

## TECHNICAL ANNEX TO

# MOU REGARDING THE HARMONISATION OF A CHARGING CAPABILITY FOR MOBILE PHONES

Date: January 12, 2010

This annex contains the output of the technical specification activity which the MoU Signatories have carried out in accordance with section 5.1 of the MoU.

This final version is intended for the standardisation organisations which have accepted the EU standardisations mandate EN40-2009, and compared with the October 6 version only Part A and C have been changed.

This annex is divided in three parts:

- Part A covering the specification of the Common EPS
- Part B covering the input to EMC standardisation
- Part C covering the input to safety standardisation

The specific comments to Part A are:

The MoU Signatories have based their specification on the highest possible degree of reuse of existing industry standards to allow a quick introduction of the Common EPS in the market.

The specific comments to Part B are:

The present basis for R&TTE regulation and EMC standards is that each manufacturer's products show compliance as released from each specific manufacturer; there is no current provision for one manufacturer placing on the market a product (for example an EPS) which is compliant for use with another manufacturer's products (for example a phone). The introduction of a harmonised charging capability for mobile phones will open up a new compliance status. Mobile phones and external power supplies will not necessarily be from the same manufacturer and might never have been tested in the combination. The EMC standards should reflect this by removing existing requirements for testing an external power supply and mobile phone together, and develop requirements which each have to meet on a standalone testing basis. The resulting regime should ensure that any combination of separately-tested products meets the same emission and immunity requirements as required today, however it should be avoided to have more stringent requirements than needed.

Furthermore it must be noted that some of the parameters in Part A could be considered as an input for the EMC standardisation work.

As the Common EPS will be ancillary equipment for radio equipment the recommendation is that the specific requirements for the common EPS can be incorporated into the EN 301 489 series of EMC standards. Part B is proposing specific input to the relevant clauses of EN 301 489 – 1. Clauses where no changes are required are marked "**As EN 301 489-1**".

The specific comments to Part C are:

The basis for the recommendation of safety requirements are EN 60950 and IEEE1725. Changes in safety requirements for the Common EPS should not prevent an EPS or phone manufacturer to certify its product against the IEEE1725 requirement however it is not proposal of the MOU Signatories to mandate this standard as part of EU regulation.

## EPS SPECIFICATION

### 1. Cable and Wiring Specification

The cable assembly used to interface between the EPS and the Plug connector shall have the following characteristics and properties

Flame Resistance: According to EN60950

### 2. DC Plug Connector Specification

The cable assembly shall terminate in a Micro-B plug. The plug shall meet the USB-IF Connector Test Requirements

(<http://www.usb.org/developers/compliance/connectors/>), shall be compliant to the Micro-USB Cables and Connectors Specification, Rev 1.01 (Micro-USB 1.01), and shall be rated to meet all electrical specifications.

An EPS provided with a detachable cable shall be equipped with a USB Standard-A receptacle. Standard detachable cable assembly, supplied for use with the EPS, shall have Standard-A and Micro-B plugs and meet the USB-IF Cable Assembly Test Requirements for Compliant Usage of Connectors and Cables in Micro-USB 1.01. (<http://www.usb.org/developers/compliance/cable/>).

Above requirement also applies to detachable cables used as adaptor i.e. where the Micro-B is replaced by a proprietary plug

### 3. AC Plug Specifications

Per regulatory requirements for each market

### 4. AC Input Characteristic

EPS: AC to DC convertor

Operating Temperature Range: 0 to + 45 °C

Relative Humidity: up to 90 %

Input Voltage Range: As per EN60950 but preferred supplied input voltage range should be at least 90-264 V.

Input Frequency: As per EN50160:2007

## 5. DC Output Characteristic

As per: USB Battery Charging Specification, Revision 1.1 (BC 1.1), Section 4.1 Charging Port. An EPS shall meet the USB-IF Charging Port Test Requirements. Top level requirements listed below:

- Output Voltage Range: 5V +/-0.25V from no load to maximum output current measured at the Micro-B plug of the captive cable
- If the cable is detachable, the voltage at the Standard-A receptacle is required to be 5V +/-0.25V
- Allowed voltage drop over detachable cables as per USB Cables and Connector Class, Aug 2007: 125 mV max drop across power pair from pin to pin tested at 5V and 500 mA.
- Output Current Range at 5V +/-0.25V: 500 mA to 1500 mA
- Max Load Current at voltages below 4.75V: 1.5 A

Output Voltage Ripple (Under load conditions from idle to full):  
80 mVp-p measured at 20 MHz bandwidth using the test method as defined in Addendum II.

