

Final draft **ETSI EN 301 908-12** V1.1.2 (2007-06)

---

*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 12: Harmonized EN for IMT-2000,  
CDMA Multi-Carrier (cdma2000) (Repeaters)  
covering essential requirements  
of article 3.2 of the R&TTE Directive**

---



---

Reference

DEN/ERM-TFES-002-12

---

Keywords

3G, 3GPP, digital, IMT-2000, regulation,  
repeater, testing, UMTS

**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

[http://portal.etsi.org/chaicor/ETSI\\_support.asp](http://portal.etsi.org/chaicor/ETSI_support.asp)

---

**Copyright Notification**

No part may be reproduced except as authorized by written permission.  
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2007.  
All rights reserved.

**DECT**<sup>TM</sup>, **PLUGTESTS**<sup>TM</sup> and **UMTS**<sup>TM</sup> are Trade Marks of ETSI registered for the benefit of its Members.  
**TIPHON**<sup>TM</sup> and the **TIPHON logo** are Trade Marks currently being registered by ETSI for the benefit of its Members.  
**3GPP**<sup>TM</sup> is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

# Contents

Intellectual Property Rights .....	5
Foreword.....	5
Introduction .....	6
1 Scope .....	7
2 References .....	7
3 Definitions, symbols and abbreviations .....	8
3.1 Definitions .....	8
3.2 Symbols.....	10
3.3 Abbreviations .....	10
4 Technical requirements specifications .....	11
4.1 Environmental profile.....	11
4.2 Conformance requirements .....	11
4.2.1 Introduction.....	11
4.2.2 Spectrum emissions mask .....	11
4.2.2.1 Definition .....	11
4.2.2.2 Limits .....	12
4.2.2.3 Conformance.....	12
4.2.3 Spurious emissions .....	13
4.2.3.1 Definition .....	13
4.2.3.2 Limits .....	13
4.2.3.2.1 Spurious emissions .....	13
4.2.3.3 Conformance.....	15
4.2.4 Maximum output power.....	15
4.2.4.1 Definition .....	15
4.2.4.2 Limits .....	15
4.2.4.3 Conformance.....	15
4.2.5 Input intermodulation .....	16
4.2.5.1 Definition .....	16
4.2.5.2 Limits .....	16
4.2.5.3 Conformance.....	16
4.2.6 Out-of-band gain.....	17
4.2.6.1 Definition .....	17
4.2.6.2 Limits .....	17
4.2.6.3 Conformance.....	17
4.2.7 Output intermodulation.....	18
4.2.7.1 Definition .....	18
4.2.7.2 Limits .....	18
4.2.7.3 Conformance.....	18
5 Testing for compliance with technical requirements.....	18
5.1 Conditions for testing .....	18
5.1.1 Introduction.....	18
5.1.2 Standard equipment under test.....	18
5.2 Interpretation of the measurement results .....	18
5.3 Essential radio test suites.....	19
5.3.1 Spectrum emission mask .....	19
5.3.1.1 Initial conditions .....	19
5.3.1.2 Procedures .....	19
5.3.2 Spurious emissions .....	19
5.3.2.1 Initial conditions .....	19
5.3.2.2 Procedure .....	20
5.3.3 Maximum output power.....	20
5.3.3.1 Initial conditions .....	20
5.3.3.2 Procedure .....	20

5.3.4	Input intermodulation .....	20
5.3.4.1	Initial conditions .....	20
5.3.4.2	Procedures .....	20
5.3.5	Out-of-band gain.....	21
5.3.5.1	Initial conditions .....	21
5.3.5.2	Procedure .....	21
5.3.6	Output intermodulation.....	22
5.3.6.1	Initial conditions .....	22
5.3.6.2	Procedure .....	22
<b>Annex A (normative):</b>	<b>HS Requirements and conformance Test specifications Table (HS-RTT).....</b>	<b>24</b>
<b>Annex B (normative):</b>	<b>Repeater configurations .....</b>	<b>26</b>
B.1	Power supply .....	26
B.2	Power supply options .....	26
B.3	Ancillary equipment.....	26
<b>Annex C (informative):</b>	<b>Environmental profile specification .....</b>	<b>27</b>
<b>Annex D (informative):</b>	<b>Bibliography.....</b>	<b>28</b>
<b>Annex E (informative):</b>	<b>The EN title in the official languages .....</b>	<b>29</b>
History .....		31

---

# Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://webapp.etsi.org/IPR/home.asp>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

---

## Foreword

This 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 Vote 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 12 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) 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".

**Part 12: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) (Repeaters) covering essential requirements of article 3.2 of the R&TTE Directive".**

<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):	18 months after doa

---

## Introduction

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the R&TTE Directive. The modular structure is shown in EG 201 399.

# 1 Scope

The present document applies to the following radio equipment types:

- Repeaters for IMT-2000 CDMA multi-carrier (cdma2000).

These radio equipment types are capable of operating in all or any part of the frequency bands given in table 1.

**Table 1: CDMA multi-carrier Repeater service frequency bands**

Direction of transmission	CDMA multi-carrier Repeater service frequency bands	Band Class (BC)
Forward link (DL)	2 110 MHz to 2 170 MHz	6
Reverse link (UL)	1 920 MHz to 1 980 MHz	
Forward link (DL)	1 805 MHz to 1 880 MHz	8
Reverse link (UL)	1 710 MHz to 1 785 MHz	
Forward link (DL)	925 MHz to 960 MHz	9
Reverse link (UL)	880 MHz to 915 MHz	
Forward link (DL)	2 620 MHz to 2 690 MHz	13
Reverse link (UL)	2 500 MHz to 2 570 MHz	

Repeaters for IMT-2000 CDMA multi-carrier (cdma2000) may support:

- 1) operation in cdma2000 spread spectrum systems as defined in TIA-2000.2 [5], referred to herein as operation in Type 1 cdma2000 systems; or
- 2) operation in cdma2000 High Rate Packet Data Systems as defined in TIA-856 [11], referred to herein in Type 2 cdma2000 systems.

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] may 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.

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

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

- [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] Void.
- [3] Void.
- [4] ANSI/TIA-97-F-1 (June 2006): "Recommended Minimum Performance Standard for cdma2000 Spread Spectrum Base Stations - Addendum 1".
- [5] TIA-2000.2-D-1 (January 2006): "Physical Layer Standard for cdma2000 Spread Spectrum Systems - Addendum 1".
- [6] Void.
- [7] Void.
- [8] Void.
- [9] Void.
- [10] Void.
- [11] TIA-856-A-1[E] (February 2007): "cdma2000 High Rate Packet Data Air Interface Specification - Addendum 1".
- [12] TIA-864-A (January 2006): "Recommended Minimum Performance Standards for cdma2000 High Rate Packet Data Access Network Equipment".
- [13] Void.
- [14] TIA-1037 (2007): "Recommended Minimum Performance Standard for cdma2000 Spread Spectrum Repeater".
- [15] TIA-1030-B (December 2006): "Band Class Specification for cdma2000® Spread Spectrum Systems".

