



**ElectroMagnetic Compatibility (EMC)
standard for radio equipment and services;
Part 34: Specific conditions for External Power Supply (EPS)
for mobile phones;
Harmonised Standard covering the essential requirements
of article 6 of Directive 2014/30/EU**

Reference

REN/ERM-EMC-339

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Contents

Intellectual Property Rights	5
Foreword.....	5
Modal verbs terminology.....	5
1 Scope	6
2 References	6
2.1 Normative references	6
2.2 Informative references.....	6
3 Definitions and abbreviations.....	7
3.1 Definitions	7
3.2 Abbreviations	7
4 Test conditions	8
4.1 General	8
4.2 Arrangements for test signals	8
4.3 RF exclusion band of radio communications equipment.....	8
4.4 Narrow band responses of receivers or receivers which are part of transceivers	8
4.5 Normal test modulation	8
4.6 Representative generic test load	9
5 Performance assessment.....	9
6 Performance criteria	9
6.0 General	9
6.1 Performance criteria for EPS.....	9
7 Applicability overview tables.....	10
7.0 General	10
7.1 EMC requirements for emission.....	10
7.2 EMC requirements for Immunity	10
8 Methods of measurement and limits for EMC emissions	11
8.1 Test configuration.....	11
8.2 Enclosure of EPS equipment	11
8.2.0 Configuration of enclosure of EPS equipment.....	11
8.2.1 Test method	11
8.2.2 Limits.....	11
8.3 DC power output ports	11
8.3.0 Configuration of DC power output ports	11
8.3.1 Definition.....	11
8.3.2 Test method	12
8.3.3 Limits.....	12
8.4 AC mains power input ports.....	12
8.4.0 Configuration of AC mains power input ports.....	12
8.4.1 Definition.....	12
8.4.2 Test method	12
8.4.3 Limits.....	12
8.5 Harmonic current emissions (AC mains input port).....	12
8.6 Voltage fluctuations and flicker (AC mains input port)	12
9 Test methods and levels for immunity tests	13
9.1 Test configuration.....	13
9.2 Radio frequency electromagnetic field (80 MHz to 6 000 MHz).....	13
9.2.0 Configuration of EPS for Radio frequency electromagnetic field (80 MHz to 6 000 MHz) test.....	13
9.2.1 Definition.....	13
9.2.2 Test method	13
9.3 Electrostatic discharge.....	14
9.3.0 Configuration of EPS for electrostatic discharge test	14

9.3.1	Definition.....	14
9.3.2	Test method	14
9.4	Fast transients, common mode	14
9.4.0	Configuration of EPS for Fast transients, common mode test	14
9.4.1	Definition.....	14
9.4.2	Test method	15
9.5	Radio frequency, common mode.....	15
9.5.0	Configuration of EPS for Radio frequency, common mode test.....	15
9.5.1	Definition.....	15
9.5.2	Test method	15
9.6	Transients and surges in the vehicular environment.....	15
9.7	Voltage dips and interruptions.....	15
9.7.0	Configuration of EPS for Voltage dips and interruptions test	15
9.7.1	Definition.....	16
9.7.2	Test method	16
9.8	Surges	16
9.8.0	Configuration of EPS for Surge test	16
9.8.1	Definition.....	16
9.8.2	Test method	16
Annex A (informative):	Relationship between the present document and the essential requirements of Directive 2014/30/EU	17
Annex B (informative):	Rationales considered in drafting ETSI EN 301 489-34.....	18
Annex C (informative):	Global cellular uplink test frequencies	19
Annex D (informative):	Change history	21
History		22

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Foreword

This final draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Vote phase of the ETSI standards EN Approval Procedure.

The present document has been prepared under the Commission's standardisation request C(2016) 7641 final [i.9] to provide one voluntary means of conforming to the essential requirements of Directive 2014/30/EU on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast) [i.1].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

The present document is part 34 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

Proposed national transposition dates	
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Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
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Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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1 Scope

The present document specifies technical characteristics and methods of measurement for the common external power supply (EPS) for use with data-enabled mobile telephones as described in CENELEC EN 62684 [3].

The present document covers the essential requirements of article 6 of Directive 2014/30/EU under the conditions identified in annex A.

In case of differences (for instance concerning special conditions, definitions and abbreviations) between the present document and ETSI EN 301 489-1 [1], the provisions of the present document take precedence.

