

# ETSI EN 301 908-12 V7.1.1 (2016-05)



**IMT cellular networks;  
Harmonised Standard covering the essential requirements  
of article 3.2 of the Directive 2014/53/EU;  
Part 12: CDMA Multi-Carrier (cdma2000) Repeaters**

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**Reference**

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**Keywords**

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3G, 3GPP2, cdma2000, digital, IMT-2000,  
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# Contents

Intellectual Property Rights .....	5
Foreword.....	5
Modal verbs terminology.....	5
Introduction .....	5
1 Scope .....	6
2 References .....	6
2.1 Normative references .....	6
2.2 Informative references.....	7
3 Definitions, symbols and abbreviations .....	7
3.1 Definitions .....	7
3.2 Symbols.....	9
3.3 Abbreviations .....	9
4 Technical requirements specifications .....	10
4.1 Environmental profile.....	10
4.2 Conformance requirements .....	10
4.2.1 Introduction.....	10
4.2.2 Spectrum emissions mask.....	11
4.2.2.1 Definition .....	11
4.2.2.2 Limits .....	11
4.2.2.3 Conformance.....	11
4.2.3 Spurious emissions .....	12
4.2.3.1 Definition .....	12
4.2.3.2 Limits .....	12
4.2.3.2.1 Spurious emissions .....	12
4.2.3.3 Conformance.....	14
4.2.4 Maximum output power.....	14
4.2.4.1 Definition .....	14
4.2.4.2 Limits .....	14
4.2.4.3 Conformance.....	14
4.2.5 Input intermodulation .....	14
4.2.5.1 Definition .....	14
4.2.5.2 Limits .....	15
4.2.5.3 Conformance.....	15
4.2.6 Out-of-band gain.....	15
4.2.6.1 Definition .....	15
4.2.6.2 Limits .....	15
4.2.6.3 Conformance.....	16
4.2.7 Output intermodulation.....	16
4.2.7.1 Definition .....	16
4.2.7.2 Limits .....	16
4.2.7.3 Conformance.....	16
5 Testing for compliance with technical requirements.....	17
5.1 Conditions for testing .....	17
5.1.1 Introduction.....	17
5.1.2 Standard equipment under test.....	17
5.2 Interpretation of the measurement results .....	17
5.3 Essential radio test suites.....	17
5.3.1 Spectrum emission mask .....	17
5.3.1.1 Initial conditions .....	17
5.3.1.2 Procedures .....	18
5.3.1.3 Test requirement .....	18
5.3.2 Spurious emissions .....	18
5.3.2.1 Initial conditions .....	18
5.3.2.2 Procedure .....	18

5.3.2.3	Test requirement .....	18
5.3.3	Maximum output power.....	18
5.3.3.1	Initial conditions .....	18
5.3.3.2	Procedure .....	18
5.3.3.3	Test requirement .....	19
5.3.4	Input intermodulation .....	19
5.3.4.1	Initial conditions .....	19
5.3.4.2	Procedures.....	19
5.3.4.3	Test requirement .....	20
5.3.5	Out-of-band gain.....	20
5.3.5.1	Initial conditions .....	20
5.3.5.2	Procedure .....	20
5.3.5.3	Test requirement .....	21
5.3.6	Output intermodulation.....	21
5.3.6.1	Initial conditions .....	21
5.3.6.2	Procedure .....	21
5.3.6.3	Test requirement .....	21
<b>Annex A (normative):</b>	<b>Relationship between the present document and the essential requirements of Directive 2014/53/EU .....</b>	<b>22</b>
<b>Annex B (normative):</b>	<b>Repeater configurations .....</b>	<b>23</b>
B.1	Power supply .....	23
B.2	Power supply options .....	23
B.3	Ancillary equipment.....	23
<b>Annex C (informative):</b>	<b>Environmental profile specification .....</b>	<b>24</b>
<b>Annex D (informative):</b>	<b>Bibliography.....</b>	<b>25</b>
History .....		26

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## Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Mobile Standards Group (MSG).

For non EU countries the present document may be used for regulatory (Type Approval) purposes.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.4] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.1].

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

The present document is part 12 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.3].

