TSG RAN Meeting #16 **RP-020286**
Marco Island, FL, USA, 4 - 7 June 2002

Title **CRs (R'99 and Rel-4/Rel-5 Category A) to TS 25.141**
Source **TSG RAN WG4**
Agenda Item **7.4.3**

RAN4 Tdoc	Spec	Curr Ver	New Ver	CR	R	Cat	Ph	Title	Acronym
R4-020889	25.141	3.9.0	3.10.0	226		F	R99	Correction of power control dynamic range Test Tolerance	TEI
R4-020890	25.141	4.4.0	4.5.0	227		A	Rel-4	Correction of power control dynamic range Test Tolerance	TEI
R4-020891	25.141	5.2.0	5.3.0	228		A	Rel-5	Correction of power control dynamic range Test Tolerance	TEI
R4-021048	25.141	3.9.0	3.10.0	229	1	F	R99	Correction to total power dynamic range test	TEI
R4-021049	25.141	4.4.0	4.5.0	230	1	A	Rel-4	Correction to total power dynamic range test	TEI
RP-020115	25.141	5.2.0	5.3.0	197	2	A	Rel-5	TBD on test tolerances	TEI

3GPP TSG-RAN Meeting #15
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Tdoc RP-020115

CR-Form-v6.1

CHANGE REQUEST

⌘ **25.141** **CR** **197** ⌘ **rev** **2** ⌘ Current version: **5.2.0** ⌘

*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:	⌘	TBDs on test tolerances
Source:	⌘	3GPP Support (Agilent Technologies, Ericsson, Nokia, Nortel Networks, Rohde & Schwarz)
Work item code:	⌘	TEI
Date:	⌘	2002-02-26
Category:	⌘	**A**
Release:	⌘	Rel-5

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:	⌘	There are still TBDs on test tolerances in 25.141 for Clause 8 and the corresponding test requirements are without test tolerances
Summary of change:	⌘	TBDs are replaced by agreed test tolerances and the correct tests requirement are introduced by applying the test tolerance to the minimum requirement (from the core specification)
Consequences if not approved:	⌘	The core specification values have been derived without consideration of test tolerance. If it is not applied, the tests will be incorrect.

Clauses affected:	⌘	4.1.4, 4.2.3, 8.2, 8.3, 8.4, 8.5, Annex F
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

4.1.4 Measurement of performance requirement

Table 4.1B: Maximum Test System Uncertainty for Performance Requirements

Subclause	Maximum Test System Uncertainty[1]	Derivation of Test System Uncertainty
8.2, Demodulation in static propagation condtion	~~TBD~~ ± 0.4dB	Wanted/AWGN: ± 0.4dB (relative uncertainty for E_b/N_0) (AWGN: ±1dB)
8.3, Demodulation of DCH in multiplath fading conditons	~~TBD~~ ± 0.6dB	Fader: ± 0.5dB Wanted/AWGN: ± 0.4dB (relative) Combined relative uncertainty for E_b/N_0: ± 0.6dB
8.4 Demodulation of DCH in moving propagation conditions	~~TBD~~ ± 0.6dB	Fader: ± 0.5dB Wanted/AWGN: ± 0.4dB (relative) Combined relative uncertainty for E_b/N_0: ± 0.6dB
8.5 Demodulation of DCH in birth/death propagation conditions	~~TBD~~ ± 0.6dB	Fader: ± 0.5dB Wanted/AWGN: ± 0.4dB (relative) Combined relative uncertainty for E_b/N_0: ± 0.6dB
~~8.6 Verification of the internal BLER calculation~~	~~TBD~~	
8.7 Site Selection Diversity Transmission (SSDT) Mode	TBD	
Note 1: Only the overall stimulus error is considered here. The effect of errors in the BER/FER measurements due to finite test duration is not considered.		

4.2 Test Tolerances (informative)

The Test Tolerances defined in this subclause have been used to relax the Minimum Requirements in this specification to derive the Test Requirements.

The Test Tolerances are derived from Test System uncertainties, regulatory requirements and criticality to system performance. As a result, the Test Tolerances may sometimes be set to zero.

The test tolerances should not be modified for any reason e.g. to take account of commonly known test system errors (such as mismatch, cable loss, etc.)

4.2.1 Transmitter

Table 4.1C: Test Tolerances for transmitter tests.

Subclause	Test Tolerance[1]
6.2.1 Maximum Output Power	0.7 dB
6.2.2 CPICH Power accuracy	0.8 dB
6.3.4 Frequency error	12 Hz
6.4.2 Power control steps	0.1 dB
6.4.3 Power dynamic range	0.2 dB
6.4.4 Total power dynamic range	0.3 dB
6.5.1 Occupied Bandwidth	0 kHz
6.5.2.1 Spectrum emission mask	1.5 dB
6.5.2.2 ACLR	0.8 dB
6.5.3 Spurious emissions	0 dB
6.6 Transmit intermodulation (interferer requirements)	0 dB[2]
6.7.1 Frequency error	12 Hz
6.7.12 EVM	0 %
6.7.23 Peak code Domain error	1.0dB
Note 1: Unless otherwise stated, The Test Tolerances are applied to the DUT Minimum Requirement. See Annex F. Note 2: The Test Tolerance is applied to the stimulus signal(s). See Annex F.	

4.2.2 Receiver

Table 4.1D: Test Tolerances for receiver tests.

Subclause	Test Tolerance[1]
7.2 Reference sensitivity level	0.7 dB
7.3 Dynamic range	1.2 dB
7.4 Adjacent channel selectivity	0 dB
7.5 Blocking characteristics	0 dB
7.6 Intermod Characteristics	0 dB
7.7 Spurious Emissions	0 dB[2]
Note 1: Unless otherwise stated, the Test Tolerances are applied to the stimulus signal(s). See Annex F. Note 2: The Test Tolerance is applied to the DUT Minimum Requirement. See Annex F.	

4.2.3 Performance requirement

Table 4.1E: Test Tolerances for Performance Requirements.

Subclause	Test Tolerance[1]
8.2, Demodulation in static propagation condtion	~~TBD~~0.4dB
8.3, Demodulation of DCH in multiplath fading conditons	~~TBD~~0.6dB
8.4 Demodulation of DCH in moving propagation conditions	~~TBD~~0.6dB
8.5 Demodulation of DCH in birth/death propagation conditions	~~TBD~~0.6dB
~~8.6 Verification of the internal BLER calculation~~	~~TBD~~
8.7 Site Selection Diversity Transmission (SSDT) Mode	TBD
Note 1: Unless otherwise stated, the Test Tolerances are applied to the stimulus signal(s). See Annex F.	

8.2.1 Demodulation of DCH

8.2.1.1 Definition and applicability

The performance requirement of DCH in static propagation conditions is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

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

8.2.1.2 ~~Conformance~~ Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in table 8.1.

Table 8.1: Performance requirements in AWGN channel.

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
12.2 kbps	n.a.	5.1 dB
64 kbps	1.5 dB	1.7 dB
144 kbps	0.8 dB	0.9 dB
384 kbps	0.9 dB	1.0 dB

The reference for this requirement is TS 25.104 subclause 8.2.1.1.

8.2.1.3 Test purpose

The test shall verify the receiver's ability to receive the test signal under static propagation conditions with a BLER not exceeding a specified limit.

8.2.1.4 Method of test

8.2.1.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

1) Connect the BS tester generating the wanted signal and AWGN generators to both BS antenna connectors for diversity reception via a combining network as shown in annex B.

8.2.1.4.2 Procedure

1) Adjust the AWGN generator to -84 dBm/3.84 MHz at the BS input.

2) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A.

3) Adjust the equipment so that required E_b/N_0 specified in table 8.2~~8.1~~ is achieved. To achieve the specified E_b/N_O, the ratio of the wanted signal level relative to the AWGN signal at the BS input should be adjusted to: ~~-84+~~10*Log10(R_b /3.84*10^6)+E_b/N_0 [dB~~m~~]. ~~The wanted signal levels at the BS input for the specified E_b/N_0 levels in table 8.1 is found in table 8.2~~

~~**Table 8.2: Wanted signal levels in AWGN channels.**~~

~~Measurement channel data rate (R_b)~~	~~Wanted signal level for required BLER < 10^{-1}~~	~~Wanted signal level for required BLER < 10^{-2}~~
~~12.2 kbps~~	~~n.a.~~	~~-103.9 dBm~~
~~64 kbps~~	~~-100.3 dBm~~	~~-100.1 dBm~~
~~144 kbps~~	~~-97.5 dBm~~	~~-97.4 dBm~~
~~384 kbps~~	~~-93.1 dBm~~	~~-93 dBm~~

4) For each of the data rates in table 8.2~~8.1~~ applicable for the base station, measure the BLER.

8.2.1.5 Test requirements

The BLER measured according to subclause 8.2.1.4.2 shall not exceed the BLER limits for the E_b/N_0 levels specified in table 8.2~~8.1~~.

Table 8.2: Test requirements in AWGN channel.

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
12.2 kbps	n.a.	5.5 dB
64 kbps	1.9 dB	2.1 dB
144 kbps	1.2 dB	1.3 dB
384 kbps	1.3 dB	1.4 dB

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

8.3 Demodulation of DCH in multipath fading conditions

8.3.1 Multipath fading Case 1

8.3.1.1 Definition and applicability

The performance requirement of DCH in multipath fading Case 1 is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

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

8.3.1.2 ~~Conformance~~ Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in table 8.3.

Table 8.3: Performance requirements in multipath Case 1 channel

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
12.2 kbps	n.a.	11.9 dB
64 kbps	6.2 dB	9.2 dB
144 kbps	5.4 dB	8.4 dB
384 kbps	5.8 dB	8.8 dB

The reference for this requirement is TS 25.104 subclause 8.3.1.1

8.3.1.3 Test Purpose

The test shall verify the receiver's ability to receive the test signal under slow multipath fading propagation conditions with a BLER not exceeding a specified limit.

8.3.1.4 Method of test

8.3.1.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

1) Connect the BS tester generating the wanted signal, multipath fading simulators and AWGN generators to both BS antenna connectors for diversity reception via a combining network as shown in annex B.

8.3.1.4.2 Procedure

1) Adjust the AWGN generator to -84 dBm/3.84 MHz at the BS input.

2) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A.

3) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex D.

4) Adjust the equipment so that required E_b/N_0 specified in table 8.4~~8.3~~ is achieved. To achieve the specified E_b/N_O, the ratio of the wanted signal level relative to the AWGN signal at the BS input should be adjusted to: ~~-84+~~$10*\mathrm{Log10}(R_b/3.84*10^6)+E_b/N_0$ [dB~~m~~]. ~~The wanted signal levels at the BS input for the specified E_b/N_0 levels in table 8.3 is found in table 8.4~~

~~**Table 8.4: Wanted signal levels in multipath Case 1 channel**~~

~~Measurement channel data rate (R_b)~~	~~Wanted signal level for required BLER < 10^{-1}~~	~~Wanted signal level for required BLER < 10^{-2}~~
~~12.2 kbps~~	~~n.a.~~	~~-97.1 dBm~~
~~64 kbps~~	~~-95.6 dBm~~	~~-92.6 dBm~~
~~144 kbps~~	~~-92.9 dBm~~	~~-89.9 dBm~~
~~384 kbps~~	~~-88.2 dBm~~	~~-85.2 dBm~~

5) For each of the data rates in table 8.4~~8.3~~ applicable for the base station, measure the BLER.

8.3.1.5 Test requirements

The BLER measured according to subclause 8.3.1.4.2 shall not exceed the BLER limits for the E_b/N_0 levels specified in table 8.4~~8.3~~.

Table 8.4: Test requirements in multipath Case 1 channel

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
12.2 kbps	n.a.	12.5 dB
64 kbps	6.8 dB	9.8 dB
144 kbps	6.0 dB	9.0 dB
384 kbps	6.4 dB	9.4 dB

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

8.3.2 Multipath fading Case 2

8.3.2.1 Definition and applicability

The performance requirement of DCH in multipath fading Case 2 is determined by the maximum Block Error Rate (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

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

8.3.2.2 ~~Conformance~~ Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in table 8.5.

Table 8.5: Performance requirements in multipath Case 2 channel

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
12.2 kbps	n.a.	9.0 dB
64 kbps	4.3 dB	6.4 dB
144 kbps	3.7 dB	5.6 dB
384 kbps	4.1 dB	6.1 dB

The reference for this requirement is TS 25.104 subclause 8.3.2.1.

8.3.2.3 Test Purpose

The test shall verify the receiver's ability to receive the test signal that has a large time dispersion with a BLER not exceeding a specified limit.