---

## 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:

**Band Class (BC):** set of frequency channels and a numbering scheme for these channels

**Base Station (BS):** fixed station used for communicating with mobile stations

NOTE 1: Base stations for IMT-2000 CDMA multi-carrier (cdma2000) may support, operation in cdma2000 spread spectrum systems as defined in TIA-2000.2 [5], referred to herein as operation in Type 1 cdma2000 system, or operation in cdma2000 High Rate Packet Data Systems as defined in TIA-856 [11], referred to herein as operation in Type 2 cdma2000 systems.

NOTE 2: Depending upon the context, the term base station may refer to a cell, a sector within a cell, an MSC, and access network or other part of the wireless system. See also MSC.

**CDMA channel:** set of channels transmitted from the base station and the mobile stations on a given frequency

**CDMA channel number:** 11-bit number corresponding to the centre of the CDMA frequency assignment

**CDMA frequency assignment:** 1,23 MHz segment of spectrum

NOTE: For band classes 6, 8, and 9, the channel is centred on one of the 50 kHz channels.

**Code Division Multiple Access (CDMA):** technique for spread-spectrum multiple-access digital communications that creates channels through the use of unique code sequences



**donor coupling loss:** coupling loss between the Repeater and the donor base station

**Down Link (DL):** signal path where base station or Repeater transmits and the mobile receives

NOTE: Also referred to as the forward link.

**environmental profile:** range of environmental conditions under which equipment within the scope of the present document is required to comply with the provisions of the present document

**forward CDMA channel:** CDMA channel from a base station or Repeater to mobile stations

NOTE: The forward CDMA channel contains one or more code channels that are transmitted on a CDMA frequency assignment using a particular pilot PN offset.

**High Rate Packet Data (HRPD):** CDMA technique optimized for data communications in Type 2 cdma2000 systems

**maximum output power (P<sub>max</sub>):** mean power level per carrier measured at the antenna connector of the Repeater in specified reference condition

**mean power:** total calorimetric power measured in a specified bandwidth at the antenna connector.

**mobile station:** station intended to be used while in motion or during halts at unspecified points

NOTE: Mobile stations include portable units (e.g. hand-held personal units) and units installed in vehicles and HRPD access terminals.

**pass band:** frequency range that the Repeater operates in with operational configuration

NOTE 1: This frequency range can correspond to one or several consecutive nominal 5 MHz channels. If they are not consecutive each subset of channels is considered as an individual pass band.

NOTE 2: The Repeater can have one or several pass bands.

**radio configuration:** set of forward traffic channel and reverse traffic channel transmission formats that are characterized by physical layer parameters such as transmission rates, modulation characteristics, and spreading rate

NOTE: Radio configurations are defined in TIA-2000.2 [5], clauses 2.1.3 and 3.1.3.

**Resolution Band Width (RBW):** measured in Hz and represents the frequency over which power is integrated in a spectrum analyser to display the amplitude at the centre of the integration frequency range

**repeater:** device that receives, amplifies and transmits the radiated or conducted RF carrier both in the down-link direction (from the base station to the mobile area) and in the up-link direction (from the mobile to the base station)

NOTE: A repeater can be a device that receives, amplifies and transmits one or more radiated or conducted CDMA channel(s) both in the down-link direction (from the base station to the mobile area) and in the up-link direction (from the mobile to the base station).

**reverse CDMA channel:** CDMA channel from the mobile station to the base station

NOTE: From the base station's perspective, the reverse CDMA channel is the sum of all mobile station transmissions on a CDMA frequency assignment.

**RF carrier:** direct-sequence spread RF channel

NOTE: For the forward CDMA channel, the number of RF carriers is 1 for spreading rate 1 and 3 for spreading rate 3; for the reverse CDMA channel, there is one RF carrier.

**spreading rate:** PN chip rate of the forward CDMA channel or the reverse CDMA channel, defined as a multiple of 1,2288 Mcps

**spreading rate 1:** spreading rate 1 is often referred to as "1X"

NOTE 1: A spreading rate 1 forward CDMA channel uses a single direct-sequence spread carrier with a chip rate of 1,2288 Mcps.

NOTE 2: A spreading rate 1 reverse CDMA channel uses a single direct-sequence spread carrier with a chip rate of 1,2288 Mcps.

**spreading rate 3:** spreading rate 3 is often referred to as "3X"

NOTE 1: A spreading rate 3 forward CDMA channel uses three direct-sequence spread carriers (see multiple-carrier forward channel) each with a chip rate of 1,2288 Mcps.

NOTE 2: A spreading rate 3 reverse CDMA channel uses a single direct-sequence spread carrier with a chip rate of 3,6864 Mcps.

**Up Link (UL):** signal path where the mobile or Repeater transmits and the base station receives

NOTE: Also referred to as the reverse link.

**User Equipment (UE):** mobile station supporting operation in cdma2000 spread spectrum systems

NOTE: See TIA-2000.2 [5], referred to herein as operation in Type 1 cdma2000 system; access terminal supporting operation in cdma2000 High Rate Packet Data Systems as defined in TIA-856 [11], referred to herein as operation in Type 2 cdma2000 system; and mobile station supporting operation in Type 1 and Type 2 cdma2000 systems.

## 3.2 Symbols

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

dBc	ratio (in dB) of the sideband power of a signal, measured in a given bandwidth at a given frequency offset from the centre frequency of the same signal, to the total inband power of the signal. For CDMA, the total inband power of the signal is measured in a 1,23 MHz bandwidth around the centre frequency of the CDMA signal for a spreading rate 1 CDMA signal and in 3,69 MHz bandwidth around the centre frequency of the CDMA signal for a spreading rate 3 CDMA signal.
dBm	measure of power expressed in terms of its ratio (in dB) to 1 mW
dBm/Hz	measure of power spectral density. The ratio, dBm/Hz, is the power in 1 Hz of bandwidth, where power is expressed in units of dBm
GHz	GigaHertz ( $10^9$ Hertz)
kHz	kiloHertz ( $10^3$ Hertz)
MHz	MegaHertz ( $10^6$ Hertz)

## 3.3 Abbreviations

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

BC	Band Class
BS	Base Station
CDMA	Code Division Multiple Access
CW	Continuous Wave (unmodulated signal)
DCS	Digital Cellular System
DL	Downlink
EMC	ElectroMagnetic Compatibility
GSM	Global System for Mobile Communications
HRPD	High Rate Packet Data
IMT	International Mobile Telecommunications
MSC	Mobile Switching Centre
PN	PseudoNoise
R&TTE	Radio and Telecommunications Terminal Equipment
RBW	Resolution BandWidth

RF	Radio Frequency
TDD	Time Division Duplex
UE	User Equipment
UL	Uplink
UTRA	Universal 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 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

The requirements in the present document are based on the assumption that the operating band is shared between systems of the IMT-2000 family or systems having compatible characteristics.

