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*Candidate Harmonized European Standard (Telecommunications series)*

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
Base Stations (BS), Repeaters and User Equipment (UE) for  
IMT-2000 Third-Generation cellular networks;  
Part 3: Harmonized EN for IMT-2000,  
CDMA Direct Spread (UTRA FDD) (BS)  
covering essential requirements  
of article 3.2 of the R&TTE Directive**

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Reference

REN/ERM-TFES-002-3

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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 has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC (as amended) 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").

The present document is part 3 of a multi-part deliverable covering the Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks, as identified below:

- Part 1: "Harmonized EN for IMT-2000, introduction and common requirements, covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 2: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 3: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";**
- Part 4: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 5: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) (BS and Repeaters) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 6: "Harmonized EN for IMT-2000, CDMA TDD (UTRA TDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 7: "Harmonized EN for IMT-2000, CDMA TDD (UTRA TDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 8: "Harmonized EN for IMT-2000, TDMA Single-Carrier (UWC 136) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 9: "Harmonized EN for IMT-2000, TDMA Single-Carrier (UWC 136) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 10: "Harmonized EN for IMT-2000 FDMA/TDMA (DECT) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 11: "Harmonized EN for IMT-2000 CDMA Direct Spread (UTRA FDD) (Repeaters) covering essential requirements of article 3.2 of the R&TTE Directive".

Technical specifications relevant to Directive 1999/5/EC [1] are given in annex A.

<b>Proposed national transposition dates</b>	
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):	36 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.

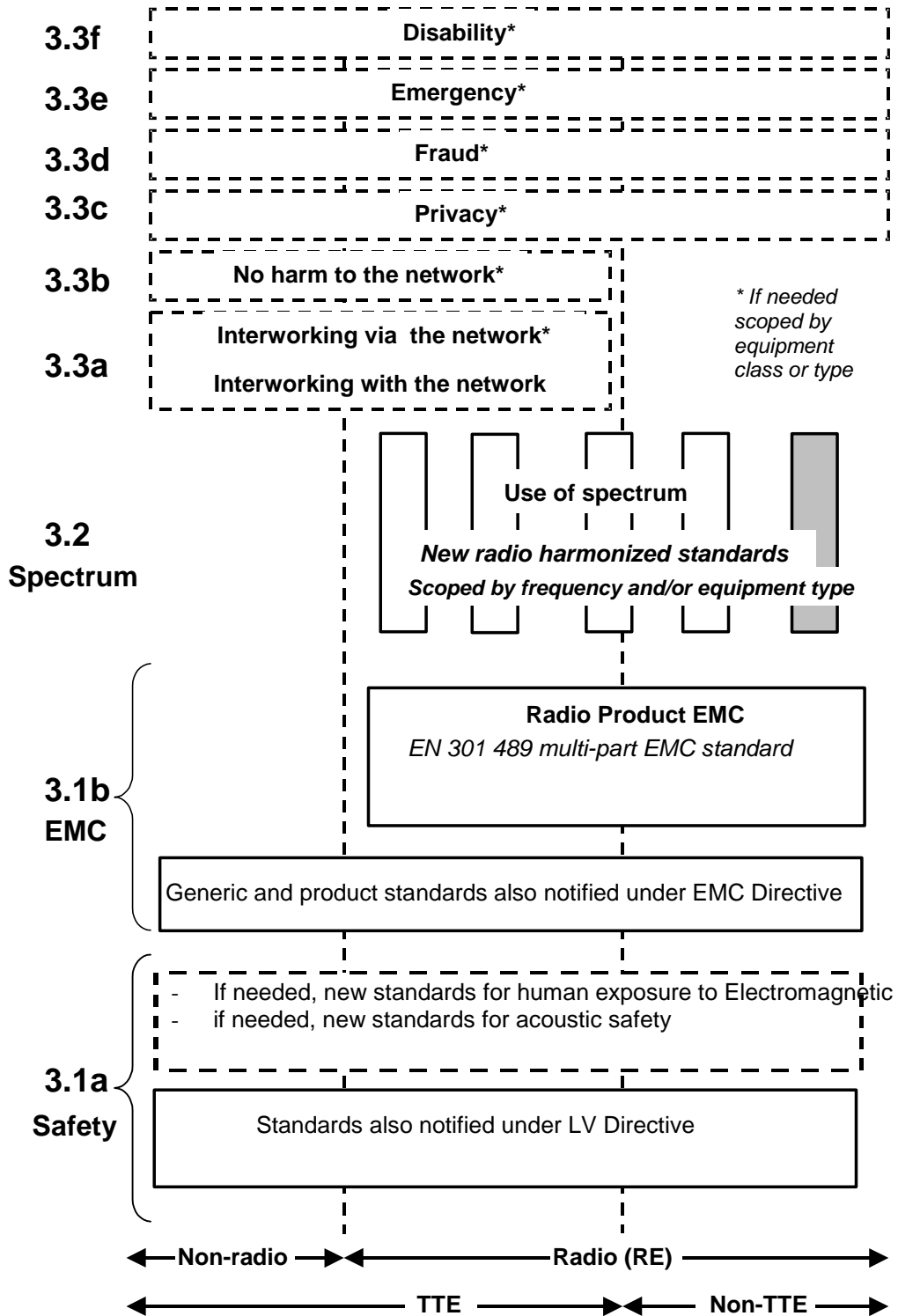


Figure 1: Modular structure for the various standards used under the R&TTE Directive

The left hand edge of the figure 1 shows the different 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 the present document 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, Figure 1 shows EN 301 489 [6], the multi-part product EMC standard for radio 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 figure 1 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 all parts of EN 301 908 are based, differ in presentation; and this is reflected in the present document.



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# 1 Scope

The present document applies to the following radio equipment type:

- Base Stations for IMT-2000 CDMA Direct Spread (UTRA FDD).

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

**Table 1: CDMA Direct Spread base station frequency bands**

Direction of transmission	CDMA Direct Spread base station frequency bands
Transmit	2 110 MHz to 2 170 MHz
Receive	1 920 MHz to 1 980 MHz

The present document covers requirements for UTRA FDD base stations for Release 99, 4 and 5, including base stations supporting HS-PDSCH transmission using QPSK and 16QAM modulation. It also covers Release 6 requirements for wide area base stations, medium range base stations and local area base stations.

The present document is intended to cover the provisions of Directive 1999/5/EC [1] (R&TTE Directive) 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/>.

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# 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.

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

- [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 TR 100 028 (all parts) (V1.4.1): "Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [5] ETSI TS 125 141 (V5.4.0): "Universal Mobile Telecommunications System (UMTS); Base station conformance testing (FDD) (3GPP TS 25.141 version 5.4.0 Release 5)".

- [6] ETSI EN 301 489 (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".
- [7] ITU-R Recommendation SM.329-9 (2001): "Spurious emissions".
- [8] ETSI TS 125 141 (V6.0.0): "Universal Mobile Telecommunications System (UMTS); Base station conformance testing (FDD) (3GPP TS 25.141 version 6.0.0 Release 6)".

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## 3 Definitions 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:

**ancillary equipment:** equipment (apparatus) used in connection with a Base Station, which is considered as an ancillary equipment (apparatus) if:

- the equipment is intended for use in conjunction with a BS to provide additional operational and/or control features to the radio equipment, (e.g. to extend control to another position or location);
- the equipment cannot be used on a stand alone basis to provide user functions independently of a BS; and
- the BS to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions).

