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Contents

Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

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1 Scope

The present document specifies the measurement procedures for the conformance test of the user equipment (UE) that contain transmitting characteristics, receiving characteristics and performance requirements in FDD mode.

2 References

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

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

[1] 3GPP TS 25.101 "UE Radio transmission and reception (FDD)" V3.2.1*.

[2] 3GPP TS 25.133 "Requirements for Support of Radio Resource Management (FDD)" V3.1.0*.

[3] 3GPP TS 34.108 "Common Test Environments for User Equipment (UE) Conformance Testing".

[4] 3GPP TS 34.109 "Logical Test Interface; Special conformance testing functions".

[5] 3GPP TS 25.214 "Physical layer procedures (FDD)".

[6] 3GPP TR 21.905 "Vocabulary for 3GPP Specifications".

[7] 3GPP TR 25.990 "Vocabulary".

*<*Editor's Note: The version numbers of the referred core documents are attached in order to avoid the confusion of readers. They will be removed in future because they are not permanent.>*

3 Definitions, symbols, abbreviations and equations

Definitions, symbols, abbreviations and equations used in the present document are listed in TR 21.905 [5] and TR 25.990 [6].

Terms are listed in alphabetical order in this clause.

3.1 Definitions

For the purpose of the present document, the following additional terms and definitions apply:

Average power: *[TBD]*

Maximum average power: average transmitter output power obtained over any specified time interval, including periods with no transmission, when the transmit time slots are at the maximum power setting

Peak Power: The instantaneous power of the RF envelope which is not expected to be exceeded for 99.9% of the time

3.2 Symbols

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

[…]**:** Values included in square bracket must be considered for further studies, because it means that a decision about that value was not taken;

3.3 Abbreviations

For the purpose of the present document, the following additional abbreviations apply:

AFC: Automatic Frequency Control

ATT: Attenuator

BER: Bit Error Ratio

BLER: Block Error Ratio

EVM: Error Vector Magnitude

FDR: False transmit format Detection Ratio

HYB: Hybrid

OBW: Occupied Bandwidth

OCNS: Orthogonal Channel Noise Simulator, a mechanism used to simulate the users or control signals on the other orthogonal channels of a downlink

RRC: Root-Raised Cosine

SCH: Synchronisation Channel consisting of Primary and Secondary synchronisation channels

SS: System Simulator

3.4 Equations

For the purpose of the present document, the following additional equations apply:

$\frac{CPICH\_E_c}{I_{or}}$	The ratio of the received energy per PN chip of the CPICH to the total transmit power spectral density at the BS (SS) antenna connector.
$\frac{DPCH\_E_c}{I_{or}}$	The ratio of the transmit energy per PN chip of the DPCH to the total transmit power spectral density at the BS antenna connector.
F_{uw}	Frequency of unwanted signal. This is specified in bracket in terms of an absolute frequency(s) or a frequency offset from the assigned channel frequency.
I_{BTS}	Interference signal power level at BTS in dBm, which is broadcasted on BCH.
I_{oac}	The power spectral density of the adjacent frequency channel as measured at the UE antenna connector.
$\frac{PICH\_E_c}{I_{or}}$	The ratio of the received energy per PN chip of the PICH to the total transmit power spectral density at the BS (SS) antenna connector.

4 Frequency bands and channel arrangement

4.1 General

The information presented in this clause is based on a chip rate of 3.,84 Mcps.

NOTE: Other chip rates may be considered in future releases.

4.2 Frequency bands

UTRA/FDD is designed to operate in either of the following paired bands;

(a) 1920 – 1980MHz: Up-link (Mobile transmit, base receive)

2110 – 2170MHz: Down-link (Base transmit, mobile receive)

(b)* 1850 – 1910MHz: Up-link (Mobile transmit, base receive)

1930 – 1990MHz: Down-link (Base transmit, mobile receive)

* Used in Region 2.

Additional allocations in ITU region 2 are FFS.

Deployment in other frequency bands is not precluded.

4.3 TX–RX frequency separation

a) The minimum transmit to receive frequency separation is 134.8 MHz and the maximum value is 245.2 MHz and all UE(s) shall support a TX–RX frequency separation of 190 MHz when operating in the paired band defined in subclause 4.2 (a).

b) When operating in the paired band defined in subclause 4.2 (b), all UE(s) shall support a TX-RX frequency separation of 80 MHz.

c) UTRA/FDD can support both fixed and variable transmit to receive frequency separation.

d) The use of other transmit to receive frequency separations in existing or other frequency bands shall not be precluded.

4.4 Channel arrangement

4.4.1 Channel spacing

The nominal channel spacing is 5 MHz, but this can be adjusted to optimise performance in a particular deployment scenario.

4.4.2 Channel raster

The channel raster is 200 kHz, which means that the centre frequency must be an integer multiple of 200 kHz.

4.4.3 Channel number

The carrier frequency is designated by the UTRA Absolute Radio Frequency Channel Number (UARFCN). The value of the UARFCN in the IMT-2000 band is defined as follows;

Table 4.1: UTRA Absolute Radio Frequency Channel Number

Uplink	$N_u = 5 * (F_{uplink}$ MHz)	0.0 MHz ≤ F_{uplink} ≤ 3276.6 MHz where F_{uplink} is the uplink frequency in MHz
Downlink	$N_d = 5 * (F_{downlink}$ MHz)	0.0 MHz ≤ $F_{downlink}$ ≤ 3276.6 MHz where $F_{downlink}$ is the downlink frequency in MHz

5 Transmitter Characteristics

5.1 General

Transmitting performance test of the UE is implemented during communicating with the SS via air interface. The procedure is using normal call protocol until the UE is communicating on traffic channel basically. On the traffic channel, the UE provides special function for testing that is called Logical Test Interface and the UE is tested using this function. (Refer to [4] TS 34.109).

Transmitting or receiving bit/symbol rate for test channel is shown in Table 5.1.

Table 5.1: Bit / Symbol rate for Test Channel

Type of User Information	User bit rate	DL DPCH symbol rate	UL DPCH bit rate	Remarks
12.2 kbps reference measurement channel	12.2 kbps	30 ksps	60 kbps	Standard Test

Unless detailed the transmitter characteristic are specified at the antenna connector of the UE. For UE with integral antenna only, a reference antenna with a gain of 0 dBi is assumed. Transmitter characteristics for UE(s) with multiple antennas/antenna connectors are FFS.

The UE antenna performance has a significant impact on system performance, and minimum requirements on the antenna efficiency are therefore intended to be included in future versions of this specification. It is recognised that different requirements and test methods are likely to be required for the different types of UE.

All the parameters in clause 5 are defined using the UL reference measurement channel (12.2 kbps) specified in subclause C.2.1 and unless stated otherwise, with the UL power control ON.

The common RF test conditions are defined in Annex E, and each test conditions in this subclause should refer Annex E. An individual test conditions are defined in the paragraph of each test.

5.2 Maximum Output Power

5.2.1 Definition and applicability

The maximum output power and its tolerance are defined according to the Power Class of the UE.

The maximum output power refers to the measure power when averaged over the transmit slot at the maximum power control setting.

For UE using directive antennas for transmission, a class dependent limit will be placed on the maximum Effective Isotropic Radiated Power (EIRP).

The requirements and this test apply to all types of UTRA for the FDD UE.

5.2.2 Conformance requirements

The UE maximum output power shall be within the shown value in Table 5.2.1 even for the multi-code transmission mode.

Table 5.2.1: Maximum Output Power

Power Class	Maximum output power	Tolerance
1	+33 dBm	+1/–3 dB
2	+27 dBm	+1/–3 dB
3	+24 dBm	+1/–3 dB
4	+21 dBm	± 2 dB

The reference for this requirement is [1] TS 25.101 subclause 6.2.1.

5.2.3 Test purpose

To verify that the error of the UE maximum output power does not exceed the prescribed tolerance in Table 5.2.1.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

5.2.4 Method of test

5.2.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.2.2.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.2.2: Test parameters for Maximum Output Power

Parameter	Level / Status	Unit
Inner Loop Power Control	Enabled	

5.2.4.2 Procedure

1) Set and send continuously Up power control commands to the UE.
2) Measure the output power of the UE by Tester. The output power shall be averaged over the transmit one timeslot.

5.2.5 Test requirements

The error of measured output power, derived in step 2), shall not exceed the prescribed tolerance in Table 5.2.1.

5.3 Frequency Stability

5.3.1 Definition and applicability

The frequency stability is the difference between the RF modulated carrier frequency transmitted from the UE with AFC ON and assigned frequency. The UE transmitter tracks to the RF carrier frequency received from the BS. These signals will have an apparent error due to BS frequency.

The requirements and this test apply to all types of UTRA for the FDD UE.

5.3.2 Conformance requirements

The UE modulated carrier frequency shall be accurate to within ±0,1 ppm compared to carrier frequency received from the BS.

The reference for this requirement is [1] TS 25.101 subclause 6.3.

5.3.3 Test purpose

To verify that the UE carrier frequency error does not exceed ±0,1 ppm.

An excess error of the carrier frequency increases the transmission errors in the up link own channel.

This test verifies the ability of receiver to derive correct frequency information for transmitter.

5.3.4 Method of test

5.3.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.

2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.3.

3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.3: Test parameters for Frequency Stability

Parameter	Level / Status	Unit
DPCH_Ec	–117	dBm / 3,84 MHz
$\hat{I}_{or}$	–106,7	dBm / 3,84 MHz
Inner Loop Power Control	Enabled	
AFC	ON	
Modulation	ON	

5.3.4.2 Procedure

1) Set and send continuously Up power control commands to the UE until the UE output power shall be maximum level.

2) Measure the frequency error delta f, at the UE antenna connector by Tester using Global In-Channel-Tx-test (Annex B). Since counter method leads an incorrect result, EVM method shall be used.

5.3.5 Test requirements

For all measured bursts, the frequency error, derived in step 1), shall not exceed ±0,1 ppm.

5.4 Output Power Dynamics in the Uplink

Power control is used to limit the interference level.

5.4.1 Open Loop Power Control in the Uplink

5.4.1.1 Definition and applicability

Open loop power control in the uplink is the ability of the UE transmitter to set its output power to a specific value. This function is used for PRACH transmission and based on the information from BS using BCCH and the downlink received signal power level of the PCCPCH. The information from BS includes transmission power of PCCPCH and uplink interference power level.

The requirements and this test apply to all types of UTRA for the FDD UE.

5.4.1.2 Conformance requirements

The UE open loop power is defined as the average power in a timeslot or ON power duration, whichever is available, and they are measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate.

The UE open loop power control tolerance is given in Table 5.4.1.1.

Table 5.4.1.1: Open loop power control tolerance

Normal conditions	± 9 dB
Extreme conditions	± 12 dB

The reference for this requirement is [1] TS 25.101 subclause 6.4.1.

5.4.1.3 Test purpose

The power of the received signal and the BCCH information control the power of the transmitted signal with the target to transmit at lowest power acceptable for proper communication.

The test stresses the ability of the receiver to measure the received power correctly over the receiver dynamic range.

The test purpose is to verify that the UE open loop power control tolerance does not exceed the described value shown in Table 5.4.1.1.

An excess error of the open loop power control decreases the system capacity.

5.4.1.4 Method of test

This test is also covered by subclause 5.5.2 Transmit ON/OFF Time mask.

5.4.1.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.

2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.4.1.2.
The RACH procedure within the call setup is used for the test.

See [3] TS 34.108 for details regarding generic call setup procedure.

Table 5.4.1.2: Test parameters for Open Loop Power Control (UE)

Parameter	Level / Status	Unit
$\hat{I}_{or}$	See Table 5.4.1.3	dBm / 3.84 MHz
Inner Loop Power Control	Disabled	

Table 5.4.1.3: Test parameters for Open Loop Power Control (SS)

Parameter	Upper dynamic range	middle	Sensitivity level
$\hat{I}_{or}$ 3)	[–25.0 dBm / 3.84 MHz]	[–65.7 dBm / 3.84 MHz]	[–106.7 dBm / 3.84 MHz]
CPICH_RSCP 3),4)	[–28.3 dBm]	[–69 dBm]	[–110 dBm]
Primary CPICH DL TX power	[+25 dBm]	[+31 dBm]	[+19 dBm]
Simulated path loss = Primary CPICH DL TX power – CPICH_RSCP	[+53.3 dB]	[+100 dB]	[+129 dB]
UL interference	[–75 dB]	[–101 dB]	[–110 dB]
Constant Value	[–10 dB]	[–10 dB]	[–10 dB]
Expected nominal UE TX power	[–31.7 dBm]	[–11 dBm]	[+9 dBm] 2)

NOTE 1: While the SS transmit power shall cover the receiver input dynamic range, the logical parameters: broadcasted transmit power, I_{BTS}, constant factor are chosen to achieve a UE TX power, located within the TX output power dynamic range of a class 4 UE.

NOTE 2: Nominal TX output power 9 dBm allows to check the open loop power algorithm within the entire tolerance range (9 dBm ± 12 dB; 9 dBm + 12 dB = 21 dBm = max power class 4).

NOTE 3: The power level of SCCPCH should be defined because SCCPCH is transmitted instead of DPCH during Preamble RACH transmission period. Currently, it is assumed that Table E.3.1 is utilised for DL physical channel condition. The power level of SCCPCH is temporarily set to the same as DL DPCH. However, it is necessary to check whether the above SCCPCH level is enough to establish a connection with the reference measurement channels.

NOTE 4: The purpose of this parameter is to calculate the Expected nominal UE TX power.

5.4.1.4.2 Procedure

1) Set the TX output level of the SS to obtain $\hat{I}_{or}$ at the UE antenna connector. $\hat{I}_{or}$ shall be according to Table 5.4.1.3 ([–25 dBm / 3.84 MHz]).

2) Measure the RACH output power of the UE according to Annex B.

3) Repeat the above measurement for all SS levels in Table 5.4.1.3.

5.4.1.5 Test requirements

The deviation with respect to the Expected nominal UE TX power (Table 5.4.1.3), derived in step 2), shall not exceed the prescribed tolerance in Table 5.4.1.1.

5.4.2 Inner Loop Power Control in the Uplink

5.4.2.1 Definition and applicability

Inner loop power control in the uplink is the ability of the UE transmitter to adjust its output power in accordance with one or more TPC commands received in the downlink.

The power control step is the change in the UE transmitter output power in response to a single TPC command, TPC_cmd, derived at the UE.

This clause does not cover all the requirements of compressed mode or soft handover.

The requirements and this test apply to all types of UTRA for the FDD UE.

5.4.2.2 Conformance requirements

The UE transmitter shall have the capability of changing the output power with a step size of 1, 2 and 3 dB according to the value of Δ_{TPC} or Δ_{RP-TPC}, in the slot immediately after the TPC_cmd can be derived.

a) The transmitter output power step due to inner loop power control shall be within the range shown in Table 5.4.2.1. The Maximum power threshold is defined as the lowest permissible maximum output power for the UE power class, as defined in Table 5.2.1. The Minimum power threshold is defined as –50 dBm.

b) When the transmitter output power is between the Minimum and Maximum power thresholds, the transmitter average output power step due to inner loop power control shall be within the range shown in Table 5.4.2.2. Here a TPC_cmd group is a set of TPC_cmd values derived from a corresponding sequence of TCP commands of the same duration.

NOTE: 3dB inner loop power control steps are only used in compressed mode.

The inner loop power is defined as the relative power differences between averaged power of original (reference) timeslot and averaged power of the target timeslot without transient duration. (Figure. 5.5, 5.6.1 and 5.6.2) They are measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate.

Table 5.4.2.1: Transmitter power control tolerance

TPC_cmd	Transmitter power control range (all units are in dB)					
	1 dB step size		2 dB step size		3 dB step size	
	Lower	Upper	Lower	Upper	Lower	Upper
+ 1	+0.5	+1.5	+1	+3	+1.5	+4.5
0	–0.5	+0.5	–0.5	+0.5	–0.5	+0.5
– 1	–0.5	–1.5	–1	–3	–1.5	–4.5
+ 1 at or above max power threshold	–0.5	+1.5	–0.5	+3	–0.5	+4.5
– 1 at or below min power threshold	+0.5	–1.5	+0.5	–3	+0.5	–4.5

Table 5.4.2.2: Transmitter average power control tolerance

TPC_cmd group	Transmitter power control range after 10 equal TPC_cmd group (all units are in dB)				Transmitter power control range after 7 equal TPC_cmd groups (all units are in dB)	
	1 dB step size		2 dB step size		3 dB step size	
	Lower	Upper	Lower	Upper	Lower	Upper
+ 1	+8	+12	+16	+24	+16	+26
0	–1	+1	–1	+1	–1	+1
– 1	–8	–12	–16	–24	–16	–26
0,0,0,0,+1	+6	+14	N/A	N/A	N/A	N/A
0,0,0,0,–1	–6	–14	N/A	N/A	N/A	N/A

The reference for this requirement is [1] TS 25.101 subclause 6.4.2.1.1.

The requirements for the derivation of TPC_cmd are detailed in TS 25.214 subclauses 5.1.2.2.2 and 5.1.2.2.3.

5.4.2.3 Test purpose

- To verify that the UE inner loop power control size and response is meet to the described value shown in subclause 5.4.2.2.

- To verify that TPC_cmd is correctly derived from received TPC commands.

An excess error of the inner loop power control decreases the system capacity.

5.4.2.4 Method of test

5.4.2.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.4.2.3. The Uplink DPCH Power Control Info shall specify the Power Control Algorithm as algorithm 2 for interpreting TPC commands.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.4.2.3: Test parameters for Inner Loop Power Control

Parameter	Level / Status	Unit
Inner Loop Power Control	Enabled	

5.4.2.4.2 Procedure

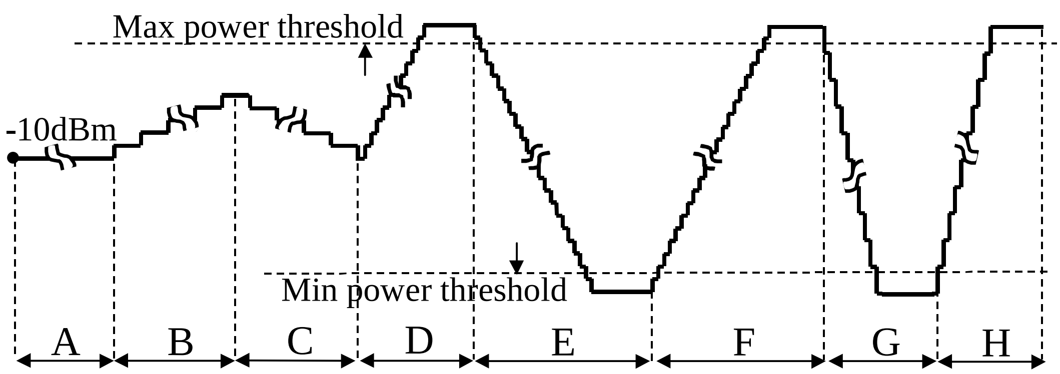


Figure 5.4.2.4 Inner Loop Power Control Test Steps

1) Set the downlink signal ($\hat{I}_{or}$) to yield an open loop output power, measured at the UE antenna connector, of -10±9 dBm.
2) Step A: Transmit a sequence of at least 30 and no more than 60 TPC commands, which shall commence at a frame boundary and last for a whole number of frames, and which shall contain:
   - no sets of 5 consecutive “0” or “1” commands which commence in the 1st, 6th or 11th slots of a frame;
   - at least one set of 5 consecutive “0” commands which does not commence in the 1st, 6th or 11th slots of a frame;
   - at least one set of 5 consecutive “1” commands which does not commence in the 1st, 6th or 11th slots of a frame.

   The following is an example of a suitable sequence of TPC commands:

1000001010101011111010000010101010111110100000101010101111110

3) Step B: Transmit a sequence of 50 TPC commands with the value 1.

4) Step C: Transmit a sequence of 50 TPC commands with the value 0.

5) Step D: Reconfigure the uplink channel to set the Power Control Algorithm to algorithm 1, and the TPC step size to 1 dB. Transmit a sequence of 90[1] TPC commands with the value 1.

6) Step E: Transmit a sequence of 150[1] TPC commands with the value 0.

7) Step F: Transmit a sequence of 150[1] TPC commands with the value 1.

8) Step G: Reconfigure the uplink channel to set the TPC step size to 2 dB (with the Power Control Algorithm remaining as algorithm 1). Transmit a sequence of 75[1] TPC commands with the value 0.

9) Step H: Transmit a sequence of 75[1] TPC commands with the value 1.

10) During steps A to H the mean output power of every slot shall be measured, with the following exceptions:

- In steps D and F, measurement of the output power is not required in slots after the 10th slot after the mean output power has exceeded the maximum power threshold;

- In steps E and G, measurement of the output power is not required in slots after the 10th slot after the mean output power has fallen below the minimum power threshold.

[1] NOTE: These numbers of TPC commands are given as examples. The actual number of TPC commands transmitted in these steps shall be at least 10 more than the number required to ensure that the UE reaches the relevant maximum or minimum power threshold in each step, as shown in Figure 5.4.2.4.

5.4.2.5 Test requirements

a) During Step A, the difference in mean output power between adjacent slots shall be within the prescribed range for a TPC_cmd of 0, as given in Table 5.4.2.1.

b) During Step A, the change in mean output power over 10 consecutive slots shall be within the prescribed range for a TPC_cmd group of 0, as given in Table 5.4.2.2.

c) During Step B, the difference in mean output power between adjacent slots shall be within the prescribed range given in Table 5.4.2.1, given that every 5th TPC_cmd should have the value + 1, with a step size of 1 dB, and all other TPC_cmd should have the value 0.

d) During Step B, the change in mean output power over 50 consecutive slots shall be within the prescribed range for a TPC_cmd group of {0,0,0,0,+1}, as given in Table 5.4.2.2.

e) During Step C, the difference in mean output power between adjacent slots shall be within the prescribed range given in Table 5.4.2.1, given that every 5th TPC_cmd should have the value – 1, with a step size of 1 dB, and all other TPC_cmd should have the value 0.

f) During Step C, the change in mean output power over 50 consecutive slots shall be within the prescribed range for a TPC_cmd group of {0,0,0,0,-1}, as given in Table 5.4.2.2.

g) During Step D, the difference in mean output power between adjacent slots shall be within the prescribed range given in Table 5.4.2.1 for a TPC_cmd of + 1 and step size of 1 dB, until the output power reaches (Maximum power threshold – 0.5 dB). When the output power is between the values of (Maximum power threshold – 0.5 dB) and (Maximum power threshold), the difference in mean output power between adjacent slots shall be at least sufficient to increase the output power to the Maximum power threshold, but shall not exceed + 1.5 dB. Once the output power is at or above the Maximum power threshold, the relevant condition in Table 5.4.2.1 shall be met.

h) During Step D, the change in mean output power over 10 consecutive slots shall be within the prescribed range for a TPC_cmd group of + 1 and step size of 1 dB as given in Table 5.4.2.2, until the output power reaches (Maximum power threshold – 0.5 dB).

i) During Step E, the difference in mean output power between adjacent slots shall be within the prescribed range given in Table 5.4.2.1 for a TPC_cmd of – 1 and step size of 1 dB, until the output power reaches (Minimum power threshold + 0.5 dB). When the output power is between the values of (Minimum power threshold + 0.5 dB) and (Minimum power threshold), the difference in mean output power between adjacent slots shall be at least sufficient to decrease the output power to the Minimum power threshold, but shall not exceed – 1.5 dB. Once the output power is at or below the Minimum power threshold, the relevant condition in Table 5.4.2.1 shall be met.

j) During Step E, the change in mean output power over 10 consecutive slots shall be within the prescribed range for a TPC_cmd group of – 1, and step size of 1 dB as given in Table 5.4.2.2, until the output power reaches (Minimum power threshold + 0,5 dB).

k) During Step F, the difference in mean output power between adjacent slots shall be within the prescribed range given in Table 5.4.2.1 for a TPC_cmd of + 1 and step size of 1 dB, until the output power reaches (Maximum power threshold – 0,5 dB). When the output power is between the values of (Maximum power threshold – 0,5 dB) and (Maximum power threshold), the difference in mean output power between adjacent slots shall be at least sufficient to increase the output power to the Maximum power threshold, but shall not exceed + 1,5 dB. Once the output power is at or above the Maximum power threshold, the relevant condition in Table 5.4.2.1 shall be met.

l) During Step F, the change in mean output power over 10 consecutive slots shall be within the prescribed range for a TPC_cmd group of + 1, and step size of 1 dB as given in Table 5.4.2.2, until the output power reaches (Maximum power threshold – 0,5 dB).

m) During Step G, the difference in mean output power between adjacent slots shall be within the prescribed range given in Table 5.4.2.1 for a TPC_cmd of – 1 and step size of 2 dB, until the output power reaches (Minimum power threshold + 1 dB). When the output power is between the values of (Minimum power threshold + 1 dB) and (Minimum power threshold), the difference in mean output power between adjacent slots shall be at least sufficient to decrease the output power to the Minimum power threshold, but shall not exceed – 3 dB. Once the output power is at or below the Minimum power threshold, the relevant condition in Table 5.4.2.1 shall be met.

n) During Step G, the change in mean output power over 10 consecutive slots shall be within the prescribed range for a TPC_cmd group of – 1, and step size of 2 dB as given in Table 5.4.2.2, until the output power reaches (Minimum power threshold +1 dB).

o) During Step H, the difference in mean output power between adjacent slots shall be within the prescribed range given in Table 5.4.2.1 for a TPC_cmd of + 1 and step size of 2 dB, until the output power reaches (Maximum power threshold –1 dB). When the output power is between the values of (Maximum power threshold –1 dB) and (Maximum power threshold), the difference in mean output power between adjacent slots shall be at least sufficient to increase the output power to the Maximum power threshold, but shall not exceed + 3 dB. Once the output power is at or above the Maximum power threshold, the relevant condition in Table 5.4.2.1 shall be met.

p) During Step H, the change in mean output power over 10 consecutive slots shall be within the prescribed range for a TPC_cmd group of + 1, and step size of 2 dB as given in Table 5.4.2.2, until the output power reaches (Maximum power threshold – 1 dB).

5.4.3 Minimum Output Power

5.4.3.1 Definition and applicability

The minimum controlled output power of the UE is when the power control setting is set to a minimum value. This is when both the inner loop and open loop power control indicate a minimum transmit output power is required.

The requirements and this test apply to all types of UTRA for the FDD UE.

5.4.3.2 Conformance requirements

The minimum transmit power is defined as an averaged power in a time slot measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate. The minimum transmit power shall be better than –50 dBm.

The reference for this requirement is [1] TS 25.101 subclause 6.4.3.1.

5.4.3.3 Test purpose

To verify that the UE minimum transmit power is below –50 dBm.

An excess minimum output power increases the interference to other channels, and decreases the system capacity.

5.4.3.4 Method of test

5.4.3.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.4.3.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.4.3: Test parameters for Minimum Output Power

Parameter	Level / Status	Unit
Inner Loop Power Control	Enabled	

5.4.3.4.2 Procedure

1) Set and send continuously Down power control commands to the UE.
2) Measure the output power of the UE by Tester.

5.4.3.5 Test requirements

The measured output power, derived in step 2), shall be below –50 dBm.

5.4.4 Out-of-synchronisation handling of output power

5.4.4.1 Definition and applicability

The UE shall monitor the DPCCH quality in order to detect a loss of the signal on Layer 1, as specified in [5] TS 25.214. The thresholds Q_{out} and Q_{in} specify at what DPCCH quality levels the UE shall shut its power off and when it may turn its transmitter on respectively. The thresholds are not defined explicitly, but are defined by the conditions under which the UE shall shut its transmitter off and turn it on, as stated in this clause.

5.4.4.2 Conformance requirements

The parameters in Table 5.4.4.1 are defined using the DL reference measurement channel (12.2 kbps) specified in Annex C.3.1 and with static propagation conditions.

Table 5.4.4.1: DCH parameters for test of Out-of-synch handling

Parameter	Value	Unit
$\hat{I}_{or}/I_{oc}$	–1	dB
I_{oc}	–60	dBm / 3.84 MHz
$\frac{DPDCH\_E_c}{I_{or}}$	See Figure 5.4.4.1: Before point A –16.6 After point A Not defined	dB
$\frac{DPCCH\_E_c}{I_{or}}$	See Figure 5.4.4.1	dB
Information Data Rate	12.2	kbps
TFCI	on	-

The conditions for when the UE shall shut its transmitter off and when it may turn it on are defined by the parameters in Table 5.4.4.1 together with the DPCH power level as defined in Figure 5.4.4.1.

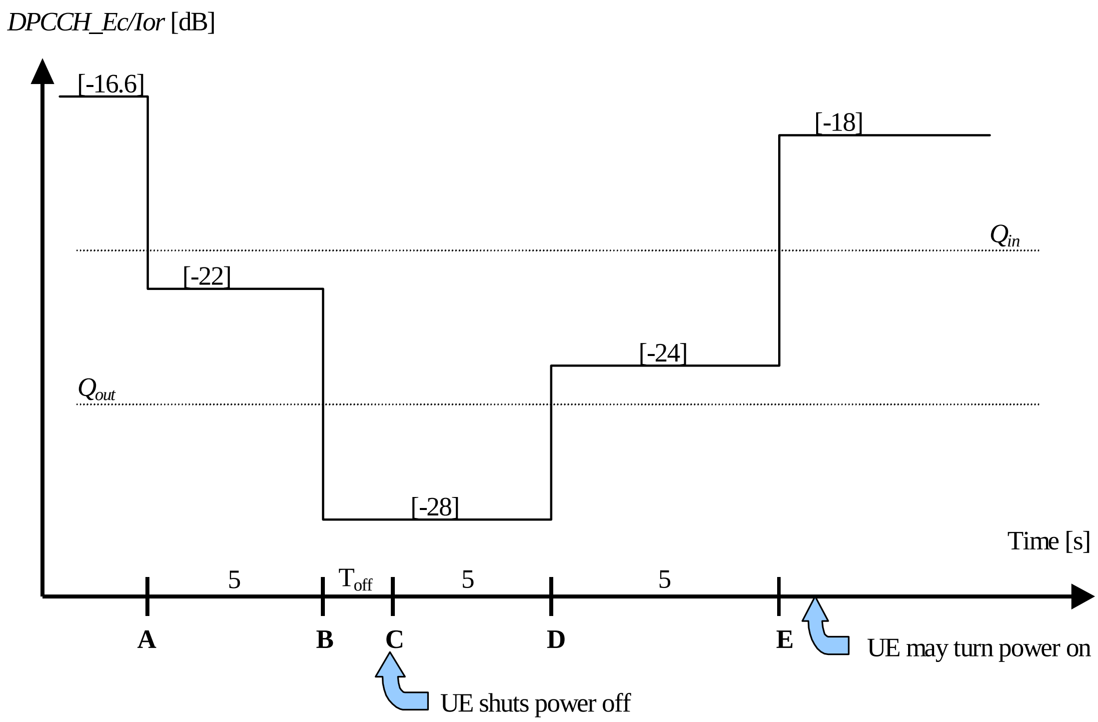


Figure 5.4.4.1: Conditions for out-of-synch handling in the UE.
The indicated thresholds Q_{out} and Q_{in} are only informative.

