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Test method for user equipment of TD-LTE digital cellular mobile telecommunication network (phase 1) – Part 2: Radio transmission and reception performance test TD-LTE 数字蜂窝移动通信网终端设备测试方法（第一阶段） 第二部分：无线射频性能测试

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Foreword

YD/T 2576-2013 “Test method for user equipment of TD-LTE digital cellular mobile telecommunication network (phase 1)” is divided into 5 parts:

- Part 1: Basic operation, services and reliability test
- Part 2: Radio transmission and reception performance test
- Part 3: Radio resource management performance test
- Part 4: Protocol conformance test
- Part 5: Network compatibility test

This part is part 2 of the YD/T 2576-2013 “Test method for user equipment of TD-LTE digital cellular mobile telecommunication network (phase 1)”.

With the development of technology, it will also develop follow-up standards.

This part was drafted in accordance with the rules given in GB/T 1.1-2009.

This part was proposed by AND shall be under the jurisdiction of the China Communications Standardization Association.

The drafting organizations of this part: Ministry of Industry and Information Technology Telecommunications Research Institute, China Mobile Communications Corporation, the National Radio Monitoring Center, Datang Telecom Technology Industry Group, Huawei Technologies Co., Ltd., ZTE Corporation, Beijing Spreadtrum Communications Inc., NOKIA Communication Co., Ltd., Tianjin Samsung Communication Technology Co., Ltd., Media Tek (Beijing) Co., Ltd., Chongqing Chongyou Information Technology (Group) Co., Ltd., heavy mail Branch Co., Ltd., Beijing Star Point Communication Software Co., Ltd.

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Test method for user equipment of TD-LTE digital cellular mobile telecommunication network (phase 1) – Part 2: Radio transmission and reception performance test

1 Scope

This part specifies the test methods of the transmitter, receiver, performance, and channel state of the TD-LTE digital cellular mobile communication network user equipment (UE).

This part applies to all the phase 1 TD-LTE digital cellular mobile communication network user equipment.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this Standard.

3GPP TS36.101 User equipment (UE) radio transmission and reception

3GPP TS36.211 Physical channels and modulation

3GPP TS36.213 Physical layer procedures

3GPP TS36.508 Common test environments for user equipment (UE) conformance testing

3GPP TS36.521-1 User equipment (UE) conformance specification radio transmission and reception Part 1: Conformance testing

3 Abbreviations

The following abbreviations apply to this document.

ACK: Acknowledgment

ACLR: Adjacent channel leakage ratio

ACS: Adjacent channel selectivity

A-MPR: Additional max power reduction

AWGN: Additive white Gaussian noise

PCH: Paging channel

PDCCH: Physical downlink control channel

PDSCH: Physical downlink shared channel

PHICH: Physical HARQ indicator channel

Pm-dsg: Probability of miss-detection of the downlink scheduling grant

PRACH: Physical random access channel

PRB: Physical resource block

PUCCH: Physical uplink control channel

PUSCH: Physical uplink shared channel

QAM: Quadrature amplitude modulation

QPSK: Quadrature phase shift keying

RB: Resource block

RE: Resource element

RF: Radio frequency

RMC: Reference measurement channel

RRC: Radio resource control

RS: Reference signal

RX: Receive

SNR: Signal to noise ratio

SRS: Sounding reference signal

SS: System simulator

TDD: Time division duplex

TPC: Transmit power control

TTI: Transmission time interval

TX: Transmit

UE: User equipment

UL: Uplink

4	Terminal supported service and function
---	---

5 Transmitter characteristics

5.1 Overview

Unless otherwise stated, the characteristics of the transmitter are determined at the antenna interface of the user terminal equipment having a single transmission antenna. For mobile equipment with built-in antennas only, the gain of the reference antenna is assumed to be 0dBi.

Transient due to power step, OFF/ON, and ON/OFF transitions may occur at the boundaries of the time slot or symbol, the measurement period and whether or not to ignore the transient are described in the following chapters.

Unless otherwise stated, in order to measure the characteristics of the TDD transmitter, the test instrument shall be synchronized with the uplink signal.

5.2 Emission power

5.2.1 Maximum output power of UE

5.2.1 Purpose of test

In order to ensure that the maximum output power does not exceed the range specified by nominal power and tolerance.

If the maximum output power is exceeded, it may interfere with other channels or other systems, whilst the reduction of the maximum output power will reduce the coverage range.

5.2.1.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

5.2.1.3 Minimum consistency requirements

The following UE power levels define the maximum output power for any transmission bandwidth within the channel bandwidth. The measurement period is at least one subframe (1ms).

- 1) CONNECT the system simulator and the interference source into the user equipment antenna interface in accordance with the Figure A.3 of 3GPP TS36.508.
- 2) SET the parameters of the cell in accordance with clause 4.4.3 of 3GPP TS36.508.
- 3) INITIALIZE the downlink signal in accordance with clause C.0, C.1 and C.3.0 of 3GPP TS36.521-1, and INITIALIZE the uplink signal in accordance with Appendix H.1 and H.3.0 in 3GPP TS36.521-1.
- 4) SET the uplink reference measurement channel in accordance with Table 6.
- 5) ENSURE that the UE is in 3A-RF status in accordance with the clause 5.2A.2 of 3GPP TS36.508. The message contents are defined in clause 5.2.2.4.3.

5.2.2.4.2 Test procedure

- 1) In accordance with Table 6, the system simulator or the mobile switching subsystem (SS) uses the downlink control information format 0 (DCI format 0) to send the uplink scheduling information to the cell radio network temporary identifier (C_RNTI) in the progress of each uplink hybrid automatic repeat request (UL HARQ), in order to schedule the uplink reference measurement channel (UL RMC). Since the user equipment (UE) does not require sending the net load and the loopback data, the UE sends the uplink MAC padding bit in the uplink reference measurement channel (UL RMC).
- 2) Continuously SEND an uplink power control “up” command to the UE in the uplink scheduling information, to ensure that the UE transmits at the PUMAX level.
- 3) MEASURE the average power in the UE channel bandwidth under the radio access mode. The measurement period is at least one continuous subframe (1ms). There is no need to test a transient TDD time slot.

