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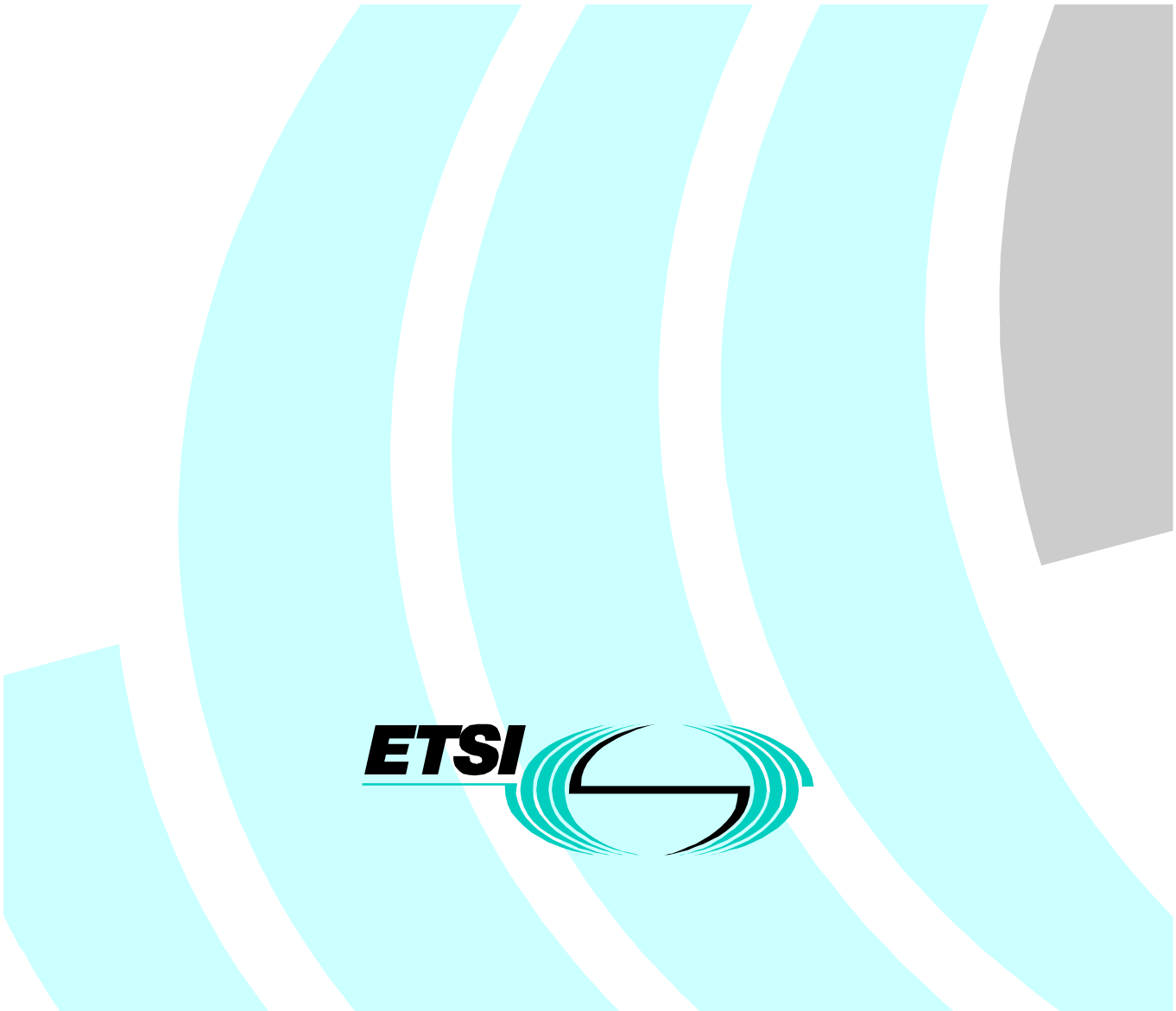
Candidate Harmonized European Standard (Telecommunications series)

Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 6: Harmonized standard for IMT-2000, CDMA TDD (UTRA TDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive



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Contents

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Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

The present document is part 6 of a multi-part deliverable covering the Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks, as identified below:

Part 1: "Harmonized standard for IMT-2000, Introduction and common requirements, covering essential requirements of article 3.2 of the R&TTE Directive";

Part 2: "Harmonized standard for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 3: "Harmonized standard for IMT-2000, CDMA Direct Spread (UTRA FDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 4: "Harmonized standard for IMT-2000, CDMA Multi-Carrier (cdma2000) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 5: "Harmonized standard for IMT-2000, CDMA Multi-Carrier (cdma2000) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 6: "Harmonized standard for IMT-2000, CDMA TDD (UTRA TDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 7: "Harmonized standard for IMT-2000, CDMA TDD (UTRA TDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 8: "Harmonized standard for IMT-2000, TDMA Single-Carrier (UWC 136) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 9: "Harmonized standard for IMT-2000, TDMA Single-Carrier (UWC 136) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";

Part 10: "Harmonized standard for IMT-2000 FDMA/TDMA (DECT) covering essential requirements of article 3.2 of the R&TTE Directive".

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [1] of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ("the R&TTE Directive").

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

Introduction

The present document is part of a set of standards designed to fit in a modular structure to cover all radio and telecommunications terminal equipment under the R&TTE Directive [1]. Each standard is a module in the structure. The modular structure is shown in figure 1.

