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Candidate Harmonized European Standard (Telecommunications series)

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Base Stations (BS), Repeaters and User Equipment (UE) for
IMT-2000 Third-Generation cellular networks;
Part 11: Harmonized EN for IMT-2000,
CDMA Direct Spread (UTRA FDD) (Repeaters)
covering essential requirements
of article 3.2 of the R&TTE Directive**



Reference

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Foreword

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

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [6] (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 11 of a multi-part deliverable covering the Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks, as identified below:

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

Part 11: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (Repeaters) covering essential requirements of article 3.2 of the R&TTE Directive".

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

Technical specifications relevant to Directive 1999/5/EC [1] are given in annex A in the present document and annex A of part 1.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	36 months after doa

1 Scope

The present document applies to the following radio equipment type:

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

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

Table 1: CDMA Direct Spread Repeater frequency bands

Operating Band	Direction of transmission	CDMA Direct Spread Repeater frequency bands
I	Downlink	2110 MHz to 2170 MHz
	Uplink	1920 MHz to 1980 MHz
III	Downlink	1710 MHz to 1785 MHz
	Uplink	1805 MHz to 1880 MHz
VII	Downlink	2500 MHz to 2570 MHz
	Uplink	2620 MHz to 2690 MHz
VIII	Downlink	880 MHz to 915 MHz
	Uplink	925 MHz to 960 MHz

The present document covers requirements for UTRA FDD Repeater from 3GPP Release 4, 5, 6 and 7.

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

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

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

2 References

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

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

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

- [1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
- [2] ETSI TR 100 028 (all parts) (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [3] ETSI TS 125 143 (V7.0.0): "Universal Mobile Telecommunications System (UMTS); UTRA repeater conformance testing(3GPP TS 25.143 version 7.0.0 Release 7) UTRA repeater conformance testing".
- [4] ITU-R Recommendation SM.329-10 (2003): "Unwanted emissions in the spurious domain".

- [5] ETSI TS 125 141 (V7.3.0): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD) (3GPP TS 25.141 version 7.3.0 Release 7)".
- [6] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.
- [7] IEC 60068-2-1(1990): "Environmental testing - Part 2: Tests. Tests A: Cold".
- [8] IEC 60068-2-2(1974): "Environmental testing - Part 2: Tests. Tests B: Dry heat".

3 Definitions and abbreviations

3.1 Definitions

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

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

down-link: signal path where base station transmits and mobile receives

maximum output power (P_{max}): mean power level per carrier measured at the antenna connector of the Repeater in specified reference condition

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 shall be considered as an individual pass band.

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

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)

up-link: signal path where mobile transmits and base station receives

3.2 Abbreviations

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

ACRR	Adjacent Channel Rejection Ratio
BTS	Base Transceiver Station
CW	Continuous Wave (unmodulated signal)
DUT	Device Under Test
EUT	Equipment Under Test
FDD	Frequency Division Duplexing
MS	Mobile Station
PCCPCH	Primary Common Control Physical Channel
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
RMS	Root Mean Square
RRC	Root Raised Cosine
SCCPCH	Secondary Common Control Physical Channel
TDD	Time Division Duplexing
UARFCN	UTRA Absolute Radio Frequency Channel Number
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
UTRA	UMTS Terrestrial Radio Access
WCDMA	Wideband Code Division Multiple 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 (e.g. band I, III, VII and VIII) is shared between systems of the IMT-2000 family (for band III and VIII also GSM) 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
	4.2.7 Adjacent Channel Rejection Ratio
Intermodulation attenuation of the output	4.2.8 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. 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 Limit

The requirement shall be met by a Repeater's RF-signal output at maximum gain with WCDMA signals 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, 4, 5 and 6 for the appropriate Repeater maximum output power, in the frequency range from $\Delta f = 2,5$ MHz to Δf_{\max} from the 5 MHz channel, where:

- Δf is the separation between the centre frequency of first or last 5 MHz channel used in the pass band and the nominal -3 dB point of the measuring filter closest to the carrier frequency;
- f_{offset} is the separation between the centre frequency of first or last 5 MHz channel in the pass band and the centre of the measuring filter;
- $f_{\text{offset}_{\max}}$ is either 12,5 MHz or the offset to the UTRA band edge at both up- and down-link as defined in clause 1, whichever is the greater;
- Δf_{\max} is equal to $f_{\text{offset}_{\max}}$ minus half of the bandwidth of the measurement filter.

If the pass band corresponds to two or more consecutive nominal 5 MHz channels, the requirement shall be met with any combination of two WCDMA modulated signals of equal power in the Repeaters pass band.

To select the table of the maximum level for the spectrum emission mask test, use the maximum output power as defined in clause 3.1. If one channel is used for the spectrum emission mask test use this power for the selection. If two channels are used for the spectrum emission mask test use the power of one of these.

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

Frequency offset of measurement filter -3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Maximum level	Measurement bandwidth
$2,5 \text{ MHz} \leq \Delta f < 2,7 \text{ MHz}$	$2515 \text{ MHz} \leq f_{\text{offset}} < 2715 \text{ MHz}$	-12,5 dBm	30 kHz
$2,7 \text{ MHz} \leq \Delta f < 3,5 \text{ MHz}$	$2715 \text{ MHz} \leq f_{\text{offset}} < 3515 \text{ MHz}$	$-12,5 \text{ dBm} - 15 \times \left(\frac{f_{\text{offset}}}{\text{MHz}} - 2,715 \right) \text{ dB}$	30 kHz
	$3515 \text{ MHz} \leq f_{\text{offset}} < 4,0 \text{ MHz}$	-24,5 dBm	30 kHz
$3,5 \text{ MHz} \leq \Delta f < 7,5 \text{ MHz}$	$4,0 \text{ MHz} \leq f_{\text{offset}} < 8,0 \text{ MHz}$	-11,5 dBm	1 MHz
$7,5 \text{ MHz} \leq \Delta f \leq f_{\max}$	$8,0 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\max}}$	-11,5 dBm	1 MHz

Table 4: Spectrum emission mask values, maximum output power $39 \leq P < 43$ dBm