Common mode noise requirements:

- AC voltage frequency component: 95 Vp-p maximum
- EPS switching frequency component:
  - i. Minimum 170 pF from load to line
  - ii. The peak to peak voltage measured in the frequency range of 1 kHz to 100 kHz shall not exceed 1 Vpp
  - iii. The peak to peak voltage measured in the frequency range of 100 kHz to 400 kHz shall not exceed 200 mVpp
  - iv. The peak to peak voltage measured in the frequency range of 400 kHz to 1 MHz shall not exceed 39 mVpp
  - v. The peak to peak voltage measured in the frequency range of 1 MHz to 100 MHz shall not exceed 20 mVpp
  - vi. The occupied bandwidth of the fundamental measured with peak hold shall not exceed +/- 10% of a fixed frequency
  - vii. Maximum amount of slew within any 1 us window is 0.125 Vpp
- Above to be tested according to Addendum I and limits are subject to review by the standards organisation

Noise in the FM and TV bands: As defined per EMC standard for the Common EPS

## 6. Safety and Protection

Output of the power adapter shall meet LPS, SELV, non-hazardous energy requirements.

Single Fault Condition Temperature: As per EN60950

As per: USB Battery Charging Specification, Revision 1.1 (BC 1.1), Section 4.1 Charging Port. EPSs shall meet the USB-IF Charging Port Test Requirements. Absolute Maximum Output Voltage in Single Fault Condition:

- Voltage shall not exceed  $V_{CHG\_FAIL}$  (see table 5.1 in BC 1.1)

Maximum Current under Single Fault Condition: shall not exceed 3A

The power adapter shall meet Class II requirements with max leakage current not exceeding 90 micro-Amps.

- The EPS shall not be damaged as a result of any electrical overload, over-temperature condition or any short circuit condition. If shut down occurs, unit shall not resume operation until ac power is cycled.

## 7. Adapter Detection

As per: USB Battery Charging Specification, Revision 1.1 (BC 1.1), Section 4.1 Charging Port. EPS shall meet the USB-IF Charging Port Test Requirements for a Dedicated Charging Port. Top level requirements listed below:

- The EPS shall short the D+ and D- lines with a resistance not greater than 200 ohms.
- The resistance between the D+ or D- lines of the EPS and either Vbus or Gnd shall be greater than 2 MOhms.
- The capacitance between the D+ or D- lines of the EPS and either Vbus or Gnd shall be less than 1nF.

## **8. Regulatory Requirements**

Environmental Directives: Compliance with European Directives 2002/95/EC (RoHS) and possible later revisions is required.

LVD, EMC and R&TTE Directives:

The EPS shall comply with all safety and electromagnetic compatibility requirements of the product specific standards to be development under standardisation mandate M/455 EN 1<sup>st</sup> October 2009.

## **9. Reliability**

Durability of the plug and receptacles shall as minimum meet the performance as given in Table 3-1 of Universal Serial Bus, Cables and Connectors Class Document, Revision 2.0 August 2007

Micro-B Plug: 10,000 cycles

Standard-A Receptacle and Plug: 10,000 cycles (ruggedized Standard-A):

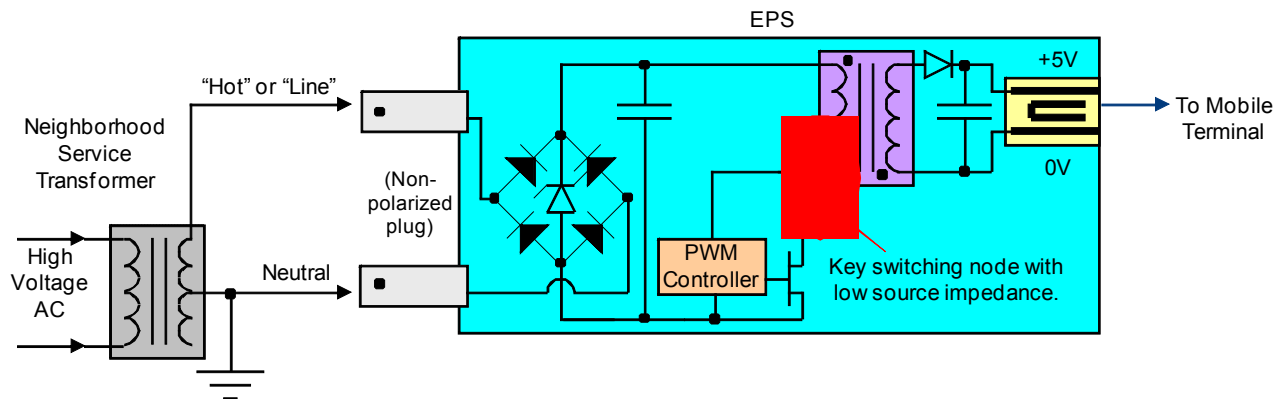
## Addendum I – Common Mode Noise considerations