5.2.2.4.3 Message contents

The message contents are as shown in clause 4.6 of 3GPP TS36.508.

5.2.2.5 Test requirements

The maximum output power obtained in the test step 2 shall be within the range limited by the nominal maximum output power and tolerance in Table 7.

test					
Note 1: The test channel bandwidth for each E-UTRA band is checked respectively, AND the available channel bandwidth is specified in Table 5.4.2.1-1 of 3GPP TS36.521-1.					
Note 2: The configuration ID will be used to correspond the feasible test configuration to the relevant test requirements in 6.2.4, since it is not required for all combinations based on the application of UE.					
Note 3: The starting resource block (RB_{start}) of the partial RB allocation shall be RB # 0 and RB # (max + 1 - RB allocation) of the channel bandwidth.					
Note 4: It is applicable only to user equipment of category 2 ~ 5 (UE-Categories 2 ~ 5)					

- 1) CONNECT the system simulator and interference source to the user equipment antenna interface as shown in Figure A.3 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with clause 4.4.3 of 3GPP TS36.508.
- 3) INITIALIZE the downlink signal in accordance with Appendix C.0, C.1 and C.3.0 of 3GPP TS36.521-1; INITIALIZE the uplink signal in accordance with Appendix H.1 and H.3.0 in 3GPP TS36.521-1.
- 4) SET the uplink reference measurement channel in accordance with Table 13 ~ Table 14.
- 5) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 6) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508. The message contents are as defined in clause 5.2.3.4.3.

5.2.3.4.2 Test procedure

- 1) In accordance with Table 13 ~ 14, the system simulator or the mobile switching subsystem (SS) uses the downlink control information format 0 (DCI format 0) to send the uplink scheduling information to the cell radio network temporary identifier (C_RNTI) in the progress of each uplink hybrid automatic repeat request (UL HARQ), in order to schedule the uplink reference measurement channel (UL RMC). Since the user equipment (UE) does not require sending the net load and the loopback data, the UE sends the uplink MAC padding bit in the uplink reference measurement channel (UL RMC).
- 2) Continuously SEND an uplink power control “up” command to the UE in the uplink scheduling information, to ensure that the UE transmits at the PUMAX level.
- 3) MEASURE the average power in the UE channel bandwidth under the radio access mode. The measurement period is at least one continuous subframe (1ms). There is no need to test a transient TDD time slot.

5.2.3.4.3 Message contents

5.2.3.4.3.8 Message content exception (network calibration value “NS_10”)

The cell additional spectrum emission is set to NS_10. This can be set in SystemInformationblockType2 as part of the cell broadcast information. This exception means that the UE shall comply with at least the additional spectrum emission requirements in a special deployment scenario.

Table 22 -- SystemInformationblockType2: Additional spurious radiation test requirements for “NS_10”

Source: Table 4.4.3.3-1 of 3GPP TS36.508			
Cell	Value/description	Description	Conditions
Additional spectrum emission	10 (NS_10)		

5.2.3.4.3.9 Message content exception (network calibration value “NS_11”)

The cell additional spectrum emission is set to NS_11. This can be set in SystemInformationblockType2 as part of the cell broadcast information. This exception means that the UE shall comply with at least the additional spectrum emission requirements in a special deployment scenario.

Table 23 -- SystemInformationblockType2: Additional spurious radiation test requirements for “NS_11”

Source: Table 4.4.3.3-1 of 3GPP TS36.508			
Cell	Value/description	Description	Conditions
Additional spectrum emission	11 (NS_11)		

5.2.3.5 Test requirements

The maximum output power obtained from step 2 shall be within the range defined by the nominal maximum output power and deviation specified by the applicable table (Table 24 ~ Table 25). The additional maximum power reduction value (A-MPR) complying with requirements as determined in Table 8 is a complementary of the maximum power reduction (MPR) complying with requirements as determined in clause 5.2.2. The user maximum output power as corrected by the maximum power reduction and/or additional power reduction shall be subjected to the power limit as determined in Table 7.

Table 24 -- UE power level test requirements (applicable to Bands 35, 36; network calibration value “NS_03”)

Configuration ID	EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)
1	35, 36					23	+2.7/-3.7
2	35, 36					23	+2.7/-2.7
3	35, 36					23	+2.7/-3.7
4	35, 36					23	+2.7/-4.7
5	35, 36					23	+2.7/-2.7
6	35, 36					23	+2.7/-6.2
7	35, 36					23	+2.7/-3.7

The initial condition refers to the set of steps of the test configuration and system simulator (SS) required to make the user equipment (UE) reach the correct measurement state for purpose of user equipment (UE) test.

The initialized test configuration contains the environmental conditions, the test frequency, and the channel bandwidth based on the E-UTRA working band as specified in Table 5.4.2.1-1 in 3GPP TS36.521-1. All of these configurations shall be tested by test parameters applicable to each channel bandwidth, as shown in Table 13 ~ 14. For details of the reference measurement channel (RMCS), SEE Appendix A.2 of 3GPP TS36.521-1. The configuration of PDSCH and PDCCH before measurement is as shown in Appendix C.2 of 3GPP TS36.521-1.

Table 27 -- Test configuration

Initial conditions			
Test environment (as specified in clause 4.1 in 3GPP TS36.508)		Normal, TL/VL, TL/VH, TH/VH	
Test frequency (as specified in clause 4.3.1 in 3GPP TS36.508)		Mid range	
Test channel bandwidth (as specified in clause 4.3.1 in 3GPP TS36.508)		Lowest, 5MHz, Highest	
Test parameters of NS_04 A-MPR			
	Downlink configuration	Uplink configuration	
Channel bandwidth	Not applicable	Modulation method	Resource block (RB) allocation
1.4MHz		QPSK	5
3MHz		QPSK	4
5MHz		QPSK	8
10MHz		QPSK	12
15MHz		QPSK	16
20MHz		QPSK	18
Note 1: The test channel bandwidth of each E-UTRA band will be respectively checked, AND the available channel bandwidth is as shown in Table 5.4.2.1-1 of 3GPP TS36.521-1.			
Note 2: The starting resource block (RB _{start}) of the uplink resource block allocation shall be RB#0.			

