

# ETSI TS 131 101 V15.2.0 (2019-10)



**Universal Mobile Telecommunications System (UMTS);  
LTE;  
UICC-terminal interface;  
Physical and logical characteristics  
(3GPP TS 31.101 version 15.2.0 Release 15)**



## Reference

---

RTS/TSGC-0631101vf20

## Keywords

---

LTE,UMTS

**ETSI**

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

---

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

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

---

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at [www.etsi.org/deliver](http://www.etsi.org/deliver).

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

---

**Copyright Notification**

---

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2019.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

**3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

**GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

---

# Intellectual Property Rights

## Essential patents

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

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

## Trademarks

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

---

# Legal Notice

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

---

# Modal verbs terminology

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

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

# Contents

Intellectual Property Rights .....	2
Legal Notice .....	2
Modal verbs terminology.....	2
Foreword.....	6
Introduction .....	6
1 Scope .....	7
2 References .....	7
3 Definitions, symbols, abbreviations and coding.....	8
4 General 3GPP platform requirements .....	8
4.1 GSM/USIM application interaction and restrictions .....	8
4.2 3GPP platform overview .....	8
4.3 TS 102 221 UICC/terminal interface.....	9
4.4 TS 102 600 Inter-Chip USB UICC/terminal interface .....	9
4A Physical Characteristics.....	9
5 Physical and logical characteristics .....	9
5.1 Transmission speed .....	9
5.2 Voltage classes .....	9
5.3 File Control Parameters (FCP) .....	10
5.3.1 Minimum application clock frequency.....	10
5.4 Interface protocol .....	10
5A Electrical specifications of the UICC – Terminal interface .....	10
5A.1 Class A operating conditions .....	10
5A.2 Class B operating conditions .....	10
5A.3 Class C operating conditions .....	10
6 Application protocol.....	10
6A Initial communication establishment procedures .....	10
6A.1 UICC activation and deactivation.....	10
6A.2 Supply voltage switching .....	10
6A.3 Answer To Reset content .....	11
6A.3.1 Coding of historical bytes .....	11
6A.3.2 Speed enhancement.....	11
6A.3.3 Global Interface bytes .....	11
6A.4 PPS procedure .....	11
6A.5 Reset procedures .....	11
6A.6 Clock stop mode.....	11
6A.7 Bit/character duration and sampling time.....	11
6A.8 Error handling .....	11
6A.9 Compatibility.....	11
7 User verification and file access conditions .....	12
7A Transmission protocols.....	12
7A.1 Physical layer .....	12
7A.2 Data link layer .....	12
7A.3 Transport layer .....	12
7A.4 Application layer .....	12
8 Application and file structure .....	13
8.0 General .....	13
8.1 Contents of the EFs at the MF level .....	13
8.2 File types .....	13

8.3	File referencing .....	13
8.4	Methods for selecting a file .....	13
8.5	Application characteristics .....	13
8.6	Reservation of file IDs .....	14
8.7	Logical channels.....	14
8.8	Shareable versus not-shareable files.....	14
8.9	Secure channels .....	14
9	Security features .....	14
9.1	Supported security features .....	14
9.2	Security architecture.....	14
9.3	Security environment .....	14
9.4	PIN definitions .....	14
9.5	PIN and key reference relation ship .....	14
9.6	User verification and file access conditions .....	14
10	Structure of commands and responses .....	15
10.1	Command APDU structure.....	15
10.1.1	Coding of Class Byte .....	15
10.1.2	Coding of Instruction Byte .....	15
10.1.3	Coding of parameter bytes .....	16
10.1.4	Coding of Lc byte .....	16
10.1.5	Coding of data part .....	16
10.1.6	Coding of Le byte .....	16
10.2	Response APDU structure.....	16
10.2.1	Status conditions returned by the UICC .....	16
10.2.1.1	Normal processing .....	16
10.2.1.2	Postponed processing.....	16
10.2.1.3	Warnings .....	16
10.2.1.4	Execution errors .....	16
10.2.1.5	Checking errors .....	16
10.2.1.5.1	Functions in CLA not supported .....	16
10.2.1.5.2	Command not allowed .....	16
10.2.1.5.3	Wrong parameters .....	16
10.2.1.6	Application errors .....	17
10.2.2	Status words of the commands .....	17
10.3	Logical channels.....	18
11	Commands.....	18
11.1	Generic commands .....	18
11.1.1	SELECT.....	18
11.1.1.1	Functional description.....	18
11.1.1.2	Command parameters and data .....	18
11.1.1.3	Response Data.....	18
11.1.1.4	File control parameters.....	18
11.1.1.4.1	File size.....	18
11.1.1.4.2	Total file size .....	18
11.1.1.4.3	File Descriptor.....	18
11.1.1.4.4	File identifier .....	18
11.1.1.4.5	DF name .....	18
11.1.1.4.6	Proprietary information .....	18
11.1.1.4.7	Security attributes.....	19
11.1.1.4.8	Short file identifier .....	19
11.1.1.4.9	Life cycle status integer.....	19
11.1.1.4.10	PIN status template DO .....	19
11.1.2	STATUS .....	19
11.1.3	READ BINARY .....	19
11.1.4	UPDATE BINARY .....	19
11.1.5	READ RECORD .....	19
11.1.6	UPDATE RECORD .....	19
11.1.7	SEARCH RECORD .....	19
11.1.8	INCREASE.....	19
11.1.9	VERIFY PIN .....	19