#### 4.2.1 Introduction

To meet the essential requirement under article 3.2 of the R&TTE Directive [1] for IMT-2000 Repeater equipment five essential parameters in addition to those in part 1 have been identified. Table 2 provides a cross reference between these five essential parameters and the corresponding six 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
Conducted spurious emissions from the antenna connector	4.2.3 Spurious emissions
Accuracy of maximum output power	4.2.4 Maximum output power
Receiver immunity	4.2.5 Input intermodulation
	4.2.6 Out-of-band gain
Intermodulation attenuation of the output	4.2.7 Output intermodulation

The supplier shall declare operating band(s) for the Repeater. The technical requirements apply for the declared operating band(s) as outlined for each requirement. For a Repeater supporting more than one operating band, conformance testing for each technical requirement in clause 5 shall be performed independently for each operating band.

The technical requirements also apply to Repeater 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 for the transmitter.

#### 4.2.2.2 Limits

The requirement shall be met by a Repeater's RF-signal output at maximum gain in the pass band of the Repeater, at levels that produce the maximum rated output power per channel, configured in accordance with the manufacturer's specification. Emissions shall not exceed the maximum level specified in tables 3 and 4 for the appropriate Repeater maximum output power.

If the pass band corresponds to two or more consecutive nominal carriers, the requirement shall be met with any combination of two CDMA modulated signals of equal power in the Repeaters pass band.

**Table 3: Spectrum emission mask values, Band Class 9**

For $ \Delta f $ Within the Range	Applies to Multiple Carriers	Emission limit
750 kHz to 1,98 MHz	No	-45 dBc/30 kHz
1,98 MHz to 4,00 MHz	No	-60 dBc/30 kHz; $P_{out} \geq 33$ dBm -27 dBm/30 kHz; $28$ dBm $\leq P_{out} < 33$ dBm -55 dBc/30 kHz; $P_{out} < 28$ dBm
NOTE: All frequencies in the measurement bandwidth shall satisfy the restrictions on $ \Delta f $ where $\Delta f$ = centre frequency - closer measurement edge frequency (f). The emissions requirements shall apply for all values of $\Delta f$ regardless of whether the measurement frequency falls inside or outside of the band or block edge. Compliance with the -46 dBm/6,25 kHz limit is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral power in a 6,25 kHz segment. For multiple-carrier testing, $\Delta f$ is defined for positive $\Delta f$ as the centre frequency of the highest carrier - closer measurement edge frequency (f) and for negative $\Delta f$ as the centre frequency of the lowest carrier - closer measurement edge frequency (f).		

**Table 4: Spectrum emission mask values, Band Class 6, 8 and 13**

For $ \Delta f $ Within the Range	Applies to Multiple Carriers	Emission limit
885 kHz to 1,25 MHz	No	-45 dBc/30 kHz
1,25 MHz to 1,98 MHz	No	More stringent of -45 dBc/30 kHz or -9 dBm/30 kHz
1,25 MHz to 1,45 MHz	Yes	-13 dBm/30 kHz
1,45 MHz to 2,25 MHz	Yes	$-[13 + 17 \times ( \Delta f  - 1,45 \text{ MHz})]$ dBm/30 kHz
1,98 MHz to 2,25 MHz	No	-55 dBc/30 kHz; $P_{out} \geq 33$ dBm -22 dBm/30 kHz; $28$ dBm $\leq P_{out} < 33$ dBm -50 dBc/30 kHz; $P_{out} < 28$ dBm
2,25 MHz to 4,00 MHz	Yes	-13 dBm/1 MHz
NOTE: All frequencies in the measurement bandwidth shall satisfy the restrictions on $ \Delta f $ where $\Delta f$ = centre frequency - closer measurement edge frequency (f). The emissions requirements shall apply for all values of $\Delta f$ regardless of whether the measurement frequency falls inside or outside of the band or block edge. For multiple-carrier testing, $\Delta f$ is defined for positive $\Delta f$ as the centre frequency of the highest carrier - closer measurement edge frequency (f) and for negative $\Delta f$ as the centre frequency of the lowest carrier - closer measurement edge frequency (f).		

#### 4.2.2.3 Conformance

Conformance tests described in clause 5.3.1 shall be carried out.

## 4.2.3 Spurious emissions

### 4.2.3.1 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 Repeater output port.

The requirements of clause 4.2.3.2 shall apply whatever the type of Repeater considered (one or several pass bands). It applies for all configurations foreseen by the manufacturer's specification.

### 4.2.3.2 Limits

#### 4.2.3.2.1 Spurious emissions

The mean spurious emissions levels shall comply with the applicable band class limits contained in tables 5 to 8A for every specified test.

If the pass band corresponds to two or more consecutive nominal carriers, the requirement shall be met with any combination of two CDMA modulated signals of equal power in the Repeaters pass band.

When transmitting in Band Class 9, the mean spurious emissions shall be less than all of the limits specified in table 5 for both the Forward and Reverse signal paths.

**Table 5: Band Class 9 transmitter spurious emission limits**

For $ \Delta f $ Within the Range	Applies to Multiple Carriers	Emission limit	
> 4,00 MHz	Yes	-36 dBm/1 kHz; -36 dBm/10 kHz; -30 dBm/1 MHz;	9 kHz < f < 150 kHz 150 kHz < f < 30 MHz 1 GHz < f < 12,75 GHz
4,00 MHz to 6,40 MHz	Yes	-36 dBm/1 kHz	30 MHz < f < 1 GHz
6,40 MHz to 16 MHz	Yes	-36 dBm/10 kHz	30 MHz < f < 1 GHz
> 16 MHz	Yes	-36 dBm/100 kHz	30 MHz < f < 1 GHz
NOTE: All frequencies in the measurement bandwidth shall satisfy the restrictions on $ \Delta f $ where $\Delta f$ = centre frequency - closer measurement edge frequency (f). The emissions requirements shall apply for all values of $\Delta f$ regardless of whether the measurement frequency falls inside or outside of the band or block edge. Compliance with the -46 dBm/6,25 kHz limit is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral power in a 6,25 kHz segment. For multiple-carrier testing, $\Delta f$ is defined for positive $\Delta f$ as the centre frequency of the highest carrier - closer measurement edge frequency (f) and for negative $\Delta f$ as the centre frequency of the lowest carrier - closer measurement edge frequency (f).			

When transmitting in Band Class 6, 8 or 13 the mean spurious emissions shall be less than all of the limits specified in table 6 for both the Forward and Reverse signal paths.

**Table 6: Band Class 6, 8 and 13 transmitter spurious emission limits**

For $ \Delta f $ Within the Range	Applies to Multiple Carriers	Emission limit	
> 4,00 MHz	Yes	-36 dBm/1 kHz -36 dBm/10 kHz -36 dBm/100 kHz	9 kHz < f < 150 kHz 150 kHz < f < 30 MHz 30 MHz < f < 1 GHz
4,00 MHz to 16,0 MHz	Yes	-30 dBm/30 kHz	1 GHz < f < 12,75 GHz
16,0 MHz to 19,2 MHz	Yes	-30 dBm/300 kHz	1 GHz < f < 12,5 GHz
> 19,2 MHz	Yes	-30 dBm/1 MHz	1 GHz < f < 12,75 GHz
NOTE: All frequencies in the measurement bandwidth shall satisfy the restrictions on $ \Delta f $ where $\Delta f$ = centre frequency - closer measurement edge frequency (f). The emissions requirements shall apply for all values of $\Delta f$ regardless of whether the measurement frequency falls inside or outside of the band or block edge. For multiple-carrier testing, $\Delta f$ is defined for positive $\Delta f$ as the centre frequency of the highest carrier - closer measurement edge frequency (f) and for negative $\Delta f$ as the centre frequency of the lowest carrier - closer measurement edge frequency (f).			

