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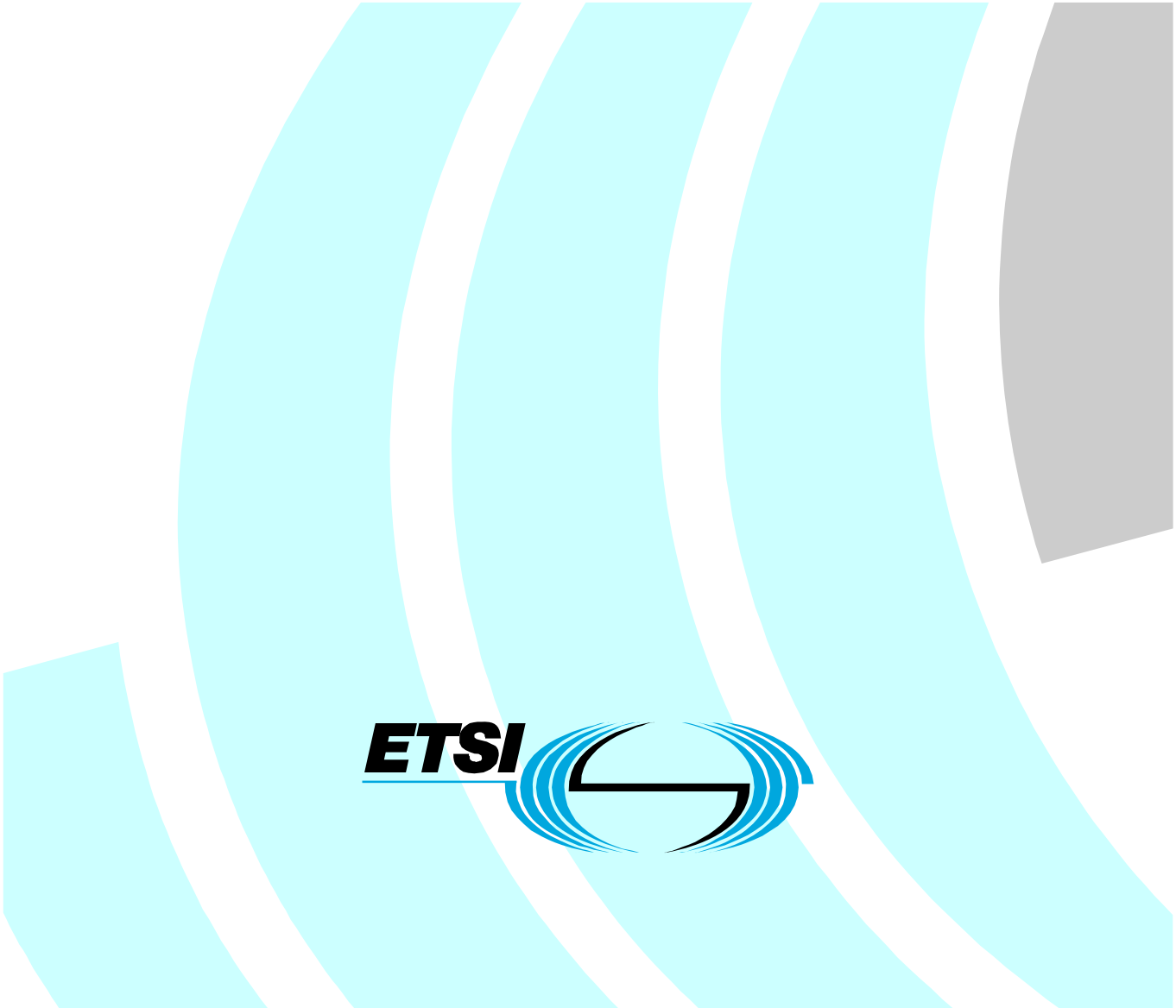
Technical Specification

Smart Cards;
Test specification for the ETSI aspects of the IC USB interface;
Part 1: Terminal features
(Release 7)



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Contents

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Foreword

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z the third digit is incremented when editorial only changes have been incorporated in the document.

The present document is part 1 of a multi-part deliverable covering the Test specification for the USB interface, as identified below:

Part 1: "Terminal features";

Part 2: "UICC features".

Introduction

The present document defines test cases for the terminal relating to the USB interface, as specified in TS 102 600 [1].

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

1 Scope

The present document covers the minimum characteristics which are considered necessary for the terminal in order to provide compliance to TS 102 600 [1].

The present document specifies the test cases for:

- the characteristics of the Inter-Chip USB electrical interface between the USB UICC and the USB UICC-enabled terminal;
- the initial communication establishment and the transport protocols;
- the communication layers between the USB UICC and the USB UICC-enabled terminal.

Test cases for the USB UICC-enabled terminal relating to TS 102 221 [2] interface are out of scope of the present document.

2 References

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

- In the case of a reference to a TC SCP 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 http://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.

2.1 Normative references

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

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

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

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

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

[5] Universal Serial Bus Specification Revision 2.0, USB Implementers Forum.

NOTE: Available at http://www.usb.org/developers/docs. This is a ZIP package containing the following:

- The original USB 2.0 specification released on April 27, 2000.
- The "USB On-The-Go supplement" Revision 1.3 as of December 5, 2006.
- The "Inter-Chip USB supplement to the USB 2.0 Specification" Revision 1.0 March 13, 2006.
- Errata and Engineering Change Notices.

In the context of the present document, this reference, abbreviated as "USB 2.0", is used specifically in relation to the original USB 2.0 specification and associated errata and Engineering Change Notices, while its supplements are referred through separate references.

[6] "Inter-Chip USB supplement to the USB 2.0 Specification", Revision 1.0 March 13, 2006 published as part of the Universal Serial Bus Revision 2.0 specification package (see TS 102 223 [3]).

NOTE: available at http://www.usb.org/developers/docs.

[7] Universal Serial Bus, "Mass Storage Class Specification Overview", Revision 1.2, USB Implementers Forum, Device Working Group: Mass Storage.

NOTE: Available at http://www.usb.org/developers/devclass_docs.

[8] "Universal Serial Bus Mass Storage Class Bulk-Only Transport" Revision 1.0.

NOTE: Available at http://www.usb.org/developers/devclass_docs.

[9] Universal Serial Bus "Device Class: Smart Card ICCD Specification for USB Integrated Circuit(s) Card Devices" Revision 1.0.

NOTE: Available at http://www.usb.org/developers/devclass_docs.

[10] "Universal Serial Bus Communications Class Subclass Specification for Ethernet Emulation Model Devices", Revision 1.0, USB Implementers Forum, Device Working Group: Communication.

NOTE: Available at http://www.usb.org/developers/devclass_docs.

[11] ANSI/INCITS 408-2005: "Information Technology - SCSI Primary Commands - 3 (SPC-3)".

NOTE: Available at http://www.t10.org.

[12] ETSI TS 102 230: "Smart cards; UICC-Terminal interface; Physical, electrical and logical test specification (Release 7)".

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

2.2 Informative references

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

Not applicable.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the termns and definitions given in TS 102 600 [1] and TS 102 221 [2]apply.

3.2 Symbols

For the purposes of the present document, the symbols given in TS 102 600 [1] and TS 102 221 [2] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TS 102 600 [1], TS 102 221 [2] and the following apply:

APDU	Application Protocol Data Unit
ATR	Answer To Reset
DUT	Device Under Test
EEM	Ethernet Emulation Model
EOP	End Of Packet
FFS	For Further Study
IC	Integrated Circuit
ICC	Integrated Circuit Card
ICCD	Integrated Circuit Card Device
NAA	Network Access Application
RPDH	Host-side Pull Down Resistor
RQ	Conformance requirement
SOF	Start Of Frame
T	Terminal
TE	Test Equipment
USB	Universal Serial Bus

3.4 Formats

3.4.1 Format of the table of optional features

The columns in table 4.1 have the following meaning.

Column	Meaning
Option	The optional feature supported or not by the implementation.
Status	See clause 3.4.3, "Status and Notations".
Support	The support columns shall be filled in by the supplier of the implementation. The following common notations, defined in ISO/IEC 9646-7 [4], are used for the support column in table 4.1. Y or y supported by the implementation. N or n not supported by the implementation. N/A, n/a or - no answer required (allowed only if the status is N/A, directly or after evaluation of a conditional status).
Mnemonic	The mnemonic column contains mnemonic identifiers for each item.

3.4.2 Format of the applicability table

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

The columns in table 4.2 have the following meaning:

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

3.4.3 Status and Notations

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

The following notations, defined in ISO/IEC 9646-7 [4], are used for the status column:

M	mandatory - the capability is required to be supported.
O	optional - the capability may be supported or not.
N/A	not applicable - in the given context, it is impossible to use the capability.
X	prohibited (excluded) - there is a requirement not to use this capability in the given context.
O.i	qualified optional - for mutually exclusive or selectable options from a set. "i" is an integer which identifies an unique group of related optional items and the logic of their selection which is defined immediately following the table.
Ci	conditional - the requirement on the capability ("M", "O", "X" or "N/A") depends on the support of other optional or conditional items. "i" is an integer identifying an unique conditional status expression which is defined immediately following the table. For nested conditional expressions, the syntax "IF ... THEN (IF ... THEN ... ELSE...) ELSE ..." shall 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 shall be discriminated by letters (a, b, etc.), respectively.

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

4 Test environment

4.1 Table of optional features

The supplier of the implementation shall state the support of possible options in table 4.1. See clause 3.4 for the format of table 4.1.

Table 4.1: Options

Item	Option	Status	Support	Mnemonic
1	Class B supported	O		O_ClassB
2	Resume Time Request supported	O		O_ResTimeReq
3	Remote Wake-up supported	O		O_RemWakeUp
4	ICCD Bulk Interface supported	O		O_Bulk
5	EEM Interface supported	O		O_EEM

4.2 Applicability table

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

Table 4.2 a): Applicability of tests

Test case	Description	Release	Rel-7 Terminal	Support
	Physical Tests			
6.2.1	Dimensions of the card reader slot	Rel-7	M	
	Basic Electrical Tests			
6.3.1.1	Phase preceding Terminal power on	Rel-7	M	
	Activation Tests			
6.4.1.1	Selection of voltage class C' as lowest supported voltage class, no support of class B	Rel-7	C001	
6.4.1.2	Selection of voltage class C' as lowest supported voltage, with support of class B	Rel-7	C002	
6.4.1.3	TS 102 221 [2] only UICC Interface Activation for voltage class C'	Rel-7	M	
6.4.1.4	TS 102 221 [2] Interface Activation, no support of class B	Rel-7	C001	
6.4.1.5	TS 102 221 [2] Interface Activation, with support of class B	Rel-7	C002	
6.4.1.6	USB Interface Activation	Rel-7	M	
6.4.1.7	Corrupted ATR at USB UICC-enabled Terminal	Rel-7	M	
	Initialization Tests			
6.5.1.1	Set address Test at USB Full Speed	Rel-7	M	
6.5.2.1	Power Negotiation support	Rel-7	M	
6.5.2.2	Power Negotiation, Voltage Class not supported	Rel-7	M	
6.5.2.3	Power Negotiation, Class B Activation preferred	Rel-7	M	
6.5.2.4	Power Negotiation with more than minimum current	Rel-7	M	
6.5.3.1	Resume Time Negotiation	Rel-7	C003	
	Descriptors			
6.6.1.1.1	Device Descriptor Test	Rel-7	M	
6.6.1.2.1	ICCD Control Transfer configuration Test, single interface	Rel-7	M	
6.6.1.2.2	Multiple ICCD configuration, single interface test	Rel-7	M	
6.6.1.2.3	Multiple configuration, multiple interfaces test	Rel-7	M	
6.6.1.2.4	Configuration Descriptor and no ICCD support from the USB UICC	Rel-7	M	
6.6.2.1.1	ICCD Class Descriptor Test	Rel-7	M	
	Protocol Stack and Higher Level			
6.7.1.1	ICCD Control B Interface	Rel-7	M	
6.7.1.2	ICCD Bulk Interface	Rel-7	C005	
6.7.2.1	EEM Echo Test	Rel-7	C006	

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

Conditional item	Condition
C001	IF not O_ClassB THEN M ELSE N/A
C002	IF O_ClassB THEN M ELSE N/A
C003	IF O_ResTimeReq THEN M ELSE N/A
C004	IF O_RemWakeUp THEN M ELSE N/A
C005	IF O_Bulk THEN M ELSE N/A
C006	IF O_EEM THEN M ELSE N/A

4.3 Information provided by the device supplier

Void.

4.4 Test Equipment (TE)

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

With respect to the Terminal, the UICC simulator shall act as a valid UICC according to TS 102 600 [1] and TS 102 221 [2], unless otherwise specified. In particular, during test procedure execution, the UICC simulator shall respect the electrical and signalling conditions for all UICC contacts within the limits given by TS 102 600 [1] and TS 102 221 [2]. The accuracy of the UICC simulator's settings shall be taken into account when ensuring this.