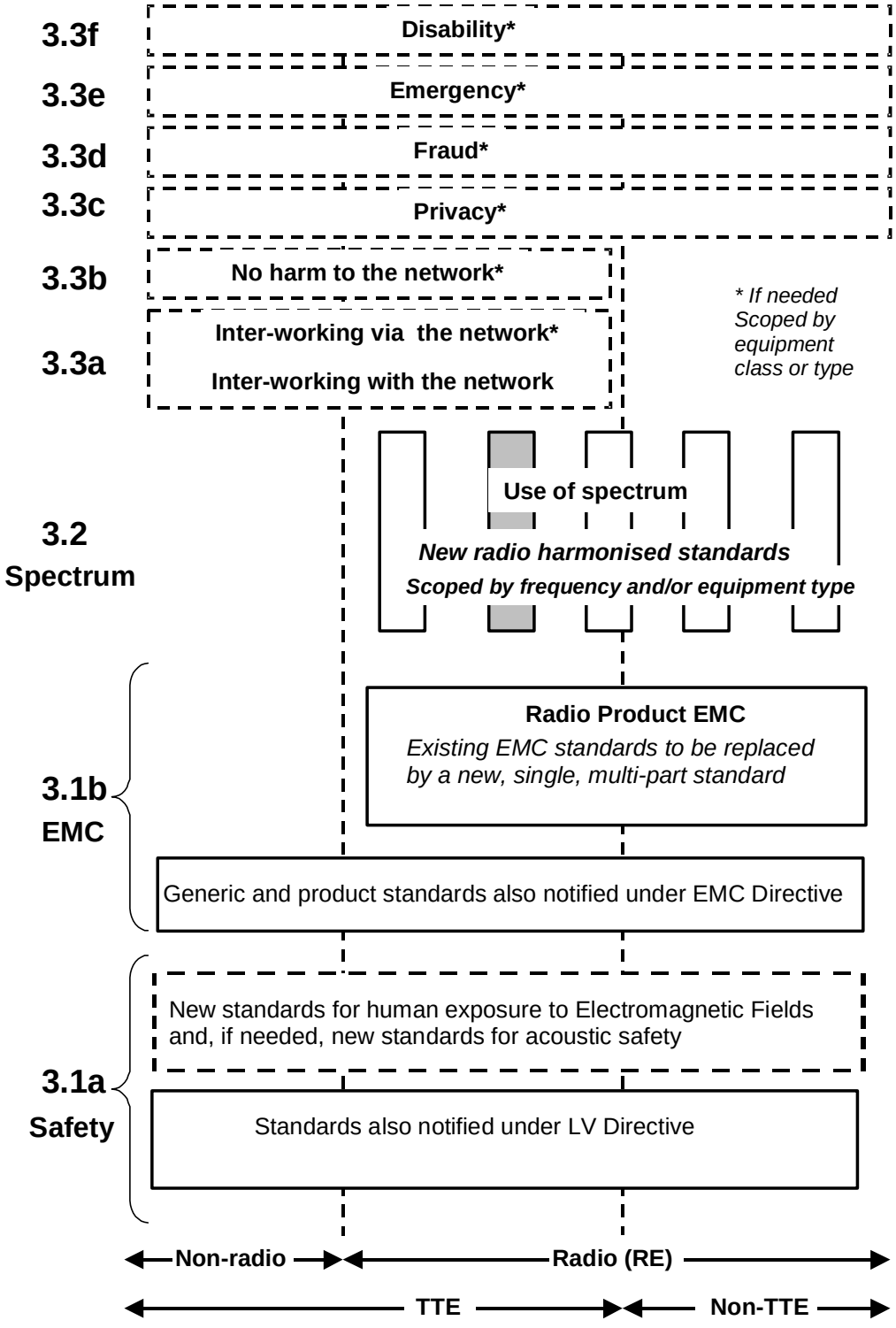

Figure 1: Modular structure for the various standards used under the R&TTE Directive [1]

The left hand edge of the figure 1 shows the pertinent clauses of article 3 of the R&TTE Directive [1].

For article 3.3 various horizontal boxes are shown. Dotted lines indicate that at the time of publication of this standard essential requirements in these areas have to be adopted by the Commission. If such essential requirements are adopted, and as far and as long as they are applicable, they will justify individual standards whose scope is likely to be specified by function or interface type.

The vertical boxes show the standards under article 3.2 for the use of the radio spectrum by radio equipment. The scopes of these standards are specified either by frequency (normally in the case where frequency bands are harmonized) or by radio equipment type.

For article 3.1b the diagram shows EN 301 489 [10], the multi-part product EMC standard for radio, and the existing collection of generic and product standards currently used under the EMC Directive [2].

For article 3.1a the diagram shows the existing safety standards currently used under the LV Directive [3] and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

The bottom of the figure shows the relationship of the standards to radio equipment and telecommunications terminal equipment. A particular equipment may be radio equipment, telecommunications terminal equipment or both. A radio spectrum standard will apply if it is radio equipment. An article 3.3 standard will apply as well only if the relevant essential requirement under the R&TTE Directive [1] is adopted by the Commission and if the equipment in question is covered by the scope of the corresponding standard. Thus, depending on the nature of the equipment, the essential requirements under the R&TTE Directive [1] may be covered in a set of standards.

The modularity principle has been taken because:

- it minimizes the number of standards needed. Because equipment may, in fact, have multiple interfaces and functions it is not practicable to produce a single standard for each possible combination of functions that may occur in an equipment;
- it provides scope for standards to be added:
  - under article 3.2 when new frequency bands are agreed; or
  - under article 3.3 should the Commission take the necessary decisions;

  without requiring alteration of standards that are already published;
- it clarifies, simplifies and promotes the usage of Harmonized Standards as the relevant means of conformity assessment.

The product specifications upon which this multi-part deliverable is based, differ in presentation; and this is reflected in the present document.

1 Scope

The present document applies to the following radio equipment type:

- User equipment for IMT-2000 CDMA TDD (UTRA 3,84 Mcps TDD).

This radio equipment type is capable of operating in all or any part of the frequency bands given in table 1.

Table 1: IMT-2000 CDMA TDD service frequency bands

Direction of tranmission	IMT-2000 CDMA TDD service frequency bands
Transmit and Receive	1900 MHz to 1920 MHz
Transmit and Receive	2010 MHz to 2025 MHz

The present document covers the provisions of Directive 1999/5/EC (R&TTE Directive) [1] article 3.2, which states that "….. radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the R&TTE Directive [1] will apply to equipment within the scope of the present document.

NOTE: A list of such ENs is included on the web site: http://www.newapproach.org/.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).

[2] Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).

[3] Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (LV Directive).

[4] ETSI ETR 028 (2nd Edition, March 1994): "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".

[5] ETSI TS 125 102 V3.5.0 (2000-12): "3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; UE Radio Transmission and Reception (TDD) (Release 1999)".

[6] ETSI TS 134 108 V3.2.0 (2000-12): "3rd Generation Partnership Project; Technical Specification Group Terminal; Terminal Conformance Specification; Common Test Environments for User Equipment Conformance Testing (Release 1999)".