- 1) CONNECT the system simulator and interference source to the user equipment antenna interface as shown in Figure A.3 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with clause 4.4.3 of 3GPP TS36.508.
- 3) INITIALIZE the downlink signal in accordance with Appendix C.0, C.1 and C.3.0 of 3GPP TS36.521-1; INITIALIZE the uplink signal in accordance with Appendix H.1 and H.3.0 in 3GPP TS36.521-1.
- 4) SET the uplink reference measurement channel in accordance with Table 27.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508. The message contents are as defined in clause 5.2.4.4.3.

5.3.2.2 Test applicability

Test requirements are applied in the test case clause 5.3.31 (universal ON/OFF time template) AND in the test case clause 5.3.3.2 (PRACH and SRS time templates), which apply to all phase 1 TD-LTE digital cellular mobile telecommunications network user equipment.

5.3.2.3 Minimum consistency requirements

The transmission turnoff power is defined as the average power of at least one subframe (1ms), which does not include any transient. The requirements for the transmission turnoff power shall not exceed the values as given in Table 35.

Table 35 -- Transmission turnoff power

	Channel bandwidth/minimum output power/measurement bandwidth					
	1.4MHz	3.0MHz	5MHz	10MHz	15MHz	20MHz
Transmission turnoff power	-50dBm					
Measurement bandwidth	1.08MHz	2.7MHz	4.5MHz	9.0MHz	13.5MHz	18MHz

The standard reference for this test is the clause 6.3.3 of 3GPP TS36.101.

The transmission turnoff power is defined as the average power when the transmitter is turned off. When it is not allowed for the UE to make transmission OR when the UE is in the period in which subframe is not transmitted, the transmitter is considered as turned off. In the DTX and the measurement interval, UE is not considered as turned off.

The minimum emission power exceeding limit may increase the temperature rise, AND therefore it will reduce the coverage range of other UE in the cell.

5.3.2.4 Test description

Clause 5.3.3.1 (Universal ON/OFF time templates) and clause 5.3.3.2 (PRACH and SRS time templates) cover this test item.

5.3.2.5 Test requirements

The transmission turnoff power shall not exceed the values as given in Table 36.

Table 36 -- Transmission turn-off power

	Channel bandwidth/minimum output power/measurement bandwidth					
	1.4MHz	3.0MHz	5MHz	10MHz	15MHz	20MHz
Minimum output power	Carrier frequency $f \leq 3.0\text{GHz}$: -48.5dBm Carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: -48.2dBm					
Measurement bandwidth	1.08MHz	2.7MHz	4.5MHz	9.0MHz	13.5MHz	18MHz

5.3.3 ON/OFF time template

5.3.3.1 Universal ON/OFF time template

Editor's note: The measurement period in the minimum requirement is defined as 1 subframe (14 symbols). For practical reasons, the turn-off power FDD measurement period before PUSCH is 10 symbols. If this difference is acceptable, this is used in the future (FFS).

5.3.3.1.1 Purposes of test

ENSURE that the universal on/off time template matches the requirements in 5.3.3.1.5.

The on/off time template defines the rising/falling time (ramping time) for the allowable UE transmission off and on.

Transmitting the wrong power will interfere with other channels OR increase the uplink channel transmission error.

5.3.3.1.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

5.3.3.1.3 Minimum consistency requirements

The universal on/off time template is defined as the observation period between transmission off and on OR between the transmission on and off. The on/off scenario includes: DTX start or end point, measurement interval, continuous and discontinuous transmission.

The turn-off power measurement period is defined as the time of at least one subframe period other than the transient. The turn-on power is defined as the average power in at least one subframe period other than the transient.

Except for the requirements in clause 5.2.1 and 5.2.3, there is no requirement for additional emission power to the UE.

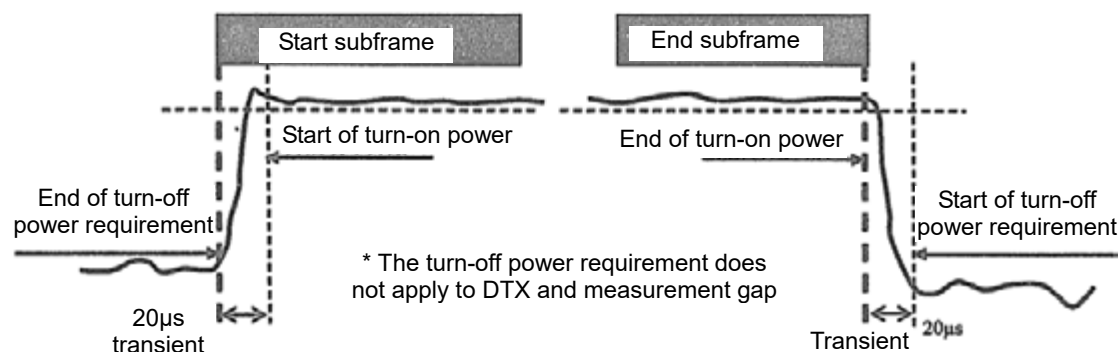


Figure 2 -- Universal ON/OFF time template

This requirement refers to clause 6.3.4.1 of 3GPP TS 36.101.

5.3.3.1.4 Test description

- 5) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 6) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508. The message content is defined in clause 5.3.3.1.4.3. NOTE that the DCI having a PDCCH format of 0 as transmitted after RRC connection reconfiguration message reset uplink power shall carry a 0dB TPC command.