The requirements for the UE are that

1. The UE shall not shut its transmitter off before point B.
2. The UE shall shut its transmitter off before point C, which is Toff = [200] ms after point B.
3. The UE shall not turn its transmitter on between points C and E.
4. The UE may turn its transmitter on after point E.

The reference for this requirement is [1] TS 25.101 subclause 6.4.4.1.

5.4.4.3 Test purpose

[TBD]

5.4.4.4 Method of test

5.4.4.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.4.4.2.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.4.4.2: Test parameters for test of Out-of-synch handling

Parameter	Level / Status	Unit

5.4.4.4.2 Procedure

[TBD]

5.4.4.5 Test requirements

[TBD]

5.5 Transmit ON/OFF Power

5.5.1 Transmit OFF Power

5.5.1.1 Definition and applicability

The transmit OFF power state is when the UE does not transmit except during uplink DTX mode. This parameter is defined as the maximum output transmit power within the channel bandwidth when the transmitter is OFF.

The requirements and this test apply to all types of UTRA for the FDD UE.

5.5.1.2 Conformance requirements

The transmit OFF power is defined as an averaged power at least in a timeslot duration measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate. The requirement for the transmit OFF power shall be better than −56 dBm.

The reference for this requirement is [1] TS 25.101 subclause 6.5.1.1.

5.5.1.3 Test purpose

To verify that the UE transmit OFF power is below −56 dBm.

An excess transmit OFF power increases the interference to other channels, and decreases the system capacity.

5.5.1.4 Method of test

This test is also covered by subclause 5.5.2 Transmit ON/OFF Time mask.

5.5.1.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Annex E.3.1.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

5.5.1.4.2 Procedure

1) Send release message to the UE to stop transmitting.
2) Measure the leakage power within the transmission band from the UE by the Tester.

5.5.1.5 Test requirements

The measured leakage power, derived in step 2), shall be below −56 dBm.

5.5.2 Transmit ON/OFF Time mask

5.5.2.1 Definition and applicability

The time mask for transmit ON/OFF defines the ramping time allowed for the UE between transmit OFF power and transmit ON power. Possible ON/OFF scenarios are PRACH, CPCH or uplink slotted mode

The requirements and this test apply to all types of UTRA for the FDD UE.

5.5.2.2 Conformance requirements

The transmit power levels versus time should meet the mask specified in Figure 5.5, and the signal is measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate.

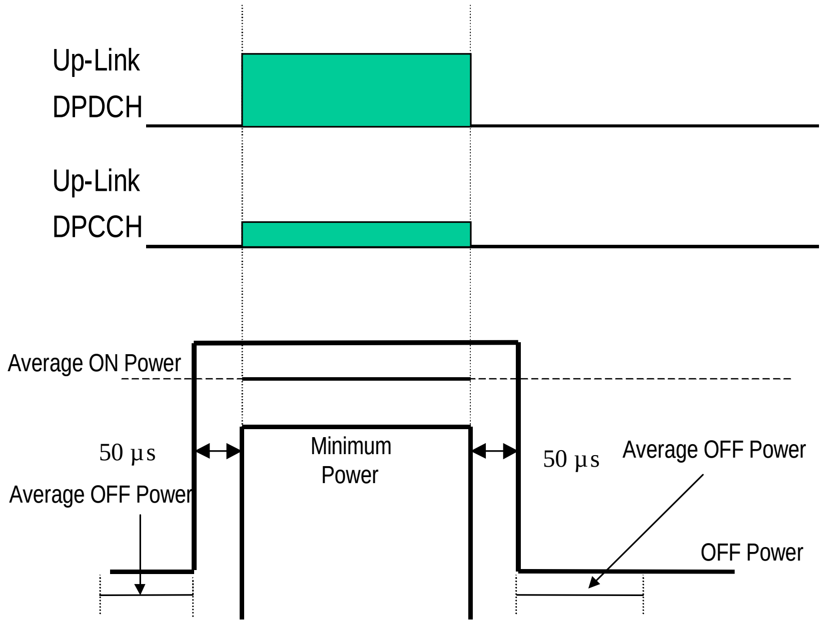


Figure 5.5: Transmit ON/OFF template

OFF Power is defined in 5.5.1.

ON power is defined as either case as follows. The specification depends on each possible case.

- First preamble of PRACH: Open loop accuracy (subclause 5.4.1).
- During preamble ramping of the RACH and compressed mode: Accuracy depending on size of the power step (subclause 5.6).
- Power step to Maximum Power: Maximum power accuracy (subclause 5.2).

The reference for this requirement is [1] TS 25.101 subclause 6.5.2.1.

This is tested using PRACH operation.

The minimum requirement for ON power is defined in subclause 5.4.1.2.

The minimum requirement for OFF power is defined in subclause 5.5.1.2.

5.5.2.3 Test purpose

To verify that the UE transmit ON/OFF power levels versus time meets the described mask shown in Figure 5.5.

An excess error of transmit ON/OFF response increases the interference to other channels, or increases transmission errors in the up link own channel.

5.5.2.4 Method of test

5.5.2.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.5.2.1.

   The RACH procedure within the call setup is used for the test.

See [3] TS 34.108 for details regarding generic call setup procedure.

Table 5.5.2.1: Test parameters for Transmit ON/OFF Time mask (UE)

Parameter	Level / Status	Unit
$\hat{I}_{or}$	See Table 5.5.2.2	dBm / 3.84 MHz
Inner Loop Power Control	Disabled	

Table 5.5.2.2: Test parameters for Transmit ON/OFF Time mask (SS)

Parameter	Upper dynamic range	middle	Sensitivity level
$\hat{I}_{or}$ 3)	[–25.0 dBm / 3.84 MHz]	[–65.7 dBm / 3.84 MHz]	[–106.7 dBm / 3.84 MHz]
CPICH_RSCP 3),4)	[–28.3 dBm]	[–69 dBm]	[–110 dBm]
Primary CPICH DL TX power	[+25 dBm]	[+31 dBm]	[+19 dBm]
Simulated path loss = Primary CPICH DL TX power – CPICH_RSCP	[+53.3 dB]	[+100 dB]	[+129 dB]
UL interference	[–75 dBm]	[–101 dBm]	[–110 dBm]
Constant Value	[–10 dB]	[–10 dB]	[–10 dB]
Expected nominal UE TX power	[–31.7 dBm]	[–11 dBm]	[+9 dBm] 2)

NOTE 1: While the SS transmit power shall cover the receiver input dynamic range, the logical parameters: broadcasted transmit power, I_{BTS}, constant factor are chosen to achieve a UE TX power, located within the TX output power dynamic range of a class 4 UE.

NOTE 2: Nominal TX output power 9 dBm allows to check the open loop power algorithm within the entire tolerance range (9 dBm ± 12 dB; 9dBm + 12dB = 21dBm = max power class 4).

NOTE 3: The power level of SCCPCH should be defined because SCCPCH is transmitted instead of DPCH during Preamble RACH transmission period. Currently, it is assumed that Table E.3.1 is utilised for DL physical channel condition. The power level of SCCPCH is temporarily set to the same as DL DPCH. However, it is necessary to check whether the above SCCPCH level is enough to establish a connection with the reference measurement channels.

NOTE 4: The purpose of this parameter is to calculate the Expected nominal UE TX power.

5.5.2.4.2 Procedure

1) Set the TX output level of the SS to obtain $\hat{I}_{or}$ at the UE antenna connector. $\hat{I}_{or}$ shall be according to Table 5.5.2.2 ([–25 dBm / 3.84 MHz]).

2) Measure the RACH output power of the UE according to Annex B.

3) Measure OFF power immediate before and after RACH (ON power) except transient period.

4) Repeat the above measurement for all SS levels in Table 5.5.2.2.

5.5.2.5 Test requirements

The deviation with respect to the Expected nominal UE TX power (Table 5.5.2.2), derived in step 2), shall not exceed the prescribed tolerance in Table 5.4.1.1. (Subclause 5.4.1.2).

The measured leakage power, derived in step 3), shall be below –56 dBm. (Subclause 5.5.1.2).

5.6 Change of TFC

5.6.1 Definition and applicability

A change of TFC (Transport Format Combination) in uplink means that the power in the uplink varies according to the change in data rate. DTX, where the DPCH is turned off, is a special case of variable data, which is used to minimise the interference between UE(s) by reducing the UE transmit power when voice, user or control information is not present.

The requirements and this test apply to all types of UTRA for the FDD UE.

5.6.2 Conformance requirements

A change of output power is required when the TFC, and thereby the data rate, is changed. The ratio of the amplitude between the DPDCH codes and the DPCCH code will vary. The power step due to a change in TFC shall be calculated in the UE so that the power transmitted on the DPCCH shall follow the inner loop power control. The power step shall then be rounded to the closest integer dB value. The accuracy of the power step, given the step size is specified in Table 5.6.1. The power change by TFC is defined as the relative power differences between the averaged power of original (reference) timeslot and the averaged power of target timeslot without transient duration. And they are measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate.

Table 5.6.1: Transmitter power step tolerance

Power control step size (Up or down) ΔP [dB]	Transmitter power step tolerance
1	+/– 0.5 dB
2	+/– 1.0 dB
3	+/– 1.5 dB
$4 \le \Delta P \le 10$	+/– 2 dB
$11 \le \Delta P \le 15$	+/– 3 dB
$16 \le \Delta P \le 20$	+/– 4 dB
$21 \le \Delta P$	+/– 6 dB

Clause C.2.1 defines the UL reference measurement channels (12,2 kbps) for TX test and the power ratio between DPCCH and DPDCH as –6 dB. Therefore, only one power control step size is selected as minimum requirement from Table 5.6.1. The accuracy of the power step, given the step size is specified in Table 5.6.2.

Table 5.6.2: Transmitter power step tolerance for test

Quantized amplitude ratios β_c and β_d	Power control step size (Up or down) ΔP [dB]	Transmitter power step tolerance
$\beta_c = 0.5333$, $\beta_d = 1.0$	7	+/– 2 dB

The transmit power levels versus time should meet the mask specified in Figure 5.6.1. When power increases the power step shall be performed before the frame boundary, when power decreases the power step shall be performed after the frame boundary.

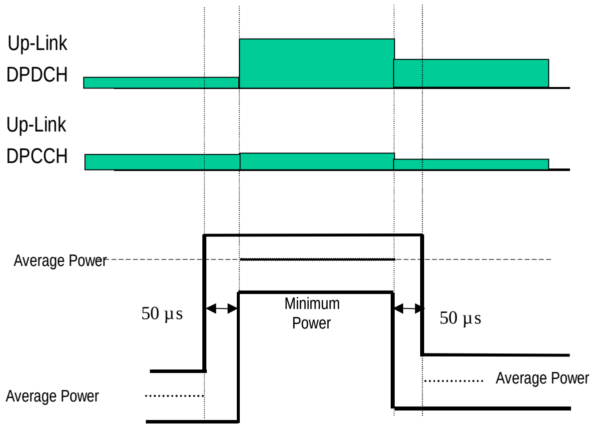


Figure 5.6.1: Transmit template during TFC change

The UL reference measurement channel (12.2 kbps) is fixed rate channel. Therefore, DTX, where the DPDCH is turned off, is tested, as shown in Figure 5.6.2.

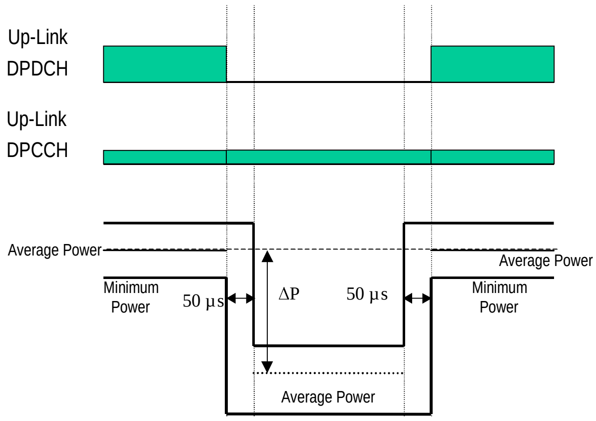


Figure 5.6.2: Transmit template during DTX

The reference for this requirement is [1] TS 25.101 subclause 6.5.3.1.

5.6.3 Test purpose

To verify that the tolerance of power control step size does not exceed the described value shown in Table 5.6.2.

To verify that the DTX ON/OFF power levels versus time meets the described mask shown in Figure 5.6.2.

5.6.4 Method of test

5.6.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.

2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Annex E. The Uplink DPCH Power Control Info shall specify the Power Control Algorithm as algorithm 2 for interpreting TPC commands.

3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

5.6.4.2 Procedure

1) Set the attenuation in the downlink signal ($\hat{I}_{or}$) to yield an open loop output power, measured at the UE antenna connector, of 0 dBm.
2) Send alternating “0” and “1” TPC commands in the downlink so as to satisfy the condition of obtaining TPC_cmd = 0.
3) Measure the average output power at the antenna connector of the UE by Tester in two cases, both DPDCH and DPCCH are ON and only DPCCH is ON.

5.6.5 Test requirements

The difference in mean output power between DPDCH ON and OFF, derived in step 3), shall not exceed the prescribed range in Table 5.6.2.

5.7 Power setting in uplink compressed mode

5.7.1 Definition and applicability

Compressed mode in uplink means that the power in uplink is changed.

The requirements and this test apply to all types of UTRA for the FDD UE.

5.7.2 Conformance requirements

A change of output power is required during uplink compressed frames since the transmission of data is performed in a shorter interval. The ratio of the amplitude between the DPDCH codes and the DPCCH code will also vary. The power step due to compressed mode shall be calculated in the UE so that the energy transmitted on the pilot bits during each transmitted slot shall follow the inner loop power control. Thereby the power step during the transmitted part of a compressed frame shall be such that the power on the DPCCH follows the inner loop power control with an additional power offset during a compressed frame of Npilot,N / Npilot,C where Npilot,C is the number of pilot bits per slot when in compressed mode, and Npilot,N is the number of pilot bits per slot in normal mode.

In addition to any power change due to the ratio $N_{pilot,N} / N_{pilot,C}$, the average power in the first slot after a compressed mode transmission gap shall differ from the average power in the last slot before the transmission gap by an amount Δ_{RESUME}, where Δ_{RESUME} is calculated as described in subclause 5.1.2.3 of [5] TS 25.214.

The combined power step shall then be rounded to the closest integer dB value. The accuracy of the power step, given the step size is specified in Table 5.6.1 in paragraph 5.6.2. The power step is defined as the relative power differences between the average power of original (reference) timeslot and the averaged power of target timeslot. During the compress mode, the average should be done in only either power ON duration. The relative power is measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate.

The transmit power levels versus time shall meet the mask specified in Figure 5.7.1. When power increases the power step shall be performed before the actual slot boundary, when power decreases the power step shall be performed after the actual slot boundary.

The reference for this requirement is [1] TS 25.101 subclause 6.5.4.1.

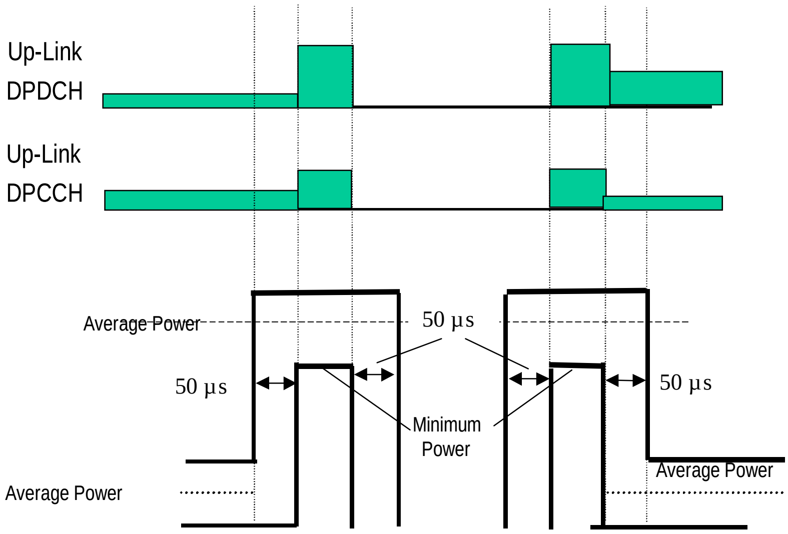


Figure 5.7.1: Transmit template during Compressed mode

The mean power in the transmission gaps, not including the 50 µs transition periods, shall be less than –56 dBm. The reference for this requirement is [1] TS 25.101 subclause 6.5.1.1.

For RPL (Recovery Period Length) slots after the transmission gap, where RPL is the minimum out of the transmission gap length and 7 slots, the UE shall use the power control algorithm and step size specified by the signalled Power Control Mode, as detailed in TS 25.214 subclause 5.1.2.3.

When nominal 3 dB power control steps are used in the recovery period, the transmitter output power steps due to inner loop power control shall be within the range shown in Table 5.7.2, and the transmitter average output power step due to inner loop power control shall be within the range shown in Table 5.7.3, excluding any other power changes due, for example, to changes in spreading factor or number of pilot bits.

Table 5.7.2: Transmitter power control range for 3dB step size

TPC_cmd	Transmitter power control range for 3dB step size	
	Lower	Upper
+ 1	+1.5 dB	+4.5 dB
0	–0.5 dB	+0.5 dB
– 1	–1.5 dB	–4.5 dB

Table 5.7.3: Transmitter average power control range for 3dB step size

TPC_cmd group	Transmitter power control range after 7 equal TPC_cmd groups	
	Lower	Upper
+ 1	+16 dB	+26 dB
0	–2 dB	+2 dB
– 1	–16 dB	–26 dB

The reference for this requirement is [1] TS 25.101 subclause 6.4.2.1.1.

5.7.3 Test purpose

To verify that the changes in uplink transmit power in compressed mode are within the prescribed tolerances.

Excess error in transmit power setting in compressed mode increases the interference to other channels, or increases transmission errors in the uplink.

5.7.4 Method of test

5.7.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.

2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.7.4. The 12.2 kbps UL reference measurement channel is used, with gain factors $\beta_c = 0.5333$ and $\beta_d = 1$.

3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.7.4: Test parameters for Power Setting in Uplink Compressed Mode

Parameter	Level / Status	Unit
Inner Loop Power Control	Enabled	

5.7.4.2 Procedure

<Editor's Note: The following procedure and test requirements are still under discussion. This might not be consistent with the core specification TS25.101 until the next revision.>

1) Set the attenuation in the downlink signal (Îor) to yield an open loop output power, measured at the UE antenna connector, of –10 dBm.

2) Signal the uplink power control parameters to use Algorithm 1 and a step size of 2 dB.

3) Use Slot Format #0 on the uplink DPCCH.

4) During the time period between CFN #57 and CFN #253, signal the following sets of compressed mode parameters. These sets of compressed mode parameters define 5 compressed mode patterns which are used for the test between CFN #254 and CFN #56.

Pattern A

This set of compressed mode parameters results in a set of 5 uplink frames in which the first 2 frames are compressed, with a 10-slot transmission gap beginning at the 11th slot of the first compressed frame, as shown in Figure 5.7.2.

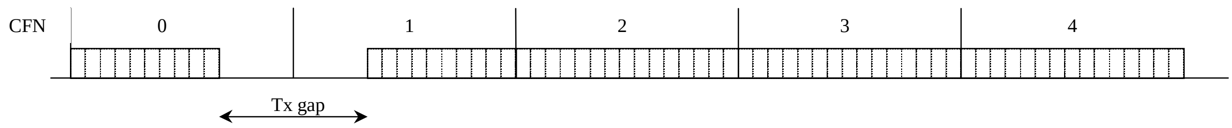


Figure 5.7.2: Pattern A for compressed mode test

This is used to test the implementation of PRM = 0 and PCM = 0.

Parameter	Value
TGL	10 slots
CFN	0
SN	10
TGP1	5 frames
TGD	0
PD	5 frames
PCM	0
PRM	0
UL/DL Mode	UL/DL
Compressed Mode Method	SF/2
Scrambling code change	No code change
Downlink frame type	A
DeltaSIR	0
DeltaSIRafter	0

Pattern B

This set of compressed mode parameters results in a series of 10 sets of 3 frames in which the first 2 frames in each set are compressed, with a 10-slot transmission gap beginning at the 11th slot of the first compressed frame.

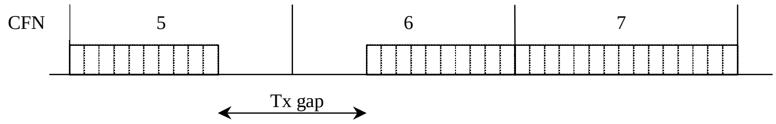


Figure 5.7.3: Pattern B for compressed mode test

This is used to test the implementation of 3dB output power steps and PCM = 1.

Parameter	Value
TGL	10 slots
CFN	5
SN	10
TGP1	3
TGD	0
PD	30
PCM	1
PRM	0
UL/DL Mode	UL/DL
Compressed Mode Method	SF/2
Scrambling code change	No code change
Downlink frame type	A
DeltaSIR	0
DeltaSIRafter	0

Pattern C

This set of compressed mode parameters results in 4 sets of 4 frames in which the first 2 frames in each set are compressed, with a 10-slot transmission gap beginning at the 11th slot of the first compressed frame.

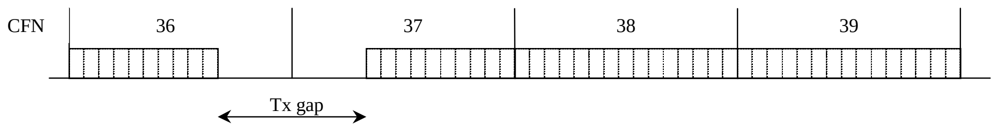


Figure 5.7.4: Pattern C for compressed mode test

This is used to test the implementation of PRM = 1.

Parameter	Value
TGL	10 slots
CFN	36
SN	10
TGP1	4
TGD	0
PD	16
PCM	0
PRM	1
UL/DL Mode	UL/DL
Compressed Mode Method	SF/2
Scrambling code change	No code change
Downlink frame type	A
DeltaSIR	0
DeltaSIRafter	0

Pattern D

This set of compressed mode parameters results in a set of 2 frames in which the first frame is compressed, with a 4-slot transmission gap beginning in the 1st slot of the compressed frame.

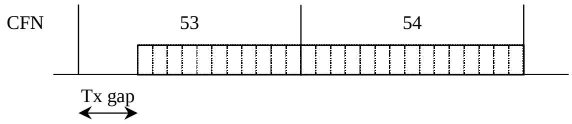


Figure 5.7.5: Pattern D for compressed mode test

This is used to test the implementation of a transmission gap at the start of a frame.

Parameter	Value
TGL	4 slots
CFN	53
SN	0
TGP1	2
TGD	0
PD	2
PCM	0
PRM	1
UL/DL Mode	UL/DL
Compressed Mode Method	SF/2
Scrambling code change	No code change
Downlink frame type	A
DeltaSIR	0
DeltaSIRafter	0

Pattern E

This set of compressed mode parameters results in a set of 2 frames in which the first frame is compressed, with a 4-slot transmission gap beginning at the 12th slot of the compressed frame.

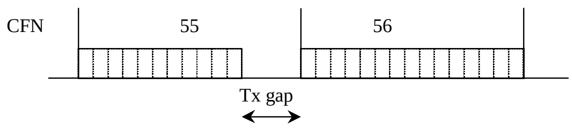


Figure 5.7.6: Pattern E for compressed mode test

This is used to test the implementation of a transmission gap at the end of a frame.

Parameter	Value
TGL	4 slots
CFN	55
SN	11
TGP1	2
TGD	0
PD	2
PCM	0
PRM	1
UL/DL Mode	UL/DL
Compressed Mode Method	SF/2
Scrambling code change	No code change
Downlink frame type	A
DeltaSIR	0
DeltaSIRafter	0

5) Transmit TPC commands on the downlink as follows:

CFN	TPC commands in downlink	Compressed Mode Pattern
254 (and all previous even-numbered CFNs)	0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	
255 (and all previous odd-numbered CFNs)	1 0 1 0 1 0 1 0 1 0 1 0 1 0 1	
0	0 1 1 1 1 1 1 1 1 1 - - - - -	A
1	- - - - - 0 0 0 0 0 0 0 0 0 1	
2	0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	
3	1 0 1 0 1 0 1 0 1 0 1 0 1 0 1	
4	0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	
5, 8, 11, 14, 17	1 1 1 1 1 1 1 1 1 1 - - - - -	B
6, 9, 12, 15, 18	- - - - - 0 0 0 0 0 0 0 1 0 1	
7, 10, 13, 16, 19	0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	
20	1 0 1 0 1 0 1 0 1 0 - - - - -	
23, 26, 29, 32	0 0 0 0 0 0 0 0 0 0 - - - - -	
21, 24, 27, 30, 33	- - - - - 1 1 1 1 1 1 1 0 1 0	
22, 25, 28, 31, 34	1 0 1 0 1 0 1 0 1 0 1 0 1 0 1	
35	0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	
36	1 0 0 0 0 0 0 0 0 0 - - - - -	C
37	- - - - - 1 1 1 0 1 0 1 0 1 0	
38	1 0 1 0 1 0 1 0 1 0 1 0 1 0 1	
39	0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	
40	1 0 0 0 0 0 0 0 0 0 - - - - -	
41	- - - - - 0 0 0 0 0 0 0 1 0 1	
42	0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	
43	1 0 1 0 1 0 1 0 1 0 1 0 1 0 1	
44, 48	0 1 1 1 1 1 1 1 1 1 - - - - -	
45, 49	- - - - - 0 0 0 1 0 1 0 1 0 1	
46, 50	0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	
47, 51	1 0 1 0 1 0 1 0 1 0 1 0 1 0 1	
52	1 1 1 1 1 1 0 1 0 1 0 1 0 1 0	
53	- - - - 0 1 0 1 0 1 0 1 0 1 0	D
54	1 0 1 0 1 0 1 0 1 0 1 1 1 1 1	
55	1 1 0 1 0 1 0 1 0 1 0 - - - -	E
56	0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	

6) Measure the mean output power in every slot (not including 50 µs transition periods) which is:

- the last slot before a compressed frame; *or*
- the first slot in a compressed frame; *or*
- the last slot before a transmission gap; *or*
- the first slot after a transmission gap; *or*
- the last slot of a compressed frame; *or*
- the first slot after a compressed frame.

Measure the mean output power in every uplink transmission gap (not including 50 µs transition periods).

5.7.5 Test requirements

For ease of reference, the following uplink output power measurements are defined in Figure 5.7.7. In this figure:

- P_i is the mean power in the uplink transmission gap, excluding the 50 µs transient periods.

When the transmission gap is not at the beginning of a compressed frame:

- P_a is the mean power in the last slot before the compressed frame (or pair of compressed frames), excluding the 50 µs transient period.
- P_b is the mean power in the first slot of the compressed frame.
- P_c is the mean power in the last slot before the transmission gap.

When the transmission gap is not at the end of a compressed frame:

- P_d is the mean power in the first slot after the transmission gap.
- P_e is the mean power in the last slot of the compressed frame.
- P_f is the mean power in the first slot after the compressed frame (or pair of compressed frames), excluding the 50 µs transient period.

When the transmission gap is at the beginning of the compressed frame:

- P_g is the mean power in the last slot before the compressed frame.

When the transmission gap is at the end of the compressed frame:

- P_h is the mean power in the first slot after the compressed frame.

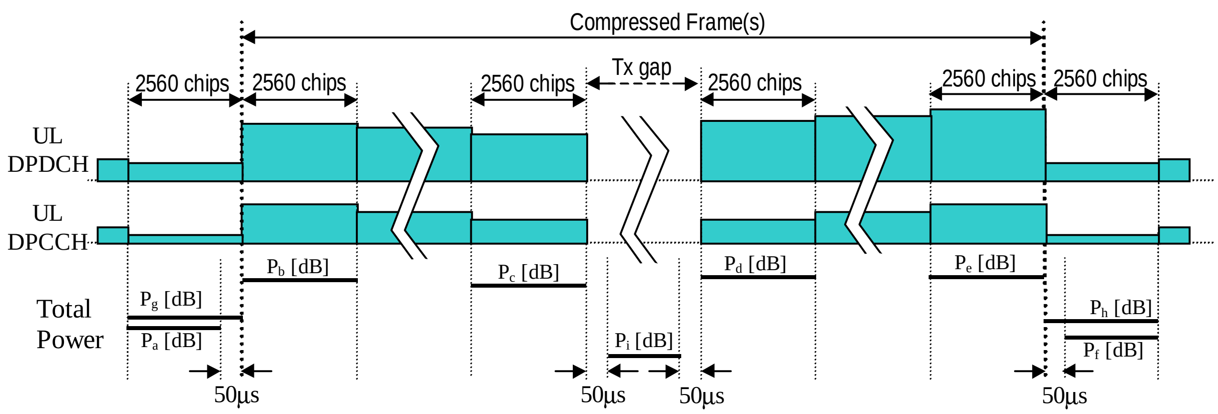


Figure 5.7.7: Uplink transmit power in uplink compressed mode

1. In CFNs 0, 23, 26, 29, 32, 44 and 48, $P_b - P_a$ should be within the range 4 ± 2 dB.
2. In CFNs 5, 8, 11, 14, 17, 20, 36 and 40 $P_b - P_a$ should be within the range 0 ± 0.5 dB.
3. In CFNs 1, 6, 9, 12, 15, 18, 21, 24, 27, 30 and 33, $P_d - P_c$ should be within the range 0 ± 0.5 dB.
4. In CFNs 0, 1, 5, 6, 8, 9, 11, 12, 14, 15, 17, 18, 20, 21, 23, 24, 26, 27, 29, 30, 32, 33, 36, 37, 40, 41, 44, 45, 48, 49, 53 and 55, P_i should be less than –56 dBm.
5. In CFNs 2, 7, 10, 13, 16, 19, 42, 46 and 50, $P_f - P_e$ should be within the range 0 ± 0.5 dB.
6. In CFNs 22, 25, 28, 31, 34, 38 and 54, $P_f - P_e$ should be within the range – 4 ± 2 dB.
7. In slots 5-12 of CFN 1, the difference in mean output power between adjacent slots should be within the range given in Table 5.4.2.1 for TPC_cmd = –1 with a 2 dB step size.