[7] ETSI TS 134 109 V3.2.0 (2000-12): "3rd Generation Partnership Project; Technical Specification Group Terminal; Terminal logic test interface; Special conformance testing functions (Release 1999)".

[8] ETSI TS 134 122 V3.2.0 (2000-12): "3rd Generation Partnership Project; Technical Specification Group Terminal; Terminal Conformance Specification; Radio Transmission and Reception (TDD) (Release 1999)".

[9] ETSI TR 100 028-2:"Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics Part 2".

[10] ETSI EN 301 489: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive [1], and the following apply.

Environmental profile: Range of environmental conditions under which the equipment within the scope of the present document is required to comply with the provisions of the present document.

Power Setting: value of the control signal which determines the desired transmitter output power
Typically, the power setting would be altered in response to power control commands.

Maximum Power Setting: highest value of the power control setting which can be used

Maximum Output Power: measure of power when averaged over the transmit timeslot at the maximum power setting

Average transmit power: average transmitter output power obtained over any specified time interval, including periods with no transmission

Maximum average power: average transmitter output power obtained over any specified time interval, including periods with no transmission, when the transmit time slots are at the maximum power setting

3.2 Symbols

For the purposes of the present document, the following symbols apply:

$\frac{DPCH\_Ec}{I_{or}}$ ratio of the average energy per PN chip of the DPCH to the total transmit power spectral density of the downlink at the BS antenna connector

$\frac{\Sigma\ DPCH\_Ec}{I_{or}}$ ratio of the sum of DPCH_Ec for one service in case of multicode to the total transmit power spectral density of the downlink at the BS antenna connector

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACS	Adjacent Channel Selectivity
BS	Base Station
CW	Continuous wave (unmodulated signal)
DL	Down link (forward link)
DPCH	Dedicated physical channel
DPCH_Ec	Average energy per PN chip for DPCH

EIRP	Effective Isotropic Radiated Power
EMC	Electro-Magnetic Compatibility
EN	European Norm
EN-R	European Norm Requirement
EN-RT	European Norm Requirements Table
EVM	Error Vector Magnitude
FDD	Frequency Division Duplexing
FER	Frame Error Ratio
F_{uw}	Frequency of unwanted signal. This is specified in bracket in terms of an absolute frequency(s) or frequency offset from the assigned channel frequency.
I_{oc}	The power spectral density of a band limited white noise source (simulating interference from other cells) as measured at the UE antenna connector.
I_{oac}	The power spectral density of the adjacent frequency channel as measured at the UE antenna connector
I_{or}	The total transmit power spectral density of the downlink at the BS antenna connector
$\hat{I}_{or}$	The received power spectral density of the downlink as measured at the UE antenna connector
OBW	Occupied Bandwidth
R&TTE	Radio and Telecommunications Terminal Equipment
RE	Radio Equipment
REFSENS	Reference Sensitivity
RRC	Root-Raised Cosine
RX	Receiver
SS	System Simulator
TDD	Time Division Duplexing
TPC	Transmit Power Control
TS	Time Slot
TTE	Telecommunications Terminal Equipment
UE	User Equipment
TX	Transmitter
UARFCN	UTRA Absolute Radio Frequency Channel Number
UL	Uplink (reverse link)
UTRA	UMTS Terrestrial Radio Access

4 Technical requirements specifications

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the user equipment, which shall be declared by the supplier. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile.

For guidance on how a supplier can declare the environmental profile see annex B.

4.2 Conformance requirements

4.2.1 Introduction

To meet the essential requirement under article 3.2 of the R&TTE Directive [1] for IMT-2000 CDMA TDD User Equipment eight essential parameters have been identified. Table 2 provides a cross reference between these essential parameters and the corresponding technical requirements within the scope of the present document.

To fulfill an essential parameter the compliance with all the corresponding technical requirements in table 2 must be verified.

Table 2: Cross reference

Essential parameter	Corresponding technical requirement
Spectrum emissions mask	4.2.2 Spectrum emissions mask
Conducted spurious emissions in active mode	4.2.3 Transmitter spurious emissions
Accuracy of maximum output power	4.2.4 Maximum output power
Prevention of harmful interference through control of power	4.2.5 Minimum transmit power
Conducted spurious emissions in idle mode	4.2.6 Receiver spurious emissions
Impact of interference on receiver performance	4.2.7 Receiver blocking characteristics
	4.2.8 Receiver intermodulation characteristics
	4.2.9 Receiver spurious response
Receiver adjacent channel selectivity	4.2.10 Receiver adjacent channel selectivity
Control and Monitoring functions	4.2.11 Out-of-synchronization handling of output power

4.2.2 Spectrum emission mask

4.2.2.1 Definition

The spectrum emission mask establishes out-of-band emission power limits of the user equipment transmitter. Out of band emissions are defined as unwanted emissions outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions.

The spectrum emission mask of the UE applies to frequency offsets between 2,5 MHz and 12,5 MHz on both sides of the carrier frequency. The out of channel emission is specified as a power level relative to the UE output power in a frequency band of 3,84 MHz width.

4.2.2.2 Limits

The power of any UE emission shall not exceed the levels specified in table 3.

Table3: Spectrum Emission Mask Requirement

Frequency offset from carrier Δf	Minimum requirement	Measurement bandwidth
2,5 MHz to 3,5 MHz	–33.5 – 15*(Δf – 2.5) dBc	30 kHz *
3,5 to 7,5 MHz	–33.5 – 1*(Δf – 3.5) dBc	1 MHz *
7,5 MHz to 8,5 MHz	–37.5 – 10*(Δf – 7.5) dBc	1 MHz *
8,5 MHz to 12,5 MHz	–47,5 dBc	1 MHz *
NOTE 1: The first measurement position with a 30 kHz filter is 2,515 MHz; the last is 3,485 MHz. NOTE 2: The first measurement position with a 1 MHz filter is 4 MHz; the last is 12 MHz. As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be different from the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth. NOTE 3: The lower limit shall be -50 dBm/3,84 MHz or whichever is higher.		

4.2.2.3 Conformance

Conformance tests described in clause 5.3.1 shall be carried out.

