IEC 62637-1

Edition 1.0 2011-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Battery charging interface for small handheld multimedia devices – Part 1: 2 mm barrel interface

Interface de charge de batterie pour petits appareils multimédia portables – Partie 1: Spécification de l'interface cylindrique 2 mm

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE
CODE PRIX S

ICS 33.160.99; 97.18

ISBN 978-2-88912-597-5

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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International Standard IEC 62637-1 has been prepared by technical area 1: Terminals for audio, video and data services and content, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This bilingual version (2011-07) replaces the English version.

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

CDV	Report on voting
100/1673/CDV	100/1749/RVC

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

The French version of this standard has not been voted upon.

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

A list of all parts of the IEC 62637 series, under the general title *Battery charging interface for small handheld multimedia devices*, can be found on the IEC website.

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

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- withdrawn,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

BATTERY CHARGING INTERFACE FOR SMALL HANDHELD MULTIMEDIA DEVICES –

Part 1: 2 mm barrel interface

1 Scope

This part of IEC 62637 defines a charging interface between small handheld multimedia devices and power-supply accessories, specifically chargers. Devices, which could be based on this standard may vary over time, but have to comply with the limited power available[1].

The interface is a 2 mm barrel type charging interface. This standard does not include the whole charger nor does it include the internal functions of the device. Chargers and devices shall follow the applicable EMC and safety standards. The scope of this part of IEC 62637 is illustrated in Figure 1.

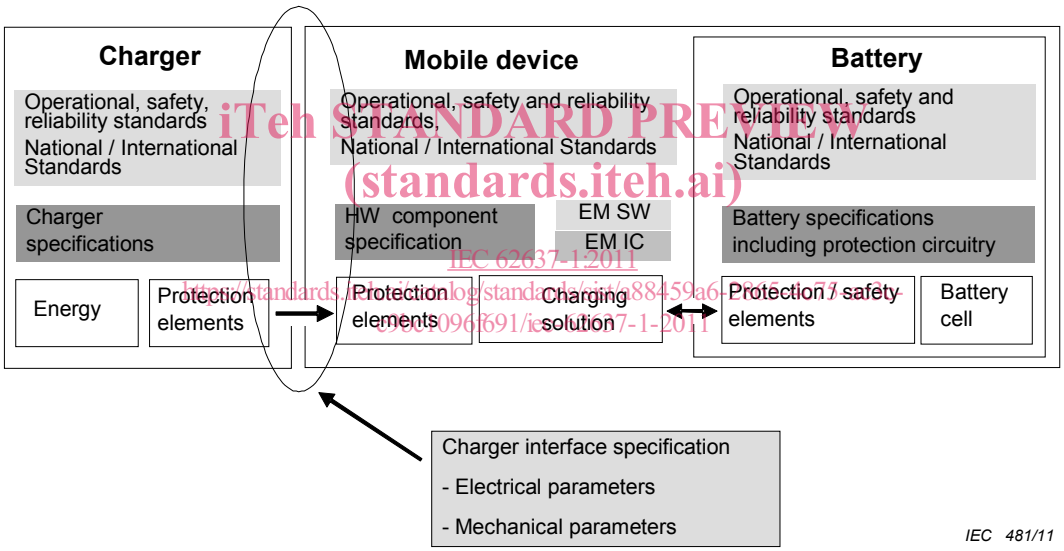

Figure 1 – Scope of the charging interface standard

2 Normative references

The following referenced documents are indispensable for the application 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 62637-2, *Battery charging interface for small handheld multimedia devices – Part 2: 2 mm barrel type interface conformance testing*

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[1] Devices like mobile phones, MP-3 players, portable radio receivers, small handheld TV receivers, GPS-navigators, gaming devices, digital cameras may use this interface if the delivered power is adequate.

3 Abbreviations and symbols

For the purposes of this document, the following abbreviations apply.