Frequency offset of measurement filter -3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Maximum level	Measurement bandwidth
$2,5 \text{ MHz} \leq \Delta f < 2,7 \text{ MHz}$	$2515 \text{ MHz} \leq f_{\text{offset}} < 2715 \text{ MHz}$	-12,5 dBm	30 kHz
$2,7 \text{ MHz} \leq \Delta f < 3,5 \text{ MHz}$	$2715 \text{ MHz} \leq f_{\text{offset}} < 3515 \text{ MHz}$	$-12,5 \text{ dBm} - 15 \times \left(\frac{f_{\text{offset}}}{\text{MHz}} - 2,715 \right) \text{ dB}$	30 kHz
	$3515 \text{ MHz} \leq f_{\text{offset}} < 4,0 \text{ MHz}$	-24,5 dBm	30 kHz
$3,5 \text{ MHz} \leq \Delta f < 7,5 \text{ MHz}$	$4,0 \text{ MHz} \leq f_{\text{offset}} < 8,0 \text{ MHz}$	-11,5 dBm	1 MHz
$7,5 \text{ MHz} \leq \Delta f \leq f_{\max}$	$8,0 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\max}}$	$P - 54,5 \text{ dB}$	1 MHz

Table 5: Spectrum emission mask values, maximum output power $31 \leq P < 39$ dBm

Frequency offset of measurement filter -3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Maximum level	Measurement bandwidth
$2,5 \text{ MHz} \leq \Delta f < 2,7 \text{ MHz}$	$2515 \text{ MHz} \leq f_{\text{offset}} < 2715 \text{ MHz}$	$P - 51,5 \text{ dB}$	30 kHz
$2,7 \text{ MHz} \leq \Delta f < 3,5 \text{ MHz}$	$2715 \text{ MHz} \leq f_{\text{offset}} < 3515 \text{ MHz}$	$P - 51,5 \text{ dB} - 15 \times \left(\frac{f_{\text{offset}}}{\text{MHz}} - 2,715 \right) \text{ dB}$	30 kHz
	$3515 \text{ MHz} \leq f_{\text{offset}} < 4,0 \text{ MHz}$	$P - 63,5 \text{ dB}$	30 kHz
$3,5 \text{ MHz} \leq \Delta f < 7,5 \text{ MHz}$	$4,0 \text{ MHz} \leq f_{\text{offset}} < 8,0 \text{ MHz}$	$P - 50,5 \text{ dB}$	1 MHz
$7,5 \text{ MHz} \leq \Delta f \leq f_{\text{max}}$	$8,0 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$P - 54,5 \text{ dB}$	1 MHz

Table 6: Spectrum emission mask values, maximum output power $P < 31$ dBm

Frequency offset of measurement filter -3 dB point, Δf	Frequency offset of measurement filter centre frequency, f_{offset}	Maximum level	Measurement bandwidth
$2,5 \text{ MHz} \leq \Delta f < 2,7 \text{ MHz}$	$2515 \text{ MHz} \leq f_{\text{offset}} < 2715 \text{ MHz}$	$-20,5 \text{ dBm}$	30 kHz
$2,7 \text{ MHz} \leq \Delta f < 3,5 \text{ MHz}$	$2715 \text{ MHz} \leq f_{\text{offset}} < 3515 \text{ MHz}$	$-20,5 \text{ dBm} - 15 \times \left(\frac{f_{\text{offset}}}{\text{MHz}} - 2,715 \right) \text{ dB}$	30 kHz
	$3515 \text{ MHz} \leq f_{\text{offset}} < 4,0 \text{ MHz}$	$-32,5 \text{ dBm}$	30 kHz
$3,5 \text{ MHz} \leq \Delta f < 7,5 \text{ MHz}$	$4,0 \text{ MHz} \leq f_{\text{offset}} < 8,0 \text{ MHz}$	$-19,5 \text{ dBm}$	1 MHz
$7,5 \text{ MHz} \leq \Delta f \leq f_{\text{max}}$	$8,0 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$-23,5 \text{ dBm}$	1 MHz

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.

The requirement applies at frequencies within the specified frequency ranges that are more than 12,5 MHz below the centre frequency of the first 5 MHz channel or more than 12,5 MHz above the centre frequency of the last 5 MHz channel in the pass band.

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

4.2.3.2 Limit

4.2.3.2.1 Spurious emissions

At maximum Repeater gain, with WCDMA signals in the pass band of the Repeater, at levels that produce the maximum rated power output per channel, the power of any spurious emission shall not exceed the limits specified in tables 7, 8, 8A and 8B depending on the declared operating band for the down- and up-link.

When the power in all channels is increased by 10 dB the requirements shall still be met.

The requirement shall apply both with and without an input signal applied.

If the pass band corresponds to two or more consecutive nominal 5 MHz channels, the requirement shall be met with any combination of two WCDMA modulated signals of equal power in the Repeaters pass band.

Table 7: General spurious emissions limits, operating band I

Up-link Band	Down-link Band	Maximum Level	Measurement Bandwidth	Notes
9 kHz ↔ 150 kHz	9 kHz ↔ 150 kHz	-36 dBm	1 kHz	Note 1
150 kHz ↔ 30 MHz	150 kHz ↔ 30 MHz	-36 dBm	10 kHz	Note 1
30 MHz ↔ 1 GHz	30 MHz ↔ 1 GHz	-36 dBm	100 kHz	Note 1
1 GHz ↔ Fc1 - 60 MHz or 1910 MHz whichever is the higher	1 GHz ↔ Fc1 - 60 MHz or 2100 MHz whichever is the higher	-30 dBm	1 MHz	Note 1
Fc1 – 60 MHz or 1910 MHz whichever is the higher ↔ Fc1 – 50 MHz or 1910 MHz whichever is the higher	Fc1 – 60 MHz or 2100 MHz whichever is the higher ↔ Fc1 – 50 MHz or 2100 MHz whichever is the higher	-25 dBm	1 MHz	Note 2
Fc1 – 50 MHz or 1910 MHz whichever is the higher ↔ Fc2 + 50 MHz or 1990 MHz whichever is the lower	Fc1 – 50 MHz or 2100 MHz whichever is the higher ↔ Fc2 + 50 MHz or 2180 MHz whichever is the lower	-15 dBm	1 MHz	Note 2
Fc2 + 50 MHz or 1990 MHz whichever is the lower ↔ Fc2 + 60 MHz or 1990 MHz whichever is the lower	Fc2 + 50 MHz or 2180 MHz whichever is the lower ↔ Fc2 + 60 MHz or 2180 MHz whichever is the lower	-25 dBm	1 MHz	Note 2
Fc2 + 60 MHz or 1990 MHz whichever is the lower ↔ 12,75 GHz	Fc2 + 60 MHz or 2180 MHz whichever is the lower ↔ 12,75 GHz	-30 dBm	1 MHz	Note 3
NOTE 1: Bandwidth as in ITU-R Recommendation SM.329 [4], clause 4.1.				
NOTE 2: Specification in accordance with ITU-R Recommendation SM.329 [4], clause 4.3 and annex 7.				
NOTE 3: Bandwidth as in ITU-R Recommendation SM.329 [4], clause 4.1. Upper frequency as in ITU-R Recommendation SM.329 [4], clause 2.5 and table 10.				
Key:				
Fc1: Centre frequency of emission of the first 5 MHz channel in a pass band.				
Fc2: Centre frequency of emission of the last 5 MHz channel in a pass band.				