4.2.3 Transmitter spurious emissions

4.2.3.1 Definition

Transmitter spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions.

4.2.3.2 Limits

The following requirements are only applicable for UE center carrier frequency offsets greater than 12,5 MHz.

Table 4: General Spurious Emissions Requirements

Frequency Band	Measurement Bandwidth	Minimum Requirement
9 kHz ≤ f < 150 kHz	1 kHz	-36 dBm
150 kHz ≤ f < 30 MHz	10 kHz	-36 dBm
30 MHz ≤ f < 1000 MHz	100 kHz	-36 dBm
1 GHz ≤ f < 12,75 GHz	1 MHz	-30 dBm

Table 5: Additional Spurious Emissions Requirements

Frequency Band	Measurement Bandwidth	Minimum Requirement
925 MHz ≤ f ≤ 935 MHz	100 KHz	-67 dBm
935 MHz < f ≤ 960 MHz	100 KHz	-79 dBm
1 805 MHz ≤ f ≤ 1 880 MHz	100 KHz	-71 dBm
NOTE: The measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the applicable requirements defined in table 4 are permitted for each UARFCN used in the measurement.		

4.2.3.3 Conformance

Conformance tests described in clause 5.3.2.2 shall be carried out.

4.2.4 Maximum output power

4.2.4.1 Definition

The maximum output power refers to the measure of power when averaged over the useful part of the transmit timeslots at the maximum power control setting.

4.2.4.2 Limits

The error of the UE maximum output power shall not exceed the tolerance shown in table 6 for single code.

Table 6: Maximum Output Power and Tolerance for Single Code

Power Class	Maximum output power	Tolerance
1	+30 dBm	+1,7 dB / -3,7 dB
2	+24 dBm	+1,7 dB /-3,7 dB
3	+21 dBm	+2,7 dB /-2,7 dB
4	+10 dBm	+4,7 dB /-4,7 dB

4.2.4.3 Conformance

Conformance tests described in clause 5.3.3 shall be carried out.

4.2.5 Minimum transmit output power

4.2.5.1 Definition

The minimum controlled output power of the UE is when the power control setting is set to a minimum value. This is when the uplink power control indicates a minimum transmit output power is required.

4.2.5.2 Limits

The minimum transmit power shall be better than -44 dBm, measured with a filter that has a root-raised cosine (RRC) filter response with a roll-off factor $\alpha = 0,22$ and a bandwidth equal to the chip-rate.

4.2.5.3 Conformance

Conformance tests described in clause 5.3.4 shall be carried out.

4.2.6 Receiver spurious emissions

4.2.6.1 Definition

The spurious emissions power is the power of emissions generated or amplified in a receiver that appears at the UE antenna connector.

4.2.6.2 Limits

The power of any spurious emissions shall not exceed the limits given in table 7.

Table 7: Receiver spurious emission requirements

Band	Maximum level	Measurement Bandwidth	Note
30 MHz to 1 GHz	- 57 dBm	100 kHz	
1 GHz to 1,9 GHz and 1,92 GHz to 2,01 GHz and 2,025 GHz to 2,11 GHz	- 47 dBm	1 MHz	With the exception of frequencies between 12,5 MHz below the first carrier frequency and 12,5 MHz above the last carrier frequency used by the UE
1,9 GHz to 1,92 GHz and 2,01 GHz to 2,025 GHz and 2,11 GHz to 2,170 GHz	- 60 dBm	3,84 MHz	With the exception of frequencies between 12,5 MHz below the first carrier frequency and 12,5 MHz above the last carrier frequency used by the UE
2,170 GHz to 12,75 GHz	- 47 dBm	1 MHz	

4.2.6.3 Conformance

Conformance tests described in clause 5.3.5 shall be carried out.

4.2.7 Receiver blocking characteristics

4.2.7.1 Definition

The blocking characteristic is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occurs.

4.2.7.2 Limits

The BER shall not exceed 0,001 for the parameters specified in tables 8 and 9.

For table 8 up to 24 exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size for the interference signal.

Table 8: In-band blocking

Parameter	Offset 1	Offset 2	Unit
$\frac{\Sigma DPCH\_Ec}{I_{or}}$	**0**	0	dB
$\hat{I}_{or}$	<REFSENS> + 3 dB	<REFSENS> + 3 dB	dBm/3,84 MHz
$I_{blocking}$ (modulated)	-56	-44	dBm/3,84 MHz
$F_{uw\ offset}$	+10 or –10	+15 or -15	MHz
REFSENS = -105 dBm (see TS 125 102 [5]).			

Table 9: Out of band blocking

Parameter	Band 1	Band 2	Band 3	Unit
$\frac{\Sigma DPCH\_Ec}{I_{or}}$	0	0	0	dB
$\hat{I}_{or}$	<REFSENS> + 3 dB	<REFSENS> + 3 dB	<REFSENS> + 3 dB	dBm/3,84 MHz
$I_{blocking}$ (CW)	-44	-30	-15	dBm
F_{uw}	1 840 < f <1 885 1 935 < f <1 995 2 040 < f <2 085	1 815 < f <1 840 2 085 < f <2 110	1< f <1 815 2 110< f <12 750	MHz
REFSENS = -105 dBm (see TS25.102 [5])				

4.2.7.3 Conformance

Conformance tests described in clause 5.3.6.2 shall be carried out.

4.2.8 Receiver intermodulation characteristics

4.2.8.1 Definition and applicability

Third and higher order mixing of two interfering RF signals can produce an interference. Intermodulation response rejection is a measure of the capability of the receiver to receive a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

4.2.8.2 Limits

The BER shall not exceed 0,001 for the parameters specified in table 10.

Table10: Receiver intermodulation characteristics

Parameter	Value		Unit
$\frac{\Sigma\ DPCH\_Ec}{I_{or}}$	0		dB
$\hat{I}_{or}$ Wanted Signal Level	<REFSENS> + 3 dB		dBm/3,84 MHz
I_{ouw1}(CW)	-46		dBm
I_{ouw2}(modulated)	-46		dBm/3,84 MHz
F_{uw1}(CW)	-10	10	MHz
F_{uw2}(modulated)	-20	20	MHz
REFSENS = -105 dBm (see TS25.102 [5]).			

4.2.8.3 Conformance

Conformance tests described in clause 5.3.6.2 shall be carried out.