### Background:

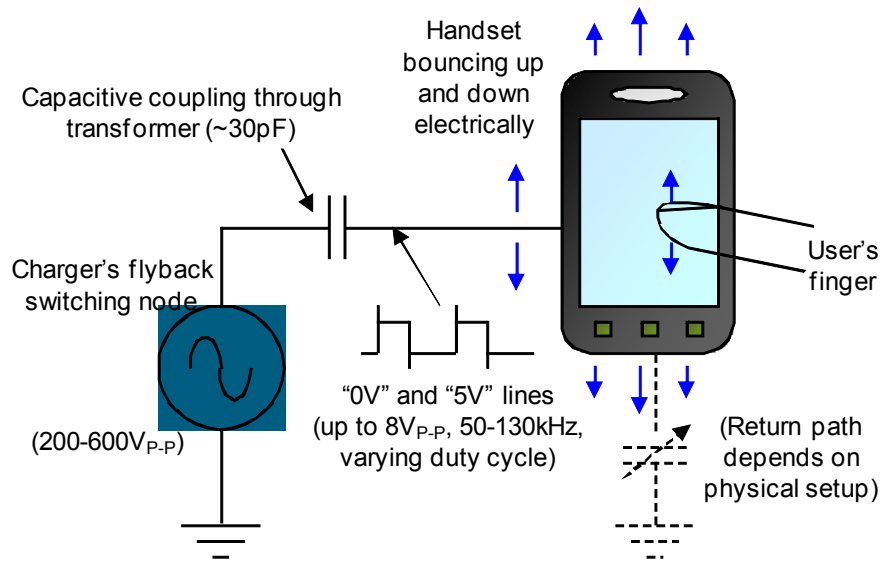
Modern EPS designs have attained high efficiency, tight output regulation, and fast response, at low size and cost. However, without deliberate incorporation of certain design principles, significant common-mode output noise is produced, which can adversely affect the operation of sensitive subsystems in the Mobile Terminal, such as capacitive touch-screens.

A typical EPS may employ an AC-DC fly-back topology as shown in above. The charger converts 90V-264VAC at 50-60Hz into 5VDC, 500-1500mA. The galvanic isolation required for user safety also isolates the charger output from earth ground, although there still exists capacitive coupling between the primary and secondary through the transformer. The distributed switching node in red generates large displacement currents, as the voltage can swing up to ~600VP-P depending on the input AC voltage. Common-mode noise with respect to earth ground on this node enters the system here, and some portion of the voltage swings are coupled into the secondary.

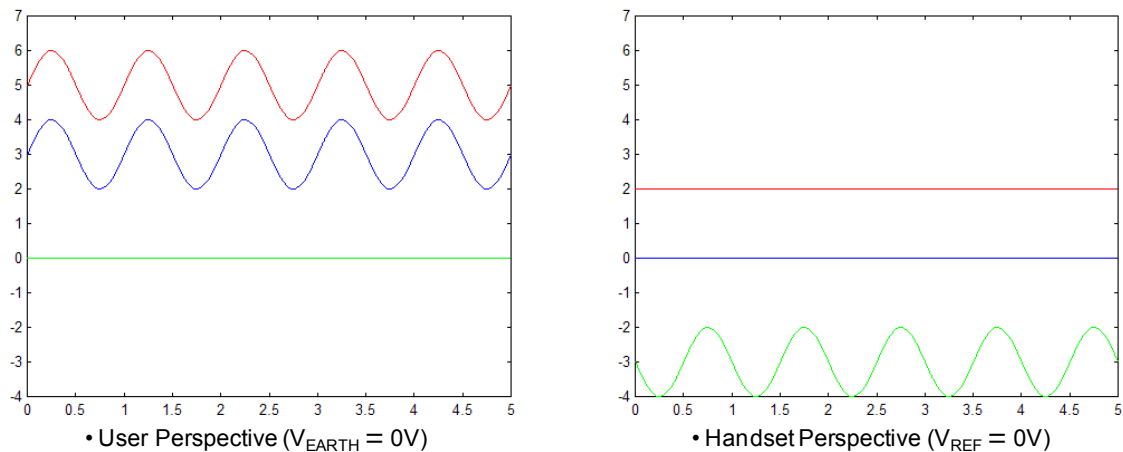
The net effect is that the Mobile Terminal is pushed up and down electrically with respect earth ground, and generally also with respect to the user. This creates error in the positions detected.



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It should be noted that the common-mode noise exists independent of a well-regulated DC output, as the positive and negative DC output lines, the USB cable, and the Mobile Terminal are all pushed “up” and “down” together.

