical tests on contact C2: 3 V - 5 V	R99	Rel-12	C001	
		Rel-13		C009	
5.2.3.2	Electrical tests on contact C2: 1,8 V - 3 V	R99	Rel-12	C002	
		Rel-13		C010	
5.2.3.3	Electrical tests on contact C2: 1,2 V - 1,8 V	Rel-17		C016	
5.2.4.1	Electrical tests on contact C3: 3 V - 5 V	R99	Rel-12	C001	
		Rel-13		C009	
5.2.4.2	Electrical tests on contact C3: 1,8 V - 3 V	R99	Rel-12	C002	
		Rel-13		C010	
5.2.4.3	Electrical tests on contact C3: 1,2 V - 1,8 V	Rel-17		C016	
5.2.5.1	Electrical tests on contact C7, Test 1: 3 V - 5 V	R99	Rel-12	C001	
		Rel-13		C009	
5.2.5.2	Electrical tests on contact C7, Test 2: 3 V - 5 V	Rel-6	Rel-12	C001 AND C007	
		Rel-13		C009 AND C007	
5.2.5.3	Electrical tests on contact C7, Test 1: 1,8 V - 3 V	R99	Rel-12	C002	
		Rel-13		C010	
5.2.5.4	Electrical tests on contact C7, Test 2: 1,8 V - 3 V	Rel-6	Rel-12	C002 AND C007	
		Rel-13		C010 AND C007	
5.2.5.5	Electrical tests on contact C7, Test 1: 1,2 V - 1,8 V	Rel-17		C016	
5.2.5.6	Electrical tests on contact C7, Test 2: 1,2 V - 1,8 V	Rel-17		C016	
6	**Initial communication tests**				
6.1.1	ATR characters	R99		M	
6.1.2	ATR indicating the support of LSIs	Rel-17		C013	

Test case	Description	From Release	Up to Release (see note 1)	Applicability	Support
6.2	Clock stop mode with UICC accepting voltage classes B and C	R99		C003	
6.3	Clock stop mode with UICC accepting voltage classes A and B	R99		C004	
6.5	Speed enhancement	R99		M	
6.6	Clock stop mode with UICC accepting voltage classes C and D	Rel-17		C015	
6.7	Clock stop mode with UICC indicating no supply voltage classes	Rel-17		M	
7	**Transmission protocol tests**				
7.1.1	Bit/character duration during the transmission from the Terminal to the UICC	R99		M	
7.1.2	Bit/character duration during the transmission from the UICC to the Terminal	R99		M	
7.2.1	Timing	R99		M	
7.2.2	Command processing, ACK, NACK, NULL procedure bytes	R99		M	
7.2.3	Case 2 command, use of procedure bytes '61xx' and '6Cxx'	R99		M	
7.2.4	Case 4 command, use of procedure bytes '61xx'	R99		M	
7.2.5	Command processing, warning and error status bytes	R99		M	
7.2.6	Error correction	R99		M	
7.2.7	Error detection	R99		M	
7.3.1	Character Waiting Time	R99		M	
7.3.2	Block Timing	R99		M	
7.3.3	Block Waiting Time extension	R99		M	
7.3.4	Chaining - Respect of IFSC by Terminal	R99		M	
7.3.5	Chaining - IFSD management	R99		M	
7.3.6	I-Block error correction	R99		M	
7.3.7	I-Block error detection	R99		M	
7.3.8	R-Block error handling in non-chaining mode	R99		M	
7.3.9	R-Block error handling in chaining mode	R99		M	
7.3.10	Successive errors in both directions	R99		M	
7.3.11	Chaining - Abortion	R99		M	
7.3.12	Block repetition and resynchronization	R99		M	
7.3.13	UICC is unresponsive	R99		M	
8	**Application dependent procedures**				
8.1	UICC presence detection	R99	Rel-4	M	
9	**Commands**				
9.1.1	TERMINAL CAPABILITY - Additional interfaces support	Rel-7		C008	
9.2.1.1	SUSPEND UICC - Nominal Condition	Rel-14		C011	
9.2.1.2	SUSPEND UICC - Nominal Condition - Events	Rel-14		C012	
9.2.1.3	SUSPEND UICC - Suspension not supported by the UICC	Rel-14		C011	
9.2.1.4	SUSPEND UICC - Rejection of the UICC suspension with status word '6985	Rel-14		C011	
9.2.1.5	SUSPEND UICC - Rejection of the UICC suspension with status word '9864'	Rel-14		C011	
9.2.1.6	SUSPEND UICC - Rejection of the UICC resume with status word '6982'	Rel-14		C011	
9.2.1.7	SUSPEND UICC - Rejection of the UICC resume with status word '6982' - Events	Rel-14		C012	
9.2.1.8	SUSPEND UICC - Rejection of the UICC resume with status word '6985'	Rel-14		C011	
9.2.1.9	SUSPEND UICC - Rejection of the UICC resume with status word '6985' - Events	Rel-14		C012	
9.3.3.1	MANAGE LSI (reset LSE) - with MANAGE LSI (select LSI)	Rel-17		C018	
9.3.3.2	MANAGE LSI (reset LSE) - T=1 with NAD selection	Rel-17		C017	

Test case	Description	From Release	Up to Release (see note 1)	Applicability	Support
9.3.4	MANAGE LSI (assign SWP)	Rel-17		C020	
9.3.5	MANAGE LSI (retrieve SWP)	Rel-17		C019	
10	**Application independent features**				
10.1.3.3	Selection of an LSI in T=1 using the NAD byte	Rel-17		C014	

NOTE 1: Blank entries indicate the latest valid release at the time of publication of the present document.
NOTE 2: Up to Rel-16 test case 5.1.5.1 was named: Reaction of 3 V technology Terminals on type recognition of 3 V technology UICCs.
NOTE 3: Up to Rel-16 test case 5.1.5.2 was named: Reaction of 3 V technology Terminals on type recognition of 1,8 V technology UICCs.
NOTE 4: Up to Rel-16 test case 5.1.5.3 was named: Reaction of 1,8 V technology Terminals on type recognition of 1,8 V technology UICCs.
NOTE 5: Up to Rel-16 test case 5.1.5.4 was named: Reaction of 1,8 V technology Terminals on type recognition of 3 V technology UICCs.

Table B.1b: Void

Table B.1c: Applicability of tests (conditions and options list)

C001	IF (O_CLASS_A AND O_CLASS_B AND NOT O_COMP_121_111) THEN M ELSE N/A.
C002	IF (O_CLASS_B AND O_CLASS_C) THEN M ELSE N/A.
C003	IF O_CLASS_C THEN M ELSE N/A.
C004	IF O_CLASS_B THEN M ELSE N/A.
C005	Void.
C006	Void.
C007	IF O_LIB THEN M ELSE N/A.
C008	IF O_SWP THEN M ELSE N/A.
C009	IF ((O_CLASS_B AND NOT O_CLASS_A AND NOT O_CLASS_C AND NOT O_CLASS_D) OR (O_CLASS_A AND O_CLASS_B AND NOT O_COMP_121_111)) THEN M ELSE N/A.
C010	IF ((O_CLASS_C AND NOT O_CLASS_A AND NOT O_CLASS_B AND NOT_O_CLASS_D) OR (O_CLASS_B AND O_CLASS_C)) THEN M ELSE N/A.
C011	IF (O_SUSPEND_UICC AND NOT O_SWP) THEN M ELSE N/A.
C012	IF (O_SUSPEND_UICC AND NOT O_SWP AND O_NO_TYPE_NK) THEN M ELSE N/A.
C013	IF O_LSI THEN M ELSE N/A.
C014	IF (O_LSI_T1_NAD AND O_LSI) THEN M ELSE N/A.
C015	IF O_CLASS_D THEN M ELSE N/A
C016	IF ((O_CLASS_D AND NOT O_CLASS_C AND NOT O_CLASS_B AND NOT O_CLASS_A) OR (O_CLASS_D AND O_CLASS_C)) AND O_NOT_REMOVABLE_FORM_FACTOR) THEN M ELSE N/A (see note).
C017	IF (O_LSI AND O_LSI_T1_NAD AND O_MANAGE_LSI_RESET_LSE) THEN M ELSE N/A.
C018	IF (O_LSI AND O_MANAGE_LSI_RESET_LSE) THEN M ELSE N/A.
C019	IF (O_LSI AND O_SWP AND O_MANAGE_LSI_RETRIEVE_SWP) THEN M ELSE N/A.
C020	IF (O_LSI AND O_SWP AND O_MANAGE_LSI_ASSIGN_SWP) THEN M ELSE N/A.

NOTE: Terminals supporting O_NOT_REMOVABLE_FORM_FACTOR should grant access to all contacts of the Terminal-UICC interface by providing a TT connector respecting physical and electrical characteristics defined in ETSI TS 102 221 [1].

4 Physical characteristic tests

4.1 Contact pressure

4.1.1 Definition and applicability

The contact pressure shall be large enough to ensure reliable and continuous contact (e.g. to overcome oxidization and to prevent interruption caused by vibration).

For applicability of this test case see clause 3.8.

4.1.2 Conformance requirement

4.1.2.1 Description

Under no circumstances shall the contact force exceed 0,5 N per contact.

4.1.2.2 Reference

ETSI TS 102 221 [1], clause 4.5.4.

4.1.3 Test purpose

To verify that the contact pressure of each contacting element is not greater than 0,5 N when each of the following types of card is used:

1) Unembossed.

2) Embossed on the contact side.

NOTE: Only type 1) applies to the plug-in UICC.

4.1.4 Method of test

4.1.4.1 Initial conditions

The Terminal manufacturers shall provide, if possible, a separate card reader (mechanical components) to allow measurements.

4.1.4.2 Procedure

The pressure of each contacting element is measured.

4.1.5 Acceptance criteria

The contact force shall not exceed 0,5 N per contact.

4.2 Curvature of the contacting elements

4.2.1 Definition and applicability

The contact pressure shall be large enough to ensure reliable and continuous contact (e.g. to overcome oxidization and to prevent interruption caused by vibration).

For applicability of this test case see clause 3.8.

4.2.2 Conformance requirement

4.2.2.1 Description

The radius of any curvature of the contacting elements shall be greater than or equal to 0,8 mm over the contact area.

4.2.2.2 Reference

ETSI TS 102 221 [1], clause 4.5.4.

4.2.3 Test purpose

To verify that the radius of curvature of the contacting elements is greater than or equal to 0,8 mm over the contact area.

4.2.4 Method of test

4.2.4.1 Initial conditions

The Terminal manufacturers shall provide, if possible, a separate card reader (mechanical components) to allow measurements.

4.2.4.2 Procedure

The radius of curvature of the contacting elements is measured on both axes.

4.2.5 Acceptance criteria

The radius of any curvature of the contacting elements shall be greater than or equal to 0,8 mm over the contact area.

5 Electrical characteristic tests

5.1 Test of the power transition phases

5.1.1 Phase preceding Terminal power on

5.1.1.1 Definition and applicability

When the mobile equipment is switched off, the contacts of the UICC-Terminal interface remain in an inactive state in order to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.1.1.2 Conformance requirement

5.1.1.2.1 Description

The residual voltage across the contacts of the UICC-Terminal interface (C1, C2, C3, C7) shall not exceed ±0,4 V referenced to GND.

5.1.1.2.2 Reference

ETSI TS 102 221 [1], clause 4.4.3.

5.1.1.3 Test purpose

To verify that the residual voltage across the contacts of the UICC-Terminal interface (C1, C2, C3, C7) is not greater than ±0,4 V referenced to GND.

5.1.1.4 Method of test

5.1.1.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The contact C1 (V_{CC}) of the UICC-Terminal interface shall be loaded with an impedance of 10 kΩ.

The other contacts (C2, C3, C7) shall be loaded with an impedance of 50 kΩ.

5.1.1.4.2 Procedure

The residual voltage on each contact shall be measured.

5.1.1.5 Acceptance criteria

The residual voltage on each contact shall not exceed ±0,4 V referenced to GND.

5.1.2 Phase during UICC power on

5.1.2.1 Phase during UICC power on: 3 V - 5 V

5.1.2.1.1 Definition and applicability

When the user equipment is switched on or when the UICC-Terminal interface is being activated after supply voltage switching, the contacts shall be activated in a defined sequence in order to prevent any damage to the UICC.

A Terminal supporting voltage classes A and B may switch from 3 V to 5 V after it has analysed the ATR and identified the UICC voltage class by deactivating the UICC and activating it at the new supply voltage.

For applicability of this test case see clause 3.8.

5.1.2.1.2 Conformance requirement

5.1.2.1.2.1 Description

RQ	Description
RQ_1	When the UE is soft powered on, the contacts of the UICC-Terminal interface shall be activated to 3 V mode in the following order: • VCC at state H and stable; • CLK stable; • RST at state L for at least 400 clock cycles after the clock signal is applied to CLK; • I/O in reception mode (state H) within 200 clock cycles after the clock signal is applied to CLK.
RQ_2	For a Terminal supporting voltage classes A and B: When the UICC-Terminal interface is being activated after the 3 V/5 V switching the contacts shall be activated to 5 V mode in the order given in RQ_1.

5.1.2.1.2.2 Reference

ETSI TS 102 221 [1], clause 4.5.2.1.

5.1.2.1.3 Test purpose

To verify that the contacts of the UICC-Terminal interface are activated in the correct order, as described in the conformance requirement.

5.1.2.1.4 Method of test

5.1.2.1.4.1 Initial condition

The Terminal shall be connected to an UICC-Terminal simulator.

5.1.2.1.4.2 Procedure

To test RQ_1, the UE shall be soft powered on.

For a Terminal supporting voltage classes A and B: To test RQ_2, the Terminal shall be caused to switch the voltage on the UICC-Terminal interface.

The verification of the activation procedure shall be started with the first contact leaving the inactive state. The UICC-Terminal interface shall be monitored until it is fully activated.

5.1.2.1.5 Acceptance criteria

The contacts of the UICC-Terminal interface shall be activated in the correct order, as described in the conformance requirement.

5.1.2.2 Phase during UICC power on: 1,8 V - 3 V

5.1.2.2.1 Definition and applicability

When the user equipment is switched on or when the UICC-Terminal interface is being activated after supply voltage switching, the contacts shall be activated in a defined sequence in order to prevent any damage to the UICC.

A Terminal supporting voltage classes B and C may switch from 1,8 V to 3 V after it has analysed the ATR and identified the UICC voltage class by deactivating the UICC and activating it at the new supply voltage.

For applicability of this test case see clause 3.8.

5.1.2.2.2 Conformance requirement

5.1.2.2.2.1 Description

RQ	Description
RQ_1	When the UE is soft powered on, the contacts of the UICC-Terminal interface shall be activated to 1,8 V mode in the following order: • VCC at state H and stable; • CLK stable; • RST at state L for at least 400 clock cycles after the clock signal is applied to CLK; • I/O in reception mode (state H) within 200 clock cycles after the clock signal is applied to CLK.
RQ_2	For a Terminal supporting voltage classes B and C: When the UICC-Terminal interface is being activated after the 1,8 V/3 V switching the contacts shall be activated to 3 V mode in the order given in RQ_1.

5.1.2.2.2.2 Reference

ETSI TS 102 221 [1], clause 4.5.2.1.

5.1.2.2.3 Test purpose

To verify that the contacts of the UICC-Terminal interface are activated in the correct order, as described in the conformance requirement.

5.1.2.2.4 Method of test

5.1.2.2.4.1 Initial condition

The Terminal shall be connected to an UICC-Terminal simulator.

5.1.2.2.4.2 Procedure

To test RQ_1, the UE shall be soft powered on.

For a Terminal supporting voltage classes B and C: To test RQ_2, the Terminal shall be caused to switch the voltage on the UICC-Terminal interface.

The verification of the activation procedure shall be started with the first contact leaving the inactive state. The UICC-Terminal interface shall be monitored until it is fully activated.

5.1.2.2.5 Acceptance criteria

The contacts of the UICC-Terminal interface shall be activated in the correct order, as described in the conformance requirement.

5.1.2.3 Phase during UICC power on: 1,2 V - 1,8 V

5.1.2.3.1 Definition and applicability

When the UE is switched on or when the UICC-Terminal interface is being activated after supply voltage switching, the contacts shall be activated in a defined sequence in order to prevent any damage to the UICC.

A Terminal supporting voltage classes C and D may switch from 1,2 V to 1,8 V after it has analysed the ATR and identified the UICC voltage class by deactivating the UICC and activating it at the new supply voltage.

For applicability of this test case see clause 3.8.

5.1.2.3.2 Conformance requirement

5.1.2.3.2.1 Description

RQ	Description
RQ_1	When the UE is soft powered on, the contacts of the UICC-Terminal interface shall be activated to 1,2 V mode in the following order: • VCC at state H and stable; • CLK stable; • RST at state L for at least 400 clock cycles after the clock signal is applied to CLK; • I/O at state Z within 200 clock cycles after the clock signal is applied to CLK.
RQ_2	For a Terminal supporting voltage classes C and D: When the UICC-Terminal interface is being activated after the 1,2 V/1,8 V switching the contacts shall be activated to 1,8 V mode in the order given in RQ_1.

5.1.2.3.2.2 Reference

ETSI TS 102 221 [1], clause 4.5.2.1.

5.1.2.3.3 Test purpose

To verify that the contacts of the UICC-Terminal interface are activated in the correct order, as described in the conformance requirement.

5.1.2.3.4 Method of test

5.1.2.3.4.1 Initial condition

Identify the voltage class(es) supported by the Terminal in order to execute the correct test procedure.

- Terminal supports voltage class C only - execute Procedure 1 as defined in clause 5.1.2.2 of the present document.

- Terminal supports voltage class D only - execute Procedure 1 with an ATR with a TA_i (i > 2) accepting a 1,2 V power supply.
- Terminal supports voltage classes C and D - execute Procedure 2 with an ATR with a TA_i (i > 2) accepting a 1,8 V power supply.

The Terminal shall be connected to an UICC-Terminal simulator.

5.1.2.3.4.2 Procedure 1

Step	Direction	Description	RQ
1	User	Soft power on the UICC-Terminal interface	RQ_1
	TT	Start measuring the contacts on the UICC-Terminal interface	
2	TT	Wait until the UICC-Terminal interface is fully activated then stop the measuring	
NOTE: To allow a verification of the activation procedure the monitoring of the contacts on the UICC-Terminal interface needs to be started with the first contact leaving the inactive state (state L) and should not be ended before the interface is fully activated.			

5.1.2.3.4.3 Procedure 2

Step	Direction	Description	RQ
1	User	Soft power on the UICC-Terminal interface	RQ_1
	TT	Start measuring the contacts on the UICC-Terminal interface	
2	TT	Wait until the UICC-Terminal interface is fully activated then stop the measuring	
3	Terminal	Switch to the voltage class accepted by the UICC	RQ_2
	TT	Start measuring the contacts on the UICC-Terminal interface at activation	
4	TT	Wait until the UICC-Terminal interface is fully activated then stop the measuring	
NOTE: To allow a verification of the activation procedure the monitoring of the contacts on the UICC-Terminal interface needs to be started with the first contact leaving the inactive state (state L) and should not be ended before the interface is fully activated.			

5.1.3 Phase during Terminal power off

5.1.3.1 Phase during Terminal power off: 3 V - 5 V

5.1.3.1.1 Definition and applicability

When the user equipment is soft powered off or when the UICC-Terminal interface is being deactivated for 3 V/5 V switching, the contacts shall be deactivated in a defined sequence in order to prevent any damage to the UICC.

NOTE: If during UE operation the UICC is physically removed it is impractical to ensure correct sequencing of deactivation and the possible damage to the UICC cannot be safeguarded by a type approval test. Furthermore, in this situation the integrity of the UICC data is not guaranteed.

For applicability of this test case see clause 3.8.

5.1.3.1.2 Conformance requirement

5.1.3.1.2.1 Description

RQ	Description
RQ_1	Depending on the state of the clock at the time of deactivation, the contacts of the UICC-Terminal shall be deactivated in one of two ways. If the clock is running, the contacts of the UICC-Terminal interface shall be deactivated in the following order: - RST at low level; - Clock stopped at low level; - I/O at status A; - VCC inactive. If the clock is stopped and is not restarted, the Terminal is allowed to deactivate all the contacts in any order, provided that all signals reach low level before V_{CC} leaves high level.
RQ_2	For a Terminal supporting voltage classes A and B: When the UICC-Terminal interface is deactivated for 3 V/5 V switching, the contacts shall be deactivated as given in RQ_1.

5.1.3.1.2.2 Reference

ETSI TS 102 221 [1], clause 4.5.2.1.

5.1.3.1.3 Test purpose

To verify that, depending on the state of the clock (running or stopped), the contacts of the UICC-Terminal interface become deactivated in the correct order, as given in the conformance requirement.

5.1.3.1.4 Method of test

5.1.3.1.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UICC characteristics of the directories (see ETSI TS 102 221 [1], clause 11.1.1.4.6.1) shall indicate that clock stop is allowed.

5.1.3.1.4.2 Procedure

To test RQ_1, the UE shall be soft powered off.

For a Terminal supporting voltage classes A and B: To test RQ_2, the Terminal shall be caused to switch the voltage on the UICC-Terminal interface.

The UICC-Terminal interface shall be monitored until it is fully deactivated.

5.1.3.1.5 Acceptance criteria

The contacts of the UICC-Terminal interface shall be deactivated in the correct order, as given in the conformance requirements.

5.1.3.2 Phase during Terminal power off: 1,8 V - 3 V

5.1.3.2.1 Definition and applicability

When the user equipment is soft powered off or when the UICC-Terminal interface is being deactivated for 1,8 V/3 V switching, the contacts shall be deactivated in a defined sequence in order to prevent any damage to the UICC.

NOTE: If during UE operation the UICC is physically removed it is impractical to ensure correct sequencing of deactivation and the possible damage to the UICC cannot be safeguarded by a type approval test. Furthermore, in this situation the integrity of the UICC data is not guaranteed.

For applicability of this test case see clause 3.8.

5.1.3.2.2 Conformance requirement

5.1.3.2.2.1 Description

RQ	Description
RQ_1	Depending on the state of the clock at the time of deactivation, the contacts of the UICC-Terminal shall be deactivated in one of two ways. If the clock is running, the contacts of the UICC-Terminal interface shall be deactivated in the following order: - RST at low level; - Clock stopped at low level; - I/O at status A; - VCC inactive. If the clock is stopped and is not restarted, the Terminal is allowed to deactivate all the contacts in any order, provided that all signals reach low level before V_{CC} leaves high level.
RQ_2	For a Terminal supporting voltage classes B and C: When the UICC-Terminal interface is deactivated for 1.8 V/3 V switching, the contacts shall be deactivated as given in RQ_1.

5.1.3.2.2.2 Reference

ETSI TS 102 221 [1], clause 4.4.2.

5.1.3.2.3 Test purpose

To verify that, depending on the state of the clock (running or stopped), the contacts of the UICC-Terminal interface become deactivated in the correct order, as given in the conformance requirement.

5.1.3.2.4 Method of test

5.1.3.2.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UICC characteristics of the directories (see ETSI TS 102 221 [1], clause 11.1.1.4.6.1) shall indicate that clock stop is allowed.

5.1.3.2.4.2 Procedure

To test RQ_1, the UE shall be soft powered off.

For a Terminal supporting voltage classes B and C: To test RQ_2, the Terminal shall be caused to switch the voltage on the UICC-Terminal interface.

The UICC-Terminal interface shall be monitored until it is fully deactivated.

5.1.3.2.5 Acceptance criteria

The contacts of the UICC-Terminal interface shall be deactivated in the correct order, as given in the conformance requirements.

5.1.3.3 Phase during Terminal power off: 1,2 V - 1,8 V

5.1.3.3.1 Definition and applicability

When the user equipment is soft powered off or when the UICC-Terminal interface is being deactivated for 1,2 V/1,8 V switching, the contacts shall be deactivated in a defined sequence in order to prevent any damage to the UICC.

NOTE: If during UE operation the UICC is physically removed it is impractical to ensure correct sequencing of deactivation and the possible damage to the UICC cannot be safeguarded by a type approval test. Furthermore, in this situation the integrity of the UICC data is not guaranteed.

For applicability of this test case see clause 3.8.

5.1.3.3.2 Conformance requirement

5.1.3.3.2.1 Description

RQ	Description
RQ_1	Depending on the state of the clock at the time of deactivation, the contacts of the UICC-Terminal shall be deactivated in one of two ways. If the clock is running, the contacts of the UICC-Terminal interface shall be deactivated in the following order: - RST at low level; - Clock stopped at low level; - I/O at status A; - VCC inactive. If the clock is stopped and is not restarted, the Terminal is allowed to deactivate all the contacts in any order, provided that all signals reach low level before V_{CC} leaves high level.
RQ_2	For a Terminal supporting voltage classes C and D: When the UICC-Terminal interface is deactivated for 1,2 V/1,8 V switching, the contacts shall be deactivated as given in RQ_1.

5.1.3.3.2.2 Reference

ETSI TS 102 221 [1], clause 4.4.2.

5.1.3.3.3 Test purpose

To verify that, depending on the state of the clock (running or stopped), the contacts of the UICC-Terminal interface become deactivated in the correct order, as given in the conformance requirement.

5.1.3.3.4 Method of test

5.1.3.3.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UICC characteristics of the directories (see ETSI TS 102 221 [1], clause 11.1.1.4.6.1) shall indicate that clock stop is allowed.

5.1.3.3.4.2 Procedure

Step	Direction	Description	RQ
1	User/UE	Soft power off the UICC-Terminal interface	RQ_1
	TT	Start monitoring the contacts on the UICC-Terminal interface	
2	TT	Wait until the UICC-Terminal interface is fully deactivated	
Condition		If a Terminal is supporting voltage classes C and D then the Terminal shall be caused to execute steps 3) to 5)	
3	User	Activate the UICC-Terminal interface	
4	UE	Soft power off the UICC-Terminal interface	RQ_2
	TT	Start monitoring the contacts on the UICC-Terminal interface	
5	TT	Wait until the UICC-Terminal interface is fully deactivated	
NOTE: To allow a verification of the deactivation procedure the monitoring of the contacts on the UICC-Terminal interface needs to be started before the first contact is leaving the active state and should not be ended before the interface is fully deactivated.			

5.1.3.3.5 Acceptance criteria

The contacts of the UICC-Terminal interface shall be deactivated in the correct order, as given in the conformance requirements.

5.1.4 Warm reset timing

5.1.4.1 Definition and applicability

The warm reset is performed according to clause 5.3.3 of ISO/IEC 7816-3 [2] and the UICC shall enter either the negotiable or the specific mode.

For applicability of this test case see clause 3.8.

5.1.4.2 Conformance requirement

5.1.4.2.1 Description

1) V_{CC} at state H and stable.
2) CLK stable.
3) RST at state H.
4) RST at state L for 400 clock cycles.
5) RST at state H for at least 400 clock cycles.
6) RST at state H for 40 000 clock cycles before deactivation if no answer is received.

5.1.4.2.2 Reference

ETSI TS 102 221 [1], clause 6.6.

ISO/IEC 7816-3 [2], clause 5.3.3.

5.1.4.3 Test purpose

To verify that the contacts of the UICC-Terminal interface are activated in the correct order, as described in the conformance requirement.

5.1.4.4 Method of test

5.1.4.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator.

5.1.4.4.2 Procedure

a) The Terminal shall be made to initiate a warm reset (TBD).

b) The UICC simulator shall send a valid ATR:

   b-1) 400 clock cycles after RST is set to state H.

   b-2) 39 990 clock cycles after RST is set to state H. The contacts of the UICC-Terminal interface shall be monitored during the warm reset sequence.

5.1.4.5 Acceptance criteria

The Terminal shall perform a warm reset as described in the conformance requirement.

In steps b-1) and b-2) the Terminal shall read the answer to the warm reset and work with the UICC.

5.1.5 Recognition of voltage classes accepted by the UICC and voltage switching

5.1.5.1 Reaction of Terminals supporting voltage classes A and B on recognition of UICCs accepting voltage classes A and B

5.1.5.1.1 Definition and applicability

When a Terminal supporting voltage classes A and B detects a UICC accepting voltage classes A and B during the ATR analysis the Terminal may either switch to 5 V operation or stay in 3 V operation.