Table 8: General spurious emissions limits, operating band III

Up-link Band	Down-link Band	Maximum Level	Measurement Bandwidth	Note
9 kHz ↔ 150 kHz	9 kHz ↔ 150 kHz	-36 dBm	1 kHz	Note 1
150 kHz ↔ 30 MHz	150 kHz ↔ 30 MHz	-36 dBm	10 kHz	Note 1
30 MHz ↔ 1 GHz	30 MHz ↔ 1 GHz	-36 dBm	100 kHz	Note 1
1 GHz ↔ Fc1 - 60 MHz or 1700 MHz whichever is the higher	1 GHz ↔ Fc1 - 60 MHz or 1795 MHz whichever is the higher	-30 dBm	1 MHz	Note 1
Fc1 - 60 MHz or 1700 MHz whichever is the higher ↔ Fc1 - 50 MHz or 1700 MHz whichever is the higher	Fc1 - 60 MHz or 1795 MHz whichever is the higher ↔ Fc1 - 50 MHz or 1795 MHz whichever is the higher	-25 dBm	1 MHz	Note 2
Fc1 - 50 MHz or 1700 MHz whichever is the higher ↔ Fc2 + 50 MHz or 1795 MHz whichever is the lower	Fc1 - 50 MHz or 1795 MHz whichever is the higher ↔ Fc2 + 50 MHz or 1890 MHz whichever is the lower	-15 dBm	1 MHz	Note 2
Fc2 + 50 MHz or 1795 MHz whichever is the lower ↔ Fc2 + 60 MHz or 1795 MHz whichever is the lower	Fc2 + 50 MHz or 1890 MHz whichever is the lower ↔ Fc2 + 60 MHz or 1890 MHz whichever is the lower	-25 dBm	1 MHz	Note 2
Fc2 + 60 MHz or 1795 MHz whichever is the lower ↔ 12,75 GHz	Fc2 + 60 MHz or 1890 MHz whichever is the lower ↔ 12,75 GHz	-30 dBm	1 MHz	Note 3
NOTE 1: Bandwidth as in ITU-R Recommendation SM.329 [4], clause 4.1.				
NOTE 2: Specification in accordance with ITU-R Recommendation SM.329 [4], clause 4.3 and annex 7.				
NOTE 3: Bandwidth as in ITU-R Recommendation SM.329 [4], clause 4.1. Upper frequency as in ITU-R Recommendation SM.329 [4], clause 2.5 and table 1.				
Key:				
Fc1: Centre frequency of emission of the first 5 MHz channel in a pass band.				
Fc2: Centre frequency of emission of the last 5 MHz channel in a pass band.				

Table 8A: General spurious emissions limits, operating band VII

Up-link Band	Down-link Band	Maximum Level	Measurement Bandwidth	Note
9 kHz ↔ 150 kHz	9 kHz ↔ 150 kHz	-36 dBm	1 kHz	Note 1
150 kHz ↔ 30 MHz	150 kHz ↔ 30 MHz	- 36 dBm	10 kHz	Note 1
30 MHz ↔ 1 GHz	30 MHz ↔ 1 GHz	-36 dBm	100 kHz	Note 1
1 GHz ↔ Fc1 - 60 MHz or 2490 MHz whichever is the higher	1 GHz ↔ Fc1 - 60 MHz or 2610 MHz whichever is the higher	-30 dBm	1 MHz	Note 1
Fc1 – 60 MHz or 2490 MHz whichever is the higher ↔ Fc1 – 50 MHz or 2490 MHz whichever is the higher	Fc1 – 60 MHz or 2610 MHz whichever is the higher ↔ Fc1 – 50 MHz or 2610 MHz whichever is the higher	-25 dBm	1 MHz	Note 2
Fc1 – 50 MHz or 2490 MHz whichever is the higher ↔ Fc2 + 50 MHz or 2580 MHz whichever is the lower	Fc1 – 50 MHz or 2610 MHz whichever is the higher ↔ Fc2 + 50 MHz or 2700 MHz whichever is the lower	-15 dBm	1 MHz	Note 2
Fc2 + 50 MHz or 2 580 MHz whichever is the lower ↔ Fc2 + 60 MHz or 2580 MHz whichever is the lower	Fc2 + 50 MHz or 2700 MHz whichever is the lower ↔ Fc2 + 60 MHz or 2700 MHz whichever is the lower	-25 dBm	1 MHz	Note 2
Fc2 + 60 MHz or 2580 MHz whichever is the lower ↔ 12,75 GHz	Fc2 + 60 MHz or 2700 MHz whichever is the lower ↔ 12,75 GHz	-30 dBm	1 MHz	Note 3
NOTE 1: Bandwidth as in ITU-R Recommendation SM.329 [4], clause 4.1.				
NOTE 2: Specification in accordance with ITU-R Recommendation SM.329 [4], clause 4.3 and annex 7.				
NOTE 3: Bandwidth as in ITU-R Recommendation SM.329 [4], clause 4.1. Upper frequency as in ITU-R Recommendation SM.329 [4], clause 2.5 and table 1.				
Key:				
Fc1:	Centre frequency of emission of the first 5 MHz channel in a pass band.			
Fc2:	Centre frequency of emission of the last 5 MHz channel in a pass band.			

Table 8B: General spurious emissions limits, operating band VIII

Up-link Band	Down-link Band	Maximum Level	Measurement Bandwidth	Note
9 kHz ↔ 150 kHz	9 kHz ↔ 150 kHz	-36 dBm	1 kHz	Note 1
150 kHz ↔ 30 MHz	150 kHz ↔ 30 MHz	-36 dBm	10 kHz	Note 1
30 MHz ↔ 870 MHz	30 MHz ↔ 915 MHz	-36 dBm	100 kHz	Note 1
870 MHz ↔ Fc1 - 20 MHz or 870 MHz whichever is the higher	915 MHz ↔ Fc1 - 20 MHz or 915 MHz whichever is the higher	-26 dBm	100 kHz	Note 2
Fc1 - 20 MHz or 870 MHz whichever is the higher ↔ Fc2 + 20 MHz or 925 MHz whichever is the lower	Fc1 - 20 MHz or 915 MHz whichever is the higher ↔ Fc2 + 20 MHz or 970 MHz whichever is the lower	-16 dBm	100 kHz	Note 2
Fc2 + 20 MHz or 925 MHz whichever is the lower ↔ 925 MHz	Fc2 + 20 MHz or 970 MHz whichever is the lower ↔ 970 MHz	-26 dBm	100 kHz	Note 2
925 MHz ↔ 1 GHz	970 MHz ↔ 1 GHz	-36 dBm	100 kHz	Note 1
1 GHz ↔ 12,75 GHz	1 GHz ↔ 12,75 GHz	-30 dBm	1 MHz	Note 3
NOTE 1: Bandwidth as in ITU-R Recommendation SM.329 [4], clause 4.1.				
NOTE 2: Specification in accordance with ITU-R Recommendation SM.329 [4], clause 4.3 and annex 7.				
NOTE 3: Bandwidth as in ITU-R Recommendation SM.329 [4], clause 4.1. Upper frequency as in ITU-R Recommendation SM.329 [4], clause 2.5 and table 1.				
Key:				
Fc1: Centre frequency of emission of the first 5 MHz channel in a pass band.				
Fc2: Centre frequency of emission of the last 5 MHz channel in a pass band.				

