TSG RAN Meeting #17 **RP-020476**
Biarritz, France, 3 - 6 September, 2002

Title **CRs (R'99 and Rel-4/Rel-5 Category A) to TS 25.142**
Source **TSG RAN WG4**
Agenda Item **7.4.3**

RAN4 Tdoc	Spec	CR	R	Cat	Rel	Curr Ver	Title	Work Item
R4-021206	25.142	131		F	R99	3.10.0	Alignment of minimum output power definition with core specification.	TEI
R4-021207	25.142	132		A	Rel-4	4.5.0	Alignment of minimum output power definition with core specification.	TEI
R4-021208	25.142	133		A	Rel-5	5.1.0	Alignment of minimum output power definition with core specification.	TEI

3GPP TSR RAN WG4 Meeting #24 **R4-021206**

Helsinki, Finland 12 - 16 August 2002

CR-Form-v7

CHANGE REQUEST

⌘ **25.142** **CR** **131** ⌘ **rev** ⌘ Current version: **3.10.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☐

Title:	⌘	Alignment of minimum output power definition with core specification.
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	21/08/2002
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)
Rel-6 (Release 6)

Reason for change: ⌘

In 25.105, the minimum output power is defined as the **maximum output power – 30 dB** (section 6.4.4).
The maximum output power is the power **measured** without measurement error when the Node B power is set to PRAT. PRAT is the maximum BS power **declared** by the manufacturer which is used for setting the BS power for tests at maximum power.
PRAT and maximum output power can have up to +/-2 dB difference under normal conditions.

In 25.142, two tests are performed at minimum output power (minimum output power and EVM) where the minimum output power is obtained with respect to **PRAT**.
This is in contradiction with the core requirement and should be corrected.

Summary of change: ⌘

1- Test requirement for minimum output power is aligned with core requirement.
2- Minimum output power is corrected as being maximum output power –30 dB in EVM test.

Consequences if not approved: ⌘

A correctly implemented node B satisfying the core requirement as specified in TS25.105 may fail the test requirement since the test requirement can be more stringent than the core requirement.

Example:
PRAT=43 dBm
Maximum output power =45 dBm

Minimum output power requirement= maximum output power – 30dB= **15** dBm
Corresponding test requirement (see 6.4.4.5) (with test tolerances):

PRAT – 29,3 = **13,7** dBm

In this case the test requirement is **more** stringent than the core requirement.

This CR ensures that no Node B satisfying the core requirements will fail a test that is that is more stringent than the core requirement.

Isolated impact analysis:
The proposed correction has no impact on Node B implementation or NodeB-UE interworking since it is a correction to a test specification

Clauses affected:	⌘	6.4.4.5, 6.8.1.4.2			
Other specs affected:	⌘	**Y** / **N**	Other core specifications	⌘	
			Test specifications		
			O&M Specifications		
Other comments:	⌘	Equivalent CRs in other Releases: CR132 cat. A to 25.142 v4.5.0, CR133 cat. A to 25.142 v5.1.0			

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.
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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.

6.4.4 Minimum output power

6.4.4.1 Definition and applicability

The minimum controlled output power of the BS is when the power is set to a minimum value.

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

6.4.4.2 Minimum Requirements

The DL minimum output power shall be less than or equal to:

Maximum output power - 30 dB.

The normative reference for this requirement is TS 25.105 [1] subclause 6.4.4.1.

6.4.4.3 Test purpose

The test purpose is to verify the ability of the BS to reduce its output power to a specified value.

6.4.4.4 Method of test

6.4.4.4.1 Initial conditions

Test environment: normal; see subclause 5.9.1.

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

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

(2) Set the parameters of the BS transmitted signal according to table 6.7.

(3) Operate the BS in such a mode that it is able to interpret received TPC commands

(4) Start BS transmission.

NOTE: The BS tester used for this test must have the ability:

- to analyze the output signal of the BS under test with respect to thermal power;

- to simulate an UE with respect to the generation of TPC commands embedded in a valid UE signal.

Table 6.7: Parameters of the BS transmitted signal for minimum output power test

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

6.4.4.4.2 Procedure

(1) Configure the BS transmitter to enable power control steps of size 1 dB.

(2) Set the BS tester to produce a sequence of TPC commands related to the active DPCH, with content "Decrease Tx power". This sequence shall be sufficiently long so that the output power of all active DPCH is controlled to reach its minimum, and shall be transmitted to the BS within the odd time slots TS i (receive time slots of the BS).