8. In slots 5-12 of CFNs 6, 9, 12, 15 and 18, the difference in mean output power between adjacent slots should be within the range given in Table 5.7.2 for TPC_cmd = –1.
9. In slots 5-12 of CFNs 6, 9, 12, 15 and 18, the change in mean output power over the 7 slots should be within the range given in Table 5.7.3 for TPC_cmd = –1.
10. In slots 5-12 of CFNs 21, 24, 27, 30 and 33, the difference in mean output power between adjacent slots should be within the range given in Table 5.7.2 for TPC_cmd = 1.
11. In slots 5-12 of CFNs 21, 24, 27, 30 and 33, the change in mean output power over the 7 slots should be within the range given in Table 5.7.3 for TPC_cmd = –1.
12. In CFN 37, $P_d - P_c$ should be within the range +12 ± 3 dB.
13. In CFN 41, $P_d - P_c$ should be within the range +13 ± 3 dB.
14. In CFN 45, $P_d - P_c$ should be within the range –12 ± 3 dB.
15. In CFN 49, $P_d - P_c$ should be within the range –13 ± 3 dB.
16. In CFN 53, $P_d - P_g$ should be within the range –3 ± 1.5 dB.
17. In CFN 55, $P_b - P_a$ should be within the range +4 ± 2 dB.
18. In CFN 56, $P_h - P_c$ should be within the range –6 ± 2 dB.

5.8 Occupied Bandwidth (OBW)

5.8.1 Definition and applicability

Occupied bandwidth is a measure of the bandwidth containing 99 % of the total integrated power of the transmitted spectrum, centred on the assigned channel frequency.

The requirements and this test apply to all types of UTRA for the FDD UE.

5.8.2 Conformance requirements

The occupied channel bandwidth shall be less than 5 MHz based on a chip rate of 3.84 Mcps.

The reference for this requirement is [1] TS 25.101 subclause 6.6.1.

5.8.3 Test purpose

To verify that the UE occupied channel bandwidth is less than 5 MHz based on a chip rate of 3.84 Mcps.

Excess occupied channel bandwidth increases the interference to other channels or to other systems.

5.8.4 Method of test

5.8.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.8.1.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.8.1: Test parameters for Occupied Bandwidth

Parameter	Level / Status	Unit
Inner Loop Power Control	Enabled	
DTX mode	Off	

5.8.4.2 Procedure

1) Set and send continuously Up power control commands to the UE until the UE output power shall be maximum level.

2) Measure the power spectrum distribution within two times or more range over the requirement for Occupied Bandwidth specification centring on the current carrier frequency with 30 kHz or less RBW. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter).

3) Calculate the total power within the range of all frequencies measured in ‘2)’ and save this value as "Total Power".

4) Sum up the power upward from the lower boundary of the measured frequency range in ‘2)’ and seek the limit frequency point by which this sum becomes 0.5 % of "Total Power" and save this point as "Lower Frequency".

5) Sum up the power downward from the upper boundary of the measured frequency range in ‘2)’ and seek the limit frequency point by which this sum becomes 0.5 % of "Total Power" and save this point as "Upper Frequency".

Calculate the difference ("Upper Frequency" – "Lower Frequency" = "Occupied Bandwidth") between two limit frequencies obtained in ‘4)’ and ‘5)’.

5.8.5 Test requirements

The measured Occupied Bandwidth, derived in step 6), shall not exceed 5 MHz.

5.9 Spectrum emission mask

5.9.1 Definition and applicability

The spectrum emission mask of the UE applies to frequencies, which are between 2.5 MHz and 12.5 MHz away from the UE centre carrier frequency. The out of channel emission is specified relative to the UE output power measured in a 3.84 MHz bandwidth.

The requirements and this test apply to all types of UTRA for the FDD UE.

5.9.2 Conformance requirements

The power of any UE emission shall not exceed the levels specified in Table 5.9.1.

Table 5.9.1: Spectrum Emission Mask Requirement

Frequency offset from carrier Δf	Minimum requirement	Measurement bandwidth
2.5 - 3.5 MHz	–35 – 15*(Δf – 2.5) dBc	30 kHz *
3.5 - 7.5 MHz	–35 – 1*(Δf – 3.5) dBc	1 MHz *
7.5 - 8.5 MHz	–39 – 10*(Δf – 7.5) dBc	1 MHz *
8.5 - 12.5 MHz	–49 dBc	1 MHz *

NOTE*:

1. The first and last measurement position with a 30 kHz filter is 2.515 MHz and 3.485 MHz.

2. The first and last measurement position with a 1 MHz filter is 4 MHz and 12 MHz.

3. The lower limit shall be –50 dBm / 3.84 MHz or which ever is higher.

The reference for this requirement is [1] TS 25.101 subclause 6.6.2.1.1.

5.9.3 Test purpose

To verify that the power of UE emission does not exceed the prescribed limits shown in Table 5.9.1.

Excess emission increases the interference to other channels or to other systems.

5.9.4 Method of test

5.9.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.9.2.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.9.2: Test parameters for UE spectrum emission mask

Parameter	Level / Status	Unit
Inner Loop Power Control	Enabled	
DTX mode	Off	

5.9.4.2 Procedure

1) Set and send continuously Up power control commands to the UE until the UE output power shall be maximum level.
2) Measure the power of the transmitted signal with a measurement filter of bandwidths according to Table 5.9.1. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). The centre frequency of the filter shall be stepped in contiguous steps according to Table 5.9.1. The measured power shall be recorded for each step.
3) Measure the wanted output power according to Annex B.
4) Calculate the ratio of the power 2) with respect to 3) in dBc.

5.9.5 Test requirements

The result of 5.9.4.2 step 4) shall fulfil the requirements of Table 5.9.1.

5.10 Adjacent Channel Leakage Power Ratio (ACLR)

5.10.1 Definition and applicability

ACLR is the ratio of the transmitted power to the power measured in an adjacent channel. Both the transmitted power and the adjacent channel power are measured with a filter that has a Root-Raised Cosine (RRC) filter response with roll-off α=0.22 and a bandwidth equal to the chip rate.

The requirements and this test apply to all types of UTRA for the FDD UE.

5.10.2 Conformance requirements

If the adjacent channel power is greater than –50dBm then the ACLR should be higher than the value specified in Table 5.10.1.

Table 5.10.1: UE ACLR due to modulation

Power Class	UE channel	ACLR limit
3	+ 5 MHz or – 5 MHz	33 dB
	+ 10 MHz or – 10 MHz	43 dB
4	+ 5 MHz or – 5 MHz	33 dB
	+ 10 MHz or – 10 MHz	43 dB

The reference for this requirement is [1] TS 25.101 subclause 6.6.2.2.1.

5.10.3 Test purpose

To verify that the UE ACLR due to modulation does not exceed prescribed limit shown in Table 5.10.1.

Excess ACLR increase the interference to other channels or to other systems.

5.10.4 Method of test

5.10.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.

2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.10.2.

3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.10.2: Test parameters for Leakage Power due to Modulation

Parameter	Level / Status	Unit
Inner Loop Power Control	Enabled	
DTX mode	Off	

5.10.4.2 Procedure

1) Set and send continuously Up power control commands to the UE until the UE output power shall be maximum level.

2) Measure the power within the bandwidth of current carrier through a matched filter (RRC 0.22).

3) Measure the power fallen in the bandwidth of the first adjacent channels and the second adjacent channels through a matched filter (RRC 0.22).

4) Calculate the ratio of the power between the values measured in ‘2)’and ‘3)’.

5.10.5 Test requirements

If the measured adjacent channel power, derived in step 3), is greater than –50dBm then the measured ACLR, derived in step 4), shall be higher than the limit in Table 5.10.1.

5.11 Spurious Emissions

5.11.1 Definition and applicability

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions.

The frequency boundary and the detailed transitions of the limits between the requirement for out band emissions and spectrum emissions are based on ITU-R Recommendations SM.329.

The requirements and this test apply to all types of UTRA for the FDD UE.

5.11.2 Conformance requirements

These requirements are only applicable for frequencies, which are greater than 12.5 MHz away from the UE centre carrier frequency.

Table 5.11.1a: General spurious emissions requirements

Frequency Bandwidth	Resolution Bandwidth	Minimum requirement
9 kHz ≤ f < 150 kHz	1 kHz	–36 dBm
150 kHz ≤ f < 30 MHz	10 kHz	–36 dBm
30 MHz ≤ f < 1000 MHz	100 kHz	–36 dBm
1 GHz ≤ f < 12.75 GHz	1 MHz	–30 dBm

Table 5.11.1b: Additional spurious emissions requirements

Frequency Bandwidth	Resolution Bandwidth	Minimum requirement
1893.5 MHz < f < 1919.6 MHz	300 kHz	–41 dBm
925 MHz ≤ f ≤ 935 MHz	100 kHz	–67 dBm *
935 MHz < f ≤ 960 MHz	100 kHz	–79 dBm *
1805 MHz ≤ f ≤ 1880 MHz	100 kHz	–71 dBm *

*NOTE: The measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the applicable requirements defined in Table 5.11.1a are permitted for each UARFCN used in the measurement.

The reference for this requirement is [1] TS 25.101 subclause 6.6.3.1.

5.11.3 Test purpose

To verify that the UE spurious emissions do not exceed described value shown in Table 5.11.1a and Table 5.11.1b.

Excess spurious emissions increase the interference to other systems.

5.11.4 Method of test

5.11.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.

2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.11.2.

3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.11.2: Test parameters for Spurious Emissions

Parameter	Level / Status	Unit
Inner Loop Power Control	Enabled	

5.11.4.2 Procedure

1) Set and send continuously Up power control commands to the UE until the UE output power shall be maximum level.

2) Sweep the spectrum analyzer (or equivalent equipment) over a frequency range and measure the average power of spurious emission.

5.11.5 Test requirements

The measured average power of spurious emission, derived in step 2), shall not exceed the described value in Table 5.11.1a and 5.11.1b.

5.12 Transmit Intermodulation

5.12.1 Definition and applicability

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

UE(s) transmitting in close vicinity of each other can produce intermodulation products, which can fall into the UE, or BS receive band as an unwanted interfering signal. The UE transmit intermodulation attenuation is defined by the ratio of the output power of the wanted signal to the output power of the intermodulation product when an interfering CW signal is added at a level below the wanted signal. Both the wanted signal power and the IM product power are measured with a filter that has a Root-Raised Cosine (RRC) filter response with roll-off $\alpha = 0,22$ and a bandwidth equal to the chip rate.

The requirements and this test apply to all types of UTRA for the FDD UE.

5.12.2 Conformance requirements

The UE transmit intermodulation shall not exceed the described value in Table 5.12.1.

Table 5.12.1: Transmit Intermodulation

CW Signal Frequency Offset from Transmitting Carrier	5MHz	10MHz
Interference CW Signal Level	–40 dBc	
Intermodulation Product	–31 dBc	–41 dBc

The reference for this requirement is [1] TS 25.101 subclause 6.7.1.

5.12.3 Test purpose

To verify that the UE transmit intermodulation does not exceed the described value in Table 5.12.1.

An excess transmit intermodulation increases transmission errors in the up link own channel when other transmitter exists nearby.

5.12.4 Method of test

5.12.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.2.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.12.2.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.12.2: Test parameters for Transmit Intermodulation

Parameter	Level / Status	Unit
Inner Loop Power Control	Enabled	

5.12.4.2 Procedure

1) Set and send continuously Up power control commands to the UE until the UE output power shall be maximum level.
2) Set the frequency of the CW generator to the offset 1 or offset 2 as shown in Table 5.12.1.
3) Measure the average output power of the UE by spectrum analyzer (or equivalent equipment) through RRC filter.
4) Search the intermodulation product signal, then measure the average power of transmitting intermodulation through RRC filter, and calculate the ratio to the average output power of UE.
5) Repeat the measurement with another tone offset.

5.12.5 Test requirements

The measured average power of transmit intermodulation, derived in step 4), shall not exceed the described value in Table 5.12.1.

5.13 Transmit Modulation

5.13.1 Error Vector Magnitude (EVM)

5.13.1.1 Definition and applicability

The Error Vector Magnitude (EVM) is a measure of the difference between the measured waveform and the theoretical modulated waveform (the error vector). It is the square root of the ratio of the mean error vector power to the mean reference signal power expressed as a %. The measurement interval is one power control group (timeslot).

The requirements and this test apply to all types of UTRA for the FDD UE.

5.13.1.2 Conformance requirements

The EVM shall not exceed 17.,5 % for the parameters specified in Table 5.13.1.

Table 5.13.1: Parameters for EVM

Parameter	Level / Status	Unit
Output power	≥ –20	dBm
Operating conditions	Normal conditions	
Power control step size	1	dB

The reference for this requirement is [1] TS 25.101 clause 6.8.2.1.

5.13.1.3 Test purpose

To verify that the EVM does not exceed 17.5 % for the specified parameters in Table 5.13.1.

An excess EVM increases transmission errors in the up link own channel.

5.13.1.4 Method of test

5.13.1.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.13.2.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.13.1: Test parameters for EVM

Parameter	Level / Status	Unit
Operating conditions	Normal conditions	
Power control step size	1	dB

5.13.1.4.2 Procedure

1) Set and send continuously Up power control commands to the UE until the UE output power shall be maximum level.
2) Measure the EVM using Global In-Channel Tx-Test (Annex B).
3) Set the power level of UE to –20dBm or send Down power control commands (1dB step size should be used.) to the UE until UE output power shall be –20dBm with +/- 1dB tolerance.
4) Repeat step 2).

5.13.1.5 Test requirements

The measured EVM, derived in step 2) and 4), shall not exceed 17.5%.

5.13.2 Peak code domain error

5.13.2.1 Definition and applicability

The code domain error is computed by projecting the error vector power onto the code domain at the maximum spreading factor. The error vector for each power code is defined as the ratio to the mean power of the reference waveform expressed in dB. The peak code domain error is defined as the maximum value for the code domain error. The measurement interval is one power control group (timeslot).

The requirements and this test apply only to the UE in which the multi-code transmission is provided.

5.13.2.2 Conformance requirements

The peak code domain error shall not exceed -15 dB at spreading factor 4 for the parameters specified in Table 5.13.3.The requirements are defined using the UL reference measurement channel (768 kbps) specified in subclause C.2.6.

Table 5.13.3: Parameters for Peak code domain error

Parameter	Level / Status	Unit
Output power	≥ –20	dBm
Operating conditions	Normal conditions	
Power control step size	1	dB

The reference for this requirement is [1] TS 25.101 subclause 6.8.3.1.

5.13.2.3 Test purpose

To verify that the UE peak code domain error does not exceed -15 dB for the specified parameters in Table 5.13.3.

An excess peak code domain error increases transmission errors in the up link own channel.

5.13.2.4 Method of test

5.13.2.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.1.

2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 5.13.4.

3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 5.13.4: Test parameters for Peak code domain error

Parameter	Level / Status	Unit
Operating conditions	Normal conditions	
Uplink signal	multi-code	
Information bit rate	2*384	kbps
Power control step size	1	dB

5.13.2.4.2 Procedure

1) Set and send continuously Up power control commands to the UE until the UE output power shall be maximum level.

2) Measure the Peak code Domain error using Global In-Channel Tx-Test (Annex B).

3) Set the power level of UE to –20dBm or send Down power control commands (1dB step size should be used.) to the UE until UE output power shall be–20dBm with +/- 1dB tolerance.

4) Repeat step 2).

5.13.2.5 Test requirements

The measured Peak code domain error, derived in step 2) and 4), shall not exceed -15 dB.

6 Receiver Characteristics

6.1 General

Receiving performance test of the UE is implemented during communicating with the SS via air interface. The procedure is using normal call protocol until the UE is communicating on traffic channel basically. On the traffic channel, the UE provides special function for testing that is called Logical Test Interface and the UE is tested using this function (Refer to [4] TS 34.109)

Transmitting or receiving bit/symbol rate for test channel is shown in Table 6.1.

Table 6.1: Bit / Symbol rate for Test Channel

Type of User Information	User bit rate	DL DPCH symbol rate	UL DPCH bit rate	Remarks
12.2 kbps reference measurement channel	12.2 kbps	30 ksps	60 kbps	Standard Test

Unless otherwise stated the receiver characteristics are specified at the antenna connector of the UE. For UE(s) with an integral antenna only, a reference antenna with a gain of 0 dBi is assumed. UE with an integral antenna may be taken into account by converting these power levels into field strength requirements, assuming a 0 dBi gain antenna. Receiver characteristics for UE(s) with multiple antennas/antenna connectors are FFS.

The UE antenna performance has a significant impact on system performance, and minimum requirements on the antenna efficiency are therefore intended to be included in future versions of this specification. It is recognised that different requirements and test methods are likely to be required for the different types of UE.

All the parameters in clause 6 are defined using the DL reference measurement channel (12.2 kbps) specified in subclause C.3.1 and unless stated otherwise, with DL power control OFF.

The common RF test conditions are defined in Annex E, and each test conditions in this clause should refer Annex E. An individual test conditions are defined in the paragraph of each test.

6.2 Reference Sensitivity Level

6.2.1 Definition and applicability

The reference sensitivity is the minimum receiver input power measured at the antenna port at which the Bit Error Ratio (BER) does not exceed a specific value

The requirements and this test apply to all types of UTRA for the FDD UE.

6.2.2 Conformance requirements

The BER shall not exceed 0.001 for the parameters specified in Table 6.2.

The reference for this requirement is [1] TS 25.101 subclause 7.3.1.

6.2.3 Test purpose

To verify that the UE BER does not exceed 0.001 for the parameters specified in Table 6.2.

The lack of the reception sensitivity decreases the coverage area at the far side from BS.

6.2.4 Method of test

6.2.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.3.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 6.2.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 6.2: Test parameters for Reference Sensitivity Level

Parameter	Level / Status	Unit
$\hat{I}_{or}$	–106. 7	dBm / 3.84 MHz
DPCH_Ec	–117	dBm / 3.84 MHz
Tx output power	UE maximum power	

6.2.4.2 Procedure

1) Set and send continuously Up power control commands to the UE until the UE output power shall be maximum level.
2) Measure the BER of DCH received from the UE at the SS.

6.2.5 Test requirements

The measured BER, derived in step 2), shall not exceed 0.001.

6.3 Maximum Input Level

6.3.1 Definition and applicability

This is defined as the maximum receiver input power at the UE antenna port which does not degrade the specified BER performance.

The requirements and this test apply to all types of UTRA for the FDD UE.

6.3.2 Conformance requirements

The BER shall not exceed 0.001 for the parameters specified in Table 6.3.

The reference for this requirement is [1] TS 25.101 subclause 7.4.1.

NOTE: Since the spreading factor is large (10log(SF)=21dB), the majority of the total input signal consists of the OCNS interference.

6.3.3 Test purpose

To verify that the UE BER does not exceed 0.001 for the parameters specified in Table 6.3.

The lack of the maximum input level decreases the coverage area at the near side from BS.

6.3.4 Method of test

6.3.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.3.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 6.3.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 6.3: Test parameters for Maximum Input Level

Parameter	Level / Status	Unit
$\hat{I}_{or}$	–25	dBm / 3.84MHz
$\frac{DPCH\_E_c}{I_{or}}$	–19	dB

6.3.4.2 Procedure

1) Measure the BER of DCH received from the UE at the SS.

6.3.5 Test requirements

The measured BER, derived in step 1), shall not exceed 0.001.

6.4 Adjacent Channel Selectivity (ACS)

6.4.1 Definition and applicability

Adjacent Channel Selectivity (ACS) is a measure of a receiver's ability to receive a W-CDMA signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

The requirements and this test apply to all types of UTRA for the FDD UE.

6.4.2 Conformance requirements

For the UE of power class 3 and 4, the BER shall not exceed 0.001 for the parameters specified in Table 6.4. This test condition is equivalent to the ACS value 33 dB.

The reference for this requirement is [1] TS 25.101 subclause 7.5.1.

6.4.3 Test purpose

To verify that the UE BER does not exceed 0.001 for the test parameters specified in Table 6.4.

The lack of the ACS decreases the coverage area when other transmitter exists in the adjacent channel.

6.4.4 Method of test

6.4.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.4.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 6.4.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 6.4: Test parameters for Adjacent Channel Selectivity

Parameter	Level / Status	Unit
DPCH_Ec	–103	dBm / 3.84 MHz
$\hat{I}_{or}$	–92.7	dBm / 3.84 MHz
I_{oac} (modulated)	–52	dBm / 3.84 MHz
F_{uw} (offset)	–5 or +5	MHz

6.4.4.2 Procedure

1) Set the parameters of the interference signal generator as shown in Table 6.4.
2) Measure the BER of DCH received from the UE at the SS.

6.4.5 Test requirements

The measured BER, derived in step 1), shall not exceed 0.001.

6.5 Blocking Characteristics

6.5.1 Definition and applicability

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occur.

The requirements and this test apply to all types of UTRA for the FDD UE.

6.5.2 Conformance requirements

The BER shall not exceed 0.,001 for the parameters specified in Table 6.5.1 and Table 6.5.2. For Table 6.5.2 up to (24) exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1 MHz step size.

The reference for this requirement is [1] TS 25.101 subclause 7.6.1.

6.5.3 Test purpose

To verify that the UE BER does not exceed 0.001 for the parameters specified in Table 6.5.1 and Table 6.5.2. For Table 6.5.2 up to (24) exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1 MHz step size.

The lack of the blocking ability decreases the coverage area when other transmitter exists (except in the adjacent channels and spurious response).

6.5.4 Method of test

6.5.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.5.

2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 6.5.1 and Table 6.5.2.

3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 6.5.1: Test parameters for In-band blocking characteristics

Parameter	10 MHz offset	15 MHz offset	Unit
DPCH_Ec	–114	–114	dBm / 3.84 MHz
$\hat{I}_{or}$	–103.7	–103.7	dBm / 3.84 MHz
$I_{blocking}$ (modulated)	–56	–44	dBm / 3.84 MHz
F_{uw} (offset)	+10 or –10	+15 or –15	MHz

Table 6.5.2: Test parameters for Out of band blocking characteristics

Parameter	Band 1	Band 2	Band 3	Unit
DPCH_Ec	–114	–114	–114	dBm / 3.84MHz
$\hat{I}_{or}$	–103.7	–103.7	–103.7	dBm / 3.84MHz
$I_{blocking}$ (CW)	–44	–30	–15	dBm
F_{uw} For operation in frequency bands as defined in subclause 4.2(a)	2050 < f < 2095 2185 < f < 2230	2025 < f < 2050 2230 < f < 2255	1 < f < 2025 2255 < f < 12750	MHz
F_{uw} For operation in frequency bands as defined in subclause 4.2(b)	1870 < f < 1915 2005 < f < 2050	1845 < f < 1870 2050 < f < 2075	1 < f < 1845 2075 < f < 12750	MHz

NOTE:

1. For operation in bands referenced in 4.2(a), from 2095 < f < 2110 MHz and 2170 < f < 2185 MHz, the appropriate in-band blocking or adjacent channel selectivity in subclause 6.4.2 shall be applied.

2. For operation in bands referenced in 4.2(b), 1915 < f < 1930 MHz and 1990 < f < 2005 MHz, the appropriate in-band blocking or adjacent channel selectivity in subclause 6.4.2 shall be applied.

6.5.4.2 Procedure

1) Set the parameters of the CW generator or the interference signal generator as shown in Table 6.5.1 and Table 6.5.2.

2) Measure the BER of DCH received from the UE at the SS.

6.5.5 Test requirements

The measured BER, derived in step 2), shall not exceed 0.001.

6.6 Spurious Response

6.6.1 Definition and applicability

Spurious response is a measure of the receiver's ability to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the blocking limit is not met.

The requirements and this test apply to all types of UTRA for the FDD UE.

6.6.2 Conformance requirements

The BER shall not exceed 0.001 for the parameters specified in Table 6.6.1.

The reference for this requirement is [1] TS 25.101 subclause 7.7.1.

6.6.3 Test purpose

To verify that the UE BER does not exceed 0.001 for the parameters specified in Table 6.6.1.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

6.6.4 Method of test

6.6.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.6.

2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 6.6.1.

3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 6.6.1: Test parameters for Spurious Response

Parameter	Level	Unit
DPCH_Ec	–114	dBm / 3.84MHz
$\hat{I}_{or}$	–103.7	dBm / 3.84MHz
$I_{blocking}$(CW)	–44	dBm
F_{uw}	Spurious response frequencies	MHz

6.6.4.2 Procedure

1) Set the parameter of the CW generator as shown in Table 6.6.1.

2) Measure the BER of DCH received from the UE at the SS.

6.6.5 Test requirements

The measured BER, derived in step 2), shall not exceed 0.001.

6.7 Intermodulation Characteristics

6.7.1 Definition and applicability

Third and higher order mixing of the two interfering RF signals can produce an interfering signal in the band of the desired channel. Intermodulation response rejection is a measure of the capability of the receiver to receiver a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

The requirements and this test apply to all types of UTRA for the FDD UE.

6.7.2 Conformance requirements

The BER shall not exceed 0.001 for the parameters specified in Table 6.7.1.

The reference for this requirement is [1] TS 25.101 subclause 7.8.1.

6.7.3 Test purpose

To verify that the UE BER does not exceed 0.001 for the parameters specified in Table 6.7.1.

The lack of the intermodulation response rejection ability decreases the coverage area when two or more interfering signals, which have a specific frequency relationship to the wanted signal, exist.

6.7.4 Method of test

6.7.4.1 Initial conditions

1) Connect the SS to the UE antenna connector as shown in Figure A.7.
2) A call is set up according to the Generic call setup procedure, and RF parameters are set up according to Table 6.7.1.
3) Enter the UE into loopback test mode and start the loopback test.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

Table 6.7.1: Test parameters for Intermodulation Characteristics

Parameter	Level	Unit
DPCH_Ec	–114	dBm / 3.84 MHz
$\hat{I}_{or}$	–103.7	dBm / 3.84 MHz
I_{ouw1} (CW)	–46	dBm
I_{ouw2} (modulated)	–46	dBm / 3.84 MHz
F_{uw1} (offset)	10	MHz
F_{uw2} (offset)	20	MHz

6.7.4.2 Procedure

1) Set the parameters of the CW generator and interference signal generator as shown in Table 6.7.1.
2) Measure the BER of DCH received from the UE at the SS.

6.7.5 Test requirements

The measured BER, derived in step 1), shall not exceed 0.001.

6.8 Spurious Emissions

6.8.1 Definition and applicability

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

The requirements and this test apply to all types of UTRA for the FDD UE.

6.8.2 Conformance requirements

The spurious emission shall be:

a) Less than –60 dBm / 3,84 MHz at the UE antenna connector, for frequencies within the UE receive band. In URA_PCH-, Cell_PCH- and IDLE- stage the requirement applies also for UE transmit band.

b) Less than –57 dBm / 100 kHz at the UE antenna connector, for frequencies band from 9 kHz to 1 GHz.

c) Less than –47 dBm / 100 kHz at the UE antenna connector, for frequencies band from 1 GHz to 12.75 GHz.

The reference for this requirement is [1] TS 25.101 subclause 7.9.1.

6.8.3 Test purpose

To verify that the UE spurious emission meets the specifications described in subclause 6.8.2.

Excess spurious emissions increase the interference to other systems.

6.8.4 Method of test

6.8.4.1 Initial conditions

1) Connect a spectrum analyzer (or other suitable test equipment) to the UE antenna connector as shown in Figure A.8.

2) Enable the UE receiver and set Cell Search Mode on a PCCPCH. Since there is no downlink signal, the UE should not pass the Cell Search mode.

6.8.4.2 Procedure

1) Sweep the spectrum analyzer (or other suitable test equipment) over a frequency range from the lowest intermediate frequency or lowest oscillator frequency used in the receiver or 1 MHz, whichever is lowest to at least 3 times the carrier frequency.

6.8.5 Test requirements

The all measured spurious emissions, derived in step 1), shall be:

a) Less than –60 dBm / 3,84 MHz at the UE antenna connector, for frequencies within the UE receive band. In URA_PCH-, Cell_PCH- and IDLE- stage the requirement applies also for UE transmit band.

b) Less than –57 dBm / 100 kHz at the UE antenna connector, for frequencies band from 9 kHz to 1 GHz.

c) Less than –47 dBm / 100 kHz at the UE antenna connector, for frequencies band from 1 GHz to 12.75 GHz.

7 Performance requirements

7.1 General

The performance requirements for the UE in this clause are specified for the measurement channels specified in Annex C and Table 7.1.1, the propagation conditions specified in 7.1.2 and the Down link Physical channels specified in Annex D. Unless stated otherwise, DL power control is OFF.

The method for Block Error Ratio (BLER) measurement is specified in [4] TS 34.109.