**chip rate:** rate of "chips" (modulated symbols after spreading) per second

NOTE: The UTRA FDD chip rate is 3,84 Mchip/s.

**environmental profile:** range of environmental conditions under which equipment, within the scope of EN 301 908-3, is required to comply with the provisions of EN 301 908-3

**local area base station:** base stations characterized by requirements derived from scenarios with a BS to UE minimum coupling loss equal to 45 dB

**maximum output power:** mean power level per carrier of the base station measured at the antenna connector in a specified reference condition

**mean power:** this is the power (transmitted or received) in a bandwidth of at least  $(1 + \alpha)$  times the chip rate of the radio access mod, when applied to a WCDMA modulated signal

NOTE 1: The period of measurement shall be at least one timeslot unless otherwise stated.

NOTE 2:  $\alpha = 0,22$  is the roll-off factor of the WCDMA signal.

**medium range base station:** base stations characterized by requirements derived from scenarios with a BS to UE minimum coupling loss equal to 53 dB

**output power:** mean power of one carrier of the base station, delivered to a load with resistance equal to the nominal load impedance of the transmitter

**rated output power:** rated output power of the base station is the mean power level per carrier that the manufacturer has declared to be available at the antenna connector

**RRC filtered mean power:** the mean power as measured through a root raised cosine filter with roll-off factor  $\alpha$  and a bandwidth equal to the chip rate of the radio access mode

NOTE: The RRC filtered mean power of a perfectly modulated WCDMA signal is 0,246 dB lower than the mean power of the same signal.

**wide area base station:** base stations characterized by requirements derived from scenarios with a BS to UE minimum coupling loss equal to 70 dB

NOTE: This base station class has the same requirements as the General Purpose base station in Release 99, 4 and 5.

## 3.2 Abbreviations

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

16QAM	16 - Quadrature Amplitude Modulation
ACLR	Adjacent Channel Leakage power Ratio
ACS	Adjacent Channel Selectivity
B	appropriate frequency in the Bottom of the operating frequency band of the BS
BER	Bit Error Ratio
BS	Base Station
CDMA	Code Division Multiple Access
CW	Continuous Wave (unmodulated signal)
DCS	Digital Communication System
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
FDD	Frequency Division Duplexing
$F_{uw}$	Frequency of unwanted signal
GSM	Global System for Mobile communications
HS-PDSCH	High Speed Physical Downlink Shared Channel
LV	Low Voltage
M	appropriate frequency in the Middle of the operating frequency band of the BS
MS	Mobile Station
PCCPCH	Primary Common Control Physical CHannel
QPSK	Quadrature Phase Shift Keying
R&TTE	Radio and Telecommunications Terminal Equipment
RE	Radio Equipment
RF	Radio Frequency
RMS	Root Mean Square
RRC	Root-Raised Cosine
RX	Receiver
SCCPCH	Secondary Common Control Physical CHannel
T	appropriate frequency in the Top of the operating frequency band of the BS
TDD	Time Division Duplexing
TTE	Telecommunications Terminal Equipment
TX	Transmitter
UARFCN	UTRA Absolute Radio Frequency Channel Number
UE	User Equipment
UL	Up Link (reverse link)
UMTS	Universal Mobile Telecommunications System
UTRA	Universal Terrestrial Radio Access
WCDMA	Wideband Code Division Multiple Access

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# 4 Technical requirements specifications

## 4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the 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 C.

## 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 base station equipment (BS) seven essential parameters have been identified. Table 2 provides a cross reference between these essential parameters and the corresponding technical requirements for equipment within the scope of the present document.

**Table 2: Cross references**

Essential parameter	Corresponding technical requirements
Spectrum emissions mask	4.2.2 Spectrum emissions mask
	4.2.3 Adjacent Channel Leakage power Ratio (ACLR)
Conducted spurious emissions from the transmitter antenna connector	4.2.4 Transmitter spurious emissions
Accuracy of maximum output power	4.2.5 Base station maximum output power
Intermodulation attenuation of the transmitter	4.2.6 Transmit intermodulation
Conducted spurious emissions from the receiver antenna connector	4.2.7 Receiver spurious emissions
Impact of interference on receiver performance	4.2.8 Blocking characteristics
	4.2.9 Receiver intermodulation characteristics
Receiver adjacent channel selectivity	4.2.10 Receiver Adjacent Channel Selectivity (ACS)

The technical requirements also apply to the BS configurations described in annex B.

### 4.2.2 Spectrum emissions mask

#### 4.2.2.1 Definition

Out of band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission limit is specified in terms of a spectrum emission mask and adjacent channel leakage power ratio for the transmitter.

#### 4.2.2.2 Limit

The requirement shall be met by a base station transmitting on a single RF carrier configured in accordance with the manufacturer's specification. Emissions shall not exceed the maximum level specified in tables 3 to 6 for the appropriate BS maximum output power, in the frequency range from  $\Delta f = 2,5$  MHz to  $\Delta f_{\max}$  from the carrier frequency, where:

- $\Delta f$  is the separation between the carrier frequency and the nominal -3 dB point of the measuring filter closest to the carrier frequency;
- $f_{\text{offset}}$  is the separation between the carrier frequency and the centre of the measurement filter;
- $f_{\text{offset}_{\max}}$  is either 12,5 MHz or the offset to the UMTS TX band edge as defined in clause 1, whichever is the greater;
- $\Delta f_{\max}$  is equal to  $f_{\text{offset}_{\max}}$  minus half of the bandwidth of the measuring filter.

**Table 3: Spectrum emission mask values, BS maximum output power  $P \geq 43$  dBm**

Frequency offset of measurement filter -3dB point, $\Delta f$	Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$	Maximum level	Measurement bandwidth
$2,5 \text{ MHz} \leq \Delta f < 2,7 \text{ MHz}$	$2,515 \text{ MHz} \leq f_{\text{offset}} < 2,715 \text{ MHz}$	-12,5 dBm	30 kHz
$2,7 \text{ MHz} \leq \Delta f < 3,5 \text{ MHz}$	$2,715 \text{ MHz} \leq f_{\text{offset}} < 3,515 \text{ MHz}$	$-12,5 \text{ dBm} - 15 \times \left( \frac{f_{\text{offset}}}{\text{MHz}} - 2,715 \right) \text{ dB}$	30 kHz
	$3,515 \text{ MHz} \leq f_{\text{offset}} < 4,0 \text{ MHz}$	-24,5 dBm	30 kHz
$3,5 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$4,0 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-11,5 dBm	1 MHz

**Table 4: Spectrum emission mask values, BS maximum output power  $39 \text{ dBm} \leq P < 43 \text{ dBm}$** 

Frequency offset of measurement filter -3dB point, $\Delta f$	Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$	Maximum level	Measurement bandwidth
$2,5 \text{ MHz} \leq \Delta f < 2,7 \text{ MHz}$	$2,515 \text{ MHz} \leq f_{\text{offset}} < 2,715 \text{ MHz}$	-12,5 dBm	30 kHz
$2,7 \text{ MHz} \leq \Delta f < 3,5 \text{ MHz}$	$2,715 \text{ MHz} \leq f_{\text{offset}} < 3,515 \text{ MHz}$	$-12,5 \text{ dBm} - 15 \times \left( \frac{f_{\text{offset}}}{\text{MHz}} - 2,715 \right) \text{ dB}$	30 kHz
	$3,515 \text{ MHz} \leq f_{\text{offset}} < 4,0 \text{ MHz}$	-24,5 dBm	30 kHz
$3,5 \text{ MHz} \leq \Delta f < 7,5 \text{ MHz}$	$4,0 \text{ MHz} \leq f_{\text{offset}} < 8,0 \text{ MHz}$	-11,5 dBm	1 MHz
$7,5 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$8,0 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$P - 54,5 \text{ dB}$	1 MHz