National transposition dates	
Date of adoption of this EN:	20 April 2016
Date of latest announcement of this EN (doa):	31 July 2016
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2017
Date of withdrawal of any conflicting National Standard (dow):	31 January 2018

## Modal verbs terminology

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

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## Introduction

The present document is part of a set of standards developed by ETSI that are designed to fit in a modular structure to cover radio equipment within the scope of the Radio Equipment Directive [i.1]. The present document is produced following the guidance in ETSI EG 203 336 [i.2] as applicable.

# 1 Scope

The present document applies to the following equipment types:

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

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

**Table 1-1: CDMA multi-carrier Repeater operating bands**

Band Class (BC)	Direction of transmission	CDMA multi-carrier Repeater operating bands
6	Forward link (DL)	2 110 MHz to 2 170 MHz
	Reverse link (UL)	1 920 MHz to 1 980 MHz
8	Forward link (DL)	1 805 MHz to 1 880 MHz
	Reverse link (UL)	1 710 MHz to 1 785 MHz
9	Forward link (DL)	925 MHz to 960 MHz
	Reverse link (UL)	880 MHz to 915 MHz
13	Forward link (DL)	2 620 MHz to 2 690 MHz
	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 3GPP2 C.S0002-F [i.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 [i.6], referred to herein in Type 2 cdma2000 systems.

The present document contains requirements to demonstrate that Radio equipment both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference.

## 2 References

### 2.1 Normative references

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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.

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

- [1] TIA-1037-A (May 2012): "Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Repeaters".
- [2] TIA-1030-F (September 2015): "Band Class Specification for cdma2000 Spread Spectrum Systems".
- [3] 3GPP2 C.S0032-D (March 2014): "Recommended Minimum Performance Standards for cdma2000 High Rate Packet Data Access Network".

NOTE: Available at [http://www.3gpp2.org/Public\\_html/specs/C.S0032-D\\_v2.0\\_20140321.pdf](http://www.3gpp2.org/Public_html/specs/C.S0032-D_v2.0_20140321.pdf).

## 2.2 Informative references

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

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

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

- [i.1] Directive 2014/53/EU of the European parliament and of the council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.
- [i.2] ETSI EG 203 336 (V1.1.1) (06-2015): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".
- [i.3] ETSI EN 301 908-1 (V11.1.1): "IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Introduction and common requirements".
- [i.4] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.
- [i.5] 3GPP2 C.S0002-F V2.0 (05-2014): "Physical Layer Standard for cdma2000 Spread Spectrum Systems Revision F".

NOTE: Available at [http://www.3gpp2.org/Public\\_html/specs/C.S0002-F%20v2.0\\_20140519.pdf](http://www.3gpp2.org/Public_html/specs/C.S0002-F%20v2.0_20140519.pdf).

- [i.6] TIA-856-B-2 (July 2012): "cdma2000 High Rate Packet Data Air Interface Specification".

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## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions 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: Base stations for IMT-2000 CDMA multi-carrier (cdma2000) may support, operation in cdma2000 spread spectrum systems as defined in 3GPP2 C.S0002-F [i.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 [i.6], referred to herein as operation in Type 2 cdma2000 systems. 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.

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

**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

**DownLink (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: This frequency range can correspond to one or several consecutive nominal channels. If they are not consecutive each subset of channels is considered as an individual pass band. 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 3GPP2 C.S0002-F [i.5], clauses 2.1.3 and 3.1.3.

**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).

**Resolution BandWidth (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

**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:** often referred to as "1X"

NOTE: A spreading rate 1 forward CDMA channel uses a single direct-sequence spread carrier with a chip rate of 1,2288 Mcps.  
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:** often referred to as "3X"

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

**UpLink (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 3GPP2 C.S0002-F [i.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 [i.6], 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:

$\Delta f$	frequency offset from the centre frequency
$\Omega$	Ohm
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

NOTE: 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

NOTE: 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)
Pout	transmitter RF output power

## 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
EFTA	European Free Trade Association
EMC	ElectroMagnetic Compatibility
FDD	Frequency Division Duplex
GSM	Global System for Mobile communications
HRPD	High Rate Packet Data

IMT	International Mobile Telecommunications
MSC	Mobile Switching Centre
PN	PseudoNoise
RBW	Resolution BandWidth
RF	Radio Frequency
RMS	Root Mean Square
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

#### 4.2.1 Introduction

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.