Mean spurious emissions shall also be less than the limits specified in table 7 for the forward link. For the reverse link spurious emissions shall also be less than the limits specified in tables 8 and 8A .

**Table 7: Additional forward link transmitter spurious emission limits**

Measurement Frequency	Applies to Multiple Carriers	Emission limit	When Coverage Overlaps With	Applies to Operating Band
876 MHz to 915 MHz	No	-61 dBm/100 kHz	GSM 900	BC 6, 8, 13
921 MHz to 960 MHz	Yes	-57 dBm/100 kHz	GSM 900	BC 6, 8, 13
1 710 MHz to 1 785 MHz	No	-61 dBm/100 kHz	DCS 1800	BC 6, 9, 13
1 805 MHz to 1 880 MHz	Yes	-47 dBm/100 kHz	DCS 1800	BC 6, 9, 13
1 900 MHz to 1 920 MHz, 2 010 MHz to 2 025 MHz, and 2 570 MHz to 2 610 MHz	Yes	-52 dBm/1 MHz	UTRA-TDD	BC 6, 8, 9, 13
1 920 MHz to 1 980 MHz	No	-86 dBm/1 MHz	Always	BC 6
1 710 MHz to 1 785 MHz	No	-86 dBm/1 MHz	Always	BC 8
876 MHz to 915 MHz	No	-86 dBm/1 MHz	Always	BC 9
2 500 MHz to 2 570 MHz	No	-86 dBm/1 MHz	Always	BC 13

**Table 8: Additional reverse link transmitter spurious emission limits**

Measurement frequency	Emission limit	When Coverage Overlaps With	Applies to Operating Band
921 MHz to 925 MHz	-60 dBm/100 kHz	GSM 900	BC 6, 8, 13
925 MHz to 935 MHz	-67 dBm/100 kHz	GSM 900	BC 6, 8, 13
935 MHz to 960 MHz	-79 dBm/100 kHz	GSM 900	BC 6, 8, 13
1 805 MHz to 1 880 MHz	-71 dBm/100 kHz	DCS 1 800	BC 6, 9, 13
2 110 MHz to 2 170 MHz	-60 dBm/1,23 MHz	IMT-2000 BC 6	BC 8, 9, 13
2 590 MHz to 2 620 MHz	-50 dBm/1,23 MHz	IMT-2000 BC 13 TDD	BC 13
2 620 MHz to 2 690 MHz	-60 dBm/1,23 MHz	IMT-2000 BC 13 FDD	BC 9, 13
NOTE: Measurements apply only when the measurement frequency is at least 5,625 MHz from the CDMA centre frequency. The measurements shall be made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the spurious emission limits in tables 5 and 6 are allowed.			

**Table 8A: Repeater spurious emissions limits  
in geographic coverage area of GSM900, DCS1800 and/or BS receiver  
for the reverse link direction of the Repeater**

BS type operating in the same geographical area	Measurement Band	Maximum level	Measurement bandwidth
GSM900	876 MHz to 915 MHz	-47 dBm	100 kHz
DCS1800	1 710 MHz to 1 785 MHz	-47 dBm	100 kHz
IMT-2000 BC 6	1 920 MHz to 1 980 MHz	-47 dBm	100 kHz
IMT-2000 BC 8	1 710 MHz to 1 785 MHz	-47 dBm	100 kHz
IMT-2000 BC 9	880 MHz to 915 MHz	-47 dBm	100 kHz
IMT-2000 BC 13	2 500 MHz to 2 570 MHz	-47 dBm	100 kHz
NOTE: Measurements apply only when the measurement frequency is at least 12,5 MHz from the CDMA centre frequency. The measurements shall be made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the spurious emission limits in tables 5 and 6 are allowed.			

#### 4.2.3.3 Conformance

Conformance tests described in clause 5.3.2 shall be carried out.

#### 4.2.4 Maximum output power

##### 4.2.4.1 Definition

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

##### 4.2.4.2 Limits

When tested using the standard test environmental requirements as specified in clause 5.1 in TIA-1037 [14], the Repeater's mean output power shall remain within limits specified in table 9 relative to the manufacturer's rated mean output under every specified test.

**Table 9: Repeater output power: normal conditions**

Rated output power	Limit
$P \geq 43$ dBm	+2,0 dB and -2,0 dB
$39$ dBm $\leq P < 43$ dBm	+2,0 dB and -2,0 dB
$31$ dBm $\leq P < 39$ dBm	+2,0 dB and -2,0 dB
$P < 31$ dBm	+3,0 dB and -3,0 dB

When tested using the extreme environmental test conditions specified in clause 4.1.1 in TIA-1037 [14], the Repeater's mean output power shall remain within limits specified in table 10 relative to the manufacturer's rated mean output power.

**Table 10: Repeater output power: extreme conditions**

Rated output power	Limit
$P \geq 43$ dBm	+2,0 dB and -4,0 dB
$39$ dBm $\leq P < 43$ dBm	+2,0 dB and -4,0 dB
$31$ dBm $\leq P < 39$ dBm	+2,0 dB and -4,0 dB
$P < 31$ dBm	+3,5 dB and -5,5 dB

#### 4.2.4.3 Conformance

Conformance tests described in clause 5.3.3 shall be carried out.

## 4.2.5 Input intermodulation

### 4.2.5.1 Definition

Input intermodulation spurious response attenuation is a measure of a Repeater's ability to rebroadcast an in-band signal in the presence of two interfering out-of-band CW signals at the input of the Repeater. For Repeaters specified by the manufacturer as not suitable for use as an Over the Air Repeater, this test only applies to the reverse link.

### 4.2.5.2 Limits

The intermodulation performance should be met when the following signals are applied to the Repeater.

**Table 11: General input intermodulation requirement**

Band Class	CW Generator Power at RF input port of Repeater	CW Generator Frequencies	Measurement bandwidth
9	-40 dBm	F1 - 900 kHz and F1 - 1 800 kHz	10 kHz
	-40 dBm	F2 + 900 kHz and F2 + 1 800 kHz	10 kHz
6, 8, 13	-40 dBm	F1 - 1,25 MHz and F1 - 2,50 MHz	10 kHz
	-40 dBm	F2 + 1,25 MHz and F2 + 2,50 MHz	10 kHz

NOTE: F1 = Centre frequency of the lowest supported CDMA channel in the pass band under test.  
F2 = Centre frequency of the highest supported CDMA channel in the pass band under test.