5.3.3.1.4.2 Test procedure

- a) In accordance with Table 37, the system simulator or the mobile switching subsystem (SS) uses the PDCCH downlink control information format 0 (DCI format 0) which carries 0dB TPC command to send the uplink scheduling information to the cell radio network temporary identifier (C_RNTI), in order to schedule the uplink reference measurement channel (UL RMC). Since the user equipment (UE) does not require sending the net load and the loopback data, the UE sends the uplink MAC padding bit in the uplink reference measurement channel (UL RMC). The UE makes transmission in the second subframe of each radio frame.
- 2) MEASURE the UE transmission turn-off power in the first 10 SCFDMA symbols of the PUSCH subframe.
- 3) MEASURE the UE PUSCH emission power for one subframe period (except for the 20µs transient at the beginning of the subframe).
- 4) MEASURE the UE transmission turn-off power of the subframe period (except for the 20µs transient at the beginning of the subframe) immediately after the PUSCH subframe.

5.3.3.1.4.3 Message contents

As for the message contents, in addition to the following requirements, it shall also make reference to the clause 4.6 of 3GPP TS36.508, except for the following items:

Table 38 -- UplinkPowerControlCommon: Test point 1

Source path: Table 4.6.3-25 of 3GPP TS36.508			
Cell	Value/description	Description	Conditions
UplinkPowerControlCommon-DEFAULT: = SEQUENCE { P0-NominalPUSCH	-105	Test point 1 ensures that the relatively low initial power transmission of UE	

Table 39 -- PhysicalConfigDedicated

Source path: Table 5.5.1.2.1 of 3GPP TS36.508			
Cell	Value/description	Description	Conditions
UplinkPowerControlCommon-DEFAU LT:: = SEQUENCE {			

5.3.4.2.1.4.1 Initial conditions [Translator note: should be 5.3.3.2.1.4.1]

The initial condition refers to the set of steps of the test configuration and system simulator (SS) required to make the user equipment (UE) reach the correct measurement state for purpose of user equipment (UE) test.

The initial test configuration contains the environmental conditions, the test frequency, and the channel bandwidth supported by the E-UTRA as specified in Table 5.4.2.1-1 in 3GPP TS36.521-1. As shown in Table 44, all these configurations shall pass the test which uses the test parameters applicable to each channel bandwidth. For details of the reference measurement channel (RMCs), SEE Appendix A.2 and A.3 of 3GPP TS36.521-1.

Table 44 -- Test configurations

Initial conditions	
Test environment (as specified in clause 4.1 in 3GPP TS36.508)	Normal, TL/VL, TL/VH, TH/VL, TH/VH
Test frequency (as specified in clause 4.3.1 in 3GPP TS36.508)	Mid range
Test channel bandwidth (as specified in clause 4.3.1 in 3GPP TS36.508)	Lowest, 5MHz, Highest
PRACH preamble format	
PRACH configuration index	51

- 1) CONNECT the SS and UE antenna interfaces with reference to Figure A.3 of 3GPP TS36.508.
- 2) SET the parameters of the cell in accordance with clause 4.4.3 of 3GPP TS36.508.
- 3) SET the downlink signal in accordance with Appendix C.0, C.1 and C.3.0 of 3GPP TS36.521-1, and SET the uplink signal in accordance with Appendix H.1 and H.3.0 in 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508. The message content is defined in clause 5.3.4.2.1.4.3.

5.3.4.2.1.4.2 Test procedure [Translator note: should be 5.3.3.2.1.4.2]

- 1) SS sends the random access preamble ID to the UE via a PDCCH command, initiating a non-contention based random access procedure.
- 2) The UE sends a preamble to the SS.
- 3) The SS measures the UE transmission turn-off power within the time period before the start of PRACH (20 μ s + 8 OFDM symbol duration) and

Table 48 -- PRACH time template

	Channel bandwidth/minimum output power (dBm)/measurement bandwidth					
	1.4MHz	3.0MHz	5MHz	10MHz	15MHz	20MHz
Transmission turn-off power	Frequency $f \leq 3.0\text{GHz}$: $\leq -48.5\text{dBm}$ Frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$: $\leq -48.2\text{dBm}$					
Transmission turn-off measurement bandwidth	1.08MHz	2.7MHz	4.5MHz	9.0MHz	13.5MHz	18MHz
Expected PRACH transmission turn-on measurement power	-1 ± 7.5	-1 ± 7.5	-1 ± 7.5	-1 ± 7.5	-1 ± 7.5	-1 ± 7.5
Turn-on power tolerance at frequency $f \leq 3.0\text{GHz}$ and $3.0\text{GHz} < f \leq 4.2\text{GHz}$	$\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$	$\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$	$\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$	$\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$	$\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$	$\pm 7.5\text{dB}$ $\pm 7.8\text{dB}$

5.3.3.2.2 SRS time template

5.3.3.2.2.1 Purpose of test

ENSURE that the SRS time template complies with the requirements of 5.3.3.2.1.5.

The SRS time template is defined as the rise time between the transmission turn-off and the transmission turn-on of the allowable UE when the SRS is transmitted.

Transmission of wrong power may cause interference to other channels OR increase transmission errors in the uplink channel.

5.3.3.2.2.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

5.3.3.2.2.3 Minimum consistency requirements

In the case of single SRS transmission, the turn-on power is defined as the average power of each symbol duration (except for transient), as shown in Figure 4.

In the case of dual SRS transmissions, the turn-on power is defined as the average power of each symbol duration (except for transient), as shown in Figure 5.

5.3.4.1 Power control absolute power tolerance

5.3.4.1.1 Purposes of test

It is used to verify the ability of the transmitter to set its initial output power to a specific value at the beginning of a discontinuous transmission of a UE during continuous transmission or a large transmission interval (transmission interval exceeding 20ms).

5.3.4.1.2 Minimum consistency requirements

Absolute power tolerance is the ability of the UE transmitter to set its initial transmit power to a specific value in the first subframe of a discontinuous transmission of a continuous transmission or a large transmission interval (>20ms).

Within the power range as defined by the maximum emission power defined in clause 5.2.1 and the minimum emission power as defined in clause 5.3.1, the minimum power requirement for absolute power tolerance is given in Table 58.