2 References

2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference/>.

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The following referenced documents are necessary for the application of the present document.

- [1] ETSI EN 301 489-1 (V2.2.0) (03-2017): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU".
- [2] CENELEC EN 61000-4-6:2009: "Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields".
- [3] CENELEC EN 62684:2010: "Interoperability specifications of common external power supply (EPS) for use with data-enabled mobile telephones".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast).
- [i.2] Void.
- [i.3] Void.
- [i.4] Void.
- [i.5] Void.

- [i.6] Void.
- [i.7] ETSI EN 301 489 (all parts): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".
- [i.8] Void.
- [i.9] Commission Implementing Decision C(2016) 7641 final of 30.11.2016 on a standardisation request to the European Committee for Standardisation, to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards harmonised standards in support of Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in clause 3 of ETSI EN 301 489-1 [1] and the following apply:

adaptor: device with a USB Micro-B receptacle/plug connecting to a specific non USB Micro-B connector

NOTE: An Adaptor can also be a cable.

enclosure port: physical boundary of the apparatus through which electromagnetic fields may radiate or impinge

External Power Supply (EPS): Common external Power Supply (EPS) with an AC input which meets the requirements of the specifications given in CENELEC EN 62684 [3]

port: particular interface, of the specified equipment (apparatus), with the electromagnetic environment

EXAMPLE: Any connection point on an equipment intended for connection of cables to or from that equipment is considered as a port (see figure 1).

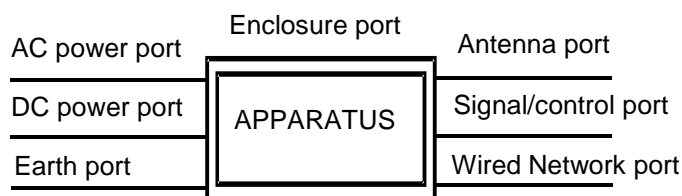


Figure 1: Examples of ports

NOTE: An interface, which uses optical fibre, is not a port for the purposes of testing because it does not interact with the electromagnetic environment within the frequency range, which is applicable for the present document. An optical fibre interface may still be used in the assessment of performance.

representative generic test load: EPS load which fully exercise the EPS and is supplied by the EPS manufacturer

NOTE: E.g. as in clause 4.3.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in clause 3 of ETSI EN 301 489-1 [1] and the following apply:

AC	Alternating Current
AMN	Artificial Mains Network
DC	Direct Current

DCS	Digital Cellular System
EMC	ElectroMagnetic Compatibility
EPS	External Power Supply
ESD	Electro Static Discharge
EUT	Equipment Under Test
PCS	Personal Communications Service
RF	Radio Frequency
rms	root mean square
UE	User Equipment (Mobile station)
UMTS	Universal Mobile Telecommunication System

4 Test conditions

4.1 General

The present document relates to the testing of the EPS, and seeks to ensure that an EPS which is compliant to the provisions of the present document will, when used with a compatible UE which is compliant to the applicable provisions of the ETSI EN 301 489 [i.7], comply with the requirements of ETSI EN 301 489-1 [1].

The present document describes testing the EPS with a Representative generic test load, which is intended to emulate a UE for the purpose of testing the EPS.

Because the choice of UE may have some impact on the EMC performance of the EPS certain criteria and/or limits have been tightened beyond those applied in the case of testing intended to determine the compliance of a specific EPS - UE combination. Such specific combinations may be tested as described in other parts of the ETSI EN 301 489 [i.7], but such testing does not demonstrate compliance to the requirements of an EPS.

The provisions of ETSI EN 301 489-1 [1], clause 4.2 shall apply with the following modifications:

- The EPS shall be connected with a Representative generic test load exercising the DC output port.
- Adequate measures shall be taken to avoid the effect of immunity RF test signals on the measuring equipment.
- Measurements shall be taken with the cable supplied with the EPS at the USB Micro-B port. The type and length of cable used shall be recorded in the test report.

4.2 Arrangements for test signals

Adequate measures shall be taken to avoid the effect of immunity test signals on both the measuring equipment and the signal sources for the wanted signals located outside the test environment.

4.3 RF exclusion band of radio communications equipment

Not applicable.

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

Not applicable.

4.5 Normal test modulation

Not applicable.