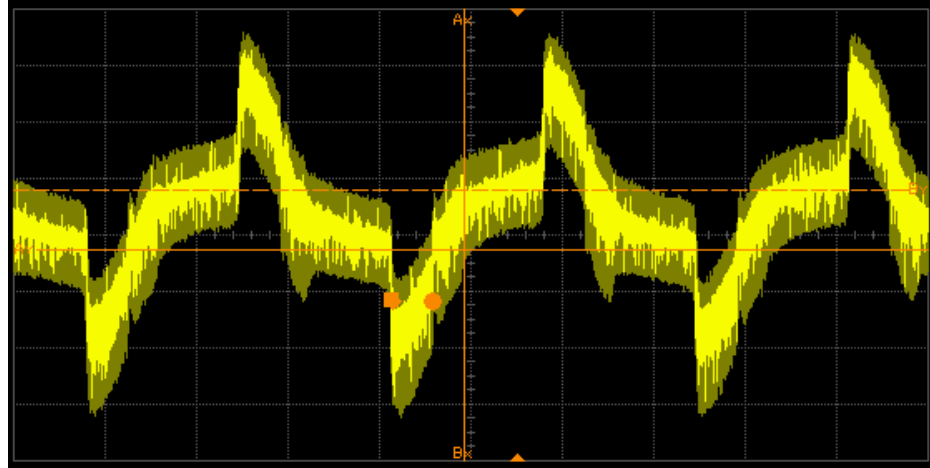


From the perspective of the Mobile Terminal, the CMN of the EPS causes the user to appear electrically noisy, and this is manifested as positional jitter in the touchscreen subsystem. In order to preserve quality of user experience in the important and fast-growing “smartphone” market segment, common-mode output noise must be maintained within manageable levels.



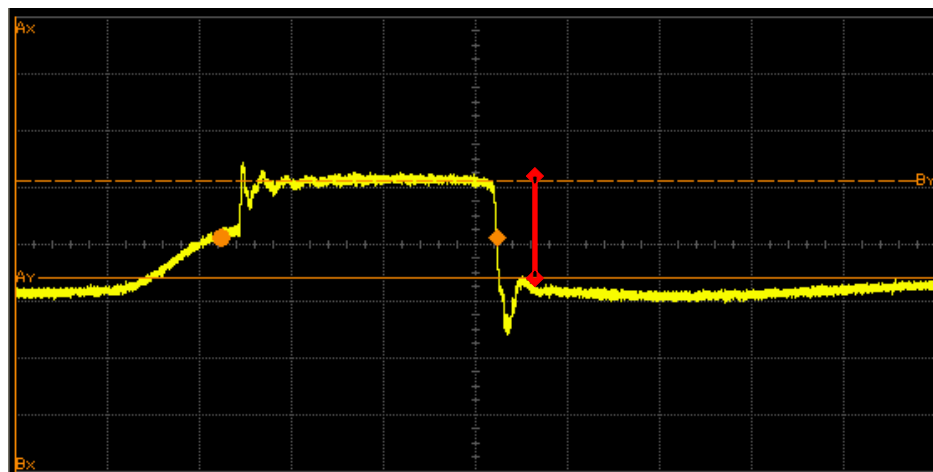
### Performance Requirements:

The amplitude of the 50/60Hz AC component of the waveform seen at the negative output terminal shall not exceed 95Vp-p (peak to peak) with respect to earth ground, under the test conditions.



• Typical Charger Measurement

The EPS switching frequency component of the waveform seen at the negative output terminal shall not exhibit the specific peak to peak values with respect to earth ground, within the frequency ranges defined in section 5 under the test conditions. Since the amplitude of the switchmode CMN component varies over the AC line cycle, the switchmode CMN shall be sample at the phase of the AC line cycle observed to produce the greatest CMN. This is often, though not always, found near the zero crossings of the AC line cycles.



## Test Condition Requirements

1. Frequency and voltage stability of the AC mains shall be maintained during common-mode noise measurements.

2. The EPS shall be connected to an AC power source wherein one or the other of the AC mains is a neutral conductor, bonded to earth ground either at the upstream service transformer, or locally in the laboratory environment.

Rationale: a) In most installations, it is required that one or the other of the AC mains is bonded to earth ground at the upstream service transformer, and is termed the “neutral” or “return” conductor; and b) common-mode noise is manifested to the greatest extent when one or the other of AC mains is bonded as such.

It should be noted that many synthesized AC power supplies produce galvanically isolated AC outputs, with no AC connection to earth ground. Common-mode noise is falsely attenuated in such situations, since the EPS common-mode noise source has no real ground to “push against”. Therefore, isolated AC outputs must have one or the other of the output lines bonded to local earth ground or neutral. Similar considerations exist when using variable autotransformers to produce the required AC line voltage.

3. The EPS shall be powered by 264VAC +1% / -0%

Rationale: a) Common-mode noise amplitude is greater at higher AC mains voltage, and b) AC mains voltages that may be seen by the EPS and its associated Mobile Terminal are permitted to range up to 240VAC +10%;

4. The EPS shall be loaded with a 10-ohm, 1%, resistive load, at the end of a 1-meter USB cable. To provide the equivalent capacitive load of a generic mobile terminal, a conductive metal box shall be connected to the ground terminal of the USB cable, the conductive box or block measuring 100 x 60 x 12mm in extent. This cable, resistance, and simulated Mobile Terminal shall be kept at least 30 cm from nearby metal structures, and should, preferably, be supported upon a low-dielectric material, such as Styrofoam or corrugated paperboard box.”

