# IEC 62637-2

Edition 1.0 2011-03

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

## Battery charging interface for small handheld multimedia devices – Part 2: 2 mm barrel type interface conformance testing

## Interface de charge de batterie pour petits appareils multimédia portables – Partie 2: Essai de conformité de l'interface de type cylindrique 2 mm

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX R

ICS 33.160.99; 97.180

ISBN 978-2-88912-598-2

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# BATTERY CHARGING INTERFACE FOR SMALL HANDHELD MULTIMEDIA DEVICES –

## Part 2: 2 mm barrel type interface conformance testing

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

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

| CDV | Report on voting |
|---|---|
| 100/1674/CDV | 100/1750/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.

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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

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# BATTERY CHARGING INTERFACE FOR SMALL HANDHELD MULTIMEDIA DEVICES –

## Part 2: 2 mm barrel type interface conformance testing

## 1 Scope

This part of the IEC 62637 provides the conformance testing rules and guidelines for equipment built to meet the 2 mm barrel type charging interface specified in the 62637-1.

## 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 62637-1:2011, *Battery charging interface for small handheld multimedia devices – Part 1: 2 mm barrel interface*

## 3 Abbreviations and symbols

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

| | |
|---|---|
| AC | Alternating Current |
| ATT | ATTenuator |
| 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 |
| DUT | Device Under Test |
| EMC | Electromagnetic Compatibility |
| ESD | ElectroStatic Discharge |
| ESR | Effective Series Resistance Ω |
| $f$ | Frequency in Hz |
| $f_{I\text{char}}$ | Charging current change frequency Hz |
| GND | GrouND |
| $I$ | Current A |
| $I_{\text{char}}$ | Charging current A |
| $I_{\text{max}}$ | Maximum current A |
| $I_{\text{peak}}$ | Peak current A |
| $L$ | Inductance H |

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| | |
|---|---|
| N | Newton |
| $R$ | Resistance Ω |
| RBW | Resolution BandWidth |
| RMS | Root mean square |
| $V$ | Voltage V |
| $V_{char}$ | Charging voltage |
| $V_{max\text{-}out}$ | Maximum output voltage |
| $V_{out}$ | Output voltage |
| $V_{ripple}$ | Ripple voltage |
| VBW | Video BandWidth |
| SWP | SWeeP time |

# 4 Test conditions for the 2 mm barrel charging interface

## 4.1 General test conditions

The general test conditions are set out below. Manufacturers should note that the actual conditions of use could be more stringent.

Tests conducted using this conformance document do not replace EMC, ESD, safety, type approval, or any tests set by legislation in the chargers or devices using the charging interface specified in IEC 62637-1. The purpose of the conformance testing is to achieve good interoperability between different chargers and devices.

## 4.2 Temperature

All measurements shall be made at normal room temperature 18 °C to 25 °C, unless some other temperature is specified.

## 4.3 Voltage

All tests are performed under nominal operating voltage as defined by the manufacturer.

# 5 Electrical testing of 2 mm barrel type chargers

## 5.1 Maximum transient voltage and current values

### 5.1.1 Test purpose

The purpose of this test is to verify that the charger complies with the requirements of settling time, minimum voltage and maximum voltage limits specified in IEC 62637-1, 5.2.

### 5.1.2 Requirements

The following requirements apply.

- Maximum charger output overshoot shall be less than or equal to 16 V.
- Maximum reverse voltage at charger output shall be less than or equal to 1 V.
- Maximum time to achieve steady state value for voltage and current (± 10 % tolerance) after load change ("no load"/"normal load") shall be less than or equal to 10 ms.
- Maximum duration of charging current overshoot peak value greater than 1,1 A shall be less than or equal to 5 ms.

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- Maximum output voltage undershoot with a load current less or equal than 100 mA shall be 4,1 V.

Maximum duration of charging current overshoot is shown in Figure 1.

### 5.1.3 Test equipment

The following equipment is required to perform the test:

- oscilloscope;
- 6 kΩ load as “no load”;
- a suitable resistor to draw a 100 mA load current at the nominal output voltage;
- 3,0 V current sink type of load with 1,1 A current limit as “normal load”;
- AC power source (if charger is AC powered);
- DC power source (if charger is made for car environment).

### 5.1.4 Test method

Proceed as follows.

a) Set the oscilloscope to measure voltage and current from the charger output.

b) Set the output of AC or DC power source to nominal value.

c) Measure the voltage and current values when the 6 kΩ load and 3,0 V load (a load, which results 3,0 V charging voltage) are interchanged with a fast electronic switch (switching time less than 100 μs) at the charger output.

d) Measure the voltage undershoot when in 100 mA resistive load (a load, which draws 100 mA at nominal output voltage).

Repeat the test using minimum and maximum supply voltages specified to the charger (recommendation for AC powered chargers is nominal voltage ± 20 %).