(3) Measure the power of the BS output signal over the 2464 active chips of an even time slot TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off $\alpha = 0,22$ and a bandwidth equal to the chip rate. The power is determined by calculating the RMS value of the signal samples at the measurement filter output taken at the decision points.

(4) Configure the BS transmitter to enable power control steps of 2 dB and of 3 dB, respectively, and repeat steps (2) and (3).

6.4.4.5 Test Requirements

For all measurements, the minimum output power derived in step (4) of subclause 6.4.4.4.2 shall be at least 29,3 dB below the maximum output power ~~as declared by the manufacturer~~; see 6.2.

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

---NEXT SECTION---

6.8 Transmit Modulation

6.8.1 Modulation accuracy

6.8.1.1 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. The requirement is valid over the total power dynamic range as specified in 25.105 subclause 6.4.3. See Annex C of this specification for further details.

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

NOTE: The theoretical modulated waveform shall be calculated on the basis that the transmit pulse shaping filter is a root-raised cosine (RRC) with roll-off α =0,22 in the frequency domain. The impulse response of the chip impulse filter $RC_0(t)$ is

$$RC_0(t) = \frac{\sin\left(\pi \frac{t}{T_C}(1-\alpha)\right) + 4\alpha \frac{t}{T_C}\cos\left(\pi \frac{t}{T_C}(1+\alpha)\right)}{\pi \frac{t}{T_C}\left(1-\left(4\alpha \frac{t}{T_C}\right)^2\right)}$$

Where the roll-off factor α = 0,22 and the chip duration

$$T_C = \frac{1}{chiprate} \approx 0.26042\mu s\,.$$

6.8.1.2 Minimum Requirements

The error vector magnitude (EVM) shall not exceed 12,5 %. The requirement is valid over the total power dynamic range as specified in subclause 6.4.3 of TS 25.105.

The normative reference for this requirement is TS 25.105 [1] subclause 6.8.2.1.

6.8.1.3 Test purpose

The test purpose is to verify the ability of the BS transmitter to generate a sufficient precise waveform and thus to enable the UE receiver to achieve the specified error performance.

6.8.1.4 Method of test

6.8.1.4.1 Initial conditions

Test environment: normal; see subclause 5.9.1.

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

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

(2) Set the parameters of the BS transmitted signal according to table 6.39.

Table 6.39: Parameters of the BS transmitted signal for modulation accuracy testing

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

6.8.1.4.2 Procedure

(1) Measure the error vector magnitude (EVM) by applying the global in-channel Tx test method described in Annex C.

(2) Set the BS output power to ~~PRAT~~ maximum output power – 30 dB and repeat step (1) above.

6.8.1.5 Test Requirements

The error vector magnitude (EVM) measured according to subclause 6.8.1.4.2 shall not exceed 12,5 %.

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

3GPP TSR RAN WG4 Meeting #24 **R4-021207**

Helsinki, Finland 12 - 16 August 2002

CR-Form-v7

CHANGE REQUEST

⌘ **25.142** **CR** **132** ⌘ **rev** ⌘ Current version: **4.5.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☐

Title:	⌘	Alignment of minimum output power definition with core specification.
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	21/08/2002
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)*
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Use one of the following releases:

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R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change: ⌘

In 25.105, the minimum output power is defined as the **maximum output power – 30 dB** (section 6.4.4).
The maximum output power is the power **measured** without measurement error when the Node B power is set to PRAT. PRAT is the maximum BS power **declared** by the manufacturer which is used for setting the BS power for tests at maximum power.
PRAT and maximum output power can have up to +/-2 dB difference under normal conditions.

In 25.142, two tests are performed at minimum output power (minimum output power and EVM) where the minimum output power is obtained with respect to PRAT.
This is in contradiction with the core requirement and should be corrected.

Summary of change: ⌘

1- Test requirement for minimum output power is aligned with core requirement.
2- Minimum output power is corrected as being maximum output power –30 dB in EVM test.

Consequences if not approved: ⌘

A correctly implemented node B satisfying the core requirement as specified in TS25.105 may fail the test requirement since the test requirement can be more stringent than the core requirement.