4.2.3.2.2 Co-existence with GSM 900

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

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

**Table 9: UTRA Repeater Spurious emissions limits
in geographic coverage area of GSM 900 MS and GSM 900 BTS receivers**

Band	Maximum level	Measurement bandwidth	Note
921 MHz to 960 MHz	-57 dBm	100 kHz	This requirement does not apply to UTRA FDD Repeater operating in band VIII.
876 MHz to 915 MHz	-61 dBm	100 kHz	For the frequency range 880 MHz to 915 MHz, this requirement does not apply to UTRA FDD Repeater operating in band VIII, since it is already covered by the requirement in clause 4.2.3.2.6

4.2.3.2.3 Co-existence with DCS 1800

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

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

**Table 10: UTRA Repeater Spurious emissions limits
in geographic coverage area of DCS 1800 MS and DCS 1800 BTS receivers**

Band	Maximum level	Measurement bandwidth	Note
1805 MHz to 1880 MHz	-47 dBm	100 kHz	This requirement does not apply to UTRA FDD Repeater operating in band III.
1710 MHz to 1785 MHz	-61 dBm	100 kHz	This requirement does not apply to UTRA FDD Repeater operating in band III, since it is already covered by the requirement in clause 4.2.3.2.6.

4.2.3.2.4 Co-existence with services in adjacent frequency bands

This requirement shall be applied for the protection in bands adjacent to bands I, II, III or VII, as defined in table 1 in geographic areas in which both an adjacent band service and UTRA FDD are deployed.

In the down-link direction of the Repeater the power of any spurious emission shall not exceed the limits specified in table 11.

**Table 11: Spurious emissions limits for protection of adjacent band services
for the down-link direction of the Repeater**

Operating Band	Band (f)	Maximum level	Measurement bandwidth
I	2100 MHz to 2105 MHz	$-30 + 3,4 (f - 2\ 100\ \text{MHz})\ \text{dBm}$	1 MHz
	2175 MHz to 2180 MHz	$-30 + 3,4 (2\ 180\ \text{MHz} - f)\ \text{dBm}$	1 MHz
III	1795 MHz to 1800 MHz	$-30 + 3,4 (f - 1\ 795\ \text{MHz})\ \text{dBm}$	1 MHz
	1885 MHz to 1890 MHz	$-30 + 3,4 (1\ 890\ \text{MHz} - f)\ \text{dBm}$	1 MHz
VII	2610 MHz to 2615 MHz	$-30 + 3,4 (f - 2\ 610\ \text{MHz})\ \text{dBm}$	1 MHz
	2695 MHz to 2700 MHz	$-30 + 3,4 (2\ 700\ \text{MHz} - f)\ \text{dBm}$	1 MHz

4.2.3.2.5 Co-existence with UTRA-TDD

This requirement shall be applied for the protection of the UTRA-TDD. The requirement applies only to the down-link direction of the Repeater.

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

**Table 12: UTRA Repeater Spurious emissions limits
in geographic coverage area of UTRA-TDD for the down-link direction of the Repeater**

Band	Maximum level	Measurement bandwidth
1900 MHz to 1920 MHz	-52 dBm	1 MHz
2010 MHz to 2025 MHz	-52 dBm	1 MHz
2570 MHz to 2610 MHz	-52 dBm	1 MHz

4.2.3.2.6 Co-existence with UTRA-FDD BS

This requirement shall be applied for the protection of UTRA-FDD BS receivers.

In the down-link direction of the Repeater the power of any spurious emission shall not exceed the limit specified in table 13.

Table 13: UTRA Repeater Spurious emissions limits for the protection of UTRA FDD BS receiver for the down-link direction of the Repeater

Operating Band	Band	Maximum level	Measurement bandwidth	Note
I	1920 MHz to 1980 MHz	-96 dBm	100 kHz	
III	1710 MHz to 1785 MHz	-96 dBm	100 kHz	
VII	2500 MHz to 2570 MHz	-96 dBm	100 kHz	
VIII	880 MHz to 915 MHz	-96 dBm	100 kHz	

In the up-link direction of the Repeater the power of any spurious emission shall not exceed the limit specified in table 14.

Table 14: UTRA Repeater Spurious emissions limits in geographic coverage area of GSM900, DCS1800 and/or UTRA FDD BS receiver for the up-link direction of the Repeater

BS type operating in the same geographical area	Band	Maximum level	Measurement bandwidth	Note
GSM900	876 MHz to 915 MHz	-53 dBm	100 kHz	
DCS1800	1710 MHz to 1785 MHz	-53 dBm	100 kHz	
I	1920 MHz to 1980 MHz	-53 dBm	100 kHz	
III	1710 MHz to 1785 MHz	-53 dBm	100 kHz	
VII	2500 MHz to 2570 MHz	-53 dBm	100 kHz	
VIII	880 MHz to 915 MHz	-53 dBm	100 kHz	

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 Limit

In normal conditions, the Repeater maximum output power shall remain within limits specified in table 15 relative to the manufacturer's rated output power.

Table 15: Repeater output power; normal conditions

Rated output power	Limit
$P \geq 43$ dBm	+2,7 dB and -2,7 dB
39 dBm $\leq P < 43$ dBm	+2,7 dB and -2,7 dB
31 dBm $\leq P < 39$ dBm	+2,7 dB and -2,7 dB
$P < 31$ dBm	+3,7 dB and -3,7 dB

In extreme conditions, the Repeater maximum output power shall remain within limits specified in table 16 relative to the manufacturer's rated output power.

Table 16: Repeater output power; extreme conditions

Rated output power	Limit
$P \geq 43$ dBm	+3,2 dB and -3,2 dB
39 dBm $\leq P < 43$ dBm	+3,2 dB and -3,2 dB
31 dBm $\leq P < 39$ dBm	+3,2 dB and -3,2 dB
$P < 31$ dBm	+4,7 dB and -4,7 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

The input intermodulation is a measure of the capability of the Repeater to inhibit the generation of interference in the pass band, in the presence of interfering signals on frequencies other than the pass band.