To meet the essential requirement under article 3.2 of Directive 2014/53/EU [i.1] for IMT Repeater equipment, a set of essential parameters in addition to those in ETSI EN 301 908-1 [i.3] have been identified. Table 4.2.1-1 provides a cross reference between these essential parameters and the corresponding technical requirements for equipment within the scope of the present document.

**Table 4.2.1-1: Cross references**

Essential parameter	Corresponding technical requirements	Corresponding test suites
Transmitter spectrum mask	4.2.2 Spectrum emissions mask	5.3.1
Transmitter unwanted emissions in the out-of-band domain	4.2.3 Spurious emissions	5.3.2
Transmitter power accuracy	4.2.4 Maximum output power	5.3.3
Receiver radio-frequency intermodulation	4.2.5 Input intermodulation	5.3.4
Receiver desensitization		
Receiver adjacent signal selectivity	4.2.6 Out-of-band gain	5.3.5
Transmitter intermodulation attenuation	4.2.7 Output intermodulation	5.3.6

**NOTE:** Some of the essential parameters of the ETSI EG 203 336 [i.2] are not included into the present document since those requirements are not applicable for repeater equipment.

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 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 4.2.2.2-1 and 4.2.2.2-2 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 4.2.2.2-1: 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 4.2.2.2-2: 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 4.2.3.2.1-1 to 4.2.3.2.1-5 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 4.2.3.2.1-1 for both the Forward and Reverse signal paths.

**Table 4.2.3.2.1-1: 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 4.2.3.2.1-2 for both the Forward and Reverse signal paths.

**Table 4.2.3.2.1-2: 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 4.2.3.2.1-3 for the forward link. For the reverse link spurious emissions shall also be less than the limits specified in tables 4.2.3.2.1-4 and 4.2.3.2.1-5.

**Table 4.2.3.2.1-3: 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	GSM900	BC 6, 8, 13
921 MHz to 960 MHz	Yes	-57 dBm/100 kHz	GSM900	BC 6, 8, 13
1 710 MHz to 1 785 MHz	No	-61 dBm/100 kHz	DCS1800	BC 6, 9, 13
1 805 MHz to 1 880 MHz	Yes	-47 dBm/100 kHz	DCS1800	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 4.2.3.2.1-4: 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	GSM900	BC 6, 8, 13
925 MHz to 935 MHz	-67 dBm/100 kHz	GSM900	BC 6, 8, 13
935 MHz to 960 MHz	-79 dBm/100 kHz	GSM900	BC 6, 8, 13
1 805 MHz to 1 880 MHz	-71 dBm/100 kHz	DCS1800	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 4.2.3.2.1-1 and 4.2.3.2.1-2 are allowed.			

**Table 4.2.3.2.1-5: 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 4.2.3.2.1-1 and 4.2.3.2.1-2 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 [1], the Repeater's mean output power shall remain within limits specified in table 4.2.4.2-1 relative to the manufacturer's rated mean output under every specified test.

**Table 4.2.4.2-1: 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 in TIA-1037 [1], the Repeater's mean output power shall remain within limits specified in table 4.2.4.2-2 relative to the manufacturer's rated mean output power.

**Table 4.2.4.2-2: 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 4.2.5.2-1: 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 4.2.5.2-2: Input intermodulation requirements for interfering signals in the GSM900 and DCS1800 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 tables 4.2.5.2-1 or 4.2.5.2-2, the power in the operating band shall not increase with more than the limit in table 4.2.5.2-3 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 4.2.5.2-3: 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 is 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 [2].

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 4.2.6.2-1.

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 4.2.6.2-1.