Table 7.1.1: Bit / Symbol rate for Test Channel

Type of User Information	User bit rate	DL DPCH symbol rate	UL DPCH bit rate
12.2 kbps reference measurement channel	12.2 kbps	30 ksps	60 kbps
64/144/384 kbps reference measurement channel	64 kbps	120 ksps	240 kbps
	144 kbps	240 ksps	480 kbps
	384 kbps	480 ksps	960 kbps

Table 7.1.2: Summary of UE performance targets

Meas. Channel	Information Data Rate	Static	Multi-path Case 1	Multi-path Case 2	Multi-path Case 3	Multi-path Case 4	Moving	Birth / Death
		Propagation conditions / Performance metric						
DCH	12.2 kbps	BLER<10-2	BLER<10-2	BLER<10-2	BLER<10-2		BLER<	BLER<
	64 kbps	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}, 10^{-3}		BLER<	BLER<
	144 kbps	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}, 10^{-3}		-	-
	384 kbps	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}, 10^{-3}		-	-

7.1.1 Measurement Configurations

In all measurements UE should transmit with maximum power while receiving signals from BS. Transmission Power Control is always disable during the measurements. Chip Rate is specified to be 3.84 MHz.

It as assumed that fields inside DPCH have the same energy per PN chip. Also, if the power of SCCPCH is not specified in the test parameter table, it should be set to zero. The power of OCNS should be adjusted that the power ratios (E_c/I_{or}) of all specified forward channels add up to one.

Measurement configurations for different scenarios are shown in Figure A.9, Figure A.10 and Figure A.11.

7.2 Demodulation in Static Propagation conditions

7.2.1 Demodulation of Dedicated Channel (DCH)

7.2.1.1 Definition and applicability

The receive characteristic of the Dedicated Channel (DCH) in the static environment is determined by the Block Error Ratio (BLER). BLER is specified for each individual data rate of the DCH. DCH is mapped into the Dedicated Physical Channel (DPCH).

The UE shall be tested only according to the data rate, supported. The data-rate-corresponding requirements shall apply to the UE.

7.2.1.2 Conformance requirements

For the parameters specified in Table 7.2.1.1 the BLER shall not exceed the piece-wise linear BLER curve specified by the points in Table 7.2.1.2.

Note: The performance requirements for 384 kbps will be replaced with new value using 10ms TTI measurement channel defined in clause C.3.5.

Table 7.2.1.1: DCH parameters in static propagation conditions

Parameter	Test 1	Test 2	Test 3	Test 4	Unit
$\hat{I}_{or}/I_{oc}$	–1				dB
I_{oc}	–60				dBm / 3.84 MHz
Information Data Rate	12,2	64	144	384	kbps

Table 7.2.1.2: DCH requirements in static propagation conditions

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	–16.6 dB	10^{-2}
2	–13.1 dB	10^{-1}
	–12.8 dB	10^{-2}
3	–9.9 dB	10^{-1}
	–9.8 dB	10^{-2}
4	–5.6 dB	10^{-1}
	–5.5 dB	10^{-2}

The reference for this requirement is [1] TS 25.101 subclause 8.2.3.1.

7.2.1.3 Test purpose

To verify the ability of the receiver to receive a predefined test signal, representing a static propagation channel for the wanted and for the co-channel signals from serving and adjacent cells, with a BLER not exceeding a specified value.

7.2.1.4 Method of test

7.2.1.4.1 Initial conditions

1. Connect the SS and an AWGN noise source to the UE antenna connector as shown in Figure A.9.
2. Set up a call according to the Generic call setup procedure.
3. Set the test parameters for test 1-5 as specified in Table 7.2.1.1.

4. Enter the UE into loopback test mode and start the loopback test.

7.2.1.4.2 Procedures

1. Measure BLER of DCH.

7.2.1.5 Test requirements

For the parameters specified in Table 7.2.1.1 the BLER shall not exceed the associated piece-wise linear BLER curve specified by the points in Table 7.2.1.2.

7.3 Demodulation of DCH in Multi-path Fading Propagation conditions

7.3.1 Single Link Performance

7.3.1.1 Definition and applicability

The receive characteristics of the Dedicated Channel (DCH) in different multi-path fading environments are determined by the Block Error Ratio (BLER) values. BLER is measured for the each of the individual data rate specified for the DPCH. DCH is mapped into in Dedicated Physical Channel (DPCH).

The UE shall be tested only according to the data rate, supported. The data-rate-corresponding requirements shall apply to the UE.

7.3.1.2 Conformance requirements

For the parameters specified in Table 7.3.1.1, 7.3.1.3 and 7.1.3.5 the BLER shall not exceed the associated piece-wise linear BLER curves specified by the points in Table 7.3.1.2, 7.3.1.4 and 7.3.1.6.

Note: The performance requirements for 384 kbps will be replaced with new value using 10ms TTI measurement channel defined in clause C.3.5.

Table 7.3.1.1: DCH parameters in multi-path fading propagation conditions (Case 1)

Parameter	Test 1	Test 2	Test 3	Test 4	Unit
$\hat{I}_{or}/I_{oc}$	9				dB
I_{oc}	–60				dBm / 3.84 MHz
Information Data Rate	12.2	64	144	384	kbps

Table 7.3.1.2: DCH requirements in multi-path fading propagation conditions (Case 1)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	–15.0 dB	10^{-2}
2	–13.9 dB	10^{-1}
	–10.0 dB	10^{-2}
3	–10.6 dB	10^{-1}
	–6.8 dB	10^{-2}
4	–6.3 dB	10^{-1}
	–2.2 dB	10^{-2}

Table 7.3.1.3: DCH parameters in multi-path fading propagation conditions (Case 2)

Parameter	Test 5	Test 6	Test 7	Test 8	Unit
$\hat{I}_{or}/I_{oc}$	–3	–3	3	6	dB
I_{oc}	–60				dBm / 3.84 MHz
Information Data Rate	12.2	64	144	384	kbps

Table 7.3.1.4: DCH requirements in multi-path fading propagation conditions (Case 2)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
5	–7.7 dB	10^{-2}
6	–6.4 dB	10^{-1}
	–2.7 dB	10^{-2}
7	–8.1 dB	10^{-1}
	–5.1 dB	10^{-2}
8	–5.5 dB	10^{-1}
	–3.2 dB	10^{-2}

Table 7.3.1.5: DCH parameters in multi-path fading propagation conditions (Case 3)

Parameter	Test 9	Test 10	Test 11	Test 12	Unit
$\hat{I}_{or}/I_{oc}$	–3	–3	3	6	dB
I_{oc}	–60				dBm / 3.84 MHz
Information Data Rate	12.2	64	144	384	kbps

Table 7.3.1.6: DCH requirements in multi-path fading propagation conditions (Case 3)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
9	–11.8 dB	10^{-2}
10	–8.1 dB	10^{-1}
	–7.4 dB	10^{-2}
	–6.8 dB	10^{-3}
11	–9.0 dB	10^{-1}
	–8.5 dB	10^{-2}
	–8.0 dB	10^{-3}
12	–6.0 dB	10^{-1}
	–5.5 dB	10^{-2}
	–5.0 dB	10^{-3}

The reference for this requirement is [1] TS 25.101 subclause 8.3.1.1.

7.3.1.3 Test purpose

To verify the ability of the receiver to receive a predefined test signal, representing a multi-path fading propagation channel for the wanted and for the co-channel signals from serving and adjacent cells, with a BLER not exceeding a specified value.

7.3.1.4 Method of test

7.3.1.4.1 Initial conditions

1. Connect the SS, multi-path fading simulator and an AWGN noise source to the UE antenna connector as shown in Figure A.10.

2. Set up a call according to the Generic call setup procedure.
3. Set the test parameters for test 1-15 as specified Table 7.3.1.1, Table 7.3.1.3 and Table 7.3.1.5.
4. Enter the UE into loopback test mode and start the loopback test.
5. Setup fading simulators as fading condition case 1 to 3 which are described in Table D.2.2.1

7.3.1.4.2 Procedures

1. Measure BLER of DCH.

7.3.1.5 Test requirements

For the parameters specified in Table 7.3.1.1, Table 7.3.1.3 and Table 7.3.1.5, the BLER shall not exceed the associated piece-wise linear BLER curve specified by the points in Table 7.3.1.2, Table 7.3.1.4 and Table 7.3.1.6.

7.4 Demodulation of DCH in Moving Propagation conditions

7.4.1 Single Link Performance

7.4.1.1 Definition and applicability

The receive single link performance of the Dedicated Traffic Channel (DCH) in dynamic moving propagation conditions are determined by the Block Error Ratio (BLER) values. BLER is measured for the each of the individual data rate specified for the DPCH. DCH is mapped into Dedicated Physical Channel (DPCH).

The UE shall be tested only according to the data rate, supported. The data-rate-corresponding requirements shall apply to the UE.

7.4.1.2 Conformance requirements

For the parameters specified in Table 7.4.1.1 the BLER shall not exceed the piece-wise linear BLER curve specified in points in Table 7.4.1.2.

Table 7.4.1.1: DCH parameters in moving propagation conditions

Parameter	Test 1	Test 2	Unit
$\hat{I}_{or}/I_{oc}$	–1		dB
I_{oc}	–60		dBm / 3.84 MHz
Information Data Rate	12.2	64	kbps

Table 7.4.1.2: DCH requirements in moving propagation conditions

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	–14.5 dB	10^{-2}
2	–10.9 dB	10^{-2}

The reference for this requirement is [1] TS 25.101 subclause 8.4.1.1.

7.4.1.3 Test purpose

To verify the ability of the receiver to receive a predefined test signal, representing a moving propagation channel for the wanted and for the co-channel signals from serving and adjacent cells, with a BLER not exceeding a specified value.

7.4.1.4 Method of test

7.4.1.4.1 Initial conditions

1. Connect the SS and an AWGN noise source to the UE antenna connector as shown in Figure A.10.
2. Set up a call according to the Generic call setup procedure.
3. Set the test parameters as specified in Table 7.4.1.1.
4. Enter the UE into loopback test mode and start the loopback test.
5. Setup fading simulator as moving propagation condition, which is described in clause D.2.3.

7.4.1.4.2 Procedures

1. Measure BLER of DCH.

7.4.1.5 Test requirements

For the parameters specified in Table 7.4.1.1 the BLER shall not exceed the associated piece-wise linear BLER curve specified by the points in Table 7.4.1.2.

7.5 Demodulation of DCH in Birth-Death Propagation conditions

7.5.1 Single Link Performance

7.5.1.1 Definition and applicability

The receive single link performance of the Dedicated Traffic Channel (DCH) in dynamic birth-death propagation conditions are determined by the Block Error Ratio (BLER) values. BLER is measured for the each of the individual data rate specified for the DPCH. DCH is mapped into Dedicated Physical Channel (DPCH).

The UE shall be tested only according to the data rate, supported. The data-rate-corresponding requirements shall apply to the UE.

7.5.1.2 Conformance requirements

For the parameters specified in Table 7.5.1.1, the BLER shall not exceed the piece-wise linear BLER curve in the points in Table 7.5.1.2.

Table 7.5.1.1: DCH parameters in birth-death propagation conditions

Parameter	Test 1	Test 2	Unit
$\hat{I}_{or}/I_{oc}$	–1		dB
I_{oc}	–60		dBm / 3.84 MHz
Information Data Rate	12.2	64	kbps

Table 7.5.1.2: DCH requirements in birth-death propagation conditions

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	–12.6 dB	10^{-2}
2		10^{-2}

The reference for this requirement is [1] TS 25.101 subclause 8.5.1.1.

7.5.1.3 Test purpose

To verify the ability of the receiver to receive a predefined test signal, representing a birth-death propagation channel for the wanted and for the co-channel signals from serving and adjacent cells, with a BLER not exceeding a specified value.

7.5.1.4 Method of test

7.5.1.4.1 Initial conditions

1. Connect the SS and an AWGN noise source to the UE antenna connector as shown in Figure A.10.
2. Set up a call according to the Generic call setup procedure.
3. Set the test parameters as specified in Table 7.5.1.1.
4. Enter the UE into loopback test mode and start the loopback test.
5. Setup fading simulator as birth-death propagation condition, which is described in clause D.2.4.

7.5.1.4.2 Procedures

1. Measure BLER of DCH.

7.5.1.5 Test requirements

For the parameters specified in Table 7.5.1.1 the BLER shall not exceed the associated piece-wise linear BLER curve specified by the points in Table 7.5.1.2.

7.6 Demodulation of DCH in Base Station Transmit diversity modes

7.6.1 Demodulation of DCH in open-loop transmit diversity mode

7.6.1.1 Definition and applicability

The receive characteristic of the Dedicated Channel (DCH) in open loop transmit diversity mode is determined by the Block Error Ratio (BLER). DCH is mapped into in Dedicated Physical Channel (DPCH).

The requirements and this test apply to all types of UTRA for the FDD UE.

7.6.1.2 Conformance requirements

For the parameters specified in Table 7.6.1.1 the BLER shall not exceed the associated piece-wise linear BLER curve specified by the points in Table 7.6.1.2.

Table 7.6.1.1: Test parameters for DCH reception in a open-loop transmit diversity scheme (Propagation condition: Case 1)

Parameter	Test 1	Unit
$\hat{I}_{or}/I_{oc}$	9	dB
I_{oc}	–60	dBm / 3.84 MHz
Information data rate	12.2	kbps

Table 7.6.1.2: Test requirements for DCH reception in open-loop transmit diversity scheme

Test Number	$\frac{DPCH\_E_c}{I_{or}}$ **(antenna 1/2)**	BLER
1	[–16.8 dB]	10^{-2}

The reference for this requirement is [1] TS 25.101 subclause 8.6.1.1.

7.6.1.3 Test purpose

To verify that UE reliably demodulates the DPCH of the BS while open loop transmit diversity is enabled during the connection.

7.6.1.4 Method of test

7.6.1.4.1 Initial conditions

1) Connect SS, multi-path fading simulators and an AWGN source to the UE antenna connector as shown in Figure A.12.

2) Set up a call according to the Generic call setup procedure.

3) RF parameters are set up according to Table 7.6.1.1 and Table E 3.4.

4) Enter the UE into loopback test mode and start the loopback test.

5) Activate open loop Tx diversity function.

6) Set up fading simulators as fading condition case 1, which is described in Table D.2.2.1.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

7.6.1.4.2 Procedure

1) Measure BLER in points specified in Table 7.6.1.2.

7.6.1.5 Test Requirements

For the parameters specified in Table 7.6.1.1 the BLER shall not exceed the associated piece-wise linear BLER curve specified by the points in Table 7.6.1.2.

7.6.2 Demodulation of DCH in closed loop transmit diversity mode

7.6.2.1 Definition and applicability

The receive characteristic of the dedicated channel (DCH) in closed loop transmit diversity mode is determined by the Block Error Ratio (BLER). DCH is mapped into in Dedicated Physical Channel (DPCH).

The requirements and this test apply to all types of UTRA for the FDD UE.

7.6.2.2 Conformance requirements

For the parameters specified in Table 7.6.2.1 the BLER shall not exceed the associated piece-wise linear BLER curves specified by the points in Table 7.6.2.2.

Table 7.6.2.1: Test Parameters for DCH Reception in closed loop transmit diversity mode (Propagation condition: Case 1)

Parameter	Test 1 (Mode 1)	Test 2 (Mode 2)	Unit
$\hat{I}_{or}/I_{oc}$	9	9	dB
I_{oc}	–60	–60	dBm / 3.84 MHz
Information data rate	12.2	12.2	kbps
Feedback error ratio	4	4	%

Table 7.6.2.2: Test requirements for DCH reception in feedback transmit diversity mode

Test Number	$\frac{DPCH\_E_c}{I_{or}}$ (1)	BLER
1	–17.5 dB	10^{-2}
2	–17.8 dB	10^{-2}

The reference for this requirement is [1] TS 25.101 subclause 8.6.2.1.

7.6.2.3 Test purpose

To verify that UE reliably demodulates the DPCH of the BS while closed loop transmit diversity is enabled during the connection.

7.6.2.4 Method of test

7.6.2.4.1 Initial conditions

1) Connect SS, multi-path fading simulators and an AWGN source to the UE antenna connector as shown in Figure A.12.

2) Set up a call according to the Generic call setup procedure.

3) RF parameters are set up according to Table 7.6.2.1 and Table E 3.5.

4) Enter the UE into loopback test mode and start the loopback test.

5) Activate closed loop Tx diversity function.

---

1 This is the total power from both antennas. Power sharing between antennas are closed loop mode dependent as specified in TS25.214

6) Set up fading simulators as fading condition case 1, which is described in Table D.2.2.1.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

7.6.2.4.2 Procedure

1) Measure BLER in points specified in Table 7.6.2.2.

7.6.2.5 Test Requirements

For the parameters specified in Table 7.6.2.1 the BLER shall not exceed the associated piece-wise linear BLER curve specified by the points in Table 7.6.2.2.

7.6.3 Demodulation of DCH in Site Selection Diversity Transmission Power Control mode

7.6.3.1 Definition and applicability

The bit error characteristics of UE receiver is determined in Site Selection Diversity Transmission Power Control (SSDT) mode. Two BS emulators are required for this performance test. The delay profiles of signals received from different base stations are assumed to be the same but time shifted by 10 chip periods.

The requirements and this test apply to all types of UTRA for the FDD UE.

7.6.3.2 Conformance requirements

DCH parameters are specified in Table 7.6.3.1. The downlink physical channels and their relative power to Ior are the same as those specified in clause E.3 irrespective of BSs and the test cases. In Test 1 and Test 3, the received powers at UE from two BSs are the same, while 3dB offset is given to one that comes from one of BSs for Test 2 and Test 4 as specified in Table 7.6.3.1. For the parameters specified in Table 7.6.3.1, the BLER shall not exceed the value at the DPCH_Ec/Ior specified in Table 7.6.3.2.

Table 7.6.3.1: DCH parameters in multi-path propagation conditions during SSDT mode (Propagation condition: Case 1)

Parameter	Test 1	Test 2	Test 3	Test 4	Unit
$\frac{CPICH\_E_c}{I_{or}}$ (for Cell 1)	–10	–13	–10	–10	dB
$\frac{CPICH\_E_c}{I_{or}}$ (for Cell 2)	–10	–10	–10	–10	dB
$\frac{DPCH\_E_{c1}}{I_{or}} / \frac{DPCH\_E_{c2}}{I_{or}}$ *	0	–3	0	+3	dB
$\hat{I}_{or1}/I_{oc}$	0	-3	0	0	dB
$\hat{I}_{or2}/I_{oc}$	0	0	0	-3	dB
I_{oc}	–60				dBm / 3.84 MHz
Information Data Rate	12.2	12.2	12.2	12.2	kbps
Number of FBI bits assigned to “S” Field	1	1	2	2	
Code word Set	Long	Long	Short	Short	

*NOTE: $DPCH\_E_c/I_{or}$ value applies whenever DPDCH in the cell is transmitted.

Table 7.6.3.2: DCH requirements in multi-path propagation conditions during SSDT Mode

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	–7.5 dB	10^{-2}
2	–6.5 dB	10^{-2}
3	–10.5 dB	10^{-2}
4	–9.2 dB	10^{-2}

The reference for this requirement is [1] TS 25.101 subclause 8.6.3.1.

7.6.3.3 Test purpose

To verify that UE reliably demodulates the DPCH of the selected BS while site selection diversity is enabled during soft handover.

7.6.3.4 Method of test

7.6.3.4.1 Initial conditions

1) Connect two SS's, multi-path fading simulators and an AWGN source to the UE antenna connector as shown in Figure A.11.

2) Set up a call according to the Generic call setup procedure, and RF parameters are set up according to Table 7.6.3.1 and Table 7.6.3.2.

3) Enter the UE into loopback test mode and start the loopback test.

4) Activate SSDT function.

5) Set up fading simulators as fading condition case 1, which is described in Table D.2.2.1.

7.6.3.4.2 Procedure

Measure BLER in points specified in Table 7.6.3.2..

7.6.3.5 Test Requirements

BLER shall not exceed the value at the DPCH_Ec/Ior specified in Table 7.6.3.2.

7.7 Demodulation in Handover conditions

7.7.1 Inter-Cell Soft Handover Performance

7.7.1.1 Definition and applicability

The bit error ratio characteristics of UE is determined during an inter-cell soft handover. During the soft handover a UE receives signals from different Base Stations. A UE has to be able to demodulate two PCCPCH channels and to combine the energy of DCH channels. Delay profiles of signals received from different Base Stations are assumed to be the same but time shifted by 10 chips.

The receive characteristics of the different channels during inter-cell handover are determined by the Block Error Ratio (BLER) values.

The UE shall be tested only according to the data rate, supported. The data-rate-corresponding requirements shall apply to the UE.

7.7.1.2 Conformance requirements

For the parameters specified in Table 7.7.1.1, the BLER shall not exceed the piece-wise linear BLER curve specified by the points in Table 7.7.1.2

Table 7.7.1.1: DCH parameters in multi-path propagation conditions during Soft Handoff (Case 3)

Parameter		Test 1	Test 2	Test 3	Test 4	Unit
$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$		0	0	3	6	dB
I_{oc}	-60					dBm / 3.84 MHz
Information Data Rate		12.2	64	144	384	kbps

Table 7.7.1.2: DCH requirements in multi-path propagation conditions during Soft Handoff (Case 3)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	[–15.2 dB]	10^{-2}
2	[–11.8 dB]	10^{-1}
	[–11.3 dB]	10^{-2}
3	[–9.6 dB]	10^{-1}
	[–9.2 dB]	10^{-2}
4	[–6.0 dB]	10^{-1}
	[–5.5 dB]	10^{-2}

The reference for this requirement is [1] TS 25.101 subclause 8.7.1.1.

7.7.1.3 Test purpose

To verify that the BLER does not exceed the piece-wise linear BLER curve specified by the points in Table 7.7.1.2.

7.7.1.4 Method of test

7.7.1.4.1 Initial conditions

[TBD]

7.7.1.4.2 Procedures

1) Connect the SS, multi-path fading simulator and an AWGN noise source to the UE antenna connector as shown in Figure A.11.

2) Set up the call.

3) Set the test parameters for test 1-5 as specified in Table 7.7.1.1.

4) Count, at the SS, the number of information blocks transmitted and the number of correctly received information blocks at the UE.

5) Measure BLER of DCH channel.

7.7.1.5 Test requirements

[TBD]

7.8 Power control in downlink, constant BLER

7.8.1 Definition and applicability

Power control in the downlink is the ability of the UE receiver to converge to required link quality set by the network while using as low power as possible in downlink.The requirements and this test apply to all types of UTRA for the FDD UE.

7.8.2 Conformance requirements

For the parameters specified in Table 7.8.1 the downlink $\frac{DPCH\_E_c}{I_{or}}$ power shall be below the specified value in Table 7.8.2 and the measured BLER value shall be as required in Table 7.8.2.

NOTE:

1. Power control in downlink is ON during the test.

Table 7.8.1: Test parameter for downlink power control

Parameter	Test 1	Test 2	Unit
$\hat{I}_{or}/I_{oc}$	9	-1	dB
I_{oc}	–60		dBm / 3.84 MHz
Information Data Rate	12.2		kbps
Target quality on DTCH	0.01		BLER
Propagation condition	Case 4		

Table 7.8.2: Requirements in downlink power control

Parameter	Test 1	Test 2	Unit
$\frac{DPCH\_E_c}{I_{or}}$	[-16.0]	[-9.0]	dB
Measured quality on DTCH	FFS	FFS	BLER
Confidence level for measured quality and $\frac{DPCH\_E_c}{I_{or}}$	90		%

The reference for this requirement is [1] TS 25.101 subclause 8.8.1.1.

7.8.3 Test purpose

To verify that the UE receiver is capable of converging to required link quality set by network while using as low power as possible.

7.8.4 Method of test

7.8.4.1 Initial conditions

1) Connect SS, multipath fading simulator and an AWGN source to the UE antenna connector as shown in Figure A.10.
2) Set up a call according to the Generic call setup procedure.
3) RF parameters are set up according to Table 7.8.1 and Table E.3.3.
4) Enter the UE into loopback test mode and start the loopback test.
5) SS signals to UE target quality value on DTCH as specified in Table 7.8.1. SS will vary the physical channel power in downlink according to the TPC commands from UE. At the same time BLER is measured. This is continued until the target quality value on DTCH is met, within the minimum accuracy requirement.

See [3] TS 34.108 and [4] TS 34.109 for details regarding generic call setup procedure and loopback test.

7.8.4.2 Procedure

1) After the target quality on DTCH is met, BLER is measured. Simultaneously the average downlink $\frac{DPCH\_E_c}{I_{or}}$ power is measured. This is repeated until adequate amount of measurements is done to reach the required confidence level.
2) The measured quality on DTCH (BLER) and the measured average downlink $\frac{DPCH\_E_c}{I_{or}}$ power are compared to limits in Table 7.8.2.

7.8.5 Test Requirements

a) The measured quality on DTCH does not exceed the values in Table 7.8.2.

b) The average measured downlink $\frac{DPCH\_E_c}{I_{or}}$ power does not exceed the values in Table 7.8.2.

7.9 Void

Note: This subclause is kept for stable subclause numbering.

7.10 Downlink compressed mode

Downlink compressed mode is used to create gaps in the downlink transmission, to allow the UE to make measurements on other frequencies.

7.10.1 Single link performance

7.10.1.1 Definition and applicability

The receiver single link performance of the Dedicated Traffic Channel (DCH) in compressed mode is determined by the Block Error Ratio (BLER), average power in the downlink and the maximum power in the uplink.

The compressed mode parameters are given in clause C.4.

The requirements and this test apply to all types of UTRA for the FDD UE.

7.10.1.2 Conformance requirements

For the parameters specified in Table 7.10.1 the average downlink $\frac{DPCH\_E_c}{I_{or}}$ power shall be below the specified value for the reported BLER shown in Table 7.10.2. The uplink DPDCH power shall be below the specified value.

NOTE:

1. Inner loop power control is ON during the test.

Table 7.10.1: Test parameter for downlink compressed mode

Parameter	Test 1	Unit
$\hat{I}_{or}/I_{oc}$	9	dB
I_{oc}	–60	dBm / 3.84 MHz
Information Data Rate	12.2	kbps
TFCI	On	-
Propagation condition	Case 2	

Table 7.10.2: Requirements in downlink compressed mode

Parameter	Test 1	Unit
$\frac{DPCH\_E_c}{I_{or}}$		dB
Target quality		
Downlink BLER		
Uplink DPDCH	[Maximum power / slot]	dBm
Confidence level		%

The reference for this requirement is [1] TS 25.101 subclause 8.9.1.1.

7.10.1.3 Test purpose

It is the purpose of the test, to verify, that, due to temporary dynamic re-organisation of certain parameters in the DL compressed mode the BLER at the UE is preserved.

As the inner loop power control is running, controlling the DL power, it is furtheron verified, whether the preserved BLER is achieved by a sufficient low average DL power.

7.10.1.4 Method of test

7.10.1.4.1 Initial conditions

[TBD]

7.10.1.4.2 Procedure

[TBD]

7.10.1.5 Test requirements

[TBD]

7.11 Blind transport format detection

7.11.1 Definition and applicability

Performance of Blind transport format detection is determined by the Block Error Ratio (BLER) values and by the measured average transmitted DPCH_Ec/Ior value.

7.11.2 Conformance requirements

For the parameters specified in Table 7.11.1 the BLER and FDR shall not exceed the piece-wise linear BLER curve specified by the points in table 7.11.2

Table 7.11.1: Test parameters for Blind transport format detection

Parameter	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Unit
$\hat{I}_{or}/I_{oc}$	–1			–3			dB
I_{oc}	–60						dBm / 3.84 MHz
Information Data Rate	12.2 (rate 1)	7.95 (rate 2)	1.95 (rate 3)	12.2 (rate 1)	7.95 (rate 2)	1.95 (rate 3)	kbps
propagation condition	static			multi-path fading case 3			-
TFCI	off						-

Table 7.11.2: The Requirements for DCH reception in Blind transport format detection

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER	FDR
1	[–17.7dB]	10^{-2}	10^{-4}
2	[–17.8dB]	10^{-2}	10^{-4}
3	[–18.4dB]	10^{-2}	10^{-4}
4	[–13dB]	10^{-2}	10^{-4}
5	[–13.2dB]	10^{-2}	10^{-4}
6	[–13.8dB]	10^{-2}	10^{-4}

* The value of DPCH_Ec/Ior, Ioc, and Ior/Ioc are defined in case of DPCH is transmitted

Note: In the test, 9 deferent Transport Format Combinations (Table.7.11.3) are informed during the call set up procedure, so that UE have to detect correct transport format in this 9 candidates.

Table.7.11.3: Transport format combinations informed during the call set up procedure in the test

	1	2	3	4	5	6	7	8	9
DTCH	12.2k	10.2k	7.95k	7.4k	6.7k	5.9k	5.15k	4.75k	1.95k
DCCH				2.4k					

7.11.3 Test purpose

To verify the ability of the blind transport format detection to receive a predefined test signal, representing a static propagation channel for the wanted and for the co-channel signals from serving and adjacent cells, with a block error ratio (BLER) and false transport format detection ratio (FDR) not exceeding a specified value.

To verify the ability of the blind transport format detection to receive a predefined test signal, representing a malti-path propagation channel for the wanted and for the co-channel signals from serving and adjacent cells, with a block error ratio (BLER) and false transport format detection ratio (FDR) not exceeding a specified value.

7.11.4 Method of test

7.11.4.1 Initial conditions

1. Connect the SS and AWGN noise source to the UE antenna connector as shown in Figure A.9 in the case for test 1-3. Connect the SS, multipath fading simulator and an AWGN noise source to the UE antenna connector as shown in Figure A.10 in the case of test 4-6.
2. Set up a call according to the Generic call setup procedure.
3. Set the test parameters for test 1-6 as specified Table 7.11.1 and Table 7.11.2.
4. Enter the UE into loopback test mode and start the loopback test.
5. In the case of test 4-6, Setup fading simulator as fading condition case 3 which are described in Table D.2.2.1.

7.11.4.2 Procedure

Measure BLER and FDR of DCH.

7.11.5 Test requirements

BLER and FDR shall not exceed the value at the DPCH_Ec/Ior specified in Table 7.11.2.