For applicability of this test case see clause 3.8.

5.1.5.1.2 Conformance requirement

5.1.5.1.2.1 Description

RQ	Description
RQ_1	A Terminal supporting voltage classes A and B shall initially activate the UICC with 3 V (i.e. the first activation of a card session).
RQ_2	The Terminal shall analyse the ATR and identify the voltage class supported by the UICC.
RQ_3	If a Terminal supporting voltage classes A and B identifies a UICC accepting voltage classes A and B the Terminal may switch to 5 V operation. Switching from 3 V to 5 V shall only be performed by deactivating the UICC and activating it with 5 V supply voltage immediately after the analysis of the ATR without issuing any commands.

5.1.5.1.2.2 Reference

ETSI TS 102 221 [1], clause 6.2.

5.1.5.1.3 Test purpose

1) To verify that a Terminal supporting voltage classes A and B initially activates the UICC with 3 V.

2) To verify that a Terminal supporting voltage classes A and B correctly identifies the voltage class.

3) To verify that a Terminal supporting voltage classes A and B deactivates the UICC-Terminal interface immediately after the analysis of the ATR without issuing any command and activates it with 5 V supply voltage or proceeds with the 3 V operation during the whole card session without switching to 5 V supply voltage.

5.1.5.1.4 Method of test

5.1.5.1.4.1 Initial condition

The Terminal shall be connected to an UICC simulator simulating a UICC accepting voltage classes A and B with nominal test conditions (see clause 5.2.1). All elementary files shall be coded as default.

The Terminal shall be powered on.

5.1.5.1.4.2 Procedure

The UICC simulator shall send an ATR indicating a UICC accepting voltage classes A and B.

The UICC-Terminal interface shall be monitored for at least 1 minute until the UE is switched off.

5.1.5.1.5 Acceptance criteria

1) RQ_1 is met if the initial activation of the UICC-Terminal interface is performed with 3 V supply voltage.

2) RQ_2 is implicitly verified if RQ_3 is met.

3) RQ_3 is met if the Terminal reacts in one of the following ways:

   a) The Terminal deactivates the UICC-Terminal interface immediately after the receipt of the ATR from the UICC and activates it with 5 V supply voltage.

   b) The Terminal proceeds with the card session without switching to another supply voltage.

5.1.5.2 Reaction of Terminals supporting voltage classes A and B on recognition of UICCs accepting voltage classes B and C

5.1.5.2.1 Definition and applicability

When a Terminal supporting voltage classes A and B detects a UICC accepting voltage classes B and C during the ATR analysis the Terminal shall stay in 3 V operation.

For applicability of this test case see clause 3.8.

5.1.5.2.2 Conformance requirement

5.1.5.2.2.1 Description

RQ	Description
RQ_1	A Terminal supporting voltage classes A and B shall initially activate the UICC with 3 V (i.e. the first activation of a card session).
RQ_2	The Terminal shall analyse the ATR and identify the voltage class supported by the UICC.
RQ_3	If a Terminal supporting voltage classes A and B identifies a UICC accepting voltage classes B and C during the ATR analysis the Terminal shall stay in 3 V operation.

5.1.5.2.2.2 Reference

ETSI TS 102 221 [1], clause 6.2.

5.1.5.2.3 Test purpose

1) To verify that a Terminal supporting voltage classes A and B initially activates the UICC with 3 V.

2) To verify that a Terminal supporting voltage classes A and B correctly identifies the voltage class.

3) To verify that a Terminal supporting voltage classes A and B stays in 3 V operation during the whole card session.

5.1.5.2.4 Method of test

5.1.5.2.4.1 Initial condition

The Terminal shall be connected to an UICC simulator simulating a UICC accepting voltage classes B and C with nominal test conditions (see clause 5.2.1). All elementary files shall be coded as default.

The Terminal shall be powered on.

5.1.5.2.4.2 Procedure

The UICC simulator shall send an ATR indicating a UICC accepting voltage classes B and C.

The UICC-Terminal interface shall be monitored for at least 1 minute until the UE is switched off.

5.1.5.2.5 Acceptance criteria

1) RQ_1 is met if the initial activation of the UICC-Terminal interface is performed with 3 V supply voltage.

2) RQ_2 is implicitly verified if RQ_3 is met.

3) RQ_3 is met if the Terminal reacts in the following way:

   - The Terminal proceeds with the card session without switching to another supply voltage.

5.1.5.3 Reaction of Terminals supporting voltage classes B and C on recognition of UICCs accepting voltage classes B and C

5.1.5.3.1 Definition and applicability

When a Terminal supporting voltage classes B and C detects a UICC accepting voltage classes B and C during the ATR analysis the Terminal may either switch to 3 V operation or stay in 1,8 V operation.

For applicability of this test case see clause 3.8.

5.1.5.3.2 Conformance requirement

5.1.5.3.2.1 Description

RQ	Description
RQ_1	A Terminal supporting voltage classes B and C shall initially activate the UICC with 1,8 V (i.e. the first activation of a card session).
RQ_2	The Terminal shall analyse the ATR and identify the voltage class supported by the UICC.
RQ_3	If a Terminal supporting voltage classes B and C identifies a UICC accepting voltage classes B and C during the ATR analysis the Terminal may switch to 3 V operation. Switching from 1,8 V to 3 V shall only be performed by deactivating the UICC and activating it with 3 V supply voltage immediately after the analysis of the ATR without issuing any commands.

5.1.5.3.2.2 Reference

ETSI TS 102 221 [1], clause 6.2.

5.1.5.3.3 Test purpose

1) To verify that a Terminal supporting voltage classes B and C initially activates the UICC with 1,8 V.

2) To verify that a Terminal supporting voltage classes B and C correctly identifies the voltage class.

3) To verify that a Terminal supporting voltage classes B and C deactivates the UICC-Terminal interface immediately after the analysis of the ATR without issuing any command and activates it with 3 V supply voltage or proceeds with the 1,8 V operation during the whole card session without switching to 3 V supply voltage.

5.1.5.3.4 Method of test

5.1.5.3.4.1 Initial condition

The Terminal shall be connected to an UICC simulator simulating a UICC accepting voltage classes B and C with nominal test conditions (see clause 5.2.1). All elementary files are coded as default.

The Terminal shall be powered on.

5.1.5.3.4.2 Procedure

The UICC simulator shall send the ATR indicating a UICC accepting voltage classes B and C.

The UICC-Terminal interface shall be monitored for at least 1 minute until the UE is switched off.

5.1.5.3.5 Acceptance criteria

1) RQ_1 is met if the initial activation of the UICC-Terminal interface is performed with 1,8 V supply voltage.

2) RQ_2 is implicitly verified if RQ_3 is met.

3) RQ_3 is met if the Terminal reacts in one of the following ways:

   a) The Terminal deactivates the UICC-Terminal interface immediately after the analysis of the ATR from the UICC and activates it with 3 V supply voltage.

   b) The Terminal proceeds with the card session without switching to another supply voltage.

5.1.5.4 Reaction of Terminals supporting voltage classes B and C on recognition of UICCs accepting voltage classes A and B

5.1.5.4.1 Definition and applicability

When a Terminal supporting voltage classes B and C detects a UICC accepting voltage classes A and B during the ATR analysis the Terminal shall switch to 3 V operation.

For applicability of this test case see clause 3.8.

5.1.5.4.2 Conformance requirement

5.1.5.4.2.1 Description

RQ	Description
RQ_1	A Terminal supporting voltage classes B and C shall initially activate the UICC with 1,8 V (i.e. the first activation of a card session).
RQ_2	The Terminal shall analyse the ATR and identify the voltage class supported by the UICC.
RQ_3	If a Terminal supporting voltage classes B and C identifies a UICC accepting voltage classes A and B, the Terminal shall switch to 3 V operation. Switching from 1,8 V to 3 V shall only be performed by deactivating the UICC and activating it with 3 V supply voltage immediately after the analysis of the ATR without issuing any commands.

5.1.5.4.2.2 Reference

ETSI TS 102 221 [1], clause 6.2.

5.1.5.4.3 Test purpose

1) To verify that a Terminal supporting voltage classes B and C initially activates the UICC with 1,8 V.

2) To verify that a Terminal supporting voltage classes B and C correctly identifies the voltage class.

3) To verify that a Terminal supporting voltage classes B and C deactivates the UICC-Terminal interface immediately after the recognition of a UICC accepting voltage classes A and B (in order to switch the supply voltage).

4) To verify that a Terminal supporting voltage classes B and C activates the UICC with 3 V.

5.1.5.4.4 Method of test

5.1.5.4.4.1 Initial condition

The Terminal shall be connected to an UICC simulator simulating a UICC accepting voltage classes A and B with nominal test conditions (see clause 5.2.1). All elementary files are coded as default.

The Terminal shall be powered on.

5.1.5.4.4.2 Procedure

The UICC simulator shall send the ATR indicating a UICC accepting voltage classes A and B.

The UICC-Terminal interface shall be monitored for at least 1 minute until the UE is switched off.

5.1.5.4.5 Acceptance criteria

1) RQ_1 is met if the initial activation of the UICC-Terminal interface is performed with 1,8 V supply voltage.

2) RQ_2 is implicitly verified if RQ_3 is met.

3) RQ_3 is met if the Terminal reacts in the following way:

   - The Terminal deactivates the UICC-Terminal interface immediately after the analysis of the ATR from the UICC and activates it with 3 V supply voltage. The Terminal proceeds with the card session.

5.1.5.5 Void

5.1.5.6 Reaction of Terminals receiving no ATR

5.1.5.6.1 Reaction of Terminals receiving no ATR: 3 V - 5 V

5.1.5.6.1.1 Definition and applicability

A Terminal supporting 3 V - 5 V shall initially activate the UICC with 3V. If no ATR is received, the UICC-Terminal interface shall be deactivated and activated with 5 V.

For applicability of this test case see clause 3.8.

5.1.5.6.1.2 Conformance requirement

5.1.5.6.1.2.1 Description

If a Terminal does not receive an ATR, the Terminal shall deactivate the UICC-Terminal interface and repeat the activation with the next higher voltage class.

5.1.5.6.1.2.2 Reference

ETSI TS 102 221 [1], see clause 6.2.

5.1.5.6.1.3 Test purpose

To verify that a Terminal deactivates the UICC-Terminal interface and repeats the activation with the next higher voltage class in case that the Terminal cannot receive an ATR.

5.1.5.6.1.4 Method of test

5.1.5.6.1.4.1 Initial condition

The Terminal shall be connected to an UICC simulator. All elementary files shall be coded as default. The Terminal shall be powered on.

5.1.5.6.1.4.2 Procedure

The UICC simulator shall send no ATR.

5.1.5.6.1.5 Acceptance criteria

The UICC simulator shall send no ATR.

5.1.5.6.1.6 Acceptance criteria

If no ATR is received by the Terminal, the Terminal shall wait at least 40 000 clock cycles before deactivating the UICC-Terminal interface. The Terminal shall then repeat the activation procedure with the next higher voltage class.

5.1.5.6.2 Reaction of Terminals receiving no ATR: 1,8 V - 3 V

5.1.5.6.2.1 Definition and applicability

A Terminal supporting 1,8 V - 3 V shall initially activate the UICC with 1,8 V. If no ATR is received, the UICC-Terminal interface shall be deactivated and activated with 3 V.

For applicability of this test case see clause 3.8.

5.1.5.6.2.2 Conformance requirement

5.1.5.6.2.2.1 Description

If a Terminal does not receive an ATR, the Terminal shall deactivate the UICC-Terminal interface and repeat the activation with the next higher voltage class.

5.1.5.6.2.2.2 Reference

ETSI TS 102 221 [1], see clause 6.2.

5.1.5.6.2.3 Test purpose

To verify that a Terminal deactivates the UICC-Terminal interface and repeats the activation with the next higher voltage class in case that the Terminal cannot receive an ATR.

5.1.5.6.2.4 Method of test

5.1.5.6.2.4.1 Initial condition

The Terminal shall be connected to an UICC simulator. All elementary files shall be coded as default. The Terminal shall be powered on.

5.1.5.6.2.4.2 Procedure

The UICC simulator shall send no ATR.

5.1.5.6.2.5 Acceptance criteria

If no ATR is received by the Terminal, the Terminal shall wait at least 40 000 clock cycles before deactivating the UICC-Terminal interface. The Terminal shall then repeat the activation procedure with the next higher voltage class.

5.1.5.7 Reaction of Terminals supporting voltage classes C and D on recognition of UICCs accepting voltage classes C and D

5.1.5.7.1 Definition and applicability

When a Terminal supporting voltage classes C and D detects a UICC accepting voltage classes C and D during the ATR analysis the Terminal may either switch to 1,2 V operation or stay in 1,8 V operation.

For applicability of this test case see clause 3.8.

5.1.5.7.2 Conformance requirement

5.1.5.7.2.1 Description

RQ	Description
RQ_1	A Terminal supporting voltage classes C and D shall initially activate the UICC with 1,2 V (i.e. the first activation of a card session).
RQ_2	The Terminal shall analyse the ATR and identify the voltage class supported by the UICC.
RQ_3	If a Terminal supporting voltage classes C and D identifies a UICC accepting voltage classes C and D during the ATR analysis the Terminal may switch to 1,8 V operation. Switching from 1,2 V to 1,8 V shall only be performed by deactivating the UICC and activating it with 1,8 V supply voltage immediately after the analysis of the ATR without issuing any commands.

5.1.5.7.2.2 Reference

ETSI TS 102 221 [1], clause 6.2.

5.1.5.7.3 Test purpose

1) To verify that a Terminal supporting voltage classes C and D initially activates the UICC with 1,2 V.

2) To verify that a Terminal supporting voltage classes C and D correctly identifies the voltage class.

3) To verify that a Terminal supporting voltage classes C and D deactivates the UICC-Terminal interface immediately after the analysis of the ATR without issuing any command and activates it with 1,8 V supply voltage or proceeds with the 1,2 V operation during the whole card session without switching to 1,8 V supply voltage.

5.1.5.7.4 Method of test

5.1.5.7.4.1 Initial condition

The Terminal shall be connected to an UICC simulator simulating a UICC accepting voltage classes C and D with nominal test conditions (see clause 5.2.1). All elementary files are coded as default.

The Terminal shall be powered on.

5.1.5.7.4.2 Procedure

Step	Direction	Description	RQ
1	TT > Terminal	Send an ATR indicating that voltage classes C and D are accepted	
	TT	Start monitoring the contacts on the UICC-Terminal interface and measure the voltage on contact C1 for at least 1 minute	RQ_1 RQ_2 RQ_3
2	Tester	Switch off the UE	

5.1.5.7.5 Acceptance criteria

1) RQ_1 is met if the initial activation of the UICC-Terminal interface is performed with 1,2 V supply voltage.

2) RQ_2 is implicitly verified if RQ_3 is met.

3) RQ_3 is met if the Terminal reacts in one of the following ways:

   a) The Terminal deactivates the UICC-Terminal interface immediately after the analysis of the ATR from the UICC and activates it with 1,8 V supply voltage.

   b) The Terminal proceeds with the card session without switching to another supply voltage.

5.1.5.8 Reaction of Terminals supporting voltage classes C and D on recognition of UICCs accepting voltage classes B and C

5.1.5.8.1 Definition and applicability

When a Terminal supporting voltage classes C and D detects a UICC accepting voltage classes B and C during the ATR analysis the Terminal shall switch to 1,8 V operation.

For applicability of this test case see clause 3.8.

5.1.5.8.2 Conformance requirement

5.1.5.8.2.1 Description

RQ	Description
RQ_1	A Terminal supporting voltage classes C and D shall initially activate the UICC with 1,2 V (i.e. the first activation of a card session).
RQ_2	The Terminal shall analyse the ATR and identify the voltage class supported by the UICC.
RQ_3	If a Terminal supporting voltage classes C and D identifies a UICC accepting voltage classes B and C, the Terminal shall switch to 1,8 V operation. Switching from 1,2 V to 1,8 V shall only be performed by deactivating the UICC and activating it with 1,8 V supply voltage immediately after the analysis of the ATR without issuing any commands.

5.1.5.8.2.2 Reference

ETSI TS 102 221 [1], clause 6.2.

5.1.5.8.3 Test purpose

1) To verify that a Terminal supporting voltage classes C and D initially activates the UICC with 1,2 V.

2) To verify that a Terminal supporting voltage classes C and D correctly identifies the voltage class.

3) To verify that a Terminal supporting voltage classes C and D deactivates the UICC-Terminal interface immediately after the recognition of a UICC accepting voltage classes B and C (in order to switch the supply voltage).

4) To verify that a Terminal supporting voltage classes C and D activates the UICC with 1,8 V.

5.1.5.8.4 Method of test

5.1.5.8.4.1 Initial condition

The Terminal shall be connected to an UICC simulator simulating a UICC accepting voltage classes B and C with nominal test conditions (see clause 5.2.1). All elementary files are coded as default.

The Terminal shall be powered on.

5.1.5.8.4.2 Procedure

Step	Direction	Description	RQ
1	TT > Terminal	Send an ATR indicating that voltage classes B and C are accepted	
	TT	Start monitoring the contacts on the UICC-Terminal interface and measure the voltage on contact C1 for at least 1 minute	RQ_1 RQ_2 RQ_3
2	Tester	Switch off the UE	

5.1.5.8.5 Acceptance criteria

1) RQ_1 is met if the initial activation of the UICC-Terminal interface is performed with 1,2 V supply voltage.

2) RQ_2 is implicitly verified if RQ_3 is met.

3) RQ_3 is met if the Terminal reacts in the following way:

   - The Terminal deactivates the UICC-Terminal interface immediately after the analysis of the ATR from the UICC and activates it with 1,8 V supply voltage. The Terminal proceeds with the card session.

5.1.5.9 Reaction of Terminals not supporting any voltage class indicated in the ATR

5.1.5.9.1 Definition and applicability

If a Terminal is not supporting any of the voltage classes indicated in the ATR send from the UICC, it shall not send any APDU in response and may deactivate the UICC.

For applicability of this test case see clause 3.8.

5.1.5.9.2 Conformance requirement

5.1.5.9.2.1 Description

RQ	Description
RQ_1	If an ATR is received at the first applied voltage class, the contents of the ATR shall be analysed by the Terminal.
RQ_2	If the Terminal does not support any of the voltage classes indicated in the ATR, the Terminal shall not send any APDU to the UICC.
RQ_3	The Terminal may deactivate the UICC at any time.
NOTE: According to ISO/IEC 7816-3 [2], clause 8.1 a format character shall be sent within WT = 9 600 etu. It can be assumed that the Terminal is not sending an APDU if none is sent within this timeframe.	

5.1.5.9.2.2 Reference

ETSI TS 102 221 [1], clause 6.2.

5.1.5.9.3 Test purpose

To verify that a Terminal does not send APDUs to a UICC providing an ATR indicating only voltage classes not supported by the Terminal.

5.1.5.9.4 Method of test

5.1.5.9.4.1 Initial condition

The Terminal shall be connected to an UICC simulator. All elementary files shall be coded as default. The Terminal shall be powered on.

5.1.5.9.4.2 Procedure

Step	Direction	Description	RQ
1	UICC > T	Send an ATR indicating support of at least one voltage class (TAi, i > 2), where none of the voltage classes indicated are supported by the Terminal.	RQ_1
2	T > UICC	The Terminal shall not send any APDU	RQ_2
3	User	Deactivate the Terminal	
4	T	The Terminal may deactivate the UICC at any time after receiving the ATR indication a voltage class not supported by the Terminal in step 1)	RQ_3

5.1.5.9.5 Acceptance criteria

1) If the Terminal is not sending any APDU for at least 5 seconds, it is assumed that it has analysed the ATR (RQ_1) and handles compliant to RQ_2.

2) The deactivation of the UICC by the Terminal (RQ_3) is optional.

5.2 Electrical tests on each Terminal contact

5.2.1 Nominal test conditions

If a Terminal implemented in accordance to a release up to release 11 is being tested, Tables 5.1, 5.2a and 5.3a give the electrical conditions that shall be applied by the UICC simulator to all contacts during a test if not stated otherwise.

If a Terminal implemented in accordance to a release from release 12 upwards is being tested, Tables 5.1, 5.2b and 5.3b give the electrical conditions that shall be applied by the UICC simulator to all contacts during a test if not stated otherwise.

Table 5.1: Nominal test conditions for the 5 V UICC-Terminal interface

Contacts	Low level	High level	Max. capacitive load
C1 (VCC)	---	I = 10 mA	
C2 (RST)	I = -200 µA	I = +20 µA	30 pF
C3 (CLK)	I = -200 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 5.2a: Nominal test conditions for the 3 V UICC-Terminal interface up to release 11

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 5.2b: Nominal test conditions for the 3 V UICC-Terminal interface (release 12 and higher)

Contacts	Low level	High level	Max. capacitive load
C1 (VCC)	---	I = 10 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	 I = +1 mA	 I = +20 µA	30 pF

Contacts	Low level	High level	Max. capacitive load
Terminal output	I = -1 mA	I = +20 µA	

Table 5.3a: Nominal test conditions for the 1,8 V UICC-Terminal interface up to release 11

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

Table 5.3b: Nominal test conditions for the 1,8 V UICC-Terminal interface (release 12 and higher)

Contacts	Low level	High level	Max. capacitive load
C1 (VCC)	---	I = 10 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

NOTE 1: Measurements of contacts voltage levels can be done at any time since the beginning of activation of the UICC and the end of deactivation of the UICC (ISO/IEC 7816-3 [2], clause 5.1).

NOTE 2: The reference point of all measurements is the contact C5 (Ground).

NOTE 3: Currents flowing into the UICC are considered positive.

5.2.2 Electrical tests on contact C1 (Card power supply - V_{CC})

5.2.2.1 Electrical tests on contact C1, Test 1: 3 V - 5 V

5.2.2.1.1 Definition and applicability

When the user equipment is activated, the supply voltage on the UICC -Terminal interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.2.1.2 Conformance requirement

5.2.2.1.2.1 Description

RQ	REL	Description
RQ_1		The voltage on contact C1 of the UICC-Terminal interface shall be 5 V ± 10 % for I_{CC} up to 10 mA when the Terminal is in 5 V operation mode.
RQ_2a	Up to Rel-11	The voltage on contact C1 of the UICC-Terminal interface shall be 3 V ± 10 % for I_{CC} up to 7,5 mA when the Terminal is in 3 V operation mode.
RQ_2b	Rel-12 upwards	The voltage on contact C1 of the UICC-Terminal interface shall be 3 V ± 10 % for I_{CC} up to 10 mA when the Terminal is in 3 V operation mode.

5.2.2.1.2.2 Reference

1) ETSI TS 102 221 [1], clause 5.1.

2) ETSI TS 102 221 [1], clause 5.2.

5.2.2.1.3 Test purpose

To verify that the Terminal keeps the voltage on contact C1 of the UICC-Terminal interface within the ranges specified in the conformance requirements.

5.2.2.1.4 Method of test

5.2.2.1.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be in nominal test conditions:

- For an interface operated in class A see clause 5.2.1, Table 5.1 of the present document.
- For an interface as defined for releases up to 11, operated in class B see clause 5.2.1, Table 5.2a of the present document.
- For an interface as defined for Release 12 and upwards, operated in class B see clause 5.2.1, Table 5.2b of the present document.

5.2.2.1.4.2 Test Procedure

The voltage of contact C1 (V_{CC}) of the UICC-Terminal interface shall be measured.

5.2.2.1.5 Acceptance criteria

The voltage on contact C1 of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.2.2 Electrical tests on contact C1, Test 2: 3 V - 5 V

5.2.2.2.1 Definition and applicability

When the user equipment is activated, the supply voltage on the UICC-Terminal interface shall be able to counteract spikes in the current consumption of the UICC up to the limits given in the conformance requirement, ensuring that the supply voltage stays in the specified range.

For applicability of this test case see clause 3.8.

5.2.2.2.2 Conformance requirement

5.2.2.2.2.1 Description

1) The voltage on contact C1 of the UICC-Terminal interface shall be 5 V ± 10 % for spikes in the current consumption with a maximum charge of 40 n. As with no more than 400 ns duration and an amplitude of at most 200 mA when the Terminal is in 5 V operation mode.

2) The voltage on contact C1 of the UICC-Terminal interface shall be 3 V ± 10 % for spikes in the current consumption with a maximum charge of 12 n. As with no more than 400 ns duration and an amplitude of at most 60 mA when the Terminal is in 3 V operation mode.

NOTE: For compatibility reasons a maximum spike duration of 400 ns is kept also for Terminals implemented in accordance to ETSI TS 102 221 [1] - Release 12 and upwards.

5.2.2.2.2 Reference

1) ETSI TS 102 221 [1], clause 5.1.

2) ETSI TS 102 221 [1], clause 5.2.

5.2.2.3 Test purpose

To verify that the Terminal keeps the voltage on contact C1 of the UICC-Terminal interface within the specified range for the conditions given in the UICC-Terminal conformance requirement.

5.2.2.4 Method of test

5.2.2.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the interface shall held in nominal test condition (see clause 5.2.1).

5.2.2.4.2 Procedure

In order to test the requirements 1), the voltage on contact C1 of the UICC-Terminal interface shall be monitored and the following current spikes shall be applied:

1) Continuous spikes:
   - current amplitude 20 mA;
   - current offset 0 mA;
   - duration 100 ns;
   - pause 100 ns.
2) Continuous spikes:
   - current 20 mA;
   - current offset 0 mA;
   - duration 400 ns;
   - pause 400 ns.
3) Continuous spikes:
   - current amplitude 15 mA;
   - current offset 5 mA;
   - (i.e. maximum amplitude = 5 mA + 15 mA = 20 mA);
   - duration 150 ns;
   - pause 300 ns.
4) Random spikes:
   - current amplitude 200 mA;
   - current offset 0 mA;
   - duration 200 ns;

- pause between 0,1 ms and 500 ms, randomly varied.

5) Random spikes:

- current amplitude 100 mA;
- current offset 0 mA;
- duration 400 ns;
- pause between 0,1 ms and 500 ms, randomly varied.

6) Random spikes:

- current amplitude 195 mA;
- current offset 5 mA;
- (i.e. maximum amplitude = 5 mA + 195 mA = 200 mA);
- Duration 200 ns;
- Pause between 0,1 ms and 500 ms, randomly varied.

In order to test the requirements 2), the voltage on contact C1 of the UICC-Terminal interface shall be monitored and the following current spikes shall be applied:

1) Continuous spikes:

- current amplitude 12 mA;
- current offset 0 mA;
- duration 100 ns;
- pause 100 ns.

2) Continuous spikes:

- current 12 mA;
- current offset 0 mA;
- duration 400 ns;
- pause 400 ns.

3) Continuous spikes:

- current amplitude 9 mA;
- current offset 3 mA;
- (i.e. maximum amplitude = 3 mA + 9 mA = 12 mA);
- duration 150 ns;
- pause 300 ns.

4) Random spikes:

- current amplitude 60 mA;
- current offset 0 mA;
- duration 200 ns;
- pause between 0,1 ms and 500 ms, randomly varied.

5) Random spikes:

- current amplitude 30 mA;
- current offset 0 mA;
- duration 400 ns;
- pause between 0,1 ms and 500 ms, randomly varied.

6) Random spikes:

- current amplitude 57 mA;
- current offset 3 mA;
- (i.e. maximum amplitude = 3 mA + 57 mA = 60 mA);
- duration 200 ns;
- pause between 0,1 ms and 500 ms, randomly varied.

The specified spike durations shall be measured at 50 % of the spike amplitude.