8.3.2.4 Method of test

8.3.2.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

1) Connect the BS tester generating the wanted signal, multipath fading simulators and AWGN generators to both BS antenna connectors for diversity reception via a combining network as shown in annex B.

8.3.2.4.2 Procedure

1) Adjust the AWGN generator to -84 dBm/3.84 MHz at the BS input.

2) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A.

3) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex D.

4) Adjust the equipment so that required E_b/N_0 specified in table 8.6~~8.5~~ is achieved. To achieve the specified E_b/N_O, the ratio of the wanted signal level relative to the AWGN signal at the BS input should be adjusted to: ~~-84+~~$10*\text{Log10}(R_b/3.84*10^6)+E_b/N_0$ [dB~~m~~]. ~~The wanted signal levels at the BS input for the specified E_b/N_0 levels in table 8.5 is found in table 8.6.~~

~~**Table 8.6: Wanted signal levels in multipath Case 2 channel**~~

~~Measurement channel data rate (R_b)~~	~~Wanted signal level for required BLER < 10^{-1}~~	~~Wanted signal level for required BLER < 10^{-2}~~
~~12.2 kbps~~	~~n.a.~~	~~-100 dBm~~
~~64 kbps~~	~~-97.5 dBm~~	~~-95.4 dBm~~
~~144 kbps~~	~~-94.6 dBm~~	~~-92.7 dBm~~
~~384 kbps~~	~~-89.9 dBm~~	~~-87.9 dBm~~

5) For each of the data rates in table 8.6~~8.5~~ applicable for the base station, measure the BLER.

8.3.2.5 Test requirements

The BLER measured according to subclause 8.3.2.4.2 shall not exceed the BLER limits for the E_b/N_0 levels specified in table 8.6~~8.5~~.

Table 8.6: Test requirements in multipath Case 2 channel

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
12.2 kbps	n.a.	9.6 dB
64 kbps	4.9 dB	7.0 dB
144 kbps	4.3 dB	6.2 dB
384 kbps	4.7 dB	6.7 dB

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

8.3.3 Multipath fading Case 3

8.3.3.1 Definition and applicability

The performance requirement of DCH in multipath fading Case 3 is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

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

8.3.3.2 ~~Conformance~~ Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in table 8.7.

Table 8.7: Performance requirements in multipath Case 3 channel

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}	E_b/N_0 for required BLER < 10^{-3}
12.2 kbps	n.a	7.2 dB	8.0 dB
64 kbps	3.4 dB	3.8 dB	4.1 dB
144 kbps	2.8 dB	3.2 dB	3.6 dB
384 kbps	3.2 dB	3.6 dB	4.2 dB

The reference for this requirement is TS 25.104 subclause 8.3.3.1.

8.3.3.3 Test purpose

The test shall verify the receivers ability to receive the test signal under fast fading propagation conditions with a BLER not exceeding a specified limit.

8.3.3.4 Method of test

8.3.3.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

1) Connect the BS tester generating the wanted signal, multipath fading simulators and AWGN generators to both BS antenna connectors for diversity reception via a combining network as shown in annex B.

8.3.3.4.2 Procedure

1) Adjust the AWGN generator to -84 dBm/3.84 MHz at the BS input.

2) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A.

3) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex D.

4) Adjust the equipment so that required E_b/N_0 specified in table 8.8~~8.7~~ is achieved. To achieve the specified E_b/N_O, the ratio of the wanted signal level relative to the AWGN signal at the BS input should be adjusted to: ~~-84+~~10*Log10(R_b /3.84*10^6)+E_b/N_0 [dB~~m~~]. ~~The wanted signal levels at the BS input for the specified E_b/N_0 levels in table 8.7 is found in table 8.8.~~

~~**Table 8.8: Wanted signal levels in multipath Case 3 channel**~~

~~Measurement channel data rate (R_b)~~	~~Wanted signal level for required BLER < 10^{-1}~~	~~Wanted signal level for required BLER < 10^{-2}~~	~~Wanted signal level for required BLER < 10^{-3}~~
~~12.2 kbps~~	~~n.a~~	~~-101.8 dBm~~	~~-101.0 dBm~~
~~64 kbps~~	~~-98.4 dBm~~	~~-98.0 dBm~~	~~-97.7 dBm~~
~~144 kbps~~	~~-95.5 dBm~~	~~-95.1 dBm~~	~~-94.7 dBm~~
~~384 kbps~~	~~-90.8 dBm~~	~~-90.4 dBm~~	~~-89.8 dBm~~

6) For each of the data rates in table 8.8~~8.7~~ applicable for the base station, measure the BLER

8.3.3.5 Test requirements

The BLER measured according to subclause 8.3.3.4.2 shall not exceed the BLER limits for E_b/N_0 levels specified in table 8.8~~8.7~~.

Table 8.8: Test requirements in multipath Case 3 channel

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}	E_b/N_0 for required BLER < 10^{-3}
12.2 kbps	n.a	7.8 dB	8.6 dB
64 kbps	4.0 dB	4.4 dB	4.7 dB
144 kbps	3.4 dB	3.8 dB	4.2 dB
384 kbps	3.8 dB	4.2 dB	4.8 dB

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

8.3.4 Multipath fading Case 4

8.3.4.1 Definition and applicability

The performance requirement of DCH in multipath fading Case 4 is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

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

8.3.4.2 ~~Conformance~~ Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in table 8.8A.

Table 8.8A: Performance requirements in multipath Case 4 channel

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}	E_b/N_0 for required BLER < 10^{-3}
12.2 kbps	n.a	10.2 dB	11.0 dB
64 kbps	6.4 dB	6.8 dB	7.1 dB
144 kbps	5.8 dB	6.2 dB	6.6 dB
384 kbps	6.2 dB	6.6 dB	7.2 dB

The reference for this requirement is TS 25.104 subclause 8.3.4.1.

8.3.4.3 Test purpose

The test shall verify the receivers ability to receive the test signal under fast fading propagation conditions with a BLER not exceeding a specified limit.

8.3.4.4 Method of test

8.3.4.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

1) Connect the BS tester generating the wanted signal, multipath fading simulators and AWGN generators to both BS antenna connectors for diversity reception via a combining network as shown in annex B.

8.3.4.4.2 Procedure

1) Adjust the AWGN generator to -84 dBm/3.84 MHz at the BS input.

2) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A.

3) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex D.

4) Adjust the equipment so that required E_b/N_0 specified in table 8.8B~~8.8A~~ is achieved. To achieve the specified E_b/N_O, the ratio of the wanted signal level relative to the AWGN signal at the BS input should be adjusted to: ~~-84+~~$10*\text{Log10}(R_b/3.84*10^6)+E_b/N_0$ [dB~~m~~]. ~~The wanted signal levels at the BS input for the specified E_b/N_0 levels in table 8.8A is found in table 8.8B.~~

~~**Table 8.8B: Wanted signal levels in multipath Case 4 channel**~~

~~Measurement channel data rate (R_b)~~	~~Wanted signal level for required BLER < 10^{-1}~~	~~Wanted signal level for required BLER < 10^{-2}~~	~~Wanted signal level for required BLER < 10^{-3}~~
~~12.2 kbps~~	~~n.a~~	~~-98.8 dBm~~	~~-98.0 dBm~~
~~64 kbps~~	~~-95.4 dBm~~	~~-95.0 dBm~~	~~-94.7 dBm~~
~~144 kbps~~	~~-92.5 dBm~~	~~-92.1 dBm~~	~~-91.7 dBm~~
~~384 kbps~~	~~-87.8 dBm~~	~~-87.4 dBm~~	~~-86.8 dBm~~

6) For each of the data rates in table 8.8B~~8.8A~~ applicable for the base station, measure the BLER

8.3.4.5 Test requirements

The BLER measured according to subclause 8.3.4.4.2 shall not exceed the BLER limits for the E_b/N_0 levels specified in table 8.8B~~8.8A~~.

Table 8.8B: Test requirements in multipath Case 4 channel

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}	E_b/N_0 for required BLER < 10^{-3}
12.2 kbps	n.a	10.8 dB	11.6 dB
64 kbps	7.0 dB	7.4 dB	7.7 dB
144 kbps	6.4 dB	6.8 dB	7.2 dB
384 kbps	6.8 dB	7.2 dB	7.8 dB

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

8.4 Demodulation of DCH in moving propagation conditions

8.4.1 Definition and applicability

The performance requirement of DCH in moving propagation conditions is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified Eb/N0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

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

8.4.2 ~~Conformance~~ Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in table 8.9.

Table 8.9: Performance requirements in moving channel

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
12.2 kbps	n.a.	5.7 dB
64 kbps	2.1 dB	2.2 dB

The reference for this requirement is TS 25.104 subclause 8.4.1.

8.4.3 Test purpose

The test shall verify the receiver's ability to receive and track the test signal with a BLER not exceeding the specified limit.

8.4.4 Method of test

8.4.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

1) Connect the BS tester generating the wanted signal, multipath fading simulators and AWGN generators to both BS antenna connectors for diversity reception via a combining network as shown in annex D.

8.4.4.2 Procedure

1) Adjust the AWGN generator to -84 dBm/3.84 MHz at the BS input.

2) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A.

3) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex D.

4) Adjust the equipment so that required E_b/N_0 specified in table 8.108.9 is achieved. To achieve the specified E_b/N_O, the ratio of the wanted signal level relative to the AWGN signal at the BS input should be adjusted to: -84+10*Log10(R_b /3.84*10^6)+E_b/N_0 [dBm]. The wanted signal levels at the BS input for the specified E_b/N_0 levels in table 8.9 is found in table 8.10

Table 8.10: Wanted signal levels in moving channel

Measurement channel data rate (R_b)	Wanted signal level for required BLER < 10^{-1}	Wanted signal level for required BLER < 10^{-2}
12.2 kbps	n.a.	-103.3 dBm
64 kbps	-99.7 dBm	-99.6 dBm

5) For each of the data rates in table 8.108.9 applicable for the base station, measure the BLER.

8.4.5 Test requirements

The BLER measured according to subclause 8.4.4.2 shall not exceed the BLER limits for the E_b/N_0 levels specified in table 8.108.9.

Table 8.10: Test requirements in moving channel

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
12.2 kbps	n.a.	6.3 dB
64 kbps	2.7 dB	2.8 dB

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

8.5 Demodulation of DCH in birth/death propagation conditions

8.5.1 Definition and applicability

The performance requirement of DCH in birth/death propagation conditions is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

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

8.5.2 ~~Conformance~~ Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in table 8.11.

Table 8.11: Performance requirements in birth/death channel

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
12.2 kbps	n.a.	7.7 dB
64 kbps	4.1 dB	4.2 dB

The reference for this requirement is TS 25.104 subclause 8.5.1.

8.5.3 Test purpose

The test shall verify the receiver's ability to receive the test signal to find new multi path components with a BLER not exceeding the specified limit.

8.5.4 Method of test

8.5.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

1) Connect the BS tester generating the wanted signal, multipath fading simulators and AWGN generators to both BS antenna connectors for diversity reception via a combining network as shown in annex B.

8.5.4.2 Procedure

1) Adjust the AWGN generator to -84 dBm/3.84 MHz at the BS input.

2) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A.

3) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex D.

4) Adjust the equipment so that required E_b/N_0 specified in table 8.12~~8.11~~ is achieved. To achieve the specified E_b/N_O, the ratio of the wanted signal level relative to the AWGN signal at the BS input should be adjusted to: ~~-84+~~10*Log10(R_b /3.84*10^6)+E_b/N_0 [dB~~m~~]. ~~The wanted signal levels at the BS input for the specified E_b/N_0 levels in table 8.11 is found in table 8.12~~

~~**Table 8.12: Wanted signal levels in birth/death channel**~~

~~Measurement channel data rate (R_b)~~	~~Wanted signal level for required BLER < 10^{-1}~~	~~Wanted signal level for required BLER < 10^{-2}~~
~~12.2 kbps~~	~~n.a.~~	~~-101.3 dBm~~
~~64 kbps~~	~~-97.7 dBm~~	~~-97.6 dBm~~

5) For each of the data rates in table 8.12~~8.11~~ applicable for the base station, measure the BLER.

8.5.5 Test requirements

The BLER measured according to subclause 8.5.4.2 shall not exceed the BLER limits for the E_b/N_0 levels specified in table 8.12~~8.11~~.

