TSG RAN Meeting #15 **RP-020025**

Cheju, Korea, 5 - 8 March 2002

Title: **CRs (R'99 and Rel-4 Category A) to TS 25.142**

Source: **TSG RAN WG4**

Agenda Item: **7.4.3**

RAN4 Tdoc	Spec	CR	Rev	Phase	Title	Cat	Curr Ver	New Ver
R4-020252	25.142	99		R99	Single and multi carrier in spurious emissions conformance testing	F	3.8.0	3.9.0
R4-020253	25.142	100		Rel-4	Single and multi carrier in spurious emissions conformance testing	A	4.3.0	4.4.0
R4-020304	25.142	106		R99	Maintenance of annex C, Global In-Channel TX-Test	F	3.8.0	3.9.0
R4-020305	25.142	107		Rel-4	Maintenance of annex C, Global In-Channel TX-Test	A	4.3.0	4.4.0
R4-020412	25.142	96	1	R99	Consideration of multi-carrier operation in ACLR conformance testing	F	3.8.0	3.9.0
R4-020413	25.142	97	1	Rel-4	Consideration of multi-carrier operation in ACLR conformance testing	A	4.3.0	4.4.0
R4-020442	25.142	102	1	R99	Correction of transmit intermodulation conformance testing	F	3.8.0	3.9.0
R4-020443	25.142	103	1	Rel-4	Correction of transmit intermodulation conformance testing	A	4.3.0	4.4.0

3GPP TSG RAN WG4 Meeting #21 **R4-020253**

Sophia Antipolis, France 28th January - 1st February 2002

CR-Form-v4

CHANGE REQUEST

⌘ **25.142**	**CR 100**	⌘ ev **-** ⌘	Current version:	**4.3.0** ⌘

For ***HELP*** *on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [ ] Radio Access Network [X] Core Network [ ]

Title: ⌘	Single and multi carrier in spurious emissions conformance testing		
Source: ⌘	RAN WG4		
Work item code: ⌘	TEI	***Date:*** ⌘	1/2/2002
Category: ⌘	**A** *Use one of the following categories:* ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.	***Release:*** ⌘	Rel-4 *Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change: ⌘	The current spurious emissions requirement covers single and multicarrier BS for Category A and B requirements, but not for the co-existence and co-location requirements. This is in conflict with the ITU-R M.[IMT.UNWANT-BS], where all spurious emission requirements are for both single and multicarrier. The application of the limits, as stated in ITU-R SM.329-8 and ITU-R M.[IMT.UNWANT-BS] for the additional requirements is missing.
Summary of change: ⌘	Section 5.3 is extended to cover tests with multicarrier configuration also. The provision for single and multicarrier and for application of limits are moved to section 6.6.3.1, which is the general section for spurious emissions. The gemeral test conditions in section 6.6.3.4.1.0 are extended to test at multiple carriers if supported.
Consequences if not approved: ⌘	There would be a conflict between the spurious emission requirements in the test specification and the one in ITU-R M.[IMT.UNWANT-BS]. Isolated Impact Analysis: Correction of a requirement where the specification was ambiguous or not sufficiently explicit. Would not affect implementations behaving like indicated in the CR, would affect implementations that do not behave like indicated in the CR.

Clauses affected: ⌘	5.3, 6.6.3.1, 6.6.3.2.1, 6.6.3.2.1.1.1, 6.6.3.2.1.2.1, 6.6.3.4.1.0	
Other specs affected: ⌘	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘
Other comments: ⌘	Cat A CR refers to Cat F CR tdoc R4-02xxxx	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.3 Specified frequency range

The manufacturer shall declare:

- which of the frequency bands defined in sub-clause 4.2 is supported by the BS.
- the frequency range within the above frequency band(s) supported by the BS. As TDD is employed, the same frequency range is used for transmit and receive operation.

Many tests in this TS are performed with appropriate frequencies in the bottom, middle and top of the operating frequency band of the BS. These are denoted as RF channels B (bottom), M (middle) and T (top).

Unless otherwise stated, the test shall be performed with a single carrier at each of the RF channels B, M and T.

When the requirements are specific to multiple carriers, and the BS is declared to support N>1 carriers, numbered from 1 to N, the interpretation of B, M and T for test purposes shall be as follows:

For testing at B,

- the carrier of lowest frequency shall be centered on B.

For testing at M,

- if the number N of carriers supported is odd, the carrier (N+1)/2 shall be centered on M,
- if the number N of carriers supported is even, the carrier N/2 shall be centered on M.

For testing at T,

- the carrier of highest frequency shall be centered on T.

When a test is performed by a test laboratory, the UARFCNs to be used for RF channels B, M and T shall be specified by the laboratory. The laboratory may consult with operators, the manufacturer or other bodies.

When a test is performed by a manufacturer, the UARFCNs to be used for RF channels B, M and T may be specified by an operator.

--- next changed section ---

6.6.3 Spurious emissions

6.6.3.1 Definition and applicability

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions. This is measured at the base station RF output port.

The requirements shall apply whatever the type of transmitter considered (single carrier or multiple carrier). It applies for all transmission modes foreseen by the manufacturer’s specification.

For 3.84 Mcps TDD option, either requirement applies at frequencies within the specified frequency ranges which are more than 12,5 MHz under the first carrier frequency used or more than 12,5 MHz above the last carrier frequency used.

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

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

6.6.3.2 Minimum Requirements

6.6.3.2.1 Mandatory requirements

The requirements of either subclause 6.6.3.2.1.1 or subclause 6.6.3.2.1.2 shall apply~~. whatever the type of transmitter considered (single carrier or multi-carrier). It applies for all transmission modes foreseen by the manufacturer.~~

6.6.3.2.1.1 Spurious emissions (Category A)

The following requirements shall be met in cases where Category A limits for spurious emissions, as defined in ITU-R Recommendation SM.329-8 [6], are applied.

6.6.3.2.1.1.1 3,84 Mcps TDD option

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

The power of any spurious emission shall not exceed the maximum level given in Table 6.29.

Table 6.29: BS Mandatory spurious emissions limits, Category A

Band	Maximum level	Measurement bandwidth	Note
9 kHz – 150 kHz	-13 dBm	1 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
150 kHz – 30 MHz		10 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
30 MHz – 1 GHz		100 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
1 GHz – 12,75 GHz		1 MHz	Upper frequency as in ITU-R SM.329-8, s2.5 table 1

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.3.1.1.1.1.

6.6.3.2.1.1.2 1,28 Mcps TDD option

Either requirement applies at frequencies within the specified frequency ranges which are more than 4 MHz under the first carrier frequency used or more than 4 MHz above the last carrier frequency used.

The power of any spurious emission shall not exceed the maximum level given in Table 6.29A.

Table 6.29A: BS Mandatory spurious emissions limits, Category A

Band	Maximum level	Measurement bandwidth	Note
9 kHz – 150 kHz	-13 dBm	1 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
150 kHz – 30 MHz		10 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
30 MHz – 1 GHz		100 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
1 GHz – 12,75 GHz		1 MHz	Upper frequency as in ITU-R SM.329-8, s2.5 table 1

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.3.1.1.1.2.

6.6.3.2.1.2 Spurious emissions (Category B)

The following requirements shall be met in cases where Category B limits for spurious emissions, as defined in ITU-R Recommendation SM.329-8 [6], are applied.

6.6.3.2.1.2.1 3,84 Mcps TDD option

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

The power of any spurious emission shall not exceed the maximum levels given in Table 6.30.

Table 6.30: BS Mandatory spurious emissions limits, Category B

Band	Maximum level	Measurement bandwidth	Note
9 kHz – 150 kHz	-36 dBm	1 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
150 kHz – 30 MHz	-36 dBm	10 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
30 MHz – 1 GHz	-36 dBm	100 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
1 GHz – Fc1 - 60 MHz or Fl - 10 MHz *whichever is the higher*	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-8, s4.1
Fc1 - 60 MHz or Fl - 10 MHz *whichever is the higher* – Fc1 - 50 MHz or Fl -10 MHz *whichever is the higher*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.3 and Annex 7
Fc1 - 50 MHz or Fl -10 MHz *whichever is the higher* – Fc2 + 50 MHz or Fu +10 MHz *whichever is the lower*	-15 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.3 and Annex 7
Fc2 + 50 MHz or Fu + 10 MHz *whichever is the lower* – Fc2 + 60 MHz or Fu + 10 MHz *whichever is the lower*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.3 and Annex 7
Fc2 + 60 MHz or Fu + 10 MHz *whichever is the lower* – 12,75 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-8, s4.1. Upper frequency as in ITU-R SM.329-8, s2.5 table 1

Fc1: Center frequency of emission of the first carrier transmitted by the BS

Fc2: Center frequency of emission of the last carrier transmitted by the BS

Fl : Lower frequency of the band in which TDD operates

Fu : Upper frequency of the band in which TDD operates

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.3.1.2.1.1.

--- next changed section ---

6.6.3.4 Method of test

6.6.3.4.1 Initial conditions

6.6.3.4.1.0 General test conditions

Test environment: normal; see subclause 5.9.1.

RF channels to be tested: B, M and T <u>with multiple carriers if supported</u>; see subclause 5.3.

3GPP TSG RAN WG4 Meeting #21 R4-020252

Sophia Antipolis, France 28th January - 1st February 2002

CR-Form-v4

CHANGE REQUEST

⌘ **25.142**	**CR 99**	⌘ ev **-** ⌘	Current version:	**3.8.0**	⌘

For ***HELP*** *on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [ ] Radio Access Network [X] Core Network [ ]

Title: ⌘	Single and multi carrier in spurious emissions conformance testing		
Source: ⌘	RAN WG4		
Work item code: ⌘		***Date:*** ⌘	1/2/2002
Category: ⌘	**F**	***Release:*** ⌘	R99
	Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change: ⌘	The current spurious emissions requirement covers single and multicarrier BS for Category A and B requirements, but not for the co-existence and co-location requirements. This is in conflict with the ITU-R M.[IMT.UNWANT-BS], where all spurious emission requirements are for both single and multicarrier. The application of the limits, as stated in ITU-R SM.329-8 and ITU-R M.[IMT.UNWANT-BS] for the additional requirements is missing.
Summary of change: ⌘	Section 5.3 is extended to cover tests with multicarrier configuration also. The provisions for single and multicarrier and for application of limits are moved to section 6.6.3.1, which is the general section for spurious emissions. The initial conditions in section 6.6.3.4.1 are extended to test at multiple carriers if supported.
Consequences if not approved: ⌘	There would be a conflict between the spurious emission requirements in the test specification and the one in ITU-R M.[IMT.UNWANT-BS]. Isolated Impact Analysis: Correction of a requirement where the specification was ambiguous or not sufficiently explicit. Would not affect implementations behaving like indicated in the CR, would affect implementations that do not behave like indicated in the CR.

Clauses affected: ⌘	5.3, 6.6.3.1, 6.6.3.2.1, 6.6.3.4.1	
Other specs affected: ⌘	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘
Other comments: ⌘		

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5.3 Specified frequency range

The manufacturer shall declare:

- which of the frequency bands defined in sub-clause 4.2 is supported by the BS.
- the frequency range within the above frequency band(s) supported by the BS. As TDD is employed, the same frequency range is used for transmit and receive operation.