For the purpose of the present document, the UICC simulator shall not enable support of the UICC-CLF interface as defined in TS 102 613 [13].

Some test cases might require the presence of an NAA (e.g. (U)SIM), which shall be provided by the test equipment.

4.4.1 Measurement/setting uncertainties

Void.

4.4.2 Default conditions for DUT operation

4.4.2.1 Temperature

The tests shall be run at a fully operational temperature (i.e. between -25 °C and +85 °C).

4.4.3 Minimum/maximum conditions for DUT operation

Void.

4.4.4 Void

4.4.5 ATRs to be used by the UICC simulator

For some particular test cases, the ATRs described below need to be specifically used.

4.4.5.1. ATR that indicates that UICC is USB capable and indicates support of classes B and C'

Character	Value	Description
TS	'3B'	Indicates direct convention
T0	'97'	TA1 and TD1 are present 7 historical bytes
TA1	'96'	Clock rate conversion factor FI=9 (F=512) Baud rate adjustment factor DI=6 (D=32)
TD1	'80'	TD2 only is present Protocol T=0 is supported by UICC
TD2	'3F'	TA3 and TB3 are present Global interface bytes are following (T=15)
TA3	'C6'	Clock stop supported (No preferred state) Accepted voltage class B and C
TB3	'C0'	Inter-Chip USB UICC-Terminal interface supported as defined in TS 102 600 [1]
T1	'80'	
T2	'31'	Card data services
T3	'A0'	SELECTED by AID supported, EFDIR 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	'45'	Check byte

4.4.5.2. ATR that indicates that UICC is not USB capable

ATR is the same as in clause 4.4.5.1 except.

Character	Value	Description
TD2	'1F'	Only TA3 is present Global interface bytes are following (T=15)
TA3	'C6'	Clock stop supported (No preferred state) Accepted voltage class B and C
TB3		Must be removed from ATR
TCK	'A5'	Check byte

4.4.5.3. ATR that indicates that UICC is not USB capable and only supports voltage class B

ATR is the same as in clause 4.4.5.1 except.

Character	Value	Description
TD2	'1F'	Only TA3 is present Global interface bytes are following (T=15)
TA3	'C2'	Clock stop supported (No preferred state) Accepted voltage class B only
TB3		Must be removed from ATR
TCK	'A1'	Check byte

4.4.6 USB Descriptors to be used by the UICC simulator

Within the descriptors, strings may be used to describe the descriptor and are denoted by i which is an index of a string description - set to 0 if no string. These are, if defined, to be included in the total length N of the descriptors.

4.4.6.1 Single configuration, Single interface

Descriptors supporting a single configuration containing a Control B transfer interface.

4.4.6.1.1 Device Descriptor (Single Configuraton)

bLength Check	'12'
bDescriptorType	'01'
bcdUSB	'0200'
bDeviceClass	'00'
bDeviceSubClass	'00'
bDeviceProtocol	'00'
bMaxPacketSize0	64
idVendor	X1
idProduct	Y1
bcdDevice	Z1
iManufacturer	i
iProduct	i
iSerialNumber	i
bNumConfigurations	1

The Product, Vendor ID and Device Release Number (bcdDevice) X1,Y1 and Z1 with associated string descriptors i shall be unique for this descriptor bundle and allocated by the test equipment manufacturer.

4.4.6.1.2 Configuration Descriptor (ICCD Control B)

ICCD Configuration Descriptor (Control B)

bLength	'09'
wTotalLength	N
bNumInterfaces	1
bConfigurationValue	1
iConfiguration	i
bmAttributes	'80'
bMaxPower	4

ICCD Interface Descriptor (Control B)

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	0
bAlternateSetting	'00'
bNumEndpoints	0
bInterfaceClass	'0B'
bInterfaceSubClass	'00'
bInterfaceProtocol	'02'
iInterface	i

USB-ICC Class Specific Descriptor

bLength	'36'
bDescriptorType	'21'
bcdCCID	'0110'
bMaxSlotIndex	'00'
dwProtocols	'0000 0002
dwMaxIFSD	'0000 00FE'
dwFeature	'0002 0840'
dwMaxCCIDMessageLength	261
dwClassGetResponse	'FF'
bClassEnvelope	'FF'
bMaxCCIDBusySlots	'01'

4.4.6.2 Multiple configurations, Single interface

4.4.6.2.1 Device Descriptor (Multiple Configuraton 1)

bLength Check	'12'
bDescriptorType	'01'
bcdUSB	'0200'
bDeviceClass	'00'
bDeviceSubClass	'00'
bDeviceProtocol	'00'
bMaxPacketSize0	64
idVendor	X2
idProduct	Y2
bcdDevice	Z2
iManufacturer	i
iProduct	i
iSerialNumber	i
bNumConfigurations	2

The Product, Vendor ID and Device Release Number (bcdDevice) X2,Y2 and Z2 with associated string descriptors i shall be unique for this descriptor bundle and allocated by the test equipment manufacturer.

4.4.6.2.2 Configuration Descriptors (ICCD Control B and ICCD Bulk)

ICCD Configuration Descriptor (Control B)

bLength	'09'
wTotalLength	N
bNumInterfaces	1
bConfigurationValue	1
iConfiguration	i
bmAttributes	'80'
bMaxPower	4

ICCD Interface Descriptor (Control B)

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	0
bAlternateSetting	'00'
bNumEndpoints	'00'
bInterfaceClass	'0B'
bInterfaceSubClass	'00'
bInterfaceProtocol	'02'
iInterface	i

USB-ICC Class Specific Descriptor

bLength	'36'
bDescriptorType	'21'
bcdCCID	'0110'
bMaxSlotIndex	'00'
dwProtocols	'0000 0002
dwMaxIFSD	'0000 00FE'
dwFeature	'0002 0840'
dwMaxCCIDMessageLength	261
dwClassGetResponse	'FF'
bClassEnvelope	'FF'
bMaxCCIDBusySlots	'01'

Configuration Descriptor (ICCD Bulk Transfer)

bLength	'09'
wTotalLength	N
bNumInterfaces	1
bConfigurationValue	2
iConfiguration	i
bmAttributes	'80'
bMaxPower	4

ICCD Interface Descriptor (Bulk Transfer)

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	0
bAlternateSetting	'00'
bNumEndpoints	'02'
bInterfaceClass	'0B'
bInterfaceSubClass	'00'
bInterfaceProtocol	'00'
iInterface	i

USB-ICC Class Specific Descriptor

bLength	'36'
bDescriptorType	'21'
bcdCCID	'0110'
bMaxSlotIndex	'00'
dwProtocols	'0000 0002
dwMaxIFSD	'0000 00FE'
dwFeature	'0002 0840'
dwMaxCCIDMessageLength	261
dwClassGetResponse	'FF'
bClassEnvelope	'FF'
bMaxCCIDBusySlots	'01'

Endpoint Descriptor: Bulk-OUT Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'01'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Endpoint Descriptor: Bulk-IN Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'81'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

4.4.6.3 Multiple Configurations, Multiple interfaces

4.4.6.3.1 Device Descriptor (Multiple Configuraton 2)

bLength Check	'12'
bDescriptorType	'01'
bcdUSB	'0200'
bDeviceClass	'00'
bDeviceSubClass	'00'
bDeviceProtocol	'00'
bMaxPacketSize0	64
idVendor	X3
idProduct	Y3
bcdDevice	Z3
iManufacturer	i
iProduct	i
iSerialNumber	i
bNumConfigurations	2

The Product, Vendor ID and Device Release Number (bcdDevice) X3,Y3 and Z3 with associated string descriptors i shall be unique unique for this descriptor bundle and allocated by the test equipment manufacturer.

4.4.6.3.2 Configuration Descriptors (ICCD Control B, ICCD Bulk, EEM and MSC)

ICCD Configuration Descriptor (Control B)

bLength	'09'
wTotalLength	N
bNumInterfaces	3
bConfigurationValue	1
iConfiguration	i
bmAttributes	'80'
bMaxPower	4

ICCD Interface Descriptor (Control B)

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	0
bAlternateSetting	'00'
bNumEndpoints	0
bInterfaceClass	'0B'
bInterfaceSubClass	'00'
bInterfaceProtocol	'02'
iInterface	i

USB-ICC Class Specific Descriptor

bLength	'36'
bDescriptorType	'21'
bcdCCID	'0110'
bMaxSlotIndex	'00'
dwProtocols	'0000 0002
dwMaxIFSD	'0000 00FE'
dwFeature	'0002 0840'
dwMaxCCIDMessageLength	261
dwClassGetResponse	'FF'
bClassEnvelope	'FF'
bMaxCCIDBusySlots	'01'

EEM Interface Descriptor

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	1
bAlternateSetting	'00'
bNumEndpoints	2
bInterfaceClass	'02'
bInterfaceSubClass	'0C'
bInterfaceProtocol	'07'
iInterface	i

Endpoint Descriptor: Bulk-OUT Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'01'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Endpoint Descriptor: Bulk-IN Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'81'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Mass Storage Class Interface Descriptor

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	2
bAlternateSetting	'00'
bNumEndpoints	2
bInterfaceClass	'08'
bInterfaceSubClass	'06'
bInterfaceProtocol	'50'
iInterface	i

Endpoint Descriptor: Bulk-OUT Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'02'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Endpoint Descriptor: Bulk-IN Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'82'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Configuration Descriptor (Bulk Transfer)

bLength	'09'
wTotalLength	N
bNumInterfaces	3
bConfigurationValue	2
iConfiguration	i
bmAttributes	'80'
bMaxPower	4

ICCD Interface Descriptor (Bulk Transfer)

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	0
bAlternateSetting	'00'
bNumEndpoints	2
bInterfaceClass	'0B'
bInterfaceSubClass	'00'
bInterfaceProtocol	'00'
iInterface	i

USB-ICC Class Specific Descriptor

bLength	'36'
bDescriptorType	'21'
bcdCCID	'0110'
bMaxSlotIndex	'00'
dwProtocols	'0000 0002
dwMaxIFSD	'0000 00FE'
dwFeature	'0002 0840'
dwMaxCCIDMessageLength	261
dwClassGetResponse	'FF'
bClassEnvelope	'FF'
bMaxCCIDBusySlots	'01'

Endpoint Descriptor: Bulk-OUT Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'01'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Endpoint Descriptor: Bulk-IN Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'81'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

EEM Interface Descriptor

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	2
bAlternateSetting	'00'
bNumEndpoints	2
bInterfaceClass	'02'
bInterfaceSubClass	'0C'
bInterfaceProtocol	'07'
iInterface	i

Endpoint Descriptor: Bulk-OUT Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'02'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Endpoint Descriptor: Bulk-IN Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'82'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Mass Storage Class Interface Descriptor

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	3
bAlternateSetting	'00'
bNumEndpoints	2
bInterfaceClass	'08'
bInterfaceSubClass	'06'
bInterfaceProtocol	'50'
iInterface	i

Endpoint Descriptor: Bulk-OUT Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'03'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Endpoint Descriptor: Bulk-IN Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'83'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

4.4.6.4 Multiple configurations, Single interface, Extended APDU

4.4.6.4.1 Device Descriptor (Multiple Configuraton 3)

bLength Check	'12'
bDescriptorType	'01'
bcdUSB	'0200'
bDeviceClass	'00'
bDeviceSubClass	'00'
bDeviceProtocol	'00'
bMaxPacketSize0	64
idVendor	X4
idProduct	Y4
bcdDevice	Z4
iManufacturer	i
iProduct	i
iSerialNumber	i
bNumConfigurations	2

The Product, Vendor ID and Device Release Number (bcdDevice) X4,Y4 and Z4 with associated string descriptors i shall be unique for this descriptor bundle and allocated by the test equipment manufacturer.

4.4.6.4.2 Configuration Descriptors (ICCD Control B and ICCD Bulk, Extended APDU)

ICCD Configuration Descriptor (Control B)

bLength	'09'
wTotalLength	N
bNumInterfaces	1
bConfigurationValue	1
iConfiguration	i
bmAttributes	'80'
bMaxPower	4

ICCD Interface Descriptor (Control B)

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	0
bAlternateSetting	'00'
bNumEndpoints	'00'
bInterfaceClass	'0B'
bInterfaceSubClass	'00'
bInterfaceProtocol	'02'
iInterface	i

USB-ICC Class Specific Descriptor

bLength	'36'
bDescriptorType	'21'
bcdCCID	'0110'
bMaxSlotIndex	'00'
dwProtocols	'0000 0002
dwMaxIFSD	'0000 00FE'
dwFeature	'0004 0840'
dwMaxCCIDMessageLength	261
dwClassGetResponse	'FF'
bClassEnvelope	'FF'
bMaxCCIDBusySlots	'01'

Configuration Descriptor (ICCD Bulk Transfer)

bLength	'09'
wTotalLength	N
bNumInterfaces	1
bConfigurationValue	2
iConfiguration	i
bmAttributes	'80'
bMaxPower	4

ICCD Interface Descriptor (Bulk Transfer)

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	0
bAlternateSetting	'00'
bNumEndpoints	'02'
bInterfaceClass	'0B'
bInterfaceSubClass	'00'
bInterfaceProtocol	'00'
iInterface	i

USB-ICC Class Specific Descriptor

bLength	'36'
bDescriptorType	'21'
bcdCCID	'0110'
bMaxSlotIndex	'00'
dwProtocols	'0000 0002
dwMaxIFSD	'0000 00FE'
dwFeature	'0004 0840'
dwMaxCCIDMessageLength	261
dwClassGetResponse	'FF'
bClassEnvelope	'FF'
bMaxCCIDBusySlots	'01'

Endpoint Descriptor: Bulk-OUT Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'01'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Endpoint Descriptor: Bulk-IN Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'81'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

4.4.6.5 Single Configuration, No ICCD interface support

4.4.6.5.1 Device Descriptor (Single Configuraton)

bLength Check	'12'
bDescriptorType	'01'
bcdUSB	'0200'
bDeviceClass	'00'
bDeviceSubClass	'00'
bDeviceProtocol	'00'
bMaxPacketSize0	64
idVendor	X5
idProduct	Y5
bcdDevice	Z5
iManufacturer	i
iProduct	i
iSerialNumber	i
bNumConfigurations	1

The Product, Vendor ID and Device Release Number (bcdDevice) X5,Y5 and Z5 with associated string descriptors i shall be unique unique for this descriptor bundle and allocated by the test equipment manufacturer.