5.2.2.2.5 Acceptance criteria

The voltage on contact C1 of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.2.3 Electrical tests on contact C1, Test 1: 1,8 V - 3 V

5.2.2.3.1 Definition and applicability

When the user equipment is activated, the supply voltage on the UICC -Terminal interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.2.3.2 Conformance requirement

5.2.2.3.2.1 Description

RQ	REL	Description
RQ_1a	Up to Rel-11	The voltage on contact C1 of the UICC-Terminal interface shall be 3 V ± 10 % for I_{CC} up to 7,5 mA when the Terminal is in 3 V operation mode.
RQ_1b	Rel-12 upwards	The voltage on contact C1 of the UICC-Terminal interface shall be 3 V ± 10 % for I_{CC} up to 10 mA when the Terminal is in 3 V operation mode.
RQ_2a	Up to Rel-11	The voltage on contact C1 of the UICC-Terminal interface shall be 1,8 V ± 10 % for I_{CC} up to 5 mA when the Terminal is in 1,8 V operation mode.
RQ_2b	Rel-12 upwards	The voltage on contact C1 of the UICC-Terminal interface shall be 1,8 V ± 10 % for I_{CC} up to 10 mA when the Terminal is in 1,8 V operation mode.

5.2.2.3.2.2 Reference

1) ETSI TS 102 221 [1], clause 5.2.

2) ETSI TS 102 221 [1], clause 5.3.

5.2.2.3.3 Test purpose

To verify that the Terminal keeps the voltage on contact C1 of the UICC-Terminal interface within the ranges specified in the conformance requirements.

5.2.2.3.4 Method of test

5.2.2.3.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be in nominal test conditions:

- For an interface as defined for releases up to 11, operated in class B see clause 5.2.1, Table 5.2a of the present document.
- For an interface as defined for Release 12 and upwards, operated in class B see clause 5.2.1, Table 5.2b of the present document.
- For an interface as defined for releases up to 11, operated in class C see clause 5.2.1, Table 5.3a of the present document.
- For an interface as defined for Release 12 and upwards, operated in class C see clause 5.2.1, Table 5.3b of the present document.

5.2.2.3.4.2 Test Procedure

The voltage of contact C1 (V_{CC}) of the UICC-Terminal interface shall be measured.

5.2.2.3.5 Acceptance criteria

The voltage on contact C1 of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.2.4 Electrical tests on contact C1, Test 2: 1,8 V - 3 V

5.2.2.4.1 Definition and applicability

When the user equipment is activated, the supply voltage on the UICC-Terminal interface shall be able to counteract spikes in the current consumption of the UICC up to the limits given in the conformance requirement, ensuring that the supply voltage stays in the specified range.

For applicability of this test case see clause 3.8.

5.2.2.4.2 Conformance requirement

5.2.2.4.2.1 Description

1) The voltage on contact C1 of the UICC-Terminal interface shall be 3 V ± 10 % for spikes in the current consumption with a maximum charge of 12 n. As with no more than 400 ns duration and an amplitude of at most 60 mA when the Terminal is in 3 V operation mode.

2) The voltage on contact C1 of the UICC-Terminal interface shall be 1,8 V ± 10 % for spikes in the current consumption with a maximum charge of 12 n. As with no more than 400 ns duration and an amplitude of at most 60 mA when the Terminal is in 1,8 V operation mode.

NOTE: For compatibility reasons a maximum spike duration of 400 ns is kept also for Terminals implemented in accordance to ETSI TS 102 221 [1] - Release 12 and upwards.

5.2.2.4.2.2 Reference

1) ETSI TS 102 221 [1], clause 5.2.

2) ETSI TS 102 221 [1], clause 5.3.

5.2.2.4.3 Test purpose

To verify that the Terminal keeps the voltage on contact C1 of the UICC-Terminal interface within the specified range for the conditions given in the UICC-Terminal conformance requirement.

5.2.2.4.4 Method of test

5.2.2.4.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the interface shall held in nominal test condition (see clause 5.2.1).

5.2.2.4.4.2 Procedure

In order to test the requirements 1) and 2), the voltage on contact C1 of the UICC-Terminal interface shall be monitored and the following current spikes shall be applied:

1) Continuous spikes:
   - current amplitude 12 mA;
   - current offset 0 mA;
   - duration 100 ns;
   - pause 100 ns.
2) Continuous spikes:
   - current 12 mA;
   - current offset 0 mA;
   - duration 400 ns;
   - pause 400 ns.
3) Continuous spikes:
   - current amplitude 9 mA;
   - current offset 3 mA;
   - (i.e. maximum amplitude = 3 mA + 9 mA = 12 mA);
   - duration 150 ns;
   - pause 300 ns.
4) Random spikes:
   - current amplitude 60 mA;
   - current offset 0 mA;
   - duration 200 ns;
   - pause between 0,1 ms and 500 ms, randomly varied.
5) Random spikes:
   - current amplitude 30 mA;
   - current offset 0 mA;

- duration 400 ns;
- pause between 0,1 ms and 500 ms, randomly varied.

6) Random spikes:

- current amplitude 57 mA;
- current offset 3 mA;
- (i.e. maximum amplitude = 3 mA + 57 mA = 60 mA);
- duration 200 ns;
- pause between 0,1 ms and 500 ms, randomly varied.

The specified spike durations shall be measured at 50 % of the spike amplitude.

5.2.2.4.5 Acceptance criteria

The voltage on contact C1 of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.2.5 Electrical tests on contact C1, Test 1: 1,2 V

5.2.2.5.1 Definition and applicability

When the user equipment is activated in voltage class D, the supply voltage on contact C1 of the UICC-Terminal interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.2.5.2 Conformance requirement

5.2.2.5.2.1 Description

RQ	Description
RQ_1	In state H the voltage on contact C1 (V_{CC}) of the UICC-Terminal interface shall be 1,2 V ± 10 % for currents (I_{CC}) of up to 10 mA.

5.2.2.5.2.2 Reference

ETSI TS 102 221 [1], clause 5.4.

5.2.2.5.3 Test purpose

To verify that the Terminal keeps the voltage on contact C1 (V_{CC}) of the UICC-Terminal interface within the ranges specified in the conformance requirements.

5.2.2.5.4 Method of test

5.2.2.5.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

5.2.2.5.4.2 Test Procedure

Step	Direction	Description	RQ
1	User/UE	Activate the UICC-Terminal interface	
	TT	Start measuring the voltage on contact C1 (V_{CC}) When V_{CC} is in state H draw the maximum I_{CC} current (10 mA) Keep the remaining contacts of the UICC-Terminal interface within the nominal test conditions defined in Table 5.4 of ETSI TS 102 221 [1]	RQ_1
2	UICC > T	Send an ATR indicating that voltage class D is supported	
3	T <> UICC	Process a communication sending valid APDUs	
4	User/UE	Deactivate the UICC-Terminal interface	
	TT	Stop drawing I_{CC} current Stop measuring the voltage on contact C1	
NOTE: The specified spike durations shall be measured at 50 % of the spike amplitude.			

5.2.2.5.5 Acceptance criteria

The voltage on contact C1 (V_{CC}) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.2.6 Electrical tests on contact C1, Test 2: 1,2 V

5.2.2.6.1 Definition and applicability

When the user equipment is activated in voltage class D (1,2 V), the supply voltage on the UICC-Terminal interface shall be able to counteract spikes in the current consumption of the UICC up to the limits given in the conformance requirement, ensuring that the supply voltage stays in the specified range.

For applicability of this test case see clause 3.8.

5.2.2.6.2 Conformance requirement

5.2.2.6.2.1 Description

RQ	Description
RQ_1	The voltage on contact C1 (V_{CC}) of the UICC Terminal interface shall be 1,2 V ± 10 % if there are spikes in the current consumption with a maximum charge of 12 nAs with no more than 400 ns duration and an amplitude of at most 60 mA.
NOTE:	For compatibility reasons a maximum spike duration of 400 ns is kept also for Terminals implemented in accordance to ETSI TS 102 221 [1] - Release 12 and upwards.

5.2.2.6.2.2 Reference

ETSI TS 102 221 [1], clause 5.4.

5.2.2.6.3 Test purpose

To verify that the Terminal keeps the voltage on contact C1 (V_{CC}) of the UICC-Terminal interface within the specified range for the conditions given in the UICC-Terminal conformance requirement.

5.2.2.6.4 Method of test

5.2.2.6.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

Current spikes to be generated by the TT:

Seq. #	Spike	Amplitude	Offset	Duration	Pause	Info
1	continuous	12 mA	0 mA	100 ns	100 ns	See note 1
2	continuous	12 mA	0 mA	400 ns	400 ns	See note 1
3	continuous	9 mA	3 mA	150 ns	300 ns	See notes 1 and 2
4	random	60 mA	0 mA	200 ns	0,1 ms to 500 ms	See notes 1 and 3
5	random	30 mA	0 mA	400 ns	0,1 ms to 500 ms	See notes 1 and 3
6	random	57 mA	3 mA	200 ns	0,1 ms to 500 ms	See notes 1, 3 and 4
NOTE 1: The remaining contacts of the interface shall be held in nominal test condition (see clause 5.2.1). NOTE 2: The maximum amplitude is: 3 mA + 9 mA = 12 mA. NOTE 3: The pause in between spikes is randomly varied in the given range. NOTE 4: The maximum amplitude is: 3 mA + 57 mA = 60 mA.						

5.2.2.6.4.2 Procedure

Step	Direction	Description	RQ
1	User/UE	Activate the UICC-Terminal interface.	
	TT	Start measuring the voltage on contact C1 (V_{CC}). When V_{CC} is in state H initiate current spikes (see note 1). Keep the remaining contacts of the UICC-Terminal interface within the nominal test conditions defined in Table 5.4 of ETSI TS 102 221 [1].	RQ_1
2	UICC > T	Send an ATR indicating that voltage class D is supported.	
3	T <> UICC	Process a communication sending valid APDUs.	
4	User/UE	Deactivate the UICC-Terminal interface.	
	TT	Stop the generation of current spikes. Stop measuring the voltage on contact C1.	
NOTE 1: Initiate current spikes as defined in the sequences Seq. #1 to Seq. #6. Execute the procedure for each sequence separately. NOTE 2: The specified spike durations shall be measured at 50 % of the spike amplitude.			

5.2.2.6.5 Acceptance criteria

The voltage on contact C1 (V_{CC}) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.3 Electrical tests on contact C2 (Reset - RST)

5.2.3.1 Electrical tests on contact C2: 3 V - 5 V

5.2.3.1.1 Definition and applicability

When the user equipment is activated, the voltage on contact C2 of the UICC-Terminal interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.3.1.2 Conformance requirement

5.2.3.1.2.1 Description

1) The voltage on contact C2 (RST) of the UICC-Terminal interface shall be between -0,3 V and +0,6 V for a current of -200 µA in low state and between V_{CC} -0,7 V and V_{CC} + 0,3 V for a current of +20 µA in high state when the Terminal is in 5 V operation mode.

2) The voltage on contact C2 (RST) of the UICC-Terminal interface shall be between -0,3 V and 0,2 × V_{CC} for a current of -200 µA in low state and between 0,8 × V_{CC} and V_{CC} + 0,3 V for a current of +20 µA in high state when the Terminal is in 3 V operation mode.

5.2.3.1.2.2 Reference

1) ETSI TS 102 221 [1], clause 5.1.

2) ETSI TS 102 221 [1], clause 5.2.

5.2.3.1.3 Test purpose

To verify that the Terminal keeps the voltage on contact C2 (RST) of the UICC-Terminal interface within the specified range, as given in the conformance requirement.

5.2.3.1.4 Method of test

5.2.3.1.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be held in nominal test conditions (see clause 5.2.1).

5.2.3.1.4.2 Procedure

The voltage on contact C2 (RST) of the UICC-Terminal interface shall be measured.

5.2.3.1.5 Acceptance criteria

The voltage on contact C2 (RST) of the UICC-Terminal interface shall be within the range specified in the conformance requirement.

5.2.3.2 Electrical tests on contact C2: 1,8 V - 3 V

5.2.3.2.1 Definition and applicability

When the user equipment is activated, the voltage on contact C2 of the UICC-Terminal interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.3.2.2 Conformance requirement

5.2.3.2.2.1 Description

1) The voltage on contact C2 (RST) of the UICC-Terminal interface shall be between -0,3 V and 0,2 × V_{CC} for a current of -200 µA in low state and between 0,8 × V_{CC} and V_{CC} + 0,3 V for a current of +20 µA in high state when the Terminal is in 3 V operation mode.

2) The voltage on contact C2 (RST) of the UICC-Terminal interface shall be between -0,3 V and 0,2 ×V_{CC} for a current of -200 µA in low state and between 0,8 × V_{CC} and V_{CC} + 0,3 V for a current of +20 µA in high state when the Terminal is in 1,8 V operation mode.

5.2.3.2.2.2 Reference

1) ETSI TS 102 221 [1], clause 5.2.

2) ETSI TS 102 221 [1], clause 5.3.

5.2.3.2.3 Test purpose

To verify that the Terminal keeps the voltage on contact C2 (RST) of the UICC-Terminal interface within the specified range, as given in the conformance requirement.

5.2.3.2.4 Method of test

5.2.3.2.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be held in nominal test conditions (see clause 5.2.1).

5.2.3.2.4.2 Procedure

The voltage on contact C2 (RST) of the UICC-Terminal interface shall be measured.

5.2.3.2.5 Acceptance criteria

The voltage on contact C2 (RST) of the UICC-Terminal interface shall be within the range specified in the conformance requirement.

5.2.3.3 Electrical tests on contact C2: 1,2 V

5.2.3.3.1 Definition and applicability

When the user equipment is activated in voltage class D (1,2 V), the voltage on contact C2 (RST) of the UICC-Terminal interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.3.3.2 Conformance requirement

5.2.3.3.2.1 Description

RQ	Description
RQ_1	In state L the voltage on contact C2 (RST) of the UICC-Terminal interface shall be between -0,3 V and 0,2 × V_{CC} for a current of up to -200 µA.
RQ_2	In state H the voltage on contact C2 (RST) of the UICC-Terminal interface shall be between 0,8 × V_{CC} and V_{CC} + 0,3 V for a current of up to +20 µA.

5.2.3.3.2.2 Reference

ETSI TS 102 221 [1], clause 5.4.

5.2.3.3.3 Test purpose

To verify that the Terminal keeps the voltage on contact C2 (RST) of the UICC-Terminal interface within the range specified in the conformance requirement.

5.2.3.3.4 Method of test

5.2.3.3.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

5.2.3.3.4.2 Procedure

Step	Direction	Description	RQ
1	User/UE	Activate the UICC-Terminal interface	
2	TT	Start measuring the voltage on contact C2 (RST) in state L at the activation of C3 (CLK) until C3 is switched to state H (up to 400 clock cycles)	RQ_1
3	TT	Start measuring the voltage on contact C2 (RST) in state H at 400 clock cycles after the activation of C3 (CLK)	RQ_2
4	UICC > T	Send an ATR indicating that voltage class D is supported	
5	T <> UICC	Process a communication sending valid APDUs	
6	User/UE	Deactivate the UICC-Terminal interface	
	TT	Stop measuring the voltage on contact C2 (RST) when the voltage on contact C2 is leaving state H	
	TT	Start measuring the voltage on contact C2 (RST) when the voltage on contact C2 reached state L	RQ_1
7	TT	Stop measuring the voltage on contact C2 (RST) when the voltage on contact C1 (V_{CC}) reached state L	

5.2.3.3.5 Acceptance criteria

The voltage on contact C2 (RST) of the UICC-Terminal interface shall be within the range specified in the conformance requirement.

5.2.4 Electrical tests on contact C3 (Clock - CLK)

5.2.4.1 Electrical tests on contact C3: 3 V - 5 V

5.2.4.1.1 Definition and applicability

When the user equipment is activated, the voltage, the rise/fall time of the signal, the clock cycle ratio and the frequency on contact C3 of the UICC - Terminal interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.4.1.2 Conformance requirement

5.2.4.1.2.1 Description

1) The voltage on contact C3 (CLK) of the UICC - Terminal interface shall be between -0,3 V and +0,5 V for a current of -200 µA in low state and between 0,7 × V_{CC} and V_{CC} + 0,3 V for a current of +20 µA in high state when the Terminal is in 5 V operation mode.

2) The rise and the fall time of the clock signal shall not exceed 9 % of the clock period with a maximum of 0,5 µs when the Terminal is in 5 V operation mode.

3) The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state when the Terminal is in 5 V operation mode.

4) The frequency of the clock signal shall be between 1 MHz and 5 MHz when the Terminal is in 5 V operation mode.

5) The voltage on contact C3 (CLK) of the UICC - Terminal interface shall be between -0,3 V and 0,2 × V_{CC} for a current of -20 µA in low state and between 0,7 × V_{CC} and V_{CC} + 0,3 V for a current of +20 µA in high state when the Terminal is in 3 V operation mode.

6) The rise and the fall time of the clock signal shall not exceed 50 ns when the Terminal is in 3 V operation mode.

7) The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state when the Terminal is in 3 V operation mode.

8) The frequency of the clock signal shall be between 1 MHz and 5 MHz when the Terminal is in 3 V operation mode.

5.2.4.1.2.2 Reference

1 - 4) ETSI TS 102 221 [1], clause 5.1.

5 - 8) ETSI TS 102 221 [1], clause 5.2.

5.2.4.1.3 Test purpose

To verify that the Terminal keeps the voltage, the rise and fall time, the cycle ratio and the frequency on contact C3 (CLK) of the UICC - Terminal interface within the ranges specified in the conformance requirements.

5.2.4.1.4 Method of test

5.2.4.1.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be held in nominal test conditions (see clause 5.2.1).

5.2.4.1.4.2 Procedure

The voltage, the rise/fall time, the clock cycle ratio and the frequency on contact C3 (CLK) of the UICC-Terminal interface shall be measured.

5.2.4.1.5 Acceptance criteria

The voltage, the rise and fall time, the cycle ratio and the frequency on contact C3 (CLK) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.4.2 Electrical tests on contact C3: 1,8 V - 3 V

5.2.4.2.1 Definition and applicability

When the user equipment is activated, the voltage, the rise/fall time of the signal, the clock cycle ratio and the frequency on contact C3 of the UICC - Terminal interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.4.2.2 Conformance requirement

5.2.4.2.2.1 Description

1) The voltage on contact C3 (CLK) of the UICC - Terminal interface shall be between -0,3 V and 0,2 × V_{CC} for a current of -20 µA in low state and between 0,7 × V_{CC} and V_{CC} + 0,3 V for a current of +20 µA in high state when the Terminal is in 3 V operation mode.

2) The rise and the fall time of the clock signal shall not exceed 50 ns when the Terminal is in 3 V operation mode.

3) The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state when the Terminal is in 3 V operation mode.

4) The frequency of the clock signal shall be between 1 MHz and 5 MHz when the Terminal is in 3 V operation mode.

5) The voltage on contact C3 (CLK) of the UICC-Terminal interface shall be between -0,3 V and 0,2 × V_{CC} for a current of -20 µA in low state and between 0,7 × V_{CC} and V_{CC} + 0,3 V for a current of +20 µA in high state when the Terminal is in 1,8 V operation mode.

6) The rise and the fall time of the clock signal shall not exceed 50 ns when the Terminal is in 1,8 V operation mode.

7) The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state when the Terminal is in 1,8 V operation mode.

8) The frequency of the clock signal shall be between 1 MHz and 5 MHz when the Terminal is in 1,8 V operation mode.

5.2.4.2.2.2 Reference

1 - 4) ETSI TS 102 221 [1], clause 5.2.

5 - 8) ETSI TS 102 221 [1], clause 5.3.

5.2.4.2.3 Test purpose

To verify that the Terminal keeps the voltage, the rise and fall time, the cycle ratio and the frequency on contact C3 (CLK) of the UICC - Terminal interface within the ranges specified in the conformance requirements.

5.2.4.2.4 Method of test

5.2.4.2.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be held in nominal test conditions (see clause 5.2.1).

5.2.4.2.4.2 Procedure

The voltage, the rise/fall time, the clock cycle ratio and the frequency on contact C3 (CLK) of the UICC-Terminal interface shall be measured.

5.2.4.2.5 Acceptance criteria

The voltage, the rise and fall time, the cycle ratio and the frequency on contact C3 (CLK) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.4.3 Electrical tests on contact C3: 1,2 V

5.2.4.3.1 Definition and applicability

When the user equipment is activated in voltage class D (1,2 V), the voltage, the rise/fall time of the signal, the clock cycle ratio and the frequency on contact C3 (CLK) of the UICC - Terminal interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.4.3.2 Conformance requirement

5.2.4.3.2.1 Description

RQ	Description
RQ_1	In state L the voltage on contact C3 (CLK) of the UICC-Terminal interface shall be between -0,3 V and 0,2 × V_{CC} for a current of up to -20 µA.
RQ_2	In state H the voltage on contact C2 (RST) of the UICC-Terminal interface shall be between 0,7 × V_{CC} and V_{CC} + 0,3 V for a current of up to +20 µ.
RQ_3	The rise and the fall time of the clock signal shall not exceed 50 ns.
RQ_4	The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state.
RQ_5	The frequency of the clock signal shall be between 1 MHz and 5 MHz.

5.2.4.3.2.2 Reference

ETSI TS 102 221 [1], clause 5.4.

5.2.4.3.3 Test purpose

To verify that the Terminal keeps the voltage, the rise and fall time, the cycle ratio and the frequency on contact C3 (CLK) of the UICC-Terminal interface within the range specified in the conformance requirement.

5.2.4.3.4 Method of test

5.2.4.3.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

5.2.4.3.4.2 Procedure

Step	Direction	Description	RQ
1	User/UE	Activate the UICC-Terminal interface	
2	TT	Start the measurements on contact C3 (CLK) as soon as the signal on C3 starts to toggle	RQ_1 RQ_2 RQ_3 RQ_4 RQ_5
3	UICC > T	Send an ATR indicating that voltage class D is supported	
4	T <> UICC	Process a communication sending valid APDUs	
5	User/UE	Deactivate the UICC-Terminal interface	
	TT	Stop the measurements on contact C3 (CLK) as soon as the signal on C3 stops toggling	

5.2.4.3.5 Acceptance criteria

The voltage, the rise and fall time, the cycle ratio and the frequency on contact C3 (CLK) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.5 Electrical tests on contact C7 (Input/Output - I/O)

5.2.5.1 Electrical tests on contact C7, Test 1: 3 V - 5 V

5.2.5.1.1 Definition and applicability

When the user equipment is activated, the Terminal shall keep the voltage, the current and the rise/fall time of the signal on contact C7 of the UICC-Terminal interface within the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.5.1.2 Conformance requirement

5.2.5.1.2.1 Description

1) Terminal receiving state A (low state):

   - With an imposed voltage of 0 V the current flowing out of the Terminal shall not exceed 1 mA when the Terminal is in 5 V operation mode.

2) Terminal transmitting state A (low state):

   - The voltage shall be between -0,3 V and 0,15 × V_{CC} when a current of 1 mA flowing into the Terminal is applied when the Terminal is in 5 V operation mode.

3) Terminal transmitting or receiving state Z (high state):

   - The voltage shall be between +3,8 V (V_{OH})/0,7 × V_{CC} (V_{IH}) respectively and V_{CC} + 0,3 V when a current of 20 µA flowing out of the Terminal is applied when the Terminal is in 5 V operation mode.

4) The rise time and the fall time of the I/O signal shall not exceed 1 µs when the Terminal is in 5 V operation mode.

5) Terminal receiving state A (low state):

   - With an imposed voltage of 0 V the current flowing out of the Terminal shall not exceed 1 mA when the Terminal is in 3 V operation mode.

6) Terminal transmitting state A (low state):

   - The voltage shall be between -0,3 V and 0,2 × V_{CC} when a current of 1 mA flowing into the Terminal is applied when the Terminal is in 3 V operation mode.

7) Terminal transmitting or receiving state Z (high state):

   - The voltage shall be between 0,7 × V_{CC} and V_{CC} + 0,3 V when a current of 20 µA flowing out of the Terminal is applied when the Terminal is in 3 V operation mode.

8) The rise time and the fall time of the I/O signal shall not exceed 1 µs when the Terminal is in 3 V operation mode.

5.2.5.1.2.2 Reference

1 - 4) ETSI TS 102 221 [1], clause 5.1.

5 - 8) ETSI TS 102 221 [1], clause 5.2.

5.2.5.1.3 Test purpose

To verify that the Terminal keeps the voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface within the ranges specified in the conformance requirements.

5.2.5.1.4 Method of test

5.2.5.1.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be held in nominal test conditions (see clause 5.2.1).

5.2.5.1.4.2 Procedure

The voltage, the current and the rise/fall time on contact C7 (I/O) of the UICC-Terminal interface shall be measured.

5.2.5.1.5 Acceptance criteria

The voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.5.2 Electrical tests on contact C7, Test 2: 3 V - 5 V

5.2.5.2.1 Definition and applicability

When the user equipment is activated, the Terminal shall keep the voltage, the current and the rise/fall time of the signal on contact C7 of the UICC-Terminal interface within the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.5.2.2 Conformance requirement

5.2.5.2.2.1 Description

1) Terminal receiving state A (low state):

   - With an imposed voltage of 0 V the current flowing out of the Terminal shall not exceed 1 mA when the Terminal is in 5 V operation mode.

2) Terminal transmitting state A (low state):

   - The voltage shall be between -0,3 V and 0,15 × V_{CC} when a current of 1 mA flowing into the Terminal is applied when the Terminal is in 5 V operation mode.

3) Terminal transmitting or receiving state Z (high state):

   - The voltage shall be between +3,8 V (V_{OH})/0,7 × V_{CC} (V_{IH}) respectively and V_{CC} + 0,3 V when a current of 20 µA flowing out of the Terminal is applied when the Terminal is in 5 V operation mode.

4) The rise time and the fall time of the I/O signal shall not exceed 100 ns when the Terminal is in 5 V operation mode.

5) Terminal receiving state A (low state):

   - With an imposed voltage of 0 V the current flowing out of the Terminal shall not exceed 1 mA when the Terminal is in 3 V operation mode.

6) Terminal transmitting state A (low state):

   - The voltage shall be between -0,3 V and 0,2 × V_{CC} when a current of 1 mA flowing into the Terminal is applied when the Terminal is in 3 V operation mode.

7) Terminal transmitting or receiving state Z (high state):

   - The voltage shall be between 0,7 × V_{CC} and V_{CC} + 0,3 V when a current of 20 µA flowing out of the Terminal is applied when the Terminal is in 3 V operation mode.

8) When the low impedance buffer is selected, the rise time and the fall time of the I/O signal shall not exceed 100 ns when the Terminal is in 3 V operation mode.

5.2.5.2.2.2 Reference

1 - 4) ETSI TS 102 221 [1], clause 5.1.

5 - 8) ETSI TS 102 221 [1], clause 5.2.

5.2.5.2.3 Test purpose

To verify that the Terminal supporting low impedance buffer keeps the voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface within the ranges specified in the conformance requirements.

5.2.5.2.4 Method of test

5.2.5.2.4.1 Initial condition

The Terminal shall be connected to a UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be held in nominal test conditions (see clause 5.2.1).

An ATR indicating the support of the low impedance buffer shall have been received and the PPS procedure selecting the low impedance buffer shall have been successfully completed.

5.2.5.2.4.2 Procedure

The voltage, the current and the rise/fall time on contact C7 (I/O) of the UICC-Terminal interface shall be measured.

5.2.5.2.5 Acceptance criteria

The voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.5.3 Electrical tests on contact C7, Test 1: 1,8 V - 3 V

5.2.5.3.1 Definition and applicability

When the user equipment is activated, the Terminal shall keep the voltage, the current and the rise/fall time of the signal on contact C7 of the UICC-Terminal interface within the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.5.3.2 Conformance requirement

5.2.5.3.2.1 Description

1) Terminal receiving state A (low state):

   - With an imposed voltage of 0 V the current flowing out of the Terminal shall not exceed 1 mA when the Terminal is in 3 V operation mode.

2) Terminal transmitting state A (low state):

   - The voltage shall be between -0,3 V and 0,2 × V_{CC} when a current of 1 mA flowing into the Terminal is applied when the Terminal is in 3 V operation mode.

3) Terminal transmitting or receiving state Z (high state):

   - The voltage shall be between 0,7 × V_{CC} and V_{CC} + 0,3 V when a current of 20 µA flowing out of the Terminal is applied when the Terminal is in 3 V operation mode.

4) The rise time and the fall time of the I/O signal shall not exceed 1 µs when the Terminal is in 3 V operation mode.