**Table 5: Spectrum emission mask values, BS maximum output power  $31 \text{ dBm} \leq P < 39 \text{ dBm}$** 

Frequency offset of measurement filter -3dB point, $\Delta f$	Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$	Maximum level	Measurement bandwidth
$2,5 \text{ MHz} \leq \Delta f < 2,7 \text{ MHz}$	$2,515 \text{ MHz} \leq f_{\text{offset}} < 2,715 \text{ MHz}$	$P - 51,5 \text{ dB}$	30 kHz
$2,7 \text{ MHz} \leq \Delta f < 3,5 \text{ MHz}$	$2,715 \text{ MHz} \leq f_{\text{offset}} < 3,515 \text{ MHz}$	$P - 51,5 \text{ dB} - 15 \times \left( \frac{f_{\text{offset}}}{\text{MHz}} - 2,715 \right) \text{ dB}$	30 kHz
	$3,515 \text{ MHz} \leq f_{\text{offset}} < 4,0 \text{ MHz}$	$P - 63,5 \text{ dB}$	30 kHz
$3,5 \text{ MHz} \leq \Delta f < 7,5 \text{ MHz}$	$4,0 \text{ MHz} \leq f_{\text{offset}} < 8,0 \text{ MHz}$	$P - 50,5 \text{ dB}$	1 MHz
$7,5 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$8,0 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$P - 54,5 \text{ dB}$	1 MHz

**Table 6: Spectrum emission mask values, BS maximum output power  $P < 31 \text{ dBm}$** 

Frequency offset of measurement filter -3dB point, $\Delta f$	Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$	Maximum level	Measurement bandwidth
$2,5 \text{ MHz} \leq \Delta f < 2,7 \text{ MHz}$	$2,515 \text{ MHz} \leq f_{\text{offset}} < 2,715 \text{ MHz}$	-20,5 dBm	30 kHz
$2,7 \text{ MHz} \leq \Delta f < 3,5 \text{ MHz}$	$2,715 \text{ MHz} \leq f_{\text{offset}} < 3,515 \text{ MHz}$	$-20,5 \text{ dBm} - 15 \times \left( \frac{f_{\text{offset}}}{\text{MHz}} - 2,715 \right) \text{ dB}$	30 kHz
	$3,515 \text{ MHz} \leq f_{\text{offset}} < 4,0 \text{ MHz}$	-32,5 dBm	30 kHz
$3,5 \text{ MHz} \leq \Delta f < 7,5 \text{ MHz}$	$4,0 \text{ MHz} \leq f_{\text{offset}} < 8,0 \text{ MHz}$	-19,5 dBm	1 MHz
$7,5 \text{ MHz} \leq \Delta f \leq \Delta f_{\text{max}}$	$8,0 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-23,5 dBm	1 MHz

#### 4.2.2.3 Conformance

Conformance tests described in clause 5.3.1 shall be carried out.

## 4.2.3 Adjacent channel leakage ratio (ACLR)

### 4.2.3.1 Definition

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the RRC filtered mean power centred on the assigned channel frequency to the RRC filtered mean power centred on an adjacent channel frequency.

### 4.2.3.2 Limits

The limit for ACLR shall be as specified in table 7.

**Table 7: BS ACLR limits**

<b>BS channel offset below the first or above the last carrier frequency used</b>	<b>ACLR limit</b>
5 MHz	44,2 dB
10 MHz	49,2 dB

### 4.2.3.3 Conformance

Conformance tests described in clause 5.3.2 shall be carried out.

## 4.2.4 Transmitter spurious emissions

### 4.2.4.1 Definition

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. This is measured at the base station RF output port.

The requirement applies at frequencies within the specified frequency ranges, which are more than 12,5 MHz under the first carrier frequency used or more than 12,5 MHz above the last carrier frequency used.

The requirements of clause 4.2.4.2 shall apply whatever the type of transmitter considered (single carrier or multi-carrier). It applies for all transmission modes foreseen by the manufacturer's specification.

Unless otherwise stated, all requirements are measured as mean power.

## 4.2.4.2 Limits

### 4.2.4.2.1 Spurious emissions (Category B)

The power of any spurious emission shall not exceed the limit specified in table 8.

**Table 8: BS Mandatory spurious emissions limits, Category B**

Band	Maximum level	Measurement bandwidth	Note
9 kHz to 150 kHz	-36 dBm	1 kHz	see note 1
150 kHz to 30 MHz	-36 dBm	10 kHz	see note 1
30 MHz to 1 GHz	-36 dBm	100 kHz	see note 1
1 GHz to Fc1 - 60 MHz or 2 100 MHz whichever is the higher	-30 dBm	1 MHz	see note 1
Fc1 - 60 MHz or 2 100 MHz whichever is the higher to Fc1 - 50 MHz or 2 100 MHz whichever is the higher	-25 dBm	1 MHz	see note 2
Fc1 - 50 MHz or 2 100 MHz whichever is the higher to Fc2 + 50 MHz or 2 180 MHz whichever is the lower	-15 dBm	1 MHz	see note 2
Fc2 + 50 MHz or 2 180 MHz whichever is the lower to Fc2 + 60 MHz or 2 180 MHz whichever is the lower	-25 dBm	1 MHz	see note 2
Fc2 + 60 MHz or 2 180 MHz whichever is the lower to 12,75 GHz	-30 dBm	1 MHz	see note 3
NOTE 1: Bandwidth as in ITU-R Recommendation SM.329-9 [7], clause 4.1.			
NOTE 2: Specification in accordance with ITU-R Recommendation SM.329-9 [7], clause 4.3 and annex 7.			
NOTE 3: Bandwidth as in ITU-R Recommendation SM.329-9 [7], clause 4.1. Upper frequency as in ITU-R Recommendation SM.329-9 [7], clause 2.5, table 1.			
Key:			
Fc1: Centre frequency of first carrier frequency used by the BS.			
Fc2: Centre frequency of last carrier frequency used by the BS.			

### 4.2.4.2.2 Co-existence with GSM 900

This requirement shall be applied for the protection of GSM 900 MS.

The power of any spurious emission shall not exceed the limit specified in table 9.

**Table 9: Spurious emissions limits for protection of GSM 900 MS receiver**

Band	Maximum level	Measurement bandwidth
921 MHz to 960 MHz	-57 dBm	100 kHz

#### 4.2.4.2.3 Co-existence with DCS 1800

This requirement shall be applied for the protection of DCS 1800 MS.

The power of any spurious emission shall not exceed the limit specified in table 10.

**Table 10: Spurious emissions limits for protection of DCS 1800 MS receiver**

Band	Maximum level	Measurement bandwidth
1 805 MHz to 1 880 MHz	-47 dBm	100 kHz

#### 4.2.4.2.4 Co-existence with services in adjacent frequency bands

This requirement shall be applied for the protection in bands adjacent to the frequency band 2 110 MHz to 2 170 MHz.

The power of any spurious emission shall not exceed the limits specified in table 11.