4.4.6.5.2 Configuration Descriptor (EEM and MSC)

Configuration Descriptor (EEM and MSC)

bLength	'09'
wTotalLength	N
bNumInterfaces	2
bConfigurationValue	1
iConfiguration	i
bmAttributes	'80'
bMaxPower	4

EEM Interface Descriptor

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	0
bAlternateSetting	'00'
bNumEndpoints	2
bInterfaceClass	'02'
bInterfaceSubClass	'0C'
bInterfaceProtocol	'07'
iInterface	i

Endpoint Descriptor: Bulk-OUT Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'01'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Endpoint Descriptor: Bulk-IN Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'81'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Mass Storage Class Interface Descriptor

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	1
bAlternateSetting	'00'
bNumEndpoints	2
bInterfaceClass	'08'
bInterfaceSubClass	'06'
bInterfaceProtocol	'50'
iInterface	i

Endpoint Descriptor: Bulk-OUT Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'02'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Endpoint Descriptor: Bulk-IN Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'82'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

4.4.6.6 Multiple configurations, Alternative Single interface

4.4.6.6.1 Device Descriptor (Multiple Configuraton 4)

bLength Check	'12'
bDescriptorType	'01'
bcdUSB	'0200'
bDeviceClass	'00'
bDeviceSubClass	'00'
bDeviceProtocol	'00'
bMaxPacketSize0	64
idVendor	X6
idProduct	Y6
bcdDevice	Z6
iManufacturer	i
iProduct	i
iSerialNumber	i
bNumConfigurations	2

The Product, Vendor ID and Device Release Number (bcdDevice) X6,Y6 and Z6 with associated string descriptors i shall be unique for this descriptor bundle and allocated by the test equipment manufacturer.

4.4.6.6.2 Configuration Descriptors (ICCD Bulk and ICCD Control B)

Configuration Descriptor (ICCD Bulk Transfer)

bLength	'09'
wTotalLength	N
bNumInterfaces	1
bConfigurationValue	1
iConfiguration	i
bmAttributes	'80'
bMaxPower	4

ICCD Interface Descriptor (Bulk Transfer)

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	0
bAlternateSetting	'00'
bNumEndpoints	'02'
bInterfaceClass	'0B'
bInterfaceSubClass	'00'
bInterfaceProtocol	'00'
iInterface	i

USB-ICC Class Specific Descriptor

bLength	'36'
bDescriptorType	'21'
bcdCCID	'0110'
bMaxSlotIndex	'00'
dwProtocols	'0000 0002
dwMaxIFSD	'0000 00FE'
dwFeature	'0002 0840'
dwMaxCCIDMessageLength	261
dwClassGetResponse	'FF'
bClassEnvelope	'FF'
bMaxCCIDBusySlots	'01'

Endpoint Descriptor: Bulk-OUT Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'01'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Endpoint Descriptor: Bulk-IN Endpoint

bLength	'07'
bDescriptorType	'05'
bEndpointAddress	'81'
bmAttributes	'02'
wMaxPacketSize	'0020'
bInterval	'00'

Configuration Descriptor (ICCD Control B)

bLength	'09'
wTotalLength	N
bNumInterfaces	1
bConfigurationValue	2
iConfiguration	i
bmAttributes	'80'
bMaxPower	4

ICCD Interface Descriptor (Control B)

bLength	'09'
bDescriptorType	'04'
bInterfaceNumber	0
bAlternateSetting	'00'
bNumEndpoints	'00'
bInterfaceClass	'0B'
bInterfaceSubClass	'00'
bInterfaceProtocol	'02'
iInterface	i

USB-ICC Class Specific Descriptor

bLength	'36'
bDescriptorType	'21'
bcdCCID	'0110'
bMaxSlotIndex	'00'
dwProtocols	'0000 0002
dwMaxIFSD	'0000 00FE'
dwFeature	'0002 0840'
dwMaxCCIDMessageLength	261
dwClassGetResponse	'FF'
bClassEnvelope	'FF'
bMaxCCIDBusySlots	'01'

4.5 Test execution

4.5.1 Parameter variations

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

4.6 Pass criterion

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

5 Conformance Requirements

5.1 USB UICC system architecture

Reference: TS 102 600 [1], clause 4.

RQ number	Clause	description
RQ01_0101	4.1	USB UICC-enabled terminals shall remain compliant with TS 102 221 [2].
RQ01_0201	4.2	The TS 102 221 [2] interface shall be activated when a terminal with only TS 102 221 [2] capability is connected to a USB UICC.
RQ01_0202	4.2	The TS 102 221 [2] interface shall be activated when a USB UICC-enabled terminal is connected to a UICC with only TS 102 221 [2].
RQ01_0203	4.2	Commands and functionality specified in TS 102 221 [2] shall also be supported over the IC USB interface.
RQ01_0301	4.3	The selection of the TS 102 221 [2] interface and IC USB interface shall be exclusive as specified in clause 7.2. The occurrence of the selection is as defined in TS 102 600 [1].
RQ01_0302	4.3	Except for contacts C1 and C5, actions by an entity (terminal or UICC) on one interface shall not affect the state of the other interface.
RQ01_0303	4.3	The terminal shall always drive C2 and C3 to a defined state.
NOTE 1: RQ01_0101 and RQ01_0201 are not tested in the present document. All tests related to TS 102 221 [2] terminal compliancy are provided in TS 102 230 [12]. NOTE 2: RQ01_0203 is not currently tested as it requires specific test application on the Terminal to trigger the commands.		

5.2 Physical characteristics

Reference: TS 102 600 [1], clause 5.

RQ number	Clause	description
RQ02_0001	5	The physical characteristics of the USB UICC-Terminal interface are as defined in TS 102 221 [2] except for the specific provisions specified in the present document.
RQ02_0101	5.1.1.1	A USB UICC-enabled terminal shall provide contacts C4 and C8 with the mechanical characteristics defined in TS 102 221 [2].
RQ02_0201	5.1.3	The voltages on contacts C4 and C8 of the terminal shall be in the range 0 V ± 0,4 V referenced to Gnd (C5) when the terminal is switched off with the power source connected to the terminal, while measured with a measurement equipment having a resistance of 50 kΩ.
NOTE 1: Test cases covering RQ02_0001 can be found in TS 102 230 [12] and therefore will not appear in the present document. NOTE 2: RQ02_0101 is implicitly tested in every test case where the interface is successfully activated.		

5.3 Electrical characteristics

Reference: TS 102 600 [1], clause 6.

RQ number	Clause	description
RQ03_0101	6.1	The operating conditions defined in TS 102 221 [2] apply to USB UICCs and USB UICC-enabled terminals, except when otherwise specified in the present document.
RQ03_0102	6.1	The contacts C4 and C8 operate as specified in Inter-Chip USB [6] for IC_DP and IC_DM respectively.
RQ03_0201	6.1.1	When the USB UICC-enabled terminal is operating under class B operating conditions, the supply voltage on C1 and C5 shall be as defined in TS 102 221 [2].
RQ03_0202	6.1.1	When the USB UICC-enabled terminal is operating under class B operating conditions, the operation of contacts C4 and C8 shall follow the requirements specified in Inter-Chip USB [6] for the Voltage Class 3.0 Volt.
RQ03_0301	6.1.2	When the USB UICC-enabled terminal is operating at a nominal supply voltage of 1,8 V, the supply voltage on C1 and C5 shall follow the requirements specified in the Inter-Chip USB [6] for the Voltage Class 1,8 Volt.
RQ03_0302	6.1.2	When the USB UICC-enabled terminal is operating at a nominal supply voltage of 1,8 V, the operation of contacts C4 and C8 shall follow the requirements specified in the Inter-Chip USB [6] for the Voltage Class 1,8 Volt.
NOTE 1: RQ03_0102 is not tested, as testing Inter-Chip USB [6] is not in the scope of the present document. NOTE 2: RQ03_0202 and RQ03_0302 are only partialy tested, as testing Inter-Chip USB [6] is not in the scope of the present document.		

5.4 Initial communication establishment procedures

Reference: TS 102 600 [1], clause 7.

RQ number	Clause	description
RQ04_0101	7.1	A USB UICC-enabled terminal shall support voltage class C' and may support voltage class B.
RQ04_0102	7.1	The terminal shall initially select its lowest supported voltage class.
RQ04_0103	7.1	The terminal shall power up the UICC with the selected voltage class and start the interface selection procedure defined in TS 102 600 [1], clause 7.2.
RQ04_0104	7.1	If no attachment occurs and no ATR is received during the interface selection procedure, the UICC shall be deactivated and activated with the next higher class if supported by the terminal.
RQ04_0105	7.1	In case an ATR is received on the TS 102 221 [2] interface if the voltage class used by the terminal is not indicated as supported by the UICC, the terminal shall deactivate the UICC. If an indicated voltage class is supported by the terminal, the terminal shall continue as specified in TS 102 221 [2].
RQ04_0106	7.1	In case the voltage class used by the terminal is not indicated as supported by the UICC in the response to the Get Interface Power request, the terminal shall deactivate the UICC.
RQ04_0107	7.1	If only the procedure using ATR is performed and a corrupted ATR is received the terminal shall perform the procedure at least 3 times using the same voltage class. In case of 3 or more consecutive failures, the terminal shall continue as specified in TS 102 221 [2].
RQ04_0108	7.1	If under a voltage class different from class B, the data retrieved by a Get Interface Power request indicates "Class B activation preferred", a USB UICC-enabled terminal that wants to use the features only available in Class B shall power down the UICC and power it up with supply voltage class B.
RQ04_0201	7.2	The USB UICC-enabled terminal shall activate its pull-down resistors on C4 and C8 from the beginning of the power up phase, as specified in Inter-Chip USB [6].
RQ04_0202	7.2	The terminal shall detect whether a USB UICC is present as described in Inter-Chip USB [6]. If no USB UICC is attached, i.e. C4 is not in state H, the USB attachment failed.
RQ04_0203	7.2	If a USB attachment is detected, the terminal shall drive a USB Reset as specified in Inter-Chip USB [6].
RQ04_0204	7.2	For the Interface selection procedure using ATR. The terminal initiates the UICC activation procedure specified in TS 102 221 [2] until an ATR is received from the UICC.
RQ04_0205	7.2	For the Interface selection procedure using ATR. If a UICC not supporting IC USB is recognized according to the ATR indication mechanism of TS 102 221 [2], the terminal shall continue as defined in TS 102 221 [2].
RQ04_0206	7.2	For the Interface selection procedure using ATR. If a USB UICC is recognized according to the ATR indication mechanism of TS 102 221 [2], the USB UICC-enabled terminal shall send a PPS request indicating T=15 with PPS2 set to 'C0' in conformance with the first TBi (i > 2) of the ATR to indicate switching to the IC USB interface.