5) Terminal receiving state A (low state):

- With an imposed voltage of 0 V the current flowing out of the Terminal shall not exceed 1 mA when the Terminal is in 1,8 V operation mode.

6) Terminal transmitting state A (low state):

- The voltage shall be between -0,3 V and 0,2 × V_{CC} when a current of 1 mA flowing into the Terminal is applied when the Terminal is in 1,8 V operation mode.

7) Terminal transmitting or receiving state Z (high state):

- The voltage shall be between 0,7 × V_{CC} and V_{CC} + 0,3 V when a current of 20 µA flowing out of the Terminal is applied when the Terminal is in 1,8 V operation mode.

8) The rise time and the fall time of the I/O signal shall not exceed 1 µs when the Terminal is in 1,8 V operation mode.

5.2.5.3.2.2 Reference

1 - 4) ETSI TS 102 221 [1], clause 5.2.

5 - 8) ETSI TS 102 221 [1], clause 5.3.

5.2.5.3.3 Test purpose

To verify that the Terminal keeps the voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface within the ranges specified in the conformance requirements.

5.2.5.3.4 Method of test

5.2.5.3.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be held in nominal test conditions (see clause 5.2.1).

5.2.5.3.4.2 Procedure

The voltage, the current and the rise/fall time on contact C7 (I/O) of the UICC-Terminal interface shall be measured.

5.2.5.3.5 Acceptance criteria

The voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.5.4 Electrical tests on contact C7, Test 2: 1,8 V - 3 V

5.2.5.4.1 Definition and applicability

When the user equipment is activated, the Terminal shall keep the voltage, the current and the rise/fall time of the signal on contact C7 of the UICC-Terminal interface within the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.5.4.2 Conformance requirement

5.2.5.4.2.1 Description

1) Terminal receiving state A (low state):

   - With an imposed voltage of 0 V the current flowing out of the Terminal shall not exceed 1 mA when the Terminal is in 3 V operation mode.

2) Terminal transmitting state A (low state):

   - The voltage shall be between -0,3 V and 0,2 × V_{CC} when a current of 1 mA flowing into the Terminal is applied when the Terminal is in 3 V operation mode.

3) Terminal transmitting or receiving state Z (high state):

   - The voltage shall be between 0,7 × V_{CC} and V_{CC} + 0,3 V when a current of 20 µA flowing out of the Terminal is applied when the Terminal is in 3 V operation mode.

4) The rise time and the fall time of the I/O signal shall not exceed 100 ns when the Terminal is in 3 V operation mode.

5) Terminal receiving state A (low state):

   - With an imposed voltage of 0 V the current flowing out of the Terminal shall not exceed 1 mA when the Terminal is in 1,8 V operation mode.

6) Terminal transmitting state A (low state):

   - The voltage shall be between -0,3 V and 0,2 × V_{CC} when a current of 1 mA flowing into the Terminal is applied when the Terminal is in 1,8 V operation mode.

7) Terminal transmitting or receiving state Z (high state):

   - The voltage shall be between 0,7 × V_{CC} and V_{CC} + 0,3 V when a current of 20 µA flowing out of the Terminal is applied when the Terminal is in 1,8 V operation mode.

8) When the low impedance buffer is selected, the rise time and the fall time of the I/O signal shall not exceed 100 ns when the Terminal is in 1,8 V operation mode.

5.2.5.4.2.2 Reference

1 - 4) ETSI TS 102 221 [1], clause 5.2.

5 - 8) ETSI TS 102 221 [1], clause 5.3.

5.2.5.4.3 Test purpose

To verify that the Terminal supporting low impedance buffer keeps the voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface within the ranges specified in the conformance requirements.

5.2.5.4.4 Method of test

5.2.5.4.4.1 Initial condition

The Terminal shall be connected to a UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be held in nominal test conditions (see clause 5.2.1).

An ATR indicating the support of the low impedance buffer shall have been received and the PPS procedure selecting the low impedance buffer shall have been successfully completed.

5.2.5.4.4.2 Procedure

The voltage, the current and the rise/fall time on contact C7 (I/O) of the UICC-Terminal interface shall be measured.

5.2.5.4.5 Acceptance criteria

The voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.5.5 Electrical tests on contact C7, Test 1: 1,2 V

5.2.5.5.1 Definition and applicability

When the user equipment is activated, the Terminal shall keep the voltage, the current and the rise/fall time of the signal on contact C7 (I/O) of the UICC-Terminal interface within the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.5.5.2 Conformance requirement

5.2.5.5.2.1 Description

RQ	Description
RQ_1	If the Terminal is in reception mode and imposing the state L, the voltage on contact C7 (I/O) of the UICC-Terminal interface shall be between -0,3 V and 0,2 × V_{CC} for a current of up to 1 mA.
RQ_2	If the Terminal is in reception mode (state H), the voltage on contact C7 (I/O) of the UICC-Terminal interface shall be between 0,7 × V_{CC} and V_{CC} + 0,3 V for a current of up to ±20 µA (see note).
RQ_3	If the Terminal is in transmission mode, and imposing the state H, the voltage on contact C7 (I/O) of the UICC-Terminal interface shall be between 0,75 × V_{CC} and V_{CC} + 0,3 V for a current of up to 20 µA.
RQ_4	If the Terminal is in transmission mode, and contact C7 (I/O) of the UICC-Terminal interface is in state L, the voltage on contact C7 (I/O) shall be between -0,3 V and 0,2 V for a current of up to -1 mA.
RQ_5	Rise time and the fall time of the I/O signal on contact C7 (I/O) shall not exceed 1 µs.
NOTE:	During static conditions (idle state) only the positive value can apply. Under dynamic operating conditions (transmissions) short-term voltage spikes on the I/O line may cause a current reversal.

5.2.5.5.2.2 Reference

ETSI TS 102 221 [1], clause 5.4.

5.2.5.5.3 Test purpose

To verify that the Terminal keeps the voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface within the ranges specified in the conformance requirements.

5.2.5.5.4 Method of test

5.2.5.5.4.1 Initial condition

The Terminal shall be connected to an UICC simulator.

5.2.5.5.4.2 Procedure

Step	Direction	Description	RQ
1	User/UE	Activate the UICC-Terminal interface	
2	TT	Start the measurements on contact C7 (I/O) as soon as the signal on contact C3 (RST) is switched to state H	RQ_1 RQ_2 RQ_3 RQ_4 RQ_5
3	UICC > T	Send an ATR indicating that voltage class D is supported	
4	T <> UICC	Process a communication sending valid APDUs	
5	User/UE	Deactivate the UICC-Terminal interface	
	TT	Stop the measurements on contact C7 (I/O)	
NOTE: The voltage, the current and the rise/fall time on contact C7 (I/O) of the UICC-Terminal interface shall be measured.			

5.2.5.5.5 Acceptance criteria

The voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

5.2.5.6 Electrical tests on contact C7, Test 2: 1,2 V

5.2.5.6.1 Definition and applicability

When the user equipment is activated, the Terminal shall keep the voltage, the current and the rise/fall time of the signal on contact C7 (I/O) of the UICC-Terminal interface within the specified range in order to ensure correct operation and to prevent any damage to the UICC.

For applicability of this test case see clause 3.8.

5.2.5.6.2 Conformance requirement

5.2.5.6.2.1 Description

RQ	Description
RQ_1	If the Terminal is in reception mode and imposing the state L, the voltage on contact C7 (I/O) of the UICC-Terminal interface shall be between -0,3 V and 0,2 × V_{CC} for a current of up to 1 mA.
RQ_2	If the Terminal is in reception mode (state H), the voltage on contact C7 (I/O) of the UICC-Terminal interface shall be between 0,7 × V_{CC} and V_{CC} + 0,3 V for a current of up to ±20 µA (see note).
RQ_3	If the Terminal is in transmission mode, and imposing the state H, the voltage on contact C7 (I/O) of the UICC-Terminal interface shall be between 0,75 × V_{CC} and V_{CC} + 0,3 V for a current of up to 20 µA.
RQ_4	If the Terminal is in transmission mode, and contact C7 (I/O) of the UICC-Terminal interface is in state L, the voltage on contact C7 (I/O) shall be between -0,3 V and 0,2 V for a current of up to -1 mA.
RQ_5	With the low impedance buffer is selected, rise time and the fall time of the I/O signal on contact C7 (I/O) shall not exceed 100 ns.
NOTE: During static conditions (idle state) only the positive value can apply. Under dynamic operating conditions (transmissions) short-term voltage spikes on the I/O line may cause a current reversal.	

5.2.5.6.2.1 Reference

ETSI TS 102 221 [1], clause 5.4.

5.2.5.6.3 Test purpose

To verify that the Terminal supporting low impedance buffer keeps the voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface within the ranges specified in the conformance requirements.

5.2.5.6.4 Method of test

5.2.5.6.4.1 Initial condition

The Terminal shall be connected to a UICC simulator.

An ATR indicating the support of the low impedance buffer shall have been received and the PPS procedure selecting the low impedance buffer shall have been successfully completed.

5.2.5.6.4.2 Procedure

Step	Direction	Description	RQ
1	User/UE	Activate the UICC-Terminal interface	
2	TT	Start the measurements on contact C7 (I/O) as soon as the signal on contact C3 (RST) is switched to state H	RQ_1 RQ_2 RQ_3 RQ_4 RQ_5
3	UICC > T	Send an ATR indicating that voltage class D and the low impedance buffer is supported	
4	T <> UICC	Execute PPS procedure confirming the usage of the low impedance buffer	
5	T <> UICC	Process a communication sending valid APDUs	
6	User/UE	Deactivate the UICC-Terminal interface	
	TT	Stop the measurements on contact C7 (I/O)	
NOTE: The voltage, the current and the rise/fall time on contact C7 (I/O) of the UICC-Terminal interface shall be measured.			

5.2.5.6.5 Acceptance criteria

The voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

6 Initial communication tests

6.1 ATR

6.1.1 ATR characters

6.1.1.1 Definition and applicability

The ATR is the first string of bytes sent from the UICC to the Terminal after a reset has been performed.

The historical bytes indicate to the external world how to use the card.

Both protocols T=0 and T=1 are mandatory for the Terminal. The protocol starts after either the answer to reset or a successful PPS exchange.

For applicability of this test case see clause 3.8.

6.1.1.2 Conformance requirement

6.1.1.2.1 Description

RQ	Description
RQ_1	The Terminal shall adopt the data encoding convention and initial etu time defined in the initial character TS of the ATR.
RQ_2	The Terminal shall be able to receive interface characters for transmission protocols other than T=0 and T=1, historical bytes and a check byte, even if only T=0 and T=1 are used by the Terminal.

6.1.1.2.2 Reference

ETSI TS 102 221 [1], clauses 6.3 and 7.

6.1.1.3 Test purpose

1) To verify that the Terminal adopts the data encoding convention and initial etu time defined in the initial character TS of the ATR.

2) To verify that the Terminal accepts interface characters for transmission protocols (T=0 and T=1), historical bytes and a check byte.

6.1.1.4 Method of test

6.1.1.4.1 Initial conditions

The Terminal shall be connected to the UICC (or UICC simulator).

ATR-1 (direct convention, T=0, no T=15):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 only is present Protocol T=0 supported by UICC
TD2	'1F'	TA3 only is present Global interface bytes following (T=15)
TA3	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'AA'	Check byte

ATR-2 (inverse convention, T=0, T=15):

Character	Value	Description
TS	'3F'	Indicates inverse convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 only is present Protocol T=0 supported by UICC
TD2	'1F'	TA3 only is present Global interface bytes following (T=15)
TA3	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported

Character	Value	Description
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'AA'	Check byte

ATR-3 (inverse convention, T=0, T=1, T=15):

Character	Value	Description
TS	'3F'	Indicates inverse convention
T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	Only TD2 is present Protocol T=0 supported by UICC
TD2	'B1'	TA3, TB3 and TD3 are present Protocol T=1 supported by UICC
TA3	'FE'	IFSC is 254 bytes long
TB3	'00'	Block Waiting Integer=0 Character Waiting Integer=0
TD3	'1F'	Only TA4 is present Global interface bytes following (T=15)
TA4	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'E5'	Check byte

ATR-4 (direct convention, T=1 in specific mode, T=15):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'91'	TA2 and TD2 are present Protocol T=1 supported by UICC
TA2	'81'	Protocol T=1 used in specific mode Parameters indicated by the interface bytes, and card is not able to change mode
TD2	'B1'	TA3, TB3 and TD3 are present Protocol T=1 supported by UICC
TA3	'FE'	IFSC is 254 bytes long
TB3	'00'	Block Waiting Integer=0 Character Waiting Integer=0
TD3	1F'	TA4 is present Global interface bytes following (T=15)
TA4	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported

Character	Value	Description
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'75'	Check byte

ATR-5 (inverse convention, T=1 in specific mode, T=15):

Character	Value	Description
TS	'3F'	Indicates inverse convention
T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'91'	TA2 and TD2 are present Protocol T=1 supported by UICC
TA2	'81'	Protocol T=1 used in specific mode Parameters indicated by the interface bytes, and card is not able to change mode
TD2	'B1'	TA3, TB3 and TD3 are present Protocol T=1 supported by UICC
TA3	'FE'	IFSC is 254 bytes long
TB3	'00'	Block Waiting Integer=0 Character Waiting Integer=0
TD3	'1F'	TA4 is present Global interface bytes following (T=15)
TA4	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'75'	Check byte

6.1.1.4.2 Procedure

Step	Direction	Description	RQ
1	User/UE	Activate the UICC-Terminal interface	
	TT	Start monitoring the communication	
2	UICC > T	Send an ATR as defined in the initial conditions (see note)	
Conditional		IF TA2 is present THEN skip step 3)	
3	T <> UICC	Run the PPS procedure	RQ_1
4	T <> UICC	Ensure that valid APDUs are sent (e.g. by entering the PIN)	RQ_2
5	User/UE	Deactivate the UICC-Terminal interface	
	TT	Stop monitoring the communication	
6		Repeat steps 1) to 5) for all ATRs	
NOTE: During this procedure a communication based on the parameters provided in the ATRs (ATR-1 to ATR-5) defined in the initial conditions should be tested.			

6.1.1.5 Acceptance criteria

At the first execution of the procedure the Terminal gets sent ATR-1 and shall start a T=0 session in direct convention without T=15 information (RQ_1) and work with the UICC (or UICC simulator) (RQ_2).

At the second execution of the procedure the Terminal gets sent ATR-2 and shall start a T=0 session in inverse convention (RQ_1) and work with the UICC (or UICC simulator) (RQ_2).

At the third execution of the procedure the Terminal gets sent ATR-3 and shall start a T=0 or a T=1 session in inverse convention (RQ_1) and work with the UICC (or UICC simulator) (RQ_2).

At the fourth execution of the procedure the Terminal gets sent ATR-4 and shall start a T=1 session in direct convention without running a PPS procedure (RQ_1) and work with the UICC (or UICC simulator) (RQ_2).

At the fifth execution of the procedure the Terminal gets sent ATR-5 and shall start a T=1 session in inverse convention without running a PPS procedure (RQ_1) and work with the UICC (or UICC simulator) (RQ_2).

6.1.2 ATR indicating the support of LSIs

6.1.2.1 Definition and applicability

If LSIs are supported by the UICC this is indicated in the first global interface byte (TB_i (i > 2)) of the ATR. The coding of the first TB_i (i > 2) after T = 15 is defined in ETSI TS 102 221 [1].

Terminal and UICC shall agree on using LSIs as follows:

- The UICC indicates support for LSIs in the ATR.
- If indicated by the UICC, the Terminal shall indicate in PPS2 if LSIs shall be used for the card session.
- If LSIs are used for the card session, LSI 0 is selected after the PPS.

For applicability of this test case see clause 3.8.

6.1.2.2 Conformance requirement

6.1.2.2.1 Description

RQ	Description
RQ_1	The Terminal shall be capable to interpret global interface bytes from an ATR.
RQ_2	After receiving an ATR indicating the support of LSIs, the Terminal shall indicate in PPS1 the transmission protocol shall be used for the card session.
RQ_3	After receiving an ATR indicating the support of LSIs, the Terminal shall indicate in PPS2 if LSIs shall be used for the card session.
RQ_4	The Terminal shall select LSI 0 after the PPS if LSIs are used for the card session.

6.1.2.2.2 Reference

ETSI TS 102 221 [1], clauses 6.3.3, 6.4, and 7.5.

6.1.2.3 Test purpose

1) To verify that the Terminal recognizes that LSIs shall be used from the ATR.
2) To verify that the Terminal indicates the usage of LSIs in PPS2.
3) To verify that the Terminal correctly uses LSIs and selects LSI 0.

6.1.2.4 Method of test

6.1.2.4.1 Initial conditions

The Terminal shall be connected to the UICC (or UICC simulator).

ATR-LSI1 (direct convention, T=0, T=15, eUICC and LSIs supported):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 is present Protocol T=0 supported by UICC
TD2	'3F'	TA3 and TB3 are present Global interface bytes following (T=15)
TA3	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
TB3	'83'	eUICC as defined in GSMA SGP.22 [8] supported LSIs supported
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'09'	Check byte

ATR-LSI2 (direct convention, T=0, T=1, T=15, eUICC and LSIs supported):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 is present Protocol T=0 supported by UICC
TD2	'B1'	TA3, TB3 and TD3 are present Protocol T=1 supported by UICC
TA3	'FE'	IFSC is 254 bytes long
TB3	'21'	Block Waiting Integer=2 Character Waiting Integer=1
TD3	'3F'	TA4 and TB4 are present Global interface bytes following (T=15)
TA4	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
TB4	'83'	eUICC as defined in GSMA SGP.22 [8] supported LSIs supported
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'67'	Check byte

ATR-LSI3 (direct convention, T=1, T=15, eUICC and LSIs supported):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1, and TD1 are present

Character	Value	Description
		7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'91'	TA2 and TD2 are present Protocol T=1 supported by UICC
TA2	'81'	Protocol T=1 used in specific mode Parameters indicated by the interface bytes, and card is not able to change mode
TD2	'B1'	TA3, TB3 and TD3 are present Protocol T=1 supported by UICC
TA3	'FE'	IFSC is 254 bytes long
TB3	'21'	Block Waiting Integer=2 Character Waiting Integer=1
TD3	'3F'	TA4 and TB4 are present Global interface bytes following (T=15)
TA4	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
TB4	'83'	eUICC as defined in GSMA SGP.22 [8] supported LSIs supported
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'F7'	Check byte

ATR-LSI4 (direct convention, T=0, T=15, eUICC, UICC-CLF and LSIs supported):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 is present Protocol T=0 supported by UICC
TD2	'3F'	TA3 and TB3 are present Global interface bytes following (T=15)
TA3	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
TB3	'A3'	UICC-CLF supported eUICC as defined in GSMA SGP.22 [8] supported LSIs supported
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'29'	Check byte

6.1.2.4.2 Procedure

Step	Direction	Description	RQ
0	TT	Repeat steps 1) to 6) for all ATRs defined in the initial conditions	
1	User/UE	Activate the UICC-Terminal interface	
	TT	Start monitoring the communication	
2	UICC > T	Send an ATR as defined in the initial conditions	RQ_1
3	T > UICC	Send PPS1 with communication speed settings and PPS2 indicating the support of LSIs (see note)	RQ_2 RQ_3
4	UICC > T	Send a PPS response confirming the Terminal's PPS request	
5	T > UICC	Ensure that a valid APDU is sent to LSI 0 (e.g. by selecting MF)	RQ_4
6	User/UE	Deactivate the UICC-Terminal interface	
	TT	Stop monitoring the communication	
NOTE: In addition to the support of LSIs, the global interface bytes indicates the support of eUICC-related functions. The Terminal may confirm that in PPS2 too.			

6.1.2.5 Acceptance criteria

1) During step 3) the Terminal shall select one of the protocols indicated in the ATR by indicating the protocol in PPS1 (RQ_2).

2) During step 3) the Terminal shall confirm the support of LSIs, indicating the LSI support in the PPS2 the (RQ_3).

3) During step 5) the Terminal shall correctly operate using the selected protocol with (F/D) = (372/1) on LSI 0 (RQ_4).

6.2 Clock stop mode with UICC accepting voltage classes B and C

6.2.1 Definition and applicability

The Terminal shall be able to receive interface characters, historical bytes and a check byte, even if only T=0 and T=1 are used by the Terminal.

T=15 global interface parameters shall be returned by the UICC.

The UICC shall support the clock stop procedure. The clock stop mode is indicated in TA_i (i > 2) in T=15 in the ATR.

For applicability of this test case see clause 3.8.

6.2.2 Conformance requirement

6.2.2.1 Description

RQ	Description
RQ_1	If the UICC supports any other operating conditions even together with class A, clock stop mode shall be supported and the indication shall be set accordingly. The Terminal shall follow this indication independently of operating conditions indicated by the card.
RQ_2	The Terminal shall wait at least 1 860 clock cycles after having received the last character, including the guard time (2 etu), of the response before it switches off the clock.
RQ_3	The Terminal shall wait at least 744 clock cycles before it sends the first command after having started the clock.

6.2.2.2 Reference

ETSI TS 102 221 [1], clauses 6.6 and 11.1.1.4.6.1.

ISO/IEC 7816-3 [2], clauses 6.3.2 and 8.3.

6.2.3 Test purpose

1) To verify that the clock is only switched off as indicated in the ATR first global interface byte and file characteristics (byte 1 of the directory characteristics).

2) To verify that the timing of the clock switching is as specified.

6.2.4 Method of test

6.2.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator. PIN shall be enabled.

6.2.4.2 Procedure

a) The Terminal shall be powered on and the UICC simulator shall send an ATR as follows:

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 only is present Protocol T=0 supported by UICC
TD2	'1F'	TA3 only is present Global interface bytes following (T=15)
TA3	'C6'	Clock stop supported (no preferred state) UICC accepting voltage classes B and C
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'22'	Check byte

and be used with bits set as follows:

b8	b7	b6	b5	B4	b3	b2	b1	Meaning
0	1	1	0	0	0	0	1	Voltage classes BC and clock stop mode supported. No preferred level.

b) When the Terminal is in mode PIN check, 10 seconds shall elapse before the PIN shall be entered.

c) The Terminal shall be powered off and on. The UICC simulator shall send an ATR as follows:

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 only is present Protocol T=0 supported by UICC
TD2	'1F'	TA3 only is present Global interface bytes following (T=15)
TA3	'86'	Clock stop supported (high electrical state) UICC accepting voltage classes B and C

Character	Value	Description
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'62'	Check byte

and be used with bits set as follows:

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
0	1	1	0	0	1	0	1	Voltage classes BC and clock stop mode supported. High level preferred.

d) When the Terminal is in mode PIN check, 10 seconds shall elapse before the PIN shall be entered.

e) The Terminal shall be powered off and on. The UICC simulator shall send an ATR as follows:

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 only is present Protocol T=0 supported by UICC
TD2	'1F'	TA3 only is present Global interface bytes following (T=15)
TA3	'46'	Clock stop supported (low electrical state) UICC accepting voltage classes B and C
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'A2'	Check byte

and be used with bits set as follows:

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
0	1	1	0	1	0	0	1	Voltage classes BC and clock stop mode supported. Low level preferred.

f) When the Terminal is in mode PIN check, 10 seconds shall elapse before the PIN shall be entered.

6.2.5 Acceptance criteria

1) During step b), the Terminal shall switch off the clock at either high or low level.

2) During step d), the Terminal shall switch off the clock at high level.

3) During step f), the Terminal shall switch off the clock at low level.

4) During steps b), d) and f), the Terminal shall not switch off the clock until at least 1 860 clock cycles after having received the last character of the response including the minimum guard time (2 etu).

5) During steps b), d) and f), the Terminal shall wait at least 744 clock cycles before it sends the first command after having restarted the clock.

NOTE: The Terminal will operate at either 1,8 V or 3 V and use the supply voltage procedure if it does not support the first value.

6.3 Clock stop mode with UICC accepting voltage classes A and B

6.3.1 Definition and applicability

The Terminal shall be able to receive interface characters, historical bytes and a check byte, even if only T=0 and T=1 are used by the Terminal.

T=15 global interface parameters shall be returned by the UICC.

The UICC shall support the clock stop procedure. The clock stop mode is indicated in TA_i (i > 2) in T=15 in the ATR.

For applicability of this test case see clause 3.8.

6.3.2 Conformance requirement

6.3.2.1 Description

RQ	Description
RQ_1	If the UICC supports any other operating conditions even together with class A, clock stop mode shall be supported and the indication shall be set accordingly. The Terminal shall follow this indication independently of operating conditions indicated by the card.
RQ_2	The Terminal shall wait at least 1 860 clock cycles after having received the last character, including the guard time (2 etu), of the response before it switches off the clock.
RQ_3	The Terminal shall wait at least 744 clock cycles before it sends the first command after having started the clock.

6.3.2.2 Reference

ETSI TS 102 221 [1], clauses 6.6 and 11.1.1.4.6.1.

ISO/IEC 7816-3 [2], clauses 6.3.2 and 8.3.

6.3.3 Test purpose

1) To verify that the clock is only switched off as indicated in the ATR first global interface byte and file characteristics (byte 1 of the directory characteristics).

2) To verify that the timing of the clock switching is as specified.

6.3.4 Method of test

6.3.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator. PIN shall be enabled.

6.3.4.2 Procedure

a) The Terminal shall be powered on and the UICC simulator shall send an ATR as follows:

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 only is present Protocol T=0 supported by UICC
TD2	'1F'	TA3 only is present Global interface bytes following (T=15)
TA3	'C3'	Clock stop supported (no preferred state) UICC accepting voltage classes A and B
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'27'	Check byte

and be used with bits set as follows:

b8	b7	b6	b5	B4	b3	b2	b1	Meaning
0	0	1	1	0	0	0	1	Voltage classes AB and clock stop mode supported. No preferred level.

b) When the Terminal is in mode PIN check, 10 seconds shall elapse before the PIN shall be entered.

c) The Terminal shall be powered off and on. The UICC simulator shall send an ATR as follows:

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 only is present Protocol T=0 supported by UICC
TD2	'1F'	TA3 only is present Global interface bytes following (T=15)
TA3	'83'	Clock stop supported (high electrical state) UICC accepting voltage classes A and B
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'67'	Check byte

and be used with bits set as follows:

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
0	0	1	1	0	1	0	1	Voltage classes AB and clock stop mode supported. High level preferred.

d) When the Terminal is in mode PIN check, 10 seconds shall elapse before the PIN shall be entered.

e) The Terminal shall be powered off and on. The UICC simulator shall send an ATR as follows:

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 only is present Protocol T=0 supported by UICC
TD2	'1F'	TA3 only is present Global interface bytes following (T=15)
TA3	'43'	Clock stop supported (low electrical state) UICC accepting voltage classes A and B
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'A7'	Check byte

and be used with bits set as follows:

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
0	0	1	1	1	0	0	1	Voltage classes AB and clock stop mode supported. Low level preferred.

f) When the Terminal is in mode PIN check, 10 seconds shall elapse before the PIN shall be entered.

6.3.5 Acceptance criteria

1) During step b), the Terminal shall switch off the clock at either high or low level.

2) During step d), the Terminal shall switch off the clock at high level.

3) During step f), the Terminal shall switch off the clock at low level.

4) During steps b), d) and f), the Terminal shall operate at 3 V and not switch off the clock until at least 1 860 clock cycles after having received the last character of the response including the minimum guard time (2 etu).

5) During steps b), d) and f), the Terminal shall wait at least 744 clock cycles before it sends the first command after having restarted the clock.

6.4 Void

6.5 Speed enhancement

6.5.1 Definition and applicability

The Terminal shall at least support speed enhancement using (F,D) = (512,8) and (512,16) in addition to (372,1), the default values.

For applicability of this test case see clause 3.8.

6.5.2 Conformance requirement

RQ	Description
RQ_1	The Terminal, shall support F = 512 and D = 8.
RQ_2	The Terminal, shall support F = 512 and D = 16.

6.5.3 Test purpose

To verify that the Terminal supports the transmission parameters F = 512 and D = 8 as well as F = 512 and D = 16.