Many tests in this TS are performed with appropriate frequencies in the bottom, middle and top of the operating frequency band of the BS. These are denoted as RF channels B (bottom), M (middle) and T (top).

Unless otherwise stated, the test shall be performed with a single carrier at each of the RF channels B, M and T.

When the requirements are specific to multiple carriers, and the BS is declared to support N>1 carriers, numbered from 1 to N, the interpretation of B, M and T for test purposes shall be as follows:

For testing at B,

- the carrier of lowest frequency shall be centered on B.

For testing at M,

- if the number N of carriers supported is odd, the carrier (N+1)/2 shall be centered on M,
- if the number N of carriers supported is even, the carrier N/2 shall be centered on M.

For testing at T,

the carrier of highest frequency shall be centered on T.

When a test is performed by a test laboratory, the UARFCNs to be used for RF channels B, M and T shall be specified by the laboratory. The laboratory may consult with operators, the manufacturer or other bodies.

When a test is performed by a manufacturer, the UARFCNs to be used for RF channels B, M and T may be specified by an operator.

--- next changed section ---

6.6.3 Spurious emissions

6.6.3.1 Definition and applicability

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions. This is measured at the base station RF output port.

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

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

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

6.6.3.2 Minimum Requirements

6.6.3.2.1 Mandatory requirements

The requirements of either subclause 6.6.3.2.1.1 or subclause 6.6.3.2.1.2 shall apply.~~, whatever the type of transmitter considered (single carrier or multi-carrier). It applies for all transmission modes foreseen by the manufacturer.~~

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

6.6.3.2.1.1 Spurious emissions (Category A)

The following requirements shall be met in cases where Category A limits for spurious emissions, as defined in ITU-R Recommendation SM.329-8 [6], are applied.

The power of any spurious emission shall not exceed the maximum level given in Table 6.29.

Table 6.29: BS Mandatory spurious emissions limits, Category A

Band	Maximum level	Measurement bandwidth	Note
9 kHz – 150 kHz	-13 dBm	1 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
150 kHz – 30 MHz		10 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
30 MHz – 1 GHz		100 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
1 GHz – 12,75 GHz		1 MHz	Upper frequency as in ITU-R SM.329-8, s2.5 table 1

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.3.1.1.1.

6.6.3.2.1.2 Spurious emissions (Category B)

The following requirements shall be met in cases where Category B limits for spurious emissions, as defined in ITU-R Recommendation SM.329-8 [6], are applied.

The power of any spurious emission shall not exceed the maximum levels given in Table 6.30.

Table 6.30: BS Mandatory spurious emissions limits, Category B

Band	Maximum level	Measurement bandwidth	Note
9 kHz – 150 kHz	-36 dBm	1 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
150 kHz – 30 MHz	-36 dBm	10 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
30 MHz – 1 GHz	-36 dBm	100 kHz	Bandwidth as in ITU-R SM.329-8, s4.1
1 GHz – Fc1 - 60 MHz or Fl - 10 MHz *whichever is the higher*	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-8, s4.1
Fc1 - 60 MHz or Fl - 10 MHz *whichever is the higher* – Fc1 - 50 MHz or Fl -10 MHz *whichever is the higher*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.3 and Annex 7
Fc1 - 50 MHz or Fl -10 MHz *whichever is the higher* – Fc2 + 50 MHz or Fu +10 MHz *whichever is the lower*	-15 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.3 and Annex 7
Fc2 + 50 MHz or Fu + 10 MHz *whichever is the lower* – Fc2 + 60 MHz or Fu + 10 MHz *whichever is the lower*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.3 and Annex 7
Fc2 + 60 MHz or Fu + 10 MHz *whichever is the lower* – 12,75 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-8, s4.1. Upper frequency as in ITU-R SM.329-8, s2.5 table 1

Fc1: Center frequency of emission of the first carrier transmitted by the BS

Fc2: Center frequency of emission of the last carrier transmitted by the BS

Fl : Lower frequency of the band in which TDD operates

Fu : Upper frequency of the band in which TDD operates

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.3.1.2.1.

6.6.3.2.2 Co-existence with GSM

6.6.3.2.2.1 Operation in the same geographic area

This requirement may be applied for the protection of GSM 900 MS in geographic areas in which both GSM 900 and UTRA are deployed.

The power of any spurious emission shall not exceed the maximum level given in Table 6.31.

Table 6.31: BS Spurious emissions limits for BS in geographic coverage area of GSM 900 MS receiver

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

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.3.2.1.1.

6.6.3.2.2.2 Co-located base stations

This requirement may be applied for the protection of GSM 900 BTS receivers when GSM 900 BTS and UTRA BS are co-located.

The power of any spurious emission shall not exceed the maximum level given in table 6.32.

Table 6.32: BS Spurious emissions limits for protection of the GSM 900 BTS receiver

Band	Maximum level	Measurement bandwidth	Note
876 MHz – 915 MHz	–98 dBm	100 kHz	

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.3.2.2.1.

6.6.3.2.3 Co-existence with DCS 1800

6.6.3.2.3.1 Operation in the same geographic area

This requirement may be applied for the protection of DCS 1800 MS in geographic areas in which both DCS 1800 and UTRA are deployed.

The power of any spurious emission shall not exceed the maximum level given in table 6.33.

Table 6.33: BS Spurious emissions limits for BS in geographic coverage area of DCS 1800 MS receiver

Band	Maximum level	Measurement bandwidth	Note
1805 MHz – 1880 MHz	-47 dBm	100 kHz	

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.3.3.1.1.

6.6.3.2.3.2 Co-located base stations

This requirement may be applied for the protection of DCS 1800 BTS receivers when DCS 1800 BTS and UTRA BS are co-located.

The power of any spurious emission shall not exceed the maximum level given in table 6.34.

Table 6.34: BS Spurious emissions limits for BS co-located with DCS 1800 BTS

Band	Maximum level	Measurement bandwidth	Note
1710 MHz – 1785 MHz	-98 dBm	100 kHz	

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.3.3.3.1.

6.6.3.2.4 Co-existence with UTRA FDD

6.6.3.2.4.1 Operation in the same geographic area

This requirement may be applied to geographic areas in which both UTRA TDD and UTRA FDD are deployed.

The power of any spurious emission shall not exceed the maximum level given in table 6.35.

Table 6.35: BS Spurious emissions limits for BS in geographic coverage area of UTRA FDD

Band	Maximum Level	Measurement Bandwidth	Note
1920 – 1980 MHz	-32 dBm	1 MHz	
2110 – 2170 MHz	-52 dBm	1 MHz	

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.3.4.1.1.

6.6.3.2.4.2 Co-located base stations

This requirement may be applied for the protection of UTRA FDD BS receivers when UTRA TDD BS and UTRA FDD BS are co-located.

The power of any spurious emission shall not exceed the maximum level given in table 6.36.

Table 6.36: BS Spurious emissions limits for BS co-located with UTRA FDD

Band	Maximum Level	Measurement Bandwidth	Note
1920 – 1980 MHz	-86 dBm	1 MHz	
2110 – 2170 MHz	-52 dBm	1 MHz	

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.3.4.2.1.

6.6.3.3 Test purpose

The test purpose is to verify the ability of the BS to limit the interference caused by unwanted transmitter effects to other systems operating at frequencies which are more than 12,5 MHz away from of the UTRA band used.

6.6.3.4 Method of test

6.6.3.4.1 Initial conditions

Test environment: normal; see subclause 5.9.1.

RF channels to be tested: B, M and T with multiple carriers if supported; see subclause 5.3.

(1) Connect the measuring equipment to the antenna connector of the BS under test.

(2) Set the parameters of the BS transmitted signal according to table 6.37.

Table 6.37: Parameters of the BS transmitted signal for spurious emissions testing

Parameter	Value/description
TDD Duty Cycle	TS i; i = 0, 1, 2, ..., 14: transmit, if i is even; receive, if i is odd.
BS output power setting	PRAT
Number of DPCH in each active TS	9
Power of each DPCH	1/9 of Base Station output power
Data content of DPCH	real life (sufficient irregular)

6.6.3.4.2 Procedure

Measure the power of the spurious emissions by applying measurement filters with bandwidths as specified in the relevant tables of subclause 6.6.3.2. The characteristic of the filters shall be approximately Gaussian (typical spectrum analyzer filters). The center frequency of the filter shall be stepped in contiguous steps over the frequency bands as given in the tables. The step width shall be equal to the respective measurement bandwidth. The time duration of each step shall be sufficiently long to capture one active time slot.

6.6.3.5 Test Requirements

The spurious emissions measured according to subclause 6.6.3.4.2 shall not exceed the limits specified in the relevant tables of 6.6.3.2.

NOTE: If the above Test Requirement differs from the Minimum Requirement, then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in subclause 5.11 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex D.

3GPP TSG RAN WG4 Meeting #21 **R4-020413**

Sophia Antipolis, France 28th January - 1st February 2002

CR-Form-v5

CHANGE REQUEST

⌘	**25.142**	**CR**	**97**	⌘ ev	**1**	⌘ Current version:	**4.3.0** ⌘

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Proposed change affects: ⌘ (U)SIM [ ] ME/UE [ ] Radio Access Network [X] Core Network [ ]

Title:	⌘	Consideration of multi-carrier operation in ACLR conformance testing
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	1/2/2002
Category:	⌘	**A**
Release:	⌘	Rel-4

Use one of the following categories:
- ***F*** *(correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(addition of feature),*
- ***C*** *(functional modification of feature)*
- ***D*** *(editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
- *2 (GSM Phase 2)*
- *R96 (Release 1996)*
- *R97 (Release 1997)*
- *R98 (Release 1998)*
- *R99 (Release 1999)*
- *REL-4 (Release 4)*
- *REL-5 (Release 5)*

Reason for change:	⌘	The ACLR requirement shall apply for all configurations of BS (single carrier or multi-carrier). Currently, ACLR is tested at single carrier only.
Summary of change:	⌘	- Section 5.3 extended to cover tests with multicarrier configuration. - ACLR test procedure modified to support multiple carriers under test. - BS adjacent channel offsets clarified in line with TS 25.105
Consequences if not approved:	⌘	The ACLR test will be incomplete. Isolated Impact Analysis: Correction of a requirement where the specification was ambiguous or not sufficiently explicit. This CR would affect conformance testing only, would not affect implementations, BS-UE interoperability or system performance.

Clauses affected:	⌘	5.3; 6.6.2.2.2.1.1; 6.6.2.2.2.2.1; 6.6.2.2.2.3.1; 6.6.2.2.4.1.0; 6.6.2.2.4.2.1; 6.6.2.2.5.1
Other specs affected:	⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] O&M Specifications
Other comments:	⌘	Cat A CR refers to Cat F CR tdoc R4-02xxxx

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.3 Specified frequency range

The manufacturer shall declare:

- which of the frequency bands defined in sub-clause 4.2 is supported by the BS.
- the frequency range within the above frequency band(s) supported by the BS. As TDD is employed, the same frequency range is used for transmit and receive operation.

Many tests in this TS are performed with appropriate frequencies in the bottom, middle and top of the operating frequency band of the BS. These are denoted as RF channels B (bottom), M (middle) and T (top).

Unless otherwise stated, the test shall be performed with a single carrier at each of the RF channels B, M and T.