RQ number	Clause	description
RQ04_0207	7.2	For both procedures, after the USB Reset has occurred, the USB activation procedure shall continue as described in TS 102 600 [1], clause 7.3.
RQ04_0301	7.3	USB UICC ADDRESS ASSIGNMENT: The terminal assigns a unique address to the USB UICC as specified in USB 2.0 [5].
RQ04_0302	7.3	POWER NEGOTIATION: The USB UICC and the terminal exchange information about voltage classes and current consumption as defined in TS 102 600 [1] clause 8.2.
RQ04_0303	7.3	USB UICC CONFIGURATION: The terminal configures the USB UICC for the applications it is running, as described in USB 2.0 [5].
RQ04_0304	7.3	If the terminal reached the configuration stage but could not successfully configure the USB UICC for at least the ICCD interface, the terminal shall power down and power up the USB UICC at the same voltage class and select the TS 102 221 [2] interface, ignoring the USB information that may be provided by the USB UICC in its ATR.
RQ04_0401	7.4.1	Under all operating conditions, a USB UICC-enabled terminal shall be able to supply at least 10 mA until either a power negotiation occurs on the IC USB interface or the TS 102 221 [2] interface is selected.
RQ04_0501	7.4.2	If the IC USB interface is selected, after a successful power negotiation procedure, the USB UICC-enabled terminal shall be able to supply the power negotiated in the procedure.
RQ04_0601	7.5	ATR parameters not relevant for the IC-USB interface (e.g. clock stop mode, supply voltage class) shall be ignored by the USB UICC-enabled terminal when received as response to an ICC_POWER_ON or a PC_to_RDR_IccPowerOn request.
RQ04_0701	7.6	A USB UICC-enabled terminal shall support a USB UICC behaving as a removable Inter-Chip USB peripheral as specified in Inter-Chip USB [6] - the terminal shall have switchable pull-down resistors on C4 and C8.
RQ04_0801	7.7	After a remote wakeup, the terminal shall perform the wakeup actions as defined for all configured functional interfaces.
RQ04_0802	7.7	after a resume time negotiation as described in TS 102 600 [1], clause 8.3, the minimum duration of the resume signalling and the minimum number of SOF tokens during resume recovery are the values returned by the UICC during the resume time negotiation.
NOTE 1: RQ04_0601 is not testable. NOTE 2: RQ04_0801 is FFS.		

5.5 USB interface operational features

Reference: TS 102 600 [1], clause 8.

RQ number	Clause	description
RQ05_0101	8.1	USB Full Speed, as defined in USB 2.0 [5], shall be supported on the USB UICC-enabled terminal.
RQ05_0201	8.2	A USB UICC-enabled terminal shall support the Get Interface Power request as defined in TS 102 600 [1], tables 8.1 and 8.2.
RQ05_0202	8.2	A USB UICC-enabled terminal shall support the Set Interface Power request as defined in TS 102 600 [1], tables 8.1 and 8.2.
RQ05_0203	8.2	A USB UICC-enabled terminal shall perform power negotiation by sending a Get Interface Power Request followed by a Set Interface Power Request to the USB UICC.
RQ05_0204	8.2	If the terminal does not send the set interface power request before the configuration descriptor, it shall support removable media as specified in the SCSI Primary Commands specification [11].
RQ05_0205	8.2	After evaluating the data received from the USB UICC with the Get Interface Power Request, the USB UICC-enabled terminal shall inform the USB UICC about its capabilities by sending a Set Interface Power Request.
RQ05_0206	8.2	In *bVoltageClass*, the terminal shall set only the one bit of the voltage class that is provided to the UICC.
RQ05_0207	8.2	In *bMaxCurrent*, it shall indicate the maximum current it can provide to the UICC.
RQ05_0301	8.3	If the terminal enters Resume time negotiation (sending a Resume Time Request to the UICC), it shall send it before suspending the interface for the first time.
RQ05_0302	8.3	If Terminal sends Resume Time Request, then the attributes shall be accordingly to TS 102 600 [1], table 8.3.
RQ05_0401	8.4	USB UICC-enabled terminals shall provide at least 2 bulk endpoints (one in and one out) in addition to the default endpoint 0.
RQ05_0402	8.4	The application(s) related to the functional interfaces shall keep their internal state (e.g. file and security context or dynamically assigned IP address) when configurations are switched.
RQ05_0501	8.5	The standard descriptors are read by the terminal during the enumeration process as specified in USB 2.0 [5].
NOTE 1: RQ05_0204 is FFS (could be tested by presenting a UICC implementing the removable media). NOTE 2: RQ05_0402 is not testable.		

5.6 Protocol stacks for USB UICC applications

Reference: TS 102 600 [1], clause 9.

RQ number	Clause	description
RQ06_0101	9.1	All USB UICC-enabled terminals shall support short APDU-level exchanges over Version B Control transfer with no Interrupt pipe, as defined in the Smart Card ICCD specification [9].
RQ06_0102	9.1	Applications relying on APDU communication to exchange large amount of data may specify one or several additional configurations using short APDU-level exchange over a dedicated pair of bulk pipes and no interrupt pipe for USB UICC-enabled terminals and USB UICC (see note 3).
RQ06_0103	9.1	Switching between configurations having bulk and control B interfaces shall be transparent at the application layer.
RQ06_0104	9.1	A terminal shall accept a USB UICC indicating support for short and extended APDU level exchanges in its class specific descriptor.
RQ06_0105	9.1	When the USB UICC-enabled terminal uses the present interface, the content of the FCP data objects for UICC characteristics, application power consumption and minimum application clock frequency, which are specific to the TS 102 221 [2] physical interface, shall be ignored.
RQ06_0106	9.1	The suspend conditions for this functional interface is that all commands have had a complete response.
RQ06_0107	9.1	If CAT is supported (as defined in TS 102 223 [3]), then after a remote wakeup, the terminal shall send a STATUS command on this functional interface to allow the UICC to start a proactive session.
RQ06_0201	9.1.1	All USB UICC-enabled terminals supporting CAT shall support the POLL INTERVAL and POLLING OFF proactive commands specified in TS 102 223 [3].
RQ06_0202	9.1.1	The default period for proactive polling using periodical STATUS commands is set to 300 seconds for USB UICC-enabled terminals.
RQ06_0301	9.2	If the Ethernet Emulation Model subclass of the USB communication device class is supported, it shall be as defined in CDC EEM [10].
RQ06_0302	9.2	Support of the SuspendHint, ResponseHint and ResponseCompleteHint commands as described in CDC EEM [10] is mandatory for the USB UICC-enabled terminal.
RQ06_0303	9.2	After a remote wakeup, the terminal shall check if there is data to be transferred from the USB UICC on the bulk in pipe.
RQ06_0401	9.3	The USB UICC enabled terminal shall support the Mass Storage Bulk Only 1.0 specification [8] as explained in the Mass Storage Specification Overview [7] with the SCSI Transparent subclass '06', corresponding to support of the SCSI Primary Command set of INCITS 408-2005 [11].
RQ06_0402	9.3	The suspend condition for this "Mass Storage " interface is that no response to a command is outstanding.
RQ06_0501	9.4	The terminal shall check the EEM IN endpoint for data available from the UICC while the terminal is waiting for the response to an APDU currently being processed by the UICC.
NOTE 1: RQ06_0103, RQ06_0105, RQ06_0302, RQ06_0303 and RQ06_0402 are not testable without specific applications. NOTE 2: RQ06_0107, RQ06_0201, RQ06_0202 and RQ06_0501 are FFS. NOTE 3: This is an implicit requirement for ICCD using Bulk transfers if supported.		

5.7 USB Descriptors of a USB UICC

Reference: TS 102 600 [1], annex A.

RQ number	Clause	description
RQ07_0101	A.5.1	A Terminal compliant to the TS 102 600 [1] shall accept USB UICCs that indicate support of extended APDUs in dwFeatures and dwMaxCCIDMessageLength, even though TS 102 221 [2] currently only defines short APDUs.

5.8 Assigned values for vendor specific USB requests

Reference: TS 102 600 [1], annex B.

No requirement in this clause.

6 Test cases

6.1 Void

6.2 Void

6.3 Basic Electrical Tests

6.3.1 Supply Voltage Value

6.3.1.1 Test case 1: Phase preceding Terminal power on

6.3.1.1.1 Test execution

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

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

6.3.1.1.2 Initial conditions

- The Terminal shall be connected to an UICC simulator.
- The contact C1 (VCC) of the UICC-Terminal interface shall be loaded with an impedance of 10 kΩ.
- The other contacts (C2, C3, C4, C7, C8) shall be loaded with an impedance of 50 kΩ.

6.3.1.1.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	The residual voltage on contacts C4 and C8 shall not exceed ±0,4 V referenced to GND.	RQ02_0201

6.4 Activation Tests

6.4.1 Voltage-Activation

6.4.1.1 Test case 1: Selection of voltage class C' as lowest supported voltage, no support of class B

6.4.1.1.1 Test execution

The test procedure shall only be executed if class B is not supported by the terminal.

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

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

6.4.1.1.2 Initial conditions

- Terminal off.
- In order to test voltage without any interrupt, a mute UICC is to be used for this test (e.g. a physically mute UICC, or a simulated/emulated mute UICC, or no UICC at all, etc.).
- There is a resistor load of 165 Ω across C1 (Vcc) and C5 (Gnd) or the simulated/emulated mute UICC has a current sink of 10 mA across C1 (Vcc) and C5 (Gnd).

6.4.1.1.3 Test procedure

Step	Direction	Description	RQ
1	T	Terminal remains off	
2	User → T	Trigger the Terminal to be turned on	
3	T → UICC	Activate contact V_{CC} (C1) with voltage class C'	RQ01_0303
4	UICC	Stay mute	
5	T	If the Terminal initiates the UICC activation procedure specified in TS 102 221 [2]: Maintain V_{CC} between 1,65 V and 1,95 V for a period of at least 40 000 clock cycles after RST high Otherwise: Maintain V_{CC} between 1,65 V and 1,95 V for a period of at least 20 ms (UICC maximum attachment time, as indicated in Inter-Chip [6])	RQ01_0303 RQ03_0301 RQ04_0101 RQ04_0102 RQ04_0401
6	T → UICC	Deactivate all contacts	RQ01_0303 RQ04_0104 RQ04_0202

6.4.1.2 Test case 2: Selection of voltage class C' as lowest supported voltage, with support of class B

6.4.1.2.1 Test execution

The test procedure shall only be executed if class B is supported by the terminal.

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

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

6.4.1.2.2 Initial conditions

- Terminal off.
- In order to test voltage without any interrupt, a mute UICC is to be used for this test (e.g. a physically mute UICC, or a simulated/emulated mute UICC, or no UICC at all, etc.).
- There is a resistor load of 165 Ω across C1 (Vcc) and C5 (Gnd) or the simulated/emulated mute UICC has a current sink of 10 mA. between C1 (Vcc) and C5 (Gnd).

6.4.1.2.3 Test procedure

Step	Direction	Description	RQ
1	T	Terminal remains off	
2	User → T	Trigger the Terminal to be turned on	
3	T → UICC	Activate contact V_{CC} (C1) with voltage class C'	RQ01_0303
4	UICC	Stay mute	
5	T	If the Terminal initiates the UICC activation procedure specified in TS 102 221 [2]: Maintain V_{CC} between 1,65 V and 1,95 V for a period of at least 40 000 clock cycles after RST high Otherwise: Maintain V_{CC} between 1,65 V and 1,95 V for a period of at least 20 ms (UICC maximum attachment time, as indicated in Inter-Chip [6])	RQ01_0303 RQ03_0301 RQ04_0101 RQ04_0102 RQ04_0401
6	T → UICC	Deactivate all contacts	RQ01_0303 RQ04_0104 RQ04_0202
7	UICC	If resistor load is used, change the resistor's load to 270 Ω across C1 (Vcc) and C5 (Gnd). Otherwise maintain a current sink of 10 mA between C1 (Vcc) and C5 (Gnd)	
8	T → UICC	Activate contact V_{CC} (C1) with voltage class B	RQ01_0303 RQ04_0104
9	UICC	Stay mute	
10	T	If the Terminal initiates the UICC activation procedure specified in TS 102 221 [2]: Maintain V_{CC} between 2,70 V and 3,30 V for a period of at least 40 000 clock cycles after RST high. Otherwise: Maintain V_{CC} between 2,70 V and 3,30 V for a period of at least 20 ms (UICC maximum attachment time, as indicated in Inter-Chip [6])	RQ01_0303 RQ03_0201 RQ04_0101 RQ04_0401
11	T → UICC	Deactivate all contacts	RQ01_0303 RQ04_0104 RQ04_0202

6.4.1.3 Test case 3: TS 102 221-only UICC Interface Activation for voltage class C'

6.4.1.3.1 Test execution

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

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

6.4.1.3.2 Initial conditions

- The UICC simulator supports only the TS 102 221 [2] interface, and is able to run in class C.
- Terminal is connected to UICC simulator, but none of the contacts is activated.

6.4.1.3.3 Test procedure

Step	Direction	Description	RQ
1	User → T	Trigger the Terminal to activate contact V_{CC} (C1) with voltage class C'	
2	T → UICC	Activate TS 102 221 [2] interface contacts in class C' (see note)	RQ01_0202
3	UICC → T	Send ATR, as given in clause 4.4.5.2, that indicates: ▪ no support of IC_USB interface ▪ support of TS 102 221 [2] interface class C	
4	T → UICC	Continue as specified in TS 102 221 [2], until PPS procedure starts or the first command is issued	RQ01_0303 RQ04_0105 RQ04_0202 RQ04_0204 RQ04_0205
NOTE: The Terminal may attempt to perform the procedure using USB before proceding to the TS 102 221 [2] interface activation.			

6.4.1.4 Test case 4: TS 102 221 Interface Activation, no support of class B

6.4.1.4.1 Test execution

The test procedure shall only be executed if class B is not supported by the terminal.