8 Requirements for support of RRM

8.1 General

8.2 Idle Mode Tasks

8.2.1 Introduction

8.2.2 RF Cell Selection Scenario

8.2.2.1 Cell Selection single carrier single cell case

8.2.2.1.1 Definition and applicability

Test to verify that the UE is capable of selecting a suitable cell within [5] seconds from switch on with stored information of the last registered PLMN. This cell selection delay is defined as the time the UE needs for sending RRC Connection Request for Location Registration to UTRAN after the power has been switched on with a valid USIM and PIN is disabled.

This test is applicable for all UE's.

8.2.2.1.2 Conformance requirement

Cell selection shall be correct in more than [X%] of the cases. Cell selection is correct if within [5] seconds the UE camps on the cell. The confidence level is set to [Y%]. (Annex [FFS])

The reference for this requirement is [2] TS 25.133 subclause 4.2.1.3.

8.2.2.1.3 Test purpose

To verify that the UE meets the conformance requirement.

8.2.2.1.4 Method of test

8.2.2.1.4.1 Initial conditions

The absolute signal level of each cell can be obtained from the values of $\hat{I}_{or}/I_{oc}$ in table 8.2.1.

Parameters changed from default values in table TS 34.123-1, 6.1.3.1.

Table 8.2.1: Test parameters for Cell selection single carrier single cell

Parameter	Unit	Cell 1
UTRA RF Channel Number		Channel 1
CPICH_Ec/Ior	dB	-10
PCCPCH_Ec/Ior	dB	-12
SCH_Ec/Ior	dB	-12
PICH_Ec/Ior	dB	-15
OCNS_Ec/Ior	dB	-0.941
$\hat{I}_{or}/I_{oc}$	dB	0
I_{oc}	dBm/3. 84 MHz	-70
CPICH_Ec/Io	dB	-13
Propagation Condition		AWGN
Qmin	dB	[ ]
UE_TXPWR_MAX_RACH	dBm	[ ]

8.2.2.1.4.2 Procedures

a) The SS activates cell 1 and monitors cell 1 for RA-request from the UE

b) The UE is switched on

c) The SS waits for RA-request from the UE

d) The UE is switched off

e) The SS monitors cell 1 for RA-request from the UE

f) The UE is switched on

g) The SS waits for RA-request from the UE

h) Repeat step d) to g) [TBD] times

8.2.2.1.5 Test requirements

1) In step c), the UE shall respond on cell 1 within [FFS seconds]

[Editor's note: LS of proposed timeout values sent to CN1/RAN2 to get acceptance]

2) In step g), the UE shall respond on cell 1 within [5] seconds in more than [X%] of the cases.

[Editor's note: The test must be executed a number of times as indirectly set by the Conformance Requirement. The number is for FFS]

8.2.2.2 Cell Selection multi carrier multi cell case

8.2.2.2.1 Definition and applicability

Test to verify that the UE is capable of selecting a suitable cell within [5+x] seconds from switch on with stored information of the last registered PLMN. The cell is selected among a group of cells with different relative RF signal levels. The cell selection delay is defined as the time the UE needs for sending RRC Connection Request for Location Registration to UTRAN after the power has been switched on with a valid USIM and PIN is disabled.

This test is applicable for all UEs.

8.2.2.2.2 Conformance requirement

Cell selection shall be correct in more than [X%] of the cases. Cell selection is correct if within [5+x] seconds the UE camps on the cell, which fulfils the cell selection criteria. The confidence level is set to [Y%]. (Annex [FFS])

The reference for this requirement is [2] TS 25.133 subclause 4.2.2.3.

8.2.2.2.3 Test purpose

To verify that the UE meets the conformance requirement.

8.2.2.2.4 Method of test

8.2.2.2.4.1 Initial conditions

The relative RF signal to total interference ratio at the UE (*CPICH_Ec/Io*) between the cells is shown in Table 8.2.2 and shall be:

Cell 5 > Cell 1 > Cell 2 > Cell 4 > Cell 3 > Cell 6

The absolute signal level of each cell can be obtained from the values of $\hat{I}_{or}/I_{oc}$ in table 8.2.2.

Parameters changed from default values in table TS 34.123-1, 6.1.3.1.

Table 8.2.2: Test parameters for Cell selection multi carrier multi cell

Parameter	Unit	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Cell 6
UTRA RF Channel Number		Channel 1	Channel 1	Channel 1	Channel 2	Channel 2	Channel 2
CPICH_Ec/Ior	dB	-10	-10	-10	-10	-10	-10
PCCPCH_Ec/Ior	dB	-12	-12	-12	-12	-12	-12
SCH_Ec/Ior	dB	-12	-12	-12	-12	-12	-12
PICH_Ec/Ior	dB	-15	-15	-15	-15	-15	-15
OCNS_Ec/Ior	dB	-0.941	-0.941	-0.941	-0.941	-0.941	-0.941
$\hat{I}_{or}/I_{oc}$	dB	5.3	2.3	-1.7	6.3	14.3	2.3
I_{oc}	dBm/3.84 MHz	-70			-70		
CPICH_Ec/Io	dB	-13	-16	-20	-19	-11	-23
Propagation Condition		AWGN			AWGN		
Qmin	dB	[]	[]	[]	[]	[]	[]
UE_TXPWR_MAX_RACH	dBm	[]	[]	[]	[]	[]	[]

8.2.2.2.4.2 Procedures

a) The SS activates cell 1-6 and monitors cell 5, 1 and 2 for RA-request from the UE

b) The UE is switched on.

c) The SS waits for RA-request from the UE

d) The UE is switched off.

e) The SS monitors cell 5, 1 and 2 for RA requests from the UE

f) The UE is switched on

g) The SS waits for RA-request from the UE

h) Repeat step d) to g) [TBD] times

8.2.2.2.5 Test requirements

1) In step c), the UE shall respond on cell 5 within [FFS seconds]

[Editor's note: LS of proposed timeout values sent to CN1/RAN2 to get acceptance]

2) In step g), the UE shall respond on cell 5 within [5+x] seconds in more than [X%] of the cases.

[Editor's note: The test must be executed a number of times as indirectly set by the Conformance Requirement The number is for FFS]

8.2.3 RF Cell Re-Selection Scenario

8.2.3.1 Cell Re-Selection single carrier multi cell case

8.2.3.1.1 Definition and applicability

Test to verify that the UE is capable of re-selecting a new cell within [5] seconds from it becoming a cell to be reselected according to the cell re-selection criteria. The cells, which are possible to be re-reselected during the test are belonging to different location areas. The cell re-selection delay is then defined as a time from when CPICH_Ec/Io is changed on cell 1 and 2 to the moment in time when the UE starts sending the RRC Connection request for Location Update message to the UTRAN.

This test is applicable for all UEs.

8.2.3.1.2 Conformance requirement

Cell re-selection shall be correct in more than [X%] of the cases. Cell re-selection is correct if within [5] seconds the UE re-reselects a new cell, which fulfils the cell re-selection criteria. The confidence level is set to [Y%]. (Annex [FFS])

The reference for this requirement is [2] TS 25.133 subclause 4.3.1.3.

8.2.3.1.3 Test purpose

To verify that the UE meets the conformance requirement.

8.2.3.1.4 Method of test

8.2.3.1.4.1 Initial conditions

The relative RF signal to total interference ratio at the UE (*CPICH_Ec/Io*) between the cells is shown in Table 8.2.3 and shall be:

T1: Cell 2 > Cell 1 > Cell 3 = Cell 4 = Cell 5 = Cell 6

T2: Cell 1 > Cell 2 > Cell 3 = Cell 4 = Cell 5 = Cell 6

The absolute signal level of each cell can be obtained from the values of $\hat{I}_{or}/I_{oc}$ in table 8.2.3.

Parameters changed from default values in table TS 34.123-1, 6.1.3.1.

Table 8.2.3: Test parameters for Cell re-selection single carrier multi cell

Parameter	Unit	Cell 1		Cell 2		Cell 3		Cell 4		Cell 5		Cell 6	
		T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
UTRA RF Channel Number		Channel 1		Channel 1		Channel 1		Channel 1		Channel 1		Channel 1	
CPICH_Ec/Ior	dB	-10		-10		-10		-10		-10		-10	
PCCPCH_Ec/Ior	dB	-12		-12		-12		-12		-12		-12	
SCH_Ec/Ior	dB	-12		-12		-12		-12		-12		-12	
PICH_Ec/Ior	dB	-15		-15		-15		-15		-15		-15	
OCNS_Ec/Ior	dB	-0.941		-0.941		-0.941		-0.941		-0.941		-0.941	
$\hat{I}_{or}/I_{oc}$	dB	7.3	10.27	10.27	7.3	0.27		0.27		0.27		0.27	
I_{oc}	dBm/ 3.84 MHz	–70											
CPICH_Ec/Io	dB	-16	-13	-13	-16	-23		-23		-23		-23	
Propagation Condition		AWGN											
Qoffset		[ ]		[ ]		[ ]		[ ]		[ ]		[ ]	
Qhyst Treselection Qintrasearch	dBm dB	[ ] [ ] [ ]		[ ] [ ] [ ]		[ ] [ ] [ ]		[ ] [ ] [ ]		[ ] [ ] [ ]		[ ] [ ] [ ]	

Time T1 is X seconds and T2 is Y seconds.

Note: T1 and T2 need to be defined so that cell re-selection reaction time is taken into account.

8.2.3.1.4.2 Procedures

a) The SS activates cell 1-6 with T1 defined parameters and monitors cell 1 and 2 for RA requests from the UE

b) The UE is switched on

c) The SS waits for RA request from the UE cell 2

d) After [T1] seconds from switch on, the parameters are changed as described for T2

e) The SS waits for RA request from the UE on cell 1

f) After [T2] seconds from switch on, the parameters are changed as described for T1

g) Repeat step c) to f) [TBD] times

8.2.3.1.5 Test requirements

1) In step c), the UE shall respond on cell 2 within [FFS seconds]

[Editor's note: LS of proposed timeout values sent to CN1/RAN2 to get acceptance]

2) In step e), the UE shall respond on cell 1 within [5] seconds in more than [X%] of the cases.

[Editor's note: The test must be executed a number of times as indirectly set by the Conformance Requirement The number is for FFS]

8.2.3.2 Cell Re-Selection multi carrier multi cell case

8.2.3.2.1 Definition and applicability

Test to verify that the UE is capable of re-selecting a new cell within [TBD: Tres] seconds from it becoming a cell to be reselected according to the cell re-selection criteria. The cells, which are possible to be re-reselected during the test are transmitting on different frequencies and are belonging to different location areas. The cell re-selection delay is then defined as a time from when CPICH_Ec/Io is changed on cell 1 and 2 to the moment in time when the UE starts sending the RRC Connection request for Location Update message to the UTRAN.

This test is applicable for all UEs.

8.2.3.2.2 Conformance requirement

Cell re-selection shall be correct in more than [TBD: 90%] of the cases. Cell re-selection is correct if within [TBD: Nt] seconds the UE re-reselects a new cell, which fulfills the cell re-selection criteria. The confidence level is set to [Y%]. (Annex [FFS])

The reference for this requirement is [2] TS 25.133 subclause 4.3.2.3.

8.2.3.2.3 Test purpose

To verify that the UE meets the conformance requirement.

8.2.3.2.4 Method of test

8.2.3.2.4.1 Initial conditions

The relative RF signal to total interference ratio at the UE (*CPICH_Ec/Io*) between the cells is shown in Table 8.2.4 and shall be:

T1: Cell 2 > Cell 1 > Cell 3 = Cell 4 = Cell 5 = Cell 6

T2: Cell 1 > Cell 2 > Cell 3 = Cell 4 = Cell 5 = Cell 6

The absolute signal level of each cell can be obtained from the values of $\hat{I}_{or}/I_{oc}$ in table 8.2.4.

Parameters changed from default values in table TS 34.123-1, 6.1.3.1.

Table 8.2.4: Test parameters for Cell re-selection multi carrier multi cell

Parameter	**Unit**	**Cell 1**		**Cell 2**		**Cell 3**		**Cell 4**		**Cell 5**		**Cell 6**	
		T1	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**
UTRA RF Channel Number		Channel 1		Channel 2		Channel 1		Channel 1		Channel 2		Channel 2	
CPICH_Ec/Ior	dB	-10		-10		-10		-10		-10		-10	
PCCPCH_Ec/Ior	dB	-12		-12		-12		-12		-12		-12	
SCH_Ec/Ior	dB	-12		-12		-12		-12		-12		-12	
PICH_Ec/Ior	dB	-15		-15		-15		-15		-15		-15	
OCNS_Ec/Ior	dB	-0.941		-0.941		-0.941		-0.941		-0.941		-0.941	
$\hat{I}_{or}/I_{oc}$	dB	-3.4	2.2	2.2	-3.4	-7.4	-4.8	-7.4	-4.8	-4.8	-7.4	-4.8	-7.4
I_{oc}	dBm/ 3.84 MHz	-70											
CPICH_Ec/Io	dB	-16	-13	-13	-16	-20		-20		-20		-20	
Propagation Condition		AWGN											
Qoffset		[0]		[0]		[0]		[0]		[0]		[0]	
Qhyst	dB	[2]		[2]		[2]		[2]		[2]		[2]	
Treselection		[5]		[5]		[5]		[5]		[5]		[5]	
Qintersearch	dB	[-8]		[-8]		[-8]		[-8]		[-8]		[-8]	

Time T1 is X seconds and T2 is Y seconds.

Note: T1 and T2 need to be defined so that cell re-selection reaction time is taken into account.

8.2.3.2.4.2 Procedures

a) The SS activates cell 1-6 with T1 defined parameters and monitors cell 1 and 2 for RA requests from the UE

b) The UE is switched on

c) The SS waits for RA request from the UE cell 2

d) After [T1] seconds from switch on, the parameters are changed as described for T2

e) The SS waits for RA request from the UE on cell 1

f) After [T2] seconds from switch on, the parameters are changed as described for T1

g) Repeat step c) to f) [TBD] times

8.2.3.2.5 Test requirements

1) In step c), the UE shall respond on cell 2 within [FFS seconds]

[Editor's note: LS of proposed timeout values sent to CN1/RAN2 to get acceptance]

2) In step e), the UE shall respond on cell 1 within [TBD] seconds in more than [X%] of the cases.

[Editor's note: The test must be executed a number of times as indirectly set by the Conformance Requirement The number is for FFS]

8.2.3.3 Requirements for UTRAN to GSM Cell Re-Selection

8.2.3.3.1 Cell re-selection delay

8.2.3.3.2 Test Parameters

8.3 RRC Connection mobility

8.3.1 Handover

8.3.1.1 Introduction

8.3.1.2 Handover 3G to 3G

8.3.1.2.1 FDD Soft/Softer Handover

8.3.1.2.1.1 Maximum number of cells to be reported

8.3.1.2.1.2 Measurement reporting delay

8.3.1.2.1.3 Test parameters

8.3.1.2.1.3.1 Minimum Requirements

8.3.1.2.1.3.2 Event triggered reporting of multiple neighbours in AWGN propagation condition

8.3.1.2.1.3.3 Correct reporting of neighbours in Fading propagation condition

8.3.1.2.1.3.3.1 Minimum Requirement8.3.1.2.1.3.4CPICH_Ec/Io measurement accuracy and incorrect reporting of neighbours in AWGN propagation condition

8.3.1.2.1.3.4.1 Minimum Requirement

8.3.1.2.1.4 Active set dimension

8.3.1.2.1.5 Active set update delay

8.3.1.2.2 FDD Hard Handover

8.3.1.2.2.1 Requirements

8.3.1.2.2.1.1 Maximum number of cells/frequencies to be monitored on other frequencies

8.3.1.2.2.1.2 Measurement reporting delay

8.3.1.2.2.1.2.1 Test Parameters for DL compressed mode

8.3.1.2.2.1.2.1.1 CPICH_Ec/Io measurement accuracy and correct reporting of neighbours in AWGN propagation condition

8.3.1.2.2.1.2.2 Minimum Requirements

8.3.1.2.2.1.3 Correct reporting of neighbours in Fading propagation condition

8.3.1.2.2.1.3.1 Minimum Requirements

8.3.1.2.2.1.4 Hard Handover Delay

8.3.1.2.3 FDD/TDD Handover

8.3.1.2.3.1 Requirements

8.3.1.2.3.1.1 Maximum number of cells/frequencies to be monitored on other frequencies

8.3.1.2.3.1.2 Measurement reporting delay

8.3.1.2.3.1.2.1 Test parameters for DL compressed mode

8.3.1.2.3.1.2.2 Correct reporting of TDD neighbours in AWGN propagation condition

8.3.1.2.3.1.2.3 Minimum Requirements

8.3.1.2.3.1.3 Handover Delay

8.3.1.3 Handover 3G to 2G

8.3.1.3.1 Handover to GSM

8.3.1.3.1.1 Requirements

8.3.1.3.1.2 RF Parameters

8.3.2 Radio Link Management

8.3.2.1 Link adaptation

8.3.2.1.1 Definition of the function

8.3.2.1.2 Link adaptation delay minimum requirement

8.3.2.1.3 Link adaptation maximum delay requirement

8.4 RRC Connection Control

8.4.1 Requirements for RRC Re-establishment

8.4.1.1 RRC Re-establishment delay

8.4.1.2 Test Parameters

8.4.1.2.1 Test 1 - Target Cell known by UE

8.4.1.2.2 Test 2 - Target cell not known by UE

8.4.1.2.3 Performance Requirements

8.4.2 Radio Access Bearer Control

8.5 Timing characteristics

8.5.1 Synchronization performance

8.5.1.1 Search of other Cells

8.5.1.1.1 Definition and applicability

Search for other cells is used to check whether the UE correctly searches and measures other BS(s) during the specified operation.

<Editor's Note: The applicability for this test whether it is mandatory or not should be clarified.>

8.5.1.1.2 Conformance requirements

[TBD]

Table 8.5.1.1.1: Test Parameters for the Search of other Cells

Parameter	Channel 1		Channel 2		Unit
	Time 1	Time 2	Time 1	Time 2	
$PCCPCH\ \frac{E_c}{I_{or}}$					dB
$\hat{I}_{or}/I_{oc}$					dB
I_{oc}	–60				dBm / 3.84 MHz
$PCCPCH\ \frac{E_c}{I_o}$					dB

The reference for this requirement is [2] TS 25.133 subclause 7.1.1.1.

8.5.1.1.3 Test purpose

[TBD]

8.5.1.1.4 Method of test

The measuring configuration is shown in Figure A.9.

8.5.1.1.4.1 Initial conditions

[TBD]

8.5.1.1.4.2 Procedures

1. Setup the equipment as shown in Figure A.11 (without fading channel blocks).
2. Set the test parameters as specified in Table 8.5.1.1.1.
3. Turn UE on.
4. TBD

8.5.1.1.5 Test requirements

[TBD]

8.5.2 spare

8.5.3 UE Transmit Timing

8.5.3.1 Initial transmission timing, Maximum timing adjustment size and Maximum timing adjustment rate

8.5.3.1.1 Definition and applicability

The UE shall have capability to follow the frame timing change of the connected Node B. UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, and maximum adjustment rate are defined in the following requirements.

<Editor's Note: The applicability for this test whether it is mandatory or not should be clarified.>

8.5.3.1.2 Conformance requirements

For parameters specified in Table 8.5.3.1.1, UE initial transmission timing error shall be less than or equal to ±1,5 Chip. The reference point for the UE initial transmit timing control requirement shall be the first significant path of the corresponding downlink DPCCH/DPDCH frame.

The UE shall be capable of changing the transmission timing according the received downlink DPCCH/DPDCH frame. The maximum amount of the timing change in one adjustment shall be 1/4 Chip.

The maximum adjustment rate shall be 1/4 chip per 280 ms. In particular, within any given 280 ms period, the UE transmit timing shall not change in excess of +-1/4 chip from the timing at the beginning of this 280 ms period.

Table 8.5.3.1.1: Test parameters for Transmission timing requirement.

Parameter	Cell 1 and 2 level	Unit
DPCH_Ec/ Ior	–17	dB
$\hat{I}_{or}$, Cell 1	–96	dBm / 3.84 MHz
$\hat{I}_{or}$, Cell 2	–97	dBm / 3.84 MHz
Information data rate	12.2	kbps
TFCI	On	-
Propagation condition	AWGN	

a) Cell 2 starts transmission 5 seconds after call has been initiated. UE shall maintain it's original timing properties.

b) Cell 1 stop transmission 5 seconds after cell 2 has started transmission. UE shall adjust transmission timing with a maximum change of 1/4 chip per adjustment, and maximum timing adjustment rate of 1/4 chip per 280 ms.

The reference for this requirement is [2] TS 25.133 subclause 7.3.1.1.

8.5.3.1.3 Test purpose

[TBD]

8.5.3.1.4 Method of test

8.5.3.1.4.1 Initial conditions

[TBD]

8.5.3.1.4.2 Procedures

[TBD]

8.5.3.1.5 Test requirements

[TBD]

8.5.4 Reception Timing

8.5.4.1 Definition and applicability

The reception timing of the UE is determined during the specified operation.

<Editor's Note: The applicability for this test whether it is mandatory or not should be clarified.>

8.5.4.2 Conformance requirements

[TBD]

The reference for this requirement is [2] TS 25.133 subclause 7.4.1.

8.5.4.3 Test purpose

[TBD]

8.5.4.4 Method of test

The measuring configuration is shown in Figure A.9.

8.5.4.4.1 Initial conditions

[TBD]

8.5.4.4.2 Procedures

[TBD]

8.5.4.5 Test requirements

[TBD]