Example:
PRAT=43 dBm
Maximum output power =45 dBm

Minimum output power requirement= maximum output power – 30dB= **15** dBm
Corresponding test requirement (see 6.4.4.5) (with test tolerances):

	PRAT – 29,3 = **13,7** dBm In this case the test requirement is **more** stringent than the core requirement. This CR ensures that no Node B satisfying the core requirements will fail a test that is that is more stringent than the core requirement. **Isolated impact analysis:** The proposed correction has no impact on Node B implementation or NodeB-UE interworking since it is a correction to a test specification

Clauses affected:	⌘	6.4.4.5, 6.8.1.4.2			
		Y	**N**		
Other specs affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘	Equivalent CRs in other Releases: CR131 cat. F to 25.142 v3.10.0, CR133 cat. A to 25.142 v5.1.0			

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6.4.4 Minimum output power

6.4.4.1 Definition and applicability

The minimum controlled output power of the BS is when the power is set to a minimum value.

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

6.4.4.2 Minimum Requirements

The DL minimum output power shall be less than or equal to:

Maximum output power - 30 dB.

The normative reference for this requirement is TS 25.105 [1] subclause 6.4.4.1.

6.4.4.3 Test purpose

The test purpose is to verify the ability of the BS to reduce its output power to a specified value.

6.4.4.4 Method of test

6.4.4.4.1 Initial conditions

6.4.4.4.1.0 General test conditions

Test environment: normal; see subclause 5.9.1.

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

6.4.4.4.1.1 3,84 Mcps TDD option

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

(2) Set the parameters of the BS transmitted signal according to table 6.7.

(3) Operate the BS in such a mode that it is able to interpret received TPC commands

(4) Start BS transmission.

NOTE: The BS tester used for this test must have the ability:

- to analyze the output signal of the BS under test with respect to thermal power;

- to simulate an UE with respect to the generation of TPC commands embedded in a valid UE signal.

Table 6.7: Parameters of the BS transmitted signal for minimum power test

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

6.4.4.4.1.2 1,28 Mcps TDD option

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

(2) Set the parameters of the BS transmitted signal according to table 6.7A.

(3) Operate the BS in such a mode that it is able to interpret received TPC commands

(4) Start BS transmission.

NOTE: The BS tester used for this test must have the ability

- to analyze the output signal of the BS under test with respect to thermal power;

- to simulate an UE with respect to the generation of TPC commands embedded in a valid UE signal.

Table 6.7A: Parameters of the BS transmitted signal for minimum power test for 1,28 Mcps TDD

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

6.4.4.4.2 Procedure

6.4.4.4.2.1 3,84 Mcps TDD option

(1) Configure the BS transmitter to enable power control steps of size 1 dB.

(2) Set the BS tester to produce a sequence of TPC commands related to all active DPCH, with content "Decrease Tx power". This sequence shall be sufficiently long so that the output power of all active DPCH is controlled to reach its minimum, and shall be transmitted to the BS within the odd time slots TS i (receive time slots of the BS).

(3) Measure the power of the BS output signal over the 2464 active chips of an even time slot TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off $\alpha = 0,22$ and a bandwidth equal to the chip rate. The power is determined by calculating the RMS value of the signal samples at the measurement filter output taken at the decision points.

(4) Configure the BS transmitter to enable power control steps of 2 dB and of 3 dB, respectively, and repeat steps (2) and (3).

6.4.4.4.2.2 1,28 Mcps TDD option

(1) Configure the BS transmitter to enable power control steps of size 1 dB.

(2) Set the BS tester to produce a sequence of TPC commands related to all active DPCH, with content "Decrease Tx power". This sequence shall be sufficiently long so that the output power of all active DPCH is controlled to reach its minimum, and shall be transmitted to the BS within the receive time slots TS i of the BS.

(3) Measure the power of the BS output signal over the 848 active chips of a receive time slot TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off $\alpha = 0,22$ and a bandwidth equal to the chip rate. The power is determined by calculating the RMS value of the signal samples at the measurement filter output taken at the decision points.

(4) Configure the BS transmitter to enable power control steps of 2 dB and of 3 dB, respectively, and repeat steps (2) and (3).

6.4.4.5 Test Requirements

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

For all measurements, the minimum output power derived in step (4) of subclause 6.4.4.4.2 shall be at least 29,3 dB below the maximum output power. ~~as declared by the manufacturer~~; see 6.2.

---NEXT SECTION---

6.8 Transmit Modulation

6.8.1 Modulation accuracy

6.8.1.1 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 corresponding to the considered chip rate 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. The requirement is valid over the total power dynamic range as specified in 25.105 subclause 6.4.3. See Annex C of this specification for further details.