**Table 12: Input intermodulation requirements for interfering signals in the GSM 900 and DCS 1800 bands**

Deployment Environment	Interfering CW signal levels	Frequencies of interfering CW signals	Measurement bandwidth
Co-existence with GSM900 and/or DCS1800 in same geographic area	-15 dBm	876 MHz to 915 MHz 921 MHz to 960 MHz	10 kHz
	-15 dBm	1 710 MHz to 1 785 MHz 1 805 MHz to 1 880 MHz	10 kHz

For the parameters specified in table 11 or table 12, the power in the operating band shall not increase with more than the limit in table 13 at the output of the Repeater as measured in the centre of the operating band, compared to the level obtained without interfering signals applied.

**Table 13: General input intermodulations limit**

Limit for the increase of power in the operating band
+10 dB

### 4.2.5.3 Conformance

Conformance tests described in clause 5.3.4 shall be carried out.



## 4.2.6 Out-of-band gain

### 4.2.6.1 Definition

In the intended application of a Repeater, the out-of-band gain of the Repeater must be less than the coupling loss to the donor Base Station in order to ensure that emissions from the Base Station are not amplified to levels that exceed emissions limits.

### 4.2.6.2 Limits

The intended use of a Repeater in a system is to amplify the in band signals and not to amplify the out-of-band emission of the donor base station.

The manufacturer shall provide information that specifies the minimum donor coupling loss as a function of the Repeater gain setting, and Repeater pass band.

The measured out-of-band gain in the forward link signal path shall be below the minimum donor coupling loss for the configured gain setting (For Repeaters with more than one pass band, each pass band is evaluated).

The manufacturer shall declare the pass band of the Repeater, which shall comply with the frequency coverage requirements of TIA-1030 [15].

For pass bands in which the maximum measured gain is more than 40 dB, when the Repeater is set to its maximum gain setting, the ratio of the inband gain to the out-of-band gain shall comply with the minimum attenuation limits in table 14.

For pass bands in which the maximum measured gain is 40 dB or less, when the Repeater is set to its maximum gain setting, the out-of-band gain shall comply with the maximum gain limits in table 14.

**Table 14: Attenuation and gain requirements**

For $ \Delta f $ Within the Range	Minimum Attenuation	Maximum Gain
2,50 MHz to 3,75 MHz	$\geq 40$ dB	$\leq 40$ dB
3,75 MHz to 12,50 MHz	$\geq 40$ dB	$\leq 35$ dB
12,50 MHz to 50,00 MHz	$\geq 40$ dB	$\leq 30$ dB
> 50,00 MHz	$\geq 40$ dB	$\leq -10$ dB

NOTE: For pass bands that only support a single channel:  $\Delta f$  = centre frequency of supported channel - measurement frequency (f). For pass bands supporting two or more channels,  $\Delta f$  is defined:

- for positive  $\Delta f$  as the centre frequency of the highest supported channel - measurement frequency (f); and
- for negative  $\Delta f$  as the centre frequency of the lowest supported channel - measurement frequency (f).

The limits shall apply for all values of  $\Delta f$  regardless of whether the measurement frequency falls inside or outside of the band or block.

### 4.2.6.3 Conformance

Conformance tests described in clause 5.3.5 shall be carried out.

NOTE: Requirements related to the Adjacent Channel Rejection Ratio are captured already in the above requirements on out-of-band gain.

## 4.2.7 Output intermodulation

### 4.2.7.1 Definition

Output intermodulation is a measure of the ability of the Repeater to inhibit the generation of intermodulation product signals created by the presence of an interfering signal reaching the Repeater via an output port. The frequency of the interfering signal be  $\pm$  one, two and three carrier channel spacing frequency offset from the wanted channel (1,23 MHz or 1,25 MHz between channel centre frequencies depending on the band class under test), but within the band class under test.

This test only applies to the Forward link signal path of the Repeater.

### 4.2.7.2 Limits

The measured power contained in the intermodulation products shall not exceed the requirements listed in the appropriate section of clauses 4.2.2 and 4.2.3 based upon the band class under test.

### 4.2.7.3 Conformance

Conformance tests described in clause 5.3.6 shall be carried out.

---

# 5 Testing for compliance with technical requirements

## 5.1 Conditions for testing

### 5.1.1 Introduction

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 standard test conditions except where otherwise stated (see TIA-1037 [14]). For a definition of standard test conditions and for guidance on the use of other test conditions to be used in order to show compliance reference can be made to annex C.

### 5.1.2 Standard equipment under test

The equipment under test shall be assembled and any necessary adjustments shall be made in accordance with the manufacturer's instructions for the mode of operation required. When alternative modes are available, the equipment shall be assembled and adjusted in accordance with the relevant instructions. A complete series of measurements shall be made for each mode of operation.

## 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 shall be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty or the accuracy of each piece of test equipment used for the measurement of each parameter shall be included in the test report; only test equipment meeting the performance requirements for standard test equipment as defined in ANSI/TIA-97 [4], clause 6.4 or TIA-864 [12], clause 6.4, shall be used;

- the recorded value of the measurement uncertainty or the recorded value of the accuracy of each piece of test equipment shall be equal to or better than the figures in ANSI/TIA-97 [4], clause 6.4 or TIA-864 [12], clause 6.4.

## 5.3 Essential radio test suites

### 5.3.1 Spectrum emission mask

#### 5.3.1.1 Initial conditions

Test environment: Normal: see clause 5.1 in TIA-1037 [14].

- 1) Connect the equipment as shown in figure 6.9-1 in TIA-1037 [14] for the forward link signal path.
- 2) Connect one signal generator to the input port of the Repeater for tests of Repeaters with an pass band corresponding to one carrier.  
If the Repeaters pass band under test is capable of supporting two or more carriers, two signal generators with a combining circuit or one signal generator with the ability to generate two CDMA carriers is connected to the input.
- 3) The 1 MHz measurement bandwidth may be calculated by integrating multiple 50 kHz or narrower filter measurements.

#### 5.3.1.2 Procedures

- 1) Configure the Repeater to its maximum rated gain. If the Repeater supports an adjustable pass band span or adjustable supported channels, see clause 5.2 in TIA-1037 [14] for additional test requirements.
- 2) Configure the CDMA signal generator(s) at the Repeater input port to generate signal(s) in accordance to CDMA test signal, clause 7 in TIA-1037 [14], at level(s) that produces the manufacturer specified maximum output power specified in clause 5.2.5 in TIA-1037 [14], at maximum gain.
- 3) Measure the mean spurious emission levels with ten or more averages and note that the measured value does not exceed the specified value.
- 4) Increase the input signal level by 10 dB compare to the level obtained in step 2).
- 5) Measure the mean output power level of the carrier with ten or more averages.
- 6) Measure the mean spurious emission levels with ten or more averages and note that the measured value does not exceed the specified value.
- 7) Repeat steps 2) through 6) for each pass band of the Repeater.
- 8) Repeat steps 2) through 7) for the reverse link signal path of the Repeater.
- 9) Configure the Repeater to its minimum gain setting and repeat steps 2) through 8).

If the pass band corresponds to two or more consecutive nominal carrier, the requirement shall be met with any combination of two CDMA modulated signals of equal power in the Repeaters pass band.