4.6 Representative generic test load

An EPS Representative generic test load which is representative of a UE shall have the following characteristics:

- A USB Micro-B socket connection.
- An input capacitance of 1 μ F in parallel with the EPS output.
- An input impedance with switchable range of:
 - 10 k Ω (for 0 % rated current).
 - Selection of resistances to obtain the currents and output voltages of the test procedures.

NOTE: Current range 500 mA to 1 500 mA, see CENELEC EN 62684 [3].

- A resistance to obtain Maximum rated current.
- A shielded casing/enclosure as given in CENELEC EN 62684 [3].

5 Performance assessment

ETSI EN 301 489-1 [1], clause 5 shall apply with the following modification stated in clause 6.

6 Performance criteria

6.0 General

For the EPS, the performance criteria are based on a UE intended to be used with the EPS. For some specific test cases a different compliance level and/or performance criteria has been defined in order to ensure the compliance at the UE and EPS.

The performance criteria are used to make a decision on whether an EPS passes or fails immunity tests.

For the purpose of the present document two categories of performance criteria apply:

- performance criteria for continuous phenomena applied to EPS;
- performance criteria for transient phenomena applied to EPS.

6.1 Performance criteria for EPS

For an EPS the performance criteria for continuous phenomena shall meet the requirements whilst tested with the representative generic test load as given below.

The EPS shall meet its specification points on voltage ranges as given below, during and after continuous phenomena and after transient phenomena:

- Output Voltage 5 V \pm 0,25 V from no load to maximum output current measured at the USB Micro-B plug, while connected to the generic test load defined in clause 4.6.

While the parameters above should be monitored at the USB Micro-B plug, the reference for the output voltage is the USB Micro-B plug for an EPS with captive cable and the Standard-A plug for an EPS with detachable cable.

The above criteria shall also be met after exposure to transient phenomena.

The following criteria shall be met after exposure to all immunity phenomena tests:

- 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 CENELEC EN 62684 [3].

7 Applicability overview tables

7.0 General

The applicability overview (tables 1 and 2) give an overview about all EMC tests specified in the present document for EPS equipment.

All tests are port-related EMC tests.

7.1 EMC requirements for emission

Table 1: EMC emission requirements for EPS equipment specified in the present document, overview

Phenomenon	Application	Equipment test requirement EPS	Reference clause in the present document
radiated emission	enclosure of EPS equipment	applicable	8.2
conducted emission	DC power output port	applicable	8.3
conducted emission	AC mains input port	applicable	8.4
harmonic current emissions	AC mains input port	applicable	8.5
voltage fluctuations and flicker	AC mains input port	applicable	8.6
NOTE: Conducted emission tests for wired network port are not applicable.			

EMC emission requirements for EPS equipment shall be as specified in table 1.

7.2 EMC requirements for Immunity

Table 2: Immunity requirements for EPS equipment specified in the present document, overview

Phenomenon	Application	Equipment test requirement EPS	Reference clause in the present document
RF electromagnetic field (80 MHz to 6 000 MHz)	enclosure of EPS equipment	applicable	9.2
electrostatic discharge	enclosure and DC power output port	applicable	9.3
fast transients common mode	DC and AC power ports	applicable	9.4
RF common mode 0,15 MHz to 80 MHz	DC and AC power ports	applicable	9.5
voltage dips and interruptions	AC mains power input ports	applicable	9.7
surges, line to line and line to ground	AC mains power input ports	applicable	9.8
NOTE: Transient and surges tests for DC power input ports are not applicable.			

EMC immunity requirements for EPS equipment shall be as specified in table 2.

8 Methods of measurement and limits for EMC emissions

8.1 Test configuration

This clause defines the requirements for test configurations:

- measurements shall be made in the operational mode producing the largest emission in the frequency band being investigated consistent with normal applications;
- the equipment shall be configured in a manner which is representative for normal/typical operation, where practical;
- ports, which in normal operation are connected, shall be connected to an EPS equipment and to the Representative generic test load, Input/output ports shall be correctly terminated;
- the configuration and mode of operation during the measurements shall be precisely noted in the test report.

8.2 Enclosure of EPS equipment

8.2.0 Configuration of enclosure of EPS equipment

The EPS shall be configured in order to ascertain the worst case radiated emissions and this shall be recorded. Tests shall then be carried out at the worst case, 10 % and 100 % of the rated output current and when disconnected from the Representative generic test load (no load condition).