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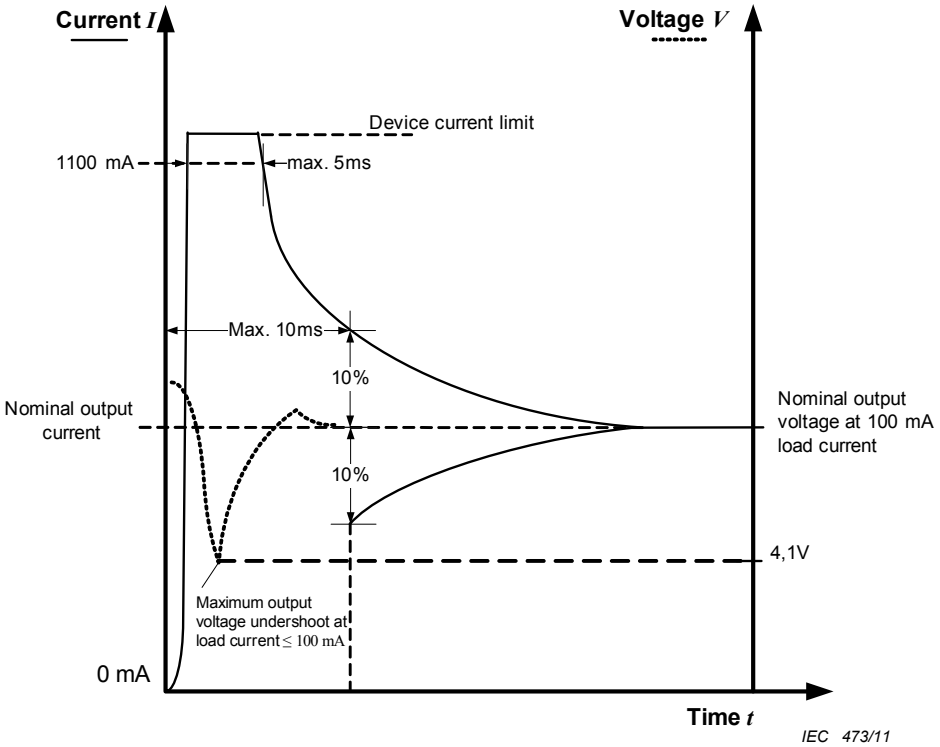


**Figure 1 – Maximum duration of charging current overshoot and output voltage undershoot**

## 5.2 Maximum output ripple voltage

### 5.2.1 Test purpose

The purpose of this test is to verify that the charger complies with the requirements of the ripple voltage specified in 5.3 of IEC 62637-1.

### 5.2.2 Requirements

Maximum ripple voltages for different frequency ranges are given in Table 1.

**Table 1 – Maximum ripple voltage in different frequency ranges**

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

The maximum allowed output ripple voltage with maximum output current in constant current mode is 300 mV RMS for output voltages $V_{out}$ between 2,5 V and 5,5 V.

A sum of ripple voltages over the full frequency range 0 MHz to 1 MHz is 800 mV (peak-to-peak).

During the test all the measured $V$ and $I$ values shall be within the voltage / current window of the charger interface.

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Maximum peak-to-peak ripple voltage is shown in Figure 2.

### 5.2.3 Test equipment

The following equipment is required to perform the test:

- oscilloscope which offers the possibility of selecting a measured frequency band;
- variable resistive load 0 kΩ to 6 kΩ. Maximum stray capacitance of ripple test load (e.g. on-line testing) is 2 μF;
- AC power source (if charger is AC powered);
- DC power source (if charger is designed for car environment).

### 5.2.4 Test method

Proceed as follows.

a) Set the output of AC or DC power source to nominal value. Connect charger to power supply and to variable load.

b) Set the oscilloscope to measure voltage from charger's output. Connect charger to variable load and set the load as 6 kΩ.

c) Set the oscilloscope to measure ripple voltage peak-to-peak value from frequency band 0 Hz to 20 Hz. Reduce resistance slowly until the output voltage is 1,5 V. Find the highest peak-to-peak value between maximum voltage and 1,5 V.

d) Set the oscilloscope to measure ripple voltage peak-to-peak value from frequency band 20 Hz to 200 Hz. Reduce resistance slowly until the output voltage is 1,5 V. Find the highest peak-to-peak value between maximum voltage and 1,5 V.

e) Set the oscilloscope to measure ripple voltage peak-to-peak value from frequency band 200 Hz to 20 kHz. Reduce resistance slowly until the output voltage is 1,5 V. Find the highest peak-to-peak value between maximum voltage and 1,5 V.

f) Set the oscilloscope to measure ripple voltage peak-to-peak value from frequency band 20 kHz to 1 MHz. Reduce resistance slowly until the output voltage is 1,5 V. Find the highest peak-to-peak value between maximum voltage and 1,5 V.

g) Set the variable resistance so that the output voltage is 5,5 V. Remove frequency band limitations from the oscilloscope. Set the oscilloscope to measure the root mean square (RMS) value of ripple voltage. Decrease resistance slowly so that the output voltage is 2,5 V. Find the largest RMS value between 5,5 V and 2,5 V.

Repeat tests c) to g) using minimum and maximum supply voltages specified for charger (recommendation for AC-powered chargers is the nominal voltage ± 20 %). Repeat tests in minimum and maximum temperatures specified for charger.

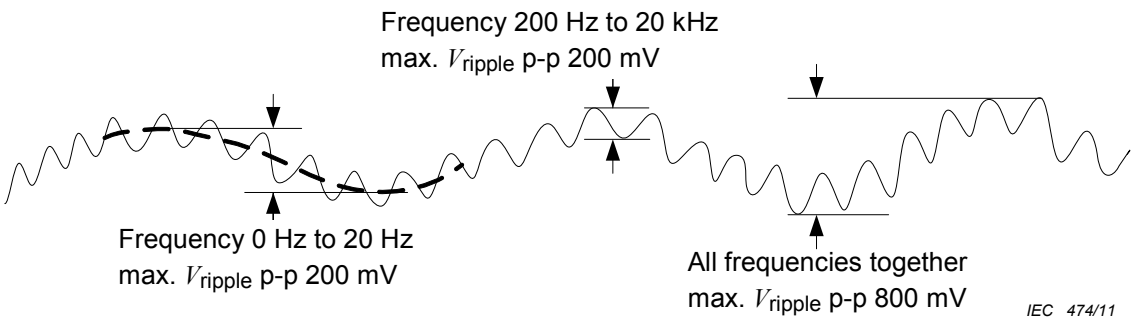


**Figure 2 – Maximum peak-to-peak ripple voltage**

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