**Table 11: Spurious emissions limits for protection of adjacent band services**

Band (f)	Maximum level	Measurement bandwidth
2 100 MHz to 2 105 MHz	$-30 + 3,4 (f - 2\ 100\ \text{MHz})\ \text{dBm}$	1 MHz
2 175 MHz to 2 180 MHz	$-30 + 3,4 (2\ 180\ \text{MHz} - f)\ \text{dBm}$	1 MHz

#### 4.2.4.2.5 Co-existence with UTRA-TDD

This requirement shall be applied for the protection of UTRA-TDD.

The power of any spurious emission shall not exceed the limit specified in table 12.

**Table 12: Spurious emissions limits for protection of UTRA-TDD receiver**

Band	Maximum level	Measurement bandwidth
1 900 MHz to 1 920 MHz	-52 dBm	1 MHz
2 010 MHz to 2 025 MHz	-52 dBm	1 MHz

#### 4.2.4.3 Conformance

Conformance tests described in clause 5.3.3 shall be carried out.

### 4.2.5 Base station maximum output power

#### 4.2.5.1 Definition

Maximum output power,  $P_{\text{max}}$ , of the base station is the mean power level per carrier measured at the antenna connector in specified reference condition.

#### 4.2.5.2 Limit

In normal conditions, the Base station maximum output power shall remain within +2,7 dB and -2,7 dB of the manufacturer's rated output power.

In extreme conditions, the Base station maximum output power shall remain within +3,2 dB and -3,2 dB of the manufacturer's rated output power.



### 4.2.5.3 Conformance

Conformance tests described in clause 5.3.4 shall be carried out.

## 4.2.6 Transmit intermodulation

### 4.2.6.1 Definition

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

The transmit intermodulation level is the power of the intermodulation products when a WCDMA modulated interference signal is injected into an antenna connector at a mean power level of 30 dB lower than that of the mean power of the wanted signal. The frequency of the interference signal shall be  $\pm 5$  MHz,  $\pm 10$  MHz and  $\pm 15$  MHz offset from the subject signal carrier frequency, but excluding interference frequencies that are outside of the allocated frequency band for UTRA-FDD downlink specified in clause 1.

The requirements are applicable for a single carrier.

### 4.2.6.2 Limit

In the frequency range relevant for this test, the transmit intermodulation level shall not exceed the out of band emission or the spurious emission requirements of clauses 4.2.2.2, 4.2.3.2 and 4.2.4.2 in the presence of a WCDMA modulated interference signal with a mean power level 30 dB lower than the mean power of the wanted signal.

### 4.2.6.3 Conformance

Conformance tests described in clause 5.3.5 shall be carried out.

## 4.2.7 Receiver spurious emissions

### 4.2.7.1 Definition

The spurious emission power is the power of the emissions generated or amplified in a receiver that appears at the BS antenna connector. The requirements apply to all BS with separate RX and TX antenna port. The test shall be performed when both TX and RX are on with the TX port terminated.

For all BS with common RX and TX antenna port the transmitter spurious emission as specified in clause 4.2.4 is valid.

### 4.2.7.2 Limit

The power of any spurious emission shall not exceed the limit specified in table 13.

**Table 13: Spurious emission minimum requirement**

Band	Maximum level	Measurement bandwidth	Note
1 900 MHz to 1 980 MHz and 2 010 MHz to 2 025 MHz	-78 dBm	3,84 MHz	
30 MHz to 1 GHz	-57 dBm	100 kHz	
1 GHz to 12,75 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 BS transmitter.

### 4.2.7.3 Conformance

Conformance tests described in clause 5.3.6 shall be carried out.

## 4.2.8 Blocking characteristics

### 4.2.8.1 Definition

The blocking characteristics 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 adjacent channels. The blocking performance requirement applies as specified in tables 14, 14a and 14b.

The requirements in this clause shall apply to base stations intended for general-purpose applications.

### 4.2.8.2 Limit

The BER shall not exceed 0,001 for the parameters specified in tables 14, 14a or 14b depending on the declared base station class.

**Table 14: Blocking characteristics for Wide Area BS**

Centre Frequency of Interfering Signal	Interfering Signal mean power	Wanted Signal mean power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1 920 MHz to 1 980 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal with one code
1 900 MHz to 1 920 MHz 1 980 MHz to 2 000 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal with one code
1 MHz to 1 900 MHz and 2 000 MHz to 12 750 MHz	-15 dBm	-115 dBm	-	CW carrier

**Table 14a: Blocking characteristics for Medium Range BS**

Centre Frequency of Interfering Signal	Interfering Signal mean power	Wanted Signal mean power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1 920 MHz to 1 980 MHz	-35 dBm	-105 dBm	10 MHz	WCDMA signal with one code
1 900 MHz to 1 920 MHz 1 980 MHz to 2 000 MHz	-35 dBm	-105 dBm	10 MHz	WCDMA signal with one code
1 MHz to 1 900 MHz and 2 000 MHz to 12 750 MHz	-15 dBm	-105 dBm	-	CW carrier

**Table 14b: Blocking characteristics for Local Area BS**

Centre Frequency of Interfering Signal	Interfering Signal mean power	Wanted Signal mean power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1 920 MHz to 1 980 MHz	-30 dBm	-101 dBm	10 MHz	WCDMA signal with one code
1 900 MHz to 1 920 MHz 1 980 MHz to 2 000 MHz	-30 dBm	-101 dBm	10 MHz	WCDMA signal with one code
1 MHz to 1 900 MHz and 2 000 MHz to 12 750 MHz	-15 dBm	-101 dBm	-	CW carrier

### 4.2.8.3 Conformance

Conformance tests described in clause 5.3.7 shall be carried out.

## 4.2.9 Receiver intermodulation characteristics

### 4.2.9.1 Definition

Third and higher order mixing of the two interfering RF signals can produce an interfering signal in the band of the desired channel. 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.

### 4.2.9.2 Limit

The intermodulation performance should be met when signals are applied to the receiver according to Table 15, 15a or 15b depending on the declared base station class.

**Table 15: Interferer signals for Wide Area BS intermodulation performance requirement**

Type of signal	Offset	Signal mean power
Wanted signal	-	-115 dBm
CW signal	10 MHz	-48 dBm
WCDMA signal with one code	20 MHz	-48 dBm

**Table 15a: Interferer signals for Medium Range BS intermodulation performance requirement**

Type of signal	Offset	Signal mean power
Wanted signal	-	-105 dBm
CW signal	10 MHz	- 44 dBm
WCDMA signal with one code	20 MHz	- 44 dBm

**Table 15b: Interferer signals for Local Area BS intermodulation performance requirement**

Type of signal	Offset	Signal mean power
Wanted signal	-	-101 dBm
CW signal	10 MHz	-38 dBm
WCDMA signal with one code	20 MHz	-38 dBm

The BER for the wanted signal shall not exceed 0,001 for the parameters specified in table 15.

### 4.2.9.3 Conformance

Conformance tests described in clause 5.3.8 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's 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 centre frequency of the assigned channel. ACS is the ratio of the receiver filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

The interference signal is  $F_{uw}$  offset from the wanted signal and QPSK modulated by a pseudo random binary sequence uncorrelated to the wanted signal.

#### 4.2.10.2 Limit

The BER shall not exceed 0,001 using the parameters specified in tables 16, 16a or 16b depending on the declared base station class.