6.5.4 Method of test

6.5.4.1 Initial conditions

The Terminal is connected to the UICC simulator.

ATR-SE-512/8:

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1, TD1 are present 7 bytes of historical bytes
TA1	'94'	F=512, D=8
TD1	'80'	TD2 only is present T=0
TD2	'1F'	TA3 only is present Global interface bytes following
TA3	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'2F'	Check byte

ATR-SE-512/16:

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1, TD1 are present 7 bytes of historical bytes
TA1	'95'	F=512, D=16
TD1	'80'	TD2 only is present T=0
TD2	'1F'	TA3 only is present Global interface bytes following

Character	Value	Description
TA3	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'2E'	Check byte

6.5.4.2 Procedure

Step	Direction	Description	RQ
1	User/UE	Activate the UICC-Terminal interface	
2	UICC > T	Send ATR-SE-512/8 as defined in the initial conditions	
3	T > UICC	Send PPS Request confirming the speed enhancement suggested in the ATR	RQ_1
4	UICC > T	Send PPS Response "FF 10 94 7B" using a work waiting time of 9 600 etu (initial waiting time)	
5	T <> UICC	Process a communication sending valid APDUs with enhanced speed (F = 512, D = 8)	RQ_1
6	User/UE	Deactivate the UICC-Terminal interface	
7	User/UE	Activate the UICC-Terminal interface	
8	UICC > T	Send ATR-SE-512/16 as defined in the initial conditions	
9	T > UICC	Send PPS Request confirming the speed enhancement suggested in the ATR	RQ_2
10	UICC > T	Send PPS Response "FF 10 95 7A" using a work waiting time of 9 600 etu (initial waiting time)	
11	T <> UICC	Process a communication sending valid APDUs with enhanced speed (F = 512, D = 16)	RQ_2
12	User/UE	Deactivate the UICC-Terminal interface	

6.5.5 Acceptance criteria

In step 3) the Terminal shall send to the UICC simulator the PPS Request "FF 10 94 7B" (RQ_1).

In step 5) the Terminal shall work with the UICC simulator (RQ_1).

In step 9) the Terminal shall send to the UICC simulator the PPS Request "FF 10 95 7A" (RQ_2).

In step 11) the Terminal shall work with the UICC simulator (RQ_2).

6.6 Clock stop mode with UICC accepting voltage classes C and D

6.6.1 Definition and applicability

The Terminal shall be able to receive interface characters, historical bytes and a check byte, even if only T=0 and T=1 are used by the Terminal.

T=15 global interface parameters shall be returned by the UICC.

The UICC shall support the clock stop procedure. The clock stop mode is indicated in TA_i (i > 2) in T=15 in the ATR.

For applicability of this test case see clause 3.8.

6.6.2 Conformance requirement

6.6.2.1 Description

RQ	Description
RQ_1	If the UICC supports any other operating conditions even together with class A, clock stop mode shall be supported and the indication shall be set accordingly. The Terminal shall follow this indication independently of operating conditions indicated by the card.
RQ_2	The Terminal shall wait at least 1 860 clock cycles after having received the last character, including the guard time (2 etu), of the response before it switches off the clock.
RQ_3	The Terminal shall wait at least 744 clock cycles before it sends the first command after having started the clock.

6.6.2.2 Reference

ETSI TS 102 221 [1], clauses 6.6, and 11.1.1.4.6.1.

6.6.3 Test purpose

1) To verify that the clock is only switched off as indicated in the ATR first global interface byte and file characteristics (byte 1 of the directory characteristics).

2) To verify that the timing of the clock switching is as specified.

6.6.4 Method of test

6.6.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator. PIN shall be enabled.

ATR-CS7 (voltage classes C and D, clock stop: no preferred state):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 only is present Protocol T=0 supported by UICC
TD2	'1F'	TA3 only is present Global interface bytes following (T=15)
TA3	'CC'	Clock stop supported (no preferred state) UICC accepting voltage classes C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'28'	Check byte

FCP-CS7 (coding of UICC characteristics to be included in the response with FCP template):

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	1	0	0	1	1	0	0	Voltage classes C, D and clock stop mode supported. No preferred level.

ATR-CS8 (voltage classes C and D, clock stop: high state):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 only is present Protocol T=0 supported by UICC
TD2	'1F'	TA3 only is present Global interface bytes following (T=15)
TA3	'BC'	Clock stop supported (high electrical state) UICC accepting voltage classes C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'58'	Check byte

FCP-CS8 (coding of UICC characteristics to be included in the response with FCP template):

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	0	0	0	1	1	0	0	Voltage classes C. D and clock stop mode supported. High level preferred.

ATR-CS9 (voltage classes C and D, clock stop: low state)

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 only is present Protocol T=0 supported by UICC
TD2	'1F'	TA3 only is present Global interface bytes following (T=15)
TA3	'4C'	Clock stop supported (low electrical state) UICC accepting voltage classes C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'A8'	Check byte

FCP-CS9 (coding of UICC characteristics to be included in the response with FCP template):

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
0	1	0	0	1	1	0	0	Voltage class C, D and clock stop mode supported. Low level preferred.

6.6.4.2 Procedure

Step	Direction	Description	RQ
1	User/UE	Activate the UICC-Terminal interface	
	TT	Start monitoring the communication	
2	UICC > T	Send an ATR as defined in the initial conditions (see note)	RQ_1
3	T <> UICC	Run the PPS procedure	
4	T > UICC	Send SELECT MF	
5	UICC > T	Send a response with FCP template included (see note)	RQ_1
6	User	Wait for at least 10 seconds when the Terminal is in mode PIN	RQ_2
7	User	Enter PIN	RQ_3
8	User/UE	Deactivate the UICC-Terminal interface	
	TT	Stop monitoring the communication	
9		Repeat steps 1) to 8) for all ATRs	
NOTE: During this procedure a communication based on the parameters provided in the ATRs (ATR-CS7 to ATR-CS9) defined in the initial conditions should be tested. The FCP template responded to the SELECT MF shall include the related coding for the UICC characteristics as defined in FCP-CS7 to FCP-CS9.			

6.6.5 Acceptance criteria

1) At the first execution of the procedure the Terminal shall switch off the clock at either high or low level during step 6).

2) At the second execution of the procedure the Terminal shall switch off the clock at high level during step 6).

3) At the third execution of the procedure the Terminal shall switch off the clock at low level during step 6).

4) During step 6) or 7) in any of the executions, the Terminal shall operate at 1,2 V and not switch off the clock until at least 1 860 clock cycles after having received the last character of the response including the minimum guard time (2 etu).

5) During step 6) or 7) in any of the executions, the Terminal shall wait at least 744 clock cycles before it sends the first command after having restarted the clock.

NOTE: The Terminal will operate at 1,2 V.

6.7 Clock stop mode with UICC indicating no supply voltage classes

6.7.1 Definition and applicability

The Terminal shall be able to receive interface characters, historical bytes and a check byte, even if only T=0 and T=1 are used by the Terminal.

T=15 global interface parameters shall be returned by the UICC.

The UICC shall support the clock stop procedure. The clock stop mode is indicated in TA_i (i > 2) in T=15 in the ATR. For a UICC supporting only class A operating conditions, clock stop mode "not allowed" may be indicated.

For applicability of this test case see clause 3.8.

6.7.2 Conformance requirement

6.7.2.1 Description

RQ	Description
RQ_1	In case the UICC does not support any supply voltage indication, the UICC shall be treated as a 5 V only card by the Terminal.
RQ_2	A UICC supporting only class A operating conditions may indicate clock stop mode "not allowed.

6.7.2.2 Reference

ETSI TS 102 221 [1], clauses 6.6, and 11.1.1.4.6.1.

6.7.3 Test purpose

1) To verify that the clock is only switched off as indicated in the ATR first global interface byte and file characteristics (byte 1 of the directory characteristics).

6.7.4 Method of test

6.7.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator. PIN shall be enabled.

ATR-CS10 (no supported voltage classes indicated, clock stop: not allowed).

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'90'	TA1 and TD1 are present no historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'80'	TD2 is present Protocol T=0 supported by UICC
TD2	'81'	TD3 is present Protocol T=1 supported by UICC
TD3	'1F'	TA4 is present Protocol T=15 supported by UICC
TA4	'00'	Clock stop not supported
TCK	'9F'	Check byte

FCP-CS10 (coding of UICC characteristics to be included in the response with FCP template):

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
0	0	0	1	0	0	0	0	Voltage classes A and clock stop: never

6.7.4.2 Procedure

Step	Direction	Description	RQ
1	User/UE	Activate the UICC-Terminal interface	
	TT	Start monitoring the communication	
2	UICC > T	Send an ATR-CS10 as defined in the initial conditions	RQ_1
3	T <> UICC	Run the PPS procedure	
4	T > UICC	Send SELECT MF	
5	UICC > T	Send a response with FCP-CS10 template included	RQ_1
6	User	Wait for at least 10 seconds when the Terminal is in mode PIN	RQ_2
7	User	Enter PIN	RQ_3
8	User/UE	Deactivate the UICC-Terminal interface	
	TT	Stop monitoring the communication	
NOTE: During this procedure a communication based on the parameters provided in ATRs-CS10, defined in the initial conditions, should be tested. A UICC not providing supply voltage information shall be handled like a 5 V card. The FCP template responded to the SELECT MF shall include the related coding for the UICC characteristics as defined in FCP-CS10.			

6.7.5 Acceptance criteria

1) During step 6), the Terminal shall not switch off the clock at either high or low level.

NOTE: The Terminal will operate at 5 V.

7 Transmission protocol tests

7.1 Character transmission

7.1.1 Bit/character duration during the transmission from the Terminal to the UICC

7.1.1.1 Definition and applicability

A character consists of 10 consecutive bits:

- 1 start bit in state L;
- 8 bits, which comprise the data byte;
- 1 even parity checking bit.

For applicability of this test case see clause 3.8.

7.1.1.2 Conformance requirement

7.1.1.2.1 Description

The bit/character duration and the delay between two consecutive characters (between start leading edges) sent by the Terminal shall be in the range specified.

7.1.1.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.1.

7.1.1.3 Test purpose

To verify the timing during the transmission from the Terminal to the UICC.

7.1.1.4 Method of test

7.1.1.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

7.1.1.4.2 Procedure

A number of characters are transmitted from the Terminal to the UICC simulator. The UICC simulator shall measure the bit/character duration and the delay between two consecutive characters for all characters transmitted by the Terminal.

7.1.1.5 Acceptance criteria

The timing shall be in the specified range.

7.1.2 Bit/character duration during the transmission from the UICC to the Terminal

7.1.2.1 Definition and applicability

A character consists of 10 consecutive bits:

- 1 start bit in state L;
- 8 bits, which comprise the data byte;
- 1 even parity checking bit.

For applicability of this test case see clause 3.8.

7.1.2.2 Conformance requirement

7.1.2.2.0 Description

The bit/character duration and the delay between two consecutive characters (between start leading edges) sent by the Terminal shall be in the range specified.

7.1.2.2.1 Reference

ETSI TS 102 221 [1], clause 7.2.1.

7.1.2.3 Test purpose

To verify the timing during the transmission from the UICC to the Terminal.

7.1.2.4 Method of test

7.1.2.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

7.1.2.4.2 Procedure

The UICC simulator shall send responses with the maximum and minimum bit/character duration specified in ETSI TS 102 221 [1].

7.1.2.5 Acceptance criteria

The Terminal shall accept the response and act accordingly.

7.2 T=0 protocol

7.2.1 Timing

7.2.1.1 Definition and applicability

The minimum interval between the leading edge of the start bits of two consecutive characters shall be at least 12 etu. The Work Waiting Time (WWT) is the maximum interval between the start leading edge of any character sent by the UICC and the start leading edge of the previous character sent by either by the UICC or the Terminal.

The value of the WWT shall not exceed $960 \times WI \times Fi/f$. WI is an integer received in the specific interface byte TC2. The clock rate conversion factor, Fi, may be indicated in TA1.

For applicability of this test case see clause 3.8.

7.2.1.2 Conformance requirement

7.2.1.2.1 Description

RQ	Description
RQ_1	If TA1 is absent the Terminal shall use the default value Fi=372.
RQ_2	If no TC2 is available the Terminal shall use the default value of WI (10).
RQ_3	The Terminal shall accept characters sent by the UICC with the Work Waiting Time within the specified range.
RQ_4	The Terminal shall use the speed defined In TA1.
RQ_5	The Terminal shall deactivate the Terminal-UICC interface if WWT is exceeded.

7.2.1.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.2.1.

7.2.1.3 Test purpose

1) To verify the correct evaluation of the characters TA1 and TC2 indicated in the ATR.

2) To verify that the Terminal accepts the minimum and maximum Work Waiting Time during the transmission from the UICC to the Terminal.

3) To verify that the Terminal deactivates the UICC if WWT is exceeded.

7.2.1.4 Method of test

7.2.1.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator and powered on.

ATR-T1 (voltage classes B, C and D, no TC2 available):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'87'	TD1 only is present 7 bytes of historical bytes
TD1	'80'	TD2 only is present
TD2	'1F'	TA3 only is present Global interface bytes following
TA3	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'AB'	Check byte

ATR-T2 (voltage classes B, C and D, WI set to '1'):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'C0'	TC2 and TD2 are present
TC2	'01'	WI=1 meaning WWT = 960 × (Fi/f) × 1
TD2	'1F'	TA3 only is present Global interface bytes following
TA3	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'EB'	Check byte

7.2.1.4.2 Procedure

Step	Direction	Description	RQ
1	User/UE	Activate the UICC-Terminal interface	
	TT	Start monitoring the communication	
2	UICC > T	Send an ATR-T1 as defined in the initial conditions	
Optional		Terminal may run the PPS procedure	
3	T > UICC	Send a command APDUs with default speed (372,1)	RQ_1
4	UICC > T	Send a response APDU with WWT: 960 × (Fi/f) ×WI (9 600 etu)	
5	T > UICC	Send a command APDU	RQ_2 RQ_3
6	TT	Initiate a reset	
7	UICC > T	Send an ATR-T2 as defined in the initial conditions	
Optional		Terminal may run the PPS procedure	
8	T > UICC	Send command APDU(s) with the speed defined in TA1 (372,1)	RQ_4
9	UICC > T	Send a response APDU with WWT of 12 etu	
10	T > UICC	Send a command APDU	RQ_3
11	UICC > T	Send a response APDU with WWT: 960 × (Fi/f) ×WI (960 etu)	
12	T > UICC	Send a command APDU	RQ_3
13	UICC > T	Do not send a response APDU	
14	T	Deactivate the UICC-Terminal interface after the WWT of 960 etu is exceeded	RQ_5
	TT	Stop monitoring the communication	

7.2.1.5 Acceptance criteria

In step 3), the Terminal shall work with the UICC simulator using the default values of TA1 and TC2 (RQ_1).

In steps 5) the Terminal shall work with the UICC simulator (RQ_2, RQ_3).

In step 8) the Terminal shall work with the UICC simulator using the values of TA1 provided in ATR-T2 (RQ_4).

In steps 10) and 12) the Terminal shall work with the UICC simulator (RQ_3).

In step 14) the Terminal shall initiate a deactivation of the UICC within 960 etu following the excess of WWT (RQ_5).

7.2.2 Command processing, ACK, NACK, NULL procedure bytes

7.2.2.1 Definition and applicability

Procedure bytes are used to keep up the communication between the Terminal and the UICC. They shall not be transmitted to the Application Layer.

The status bytes SW1 SW2 form an end sequence indicating the status of the UICC at the end of a command.

For applicability of this test case see clause 3.8.

7.2.2.2 Conformance requirement

7.2.2.2.1 Description

The Terminal shall correctly use the different modes of data transmission.

7.2.2.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.2.3.

ISO/IEC 7816-3 [2], clause 8.3.

7.2.2.3 Test purpose

To verify that the Terminal correctly uses the different modes of data transmission.

7.2.2.4 Method of test

7.2.2.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

T=0 ATR shall have been received and eventual PPS procedure successfully completed.

7.2.2.4.2 Procedure

a) The Terminal shall be made to initiate a VERIFY PIN command with 8 bytes of data.

b) The UICC simulator shall answer the first 5 bytes with ACK=INS complemented.

c1) The UICC simulator shall answer the next data byte with NULL (NULL="60"). This byte is sent between 0,8 and 1,0 x Work Waiting Time after the previous procedure byte.

c2) The UICC simulator shall send a second NULL (NULL="60"). This byte is sent between 0,8 and 1,0 x Work Waiting Time after the previous procedure byte.

c3) The UICC simulator shall send a third NULL (NULL="60"). This byte is sent between 0,8 and 1,0 x Work Waiting Time after the previous procedure byte.

d) The UICC simulator shall then send ACK=INS. This byte is sent between 0,8 and 1,0 x Work Waiting Time after the previous procedure byte.

e) The UICC simulator shall answer the transmission of the rest of the data with NULL.

f) The UICC simulator shall then send SW1 and SW2, indicating correct execution of the command ("90" and "00" for SW1 and SW2 respectively). These bytes are sent when the elapsed time since step d) is greater than the Work Waiting Time.

7.2.2.5 Acceptance criteria

The command shall be executed correctly.

7.2.3 Case 2 command, use of procedure bytes '61xx' and '6Cxx'

7.2.3.1 Definition and applicability

Procedure bytes '61XX' and '6CXX' are returned by the UICC to control exchanges between the Transport Layer of the Terminal and the UICC, and should never be returned to the Application Layer of the Terminal. Command processing in the UICC is not complete if it has returned procedure bytes '61XX' or '6CXX'.

For applicability of this test case see clause 3.8.

7.2.3.2 Conformance requirement

7.2.3.2.1 Description

The UICC returns procedure bytes '61xx 'and '6Cxx' to the Transport Layer of the Terminal to indicate to it the manner in which it should retrieve the data requested by the command currently being processed. These procedure bytes are only used when processing case 2 and 4 commands using T=0.

7.2.3.2.2 Reference

ETSI TS 102 221 [1], clause 7.3.1.1.5.

ISO/IEC 7816-3 [2], clause 8.3.

7.2.3.3 Test purpose

To verify that the Terminal correctly handles the procedure bytes '61XX' and '6CXX' when processing a case 2 command.

7.2.3.4 Method of test

7.2.3.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

T=0 ATR shall have been received and eventual PPS procedure successfully completed.

7.2.3.4.2 Procedure

a) The Terminal shall be made to initiate a case 2 command with Le > Luicc (ex: READ RECORD command).

b) The UICC simulator shall send '6CLuicc' procedure bytes.

c) Following receipt of the command, the UICC simulator shall send '61xx' procedure bytes.

d) Following receipt of the command, the UICC simulator shall send corresponding data + '61yy' procedure bytes.

e) Following receipt of the command, the UICC simulator shall then send the rest of the data and SW1 and SW2, indicating correct execution of the command ("90" and "00" for SW1 and SW2 respectively).

7.2.3.5 Acceptance criteria

After step b) the Terminal shall send the previous command with Le = 'Luicc'.

After step c) the Terminal shall send a GET RESPONSE command with Le = 'xx'.

After step f) the Terminal shall send a GET RESPONSE command with Le = 'yy'.

7.2.4 Case 4 command, use of procedure bytes '61xx'

7.2.4.1 Definition and applicability

Procedure bytes '61XX' and '6CXX' are returned by the UICC to control exchanges between the Transport Layer of the Terminal and the UICC, and should never be returned to the Application Layer of the Terminal. Command processing in the UICC is not complete if it has returned procedure bytes '61XX' or '6CXX'.

For applicability of this test case see clause 3.8.

7.2.4.2 Conformance requirement

7.2.4.2.1 Description

The UICC returns procedure bytes '61xx' and '6Cxx' to the Transport Layer of the Terminal to indicate to it the manner in which it should retrieve the data requested by the command currently being processed. These procedure bytes are only used when processing case 2 and 4 commands using T=0.

7.2.4.2.2 Reference

ETSI TS 102 221 [1], clause 7.3.1.1.5.

ISO/IEC 7816-3 [2], clause 8.3.

7.2.4.3 Test purpose

To verify that the Terminal correctly handles the procedure bytes '61XX' when processing a case 4 command.

7.2.4.4 Method of test

7.2.4.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

T=0 ATR shall have been received and eventual PPS procedure successfully completed.

7.2.4.4.2 Procedure

a) The Terminal shall be made to initiate a case 4 command with Le > Luicc (ex: SELECT command).

b) The UICC simulator shall answer the command header with INS and send '61xx' procedure bytes following reception of data.

c) Following receipt of the command, the UICC simulator shall send corresponding data + '61yy' procedure bytes.

d) Following receipt of the command, the UICC simulator shall then send the rest of the data and SW1 and SW2, indicating correct execution of the command ("90" and "00" for SW1 and SW2 respectively).

7.2.4.5 Acceptance criteria

After step b) the Terminal shall send a GET RESPONSE command with Le = 'xx'.

After step c) the Terminal shall send a GET RESPONSE command with Le = 'yy'.

7.2.5 Command processing, warning and error status bytes

7.2.5.1 Definition and applicability

The status bytes SW1 SW2 form an end sequence indicating the status of the UICC at the end of a command.

For applicability of this test case see clause 3.8.

7.2.5.2 Conformance requirement

7.2.5.2.1 Description

In the case of an error, the UICC may return status indicating error or warning conditions instead of the '61xx' or '6Cxx' response.

7.2.5.2.2 Reference

ETSI TS 102 221 [1], clauses 7.2.2.3 and 10.2.1.

7.2.5.3 Test purpose

To verify that the Terminal correctly handles status bytes different than '9000'.

7.2.5.4 Method of test

7.2.5.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

T=0 ATR shall have been received and eventual PPS procedure successfully completed.

7.2.5.4.2 Procedure

a) Warning:

a-1) The Terminal shall be made to initiate a case 4 command except for SEARCH RECORD (ex: SELECT command).

a-2) The UICC simulator shall send warning status bytes ('62xx' '63xx' or '9xxx').

a-3) Following receipt of the command, the UICC simulator shall then send the rest of the data and SW1 and SW2, indicating correct execution of the command ("90" and "00" for SW1 and SW2 respectively).

b) Error:

b-1) The Terminal shall be made to initiate a case 4 command (ex: SELECT command).

b-2) The UICC simulator shall send error status bytes ('6xxx' except '6Cxx', '61xx', '62xx' and '63xx').

7.2.5.5 Acceptance criteria

After step a-2) the Terminal shall send a GET RESPONSE command with Le = '00'.

After step b-2) the Terminal shall discontinue processing of the command.

7.2.6 Error correction

7.2.6.1 Definition and applicability

If the UICC as receiver detects a parity error within 11 etu ± 0,2 etu starting from the leading edge of the start bit, in a character just received, it shall set I/O to state L to indicate the error to the Terminal.

For applicability of this test case see clause 3.8.

7.2.6.2 Conformance requirement

7.2.6.2.1 Description

The error detection and correction procedure is mandatory for T=0 protocol except for the Terminal during the ATR-procedure.

7.2.6.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.2.4.

7.2.6.3 Test purpose

To verify the error handling during the transmission from the Terminal to the UICC.

7.2.6.4 Method of test

7.2.6.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

7.2.6.4.2 Procedure

The UICC simulator shall transmit an error signal in response to a received character by setting the I/O line to state L for a maximum of 2 etu and a minimum of 1 etu, 10,5 etu ± 0,2 etu after the leading edge of the start bit of the received character.

7.2.6.5 Acceptance criteria

The Terminal shall repeat the disputed character after a minimum delay of 2 etu.

7.2.7 Error detection

7.2.7.1 Definition and applicability

If the Terminal as receiver detects a parity error within 11 ± 0,2 etu starting from the leading edge of the start bit, in a character just received, it shall set I/O to state L to indicate the error to the UICC.

For applicability of this test case see clause 3.8.

7.2.7.2 Conformance requirement

7.2.7.2.1 Description

The error detection and correction procedure is mandatory for T=0 protocol except for the Terminal during the ATR-procedure.

7.2.7.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.2.4.

7.2.7.3 Test purpose

To verify the error handling during the transmission from the UICC to the Terminal.

7.2.7.4 Method of test

7.2.7.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

7.2.7.4.2 Procedure

The UICC simulator shall send a response with a parity error and check that the terminals correctly handles it.

7.2.7.5 Acceptance criteria

The Terminal shall detect the parity error by setting the I/O line to state L for a maximum of 2 etu and a minimum of 1 etu, 10,5 etu ± 0,2 etu after the leading edge of the start bit of the erroneous character and correctly evaluate the character when repeated by the UICC simulator.

7.3 T=1 protocol

7.3.1 Character Waiting Time

7.3.1.1 Definition and applicability

CWT is defined as the maximum delay between the leading edges of two consecutive characters in the block.

For applicability of this test case see clause 3.8.

7.3.1.2 Conformance requirement

7.3.1.2.1 Description

CWI is used to calculate CWT and shall be in the range from 0 to 5. The value is set in bits b4 to b1 in TB3. The value of CWT may be calculated from the following equation: CWT = $(11 + 2^{CWI})$ etu.

7.3.1.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.3.1.

ISO/IEC 7816-3 [2], clause 11.4.3.

7.3.1.3 Test purpose

To verify that the Terminal respects the CWT indicated by the UICC.

7.3.1.4 Method of test

7.3.1.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR-CWT (T=1, T=15, CWI=5):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'81'	Only TD2 is present Protocol T=1 supported by UICC
TD2	'A1'	TB3 and TD3 are present Protocol T=1 supported by UICC
TB3	'05'	Block Waiting Integer=0 Character Waiting Integer=5 indicating CWT=43 etu
TD3	'1F'	Only TA4 is present Global interface bytes following (T=15)
TA4	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'0F'	Check byte

7.3.1.4.2 Procedure

a) Upon reception of a reset the UICC simulator shall transmit ATR-CWT.

b) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring reception of an I-Block:

b-1) The UICC simulator shall send the I-Block (data + '9000' indicating correct execution of the command) using CWT=11 etu.

b-2) The UICC simulator shall send the I-Block (data + '9000' indicating correct execution of the command) using CWT=43 etu.

7.3.1.5 Acceptance criteria

In step b.1) and b.2) the Terminal shall acknowledge the error free I-Block.

7.3.2 Block Timing

7.3.2.1 Definition and applicability

BWT is defined as the maximum delay between the leading edge of the last character of the block received by the card and the leading edge of the first character of the next block sent by the card.

BGT is defined as the minimum delay between the leading edge of two consecutive characters sent in opposite directions. The value of BGT shall be 22 etu.

For applicability of this test case see clause 3.8.

7.3.2.2 Conformance requirement

7.3.2.2.1 Description

BWI is used to calculate BWT and shall be in the range from 0 to 4. The value is set in bits b5 to b8 in TB3. The value of BWT may be calculated from the following equation: BWT = 11 + (2^{BWI} × 960 × 372/f) etu.

The delay between the last character of a block received by the UICC and the first character of the next block sent from the UICC shall be in the interval: BGT < delay < BWT.

7.3.2.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.3.

ISO/IEC 7816-3 [2], clause 11.4.3.

7.3.2.3 Test purpose

To verify that the Terminal respects the BGT and BWT indicated by the UICC in the ATR and detects time-out.

7.3.2.4 Method of test

7.3.2.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR-BWT (T=1, T=15, BWI=3):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'81'	Only TD2 is present Protocol T=1 supported by UICC
TD2	'A1'	TB3 and TD3 are present Protocol T=1 supported by UICC
TB3	'31'	Block Waiting Integer=3 indicating BWT = 11 + (8 × 960 × 372/f) etu Character Waiting Integer=1 indicating CWT=13 etu
TD3	'1F'	Only TA4 is present Global interface bytes following
TA4	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'3B'	Check byte

7.3.2.4.2 Procedure

a) Upon reception of a reset the UICC simulator shall transmit ATR-BWT.

b) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring reception of chained I-Blocks.

c) The UICC simulator shall measure the delay between the last character of each block sent by the UICC and the first character of each following block sent by the Terminal.

d) BWT:

d-1) The UICC simulator shall send the I-Blocks using BGT = 22 etu.

d-2) The UICC simulator shall send each I-Block using BWT = 11 + (2^{BWI} × 960 × 372/f) etu.