This test assesses the ability of EPS equipment to limit their internal noise from being radiated from the enclosure.

8.2.1 Test method

The test method shall be in accordance with ETSI EN 301 489-1 [1].

8.2.2 Limits

The EPS equipment under no load condition shall meet the class B limits given in ETSI EN 301 489-1 [1].

The EPS equipment under worst case, 10 % and 100 % of the rated output current conditions the measured emissions shall meet the class B limits, given in ETSI EN 301 489-1 [1].

8.3 DC power output ports

8.3.0 Configuration of DC power output ports

The EPS shall be configured in order to ascertain the worst level of conducted emissions and this shall be recorded. Tests shall then be carried out at the worst case and at 10 % and 100 % of the rated output current and when disconnected from the Representative generic test load (no load condition).

This test is applicable to EPS equipment that may have DC cables longer than 3 m as declared by the manufacturer.

8.3.1 Definition

This test assesses the ability of the EUT to limit its internal noise from being present on the DC power output ports.

8.3.2 Test method

The test method shall be in accordance with ETSI EN 301 489-1 [1]. The Artificial Mains Networks (AMN) as specified in ETSI EN 301 489-1 [1] shall be used and be connected to the Representative generic test load.

The measurement frequency range extends from 150 kHz to 30 MHz.

8.3.3 Limits

The equipment shall meet the limits below including the average limit and the quasi-peak limit when using, respectively, an average detector receiver and a quasi-peak detector receiver and measured in accordance with the method described in clause 8.3.2. If the average limit is met when using a quasi-peak detector, the equipment shall be deemed to meet both limits and measurement with the average detector is unnecessary.

The equipment shall meet the class B limits according to ETSI EN 301 489-1 [1].

8.4 AC mains power input ports

8.4.0 Configuration of AC mains power input ports

This test shall be performed on a representative configuration of the EPS.

8.4.1 Definition

This test assesses the ability of the EUT to limit its internal noise from being present on the AC mains power input port.

8.4.2 Test method

The EPS shall be configured as follows:

The EPS shall be tested across the full range of output currents in order to ascertain the worst mode for internal noise and this shall be recorded. Tests shall then be carried out at the worst case, 10 % and 100 % of the rated output current and when disconnected from the Representative generic test load (no load condition).

The test method shall be in accordance with ETSI EN 301 489-1 [1] and the Artificial Mains Networks (AMNs) shall be connected to the AC mains power source.

The measurement frequency range extends from 150 kHz to 30 MHz.

8.4.3 Limits

The equipment shall meet the limits below including the average limit and the quasi-peak limit when using, respectively, an average detector receiver and a quasi-peak detector receiver and measured in accordance with the method described in clause 8.4.2. If the average limit is met when using a quasi-peak detector, the equipment shall be deemed to meet both limits and measurement with the average detector is unnecessary.

The equipment shall meet the class B limits given in ETSI EN 301 489-1 [1].

8.5 Harmonic current emissions (AC mains input port)

The requirements of clause 8.5 of ETSI EN 301 489-1 [1] for harmonic current emission shall apply for equipment covered by the scope of the present document with an input current up to and including 16 A per phase.

8.6 Voltage fluctuations and flicker (AC mains input port)

The requirements of clause 8.6 of ETSI EN 301 489-1 [1] for voltage fluctuations and flicker shall apply for equipment covered by the scope of the present document with an input current up to and including 16 A per phase.

9 Test methods and levels for immunity tests

9.1 Test configuration

The EPS shall have the following configurations:

- The integral USB cable or the Standard detachable cable assembly, supplied for use with the EPS shall be configured for worst case susceptibility during the immunity tests and this shall be recorded in the test report.
- An EPS shall be tested with the defined Representative generic test load.
- The EPS shall be tested at rated nominal voltage at its full rated load and this shall be recorded.

This clause defines the requirements for test configurations:

- the tests shall be carried out at a point within the specified normal operating environmental range and at the rated supply voltage for the equipment;
- ports, which in normal operation are connected, shall be connected to the Representative generic test load;
- the configuration and mode of operation during the tests shall be precisely noted in the test report.

9.2 Radio frequency electromagnetic field (80 MHz to 6 000 MHz)

9.2.0 Configuration of EPS for Radio frequency electromagnetic field (80 MHz to 6 000 MHz) test

This test shall be performed on a representative configuration of the EPS equipment.

