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INTERNATIONAL STANDARD

Interoperability specifications of common external power supplies (EPS) for use with data-enabled mobile telephones

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FOREWORD

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International Standard IEC 62684 has been prepared by technical area 14: Interfaces and methods of measurement for personal computing equipment, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This second edition cancels and replaces the first edition published in 2011. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Clause 1 is modified to include updated references to IEC Universal Serial Bus interface standards;
b) Clause 2 is expanded to include references to IEC Universal Serial Bus interface standards;
c) Subclause 4.1 is expanded to include requirements for non USB Micro-B plug DC plug connectors;

d) Subclause 4.4 is modified to remove obsolete requirements for common mode noise and reference requirements of IEC Universal Serial Bus interface standards;

e) Subclause 4.5 is modified to reference appropriate safety standards.

The text of this standard is based on the following documents:

CDV	Report on voting
100/2872/CDV	100/2966/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

INTEROPERABILITY SPECIFICATIONS OF COMMON EXTERNAL POWER SUPPLIES (EPS) FOR USE WITH DATA-ENABLED MOBILE TELEPHONES

1 Scope

This document specifies the interoperability of common external power supplies for use with data-enabled mobile telephones. It defines the common charging capability and specifies interface requirements for the external power supply.

Safety and EMC aspects are not covered by this document. Safety is covered by IEC 60950-1 or IEC 62368-1 and EMC is covered by regional /national standards.

This document defines interoperability based on legacy USB technologies and does not cover charging interfaces that implement IEC 62680-1-3 (USB Type-C™ [1]), IEC 62680-1-2 (USB PD) and IEC 63002.

NOTE: The content of this document is based on Annex II dated 12 January 2010 to the MoU regarding Harmonisation of a Charging Capability for Mobile Phone.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60950-1, *Information technology equipment – Safety – Part 1: General requirements*

IEC 62368-1, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

IEC 62680-1-1, *Universal Serial Bus interfaces for data and power – Part 1-1: Common components – USB Battery Charging Specification, Revision 1.2*

IEC 62680-2-1:2015, *Universal Serial Bus interfaces for data and power – Part 2-1: Universal Serial Bus specification, Revision 2.0*

IEC 62680-2-2, *Universal Serial Bus interfaces for data and power – Part 2-2: USB Micro-USB Cables and Connectors Specification, Revision 1.01*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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[1] USB Type-C™ is a trademark of the USB Implementers Forum (USB-IF). This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of this product.

- IEC Electropedia: available at http://www.electropedia.org
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
adapter
device for connecting from a USB Micro-B receptacle/plug defined in IEC 62680-2-2 to a specific non Micro-USB connector

Note 1 to entry: An adapter can also be a cable.

3.2 Abbreviated terms

AC alternating current
DC direct current
EPS external power supply
ESR equivalent series resistance
EUT equipment under test
GND ground
USB Universal Serial Bus

4 EPS specification

4.1 DC plug connector specification

The cable assembly supplied with the EPS shall terminate in a USB Micro-B plug, defined in IEC 62680-2-2. The cable assembly may be permanently connected to the EPS or may be a detachable cable. In either case, the terminating USB Micro-B plug shall be compliant with the USB Micro-B cables and connectors specification, IEC 62680-2-2.

The cable assembly supplied with the EPS may also terminate in a non USB Micro-B plug if a manufacturer makes available an adaptor from the Micro-USB connector of a common EPS to a specific non-Micro-USB socket in the mobile phone.[2]

An EPS provided with a detachable cable shall be equipped with a USB Standard-A receptacle to connect to the EPS. The detachable cable assembly, supplied for use with the EPS, shall have USB Standard-A and USB Micro-B plugs and meet the USB-IF cable assembly requirements in IEC 62680-2-2.

The above requirement also applies to a cable used as an adaptor, i.e. when the USB Micro-B is connected to the mobile telephone by an adaptor where the mobile telephone does not have a Micro-USB interface.

4.2 AC input characteristic

The EPS shall meet the requirements of IEC 60950-1 or IEC 62368-1 with a maximum touch current not exceeding 90 µA.

The EPS AC input shall operate over the following range:

– voltage range: the rated input voltage range covers the range 100 V to 230 V;
– frequency: 50 Hz to 60 Hz.