Table 8.12: Test requirements in birth/death channel

Measurement channel data rate (R_b)	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
12.2 kbps	n.a.	8.3 dB
64 kbps	4.7 dB	4.8 dB

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

Annex F (informative): Derivation of Test Requirements

The Test Requirements in this specification have been calculated by relaxing the Minimum Requirements of the core specification using the Test Tolerances defined in subclause 4.2. When the Test Tolerance is zero, the Test Requirement will be the same as the Minimum Requirement. When the Test Tolerance is non-zero, the Test Requirements will differ from the Minimum Requirements, and the formula used for this relaxation is given in tables F.1, F.2 and F.3

Note that a formula for applying Test Tolerances is provided for all tests, even those with a test tolerance of zero. This is necessary in the case that the Test System uncertainty is greater than that allowed in subclause 4.1. In this event, the excess error shall be subtracted from the defined test tolerance in order to generate the correct tightened Test Requirements as defined in subclause 4.3.

For example, a Test System having 0.9 dB accuracy for test 6.2.1 Base Station maximum output power (which is 0.2 dB above the limit specified in subclause 4.) would subtract 0.2 dB from the Test Tolerance of 0.7 dB defined in subclause 4.2. This new test tolerance of 0.5 dB would then be applied to the Minimum Requirement using the formula defined in Table F.1 to give a new range of ±2.5 dB of the manufacturer's rated output power.

Using this same approach for the case where a test had a test tolerance of 0 dB, an excess error of 0.2 dB would result in a modified test tolerance of –0.2 dB.

Table F.1: Derivation of Test Requirements (Transmitter tests)

Test	Minimum Requirement in TS 25.104	Test Tolerance (TT)	Test Requirement in TS 25.141
6.2.1 Base station maximum output power	In normal conditions … within +2 dB and -2 dB of the manufacturer's rated output power In extreme conditions… within +2.5 dB and –2.5 dB of the manufacturer's rated output power	0.7 dB	Formula: Upper limit + TT Lower limit – TT In normal conditions … within +2.7 dB and –2.7 dB of the manufacturer's rated output power In extreme conditions… within +3.2 dB and –3.2 dB of the manufacturer's rated output power
6.2.2 CPICH Power accuracy	CPICH power shall be within ±2.1dB	0.8 dB	Formula: Upper limit + TT Lower limit – TT CPICH power shall be within ±2.9dB
6.3.4 Frequency error	Frequency error limit = 0.05 ppm	12 Hz	Formula: Frequency Error limit + TT Frequency Error limit = 0.05 ppm + 12 Hz
6.4.2 Power control steps	Lower and upper limits as specified in tables 6.9 and 6.10a	0.1 dB	Formula: Upper limits + TT Lower limits – TT 0.1 dB applied as above to tables 6.9 and 6.10a
6.4.3 Power dynamic range	maximum power limit = BS maximum output power -3 dB minimum power limit = BS maximum output power –28 dB	0.2 dB	Formula: maximum power limit – TT minimum power limit + TT maximum power limit = BS maximum output power –3.2 dB minimum power limit = BS maximum output power –27.8 dB
6.4.4 Total power dynamic range	total power dynamic range limit = 18 dB	0.3 dB	Formula: total power dynamic range limit – TT total power dynamic range limit = 17.7 dB
6.5.1 Occupied Bandwidth	occupied bandwidth limit = 5 MHz	0 kHz	Formula: Occupied bandwidth limit + TT Occupied bandwidth limit = 5 MHz
6.5.2.1 Spectrum emission mask	Maximum level defined in tables 6.11, 6.12, 6.13 and 6.14:	1.5 dB	Formula: Maximum level + TT Add 1.5 to Maximum level entries in tables 6.11, 6.12, 6.13 and 6.14.
6.5.2.2 Adjacent Channel Leakage power Ratio (ACLR)	ACLR limit = 45 dB at 5 MHz ACLR limit = 50 dB at 10 MHz	0.8 dB	Formula: ACLR limit – TT ACLR limit = 44.2 dB at 5 MHz ACLR limit = 49.2 dB at 10 MHz
6.5.3 Spurious emissions	Maximum level defined in tables 6.16 to 6.26	0 dB	Formula: Maximum limit + TT Add 0 to Maximum level in tables 6.16 to 6.26
6.6 Transmit intermodulation (interferer requirements) This tolerance applies to the stimulus and not the measurements defined in 6.5.2.1, 6.5.2.2 and 6.5.3.	Wanted signal level – interferer level = 30 dB	0 dB	Formula: Ratio + TT Wanted signal level – interferer level = 30 + 0 dB
6.7.1 EVM	EVM limit =17.5 %	0 %	Formula: EVM limit + TT EVM limit = 17.5%
6.7.2 Peak code Domain error	Peak code domain error limit = -33 dB	1.0 dB	Formula: Peak code domain error limit + TT Peak code domain error limit = -32 dB

Table F.2: Derivation of Test Requirements (Receiver tests)

Test	Minimum Requirement in TS 25.104	Test Tolerance (TT)	Test Requirement in TS 25.141
7.2 Reference sensitivity	Reference sensitivity level = -121 dBm FER/BER limit = 0.001	0.7 dB	Formula: Reference sensitivity level + TT Reference sensitivity level = -120.3 dBm FER/BER limit is not changed
7.3 Dynamic range	Wanted signal level = -91 dBm AWGN level = -73 dBm/3.84 MHz	1.2 dB	Formula: Wanted signal level + TT AWGN level unchanged Wanted signal level = -89.8 dBm
7.4 Adjacent channel selectivity	Wanted signal level = -115 dBm W-CDMA interferer level = -52 dBm	0 dB	Formula: Wanted signal level + TT W-CDMA interferer level unchanged Wanted signal level = -115 dBm
7.5 Blocking characteristics	Wanted signal level = -115 dBm Interferer level See table 7.4a / 7.4b	0 dB	Formula: Wanted signal level + TT Interferer level unchanged Wanted signal level = -115 dBm
7.6 Intermod Characteristics	Wanted signal level = -115 dBm Interferer1 level (10 MHz offset CW) = -48 dBm Interferer2 level (20 MHz offset W-CDMA Modulated) = -48 dBm	0 dB	Formula: Wanted signal level + TT Interferer1 level unchanged Interferer2 level unchanged Wanted signal level = -115 dBm
7.7 Spurious Emissions	Maximum level defined in Table 7.7	0 dB	Formula: Maximum level + TT Add TT to Maximum level in table 7.7

Table F.3: Derivation of Test Requirements (Performance tests)

Test	Minimum Requirement in TS 25.104	Test Tolerance (TT)	Test Requirement in TS 25.141
8.2, Demodulation in static propagation condtion	Received E_b/N_0 values	~~TBD~~ 0.4 dB	Minimum requirement + TT
8.3, Demodulation of DCH in multiplath fading conditons	Received E_b/N_0 values	~~TBD~~ 0.6 dB	Minimum requirement + TT
8.4 Demodulation of DCH in moving propagation conditions	Received E_b/N_0 values	~~TBD~~ 0.6 dB	Minimum requirement + TT
8.5 Demodulation of DCH in birth/death propagation conditions	Received E_b/N_0 values	~~TBD~~ 0.6 dB	Minimum requirement + TT
~~8.6 Verification of the internal BLER calculation~~		~~TBD~~	
8.7 Site Selection Diversity Transmission (SSDT) Mode		TBD	

3GPP TSG RAN WG4 Meeting #23 **R4-020889**

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CR-Form-v5.1

CHANGE REQUEST

⌘ **25.141** **CR** **226** ⌘ **rev** **-** ⌘ Current version: **3.9.0** ⌘

*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 ☒ Core Network ☐

Title:	⌘	Correction of power control dynamic range Test Tolerance
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	17/5/2002
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 figure of 0.2 dB for power control dynamic range test tolerance was based on an assumption that this was a relative measurement of two code powers differing by 25 dB. However the actual test procedure requires the difference of an absolute power measurement and a code domain power measurement to be made. This impacts the test system uncertainty and test tolerance.

The maximum code domain power test system uncertainty is defined as 1.06 dB. It is calculated from the RSS of the Pmax measurement uncertainty (0.7 dB) with the absolute code domain power measurement accuracy of the code channel under test (0.8 dB – which allows for an additional 0.1 dB for measurement of the relative part of the measurement). No correlation is assumed between the uncertainty of the two measurements, even though the overall signal power is nominally the same.

The minimum code domain power test system uncertainty is defined as 1.14 dB. It is calculated from the RSS of the Pmax measurement uncertainty (0.7 dB) with the absolute code domain power measurement accuracy of the code channel under test (0.9 dB – which allows for an additional 0.2 dB for measurement of the relative part). No correlation is assumed between the uncertainty of the two measurements, even though the overall signal power is nominally 3 dB.

For simplicity, both upper and lower uncertainties are set to 1.1 dB to allow a single figure to be used for the test tolerance.

An alternative solution is to simplify the test and keep the existing test tolerance. But this CR proposes keeping the basic test unchanged and relaxing the uncertainties to what is necessary for the current test procedure. However, various corrections to the test procedure are still necessary to avoid confusion.

Summary of change:	⌘	The test tolerance, test system uncertainty, test requirement, test procedure, derivation of test requirement and test equipment requirement are all updated to reflect the changes.
Consequences if not approved:	⌘	Node B may incorrectly fail the power control dynamic range test. Isolated Impact Analysis: Change to the test specifications does not impact Node B.

Clauses affected:	⌘	4, 6.4.3, Annex F, Annex G		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘	Equivalent CRs in other Releases: CR227 cat. A to 25.141 v4.4.0, CR228 cat. A to 25.141 v5.2.0		

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Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.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.

4 General test conditions and declarations

The requirements of this clause apply to all applicable tests in this specification.

Many of the tests in this specification measure a parameter relative to a value that is not fully specified in the UTRA specifications. For these tests, the Minimum Requirement is determined relative to a nominal value specified by the manufacturer.

Certain functions of a BS are optional in the UTRA specifications. Some requirements for the BS may be regional as listed in subclause 4.7.

When specified in a test, the manufacturer shall declare the nominal value of a parameter, or whether an option is supported.

4.1 Acceptable uncertainty of Test System

The maximum acceptable uncertainty of the Test System is specified below for each test, where appropriate. The Test System shall enable the stimulus signals in the test case to be adjusted to within the specified tolerance and the equipment under test to be measured with an uncertainty not exceeding the specified values. All tolerances and uncertainties are absolute values, and are valid for a confidence level of 95 %, unless otherwise stated.

A confidence level of 95% is the measurement uncertainty tolerance interval for a specific measurement that contains 95% of the performance of a population of test equipment.

For RF tests, it should be noted that the uncertainties in subclause 4.1 apply to the Test System operating into a nominal 50 ohm load and do not include system effects due to mismatch between the DUT and the Test System.

4.1.1 Measurement of test environments

The measurement accuracy of the BS test environments defined in Subclause 4.4, Test environments shall be.

- Pressure ±5 kPa.
- Temperature ±2 degrees.
- Relative Humidity ±5 %.
- DC Voltage ±1,0 %.
- AC Voltage ±1,5 %.
- Vibration 10 %.
- Vibration frequency 0,1 Hz.

The above values shall apply unless the test environment is otherwise controlled and the specification for the control of the test environment specifies the uncertainty for the parameter.