AC	Alternating Current
C	Capacitance F
CDN	Coupling/Decoupling Network
Crest factor	Current peak value/current RMS value
dB	Decibel
dB(mW)	Power in dB referring to 1 mW
DC	Direct Current
EM	Energy Management
EMC	Electromagnetic Compatibility
ESR	Effective Series Resistance Ω
f	Frequency in Hz
$f_{I\text{char}}$	Charging current change frequency Hz
GND	Ground
HW	HardWare
I	Current A
I_{char}	Charging current A
I_{max}	Maximum current A
I_{peak}	Peak current A
IC	Integrated Circuit
L	Inductance H
R	Resistance Ω
RMS	Root mean square
SW	SoftWare
V	Voltage V
V_{char}	Charging voltage
$V_{\text{max-out}}$	Maximum output voltage
V_{out}	Output voltage
V_{ripple}	Ripple voltage

4 Specifications for 2 mm barrel interface

4.1 General

Clauses 4 to 8 specify the 2 mm barrel type electrical and mechanical charging interface between devices and power-supply accessories, specifically chargers. Clause 7 defines the charger-identification process of these devices.

The 2 mm barrel interface may have a wide output current range and the current may change with other parameters, but shall stay within the charging current/voltage window specified in 5.6. The recommended minimum current is specified in 5.6.

4.2 Temperature

All specifications apply at normal room temperature 18 °C to 25 °C, unless some other temperature is specified.

4.3 Voltage

All specifications are valid under nominal operating voltage as defined by the manufacturer.

5 Electrical specification for 2 mm barrel type chargers

5.1 Charger output capacitance

The capacitance at the charger output causes charging current spikes when the charger's load is changing. Low-capacitance values are recommended if possible. The maximum charger output filter capacitor size shall be 1 000 µF with + 20 % tolerance if the charger $V_{max\text{-}out}$ is less than 7 V. For output voltages of 7,0 V to 9,3 V, the maximum capacitance value decreases linearly so that for a 9,3 V charger, the maximum output capacitance shall be 700 µF with + 20 % tolerance. The maximum capacitance value is illustrated in Figure 2.

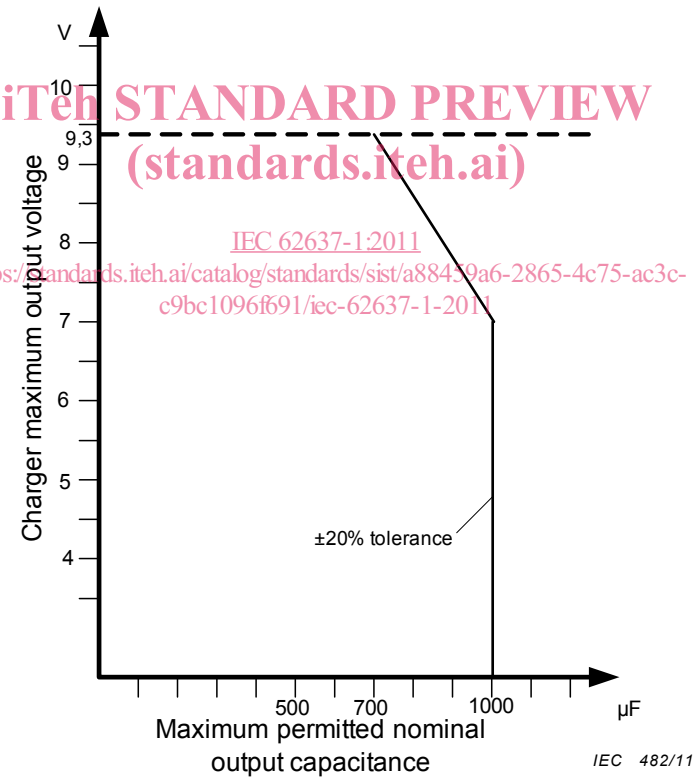

Figure 2 – Maximum permitted charger output capacitance

5.2 Maximum transient voltage and current values

Table 1 gives the maximum limits for voltage values and settling times. These limits apply to all conditions.

Table 1 – Limits for maximum voltage and settling time

Parameter	Limit
Maximum charger output overshoot	16 V
Maximum reverse voltage at charger output	1 V
Maximum time for charger to achieve steady state value (V and I) ± 10 % after load change	10 ms
Maximum duration of charging current overshoot peak value greater than 1,1 A	5 ms
Maximum output voltage undershoot for load currents up to 100 mA	4,1 V

Limits are also valid for a damaged (single fault) charger and these voltage and current limits shall be doubly ensured, meaning that if the general charging voltage control system fails, there shall be a backup limiter inside the charger. The maximum charging current overshoot and maximum voltage undershoot are shown in Figure 3.