For the working band mentioned in Note 2 in Table 2, when the transmission bandwidth is in the range of F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} , the lower limit of the absolute power tolerance given in Table 58 is reduced by 1.5 dB. However, under... [translator note: incomplete sentence]

Table 58 -- Absolute power tolerance

Conditions	Tolerances
Common conditions	± 9.0 dB
Extreme conditions	± 12.0 dB

The standard reference for this requirement is as shown in clause 6.3.5.1.1 of 3GPP TS36.101.

5.3.4.1.3 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

5.3.4.1.4 Test description

5.3.4.1.4.1 Initialization conditions

The initial condition (initial condition s) refers to the test configurations as required for the UE test as well as the set of steps executed by the system simulator (SS) to make UE reach the correct test state.

The initial test configuration contains the environmental conditions, the test frequency, and the channel bandwidth based on E-UTRA working band as specified in Table 5.4.2.1-1 in 3GPP TS36.521-1. As shown in Table 59, all these configurations shall be tested with the test parameters applicable to each channel bandwidth. For details of the reference measurement channel

In order to comply with the requirements of the PA gain switching, the two test modes allow two exceptions, respectively. These test modes separately increase and decrease the power scanning within a certain power range, AND this range is defined by the minimum and maximum power as defined in clause 5.3.1.3 and 5.2.1.3. AND the power tolerance of these exception points shall not exceed ± 6.0 dB of the value specified in Table 66.

Table 66 -- Emission relative power tolerance (conventional scene)

Power stepping ΔP (rise or fall) (dB)	All combinations of PUSCH and PUCCH emissions (dB)	All combinations of inter-subframe PUSCH/PUCCH and SRS emission (dB)	PRACH (dB)
$\Delta P < 2$	± 2.5 ^{note 3}	± 3.0	± 2.5
$2 \leq \Delta P < 3$	± 3.0	± 4.0	± 3.0
$3 \leq \Delta P < 4$	± 3.5	± 5.0	± 3.5
$4 \leq \Delta P \leq 10$	± 4.0	± 6.0	± 4.0
$10 \leq \Delta P < 15$	± 5.0	± 8.0	± 5.0
$15 \leq \Delta P$	± 6.0	± 9.0	± 6.0

Note 1: Under extreme scene, the test criteria are allowed to be widened for ± 2.0 dB.
Note 2: Under the working band as described in note 2 of Table 2, if the emission band of the reference subframe is within the frequency range of $F_{UL_low} \sim F_{UL_low} + 4\text{MHz}$ or $F_{UL_high} - 4\text{MHz} \sim F_{UL_high}$, AND the target subframe is not within any one of the above frequency range, the relative power tolerance upper limit may be increased by 1.5dB; if the emission band of the target subframe is within the frequency range of $F_{UL_low} \sim F_{UL_low} + 4\text{MHz}$ or $F_{UL_high} - 4\text{MHz} \sim F_{UL_high}$, AND the reference subframe is not within any one of the above frequency range, the relative power tolerance lower limit may be decreased by 1.5dB.
Note 3: As for the RB fixed frequency and the transmission from PUSCH to PUSCH without other transmission intervals than those generated by the downlink subframe, DwPTS, or the protection gap: if the power stepping $\Delta P \leq 1$ dB, the emission relative power tolerance is ± 1.0 dB.

The power stepping (ΔP) is defined as the difference of the UE set emission power between the target subframe and the reference subframe, AND its power setting is as shown in clause 5.1 of 3GPP TS36.213. The error is the difference between the measured power change amount at ΔP and the antenna interface (cell correlation reference signal hold constant). This error shall not exceed the relative power tolerance value as specified in Table 66.

The standard for this protocol is as shown in clause 6.3.5.2 of 3GPP TS36.101.

5.3.4.2.4 Test description

5.3.4.2.4.1 Initial conditions

Before the test, it is required to make a series setting for the UE, AND take correct procedures to set the system simulator (SS) at correct test state.

The initial test setup consists of three parts, the environmental conditions, the test frequency, and the frequency band supported by E-UTRA as described in Table 5.4.2.1-1 of 3GPP TS36.521-1. As shown in Table 67, all parameters shall be set to the values suitable for each bandwidth test. The detailed parameters of the uplink reference measurement channel (RMCs) are described in Appendix A.2 of 3GPP TS36.521-1. The settings for the PDSCH

information transmission, the UE sends an uplink MAC padding bit to the row reference control channel (UL RMC). SEND the appropriate PUSCH TPC command to the UE to ensure that the UE transmission in the PUSCH complies with: $18.0\text{dBm} \pm 3.2\text{dB}$ (when the carrier frequency is $f < 3.0\text{GHz}$) or $17.7\text{dBm} \pm 3.5\text{dB}$ (when the carrier frequency is $3.0\text{GHz} < f < 4.2\text{GHz}$).

- (2) SCHEDULE the PUSCH data transmission of UE, as shown in Table 71 (TDD mode A: sub-test is divided into 10 arbitrary radio frames, AND each radio frame has 4 active uplink subframes). Based on different channel bandwidth, its uplink RB allocation is as shown in Table 68 ~ Table 79. To schedule PUSCH, SS will send one -1dB TPC command at the PDCCH format 0. NOTE that this measurement process is discontinuous, there will be an interruption between complete frames, whilst the TPC command of 0dB is sent at the time of interruption.
- (3) MEASURE the PUSCH emission power to confirm that the UE relative power control complies with the test requirements of clause 5.3.4.2.5. For power transitions between subframes, the test does not include a power transition interval of $40\mu\text{s}$ between subframes; as for the on/off or off/on transition, the test does not include the $20\mu\text{s}$ transition interval at the start of the subframe.
- (4) REPEAT the B and C mode of the sub-test; CHANGE the RB allocation at different test points, so that the UE power stepping changes more in the power range, as shown in Table 68 ~ Table 79.