Rationale: While the amplitude and frequency of common-mode noise produced by a given EPS will dynamically change over the operational modes and battery charging cycle, it is necessary to create a common test load which will not produce inconsistent, ever-changing measurements. The resistive portion of the load prompts a certain frequency and amplitude of common-mode noise from a given EPS, and the USB cable and Mobile Terminal contribute a distributed shunt capacitance to earth ground, which does, in normal use, serve to attenuate the common mode noise, as in a capacitive AC voltage divider. Without this latter provision, any CMN test is generally too restrictive, and is not realistic.

5. The common-mode noise waveform shall be measured at the negative output lead of the detachable USB cable, where it shall be mated with the previously mentioned Mobile Terminal in its off or sleep state, with respect to earth ground. The

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sampling probe shall have an input impedance of 10 megohms in parallel with 8 picofarads.

Rationale: Common-mode noise is that electrical signal present at the output negative conductor with respect to earth ground. The probe impedance, as well as shunt capacitance to the test bench, does artificially load, and therefore attenuate, the measured common-mode noise.

## Addendum II – Ripple Test

**Load:** EPS load representative of a Mobile Phone with the following characteristics:

- USB micro-B socket connection
- Input capacitance of 1 $\mu$ F in parallel with the EPS output
- Input impedance with switchable/variable range of:
  - 10k  $\Omega$  (for 0 % rated current)
  - 3.33  $\Omega$  1% tolerance (for Maximum rated current 1500 mA)
  - Other resistances to obtain the currents and output voltages in step 10 of the test procedure

### **Test procedure:**

1. Place EUT into an environmental chamber.
2. Connect the EUT to Generic Load.
3. Set the Load to CC mode according to the test parameters in step 10.
4. Set the Load to desired load according to the test parameters in step 10.
5. Set the oscilloscope to 20mV/div, 1s/div and 20MHz bandwidth.
6. Connect the oscilloscope to the EUT output.
7. Set the temperature on the environmental chamber.
8. Wait for 10 minutes after the temperature stabilises.
9. Connect the AC input of EUT to an AC power source and let the EUT work for 10 minutes.
10. Measure the peak-to-peak voltage of the signal on the oscilloscope under each possible combination of the following parameters:
  - AC Frequency: 47Hz, 50Hz and 53 Hz for an EPS with nominal AC input of 230 Vac
  - AC Voltage: 195 Vac, 230Vac and 264 Vac for an EPS with nominal AC input of 230 Vac
  - AC Frequency: 47Hz, 50Hz, 60Hz and 63Hz for an EPS with AC input range of 100-230 Vac
  - AC Voltage: 85Vac, 120Vac, 195 Vac and 264 Vac for an EPS with AC input range of 100-230 Vac

- Load setting: CC mode (0mA) (CC = Constant Current), to (rated output current) at 25% increments and CV (CV = Constant Voltage) mode (Vout =3V to 4.25V) at 250mV increments.
- Temperature: 0 °C, 25 °C and 45 °C

#### Test requirements

Under all combinations of AC input frequency and voltage, Load settings and temperatures as defined in step 10 the measured ripple must be below the requirements in section 5

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## Foreword

This Annex has been produced by the MoU for Harmonisation of a Charging Capability for Mobile Phones.

The present document has been produced by MoU for Harmonisation of a Charging Capability for Mobile Phones as part of the mandate M/455 EN 1<sup>st</sup> October 2009 from the European Commission.

Present R&TTE regulation and EMC standards are based on that each manufacturers products show compliance as released from each specific manufacturer. The introduction of a harmonised charging capability for mobile phones will open up a new compliance status. Mobile phones and chargers are not necessarily being from the same manufacturer and might never have been tested in the combination.

In order to cover several possible combinations of mobile phones with a specific charger the MoU for Harmonisation of a Charging Capability has identified the need for additional EMC requirements as defined in this document.

This annex contains the common requirements for a common External Power Supply (EPS) in respect of ElectroMagnetic Compatibility (EMC). For the purposes of this Annex a Common EPS has A Micro-USB B-Plug attached via a cable which delivers power to the device being charged, A voltage supplied of 5.0 V +/- 5%, a maximum output current delivered of between 500 mA and 1500 mA.

The Common EPS must be a Limited Power source in accordance with EN60950-1

This Annex identifies MoU proposed changes to EN 301 489-1 where necessary to cover EMC aspects for the MoU defined EPS. Changes proposed are inserted under the appropriate Clause number with justification for proposed change within parenthesis [ ]

Clauses where no changes are required are marked “**As EN 301 489-1**”



## 1 Scope

As EN 301 489-1 ?