11.1.10	CHANGE PIN .....	20
11.1.11	DISABLE PIN .....	20
11.1.12	ENABLE PIN .....	20
11.1.13	UNBLOCK PIN.....	20
11.1.14	DEACTIVATE FILE.....	20
11.1.15	ACTIVATE FILE.....	20
11.1.16	AUTHENTICATE.....	20
11.1.17	MANAGE CHANNEL.....	20
11.1.18	GET CHALLENGE.....	20
11.1.19	TERMINAL CAPABILITY .....	20
11.1.20	MANAGE SECURE CHANNEL.....	20
11.1.21	TRANSACT DATA .....	20
11.1.22	SUSPEND UICC .....	20
11.2	CAT commands.....	20
11.3	Data Oriented commands .....	21
12	Transmission oriented commands .....	21
13	Application independent files.....	21
14	Application independent protocol .....	21
14.1	Application independent protocol .....	21
14.2	CAT commands.....	21
15	Support of APDU-based UICC applications over USB.....	21
Annex A (normative):	.....	22
UCS2 coding of Alpha fields for files residing on the UICC.....		22
<b>Annex B (informative):</b>	<b>Main states of a UICC.....</b>	<b>23</b>
<b>Annex C (informative):</b>	<b>APDU protocol transmission examples.....</b>	<b>24</b>
<b>Annex D (informative):</b>	<b>ATR examples .....</b>	<b>25</b>
<b>Annex E (informative):</b>	<b>Security attributes mechanisms and examples.....</b>	<b>26</b>
<b>Annex F (informative):</b>	<b>Example of contents of EF<sub>ARR</sub> '2F06' .....</b>	<b>27</b>
<b>Annex G (informative):</b>	<b>Access Rules Referencing (ARR).....</b>	<b>27</b>
<b>Annex H (normative):</b>	<b>List of SFI Values.....</b>	<b>28</b>
<b>Annex I (informative):</b>	<b>Resets and modes of operation .....</b>	<b>29</b>
<b>Annex J (informative):</b>	<b>Example of the use of PINs .....</b>	<b>30</b>
<b>Annex K (informative):</b>	<b>Examples of the PIN state transition on multi verification capable UICC .....</b>	<b>31</b>
<b>Annex L (informative):</b>	<b>Examples of SET DATA and RETRIEVE DATA usage.....</b>	<b>32</b>
<b>Annex M (informative):</b>	<b>Examples of ODD AUTHENTICATE instruction code usage .....</b>	<b>33</b>
<b>Annex N (informative):</b>	<b>PCB layout for the MFF.....</b>	<b>34</b>
<b>Annex O (informative):</b>	<b>Change history .....</b>	<b>35</b>
History .....		36

---

## Foreword

This Technical Specification (TS) has been produced by the 3<sup>rd</sup> Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

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

---

## Introduction

The present document defines a generic Terminal/Integrated Circuit Card (ICC) interface for 3GPP applications. The present document is based on ETSI TS 102 221 [1], which defines a generic platform for any IC card application. The functionality provided by this platform may be operated either over the electrical interface specified in ETSI TS 102 221 [1], or by transporting APDUs over the Inter-Chip USB Terminal/ICC interface specified in ETSI TS 102 600 [7].

Requirements that are common to all 3GPP smart card based applications are also listed in this specification.