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

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

6.4.1.4.2 Initial conditions

- The UICC simulator supports only the TS 102 221 [2] interface, and is able to run only in class B.
- Terminal is connected to UICC simulator, but none of the contacts is activated.

6.4.1.4.3 Test procedure

Step	Direction	Description	RQ
1	User → T	Trigger the Terminal to activate contact V_{CC} (C1) with voltage class C'	
2	T → UICC	Activate TS 102 221 [2] interface contacts in class C' (see note)	RQ01_0202
3	UICC → T	Send ATR, as given in clause 4.4.5.3, that indicates: ▪ no support of IC_USB interface ▪ no support of TS 102 221 [2] interface Class C ▪ support of TS 102 221 [2] interface class B	
4	T	Deactivate TS 102 221 [2] interface	RQ04_0105 RQ04_0202 RQ04_0204 RQ04_0205
NOTE: The Terminal may attempt to perform the procedure using USB before proceding to the TS 102 221 [2] interface activation.			

6.4.1.5 Test case 5: TS 102 221 Interface Activation, with support of class B

6.4.1.5.1 Test execution

The test procedure shall only be executed if class B is supported by the terminal.

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

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

6.4.1.5.2 Initial conditions

- The UICC simulator supports only the TS 102 221 [2] interface, and is able to run only in class B.
- Terminal is connected to UICC simulator, but none of the contacts is activated.

6.4.1.5.3 Test procedure

Step	Direction	Description	RQ
1	User → T	Trigger the Terminal to activate contact V_{CC} (C1) with voltage class C'	
2	T → UICC	Activate TS 102 221 [2] interface contacts in class C' (see note)	RQ01_0202
3	UICC → T	Send ATR, as given in 4.4.5.3, that indicates: ▪ no support of IC_USB interface ▪ no support of TS 102 221 [2] interface Class C ▪ support of TS 102 221 [2] interface class B	
4	T → UICC	Deactivate TS 102 221 [2] interface	
5	T → UICC	Activate Vcc and TS 102 221 [2] interface contacts in class B	RQ04_0105
6	UICC → T	Send ATR, as given in 4.4.5.3, that indicates: ▪ no support of IC_USB interface ▪ no support of TS 102 221 [2] interface Class C ▪ support of TS 102 221 [2] interface class B	
7	T → UICC	Continue as specified in TS 102 221 [2], until PPS procedure starts or the first command is issued.	RQ01_0303 RQ04_0105 RQ04_0202 RQ04_0204 RQ04_0205
NOTE: The Terminal may attempt to perform the procedure using USB before proceding to the TS 102 221 [2] interface activation.			

6.4.1.6 Test case 6: USB Interface Activation

6.4.1.6.1 Test execution

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

- USB attachment time by the UICC in step a1 (after Vcc high):
  - 11 ms ± 1 ms.
  - 19 ms ± 1 ms.

6.4.1.6.2 Initial conditions

- Terminal is connected to UICC simulator, but none of the contacts are activated.

6.4.1.6.3 Test procedure

If USB Reset signal is not provided 5 s after Vcc is activated, then the Terminal fails the test.

NOTE: 5 s is a reasonable time-delay for the USB reset to occur.

Step	Direction	Description	RQ
1	User → T	Trigger the Terminal to activate contact V_{CC} (C1) with voltage class C'.	
2	T → UICC	Activate contact V_{CC} (C1) with voltage class C'.	RQ04_0204
3	T → UICC	Pull C4 and C8 down.	RQ04_0201 RQ04_0701
		The terminal shall perform steps a1 to a2, and may perform steps b1 to b4. If sequence b is performed, then sequences a and b may occur in either order or in parallel, with no specific timing relationship required between the sequences, except that step a1 must be completed before step b4 is performed. If step b1 is performed, then all of steps b1 to b4 shall be completed.	
a1	UICC → T	Pull up contact C4 using the timing indicated in the test execution clause.	
a2	T → UICC	Send USB Reset signal.	RQ01_0301 RQ01_0302 RQ04_0103 RQ04_0203
b1	T → UICC	Activate the rest of the TS 102 221 [2] interface contacts in class C'.	RQ04_0103
b2	UICC → T	Send ATR, as given in clause 4.4.5.1, that indicates at least: ▪ support of IC_USB interface. ▪ support of TS 102 221 [2] interface Class C'.	
b3	T → UICC	Send PPS request with PPS0 indicating T=15 and PPS2 = 'C0'.	RQ03_0101 RQ04_0204 RQ04_0206
b4	UICC → T	Send PPS response, with the following indications: ▪ PPS0 set to '2F' (i.e. indicating T=15). ▪ No PPS1. ▪ PPS2 set to 'C0'. ▪ No PPS3. The PPS response shall only be sent after the attachment in step a1 has been performed.	

6.4.1.7 Test case 7: Corrupted ATR at USB UICC-enabled Terminal

6.4.1.7.1 Test execution

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

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

6.4.1.7.2. Initial conditions

- Terminal is connected to UICC simulator, but none of the contacts are activated.
- The UICC simulator supports only the TS 102 221 [2] interface.

6.4.1.7.3. Test procedure

Step	Direction	Description	RQ
1	User → T	Trigger the Terminal to activate contact V_{CC} (C1) with voltage class C'	
2	UICC	Do not pull up contact C4 or C8	
3	T → UICC	Initiates the UICC activation procedure specified in TS 102 221 [2] and executes Cold Reset	RQ01_0202
4	UICC → T	Send ATR with wrong Check byte. For example the ATR that is defined in clause 4.4.5.2. with following adaptation: TCK = '00'	
5	T → UICC	Deactivate all contacts on UICC	
6	T → UICC	Activate contact V_{CC} (C1) with voltage class C'	
7	UICC	Do not pull up contact C4 or C8	
8	T → UICC	Initiates the UICC activation procedure specified in TS 102 221 [2] and executes Cold Reset	RQ01_0202
9	UICC → T	Send ATR with wrong Check byte. For example the ATR that is defined in clause 4.4.5.2. with following adaptation: TCK = '00'	
10	T → UICC	Deactivate all contacts on UICC	
11	T → UICC	Activate contact V_{CC} (C1) with voltage class C'	
12	UICC	Do not pull up contact C4 or C8	
13	T → UICC	Initiates the UICC activation procedure specified in TS 102 221 [2] and executes Cold Reset	RQ01_0202
14	UICC → T	Send ATR with wrong Check byte. For example the ATR that is defined in clause 4.4.5.2. with following adaptation: TCK = '00'	
15	T → UICC	Deactivate all contacts on UICC	RQ04_0107

6.5 Initialization Tests

6.5.1 Configuration

6.5.1.1 Test Case 1: Set address Test at USB Full Speed

6.5.1.1.1 Test execution

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

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

6.5.1.1.2 Initial conditions

- Terminal is connected to UICC simulator supporting ICCD Version B Control Transfer.
- Device in Default state.

6.5.1.1.3 Test procedure

Step	Direction	Description	RQ
0	T ←→ UICC	Optional exchange between terminal and UICC may occur at this level prior to step 1 This could include requests for a partial Device Descriptor	
1	T → UICC	Send Set Address with Device Address not 0	RQ04_0301 RQ05_0101
2	T → UICC	Maintains activated voltage to UICC and continues commands	

6.5.2 Power Negotiation

6.5.2.1 Test case 1: Power Negotiation support

6.5.2.1.1 Test execution

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

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

6.5.2.1.2 Initial conditions

- Terminal is connected to UICC simulator, but none of the contacts are activated.

6.5.2.1.3 Test procedure

Step	Direction	Description	RQ
1	User → T	Trigger the terminal to activate the IC USB Interface	
2	T → UICC	Send Get Interface Power Request	RQ04_0302 RQ05_0201
3	UICC → T	Return Get Interface Power Request Response with: ▪ bVoltageClass = "06" (indicating Class C' and B supported) ▪ class B activation not preferred ▪ bMaxCurrent = "05" (Maximum current required 10 mA)	RQ05_0201
4	T → UICC	Send Set Interface Power Request indicating the support of the activated voltage and at least current of 10 mA	RQ04_0302 RQ05_0202 RQ05_0203 RQ05_0205 RQ05_0206 RQ05_0207
5	UICC → T	The UICC simulator continues, drawing a current of 10 mA	
6	T → UICC	Maintains activated voltage to UICC and continues commands	RQ03_0302 RQ04_0207

6.5.2.2 Test case 2: Power Negotiation, Voltage Class not supported

6.5.2.2.1 Test execution

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

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

6.5.2.2.2 Initial conditions

- The USB interface has been activated.

6.5.2.2.3 Test procedure

Step	Direction	Description	RQ
1	User → T	Trigger the terminal to send Get Interface Power Request	
2	T → UICC	Send Get Interface Power Request	
3	UICC → T	Return Get Interface Power Request Response indicating that theVoltage Class currently provided by the terminal is NOT supported	
4	T → UICC	Deactivate	RQ04_0106

6.5.2.3 Test case 3: Power Negotiation, Class B Activation preferred

6.5.2.3.1 Test execution

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

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

6.5.2.3.2 Initial conditions

- The USB interface has been activated.

6.5.2.3.3 Test procedure

Step	Direction	Description	RQ
1	User → T	Trigger the terminal to send Get Interface Power Request	
2	T → UICC	Send Get Interface Power Request	
3	UICC → T	Return Get Interface Power Request Response with Class B activation preferred	
		The terminal shall perform either steps a1 to a3, or steps b1 to b4	
a1	T → UICC	Send Set Interface Power Request	RQ04_0108
a2	UICC → T	Current consumption as indicated in bMaxCurrent	
a3	T → UICC	Maintains activated voltage to UICC and continues commands	
b1	T → UICC	Deactivate	RQ04_0108
b2	T → UICC	Activate at Class B	
b3	T → UICC	Send Get Device Descriptor request	RQ03_0202
b4	UICC → T	Return Device Descriptor	RQ03_0202

6.5.2.4 Test case 4: Power Negotiation with more than minimum current

6.5.2.4.1 Test execution

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

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

6.5.2.4.2 Initial conditions

- Terminal is connected to UICC simulator, but none of the contacts are activated.

6.5.2.4.3 Test procedure

Step	Direction	Description	RQ
1	User → T	Trigger the terminal to activate the IC USB Interface	
2	T → UICC	Send Get Interface Power Request	
3	UICC → T	Return Get Interface Power Request Response with: ▪ bVoltageClass = "06" (indicating Class C' and B supported) ▪ class B activation not preferred ▪ bMaxCurrent = "20" (Maximum current required 64 mA)	
4	T → UICC	Send Set Interface Power Request indicating the support of the activated voltage and at least current of 10 mA	
5	UICC → T	The UICC simulator continues, drawing a current level as indicated by the Terminal in step 4	
6	T → UICC	Maintains activated voltage to UICC and continues commands	RQ04_0501

6.5.3 Resume Time Negotiation

6.5.3.1 Test case 1: Resume Time Negotiation

6.5.3.1.1 Test execution

The test procedure shall only be executed if Resume Time Request is supported by the terminal.

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

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

6.5.3.1.2 Initial conditions

- APDU all commands have had a complete response.
- Terminal is connected to UICC simulator containing only ICCD Control B Configuration.
- ICCD Control B Configuration selected.
- Terminal is ready to send Resume Time Request.

6.5.3.1.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Check that no suspending of the interface happens before the resume time negotiation	RQ05_0301
2	T → UICC	Send Resume Time Request	RQ05_0302
3	UICC → T	Response to Resume Time Request with the following parameters: ▪ bMinResTime = '1E' ▪ bMinSofTokens = 5 ▪ bmRemWakeup = Remote Wakeup not Supported	
4	User → T	Trigger the terminal to suspend the UICC.	
5	T → UICC	Suspend Device by maintaining a constant idle state for at least 3 ms	RQ06_0106
6	UICC	No activity	
7	User → T	Trigger the terminal to resume the UICC	
8	T → UICC	Resume signalling with at least minimum duration and with at least minimum number of SOF	RQ04_0802

6.6 Descriptors

6.6.1 Standard-Descriptors

6.6.1.1 Device Descriptor

6.6.1.1.1 Test Case 1: Device Descriptor Test

6.6.1.1.1.1 Test execution

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

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

6.6.1.1.1.2 Initial conditions

- Terminal is connected to UICC simulator supporting ICCD Version B Control Transfer Descriptors as detailed in clause 4.4.6.1, Single Configuration, Single Interface.
- Device in Default state

6.6.1.1.1.3 Test procedure

Step	Direction	Description	RQ
0	T ←→ UICC	Optional exchange between terminal and UICC may occur at this level prior to step 1 This could include requests for a partial Device Descriptor	
1	T → UICC	Request the full Device Descriptor	RQ05_0501
2	UICC → T	Send the full Device Descriptor	
3	T → UICC	Maintains activated voltage to UICC and continues commands	

6.6.1.2 Configuration and Interface Descriptors

6.6.1.2.1 Test Case 1: ICCD Control Transfer configuration Test, single interface

6.6.1.2.1.1 Test execution

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

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

6.6.1.2.1.2 Initial conditions

- Terminal is connected to UICC simulator supporting ICCD Version B Control Transfer Descriptors as detailed in clause 4.4.6.1 Single Configuration, Single Interface.
- Device in Addressed state.
- Device Descriptor read.