3) Sub-test: alternating pattern

- (1) The SS (system simulator) sends the uplink time sequence information to each uplink hybrid automatic repeat request (UL HARQ) progress, through the downlink control information (DCI) format 0 which is used for the cell radio network identification (C_RNTI) in the physical downlink control channel (PDCCH), to schedule the PUSCH (physical uplink shared channel). Since the UE has no payload and loopback information transmission, the UE sends an uplink MAC padding bit to the row reference control channel (UL RMC). SEND the appropriate PUSCH TPC command to the UE to ensure that the UE transmission in the PUSCH complies with: $-10.0\text{dBm} \pm 3.2\text{dB}$ (when the carrier frequency is $f < 3.0\text{GHz}$) or $-10.0\text{Bm} \pm 3.5\text{dB}$ (when the carrier frequency is $3.0\text{GHz} < f < 4.2\text{GHz}$). The initial uplink RB allocation value shall be the smaller value in Table 80. The power level and RB allocation are reset at each sub-test.
- (2) USE the PUSCH to transmit PUSCH 0dB TPC command and the 10 subframes of the uplink RB allocation alternating pattern (as shown in Table 80), to schedule the PUSCH data transmission of the UE (as shown in Figure 8).

	category 1)				
RB change	Change from 50 ~ 1(UE category 2 ~ 5); Change from 48 ~ 1(UE category 1);	TPC = -1dB	17.99 17.81	$15 \leq \Delta P$	$17.99 \pm (6.7)$ ^{note 2} $17.99+6.7/-8.2$ ^{note 4} $17.81 \pm (6.7)$ ^{note 2} $17.81+6.7/-8.2$ ^{note 4}
Subframe after RB change	Fixed at 1	TPC = -1dB	1	$\Delta P < 2$	$1 \pm (1.7)$

Table 75 (continued)

Sub-test (ramping down)	Uplink RB allocation	TPC command	Expected power stepping (ramping up) ΔP (dB)	Power stepping range (ramping up) ΔP (dB)	PUSCH (dB)
<p>Note 1: the position of RB change: The position of the RB uplink configuration change in the mode A is after 6 active uplink subframes; The position of the RB uplink configuration change in the mode B is after 16 active uplink subframes. The position of the RB uplink configuration change in the mode C is after 26 active uplink subframes.</p> <p>Note 2: When the note 4 is not applicable.</p> <p>Note 3: N/A.</p> <p>Note 4: Under the working band as described in note 2 of Table 2, when the emission band of the target subframe is within the frequency range of $F_{UL_low} \sim F_{UL_low} + 4\text{MHz}$ or $F_{UL_high} - 4\text{MHz} \sim F_{UL_high}$, AND when the reference subframe is not within any one of the above frequency ranges.</p> <p>Note 5: As for the extreme conditions, the test specification is allowed to be widened for $\pm 2.0\text{dB}$.</p> <p>Note 6: The starting RB shall be RB# (maximum value + 1 – RB allocated).</p>					

Table 76 -- Channel bandwidth 15MHz (ramping up) at relative emission power tolerance test requirement (common scene – SEE note 5)

Sub-test (ramping down)	Uplink RB allocation	TPC command	Expected power stepping (ramping up) ΔP (dB)	Power stepping range (ramping up) ΔP (dB)	PUSCH (dB)
Subframe before RB change	Fixed at 1	TPC = +1dB	1	$\Delta P < 2$	$1 \pm (1.7)$
RB change	Change from 1 ~ 50	TPC = +1dB	17.99	$15 \leq \Delta P$	$17.99 \pm (6.7)$ ^{note 2} $17.99+8.2/-6.7$ ^{note 3}
Subframe after RB change	Fixed at 50	TPC = +1dB	1	$\Delta P < 2$	$1 \pm (1.7)$
<p>Note 1: the position of RB change: The position of the RB uplink configuration change in the mode A is after 10 active uplink subframes; The position of the RB uplink configuration change in the mode B is after 20 active uplink subframes. The position of the RB uplink configuration change in the mode C is after 30 active uplink subframes.</p>					

Table 78 -- Channel bandwidth 20MHz (ramping up) at relative emission power tolerance test requirement (common scene – SEE note 5)

Sub-test (ramping down)	Uplink RB allocation	TPC command	Expected power stepping (ramping up) ΔP (dB)	Power stepping range (ramping up) ΔP (dB)	PUSCH (dB)
Subframe before RB change	Fixed at 1	TPC = +1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 ~ 75	TPC = +1dB	19.75	15 ≤ ΔP	19.75 ± (6.7) ^{note 2} 19.75+8.2/-6.7 ^{note 3}
Subframe after RB change	Fixed at 75	TPC = +1dB	1	ΔP < 2	1 ± (1.7)

Note 1: the position of RB change:
 The position of the RB uplink configuration change in the mode A is after 10 active uplink subframes;
 The position of the RB uplink configuration change in the mode B is after 20 active uplink subframes.
 The position of the RB uplink configuration change in the mode C is after 30 active uplink subframes.

Note 2: When the note 3 is not applicable.

Note 3: Under the working band as described in note 2 of Table 2, when the emission band of the reference subframe is within the frequency range of $F_{UL_low} \sim F_{UL_low} + 4\text{MHz}$ or $F_{UL_high} - 4\text{MHz} \sim F_{UL_high}$, AND when the target subframe is not within any one of the above frequency ranges.

Note 4: N/A.

Note 5: As for the extreme conditions, the test specification is allowed to be widened for ± 2.0dB.

Note 6: The starting RB shall be RB# (maximum value + 1 – RB allocated).