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

NOTE: The theoretical modulated waveform shall be calculated on the basis that the transmit pulse shaping filter is a root-raised cosine (RRC) with roll-off α =0,22 in the frequency domain. The impulse response of the chip impulse filter $RC_0(t)$ is

$$RC_0(t) = \frac{\sin\left(\pi \frac{t}{T_C}(1-\alpha)\right) + 4\alpha \frac{t}{T_C}\cos\left(\pi \frac{t}{T_C}(1+\alpha)\right)}{\pi \frac{t}{T_C}\left(1-\left(4\alpha \frac{t}{T_C}\right)^2\right)}$$

Where the roll-off factor α = 0,22 and T_C is the chip duration

6.8.1.2 Minimum Requirements

The error vector magnitude (EVM) shall not exceed 12,5 %. The requirement is valid over the total power dynamic range as specified in subclause 6.4.3 of TS 25.105.

The normative reference for this requirement is TS 25.105 [1] subclause 6.8.2.1.

6.8.1.3 Test purpose

The test purpose is to verify the ability of the BS transmitter to generate a sufficient precise waveform and thus to enable the UE receiver to achieve the specified error performance.

6.8.1.4 Method of test

6.8.1.4.1 Initial conditions

6.8.1.4.1.0 General test conditions

Test environment: normal; see subclause 5.9.1.

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

6.8.1.4.1.1 3,84 Mcps TDD option

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

(2) Set the parameters of the BS transmitted signal according to table 6.39.

Table 6.39: Parameters of the BS transmitted signal for modulation accuracy testing

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

6.8.1.4.1.2 1,28 Mcps TDD option

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

(2) Set the parameters of the BS transmitted signal according to table 6.39A.

Table 6.39A: Parameters of the BS transmitted signal for modulation accuracy testing for 1,28 Mcps TDD

Parameter	Value/description
TDD Duty Cycle	TS i; i = 0, 1, 2, ..., 6: Transmit, if i is 0,4,5,6; receive, if i is 1,2,3.
Number of DPCH in each active TS	1
Base station power	maximum, according to manufacturer's declaration
Data content of DPCH	real life (sufficient irregular)

6.8.1.4.2 Procedure

(1) Measure the error vector magnitude (EVM) by applying the global in-channel Tx test method described in Annex C.

(2) Set the BS output power to maximum output power~~PRAT~~ – 30 dB and repeat step (1) above.

6.8.1.5 Test Requirements

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

The error vector magnitude (EVM) measured according to subclause 6.8.1.4.2 shall not exceed 12,5 %.

3GPP TSR RAN WG4 Meeting #24 **R4-021208**

Helsinki, Finland 12 - 16 August 2002

CR-Form-v7

CHANGE REQUEST

⌘ **25.142** **CR** **133** ⌘ **rev** ⌘ Current version: **5.1.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☐

Title:	⌘	Alignment of minimum output power definition with core specification.
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	21/08/2002
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)*
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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)*
Rel-6	*(Release 6)*

Reason for change: ⌘

In 25.105, the minimum output power is defined as the **maximum output power – 30 dB** (section 6.4.4).
The maximum output power is the power **measured** without measurement error when the Node B power is set to PRAT. PRAT is the maximum BS power **declared** by the manufacturer which is used for setting the BS power for tests at maximum power.
PRAT and maximum output power can have up to +/-2 dB difference under normal conditions.

In 25.142, two tests are performed at minimum output power (minimum output power and EVM) where the minimum output power is obtained with respect to PRAT.
This is in contradiction with the core requirement and should be corrected.

Summary of change: ⌘

1- Test requirement for minimum output power is aligned with core requirement.
2- Minimum output power is corrected as being maximum output power –30 dB in EVM test.

Consequences if not approved: ⌘

A correctly implemented node B satisfying the core requirement as specified in TS25.105 may fail the test requirement since the test requirement can be more stringent than the core requirement.

Example:
PRAT=43 dBm
Maximum output power =45 dBm

Minimum output power requirement= maximum output power – 30dB= **15** dBm
Corresponding test requirement (see 6.4.4.5) (with test tolerances):

PRAT – 29,3 = **13,7** dBm

In this case the test requirement is **more** stringent than the core requirement.

This CR ensures that no Node B satisfying the core requirements will fail a test that is that is more stringent than the core requirement.