6.6.1.2.1.3 Test procedure

Step	Direction	Description	RQ
0	T ←→ UICC	Optional exchange between terminal and UICC may occur at this level prior to step 1	
1	T → UICC	Send Set_Configuration (Configuration Value = as given by the Configuration Descriptor field bConfigurationValue)	RQ04_0303 RQ06_0101

6.6.1.2.2 Test Case 2: Multiple ICCD configuration, single interface test

6.6.1.2.2.1 Test execution

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

- With Configuration Descriptor ICCD control B first, then Configuration Descriptor ICCD Bulk as defined in clause 4.4.6.2, Multiple Configuration, Single Interface.
- With Configuration Descriptor ICCD Bulk first then Configuration Descriptor ICCD control B as defined in clause 4.4.6.6, Multiple Configuration, Alternative Single Interfaces.

6.6.1.2.2.2 Initial conditions

- Terminal is connected to UICC simulator supporting ICCD Version B Control Transfer and Bulk Transfer Descriptors as per the test execution indication.
- Device in Addressed state.
- Device Descriptor read.

6.6.1.2.2.3 Test procedure

Step	Direction	Description	RQ
0	T ←→ UICC	Optional exchange between terminal and UICC may occur at this level prior to step 1	
1	T → UICC	Send Set_Configuration (Configuration Value = as given by one of the Configuration Descriptor fields bConfigurationValue)	RQ06_0102

6.6.1.2.3 Test Case 3: Multiple configuration, multiple interfaces test

6.6.1.2.3.1 Test execution

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

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

6.6.1.2.3.2 Initial conditions

- Terminal is connected to UICC simulator supporting ICCD Version B Control Transfer and Bulk Transfer with EEM and Mass Storage Interface Descriptors as detailed in clause 4.4.6.3, Multiple Configuration, Multiple Interface.
- Device in Addressed state.
- Device Descriptor read.

6.6.1.2.3.3 Test procedure

Step	Direction	Description	RQ
0	T ←→ UICC	Optional exchange between terminal and UICC may occur at this level prior to step 1	
1	T → UICC	Send Set_Configuration (Configuration Value = as given by one of the Configuration Descriptor fields bConfigurationValue)	RQ06_0102 RQ06_0301 RQ06_0401

6.6.1.2.4 Test Case 4: Configuration Descriptor and no ICCD support from the USB UICC

6.6.1.2.4.1 Test execution

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

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

6.6.1.2.4.2 Initial conditions

- Terminal is connected to UICC simulator not supporting ICCD Descriptors as detailed in clause 4.4.6.5, Single Configuration, No ICCD Interface Support.
- Device in Addressed state.
- Device Descriptor read.
- ATR indicates USB support.

6.6.1.2.4.3 Test procedure

Step	Direction	Description	RQ
0	T ←→ UICC	Optional exchange between terminal and UICC may occur at this level prior to step 1.	
1	T → UICC	The terminal may request all or part of the Configuration Descriptor using Get_Descriptor with index 0	
2	UICC → T	If requested, send the Configuration Descriptor (not supporting ICCD)	
3	T → UICC	Power down the UICC and power it up again selecting TS 102 221 [2] interface at the same voltage class	RQ04_0304
NOTE: If the Terminal recognises the UICC, the terminal may request or not the Configuration Descriptor in step 1.			

6.6.2 Class Specific-Descriptors

6.6.2.1 ICCD Class Descriptor

6.6.2.1.1 Test Case 1: ICCD Class Descriptor Test

6.6.2.1.1.1 Test execution

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

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

6.6.2.1.1.2 Initial conditions

- Device in Addressed state.
- Device Descriptor read.
- Terminal is connected to UICC supporting ICCD Version B Control Transfer and Bulk Transfer. Class specific descriptor supporting short and extended level exchanges Descriptors as detailed in clause 4.4.6.4, Multiple Configuration, Single Interface, Extended APDU.

6.6.2.1.3 Test procedure

Step	Direction	Description	RQ
0	T ←→ UICC	Optional exchange between terminal and UICC may occur at this level prior to step 1	
1	T → UICC	Send Set_Configuration (Configuration Value = as given by one of the Configuration Descriptor fields bConfigurationValue)	RQ06_0104 RQ07_0101

6.7 Protocol Stack and Higher Level

6.7.1 ICCD - APDU based UICC Applications

6.7.1.1 Test Case 1: ICCD Control B Interface

6.7.1.1.1 Test execution

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

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

6.7.1.1.2 Initial conditions

- Terminal is connected to UICC simulator supporting ICCD Version B Control Transfer Descriptors as detailed in clause 4.4.6.1, Single Configuration, Single Interface.
- Device in Addressed and Configured state.

6.7.1.1.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Set the USB-IC to initial conditions by sending ICC_POWER_OFF	RQ06_0101
2	T → UICC	Send SLOT_STATUS request	RQ06_0101
3	UICC → T	Return SLOT_STATUS (USB-ICC is virtually not present)	
4	T → UICC	Exit the initial state by sending ICC_POWER_ON	RQ06_0101
5	T → UICC	Send DATA_BLOCK request	RQ06_0101
6	UICC → T	Return the ATR in the data stage	
7	T → UICC	Send XFR_BLOCK (APDU Command)	RQ06_0101
8	UICC → T	Return DATA_BLOCK (valid APDU Response)	

6.7.1.2 Test Case 2: ICCD Bulk Interface

6.7.1.2.1 Test execution

The test procedure shall only be executed if ICCD Bulk Interface is supported by the terminal.

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

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

6.7.1.2.2 Initial conditions

- Terminal is connected to UICC simulator supporting ICCD Version B Control Transfer and Bulk Transfer Descriptors as detailed in clause 4.4.6.2, Multiple Configuration, Single Interface.
- Device in Addressed and Configured state.

6.7.1.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send PC_to_RDR_IccPowerOff	RQ06_0102
2	UICC → T	Return RDR_to_PC_SlotStatus (USB-ICC is virtually not present)	
3	T → UICC	Send PC_to_RDR_IccPowerOn	RQ06_0102
4	UICC → T	Return RDR_to_PC_DataBlock containing valid ATR	
5	T → UICC	Send PC_to_RDR_XfrBlock (APDU Command)	RQ06_0102
6	UICC → T	Return RDR_to_PC_DataBlock (valid APDU Response)	RQ05_0401

6.7.2 EEM - Ethernet Emulation Model

6.7.2.1 Test case 1: EEM Echo Test

6.7.2.1.1 Test execution

The test procedure shall only be executed if EEM Interface is supported.

The test procedure shall be performed using complete configuration as defined in clause 4.4.6.3.

6.7.2.1.2 Initial conditions

- Terminal is connected to UICC simulator supporting ICCD Version B Control Transfer and Bulk Transfer with EEM and Mass Storage Interface Descriptors as detailed in clause 4.4.6.3, Multiple Configuration, Multiple Interface.
- Device is Addressed and in the Configured state.

6.7.2.1.3 Test procedure

Step	Direction	Description	RQ
1	UICC → T	Send single EEM command packet with "Echo"	
2	T → UICC	Return valid "Echo response"	RQ06_0301

Annex A(informative): List of test cases for each conformance requirement

RQ number	Test clauses
RQ01_0101	Not tested in the present document. All tests related to TS 102 221 [2] compliancy are provided in TS 102 230 [12]
RQ01_0201	Not tested in the present document. All tests related to TS 102 221 [2] compliancy are provided in TS 102 230 [12]
RQ01_0202	6.4.1.3, 6.4.1.4, 6.4.1.5, 6.4.1.7
RQ01_0203	Not currently tested as it requires specific test application on the Terminal to trigger the commands.
RQ01_0301	6.4.1.6
RQ01_0302	6.4.1.6
RQ01_0303	6.4.1.1, 6.4.1.2, 6.4.1.3, 6.4.1.5

RQ number	Test clauses
RQ02_0001	Test cases covering this RQ can be found in TS 102 230 [12] and therefore will not appear in the present document
RQ02_0101	Implicitly tested in every test case where the interface is successfully activated
RQ02_0201	6.3.1.1

RQ number	Test clauses
RQ03_0101	6.4.1.6
RQ03_0102	Not tested, as testing Inter-Chip USB [6] is not in the scope of the present document
RQ03_0201	6.4.1.2
RQ03_0202	6.5.2.3
RQ03_0301	6.4.1.1, 6.4.1.2
RQ03_0302	6.5.2.1

RQ number	Test clauses
RQ04_0101	6.4.1.1, 6.4.1.2
RQ04_0102	6.4.1.1, 6.4.1.2
RQ04_0103	6.4.1.6
RQ04_0104	6.4.1.1, 6.4.1.2
RQ04_0105	6.4.1.3, 6.4.1.4, 6.4.1.5
RQ04_0106	6.5.2.2
RQ04_0107	6.4.1.7
RQ04_0108	6.5.2.3
RQ04_0201	6.4.1.6
RQ04_0202	6.4.1.1, 6.4.1.2, 6.4.1.3, 6.4.1.4, 6.4.1.5
RQ04_0203	6.4.1.6
RQ04_0204	6.4.1.3, 6.4.1.4, 6.4.1.5, 6.4.1.6
RQ04_0205	6.4.1.3, 6.4.1.4, 6.4.1.5
RQ04_0206	6.4.1.6
RQ04_0207	6.5.2.1
RQ04_0301	6.5.1.1
RQ04_0302	6.5.2.1
RQ04_0303	6.6.1.2.1
RQ04_0304	6.6.1.2.4
RQ04_0401	6.4.1.1, 6.4.1.2
RQ04_0501	6.5.2.4
RQ04_0601	Not testable
RQ04_0701	6.4.1.6
RQ04_0801	FFS
RQ04_0802	6.5.3.1

RQ number	Test clauses
RQ05_0101	6.5.1.1
RQ05_0201	6.5.2.1
RQ05_0202	6.5.2.1
RQ05_0203	6.5.2.1
RQ05_0204	FFS
RQ05_0205	6.5.2.1
RQ05_0206	6.5.2.1
RQ05_0207	6.5.2.1
RQ05_0301	6.5.3.1
RQ05_0302	6.5.3.1
RQ05_0401	6.7.1.2
RQ05_0402	Not testable
RQ05_0501	6.6.1.1.1

RQ number	Test clauses
RQ06_0101	6.6.1.2.1, 6.7.1.1
RQ06_0102	6.6.1.2.2, 6.6.1.2.3, 6.7.1.2
RQ06_0103	Not testable
RQ06_0104	6.6.2.1
RQ06_0105	Not testable
RQ06_0106	6.5.3.1
RQ06_0107	FFS
RQ06_0201	FFS
RQ06_0202	FFS
RQ06_0301	6.6.1.2.3, 6.7.2.1
RQ06_0302	Not testable
RQ06_0303	Not testable
RQ06_0401	6.6.1.2.3
RQ06_0402	Not testable
RQ06_0501	FFS

RQ number	Test clauses
RQ07_0101	6.6.2.1

Annex B (informative): Additionnal optional requirements and test cases for Electrical characteristics

This annex contains additional material extending the above mandatory requirements and tests.

Several additional requirements are given here, derived from the Inter-Chip USB [6] and USB 2.0 [5] specifications.

These additional requirements and tests are therefore considered as optional and are provided for those interested.

B.1 Conformance Requirements from Inter-Chip USB [6] and USB 2.0 [5]

B.1.1 Full-Speed general conditions

Reference: USB 2.0 [5] (U), clause 7.1. and Inter-Chip USB [6] (IC), clause 11.2.

RQ number	clause	description
RQad_0101	U 7.1.11	The data rate for full-speed is specified at 12,000 Mb/s. The required data-rate accuracy while transmitting shall be ±0,05 % (500 ppm) for the host.
RQad_0102	U 7.1.12 U 8.4.3.1	A full-speed USB frame shall have a frame time of 1 ms indicated by a Start of Frame (SOF) packet each and every 1 ms period with defined jitter tolerances (±500 ns).
RQad_0103	U 7.1.13.2	The duration of SE0 of the EOP send by the host shall be within 160 ns and 175 ns for full-speed transmission. This interval already includes timing variations due to rise and fall time mismatches, differential delays in buffer, noise and other random effects.
RQad_0104	U 7.1.7.1 IC 11.2.1	The V_{CC} voltage shall not be affected, if a peripheral disconnects itself from the IC_USB bus by forcing a SE0 for a time span greater or equal 2,5 µs and then connects itself again to the IC_USB bus by setting IDLE for a time span greater or equal 2 ms. Until the power is removed from the system, the V_{CC} voltage shall remain unchanged.
RQad_0105	U 7.1.7.7	To prevent the system from going (back) into Suspend state after resuming or resetting the bus, the host shall start sending bus traffic within 3 ms after the start of the idle state. Therefore the host shall send at least the SOF token.