8.5.5 Signalling requirements

8.5.5.1 Signalling response delay

8.5.5.2 Test Parameters

8.5.5.3 Performance requirements

8.5.5.4 Signalling processing

8.5.5.5 Test parameters

8.5.5.6 Performance requirements

8.6 Measurements Performance Requirements

8.6.1 Common pilot measurements

8.6.1.1 Intra frequency test parameters

8.6.1.2 Inter frequency test parameters

8.6.2 CPICH RSCP

8.6.2.1 Intra frequency measurements accuracy

8.6.2.1.1 Absolute accuracy requirement

8.6.2.1.2 Relative accuracy requirement

8.6.2.2 Inter frequency measurement relative accuracy requirement

8.6.3 CPICH Ec/Io

8.6.3.1 Intra frequency measurements accuracy

8.6.3.1.1 Absolute accuracy requirement

8.6.3.1.2 Relative accuracy requirement

8.6.3.2 Inter frequency measurement relative accuracy requirement

8.6.4 Dedicated channel measurements

8.6.4.1 Test parameters

8.6.5 SIR

8.6.5.1 Absolute accuracy requirement

8.6.6 UTRA carrier RSSI

8.6.6.1 Test parameters for requirement

8.6.6.2 Absolute accuracy requirement

8.6.6.3 Relative accuracy requirement

8.6.7 GSM carrier RSSI

8.6.8 Transport channel BLER

8.6.8.1 BLER measurement requirement

8.6.9 UE transmitted power

8.6.10 CFN-SFN observed time difference

8.6.11 SFN-SFN observed time difference

8.6.12 UE Rx-Tx time difference

8.6.13 Observed time difference to GSM cell

8.6.14 Primary common control physical channel measurements

8.6.14.1 Inter frequency test parameters

8.6.15 P-CCPCH RSCP

8.6.15.1 Absolute accuracy requirements

8.7 UE parallel measurements

8.7.1 General

8.7.2 Parallel Measurement Requirements

Annex A (informative): Connection Diagrams

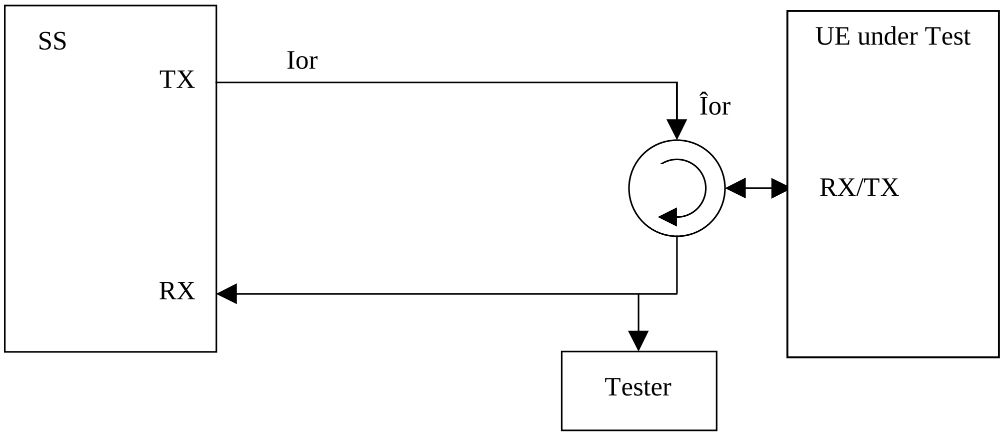


Figure A.1: Connection for Basic TX Test

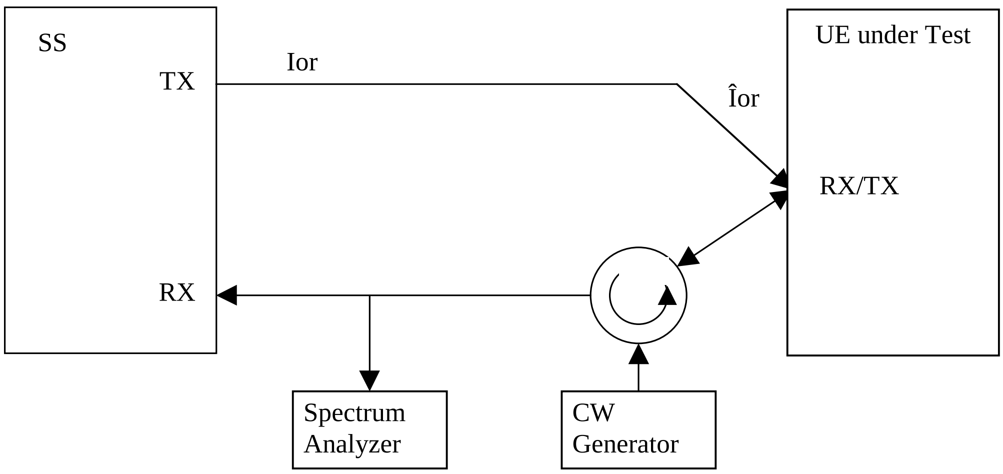


Figure A.2: Connection for TX Intermodulation Test

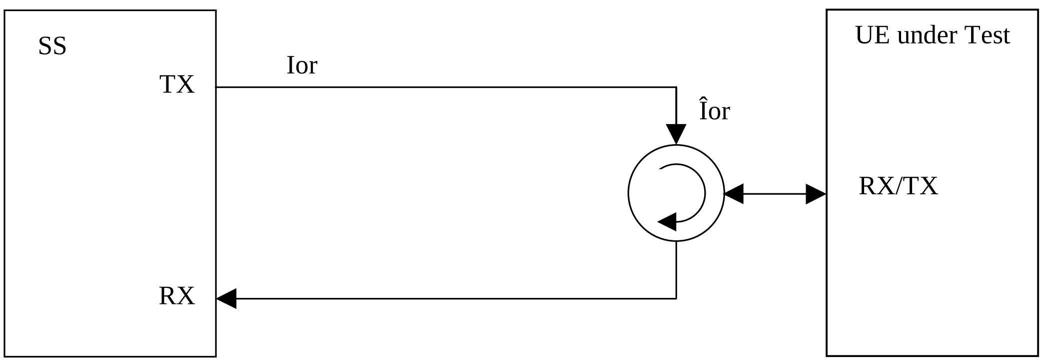


Figure A.3: Connection for Basic RX Test

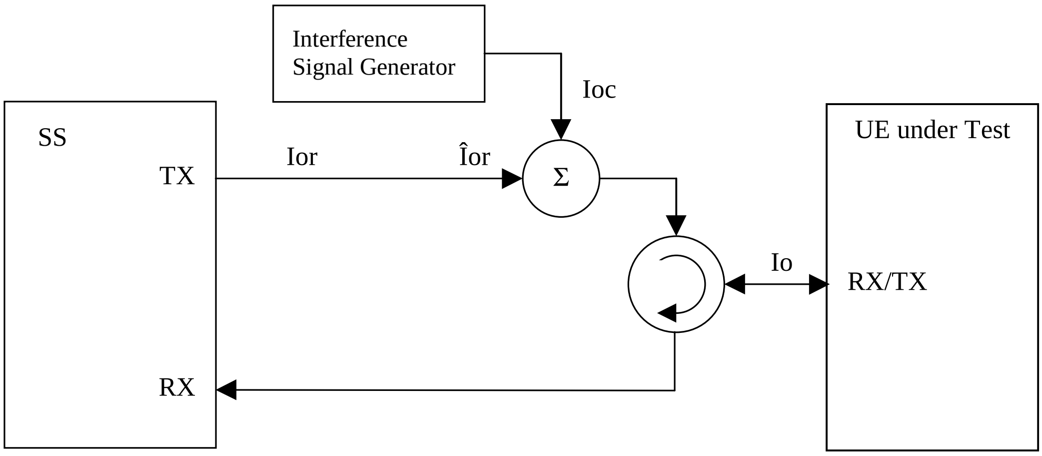


Figure A.4: Connection for RX Test with Interference

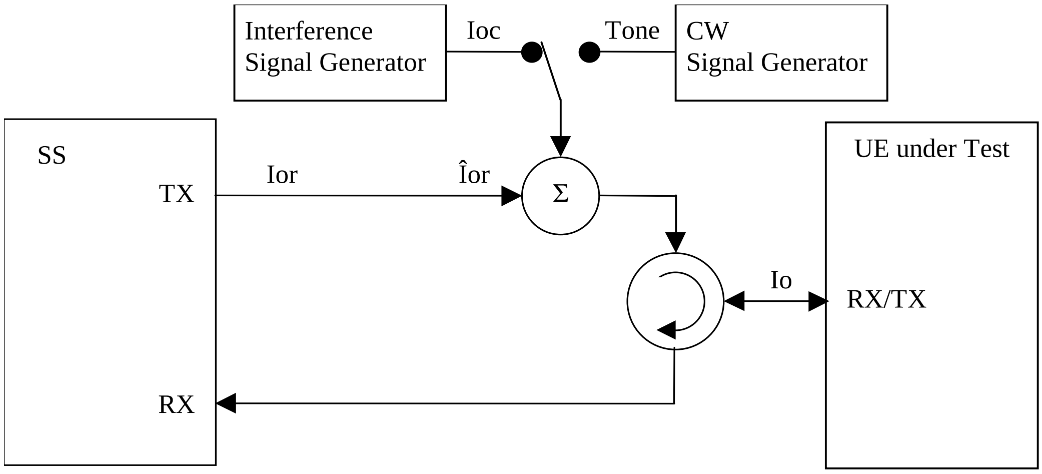


Figure A.5: Connection for RX Test with Interference or additional CW

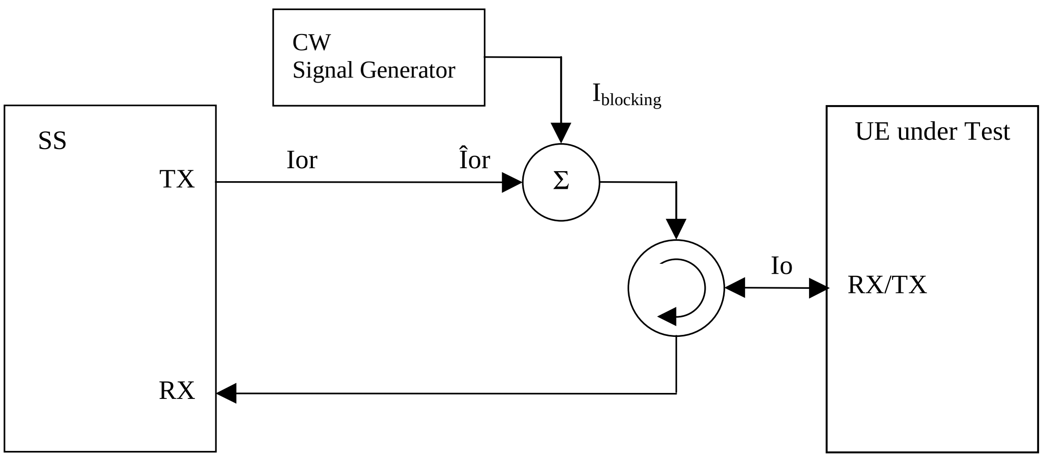


Figure A.6: Connection for RX Test with additional CW

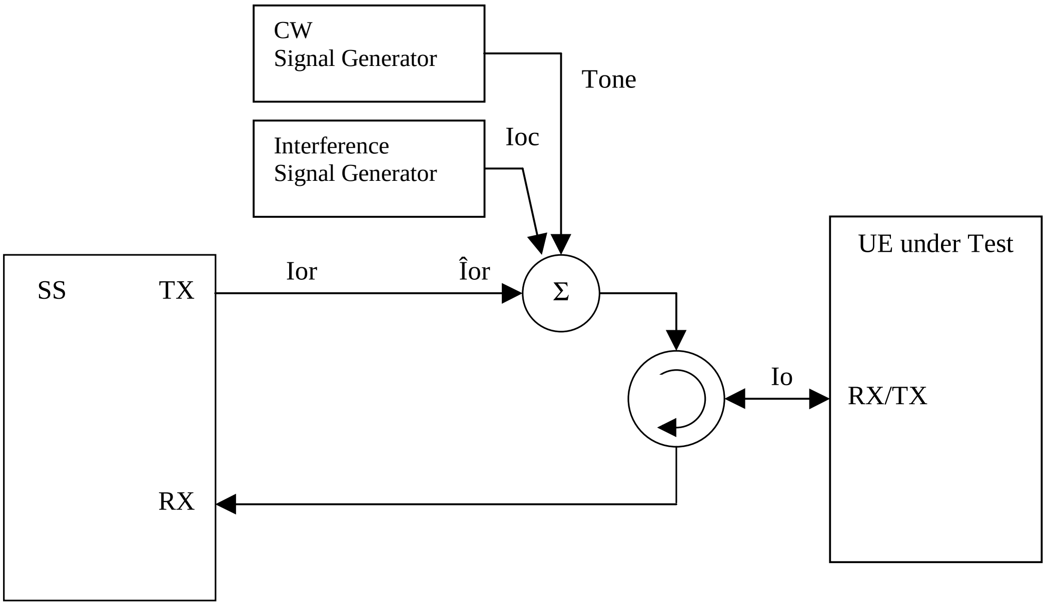


Figure A.7: Connection for RX Test with both Interference and additional CW

Figure A.8: Connection for Spurious Emission Test

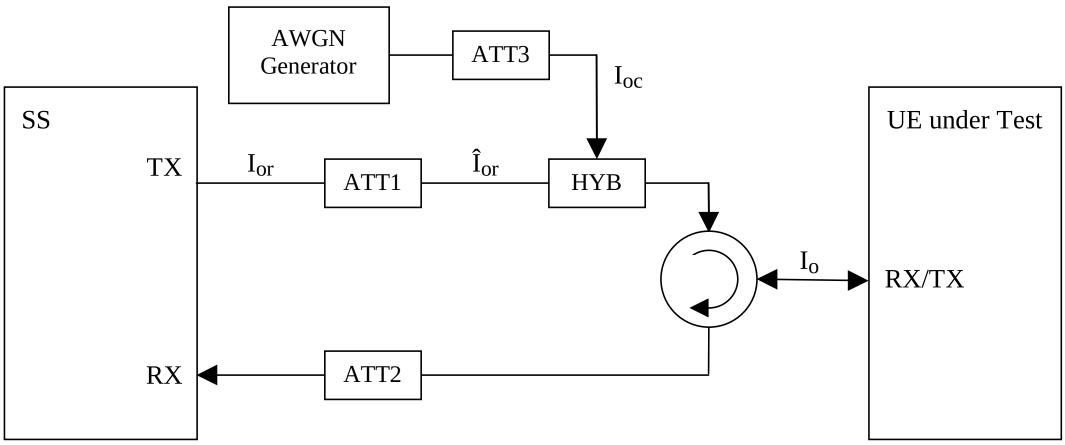


Figure A.9: Connection for Static Propagation Test

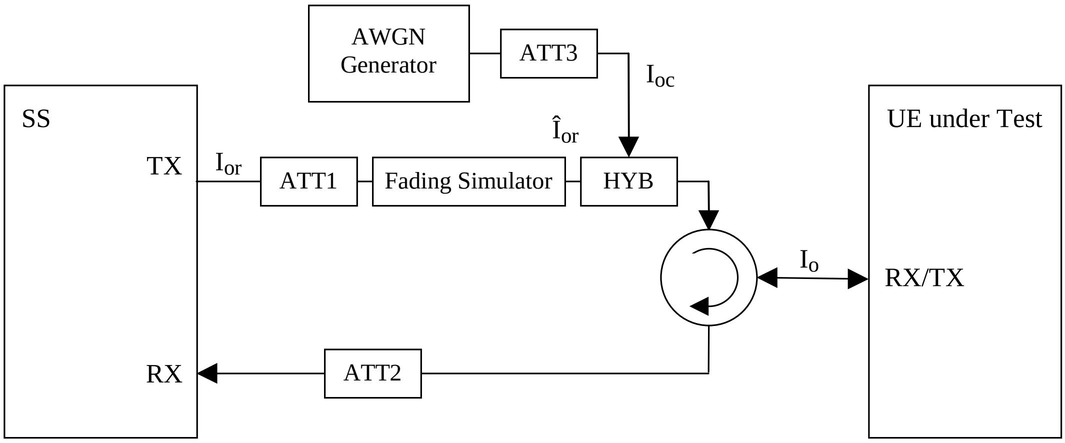


Figure A.10: Connection for Multi-path Fading Propagation Test

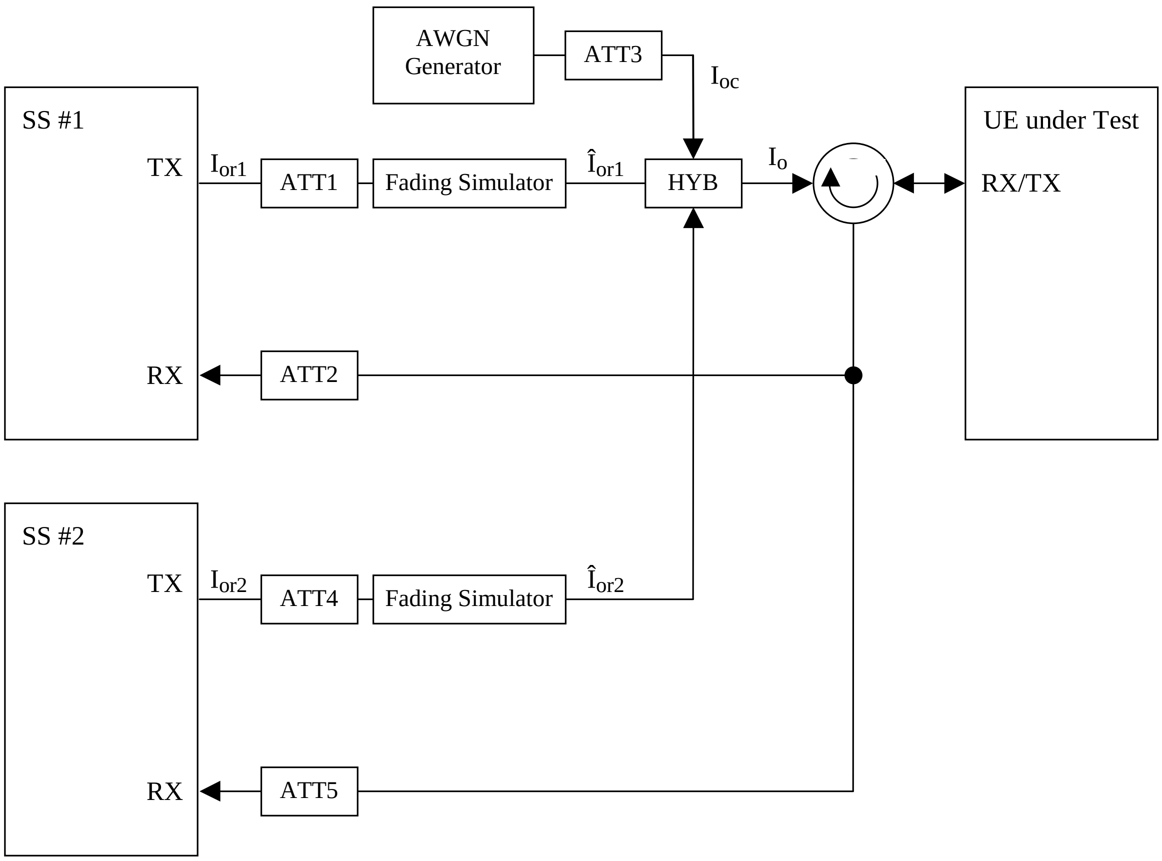


Figure A.11: Connection for Inter-Cell Soft Handover Test

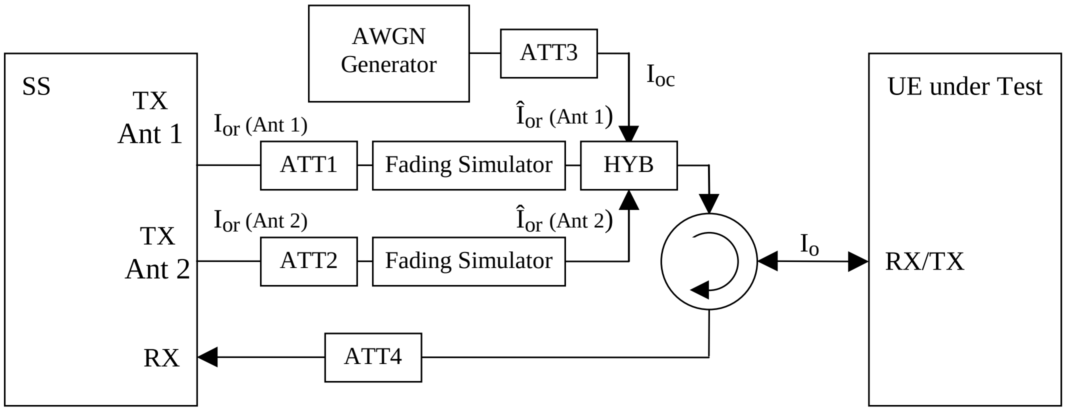


Figure A.12: Connection for Demodulation of DCH in open and closed loop transmit diversity modes

Annex B (normative): Global In-Channel TX-Test

B.1 General

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

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

All notes referred in the various subclauses of B.2 are put together in B.3

B.2 Definition of the process

B.2.1 Basic principle

The process is based on the comparison of the actual **output signal of the TX under test**, received by an ideal receiver, with a **reference signal**, that is generated by the measuring equipment and represents an ideal error free received signal. All signals are represented as equivalent (generally complex) baseband signals.

B.2.2 Output signal of the TX under test

The output signal of the TX under test is acquired by the measuring equipment, filtered by a matched filter (RRC 0.22, correct in shape and in position on the frequency axis) and stored at one sample per chip at the Inter-Symbol-Interference free instants.

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

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

with

ns: number of symbols in the measurement interval;

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

ma: number of midamble chips (only in TDD)

B.2.3 Reference signal

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

It is filtered by the same matched filter, mentioned in B.2.2., and stored at the Inter-Symbol-Interference free instants. The following form represents the reference signal in the entire measurement interval:

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

ns, sf, ma: see B.2.2

B.2.4 void

B.2.5 Classification of measurement results

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

- Results of type “deviation”, where the error-free parameter has a non-zero magnitude. (These are the parameters that quantify the integral physical characteristic of the signal).These parameters are:

  RF Frequency

  Power (in case of single code)

  Code Domain Power (in case of multi code)

  Timing (only for UE)

  (Additional parameters: see Note: Deviation)

- Results of type “residual”, where the error-free parameter has value zero. (These are the parameters that quantify the error values of the measured signal, whose ideal magnitude is zero). These parameters are:

  Error Vector Magnitude (EVM);

  Peak Code Domain Error (PCDE).

  (Additional parameters: see Note residual)

B.2.6 Process definition to achieve results of type “deviation”

The reference signal (**R**; see subclause B.2.3) is varied with respect to the parameters mentioned in subclause B.2.5 under "results of type deviation" in order to achieve best fit with the recorded signal under test (**Z**; see subclause B.2.2). Best fit is achieved when the RMS difference value between the signal under test and the varied reference signal is an absolute minimum. The varied reference signal, after the best fit process, will be called **R’.**

The varying parameters, leading to **R’** represent directly the wanted results of type “deviation”. These measurement parameters are expressed as deviation from the reference value with units same as the reference value.

In case of multi code, the type-“deviation”-parameters (frequency, timing and (RF-phase)) are varied commonly for all codes such that the process returns one frequency-deviation, one timing deviation, (one RF-phase –deviation).

(These parameters are <u>not</u> varied on the individual codes signals such that the process returns k frequency errors... . (k: number of codes)).

The only type-“deviation”-parameters varied individually are code powers such that the process returns k code power deviations (k: number of codes).

B.2.7 Process definition to achieve results of type “residual”

The difference between the varied reference signal (**R’**; see subclauseB.2.6.) and the TX signal under test (**Z**; see subclauseB.2.2) is the error vector **E** versus time:

E = **Z – R’.**

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

<u>Form EVM</u> (representing the physical error signal in the entire measurement interval)

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

ns, sf, ma: see B.2.2

<u>Form PCDE</u> (derived from Form EVM by separating the samples into symbol intervals)

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

E gives results of type “residual” applying the two algorithms defined in subclauses B 2.7.1 and B 2.7.2.

B.2.7.1 Error Vector Magnitude (EVM)

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

1) Take the error vector **E** defined in subclause B.2.7 (Form EVM) and calculate the RMS value of **E**; the result will be called RMS(**E**).

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

3) Calculate EVM according to:

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

(see note TDD)

B.2.7.2 Peak Code Domain Error (PCDE)

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

1) Take the error vectors **e** defined in subclause B.2.7 (Form PCDE)

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

3) To achieve meaningful results it is necessary to descramble **e,** leading to **e’** (see Note1: Scrambling code)

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

   k: number of codes

   ns: number of symbols in the measurement interval

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

6) Find the peak value among the k "*Absolute CodeEVMs*".
(This value can be called "*Absolute PeakCodeEVM*" [Volt].)

7) Calculate PCDE according to:

$$10*\lg \frac{(\text{“}\textit{Absolute PeakCodeEVM}\text{”})^2}{(\mathrm{RMS}(\mathbf{R}))^2} \quad \mathrm{dB}$$ (a relative value in dB).

(see Note: Denominator)

(see Note2: Scrambling code)

(see Note IQ)

(see Note TDD)

(see Note Synch channel)

B.3 Notes

Note: Symbol length)

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

Note: Deviation)

It is conceivable to regard more parameters as type „deviation“ e.g. Chip frequency and RF-phase.

As chip-frequency and RF-frequency are linked together by a statement in the core specifications [1] it is sufficient to process RF frequency only.

A parameter RF-phase must be varied within the best fit process (B 2.6.). Although necessary, this parameter-variation doesn’t describe any error, as the modulation schemes used in the system don’t depend on an absolute RF-phase.

Note: residual)

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

Note: Denominator)

If the denominator stems from mutual time shifted signals of different code powers, (e.g. BS, FDD) the measurement result PCDE should be expressed absolutely instead.

Note1: Scrambling Code)

In general a TX signal under test can use more than one scrambling code. Note that PCDE is processed regarding the unused channelisation - codes as well. In order to know which scrambling code shall be applied on unused channelisation -codes, it is necessary to restrict the test conditions: TX signal under test shall use exactly one scrambling code.

Note2 Scrambling Code)

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

Note IQ)

As in FDD/uplink each code can be used twice, on the I and on the Q channel, the measurement result may indicate on which channel (I or Q) PCDE occurs.

Note TDD)

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

Note: Synch Channel)

A BS signal contains a physical synch channel, which is non orthogonal, related to the other DPCHs. In this context note: The code channel bearing the result of PCDE is exactly one of the DPCHs (never the synch channel). The origin of PCDE (erroneous code power) can be any DPCH and/or the synch channel.

Annex C (normative): Measurement channels

C.1 General

The measurement channels in this annex are defined to derive the requirements in clauses 5, 6 and 7. The measurement channels represent example configuration of radio access bearers for different data rates.

The measurement channel for 12.2 kbps shall be supported by any UE both in up- and downlink. Support for other measurement channels is depending on the UE Radio Access capabilities.

C.2 UL reference measurement channel

C.2.1 UL reference measurement channel (12.2 kbps)

The parameters for the 12.2 kbps UL reference measurement channel are specified in Table C.2.1.1 and Table C.2.1.2. The channel coding for information is shown in Figure C.2.1

Table C.2.1.1: UL reference measurement channel physical parameters (12.2 kbps)

Parameter	Level	Unit
Information bit rate	12.2	kbps
DPDCH	60	kbps
DPCCH	15	kbps
DPCCH Slot Format #i	0	-
DPCCH/DPDCH power ratio	–5.46	dB
TFCI	On	-
Repetition	23	%
NOTE: Slot Format #2 is used for closed loop tests in subclause 7.6.2.		

Table C.2.1.2: UL reference measurement channel, transport channel parameters (12.2 kbps)

Parameters	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	244	100
Transport Block Set Size	244	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Convolution Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12

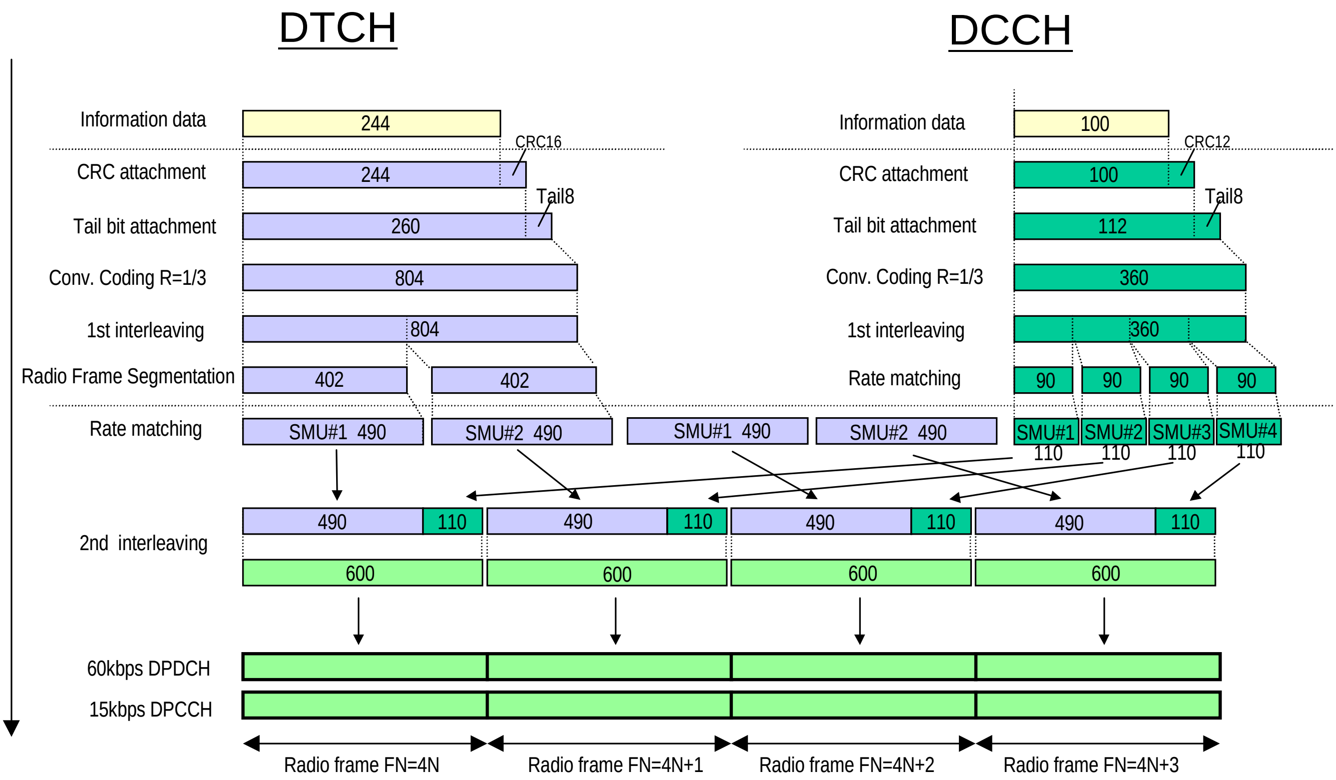


Figure C.2.1 (Informative): Channel coding of UL reference measurement channel (12.2 kbps)

C.2.2 UL reference measurement channel (64 kbps)

The parameters for the 64 kbps UL reference measurement channel are specified in Table C.2.2.1 and Table C.2.2.2. The channel coding for information is shown in Figure C.2.2. This measurement channel is not currently used in the present document but can be used for future requirements.

Table C.2.2.1: UL reference measurement channel (64 kbps)

Parameter	Level	Unit
Information bit rate	64	kbps
DPDCH	240	kbps
DPCCH	15	kbps
DPCCH Slot Format #i	0	-
DPCCH/DPDCH	–9.54	dB
TFCI	On	-
Repetition	18	%

Table C.2.2.2: UL reference measurement channel, transport channel parameters (64 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	1280	100
Transport Block Set Size	1280	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12

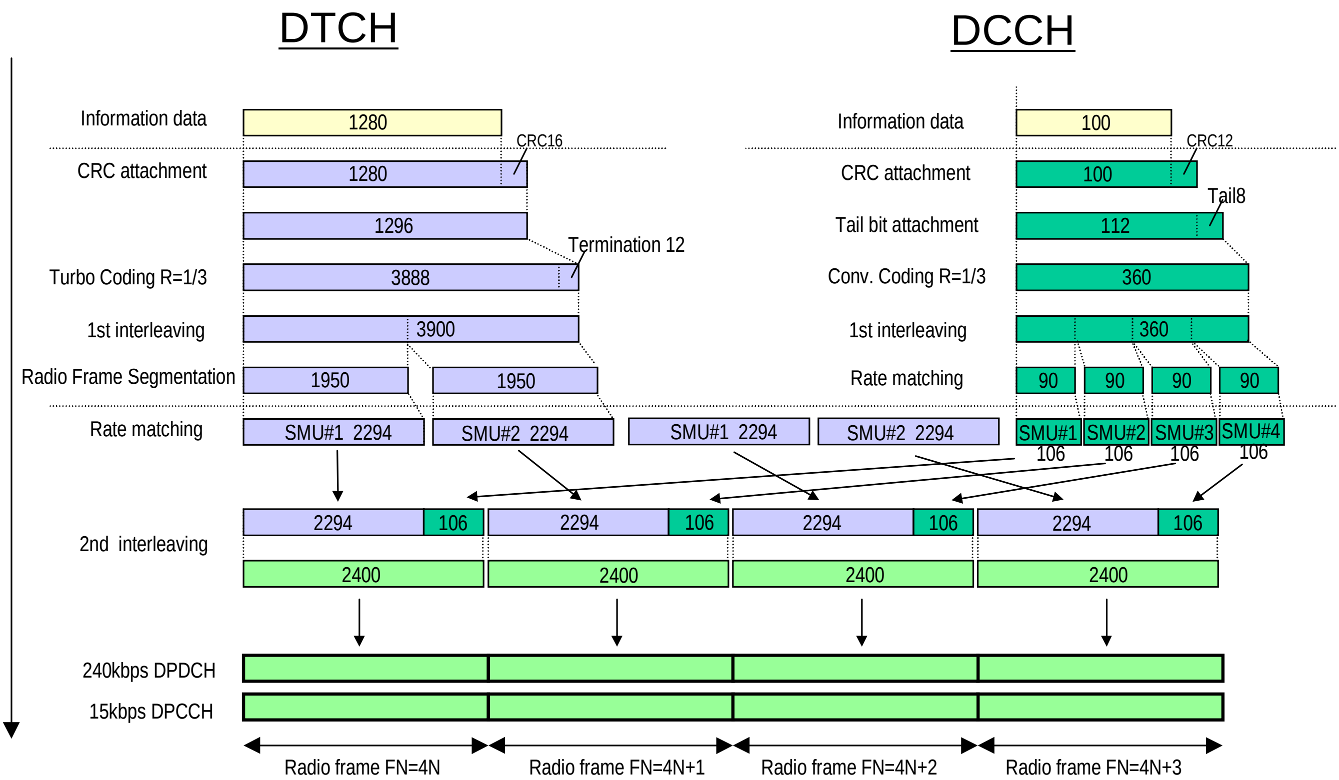


Figure C.2.2 (Informative): Channel coding of UL reference measurement channel (64 kbps)

C.2.3 UL reference measurement channel (144 kbps)

The parameters for the 144 kbps UL reference measurement channel are specified in Table C.2.3.1 and Table C.2.3.2. The channel coding for information is shown in Figure C.2.3. This measurement channel is not currently used in the present document but can be used for future requirements.

Table C.2.3.1: UL reference measurement channel (144 kbps)

Parameter	Level	Unit
Information bit rate	144	kbps
DPDCH	480	kbps
DPCCH	15	kbps
DPCCH Slot Format #i	0	-
DPCCH/DPDCH power ratio	–11.48	dB
TFCI	On	-
Repetition	8	%

Table C.2.3.2: UL reference measurement channel, transport channel parameters (144 kbps)

Parameters	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	2880	100
Transport Block Set Size	2880	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12

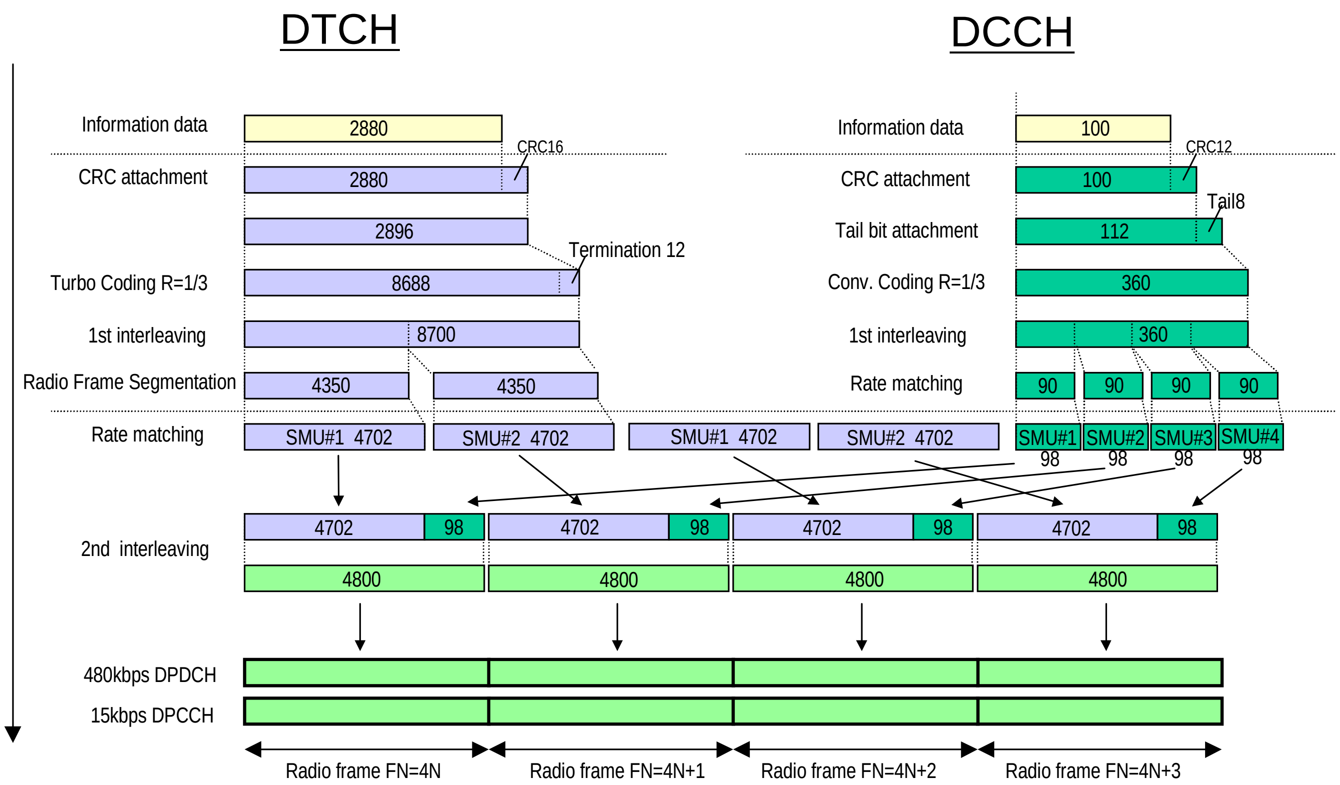


Figure C.2.3 (Informative): Channel coding of UL reference measurement channel (144 kbps)

C.2.4 UL reference measurement channel (384 kbps, 20ms TTI)

The parameters for the 384 kbps UL reference measurement channel (TTI-20ms) are specified in Table C.2.4.1 and Table C.2.4.2. The channel coding for information is shown in Figure C.2.4. This measurement channel is not currently used in the present document but can be used for future requirements.