4.2.9 Receiver spurious response

4.2.9.1 Definition

Spurious response is a measure of the receiver's ability to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained, i. e. for which the blocking limit is not met.

4.2.9.2 Limits

The BER shall not exceed 0,001 for the parameters specified in table 11.

Table 11: Spurious Response

Parameter	Value	Unit
$\frac{\Sigma DPCH\_Ec}{I_{or}}$	0 dB	dB
$\hat{I}_o$	<REFSENS> + 3 dB	dBm/3,84 MHz
$I_{blocking}$ (CW)	-44	dBm
REFSENS = -105 dBm [5].		

4.2.9.3 Conformance

Conformance tests described in clause 5.3.8.2 shall be carried out.

4.2.10 Receiver adjacent channel selectivity

4.2.10.1 Definition

Adjacent Channel Selectivity (ACS) is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the center frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receiver filter attenuation on the adjacent channel(s).

4.2.10.2 Limits

For UE of power classes 2 and 3 and parameters specified in table 12 the BER shall not exceed 0,001. This test condition is equivalent to the ACS value 33 dB.

Table 12: Test parameters for Adjacent Channel Selectivity

Parameter	Level	Unit
$\frac{\Sigma DPCH\_Ec}{I_{or}}$	0	dB
$\hat{I}_{or}$	-91	dBm/3,84 MHz
I_{oac}	-52	dBm/3,84 MHz
F_{uw} offset	+5 or -5	MHz

4.2.10.3 Conformance

Conformance tests described in clause 5.3.9 shall be carried out.

4.2.11 Out-of-synchronization handling of output power

4.2.11.1 Definition

The UE shall monitor the DPCCH quality in order to detect a loss of the signal. The threshold Q_{out} specifies at what DPCCH quality levels the UE shall shut its power off. The threshold is defined by the condition under which the UE shall shut its transmitter off as stated in this clause.

The OFF power is defined as an averaged power in a duration of at least a timeslot excluding any transient periods, measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0,22$ and a bandwidth equal to the chip rate.

4.2.11.2 Limit

The parameters in Table 13 are defined using the DL reference measurement channel (122) kbps specified in TS 125 102 [5] where the CRC bits are replaced by data bits, and with static propagation conditions.

Table 13: DCH parameters for test of Out-of-synch handling

Parameter	Unit	Value
$\hat{I}_{or}/I_{oc}$	dB	-1
I_{oc}	dBm/3,84 MHz	-60
$\frac{\Sigma \text{ DPCH\_Ec}}{\text{I}_{or}}$	dB	See figure 2
Information Data Rate	kbps	13
TFCI	-	On

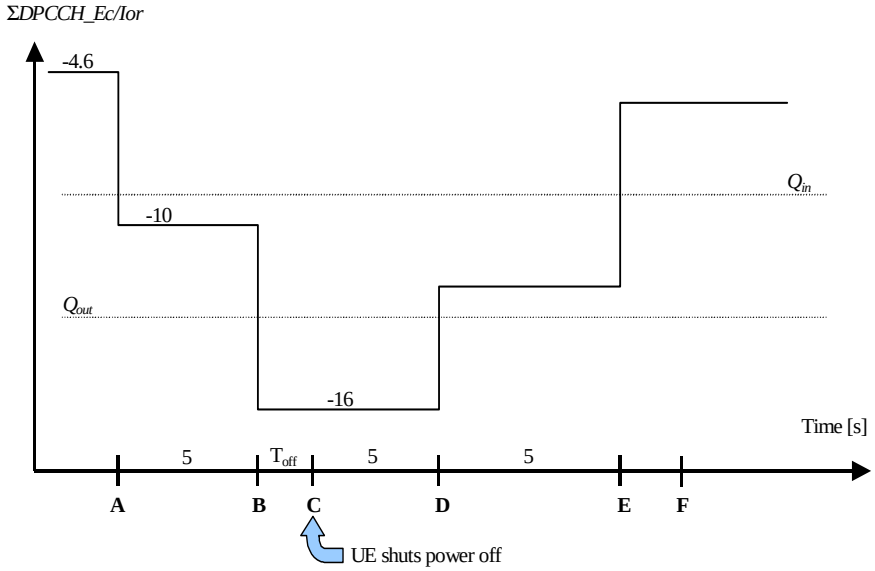

Figure 2: Conditions for out-of-synch handling in the UE

The indicated thresholds Qout and Qin are only informative.

The requirements for the UE are that it shall shut its transmitter off before point C.

The UE transmitter is considered to be off if the transmitter power is better than -64 dBm.

4.2.11.3 Conformance

Conformance tests described in clause 5.3.10 shall be carried out.

5 Testing for compliance with technical requirements

5.1 Environmental conditions for testing

Tests defined in the present document shall be carried out at representative points within the boundary limits of the required operational environmental profile.

Where technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions (within the boundary limits of the required operational environmental profile) to give confidence of compliance for the affected technical requirements.

Normally it should be sufficient for all tests to be conducted using normal test condition except where otherwise stated. For guidance on the use of other test conditions to be used in order to show compliance reference can be made to TS 134 122 [8].

5.2 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether the user equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;
- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in table 15.

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with ETR 028 [4] and shall correspond to an expansion factor (coverage factor) k = 1,96 (which provide confidence levels of respectively 95 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with ETR 028 [4] and shall correspond to an expansion factor (coverage factor) k = 1,96 (which provide confidence levels of respectively 95 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 14 is based on such expansion factors.