The aim of the present document is to ensure interoperability between an ICC and a terminal independently of the respective manufacturer, card issuer or operator. The present document does not define any aspects related to the administrative management phase of the ICC. Any internal technical realisation of either the ICC or the terminal is only specified where these are reflected over the interface.

Application specific details for applications residing on an ICC are specified in the respective application specific documents.

---

# 1 Scope

The present document specifies the interface between the UICC and the Terminal for 3G telecom network operation.

The present document specifies:

- the requirements for the physical characteristics of the UICC;
- the electrical interface between the UICC and the Terminal;
- the initial communication establishment and the transport protocols;
- the model which serves as a basis for the logical structure of the UICC;
- the communication commands and the procedures;
- the application independent files and protocols.

The administrative procedures and initial card management are not part of the present document.

For the avoidance of doubt, references to clauses of ETSI TS 102 221 [1] include all the clauses of that clause, unless specifically mentioned.

The target specification ETSI TS 102 221 [1] contains material that is outside of the scope of 3GPP requirements and the present document indicates which parts are in the scope and which are not.

A 3GPP ME may support functionality that is not required by 3GPP, but the requirements to do so are outside of the scope of 3GPP.

---

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] ETSI TS 102 221 V15.2.0: "Smart Cards; UICC-Terminal interface; Physical and logical characteristics ".
- [2] 3GPP TS 31.102: "Characteristics of the USIM Application".
- [3] ETSI TS 101 220: "Smart cards; ETSI numbering system for telecommunication application providers".
- [4] Void.
- [5] ITU-T Recommendation T.50: "International Reference Alphabet (IRA) (Formerly International Alphabet No. 5 or IA5) - Information technology - 7-bit coded character set for information interchange".
- [6] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".
- [7] ETSI TS 102 600 V7.6.0: "Smart cards; UICC-Terminal interface; Characteristics of the USB interface".
- [8] 3GPP TS 31.111: "USIM Application Toolkit (USAT)".



- [9] ETSI TS 102 671 V9.2.0: "Smart Cards; Machine to Machine UICC; Physical and logical characteristics".

## 3 Definitions, symbols, abbreviations and coding

All definitions, symbols, abbreviations applicable to the terminal are specified in ETSI TS 102 221 [1] and ETSI TS 102 600 [7].

The coding of Data Objects in the present document is according to ETSI TS 102 221 [1].

- 'XX': Single quotes indicate hexadecimal values. Valid elements for hexadecimal values are the numbers '0' to '9' and 'A' to 'F'.

Within the context of the present document, the term "terminal" used in ETSI TS 102 221 [1] refers to the Mobile Equipment (ME).

Within the context of the present document, the term "NAA" used in ETSI TS 102 221 [1] refers to the (U)SIM or the ISIM.

## 4 General 3GPP platform requirements

### 4.1 GSM/USIM application interaction and restrictions

Activation of a USIM session excludes the activation of a GSM session. In particular, this implies that once a USIM application session has been activated, commands sent to the UICC with CLAss byte set to 'A0' shall return SW1SW2 '6E 00' (class not supported) to the terminal.

Similarly, activation of a GSM session excludes the activation of a USIM session.

At most one USIM session can be active at the same time.

### 4.2 3GPP platform overview

The UICC/terminal interface shall support the interface specified in ETSI TS 102 221 [1]. In addition, the UICC/terminal interface may support the Inter-Chip USB interface defined in ETSI TS 102 600 [7].

3GPP ICC based applications (e.g. USIM, USIM Application Toolkit, ISIM, SIM) are supported over both interfaces (see figure 1).

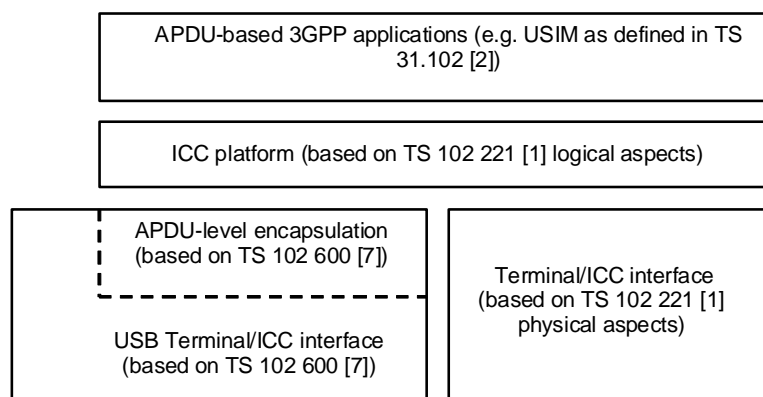


Figure 1: Terminal/UICC interface

## 4.3 TS 102 221 UICC/terminal interface

The UICC/terminal interface shall comply with all requirements stated in ETSI TS 102 221 [1]. Where options are indicated in ETSI TS 102 221 [1], the present document specifies which options are to be used for a ETSI TS 102 221 [1] UICC/terminal interface where the UICC supports a 3GPP application.