**Table 16: Adjacent channel selectivity for Wide Area BS**

Parameter	Level	Unit
Reference measurement channel data rate	12,2	Kbit/s
Wanted signal mean power	-115	dBm
Interfering signal mean power	-52	dBm
Fuw offset (modulated )	±5	MHz

**Table 16a: Adjacent channel selectivity for Medium Range BS**

Parameter	Level	Unit
Reference measurement channel data rate	12.2	Kbit/s
Wanted signal mean power	-105	dBm
Interfering signal mean power	-42	dBm
Fuw offset (modulated )	±5	MHz

**Table 16b: Adjacent channel selectivity for Local Area BS**

Parameter	Level	Unit
Reference measurement channel data rate	12,2	Kbit/s
Wanted signal mean power	-101	dBm
Interfering signal mean power	-38	dBm
Fuw offset (modulated )	±5	MHz

#### 4.2.10.3 Conformance

Conformance tests described in clause 5.3.9 shall be carried out.

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## 5 Testing for compliance with technical requirements

### 5.1 Conditions for testing

Tests defined in the present document shall be carried out at representative points within the boundary limits of the declared 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 declared 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 conditions 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 125 141 [5], clause 4.4.

Many tests in the present document are performed with appropriate frequencies in the bottom, middle and top of the operating frequency band of the BS. These are denoted as RF channels B (bottom), M (middle) and T (top) and are defined in TS 125 141 [5], clause 4.8.

The measurement system required for each test is described in TS 125 141 [5], annex B.

## 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 an 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 17.

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR 100 028 [4] and shall correspond to an expansion factor (coverage factor)  $k = 1,96$  (which provide confidence levels of 95 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 17 is based on such expansion factors.

**Table 17: Maximum uncertainty of the test system**

Parameter	Conditions	Uncertainty
Spectrum emissions mask		$\pm 1,5$ dB
Adjacent channel leakage power ratio (ACLR)		$\pm 0,8$ dB
Transmitter spurious emissions	For "Spurious emissions (Category B)": $f \leq 2,2$ GHz $2,2$ GHz < $f \leq 4$ GHz $f > 4$ GHz For the co-existence requirements:	$\pm 1,5$ dB $\pm 2,0$ dB $\pm 4,0$ dB $\pm 2,0$ dB
Base station maximum output power		$\pm 0,7$ dB
Transmit intermodulation	For spectrum emissions mask: For ACLR For "Spurious emissions (Category B)": $f \leq 2,2$ GHz $2,2$ GHz < $f \leq 4$ GHz $f > 4$ GHz For co-existence requirements Interference signal	$\pm 2,5$ dB $\pm 2,2$ dB $\pm 2,5$ dB $\pm 2,8$ dB $\pm 4,5$ dB $\pm 2,8$ dB $\pm 1,0$ dB
Receiver spurious emissions	For BS receive bands (-78 dBm) Outside the BS receive bands: $f \leq 2,2$ GHz $2,2$ GHz < $f \leq 4$ GHz $f > 4$ GHz	$\pm 3,0$ dB $\pm 2,0$ dB $\pm 2,0$ dB $\pm 4,0$ dB
Blocking characteristics	For offset < 15 MHz: For offset $\geq 15$ MHz and $f \leq 2,2$ GHz $2,2$ GHz < $f \leq 4$ GHz $f > 4$ GHz	$\pm 1,4$ dB $\pm 1,1$ dB $\pm 1,8$ dB $\pm 3,2$ dB
Receiver intermodulation characteristics		$\pm 1,3$ dB
Receiver adjacent channel selectivity (ACS)		$\pm 1,1$ dB

NOTE 1: For RF tests it should be noted that the uncertainties in table 17 apply to the Test System operating into a nominal 50  $\Omega$  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 [4] provides guidance for the calculation of the uncertainty components relating to mismatch.

NOTE 3: If the Test System for a test is known to have a measurement uncertainty greater than that specified in table 17, 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 17 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 17 does not increase the probability of passing an EUT that would otherwise have failed a test if a Test System compliant with table 17 had been used.

## 5.3 Essential radio test suites

### 5.3.1 Spectrum emission mask

#### 5.3.1.1 Initial conditions

Test environment: Normal; see TS 125 141 [5], clause 4.4.1.

RF channels to be tested: B, M and T; see clause 5.1.

- 1) Set-up the equipment as shown in TS 125 141 [5], annex B.  
As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity, efficiency and avoiding e.g. carrier leakage, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.
- 2) Measurements with an offset from the carrier centre frequency between 2,515 MHz and 4,0 MHz shall use a 30 kHz measurement bandwidth.
- 3) Measurements with an offset from the carrier centre frequency between 4,0 MHz and  $(f_{\text{offset}_{\text{max}}} - 500 \text{ kHz})$  shall use a 1 MHz measurement bandwidth.
- 4) Detection mode: true RMS voltage or true average power.

#### 5.3.1.2 Procedures

- 1) Set the BS to transmit a signal in accordance to test model 1 in TS 125 141 [5] at the manufacturer's specified maximum output power.
- 2) Step the centre frequency of the measurement filter in contiguous steps and measure the emission within the specified frequency ranges with the specified measurement bandwidth and note that the measured value does not exceed the specified value.

The results obtained shall be compared to the limits in clause 4.2.2.2 in order to prove compliance.

## 5.3.2 Adjacent Channel Leakage power Ratio (ACLR)

### 5.3.2.1 Initial conditions

Test environment: Normal; see TS 125 141 [5], clause 4.4.1.

RF channels to be tested: B, M and T with multiple carriers if supported; see clause 5.1.

- 1) Connect measurement device to the base station RF output port as shown in TS 125 141 [5], annex B.
- 2) The measurement device characteristics shall be:
  - measurement filter bandwidth: defined in clause 4.2.3.1;
  - detection mode: true RMS voltage or true average power.
- 3) Set the base station to transmit a signal modulated in accordance with TS 125 141 [5] Test model 1. The mean power at the RF output port shall be the maximum output power as specified by the manufacturer.
- 4) Set carrier frequency within the frequency band supported by BS. Minimum carrier spacing shall be 5 MHz and maximum carrier spacing shall be specified by manufacturer.

### 5.3.2.2 Procedure

- Measure Adjacent channel leakage power ratio for 5 MHz and 10 MHz offsets both side of channel frequency. In multiple carrier case only offset frequencies below the lowest and above the highest carrier frequency used shall be measured.

The results obtained shall be compared to the limits in clause 4.2.3.2 in order to prove compliance.

## 5.3.3 Transmitter spurious emissions

### 5.3.3.1 Initial conditions

Test environment: Normal; see TS 125 141 [5], clause 4.4.1.

RF channels to be tested: B, M and T with multiple carriers if supported; see clause 5.1.

- 1) Connect the BS antenna connector to a measurement receiver using an attenuator or a directional coupler if necessary.
- 2) Measurements shall use a measurement bandwidth in accordance to the tables in clause 4.2.4.2.
- 3) Detection mode: true RMS voltage or true average power.
- 4) Configure the BS with transmitters active at their maximum output power.

### 5.3.3.2 Procedure

- 1) Set the BS to transmit a signal in accordance with TS 125 141 [5] Test model 1 and at the manufacturer's specified maximum output power.
- 2) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.

The results obtained shall be compared to the limits in clause 4.2.4.2 in order to prove compliance.

## 5.3.4 Base station maximum output power

### 5.3.4.1 Initial conditions

Test environment: Normal; see TS 125 141 [5], clause 4.4.1.

RF channels to be tested: B, M and T; see clause 5.1.

In addition, on one UARFCN only, the test shall be performed under extreme power supply as defined in TS 125 141 [5], clause 4.4.4.

NOTE: Tests under extreme power supply also test extreme temperature.

- 1) Connect the power measuring equipment to the base station RF output port.