Isolated impact analysis:
The proposed correction has no impact on Node B implementation or NodeB-UE interworking since it is a correction to a test specification

Clauses affected:	⌘	6.4.4.5, 6.8.1.4.2				
		Y	**N**			
Other specs affected:	⌘		**X**	Other core specifications	⌘	
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘	The EVM test for the 1,28 Mcps TDD option is corrected in CR142 (WI TEI5)and CR143 (WI: HSDPA-RF) for Rel-5. Equivalent CRs in other Releases: CR131 cat. F to 25.142 v3.10.0, CR132 cat. A to 25.142 v4.5.0				

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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.

6.4.4 Minimum output power

6.4.4.1 Definition and applicability

The minimum controlled output power of the BS is when the power is set to a minimum value.

The requirements in this subclause shall apply to both Wide Area BS and Local Area BS.

6.4.4.2 Minimum Requirements

The DL minimum output power shall be less than or equal to:

Maximum output power - 30 dB.

The normative reference for this requirement is TS 25.105 [1] subclause 6.4.4.1.

6.4.4.3 Test purpose

The test purpose is to verify the ability of the BS to reduce its output power to a specified value.

6.4.4.4 Method of test

6.4.4.4.1 Initial conditions

6.4.4.4.1.0 General test conditions

Test environment: normal; see subclause 5.9.1.

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

6.4.4.4.1.1 3,84 Mcps TDD option

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

(2) Set the parameters of the BS transmitted signal according to table 6.7.

(3) Operate the BS in such a mode that it is able to interpret received TPC commands

(4) Start BS transmission.

NOTE: The BS tester used for this test must have the ability:

- to analyse the output signal of the BS under test with respect to thermal power;
- to simulate an UE with respect to the generation of TPC commands embedded in a valid UE signal.

Table 6.7: Parameters of the BS transmitted signal for minimum power test

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

6.4.4.4.1.2 1,28 Mcps TDD option

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

(2) Set the parameters of the BS transmitted signal according to table 6.7A.

(3) Operate the BS in such a mode that it is able to interpret received TPC commands

(4) Start BS transmission.

NOTE: The BS tester used for this test must have the ability

- to analyse the output signal of the BS under test with respect to thermal power;
- to simulate an UE with respect to the generation of TPC commands embedded in a valid UE signal.

Table 6.7A: Parameters of the BS transmitted signal for minimum power test for 1,28 Mcps TDD

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

6.4.4.4.2 Procedure

6.4.4.4.2.1 3,84 Mcps TDD option

(1) Configure the BS transmitter to enable power control steps of size 1 dB.

(2) Set the BS tester to produce a sequence of TPC commands related to all active DPCH, with content "Decrease Tx power". This sequence shall be sufficiently long so that the output power of all active DPCH is controlled to reach its minimum, and shall be transmitted to the BS within the odd time slots TS i (receive time slots of the BS).

(3) Measure the power of the BS output signal over the 2464 active chips of an even time slot TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off $\alpha = 0,22$ and a bandwidth equal to the chip rate. The power is determined by calculating the RMS value of the signal samples at the measurement filter output taken at the decision points.

(4) Configure the BS transmitter to enable power control steps of 2 dB and of 3 dB, respectively, and repeat steps (2) and (3).

6.4.4.4.2.2 1,28 Mcps TDD option

(1) Configure the BS transmitter to enable power control steps of size 1 dB.

(2) Set the BS tester to produce a sequence of TPC commands related to all active DPCH, with content "Decrease Tx power". This sequence shall be sufficiently long so that the output power of all active DPCH is controlled to reach its minimum, and shall be transmitted to the BS within the receive time slots TS i of the BS.

(3) Measure the power of the BS output signal over the 848 active chips of a receive time slot TS i (this excludes the guard period), and with a measurement filter that has a RRC filter response with a roll off $\alpha = 0,22$ and a bandwidth equal to the chip rate. The power is determined by calculating the RMS value of the signal samples at the measurement filter output taken at the decision points.

(4) Configure the BS transmitter to enable power control steps of 2 dB and of 3 dB, respectively, and repeat steps (2) and (3).

6.4.4.5 Test Requirements

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

For all measurements, the minimum output power derived in step (4) of subclause 6.4.4.4.2 shall be at least 29,3 dB below the maximum output power ~~as declared by the manufacturer~~; see 6.2.