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

### 5.3.2 Spurious emissions

#### 5.3.2.1 Initial conditions

The initial conditions for testing spurious emissions should follow the procedure outlined in clause 5.3.1.1, initial conditions for testing spectrum emission mask.

### 5.3.2.2 Procedure

The procedure for testing spurious emissions should follow the procedure outlined in clause 5.3.1.2, procedure for testing spectrum emission mask.

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

## 5.3.3 Maximum output power

### 5.3.3.1 Initial conditions

Test environment: Normal: see clause 5.1 in TIA-1037 [14]; and  
Extreme: see clause 4.1 in TIA-1037 [14].

- 1) Connect the equipment as shown figure 6.7-1, clause 6 in TIA-1037 [14] for the Forward link signal path.

### 5.3.3.2 Procedure

- 1) Configure the Repeater to its maximum rated gain. If the Repeater supports an adjustable pass band span or adjustable supported channels, see clause 5.2 in TIA-1037 [14] for additional test requirements.
- 2) Configure the Repeater to transmit a single carrier in one of its pass bands. This is the pass band under test.
- 3) Configure the CDMA signal generator at the Repeater input port to generate a signal in accordance to CDMA test signal, clause 7 in TIA-1037 [14] at a level that produces the manufacturer specified maximum output power specified in clause 5.2.5 in TIA-1037 [14], at maximum gain. Locate at the CDMA channel nearest the centre of the pass band under test.
- 4) Measure the mean output power level of the carrier with ten or more averages and note that the measured value does not exceed the specified value.
- 5) Increase the input signal to the Repeater by a total of 10 dB.
- 6) Measure the mean output power level of the carrier with ten or more averages at least 3 seconds after performing 4.
- 7) Repeat steps 1) through 6) for each pass band of the Repeater.
- 8) Repeat steps 1) through 7) for the reverse link signal path of the Repeater.
- 9) Repeat steps 1) through 8), using the extreme test environment requirements and method contained in clause 4.1 in TIA-1037 [14].

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

## 5.3.4 Input intermodulation

### 5.3.4.1 Initial conditions

Test environment: Normal: see clause 5.1 in TIA-1037 [14].

- 1) Connect the equipment as shown in figure 6.4-1 in TIA-1037 [14] for the Forward link signal path.

### 5.3.4.2 Procedures

- 1) Configure the Repeater to its maximum gain setting. If the Repeater supports adjustable pass band span or adjustable supported channels, see clause 5.2 in TIA-1037 [14] for additional test requirements.
- 2) For the Band Class and Band Subclass under test perform steps 3) through 11).
- 3) Adjust the CW generators as required to obtain the input power level listed in table 11 for the F1 test.

- 4) Measure the mean output power of the Repeater with ten or more averages by integrating the power contained in the lowest supported CDMA channel in the pass band under test (centred about F1), using a 10 kHz RBW.
- 5) Remove the signal generators from the input of the Repeater and terminate the input with 50 ohms.
- 6) Measure the mean output power of the Repeater with ten or more averages by integrating the power contained in the lowest supported CDMA channel in the pass band under test (centred about F1), using a 10 kHz RBW.
- 7) Adjust the CW generators as required to obtain the input power level listed in table 11 for the F2 test.
- 8) Measure the mean output power of the Repeater with ten or more averages by integrating the power contained in the highest supported CDMA channel in the pass band under test (centred about F2), using a 10 kHz RBW.
- 9) Remove the signal generators from the input of the Repeater and terminate the input with 50 ohms.
- 10) Measure the mean output power of the Repeater with ten or more averages by integrating the power contained in the highest supported CDMA channel in the pass band under test (centred about F2), using a 10 kHz RBW.
- 11) If the manufacturer has specified that the Repeater is not suitable for deployment in a co-existence or co-location environment with GSM900 and/or DCS1800, skip to step 17). If the pass band under test is declared to support CDMA channel numbers that would contain the interfering frequencies listed in table 12, skip to step 16. If neither of these exclusions is valid, perform steps 12) through 15).
- 12) Remove the 50 ohm termination from the Repeater input and re-connect the signal generators. Apply two CW signals at the levels and frequencies as indicated in table 12 such that the lowest order intermodulation products are located in the centre of the pass band under test (so that both intermodulation products are within  $\pm 100$  kHz of the centre of the pass band under test).
- 13) Measure the mean output power of the Repeater with ten or more averages by integrating the power contained in the CDMA channel located nearest to the centre of the pass band under test, using a 10 kHz RBW.
- 14) Remove the signal generators from the input of the Repeater and terminate the input with 50 ohms.
- 15) Measure the mean output power of the Repeater with ten or more averages by integrating the power contained in the CDMA channel located nearest to the centre of the pass band under test, using a 10 kHz RBW.
- 16) Repeat steps 1) through 15) for each pass band supported by the Repeater.
- 17) Repeat steps 1) through 16) for the reverse link signal path of the Repeater.

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

## 5.3.5 Out-of-band gain

### 5.3.5.1 Initial conditions

Test environment: Normal: see clause 5.1 in TIA-1037 [14].

- 1) Connect the equipment as shown in figure 6.1-1 in TIA-1037 [14] for the Forward link signal path.

### 5.3.5.2 Procedure

- 1) Configure the Repeater to its maximum gain setting. If the Repeater supports an adjustable pass band span or adjustable supported channels, see clause 5.2 in TIA-1037 [14] for additional test requirements.
- 2) Configure the signal generator at the Repeater input port to produce a CW signal at an amplitude approximately 5 dB below the level that would cause the maximum rated mean output power from the Repeater for the configured gain setting at the centre of its pass band.
- 3) For pass bands in which the maximum measured gain is more than 40 dB, when the Repeater is set to its maximum gain setting:  
Measure the minimum attenuation relative to the minimum gain in the pass band under test at frequency offsets from the highest supported CDMA channel centre frequency, as detailed in TIA-1037 [14].

- 4) For pass bands in which the maximum measured gain is more than 40 dB, when the Repeater is set to its maximum gain setting:  
Measure the minimum attenuation relative to the minimum gain in the pass band under test at frequency offsets from the lowest supported CDMA channel centre frequency, as detailed in table 14.
- 5) For pass bands in which the maximum measured gain is 40 dB or less, when the Repeater is set to its maximum gain setting:  
Measure the maximum gain at frequency offsets from the highest supported CDMA channel centre frequency in the pass band under test, as detailed in table 14.
- 6) For pass bands in which the maximum measured gain is 40 dB or less, when the Repeater is set to its maximum gain setting:  
Measure the maximum gain at frequency offsets from the lowest supported CDMA channel centre frequency in the pass band under test, as detailed in table 14.
- 7) Repeat steps 2) through 6) for each pass band supported by the Repeater. (Each pass band is independently evaluated; i.e. gain from a pass band that is not under test is ignored.)
- 8) Repeat steps 2) through 7) for the reverse link signal path of the Repeater.

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

## 5.3.6 Output intermodulation

### 5.3.6.1 Initial conditions

Test environment: Normal: see clause 5.1 in TIA-1037 [14].