Third and higher order mixing of the two interfering RF signals can produce an interfering signal in the band of the desired channel. Intermodulation response rejection is a measure of the capability of the Repeater to maintain the wanted frequency free of internally created interference.

This test applies to Uplink and Downlink path of the Repeater.

4.2.5.2 Limit

4.2.5.2.1 General input intermodulation requirement

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

Table 17: General input intermodulation requirement

f_offset	Interfering signal levels	Type of signals	Measurement bandwidth
3,5 MHz	-40 dBm	2 CW carriers	1 MHz

For the parameters specified in table 17, the power in the pass band shall not increase with more than the limit in table 18 at the output of the Repeater as measured in the centre of the pass band, compared to the level obtained without interfering signals applied.

Table 18: General input intermodulations limit

Limit for the increase of power in the pass band
+11,2 dB

4.2.5.2.2 Co-existence with GSM 900 and/or DCS 1800

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

Table 19: Input intermodulation requirements for interfering signals in the GSM 900 and DCS 1800 bands

Frequency of interfering signals	Interfering signal levels	Type of signals	Measurement bandwidth
876 MHz to 915 MHz	-15 dBm	2 CW carriers	1 MHz
1710 MHz to 1785 MHz	-15 dBm	2 CW carriers	1 MHz

For the parameters specified in table 19, the power in the pass band shall not increase with more than the limit in table 20 at the output of the Repeater as measured in the centre of the pass band, compared to the level obtained without interfering signals applied.

Table 20: Co-existence with GSM 900 and/or DCS 1800 input intermodulations limit

Limit for the increase of power in the pass band
+11,2 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

Out of band gain refers to the gain of the Repeater immediately outside the pass band. The measurements shall apply to both paths Uplink and Downlink of the Repeater.

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.

In the intended application of the Repeater, the out of band gain is less than the donor coupling loss.

The Repeater minimum donor coupling loss shall be declared by the manufacturer. This is the minimum required attenuation between the donor BS and the Repeater for proper Repeater operation.

The gain outside the pass band shall not exceed the maximum level specified in table 21, where:

- f_{offset} is the distance from the centre frequency of the first or last 5 MHz channel within the pass band.

Table 21: Out of band gain limits 1

Frequency offset from the carrier frequency, f_{offset}	Maximum gain
$2,7 \leq f_{\text{offset}} < 3,5$ MHz	60,5 dB
$3,5 \leq f_{\text{offset}} < 7,5$ MHz	45,5 dB
$7,5 \leq f_{\text{offset}} < 12,5$ MHz	45,5 dB
$12,5 \text{ MHz} \leq f_{\text{offset}}$	35,5 dB

For $12,5 \text{ MHz} \leq f_{\text{offset}}$ the out of band gain shall not exceed the maximum gain of table 21 or the maximum gain stated in table 22 whichever is lower.

Table 22: Out of band gain limits 2

Repeater maximum output power as in clause 4.2.2	Maximum gain
$P < 31$ dBm	Out of band gain \leq minimum donor coupling loss + 0,5 dB
31 dBm $\leq P < 43$ dBm	Out of band gain \leq minimum donor coupling loss + 0,5 dB
$P \geq 43$ dBm	Out of band gain \leq minimum donor coupling loss - (P-43 dBm) + 0,5 dB

NOTE: The out of band gain is considered with $12,5$ MHz $\leq f_{\text{offset}}$.

4.2.6.3 Conformance

Conformance tests described in clause 5.3.5 shall be carried out.

4.2.7 Adjacent Channel Rejection Ratio

4.2.7.1 Definition

Adjacent Channel Rejection Ratio (ACRR) is the ratio of the RRC weighted gain per carrier of the Repeater in the pass band to the RRC weighted gain of the Repeater on an adjacent channel.

The requirement shall apply to the Uplink and Downlink of Repeater where the donor link is maintained via antennas (over the air Repeater).

4.2.7.2 Limit

The ACRR shall be higher than the value specified in table 23.

Table 23: Repeater ACRR

Repeater maximum output power as in clause 4.2.2	Channel offset from the centre frequency of the first or last 5 MHz channel within the pass band	ACRR limit
$P \geq 31$ dBm	5 MHz	32,3 dB
$P \geq 31$ dBm	10 MHz	32,3 dB
$P < 31$ dBm	5 MHz	19,3 dB
$P < 31$ dBm	10 MHz	19,3 dB

4.2.7.3 Conformance

Conformance tests described in clause 5.3.6 shall be carried out.

4.2.8 Output intermodulation

4.2.8.1 Definition

The output intermodulation requirement is a measure of the ability of the Repeater to inhibit the generation of intermodulation products signals created by the presence of an interfering signal reaching the Repeater via the output port.

The output intermodulation level is the power of the intermodulation products when a WCDMA modulated interference signal is injected into the output port at a level of 30 dB lower than that of the wanted signal. The frequency of the interference signal shall be ± 5 MHz, ± 10 MHz and ± 15 MHz offset from the wanted signal, but within the frequency band allocated for UTRA FDD downlink as specified in clause 1.

The requirement is applicable for downlink signals.

4.2.8.2 Limit

The output intermodulation level shall not exceed the out of band emission of clause 4.2.2.2 or the downlink spurious emission requirements clause 4.2.3.2.

4.2.8.3 Conformance

Conformance tests described in clause 5.3.7 shall be carried out.

5 Testing for compliance with technical requirements

5.1 Conditions for testing

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

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

Normally it should be sufficient for all tests to be conducted using normal test conditions except where otherwise stated. For guidance on the use of other test conditions to be used in order to show compliance reference can be made to TS 125 143 [3], clause 5.4.

The measurement system required for each test is described in TS 125 143 [3], annex A.

5.2 Interpretation of the measurement results

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

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;
- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in table 24.

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR 100 028 [2] and shall correspond to an expansion factor (coverage factor) $k = 1,96$ (which provide a confidence level of 95 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 24 is based on this expansion factor.