When the requirements are specific to multiple carriers, and the BS is declared to support N>1 carriers, numbered from 1 to N, the interpretation of B, M and T for test purposes shall be as follows:

For testing at B,

- the carrier of lowest frequency shall be centered on B.

For testing at M,

- if the number N of carriers supported is odd, the carrier (N+1)/2 shall be centered on M,
- if the number N of carriers supported is even, the carrier N/2 shall be centered on M.

For testing at T,

- the carrier of highest frequency shall be centered on T.

When a test is performed by a test laboratory, the UARFCNs to be used for RF channels B, M and T shall be specified by the laboratory. The laboratory may consult with operators, the manufacturer or other bodies.

When a test is performed by a manufacturer, the UARFCNs to be used for RF channels B, M and T may be specified by an operator.

--- next changed section ---

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR)

6.6.2.2.1 Definition and applicability

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the average power centered on the assigned channel frequency to the average power centered on an adjacent channel frequency. In both cases, the power is measured with a filter that has a Root Raised Cosine (RRC) filter response with roll-off α = 0,22 and a bandwidth equal to the chip rate. The requirements shall apply for all configurations of BS (single carrier or multi-carrier), and for all operating modes foreseen by the manufacturer's specification.

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

6.6.2.2.2 Minimum Requirements

6.6.2.2.2.1 Minimum requirement

6.6.2.2.2.1.1 3,84 Mcps TDD option

The ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be equal to or greater than the limits given in table 6.22.

Table 6.22: BS ACLR limits

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
~~±~~5 MHz	45 dB
~~±~~10 MHz	55 dB

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied individually to the single carriers or group of single carriers.

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.2.2.1.1.

6.6.2.2.2.1.2 1,28 Mcps TDD option

The ACLR shall be equal to or greater than the limits given in Table 6.22A.

Table 6.22A: BS ACLR limits for 1,28 Mcps TDD

BS adjacent channel offset	ACLR limit
± 1.6 MHz	40 dB
± 3.2 MHz	50 dB

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.2.2.1.2

6.6.2.2.2.2 Requirement in case of operation in proximity to TDD BS or FDD BS operating on an adjacent frequency

6.6.2.2.2.2.1 3,84 Mcps TDD option

In case the equipment is operated in proximity to another TDD BS or FDD BS on an adjacent frequency, the ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be equal to or greater than the value specified in table 6.23.

Table 6.23: BS ACLR limits in case of operation in proximity

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
~~±~~5 MHz	70 dB
~~±~~10 MHz	70 dB

The requirement is based on the assumption that the coupling loss between the base stations is at least 84dB.

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the TDD BS or FDD BS in proximity.

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.2.2.2.1.

NOTE: The necessary dynamic range to very the conformance requirements specified in table 6.23 is at the limits of the capability of state-of-art measuring equipment.

6.6.2.2.2.2.2 1,28 Mcps TDD option

In case the equipment is operated in proximity to another TDD BS or FDD BS and both BSs operating on an adjacent frequency band , the requirement is specified in terms of power level of the transmitting BS. This requirement is valid for co-existence with non-frame and non-switching point synchronised systems operating on the closest used carrier. The interference power level shall not exceed the limit in Table 6.23A.

Table 6.23A: BS ACLR in case of operation in proximity for 1,28 Mcps TDD

Center Frequency for Measurement	Maximum Level of the interference power (in case of multiple antennas the interference powers shall be summed at all antenna connectors)	Measurement Bandwidth
Closest used carrier of the victim receiver: Either FDD carrier Or 3,84 Mcps TDD carrier Or 1,28 Mcps TDD carrier	-36 dBm	chip rate of the victim receiver: In case of FDD: 3,84 MHz In case of 3,84 Mcps TDD: 3,84 MHz In case of 1,28 Mcps TDD: 1,28 MHz

The closest used carrier with respect to the regarded carrier of one system is defined by

a minimum difference in centre frequency between the regarded carrier and the carriers used in the other system and the chip rate of the other system.

If the actual allowed interference level $P_{int, allowed, actual}$ at the victim receiver is higher than –106dBm, this requirement may be relaxed by the amount $P_{int, allowed, actual}$ – (-106dBm).

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.2.2.2.2.

6.6.2.2.2.3 Requirement in case of co-sitting with TDD BS or FDD BS operating on an adjacent frequency

6.6.2.2.2.3.1 3,84 Mcps TDD option

In case the equipment is co-sited to another TDD BS or FDD BS operating on an adjacent frequency, the ACLR is specified in terms of the absolute average power level of the BS measured in the adjacent channel. The maximum power level of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall not exceed the limit in table 6.24.

Table 6.24: BS ACLR limits in case of co-siting

BS adjacent channel offset below the first or above the last carrier frequency used	Maximum Level	Measurement Bandwidth
±~~-~~5 MHz	-80 dBm	3,~~.~~84 MHz
±~~-~~10 MHz	-80 dBm	3,~~.~~84 MHz

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the co-sited TDD BS or FDD BS.

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.2.2.3.1.

NOTE: The necessary dynamic range of the measuring equipment to verify the conformance requirements specified in table 6.24 is dependent on the BS output power. If the BS output power is larger than –10 dBm, the necessary dynamic range is beyond the capability of state-of-the-art measuring equipment; direct verification of the conformance requirements is not feasible. Alternatively, indirect measurement methods need to be defined.

6.6.2.2.2.3.2 1,28 Mcps TDD option

In case the equipment is co-sited to another TDD BS or FDD BS and both BSs operating on an adjacent frequency band, the requirement is specified in terms of the average power level of the transmitting BS. This requirement is valid for co-existence with a non-frame and non-switching point synchronised systems operating on closest used carrier. The interference power level shall not exceed the limit in Table 6.24A.

Table 6.24A : BS ACLR in case of co-siting for 1,28 Mcps TDD

Center Frequency for Measurement	Maximum Level of the interference power (in case of multiple antennas the interference powers shall be summed at all antenna connectors)	Measurement Bandwidth
Closest used carrier of the victim receiver: Either FDD carrier Or 3,84 Mcps TDD carrier Or 1,28 Mcps TDD carrier	-76 dBm	chip rate of the victim receiver: In case of FDD: 3,84 MHz In case of 3,84 Mcps TDD: 3,84 MHz In case of 1,28 Mcps TDD: 1,28 MHz

The closest used carrier with respect to the regarded carrier of one system is defined by:

a minimum difference in centre frequency between the regarded carrier and the carriers used in the other system and the chip rate of the other system.

If the actual MCL_{actual} is higher than 30dB, this requirement may be relaxed by the amount MCL_{actual} – 30dB.

If the actual allowed interference level $P_{int, allowed, actual}$ at the victim receiver is higher than –106dBm, this requirement may be relaxed by the amount $P_{int, allowed, actual}$ – (-106dBm).

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.2.2.3.2.

6.6.2.2.3 Test purpose

The test purpose is to verify the ability of the BS to limit the interference produced by the transmitted signal to other UTRA receivers operating at the first or second adjacent RF channel.

6.6.2.2.4 Method of test

6.6.2.2.4.1 Initial conditions

6.6.2.2.4.1.0 General test conditions

Test environment: normal; see subclause 5.9.1.

RF channels to be tested: B, M and T with multiple carriers if supported; see subclause 5.3.

6.6.2.2.4.1.1 3,84 Mcps TDD option

(1) Connect the measuring equipment to the antenna connector of the BS under test.

(2) Set the parameters of the BS transmitted signal according to table 6.25.

Table 6.25: Parameters of the BS transmitted signal for ACLR testing

Parameter	Value/description
TDD Duty Cycle	TS i; i = 0, 1, 2, ..., 14: transmit, if i is even; receive, if i is odd.
BS output power setting	PRAT
Number of DPCH in each active TS	9
Power of each DPCH	1/9 of Base Station output power
Data content of DPCH	Real life (sufficient irregular)

6.6.2.2.4.1.2 1,28 Mcps TDD option

(1) Connect the measuring equipment to the antenna connector of the BS under test.

(2) Set the parameters of the BS transmitted signal according to table 6.25A.

Table 6.25A: Parameters of the BS transmitted signal for ACLR testing for 1,28 Mcps TDD

Parameter	Value/description
TDD Duty Cycle	TS i; i = 0, 1, 2, 3, 4, 5, 6: transmit, if i is 0,4,5,6; receive, if i is 1,2,3.
BS output power setting	PRAT
Number of DPCH in each active TS	8
Power of each DPCH	1/8 of Base Station output power
Data content of DPCH	real life (sufficient irregular)

6.6.2.2.4.2 Procedure

6.6.2.2.4.2.1 3,84 Mcps TDD option

(1) Measure the average power centered on the lowest assigned channel frequency over the 2464 active chips of the even time slots TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off $\alpha = 0{,}22$ and a bandwidth equal to the chip rate.

(2) Average over TBD time slots.

(3) Measure the average power at the first lower adjacent RF channel (center frequency 5 MHz below the lowest assigned channel frequency of the transmitted signal) over the useful part of the burst within the even time slots TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off $\alpha = 0{,}22$ and a bandwidth equal to the chip rate. The power is determined by calculating the RMS value of the signal samples at the measurement filter output taken with adherence to the sampling theorem.

(4) Average over TBD time slots.

(5) Calculate the ACLR by the ratio

ACLR = average acc. to (2) / average interference power acc. to (4).

(6) Repeat steps (3), (4) and (5) for the second lower adjacent RF channel (center frequency 10 MHz below the lowest assigned channel frequency of the transmitted signal).

(7) In case of a multi-carrier Bs, repeat steps (1) and (2) for the highest assigned channel frequency. Otherwise, use the result obtained in step (2) above for further calculation in step (10).

(8) Measure the average power at the first higher adjacent RF channel (center frequency 5 MHz above the highest assigned channel frequency of the transmitted signal) over the useful part of the burst within the even time slots TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off $\alpha = 0{,}22$ and a bandwidth equal to the chip rate. The power is determined by calculating the RMS value of the signal samples at the measurement filter output taken with adherence to the sampling theorem.

(9) Average over TBD time slots.

(10)Calculate the ACLR by the ratio

ACLR = average power acc. to (7) / average interference power acc. to (9).

(11)Repeat steps (8) to (10) ~~and also~~ for the ~~first and~~ second upper adjacent RF channel (center frequency ~~5 MHz and~~ 10 MHz above the highest assigned channel frequency of the transmitted signal~~, respectively~~).

6.6.2.2.4.2.2 1,28 Mcps TDD option

(1) Measure the average power centered on the assigned channel frequency over the 848 active chips of the transmit time slots TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off α = 0,22 and a bandwidth equal to the chip rate.

(2) Average over TBD time slots.

(3) Measure the average power at the first lower adjacent RF channel (center frequency 1,6 MHz below the assigned channel frequency of the transmitted signal) over the useful part of the burst within the transmit time slots TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off α = 0,22 and a bandwidth equal to the chip rate. The power is determined by calculating the RMS value of the signal samples at the measurement filter output taken with adherence to the sampling theorem.

(4) Average over TBD time slots.

(5) Calculate the ACLR by the ratio:

ACLR = average power acc. to (2) / average interference power acc. to (4).