**Table 4.2.6.2-1: 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: <ul style="list-style-type: none"> <li>- for positive <math>\Delta f</math> as the centre frequency of the highest supported channel - measurement frequency (f); and</li> <li>- for negative <math>\Delta f</math> as the centre frequency of the lowest supported channel - measurement frequency (f).</li> </ul> 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 [1]). 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 [1], clause 6.4 or 3GPP2 C.S0032-D [3], 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 [1], clause 6.4 or 3GPP2 C.S0032-D [3], 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 [1].

- 1) Connect the equipment as shown in figure 6.1-9 in TIA-1037 [1] for the forward link signal path.
- 2) Connect one signal generator to the input port of the Repeater for tests of Repeaters with a 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 [1] 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 6.2 in TIA-1037 [1], at level(s) that produces the manufacturer specified maximum output power specified in clause 5.2.5 in TIA-1037 [1], 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.

### 5.3.1.3 Test requirement

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.

### 5.3.2.3 Test requirement

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 [1]; and  
                                  Extreme: see clause 4.1 in TIA-1037 [1].

- 1) Connect the equipment as shown figure 6.1-7, clause 6 in TIA-1037 [1] 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 [1] 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 6.2 in TIA-1037 [1] at a level that produces the manufacturer specified maximum output power specified in clause 5.2.5 in TIA-1037 [1], 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 step 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 [1].

### 5.3.3.3 Test requirement

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 [1].

- 1) Connect the equipment as shown in figure 6.1-4 in TIA-1037 [1] 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 [1] 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 4.2.5.2-1 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  $\Omega$ .
- 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 4.2.5.2-1 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  $\Omega$ .
- 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 4.2.5.2-2, skip to step 16). If neither of these exclusions is valid, perform steps 12) through 15).

- 12) Remove the 50  $\Omega$  termination from the Repeater input and re-connect the signal generators. Apply two CW signals at the levels and frequencies as indicated in table 4.2.5.2-2 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  $\Omega$ .
- 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.

#### 5.3.4.3 Test requirement

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 [1].

- 1) Connect the equipment as shown in figure 6.1-1 in TIA-1037 [1] 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 [1] 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 [1].
- 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 4.2.6.2-1.
- 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 4.2.6.2-1.
- 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 4.2.6.2-1.
- 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.

### 5.3.5.3 Test requirement

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 [1].

- 1) Connect the equipment as shown in figure 6.1-8 in TIA-1037 [1] 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 [1] 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 6.2 in TIA-1037 [1], 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 6.2 in TIA-1037 [1], 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 6.2 in TIA-1037 [1]) 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.

### 5.3.6.3 Test requirement

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

## Annex A (normative): Relationship between the present document and the essential requirements of Directive 2014/53/EU

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.4] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.1].

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

**Table A-1: Relationship between the present document and  
the essential requirements of Directive 2014/53/EU**

<b>Harmonised Standard ETSI EN 301 908-12</b> The following requirements are relevant to the presumption of conformity under the article 3.2 of the Directive 2014/53/EU [i.1]				
Requirement			Requirement Conditionality	
No	Description	Reference: Clause No	U/C	Condition
1	Spectrum emissions mask	4.2.2	U	
2	Spurious emissions	4.2.3	U	
3	Maximum output power	4.2.4	U	
4	Input intermodulation	4.2.5	U	
5	Out-of-band gain	4.2.6	U	
6	Output intermodulation	4.2.7	U	

### Key to columns:

#### Requirement:

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

#### Requirement Conditionality:

- U/C** Indicates whether the requirement shall 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 requirement which is classified "conditional".

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

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

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## 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.

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### 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.

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### 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.

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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

Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC (text with EEA relevance) (EMC Directive).

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CEPT/ERC/REC 74-01 (Siófok 1998, Nice 1999, Sesimbra 2002, Hradec Kralove 2005, Cardiff 2011): "Unwanted Emissions in the Spurious Domain".

Commission Decision 2008/477/EC of 13 June 2008 on the harmonisation of the 2 500-2 690 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community.

Commission Decision 2010/267/EU of 6 May 2010 on harmonised technical conditions of use in the 790-862 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union.

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Regulation (EU) No 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardisation amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No1673/2006/EC of the European Parliament and of the Council.

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ANSI/TIA-97-H-1 (April 2014): "Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Base Stations - Addendum 1".

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