Table 79 -- Channel bandwidth 20MHz (ramping down) at relative emission power tolerance test requirement (common scene – SEE note 5)

Sub-test (ramping down)	Uplink RB allocation	TPC command	Expected power stepping (ramping up) ΔP (dB)	Power stepping range (ramping up) ΔP (dB)	PUSCH (dB)
Subframe before RB change	Fixed at 100 (UE category 2 ~ 5); Fixed at 75 (UE category 1)	TPC = -1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 100 ~ 1(UE category 2 ~ 5); Change from 75 ~ 1(UE category 1);	TPC = -1dB	21.0 19.75	15 ≤ ΔP	21.0 ± (6.7) ^{note 2} 21.0+6.7/-8.2 ^{note 4} 19.75 ± (6.7) ^{note 2} 19.75+6.7/-8.2 ^{note 4}

Table 79 (continued)

Sub-test (ramping)	Uplink RB allocation	TPC command	Expected power stepping	Power stepping range	PUSCH (dB)
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Table 80 (continued)

Sub-test (ramping down)	Uplink RB allocation	TPC command	Expected power stepping (ramping up) ΔP (dB)	Power stepping range (ramping up) ΔP (dB)	PUSCH (dB)
20MHz	Alternating 1 and 100 (UE category 2 ~ 5)	TPC = 0dB	20.00	$15 \leq \Delta P$	$20.00 \pm (6.7)$ ^{note 1, 2} $20.00+8.2/-6.7$ ^{note 2} $20.00+6.7/-8.2$ ^{note 3}
	Alternating 1 and 75 (UE category 1)		18.75		$18.75 \pm (6.7)$ ^{note 1, 2} $18.75+8.2/-6.7$ ^{note 2} $18.75+6.7/-8.2$ ^{note 4}
<p>Note 1: Due to the exceptions caused by the possible PA switch, the test tolerance is determined at ± 6.7dB.</p> <p>Note 2: When both the note 3 and note 4 are not applicable.</p> <p>Note 3: Under the working band as described in note 2 of Table 2, when the reference subframe is within the frequency range of $F_{UL_low} \sim F_{UL_low} + 4\text{MHz}$ or $F_{UL_high} - 4\text{MHz} \sim F_{UL_high}$, AND when the target subframe is not within any one of the above frequency ranges.</p> <p>Note 4: Under the working band as described in note 2 of Table 2, when the target band of the reference subframe is within the frequency range of $F_{UL_low} \sim F_{UL_low} + 4\text{MHz}$ or $F_{UL_high} - 4\text{MHz} \sim F_{UL_high}$, AND when the reference subframe is not within any one of the above frequency ranges.</p> <p>Note 5: As for the extreme conditions, the test specification is allowed to be widened for ± 2.0dB.</p> <p>Note 6: The starting RB shall be RB# (maximum value + 1 – RB allocated).</p>					

5.3.4.3 Total power control tolerance

5.3.4.3.1 Purpose of test

When the power control parameter (specified in 3GPP TS 36.213) is constant, VERIFY the capability of the UE to maintain its power level at the non-adjacent emission (response 0dB TPC command within 21ms).

5.3.4.3.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

5.3.4.3.3 Minimum consistency requirements

Within the power range as defined by the minimum emission power (clause 5.3.1) and the maximum emission power (clause 6.2.2), the UE relative power control shall comply with the requirements in Table 81.

Table 81 -- Power control tolerance

TPC command	Uplink channel	Total power tolerance within 21ms
0dB	PUCCH	± 2.5 dB
0dB	PUSCH	± 3.5 dB
<p>Note 1: The UE emission gap is 4ms. The PDCCH4 subframe containing TPC command is emitted before each PUCCH/PUSCH.</p>		

ACK/NACK signal using the PUCCH. SEND the appropriate PUCCH TPC command to the UE to ensure that the PUCCH transmission of the UE complies with the following requirements: $0\text{dBm} \pm 3.2\text{dB}$ (carrier frequency $f \leq 3.0\text{ GHz}$), or $0\text{dBm} \pm 3.5\text{dB}$ (carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).

- (2) TRANSMIT the PDSCH MAC padding bits to the UE downlink and SEND the PUCCH 0dB TPC command through the PDCCH for every 5 subframes, causing the UE to transmit an ACK/NACK signal every 4 subframes at the PUCCH. The downlink transmission is scheduled at the appropriate subframe to ensure that the UE transmits the PUCCH as shown in Figure 9.
- (3) Within 21ms, MEASURE 5 consecutive PUCCH emissions to verify the UE PUCCH emission power holding. The $20\mu\text{s}$ transition period is not within the test range.

2) PUSCH sub-test:

- (1) In accordance with Table 33, the SS transmits the uplink time sequence information to each uplink hybrid automatic repeat request (UL HARQ) progress, through the downlink control information (DCI) format 0 for the cell radio network identification (C_RNTI) in the physical downlink control channel (PDCCH), in order to schedule the uplink reference control channel (UL RMC). Since UE does not have payload and loopback information transmission, UE sends the uplink MAC padding bit to the row reference control channel (UL RMC). SEND the appropriate TPC command to the PUSCH to transmit to UE to ensure that the PUCCH transmission of the UE complies with the following requirements: $0\text{dBm} \pm 3.2\text{dB}$ (carrier frequency $f \leq 3.0\text{ GHz}$), or $0\text{dBm} \pm 3.5\text{dB}$ (carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).
- (2) ARRANGE one PUSCH data emission of UE for every 5 subframes, and meanwhile USE PDCCH to send the PUSCH 0dB TPC command, to make the UE transmit one PUSCH signal every 4 subframes. The uplink transmission method is as shown in Figure 9.
- (3) Within 21ms, MEASURE 5 consecutive PUCCH emissions to verify the UE PUCCH emission power holding. The $20\mu\text{s}$ transition period is not within the test range.

5.3.4.3.4.3 Message contents

The message content is as shown in clause 4.6 of 3GPP TS36.508.

5.4 Quality of emission signal

5.4.1 Frequency error

5.4.1.1 Purpose of measurement

This test verifies the ability of the receiver and transmitter to correctly handle the frequency.

Receiver: The frequency is correctly extracted from the system simulator at ideal propagation conditions and low power levels.

Transmitter: The correct result from the receiver is used to produce the correct modulation carrier frequency.

5.4.1.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

5.4.1.3 Minimum consistency requirements

The observation period of the UE modulation carrier frequency accuracy in a time slot (0.5ms) is equivalent to the carrier frequency as received from the E-UTRA Node B being required to ± 0.1 PPM.

The specification of this requirement is as shown in clause 6.5.1 of 3GPP TS36.101.