(6) Repeat steps (3), (4) and (5) for the second lower adjacent RF channel (center frequency 3,2 MHz below the assigned channel frequency of the transmitted signal) and also for the first and second upper adjacent RF channel (center frequency 1,6 MHz and 3,2 MHz above the assigned channel frequency of the transmitted signal, respectively).

6.6.2.2.5 Test Requirements

NOTE: If the Test Requirements below differ from the Minimum Requirements, then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in subclause 5.11 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex D.

6.6.2.2.5.1 3,84 Mcps TDD option

The ACLR calculated in steps (5) and (10) of subclause 6.6.2.2.4.2.1 shall be equal or greater than the limits given in table 6.26 or table 6.27~~2~~, respectively. In case the equipment is co-sited to another TDD BS or FDD BS operating on an adjacent frequency, the interference power at the first and second adjacent channel measured according to steps (~~3~~4) and (~~4~~9) of subclause 6.6.2.2.4.2.1 shall not exceed the maximum level specified in table 6.28.

Table 6.26: BS ACLR Test Requirements

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
±5 MHz	44,2 dB
±10 MHz	54,2 dB

Table 6.27: BS ACLR Test Requirements in case of operation in proximity

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
±5 MHz	66 dB
±10 MHz	66 dB

Table 6.28: BS ACLR Test Requirements in case of co-sitting

BS adjacent channel offset below the first or above the last carrier frequency used	Maximum Level	Measurement Bandwidth
±5 MHz	-[80 dBm - TT]	3,84 MHz
±10 MHz	-[80 dBm - TT]	3,84 MHz

3GPP TSG RAN WG4 Meeting #21 **R4-020412**
Sophia Antipolis, France 28th January - 1st February 2002

CR-Form-v5

CHANGE REQUEST

⌘ **25.142**	**CR 96**	⌘	ev **1**	⌘	Current version: **3.8.0**	⌘

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Proposed change affects: ⌘ (U)SIM [ ] ME/UE [ ] Radio Access Network [X] Core Network [ ]

Title: ⌘	Consideration of multi-carrier operation in ACLR conformance testing		
Source: ⌘	RAN WG4		
Work item code: ⌘		***Date:*** ⌘	1/2/2002
Category: ⌘	**F**	***Release:*** ⌘	R99
	Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change: ⌘	The ACLR requirement shall apply for all configurations of BS (single carrier or multi-carrier). Currently, ACLR is tested at single carrier only.
Summary of change: ⌘	- Section 5.3 extended to cover tests with multicarrier configuration. - ACLR test procedure modified to support multiple carriers under test. - BS adjacent channel offsets clarified in line with TS 25.105
Consequences if not approved: ⌘	The ACLR test will be incomplete. Isolated Impact Analysis: Correction of a requirement where the specification was ambiguous or not sufficiently explicit. This CR would affect conformance testing only, would not affect implementations, BS-UE interoperability or system performance.

Clauses affected: ⌘	5.3; 6.6.2.2.2.1; 6.6.2.2.2.2; 6.6.2.2.2.3; 6.6.2.2.4.1; 6.6.2.2.4.2; 6.6.2.2.5	
Other specs affected: ⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] O&M Specifications	
Other comments: ⌘		

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downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.3 Specified frequency range

The manufacturer shall declare:

- which of the frequency bands defined in sub-clause 4.2 is supported by the BS.
- the frequency range within the above frequency band(s) supported by the BS. As TDD is employed, the same frequency range is used for transmit and receive operation.

Many tests in this TS are performed with appropriate frequencies in the bottom, middle and top of the operating frequency band of the BS. These are denoted as RF channels B (bottom), M (middle) and T (top).

Unless otherwise stated, the test shall be performed with a single carrier at each of the RF channels B, M and T.

When the requirements are specific to multiple carriers, and the BS is declared to support N>1 carriers, numbered from 1 to N, the interpretation of B, M and T for test purposes shall be as follows:

For testing at B,

- the carrier of lowest frequency shall be centered on B.

For testing at M,

- if the number N of carriers supported is odd, the carrier (N+1)/2 shall be centered on M,
- if the number N of carriers supported is even, the carrier N/2 shall be centered on M.

For testing at T,

- the carrier of highest frequency shall be centered on T.

When a test is performed by a test laboratory, the UARFCNs to be used for RF channels B, M and T shall be specified by the laboratory. The laboratory may consult with operators, the manufacturer or other bodies.

When a test is performed by a manufacturer, the UARFCNs to be used for RF channels B, M and T may be specified by an operator.

--- next changed section ---

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR)

6.6.2.2.1 Definition and applicability

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the average power centered on the assigned channel frequency to the average power centered on an adjacent channel frequency. In both cases, the power is measured with a filter that has a Root Raised Cosine (RRC) filter response with roll-off $\alpha = 0,22$ and a bandwidth equal to the chip rate. The requirements shall apply for all configurations of BS (single carrier or multi-carrier), and for all operating modes foreseen by the manufacturer's specification.

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

6.6.2.2.2 Minimum Requirements

6.6.2.2.2.1 Minimum requirement

The ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be equal to or greater than the limits given in table 6.22.

Table 6.22: BS ACLR limits

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
±5 MHz	45 dB
±10 MHz	55 dB

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied individually to the single carriers or group of single carriers.

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.2.2.1.

6.6.2.2.2.2 Requirement in case of operation in proximity to TDD BS or FDD BS operating on an adjacent frequency

In case the equipment is operated in proximity to another TDD BS or FDD BS on an adjacent frequency, the ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be equal to or greater than the value specified in table 6.23.

Table 6.23: BS ACLR limits in case of operation in proximity

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
±5 MHz	70 dB
±10 MHz	70 dB

The requirement is based on the assumption that the coupling loss between the base stations is at least 84dB.

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the TDD BS or FDD BS in proximity.

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.2.2.2.

NOTE: The necessary dynamic range to very the conformance requirements specified in table 6.23 is at the limits of the capability of state-of-art measuring equipment.

6.6.2.2.2.3 Requirement in case of co-siting with TDD BS or FDD BS operating on an adjacent frequency

In case the equipment is co-sited to another TDD BS or FDD BS operating on an adjacent frequency, the ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies is specified in terms of the absolute average power level of the BS measured in the adjacent channel. The maximum power level shall not exceed the limit in table 6.24.

Table 6.24: BS ACLR limits in case of co-siting

BS adjacent channel offset below the first or above the last carrier frequency used	Maximum Level	Measurement Bandwidth
±5 MHz	-80 dBm	3,84 MHz
±10 MHz	-80 dBm	3,84 MHz

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the co-sited TDD BS or FDD BS.

The normative reference for this requirement is TS 25.105 [1] subclause 6.6.2.2.3.

NOTE: The necessary dynamic range of the measuring equipment to verify the conformance requirements specified in table 6.24 is dependent on the BS output power. If the BS output power is larger than –10 dBm, the necessary dynamic range is beyond the capability of state-of-the-art measuring equipment; direct verification of the conformance requirements is not feasible. Alternatively, indirect measurement methods need to be defined.

6.6.2.2.3 Test purpose

The test purpose is to verify the ability of the BS to limit the interference produced by the transmitted signal to other UTRA receivers operating at the first or second adjacent RF channel.

6.6.2.2.4 Method of test

6.6.2.2.4.1 Initial conditions

Test environment: normal; see subclause 5.9.1.

RF channels to be tested: B, M and T with multiple carriers if supported; see subclause 5.3.

(1) Connect the measuring equipment to the antenna connector of the BS under test.

(2) Set the parameters of the BS transmitted signal according to table 6.25.

Table 6.25: Parameters of the BS transmitted signal for ACLR testing

Parameter	Value/description
TDD Duty Cycle	TS i; i = 0, 1, 2, ..., 14: transmit, if i is even; receive, if i is odd.
BS output power setting	PRAT
Number of DPCH in each active TS	9
Power of each DPCH	1/9 of Base Station output power
Data content of DPCH	Real life (sufficient irregular)

6.6.2.2.4.2 Procedure

(1) Measure the average power centered on the lowest assigned channel frequency over the 2464 active chips of the even time slots TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off a = 0,22 and a bandwidth equal to the chip rate.

(2) Average over TBD time slots.

(3) Measure the average power at the first lower adjacent RF channel (center frequency 5 MHz below the lowest assigned channel frequency of the transmitted signal) over the useful part of the burst within the even time slots TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off α = 0,22 and a bandwidth equal to the chip rate. The power is determined by calculating the RMS value of the signal samples at the measurement filter output taken with adherence to the sampling theorem.

(4) Average over TBD time slots.

(5) Calculate the ACLR by the ratio

ACLR = average power acc. to (2) / average interference power acc. to (4)

(6) ~~(6)~~ Repeat steps (3), (4) and (5) for the second lower adjacent RF channel (center frequency 10 MHz below the lowest assigned channel frequency of the transmitted signal).

(7) In case of a multi-carrier BS, repeat steps (1) and (2) for the highest assigned channel frequency. Otherwise, use the result obtained in step (2) above for further calculation in step (10).

(8) Measure the average power at the first higher adjacent RF channel (center frequency 5 MHz above the highest assigned channel frequency of the transmitted signal) over the useful part of the burst within the even time slots

TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off α = 0,22 and a bandwidth equal to the chip rate. The power is determined by calculating the RMS value of the signal samples at the measurement filter output taken with adherence to the sampling theorem.

(9) Average over TBD time slots.

(10) Calculate the ACLR by the ratio

ACLR = average power acc. to (7) / average interference power acc. to (9).

(11) Repeat steps (8) to (10) ~~and also~~ for the ~~first and~~ second upper adjacent RF channel (center frequency ~~5 MHz and~~ 10 MHz above the highest assigned channel frequency of the transmitted signal~~, respectively~~).

6.6.2.2.5 Test Requirements

The ACLR calculated in steps (5) and (10) of subclause 6.6.2.2.4.2 shall be equal or greater than the limits given in table 6.26 or table 6.27~~2~~, respectively. In case the equipment is co-sited to another TDD BS or FDD BS operating on an adjacent frequency, the interference power at the first and second adjacent channel measured according to steps (~~3~~4) and (~~4~~9) of subclause 6.6.2.2.4.2 shall not exceed the maximum level specified in table 6.28.

Table 6.26: BS ACLR Test Requirements

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
~~±~~ 5 MHz	44,2 dB
~~±~~ 10 MHz	54,2 dB

Table 6.27: BS ACLR Test Requirements in case of operation in proximity

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
~~±~~ 5 MHz	66 dB
~~±~~ 10 MHz	66 dB

Table 6.28: BS ACLR Test Requirements in case of co-sitting

BS adjacent channel offset below the first or above the last carrier frequency used	Maximum Level	Measurement Bandwidth
~~±~~ 5 MHz	-[80 dBm - TT]	3,~~.~~84 MHz
~~±~~ 10 MHz	-[80 dBm - TT]	3,~~.~~84 MHz

NOTE: If the above Test Requirement differs from the Minimum Requirement, then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in subclause 5.11 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex D.