Table 14: Maximum measurement uncertainty of the test system

Parameter	Conditions	Uncertainty
5.3.1 Spectrum emission mask	2,5 MHz ≤ foffset < 3,5 MHz 3,5 MHz ≤ foffset < 7,5 MHz 7,5 MHz ≤ foffset < 8,5 MHz 8,5 MHz ≤ foffset < 12,5 MHz	± 1,5 dB
5.3.2 Transmitter spurious emissions	9 kHz ≤ f < 150 kHz 150 kHz ≤ f < 30 MHz 30 MHz ≤ f < 1 000 MHz 1 GHz ≤ f < 12,75 GHz	f ≤ 2,2GHz: ± 1,5 dB 2,2 GHz < f ≤ 4 GHz : ± 2,0 dB 4 GHz < f: ±4,0 dB
	925 MHz ≤ f ≤ 935 MHz 935 MHz < f ≤ 960 MHz 1 805 MHz ≤ f ≤ 1 880 MHz	± 3,0 dB for BS and coexistence requirements
5.3.3 Maximum output power	–	± 0,7 dB
5.3.4 Minimum transmit power	–	±1,0 dB
5.3.5 Receiver spurious emissions	BS receive band (-78 dBm)	± 3,0 dB
	Outside above BS receive band: f ≤ 2,2 GHz (-57dBm 2,2 GHz < f ≤ 4 GHz (-47dBm) 4 GHz < f (-47dBm)	 ±2,0dB ±2,0dB ±4,0dB
5.3.6 Receiver blocking characteristics	Foffset < 15 MHz	±1,4dB
	Foffset ≥ 15 MHz f < = 2,2 GHz: 2,2 GHz < f < = 4 GHz : 4 GHz < f:	±1,0dB ±1,7dB ±3,1dB
5.3.7 Receiver intermodulation characteristics	-	±0,75 dB
5.3.8 Receiver spurious response	f < = 2,2GHz	±1,0dB
	2,2 GHz < f < = 4GHz	±1,7dB
	4 GHz < f:	±3,1dB
5.3.9 Receiver adjacent channel selectivity (ACS)	-	± 1,1 dB
5.3.10 Out-of-synchronization handling of output power		± 1dB

NOTE 1: For RF tests it should be noted that the uncertainties in table 15 apply to the Test System operating into a nominal 50 ohm load and do not include system effects due to mismatch between the EUT and the Test System.

NOTE 2: Annex G of TR 100 028-2 [9] provides guidance for the calculation of the uncertainty components related to mismatch.

NOTE 3: If the Test System for a test is known to have a measurement uncertainty greater than that specified in table 15, this equipment can still be used provided that an adjustment is made follows:

- any additional uncertainty in the Test System over and above that specified in table 15 is used to tighten the Test Requirements - making the test harder to pass (for some tests, e. g. receiver tests, this may require modification of stimulus signals). This procedure will ensure that a Test System not compliant with table 15 does not increase the probability of passing an EUT that would that device would otherwise have failed a test if a Test System compliant with table 15 had been used.

5.3 Essential radio test suites

5.3.1 Spectrum emission mask

5.3.1.1 Method of test

5.3.1.1.1 Initial conditions

1) Connect the System Simulator (SS) to the UE antenna connector (see 34.122 [8]).

2) Set up a call according to the generic call setup procedure using parameters as specified in table 15.

3) Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test setup, call-setup and loopback test mode, guidance on the applicability of these can be found in TS 134 122 [8], annexes A to E, TS 134 108 [6] and TS 134 109 [7], respectively.

Table 15: Common transmitter test parameters

Parameter	Value/description
UL Reference measurement channel	12,2 kbps (see 25.102 [5])
Uplink power control	Set the SS level and signalling parameter values such that MS under test will transmit maximum power.
Data content	real life (sufficiently irregular pattern)

5.3.1.1.2 Procedure

1) Measure the power of the transmitted signal using a measurement filter bandwidth according to table 3. The characteristics of the filter shall be approximately Gaussian (typical spectrum analyzer filter). The center frequency of the filter shall be stepped in contiguous steps according to table 3. The step duration shall be sufficient slow to capture the active TS. The measured power shall be recorded for each step.

2) Measure the wanted output power according to annex B in TS 134 122 [8].

3) Display the results of step 1 in dBc with respect to 2).

5.3.1.2 Test requirements

The result of the measurement according to clause 5.3.1.1.2 step 3) shall fulfil the test requirements of table 3.

5.3.2 Transmitter spurious emissions

5.3.2.1 Method of test

5.3.2.1.1 Initial conditions

1) Connect the SS to the UE antenna connector (see TS34.122 [8]).

2) Set up a call according to the generic call setup procedure using parameters as specified in table 15.

3) Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test setup, call-setup and loopback test mode, guidance on the applicability of these can be found in TS 134 122 [8], annexes A to E, TS 134 108 [6] and TS 134 109 [7], respectively.

5.3.2.1.2 Procedure

Measure the power of the spurious emissions applying measurement filters bandwidths as specified in the relevant tables 4 and 5. The characteristics of the filters shall be approximately Gaussian (typical spectrum analyzer filters). The center frequency of the filter shall be swept over the frequency bands as given in the tables. The sweep time shall be sufficiently low to capture the active time slots.

5.3.2.2 Test requirements

The spurious emissions measured according to clause 5.3.2.1.2 shall not exceed the limits specified in the relevant tables 4 and 5.

5.3.3 Maximum output power

5.3.3.1 Method of test

5.3.3.1.1 Initial conditions

1) Connect the System Simulator (SS) to the UE antenna connector (see 34.122 [8]).

2) Set up a call according to the Generic call setup procedure using parameters as specified in table 16.

3) Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test setup, call-setup and loopback test mode, guidance on the applicability of these can be found in TS 134 122 [8], annexes A to E, TS 134 108 [6] and TS 134 109 [7], respectively.

Table 16: Test parameters for Maximum Output Power single code

Parameter	Value/description
UL Reference measurement channel	Single code 12,2 kbps (see TS25.102 [5])
Uplink Power Control	SS level and signalling values such that UE will transmit maximum power.
Data content	real life (sufficiently irregular)

5.3.3.1.2 Procedure

1) Measure thermal power over the useful part of the burst with a measurement bandwidth of at least 5 MHz.

2) Average over the number of time slots defined in TS 134 122 [8].

3) Run step 1) and 2) for RF channels Low / Mid / High.

5.3.3.2 Test Requirements

The output power error, measured in step 2) of clause 5.3.3.2.2, shall not exceed the prescribed tolerance in table 6.

5.3.4 Minimum transmit power

5.3.4.1 Method of test

5.3.4.1.1 Initial conditions

1) Connect the System Simulator (SS) to the UE antenna connector (see TS 134 122 [8]).

2) A call is set up according to the Generic call setup procedure using parameters as specified in table 17.