BWT excess:

d-3) The UICC simulator shall not send an I-Block.

7.3.2.5 Acceptance criteria

In step c) the Terminal shall use a BGT of at least 22 etus.

In steps d-1) and d-2) the Terminal shall acknowledge reception of the I-Blocks without error.

In step d-3) the Terminal shall detect a time-out and send an R-Block requesting retransmission of the last block.

7.3.3 Block Waiting Time extension

7.3.3.1 Definition and applicability

WTX is a parameter used to ask for more time to process a command.

Supervisory blocks, S-block, are used to send control information.

S-blocks are always used in pairs. A S(request) is always followed by a S(response) block:

- S(WTX request), a request for an extension of the waiting time.
- S(WTX response), an acknowledge of the extension of the waiting time.

For applicability of this test case see clause 3.8.

7.3.3.2 Conformance requirement

7.3.3.2.1 Description

The UICC might need more than BWT to process the previously received block, a S(WTX request) is sent by the UICC. The Terminal shall acknowledge with a S(WTX response).

When an S(… request) has been sent and either a BWT time-out occurs (with the Terminal) or the received response is not a S(… response), the S(… request) shall be resent.

7.3.3.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.3.1.

ISO/IEC 7816-3 [2], clauses 11.3.2.2, 11.3.3, 11.6.1 and 11.6.2.3, scenarios 2, 14 and 15.

7.3.3.3 Test purpose

1) To verify that the Terminal respects the WTX procedure and applies the extended BWT.

2) To verify that the Terminal handles the different types of errors in S(... request).

7.3.3.4 Method of test

7.3.3.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR-WTX (T=1, T=15, BWI=2, CWI=1):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'81'	Only TD2 is present Protocol T=1 supported by UICC
TD2	'A1'	TB3 and TD3 are present Protocol T=1 supported by UICC
TB3	'21'	Block Waiting Integer=2 indicating BWT = 11 + (4 × 960 × 372/f) etu Character Waiting Integer=1 indicating CWT=13 etu
TD3	'1F'	Only TA4 is present Global interface bytes following
TA4	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'2B'	Check byte

7.3.3.4.2 Procedure

a) Upon reception of a reset the UICC simulator shall transmit ATR-WTX.

b) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring exchange of I-Blocks.

c-1) Error free S(WTX request):

c-1-1) Following receipt of the I-block, the UICC simulator shall send a S(WTX request) without error (BWT multiplied by 2).

c-1-2) The UICC simulator shall use the extended BWT when receiving the S(WTX response), then complete the command (data + '9000' indicating correct execution of the command).

c-2) Error in S(WTX request):

c-2-1) Following receipt of the I-block, the UICC simulator shall send a S(WTX request) and generate the following errors:

- Parity error.
- NAD ≠ '00'.
- S(WTX response) instead of S(WTX request).
- Other S(... response) instead of S(WTX request).
- LEN error.

c-2-2) Following reception of the block sent by the Terminal (correct or with error assumed) the UICC simulator shall retransmit the S(WTX request) without error.

c-2-3) The UICC simulator shall use the extended BWT when receiving the S(WTX response), then complete the command (data + '9000' indicating correct execution of the command).

7.3.3.5 Acceptance criteria

After steps c-1-1) and c-2-2) the Terminal shall send a S(WTX response).

After step c-2-1) the Terminal shall send an R-Block requesting retransmission of the last block.

7.3.4 Chaining - Respect of IFSC by Terminal

7.3.4.1 Definition and applicability

Chaining allows the Terminal or the UICC to transfer information, which is longer than IFSC or IFSD. If information longer than IFSC or IFSD is transferred, the information should be divided into pieces, each has a length ≤ IFSC or IFSD. Each piece should be sent in an I-block using the chaining function.

The IFSC defines the maximum length of the information field of blocks that can be received by the UICC.

For applicability of this test case see clause 3.8.

7.3.4.2 Conformance requirement

7.3.4.2.1 Description

The default value of the IFSC is 32 bytes. Another value may be indicated in TA3 of the ATR.

When the Terminal is the sender, all I-blocks of a chain shall have LEN = IFSC bytes except for the last, which could have a value in the range of 0 to IFSC.

When a receiver receives a more-data I-block, a R(N(R)) shall be sent. N(R) = N(S) of the expected I-block. At least one chained block should follow.

7.3.4.2.2 Reference

ETSI TS 102 221 [1], clauses 7.2.3.1.1 and 7.2.3.5.

ISO/IEC 7816-3 [2], clause 11.4.2, 11.6.2.2, 11.6.2.3, 11.6.3.1, scenarios 5 and 6.

7.3.4.3 Test purpose

To verify that the Terminal respects the Information Field Size of the UICC in chaining mode.

7.3.4.4 Method of test

7.3.4.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR-IFS1 (no TA3):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)

Character	Value	Description
TD1	'81'	Only TD2 is present Protocol T=1 supported by UICC
TD2	'A1'	TB3 and TD3 are present Protocol T=1 supported by UICC
TB3	'00'	Block Waiting Integer=0 Character Waiting Integer=0
TD3	'1F'	Only TA4 is present Global interface bytes following
TA4	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'0A'	Check byte

ATR-IFS2 (TA3='FE'):

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'11'	Clock rate conversion factor FI=1 (F=372) Baud rate adjustment factor DI=1 (D=1)
TD1	'81'	Only TD2 is present Protocol T=1 supported by UICC
TD2	'B1'	TA3, TB3 and TD3 are present Protocol T=1 supported by UICC
TA3	'FE'	IFSC is 254 bytes long
TB3	'00'	Block Waiting Integer=0 Character Waiting Integer=0
TD3	'1F'	Only TA4 is present Global interface bytes following
TA4	'4E'	Clock stop supported (low electrical state) UICC accepting voltage classes B, C and D
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECT by AID supported EF_{DIR} present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'21'	Data Coding Byte
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'E4'	Check byte

7.3.4.4.2 Procedure

a) No TA3:

a-1) Upon reception of a reset the UICC simulator shall transmit ATR-IFS1.

a-2) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring sending of chained I-Blocks.

a-3) Following receipt of the command, the UICC simulator shall evaluate the length and acknowledge reception of the received I-Blocks without error.

b) TA3='FE':

b-1) Upon reception of a reset the UICC simulator shall transmitATR-IFS2.

b-2) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring sending of chained I-Blocks.

b-3) Following receipt of the command, the UICC simulator shall evaluate the length and acknowledge reception of the received I-Blocks without error.

7.3.4.5 Acceptance criteria

In step a-2) the Terminal shall send the chained I-Blocks, except the last one, using the default value of IFSC, i.e. 32 bytes long information field.

In step b-2) the Terminal shall send the chained I-Blocks, except the last one, using the specified value of IFSC, i.e. 254 bytes long information field.

7.3.5 Chaining - IFSD management

7.3.5.1 Definition and applicability

Chaining allows the Terminal or the UICC to transfer information, which is longer than IFSC or IFSD. If information longer than IFSC or IFSD is transferred, the information should be divided into pieces, each has a length ≤ IFSC or IFSD. Each piece should be sent in an I-block using the chaining function.

When a receiver receives a more-data I-block, a R(N(R)) shall be sent. N(R) = N(S) of the expected I-block. At least one chained block should follow.

The IFSD defines the maximum length of the information field of blocks that the Terminal can receive.

The default value of the IFSD is 32 bytes and may be adjusted during the card session. The maximum value of the IFSD is 254 bytes.

For applicability of this test case see clause 3.8.

7.3.5.2 Conformance requirement

7.3.5.2.1 Description

When the UICC is the sender, all I-blocks of a chain shall have LEN ≤ IFSD bytes per block.

7.3.5.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.3.

7.3.5.3 Test purpose

To verify that the Terminal correctly handles the Information Field Size in chaining mode.

7.3.5.4 Method of test

7.3.5.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

7.3.5.4.2 Procedure

a) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring reception of chained I-Blocks.

b) The UICC simulator shall send an I-Block with LEN > IFSD.

c) Following correct receipt of the next block the UICC simulator shall send the rest of I-Blocks (data + '9000' indicating correct execution of the command).

7.3.5.5 Acceptance criteria

In step b), the Terminal shall detect the incorrect LEN and send an R-Block requesting retransmission of the last block.

In step c) the Terminal shall acknowledge reception of the I-Blocks without error by sending R-Blocks with N(R)=sequence number of expected I-Block.

7.3.6 I-Block error correction

7.3.6.1 Definition and applicability

Information blocks are used to transfer command and response APDUs.

The I-blocks are denoted as follows: I(N(S), M) where:

- N(S) is the send-sequence number of the block.
- M is the more-data bit used in the chaining function.

For applicability of this test case see clause 3.8.

7.3.6.2 Conformance requirement

7.3.6.2.1 Description

When an I-block has been sent and a BWT time-out occurs or an invalid block has been received (with the Terminal), an R-block is sent, which requests with its N(R) for the expected I-block with N(S)=N(R).

7.3.6.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.3.4.

ISO/IEC 7816-3 [2], clause 9.7.3, scenario 8.

7.3.6.3 Test purpose

To verify that the Terminal sends an I-Block again when notified incorrect reception by the UICC (R-Block meaning error).

7.3.6.4 Method of test

7.3.6.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

7.3.6.4.2 Procedure

a) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring sending of chained I-Blocks.

b) The UICC simulator shall assume each transmitted I-Block, including the last non-chained one, is invalid by sending an R-Block requesting retransmission.

7.3.6.5 Acceptance criteria

In step b), the Terminal shall resend each disputed I-Block.

7.3.7 I-Block error detection

7.3.7.1 Definition and applicability

Information blocks are used to transfer command and response APDUs.

The I-blocks are denoted as follows: I(N(S), M) where:

- N(S) is the send-sequence number of the block.
- M is the more-data bit used in the chaining function.

For applicability of this test case see clause 3.8.

7.3.7.2 Conformance requirement

7.3.7.2.1 Description

When an I-block has been sent and a BWT time-out occurs or an invalid block has been received (with the Terminal), an R-block is sent, which requests with its N(R) for the expected I-block with N(S)=N(R).

7.3.7.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.3.4.

ISO/IEC 7816-3 [2], clause 9.7.3, scenario 9.

7.3.7.3 Test purpose

To verify that the Terminal correctly handles the different types of invalid I-Blocks.

7.3.7.4 Method of test

7.3.7.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

7.3.7.4.2 Procedure

a) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring reception of I-Blocks.

b) The UICC simulator shall send I-Blocks and generate the following errors:

- Parity error.

- NAD ≠ '00'.
- PCB with wrong sequence number.
- PCB of an R-Block.
- PCB of an S-Block.
- LEN error (= 'FF').
- EDC error.

c) Following correct reception of the block sent by the Terminal, the UICC simulator shall retransmit the I-Block without error and complete the command (data + '9000' indicating correct execution of the command).

NOTE: Test can be achieved either by generating the errors in one session using chained blocks or through separate tests generating one error.

7.3.7.5 Acceptance criteria

In step b), the Terminal shall detect the invalid block and send an R-Block requesting retransmission of the last block (N(R)=sequence number of last I-Block).

In step c) the Terminal shall acknowledge reception of the I-Block without error.

7.3.8 R-Block error handling in non-chaining mode

7.3.8.1 Definition and applicability

Receive-ready blocks, R-blocks, are used to transfer acknowledgements.

The R-blocks are denoted as follows: R(N(R)), where:

- N(R) is the number of the expected I-block.

For applicability of this test case see clause 3.8.

7.3.8.2 Conformance requirement

7.3.8.2.1 Description

When an R-block was sent and an invalid block is received or BWT time-out, the R-block will be resent.

7.3.8.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.3.4.

ISO/IEC 7816-3 [2], clause 9.7.3, scenario 10.

7.3.8.3 Test purpose

To verify that the Terminal handles the different types of invalid R-Blocks and correctly recovers while sending non-chained data.

7.3.8.4 Method of test

7.3.8.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

7.3.8.4.2 Procedure

a) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring sending of a non-chained I-Block.

b) The UICC simulator shall assume the received block is invalid by sending an R-Block and generate the following errors:

- Parity error.
- NAD ≠ '00'.
- PCB with wrong sequence number.
- PCB with b6=1.
- PCB of an S-Block.
- LEN error.
- EDC error.

c) Following correct reception of the block sent by the Terminal, the UICC simulator shall retransmit the R-Block without error.

7.3.8.5 Acceptance criteria

In step b) the Terminal shall detect the invalid block and send an R-Block requesting retransmission of the last block (N(R)=sequence number of invalid R-Block).

After step c), the Terminal shall resend the first I-Block.

7.3.9 R-Block error handling in chaining mode

7.3.9.1 Definition and applicability

Receive-ready blocks, R-blocks, are used to transfer acknowledgements.

The R-blocks are denoted as follows: R(N(R)), where:

- N(R) is the number of the expected I-block.

For applicability of this test case see clause 3.8.

7.3.9.2 Conformance requirement

7.3.9.2.1 Description

When an R-block was sent and an invalid block is received or BWT time-out, the R-block will be resent.

7.3.9.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.3.4.

ISO/IEC 7816-3 [2], clause 9.7.3, scenario 21.

7.3.9.3 Test purpose

To verify that the Terminal handles the different types of invalid R-Blocks and correctly recovers while sending chained data.

7.3.9.4 Method of test

7.3.9.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

7.3.9.4.2 Procedure

a) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring sending of chained I-Blocks.

b) The UICC simulator shall send an invalid R-Block and generate the following errors:

- Parity error.
- NAD ≠ '00'.
- PCB with b6=1.
- PCB of an S-Block.
- LEN error.
- EDC error.

c) Following correct reception of the block sent by the Terminal, the UICC simulator shall retransmit the R-Block without error.

7.3.9.5 Acceptance criteria

In step b) the Terminal shall detect the invalid block and send an R-Block requesting retransmission of the last block (N(R)=sequence number of invalid R-Block).

After step c), the Terminal shall send the rest of chained data (I-Block).

7.3.10 Successive errors in both directions

7.3.10.1 Definition and applicability

Receive-ready blocks, R-blocks, are used to transfer acknowledgements.

The R-blocks are denoted as follows: R(N(R)), where:

- N(R) is the number of the expected I-block.

For applicability of this test case see clause 3.8.

7.3.10.2 Conformance requirement

7.3.10.2.1 Description

When an R-block was sent and an invalid block is received or BWT time-out, the R-block will be resent.

7.3.10.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.3.4.

ISO/IEC 7816-3 [2], clause 9.7.3, scenarios 12 and 13.

7.3.10.3 Test purpose

To verify that the Terminal properly recovers after receiving and being notified errors successively.

7.3.10.4 Method of test

7.3.10.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

7.3.10.4.2 Procedure

a) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring reception of I-Blocks.

b) The UICC simulator shall send an invalid I-Block.

c) Following correct reception of the block sent by the Terminal, the UICC simulator shall assume the received block is invalid by sending an R-Block, also invalid.

d) Following correct reception of the block sent by the Terminal:

d-1) No error:

d-1-1) The UICC simulator shall retransmit the I-Block without error and complete the command (data + '9000' indicating correct execution of the command).

d-2) Error assumed:

d-2-1) The UICC simulator shall assume the received block is invalid by sending an R-Block requesting retransmission (N(R)= correct sequence number of step c)).

d-2-2) Following correct reception of the block sent by the Terminal, the UICC simulator shall complete the command (data + '9000' indicating correct execution of the command).

7.3.10.5 Acceptance criteria

After step b) and c), the Terminal shall detect the invalid block and send an R-Block requesting retransmission of the last block (N(R)=sequence number of invalid I-Block).

After step d-2-1), the Terminal shall resend the previous R-Block with N(R)=sequence number of invalid I-Block.

After step d-1) and d-2-2), the Terminal shall acknowledge the error free I-Block(s).

7.3.11 Chaining - Abortion

7.3.11.1 Definition and applicability

Supervisory blocks, S-block, are used to send control information.

S-blocks are always used in pairs. A S(request) is always followed by a S(response) block:

- S(ABORT request), a request to abort the chain function.
- S(ABORT response), an acknowledge of the abortion of the chain function.

For applicability of this test case see clause 3.8.

7.3.11.2 Conformance requirement

7.3.11.2.1 Description

When an S(… request) has been sent and either a BWT time-out occurs (with the Terminal) or the received response is not a S(… response), the S(… request) shall be resent. But if an S(… response) has been sent and either an invalid block is received or a BWT time-out occurs (with the Terminal), an R-block shall be sent.

7.3.11.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.3.4.

ISO/IEC 7816-3 [2], clause 9.7.3, scenarios 26 and 27.

7.3.11.3 Test purpose

To verify that the Terminal correctly handles the abortion procedure in chaining mode.

7.3.11.4 Method of test

7.3.11.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

7.3.11.4.2 Procedure

a) Terminal sends chained data:

a-1) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring sending of chained I-Blocks.

a-2) The UICC simulator shall acknowledge receipt of the first chained I-Block by sending an R-Block without error.

a-3) Following receipt of the second I-Block, the UICC simulator shall send an S(ABORT request).

a-4) The UICC simulator shall acknowledge receipt of the response and give back the Terminal the right to send (R-Block without error) and complete the next command.

b) UICC sends chained data:

b-1) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring reception of chained I-Blocks.

b-2) The UICC simulator shall transmit the first chained I-Block without error.

b-3) Following correct reception of the block sent by the Terminal, the UICC simulator shall send an S(ABORT request).

b-4) The UICC simulator shall acknowledge receipt of the response without error.

b-5) The UICC simulator shall restart and complete the command (data + '9000' indicating correct execution of the command).

7.3.11.5 Acceptance criteria

After steps a-3) and b-3), the Terminal shall send an S(ABORT response).

In step b-5) the Terminal shall acknowledge reception of the I-Blocks without error by sending R-Blocks with N(R)=sequence number of expected I-Block.

7.3.12 Block repetition and resynchronization

7.3.12.1 Definition and applicability

Resynchronization of the protocol may be attempted at three consecutive levels. If one level is unsuccessful, then the next level is tried:

- For the Terminal, the three levels are:
  - Retransmission of blocks.
  - Use of S(RESYNCH request).
  - Card reset or deactivation.

Supervisory blocks, S-block, are used to send control information.

S-blocks are always used in pairs. A S(request) is always followed by a S(response) block:

- S(RESYNCH request), a request of a resynchronization.
- S(RESYNCH response), an acknowledge of the resynchronization.

For applicability of this test case see clause 3.8.

7.3.12.2 Conformance requirement

7.3.12.2.1 Description

When an S(… request) has been sent and either a BWT time-out occurs (with the Terminal) or the received response is not a S(… response), the S(… request) shall be resent. But if an S(… response) has been sent and either an invalid block is received or a BWT time-out occurs (with the Terminal), an R-block shall be sent.

If the Terminal fails to receive an error-free block during a card-session, a maximum of two further attempts is allowed before a S(RESYNCH request) is sent.

7.3.12.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.3.4.

ISO/IEC 7816-3 [2], clause 9.7.3, scenarios 29, 30, 31, 32 and 34.

7.3.12.3 Test purpose

1) To verify that the Terminal resynchronizes the UICC if block repetition is unsuccessful.

2) To verify that the Terminal correctly handles an invalid response to an S(... request).

7.3.12.4 Method of test

7.3.12.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

7.3.12.4.2 Procedure

a) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring sending of an I-Block.

b) Following receipt of the first I-Block, the UICC simulator shall send an erroneous block or be unresponsive.

c) Following correct reception of the block sent by the Terminal, the UICC simulator shall send two more erroneous blocks or remain unresponsive two more times:

c-1) No error:

c-1-1) Following correct reception of the block (S(RESYNCH request)) sent by the Terminal, the UICC simulator shall send a S(RESYNCH response), then complete the next command without error.

c-2) Error assumed:

c-2-1) Following correct reception of the block (S(RESYNCH request)) sent by the Terminal, the UICC simulator shall send a S(RESYNCH response) and generate the following errors:

- Parity error.
- NAD ≠ '00'.
- LEN error (≠ '01').
- S(RESYNCH request) instead of S(RESYNCH response).
- Other S(... response).
- EDC error.

c-2-2) Following correct reception of the block (S(RESYNCH request)) sent by the Terminal, the UICC simulator shall send a S(RESYNCH response), then complete the next command without error.

7.3.12.5 Acceptance criteria

After step b), the Terminal shall send an R-Block requesting retransmission.

In step c), the Terminal shall send the same R-Block as in b) two more times, then initiate an S(RESYNCH request).

After step c-2-1), the Terminal shall resend an S(RESYNCH request).

7.3.13 UICC is unresponsive

7.3.13.1 Definition and applicability

Resynchronization of the protocol may be attempted at three consecutive levels. If one level is unsuccessful, then the next level is tried:

- For the Terminal, the three levels are:
  - Retransmission of blocks.
  - Use of S(RESYNCH request).
  - Card reset or deactivation.

For applicability of this test case see clause 3.8.

7.3.13.2 Conformance requirement

7.3.13.2.1 Description

After an ATR due to a Warm reset or successful PPS procedure, the communication between the Terminal and the UICC can be initiated. But if the Terminal fails to receive an error-free block, in the beginning of the protocol, a maximum of two more successive attempts to receive the block is allowed before resetting or a deactivation of the card takes place.

If the Terminal fails to receive an error-free block during a card-session, a maximum of two further attempts is allowed before a S(RESYNCH request) is sent.

7.3.13.2.2 Reference

ETSI TS 102 221 [1], clause 7.2.3.4.

ISO/IEC 7816-3 [2], clause 9.7.3, scenarios 33 and 35.

7.3.13.3 Test purpose

To verify that the Terminal correctly resets or deactivates the UICC at the start of the protocol and during the protocol if resynchronization is unsuccessful.

7.3.13.4 Method of test

7.3.13.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

7.3.13.4.2 Procedure

a) At the start of the protocol:

   a-1) Following receipt of the first block, the UICC simulator shall be unresponsive.

   a-2) Following correct reception of the block sent by the Terminal, the UICC simulator shall remain unresponsive two more times.

b) During the protocol:

   b-1) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring sending of an I-Block.

   b-2) Following receipt of the first I-Block, the UICC simulator shall be unresponsive.

   b-3) Following correct reception of the block sent by the Terminal, the UICC simulator shall remain unresponsive two more times.

   b-4) Following correct reception of the block (S(RESYNCH request)) sent by the Terminal, the UICC simulator shall remain unresponsive three more times.

7.3.13.5 Acceptance criteria

After step a-1), the Terminal shall:

- Send an R-Block if the first block it sent was an I-Block.
- Repeat the S-Block if the first block it sent was an S-Block.

In step a-2), the Terminal shall send the same block as in a-1) two more times, then reset or deactivate the UICC.

After step b-2), the Terminal shall send an R-Block with N(R)=sequence number of previous I-Block.

In step b-3), the Terminal shall send the same R-Block as in b-2) two more times, then initiate an S(RESYNCH request).

In step b-4), the Terminal shall resend S(RESYNCH request) two more times, then reset or deactivate the UICC.

8 Application dependent procedures

8.1 UICC presence detection

8.1.1 Definition and applicability

To ensure that the UICC has not been removed during a card session, the Terminal sends, at frequent intervals, a STATUS command during each voice call.

This procedure shall be used in addition to a mechanical or other device used to detect the removal of a UICC.

8.1.2 Conformance requirement

8.1.2.1 Description

A STATUS command shall be issued within all 30 seconds periods of inactivity on the UICC-Terminal interface during a voice call. Inactivity in this case is defined as starting at the end of the last communication or the last issued STATUS command. If no response data is received to this STATUS command, then the voice call shall be terminated as soon as possible but at least within 5 seconds after the STATUS command has been sent. If the DF indicated in response to a STATUS command is not the same as that which was indicated in the previous response, or accessed by the previous command, then the voice call shall be terminated as soon as possible but at least within 5 seconds after the response data has been received.

8.1.2.2 Reference

ETSI TS 102 221 [1], clause 14.5.2.

8.1.3 Test purpose

To verify that:

1) There are no periods of inactivity on the UICC-Terminal interface greater than 30 seconds during a call.

2) The Terminal terminates a voice call within 5 seconds at the latest after having received an invalid response to the STATUS command.

8.1.4 Method of test

8.1.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator.

All elementary files shall be coded as default.

8.1.4.2 Procedure

a) A call shall be set up using the generic voice call setup.

b) The UICC simulator shall monitor the time of periods of inactivity on the UICC-Terminal interface.

c) After 3 minutes, the voice call shall be cleared.

d) A call shall be set up using the generic voice call setup.

e) After one minute after the call was successfully set up, the UICC simulator shall respond to a STATUS command with the response data of the MF.

8.1.5 Acceptance criteria

1) During step b), the time of periods of inactivity on the UICC-Terminal interface shall not be longer than 30 seconds.

2) After step e), the Terminal shall terminate the voice call within 5 seconds at the latest after having received the wrong response to the STATUS command.

9 Commands

9.1 TERMINAL CAPABILITY

9.1.1 Additional interfaces support

9.1.1.1 Definition and applicability

Terminals supporting an interface in addition to the interface defined in ETSI TS 102 221 [1] shall indicate it to the UICC by issuing the TERMINAL CAPABILITY command with an additional interface support TLV object during a new card session before the first application selection.

For applicability of this test case see clause 3.8.

9.1.1.2 Conformance requirement

9.1.1.2.1 Description

Terminals supporting an interface in addition to the interface defined in the present document and present in the list below (e.g. the UICC-CLF interface as defined in ETSI TS 102 613 [6]) shall indicate it to the UICC by issuing the TERMINAL CAPABILITY command with an additional interface support TLV object during a new card session before the first application selection. The Terminal supporting the SWP interface shall send a TLV object with tag '82' to indicate the support of the SWP interface before the first application selection.

The TERMINAL CAPABILITY command shall not be issued by the Terminal if the Terminal capability mechanism is not indicated inside the supported system command field.

9.1.1.2.2 Reference

ETSI TS 102 221 [1], clauses 11.1.19.2.3 and 11.1.19.1.

9.1.1.3 Test purpose

To verify that the Terminal which supports the SWP interface sends a TERMINAL CAPABILITY command indicating the interface supported before the first application selection.

9.1.1.4 Method of test

9.1.1.4.1 Initial conditions

The UICC simulator shall support the SWP interface.

The Terminal shall be connected to the UICC simulator.

The UICC simulator shall indicate support of the TERMINAL CAPABILITY command in the FCP for the MF.

9.1.1.4.2 Procedure

a) Power on the Terminal.

b) The UICC simulator shall send an ATR with a global interface byte tBi (i > 2) indicating the support of the SWP interface.

c) The Terminal shall retrieve the FCP of the MF of the UICC using a SELECT command or a STATUS command.

d) The Terminal sends a TERMINAL CAPABILITY command.

9.1.1.5 Acceptance criteria

In step d), the Terminal shall send TERMINAL CAPABILITY command indicating support of the SWP interface.

NOTE: Other commands may be sent by the Terminal before the TERMINAL CAPABILITY command.

The Terminal may send other TERMINAL CAPABILITY commands which do not include an Additional interfaces support TLV; such TERMINAL CAPABILITY commands shall be ignored for the purposes of this test case.

The Terminal shall send the TERMINAL CAPABILITY command before the first application selection.

9.2 SUSPEND UICC

9.2.1 Support of the SUSPEND UICC command

9.2.1.1 SUSPEND UICC - Nominal Condition

9.2.1.1.1 Definition and applicability

A Terminal supporting the SUSPEND UICC command shall be capable of suspending and resuming the UICC as defined in ETSI TS 102 221 [1] if operated with a UICC indicating the support of the SUSPEND UICC command.

For applicability of the test case see clause 3.8.

9.2.1.1.2 Conformance requirement

9.2.1.1.2.1 Description

The Terminal can run a UICC suspension by issuing the SUSPEND UICC command.

Upon reception of the response indicating successful execution of the SUSPEND UICC command, the Terminal shall deactivate the contacts of the UICC, storing the 8 byte Resume token sent by the UICC.