3GPP TSG RAN WG4 Meeting #21 **R4-020305**

Sophia Antipolis, France 28th January - 1st February 2002

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CHANGE REQUEST

⌘ **25.142**	**CR** **107**	⌘ **rev**	**-**	⌘	Current version: **4.3.0**	⌘

For ***HELP*** *on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [ ] Radio Access Network [X] Core Network [ ]

Title: ⌘	Maintenance of annex C: Global In-Channel TX-Test.			
Source: ⌘	RAN WG4			
Work item code: ⌘	TEI		***Date:*** ⌘	1/2/2002
Category: ⌘	**A**		***Release:*** ⌘	Rel-4
	Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.			*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change: ⌘	Progress of 25.142 concerning different power and modulation measurements stipulates maintenance of the Global In-Channel TX-Test.
Summary of change: ⌘	1) Algorithmic support for the overall test implementation added 2) Algorithmic definition of decision point power added 3) Algorithmic definition of code domain power added 4) Error corrections Isolated Impact Analysis: Changes in the test specification does not affect the function of Node B,
Consequences if not approved: ⌘	Implementation of all in-channel TX test parameters may be ambiguous leading to inconsistent measurements and system performance

Clauses affected: ⌘	Annex C	
Other specs affected: ⌘	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘
Other comments: ⌘		

Annex C (normative): Global in-channel Tx test

C.1 General

The global in-channel Tx test enables the measurement of all relevant parameters that describe the in-channel quality of the output signal of the Tx under test in a single measurement process.

The parameters describing the in-channel quality of a transmitter, however, are not necessarily independent. The algorithm chosen for description inside this annex places particular emphasis on the exclusion of all interdependencies among the parameters. Any other algorithm (e.g. having better computational efficiency) may be applied, as long as the results are the same within the accuracy limits.

~~The objective of this Annex is to list the results that shall be available from the global in-Channel TX-Test. To aid understanding, an example algorithmic description of the measurement process is provided. It is not intended that this particular method is required. It is however required that any algorithm that is used for in-channel Tx tests should deliver the required results with the required accuracy.~~

All notes referred to in the various subclauses of C.2 are put together in clause C.3~~4~~

C.2 Definition of the process

C.2.1 Basic principle

The process is based on the comparison of the actual **output signal of the Tx under test**, received by an ideal receiver, with a **reference signal**, that is generated by the measuring equipment and represents an ideal error free received signal. The reference signal shall be composed of the same number of codes at the correct spreading factors as contained in the test signal. Note, for simplification, the notation below assumes only ~~one~~ codes of ~~and~~ one spreading factor although the algorithm is valid for signals containing multiple spreading factors. All signals are represented as equivalent (generally complex) base band signals.

C.2.2 Output signal of the Tx under test

The output signal of the Tx under test is acquired by the measuring equipment, filtered by a matched filter (RRC characteristic with roll-off α = 0,22, correct in shape and in position on the frequency axis) and stored for further processing ~~at one sample per chip at the intersymbol interference free instants.~~

The following form represents the physical signal in the entire measurement interval:

one vector **Z**, containing N = ns x sf + ma complex samples;

with

ns: number of symbols in the measurement interval;

sf: number of chips per symbol. (sf: spreading factor) (see Note: Symbol length)

ma: number of midamble chips ~~(TDD only)~~

C.2.3 Reference signal

The reference signal is constructed by the measuring equipment according to the relevant Tx specifications.

It is filtered by the same matched filter, mentioned in C.2.2, and stored at the intersymbol interference free instants. The following form represents the reference signal in the entire measurement interval:

one vector **R**, containing N = ns x sf + ma complex samples;

where ns, sf and ma have the same meaning as defined above in C.2.2.

C.2.4 Classification of measurement results

The measurement results achieved by the global in-channel Tx test can be classified into two types:

- **Results of type "deviation"**, where the error-free parameter has a non-zero magnitude. (These are the parameters that represent the signal). These parameters are:

  RF Frequency

  Power (in case of single code)

  Code Domain Power (in case of multi-code)

  Timing (only for UE) (see Note: Deviation)

  (Additional parameters: see Note: Deviation)

- **Results of type "residual"**, where the error-free parameter has value zero. (These are the parameters that represent the error values of the measured signal; ideally, their magnitude is zero). These parameters are:

  Error Vector Magnitude (EVM)

  Peak Code Domain Error (PCDE)

  (Additional parameters: see Note: Residual)

C.2.5 Process definition to achieve results of type "deviation"

The reference signal (**R**; see subclause C.2.3) and the signal under Test (Z; see subclause C.2.2) are ~~is~~ varied with respect to the parameters mentioned in subclause C.2.4 under "results of type deviation" in order to achieve best fit ~~with the recorded signal under test (**Z**; see subclause C.2.2)~~. Best fit is achieved when the RMS difference value between the varied signal under test and the varied reference signal is an absolute minimum.

Overview:

$$FCT\left[Z(\tilde{f},\tilde{t},\tilde{\varphi},g_1,g_2,\dots,g_{synch}) - R(f,t,\varphi,\tilde{g}_1,\tilde{g}_2,\dots,\tilde{g}_{synch}) \right] = Minimum \quad !$$

Z : Signal under test.

R: Reference signal,

with frequency f, the timing t, the phase φ, gain of code1 (g_1), gain of code2 (g_2) etc, and the gain of the synch channel g_{synch}

The parameters marked with a tilde in Z and R are varied in order to achieve a best fit.

Detailed formula: see Note: Formula for the minimum process

The varied reference signal, after the best-fit process, will be called **R'.**

The varied signal under test, after the best fit process, will be called **Z'.**

Those parameter values, which - after the best-fit process – ~~are~~ leading to **R'and Z',** represent directly the wanted results of type "deviation". These parameter values are expressed as deviations from the reference value, using the same units as the corresponding reference value.

In the case of multi-code transmission, the best-fit process of the type "deviation" parameters frequency, timing (and any additional parameter as e.g. RF phase) is not done with respect to the individual codes, but commonly for the complete code set used; therefore, the process returns one measurement value only for each parameter.

(These parameters are not varied on the individual codes signals such that the process would return kr frequency errors... . (kr: number of codes in the reference signal)).

The only type-“deviation”-parameters varied individually are the code domain gain factors (g1, g2, …)

~~The only exception is the type "deviation" parameter Code Domain Power: The Code Domain Power is varied individually for each used code; therefore, the process returns k individual code power deviations (k: number of codes).~~

E.2.5.1 Decision Point Power

The mean-square value of the signal-under-test, sampled at the best estimate of the of Intersymbol-Interference-free points using the process defined in subclause 2.5, is referred to the *Decision Point Power* (DPP):

E.2.5.2 Code-Domain Power

The samples, Z', are separated into symbol intervals to create ns time-sequential vectors **z** with sf complex samples comprising one symbol interval. The *Code Domain Power* is calculated according to the following steps:

(1) Take the vectors **z** defined above.

(2) To achieve meaningful results it is necessary to descramble **z,** leading to **z'**

(3) Take the orthogonal vectors of the channelization code set **C** (all codes belonging to one spreading factor) as defined in TS 25.213 and TS 25.223 (range +1, -1), and normalize by the norm of the vectors to produce **C**norm=**C**/sqrt(sf). (see Note: Symbol length)

(4) Calculate the inner product of **z'** with **C**norm**.**. Do this for all symbols of the measurement interval and for all codes in the code space.
This gives an array of format k x ns, each value representing a specific symbol and a specific code, which can be exploited in a variety of ways.

k: total number of codes in the code space
ns: number of symbols in the measurement interval

(5) Calculate k mean-square values, each mean-square value unifying ns symbols within one code. (These values can be called "*Absolute CodeDomainPower* (CDP)" [Volt^2].) The sum of the k values of CDP is equal to DPP.

(6) Normalize by the decision point power to obtain

$$\text{Relative CodeDomain Power} = \frac{\text{Absolute CodeDomainPower}}{\text{DecisionPointPower}}$$

C.2.6 Process definition to achieve results of type "residual"

The difference between the varied reference signal (**R'**; see subclauseC.2.5.) and the varied Tx signal under test (**Z'**; see subclause C.2.5~~2~~) is the error vector **E** versus time:

E = **Z'** – **R'.**

Depending on the parameter to be evaluated, it is appropriate to represent **E** in one of the following two different forms:

- **Form EVM** (representing the physical error signal in the entire measurement interval)

  One vector **E**, containing N = ns x sf + ma complex samples;

  where ns, sf and ma have the same meaning as defined above in C.2.2.

- **Form PCDE** (derived from Form EVM by separating the samples into symbol intervals)

  ns time-sequential vectors **e** with sf complex samples comprising one symbol interval.

E gives results of type "residual" applying the two algorithms defined in subclauses C.2.6.1 and C.2.6.2.

C.2.6.1 Error Vector Magnitude (EVM)

The Error Vector Magnitude EVM is calculated according to the following steps:

(1) Take the error vector **E** defined in subclause C.2.6 (Form EVM) and calculate the RMS value of **E**; the result will be called RMS(**E**).

(2) Take the varied reference vector **R’** defined in subclause C.2.3 and calculate the RMS value of **R’**; the result will be called RMS(**R’**).

(3) Calculate EVM according to:

$$\text{EVM} = \frac{\text{RMS}(\mathbf{E})}{\text{RMS}(\mathbf{R}')} \text{ x } 100\%$$ (here, EVM is relative and expressed in %)

(see Note: TDD)
(see Note: Formula for EVM)

C.2.6.2 Peak Code Domain Error (PCDE)

The Peak Code Domain Error is calculated according to the following steps:

(1) Take the error vectors **e** defined in subclause C.2.6 (Form PCDE)

(2) Take the orthogonal vectors of the spreading code set C (all codes belonging to one spreading factor) as defined in TS 25.213 and TS 25.223 (range +1, -1). (see Note: Symbol length) and normalize by the norm of the vectors to produce **C**norm= **C**/sqrt(sf). (see Note: Symbol length)

(3) To achieve meaningful results, it is necessary to descramble **e,** leading to **e’** ~~(see Note: Scrambling code)~~

(4) Calculate the inner product of e’ with **C**norm. Do this for all symbols of the measurement interval and for all codes in the code space.
This gives an array of format k x ns, each value representing an error-vector representing a specific symbol and a specific code, which can be exploited in a variety of ways.

k: total number of codes in the code space

ns: number of symbols in the measurement interval

(5) Calculate k RMS values, each RMS value unifying n symbols within one code.
(These values can be called "Absolute CodeEVMs" [Volt].)

(6) Find the peak value among the k "absolute Code-EVMs".
(This value can be called "Absolute PeakCodeEVM" [Volt].)

(7) Calculate PCDE according to:

$$\mathrm{PCDE} = 10\lg \frac{(\text{absolute PeakCodeEVM})^2}{(\mathrm{RMS}(\mathbf{R}'))^2} \ \mathrm{dB}. \qquad \text{(a relative value in dB).}$$

see Note: TDD

see Note: Synch channel

~~C.3 Applications~~

~~This process may be applied in the measurements defined in the following subclauses:~~

~~6.3 Frequency Stability~~

~~6.4 Output Power Dynamics~~

~~6.4.2 Power control steps~~

~~6.4.3 Power control dynamic range~~

~~6.4.4 Minimum output power~~

~~6.4.5 Primary CCPCH power~~

~~6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR)~~

~~6.8 Transmit Modulation~~

~~6.8.1 Modulation accuracy~~

~~6.8.2 Peak Code Domain Error~~

C.34 Notes

NOTE: Symbol length

A general code-multiplexed signal is multi-code and multi-rate. In order to avoid unnecessary complexity, the measurement applications use a unique symbol-length, corresponding to a specific spreading factor, regardless of the really intended spreading factor. Nevertheless, the complexity with a multi-code / multi-rate signal can be mastered by introducing appropriate definitions.