B.1.2 Electrical Interface for voltage class C' (1,8 V)

Reference: Inter-Chip USB [6] (IC), clause 5.1.4.

RQ number	clause	description
RQad_0201	IC 5.1.4	During operation the supply voltage V_{CC} regarding to Gnd shall be within 1,65 V and 1,95 V for voltage class C' (1,8 V).
RQad_0202	IC 5.1.4	The Output High Voltage (V_{OH}) for IC_DP (C4) and IC_DM (C8) shall be greater or equal V_{CC} - 0,45 V for voltage class C' (1,8 V) while the High Level Output Current (I_{OH}) draws -2 mA.
RQad_0203	IC 5.1.4	The Output Low Voltage (V_{OL}) for IC_DP (C4) and IC_DM (C8) shall be less or equal 0,45 V for voltage class C' (1,8 V) while the Low Level Output Current (I_{OL}) draws 2 mA.
RQad_0204	IC 5.1.4	The Input High Voltage (V_{IH}) for IC_DP (C4) and IC_DM (C8) shall be within 0,65 * V_{CC} and V_{CC} + 0,3 V for voltage class C' (1,8 V) while the High Level Output Voltage (V_{OH}) is greater or equal V_{CC} - 0,45 V.
RQad_0205	IC 5.1.4	The Input Low Voltage (V_{IL}) for IC_DP (C4) and IC_DM (C8) shall be within -0,3 V and 0,35 * V_{CC} for voltage class C' (1,8 V) while the Low Level Output Voltage (V_{OL}) is less or equal 0,45 V.

B.1.3 Electrical Interface for voltage class B (3,0 V)

Reference: Inter-Chip USB [6] (IC), clause 5.1.5.

RQ number	clause	description
RQad_0301	IC 5.1.5	During operation the supply voltage V_{CC} regarding to Gnd shall be within 2,7 V and 3,3 V for voltage class B (3,0 V). Note: InterChip USB class B has 3,6 V as maximum, but TS102600 reduce it to 3,3 V (TS 102 600 [1], clause 3.1).
RQad_0302	IC 5.1.5	The Output High Voltage (V_{OH}) for IC_DP (C4) and IC_DM (C8) shall be greater or equal V_{CC} - 0,45 V for voltage class B (3,0 V) while the High Level Output Current (I_{OH}) draws -2 mA.
RQad_0303	IC 5.1.5	The Output Low Voltage (V_{OL}) for IC_DP (C4) and IC_DM (C8) shall be less or equal 0,45 V for voltage class B (3,0 V) while the Low Level Output Current (I_{OL}) draws 2 mA.
RQad_0304	IC 5.1.5	The Input High Voltage (V_{IH}) for IC_DP (C4) and IC_DM (C8) shall be within 2,0 V and V_{CC} + 0,3 V for voltage class B (3,0 V) while the High Level Output Voltage (V_{OH}) is greater or equal V_{CC} - 0,45 V.
RQad_0305	IC 5.1.5	Input Low Voltage (V_{IL}) for IC_DP (C4) and IC_DM (C8) shall be within -0,3 V and 0,8 V for voltage class B (3,0 V) while the Low Level Output Voltage (V_{OL}) is less or equal 0,45 V.

B.1.4 Buffer Characteristics

Reference: Inter-Chip USB [6] (IC), clause 9.2.

RQ number	clause	description
RQad_0401	IC 9.2.2	The output rise time (t_R) and fall time (t_F) shall be within 0 ns and 10 ns on each data line (IC_DP and IC_DM). The rising time (t_R) and falling time (t_F) shall be measured between 10 % and 90 % of the actual signal swing (V_{OH} - V_{OL}) above V_{OL}.
RQad_0402	IC 9.2.3	The time-difference between IC_DP crosses V_{CC} / 2 and IC_DM crosses V_{CC} / 2 shall be within 0 ns and 5 ns during J-to-K and K-to-J transistions.

B.1.5 Connection to IC_USB

Reference: Inter-Chip USB [6] (IC), clause 6.3.

RQ number	clause	description
RQad_0501	IC 6.3 IC 1.5	When V_{CC} is below or at 0,72 V (VMIN), the state of IC_DP (C4) and IC_DM (C8) shall be undefined.
RQad_0502	IC 6.3 IC 5.1.4 IC 5.1.5	The host shall wait at least 20 ms after V_{CC} has reached $V_{CC\ Min}$ (1,65 V at voltage class C' and 2,7 V at voltage class B) after power on, before it checks for a attached peripheral.
RQad_0503	IC 6.3	Within 10 ms after the host has detected the peripheral the host shall drive reset.
RQad_0504	IC 6.3	The host shall drive Reset for at least 20 ms.
RQad_0505	IC 6.3	During Reset the root port of the host shall disconnect its pull down resistors (RPDHs), if present.
RQad_0506	IC 6.3	After the end of Reset the host shall wait at least 10 ms before it sends the first SETUP packet to the peripheral.
RQad_0507	IC 7	If the host has pull down resistors (RPDHs), they shall be within 30 kΩ and 150 kΩ.

NOTE 1: RQad_0501 is not testable as it requires that the UICC (Simulator) controls V_{CC} and not the terminal. In addition the state is undefined and undefined can not be checked.
NOTE 2: RQad_0502 must only be tested for voltage class C', because TS 102 600 [1] requires that the terminal and the UICC have to support voltage class C' (TS 102 600 [1], clause 7.1). So the attachment must take place at voltage class C'.
NOTE 3: RQad_0503 is not testable because there is no maximum periode of time defined until the terminal have to check for a UICC and it is not testable when the terminal detects the peripheral.

B.1.6 Electrical Characteristics for Currents

Reference: Inter-Chip USB [6] (IC), clause 8.1.

RQ number	clause	description
RQad_0601	IC 8.1 IC 7	When the host is operational, in receiving mode and with disconnected pull-down resistors, the input currents (I_{in}) of the host IC_USB port shall be within -2 µA and 2 µA on contact IC_DP (C4) and IC_DM (C8) while they are connected to input voltage Gnd or V_{CC}.

B.1.7 Electrical Characteristics for Capacitive loads

Reference: Inter-Chip USB [6] (IC), clause 7.

RQ number	clause	description
RQad_0701	IC 7	The Input equivalent load, i.e. the resulting capacitor for IC_DP (C4) pin and IC_DM (C8) pin during receiving, shall be less or equal 7 pF.
RQad_0702	IC 7	The Input loads mismatch, i.e. the difference between the input equivalent loads, shall be within -1 pF and 1 pF.
RQad_0703	IC 7	The Output load, i.e. the capacitive load driven by IC_DP (C4) pin and IC_DM (C8) pin during transmitting, shall be less or equal 18 pF.
RQad_0704	IC 7	The Output loads mismatch, i.e. the difference between the output loads, shall be within -2 pF and 2 pF.
NOTE: RQad_0703 and RQad_0704 are no characteristic of the Terminal. They are characteristics of the system that is connected with the Terminal: The UICC inclusive adapter and other possible components.		

B.2 Additional Electrical test cases

B.2.1 Electrical characteristics during connection to IC_USB

B.2.1.1 Test case 1: Check timings and pull down resistors

B.2.1.1.1 Test execution

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

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

B.2.1.1.2 Initial conditions

- The Terminal shall be connected to an UICC simulator, but none of the contacts is activated.
- Terminal must have resistor RPDH, so UICC is not connected permanently.

B.2.1.1.3 Test procedure

Step	Direction	Description	RQ
1	User	Trigger the Terminal to be turned on	
2	UICC	When Voltage V_{CC} crosses VOP = 1,32 V start Time measuring of t_1	
3	UICC	If terminal selects TS 102 221 [2] - Interface first or parallel response correctly to the TS 102 221 [2] commands during the whole communication	
4	UICC	Measure resistors RPDH on contact IC_DP (C4) and IC_DM (C8)	RQad_0507 RQ04_0201
5	UICC	Activate pull up resistor on contact IC_DP (C4) while $t_1 \leq \Delta tp1_{max}$ = 20 ms	
6	T → UICC	When $t_1 > \Delta tp1_{max}$ = 20 ms start Reset of UICC (Terminal has detected UICC)	RQad_0502 RQ04_0202
7	UICC	When voltage U_{C4} at contact IC_DP (C4) falls below threshold $V_{OH\ min} = V_{CC}$ - 0,45V start Time measuring of t_2. Voltage U_{C8} at contact IC_DM (C8) shall keep below threshold $V_{OH\ min}$	
8	UICC	U_{C4} shall fall below $V_{OL\ max}$ = 0,45V and shall below	
9	T → UICC	End Reset of UICC and activate Idle - Mode	
10	UICC	When voltage U_{C4} at contact IC_DP (C4) rises above threshold $V_{OL\ max}$ = 0,45V stop measuring of t_2 and start Time measuring of t_3 Check $t_2 \geq \Delta t5_{min}$ = 20 ms	RQad_0504
11	T → UICC	While $t_3 < 3$ ms start sending only SOF as "Keep Alive" signal every 1 ms	RQad_0105
12	T → UICC	When $t_3 \geq \Delta t6_{max}$ = 10 ms start communication with UICC by sending first SETUP packet (e.g. by sending GetDeviceDescriptor(), SetAdress(), etc.)	RQad_0506
13	UICC	Measure if resistors RPDH on contact IC_DP (C4) and IC_DM (C8) are removed.	RQad_0505 RQ03_0102 RQ04_0203
NOTE: Gnd is reference voltage for all voltage measurements.			

B.2.2 Electrical characteristics during communication

B.2.2.1 Test case 1: Full-Speed Timings and uninfluenced electrical characteristics for voltage class C'

B.2.2.1.1 Test execution

The measurements of this test procedure can be run either against live data of communication between a terminal and an UICC or against pre-recorded data of such communication.

For the analysis an eye-diagram or equivalent measurement-techniques can be used.

The measurements of this test procedure shall only be executed on the data sent by the terminal.

Try to keep the terminal sending commands. This can be achieved while UICC is responding NAK as Status-Packet to the terminal commands. The terminal should retry sending the command. Another possibility:The SOF's can be used.

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

- For data of contact IC_DP (C4) and contact IC_DM (C8) separately.

B.2.2.1.2 Initial conditions

- Record/monitor data of contact V_{CC} (C1), IC_DP (C4) and IC_DM (C8).
- Use voltage thresholds on V_{CC} at 1,65 V and 1,95 V.
- The USB-interface has been activated for voltage class C' (1,8 V) and next step is the first reset.

B.2.2.1.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Reset UICC after USB-Interface has been activated at voltage class C'	
2	T → UICC	Start/continue communication: Send Setup-Packet, etc.	
3	UICC → T	Response correctly to the commands of the terminal and try to keep the terminal sending commands (e.g. sending NAK as Status-Packet so that terminal repeats command, or let terminal send SOFs, etc.)	
(4)	(UICC)	Record communication in particular from terminal as long as enough data is recorded to determine results as precisely as needed: Repeat step 2 up to step 4	
5	User	Determine results against live data or against pre-record data: - Signaling data rate - Frame time - SE0 width of EOP - Supply voltage V_{CC} - Output High Voltage (V_{OH}) if signal is high (see notes 1 and 2) - Output Low Voltage (V_{OL}) if signal is low (see notes 1 and 2) - Output rise time and fall time (see note 2) - Time-difference during J-to-K and K-to-J transistions (see note 2)	RQad_0101 RQad_0102 RQad_0103 RQad_0201 RQad_0202 RQad_0203 RQad_0401 RQad_0402 RQ03_0102 RQ03_0301 RQ03_0302
NOTE 1: Gnd is reference voltage for all voltage measurements. NOTE 2: After signal has reached steady state oscillation after signal change from high to low or low to high. Testconditions for High and Low Level Output Current (I_{OH} and I_{OL}) are ignored and tested in another test case. NOTE 3: Respect actual V_{CC}.			

B.2.2.2 Test case 2: Full-Speed Timings and uninfluenced electrical characteristics for voltage class B

B.2.2.2.1 Test execution

The test procedure shall only be executed if class B is supported by the terminal.

The measurements of this test procedure can be run either against live data of communication between a terminal and an UICC or against pre-recorded data of such communication.

For the analysis an eye-diagram or equivalent measurement-techniques can be used.

The measurements of this test procedure shall only be executed on the data sent by the terminal.

Try to keep the terminal sending commands. This can be achieved while UICC is responding NAK as Status-Packet to the terminal commands. The terminal should retry sending the command. Another possibility:The SOF's can be used.

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

- For data of contact IC_DP (C4) and contact IC_DM (C8) separately.

B.2.2.2.2 Initial conditions

- Record/monitor data of contact V_{CC} (C1), IC_DP (C4) and IC_DM (C8).
- Use voltage thresholds on V_{CC} at 2,7 V and 3,3 V.
- The USB-interface has been activated for voltage class B (3,0 V) and next step is the first reset.