NOTE: The measurement channel for 384kbps with 20ms TTI will be deleted, and the new 384kbps measurement channel defined in subclause C.2.5 will be used.

Table C.2.4.1: UL reference measurement channel (384 kbps, 20ms TTI)

Parameter	Level	Unit
Information bit rate	384	kbps
DPDCH	960	kbps
DPCCH	15	kbps
DPCCH Slot Format #i	0	-
DPCCH/DPDCH power ratio	–11.48	dB
TFCI	On	-
Puncturing	18	%

Table C.2.4.2: UL reference measurement channel, transport channel parameters (384 kbps, 20ms TTI)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	3840	100
Transport Block Set Size	7680	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12

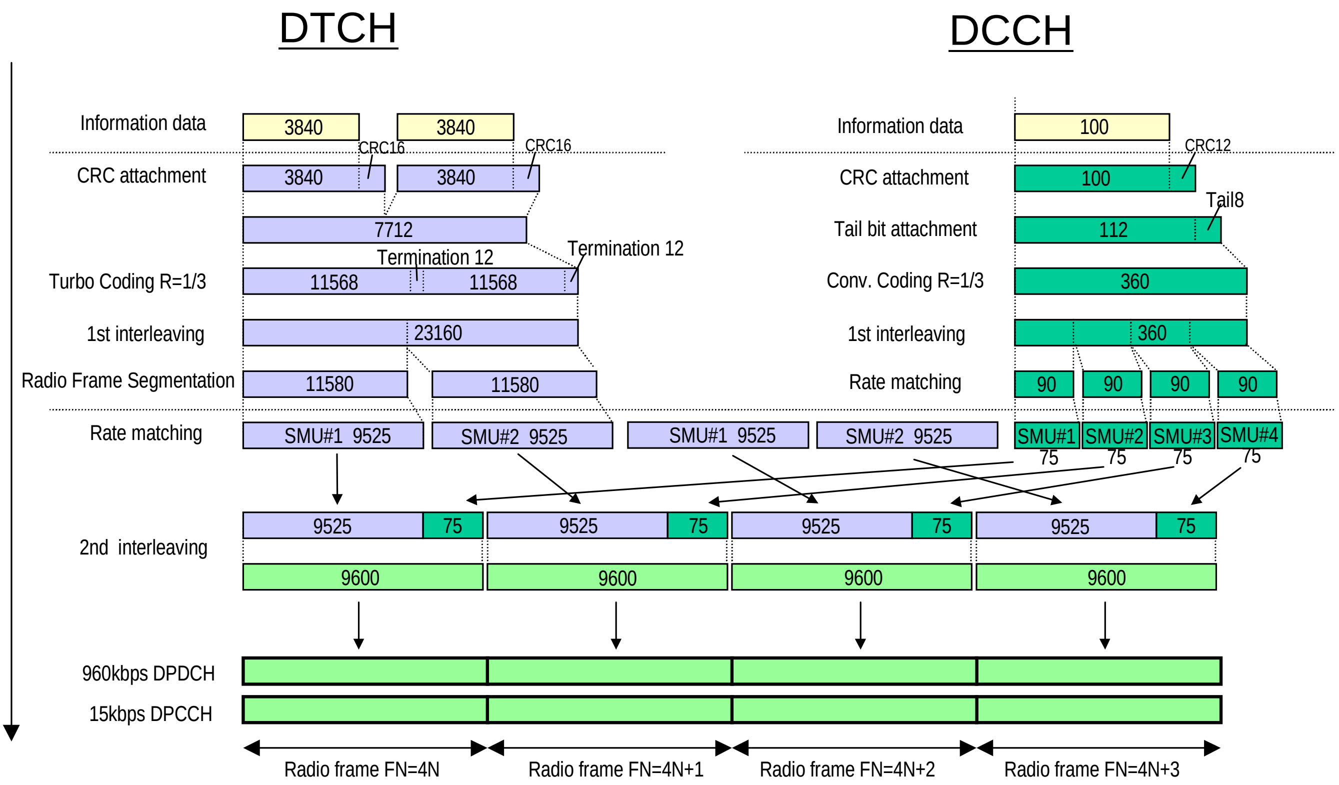


Figure C.2.4 (Informative): Channel coding of UL reference measurement channel (384 kbps, 20ms TTI)

C.2.5 UL reference measurement channel (384 kbps)

The parameters for the 384 kbps UL reference measurement channel are specified in Table C.2.5.1 and Table C.2.5.2. The channel coding for information is shown in Figure C.2.5. This measurement channel is not currently used in the present document but can be used for future requirements.

Table C.2.5.1: UL reference measurement channel (384 kbps)

Parameter	Level	Unit
Information bit rate	384	kbps
DPDCH	960	kbps
DPCCH	15	kbps
DPCCH/DPDCH power ratio	-11.48	dB
TFCI	On	-
Puncturing	18	%

Table C.2.5.2: UL reference measurement channel, transport channel parameters (384 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	3840	100
Transport Block Set Size	3840	100
Transmission Time Interval	10 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12

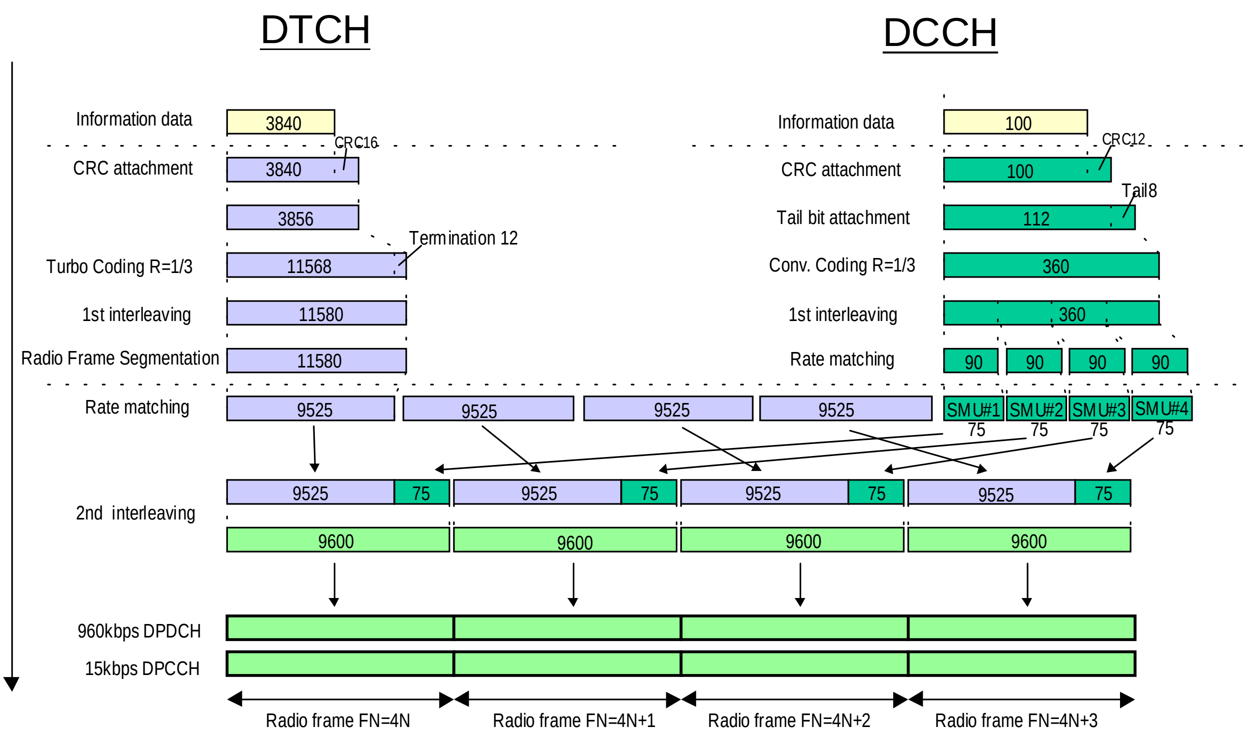


Figure C.2.5 (Informative): Channel coding of UL reference measurement channel (384 kbps)

C.2.6 UL reference measurement channel (768 kbps)

The parameters for the UL measurement channel for 768 kbps are specified in Table C.2.6.1 and Table C.2.6.2.

Table C.2.6.1: UL reference measurement channel, physical parameters (768 kbps)

Parameter	Level	Unit
Information bit rate	2*384	kbps
$DPDCH_1$	960	kbps
$DPDCH_2$	960	kbps
DPCCH	15	kbps
DPCCH/DPDCH power ratio	-11.48	dB
TFCI	On	-
Puncturing	18	%

Table C.2.6.2: UL reference measurement channel, transport channel parameters (768 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	3840	100
Transport Block Set Size	7680	100
Transmission Time Interval	10 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12

C.3 DL reference measurement channel

C.3.1 DL reference measurement channel (12.2 kbps)

The parameters for the 12.2 kbps DL reference measurement channel are specified in Table C.3.1 and Table C.3.2. The channel coding is detailed in Figure C.3.1.

Table C.3.1: DL reference measurement channel (12.2 kbps)

Parameter	Level	Unit
Information bit rate	12.2	kbps
DPCH	30	ksps
Slot Format #i	11	-
TFCI	On	
Power offsets PO1, PO2 and PO3	0	dB
Puncturing	14.5	%

Table C.3.2: DL reference measurement channel, transport channel parameters (12.2 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	244	100
Transport Block Set Size	244	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Convolution Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12
Position of TrCH in radio frame	fixed	fixed

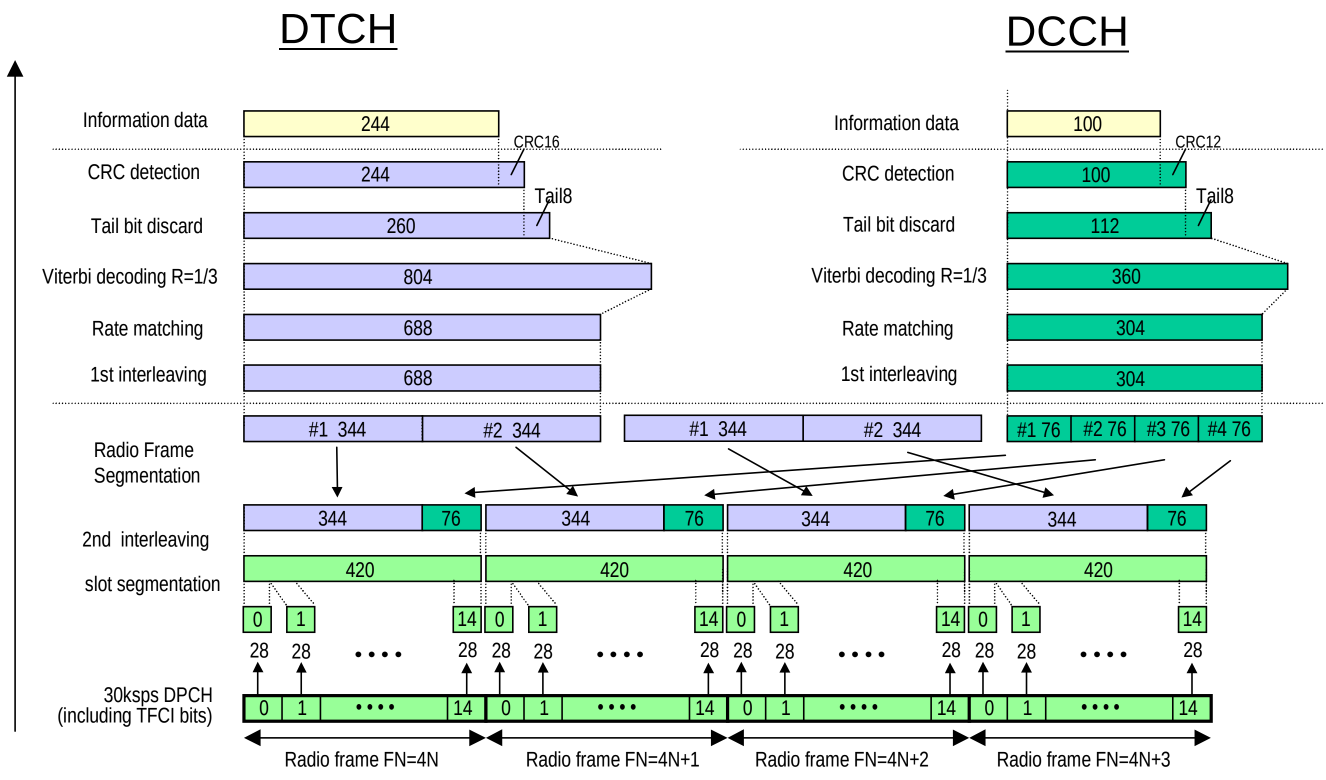


Figure C.3.1 (Informative): Channel coding of DL reference measurement channel (12.2 kbps)

C.3.2 DL reference measurement channel (64 kbps)

The parameters for the DL reference measurement channel for 64 kbps are specified in Table C.3.3 and Table C.3.4. The channel coding is detailed in Figure C.3.2.

Table C.3.3: DL reference measurement channel (64 kbps)

Parameter	Level	Unit
Information bit rate	64	kbps
DPCH	120	ksps
Slot Format #i	13	-
TFCI	On	-
Power offsets PO1, PO2 and PO3	0	dB
Repetition	2.9	%

Table C.3.4: DL reference measurement channel, transport channel parameters (64 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	1280	100
Transport Block Set Size	1280	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12
Position of TrCH in radio frame	fixed	fixed

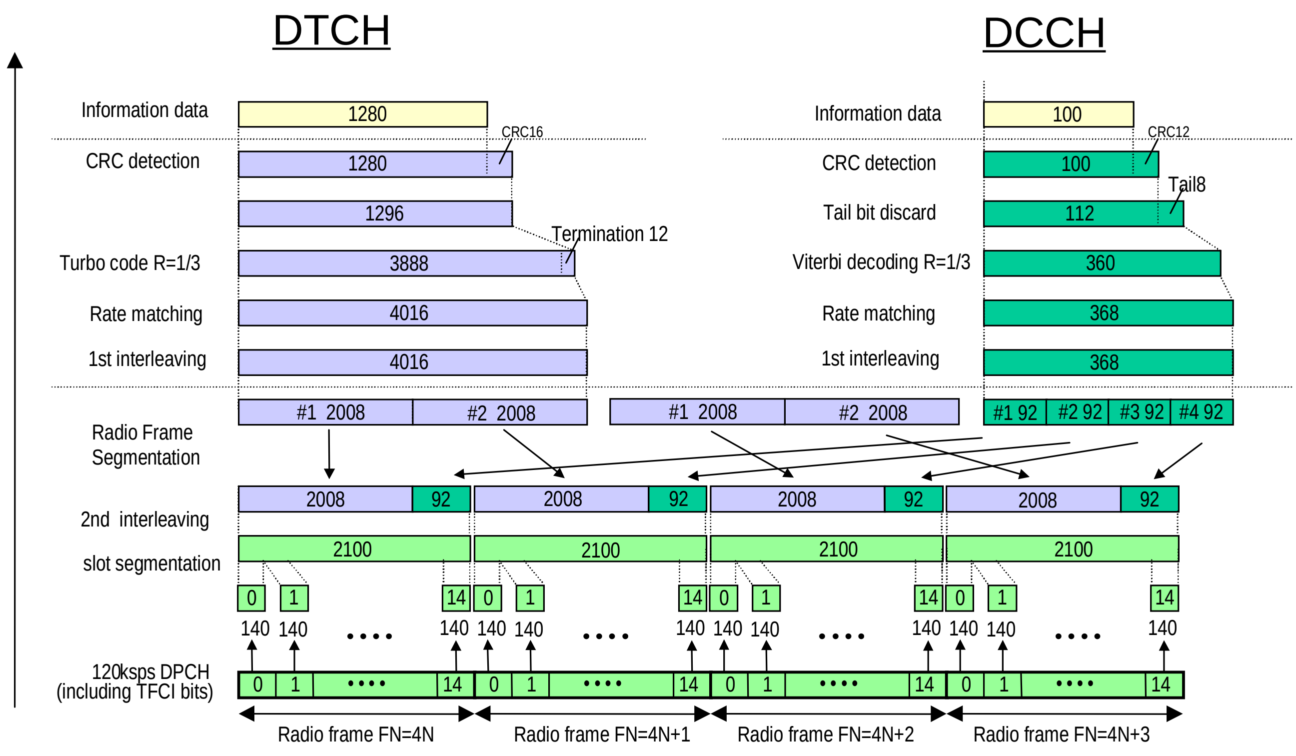


Figure C.3.2 (Informative): Channel coding of DL reference measurement channel (64 kbps)

C.3.3 DL reference measurement channel (144 kbps)

The parameters for the DL reference measurement channel for 144 kbps are specified in Table C.3.5 and Table C.3.6. The channel coding is detailed in Figure C.3.3.

Table C.3.5: DL reference measurement channel (144kbps)

Parameter	Level	Unit
Information bit rate	144	kbps
DPCH	240	ksps
Slot Format #i	14	-
TFCI	On	
Power offsets PO1, PO2 and PO3	0	dB
Puncturing	2.7	%

Table C.3.6: DL reference measurement channel, transport channel parameters (144 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	2880	100
Transport Block Set Size	2880	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12
Position of TrCH in radio frame	fixed	fixed

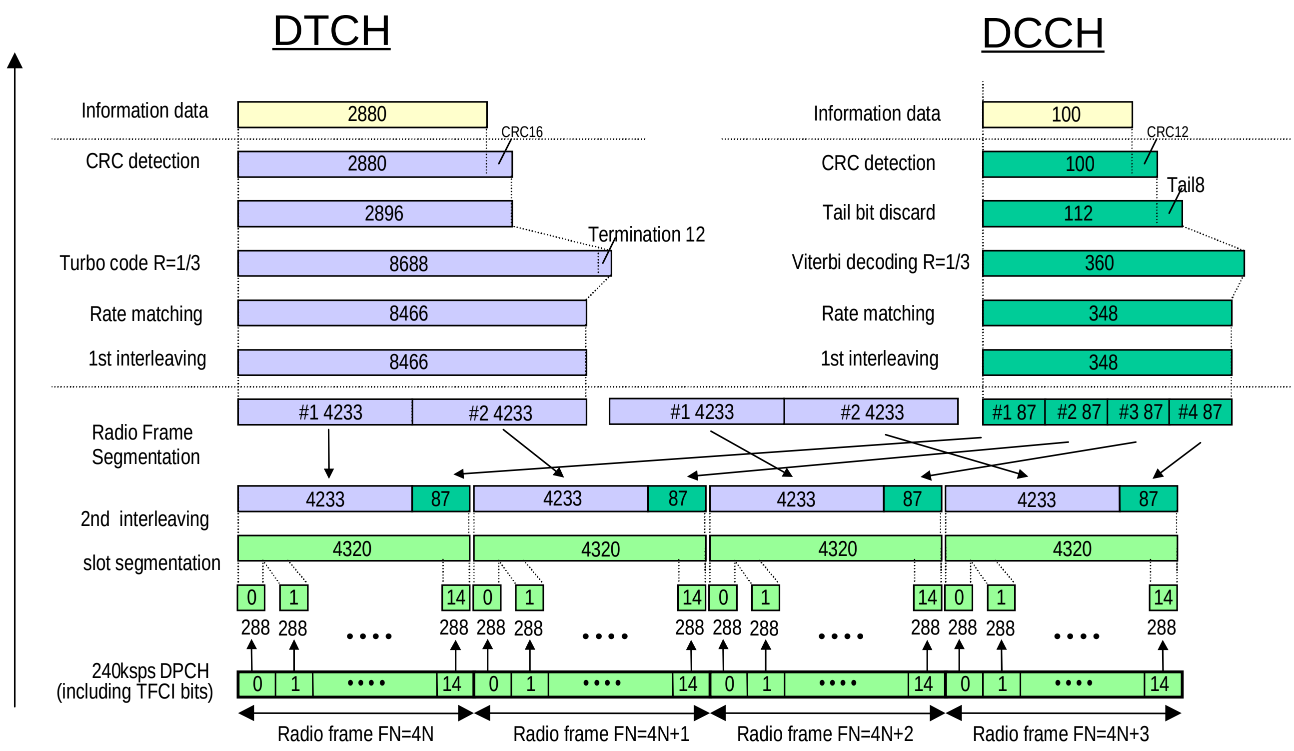


Figure C.3.3 (Informative): Channel coding of DL reference measurement channel (144 kbps)

C.3.4 DL reference measurement channel (384 kbps, 20ms TTI)

The parameters for the DL reference measurement channel for 384 kbps (20ms TTI) are specified in Table C.3.7 and Table C.3.8. The channel coding is detailed in Figure C.3.4.

NOTE: The measurement channel for 384 kbps with 20ms-TTI will be deleted, and new 384kbps measurement channel defined in subclause C.3.5 will be used.

Table C.3.7: DL reference measurement channel (384kbps, 20ms TTI)

Parameter	Level	Unit
Information bit rate	384	kbps
DPCH	480	ksps
Slot Format #i	15	-
TFCI	On	
Power offsets PO1, PO2 and PO3	0	dB
Puncturing	22	%

Table C.3.8: DL reference measurement channel, transport channel parameters (384 kbps, 20ms TTI)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	3840	100
Transport Block Set Size	7680	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12
Position of TrCH in radio frame	fixed	fixed

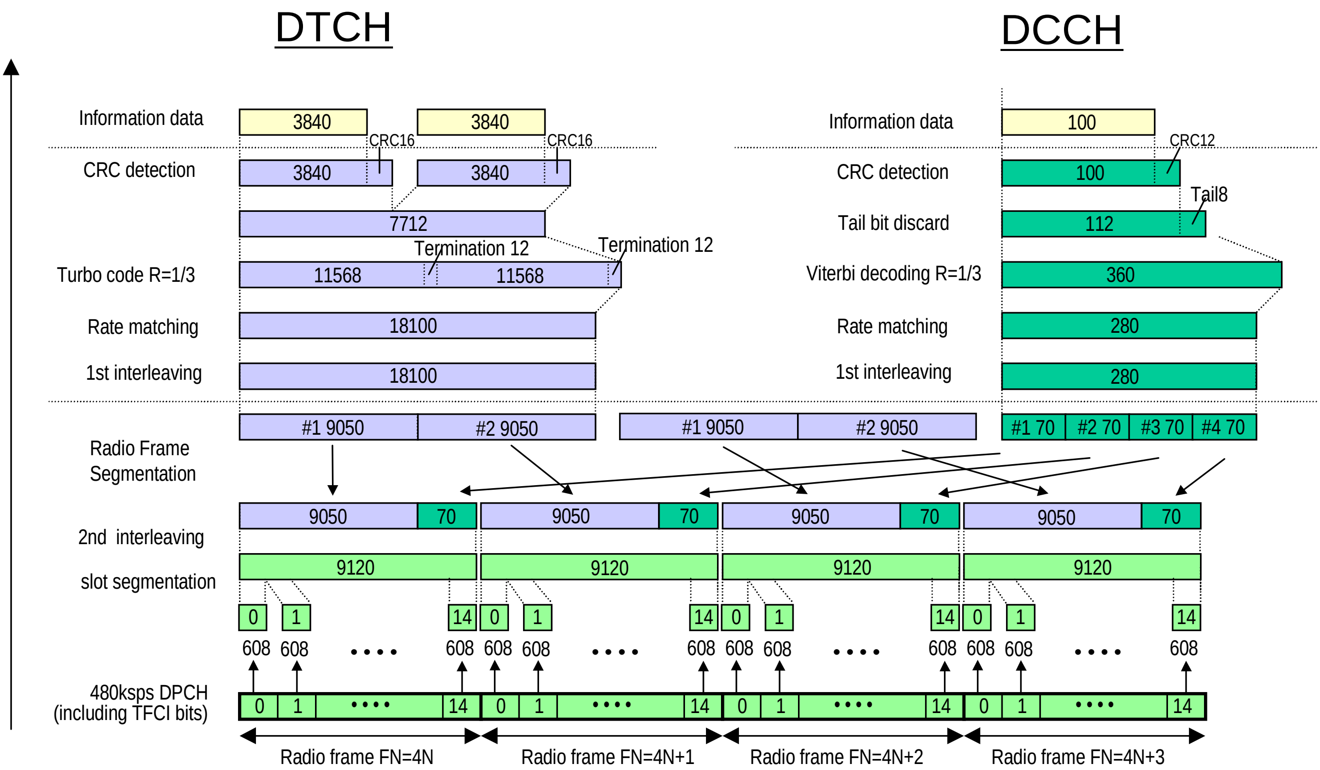


Figure C.3.4 (Informative): Channel coding of DL reference measurement channel (384 kbps, 20ms TTI))

C.3.5 DL reference measurement channel (384 kbps)

The parameters for the DL reference measurement channel for 384 kbps are specified in Table C.3.5.1 and Table C.3.5.2. The channel coding is shown for information in Figure C3.5.

Table C.3.5.1: DL reference measurement channel, physical parameters (384 kbps)

Parameter	Level	Unit
Information bit rate	384	kbps
DPCH	480	ksps
TFCI	On	-
Puncturing	22	%

Table C.3.5.2: DL reference measurement channel, transport channel parameters (384 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	3840	100
Transport Block Set Size	3840	100
Transmission Time Interval	10 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12
Position of TrCH in radio frame	fixed	Fixed

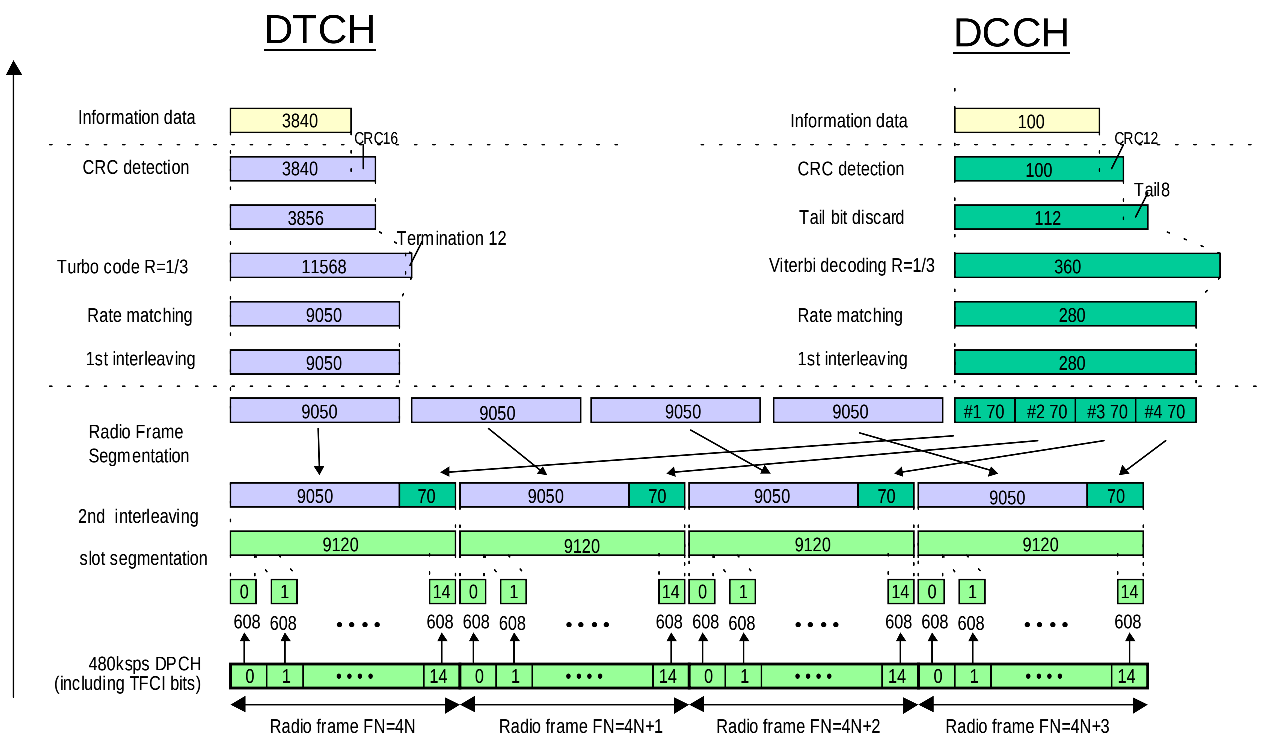


Figure C.3.5 (Informative): Channel coding of DL reference measurement channel (384 kbps)

C.4 Reference measurement channel for BTFD performance requirements

C.4.1 UL reference measurement channel for BTFD performance requirements

The parameters for UL reference measurement channel for BTFD are specified in Table C.4.1 and Table C.4.2.