NOTE: Deviation

It is conceivable to regard more parameters as type „deviation", e.g. chip clock and RF phase. However, because chip clock and RF frequency are linked together by a statement in the core specifications [1], it is sufficient to process RF frequency only.

The parameter RF phase must be varied within the best-fit process (C.2.5). Although necessary, this parameter-variation does not describe any error, as the modulation schemes used in the system do not depend on an absolute RF-phase.

The parameter Timing must be varied within the best fit process (C.2.5.) This parameter variation does not describe any error, when applied to the Node B test. However when applied to the UE test, it describes the error of the UE's Timing Advance.

NOTE: Residual

It is conceivable to regard more parameters as type „residual", e.g. IQ origin offset. As it is not the intention of the test to separate for different error sources, but to quantify the quality of the signal, all such parameters are not extracted by the best-fit process, instead remain part of EVM and PCDE.

~~NOTE: Scrambling code~~

~~To interpret the measurement results in practice, it should be kept in mind that erroneous code power on unused codes is generally de-scrambled differently under test conditions and under real life conditions, whereas erroneous code power on used codes is generally de-scrambled equally under test conditions and under real life conditions. It might be indicated if a used or unused code hits PCDE.~~

NOTE: TDD

EVM covers the midamble part as well as the data part; however PCDE disregards the midamble part.

NOTE: Synch channel

A Node B~~S~~ signal contains a physical synch channel, which is non-orthogonal, related to the other DPCHs. In this context note: The code channel bearing the result of PCDE is exactly one of the DPCHs (never the synch channel). The origin of PCDE (erroneous code power) can be any DPCH and/or the synch channel. This means that the error due to the synch channel is projected onto the other (orthogonal) codes that make up the code domain.

Note: **Fomula for the minimum process**

$$L(\Delta\tilde{f},\Delta\tilde{t},\Delta\tilde{\varphi},\Delta\tilde{g}_c,\ldots,\Delta\tilde{g}_{prim},\Delta\tilde{g}_{\sec i},\Delta\tilde{g}_{mid}) = \sum_{v=0}^{N-1}\left|Z(v)-R(v)\right|^2$$

Legend:

L : the function to be minimised

The parameters to be varied in order to minimize are:

$\Delta\tilde{f}$: the RF frequency offset

$\Delta\tilde{t}$: the timing offset

$\Delta\tilde{\varphi}$: the phase offset

$\Delta\tilde{g}_c \ldots$ code power offsets (one offset for each code)

$\Delta\tilde{g}_{mid}$: the power offset of the midamble

$\Delta\tilde{g}_{prim}$: the code power offset of the primary SCH

$\Delta\tilde{g}_{\sec i}$: the code power offsets of secondary SCHs, (i: 1,2,3)

($\Delta\tilde{g}_{prim}$ and $\Delta\tilde{g}_{\sec i}$ are only applied, if the timeslot under test contains the synchronisation channel.)

Z(v): Samples of the signal under Test

R(v): Samples of the reference signal

$\sum_{v=0}^{N-1}$: counting index v starting at the beginning of the measurement interval and ending at its end.

N = No of chips during the measurement interval.

Z(ν): Samples of the signal under Test. It is modelled as a sequence of complex baseband samples Z(γ) with a time-shift Δt, a frequency offset Δf, a phase offset Δφ, the latter three with respect to the reference signal.

$$Z(\nu) = Z(\nu - \Delta\tilde{t}) * e^{-j2\pi\Delta\tilde{f}\nu} * e^{-j\Delta\tilde{\varphi}}$$

R(ν): Samples of the reference signal:

$$R(\nu) = \sum_{c=1}^{No.of\ codes} (g_c + \Delta\tilde{g}_c) * Chip_c(\nu) + (g_{prim} + \Delta\tilde{g}_{prim}) * Chip_{prim}(\nu) +$$
$$(g_{\sec i} + \Delta\tilde{g}_{\sec i}) * Chip_{\sec i}(\nu) + (g_{mid} + \Delta\tilde{g}_{mid}) * Chip_{mid}(\nu)$$

g : nominal gain of the code channel or midamble

$\Delta\tilde{g}$: The gain offset to be varied in the minimum process

Chip(ν) is the chipsequence of the code channel or midamble

Indices at g, Δg and Chip:

The index indicates the code channel: c = 1,2,... No of code channels

prim = primary SCH

seci = three secondary SCHs, i:1,2,3

Range for $Chip_c$: +1,-1

Note: **Formula for EVM**

$$EVM = \sqrt{\frac{\sum_{\nu=0}^{N-1} \left| Z'(\gamma) - R'(\gamma) \right|^2}{\sum_{\nu=0}^{N-1} \left| R'(\gamma) \right|^2}} * 100\ \%$$

$Z'(\gamma)$, $R'(\gamma)$ are the varied measured and reference signals.

3GPP TSG RAN WG4 Meeting #21 **R4-020304**

Sophia Antipolis, France 28th January - 1st February 2002

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CHANGE REQUEST

⌘ **25.142**	**CR 106**	⌘ **rev**	**-**	⌘ Current version:	**3.8.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [ ] Radio Access Network [X] Core Network [ ]

Title:	⌘	Maintenance of annex C: Global In-Channel TX-Test.
Source:	⌘	RAN WG4
Work item code:	⌘	
Date:	⌘	1/2/2002
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
- ***F*** *(correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(addition of feature),*
- ***C*** *(functional modification of feature)*
- ***D*** *(editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
- *2 (GSM Phase 2)*
- *R96 (Release 1996)*
- *R97 (Release 1997)*
- *R98 (Release 1998)*
- *R99 (Release 1999)*
- *REL-4 (Release 4)*
- *REL-5 (Release 5)*

Reason for change:	⌘	Progress of 25.142 concerning different power and modulation measurements stipulates maintenance of the Global In-Channel TX-Test.
Summary of change:	⌘	1) Algorithmic support for the overall test implementation added 2) Algorithmic definition of decision point power added 3) Algorithmic definition of code domain power added 4) Error corrections Isolated Impact Analysis: Changes in the test specification does not affect the function of Node B,
Consequences if not approved:	⌘	Implementation of all in-channel TX test parameters may be ambiguous leading to inconsistent measurements and system performance

Clauses affected:	⌘	Annex C
Other specs affected:	⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] O&M Specifications
Other comments:	⌘	

Annex C (normative): Global in-channel Tx test

C.1 General

The global in-channel Tx test enables the measurement of all relevant parameters that describe the in-channel quality of the output signal of the Tx under test in a single measurement process.

The parameters describing the in-channel quality of a transmitter, however, are not necessarily independent. The algorithm chosen for description inside this annex places particular emphasis on the exclusion of all interdependencies among the parameters. Any other algorithm (e.g. having better computational efficiency) may be applied, as long as the results are the same within the accuracy limits.

~~The objective of this Annex is to list the results that shall be available from the global in-Channel TX-Test. To aid understanding, an example algorithmic description of the measurement process is provided. It is not intended that this particular method is required. It is however required that any algorithm that is used for in-channel Tx tests should deliver the required results with the required accuracy.~~

All notes referred to in the various subclauses of C.2 are put together in clause C.3~~4~~

C.2 Definition of the process

C.2.1 Basic principle

The process is based on the comparison of the actual **output signal of the Tx under test**, received by an ideal receiver, with a **reference signal**, that is generated by the measuring equipment and represents an ideal error free received signal. The reference signal shall be composed of the same number of codes at the correct spreading factors as contained in the test signal. Note, for simplification, the notation below assumes only ~~one~~ codes of ~~and~~ one spreading factor although the algorithm is valid for signals containing multiple spreading factors. All signals are represented as equivalent (generally complex) base band signals.

C.2.2 Output signal of the Tx under test

The output signal of the Tx under test is acquired by the measuring equipment, filtered by a matched filter (RRC characteristic with roll-off $\alpha = 0{,}22$, correct in shape and in position on the frequency axis) and stored for further processing ~~at one sample per chip at the intersymbol interference free instants.~~

The following form represents the physical signal in the entire measurement interval:

one vector **Z**, containing N = ns x sf + ma complex samples;

with

ns: number of symbols in the measurement interval;

sf: number of chips per symbol. (sf: spreading factor) (see Note: Symbol length)

ma: number of midamble chips ~~(TDD only)~~

C.2.3 Reference signal

The reference signal is constructed by the measuring equipment according to the relevant Tx specifications.

It is filtered by the same matched filter, mentioned in C.2.2, and stored at the intersymbol interference free instants. The following form represents the reference signal in the entire measurement interval:

one vector **R**, containing N = ns x sf + ma complex samples;

where ns, sf and ma have the same meaning as defined above in C.2.2.

C.2.4 Classification of measurement results

The measurement results achieved by the global in-channel Tx test can be classified into two types:

- **Results of type "deviation"**, where the error-free parameter has a non-zero magnitude. (These are the parameters that represent the signal). These parameters are:

  RF Frequency

  Power (in case of single code)

  Code Domain Power (in case of multi-code)

  Timing (only for UE) (see Note: Deviation)

  (Additional parameters: see Note: Deviation)

- **Results of type "residual"**, where the error-free parameter has value zero. (These are the parameters that represent the error values of the measured signal; ideally, their magnitude is zero). These parameters are:

  Error Vector Magnitude (EVM)

  Peak Code Domain Error (PCDE)

  (Additional parameters: see Note: Residual)

C.2.5 Process definition to achieve results of type "deviation"

The reference signal (**R**; see subclause C.2.3) and the signal under Test (Z; see subclause C.2.2) are ~~is~~ varied with respect to the parameters mentioned in subclause C.2.4 under "results of type deviation" in order to achieve best fit ~~with the recorded signal under test (**Z**; see subclause C.2.2)~~. Best fit is achieved when the RMS difference value between the varied signal under test and the varied reference signal is an absolute minimum.

Overview:

$$FCT\left[Z(\tilde{f},\tilde{t},\tilde{\varphi},g_1,g_2,\ldots,g_{synch})-R(f,t,\varphi,\tilde{g}_1,\tilde{g}_2,\ldots,\tilde{g}_{synch})\right]=Minimum\ !$$

Z : Signal under test.

R: Reference signal,

with frequency f, the timing t, the phase φ, gain of code1 (g_1), gain of code2 (g_2) etc, and the gain of the synch channel g_{synch}

The parameters marked with a tilde in Z and R are varied in order to achieve a best fit.

Detailed formula: see Note: Formula for the minimum process

The varied reference signal, after the best-fit process, will be called **R'.**

The varied signal under test, after the best fit process, will be called **Z'.**

Those parameter values, which - after the best-fit process – ~~are~~ leading to **R'and Z',** represent directly the wanted results of type "deviation". These parameter values are expressed as deviations from the reference value, using the same units as the corresponding reference value.

In the case of multi-code transmission, the best-fit process of the type "deviation" parameters frequency, timing (and any additional parameter as e.g. RF phase) is not done with respect to the individual codes, but commonly for the complete code set used; therefore, the process returns one measurement value only for each parameter.