### 5.3.4.2 Procedure

- 1) Set the base station to transmit a signal modulated with a combination of PCCPCH, SCCPCH and Dedicated Physical Channels specified as test model 1 in TS 125 141 [5], clause 6.1.1.1.
- 2) Measure the mean power at the RF output port.

The results obtained shall be compared to the limits in clause 4.2.5.2 in order to prove compliance.

## 5.3.5 Transmit intermodulation

### 5.3.5.1 Initial conditions

Test environment: Normal; see TS 125 141 [5], clause 4.4.1.

RF channels to be tested: B, M and T; see clause 5.1.

- 1) Test set-up in accordance to TS 125 141 [5], annex B.

### 5.3.5.2 Procedures

- 1) Generate the wanted signal in accordance to test model 1 in TS 125 141 [5], clause 6.1.1.1 at specified maximum BS output power.
- 2) Generate the interference signal in accordance to test model 1 in TS 125 141 [5], clause 6.1.1.1 with frequency offset of 5 MHz relative to the wanted signal, but excluding interference frequencies that are outside of the allocated frequency band for UTRA-FDD downlink specified in clause 1.
- 3) Adjust ATT1 so the level of the WCDMA modulated interference signal at BS is 30 dB below the wanted signal.
- 4) Perform the out of band emission tests as specified in clauses 5.3.1 and 5.3.2 at the frequencies of all third and fifth order intermodulation products.
- 5) Perform the spurious emission test as specified in clause 5.3.3 at the frequencies of all third and fifth order intermodulation products.
- 6) Verify that the emission level does not exceed the required level with the exception of interference signal frequencies.
- 7) Repeat the test for interference frequency off set of -5 MHz, but excluding interference frequencies that are outside of the allocated frequency band for UTRA-FDD downlink specified in clause 1.
- 8) Repeat the test for interference frequency off set of  $\pm 10$  MHz and  $\pm 15$  MHz, but excluding interference frequencies that are outside of the allocated frequency band for UTRA-FDD downlink specified in clause 1.



NOTE: The third order intermodulation products are  $(F1 \pm 2F2)$  and  $(2F1 \pm F2)$ , the fifth order intermodulation products are  $(2F1 \pm 3F2)$ ,  $(3F1 \pm 2F2)$ ,  $(4F1 \pm F2)$ , and  $(F1 \pm 4F2)$ , where  $F1$  represents the subject signal frequencies of 5 MHz channel and  $F2$  represents the interference signal frequencies of 5 MHz channel.

The results obtained shall be compared to the limits in clause 4.2.6.2 in order to prove compliance.

## 5.3.6 Receiver spurious emissions

### 5.3.6.1 Initial conditions

Test environment: Normal; see TS 125 141 [5], clause 4.4.1.

RF channels to be tested: M, with multi-carrier if supported; see clause 5.1.

- 1) Connect a measurement receiver to the BS antenna connector as shown in TS 125 141 [5], annex B.
- 2) Enable the BS receiver.
- 3) Start BS transmission with channel configuration as specified in TS 125 141 [5], tables 6.1 and 6.2 (Test model 1) at  $P_{max}$ .

### 5.3.6.2 Procedure

- 1) Terminate the BS TX antenna connector as shown in TS 125 141 [5] annex B.
- 2) Set measurement equipment parameters as specified in table 18.
- 3) Measure the spurious emissions over each frequency range described in clause 4.2.7.2.
- 4) Repeat the test using diversity antenna connector if available.

**Table 18: Measurement equipment parameters**

<b>Measurement bandwidth</b>	as in table 13
<b>Sweep frequency range</b>	30 MHz to 12,75 GHz
<b>Detection</b>	true RMS voltage or true average power

The results obtained shall be compared to the limits in clause 4.2.7.2 in order to prove compliance.

## 5.3.7 Blocking characteristics

### 5.3.7.1 Initial conditions

Test environment: Normal; see TS 125 141 [5], clause 4.4.1.

RF channels to be tested: M; see clause 5.1. The BS shall be configured to operate as close to the centre of the operating band as possible.

- 1) Connect WCDMA signal generator at the assigned channel frequency of the wanted signal and a signal generator to the antenna connector of one RX port.
- 2) Terminate any other RX port not under test.
- 3) Transmit a signal from the WCDMA signal generator to the BS. The characteristics of the signal shall be set according to the UL reference measurement channel (12,2 kbit/s) specified in TS 125 141 [5], clause A.2.1. The level of the WCDMA signal measured at the BS antenna connector shall be set to the level specified in clause 4.2.8.2.

### 5.3.7.2 Procedure

- 1) Set the signal generator to produce an interfering signal at a frequency offset  $F_{uw}$  from the assigned channel frequency of the wanted signal which is given by:

$$F_{uw} = \pm(n \times 1 \text{ MHz}),$$

where  $n$  shall be increased in integer steps from  $n = 10$  up to such a value that the centre frequency of the interfering signal covers the range from 1 MHz to 12,75 GHz. The interfering signal level measured at the antenna connector shall be set in dependency of its centre frequency, as specified in table 14. The type of the interfering signal is either equivalent to a continuous WCDMA signal with one code of chip frequency 3,84 Mchip/s, filtered by an RRC transmit pulse-shaping filter with roll-off  $\alpha = 0,22$ , or a CW signal; see table 14.

- 2) Measure the BER of the wanted signal at the BS receiver.

NOTE: The test procedure as defined in steps (1) and (2) requests to carry out more than 10 000 BER measurements. To reduce the time needed for these measurements, it may be appropriate to conduct the test in two phases: During phase 1, BER measurements are made on all centre frequencies of the interfering signal as requested but with a reduced confidence level, with the aim to identify those frequencies which require more detailed investigation. In phase 2, detailed measurements are made only at those critical frequencies identified before, applying the required confidence level.

- 3) Interchange the connections of the BS RX ports and repeat the measurements according to steps (1) to (2).

The results obtained shall be compared to the limits in clause 4.2.8.2 in order to prove compliance.

## 5.3.8 Receiver intermodulation characteristics

### 5.3.8.1 Initial conditions

Test environment: Normal; see TS 125 141 [5], clause 4.4.1.

RF channels to be tested: B, M and T; see clause 5.1.

- 1) Set-up the equipment as shown in TS 125 141 [5], annex B.

### 5.3.8.2 Procedures

- 1) Generate the wanted signal (reference signal) and adjust ATT1 to set the signal level to the BS under test to the level specified in table 15.
- 2) Adjust the signal generators to the frequency offset of +10 MHz (CW tone) and +20 MHz (WCDMA modulated) from the frequency of the wanted signal.
- 3) Adjust the ATT2 and ATT3 to obtain the specified level of interference signal at the BS input.
- 4) Measure the BER.
- 5) Repeat the test for interference signal frequency offset of -10 MHz and -20 MHz for CW and WCDMA modulated respectively.
- 6) Repeat the whole test for the port which was terminated.

The results obtained shall be compared to the limits in clause 4.2.9.2 in order to prove compliance.

## 5.3.9 Adjacent Channel Selectivity (ACS)

### 5.3.9.1 Initial conditions

Test environment: Normal; see TS 125 141 [5], clause 4.4.1.

RF channels to be tested: B, M and T; see clause 5.1.

- 1) Set-up the equipment as shown in TS 125 141 [5], annex B.