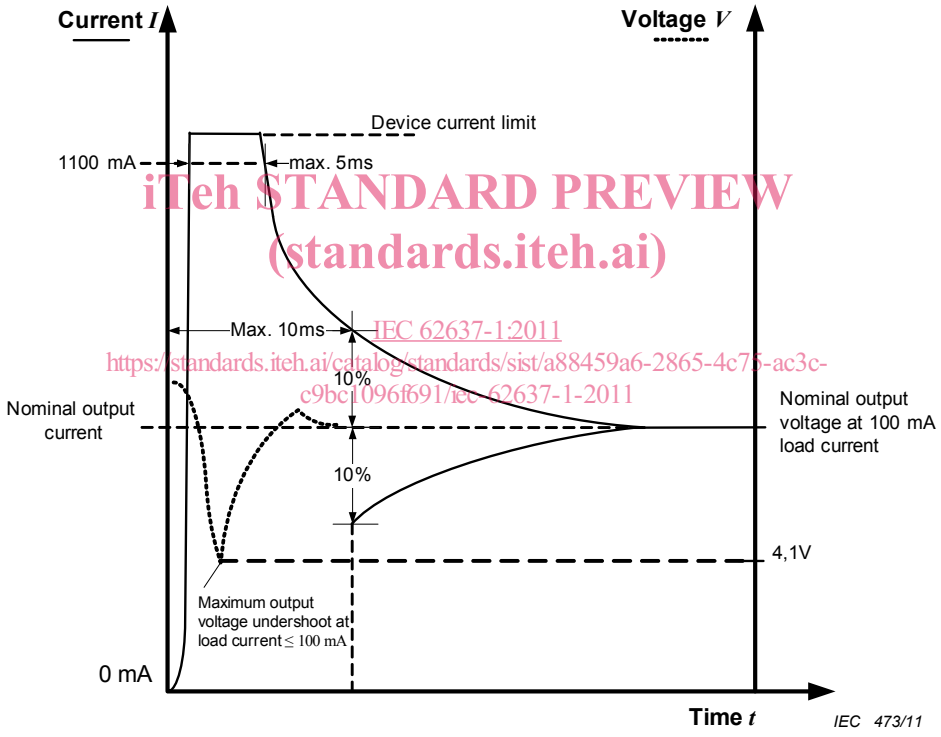

Figure 3 – Maximum duration of charging current overshoot and maximum voltage undershoot

5.3 Maximum output ripple voltage

The maximum allowed output ripple voltage with maximum output current of the charger is 300 mV RMS for output voltages V_{out} between 2,5 V and 5,5 V.

The maximum acceptable output peak-to-peak ripple voltage is separated to four frequency ranges. A sum of ripple voltages over the full frequency range 0 MHz to 1 MHz is 800 mV_{p-p}. Ripple voltage shall be measured using 0 kΩ to 6 kΩ resistive load. During the test all the measured V and I values shall be within the voltage / current window of the charger interface.

Note that charging voltage, including ripple, shall not have peak values outside the V/I window (see 5.6) for charger output.

Maximum ripple voltages V_{ripple} for different frequency ranges are given in Table 2. Maximum peak-to-peak ripple voltage is shown in Figure 4.

Table 2 – Maximum ripple voltage in different frequency ranges

Frequency range	Maximum ripple voltage (peak-to-peak)
$f < 20$ Hz	200 mV
20 Hz $\le f <$ 200 Hz	200 mV
200 Hz $\le f <$ 20 kHz	200 mV
20 kHz $\le f <$ 1 MHz	400 mV