(Scope needs update to include EPS)

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## 2 References

As EN 301 489-1

### 2.1 Normative references

As EN 301 489-1

USB Battery Charging Specification v1.1

### 2.2 Informative references

As EN 301 489-1

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## 3 Definitions and abbreviations

### 3.1 Definitions

As EN 301 489-1 , plus

**Adaptor:** a device with a Micro-USB receptacle/plug connecting to a specific non Micro-USB connector.

NOTE an Adaptor can also be a cable

**Generic Load:** A generic load is a circuit configuration to be determined that represents the input to a cell phone in such a manner that test results for standalone EPS and this load will ensure system level testing of EPS and cell phone would pass when appropriate performance criteria are applied at the standalone test.

**Common EPS:** is an External Power Supply which meets the requirements of the specifications. The specifications include:

- A Micro-USB B-Plug attached via a cable which delivers power to the device being charged.
- A voltage supplied of 5.0 V +/- 5%.
- A maximum output current delivered of between 500 mA and 1500 mA.
- The Common EPS must be a Limited Power source in accordance with EN60950-1 clause 2.5

### 3.2 Abbreviations

As EN 301 489-1 plus

EPS                      External power supply

## 4 Test conditions

### 4.1 General

As EN 301 489-1

### 4.2 Arrangements for test signals

As EN 301 489-1

#### 4.2.1 Arrangements for test signals at the input of transmitters

As EN 301 489-1

#### 4.2.2 Arrangements for test signals at the output of transmitters

As EN 301 489-1

#### 4.2.3 Arrangements for test signals at the input of receivers

As EN 301 489-1

#### 4.2.4 Arrangements for test signals at the output of receivers

As EN 301 489-1

#### 4.2.5 Arrangements for testing transmitter and receiver together (as a system)

As EN 301 489-1

### 4.3 RF exclusion band of radio communications equipment

As EN 301 489-1

### 4.4 Narrow band responses of receivers or receivers which are part of transceivers

As EN 301 489-1

### 4.5 Normal test modulation

As EN 301 489-1

## 5 Performance assessment

### 5.1 General

As EN 301 489-1

### 5.2 Equipment which can provide a continuous communication link

As EN 301 489-1

### 5.3 Equipment which does not provide a continuous communication link

As EN 301 489-1

### 5.4 Ancillary equipment

Where ancillary equipment is a Common EPS it must meet the requirements of the provisions of this standard on a standalone basis.

### 5.5 Equipment classification

Common EPS should be classified as “for fixed use”. A mobile phone intended to be used with a Common EPS should be classified as “for portable use” only.

From EN 301 489-1

radio and/or ancillary equipment for portable or vehicular use or combinations thereof declared as capable of being powered for intended use by an AC mains or DC network shall additionally be considered as equipment for fixed use.

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## 6 Performance criteria

As EN 301 489-1

**For the standalone common EPS, the performance criteria is based on the normal radio equipment intended to be used with the EPS. For some specific test cases a different stand alone compliance level and/or performance criteria has been defined in order to ensure the compliance at the combined radio and EPS. The combined compliance level reference is the specific radio equipments compliance level.**

### 6.1 Performance criteria for continuous phenomena applied to transmitters and receivers

As EN 301 489-1

## 6.2 Performance criteria for transient phenomena applied to transmitters and receivers

As EN 301 489-1

## 6.3 Performance criteria for equipment which does not provide a continuous communication link

As EN 301 489-1

## 6.4 Performance criteria for ancillary equipment tested on a stand alone basis

For a Common EPS the performance criteria shall meet the requirements for output voltage, current and ripple during both powering and charging of the battery of a mobile phone. Proposal this should be spelled out in a new Section 6.5 “Performance criteria for Common EPS for mobile phones”.

Adding definition of a common load, alternative a reference to different standard.

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# 7 Applicability overview tables

As EN 301 489-1

## 7.1 EMC emission

As EN 301 489-1

## 7.2 Immunity

As EN 301 489-1

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# 8 Methods of measurement and limits for EMC emissions

## 8.1 Test configuration

As EN 301 489-1

## 8.2 Enclosure of ancillary equipment measured on a stand alone basis

Configuration of Common EPS should cover the following configurations:

The charger shall be configured for maximum operation mode in order to find the worst operational mode during the testing, alternatively it shall be operated at 10%, 70% respective 100 % of the rated output current.

## 8.2.1 Definition

As EN 301 489-1

## 8.2.2 Test method

As EN 301 489-1

## 8.2.3 Limits

As EN 301 489-1

# 8.3 DC power input/output ports

As EN 301 489-1

Configuration of Common EPS should cover the following configurations:

The charger shall be configured for maximum operation mode in order to find the worst operational mode during the testing, alternatively it shall be operated at 10%, 70% respective 100 % of the rated output current.

Comment: Frequency range needs to be considered for a wider range in order to cover frequencies for FM radio and TV receivers. In addition this should be considered for the -7 and -24 standards. This is not only for the EPS but also for the complete EN 301 489-series

## 8.3.1 Definition

As EN 301 489-1

## 8.3.2 Test method

As EN 301 489-1

## 8.3.3 Limits

As EN 301 489-1

As EN 301 489-1

# 8.4 AC mains power input/output ports

As EN 301 489-1

## 8.4.1 Definition

As EN 301 489-1

## 8.4.2 Test method

Configuration of Common EPS should cover the following configurations:

The charger shall be configured for maximum operation mode in order to find the worst operational mode during the testing, alternatively it shall be operated at 10%, 70% respective 100 % of the rated output current.