An EPS shall be tested with the defined Representative generic test load.

9.2.1 Definition

This test assesses the ability of the EUT to operate as intended in the presence of a radio frequency electromagnetic field disturbance.

9.2.2 Test method

The test method shall be in accordance with ETSI EN 301 489-1 [1].

The following requirements and evaluation of test results shall apply:

- the test level shall be 3 V/m (measured unmodulated). The test signal shall be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 000 Hz;
- the test shall be performed over the frequency range 80 MHz to 6 000 MHz;
- the stepped frequency increments shall be 1 % frequency increment of the momentary used frequency;
- in addition, at the uplink frequencies in table 3 the test level shall be 10 V/m (measured unmodulated). The test signal shall be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 000 Hz.

NOTE: For global bands see informative annex C.

Table 3: Centre uplink test frequencies

Band	Test frequency (MHz)
LTE 13	782,0
GSM 900/UMTS VIII/LTE 8	897,5
LTE 20	847,0
GSM 1800/UMTSIII/LTE 3	1 747,5
UMTS I/LTE I	1 950,0
LTE 7	2 535,0
LTE 28	725,5 (718 see note)
LTE 40	2 350
LTE 42	3 500
LTE 43	3 700

NOTE: The figures for test frequencies for LTE 28 are for the whole band or for the allocated band (so far) in Europe in parenthesis.

9.3 Electrostatic discharge

9.3.0 Configuration of EPS for electrostatic discharge test

An EPS shall be tested with defined Representative generic test load and no load conditions.

This test shall be performed both on a representative configuration of the EPS with the Representative generic test load and to the shield of the USB Micro-B cable whilst disconnected from the Representative generic test load. In both cases the AC shall be connected.

9.3.1 Definition

This test assesses the ability of the EUT to operate as intended in the event of an electrostatic discharge.

9.3.2 Test method

The test method shall be in accordance with ETSI EN 301 489-1 [1].

For EPS equipment the following requirements and evaluation of test results shall apply.

The test severity level for contact discharge shall be 4 kV and for air discharge 8 kV. All other details, including intermediate test levels, are contained within ETSI EN 301 489-1 [1].

Electrostatic discharges shall be applied to all exposed surfaces of the EUT except where the user documentation specifically indicates a requirement for appropriate protective measures (see ETSI EN 301 489-1 [1]).

9.4 Fast transients, common mode

9.4.0 Configuration of EPS for Fast transients, common mode test

This test shall be performed on a representative configuration of the EPS with the Representative generic test load.

This test shall be performed on the AC mains power port of the EPS equipment.

This test shall be performed on the DC output port of the EPS equipment if intended to be used with cables longer than 3 m as declared by the manufacturer.

9.4.1 Definition

This test assesses the ability of the EUT to operate as intended in the event of fast transients present on one of the input/output ports.

9.4.2 Test method

The test method shall be in accordance with ETSI EN 301 489-1 [1].

The following requirements and evaluation of test results shall apply:

- the test level for DC power output ports shall be 0,5 kV open circuit voltage as given in ETSI EN 301 489-1 [1] transients shall be applied using a capacitive clamp;
- the test level for AC mains power input ports shall be 1 kV open circuit voltage as given in ETSI EN 301 489-1 [1] with the EPS AC port connected directly to the test generator.

9.5 Radio frequency, common mode

9.5.0 Configuration of EPS for Radio frequency, common mode test

This test shall be performed on the AC mains power port of the EPS equipment.

This test shall be performed on the DC output port of the EPS equipment if intended to be used with cables longer than 3 m as declared by the manufacturer.

9.5.1 Definition

This test assesses the ability of the EUT to operate as intended in the presence of a radio frequency electromagnetic disturbance on the input/output ports.

9.5.2 Test method

The test method shall be in accordance with ETSI EN 301 489-1 [1].

The following requirements and evaluation of test results shall apply:

- the test level shall be severity level 2 as given in CENELEC EN 61000-4-6 [2] corresponding to 3 V rms unmodulated. The test signal shall then be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 000 Hz;
- the test shall be performed over the frequency range 150 kHz to 80 MHz;
- a stepped frequency increments shall be 1 % frequency increment of the momentary frequency in the frequency range 150 kHz to 80 MHz;
- the injection method to be used shall be selected according to the basic standard ETSI EN 301 489-1 [1];
- the frequencies of the immunity test signal selected and used during the test shall be recorded in the test report.