4.1.2 Measurement of transmitter

Table 4.1: Maximum Test System Uncertainty for transmitter tests

Subclause	Maximum Test System Uncertainty	Derivation of Test System Uncertainty
6.2.1 Maximum Output Power	±0.7 dB	
6.2.2 CPICH Power accuracy	± 0.8 dB	
6.3.4 Frequency error	± 12 Hz	
6.4.2 Power control steps	± 0.1 dB for one 1 dB step ± 0.1 dB for one 0.5 dB step ± 0.1 dB for ten 1 dB steps ± 0.1 dB for ten 0.5 dB steps	Result is difference between two absolute CDP measurements on the power controlled DPCH. Assume BTS output power on all other channels is constant. Assume Test equipment relative power accuracy over the range of the test conditions is perfect, or otherwise included in the system measurement error. For this test the absolute power change is < 3 dB.
6.4.3 Power control dynamic range	± ~~0.2~~1.1 dB	
6.4.4 Total power dynamic range	± 0.3 dB	
6.5.1 Occupied Bandwidth	±100 kHz	Accuracy = ±3*RBW. Assume 30 kHz bandwidth
6.5.2.1 Spectrum emission mask	±1.5 dB Due to carrier leakage, for measurements specified in a 1 MHz bandwidth close to the carrier (4 MHz to 8 MHz), integration of the measurement using several narrower measurements may be necessary in order to achieve the above accuracy.	
6.5.2.2 ACLR	5 MHz offset ± 0.8 dB 10 MHz offset ± 0.8 dB Note: Impact of measurement period (averaging) and intermod effects in the measurement receiver not yet fully studied. However, the above limits remain valid.	
6.5.3 Spurious emissions	± 2.0 dB for BS and coexist~~a~~ence bands for results > -60 dBm ± 3.0 dB for results < -60 dBm Outside above range: f≤2.2GHz : ± 1.5 dB 2.2 GHz < f ≤ 4 GHz : ± 2.0 dB f > 4 GHz : ±4.0 dB	
6.6 Transmit intermodulation (interferer requirements)	The value below applies only to the interference signal and is unrelated to the measurement uncertainty ~~of the~~of the tests (6.5.2.1, 6.5.2.2 and 6.5.3) which have to be carried out in the presence of the interferer. . ± 1.0 dB	The uncertainty of interferer has double the effect on the result due to the frequency offset.
6.7.1 EVM	±2.5 % (for single code)	
6.7.2 Peak code Domain error	±1.0 dB	

4.1.3 Measurement of receiver

Table 4.1A: Maximum Test System Uncertainty for receiver tests

Subclause	Maximum Test System Uncertainty[1]	Derivation of Test System Uncertainty
7.2 Reference sensitivity level	± 0.7 dB	
7.3 Dynamic range	± 1.2 dB	Formula = SQRT(signal level error^2 and AWGN level error^2)
7.4 Adjacent channel selectivity	± 1.1 dB	Formula = SQRT (wanted_level_error^2 + interferer_level_error^2) + ACLR effect. The ACLR effect is calculated by: (Formula to follow)
7.5 Blocking characteristics	System error with blocking signal <15 MHz offset: ± 1.4 dB Blocking signal >= 15 MHz offset and f ≤ 2.2 GHz: ± 1.1 dB + broadband noise 2.2 GHz < f ≤ 4 GHz : ±1.8 dB f > 4 GHz: ±3.2 dB	Formula = SQRT (wanted_level_error^2 + interferer_level_error^2) + ACLR effect + Broadband noise. (Assuming ACLR 68 dB, and 0.7 dB for signals) Assume-130 dBc broadband noise from blocking signal has 0.1 dB effect. Harmonics and spurs of the interferer need to be carefully considered. Perhaps need to avoid harmonics of the interfere that fall on top of the receive channel. For the –15 dBm CW blocking case, filtering of the blocking signal (at least 25 dB) is necessary to eliminate problems with broadband noise.
7.6 Intermod Characteristics	±1.3 dB	Formula = $\sqrt{(2 \cdot CW\_level\_error)^2 + (\mathrm{mod}\_level\_error)^2}$ (Using CW interferer ±0.5 dB, modulated interfere ±0.5 dB, wanted singal ±0.7 dB)
7.7 Spurious Emissions	The Test System uncertainty figures for Spurious emissions apply to the ~~the~~ measurement of the DUT and not any stimulus signals. ± 3.0 dB for BS receive band (-78 dBm) Outside above range: f≤2.2GHz : ± 2.0 dB (-57 dBm) 2.2 GHz < f ≤ 4 GHz : ± 2.0 dB (-47 dBm) f > 4 GHz : ±4.0 dB (-47 dBm)	

Note 1: Unless otherwise noted, only the Test System stimulus error is considered here. The effect of errors in the BER/FER measurements due to finite test duration is not considered.

4.1.4 Measurement of performance requirement

Table 4.1B: Maximum Test System Uncertainty for Performance Requirements

Subclause	Maximum Test System Uncertainty[1]	Derivation of Test System Uncertainty
8.2, Demodulation in static propagation condition	± 0.4dB	Wanted/AWGN: ± 0.4dB (relative uncertainty for E_b/N_0) (AWGN: ±1dB)
8.3, Demodulation of DCH in multipath fading conditions	± 0.6dB	Fader: ± 0.5dB Wanted/AWGN: ± 0.4dB (relative) Combined relative uncertainty for E_b/N_0: ± 0.6dB
8.4 Demodulation of DCH in moving propagation conditions	± 0.6dB	Fader: ± 0.5dB Wanted/AWGN: ± 0.4dB (relative) Combined relative uncertainty for E_b/N_0: ± 0.6dB
8.5 Demodulation of DCH in birth/death propagation conditions	± 0.6dB	Fader: ± 0.5dB Wanted/AWGN: ± 0.4dB (relative) Combined relative uncertainty for E_b/N_0: ± 0.6dB
Note 1: Only the overall stimulus error is considered here. The effect of errors in the BER/FER measurements due to finite test duration is not considered.		

4.2 Test Tolerances (informative)

The Test Tolerances defined in this subclause have been used to relax the Minimum Requirements in this specification to derive the Test Requirements.

The Test Tolerances are derived from Test System uncertainties, regulatory requirements and criticality to system performance. As a result, the Test Tolerances may sometimes be set to zero.

The test tolerances should not be modified for any reason e.g. to take account of commonly known test system errors (such as mismatch, cable loss, etc.)

4.2.1 Transmitter

Table 4.1C: Test Tolerances for transmitter tests.

Subclause	Test Tolerance[1]
6.2.1 Maximum Output Power	0.7 dB
6.2.2 CPICH Power accuracy	0.8 dB
6.3.4 Frequency error	12 Hz
6.4.2 Power control steps	0.1 dB
6.4.3 Power control dynamic range	~~0.2~~1.1 dB
6.4.4 Total power dynamic range	0.3 dB
6.5.1 Occupied Bandwidth	0 kHz
6.5.2.1 Spectrum emission mask	1.5 dB[3]
6.5.2.2 ACLR	0.8 dB
6.5.3 Spurious emissions	0 dB
6.6 Transmit intermodulation (interferer requirements)	0 dB[2]
6.7.1 Frequency error	12 Hz
6.7.12 EVM	0 %
6.7.23 Peak code Domain error	1.0dB
Note 1: Unless otherwise stated, The Test Tolerances are applied to the DUT Minimum Requirement. See Annex F. Note 2: The Test Tolerance is applied to the stimulus signal(s). See Annex F. Note 3: 0 dB test tolerance for the additional Band b requirements.	

6.4.3 Power control dynamic range

6.4.3.1 Definition and applicability

The power control dynamic range is the difference between the maximum and the minimum code domain power of a code channel for a specified reference condition. Transmit modulation quality shall be maintained within the whole dynamic range as specified in TS 25.104 [1] subclause 6.8.

6.4.3.2 Minimum Requirement

Down link (DL) power control dynamic range:

- maximum code domain power: BS maximum output power -3 dB or greater;
- minimum code domain power: BS maximum output power -28 dB or less.

The normative reference for this requirement is TS 25.104 [1] subclause 6.4.2.1.

6.4.3.3 Test purpose

To verify that the minimum power control dynamic range is met as specified in subclause 6.4.3.2.

6.4.3.4 Method of test

6.4.3.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

1) Connect the measurement equipment to the BS antenna connector as shown in annex B.
2) Channel configuration defined in table 6.3 Test model 2 shall be used.
3) Set BS frequency.
4) Star BS transmission.

6.4.3.4.2 Procedure

Pmax shall be defined as described in subclause 6.2.1 Base station maximum output power.

1) Re-measure Pmax according to subclause 6.2.1 (using test model 1).

2~~1~~) Using test model 2, ~~S~~set the code domain power of the DPCH under test to ~~-~~Pmax-3 dB. Power levels for other code channels ~~shall~~ may be adjusted ~~as~~ if necessary.

3~~2~~) Measure the code domain power of the code channel under test. Use the code domain power measurement method defined in annex E.

4~~3~~) Set the code domain power of the DPCH under test to ~~the minimum value~~ Pmax-28 dB by means determined by the manufacturer. The ~~P~~power levels for the other code channels used in step 2 shall remain unchanged (the overall output power will drop by approximately 3 dB).

5~~4~~) Measure the code domain power of the code channel under test.

6.4.3.5 Test requirement

Down link (DL) power control dynamic range:-

- maximum code domain power: BS maximum output power –4.13.2 dB or greater;

- minimum code domain power: BS maximum output power –26.97.8 dB or less.

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

Annex F (informative): Derivation of Test Requirements

The Test Requirements in this specification have been calculated by relaxing the Minimum Requirements of the core specification using the Test Tolerances defined in subclause 4.2. When the Test Tolerance is zero, the Test Requirement will be the same as the Minimum Requirement. When the Test Tolerance is non-zero, the Test Requirements will differ from the Minimum Requirements, and the formula used for this relaxation is given in tables F.1, F.2 and F.3

Note that a formula for applying Test Tolerances is provided for all tests, even those with a test tolerance of zero. This is necessary in the case that the Test System uncertainty is greater than that allowed in subclause 4.1. In this event, the excess error shall be subtracted from the defined test tolerance in order to generate the correct tightened Test Requirements as defined in subclause 4.3.

For example, a Test System having 0.9 dB accuracy for test 6.2.1 Base Station maximum output power (which is 0.2 dB above the limit specified in subclause 4.) would subtract 0.2 dB from the Test Tolerance of 0.7 dB defined in subclause 4.2. This new test tolerance of 0.5 dB would then be applied to the Minimum Requirement using the formula defined in Table F.1 to give a new range of ±2.5 dB of the manufacturer's rated output power.

Using this same approach for the case where a test had a test tolerance of 0 dB, an excess error of 0.2 dB would result in a modified test tolerance of –0.2 dB.

Table F.1: Derivation of Test Requirements (Transmitter tests)

Test	Minimum Requirement in TS 25.104	Test Tolerance (TT)	Test Requirement in TS 25.141
6.2.1 Base station maximum output power	In normal conditions … within +2 dB and -2 dB of the manufacturer's rated output power In extreme conditions… within +2.5 dB and –2.5 dB of the manufacturer's rated output power	0.7 dB	Formula: Upper limit + TT Lower limit – TT In normal conditions … within +2.7 dB and –2.7 dB of the manufacturer's rated output power In extreme conditions… within +3.2 dB and –3.2 dB of the manufacturer's rated output power
6.2.2 CPICH Power accuracy	CPICH power shall be within ±2.1dB	0.8 dB	Formula: Upper limit + TT Lower limit – TT CPICH power shall be within ±2.9dB
6.3.4 Frequency error	Frequency error limit = 0.05 ppm	12 Hz	Formula: Frequency Error limit + TT Frequency Error limit = 0.05 ppm + 12 Hz
6.4.2 Power control steps	Lower and upper limits as specified in tables 6.9 and 6.10a	0.1 dB	Formula: Upper limits + TT Lower limits – TT 0.1 dB applied as above to tables 6.9 and 6.10a
6.4.3 Power control dynamic range	maximum power limit = BS maximum output power -3 dB minimum power limit = BS maximum output power –28 dB	~~0.2~~1.1 dB	Formula: maximum power limit – TT minimum power limit + TT maximum power limit = BS maximum output power –~~3.2~~4.1 dB minimum power limit = BS maximum output power –26.9~~7.8~~ dB
6.4.4 Total power dynamic range	total power dynamic range limit = 18 dB	0.3 dB	Formula: total power dynamic range limit – TT total power dynamic range limit = 17.7 dB
6.5.1 Occupied Bandwidth	occupied bandwidth limit = 5 MHz	0 kHz	Formula: Occupied bandwidth limit + TT Occupied bandwidth limit = 5 MHz
6.5.2.1 Spectrum emission mask	Maximum level defined in tables 6.11, 6.12, 6.13 and 6.14:	1.5 dB (0 dB for the additional Band b requirements)	Formula: Maximum level + TT Add 1.5 to Maximum level entries in tables 6.11, 6.12, 6.13 and 6.14.
6.5.2.2 Adjacent Channel Leakage power Ratio (ACLR)	ACLR limit = 45 dB at 5 MHz ACLR limit = 50 dB at 10 MHz	0.8 dB	Formula: ACLR limit – TT ACLR limit = 44.2 dB at 5 MHz ACLR limit = 49.2 dB at 10 MHz
6.5.3 Spurious emissions	Maximum level defined in tables 6.16 to 6.26	0 dB	Formula: Maximum limit + TT Add 0 to Maximum level in tables 6.16 to 6.26
6.6 Transmit intermodulation (interferer requirements) This tolerance applies to the stimulus and not the measurements defined in 6.5.2.1, 6.5.2.2 and 6.5.3.	Wanted signal level – interferer level = 30 dB	0 dB	Formula: Ratio + TT Wanted signal level – interferer level = 30 + 0 dB
6.7.1 EVM	EVM limit =17.5 %	0 %	Formula: EVM limit + TT EVM limit = 17.5%
6.7.2 Peak code Domain error	Peak code domain error limit = -33 dB	1.0 dB	Formula: Peak code domain error limit + TT Peak code domain error limit = -32 dB

Annex G (informative): Acceptable uncertainty of Test Equipment

This informative annex specifies the critical parameters of the components of an overall Test System (e.g. Signal generators, Signal Analysers etc.) which are necessary when assembling a Test System which complies with subclause 4.1 Acceptable Uncertainty of Test System. These Test Equipment parameters are fundamental to the accuracy of the overall Test System and are unlikely to be improved upon through System Calibration.