## 4.4 TS 102 600 Inter-Chip USB UICC/terminal interface

If the Inter-Chip USB UICC/terminal interface is supported, it shall comply with ETSI TS 102 600 [7]. Where options are indicated in ETSI TS 102 600 [7], the present document specifies which options are to be used for an Inter-Chip USB UICC/terminal interface where the UICC supports a 3GPP application.

The protocol stack for APDU-level exchanges that are described in ETSI TS 102 600 [7] allow the transmission of APDUs. USB UICCs and USB UICC-enabled terminals shall comply with the functionality of the ETSI TS 102 221 [1] interface. Where options are indicated in ETSI TS 102 221 [1], the present document specifies which options are to be used for APDU-based applications where the UICC supports a 3GPP application.

The mapping of APDU into TPDU (see ETSI TS 102 221 [1] clause 7.3.1.1) and transmission oriented commands (see ETSI TS 102 221 [1] clause 12) do not apply in the USB context as the APDU commands and responses are transmitted over USB as encoded at the application layer (i.e. C-APDU and R-APDU are directly encapsulated).

In the context of UICC applications running over USB, the card activation and deactivation process, the cold and warm reset procedures and the request for additional processing time as described in ETSI TS 102 221 [1] shall be performed by USB commands as described in ETSI TS 102 600 [7]. Any reference to the above procedures shall be interpreted in a USB context according to ETSI TS 102 600 [7]. When an ATR is received then the corresponding provisions and error handling procedures of ETSI TS 102 221 [1] apply.

---

# 4A Physical Characteristics

The provisions of ETSI TS 102 221 [1] clause 4 apply.

In addition to the form factors described in clause 4.0 of ETSI TS 102 221 [1], the form factors defined in ETSI TS 102 671 [9] clause 6.2 are applicable.

The usage of contact C6 for contactless as defined in ETSI TS 102 221 [1] is not required by 3GPP. This impacts the following clauses:

ETSI TS 102 221 [1] clause 4.5.1.1

ETSI TS 102 221 [1] clause 4.5.1.2

ETSI TS 102 221 [1] clause 4.5.2.1

ETSI TS 102 221 [1] clause 4.5.2.2

ETSI TS 102 221 [1] clause 4.5.3

---

# 5 Physical and logical characteristics

## 5.1 Transmission speed

See clause 6A.3.2.

## 5.2 Voltage classes

See clause 6A.2.

## 5.3 File Control Parameters (FCP)

See clause 11.1.1.4.

### 5.3.1 Minimum application clock frequency

See clause 11.1.1.4.6.

## 5.4 Interface protocol

See clause 6A.3.

---

# 5A Electrical specifications of the UICC – Terminal interface

The provisions of ETSI TS 102 221 [1] clause 5 apply.

## 5A.1 Class A operating conditions

Class A operating conditions as specified in ETSI TS 102 221 [1] clause 5.1 is not required by 3GPP.

3G MEs shall not support class A operating conditions as specified in ETSI TS 102 221 [1] clause 5.1 on the ME – UICC interface.

## 5A.2 Class B operating conditions

The provisions of ETSI TS 102 221 [1] clause 5.2 apply.

## 5A.3 Class C operating conditions

The provisions of ETSI TS 102 221 [1] clause 5.3 apply.

---

# 6 Application protocol

See clause 7A.4.

---

## 6A Initial communication establishment procedures

### 6A.1 UICC activation and deactivation

The provisions of ETSI TS 102 221 [1] clause 6.1 apply.

### 6A.2 Supply voltage switching

The provisions of ETSI TS 102 221 [1] clause 6.2 apply.

In addition, a UICC holding a 3GPP application shall support at least two consecutive voltage classes as defined in ETSI TS 102 221 [1] clause 6.2.1, e.g. AB or BC. If the UICC supports more than two classes, they shall all be consecutive, e.g. ABC