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[2] Memorandum of Understanding regarding Harmonisation of a Charging Capability for Mobile Phones. 5 June 2009, clause 4.2.1.

4.3 Environmental specification

The EPS operational environmental range, over which the DC output characteristics defined in 4.4 shall be maintained, shall be

– temperature range: 0 °C to +35 °C,

– relative humidity: up to 90 %.

4.4 DC output characteristics

The DC output voltage of the EPS shall be as specified in IEC 62680-2-1. The cable voltage drop shall be as specified in IEC 62680-2-1.

The ripple voltage on the output with a no-load current to maximum rated output current shall be no more than 80 mV peak-to-peak measured at 20 MHz bandwidth when measured in accordance with the test method defined in 5.2.

Proprietary methods for faster charging at higher voltages and/or currents are permitted, provided that interoperability according to IEC 62680-1-1 is guaranteed when the peer connected device (EPS or the mobile telephone) supports only IEC 62680-1-1.

4.5 Protection

The EPS shall comply with all appropriate safety standards, for example as specified by IEC 60950-1 or IEC 62368-1.

4.6 EPS detection

To enable the mobile telephone to detect that it is connected to an EPS, the EPS shall meet the USB-IF charging port requirements for a Dedicated Charging Port as defined in IEC 62680-1-1.

4.7 Reliability

The durability of the plug and receptacles shall, as a minimum, meet the performance as given in Table 6-7 of IEC 62680-2-1:2015.

5 Testing requirements

5.1 General

The requirements in Clause 5 have been developed to try to ensure that common EPSs perform correctly with any data-enabled mobile phone to which they may be connected. Most of the requirements can be verified using existing and well-understood measurement techniques, which do not need defining in this document.

The ripple voltage at the DC output can be affected by the load on the output of the EPS. For these parameters, the test procedures outlined in 5.2 shall be used.

5.2 Ripple voltage at the DC output

a) The USB Micro-B plug of the EPS shall be connected to a load representative of a mobile phone with the following characteristics:
   – USB Micro-B receptacle connection;
   – a capacitance of $(1 \pm 0{,}1)\ \mu F$ between the Vbus and GND terminals of the USB Micro-B receptacle. This capacitance shall have a typical ESR of 0,01 Ω at 1 MHz and 0,6 Ω at 10 kHz;

- a variable or switchable resistance between the Vbus and GND terminals of the USB Micro-B receptacle. It shall be possible to select a resistance of 10 kΩ to simulate a no-load condition and other resistances suitable to draw 25 %, 50 %, 75 % and 100 % of the rated current of the EPS.

b) Place the EUT into an environmental chamber.

c) Connect an oscilloscope to the Vbus and GND terminals. Set the oscilloscope to vertical axis of 20 mV per division, horizontal axis of 1 s per division and 20 MHz bandwidth.

d) Allow the temperature of the EPS to stabilize for at least 10 min.

e) Turn on the AC power to the EPS and allow it to operate for at least 10 min before making any measurements.

f) Measure the peak-to-peak voltage of the signal on the oscilloscope under each possible combination of the following parameters:

- AC frequency: 47 Hz, 50 Hz, 60 Hz and 63 Hz;
- AC voltage: 90 V, 120 V, 207 V and 253 V;
- load: 0 %, 25 %, 50 %, 75 % and 100 % of the rated output current;
- temperature: 0 °C, 25 °C and 45 °C.

Bibliography

IEC 62680-1-2, *Universal Serial Bus interfaces for data and power – Part 1-2: Common components – USB Power Delivery Specification*

IEC 62680-1-3, *Universal Serial Bus interfaces for data and power – Part 1-3: Common components – USB Type-C™ Cable and Connector Specification*

IEC 63002, *Identification and communication interoperability method for external power supplies used with portable computing devices*

MoU regarding Harmonisation of a Charging Capability for Mobile Phones, 5 June 2009 (http://ec.europa.eu/docsroom/documents/2417)

Annex II to the MoU, 12 January 2010 (http://ec.europa.eu/docsroom/documents/2418)

European Commission, *Standardisation mandate to CEN, CENELEC and ETSI on a common Charging Capability for Mobile Telephones* (http://ec.europa.eu/growth/tools-databases/mandates/index.cfm?fuseaction=search.detail&id=437#)

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