(These parameters are not varied on the individual codes signals such that the process would return kr frequency errors... . (kr: number of codes in the reference signal)).

The only type-"deviation"-parameters varied individually are the code domain gain factors (g1, g2, …)

~~The only exception is the type "deviation" parameter Code Domain Power: The Code Domain Power is varied individually for each used code; therefore, the process returns k individual code power deviations (k: number of codes).~~

E.2.5.1 Decision Point Power

The mean-square value of the signal-under-test, sampled at the best estimate of the of Intersymbol-Interference-free points using the process defined in subclause 2.5, is referred to the *Decision Point Power* (DPP):

E.2.5.2 Code-Domain Power

The samples, Z', are separated into symbol intervals to create ns time-sequential vectors **z** with sf complex samples comprising one symbol interval. The *Code Domain Power* is calculated according to the following steps:

(1) Take the vectors **z** defined above.

(2) To achieve meaningful results it is necessary to descramble **z,** leading to **z'**

(3) Take the orthogonal vectors of the channelization code set **C** (all codes belonging to one spreading factor) as defined in TS 25.213 and TS 25.223 (range +1, -1), and normalize by the norm of the vectors to produce **C**norm=**C**/sqrt(sf). (see Note: Symbol length)

(4) Calculate the inner product of **z'** with **C**norm**.**. Do this for all symbols of the measurement interval and for all codes in the code space.
This gives an array of format k x ns, each value representing a specific symbol and a specific code, which can be exploited in a variety of ways.

k: total number of codes in the code space
ns: number of symbols in the measurement interval

(5) Calculate k mean-square values, each mean-square value unifying ns symbols within one code. (These values can be called "*Absolute CodeDomainPower* (CDP)" [Volt^2].) The sum of the k values of CDP is equal to DPP.

(6) Normalize by the decision point power to obtain

$$\textit{Relative CodeDomain Power} = \frac{\textit{Absolute CodeDomainPower}}{\textit{DecisionPointPower}}$$

C.2.6 Process definition to achieve results of type "residual"

The difference between the varied reference signal (**R'**; see subclauseC.2.5.) and the varied Tx signal under test (**Z'**; see subclause C.2.5~~2~~) is the error vector **E** versus time:

E = **Z'** – **R'.**

Depending on the parameter to be evaluated, it is appropriate to represent **E** in one of the following two different forms:

- **Form EVM** (representing the physical error signal in the entire measurement interval)

  One vector **E**, containing N = ns x sf + ma complex samples;

  where ns, sf and ma have the same meaning as defined above in C.2.2.

- **Form PCDE** (derived from Form EVM by separating the samples into symbol intervals)

  ns time-sequential vectors **e** with sf complex samples comprising one symbol interval.

E gives results of type "residual" applying the two algorithms defined in subclauses C.2.6.1 and C.2.6.2.

C.2.6.1 Error Vector Magnitude (EVM)

The Error Vector Magnitude EVM is calculated according to the following steps:

(1) Take the error vector **E** defined in subclause C.2.6 (Form EVM) and calculate the RMS value of **E**; the result will be called RMS(**E**).

(2) Take the varied reference vector **R'** defined in subclause C.2.3 and calculate the RMS value of **R'**; the result will be called RMS(**R'**).

(3) Calculate EVM according to:

$$\mathrm{EVM} = \frac{\mathrm{RMS}(\mathbf{E})}{\mathrm{RMS}(\mathbf{R}')} \text{ x } 100\%$$ (here, EVM is relative and expressed in %)

(see Note: TDD)
(see Note: Formula for EVM)

C.2.6.2 Peak Code Domain Error (PCDE)

The Peak Code Domain Error is calculated according to the following steps:

(1) Take the error vectors **e** defined in subclause C.2.6 (Form PCDE)

(2) Take the orthogonal vectors of the spreading code set C (all codes belonging to one spreading factor) as defined in TS 25.213 and TS 25.223 (range +1, -1). (see Note: Symbol length) and normalize by the norm of the vectors to produce **C**norm= **C**/sqrt(sf). (see Note: Symbol length)

(3) To achieve meaningful results, it is necessary to descramble **e,** leading to **e'** ~~(see Note: Scrambling code)~~

(4) Calculate the inner product of e' with **C**norm. Do this for all symbols of the measurement interval and for all codes in the code space.
This gives an array of format k x ns, each value representing an error-vector representing a specific symbol and a specific code, which can be exploited in a variety of ways.

k: total number of codes in the code space

ns: number of symbols in the measurement interval

(5) Calculate k RMS values, each RMS value unifying n symbols within one code.
(These values can be called "Absolute CodeEVMs" [Volt].)

(6) Find the peak value among the k "absolute Code-EVMs".
(This value can be called "Absolute PeakCodeEVM" [Volt].)

(7) Calculate PCDE according to:

$$\mathrm{PCDE} = 10\lg \frac{(\text{absolute PeakCodeEVM})^2}{(\mathrm{RMS}(\mathbf{R}'))^2} \text{ dB}. \qquad \text{(a relative value in dB).}$$

see Note: TDD

see Note: Synch channel

~~C.3 Applications~~

~~This process may be applied in the measurements defined in the following subclauses:~~

~~6.3 Frequency Stability~~

~~6.4 Output Power Dynamics~~

~~6.4.2 Power control steps~~

~~6.4.3 Power control dynamic range~~

~~6.4.4 Minimum output power~~

~~6.4.5 Primary CCPCH power~~

~~6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR)~~

~~6.8 Transmit Modulation~~

~~6.8.1 Modulation accuracy~~

~~6.8.2 Peak Code Domain Error~~

C.34 Notes

NOTE: Symbol length

A general code-multiplexed signal is multi-code and multi-rate. In order to avoid unnecessary complexity, the measurement applications use a unique symbol-length, corresponding to a specific spreading factor, regardless of the really intended spreading factor. Nevertheless, the complexity with a multi-code / multi-rate signal can be mastered by introducing appropriate definitions.

NOTE: Deviation

It is conceivable to regard more parameters as type „deviation", e.g. chip clock and RF phase. However, because chip clock and RF frequency are linked together by a statement in the core specifications [1], it is sufficient to process RF frequency only.

The parameter RF phase must be varied within the best-fit process (C.2.5). Although necessary, this parameter-variation does not describe any error, as the modulation schemes used in the system do not depend on an absolute RF-phase.

The parameter Timing must be varied within the best fit process (C.2.5.) This parameter variation does not describe any error, when applied to the Node B test. However when applied to the UE test, it describes the error of the UE's Timing Advance.

NOTE: Residual

It is conceivable to regard more parameters as type „residual", e.g. IQ origin offset. As it is not the intention of the test to separate for different error sources, but to quantify the quality of the signal, all such parameters are not extracted by the best-fit process, instead remain part of EVM and PCDE.

~~NOTE: Scrambling code~~

~~To interpret the measurement results in practice, it should be kept in mind that erroneous code power on unused codes is generally de-scrambled differently under test conditions and under real life conditions, whereas erroneous code power on used codes is generally de-scrambled equally under test conditions and under real life conditions. It might be indicated if a used or unused code hits PCDE.~~

NOTE: TDD

EVM covers the midamble part as well as the data part; however PCDE disregards the midamble part.

NOTE: Synch channel

A Node B~~S~~ signal contains a physical synch channel, which is non-orthogonal, related to the other DPCHs. In this context note: The code channel bearing the result of PCDE is exactly one of the DPCHs (never the synch channel). The origin of PCDE (erroneous code power) can be any DPCH and/or the synch channel. This means that the error due to the synch channel is projected onto the other (orthogonal) codes that make up the code domain.

Note: **Fomula for the minimum process**

$$L(\Delta\tilde{f}, \Delta\tilde{t}, \Delta\tilde{\varphi}, \Delta\tilde{g}_c, \ldots, \Delta\tilde{g}_{prim}, \Delta\tilde{g}_{\sec i}, \Delta\tilde{g}_{mid}) = \sum_{\nu=0}^{N-1} \left| Z(\nu) - R(\nu) \right|^2$$

Legend:

L : the function to be minimised

The parameters to be varied in order to minimize are:

$\Delta\tilde{f}$: the RF frequency offset

$\Delta\tilde{t}$: the timing offset

$\Delta\tilde{\varphi}$: the phase offset

$\Delta\tilde{g}_c \ldots$ code power offsets (one offset for each code)

$\Delta\tilde{g}_{mid}$: the power offset of the midamble

$\Delta\tilde{g}_{prim}$: the code power offset of the primary SCH

$\Delta\tilde{g}_{\sec i}$: the code power offsets of secondary SCHs, (i: 1,2,3)

($\Delta\tilde{g}_{prim}$ and $\Delta\tilde{g}_{\sec i}$ are only applied, if the timeslot under test contains the synchronisation channel.)

Z(v): Samples of the signal under Test

R(v): Samples of the reference signal

$\sum_{\nu=0}^{N-1}$: counting index ν starting at the beginning of the measurement interval and ending at its end.

N = No of chips during the measurement interval.

Z(v): Samples of the signal under Test. It is modelled as a sequence of complex baseband samples Z(γ) with a time-shift Δt, a frequency offset Δf, a phase offset Δφ, the latter three with respect to the reference signal.

$$Z(v) = Z(v - \Delta\tilde{t}) * e^{-j2\pi\Delta\tilde{f}v} * e^{-j\Delta\tilde{\varphi}}$$

R(v): Samples of the reference signal:

$$R(v) = \sum_{c=1}^{No.of\ codes} (g_c + \Delta\tilde{g}_c) * Chip_c(v) + (g_{prim} + \Delta\tilde{g}_{prim}) * Chip_{prim}(v) + (g_{\sec i} + \Delta\tilde{g}_{\sec i}) * Chip_{\sec i}(v) + (g_{mid} + \Delta\tilde{g}_{mid}) * Chip_{mid}(v)$$

g : nominal gain of the code channel or midamble

$\Delta\tilde{g}$: The gain offset to be varied in the minimum process

Chip(v) is the chipsequence of the code channel or midamble

Indices at g, Δg and Chip:

The index indicates the code channel: c = 1,2,... No of code channels

prim = primary SCH

seci = three secondary SCHs, i:1,2,3

Range for $Chip_c$: +1,-1

Note: **Formula for EVM**

$$EVM = \sqrt{\frac{\sum_{\nu=0}^{N-1} |Z'(\gamma) - R'(\gamma)|^2}{\sum_{\nu=0}^{N-1} |R'(\gamma)|^2}} * 100\ \%$$

$Z'(\gamma)$, $R'(\gamma)$ are the varied measured and reference signals.

3GPP TSG RAN WG4 Meeting #21 **R4-020443**

Sophia Antipolis, France 28th January - 1st February 2002

CR-Form-v5

CHANGE REQUEST

⌘	**25.142**	**CR 103**	⌘ ev **1** ⌘	Current version:	**4.3.0**	⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [ ] Radio Access Network [X] Core Network [ ]

Title:	⌘	Correction of transmit intermodulation conformance testing		
Source:	⌘	RAN WG4		
Work item code:	⌘	TEI	***Date:*** ⌘	1/2/2002
Category:	⌘	**A**	***Release:*** ⌘	Rel-4
		Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	⌘	The frequency range for measurement of spurious emissions during the transmit intermodulation test is very large, leading to an unnecessary long testing time.
Summary of change:	⌘	Frequency range for measurement of spurious emissions during the transmit intermodulation test limited to cover the relevant frequency range.
Consequences if not approved:	⌘	The test requirement will be ambiguous. Test time will be unnecessary long. Isolated Impact Analysis: Correction of a requirement where the specification was ambiguous or not sufficiently explicit. The CR would allow to reduce the time required for transmit intermodulation conformance testing, but would not affect BS implementations, BS-UE interoperability or system performance.