### 5.3.9.2 Procedure

- 1) Generate the wanted signal and adjust the ATT1 to set the input level to the base station under test to the level specified in table 16.
- 2) Set-up the interference signal at the adjacent channel frequency and adjust the ATT2 to obtain the specified level of interference signal at the base station input defined in Table 16. Note that the interference signal shall have an ACLR of at least 63 dB in order to eliminate the impact of interference signal adjacent channel leakage power on the ACS measurement.
- 3) Measure the BER.
- 4) Repeat the test for the port, which was terminated.

The results obtained shall be compared to the limits in clause 4.2.10.2 in order to prove compliance.

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

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the EN-RT proforma in this annex so that it can be used for its intended purposes and may further publish the completed EN-RT.

The EN Requirements Table (EN-RT) serves a number of purposes, as follows:

- it provides a tabular summary of all the requirements;
- it 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 301 908-3				Comment
No.	Reference	EN-R (see note)	Status			
1	4.2.2	Spectrum emissions mask	M			
2	4.2.3	Adjacent channel leakage power ratio (ACLR)	M			
3	4.2.4	Transmitter spurious emissions	M			
4	4.2.5	Base station maximum output power	M			
5	4.2.6	Transmit intermodulation	M			
6	4.2.7	Receiver spurious emissions	M			
7	4.2.8	Blocking characteristics	M			
8	4.2.9	Receiver intermodulation characteristics	M			
9	4.2.10	Receiver adjacent channel selectivity (ACS)	M			

NOTE: These EN-Rs are justified under article 3.2 of the R&TTE Directive.

**Key to columns:**

<b>No</b>	Table entry number;
<b>Reference</b>	Clause reference number of conformance requirement within the present document;
<b>EN-R</b>	Title of conformance requirement within the present document;
<b>Status</b>	Status of the entry as follows: <ul style="list-style-type: none"><li>M Mandatory, shall be implemented under all circumstances;</li><li>O Optional, may be provided, but if provided shall be implemented in accordance with the requirements;</li><li>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".</li></ul>
<b>Comments</b>	To be completed as required.

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## Annex B (normative): Base Station Configurations

### B.1 Receiver diversity

For the tests in clause 5 of the present document, the specified test signals shall be applied to one receiver antenna connector, with the remaining receivers are disabled or their antenna connectors being terminated with 50  $\Omega$ .

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### B.2 Duplexers

The requirements of the present document shall be met with a duplexer fitted, if a duplexer is supplied as part of the BS. If the duplexer is supplied as an option by the manufacturer, sufficient tests should be repeated with and without the duplexer fitted to verify that the BS meets the requirements of the present document in both cases.

The following tests should be performed with the duplexer fitted, and without it fitted if this is an option:

- 1) clause 5.3.4, base station maximum output power, for the highest static power step only, if this is measured at the antenna connector;
- 2) clause 5.3.3, output RF spectrum emissions; outside the BS transmit band;
- 3) clause 5.3.5, transmit intermodulation; for the testing of conformance, the carrier frequencies should be selected to minimize intermodulation products from the transmitters falling in receive channels. The remaining tests may be performed with or without the duplexer fitted.

NOTE 1: When performing receiver tests with a duplexer fitted, it is important to ensure that the output from the transmitters does not affect the test apparatus. This can be achieved using a combination of attenuators, isolators and filters.

NOTE 2: When duplexers are used, intermodulation products will be generated, not only in the duplexer but also in the antenna system. The intermodulation products generated in the antenna system are not controlled by the specifications, and may degrade during operation (e.g. due to moisture ingress). Therefore, to ensure continued satisfactory operation of a BS, an operator will normally select UARFCNs to minimize intermodulation products falling on receive channels. For testing of complete conformance, an operator may specify the UARFCNs to be used.

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### B.3 Power supply options

If the BS is supplied with a number of different power supply configurations, it may not be necessary to test RF parameters for each of the power supply options, provided that it can be demonstrated that the range of conditions over which the equipment is tested is at least as great as the range of conditions due to any of the power supply configurations.

This applies particularly if a BS contains a DC rail which can be supplied either externally or from an internal mains power supply. In this case, the conditions of extreme power supply for the mains power supply options can be tested by testing only the external DC supply option. The range of DC input voltages for the test should be sufficient to verify the performance with any of the power supplies, over its range of operating conditions within the BS, including variation of mains input voltage, temperature and output current.

## B.4 Ancillary RF amplifiers

The requirements of the present document shall be met with the ancillary RF amplifier fitted. At tests according to clause 5 for TX and RX respectively, the ancillary amplifier is connected to the BS by a connecting network (including any cable(s), attenuator(s), etc.) with applicable loss to make sure the appropriate operating conditions of the ancillary amplifier and the BS. The applicable connecting network loss range is declared by the manufacturer. Other characteristics and the temperature dependence of the attenuation of the connecting network are neglected. The actual attenuation value of the connecting network is chosen for each test as one of the applicable extreme values. The lowest value is used unless otherwise stated.

Sufficient tests should be repeated with the ancillary amplifier fitted and, if it is optional, without the ancillary RF amplifier to verify that the BS meets the requirements of the present document in both cases.

When testing, the following tests should be repeated with the optional ancillary amplifier fitted according to table B.1, where x denotes that the test is applicable:

**Table B.1: Table of tests applicable to Ancillary RF Amplifiers.**

	Clause	TX amplifier only	RX amplifier only	TX/RX amplifiers combined (see note)
<b>Receiver Tests</b>	5.3.7		X	X
	5.3.8		X	X
	5.3.6		X	
<b>Transmitter Tests</b>	5.3.4	X		X
	5.3.2	X		X
	5.3.3	X		X
	5.3.5	X		X

NOTE: Combining can be by duplex filters or any other network. The amplifiers can either be in RX or TX branch or in both. Either one of these amplifiers could be a passive network.

In test according to clause 5.3.4, the highest applicable attenuation value is applied.

## B.5 BS using antenna arrays

A BS may be configured with a multiple antenna port connection for some or all of its transceivers or with an antenna array related to one cell (not one array per transceiver). This clause applies to a BS which meets at least one of the following conditions:

- the transmitter output signals from one or more transceiver appear at more than one antenna port; or
- there is more than one receiver antenna port for a transceiver or per cell and an input signal is required at more than one port for the correct operation of the receiver thus the outputs from the transmitters as well as the inputs to the receivers are directly connected to several antennas (known as "aircombining"); or

NOTE: diversity reception does not meet this requirement

- transmitters and receivers are connected via duplexers to more than one antenna.

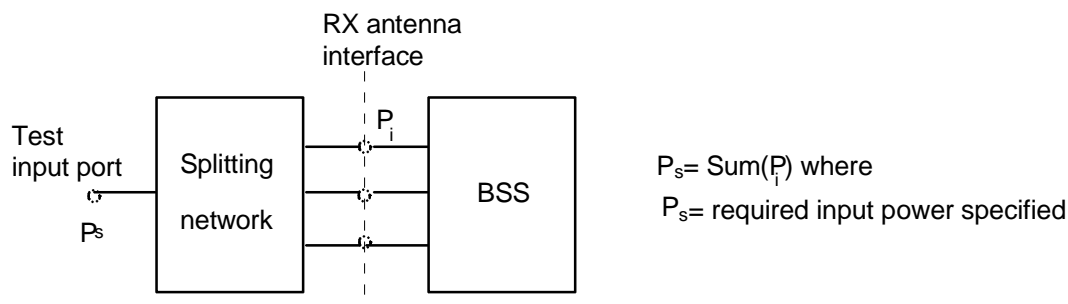
If a BS is used, in normal operation, in conjunction with an antenna system which contains filters or active elements which are necessary to meet the UTRA requirements, the conformance tests may be performed on a system comprising the BS together with these elements, supplied separately for the purposes of testing. In this case, it must be demonstrated that the performance of the configuration under test is representative of the system in normal operation, and the conformance assessment is only applicable when the BS is used with the antenna system.