Table 17: Common TX test parameters

Paramter	Value/description
UL Reference measurement channel	12,2 kbps (see TS 125 102 [5])
Uplink Power Control	SS level and signalling values such that UE transmits maximum power
Data content	Real life (sufficiently irregular)

3) Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test setup, call-setup and loopback test mode, guidance on the applicability of these can be found in TS 134 122 [8], annexes A to E, TS 134 108 [6] and TS 134 109 [7], respectively.

5.3.4.1.2 Procedure

1) Configure the UE transmitter to enable power control steps of size 1 dB.

2) Measure power of the UE output signal over the useful part of the active time slot according to annex B of TS 134 122 [8].

3) Average over the number of time slots defined in TS 134 122 [8].

4) Configure the UE transmitter to enable power control steps of 2 dB and of 3 dB, respectively, and repeat steps 2) to 3).

5) Run step 2) to 3) for RF channels Low, Mid and High.

5.3.4.2 Test requirements

For all measurements, the minimum transmit power derived in steps 3), 4) and 5) of 5.3.4.2.2 shall be below the limit in clause 4.2.5.2.

5.3.5 Receiver spurious emissions

5.3.5.1 Method of test

5.3.5.1.1 Initial conditions

1) Connect the measurement equipment to the UE antenna;

2) The measurement equipment shall measure the spurious emission power through either:

   - a 100-kHz filter having an approximately Gaussian filter characteristic (typical spectrum analyzer); or
   - a 1-MHz filter having an approximately Gaussian filter characteristic (typical spectrum analyzer); or
   - a matched filter having a bandwidth equal to the chip frequency of 3,84 Mchip/s and a roll-off of 0,22.

3) Enable the UE receiver and set the Cell Search Mode on a PCCPCH. Since there is no downlink signal, the UE should not pass the CellSearch mode.

NOTE: When reference is made to test setup, call-setup and loopback test mode, guidance on the applicability of these can be found in TS 134 122 [8], annexes A to E, TS 134 108 [6] and TS 134 109 [7], respectively.

5.3.5.1.2 Procedure

Measure the power of spurious emissions by covering the frequency ranges of table 8. Cover the UTRA/TDD and UTRA/FDD UE receive band in contiguous steps of 200 kHz. Cover the other frequency ranges in contiguous steps of 100 kHz. Apply the corresponding filters of table 7. The step duration shall be sufficient slow to capture intermittent spurious emissions.

5.3.5.2 Test requirements

The power level of any spurious emissions shall not exceed the values of table 7.

5.3.6 Receiver blocking characteristics

5.3.6.1 Method of test

5.3.6.1.1 Initial conditions

1) Connect the System Simulator (SS) and the interfering signal generator to the antenna connector.
2) Set up a call according to the Generic call setup procedure.
3) Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test setup, call-setup and loopback test mode, guidance on the applicability of these can be found in TS 134 122 [8], annexes A to E, TS 134 108 [6] and TS 134 109 [7], respectively.

5.3.6.1.2 Procedure

1) Set the wanted signal frequency channel to the middle of the band.
2) Step the interfering signal generator frequency through the frequency range indicated in table 8 with a step size of 1 MHz.
3) The interference signal modulation shall be equivalent to a continuously running wideband CDMA signal with one code and a chip frequency of 3.84 Mchip/s and a rolloff factor of 0,22.
4) Measure the BER of the wanted signal received from the UE at the SS for each step of the interfering frequency.
5) Repeat the inband blocking measurements for wanted low–band and high-band frequency channels.
6) Set the wanted signal frequency channel to the middle of the band.
7) Step the interfering signal generator through the frequency range indicated in table 9 with a step size of 1 MHz.
8) Apply an interfering CW signal.
9) Measure the BER of the wanted signal received from the UE at the SS for each interfering frequency.

5.3.6.2 Test requirements

The measured BER from step 4) and 5) shall not exceed the limit stated in clause 4.2.7.2.

The measured BER from step 9) shall not exceed the limit stated in clause 4.2.7.2 except for up to 24 different interfering frequencies. These frequencies are further processed in clause 5.3.8 receiver spurious response.

5.3.7 Receiver intermodulation characteristics

5.3.7.1 Method of test

5.3.7.1.1 Initial conditions

1) Connect the System Simulator (SS) and the generators of unwanted signals to the UE antenna (see TS 134 122 [8]).
2) Set up a call according to the Generic call setup procedure.
3) Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test setup, call-setup and loopback test mode, guidance on the applicability of these can be found in TS 134 122 [8], annexes A to E, TS 134 108 [6] and TS 134 109 [7], respectively.

5.3.7.1.2 Procedure

1) Set the interfering signals as indicated in table 10 with positive offset with respect to the wanted signal.
2) Measure the BER of DCH that the UE at the System Simulator (SS) receives.
3) Set the interfering signals according to table 10 with negative offsets with respect to the wanted signal and repeat step 2).

5.3.7.2 Test requirements

The measured BER, derived in step 2) and 3) shall not exceed the limit in clause 4.2.8.2.

5.3.8 Receiver spurious response

5.3.8.1 Method of test

5.3.8.1.1 Initial conditions

1) Connect the SS and the unwanted signal to the UE antenna connector (see 34.122 [8]).
2) A call is set up according to the Generic call setup procedure.
3) Enter the UE into loopback test mode and start the loopback test.

NOTE: When reference is made to test setup, call-setup and loopback test mode, guidance on the applicability of these can be found in TS 134 122 [8], annexes A to E, TS 134 108 [6] and TS 134 109 [7], respectively.

5.3.8.1.2 Procedure

1) Repeat the wanted signal frequency setting from the blocking test. Set the level according to table 11.
2) Repeat the frequency settings of the interferer signal, at which the blocking test failed. Set the level according to table 11.
3) Measure the BER of DCH received from the UE at the SS for each of the settings 1) and 2).

5.3.8.2 Test requirements

The measured BER, derived in step 3), shall not exceed the limit in clause 4.2.9.2.

5.3.9 Receiver adjacent channel selectivity

5.3.9.1 Method of test

5.3.9.1.1 Initial conditions

1) Connect the system simulator (SS) and the interferer to the UE antenna connector (see TS 134 122 [8]).
2) Set up a call according to the Generic call setup procedure.
3) Enter the UE into loopback test mode and start the loopback test.
4) Set the signal generator to produce an interference signal according to table 12. The interference signal shall be equivalent to a continuously running wideband CDMA signal with one code and chip frequency 3,84 Mchip/s and rolloff factor of 0,22.