Clauses affected:	⌘	6.7.1, 6.7.1.1, 6.7.4.1.1, 6.7.4.2, 6.7.5	
Other specs affected:	⌘	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘
Other comments:	⌘		

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

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downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

6.7 Transmit intermodulation

6.7.1 Definition and applicability

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

The transmit intermodulation level is the power of the intermodulation products when a WCDMA modulated interference signal is injected into the antenna connector at a level of 30 dB lower than that of the subject signal.

The requirements are applicable for a single carrier.

6.7.1.1 3,84 Mcps TDD option

The carrier frequency of the interference signal shall be ±5 MHz, ±10 MHz and ±15 MHz offset from the subject signal carrier frequency, but excluding interference carrier frequencies outside of the UTRA frequency bands specified in 4.2a, 4.2b or 4.2c, respectively.

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

6.7.1.2 1,28 Mcps TDD option

The frequency of the interference signal shall be ±1,6 MHz, ±3,2 MHz and ±4,8 MHz offset from the subject signal.

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

6.7.2 Minimum Requirements

The transmit intermodulation level shall not exceed the out of band or the spurious emission requirements of subclause 6.6.2 and 6.6.3, respectively.

The normative reference for this requirement is TS 25.105 [1] subclause 6.7.1.

6.7.3 Test purpose

The test purpose is to verify the ability of the BS transmitter to restrict the generation of intermodulation products in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna to below specified levels.

6.7.4 Method of test

6.7.4.1 Initial conditions

6.7.4.1.0 General test conditions

Test environment: normal; see subclause 5.9.1.

RF channels to be tested: B, M and T; see subclause 5.3.

6.7.4.1.1 3,84 Mcps TDD option

(1) Connect the measuring equipment, the BS under test and the WCDMA signal generator as shown in figure 6.2.

(2) Set the parameters of the BS transmitted signal according to table 6.38.

(3) Configure the WCDMA signal generator to produce an interference signal with a mean power level according to subclause 6.7.5~~of 30 dB lower than that of the BS transmitted signal~~. The interference signal shall be like-

modulated as the BS transmitted signal, and the active time slots of both signals shall be synchronized. The carrier frequency of the interference signal shall be ±5 MHz, ±10 MHz and ±15 MHz offset from the carrier frequency of the wanted~~BS transmitted~~ signal, but excluding interference frequencies outside of the UTRA frequency bands specified in 4.2a, 4.2b or 4.2c, respectively.

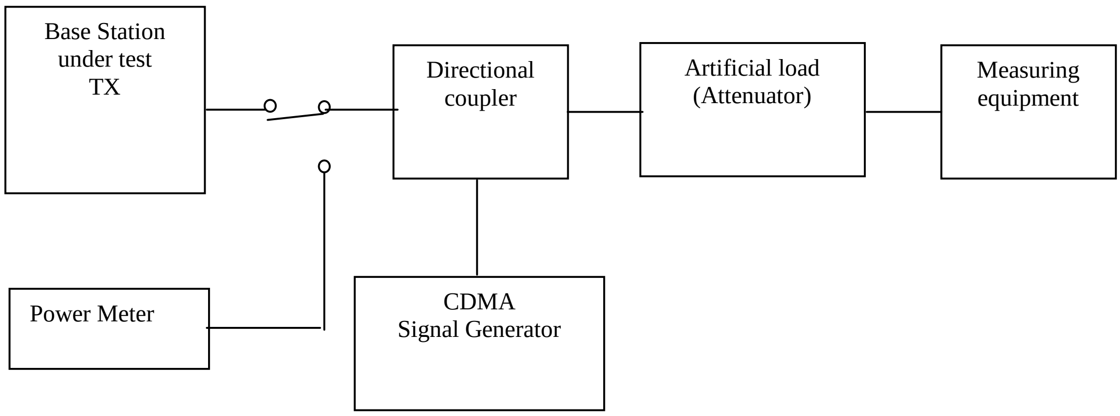

Figure 6.2: Measuring setup for Base Station transmit intermodulation testing

Table 6.38: Parameters of the BS transmitted signal for transmit intermodulation testing

Parameter	Value/description
TDD Duty Cycle	TS i; i = 0, 1, 2, ..., 14: transmit, if i is odd; receive, if i is even.
BS output power setting	PRAT
Number of DPCH in each active TS	9
Power of each DPCH	1/9 of Base Station output power
Data content of DPCH	real life (sufficient irregular)

6.7.4.1.2 1,28 Mcps TDD option

(1) Connect the measuring equipment, the BS under test and the CDMA signal generator as shown in figure 6.2A.

(2) Set the parameters of the BS transmitted signal according to table 6.38A.

(3) Configure the CDMA signal generator to produce an interference signal with a level of 30 dB lower than that of the BS transmitted signal. The interference signal shall be like-modulated as the BS transmitted signal, and the active time slots of both signals shall be synchronized. The frequency of the interference signal shall be ±1,6 MHz, ±3,2 MHz and ±4,8 MHz offset from the BS transmitted signal.

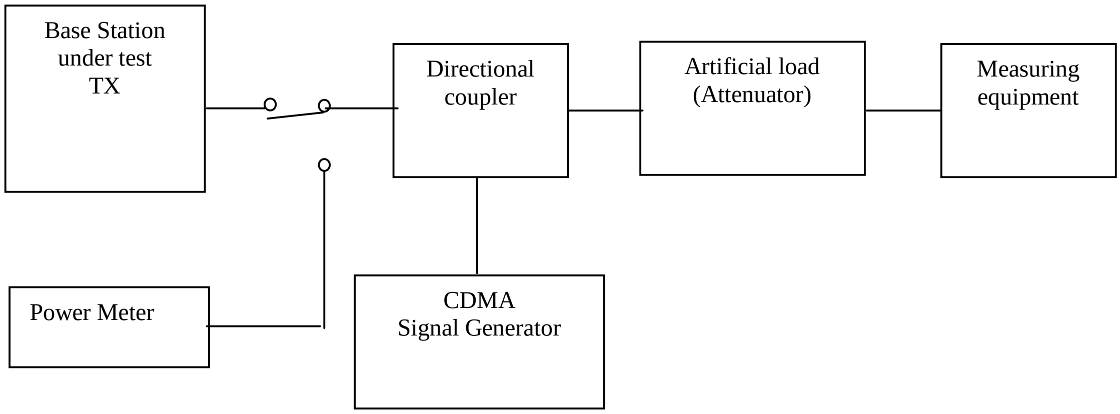

Figure 6.2A: Measuring setup for Base Station transmit intermodulation testing

Table 6.38A: Parameters of the BS transmitted signal for transmit intermodulation testing for 1,28 Mcps TDD

Parameter	Value/description
TDD Duty Cycle	TS i; ~~i~~I = 0, 1, 2, 3, 4, 5, 6: transmit, if i is 0,4,5,6; receive, if i is 1,2,3.
BS output power setting	PRAT
Number of DPCH in each active TS	8
Power of each DPCH	1/8 of Base Station output power
Data content of DPCH	real life (sufficient irregular)

6.7.4.2 Procedure

Apply the test procedures for out of band and spurious emissions as described in 6.6.2 and 6.6.3, respectively, at the frequencies of all third and fifth order intermodulation products. The frequency band occupied by the interference signal ~~are~~shall be excluded from the measurements.

NOTE: The third order intermodulation products are at frequencies (F1 ± 2F2) and (2F1 ± F2), the fifth order intermodulation products are at frequencies (2F1 ± 3F2), (3F1 ± 2F2), (4F1 ± F2) and (F1 ± 4F2), where F1 represents the frequencies within the bandwidth of the wanted signal and F2 represents the frequencies within the bandwidth of the WCDMA modulated interference signal.

6.7.5 Test Requirements

NOTE: If the Test Requirement below differs from the Minimum Requirement, then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in subclause 5.11 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex D.

The mean power level of the WCDMA modulated interference signal shall be 30 dB below the mean power level of the wanted signal.

At the frequencies of all third and fifth order intermodulation products, t~~T~~he Test Requirements for out of band and spurious emissions as specified in subclauses 6.6.2.1.5 (Spectrum emission mask), 6.6.2.2.5 (ACLR) and 6.6.3.5 (Spurious emissions) shall be met.

3GPP TSG RAN WG4 Meeting #21 **R4-020442**

Sophia Antipolis, France 28th January - 1st February 2002

CR-Form-v5

CHANGE REQUEST

⌘	**25.142**	**CR**	**102**	⌘ ev	**1**	⌘	Current version:	**3.8.0** ⌘

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Proposed change affects: ⌘ (U)SIM [ ] ME/UE [ ] Radio Access Network [X] Core Network [ ]

Title:	⌘	Correction of transmit intermodulation conformance testing		
Source:	⌘	RAN WG4		
Work item code:	⌘		***Date:*** ⌘	1/2/2002
Category:	⌘	**F** *Use one of the following categories:* ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.	***Release:*** ⌘	R99 *Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

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Clauses affected:	⌘	6.7.1, 6.7.4.1, 6.7.4.2, 6.7.5		
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The requirements are applicable for a single carrier.

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6.7.4.1 Initial conditions

Test environment: normal; see subclause 5.9.1.

RF channels to be tested: B, M and T; see subclause 5.3.

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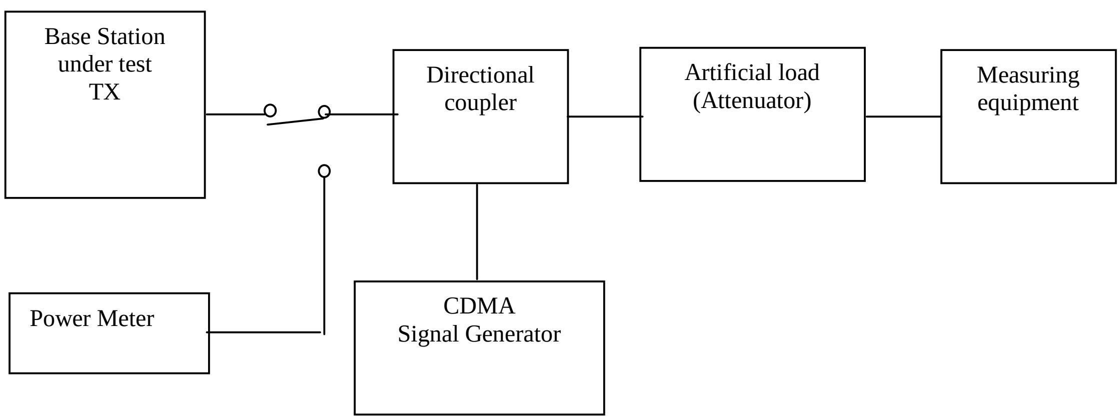

Figure 6.2: Measuring setup for Base Station transmit intermodulation testing

(2) Set the parameters of the BS transmitted signal according to table 6.38.

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