**In addition according to EN 301 489-1**

### 8.4.3 Limits

As EN 301 489-1

## 8.5 Harmonic current emissions (AC mains input port)

As EN 301 489-1

## 8.6 Voltage fluctuations and flicker (AC mains input port)

As EN 301 489-1

## 8.7 Telecommunication ports

As EN 301 489-1

### 8.7.1 Definition

As EN 301 489-1

### 8.7.2 Test method

As EN 301 489-1

### 8.7.3 Limits

As EN 301 489-1

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## 9 Test methods and levels for immunity tests

### 9.1 Test configuration

Configuration of Common EPS should cover the following configurations:

The charger shall be configured for maximum operation mode in order to find the worst operational mode during the testing, alternatively it shall be operated at 10%, 70% respective 100 % of the rated output current.

The mobile phone industry experience on EMC RF immunity testing indicates that different combinations of phones and accessories might not be in compliance to 3 V/m when used in different combinations. Based on this experience, the compliance level for a stand alone Common EPS on RF immunity testing, needs to be higher in order to minimize the risk for non-compliant combinations of mobile phones and a Common EPS for mobile phones. Both 6 and 10 V/m has been discussed as a minimum level. Some manufacturers are today already testing at 6V/m for internal compliance and feels that 10V/m should be the required level for stand alone testing of a charger. All references to a higher level is made to 6V/m in this document

A standalone Common EPS shall be tested at 6 V/m when connected to the defined generic load.

### 9.2 Radio frequency electromagnetic field (80 MHz to 1 000 MHz and 1 400 MHz to 2 700 MHz)

As EN 301 489-1

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### **MoU regarding Harmonisation of a Charging Capability for Mobile Phones, June 5th, 2009**

#### **9.2.1 Definition**

**As EN 301 489-1 but with 6 V/m**

#### **9.2.2 Test method**

#### **9.2.3 Performance criteria**

As defined in proposed 6.5

Only the electrical performance of the EPS in combination with a generic load will be evaluated. Only broadband phenomena shall be considered as failures. Narrow band responses is potentially influencing the EPS internal frequencies and must be evaluated in accordance to 4.4.

### **9.3 Electrostatic discharge**

**As EN 301 489-1**

#### **Comment,**

ESD is to ensure a safe and stabile performance of the charger. Different manufacturer have different protection levels for ESD in their design and a “bad” product will cause potential problems for a chargers that is in compliance with a “good” product. An ESD testing with a dummy load will provide a reasonable performance level for a charger since the discharges are likely to affect only the charger design and not the mobile phone. The charger is providing the ground connection in a combined testing and replacing the phone with a generic load should be seen as a sufficient replacement for this test case.

#### **9.3.1 Definition**

**As EN 301 489-1**

Configuration of Common EPS should cover the following configurations:

The charger shall be configured for maximum operation mode in order to find the worst operational mode during the testing, alternatively it shall be operated at 10%, 70% respective 100 % of the rated output current.

#### **9.3.2 Test method**

**As EN 301 489-1**

#### **9.3.3 Performance criteria**

**As defined in proposed 6.5**

Common EPS: « same voltage before and after exposure » 5Vdc +/-5%

### **9.4 Fast transients, common mode**

**As EN 301 489-1**

#### **Comment**

**Same principal as for the ESD testing**

## **9.4.1 Definition**

**As EN 301 489-1**

Configuration of Common EPS should cover the following configurations:

The charger shall be configured for maximum operation mode in order to find the worst operational mode during the testing, alternatively it shall be operated at 10%, 70% respective 100 % of the rated output current.

## **9.4.2 Test method**

**As EN 301 489-1**

## **9.4.3 Performance criteria**

According to Item 6.5

# **9.5 Radio frequency, common mode**

**As EN 301 489-1**

## **9.5.1 Definition**

Configuration of Common EPS should cover the following configurations:

The charger shall be configured for maximum operation mode in order to find the worst operational mode during the testing, alternatively it shall be operated at 10%, 70% respective 100 % of the rated output current.

The mobile phone industry experience on EMC RF immunity testing indicates that different combinations of phones and accessories might not be in compliance to 3 Vrms when used in different combinations. Based on this experience, the compliance level for a stand alone Common EPS on RF immunity testing, needs to be higher in order to minimize the risk for non-compliant combinations of mobile phones and a Common EPS for mobile phones. Both 6 and 10 Vrms has been discussed as a minimum level. Some manufacturers are today already testing at 6Vrms for internal compliance and feels that 10Vrms should be the required level for stand alone testing of a charger. All references to a higher level is made to 6Vrms in this document

A standalone Common EPS shall be tested at 6 Vrms when connected to the defined generic load.