G.1 Transmitter measurements

Table G.1: Equipment accuracy for transmitter measurements

Test	Equipment accuracy	Range over which equipment accuracy applies
6.2.1 Maximum Output Power	Not critical	Not critical
6.2.2 CPICH Power accuracy	Not critical	Not critical
6.3.4 Frequency error	± 10 Hz + timebase = [12] Hz	Measurements in the range ±500 Hz.
6.4.2 Power control steps	± 0.1 dB for one 1 dB step ± 0.1 dB for ten 1 dB steps	Pmax – 3dB to Pmax – 28 dB
6.4.3 Power control dynamic range	± 0.2 dB relative code domain power accuracy	Pmax – 3dB to Pmax – 28 dB
6.4.4 Total power dynamic range	±0.3 dB relative error over 18 dB	Pmax to Pmax – 18 dB
6.5.1 Occupied Bandwidth	± 100 kHz	±1 MHz of the minimum requirement
6.5.2.1 Spectrum emission mask	Not critical	Not critical
6.5.2.2 ACLR	± 0.8 dB	Measurements in the range ±3 dB of the minimum requirement at signal power = Pmax
6.5.3 Spurious emissions	Not critical	Not critical
6.6 Transmit intermodulation (interferer requirements)	Not critical	Not critical
6.7.1 EVM	± 2.5 % (for single code)	Measurements in the range 12.5% to 22.5% at signal power = Pmax –3 dB to Pmax – 18 dB
6.7.2 Peak code Domain error	±1.0dB	Measurements in the range –30 to –36 dB at signal power = Pmax

3GPP TSG RAN WG4 Meeting #23 **R4-020890**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v5.1

CHANGE REQUEST

⌘ **25.141** **CR** **227** ⌘ **rev** **-** ⌘ Current version: **4.4.0** ⌘

*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 power control dynamic range Test Tolerance
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	17/5/2002
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 current figure of 0.2 dB for power control dynamic range test tolerance was based on an assumption that this was a relative measurement of two code powers differing by 25 dB. However the actual test procedure requires the difference of an absolute power measurement and a code domain power measurement to be made. This impacts the test system uncertainty and test tolerance.

The maximum code domain power test system uncertainty is defined as 1.06 dB. It is calculated from the RSS of the Pmax measurement uncertainty (0.7 dB) with the absolute code domain power measurement accuracy of the code channel under test (0.8 dB – which allows for an additional 0.1 dB for measurement of the relative part of the measurement). No correlation is assumed between the uncertainty of the two measurements, even though the overall signal power is nominally the same.

The minimum code domain power test system uncertainty is defined as 1.14 dB. It is calculated from the RSS of the Pmax measurement uncertainty (0.7 dB) with the absolute code domain power measurement accuracy of the code channel under test (0.9 dB – which allows for an additional 0.2 dB for measurement of the relative part). No correlation is assumed between the uncertainty of the two measurements, even though the overall signal power is nominally 3 dB.

For simplicity, both upper and lower uncertainties are set to 1.1 dB to allow a single figure to be used for the test tolerance.

An alternative solution is to simplify the test and keep the existing test tolerance. But this CR proposes keeping the basic test unchanged and relaxing the uncertainties to what is necessary for the current test procedure. However, various corrections to the test procedure are still necessary to avoid confusion.

Summary of change:	⌘	The test tolerance, test system uncertainty, test requirement, test procedure, derivation of test requirement and test equipment requirement are all updated to reflect the changes.
Consequences if not approved:	⌘	Node B may incorrectly fail the power control dynamic range test. Isolated Impact Analysis: Change to the test specifications does not impact Node B.

Clauses affected:	⌘	4, 6.4.3, Annex F, Annex G		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘	Equivalent CRs in other Releases: CR226 cat. F to 25.141 v3.9.0, CR228 cat. A to 25.141 v5.2.0		

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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.

4 General test conditions and declarations

The requirements of this clause apply to all applicable tests in this specification.

Many of the tests in this specification measure a parameter relative to a value that is not fully specified in the UTRA specifications. For these tests, the Minimum Requirement is determined relative to a nominal value specified by the manufacturer.

Certain functions of a BS are optional in the UTRA specifications. Some requirements for the BS may be regional as listed in subclause 4.7.

When specified in a test, the manufacturer shall declare the nominal value of a parameter, or whether an option is supported.

4.1 Acceptable uncertainty of Test System

The maximum acceptable uncertainty of the Test System is specified below for each test, where appropriate. The Test System shall enable the stimulus signals in the test case to be adjusted to within the specified tolerance and the equipment under test to be measured with an uncertainty not exceeding the specified values. All tolerances and uncertainties are absolute values, and are valid for a confidence level of 95 %, unless otherwise stated.

A confidence level of 95% is the measurement uncertainty tolerance interval for a specific measurement that contains 95% of the performance of a population of test equipment.

For RF tests, it should be noted that the uncertainties in subclause 4.1 apply to the Test System operating into a nominal 50 ohm load and do not include system effects due to mismatch between the DUT and the Test System.

4.1.1 Measurement of test environments

The measurement accuracy of the BS test environments defined in Subclause 4.4, Test environments shall be.

- Pressure ±5 kPa.
- Temperature ±2 degrees.
- Relative Humidity ±5 %.
- DC Voltage ±1,0 %.
- AC Voltage ±1,5 %.
- Vibration 10 %.
- Vibration frequency 0,1 Hz.

The above values shall apply unless the test environment is otherwise controlled and the specification for the control of the test environment specifies the uncertainty for the parameter.

4.1.2 Measurement of transmitter

Table 4.1: Maximum Test System Uncertainty for transmitter tests

Subclause	Maximum Test System Uncertainty	Derivation of Test System Uncertainty
6.2.1 Maximum Output Power	±0.7 dB	
6.2.2 CPICH Power accuracy	± 0.8 dB	
6.3.4 Frequency error	± 12 Hz	
6.4.2 Power control steps	± 0.1 dB for one 1 dB step ± 0.1 dB for one 0.5 dB step ± 0.1 dB for ten 1 dB steps ± 0.1 dB for ten 0.5 dB steps	Result is difference between two absolute CDP measurements on the power controlled DPCH. Assume BTS output power on all other channels is constant. Assume Test equipment relative power accuracy over the range of the test conditions is perfect, or otherwise included in the system measurement error. For this test the absolute power change is < 3 dB.
6.4.3 Power control dynamic range	± ~~0.2~~1.1 dB	
6.4.4 Total power dynamic range	± 0.3 dB	
6.5.1 Occupied Bandwidth	±100 kHz	Accuracy = ±3*RBW. Assume 30 kHz bandwidth
6.5.2.1 Spectrum emission mask	±1.5 dB Due to carrier leakage, for measurements specified in a 1 MHz bandwidth close to the carrier (4 MHz to 8 MHz), integration of the measurement using several narrower measurements may be necessary in order to achieve the above accuracy.	
6.5.2.2 ACLR	5 MHz offset ± 0.8 dB 10 MHz offset ± 0.8 dB Note: Impact of measurement period (averaging) and intermod effects in the measurement receiver not yet fully studied. However, the above limits remain valid.	
6.5.3 Spurious emissions	± 2.0 dB for BS and coexist~~a~~ence bands for results > -60 dBm ± 3.0 dB for results < -60 dBm Outside above range: f≤2.2GHz : ± 1.5 dB 2.2 GHz < f ≤ 4 GHz : ± 2.0 dB f > 4 GHz : ±4.0 dB	
6.6 Transmit intermodulation (interferer requirements)	The value below applies only to the interference signal and is unrelated to the measurement uncertainty ~~of the~~of the tests (6.5.2.1, 6.5.2.2 and 6.5.3) which have to be carried out in the presence of the interferer. . ± 1.0 dB	The uncertainty of interferer has double the effect on the result due to the frequency offset.
6.7.1 EVM	±2.5 % (for single code)	
6.7.2 Peak code Domain error	±1.0 dB	

4.1.3 Measurement of receiver

Table 4.1A: Maximum Test System Uncertainty for receiver tests

Subclause	Maximum Test System Uncertainty[1]	Derivation of Test System Uncertainty
7.2 Reference sensitivity level	± 0.7 dB	
7.3 Dynamic range	± 1.2 dB	Formula = SQRT(signal level error^2 and AWGN level error^2)
7.4 Adjacent channel selectivity	± 1.1 dB	Formula = SQRT (wanted_level_error^2 + interferer_level_error^2) + ACLR effect. The ACLR effect is calculated by: (Formula to follow)
7.5 Blocking characteristics	System error with blocking signal <15 MHz offset: ± 1.4 dB Blocking signal >= 15 MHz offset and f ≤ 2.2 GHz: ± 1.1 dB + broadband noise 2.2 GHz < f ≤ 4 GHz : ±1.8 dB f > 4 GHz: ±3.2 dB	Formula = SQRT (wanted_level_error^2 + interferer_level_error^2) + ACLR effect + Broadband noise. (Assuming ACLR 68 dB, and 0.7 dB for signals) Assume-130 dBc broadband noise from blocking signal has 0.1 dB effect. Harmonics and spurs of the interferer need to be carefully considered. Perhaps need to avoid harmonics of the interfere that fall on top of the receive channel. For the –15 dBm CW blocking case, filtering of the blocking signal (at least 25 dB) is necessary to eliminate problems with broadband noise.
7.6 Intermod Characteristics	±1.3 dB	Formula = $\sqrt{(2 \cdot CW\_level\_error)^2 + (\mathrm{mod}\_level\_error)^2}$ (Using CW interferer ±0.5 dB, modulated interfere ±0.5 dB, wanted singal ±0.7 dB)
7.7 Spurious Emissions	The Test System uncertainty figures for Spurious emissions apply to the ~~the~~ measurement of the DUT and not any stimulus signals. ± 3.0 dB for BS receive band (-78 dBm) Outside above range: f≤2.2GHz : ± 2.0 dB (-57 dBm) 2.2 GHz < f ≤ 4 GHz : ± 2.0 dB (-47 dBm) f > 4 GHz : ±4.0 dB (-47 dBm)	

Note 1: Unless otherwise noted, only the Test System stimulus error is considered here. The effect of errors in the BER/FER measurements due to finite test duration is not considered.

4.1.4 Measurement of performance requirement

Table 4.1B: Maximum Test System Uncertainty for Performance Requirements

Subclause	Maximum Test System Uncertainty[1]	Derivation of Test System Uncertainty
8.2, Demodulation in static propagation condition	± 0.4dB	Wanted/AWGN: ± 0.4dB (relative uncertainty for E_b/N_0) (AWGN: ±1dB)
8.3, Demodulation of DCH in multipath fading conditions	± 0.6dB	Fader: ± 0.5dB Wanted/AWGN: ± 0.4dB (relative) Combined relative uncertainty for E_b/N_0: ± 0.6dB
8.4 Demodulation of DCH in moving propagation conditions	± 0.6dB	Fader: ± 0.5dB Wanted/AWGN: ± 0.4dB (relative) Combined relative uncertainty for E_b/N_0: ± 0.6dB
8.5 Demodulation of DCH in birth/death propagation conditions	± 0.6dB	Fader: ± 0.5dB Wanted/AWGN: ± 0.4dB (relative) Combined relative uncertainty for E_b/N_0: ± 0.6dB
Note 1: Only the overall stimulus error is considered here. The effect of errors in the BER/FER measurements due to finite test duration is not considered.		

4.2 Test Tolerances (informative)

The Test Tolerances defined in this subclause have been used to relax the Minimum Requirements in this specification to derive the Test Requirements.

The Test Tolerances are derived from Test System uncertainties, regulatory requirements and criticality to system performance. As a result, the Test Tolerances may sometimes be set to zero.

The test tolerances should not be modified for any reason e.g. to take account of commonly known test system errors (such as mismatch, cable loss, etc.)

4.2.1 Transmitter

Table 4.1C: Test Tolerances for transmitter tests.