B.2.2.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Reset UICC after USB-Interface has been activated at voltage class B	
2	T → UICC	Start/continue communication: Send Setup-Packet, etc.	
3	UICC → T	Response correctly to the commands of the terminal and try to keep the terminal sending commands (e.g. sending NAK as Status-Packet so that terminal repeats command, or let terminal send SOFs, etc.)	
(4)	(UICC)	Record communication in particular from terminal as long as enough data is recorded to determine results as precisely as needed: Repeat step 2 up to step 4	
5	User	Determine results against live data or against pre-record data: - Signaling data rate - Frame time - SE0 width of EOP - Supply voltage V_{CC} - Output High Voltage (V_{OH}) if signal is high (see notes 1 and 2) - Output Low Voltage (V_{OL}) if signal is low (see notes 1 and 2) - Output rise time and fall time (see note 2) - Time-difference during J-to-K and K-to-J transistions (see note 2)	RQad_0101 RQad_0102 RQad_0103 RQad_0301 RQad_0302 RQad_0303 RQad_0401 RQad_0402 RQ03_0102 RQ03_0201 RQ03_0202
NOTE 1: Gnd is reference voltage for all voltage measurements. NOTE 2: After signal has reached steady state oscillation after signal change from high to low or low to high. Testconditions for High and Low Level Output Current (I_{OH} and I_{OL}) are ignored and tested in another test case. NOTE 3: Respect actual V_{CC}.			

B.2.2.3 Test case 3: Electrical characteristics for voltage class C' at limits

B.2.2.3.1 Test execution

The measurements of this test procedure can be run either against live data of communication between a terminal and an UICC or against pre-recorded data of such communication.

For the analysis an eye-diagram or equivalent measurement-techniques can be used.

The measurements of this test procedure shall only be executed on the data sent by the terminal.

Try to keep the terminal sending commands. This can be achieved while UICC is responding NAK as Status-Packet to the terminal commands. The terminal should retry sending the command. Another possibility:The SOF's can be used.

First the Output Voltage Levels V_{OH} and V_{OL} are tested. After that the Input Voltage Levels V_{IH} and V_{IL}.

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

- For data of contact IC_DP (C4) and contact IC_DM (C8) separately.

B.2.2.3.2 Initial conditions

- Record/monitor data of contact V_{CC} (C1), IC_DP (C4) and IC_DM (C8).
- Use voltage thresholds on V_{CC} at 1,65 V and 1,95 V.
- Prepare UICC Simulator / Emulator so that during the terminal sends data and:
  - IC_DP (C4) or IC_DM (C8) is high that it drives 2 mA out of the terminal contact at high level.
  - IC_DP (C4) or IC_DM (C8) is low that it drives 2 mA into the terminal contact.at low level.
- The USB-interface has been activated for voltage class C' (1,8 V) and next step is the first reset.

B.2.2.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Reset UICC after USB-Interface has been activated at voltage class C'	
2	UICC	Prepare for testing Output Voltage Levels (V_{OH} and V_{OL}), see initial conditions.	
3	T → UICC	Start/continue communication: Send Setup-Packet, etc.	
4	UICC → T	Response correctly to the commands of the terminal and try to keep the terminal sending commands (e.g. sending NAK as Status-Packet so that terminal repeats command, or let terminal send SOFs, etc.)	
(5)	(UICC)	Record communication in particular from terminal as long as enough data is recorded to determine results as precisely as needed: Repeat step 2 up to step 4	
6	UICC	Set the Output voltage of the UICC on contact IC_DP (C4) and IC_DM (C8) to following values: $V_{OH} = V_{IH\ min} = 0{,}65 * V_{CC}$ and $V_{OL} = V_{IL\ max} = 0{,}35 * V_{CC}$	
7	UICC → T T → UICC	Continue communication with the terminal as mentioned in steps 3 and 4	RQad_0204 RQad_0205
8	UICC	Set the Output voltage of the UICC on contact IC_DP (C4) and IC_DM (C8) to following values: $V_{OH} = V_{IH\ max} = V_{CC} + 0{,}3$ V and $V_{OL} = V_{IL\ min} = -0{,}3$ V	
9	UICC → T T → UICC	Continue communication with the terminal as mentioned in steps 3 and 4	RQad_0204 RQad_0205
10	User	Determine results against live data or against pre-record data: - Supply voltage V_{CC} - Output High Voltage (V_{OH}) if signal is high (see notes 1 and 2) - Output Low Voltage (V_{OL}) if signal is low (see notes 1 and 2)	RQad_0201 RQad_0202 RQad_0203 RQ03_0102 RQ03_0301 RQ03_0302
NOTE 1: Gnd is reference voltage for all voltage measurements. NOTE 2: After signal has reached steady state oscillation after signal change from high to low or low to high. NOTE 3: Respect actual V_{CC}.			

B.2.2.4 Test case 4: Electrical characteristics for voltage class B at limits

B.2.2.4.1 Test execution

The test procedure shall only be executed if class B is supported by the terminal.

The measurements of this test procedure can be run either against live data of communication between a terminal and an UICC or against pre-recorded data of such communication.

For the analysis an eye-diagram or equivalent measurement-techniques can be used.

The measurements of this test procedure shall only be executed on the data sent by the terminal.

Try to keep the terminal sending commands. This can be achieved while UICC is responding NAK as Status-Packet to the terminal commands. The terminal should retry sending the command. Another possibility:The SOF's can be used.

First the Output Voltage Levels V_{OH} and V_{OL} are tested. After that the Input Voltage Levels V_{IH} and V_{IL}.

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

- For data of contact IC_DP (C4) and contact IC_DM (C8) separately.

B.2.2.4.2 Initial conditions

- Record/monitor data of contact V_{CC} (C1), IC_DP (C4) and IC_DM (C8).
- Use voltage thresholds on V_{CC} at 2,7 V and 3,3 V.
- Prepare UICC Simulator / Emulator so that during the terminal sends data and:
  - IC_DP (C4) or IC_DM (C8) is high that it drives 2 mA out of the terminal contact at high level.

- IC_DP (C4) or IC_DM (C8) is low that it drives 2 mA into the terminal contact.at low level.

- The USB-interface has been activated for voltage class B (3,0 V) and next step is the first reset.

B.2.2.4.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Reset UICC after USB-Interface has been activated at voltage class B	
2	UICC	Prepare for testing Output Voltage Levels (V_{OH} and V_{OL}), see initial conditions.	
3	T → UICC	Start/continue communication: Send Setup-Packet, etc.	
4	UICC → T	Response correctly to the commands of the terminal and try to keep the terminal sending commands (e.g. sending NAK as Status-Packet so that terminal repeats command, or let terminal send SOFs, etc.)	
(5)	(UICC)	Record communication in particular from terminal as long as enough data is recorded to determine results as precisely as needed: Repeat step 2 up to step 4	
6	UICC	Set the Output voltage of the UICC on contact IC_DP (C4) and IC_DM (C8) to following values: $V_{OH} = V_{IH\ min} = 2,0$ V and $V_{OL} = V_{IL\ max} = 0,8$ V	
7	UICC → T T → UICC	Continue communication with the terminal as mentioned in Step 3 and 4	RQad_0304 RQad_0305
8	UICC	Set the Output voltage of the UICC on contact IC_DP (C4) and IC_DM (C8) to following values: $V_{OH} = V_{IH\ max} = V_{CC} + 0,3$V and $V_{OL} = V_{IL\ min} = -0,3$V	
9	UICC → T T → UICC	Continue communication with the terminal as mentioned in Step 3 and 4	RQad_0304 RQad_0305
10	User	Determine results against live data or against pre-record data - Supply voltage V_{CC} - Output High Voltage (V_{OH}) if signal is high (see notes 1 and 2) - Output Low Voltage (V_{OL}) if signal is low (see notes 1 and 2)	RQad_0301 RQad_0302 RQad_0303 RQ03_0102 RQ03_0201 RQ03_0202
NOTE 1: Gnd is reference voltage for all voltage measurements. NOTE 2: After signal has reached steady state oscillation after signal change from high to low or low to high. NOTE 3: Respect actual V_{CC}.			

B.2.2.5 Test case 5: Check Input current I_{in}

B.2.2.5.1 Test execution

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

- For contact IC_DP (C4) and contact IC_DM (C8) separately.

- For voltage class C' and if terminal supports voltage class B for voltage class B, too.

B.2.2.5.2 Initial conditions

- The USB-interface has been activated for voltage class C' (1,8 V) or voltage class B (3,0 V).

B.2.2.5.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Reset UICC	
2	T → UICC	Start sending SOF as "Keep Alive" signal every 1 ms directly after SE0 state of Reset	
3	UICC	After the first SOF is sent measure the input current I_{in} on contact IC_DP (C4) and on contact IC_DM (C8).	
4	UICC	Check that the input current I_{in}: - flows into the terminal on contact IC_DP (C4) is less than 2 µA - flows out of the terminal on contact IC_DM (C8) is less than 2 µA	RQad_0601
5	T → UICC	Start communication, e.g. Send GetDeviceDescriptor(), etc.	
6	UICC → T	Start responding to the command	
7	UICC	During the respond stop responding and start forcing a K-State (IC_DP (C4) is low and IC_DM (C8) is high) and measure the input current I_{in} on contact IC_DP (C4) and on contact IC_DM (C8)	
8	UICC	Check that the input current I_{in}: - flows out of the terminal on contact IC_DP (C4) is less than 2 µA - flows into the terminal on contact IC_DM (C8) is less than 2 µA	RQad_0601
NOTE 1: After the first SOF the terminal shall be quasi in receiving mode until the next SOF is sent. NOTE 2: After the first SOF the terminal shall be in Idle-Mode: Contact IC_DP (C4) is high and contact IC_DM (C8) is low. NOTE 3: While terminal is waiting for the respond of UICC it is in receiving mode. NOTE 4: Step 8 checks the other flow direction of input current I_{in} on contacts.			

B.2.2.6 Test case 6: Check V_{CC} during dis- and re-connection of UICC

B.2.2.6.1 Test execution

The measurements of this test procedure can be run either against live data of communication between a terminal and an UICC or against pre-recorded data of such communication.

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

- For voltage class C' and if terminal supports voltage class B for voltage class B, too.

B.2.2.6.2 Initial conditions

- Record/monitor data of contact V_{CC} (C1).
- The USB-interface has been activated for voltage class C' (1,8 V) or voltage class B (3,0 V) and communication is running.
- Use voltage thresholds on V_{CC} at 1,65 V and 1,95 V for voltage class C' or use voltage thresholds on V_{CC} at 2,7 V and 3,3 V for voltage class B.

B.2.2.6.3 Test procedure

Step	Direction	Description	RQ
(1)	(UICC)	Record voltage on V_{CC}	
2	T → UICC	Continue communication	
3	UICC → T	Response correctly to the commands.	
4	UICC → T	Start forcing state SE0 for 1 ms => disconnect from the IC_USB	
5	UICC → T	Set Idle state for 2 ms => Reconnect to the IC_USB	
6	T → UICC UICC → T	Continue communication with the terminal	
7	User	Check that V_{CC} voltage has not been effected	RQad_0104

B.2.2.7 Test case 7: Check Capacitive loads during transmitting and receiving

B.2.2.7.1 Test execution

It is very likely that the test- and measurement-equipment must be calibrated every time before a new terminal is tested, because the capacitive loads are so low that this equipment and the environmental conditions will influence the results.

So it is very unlikely that this test procedure can be automatized, because the DUT connection has to be broken during calibration.

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

- For voltage class C' and if terminal supports voltage class B for voltage class B, too.

B.2.2.7.2 Initial conditions

- The test- and measurement-equipment has to be calibrated for the test.
- The USB-interface has been activated for voltage class C' (1,8 V) or voltage class B (3,0 V).

B.2.2.7.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Reset UICC after USB-Interface has been activated	
2	T → UICC	Send GetDeviceDescriptor()	
3	UICC → T	Send the DeviceDescriptor	
4	UICC	While the Terminal is receiving measure its input load on contact IC_DP (C4) and IC_DM (C8)	RQad_0701
5	UICC	Determine the input load mismatch	RQad_0702

Annex C (informative): Bibliography

- "Universal Serial Bus Common Class Specification", Revision 1.0.

NOTE: Available at http://www.usb.org/developers/devclass_docs.

- ANSI/INCITS 405-2005: "Information Technology - SCSI Block Commands - 2 (SBC-2)".

NOTE: Available at http://www.t10.org.

- ISO/IEC 7810: "Identification cards -- Physical characteristics".
- ISO/IEC 7816-2: "Identification cards -- Integrated circuit cards -- Part 2: Cards with contacts -- Dimensions and location of the contacts".

Annex D (informative): Change history

The table below indicates changes that have been incorporated into the present document since it was created by TC SCP.

Change history								
Date	**Meeting**	**TC SCP Doc.**	**CR**	**Rv**	**Cat**	**Subject/Comment**	**Old**	**New**
2010-08	SCP-46	SCP(10)0205	-	-	-	Approval of the specification by TC SCP		7.0.0

History

Document history		
V7.0.0	January 2011	Publication