9.6 Transients and surges in the vehicular environment

Not applicable.

9.7 Voltage dips and interruptions

9.7.0 Configuration of EPS for Voltage dips and interruptions test

This test shall be performed on a representative configuration of the EPS with the Representative generic test load.

This test shall be performed on the AC mains power port of the EPS equipment.

9.7.1 Definition

These tests assess the ability of the EUT to operate as intended in the event of voltage dips and interruptions present on the AC mains power input ports.

9.7.2 Test method

The test method of ETSI EN 301 489-1 [1], clause 9.7.2 shall apply.

9.8 Surges

9.8.0 Configuration of EPS for Surge test

This test shall be performed on a representative configuration of the EPS with the Representative generic test load.

This test shall be performed on the AC mains power port of the EPS equipment.

9.8.1 Definition

These tests assess the ability of the EUT to operate as intended in the event of surges present on the AC mains power input port.

9.8.2 Test method

For EPS equipment the pass/failure criteria given in clause 6 (see also CENELEC EN 62684 [3]) shall apply.

The test level for ac mains power input ports shall be 2 kV line to ground, and 1 kV line to line, with the output impedance of the surge generator as given in ETSI EN 301 489-1 [1].

The test generator shall provide the 1,2/50 μ s pulse as defined in ETSI EN 301 489-1 [1].

Annex A (informative): Relationship between the present document and the essential requirements of Directive 2014/30/EU

The present document has been prepared under the Commission's standardisation request C(2016) 7641 final [i.9] to provide one voluntary means of conforming to the essential requirements of Directive 2014/30/EU on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast) [i.1].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table A.1: Relationship between the present document and the essential requirements of Directive 2014/30/EU

Harmonised Standard ETSI EN 301 489-34				
Requirement			Requirement Conditionality	
No	Description	Reference: Clause No	U/C	Condition
1	Emissions (Annex I, 1a of Directive 2014/30/EU [i.1])	7.1	U	
2	Immunity (Annex I, 1b of Directive 2014/30/EU [i.1])	7.2	U	

Key to columns:

Requirement:

- No** A unique identifier for one row of the table which may be used to identify a requirement.
- Description** A textual reference to the requirement.
- Clause Number** Identification of clause(s) defining the requirement in the present document unless another document is referenced explicitly.

Requirement Conditionality:

- U/C** Indicates whether the requirement is unconditionally applicable (U) or is conditional upon the manufacturer's claimed functionality of the equipment (C).
- Condition** Explains the conditions when the requirement is or is not applicable for a requirement which is classified "conditional".

Presumption of conformity stays valid only as long as a reference to the present document is maintained in the list published in the Official Journal of the European Union. Users of the present document should consult frequently the latest list published in the Official Journal of the European Union.

Other Union legislation may be applicable to the product(s) falling within the scope of the present document.

Annex B (informative): Rationales considered in drafting ETSI EN 301 489-34

Levels for immunity. The mobile phone industry's 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 EPS on RF immunity testing with a Representative generic test load, needs to be higher in order to minimize the risk for non-tested combinations of mobile phones and an EPS for UEs. Also 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 standalone EPS on RF immunity testing, needs to be higher in order to minimize the risk for non-compliant combinations of UEs and an EPS for mobile phones.

ESD is to ensure a safe and stable performance of the EPS. Different manufacturers have different protection levels for ESD in their design and product and this may cause potential problems for an EPS that is in compliance with a different product. An ESD testing with a Representative generic test load will provide a reasonable performance level for an EPS since the discharges are likely to affect only the EPS design and not the UE.

Annex C (informative): Global cellular uplink test frequencies

Any optional additional frequencies selected and used during the test specified in clause 9.2.2 should be recorded in the test report.

NOTE: Where the bands overlap they have been grouped appropriately.