For conformance testing of such a BS, the following procedure may be used.

## B.5.1 Receiver tests

For each test, the test signals applied to the receiver antenna connectors shall be such that the sum of the powers of the signals applied equals the power of the test signal(s) specified in the test.

An example of a suitable test configuration is shown in figure B.1.



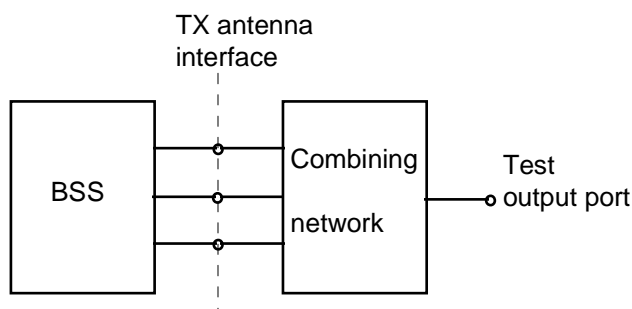
**Figure B.1: Receiver test set-up**

For spurious emissions from the receiver antenna connector, the test may be performed separately for each receiver antenna connector.

## B.5.2 Transmitter tests

For each test, the test signals applied to the transmitter antenna connectors ( $P_i$ ) shall be such that the sum of the powers of the signals applied equals the power of the test signal(s) ( $P_s$ ) specified in the test. This may be assessed by separately measuring the signals emitted by each antenna connector and summing the results, or by combining the signals and performing a single measurement. The characteristics (e.g. amplitude and phase) of the combining network should be such that the power of the combined signal is maximized.

An example of a suitable test configuration is shown in figure B.2.



**Figure B.2: Transmitter test set-up**

For Intermodulation attenuation, the test may be performed separately for each transmitter antenna connector.



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## Annex C (informative): Environmental profile specification

The following environmental conditions may be declared by the supplier:

- barometric pressure: minimum and maximum;
- temperature: minimum and maximum;
- relative humidity: minimum and maximum;
- power supply: lower and upper voltage limit.

When operating outside the boundary limits of the declared operational environmental profile the equipment should not make ineffective use of the radio frequency spectrum so as to cause harmful interference.

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## Annex D (informative): Bibliography

ETSI TS 125 104: "Universal Mobile Telecommunications System (UMTS); UTRA (BS) FDD; Radio transmission and Reception".

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.

CEPT/ERC/REC 74-01E (Siófok 1998, Nice 1999): "Spurious Emissions".

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

Language	EN title
Danish	Elektromagnetisk kompatibilitet og radiospektrumliggender (ERM); Basisstationer (BS), Repeaters og brugerudstyr (UE) for IMT-2000 CDMA tredje generations cellulær radionet; Part 3: Harmoniseret EN for IMT-2000, CDMA direkte spredt (UTRA FDD) (BS) , der dækker de væsentlige krav i R&TTE Direktivets artikel 3.2
Dutch	Elektromagnetische compatibiliteit en radiospectrum-zaken (ERM); Basisstations (BS), Repeaters en gebruikersapparatuur (UE) voor IMT-2000 derde generatie mobiele netwerken; Deel 3: Geharmoniseerde EN voor IMT-2000, CDMA Direct Spread (UTRA FDD) (BS), welke invulling geeft aan de wezenlijke vereisten, neergelegd in artikel 3.2 van de R&TTE-richtlijn
English	Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 3: Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive
Finnish	Sähkömagneettinen yhteensopivuus ja radiospektriasiat (ERM); IMT-2000 kolmannen sukupolven matkaviestinjärjestelmien tukiasemat (BS), toistimet ja päätelaitteet (UE); Osa 3: R&TTE direktiivin artiklan 3.2 olennaiset vaatimukset toteuttava yhdenmukaistettu standardi IMT-2000 CDMA suorasekvensihajaspektritekniikkaa (UTRA FDD) käytäville tukiasemille (BS)
French	Compatibilité électromagnétique et Radioélectrique (ERM); Stations de Base (BS), Répéteurs et Equipement Utilisateur (UE) pour les réseaux cellulaires de troisième génération IMT-2000; Partie 3: Norme harmonisée pour l'IMT-2000, CDMA à Etagement direct (UTRA FDD) (BS) couvrant les exigences essentielles de l'article 3.2 de la Directive R&TTE
German	Elektromagnetische Verträglichkeit und Funkspektrumangelegenheiten (ERM); Feststationen (BS), Repeater und Einrichtungen für den Nutzer (UE) für digitale zellulare IMT-2000 Funknetze der 3. Generation, Teil 3: Harmonisierte Europäische Norm (EN) für IMT-2000, CDMA-Direkt-Spreizspektrum (UTRA FDD) Feststationen (BS) mit wesentlichen Anforderungen nach R&TTE-Richtlinie Artikel 3.2
Greek	Ζητήματα Ηλεκτρομαγνητικής συμβατότητας και Ηλεκτρομαγνητικού φάσματος (ERM); Σταθμοί Βάσης (BS), αναμεταδότες και Τερματικό Χρήστη (UE) για IMT-2000 κυψελωτά συστήματα 3ης Γενιάς; Μέρος 3. Εναρμονισμένο «EN» για IMT-2000, CDMA Άμεσης Διασποράς (UTRA FDD) (BS) που καλύπτει βασικές αρχές του άρθρου 3.2 της R&TT Οδηγίας
Italian	Compatibilità elettromagnetica e problematiche di Spettro Radio (ERM); Stazioni Base (BS), Ripetitori e Terminali Mobili (UE) per le reti cellulari di terza generazione IMT-2000; Parte 3: Norma armonizzata per IMT-2000, CDMA Direct Spread (UTRA FDD) (BS) relativa ai requisiti essenziali dell'articolo 3.2 della Direttiva R&TTE
Portuguese	Assuntos de Espectro Radioelétrico e Compatibilidade Electromagnética (ERM); Estações de Base (BS), Repetidores e equipamento de utilizador (UE) para a terceira geração de redes celulares IMT-2000; Parte 3: EN Harmonizada para o IMT-2000, Espalhamento Directo CDMA (UTRA-FDD) (BS), cobrindo os requisitos essenciais no âmbito do artigo 3.º, n.º 2 da Directiva R & TTE
Spanish	Compatibilidad electromagnética y espectro radio (ERM); estaciones base (BS), Repetidores y equipos de usuario (UE) de redes móviles de tercera generación IMT-2000; EN armonizada que cubre los requisitos mínimos del artículo 3.2 de la directiva de R&TTE (1999/5/EC); parte 3: CDMA con ensanchamiento por secuencia directa (UTRA FDD) (BS)
Swedish	Elektromagnetisk kompatibilitet och radio-spektrumfrågor (ERM); Basstationer (BS), Repeater och Mobilstationer (UE) för tredje generationens mobilnät IMT-2000; Del 3: Harmoniserad EN för IMT-2000, CDMA med direktspridning (UTRA FDD) (BS) omfattande väsentliga krav enligt artikel 3.2 i R&TTE-direktivet

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## History

<b>Document history</b>		
V1.1.1	January 2002	Publication
V2.1.1	January 2003	Public Enquiry PE 20030516: 2003-01-15 to 2003-05-16