Subclause	Test Tolerance[1]
6.2.1 Maximum Output Power	0.7 dB
6.2.2 CPICH Power accuracy	0.8 dB
6.3.4 Frequency error	12 Hz
6.4.2 Power control steps	0.1 dB
6.4.3 Power control dynamic range	~~0.2~~1.1 dB
6.4.4 Total power dynamic range	0.3 dB
6.5.1 Occupied Bandwidth	0 kHz
6.5.2.1 Spectrum emission mask	1.5 dB[3]
6.5.2.2 ACLR	0.8 dB
6.5.3 Spurious emissions	0 dB
6.6 Transmit intermodulation (interferer requirements)	0 dB[2]
6.7.1 Frequency error	12 Hz
6.7.12 EVM	0 %
6.7.23 Peak code Domain error	1.0dB
Note 1: Unless otherwise stated, The Test Tolerances are applied to the DUT Minimum Requirement. See Annex F. Note 2: The Test Tolerance is applied to the stimulus signal(s). See Annex F. Note 3: 0 dB test tolerance for the additional Band b requirements.	

6.4.3 Power control dynamic range

6.4.3.1 Definition and applicability

The power control dynamic range is the difference between the maximum and the minimum code domain power of a code channel for a specified reference condition. Transmit modulation quality shall be maintained within the whole dynamic range as specified in TS 25.104 [1] subclause 6.8.

6.4.3.2 Minimum Requirement

Down link (DL) power control dynamic range:

- maximum code domain power: BS maximum output power -3 dB or greater;
- minimum code domain power: BS maximum output power -28 dB or less.

The normative reference for this requirement is TS 25.104 [1] subclause 6.4.2.1.

6.4.3.3 Test purpose

To verify that the minimum power control dynamic range is met as specified in subclause 6.4.3.2.

6.4.3.4 Method of test

6.4.3.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

1) Connect the measurement equipment to the BS antenna connector as shown in annex B.
2) Channel configuration defined in table 6.3 Test model 2 shall be used.
3) Set BS frequency.
4) Star BS transmission.

6.4.3.4.2 Procedure

Pmax shall be defined as described in subclause 6.2.1 Base station maximum output power.

1) Re-measure Pmax according to subclause 6.2.1 (using test model 1).

2~~1~~) Using test model 2, ~~S~~set the code domain power of the DPCH under test to ~~-~~Pmax-3 dB. Power levels for other code channels ~~shall~~ may be adjusted ~~as~~ if necessary.

3~~2~~) Measure the code domain power of the code channel under test. Use the code domain power measurement method defined in annex E.

4~~3~~) Set the code domain power of the DPCH under test to ~~the minimum value~~ Pmax-28 dB by means determined by the manufacturer. The ~~P~~power levels for the other code channels used in step 2 shall remain unchanged (the overall output power will drop by approximately 3 dB).

5~~4~~) Measure the code domain power of the code channel under test.

6.4.3.5 Test requirement

Down link (DL) power control dynamic range:-

- maximum code domain power: BS maximum output power –4.13.2 dB or greater;

- minimum code domain power: BS maximum output power –26.97.8 dB or less.

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

Annex F (informative): Derivation of Test Requirements

The Test Requirements in this specification have been calculated by relaxing the Minimum Requirements of the core specification using the Test Tolerances defined in subclause 4.2. When the Test Tolerance is zero, the Test Requirement will be the same as the Minimum Requirement. When the Test Tolerance is non-zero, the Test Requirements will differ from the Minimum Requirements, and the formula used for this relaxation is given in tables F.1, F.2 and F.3

Note that a formula for applying Test Tolerances is provided for all tests, even those with a test tolerance of zero. This is necessary in the case that the Test System uncertainty is greater than that allowed in subclause 4.1. In this event, the excess error shall be subtracted from the defined test tolerance in order to generate the correct tightened Test Requirements as defined in subclause 4.3.

For example, a Test System having 0.9 dB accuracy for test 6.2.1 Base Station maximum output power (which is 0.2 dB above the limit specified in subclause 4.) would subtract 0.2 dB from the Test Tolerance of 0.7 dB defined in subclause 4.2. This new test tolerance of 0.5 dB would then be applied to the Minimum Requirement using the formula defined in Table F.1 to give a new range of ±2.5 dB of the manufacturer's rated output power.

Using this same approach for the case where a test had a test tolerance of 0 dB, an excess error of 0.2 dB would result in a modified test tolerance of –0.2 dB.

Table F.1: Derivation of Test Requirements (Transmitter tests)

Test	Minimum Requirement in TS 25.104	Test Tolerance (TT)	Test Requirement in TS 25.141
6.2.1 Base station maximum output power	In normal conditions … within +2 dB and -2 dB of the manufacturer's rated output power In extreme conditions… within +2.5 dB and –2.5 dB of the manufacturer's rated output power	0.7 dB	Formula: Upper limit + TT Lower limit – TT In normal conditions … within +2.7 dB and –2.7 dB of the manufacturer's rated output power In extreme conditions… within +3.2 dB and –3.2 dB of the manufacturer's rated output power
6.2.2 CPICH Power accuracy	CPICH power shall be within ±2.1dB	0.8 dB	Formula: Upper limit + TT Lower limit – TT CPICH power shall be within ±2.9dB
6.3.4 Frequency error	Frequency error limit = 0.05 ppm	12 Hz	Formula: Frequency Error limit + TT Frequency Error limit = 0.05 ppm + 12 Hz
6.4.2 Power control steps	Lower and upper limits as specified in tables 6.9 and 6.10a	0.1 dB	Formula: Upper limits + TT Lower limits – TT 0.1 dB applied as above to tables 6.9 and 6.10a
6.4.3 Power control dynamic range	maximum power limit = BS maximum output power -3 dB minimum power limit = BS maximum output power –28 dB	~~0.2~~1.1 dB	Formula: maximum power limit – TT minimum power limit + TT maximum power limit = BS maximum output power –~~3.2~~4.1 dB minimum power limit = BS maximum output power –26.9~~7.8~~ dB
6.4.4 Total power dynamic range	total power dynamic range limit = 18 dB	0.3 dB	Formula: total power dynamic range limit – TT total power dynamic range limit = 17.7 dB
6.5.1 Occupied Bandwidth	occupied bandwidth limit = 5 MHz	0 kHz	Formula: Occupied bandwidth limit + TT Occupied bandwidth limit = 5 MHz
6.5.2.1 Spectrum emission mask	Maximum level defined in tables 6.11, 6.12, 6.13 and 6.14:	1.5 dB (0 dB for the additional Band b requirements)	Formula: Maximum level + TT Add 1.5 to Maximum level entries in tables 6.11, 6.12, 6.13 and 6.14.
6.5.2.2 Adjacent Channel Leakage power Ratio (ACLR)	ACLR limit = 45 dB at 5 MHz ACLR limit = 50 dB at 10 MHz	0.8 dB	Formula: ACLR limit – TT ACLR limit = 44.2 dB at 5 MHz ACLR limit = 49.2 dB at 10 MHz
6.5.3 Spurious emissions	Maximum level defined in tables 6.16 to 6.26	0 dB	Formula: Maximum limit + TT Add 0 to Maximum level in tables 6.16 to 6.26
6.6 Transmit intermodulation (interferer requirements) This tolerance applies to the stimulus and not the measurements defined in 6.5.2.1, 6.5.2.2 and 6.5.3.	Wanted signal level – interferer level = 30 dB	0 dB	Formula: Ratio + TT Wanted signal level – interferer level = 30 + 0 dB
6.7.1 EVM	EVM limit =17.5 %	0 %	Formula: EVM limit + TT EVM limit = 17.5%
6.7.2 Peak code Domain error	Peak code domain error limit = -33 dB	1.0 dB	Formula: Peak code domain error limit + TT Peak code domain error limit = -32 dB

Annex G (informative): Acceptable uncertainty of Test Equipment

This informative annex specifies the critical parameters of the components of an overall Test System (e.g. Signal generators, Signal Analysers etc.) which are necessary when assembling a Test System which complies with subclause 4.1 Acceptable Uncertainty of Test System. These Test Equipment parameters are fundamental to the accuracy of the overall Test System and are unlikely to be improved upon through System Calibration.

G.1 Transmitter measurements

Table G.1: Equipment accuracy for transmitter measurements

Test	Equipment accuracy	Range over which equipment accuracy applies
6.2.1 Maximum Output Power	Not critical	Not critical
6.2.2 CPICH Power accuracy	Not critical	Not critical
6.3.4 Frequency error	± 10 Hz + timebase = [12] Hz	Measurements in the range ±500 Hz.
6.4.2 Power control steps	± 0.1 dB for one 1 dB step ± 0.1 dB for ten 1 dB steps	Pmax – 3dB to Pmax – 28 dB
6.4.3 Power control dynamic range	± 0.2 dB relative code domain power accuracy	Pmax – 3dB to Pmax – 28 dB
6.4.4 Total power dynamic range	±0.3 dB relative error over 18 dB	Pmax to Pmax – 18 dB
6.5.1 Occupied Bandwidth	± 100 kHz	±1 MHz of the minimum requirement
6.5.2.1 Spectrum emission mask	Not critical	Not critical
6.5.2.2 ACLR	± 0.8 dB	Measurements in the range ±3 dB of the minimum requirement at signal power = Pmax
6.5.3 Spurious emissions	Not critical	Not critical
6.6 Transmit intermodulation (interferer requirements)	Not critical	Not critical
6.7.1 EVM	± 2.5 % (for single code)	Measurements in the range 12.5% to 22.5% at signal power = Pmax –3 dB to Pmax – 18 dB
6.7.2 Peak code Domain error	±1.0dB	Measurements in the range –30 to –36 dB at signal power = Pmax

3GPP TSG RAN WG4 Meeting #23 **R4-020891**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v5.1

CHANGE REQUEST

⌘ **25.141** **CR** **228** ⌘ **rev** **-** ⌘ Current version: **5.2.0** ⌘

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

Title:	⌘	Correction of power control dynamic range Test Tolerance
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	17/5/2002
Category:	⌘	**A**
Release:	⌘	Rel-5

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 figure of 0.2 dB for power control dynamic range test tolerance was based on an assumption that this was a relative measurement of two code powers differing by 25 dB. However the actual test procedure requires the difference of an absolute power measurement and a code domain power measurement to be made. This impacts the test system uncertainty and test tolerance.

The maximum code domain power test system uncertainty is defined as 1.06 dB. It is calculated from the RSS of the Pmax measurement uncertainty (0.7 dB) with the absolute code domain power measurement accuracy of the code channel under test (0.8 dB – which allows for an additional 0.1 dB for measurement of the relative part of the measurement). No correlation is assumed between the uncertainty of the two measurements, even though the overall signal power is nominally the same.

The minimum code domain power test system uncertainty is defined as 1.14 dB. It is calculated from the RSS of the Pmax measurement uncertainty (0.7 dB) with the absolute code domain power measurement accuracy of the code channel under test (0.9 dB – which allows for an additional 0.2 dB for measurement of the relative part). No correlation is assumed between the uncertainty of the two measurements, even though the overall signal power is nominally 3 dB.

For simplicity, both upper and lower uncertainties are set to 1.1 dB to allow a single figure to be used for the test tolerance.

An alternative solution is to simplify the test and keep the existing test tolerance. But this CR proposes keeping the basic test unchanged and relaxing the uncertainties to what is necessary for the current test procedure. However, various corrections to the test procedure are still necessary to avoid confusion.

Summary of change:	⌘	The test tolerance, test system uncertainty, test requirement, test procedure, derivation of test requirement and test equipment requirement are all updated to reflect the changes.
Consequences if not approved:	⌘	Node B may incorrectly fail the power control dynamic range test. Isolated Impact Analysis: Change to the test specifications does not impact Node B.

Clauses affected:	⌘	4, 6.4.3, Annex F, Annex G		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘	Equivalent CRs in other Releases: CR226 cat. F to 25.141 v3.9.0, CR227 cat. A to 25.141 v4.4.0		

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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.

4 General test conditions and declarations

The requirements of this clause apply to all applicable tests in this specification.

Many of the tests in this specification measure a parameter relative to a value that is not fully specified in the UTRA specifications. For these tests, the Minimum Requirement is determined relative to a nominal value specified by the manufacturer.

Certain functions of a BS are optional in the UTRA specifications. Some requirements for the BS may be regional as listed in subclause 4.7.

When specified in a test, the manufacturer shall declare the nominal value of a parameter, or whether an option is supported.

4.1 Acceptable uncertainty of Test System

The maximum acceptable uncertainty of the Test System is specified below for each test, where appropriate. The Test System shall enable the stimulus signals in the test case to be adjusted to within the specified tolerance and the equipment under test to be measured with an uncertainty not exceeding the specified values. All tolerances and uncertainties are absolute values, and are valid for a confidence level of 95 %, unless otherwise stated.

A confidence level of 95% is the measurement uncertainty tolerance interval for a specific measurement that contains 95% of the performance of a population of test equipment.

For RF tests, it should be noted that the uncertainties in subclause 4.1 apply to the Test System operating into a nominal 50 ohm load and do not include system effects due to mismatch between the DUT and the Test System.