Within the maximum time duration for the suspension given by the UICC the Terminal resumes the UICC-Terminal interface. The Terminal performs the initial communication establishment procedures to allow the UICC to resume in the exact same condition it was in before the power supply was removed.

9.2.1.1.2.2 Reference

ETSI TS 102 221 [1], clauses 11.1.22 and 14.5.6.

9.2.1.1.3 Test purpose

1) To verify that the Terminal is issuing the SUSPEND UICC command correctly.

2) To verify that the Terminal is deactivating the contacts of the UICC-Terminal interface.in the correct order (as defined in clause 5.1.3) after receiving the confirmation for the UICC suspension.

3) To verify that the Terminal is reactivating the UICC-Terminal interface within the maximum time frame negotiated with the UICC.

4) To verify that the Terminal is performing the initial communication establishment procedures as defined in ETSI TS 102 221 [1], clause 6:

   a) During establishment of the initial communication the Terminal is not issuing commands other than:

      - SELECT with P1 ≠ '04';
      - READ BINARY;
      - READ RECORD;
      - TERMINAL CAPABILITY;

      before a SUSPEND UICC command with P1 = 'Resume the UICC' and the Resume token is sent.

   b) If the Terminal has sent a TERMINAL CAPABILITY command before suspending the UICC, it is sending a TERMINAL CAPABILITY command with the same content as sent before when resuming the UICC.

5) To verify that the Terminal is sending the 8-byte Resume token provided by the UICC when it was suspended.

6) To verify that the Terminal is maintaining the logical status of the UICC as before the suspension and is resuming the UICC for the events for which it had previously registered:

   a) On request of the UICC a Terminal shall correctly indicate the status of a timer as defined in ETSI TS 102 223 [7] for a timer set using the TIMER MANAGEMENT command before the UICC was suspended.

9.2.1.1.4 Method of test

9.2.1.1.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, where the UICC simulator indicates support of the SUSPEND UICC command in EF_{UMPC}.

The UICC simulator shall indicate support of the TERMINAL CAPABILITY command in the FCP for the MF.

The PIN to verify the user at the NAA is disabled.

The Terminal shall be activated.

The test tool shall record any TERMINAL CAPABILITY command sent by the Terminal.

The Terminal has selected an NAA present on the UICC. Any technology specific conditions for the Terminal to use the SUSPEND UICC command are met.

9.2.1.1.4.2 Procedure

a) The UICC simulator shall send the proactive command TIMER MANAGEMENT to start a timer for 24 hours.

b) The Terminal shall be made to suspend the UICC. Any conditions (for example: waiting for a timeout or suitable configuration of the Terminal) which would normally be required for the Terminal to suspend the UICC shall be satisfied (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

c) After reception of a SUSPEND UICC command with P1 = 'Suspend the UICC' the UICC simulator returns an 8 byte Resume token and the minimum time duration proposed by the Terminal as the time duration for which it can be suspended.

d) The Terminal shall deactivate the UICC-Terminal interface.

e) The Terminal shall be made to resume the UICC (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

f) The Terminal shall activate the UICC-Terminal interface after the suspension.

g) The Terminal is performing the communication establishment procedures.

h) After reception of a SUSPEND UICC command with P1 = 'Resume the UICC' the UICC simulator shall restore the previous status and return '9000' (indicating correct execution of the command).

i) The UICC simulator shall send the proactive command TIMER MANGEMENT to get the current value of the Timer.

NOTE: The maximum value (24 hours) for the timer set in the proactive command TIMER MANAGEMENT is used to ensure that the timer is still running after the resume. It is not intended that the test execution will last 24 hours.

9.2.1.1.5 Acceptance criteria

1) In step d) the Terminal shall deactivate the UICC-Terminal interface as defined in ETSI TS 102 221 [1], clause 4.5.2.

2) After step d) the Terminal shall keep the inactive contacts within the voltage range defined in ETSI TS 102 221 [1], clause 4.5.3.

3) In step e) the Terminal is activating the UICC-Terminal interface as defined in ETSI TS 102 221 [1], clause 4.5.2 within the time frame negotiated to be the time duration for the suspension in step c).

4) After step f), the Terminal shall not re-select the network application.

5) During step g) The Terminal is successfully establishing the communication as defined in ETSI TS 102 221 [1] clause 6. Where the Terminal shall not issue commands other than:

   - SELECT with P1 ≠ '04'.
   - READ BINARY.
   - READ RECORD.
   - TERMINAL CAPABILITY:
     - Where the TERMINAL CAPABILITY, if sent, shall be identical to the one sent in the Initial conditions.

6) After step i) the Terminal shall send a TERMINAL RESPONSE providing the current value of the timer started before the resume. The timer value returned shall be 24 hours minus the test execution time elapsed after ending the proactive command 'TIMER MANAGEMENT ± 1 minute.

9.2.1.2 SUSPEND UICC - Nominal Condition - Events

9.2.1.2.1 Definition and applicability

A Terminal supporting the SUSPEND UICC command shall be capable of suspending and resuming the UICC as defined in ETSI TS 102 221 [1] if operated with a UICC indicating the support of the SUSPEND UICC command.

For applicability of the test case see clause 3.8.

9.2.1.2.2 Conformance requirement

9.2.1.2.2.1 Description

The Terminal can run a UICC suspension by issuing the SUSPEND UICC command.

Upon reception of the response indicating successful execution of the SUSPEND UICC command, the Terminal shall deactivate the contacts of the UICC, storing the 8 byte Resume token sent by the UICC.

Within the maximum time duration for the suspension given by the UICC the Terminal resumes the UICC-Terminal interface. The Terminal performs the initial communication establishment procedures to allow the UICC to resume in the exact same condition it was in before the power supply was removed.

9.2.1.2.2.2 Reference

ETSI TS 102 221 [1], clauses 11.1.22 and 14.5.6.

9.2.1.2.3 Test purpose

1) To verify that the Terminal is issuing the SUSPEND UICC command correctly.

2) To verify that the Terminal is deactivating the contacts of the UICC-Terminal interface.in the correct order (as defined in clause 5.1.3) after receiving the confirmation for the UICC suspension.

3) To verify that the Terminal is reactivating the UICC-Terminal interface within the maximum time frame negotiated with the UICC

4) To verify that the Terminal is performing the initial communication establishment procedures as defined in ETSI TS 102 221 [1], clause 6:

   - During establishment of the initial communication the Terminal is not issuing commands other than:

     - SELECT with P1 ≠ '04';
     - READ BINARY;
     - READ RECORD;
     - TERMINAL CAPABILITY;

     before a SUSPEND UICC command with P1 = 'Resume the UICC' and the Resume token is sent.

5) To verify that the Terminal is sending the 8-byte Resume token provided by the UICC when it was suspended.

6) To verify that the Terminal is maintaining the logical status of the UICC as before the suspension and is resuming the UICC for the events for which it had previously registered:

   a) The Terminal shall not ask for a PIN verification for applications already verified.

   b) A Terminal supporting the SETUP EVENT LIST command shall provide information to the UICC as defined in ETSI TS 102 223 [7] at occurrence of a listed event.

9.2.1.2.4 Method of test

9.2.1.2.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, where the UICC simulator indicates support of the SUSPEND UICC command in EF_{UMPC}.

The UICC simulator shall indicate support of the TERMINAL CAPABILITY command in the FCP for the MF.

The PIN to verify the user at the NAA is enabled.

The Terminal shall be activated.

The Terminal has selected an NAA present on the UICC. Any technology specific conditions for the Terminal to use the SUSPEND UICC command are met.

9.2.1.2.4.2 Procedure

a) When the Terminal is in mode PIN check, the valid PIN shall be entered.

b) The UICC simulator shall send the proactive command SETUP EVENT LIST for the event: User activity.

c) The Terminal shall be made to suspend the UICC. Any conditions (for example: waiting for a timeout or suitable configuration of the Terminal) which would normally be required for the Terminal to suspend the UICC shall be satisfied (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

d) After reception of a SUSPEND UICC command with P1 = 'Suspend the UICC' the UICC simulator returns an 8 byte Resume token and the minimum time duration proposed by the Terminal as the time duration for which it can be suspended.

e) The Terminal shall deactivate the UICC-Terminal interface.

f) The Terminal shall be made to resume the UICC (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

NOTE: No user activity should be performed before step j).

g) The Terminal shall activate the UICC-Terminal interface after the suspension.

h) The Terminal is performing the communication establishment procedures.

i) After reception of a SUSPEND UICC command with P1 = 'Resume the UICC' the UICC simulator shall restore the previous status and return '9000' (indicating correct execution of the command).

j) When there is a period of inactivity on the UICC-Terminal interface longer than 20 seconds, the user shall press any key.

9.2.1.2.5 Acceptance criteria

1) In step e) the Terminal shall deactivate the UICC-Terminal interface as defined in ETSI TS 102 221 [1], clause 4.5.2.

2) After step e) the Terminal shall keep the inactive contacts within the voltage range defined in ETSI TS 102 221 [1], clause 4.5.3.

3) In step f) the Terminal is activating the UICC-Terminal interface as defined in ETSI TS 102 221 [1], clause 4.5.2 within the time frame negotiated to be the time duration for the suspension in step c).

4) After step g), the terminal shall not re-select the network application and shall not ask the user to verify the PIN.

5) During step h) The Terminal is successfully establishing the communication as defined in ETSI TS 102 221 [1] clause 6. Where the Terminal shall not issue commands other than:

- SELECT with P1 ≠ '04'.
- READ BINARY.
- READ RECORD.
- TERMINAL CAPABILITY.

6) After step i) and before step j) the Terminal shall not sent an ENVELOPE for the User activity event to the UICC simulator.

7) After step j) the Terminal shall send an ENVELOPE for the User activity event to the UICC simulator.

9.2.1.3 SUSPEND UICC - Suspension not supported by the UICC

9.2.1.3.1 Definition and applicability

A Terminal supporting the SUSPEND UICC command shall not cause the UICC suspension if the UICC is not indicating the support in EF_{UMPC}.

For applicability of the test case see clause 3.8.

9.2.1.3.2 Conformance requirement

9.2.1.3.2.1 Description

The Terminal does not issue the command if the UICC suspension mechanism is not indicated as supported by the UICC in the UICC Maximum Power Consumption file (EF_{UMPC}).

9.2.1.3.2.2 Reference

ETSI TS 102 221 [1], clause 11.1.22.

9.2.1.3.3 Test purpose

To verify that the Terminal is not issuing a SUSPEND UICC command if the support is not indicated in EF_{UMPC}.

9.2.1.3.4 Method of test

9.2.1.3.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, where the UICC simulator shall not indicate support of the SUSPEND UICC command in $EF_{UMPC.}$

The PIN to verify the user at the NAA is disabled.

The Terminal shall be activated.

The Terminal has selected an NAA present on the UICC.

Any technology specific conditions for the Terminal to use the SUSPEND UICC command are met.

9.2.1.3.4.2 Procedure

a) The UICC simulator shall monitor the activity on the UICC-Terminal interface.

b) After the conditions which would normally cause the Terminal to suspend the UICC are met, wait for 3 minutes.

9.2.1.3.5 Acceptance criteria

During step b) the Terminal shall not issue the SUSPEND UICC command or deactivate the UICC-Terminal interface.

9.2.1.4 SUSPEND UICC - Rejection of the UICC suspension with status word '6985'

9.2.1.4.1 Definition and applicability

A Terminal shall not deactivate the contacts of the UICC if the UICC has send status word '6985' in response to a SUSPEND UICC command with coding P1 = 'Suspend the UICC'.

For applicability of the test case see clause 3.8.

9.2.1.4.2 Conformance requirement

9.2.1.4.2.1 Description

The UICC can reject the SUSPEND UICC command with status word '6985' during an active proactive UICC session, or if there is any open BIP channel, or if a secure channel is in use, or due to internal reasons.

9.2.1.4.2.2 Reference

ETSI TS 102 221 [1], clause 11.1.22.

9.2.1.4.3 Test purpose

To verify that the Terminal is not deactivating the UICC-Terminal interface after receiving status word '6985' in response to a SUSPEND UICC command with coding P1 = 'Suspend the UICC'.

9.2.1.4.4 Method of test

9.2.1.4.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, where the UICC simulator indicates support of the SUSPEND UICC command in EF_{UMPC}.

The UICC simulator shall indicate support of the TERMINAL CAPABILITY command in the FCP for the MF.

The PIN to verify the user at the NAA is disabled.

The Terminal shall be activated.

The Terminal has selected an NAA present on the UICC.

Any technology specific conditions for the Terminal to use the SUSPEND UICC command are met.

9.2.1.4.4.2 Procedure

a) The Terminal shall be made to suspend the UICC. Any conditions (for example: waiting for a timeout or suitable configuration of the Terminal) which would normally be required for the Terminal to suspend the UICC shall be satisfied (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

b) After reception of a SUSPEND UICC command with P1 = 'Suspend the UICC' the UICC simulator sends status word '6985' in response.

c) Wait for 3 minutes.

9.2.1.4.5 Acceptance criteria

In step c) the Terminal shall not deactivate the UICC-Terminal interface.

9.2.1.5 SUSPEND UICC - Rejection of the UICC suspension with status word '9864'

9.2.1.5.1 Definition and applicability

A Terminal shall not deactivate the contacts of the UICC if the UICC has send status word '9864' in response to a SUSPEND UICC command.

For applicability of the test case see clause 3.8.

9.2.1.5.2 Conformance requirement

9.2.1.5.2.1 Description

The UICC can reject the SUSPEND UICC command with status word '9864' in response to a SUSPEND UICC command where the minimum duration requested by the Terminal is too large to be accepted.

9.2.1.5.2.2 Reference

ETSI TS 102 221 [1], clause 11.1.22.

9.2.1.5.3 Test purpose

To verify that the Terminal is not deactivating the UICC-Terminal interface after receiving status word '9864' in response to a SUSPEND UICC command.

9.2.1.5.4 Method of test

9.2.1.5.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, where the UICC simulator indicates support of the SUSPEND UICC command in EF_{UMPC}.

The UICC simulator shall indicate support of the TERMINAL CAPABILITY command in the FCP for the MF.

The PIN to verify the user at the NAA is disabled.

The Terminal shall be activated.

The Terminal has selected an NAA present on the UICC.

Any technology specific conditions for the Terminal to use the SUSPEND UICC command are met.

9.2.1.5.4.2 Procedure

a) The Terminal shall be made to suspend the UICC. Any conditions (for example: waiting for a timeout or suitable configuration of the Terminal) which would normally be required for the Terminal to suspend the UICC shall be satisfied (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

b) After reception of a SUSPEND UICC command with P1 = 'Suspend the UICC' the UICC simulator sends the status word '9864' in response.

c) Wait for 3 minutes.

9.2.1.5.5 Acceptance criteria

In step c) the Terminal shall not deactivate the UICC-Terminal interface.

9.2.1.6 SUSPEND UICC - Rejection of the UICC resume with status word '6982'

9.2.1.6.1 Definition and applicability

A Terminal shall not try to restore the logical status as before the suspension or to resume the UICC for the events for which it had previously registered if the UICC sent status word '6982' in response to a SUSPEND UICC command with P1 = 'Resume the UICC'.

For applicability of the test case see clause 3.8.

9.2.1.6.2 Conformance requirement

9.2.1.6.2.1 Description

The UICC compares the Resume token passed by the Terminal with the token stored in its non-volatile memory. If the Resume token passed by the Terminal does not match the token stored the UICC will return status word '6982'.

9.2.1.6.2.2 Reference

ETSI TS 102 221 [1], clause 11.1.22.

9.2.1.6.3 Test purpose

To verify that the Terminal is not resuming the UICC for the file system state and for the events for which it had previously registered if the resume is rejected by the UICC.

9.2.1.6.4 Method of test

9.2.1.6.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, where the UICC simulator indicates support of the SUSPEND UICC command in EF_{UMPC}.

The UICC simulator shall indicate support of the TERMINAL CAPABILITY command in the FCP for the MF.

The PIN to verify the user at the NAA is disabled.

The Terminal shall be activated.

The Terminal has selected an NAA present on the UICC.

Any technology specific conditions for the Terminal to use the SUSPEND UICC command are met.

9.2.1.6.4.2 Procedure

a) The UICC simulator shall send the proactive command TIMER MANAGEMENT to start a timer for 24 hours.

b) The Terminal shall be made to suspend the UICC. Any conditions (for example: waiting for a timeout or suitable configuration of the Terminal) which would normally be required for the Terminal to suspend the UICC shall be satisfied (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

c) After reception of a SUSPEND UICC command with P1 = 'Suspend the UICC' the UICC simulator returns an 8 byte Resume token and the minimum time duration proposed by the terminal as the time duration for which it can be suspended.

d) The Terminal shall deactivate the UICC-Terminal interface.

e) The Terminal shall be made to resume the UICC (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

f) The Terminal shall activate the UICC-Terminal interface.

g) The Terminal is performing the communication establishment procedures.

h) After reception of a SUSPEND UICC command with P1 = 'Resume the UICC' the UICC simulator sends status word '6982' in return.

i) The Terminal shall send TERMINAL PROFILE.

j) The Terminal shall select a network application present on the UICC.

k) The UICC simulator shall send the proactive command TIMER MANGEMENT to get the current value of the Timer.

NOTE: The maximum value (24 hours) for the timer set in the proactive command TIMER MANAGEMENT is used to ensure that the timer is still running after the resume. It is not intended that the test execution will last 24 hours.

9.2.1.6.5 Acceptance criteria

1) After step k) the Terminal shall send a TERMINAL RESPONSE providing the message:

   - 'Action in contradiction with the current timer state'.

9.2.1.7 SUSPEND UICC - Rejection of the UICC resume with status word '6982' - Events

9.2.1.7.1 Definition and applicability

A Terminal shall not try to restore the logical status as before the suspension or to resume the UICC for the events for which it had previously registered if the UICC sent status word '6982' in response to a SUSPEND UICC command with P1 = 'Resume the UICC'.

For applicability of the test case see clause 3.8.

9.2.1.7.2 Conformance requirement

9.2.1.7.2.1 Description

The UICC compares the Resume token passed by the Terminal with the token stored in its non-volatile memory. If the Resume token passed by the Terminal does not match the token stored the UICC will return status word '6982'.

9.2.1.7.2.2 Reference

ETSI TS 102 221 [1], clause 11.1.22.

9.2.1.7.3 Test purpose

To verify that the Terminal is not resuming the UICC for the file system state and for the events for which it had previously registered if the resume is rejected by the UICC.

9.2.1.7.4 Method of test

9.2.1.7.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, where the UICC simulator indicates support of the SUSPEND UICC command in EF_{UMPC}.

The UICC simulator shall indicate support of the TERMINAL CAPABILITY command in the FCP for the MF.

The Terminal supports a keypad and the PIN to verify the user at the NAA is enabled.

The Terminal shall be activated.

The Terminal has selected an NAA present on the UICC.

Any technology specific conditions for the Terminal to use the SUSPEND UICC command are met.

9.2.1.7.4.2 Procedure

a) When the Terminal is in mode PIN check, the valid PIN shall be entered.

b) The UICC simulator shall send the proactive command SETUP EVENT LIST for the event: User activity.

c) The Terminal shall be made to suspend the UICC. Any conditions (for example: waiting for a timeout or suitable configuration of the Terminal) which would normally be required for the Terminal to suspend the UICC shall be satisfied (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

d) After reception of a SUSPEND UICC command with P1 = 'Suspend the UICC' the UICC simulator returns an 8 byte Resume token and the minimum time duration proposed by the Terminal as the time duration for which it can be suspended.

e) The Terminal shall deactivate the UICC-Terminal interface.

f) The Terminal shall be made to resume the UICC (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

NOTE: No user activity should be performed before step k).

g) The Terminal shall activate the UICC-Terminal interface.

h) The Terminal is performing the communication establishment procedures.

i) After reception of a SUSPEND UICC command with P1 = 'Resume the UICC' the UICC simulator sends status word '6982' in return.

j) The Terminal shall send TERMINAL PROFILE.

k) The Terminal shall select a network application present on the UICC.

l) When the Terminal is in mode PIN check, the valid PIN shall be entered.

m) Wait for at least 2 minutes.

9.2.1.7.5 Acceptance criteria

1) During step m) the Terminal shall not send an ENVELOPE for the User activity event to the UICC simulator.

9.2.1.8 SUSPEND UICC - Rejection of the UICC resume with status word '6985'

9.2.1.8.1 Definition and applicability

A Terminal shall not try to restore the logical status as before the suspension or to resume the UICC for the events for which it had previously registered if the UICC sent status word '6985' in response to a SUSPEND UICC command with P1 = 'Resume the UICC'.

For applicability of the test case see clause 3.8.

9.2.1.8.2 Conformance requirement

9.2.1.8.2.1 Description

The UICC rejects the RESUME UICC command if it does not have a valid status to resume. To indicate the rejection the UICC will return status word '6985'.

9.2.1.8.2.2 Reference

ETSI TS 102 221 [1], clause 11.1.22.

9.2.1.8.3 Test purpose

To verify that the Terminal is not resuming the UICC for the file system state and for the events for which it had previously registered if the resume is rejected by the UICC.

9.2.1.8.4 Method of test

9.2.1.8.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, where the UICC simulator indicates support of the SUSPEND UICC command in EF_{UMPC}.

The UICC simulator shall indicate support of the TERMINAL CAPABILITY command in the FCP for the MF.

The PIN is disabled.

The Terminal shall be activated.

The Terminal has selected an NAA present on the UICC.

Any technology specific conditions for the Terminal to use the SUSPEND UICC command are met.

9.2.1.8.4.2 Procedure

a) The UICC simulator shall send the proactive command TIMER MANAGEMENT to start a timer for 24 hours.

b) The Terminal shall be made to suspend the UICC. Any conditions (for example: waiting for a timeout or suitable configuration of the Terminal) which would normally be required for the Terminal to suspend the UICC shall be satisfied (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

c) After reception of a SUSPEND UICC command with P1 = 'Suspend the UICC' the UICC simulator returns an 8 byte Resume token and the minimum time duration proposed by the Terminal as the time duration for which it can be suspended.

d) The Terminal shall deactivate the UICC-Terminal interface.

e) The Terminal shall be made to resume the UICC (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

f) The Terminal shall activate the UICC-Terminal interface.

g) The Terminal is performing the communication establishment procedures.

h) After reception of a SUSPEND UICC command with P1 = 'Resume the UICC' the UICC simulator sends status word '6985' in return.

i) The Terminal shall send TERMINAL PROFILE.

j) The Terminal shall select a network application present on the UICC.

k) The UICC simulator shall send the proactive command TIMER MANGEMENT to get the current value of the Timer.

NOTE: The maximum value (24 hours) for the timer set in the proactive command TIMER MANAGEMENT is used to ensure that the timer is still running after the resume. It is not intended that the test execution will last 24 hours.

9.2.1.8.5 Acceptance criteria

1) After step k) the Terminal shall send a TERMINAL RESPONSE providing the message: 'Action in contradiction with the current timer state'.

9.2.1.9 SUSPEND UICC - Rejection of the UICC resume with status word '6985' - Events

9.2.1.9.1 Definition and applicability

A Terminal shall not try to restore the logical status as before the suspension or to resume the UICC for the events for which it had previously registered if the UICC sent status word '6985' in response to a SUSPEND UICC command with P1 = 'Resume the UICC'.

For applicability of the test case see clause 3.8.

9.2.1.9.2 Conformance requirement

9.2.1.9.2.1 Description

The UICC rejects the RESUME UICC command if it does not have a valid status to resume. To indicate the rejection the UICC will return status word '6985'.

9.2.1.9.2.2 Reference

ETSI TS 102 221 [1], clause 11.1.22.

9.2.1.9.3 Test purpose

To verify that the Terminal is not resuming the UICC for the file system state and for the events for which it had previously registered if the resume is rejected by the UICC.

9.2.1.9.4 Method of test

9.2.1.9.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, where the UICC simulator indicates support of the SUSPEND UICC command in EF_{UMPC}.

The UICC simulator shall indicate support of the TERMINAL CAPABILITY command in the FCP for the MF.

The Terminal supports a keypad and the PIN to verify the user at the NAA is enabled.

The Terminal shall be activated.

The Terminal has selected an NAA present on the UICC.

Any technology specific conditions for the Terminal to use the SUSPEND UICC command are met.

9.2.1.9.4.2 Procedure

a) When the Terminal is in mode PIN check, the valid PIN shall be entered.

b) The UICC simulator shall send the proactive command SETUP EVENT LIST for the event: User activity.

c) The Terminal shall be made to suspend the UICC. Any conditions (for example: waiting for a timeout or suitable configuration of the Terminal) which would normally be required for the Terminal to suspend the UICC shall be satisfied (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

d) After reception of a SUSPEND UICC command with P1 = 'Suspend the UICC' the UICC simulator returns an 8 byte Resume token and the minimum time duration proposed by the terminal as the time duration for which it can be suspended.

e) The Terminal shall deactivate the UICC-Terminal interface.

f) The Terminal shall be made to resume the UICC (see note related to O_SUSPEND_UICC of Table A.1 in clause 3.7).

NOTE: No user activity should be performed before step k).

g) The Terminal shall activate the UICC-Terminal interface.

h) The Terminal is performing the communication establishment procedures.

i) After reception of a SUSPEND UICC command with P1 = 'Resume the UICC' the UICC simulator sends status word '6985' in return.

j) The Terminal shall send TERMINAL PROFILE.

k) The Terminal shall select a network application present on the UICC.

l) When the Terminal is in mode PIN check, the valid PIN shall be entered.

m) Wait for at least 2 minutes.

9.2.1.9.5 Acceptance criteria

1) During step m) the Terminal shall not send an ENVELOPE for the User activity event to the UICC simulator.

9.3 MANAGE LSI

9.3.1 MANAGE LSI (configure LSIs)

FFS.

9.3.2 MANAGE LSI (select LSI)

FFS.

9.3.3 MANAGE LSI (reset LSE)

9.3.3.1 MANAGE LSI (reset LSE) - with MANAGE LSI (select LSI)

9.3.3.1.1 Definition and applicability

A MANAGE LSI (reset LSE) APDU shall result in the selection and the resetting of the LSE on the indicated LSI and shall be equivalent to a warm reset for a UICC not supporting LSEs. In case multiple LSIs are available, each LSI should be reset by using the MANAGE LSI (reset LSE) command.

For applicability of this test case see clause 3.8.

This test case shall be executed using the following options (if supported):

- T=0, using command data '80 01 01' in the MANAGE LSI (configure LSIs) command, expecting response data '80 01 01'.
- T=1, using command data '80 01 01' in the MANAGE LSI (configure LSIs) command, expecting response data '80 01 01'.

9.3.3.1.2 Conformance requirement

9.3.3.1.2.1 Description

RQ	Description
RQ_1	The Terminal shall correctly discover the protocol and the Multiple LSIs support from an ATR.
RQ_2	The Terminal shall correctly define the protocol and the number of LSIs to use and send the expected PPS1 and PPS2 values.
RQ_3	The Terminal shall correctly send the MANAGE LSI (reset LSE) command to other LSIs available on the UICC and retrieve their ATRs.

9.3.3.1.2.2 Reference

ETSI TS 102 221 [1], clauses 6.3.3, 6.4, 7.5 and 11.1.25.

9.3.3.1.3 Test purpose

To verify that the Terminal correctly sends the MANAGE LSI (reset LSE) command and retrieves the related ATR(s) to initialize the LSI(s).

9.3.3.1.4 Method of test

9.3.3.1.4.1 Initial conditions

The Terminal shall be connected to the UICC (or UICC simulator).

Expected commands:

MANAGE LSI (configure LSIs)1:

CLA	INS	P1	P2	Lc	Data	Le
80	7C	04	00	03	80 01 XX (see note)	00
NOTE: 'XX' is the highest LSI proposed by the Terminal in the range '00' to '1F'.						

