

INTERNATIONAL STANDARD



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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

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.

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INTEROPERABILITY SPECIFICATIONS OF COMMON EXTERNAL POWER ~~SUPPLY~~ 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 ~~EN 301 489-34~~ 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:~~2005~~, *Information technology equipment – Safety – Part 1: General requirements*

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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*

~~EN 301 489-34 Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services – Part 34: Specific conditions for External Power Supply (EPS) for mobile phones~~

~~Universal Serial Bus Specification, Cables and Connectors Class Document, Revision 2.0, August 2007~~

~~(<http://www.usb.org/developers/docs>)~~

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.

~~USB Battery Charging Specification, Revision 1.1~~

~~USB Micro-USB Cables and Connectors Specification, Revision 1.01~~

~~USB-IF Cable Assembly Test Requirements for Compliant Usage of Connectors and Cables in Micro-USB 1.01~~

~~USB-IF Connector Test Requirements~~

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:

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

3.1.1

adapter 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

~~For the purposes of this document, the following abbreviations apply:~~

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

~~Vbus Virtual 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.

~~— shall meet the USB-IF connector test requirements,~~

~~— shall be compliant to the USB Micro-B cables and connectors specification, Rev 1.01 (Micro-USB 1.01) and~~

~~— shall be rated to meet all electrical specifications.~~

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 an 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 ~~test requirements for compliant usage of connectors and cables in Micro-USB 1.01~~ in IEC 62680-2-2.

The above requirement also applies to a cables 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 ~~Class II~~ 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 ~~should be at least~~ covers the range 100 V to 230 V;
- frequency: 50 Hz to 60 Hz.

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 ~~+45~~ 35 °C,
- relative humidity: up to 90 %.

4.4 DC output characteristics

~~For EPS with permanently connected cables, the voltage at the USB Micro-B plug of the EPS shall be 5 V ± 0,25 V with no load current to rated output current.~~

~~For EPS with detachable cables the voltage at the USB standard A receptacle shall be (5 ± 0,25) V with no load current to rated output current. The maximum voltage drop caused by the detachable cable shall be 125 mV when measured across the power pair pins of the USB Micro-B plug, while drawing 500 mA from a nominal 5 V source.~~

~~The minimum rated output current shall be 500 mA.~~

~~The maximum rated output current shall be 1 500 mA.~~

~~The maximum output current at any voltage shall not be greater than 1 500 mA.~~

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 ~~using the test method as defined in Clause 6~~ when measured in accordance with the test method defined in 5.2.

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

~~The common mode noise at the DC output when measured in accordance with Clause 6 shall be~~

- ~~— AC voltage frequency component: 95 V peak-to-peak maximum;~~
- ~~— EPS switching frequency component:~~
 - ~~a) the peak-to-peak voltage measured in the frequency range of 1 kHz to 100 kHz shall not exceed 1 V peak-to-peak;~~
 - ~~b) the peak-to-peak voltage measured in the frequency range of 100 kHz to 400 kHz shall not exceed 200 mV peak-to-peak;~~
 - ~~c) the peak-to-peak voltage measured in the frequency range of 400 kHz to 1 MHz shall not exceed 39 mV peak-to-peak;~~
 - ~~d) the peak-to-peak voltage measured in the frequency range of 1 MHz to 100 MHz shall not exceed 20 mV peak-to-peak;~~
 - ~~e) the occupied bandwidth of the fundamental measured with peak hold shall not exceed $\pm 10\%$ of the EPS switching frequency;~~
 - ~~f) the maximum amount of slew within any 100 ns window is 1,25 V peak-to-peak.~~

~~NOTE— Noise in the FM and TV bands from the EPS should be minimized as it may cause interference to any FM radio and/or TV function of the mobile telephone to which the EPS is connected. At the time of writing, no suitable method of measurement has been defined and is the subject of ongoing work.~~

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 maximum output voltage under Single Fault Condition shall not exceed 9 V.~~

~~The maximum output current under Single Fault Condition shall not exceed 3 A.~~

~~The EPS shall not be damaged as a result of either any over temperature condition of the EPS circuitry components which is not due to a fault of the EPS, or any output short circuit condition. If shut down occurs, the unit shall not resume operation until AC power is cycled or the failure condition causing the shut down has been removed.~~

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 ~~test~~ requirements for a Dedicated Charging Port as defined in ~~USB Battery Charging Specification, Revision 1.1 (BC 1.1), Section 4.1 'Charging Port'~~ IEC 62680-1-1.

~~The top level requirements are~~

- ~~— the EPS shall short the D+ and D– lines with a resistance not greater than 200 Ω ,~~
- ~~— the resistance between the D+ or D– lines of the EPS and either Vbus or GND shall be greater than 2 M Ω ,~~
- ~~— the capacitance between the D+ or D– lines of the EPS and either Vbus or GND shall be less than 1 nF.~~