**As EN 301 489-1**

## **9.5.2 Test method**

**As EN 301 489-1 but with 6Vrms due to different terminal solutions.**

## **9.5.3 Performance criteria**

According to Item 6.5

Only the electrical performance of the EPS in combination with a generic load will be evaluated. Only broadband phenomena shall be considered as failures. Narrow band responses are potentially influencing the EPS internal frequencies and must be evaluated in accordance to 4.4.



## 9.6 Transients and surges in the vehicular environment

Test is not applicable

As EN 301 489-1

### 9.6.1 Definition

Test is not applicable

As EN 301 489-1

### 9.6.2 Test method

Test is not applicable

As EN 301 489-1

#### 9.6.2.1 Test requirements for 12 V and 24V DC powered equipment

Test is not applicable

As EN 301 489-1

### 9.6.3 Performance criteria

Test is not applicable

As EN 301 489-1

## 9.7 Voltage dips and interruptions

As EN 301 489-1

Configuration of Common EPS should cover the following configurations:

The charger shall be configured for maximum operation mode in order to find the worst operational mode during the testing, alternatively it shall be operated at 10%, 70% respective 100 % of the rated output current.

### 9.7.1 Definition

As EN 301 489-1

### 9.7.2 Test method

As EN 301 489-1

### 9.7.3 Performance criteria

According to Item 6.5

## 9.8 Surges

As EN 301 489-1

## **Annex II – Part B to**

### **MoU regarding Harmonisation of a Charging Capability for Mobile Phones, June 5th, 2009**

Configuration of Common EPS should cover the following configurations:

The charger shall be configured for maximum operation mode in order to find the worst operational mode during the testing, alternatively it shall be operated at 10%, 70% respective 100 % of the rated output current.

#### **9.8.1 Definition**

As EN 301 489-1

#### **9.8.2 Test method**

According to Item 6.5

##### **9.8.2.1 Test method for telecommunication ports directly connected to outdoor cables**

As EN 301 489-1

##### **9.8.2.2 Test method for telecommunication ports connected to indoor cables**

As EN 301 489-1

##### **9.8.2.3 Test method for mains ports**

As EN 301 489-1

#### **9.8.3 Performance criteria**

As EN 301 489-1

**(New Subclause covering Ripple to be inserted under appropriate Clause) Proposed to be 6.5**

### **x.1 EPS DC output /Mobile phone Input performance criteria on Immunity to Ripple**

These tests are applicable to an EPS intended for mobile phones.

These tests shall be performed on nominal V DC output voltage (input ports of mobile phone)

Configuration of Common EPS should cover the following configurations:

The charger shall be configured for maximum operation mode in order to find the worst operational mode during the testing, alternatively it shall be operated at 10%, 70% respective 100 % of the rated output current.

#### **x.x.1 Definition**

These tests assess the ability of the EUT to operate as intended in the event of transients and surges present on their DC power ports.

**Annex II – Part B to**

**MoU regarding Harmonisation of a Charging Capability for Mobile Phones, June 5th, 2009**

**x.x..2 Test method**

According to EN 301 489-1 applicable clauses

**x.x.1 Test requirements**

The test levels shall be:

Voltage Stability: 5 Volt +/- 0,25

Voltage ripple: 100 mV

Current tolerances: current load level +/- 10%

## Safety (EN 60950-1)

This Annex has been produced by MoU for Harmonisation of a Charging Capability for Mobile Phones as part of the mandate M/455 EN 1<sup>st</sup> October 2009 from the European Commission.

This annex contains the common requirements for a common External Power Supply (EPS) in respect of Safety. For the purposes of this Annex a Common EPS has A Micro-USB B-Plug attached via a cable which delivers power to the device being charged, A voltage supplied of 5.0 V +/- 5%, a maximum output current delivered of between 500 mA and 1500 mA.

The Common EPS must be a Limited Power source in accordance with EN60950-1

EN60950 has been reviewed by the MoU for Harmonisation of a Charging Capability for Mobile Phones which has resulted in the following recommendations:

- 1) Common EPS safety testing and certification currently available for Limited Power Source certification to EN60950 should be employed.

**However, for Regulatory purposes the MoU have identified a need to request the responsible SDO for additional Safety standardisation work for the EPS in the following areas:**

- **A Voltage limit for EPS, under single fault conditions as given in USB Implementers Forum Battery Charging Specification, revision 1.1 April 15 2009.**
- **A Current limit which shall not allow current to rise above 3 A for the EPS, under single fault conditions.**

- 2) Mobile phone safety testing and certification does not require the use of the specific charger/EPS, any appropriate representative EPS or other power source may be used. Battery safety is unchanged from the current situation.

**Therefore there is no request to SDOs for Safety standardisation work for the Mobile Phone as a result of the introduction of EPS.**