Table 24: Maximum uncertainty of the test system

Parameter	Conditions	Uncertainty
Spectrum emissions mask	Due to carrier leakage for measurements specified in a 1 MHz bandwidth close to the carrier (4 MHz to 8 MHz), integration of the measurement using several narrower bandwidth measurements may be necessary in order to achieve the above accuracy. The interference from the signal generator ACLR shall be minimum 10 dB below that of a Base Station according to TS 125 141 [5]	±1,5 dB
Spurious emissions	For "Spurious emissions": f ≤ 2,2 GHz 2,2 GHz < f ≤ 4 GHz f > 4 GHz	±1,5 dB ±2,0 dB ±4,0 dB
	In UTRA and co-existence receive bands: for results > -60 dBm for results < -60 dBm	±2,0 dB ±3,0 dB
	The interference from the signal generator ACLR shall be minimum 10 dB below that of a Base Station according to TS 125 141 [5]	
Maximum output power		±0,7 dB
Input intermodulation characteristics	Formula: $\sqrt{(CW1_level_error)^2 + (2 \cdot CW2_level_error)^2 + (measurement_error)^2}$ RSS: CW1 level error, 2 x CW2 level error, and measurement error (using all errors = ±0,5 dB)	±1,2 dB
Out of band gain	5 MHz offset	±0,5 dB
	Calibration of test set-up shall be made without DUT in order to achieve the accuracy.	
Output intermodulation	Spectrum emissions mask	±2,1 dB
	$\sqrt{(2 \cdot Interference_level_error)^2 + (Spectrum_emission_measurement_error)^2}$	
	RSS: 2x Interference signal level error and Spectrum emission measurement level error. (1 dB interference signal level error is assumed.)	
	Due to carrier leakage for measurements specified in a 1 MHz bandwidth close to the carrier (4 MHz to 8 MHz), integration of the measurement using several narrower bandwidth measurements may be necessary in order to achieve the above accuracy.	
	The interference from the signal generator ACLR shall be minimum 10 dB below that of a Base Station according to TS 125 141 [5]	
	For "Spurious emissions": f ≤ 2,2 GHz 2,2 GHz < f ≤ 4 GHz f > 4 GHz	±1,5 dB ±2,0 dB ±4,0 dB
	In UTRA and co-existence receive bands: for results > -60 dBm for results < -60 dBm	±2,0 dB ±3,0 dB
The interference from the signal generator ACLR shall be minimum 10 dB below that of a Base Station according to TS 125 141 [5]		
The interference signal must have a spurious emission level at least [10 dB] below the spurious levels required in clause 4.2.3.2.		
Adjacent Channel Rejection Ratio		±0,7 dB

NOTE 1: For RF tests it should be noted that the uncertainties in table 24 apply to the Test System operating into a nominal 50 Ω load and do not include system effects due to mismatch between the EUT and the Test System.

NOTE 2: Annex G of TR 100 028 [2], part 2 provides guidance for the calculation of the uncertainty components relating to mismatch.

NOTE 3: If the Test System for a test is known to have a measurement uncertainty greater than that specified in table 24, this equipment can still be used, provided that an adjustment is made follows:

- Any additional uncertainty in the Test System over and above that specified in table 24 is used to tighten the Test Requirements - making the test harder to pass (for some tests, e. g. receiver tests, this may require modification of stimulus signals). This procedure will ensure that a Test System not compliant with table 24 does not increase the probability of passing an EUT that would otherwise have failed a test if a Test System compliant with table 24 had been used.

5.3 Essential radio test suites

5.3.1 Spectrum emission mask

5.3.1.1 Initial conditions

Test environment: Normal; see TS 125 143 [3], clause 5.4.1.

- 1) Set-up the equipment as shown in TS 125 143 [3], annex A.
- 2) Connect a signal generator to the input port of the Repeater for tests of Repeaters with a pass band corresponding to one 5 MHz channel. If the pass band corresponds to two or more 5 MHz carriers, two signal generators with a combining circuit or one signal generator with the ability to generate several WCDMA carriers is connected to the input.
- 3) Measurements with an offset from the carrier centre frequency between 2515 MHz and 4,0 MHz shall use a 30 kHz measurement bandwidth.
- 4) Measurements with an offset from the carrier centre frequency between 4,0 MHz and ($f_{\text{offset}_{\text{max}}} - 500 \text{ kHz}$) shall use a 1 MHz measurement bandwidth. The 1 MHz measurement bandwidth may be calculated by integrating multiple 50 kHz or narrower filter measurements.
- 5) Detection mode: True RMS.

5.3.1.2 Procedures

- 1) Set the Repeater to maximum gain.
- 2) Set the signal generator(s) to generate signal(s) in accordance to test model 1, TS 125 141 [5], at level(s) which produce the manufacturer specified maximum output power at maximum gain.
- 3) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.
- 4) Increase the input power with 10 dB compare to the level obtained in step 2).
- 5) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.
- 6) Repeat the test for the opposite path of the Repeater.

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

Test environment: Normal; see TS 125 143 [3], clause 5.4.1.

- 1) Set-up the equipment as shown in TS 125 143 [3], annex A.
- 2) Connect a signal generator to the input port of the Repeater for tests of Repeaters with a pass band corresponding to one 5 MHz channel. If the pass band corresponds to two or more 5 MHz carriers, two signal generators with a combining circuit or one signal generator with the ability to generate several WCDMA carriers is connected to the input.
- 3) Detection mode: True RMS.

5.3.2.2 Procedure

- 1) Set the Repeater to maximum gain.
- 2) Set the signal generator(s) to generate signal(s) in accordance to test model 1, TS 125 141 [5], at level(s) which produce the manufacturer specified maximum output power at maximum gain.
- 3) The detecting device shall be configured with a measurement bandwidth as stated in the tables.
- 4) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.
- 5) Increase the input power with 10 dB compare to the level obtained in step 2).
- 6) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.

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

5.3.3 Maximum output power

5.3.3.1 Initial conditions

Test environment: Normal: see TS 125 143 [3], clause 5.4.1; and
Extreme: see TS 125 143 [3], clause 5.4.2.

In addition, on one UARFCN only, the test shall be performed under extreme power supply conditions as defined in clause B.1.

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

- 1) Set-up the equipment as shown in TS 125 143 [3], annex A.
- 2) Connect the signal generator equipment to the Repeater input port.
- 3) Connect the power measuring equipment to the Repeater output port.

5.3.3.2 Procedure

- 1) Set the signal generator to transmit a signal modulated with a combination of PCCPCH, SCCPCH and Dedicated Physical Channels specified as test model 1 in TS 125 141 [5].
- 2) Adjust the input power to the Repeater to create the maximum nominal Repeater output power at maximum gain.
- 3) Measure the mean power at the RF output port over a certain slot.
- 4) Increase the power with 10 dB compare to the level obtained in step 2).
- 5) Measure the mean power at the RF output port over a certain slot.

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 TS 125 143 [3], clause 5.4.1.

- 1) Set-up the equipment as shown in TS 125 143 [3], annex A.
- 2) Set the Repeater to maximum gain.
- 3) Connect two signal generators with a combining circuit or one signal generator with the ability to generate several CW carriers to the input.
- 4) Connect a spectrum analyser to the output of the Repeater. Set the resolution bandwidth to 1 MHz in the centre of the pass band. Set averaging to 1 s.