4.1.1 Measurement of test environments

The measurement accuracy of the BS test environments defined in Subclause 4.4, Test environments shall be.

- Pressure ±5 kPa.
- Temperature ±2 degrees.
- Relative Humidity ±5 %.
- DC Voltage ±1,0 %.
- AC Voltage ±1,5 %.
- Vibration 10 %.
- Vibration frequency 0,1 Hz.

The above values shall apply unless the test environment is otherwise controlled and the specification for the control of the test environment specifies the uncertainty for the parameter.

4.1.2 Measurement of transmitter

Table 4.1: Maximum Test System Uncertainty for transmitter tests

Subclause	Maximum Test System Uncertainty	Derivation of Test System Uncertainty
6.2.1 Maximum Output Power	±0.7 dB	
6.2.2 CPICH Power accuracy	± 0.8 dB	
6.3.4 Frequency error	± 12 Hz	
6.4.2 Power control steps	± 0.1 dB for one 1 dB step ± 0.1 dB for one 0.5 dB step ± 0.1 dB for ten 1 dB steps ± 0.1 dB for ten 0.5 dB steps	Result is difference between two absolute CDP measurements on the power controlled DPCH. Assume BTS output power on all other channels is constant. Assume Test equipment relative power accuracy over the range of the test conditions is perfect, or otherwise included in the system measurement error. For this test the absolute power change is < 3 dB.
6.4.3 Power control dynamic range	± ~~0.2~~1.1 dB	
6.4.4 Total power dynamic range	± 0.3 dB	
6.5.1 Occupied Bandwidth	±100 kHz	Accuracy = ±3*RBW. Assume 30 kHz bandwidth
6.5.2.1 Spectrum emission mask	±1.5 dB Due to carrier leakage, for measurements specified in a 1 MHz bandwidth close to the carrier (4 MHz to 8 MHz), integration of the measurement using several narrower measurements may be necessary in order to achieve the above accuracy.	
6.5.2.2 ACLR	5 MHz offset ± 0.8 dB 10 MHz offset ± 0.8 dB Note: Impact of measurement period (averaging) and intermod effects in the measurement receiver not yet fully studied. However, the above limits remain valid.	
6.5.3 Spurious emissions	± 2.0 dB for BS and coexist~~a~~ence bands for results > -60 dBm ± 3.0 dB for results < -60 dBm Outside above range: f≤2.2GHz : ± 1.5 dB 2.2 GHz < f ≤ 4 GHz : ± 2.0 dB f > 4 GHz : ±4.0 dB	
6.6 Transmit intermodulation (interferer requirements)	The value below applies only to the interference signal and is unrelated to the measurement uncertainty ~~of the~~of the tests (6.5.2.1, 6.5.2.2 and 6.5.3) which have to be carried out in the presence of the interferer. . ± 1.0 dB	The uncertainty of interferer has double the effect on the result due to the frequency offset.
6.7.1 EVM	±2.5 % (for single code)	
6.7.2 Peak code Domain error	±1.0 dB	

4.1.3 Measurement of receiver

Table 4.1A: Maximum Test System Uncertainty for receiver tests

Subclause	Maximum Test System Uncertainty[1]	Derivation of Test System Uncertainty
7.2 Reference sensitivity level	± 0.7 dB	
7.3 Dynamic range	± 1.2 dB	Formula = SQRT(signal level error^2 and AWGN level error^2)
7.4 Adjacent channel selectivity	± 1.1 dB	Formula = SQRT (wanted_level_error^2 + interferer_level_error^2) + ACLR effect. The ACLR effect is calculated by: (Formula to follow)
7.5 Blocking characteristics	System error with blocking signal <15 MHz offset: ± 1.4 dB Blocking signal >= 15 MHz offset and f ≤ 2.2 GHz: ± 1.1 dB + broadband noise 2.2 GHz < f ≤ 4 GHz : ±1.8 dB f > 4 GHz: ±3.2 dB	Formula = SQRT (wanted_level_error^2 + interferer_level_error^2) + ACLR effect + Broadband noise. (Assuming ACLR 68 dB, and 0.7 dB for signals) Assume-130 dBc broadband noise from blocking signal has 0.1 dB effect. Harmonics and spurs of the interferer need to be carefully considered. Perhaps need to avoid harmonics of the interfere that fall on top of the receive channel. For the –15 dBm CW blocking case, filtering of the blocking signal (at least 25 dB) is necessary to eliminate problems with broadband noise.
7.6 Intermod Characteristics	±1.3 dB	Formula = $\sqrt{(2 \cdot CW\_level\_error)^2 + (\mathrm{mod}\_level\_error)^2}$ (Using CW interferer ±0.5 dB, modulated interfere ±0.5 dB, wanted singal ±0.7 dB)
7.7 Spurious Emissions	The Test System uncertainty figures for Spurious emissions apply to the ~~the~~ measurement of the DUT and not any stimulus signals. ± 3.0 dB for BS receive band (-78 dBm) Outside above range: f≤2.2GHz : ± 2.0 dB (-57 dBm) 2.2 GHz < f ≤ 4 GHz : ± 2.0 dB (-47 dBm) f > 4 GHz : ±4.0 dB (-47 dBm)	

Note 1: Unless otherwise noted, only the Test System stimulus error is considered here. The effect of errors in the BER/FER measurements due to finite test duration is not considered.

4.1.4 Measurement of performance requirement

Table 4.1B: Maximum Test System Uncertainty for Performance Requirements

Subclause	Maximum Test System Uncertainty[1]	Derivation of Test System Uncertainty
8.2, Demodulation in static propagation condition	± 0.4dB	Wanted/AWGN: ± 0.4dB (relative uncertainty for E_b/N_0) (AWGN: ±1dB)
8.3, Demodulation of DCH in multipath fading conditions	± 0.6dB	Fader: ± 0.5dB Wanted/AWGN: ± 0.4dB (relative) Combined relative uncertainty for E_b/N_0: ± 0.6dB
8.4 Demodulation of DCH in moving propagation conditions	± 0.6dB	Fader: ± 0.5dB Wanted/AWGN: ± 0.4dB (relative) Combined relative uncertainty for E_b/N_0: ± 0.6dB
8.5 Demodulation of DCH in birth/death propagation conditions	± 0.6dB	Fader: ± 0.5dB Wanted/AWGN: ± 0.4dB (relative) Combined relative uncertainty for E_b/N_0: ± 0.6dB
Note 1: Only the overall stimulus error is considered here. The effect of errors in the BER/FER measurements due to finite test duration is not considered.		

4.2 Test Tolerances (informative)

The Test Tolerances defined in this subclause have been used to relax the Minimum Requirements in this specification to derive the Test Requirements.

The Test Tolerances are derived from Test System uncertainties, regulatory requirements and criticality to system performance. As a result, the Test Tolerances may sometimes be set to zero.

The test tolerances should not be modified for any reason e.g. to take account of commonly known test system errors (such as mismatch, cable loss, etc.)

4.2.1 Transmitter

Table 4.1C: Test Tolerances for transmitter tests.

Subclause	Test Tolerance[1]
6.2.1 Maximum Output Power	0.7 dB
6.2.2 CPICH Power accuracy	0.8 dB
6.3.4 Frequency error	12 Hz
6.4.2 Power control steps	0.1 dB
6.4.3 Power control dynamic range	~~0.2~~1.1 dB
6.4.4 Total power dynamic range	0.3 dB
6.5.1 Occupied Bandwidth	0 kHz
6.5.2.1 Spectrum emission mask	1.5 dB[3]
6.5.2.2 ACLR	0.8 dB
6.5.3 Spurious emissions	0 dB
6.6 Transmit intermodulation (interferer requirements)	0 dB[2]
6.7.1 Frequency error	12 Hz
6.7.12 EVM	0 %
6.7.23 Peak code Domain error	1.0dB
Note 1: Unless otherwise stated, The Test Tolerances are applied to the DUT Minimum Requirement. See Annex F. Note 2: The Test Tolerance is applied to the stimulus signal(s). See Annex F. Note 3: 0 dB test tolerance for the additional Band b requirements.	

6.4.3 Power control dynamic range

6.4.3.1 Definition and applicability

The power control dynamic range is the difference between the maximum and the minimum code domain power of a code channel for a specified reference condition. Transmit modulation quality shall be maintained within the whole dynamic range as specified in TS 25.104 [1] subclause 6.8.

6.4.3.2 Minimum Requirement

Down link (DL) power control dynamic range:

- maximum code domain power: BS maximum output power -3 dB or greater;
- minimum code domain power: BS maximum output power -28 dB or less.

The normative reference for this requirement is TS 25.104 [1] subclause 6.4.2.1.

6.4.3.3 Test purpose

To verify that the minimum power control dynamic range is met as specified in subclause 6.4.3.2.

6.4.3.4 Method of test

6.4.3.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

1) Connect the measurement equipment to the BS antenna connector as shown in annex B.
2) Channel configuration defined in table 6.3 Test model 2 shall be used.
3) Set BS frequency.
4) Star BS transmission.

6.4.3.4.2 Procedure

Pmax shall be defined as described in subclause 6.2.1 Base station maximum output power.

1) Re-measure Pmax according to subclause 6.2.1 (using test model 1).

2~~1~~) Using test model 2, ~~S~~set the code domain power of the DPCH under test to ~~-~~Pmax-3 dB. Power levels for other code channels ~~shall~~ may be adjusted ~~as~~ if necessary.

3~~2~~) Measure the code domain power of the code channel under test. Use the code domain power measurement method defined in annex E.

4~~3~~) Set the code domain power of the DPCH under test to ~~the minimum value~~ Pmax-28 dB by means determined by the manufacturer. The ~~P~~power levels for the other code channels used in step 2 shall remain unchanged (the overall output power will drop by approximately 3 dB).

5~~4~~) Measure the code domain power of the code channel under test.

6.4.3.5 Test requirement

Down link (DL) power control dynamic range:-

- maximum code domain power: BS maximum output power –4.13.2 dB or greater;

- minimum code domain power: BS maximum output power –26.97.8 dB or less.

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

Annex F (informative): Derivation of Test Requirements

The Test Requirements in this specification have been calculated by relaxing the Minimum Requirements of the core specification using the Test Tolerances defined in subclause 4.2. When the Test Tolerance is zero, the Test Requirement will be the same as the Minimum Requirement. When the Test Tolerance is non-zero, the Test Requirements will differ from the Minimum Requirements, and the formula used for this relaxation is given in tables F.1, F.2 and F.3

Note that a formula for applying Test Tolerances is provided for all tests, even those with a test tolerance of zero. This is necessary in the case that the Test System uncertainty is greater than that allowed in subclause 4.1. In this event, the excess error shall be subtracted from the defined test tolerance in order to generate the correct tightened Test Requirements as defined in subclause 4.3.

For example, a Test System having 0.9 dB accuracy for test 6.2.1 Base Station maximum output power (which is 0.2 dB above the limit specified in subclause 4.) would subtract 0.2 dB from the Test Tolerance of 0.7 dB defined in subclause 4.2. This new test tolerance of 0.5 dB would then be applied to the Minimum Requirement using the formula defined in Table F.1 to give a new range of ±2.5 dB of the manufacturer's rated output power.

Using this same approach for the case where a test had a test tolerance of 0 dB, an excess error of 0.2 dB would result in a modified test tolerance of –0.2 dB.