- 1) Connect the equipment as shown in figure 6.8-1 in TIA-1037 [14] for the Forward link signal path.

### 5.3.6.2 Procedure

- 1) Configure the Repeater to its maximum gain setting. If the Repeater supports an adjustable pass band span, adjustable supported channels, see clause 5.2 in TIA-1037 [14] for additional test requirements.
- 2) Connect a signal generator to the circulator on the input port of the Repeater. Connect another signal generator to the circulator on the output port and make sure the signal generator's power is directed to the Repeater output port.
- 3) Configure this CDMA signal generator at the Repeater (subject signal) input port to generate a signal in accordance to CDMA test signal, clause 7 in TIA-1037 [14], at a level that produces the manufacturer's specified maximum output power from the Repeater, at the CDMA channel nearest the centre of the pass band under test.
- 4) Configure the signal generator on the circulator connected to the output port of the Repeater (interfering signal) to generate a signal in accordance to CDMA test signal, clause 7 in TIA-1037 [14], at a level that produces a signal power corresponding to 30 dB below the manufacturer's specified maximum output power of the Repeater with a frequency offset of one carrier channel spacing (1,23 MHz or 1,25 MHz between channel centre frequencies depending on the band class under test) above the Repeater output frequency.
- 5) Measure the emission at the third and fifth order intermodulation products of the Repeater output signal and the interfering signal using a true RMS detector and the bandwidth specified for the frequency offset based on the band class under test as specified in the appropriate section of clauses 4.2.2 and 4.2.3.
- 6) Configure the signal generator on the circulator connected to the output port of the Repeater (interfering signal) to generate a CDMA signal (see clause 7 in TIA-1037 [14]) that produces a signal power corresponding to 30 dB below the manufacturer's specified maximum mean output power of the Repeater with a frequency offset of one carrier channel spacing (1,23 MHz or 1,25 MHz between channel centre frequencies depending on the band class under test) below the Repeater output frequency.
- 7) Measure the emission at the third and fifth order intermodulation products of the Repeater output signal and the interfering signal using a true RMS detector and the bandwidth specified for the frequency offset based on the band class under test as specified in the appropriate section of clauses 4.2.2 and 4.2.3.

- 8) Repeat steps 4) through 7) using frequency offsets of 2 times the carrier channel spacing.
- 9) Repeat steps 4) through 7) using frequency offsets of 3 times the carrier channel spacing.
- 10) Repeat steps 3) through 9) for each Forward link pass band supported by the Repeater.

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

## Annex A (normative): HS Requirements and conformance Test specifications Table (HS-RTT)

The HS Requirements and conformance Test specifications Table (HS-RTT) in table A.1 serves a number of purposes, as follows:

- it provides a statement of all the essential requirements in words and by cross reference to (a) specific clause(s) in the present document or to (a) specific clause(s) in (a) specific referenced document(s);
- it provides a statement of all the test procedures corresponding to those essential requirements by cross reference to (a) specific clause(s) in the present document or to (a) specific clause(s) in (a) specific referenced document(s);
- it qualifies each requirement to be either:
  - Unconditional: meaning that the requirement applies in all circumstances; or
  - Conditional: meaning that the requirement is dependent on the manufacturer having chosen to support optional functionality defined within the schedule;
- in the case of Conditional requirements, it associates the requirement with the particular optional service or functionality;
- it qualifies each test procedure to be either:
  - Essential: meaning that it is included with the Essential Radio Test Suite and therefore the requirement shall be demonstrated to be met in accordance with the referenced procedures;
  - Other: meaning that the test procedure is illustrative but other means of demonstrating compliance with the requirement are permitted.

**Table A.1: HS Requirements and conformance Test specifications Table (HS-RTT)**

Harmonized Standard EN 301 908-12						
The following essential requirements and test specifications are relevant to the presumption of conformity under Article 3.2 of the R&TTE Directive						
Essential Requirement			Requirement Conditionality		Test Specification	
No	Description	Reference: Clause No	U/C	Condition	E/O	Reference: Clause No
1	Spectrum emissions mask	4.2.2	U		E	5.3.1
2	Spurious emissions	4.2.3	U		E	5.3.2
3	Maximum output power	4.2.4	U		E	5.3.3
4	Input intermodulation	4.2.5	U		E	5.3.4
5	Out-of-band gain	4.2.6	U		E	5.3.5
6	Output intermodulation	4.2.7	U		E	5.3.6

### Key to columns:

#### Essential Requirement:

**No** A unique identifier for one row of the table which may be used to identify a requirement or its test specification.

**Description** A textual reference to the requirement.

**Clause Number** Identification of clause(s) defining the requirement in the present document unless another document is referenced explicitly.



**Requirement Conditionality:**

**U/C** Indicates whether the requirement is to be *unconditionally* applicable (U) or is *conditional* upon the manufacturers claimed functionality of the equipment (C).

**Condition** Explains the conditions when the requirement shall or shall not be applicable for a technical requirement which is classified "conditional".

**Test Specification:**

**E/O** Indicates whether the test specification forms part of the Essential Radio Test Suite (E) or whether it is one of the Other Test Suite (O).

**NOTE:** All tests whether "E" or "O" are relevant to the requirements. Rows designated "E" collectively make up the Essential Radio Test Suite. The completion of all tests classified "E" as specified with satisfactory outcomes is a necessary condition for a presumption of conformity.

**Clause Number** Identification of clause(s) defining the test specification in the present document unless another document is referenced explicitly.

---

## Annex B (normative): Repeater configurations

### B.1 Power supply

When extreme power supply conditions are specified for a test, the test shall be performed at the standard upper and lower limits of operating voltage defined by manufacturer's declaration for the equipment under test.

---

### B.2 Power supply options

If the Repeater 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.

---

### B.3 Ancillary equipment

The Repeater equipment may include ancillary equipment during tests, if the ancillary equipment is normally used in the operation of the equipment under test. This would include power supplies, cabinets, antenna couplers, and receiver multi-couplers.

---

## 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.

---

## Annex D (informative): Bibliography

- ETSI TR 100 028 (V1.4.1): "Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- ETSI EN 301 489 (series): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".
- CEPT/ERC/REC 74-01E (Siófok 1998, Nice 1999, Sesimbra 2002, Hradec Kralove 2005): "Unwanted Emissions in the Spurious Domain".
- ETSI EG 201 399 (V2.1.1): "A guide to the production of Harmonized Standards for application under the R&TTE Directive".