MANAGE LSI (reset LSE)1:

CLA	INS	P1	P2	Le
80	7C	01	00	00

MANAGE LSI (reset LSE)2:

CLA	INS	P1	P2	Le
80	7C	01	01	00

MANAGE LSI (select LSI):

CLA	INS	P1	P2
80	7C	00	01

9.3.3.1.4.2 Procedure 1 - T=0 with MANAGE LSI (select LSI)

Step	Direction	LSI	Description	RQ
1	User/UE		Power on the UICC-Terminal interface	
2	UICC > T		Send ATR-LSI1 (as defined in clause 6.1.2.4.1 of the present document)	
3	T > UICC		Send PPS request including the PPS1 transmission protocol selected (T=0) and the PPS2 indicating the support of LSI	RQ_1 RQ_2
4	UICC > T		Send PPS response confirming the Terminal's PPS request	
Condition			If O_LSI_CONFIG_PRE_AGREED = TRUE, skip steps 5) and 6)	
5	T > UICC	00	Send expected MANAGE LSI (configure LSIs)1 command as specified in the initial condition clause	RQ_2
6	UICC > T	00	Send response data confirming the support of '01' LSIs	
7	User		Trigger the Terminal MANAGE LSI (reset LSE) command on LSI 0	
8	T > UICC	00	Send expected MANAGE LSI (reset LSE)1 command as specified in the initial condition clause	RQ_3
9	UICC > T	00	Return status word 9000 with response data containing an ATR TLV	
10	T > UICC	00	Send a TERMINAL CAPABILITY command (see note)	
11	UICC > T	00	Respond with SW1 = '90', SW2 = '00'	
12	T > UICC	00	Send MANAGE LSI (select LSI) with selected LSI ='01'	
13	UICC > T	00	Respond with SW1 = '90', SW2 = '00'	
14	User		Trigger the Terminal MANAGE LSI (reset LSE) command on LSI 1	
15	T > UICC	01	Send expected MANAGE LSI (reset LSE)2 command as specified in the initial condition clause	RQ_3
16	UICC > T	01	Return status word 9000 with response data containing an ATR TLV	
17	T > UICC	01	Send a TERMINAL CAPABILITY command (see note)	
18	UICC > T	01	Respond with SW1 = '90', SW2 = '00'	
NOTE: This might not be the first command sent by the Terminal.				

9.3.3.1.4.3 Procedure 2 - T=1 with MANAGE LSI (select LSI)

Step	Direction	LSI	Description	RQ
1	User/UE		Power on the UICC-Terminal interface	
2	UICC > T		Send ATR-LSI2 (as defined in clause 6.1.2.4.1 of the present document)	
3	T > UICC		Send PPS request including the PPS1 transmission protocol selected (T=1) and the PPS2 indicating the support of LSI	RQ_1 RQ_2
4	UICC > T		Send PPS response confirming the Terminal's PPS request	
5	T > UICC	00	Send an S-Block with an IFS request	

Step	Direction	LSI	Description	RQ
6	UICC > T	00	Send an S-Block with the IFS response	
Condition			If O_LSI_CONFIG_PRE_AGREED = TRUE, skip steps 7) and 8)	
7	T > UICC	00	Send an I-Block containing the expected MANAGE LSI (configure LSIs)1 command as specified in the initial condition clause	RQ_2
8	UICC > T	00	Send an I-Block containing the response data confirming the support of '01' LSIs	
9	T > UICC	00	Send an I-Block containing the expected MANAGE LSI (reset LSE)1 command as specified in the initial condition clause	RQ_3
10	UICC > T	00	Return status word 9000 with response data containing an ATR TLV	
11	T > UICC	00	Send an I-Block containing a TERMINAL CAPABILITY command addressing LSI 0 (see note)	
12	UICC > T	00	Send a response I-Block containing SW1 = '90', SW2 = '00'	
13	T > UICC	00	Send MANAGE LSI (select LSI) with selected LSI ='01'	
14	UICC > T	00	Respond with SW1 = '90', SW2 = '00'	
15	T > UICC	01	Send an I-Block containing the expected MANAGE LSI (reset LSE)2 command as specified in the initial condition clause	RQ_3
16	UICC > T	01	Return status word 9000 with response data containing an ATR TLV.	
17	T > UICC	01	Send an I-Block containing a TERMINAL CAPABILITY addressing LSI 1 (see note)	
18	UICC > T	01	Send a response I-Block containing SW1 = '90', SW2 = '00'	
NOTE: This might not be the first command sent by the Terminal.				

9.3.3.1.5 Acceptance criteria

The command shall be executed correctly.

9.3.3.2 MANAGE LSI (reset LSE) - T=1 with NAD selection

9.3.3.2.1 Definition and applicability

A MANAGE LSI (reset LSE) APDU shall result in the selection and the resetting of the LSE on the indicated LSI and shall be equivalent to a warm reset for a UICC not supporting LSEs. In case multiple LSIs are available, each LSI should be reset by using the MANAGE LSI (reset LSE) command.

For applicability of this test case see clause 3.8.

This test case shall be executed using the following option:

- T=1 with usage of NAD byte, using command data '80 01 01 81 01 01' in the MANAGE LSI (configure LSIs), expecting response data '80 01 01 81 01 01'.

9.3.3.2.2 Conformance requirement

9.3.3.2.2.1 Description

RQ	Description
RQ_1	The Terminal shall correctly discover the protocol and the Multiple LSIs support from an ATR.
RQ_2	The Terminal shall correctly define the protocol and the number of LSIs to use and send the expected PPS1 and PPS2 values.
RQ_3	The Terminal shall correctly send the MANAGE LSI (reset LSE) command to other LSIs available on the UICC and retrieve their ATRs.

9.3.3.2.2.2 Reference

ETSI TS 102 221 [1], clauses 6.3.3, 6.4, 7.5 and 11.1.25.

9.3.3.2.3 Test purpose

To verify that the Terminal correctly sends the MANAGE LSI (reset LSE) command and retrieves the related ATR(s) to initialize the LSI(s).

9.3.3.2.4 Method of test

9.3.3.2.4.1 Initial conditions

The Terminal shall be connected to the UICC (or UICC simulator).

Expected commands:

MANAGE LSI (configure LSIs)2:

CLA	INS	P1	P2	Lc	Data	Le
80	7C	04	00	06	80 01 XX 81 01 01 (see note)	00
NOTE: 'XX' is the highest LSI proposed by the Terminal in the range '00' to '1F'.						

MANAGE LSI (reset LSE)1:

CLA	INS	P1	P2	Le
80	7C	01	00	00

MANAGE LSI (reset LSE)2:

CLA	INS	P1	P2	Le
80	7C	01	01	00

The MANAGE LSI (configure LSI) command is not mandated by the UICC.

9.3.3.2.4.4 Procedure

Step	Direction	LSI	Description	RQ
1	User/UE		Power on the UICC-Terminal interface	
2	UICC > T		Send ATR-LSI2 (as defined in clause 6.1.2.4.1 of the present document)	
3	T > UICC		Send PPS request including the PPS1 transmission protocol selected (T=1) and the PPS2 indicating the support of LSI and the indication via NAD byte	RQ_1 RQ_2
4	UICC > T		Send PPS response confirming the Terminal's PPS request	
5	T > UICC	00	Send an S-Block with an IFS request	
6	UICC > T	00	Send an S-Block with the IFS response	
Condition			If O_LSI_CONFIG_PRE_AGREED = TRUE, skip steps 7) and 8)	
7	T > UICC	00	Send an I-Block containing the expected MANAGE LSI (configure LSIs)2 command as specified in the initial condition clause	RQ_2
8	UICC > T	00	Send an I-Block containing the response data confirming the support of '01' LSIs	
9	T > UICC	00	Send an I-Block containing TERMINAL CAPABILITY command (see note)	
10	UICC > T	00	Send a response I-Block containing SW1 = '90', SW2 = '00'	
11	T > UICC	00	Send an I-Block containing the expected MANAGE LSI (reset LSE)1 command as specified in the initial condition clause.	RQ_3
12	UICC > T	00	Return status word 9000 with response data containing an ATR TLV.	
13	T > UICC	00	Send an I-Block containing a TERMINAL CAPABILITY command addressing LSI 0 (see note)	
14	UICC > T	00	Send a response I-Block containing SW1 = '90', SW2 = '00'	
15	T > UICC	01	Send an I-Block containing the expected MANAGE LSI (reset LSE)2 command as specified in the initial condition clause	RQ_3
16	UICC > T	01	Return status word 9000 with response data containing an ATR TLV	
17	T > UICC	01	Send an I-Block containing a TERMINAL CAPABILITY addressing LSI 1 (see note)	
18	UICC > T	01	Send a response I-Block containing SW1 = '90', SW2 = '00'	
NOTE: This might not be the first command sent by the Terminal.				

9.3.3.2.5 Acceptance criteria

The command shall be executed correctly.

9.3.4 MANAGE LSI (assign SWP)

9.3.4.1 Definition and applicability

A MANAGE LSI (assign SWP) APDU shall be sent when the device supports the LSI and SWP.

For applicability of this test case see clause 3.8.

9.3.4.2 Conformance requirement

9.3.4.2.1 Description

RQ	Description
RQ_1	The Terminal can retrieve the LSE that is currently assigned to handle the communication over the UICC-CLF interface using the MANAGE LSI (retrieve SWP) command.
RQ_2	If the UICC supports the UICC-CLF interface as defined in ETSI TS 102 613 [6], this interface shall be assigned to at most one LSE.

9.3.4.2.2 Reference

ETSI TS 102 221 [1], clause 8.10 and 11.1.25

9.3.4.3 Test purpose

To verify that the Terminal correctly sends the MANAGE LSI (assign SWP) command.

9.3.4.4 Method of test

9.3.4.4.1 Initial conditions

The Terminal shall be connected to the UICC (or UICC simulator).

Expected commands:

MANAGE LSI (reset LSE):

CLA	INS	P1	P2	Le
80	7C	01	XX	00

'XX' is the LSI number between '00' and '1F'.

MANAGE LSI (retrieve SWP):

CLA	INS	P1	P2	Le
80	7C	03	00	00

MANAGE LSI (assign SWP):

CLA	INS	P1	P2	Le
80	7C	02	YY	00

'YY' is the LSI number between '00' and '1F'.

9.3.4.4.2 Procedure

Step	Direction	LSI	Description	RQ
1	User/UE		Power on the UICC-Terminal interface	
2	UICC > T		Send ATR-LSI4 (as defined in clause 6.1.2.4.1 of the present document)	
Condition			If the Terminal sends a MANAGE LSI (reset LSE) command, execute steps 3) and 4)	
3	T > UICC	00	Send the expected MANAGE LSI (reset LSE) command as specified in the initial condition clause. (see note)	
4	UICC > T	00	Return status word '9000' with response data containing an ATR TLV with ATR-LSI4. '80 0F' + ATR-LSI4	
Condition			If O_MANAGE_LSI_RETRIEVE_SWP = FALSE, skip steps 5) and 6)	
5	T > UICC	00	Send a MANAGE LSI (retrieve SWP) command as specified in the initial condition clause. (see note)	RQ_1
6	UICC > T	00	Send a response containing SW1 = '90', SW2 = '00' and response data '80 01 FF' confirming no LSE assigned for UICC-CLF	
7	T > UICC	00	Send a MANAGE LSI (assign SWP) command as specified in the initial condition clause. (see note)	RQ_2
8	UICC > T	00	Return status word '9000' with response data containing an ATR TLV with ATR-LSI4. '80 0F' + ATR-LSI4	
NOTE: This might not be the first command sent by the Terminal				

9.3.4.5 Acceptance criteria

The command shall be executed correctly.

9.3.5 MANAGE LSI (retrieve SWP)

9.3.5.1 Definition and applicability

A MANAGE LSI (retrieve SWP) APDU shall be sent when the device supports the discovery of the LSE that is currently assigned to handle the communication over the UICC-CLF interface.

For applicability of this test case see clause 3.8.

9.3.5.2 Conformance requirement

9.3.5.2.1 Description

RQ	Description
RQ_1	The Terminal can retrieve the LSE that is currently assigned to handle the communication over the UICC-CLF interface using the MANAGE LSI (retrieve SWP) command.

9.3.5.2.2 Reference

ETSI TS 102 221 [1], clause 6.3.3, 7.5 and 11.1.25.

9.3.5.3 Test purpose

To verify that the Terminal correctly sends the MANAGE LSI (retrieve SWP) command.

9.3.5.4 Method of test

9.3.5.4.1 Initial conditions

The Terminal shall be connected to the UICC (or UICC simulator).

Expected commands:

MANAGE LSI (retrieve SWP):

CLA	INS	P1	P2	Le
80	7C	03	00	00

9.3.5.4.2 Procedure

Step	Direction	LSI	Description	RQ
1	User/UE		Power on the UICC-Terminal interface	
2	UICC > T		Send ATR-LSI4 (as defined in clause 6.1.2.4.1 of the present document)	
3	T > UICC	00	Send a MANAGE LSI (retrieve SWP) command as specified in the initial condition clause. (see note)	RQ_1
4	UICC > T	00	Send a response containing SW1 = '90', SW2 = '00' and response data '80 01 FF' confirming no LSE assigned for UICC-CLF	
NOTE: This might not be the first command sent by the Terminal.				

9.3.5.5 Acceptance criteria

The command shall be executed correctly.

10 Application independent features

10.1 Logical secure element Interfaces

10.1.0 General test execution information

The following statements are applicable to all procedure clauses contained within clause 10.1:

- Some other specifications which reference ETSI TS 102 221 [1] may add additional TLVs to the command data or response data of MANAGE LSI (configure LSIs). Therefore, if the Terminal is implemented according to such a specification, then, unless otherwise specified:
  - Additional TLVs may be present in the command data of MANAGE LSI (configure LSIs), after the '80' and (if present) '81' TLVs.
  - The test tool shall add suitable additional TLVs to the response data of MANAGE LSI (configure LSIs), after the '80' and (if present) '81' TLVs.

10.1.1 Identification of Multiplexing mechanism

FFS.

10.1.2 Identification of LSIs

FFS.

10.1.3 Selection of an LSI

10.1.3.1 Selection of an LSI in T=0 using MANAGE LSI (select LSI)

FFS.

10.1.3.2 Selection of an LSI in T=1 using MANAGE LSI (select LSI)

FFS.

10.1.3.3 Selection of an LSI in T=1 using the NAD byte

10.1.3.3.1 Definition and applicability

If the T=1 protocol and multiple LSIs are supported, the Terminal and the UICC can agree to use the NAD byte to indicate the LSI. The LSIs are identified by the combination of SAD and DAD values.

For applicability of this test case see clause 3.8.

10.1.3.3.2 Conformance requirement

10.1.3.3.2.1 Description

RQ	Description
RQ_1	The Terminal shall correctly discover the T=1 protocol and the Multiple LSIs support from the ATR
RQ_2	The Terminal shall correctly define the protocol and the number of LSIs to use and send the expected PPS1 and PPS2 values
RQ_3	The Terminal shall be capable to indicate an LSI by the NAD byte used
RQ_4	The Terminal shall be capable to identify an LSI by the NAD byte used
RQ_5	The Terminal shall be capable to select different LSI by changing the NAD byte

10.1.3.3.2.2 Reference

ETSI TS 102 221 [1], clauses 6.3.3, 6.4, 7.2.3.2.1.1 and 7.5.

10.1.3.3.3 Test purpose

To verify that the Terminal correctly uses the different NAD bytes for the LSI selection.

10.1.3.3.4 Method of test

10.1.3.3.4.1 Initial conditions

The Terminal shall be connected to the UICC (or UICC simulator).

The UICC (or UICC simulator) shall be configured with at least 2 LSIs and corresponding LSEs capable to respond to a SELECT MF command.

Expected MANAGE LSI (configure LSIs) command to be sent from a Terminal supporting T=1 and LSI selection by NAD byte:

CLA	INS	P1	P2	Lc	Data	Le
80	7C	04	00	YY	80 01 XX 81 01 01	00

Where 'XX' is the highest LSI proposed by the Terminal in the range '01' to '1F'.

10.1.3.3.4.2 Procedure

Step	Direction	LSI	Description	RQ
1	User/UE		Power on the UICC-Terminal interface	
2	UICC > T		Send ATR-LSI2 (as defined in clause 6.1.2.4.1 of the present document)	
3	T > UICC		PPS request including transmission protocol selected and the PPS2 indicating the support of LSIs	RQ_1 RQ_2
4	UICC > T		PPS response confirming the Terminal's PPS request	

Step	Direction	LSI	Description	RQ
Condition			If O_LSI_CONFIG_PRE_AGREED = TRUE, skip steps 5) and 6)	
5	T > UICC	00	Send expected MANAGE LSI (configure LSIs) command containing command data as specified in the initial condition clause	RQ_2 RQ_3
6	UICC > T	00	Return status condition SW1 = '90', SW2 = '00' Send response data confirming the support of LSIs and the selection via NAD byte by the UICC (data = '80 01 01 81 01 01')	RQ_4
7	T > UICC	00	Send an I-Block with a C-APDU (e.g. SELECT MF command) addressing LSI 0 with NAD '00'	RQ_3
8	UICC > T	00	Return I-Block with SW1 = '90', SW2 = '00' to LSI 0 with NAD '00'	RQ_4
9	User/UE		Initiate a switch to LSI 1	
10	T > UICC	01	Send an I-Block with a C-APDU (e.g. SELECT MF command) addressing LSI 1 with NAD '10'	RQ_3 RQ_5
11	UICC > T	01	Return I-Block with SW1 = '90', SW2 = '00' to LSI 1 with NAD '01'	RQ_4

10.1.3.3.5 Acceptance criteria

The Terminal supporting T=1 and the LSI selection via NAD byte shall be capable to execute the procedure defined in clause 10.1.3.3.4 correctly.

Annex A (normative): UICC simulator functional requirement

A.1 General

The UICC simulator shall implement the functions of an UICC as described in ETSI TS 102 221 [1].

A.2 Contacts C1, C3, C7

A.2.1 Default measurement/setting uncertainties

Unless stated otherwise below, the following uncertainties apply:

Voltage measurement uncertainty: < ±50 mV

Time measurement uncertainty: < ±100 ns

A.2.2 Contact C1

Continuous Spikes:

Voltage measurement uncertainty: < ±100 mV

Current Load Amplitude: 0 mA to 20 mA

Adjustable Step Size: 1 mA

Uncertainty: < ±1 mA

Additional Current Offset: 0 mA to 5 mA

Adjustable Step Size: 1 mA

Uncertainty: < ±1 mA

Pulse Width: 100 ns to 500 ns

Adjustable Step Size: 50 ns

Uncertainty: < ±25 ns

Rise and Fall Time: ≤ 50 ns

Pause Width: 100 ns to 500 ns

Adjustable Step Size: 50 ns

Uncertainty: < ±25 ns

Random Spikes:

Voltage measurement uncertainty: < ±100 mV

Current Load Amplitude: 50 mA to 200 mA

Adjustable Step Size: 1 mA

Uncertainty: < ±1 mA

Additional Current Offset: 0 mA to 5 mA

Adjustable Step Size: 1 mA

Uncertainty: < ±0,1 mA

Pulse Width: 100 ns to 500 ns

Adjustable Step Size: 50 ns

Uncertainty: < ±25 ns

Rise and Fall Time: ≤ 50 ns

Pause Width: 0,1 ms to 500 ms, randomly varied

Adjustable Step Size: 0,1 ms

Uncertainty: < ±0,1 ms

A.2.3 Contact C7

The Elementary Time Unit (etu) used in the clauses below refer to the nominal bit duration on the I/O line, as defined in ISO/IEC 7816-3 [2]:

Voltage setting uncertainty: < ±25 mV

Rise and fall Time setting uncertainty: < ±100 ns

Jitter measurement uncertainty: < ±5 × 10E-3 etu

Jitter setting uncertainty: < ±5 × 10E-3 etu

A.2.4 Contact C3

Frequency measurement uncertainty: < ±0,5 %

Voltage Measurement uncertainty: < ±50 mV

Rise and fall time measurement uncertainty: < ±5 ns

Duty cycle:

Measurement range: 35 % to 65 %

Measurement uncertainty: < ±2,5 %

A.3 Definition of timing

It shall be possible to define all timings relative to the clock. The UICC simulator shall be able to calculate and to use the absolute values automatically, even if the Terminal changes the frequency during the communication.

Annex B (informative): Change history

The table below indicates all change requests that have been incorporated into the present document since it was created by TC SET (formerly TC SCP).

Date	Meeting	Doc	CR	Rev	Cat	Subject/Comment	Old	New
2001-06	SCP-06	SCP-010156				TSG-T #11 agreed to transfer the contents of the test specification, 3GPP TS 31.120 to EP SCP. V1.0.0 is submitted to EP SCP for approval. It contains only editorial changes compared to 3GPP TS 31.120 V3.0.0		1.0.0
		SCP-010194				Undoing a change regarding the coding conventions in clause 3.4	1.0.0	1.0.1
		-				EP SCP agreed that V1.0.1 was ready to be put under change control. As a result, V3.0.0 was created.	1.0.1	3.0.0
2001-07	SCP-06	SCP-010193	001		B	Alignment with Rel-4 version of core specification (UICC current consumption values for 3 V and 1,8V)	3.0.0	4.0.0
		SCP-010200	002		F	Correction of ATR examples regarding DCB and T4		
2002-03	SCP-09	SCP-020052	003		F	Correction of Errors in UICC type recognition	4.0.0	4.1.0
2003-01	SCP-12	SCP-030013	005		F	Correction of test on processing of ACK, NACK, NULL procedure bytes and correction of CHV	4.1.0	4.2.0
		SCP-030062	006		D	Remove UICC as an abbreviation to align with 3GPP TR 21.905		
2003-09	SCP-14	SCP-030288	007		F	Upgrade to Rel-5 version of the specification	4.2.0	5.0.0
2004-05	SCP-17	SCP-040284	010		A	Removal of test 6.4 and modification of the numbering order of electrical tests in clause 5.2	5.0.0	5.1.0
2004-09	SCP#18	SCP-040376	015		A	Removal of transmit for WWT exceeded in test 7.2.1 Timing	5.1.0	5.2.0
2004-11	SCP#19	SCP-040489	020		A	Non-specific Referencing	5.2.0	5.3.0
		SCP-040492	023		A	Modification of test 7.3.2 Block Timing		
2005-06	SCP#21	SCP-050129	026		F	Correction of test case 7.3.9	5.3.0	5.4.0
		SCP-050131	029		F	Correction of test case 7.3.11		
		SCP-050186	032		F	Correction of references to ISO/IEC 7816-3		
2005-09	SCP#22	SCP-050297	035		A	Change of internal references	5.4.0	5.5.0
2006-03	SCP#25	SCP-060160	038		A	Removal of test case 5.1.5.5	5.5.0	5.6.0
2007-01	SCP#29	SCP-070062	041		A	Essential correction of "Chaining - IFSD management" test case	5.6.0	5.7.0
2007-10	SCP#33	SCP-070446	049		F	CR to ETSI TS 102 230, Rel-5: Adding an applicability table to generate a base for a combined Rel-5 to Rel-7 test specification Note: incorrect CR number renumbered from 42 to 49	5.7.0	5.8.0
2008-07	SCP#38	SCP-080337	047		A	CR 102 230 Rel-5 Essential correction of ATR coding	5.7.0	5.8.0
2008-10	SCP#39	SCP-080414	050		F	Correction of cl. 5.2 chapter numbering	5.8.0	5.9.0
2009-04	SCP#41	----------	----		-	Upgrade of the specification to Rel-7	5.9.0	7.0.0
		SCP-090180	053		B	Addition of a test case: analysing rise- and fall-time when a low impedance buffer is selected.	7.0.0	7.1.0
2010-03	SCP#44	SCP(10)0065	055		F	Creation of REL 8 of ETSI TS 102 230	7.1.0	8.0.0
2013-03	SCP#45	SCP(10)0116	059		F	Correction of maximum allowed rise/fall time on contact C7 in test 5.2.5.2	8.0.0	8.1.0
2013-03	SCP#58	SCP(13)000016	061		F	Enhancement of TC 7.2.2 with regards to NULL procedure byte	8.0.0	8.1.0
2013-03	SCP#57	SCP(12)000229	060		F	Creation of ETSI TS 102 230 REL-9	8.1.0	9.0.0
2013-04	SCP#59	SCP(13)000063	062		F	Creation of ETSI TS 102 230 REL-10	9.0.0	10.0.0
2014-02	SCP#62	SCP(14)000009	063		F	Modification of the electrical test cases	10.0.0	10.1.0
2014-04	-	-	-		-	Correction of clause numbering and related release information in applicability table	10.1.0	10.1.1
2014-04	SCP#63	SCP(14)000106r1	064	1	F	Modification of test case 5.1.5.6	10.1.1	10.2.0
2015-10	SCP#70	SCP(15)000212	067		B	Creation of Rel-11 of the specification	10.2.0	11.0.0
		SCP(15)000213	068		B	Additional of TERMINAL CAPABILITY - Additional interfaces support test case		
						Addition/modification of section headers to remove hanging paragraphs (as required by updated ETSI drafting rules)		
2018-05	SCP#75	SCP(16)000167r1	069	1	C	Update the applicability of test case 9.1.1	11.0.0	11.1.0
		SCP(16)000168	070		B	Creation of REL-12 of ETSI TS 102 230-1	11.1.0	12.0.0

Date	Meeting	Doc	CR	Rev	Cat	Subject/Comment	Old	New
2018-05	SCP#76	SCP(16)000244	071		B	Creation of REL-13 of ETSI TS 102 230-1	12.0.0	13.0.0
		SCP(16)000245	072	1	F	Test case 7.2.5: fix for unfair failure for '6282' after SEARCH RECORD		
2018-05	SCP#79	SCP(17)000092r1	073	1	C	Adding Nominal Test Conditions for Rel-12 implementations	13.0.0	13.1.0
2018-05	SCP#81	SCP(17)000166r1	074	1	B	Adding tests for Terminals supporting one Voltage Class only	13.1.0	13.2.0
		SCP(17)000167r1	075	1	F	Clarification on UICC Presence Detection Test Case		
		SCP(17)000168r1	076	1	B	Creation of REL-14 of ETSI TS 102 230-1	13.2.0	14.0.0
2018-07	SCP#85	SCP(18)000150	077	2	B	Adding new Rel-14 test cases for the UICC Suspension Mechanism	14.0.0	14.1.0
		SCP(18)000151	078	2	B	Additional Rel-14 test cases for the UICC Suspension Mechanism		
2023-06	SET#110	SET(23)000054	086		F	Addition of test case 'Reaction of Terminals not supporting any voltage class indicated in the ATR'	14.1.0	14.2.0
		SET(23)000055	087		F	Change of maximum current on C1 to allow for different releases		
		SET(23)000056	083		F	Update to Rel-15	14.2.0	15.0.0
		SET(23)000057	084		F	Update to Rel-16	15.0.0	16.0.0
		SET(23)000058	085		B	Update to Rel-17	16.0.0	17.0.0
		SET(23)000059	088		B	Addition of LSI test cases for ATR and T=1 NAD selection		
2023-10	SET#111	SET(23)000099	089		B	Introduction of Class D testing	17.0.0	17.1.0
		SET(23)000100r1	090		B	Addition of Manage LSI (reset LSE) command Test		
2023-12	SET#112	SET(23)000135	091		D	Update of the presentation of the Applicability Table	17.0.0	17.1.0
2024-03	SET#113	SET(24)000014	092		B	Addition of Manage LSI (retrieve SWP) command Test	17.1.0	17.2.0
		SET(24)000015r1	093	1	B	Addition of Manage LSI (assign SWP) command Test		
		SET(24)000016	094		F	Correction of test case 6.5		
		SET(24)000017	095		F	Correction of test case 7.2.1		
		SET(24)000018	096		D	Adjustment of the format description for the applicability table		

Annex C (informative): Core specification version information

Unless otherwise specified, the versions of ETSI TS 102 221 [1] which have been taken into consideration for the present document are as follows.

Release	ETSI TS 102 221 [1] version
Rel-9	V9.2.0
Rel-10	V10.0.0
Rel-11	V11.1.0
Rel-12	V12.1.0
Rel-13	V13.2.0
Rel-14	V14.2.0
Rel-15	V15.5.0
Rel-16	V16.6.0
Rel-17	V17.4.0

History

Document history		
V17.0.0	August 2023	Publication
V17.1.0	February 2024	Publication
V17.2.0	May 2024	Publication