5.3.4.2 Procedures

- 1) Adjust the frequency of the input signals, either below or above the pass band, so that the lowest order intermodulation product is positioned in the centre of the pass band, according to clause 4.2.5.2.
- 2) Take the measurement of the rise of the output signal.
- 3) Repeat the measurement for the opposite 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 TS 125 143 [3], clause 5.4.1.

- 1) Set-up the equipment as shown in TS 125 143 [3], annex A.
- 2) The test shall be performed with an offset between CW-signal and the first or last 5 MHz channel within the pass band of 2,7 MHz, 3 MHz, 3,5 MHz, 5 MHz, 7,5 MHz, 10 MHz, 12,5 MHz, 15 MHz and 20 MHz, excluding other pass bands. In addition the test shall also be performed for all harmonic frequencies of the Repeaters pass band up to 12,75 GHz.

5.3.5.2 Procedure

- 1) Set the Repeater to maximum gain.
- 2) Set the signal generator to generate a CW-signal, applied to the input port of the Repeater. The power level of the RF input signal shall be at least 5 dB below the power level which, when applied within the pass band, would produce the maximum rated output power, as declared by the manufacturer. This is to ensure that the equipment is operating in the linear output range.
- 3) The average output power in each case shall be measured using a spectrum analyser connected to the output port of the Repeater and the net gain shall be recorded and compared to tables 21 or 22 whichever is lower.
- 4) With the same input power as in step 1) set the Repeater gain to the minimum specified by the manufacturer.
- 5) The average output power in each case shall be measured using a spectrum analyser connected to the output port of the Repeater and the net gain shall be recorded and compared to tables 21 or 22 whichever is lower.

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

5.3.6 Adjacent Channel Rejection Ratio

5.3.6.1 Initial conditions

Test environment: Normal; see TS 125 143 [3], clause 5.4.1.

- 1) Set-up the equipment as shown in TS 125 143 [3], annex A.
- 2) Connect a signal generator to the input port of the Repeater.
- 3) Connect a power measuring equipment to the output port of the Repeater.
- 4) The measurement device characteristics shall be:
 - measurement filter bandwidth: defined in clause 4.2.7.1;
 - detection mode: true RMS voltage or true average power.

5.3.6.2 Procedures

- 1) Set the signal generator to transmit a signal modulated with a combination of PCCPCH, SCCPCH and Dedicated Physical Channels specified as test model 1 in TS 125 141 [5] at the first or last 5 MHz channel within the pass band.
- 2) Adjust the input power to the Repeater to create the maximum nominal Repeater output power at maximum gain
- 3) Measure the RRC filtered mean power at the RF output port over a certain slot.
- 4) Set the signal generator to transmit the same signal and the same input power at one of the channel offsets according to table 23.
- 5) Measure the RRC filtered mean power at the RF output port over a certain slot.
- 6) Calculate the ratio of the measured power in the pass band to the measured power at the channel offset.
- 7) Repeat step 4) to 6) until all channel offsets in table 23 are measured.

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

5.3.7 Output intermodulation

5.3.7.1 Initial conditions

Test environment: Normal; see TS 125 143 [3], clause 5.4.1.

- 1) Set-up the equipment as shown in TS 125 143 [3], annex A.
- 2) Connect a signal generator to the input port of the Repeater for tests of Repeaters with a pass band corresponding to one 5 MHz channel. Connect a signal generator to the circulator on the output port and make sure the signal generator power is directed to the Repeater output port.
- 3) Measurements with an offset from the carrier centre frequency between 2,515 MHz and 4,0 MHz shall use a 30 kHz measurement bandwidth.
- 4) Measurements with an offset from the carrier centre frequency between 4,0 MHz and (Δf_{\max} - 500 kHz) shall use a 1 MHz measurement bandwidth. The 1 MHz measurement bandwidth may be calculated by integrating multiple 50 kHz or narrower filter measurements
- 5) Detection mode: True RMS.

5.3.7.2 Procedures

- 1) Set the Repeater to maximum gain.
- 2) Set the signal generator at the Repeater input port (subject signal) to generate a signal in accordance to test model 1, TS 125 141 [5], clause 6.1.1.1, at the level which produce the manufacturer specified maximum output power at maximum gain.
- 3) Set the signal generator at the Repeater output port (interference signal) to generate a signal in accordance to test model 1, TS 125 141 [5], clause 6.1.1.1, at the level producing signal power corresponding to 30 dB below the manufacturer specified maximum output power at the Repeater output port with the specified frequency offset from the wanted signal.
- 4) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value. Measurements in the band of the interfering signal shall be excluded. The measurements can be limited to the power of all third and fifth order intermodulation products.
- 5) Repeat from clause 3 until interference signals ± 5 MHz, ± 10 MHz and ± 15 MHz frequency offset from the wanted signal has been tested. Note that interfering signals outside the UTRA-FDD allocated frequency band , as specifies in clause 4.1 need not be tested.

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

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

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

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

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

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

EN Reference		EN 301 908-11				Comment
No.	Reference	EN-R (note)	Status			
1	4.2.2	Spectrum emissions mask	M			
2	4.2.3	Spurious emissions	M			
3	4.2.4	Maximum output power	M			
4	4.2.5	Input intermodulation	M			
5	4.2.6	Out of band gain	M			
6	4.2.7	Adjacent Channel Rejection Ratio	M			
7	4.2.8	Output intermodulation	M			

NOTE: These EN-Rs are justified under article 3.2 of the R&TTE Directive [1].

Key to columns:

No	Table entry number;
Reference	Clause reference number of conformance requirement within the present document;
EN-R	Title of conformance requirement within the present document;
Status	Status of the entry as follows:
M	Mandatory, shall be implemented under all circumstances;
O	Optional, may be provided, but if provided shall be implemented in accordance with the requirements;
O.n	this status is used for mutually exclusive or selectable options among a set. The integer "n" shall refer to a unique group of options within the EN-RT. A footnote to the EN-RT shall explicitly state what the requirement is for each numbered group. For example, "It is mandatory to support at least one of these options", or, "It is mandatory to support exactly one of these options".
Comments	To be completed as required.

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.

Upper voltage limit:

The equipment shall be supplied with a voltage equal to the upper limit declared by the manufacturer (as measured at the input terminals to the equipment). The tests shall be carried out at the steady state minimum and maximum temperature limits declared by the manufacturer for the equipment, to the methods described in IEC 60068-2-1 [7] Test Ab/Ad and IEC 60068-2-2 [8] Test Bb/Bd: Dry Heat.