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

Language	EN title
Bulgarian	
Czech	Elektromagnetická kompatibilita a rádiové spektrum (ERM) – Základnové stanice (BS), opakovače a uživatelská zařízení (UE) buňkových sítí IMT-2000 třetí generace – Část 12: Harmonizovaná EN pokrývající základní požadavky článku 3.2 Směrnice R&TTE na IMT-2000, CDMA s více nosnými (cdma2000) (opakovače)
Danish	Elektromagnetisk kompatibilitet og radiospektrumanligger (ERM); Basisstationer (BS), Repeaters og brugerudstyr (UE) for IMT-2000 CDMA tredje generations cellulær radionet; Part 12: Harmoniseret EN for IMT-2000, CDMA multibærebølge (CDMA2000) (Repeaters), 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 12: Geharmoniseerde EN voor IMT-2000, CDMA Multi-Carrier (cdma2000) (Repeaters), 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 12: Harmonized standard for IMT-2000, CDMA Multi-Carrier (cdma2000) Repeaters) covering essential requirements of article 3.2 of the R&TTE Directive
Estonian	Elektromagnetilise ühilduvuse ja raadiospektri küsimused (ERM); Kolmanda põlvkonna mobiilsidevõrgu IMT-2000 baasjaamad (BS), repiiterid ja kasutajaseadmed (UE); Osa 12: IMT-2000, mitme kandjaga CDMA (cdma2000) (Repiiterid) põhinõuded, harmoneeritud EN R&TTE direktiivi artikli 3.2 alusel
Finnish	Sähkömagneettinen yhteensopivuus ja radiospektriasiat (ERM); IMT-2000 kolmannen sukupolven solukkovertkojen tukiasemat (BS), toistimet ja matkaviestinlaitteet (UE); Osa 12: R&TTE direktiivin artiklan 3.2 olennaiset vaatimukset toteuttava yhdenmukaistettu EN IMT-2000 CDMA monikanalitekniikkaa (cdma2000) käytäville toistimille
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 12: Norme harmonisée pour l'IMT-2000, CDMA Multi-porteuse (CDMA 2000) (Répéteurs) couvrant les exigences essentielles de l'article 3.2 de la Directive R&TTE
German	Elektromagnetische Verträglichkeit und Funkspektrumanforderungen (ERM); Feststationen (BS), Repeater und Mobilstationen (UE) für zellulare Mobilfunknetze der dritten Generation IMT-2000; Teil 12: CDMA Mehrfachträger (cdma2000) (Repeater), Harmonisierte Europäische Norm (EN) für IMT-2000 mit wesentlichen Anforderungen nach R&TTE Richtlinie Artikel 3.2
Greek	Ηλεκτρομαγνητική συμβατότητα και Θέματα Ηλεκτρομαγνητικού Φάσματος (ERM); Σταθμοί Βάσης (BS), αναμεταδότες και Μηχανήματα Χρηστών (UE) για κυψελωτά δίκτυα Τρίτης Γενιάς IMT-2000; Μέρος 12: Εξαρμοσμένη τυποποίηση για IMT-2000, CDMA Multi-Carrier (cdma2000) (αναμεταδότες) Που καλύπτει τα αναγκαία προαπαιτούμενα του Αρθρου 3.2 της Ντιρεκτιβας R&TTE
Hungarian	Elektromágneses összeférhetőségi és rádióspektrumügyek (ERM). Az IMT-2000 harmadik generációs cellás hálózatának bázisállomásai (BS), átjátszói és felhasználói berendezései (UE). 12. rész: Az IMT-2000 többvívós CDMA (cdma2000) (átjátszó) berendezéseire vonatkozó, az R&TTE
Icelandic	
Italian	Compatibilità elettromagnetica e problematiche di Spettro Radio (ERM); Stazioni Base (BS), Ripetitori e Terminali (UE) per le reti cellulari di terza generazione IMT-2000; Parte 12: Norma armonizzata per IMT-2000, CDMA Multi-Portante (cdma2000) (Ripetitori) relativa ai requisiti essenziali dell'articolo 3.2 della Direttiva R&TTE
Latvian	Elektromagnētiskā saderība un radiofrekvenču spektra jautājumi (ERM) - IMT-2000 trešās paaudzes šūnu tīklu bāzes stacijas (BS), retranslatori un lietotāja iekārtas (UE)- 12.daļa: Harmonizēts IMT-2000 un daudznesēju CDMA (cdma2000) (retranslators) Eiropas standarts (EN), kas atbilst R&TTE
Lithuanian	Elektromagnetinio suderinamumo ir radijo dažnių spektro dalykai. Trečiosios kartos korinių tinklų IMT-2000 bazinės stotys (BS), kartotuvai ir vartotojų įranga (VI). 12 dalis. Darnusis IMT-2000, CDMA daugianešio būdo (cdma 2000) (kartotuvo) Europos standartas, apimantis esminius 1999/5/EC direktyvos 3.2 straipsnio reikalavimus
Maltese	
Norwegian	Elektromagnetisk kompatibilitet og radiospektrums spørsmål (ERM); Basestasjoner (BS), repeater og brukerstyr (UE) for IMT-2000 tredjegenersjons celledelte nett; Del 12: Harmonisert EN for IMT-2000, CDMA flerbærer (CDMA 2000) (Repeater) som dekker de vesentligste krav i R&TTE

Language	EN title
Polish	Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM); Stacje bazowe (BS), stacje przekaźnikowe i urządzenia użytkownika (UE) dla sieci komórkowych trzeciej generacji IMT-2000; Część 12: Zharmonizowana EN dla IMT-2000 CDMA z wieloma falami nośnymi (cdma2000) (stacje przekaźnikowe) zapewniająca spełnianie zasadniczych wymagań zgodnie z artykułem 3.2 dyrektywy 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 12: EN Harmonizada para o IMT-2000, Portadoras múltiplas CDMA (cdma2000) (Repetidores), cobrindo os requisitos essenciais no âmbito do artigo 3.º, n.º 2 da Directiva R & TTE
Romanian	
Slovak	Elektromagnetická kompatibilita a závislosti rádiového spektra (ERM). Základňové stanice (BS), opakovače a používateľské zariadenia (UE) bunkových sietí tretej generácie IMT-2000. Časť 12: Harmonizovaná EN na IMT-2000 - CDMA s viacnásobnou nosnou frekvenciou (cdma 2000) (opakovače), vzťahujúca sa na základné požiadavky podľa článku 3.2 smernice R&TTE
Slovenian	Elektromagnetna združljivost in zadeve v zvezi z radijskim spektrom (ERM) – Bazne postaje (BS), ponavljalniki (repetitorji) in uporabniška oprema (UE) za celična omrežja tretje generacije IMT-2000 – 12. del: Harmonizirani EN za IMT-2000, CDMA "Multi-Carrier" (CDMA2000) (ponavljalnik (repetitor)), ki zajema bistvene zahteve člena 3.2 direktive 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 12: CDMA multi portadora (cdma2000) (Repetidores)
Swedish	Elektromagnetisk kompatibilitet och radiospektrumfrågor (ERM); Basstationer (BS), Repeatrar och Mobilstationer (UE) för tredje generationens mobilnät IMT-2000; Del 12: Harmoniserad EN för IMT-2000, CDMA med multipla bärvågor (cdma2000) (Repeater) omfattande väsentliga krav enligt artikel 3.2 i R&TTE-direktivet

---

## History

<b>Document history</b>		
V1.1.1	November 2006	Public Enquiry PE 20070309: 2006-11-08 to 2007-03-09
V1.1.2	June 2007	Vote V 20070824: 2007-06-25 to 2007-08-24