Table F.1: Derivation of Test Requirements (Transmitter tests)

Test	Minimum Requirement in TS 25.104	Test Tolerance (TT)	Test Requirement in TS 25.141
6.2.1 Base station maximum output power	In normal conditions … within +2 dB and -2 dB of the manufacturer's rated output power In extreme conditions… within +2.5 dB and –2.5 dB of the manufacturer's rated output power	0.7 dB	Formula: Upper limit + TT Lower limit – TT In normal conditions … within +2.7 dB and –2.7 dB of the manufacturer's rated output power In extreme conditions… within +3.2 dB and –3.2 dB of the manufacturer's rated output power
6.2.2 CPICH Power accuracy	CPICH power shall be within ±2.1dB	0.8 dB	Formula: Upper limit + TT Lower limit – TT CPICH power shall be within ±2.9dB
6.3.4 Frequency error	Frequency error limit = 0.05 ppm	12 Hz	Formula: Frequency Error limit + TT Frequency Error limit = 0.05 ppm + 12 Hz
6.4.2 Power control steps	Lower and upper limits as specified in tables 6.9 and 6.10a	0.1 dB	Formula: Upper limits + TT Lower limits – TT 0.1 dB applied as above to tables 6.9 and 6.10a
6.4.3 Power control dynamic range	maximum power limit = BS maximum output power -3 dB minimum power limit = BS maximum output power –28 dB	~~0.2~~1.1 dB	Formula: maximum power limit – TT minimum power limit + TT maximum power limit = BS maximum output power –~~3.2~~4.1 dB minimum power limit = BS maximum output power –26.9~~7.8~~ dB
6.4.4 Total power dynamic range	total power dynamic range limit = 18 dB	0.3 dB	Formula: total power dynamic range limit – TT total power dynamic range limit = 17.7 dB
6.5.1 Occupied Bandwidth	occupied bandwidth limit = 5 MHz	0 kHz	Formula: Occupied bandwidth limit + TT Occupied bandwidth limit = 5 MHz
6.5.2.1 Spectrum emission mask	Maximum level defined in tables 6.11, 6.12, 6.13 and 6.14:	1.5 dB (0 dB for the additional Band b requirements)	Formula: Maximum level + TT Add 1.5 to Maximum level entries in tables 6.11, 6.12, 6.13 and 6.14.
6.5.2.2 Adjacent Channel Leakage power Ratio (ACLR)	ACLR limit = 45 dB at 5 MHz ACLR limit = 50 dB at 10 MHz	0.8 dB	Formula: ACLR limit – TT ACLR limit = 44.2 dB at 5 MHz ACLR limit = 49.2 dB at 10 MHz
6.5.3 Spurious emissions	Maximum level defined in tables 6.16 to 6.26	0 dB	Formula: Maximum limit + TT Add 0 to Maximum level in tables 6.16 to 6.26
6.6 Transmit intermodulation (interferer requirements) This tolerance applies to the stimulus and not the measurements defined in 6.5.2.1, 6.5.2.2 and 6.5.3.	Wanted signal level – interferer level = 30 dB	0 dB	Formula: Ratio + TT Wanted signal level – interferer level = 30 + 0 dB
6.7.1 EVM	EVM limit =17.5 %	0 %	Formula: EVM limit + TT EVM limit = 17.5%
6.7.2 Peak code Domain error	Peak code domain error limit = -33 dB	1.0 dB	Formula: Peak code domain error limit + TT Peak code domain error limit = -32 dB

Annex G (informative): Acceptable uncertainty of Test Equipment

This informative annex specifies the critical parameters of the components of an overall Test System (e.g. Signal generators, Signal Analysers etc.) which are necessary when assembling a Test System which complies with subclause 4.1 Acceptable Uncertainty of Test System. These Test Equipment parameters are fundamental to the accuracy of the overall Test System and are unlikely to be improved upon through System Calibration.

G.1 Transmitter measurements

Table G.1: Equipment accuracy for transmitter measurements

Test	Equipment accuracy	Range over which equipment accuracy applies
6.2.1 Maximum Output Power	Not critical	Not critical
6.2.2 CPICH Power accuracy	Not critical	Not critical
6.3.4 Frequency error	± 10 Hz + timebase = [12] Hz	Measurements in the range ±500 Hz.
6.4.2 Power control steps	± 0.1 dB for one 1 dB step ± 0.1 dB for ten 1 dB steps	Pmax – 3dB to Pmax – 28 dB
6.4.3 Power control dynamic range	± 0.2 dB relative code domain power accuracy	Pmax – 3dB to Pmax – 28 dB
6.4.4 Total power dynamic range	±0.3 dB relative error over 18 dB	Pmax to Pmax – 18 dB
6.5.1 Occupied Bandwidth	± 100 kHz	±1 MHz of the minimum requirement
6.5.2.1 Spectrum emission mask	Not critical	Not critical
6.5.2.2 ACLR	± 0.8 dB	Measurements in the range ±3 dB of the minimum requirement at signal power = Pmax
6.5.3 Spurious emissions	Not critical	Not critical
6.6 Transmit intermodulation (interferer requirements)	Not critical	Not critical
6.7.1 EVM	± 2.5 % (for single code)	Measurements in the range 12.5% to 22.5% at signal power = Pmax –3 dB to Pmax – 18 dB
6.7.2 Peak code Domain error	±1.0dB	Measurements in the range –30 to –36 dB at signal power = Pmax

3GPP TSG RAN WG4 Meeting #23 **R4-021048**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v5.1

CHANGE REQUEST

⌘ **25.141** **CR** **229** ⌘ **rev** **1** ⌘ Current version: **3.9.0** ⌘

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

Title:	⌘	Correction to total power dynamic range test
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	17/5/2002
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 requirement for total power dynamic range is not properly defined and will always fail.
Summary of change:	⌘	The test method is redefined as the difference between the Pmax power measurement in 6.2.1.4.2 and the Pmax – 18 dB power measurement made during the EVM test in 6.7.1.4.2. The procedure for EVM is corrected to include the power measurement at Pmax – 18 dB that was missing.
Consequences if not approved:	⌘	Node B will fail the total power dynamic range test. Isolated Impact Analysis: Change to the test specifications does not impact Node B.
Clauses affected:	⌘	6.1.1.1, 6.1.1.4, 6.4.4, 6.7.1.4
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	Equivalent CRs in other Releases: CR230r1 cat. A to 25.141 v4.4.0

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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.

6.1.1.1 Test Model 1

This model shall be used for tests on:

- spectrum emission mask;
- ACLR;
- spurious emissions;
- transmit intermodulation;
- base station maximum output power.
- total power dynamic range (at Pmax)

6.1.1.4 Test Model 4

This model shall be used for tests on:

- EVM measurement.
- Total power dynamic range (at Pmax – 18 dB)
- Frequency error

6.4.4 Total power dynamic range

6.4.4.1 Definition and applicability

The total power dynamic range is the difference between the maximum and the minimum output power for a specified reference condition.

6.4.4.2 Minimum Requirement

The down link (DL) total power dynamic range shall be 18 dB or greater. The normative reference for this requirement is TS 25.104 [1] subclause 6.4.3.1.

6.4.4.3 Test purpose

To verify that the total power dynamic range is met as specified in TS 25.104 subclause 6.4.3.1. The test is to ensure that the total output power can be reduced while still transmitting a single code. This is to ensure that the interference to neighbouring cells is reduced.

6.4.4.4 Method of test

~~Requirement is tested together with Error Vector Magnitude test, as described in subclause 6.7.1~~The method of test is carried out as part of 6.2.1 Base station maximum output power and 6.7.1 Error vector magnitude.

The total power dynamic range result is the difference between the power measurement at Pmax made in 6.2.1.4.2 and the power measurement at Pmax – 18 dB made in 6.7.1.4.2.

6.4.4.5 Test requirement

The down link (DL) total power dynamic range shall be 17.7 dB or greater.

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

6.7 Transmit modulation

6.7.1 Error Vector Magnitude

6.7.1.1 Definition and applicability

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Both waveforms pass through a matched Root Raised Cosine filter with bandwidth 3.84 MHz and roll-off α =0.22. Both waveforms are then further modified by selecting the frequency, absolute phase, absolute amplitude and chip clock timing so as to minimise the error vector. The EVM result is defined as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %. The measurement interval is one timeslot as defined by the C-PICH (when present) otherwise the measurement interval is one timeslot starting with the beginning of the SCH. The requirement is valid over the total power dynamic range as specified in 25.104 subclause 6.4.3. See Annex E of this specification for further details

6.7.1.2 Minimum Requirement

The Error Vector Magnitude shall be less than 17.5%

The normative reference for this requirement is in TS 25.104 [1] subclause 6.8.2

6.7.1.3 Test Purpose

To verify that the Error Vector Magnitude is within the limit specified in 6.7.1.2

6.7.1.4 Method of Test

This test method includes the procedure for subclause 6.4.4.4. Total power dynamic range.

6.7.1.4.1 Initial Conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

Refer to annex B for a functional block diagram of the test set-up.

1) Connect the base station RF output port to the measurement equipment.
2) Set the base station to transmit a signal according to 6.1.1.4 (test model 4)
3) Set BS frequency

6.7.1.4.2 Procedure

1) Start BS transmission at Pmax-3dB
2) Measure the Error Vector Magnitude as defined in annex E. If the base station supports STTD or closed loop transmit diversity, EVM shall be measured on both main and diversity RF output ports.
3) Set the total output power to Pmax-18 dB ~~and repeat step 2)~~
4) Measure the EVM and mean power.

6.7.1.5 Test Requirement

The Error Vector Magnitude shall be less than 17.5%

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

3GPP TSG RAN WG4 Meeting #23 **R4-021049**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v5.1

CHANGE REQUEST

⌘ **25.141** **CR** **230** ⌘ **rev** **1** ⌘ Current version: **4.4.0** ⌘

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

Title:	⌘	Correction to total power dynamic range test
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	17/5/2002
Category:	⌘	**A**
Release:	⌘	Rel-4

Use one of the following categories:
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A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
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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 requirement for total power dynamic range is not properly defined and will always fail.
Summary of change:	⌘	The test method is redefined as the difference between the Pmax power measurement in 6.2.1.4.2 and the Pmax – 18 dB power measurement made during the EVM test in 6.7.1.4.2. The procedure for EVM is corrected to include the power measurement at Pmax – 18 dB that was missing.
Consequences if not approved:	⌘	Node B will fail the total power dynamic range test. Isolated Impact Analysis: Change to the test specifications does not impact Node B.
Clauses affected:	⌘	6.1.1.1, 6.1.1.4, 6.4.4, 6.7.1.4
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	Equivalent CRs in other Releases: CR229r1 cat. F to 25.141 v3.9.0

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.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.

6.1.1.1 Test Model 1

This model shall be used for tests on:

- spectrum emission mask;
- ACLR;
- spurious emissions;
- transmit intermodulation;
- base station maximum output power.
- total power dynamic range (at Pmax)

6.1.1.4 Test Model 4

This model shall be used for tests on:

- EVM measurement.
- Total power dynamic range (at Pmax – 18 dB)
- Frequency error

6.4.4 Total power dynamic range

6.4.4.1 Definition and applicability

The total power dynamic range is the difference between the maximum and the minimum output power for a specified reference condition.

6.4.4.2 Minimum Requirement

The down link (DL) total power dynamic range shall be 18 dB or greater. The normative reference for this requirement is TS 25.104 [1] subclause 6.4.3.1.

6.4.4.3 Test purpose

To verify that the total power dynamic range is met as specified in TS 25.104 subclause 6.4.3.1. The test is to ensure that the total output power can be reduced while still transmitting a single code. This is to ensure that the interference to neighbouring cells is reduced.

6.4.4.4 Method of test

~~Requirement is tested together with Error Vector Magnitude test, as described in subclause 6.7.1~~The method of test is carried out as part of 6.2.1 Base station maximum output power and 6.7.1 Error vector magnitude.

The total power dynamic range result is the difference between the power measurement at Pmax made in 6.2.1.4.2 and the power measurement at Pmax – 18 dB made in 6.7.1.4.2.

6.4.4.5 Test requirement

The down link (DL) total power dynamic range shall be 17.7 dB or greater.

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

6.7 Transmit modulation

6.7.1 Error Vector Magnitude

6.7.1.1 Definition and applicability

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Both waveforms pass through a matched Root Raised Cosine filter with bandwidth 3.84 MHz and roll-off α =0.22. Both waveforms are then further modified by selecting the frequency, absolute phase, absolute amplitude and chip clock timing so as to minimise the error vector. The EVM result is defined as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %. The measurement interval is one timeslot as defined by the C-PICH (when present) otherwise the measurement interval is one timeslot starting with the beginning of the SCH. The requirement is valid over the total power dynamic range as specified in 25.104 subclause 6.4.3. See Annex E of this specification for further details

6.7.1.2 Minimum Requirement

The Error Vector Magnitude shall be less than 17.5%

The normative reference for this requirement is in TS 25.104 [1] subclause 6.8.2

6.7.1.3 Test Purpose

To verify that the Error Vector Magnitude is within the limit specified in 6.7.1.2

6.7.1.4 Method of Test

This test method includes the procedure for 6.4.4.4. Total power dynamic range.

6.7.1.4.1 Initial Conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

Refer to annex B for a functional block diagram of the test set-up.

1) Connect the base station RF output port to the measurement equipment.
2) Set the base station to transmit a signal according to 6.1.1.4 (test model 4)
3) Set BS frequency

6.7.1.4.2 Procedure

1) Start BS transmission at Pmax-3dB
2) Measure the Error Vector Magnitude as defined in annex E. If the base station supports STTD or closed loop transmit diversity, EVM shall be measured on both main and diversity RF output ports.
3) Set the total output power to Pmax-18 dB ~~and repeat step 2)~~
4) Measure the EVM and mean power.

6.7.1.5 Test Requirement

The Error Vector Magnitude shall be less than 17.5%

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 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.