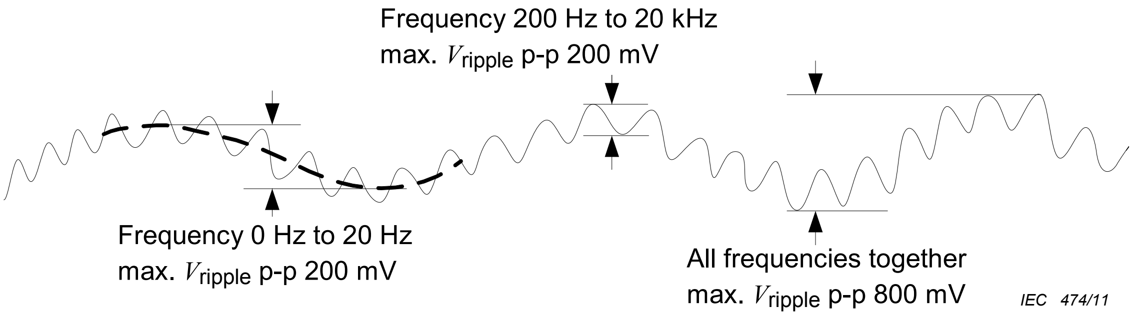

Figure 4 – Maximum peak-to-peak ripple voltage

5.4 High-frequency voltage components at the charger output

The purpose of this part of the specification is concerned with intra-system EMC, to guarantee that the charger connected to the device via the interface does not cause interference with the possible radio receiver reception in the device.

The charger shall not cause more high-frequency voltage components at the charger output than specified in Table 3 and Figure 5 when connected to the artificial load specified in Annex A and measured with the coupling-decoupling network specified in Annex B.

Table 3 – Maximum conducted interference

Frequency range MHz	**Maximum high frequency voltage components** dB(mW)
1 to 80	−40 to −65 linear slope
80 to 150	−65

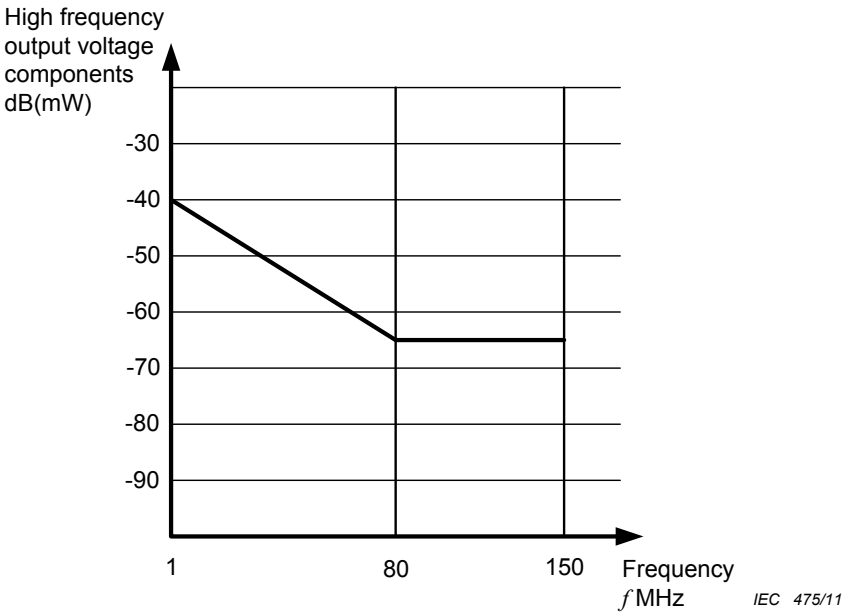

Figure 5 – Maximum high-frequency output voltage components

5.5 Feel current of AC chargers

The purpose of the feel current specification is not electrical safety but to guarantee a minimum physical sensation felt by the user when connecting the devices to chargers using the 2 mm barrel charger interface.

The maximum feel current from AC mains to the mobile device through the charger shall be 5 μA when measured as specified in IEC 62637-2.

5.6 Charging voltage/current window

The minimum charging current is 300 mA when the voltage is between 2,0 V and 4,65 V. During charging, the current and voltage values at the interface shall not exceed the charging window shown in Figure 6. This means that the charger shall operate inside the window and the devices shall accept all chargers which operate inside the window. The maximum voltage is 9,30 V and maximum current 950 mA. Below 1 V it is allowed that the current may raise to 1,2 A as shown in Figure 6. Below 2 V the minimum current is 100 mA, reducing to 0 mA when the voltage drops to 0 V.

The only case when the charging voltage is allowed to exceed the charging current/voltage window is in a load change situation (see 5.2).