NOTE: When reference is made to test setup, call-setup and loopback test mode, guidance on the applicability of these can be found in TS 134 122 [8], annexes A to E, TS 134 108 [6] and TS 134 109 [7], respectively.

5.3.9.1.2 Procedure

1) Set the interference signal 5 MHz above the assigned channel frequency of the wanted signal.
2) Measure the BER of the wanted signal received from the UE at the SS.
3) Set the interference signal 5 MHz below the assigned channel frequency of the wanted signal and repeat 2).

5.3.9.2 Test requirements

The measured BER, derived in step 2), shall not exceed the limit in clause 4.2.9.2.

5.3.10 Out-of-synchronization handling of output power

5.3.10.1 Method of test

5.3.10.1.1 Initial conditions

1) Connect the SS to the UE antenna connector (see TS 134 122 [8]).
2) Calls ere set up according to the Generic call setup procedure using parameters as specified in table 13 with ΣDPCCH_Ec/Ior ratio level at -4,6dB.
3) Enter the UE into loopback test mode and start the loopback test

NOTE: When reference is made to test setup, call-setup and loopback test mode, guidance on the applicability of these can be found in TS 134 122 [8], annexes A to E, TS 134 108 [6] and TS 134 109 [7], respectively.

5.3.10.1.2 Procedure

1) Set the SS TX signal quality to $\frac{\Sigma DPCH\_E_c}{I_{or}}$ = -3,6 dB and verify that the UE TX signal is on.
2) Set the SS TX signal quality to $\frac{\Sigma DPCH\_E_c}{I_{or}}$ = -17 dB. The SS waits 200 ms and verifies that the UE TX signal turns off.
3) The SS monitors the UE transmitted power for 5 seconds and verifies that the UE transmitter is not switched on during this time.

5.3.10.2 Test requirements

The results obtained shall be compared to the limits in clause 4.2.11.2 in order to prove compliance.

Annex A (normative): The EN Requirements Table (EN-RT)

The EN Requirements Table (EN-RT):

- provides a tabular summary of all the requirements;
- shows the status of each EN-R, whether it is essential to implement in all circumstances (Mandatory), or whether the requirement is dependent on the supplier having chosen to support a particular optional service or functionality (Optional). In particular it enables the EN-Rs associated with a particular optional service or functionality to be grouped and identified;
- when completed in respect of a particular equipment, it provides a means to undertake the static assessment of conformity with the EN.

Table A.1: EN Requirements Table (EN-RT)

EN Reference		**EN <xxx xxx-6>**				**Comment**
No.	**Reference**	**EN-R** (note)	**Status**			
1	4.2.2	Spectrum emission mask	M			
2	4.2.3	Transmitter spurious emissions	M			
3	4.2.4	Maximum transmit output power	M			
4	4.2.5	Minimum transmit output power	M			
5	4.2.6	Receiver spurious emissions	M			
6	4.2.7	Receiver blocking characteristics	M			
7	4.2.8	Receiver intermodulation characteristics	M			
8	4.2.9	Receiver spurious response	M			
9	4.2.10	Receiver adjacent channel selectivity	M			
10	4.2.11	Out-of-synchronization handling of output power	M			
NOTE: These EN-Rs are justified under article 3.2 of the R&TTE Directive [1].						

Key to columns:

No Table entry number;

Reference Clause reference number of conformance requirement within the present document;

EN-R Title of conformance requirement within the present document;

Status Status of the entry as follows:

M Mandatory, shall be implemented under all circumstances;
O Optional, may be provided, but if provided shall be implemented in accordance with the requirements;
O.n this status is used for mutually exclusive or selectable options among a set. The integer "n" shall refer to a unique group of options within the EN-RT. A footnote to the EN-RT shall explicitly state what the requirement is for each numbered group. For example, "It is mandatory to support at least one of these options", or, "It is mandatory to support exactly one of these options".

Annex B (informative): Environmental conditions

B.1 General

This informative annex defines the environmental profile of the UE.

B.2 Environmental profile

B.2.1 Temperature

The UE should fulfil all the test requirements in the full temperature range as given in table B.1.

Table B.1 Temperatures

Range	Conditions
+15 °C – +35°C	for normal conditions (with relative humidity of 25 % to 75 %);
-10 °C - +55 °C	for extreme conditions (see IEC publications 68-2-1 and 68-2-2)

B.2.2 Supply Voltage

The UE should fulfill all test requirements stated in the present document in the full voltage range between the extreme supply voltages.

The manufacturer should declare a lower and a higher extreme supply voltage and an approximate shutdown voltage. For equipment that can be operated from one or more of the power sources listed below, the lower extreme voltage should not be higher, and the higher extreme voltage should not be lower than that specified in table B.2.

Table B.2: Supply voltages

Power source	Lower extreme voltage	Higher extreme voltage	Normal conditions voltage
AC mains	0,9 * nominal	1,1 * nominal	nominal
Regulated lead acid battery	0,9 * nominal	1,3 * nominal	1,1 * nominal
Non regulated batteries: Leclanché/lithium Mercury/nickel cadmium	 0,85 * nominal 0,90 * nominal	 Nominal Nominal	 Nominal Nominal

B.2.3 Vibration

The UE should fulfill all test requirements stated in the present document when vibrated at the frequencies and amplitudes as shown in table B.3.

Table B.3: Vibration

Frequency	ASD (Acceleration Spectral Density) random vibration
5 Hz to 20 Hz	0,96 m^2/s^3
20 Hz to 500 Hz	0,96 m^2/s^3 at 20 Hz, slope -3 dB/Octave

Annex C (informative): Bibliography

IEC 60068-3-1 (1974-01): "Environmental testing - Part 3: Background information - Clause One: Cold and dry heat tests".

Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.

Annex D (informative): The EN title in the official languages

Language	EN title
Danish	
Dutch	
English	Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 6: Harmonized standard for IMT-2000, CDMA TDD (UTRA TDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive
Finnish	
French	
German	
Greek	
Icelandic	
Italian	
Portuguese	
Spanish	
Swedish	

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