Lower voltage limit:

The equipment shall be supplied with a voltage equal to the lower limit declared by the manufacturer (as measured at the input terminals to the equipment). The tests shall be carried out at the steady state minimum and maximum temperature limits declared by the manufacturer for the equipment, to the methods described in IEC 60068-2-1 [7] Test Ab/Ad and IEC 60068-2-2 [8] Test Bb/Bd: Dry Heat.

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 Combining of Repeaters

If the Repeater is intended for combination with additional apparatus connected to a Repeater port and this combination is supplied as a system, the combination of Repeater together with the additional apparatus must also fulfil the Repeater requirements. E.g. if the Repeater is intended for combination such that multiple Repeaters amplify the same signals into the same ports the combination must also fulfil the Repeater requirements.

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

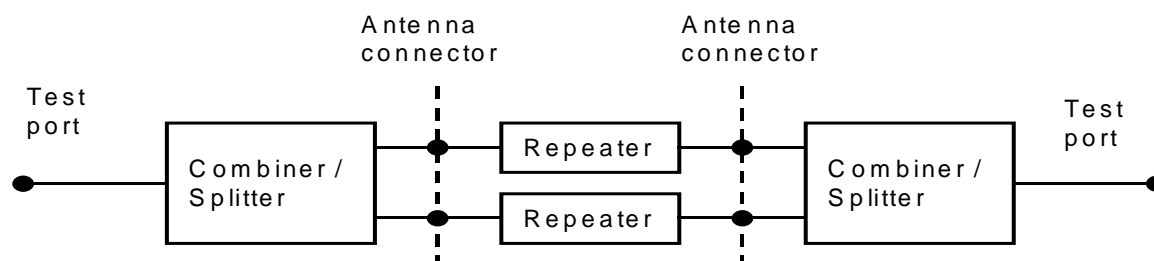


Figure B.1: Example of Repeater configuration

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 TS 125 106: "Universal Mobile Telecommunications System (UMTS); UTRA Repeater radio transmission and reception (3GPP TS 25.106)".
- CEPT/ERC/REC 74-01E (Siófok 1998, Nice 1999, Sesimbra 2002, Hradec Kralove 2005): "Spurious emissions".
- ETSI EN 301 489 (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".

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

Language	EN title
Czech	
Danish	Elektromagnetisk kompatibilitet og radiospektrumanliggende (ERM); Basisstationer (BS), Repeaters og brugerudstyr (UE) for IMT-2000 CDMA tredje generations cellulær radionet; Part 11: Harmoniseret EN for IMT-2000, CDMA direkte spredt (UTRA FDD) (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 11: Geharmoniseerde EN voor IMT-2000, CDMA Direct Spread (UTRA FDD) (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; Part11: Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (Repeaters) covering essential requirements of article 3.2 of the R&TTE Directive
Estonian	
Finnish	Sähkömagneettinen yhteensopivuus ja radiospektriasiat (ERM); IMT-2000 kolmannen sukupolven solukkoverkkojen tukiasemat (BS), toistimet ja päätelaitteet (UE); Osa 11: R&TTE direktiivin artiklan 3.2 olennaiset vaatimukset toteuttava yhdenmukaistettu EN IMT-2000 CDMA suorasekvenssihajaspektritekniikkaa (UTRA FDD) 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 11: Norme harmonisée pour l'IMT-2000, CDMA à Etagement direct (UTRA FDD) (Répéteurs) couvrant les exigences essentielles de l'article 3.2 de la Directive R&TTE
German	Elektromagnetische Verträglichkeit und Funkspektrumangelegenheiten (ERM); Feststationen (BS), Repeater und Einrichtungen für den Nutzer (UE) für digitale zellulare IMT-2000 Funknetze der 3. Generation, Teil 11: Harmonisierte Europäische Norm (EN) für IMT-2000, CDMA-Direkt-Spreizspektrum (UTRA FDD) (Repeater) mit wesentlichen Anforderungen nach R&TTE-Richtlinie Artikel 3.2
Greek	Ζητήματα Ηλεκτρομαγνητικής συμβατότητας και Ηλεκτρομαγνητικού φάσματος (ERM); Σταθμοί Βάσης (BS), αναμεταδότες και Τερματικό Χρήστη (UE) για IMT-2000 κυψελωτά συστήματα 3ης Γενιάς; Μέρος 11. Εναρμονισμένο «EN» για IMT-2000, CDMA Άμεσης Διασποράς (UTRA FDD) (αναμεταδότες) που καλύπτει βασικές αρχές του άρθρου 3.2 της R&TT Οδηγίας
Hungarian	
Icelandic	
Italian	Compatibilità elettromagnetica e problematiche di Spettro Radio (ERM); Stazioni Base (BS), Ripetitori e Terminali Mobili (UE) per le reti cellulari di terza generazione IMT-2000; Parte 3: Norma armonizzata per IMT-2000, CDMA Direct Spread (UTRA FDD) (Ripetitori) relativa ai requisiti essenziali dell'articolo 3.2 della Direttiva R&TTE
Latvian	
Lithuanian	
Maltese	
Norwegian	
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 11: Zharmonizowana EN dla IMT-2000 CDMA z rozproszeniem bezpośrednim (ULTRA FDD) (stacje przekaźnikowe) zapewniająca spełnienie 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 11: EN Harmonizada para o IMT-2000, Espalhamento Directo CDMA (UTRA-FDD) (Repetidores), cobrindo os requisitos essenciais no âmbito do artigo 3.º, n.º 2 da Directiva R&TTE
Slovak	Elektromagnetická kompatibilita a závislosti rádiového spektra (ERM). Základňové stanice (BS), opakovače a používateľské zariadenia (UE) bunkových sietí tretej generácie IMT-2000. Časť 11: Harmonizovaná EN na IMT-2000 - CDMA s priamym rozprestretím (UTRA FDD) (opakovače), vzťahujúca sa na základné požiadavky podľa článku 3.2 smernice R&TTE
Slovenian	
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 harmonizada que cubre los requisitos mínimos del artículo 3.2 de la directiva de R&TTE (1999/5/EC); parte 11: CDMA con ensanchamiento por secuencia directa (UTRA FDD) (Repetidores)

Language	EN title
Swedish	Elektromagnetisk kompatibilitet och radio-spektrumfrågor (ERM); Basstationer (BS), repeatrar och Mobilstationer (UE) för tredje generationens mobilnät IMT-2000; Del 11: Harmoniserad standard för IMT-2000, CDMA med direktspridning (UTRA FDD) (repeatrar) omfattande väsentliga krav enligt artikel 3.2 i R&TTE-direktivet

History

Document history		
V1.1.1	January 2002	Publication
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