Table C.4.1: UL reference measurement channel physical parameters for BTFD

Parameter	Level									Unit
Information bit rate	Rate1	Rate2	Rate3	Rate4	Rate5	Rate6	Rate7	Rate8	Rate9	kbps
	12.2k	10.2k	7.95k	7.4k	6.7k	5.9k	5.15k	4.75k	1.95k	
DPDCH	60									kbps
DPCCH	15									kbps
DPCCH Slot Format #i	0									-
DPCCH/DPDCH power ratio	-5.46	[T.B.D.]	[T.B.D.]	[T.B.D.]	[T.B.D.]	[T.B.D.]	[T.B.D.]	[T.B.D.]	[T.B.D.]	dB
TFCI	On									-
Repetition	23									%

Table C.4.2: UL reference measurement channel, transport channel parameters for BTFD

Parameters	DTCH									DCCH
	Rate1	Rate2	Rate3	Rate4	Rate5	Rate6	Rate7	Rate8	Rate9	
Transport Channel Number	1									2
Transport Block Size	244	204	159	148	134	118	103	95	39	100
Transport Block Set Size	244	204	159	148	134	118	103	95	39	100
Transmission Time Interval	20 ms									40 ms
Type of Error Protection	Convolution Coding									Convolution Coding
Coding Rate	1/3									1/3
Static Rate Matching parameter	1.0									1.0
Size of CRC	16									12

C.4.2 DL reference measurement channel for BTFD performance requirements

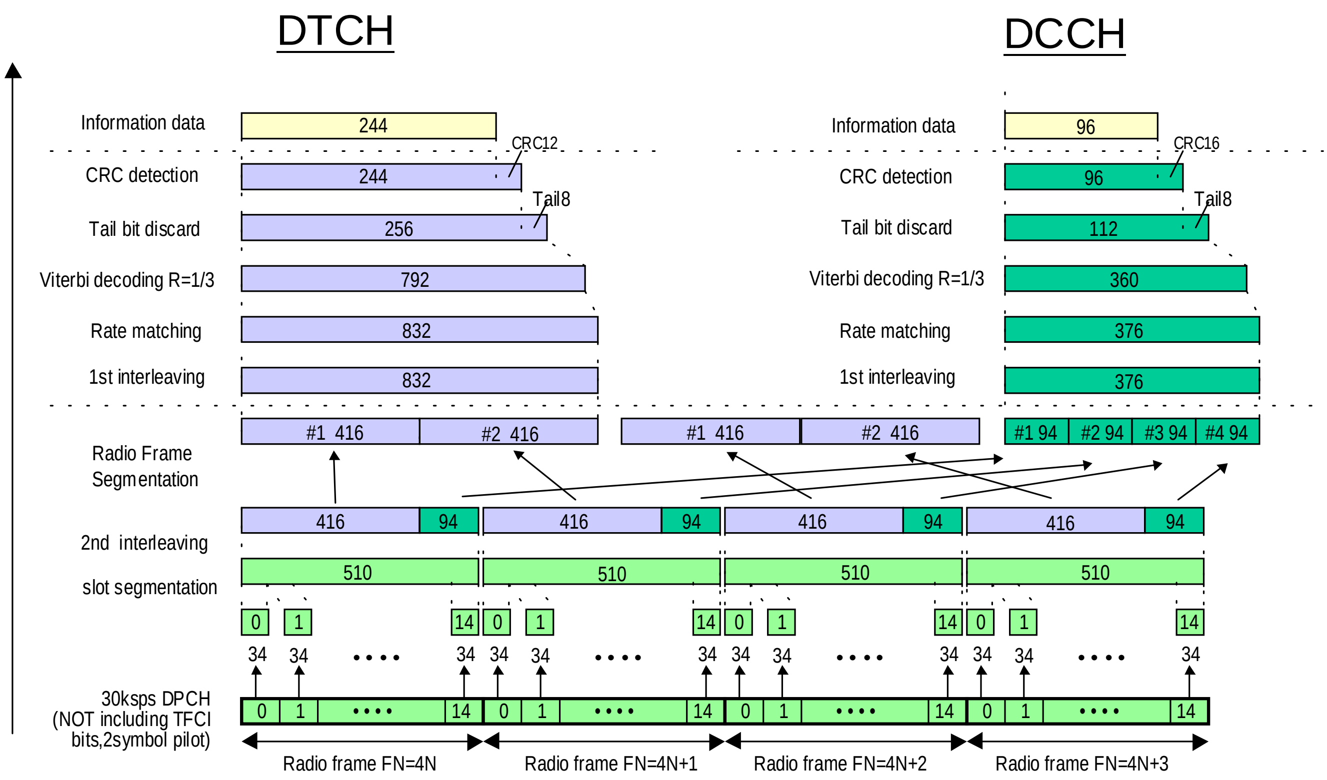
The parameters for DL reference measurement channel for BTFD are specified in Table C.4.3 and Table C.4.4. The channel coding for information is shown in Figures C.4.1, C.4.2, and C.4.3.

Table C.4.3: DL reference measurement channel physical parameters for BTFD

Parameter	Rate 1	Rate 2	Rate 3	Unit
Information bit rate	12.2	7.95	1.95	kbps
DPCH	30			ksps
TFCI	Off			-
Repetition	5			%

Table C.4.4: DL reference measurement channel, transport channel parameters for BTFD

Parameter	DTCH			DCCH
	Rate 1	Rate 2	Rate 3	
Transport Channel Number	1			2
Transport Block Size	244	159	39	96
Transport Block Set Size	244	159	39	96
Transmission Time Interval	20 ms			40 ms
Type of Error Protection	Convolution Coding			Convolution Coding
Coding Rate	1/3			1/3
Static Rate Matching parameter	1.0			1.0
Size of CRC	12			16
Position of TrCH in radio frame	fixed			fixed



FigureC.4.1 (Informative): Channel coding of DL reference measurement channel for BTFD (Rate 1)

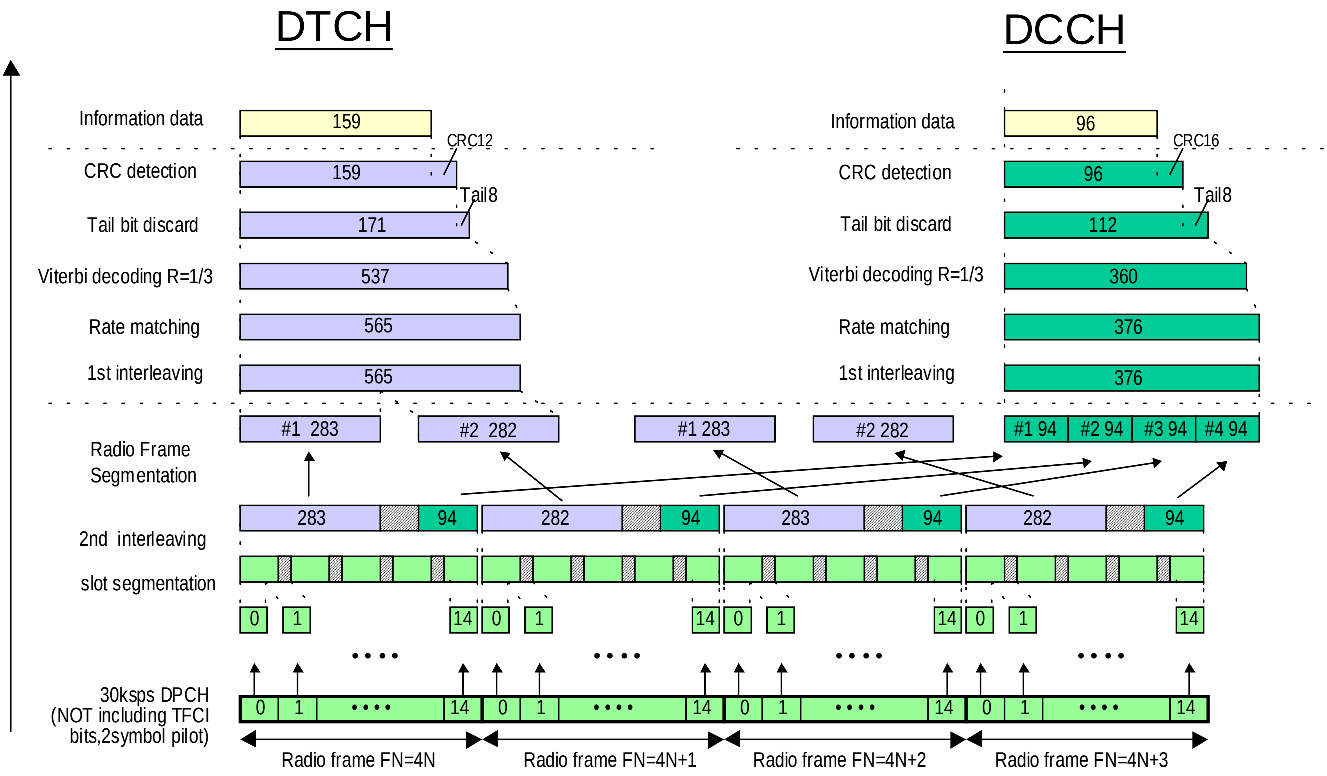


Figure C.4.2 (Informative): Channel coding of DL reference measurement channel for BTFD (Rate 2)

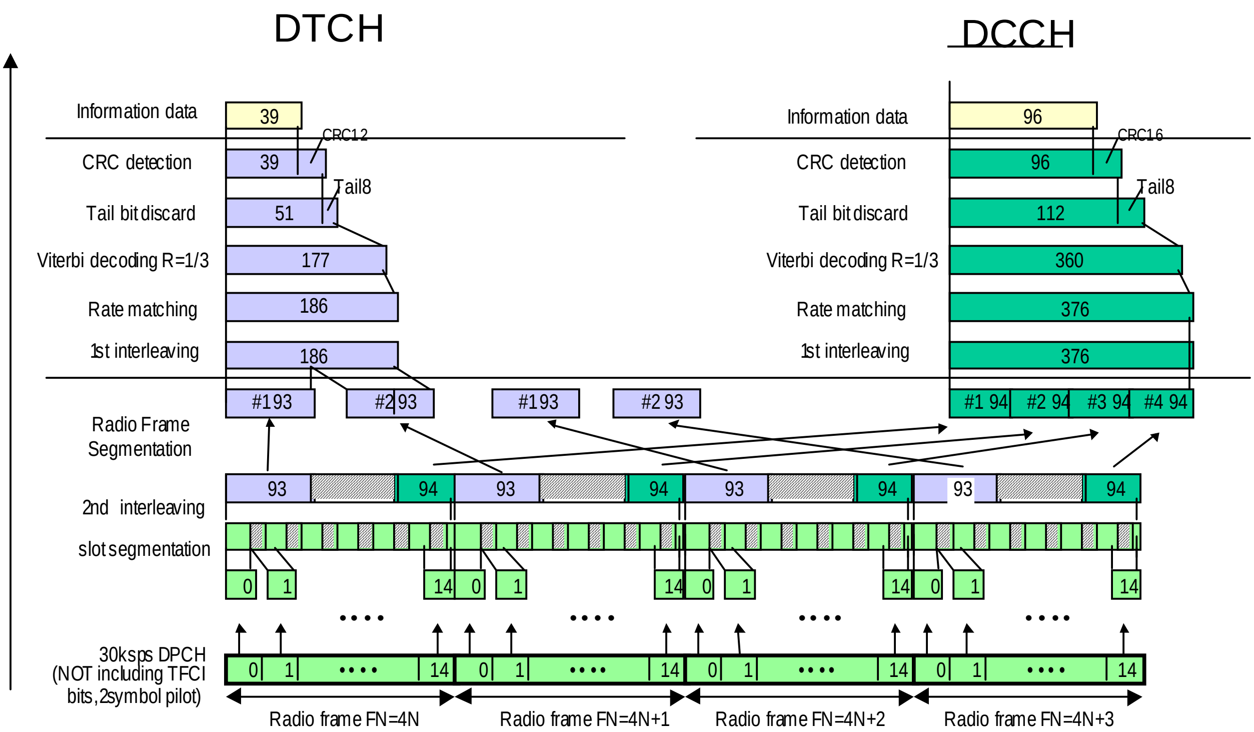


Figure C.4.3 (Informative): Channel coding of DL reference measurement channel for BTFD (Rate 3)

C.5 DL reference compressed mode parameters

Table C.5.1: Compressed mode reference pattern 1 parameters

Parameter	1.1	1.2	Note
TGSN (Transmission Gap Starting Slot Number)	11	11	
TGL1 (Transmission Gap Length 1)	7	7	
TGL2 (Transmission Gap Length 2)	-	-	Only one gap in use.
TGD (Transmission Gap Distance)	-	-	Only one gap in use.
TGPL1 (Transmission Gap Pattern Length)	2	4	
TGPL2 (Transmission Gap Pattern Length)	-	-	Only one pattern in use.
TGPRC (Transmission Gap Pattern Repetition Count)	NA	NA	Defined by higher layers
TGCFN (Transmission Gap Connection Frame Number):	NA	NA	Defined by higher layers
UL/DL compressed mode selection	DL & UL	DL & UL	2 configurations possible DL &UL / DL
UL compressed mode method	SF/2	SF/2	
DL compressed mode method	SF/2	Puncturing	
Downlink frame type and Slot format	11B	11A	
Scrambling code change	No	No	
RPP (Recovery period power control mode)	0	0	
ITP (Initial transmission power control mode)	0	0	

Table C.5.2: Compressed mode reference pattern 2 parameters

Parameter	2.1	2.2	Note
TGSN (Transmission Gap Starting Slot Number)	4	4	
TGL1 (Transmission Gap Length 1)	7	7	
TGL2 (Transmission Gap Length 2)	-	-	Only one gap in use.
TGD (Transmission Gap Distance)	-	135	
TGPL1 (Transmission Gap Pattern Length)	3	12	
TGPL2 (Transmission Gap Pattern Length)	-	-	Only one pattern in use.
TGPRC (Transmission Gap Pattern Repetition Count)	NA	NA	Defined by higher layers
TGCFN (Transmission Gap Connection Frame Number):	NA	NA	Defined by higher layers
UL/DL compressed mode selection	DL & UL	DL & UL	2 configurations possible. DL & UL / DL
UL compressed mode method	SF/2	SF/2	
DL compressed mode method	SF/2	SF/2	
Downlink frame type and Slot format	11B	11B	
Scrambling code change	No	No	
RPP (Recovery period power control mode)	0	0	
ITP (Initial transmission power control mode)	0	0	

Annex D (normative): Propagation Conditions

D.1 General

D.2 Propagation Conditions

D.2.1 Static propagation condition

The propagation for the static performance measurement is an Additive White Gaussian Noise (AWGN) environment. No fading and multi-paths exist for this propagation model.

D.2.2 Multi-path fading propagation conditions

Table D.2.2.1 shows propagation conditions that are used for the performance measurements in multi-path fading environment. All taps have classical Doppler spectrum.

Table D.2.2.1: Propagation condition for multi-path fading environments

Case 1, speed 3km/h		Case 2, speed 3 km/h		Case 3, 120 km/h		Case 4, 3 km/h	
Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]
0	0	0	0	0	0	0	0
976	–10	976	0	260	–3	976	0
		20000	0	521	–6		
				781	–9		

D.2.3 Moving propagation conditions

The dynamic propagation conditions for the test of the baseband performance are non fading channel models with two taps. The moving propagation condition has two taps, one static, Path0, and one moving, Path1. The time difference between the two paths is according Equation D.2.3.1. The taps have equal strengths and equal phases.

$$\Delta\tau = \left(1 + \frac{A}{2}\left(1 + \sin\left(\Delta\omega \cdot t\right)\right)\right)$$

Figure D.2.3.1: The moving propagation conditions

$$\Delta\tau = \left(1 + \frac{A}{2}\left(1 + \sin\left(\Delta\omega \cdot t\right)\right)\right)$$ **Equation D.2.3.1**

The parameters in the equation are shown in.

A	**5 µs**
Δω	**$40 \cdot 10^{-3}\ s^{-1}$**

D.2.4 Birth-Death propagation conditions

The dynamic propagation conditions for the test of the baseband performance is a non fading propagation channel with two taps. The moving propagation condition has two taps, Path1 and Path2 while alternate between 'birth' and 'death'. The positions the paths appear are randomly selected with an equal probability rate and are shown in Figure D.2.4.1.

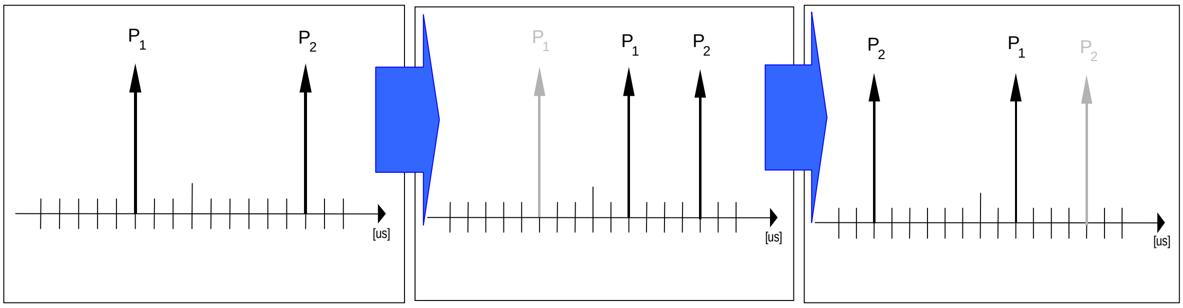


Figure D.2.4.1: Birth death propagation sequence

NOTE:

1. Two paths, Path1 and Path2 are randomly selected from the group [-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5] µs. The paths have equal strengths and equal phases.
2. After 191 ms, Path1 vanishes and reappears immediately at a new location randomly selected from the group [-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5] µs but excludes the point Path2.
3. After additional 191 ms, Path2 vanishes and reappears immediately at a new location randomly selected from the group [-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5] µs but excludes the point Path1.
4. The sequence in 2) and 3) is repeated.

Annex E (normative): Downlink Physical Channels

E.1 General

This Normative annex specifies the downlink physical channels that are needed for setting a connection and channels that are needed during a connection.

E.2 Connection Set-up

Table E.2.1 describes the downlink Physical Channels that are required for connection set up.

Table E.2.1: Downlink Physical Channels required for connection set-up

Physical Channel
CPICH
PCCPCH
SCH
SCCPCH
PICH
AICH
DPCH

E.3 During connection

The following clauses describe the downlink Physical Channels that are transmitted during a connection i.e., when measurements are done. For these measurements the offset between DPCH and SCH shall be zero chips at base station meaning that SCH is overlapping with the first symbols in DPCH in the beginning of DPCH slot structure.

E.3.1 Measurement of Tx Characteristics

Table E.3.1 is applicable for measurements on the Transmitter Characteristics (clause 5) with the exception of subclauses 5.3 (Frequency Stability), 5.4.1 (Open Loop Power Control in the Uplink), and 5.5.2 (Transmit ON/OFF Time mask). For these cases, the power levels of Îor and DPCH are defined individually.

NOTE: Applicability to subclause 5.7 (Power setting in uplink compressed mode) is FFS.

Table E.3.1: Downlink Physical Channels transmitted during a connection

Physical Channel	Power
Îor	–93 dBm / 3.84MHz
CPICH	CPICH_Ec / DPCH_Ec = 7 dB
PCCPCH	PCCPCH_Ec / DPCH_Ec = 5 dB
SCH	SCH_Ec / DPCH_Ec = 5 dB
PICH	PICH_Ec / DPCH_Ec = 2 dB
DPCH	–103.3 dBm / 3.84MHz

E.3.2 Measurement of Rx Characteristics

Table E.3.2 is applicable for measurements on the Receiver Characteristics (clause 6) with the exception of subclause 6.3 (Maximum input level).

Table E.3.2: Downlink Physical Channels transmitted during a connection

Physical Channel	Power
CPICH	CPICH_Ec / DPCH_Ec = 7 dB
PCCPCH	PCCPCH_Ec / DPCH_Ec = 5 dB
SCH	SCH_Ec / DPCH_Ec = 5 dB
PICH	PICH_Ec / DPCH_Ec = 2 dB
DPCH	Test dependent power

E.3.3 Measurement of Performance requirements

Table E.3.3 is applicable for measurements on the Performance requirements (clause 7), including subclause 6.3 (Maximum input level), excluding subclauses 7.6.1 (Demodulation of DCH in open loop transmit diversity mode) and 7.6.2 (Demodulation of DCH in closed loop transmit diversity mode).

Table E.3.3: Downlink Physical Channels transmitted during a connection[2]

Physical Channel	Power	Note
CPICH	CPICH_Ec/Ior= –10 dB	
PCCPCH	PCCPCH_Ec/Ior = –12 dB	
SCH	SCH_Ec/Ior = –12 dB	This power shall be divided equally between Primary and Secondary Synchronous channels
PICH	PICH_Ec/Ior = –15 dB	
DPCH	Test dependent power	
OCNS	Necessary power so that total transmit power spectral density of BS (Ior) adds to one	

E.3.4 Connection with open-loop transmit diversity mode

Table E.3.4 is applicable for measurements for subclause 7.6.1(Demodulation of DCH in open loop transmit diversity mode)

Table E.3.4: Downlink Physical Channels transmitted during a connection[3]

Physical Channel	Power	Note
CPICH (antenna 1)	CPICH_E_{c1}/I_{or}= –13 dB	1. Total CPICH_E_c/I_{or} = –10 dB
CPICH (antenna 2)	CPICH_E_{c2}/I_{or}= –13 dB	
PCCPCH (antenna 1)	PCCPCH_E_{c1}/I_{or} = –15 dB	1. STTD applied 2. Total PCCPCH_E_c/I_{or} = –12 dB
PCCPCH (antenna 2)	PCCPCH_E_{c2}/I_{or} = –15 dB	
SCH (antenna 1 / 2)	SCH_E_c/I_{or} = –12 dB	1. TSTD applied. 2. This power shall be divided equally between Primary and Secondary Synchronous channels
PICH (antenna 1)	PICH_E_{c1}/I_{or} = –18 dB	1. STTD applied 2. Total PICH_E_c/I_{or} = –15 dB
PICH (antenna 2)	PICH_E_{c2}/I_{or} = –18 dB	
DPCH	Test dependent power	1. STTD applied 2. Total power from both antennas
OCNS	Necessary power so that total transmit power spectral density of BS (I_{or}) adds to one	1. This power shall be divided equally between antennas

[2] Power levels are based on the assumption that multipath propagation conditions and noise source representing interference from other cells Ioc are turned on after the call set-up phase.

[3] Power levels are based on the assumption that multipath propagation conditions and noise source representing interference from other cells Ioc are turned on after the call set-up phase.

E.3.5 Connection with closed loop transmit diversity mode

Table E.3.5 is applicable for measurements for subclause 7.6.2 (Demodulation of DCH in closed loop transmit diversity mode)

Table E.3.5: Downlink Physical Channels transmitted during a connection[4]

Physical Channel	Power	Note
CPICH (antenna 1)	CPICH_Ec1/Ior = –13 dB	1. Total CPICH_Ec/Ior = –10 dB
CPICH (antenna 2)	CPICH_Ec2/Ior = –13 dB	
PCCPCH (antenna 1)	PCCPCH_Ec1/Ior = –15 dB	1. STTD applied
PCCPCH (antenna 2)	PCCPCH_Ec2/Ior = –15 dB	1. STTD applied, total PCCPCH_Ec/Ior = –12 dB
SCH (antenna 1 / 2)	SCH_Ec/Ior = –12 dB	1. TSTD applied
PICH (antenna 1)	PICH_Ec1/Ior = –18 dB	1. STTD applied 2. STTD applied, total PICH_Ec/Ior = –15 dB
PICH (antenna 2)	PICH_Ec2/Ior = –18 dB	
DPCH	Test dependent power	1. Total power from both antennas
OCNS	Necessary power so that total transmit power spectral density of BS (Ior) adds to one	1. This power shall be divided equally between antennas

[4] Power levels are based on the assumption that multipath propagation conditions and noise source representing interference from other cells Ioc are turned on after the call set-up phase.

Annex F (normative): Requirement of Test Equipment

[TBD]

Annex G (normative): Environmental conditions

G.1 General

This normative annex specifies the environmental requirements of the UE. Within these limits the requirements of this specifications shall be fulfilled.

G.2 Environmental requirements

The requirements in this clause apply to all types of UE(s)

G.2.1 Temperature

The UE shall fulfil all the requirements in the full temperature range of:

Table G.2.1.1

+15°C to + 35°C	for normal conditions (with relative humidity of 25 % to 75 %)
−10°C to + 55°C	for extreme conditions (see IEC publications 68-2-1 and 68-2-2)

Outside this temperature range the UE, if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in [1] TS 25.101 for extreme operation.

G.2.2 Voltage

The UE shall fulfil all the requirements in the full voltage range, i.e. the voltage range between the extreme voltages.

The manufacturer shall declare the lower and higher extreme voltages and the approximate shutdown voltage. For the equipment that can be operated from one or more of the power sources listed below, the lower extreme voltage shall not be higher, and the higher extreme voltage shall not be lower than that specified below.

Table G.2.2.1

Power source	Lower extreme voltage	Higher extreme voltage	Normal conditions voltage
AC mains	0.9 * nominal	1.1 * nominal	nominal
Regulated lead acid battery	0.9 * nominal	1.3 * nominal	1.1 * nominal
Non regulated batteries: - Leclanché / lithium - Mercury/nickel & cadmium	 0.85 * nominal 0.90 * nominal	 Nominal Nominal	 Nominal Nominal

Outside this voltage range the UE if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in [1] TS 25.101 for extreme operation. In particular, the UE shall inhibit all RF transmissions when the power supply voltage is below the manufacturer declared shutdown voltage.

G.2.3 Vibration

The UE shall fulfil all the requirements when vibrated at the following frequency/amplitudes:

Table G.2.3.1

Frequency	ASD (Acceleration Spectral Density) random vibration
5 Hz to 20 Hz	0.96 m^2/s^3
20 Hz to 500 Hz	0.96 m^2/s^3 at 20 Hz, thereafter –3 dB / Octave

Outside the specified frequency range the UE, if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in [1] TS 25.101 for extreme operation

Annex H (normative): UE Capabilities (FDD)

H.1 Radio Access and RF Baseline Implementation Capabilities:

NOTES:

This clause shall be aligned with TR25.926, UE Radio Access Capabilities regarding FDD RF parameters. These RF UE Radio Access capabilities represent options in the UE, that require signalling to the network.

In addition there are options in the UE that do not require any signalling. They are designated as UE baseline capabilities, according to TR 21.904, Terminal Capability Requirements.

Table H.1 provides the list of UE radio access capability parameters and possible values.

Table H.1: RF UE Radio Access Capabilities

	UE radio access capability parameter	Value range
FDD RF parameters	UE power class ([1] 25.101 subclause 6.2.1)	3, 4
	Tx/Rx frequency separation for frequency band a) ([1] 25.101 subclause 5.3) Not applicable if UE is not operating in frequency band a)	190 MHz, 174.8-205.2 MHz, 134.8-245.2 MHz

Table H.2 provides the UE baseline implementation capabilities.

Table H.2: UE RF Baseline Implementation Capabilities

UE implementation capability	Value range
Radio frequency bands ([1] 25.101 subclause 5.2)	a), b), a+b)

- The special conformance testing functions and the logical test interface as specified in [4] TS 34.109. This issue is currently under investigation.
- Uplink reference measurement channel 12.2 kbps (FDD), [1] TS 25.101 subclause A.2.1
- Downlink reference measurement channel 12.2 kbps (FDD), [1] TS 25.101 subclause A.3.1.

H.2 Service Implementation Capabilities:

- Uplink reference measurement channel 64 kbps (FDD), [1] TS 25.101 subclause A.2.2
- Uplink reference measurement channel 144 kbps (FDD), [1] TS 25.101 subclause A.2.3
- Uplink reference measurement channel 384 kbps (FDD), [1] TS 25.101 subclause A.2.4
- Downlink reference measurement channel 64 kbps (FDD), [1] TS 25.101 subclause A.3.2.
- Downlink reference measurement channel 144 kbps (FDD), [1] TS 25.101 subclause A.3.3.
- Down-link reference measurement channel 384 kbps (FDD), [1] TS 25.101 subclause A.3.4.

Annex I (informative): Change History

T Meeting	Doc-1st-Level	CR	Rev	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level
TP-08	TP-000090	001		Editorial corrections to clauses 2, 3, 4 and 5.1	D	3.0.1	3.1.0	T1-000059
TP-08	TP-000090	002		Modifications to clause 5.4 "Output Power Dynamics in the Uplink"	C	3.0.1	3.1.0	T1-000060
TP-08	TP-000090	003		Out-of-synchronisation handling of the UE	B	3.0.1	3.1.0	T1-000061
TP-08	TP-000090	004		Modifications to clauses 5.8, 5.9, 5.10 and 5.11	D	3.0.1	3.1.0	T1-000062
TP-08	TP-000090	005		Modifications to Chapter 6 "Receiver Characteristics"	F	3.0.1	3.1.0	T1-000063
TP-08	TP-000090	006		Modifications to Annex D, Annex E, Annex G and Annex H	F	3.0.1	3.1.0	T1-000067
TP-08	TP-000090	008		Modifications to clauses 5.5, 5.6 and 5.7	F	3.0.1	3.1.0	T1-000069
TP-08	TP-000090	009		Modifications to Chapter 7 "Performance requirements"	F	3.0.1	3.1.0	T1-000070
TP-08	TP-000090	010		Modifications to test power control in downlink	F	3.0.1	3.1.0	T1-000071
TP-08	TP-000090	011		Modifications to clause 5.13 "Transmit Modulation"	F	3.0.1	3.1.0	T1-000072
TP-08	TP-000090	012		Modifications to test for inner loop power control in the uplink	F	3.0.1	3.1.0	T1-000073
TP-08	TP-000090	013		Revision of Annex B: Global in-channel Tx test	F	3.0.1	3.1.0	T1-000074
TP-08	TP-000090	014		Blind transport format detection	B	3.0.1	3.1.0	T1-000075
TP-08	TP-000090	015		Removal of Annex I "Open Items"	D	3.0.1	3.1.0	T1-000077
TP-08	TP-000090	016		Modifications to Chapter 8 "Requirements for support of RRM"	C	3.0.1	3.1.0	T1-000117
TP-08	TP-000090	017		Modifications to Annex C "Measurement channels"	F	3.0.1	3.1.0	T1-000118
TP-08	TP-000090	018		Idle mode test cases (test of performance requirements)	F	3.0.1	3.1.0	T1-000119

History

Document history		
V3.0.1	March 2000	Publication
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