Table C.1

Current EU Designation	Frequency Band	Test Frequency (MHz)	Uplink Frequency		
No	GSM-450	467,6	460,6	–	467,6
No	GSM-480		489,0	–	496,0
No	Band 12	Covered by Band 13 in table 3	729,0	–	746,0
No	Band 17		734,0	–	746,0
No (see note)	Band 13		777,0	–	787,0
No	Band 14		758,0	–	768,0
No	GSM-750		777,2	–	792,2
Yes	Band 20		791,0	–	821,0
No	Band 18	Covered by LTE Band 20 and GSM 900 in table 3	860,0	–	875,0
No	Band 5		869,0	–	894,0
No	GSM-850		869,2	–	894,2
No	Band 6		875,0	–	885,0
No	Band 19		875,0	–	890,0
Yes	R-GSM-900	Covered by GSM 900 in table 3	921,0	–	960,0
Yes	E-GSM-900		925,0	–	960,0
Yes	Band 8		925,0	–	960,0
Yes	P-GSM-900		935,0	–	960,0
No	Band 11	1 493,4	1 475,9	–	1 495,9
No	Band 21		1 495,9	–	1 510,9
No	Band 24	1 542,0	1 525,0	–	1 559,0
Yes	Band 3	Covered by: GSM 1800/UMTS III/ LTE 3 in table 3	1 805,0	–	1 880,0
Yes	DCS-1 800		1 805,2	–	1 879,8
No	Band 9		1 844,9	–	1 879,9
No	Band 35		1 850,0	–	1 910,0
No	Band 39		1 880,0	–	1 920,0
No	Band 33		1 900,0	–	1 920,0
No	Band 37		1 910,0	–	1 930,0
No	Band 2		1 930,0	–	1 990,0
No	Band 25		1 930,0	–	1 995,0
No	Band 36		1 930,0	–	1 990,0
No	PCS-1 900		1 930,2	–	1 989,8
No	Band 34		2 017,5	2 010,0	–
Yes	Band 1	2 155,0	2 110,0	–	2 170,0
No	Band 4		2 110,0	–	2 155,0
No	Band 10		2 110,0	–	2 170,0
No	Band 23		2 180,0	–	2 200,0
No	Band 40	2 350,0	2 300,0	–	2 400,0
No	Band 41	2 495,0	2 496,0	–	2 690,0
Yes	Band 38		2 570,0	–	2 620,0
Yes	Band 7		2 620,0	–	2 690,0

NOTE: Cellular bands expected to be in operation during 2016.

Annex D (informative): Change history

Version	Information about changes										
1.4.1 - 2.1.1	The standard is associated only with Directive 2014/30/EU and M/552, because of changes of provisions of 2014/53/EU in comparison to 1999/5/EC.										
	In table 3 test frequency for the first line (LTE 13) was corrected to 782 MHz.										
	Added the following lines to table 3										
	<table border="1" data-bbox="368 479 850 508"> <thead> <tr> <th data-bbox="368 479 612 508">Band</th> <th data-bbox="617 479 850 508">Test Frequency</th> </tr> </thead> <tbody> <tr> <td data-bbox="368 508 612 537">LTE 28</td> <td data-bbox="617 508 850 537">725,5 (718)</td> </tr> <tr> <td data-bbox="368 537 612 566">LTE 40</td> <td data-bbox="617 537 850 566">2 350</td> </tr> <tr> <td data-bbox="368 566 612 595">LTE 42</td> <td data-bbox="617 566 850 595">3 500</td> </tr> <tr> <td data-bbox="368 595 612 624">LTE 43</td> <td data-bbox="617 595 850 624">3 700</td> </tr> </tbody> </table>	Band	Test Frequency	LTE 28	725,5 (718)	LTE 40	2 350	LTE 42	3 500	LTE 43	3 700
	Band	Test Frequency									
	LTE 28	725,5 (718)									
LTE 40	2 350										
LTE 42	3 500										
LTE 43	3 700										
E-UTRA band 13 had the uplink and downlink frequencies swapped around when compared with 3GPP TS 36.104.											
In table C.1:											
Uplink changed to 777 MHz - 787 MHz.											
Downlink changed to 746 MHz - 756 MHz.											
In table 3 Test Frequency has been changed to 2 350 MHz. The test frequency for band 40 was outside of the band.											

History

Document history		
V1.1.1	October 2010	Publication
V1.3.1	May 2012	Publication
V1.4.1	May 2013	Publication
V2.1.0	May 2016	EN Approval Procedure AP 20160811: 2016-05-13 to 2016-08-11
V2.1.1	April 2017	Vote V 20170605: 2017-04-06 to 2017-06-05