---NEXT SECTION---

6.8 Transmit Modulation

6.8.1 Modulation accuracy

6.8.1.1 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 corresponding to the considered chip rate 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. The requirement is valid over the total power dynamic range as specified in 25.105 subclause 6.4.3. See Annex C of this specification for further details.

The requirements in this subclause shall apply to both Wide Area BS and Local Area BS.

NOTE: The theoretical modulated waveform shall be calculated on the basis that the transmit pulse shaping filter is a root-raised cosine (RRC) with roll-off α =0,22 in the frequency domain. The impulse response of the chip impulse filter $RC_0(t)$ is

$$RC_0(t) = \frac{\sin\left(\pi \frac{t}{T_C}(1-\alpha)\right) + 4\alpha \frac{t}{T_C}\cos\left(\pi \frac{t}{T_C}(1+\alpha)\right)}{\pi \frac{t}{T_C}\left(1-\left(4\alpha \frac{t}{T_C}\right)^2\right)}$$

Where the roll-off factor α = 0,22 and T_C is the chip duration

6.8.1.2 Minimum Requirements

The error vector magnitude (EVM) shall not exceed 12,5 %. The requirement is valid over the total power dynamic range as specified in subclause 6.4.3 of TS 25.105.

The normative reference for this requirement is TS 25.105 [1] subclause 6.8.2.1.

6.8.1.3 Test purpose

The test purpose is to verify the ability of the BS transmitter to generate a sufficient precise waveform and thus to enable the UE receiver to achieve the specified error performance.

6.8.1.4 Method of test

6.8.1.4.1 Initial conditions

For 1,28 Mcps BS supporting 16QAM, the EVM requirements shall be tested with the general test set up specified in section 6.8.1.4.1.2 and also with the special test set up for 16QAM capable base station specified in section 6.8.1.4.1.2.

6.8.1.4.1.0 General test conditions

Test environment: normal; see subclause 5.9.1.

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

6.8.1.4.1.1 3,84 Mcps TDD option

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

(2) Set the parameters of the BS transmitted signal according to table 6.39.

Table 6.39: Parameters of the BS transmitted signal for modulation accuracy testing

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

6.8.1.4.1.2 1,28 Mcps TDD option– General test set up

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

(2) Set the parameters of the BS transmitted signal according to table 6.39A.

Table 6.39A: Parameters of the BS transmitted signal for modulation accuracy testing for 1,28 Mcps TDD

Parameter	Value/description
TDD Duty Cycle	TS i; i = 0, 1, 2, ..., 6: Transmit, if i is 0,4,5,6; receive, if i is 1,2,3.
Number of DPCH in each active TS	1
Base station power	maximum, according to manufacturer's declaration
Data content of DPCH	real life (sufficient irregular)

6.8.1.4.1.3 1,28 Mcps TDD option – Special test set up for 16QAM capable BS

This test set up only applies for 16QAM capable BS.

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

(2) Set the parameters of the BS transmitted signal according to table 6.39B.

Table 6.39B: Parameters of the BS transmitted signal for modulation accuracy testing for 1,28 Mcps TDD - 16QAM capable BS

Parameter	Value/description
TDD Duty Cycle	TS i; i = 0, 1, 2, 3, 4, 5, 6: transmit, if i is 0,4,5,6; receive, if i is 1,2,3.
HS-PDSCH modulation	16QAM
Number of HS-PDSCH in each active TS	1
BS station power	Maximum, according to manufacturer's declaration
Data content of HS-PDSCH	Real life (sufficient irregular)
Spreading factor	16

6.8.1.4.2 Procedure

6.8.1.4.2.1 3,84 Mcps TDD option

(1)Measure the error vector magnitude (EVM) by applying the global in-channel Tx test method described in Annex C.

(2) Set the BS output power to ~~PRAT~~ maximum output power– 30 dB and repeat step (1) above.

6.8.1.4.2.2 1,28 Mcps TDD option – General procedure

(1) Measure the error vector magnitude (EVM) by applying the global in-channel Tx test method described in Annex C.

(2) Set the BS output power to PRAT – 30 dB and repeat step (1) above.

6.8.1.4.2.3 1,28 Mcps TDD option – Special procedure for 16QAM capable BS

(1) Measure the error vector magnitude (EVM) by applying the global in-channel Tx test method described in Annex C.

6.8.1.5 Test Requirements

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

The error vector magnitude (EVM) measured according to subclause 6.8.1.4.2 shall not exceed 12,5 %.