5.4.1.4 Test description

5.4.1.4.1 Initial conditions

The initial conditions include a set of test configurations for the UE test AND a series of steps required by the SS (System Simulator) to guide the UE to the correct test state.

The initial test configuration includes the environmental state, the test frequency, and the E-UTRA channel bandwidth indicated in Table 5.4.2.1-1 in 3GPP TS36.521-1. All of these configurations are as shown in Table 84. The detailed uplink and downlink reference measurement channel (RMC) is described in Appendix A.2 and A.3 of 3GPP TS36.521-1. The configurations of PDSCH and PDCCH before measurement are as described in Appendix C.2 of 3GPP TS36.521-1.

Table 84 -- Test configurations

Initial conditions						
Test environment (as specified in clause 4.1 in 3GPP TS36.508)			NC, TL/VL, TL/VH, TH/VL, TH/VH			
Test frequency (as specified in clause 4.3.1 in 3GPP TS36.508)			Low range, mid range, high range			
Test channel bandwidth (as specified in clause 4.3.1 in 3GPP TS36.508)			Lowest, 5MHz, Highest			
Test parameters of channel bandwidth						
Downlink configuration			Uplink configuration			
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
			TDD			TDD

- 3) SET the downlink signal to the correct REFSENS value (SEE Table 144). In each of the uplink scheduling information, SEND continuously the uplink power control “up” command to UE, to allow UE to make emission at the PUMAX power during the test period.
- 4) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure the frequency error. It is not required for test in the TDD time slot transition period.

5.4.1.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508.

5.4.1.5 Test requirements

The frequency error Δf must comply with the requirements of the following test:

$$|\Delta f| \leq (0.1\text{PPM} + 15\text{Hz})$$

5.4.2 Emission modulation

The emission modulation defines the modulation quality of the UE's RF emissions in the channel. The emission modulation limits are described by the following parameters:

- The error vector magnitude (EVM) of the allocated resource block (RB);
- The EVM equalizer spectral smoothness of the equalizer parameter produced by the EVM measurement process;
- The carrier leakage (caused by IQ deviation).

In-band radiation of non-distributed RB.

5.4.2.1 Error vector magnitude (EVM)

5.4.2.1.1 Purpose of test

The error vector magnitude is used to measure the difference between the reference waveform and the measured waveform. The difference is called the error vector. Before calculating the EVM, the measured waveform is corrected by the sampling time, the RF frequency offset, and the IQ initial offset.

The measured waveform is modified by selecting the absolute phase and amplitude of the Tx chain. EVM is defined as the square root of the ratio of the average error power to the average reference power of the IDFT front end, expressed in %.

The basic EVM measurement interval in the time domain is a PRACH preamble sequence and a time slot of the PUCCH and PUSCH. When the emission time slots of the PUSCH and the PUCCH become shorter due to the

5.4.2.1.4.2 Test procedure

1) PUSCH test procedure:

- (1) SS sends the uplink scheduling information (to schedule the uplink RMC) in accordance with the C_RNTI defined by PDCCH format 0 for each uplink HARQ progress in Table 84. Since the UE has no uplink payload data transmission, the UE sends the uplink MAC padding bits in the uplink RMC.
- (2) In the uplink scheduling information, SEND continuously the uplink power control “up” command to the UE, to allow the UE to make emission at PUMAX power during the test.
- (3) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure EVM and \overline{EVM}_{DMRS} .
- (4) SEND the TPC command in the uplink scheduling information which is sent to the UE, to make the UE output power at $-36.8\text{dBm} \pm 3.2\text{dB}$ (carrier frequency $f \leq 3.0\text{GHz}$) or $-36.5\text{dBm} \pm 3.5\text{dB}$ (carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).
- (5) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure EVM and \overline{EVM}_{DMRS} .

2) PUCCH test process:

- (1) SET the PUCCH in accordance with Table 88.
- (2) SS transmits PDSCH (to transmit downlink RMC) in accordance with C_RNTI defined by PDCCH DCI format 1A in Table 84. SS transmits a downlink MAC padding bit in the downlink RMC. The PDSCH is transmitted so that the UE transmits the ACK/NACK through the PUCCH. There is no PUSCH transmission.
- (3) The SS sends a TPC command to the UE, until the UE sends the PUCCH to the PUMAX power level.
- (4) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure EVM of the PUCCH.
- (5) SEND the TPC command in the uplink scheduling information which is sent to the UE, to make the UE's output power to send PUCCH at $-36.8\text{dBm} \pm 3.2\text{dB}$ (carrier frequency $f \leq 3.0\text{GHz}$) or $-36.5\text{dBm} \pm 3.5\text{dB}$ (carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).
- (6) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure EVM of the PUCCH.

3) PRACH test procedure:

- (1) SS sets the RS EPRE in accordance with Table 89.
- (2) SET the PRACH in accordance with Table 89.
- (3) SS indicates the random access preamble to the UE through the PDCCH command, AND initiates the non-contention random access procedure.
- (4) The UE sends a signal preamble to the SS.
- (5) As a preamble response, the SS sends a random access response (and does not correspond to the transmitted random access preamble). AND it may also not send the response.
- (6) The UE considers the random access to be unsuccessful AND then resends the preamble of the calculated PRACH transmission power.
- (7) REPEAT steps 5 and 6, until the SS receives enough RACH preamble (2 preamble for format 0 and 10 preamble for format 4). USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure EVM of the EVACH.

5.4.2.1.4.3 Message contents

The message content is as shown in clause 4.6 of 3GPP TS36.508, except for the following.

Table 90 -- PRACH-ConfigCommonDEFAULT: PRACH EVM measurement TDD

Reference source: Table of 3GPP TS36.508			
Cell	Value	Remarks	Conditions
PRACH-ConfigInfo SEQUENCE {			
prach-ConfigIndex	53		

At the time of PUSCH emission, the measurement reduction by 5µs and the clause 6.3.4 define the sum of the boundaries required for the power change. The PUSCH reduction period is also applicable to the signal after the IDFT front-end.

5.4.2.2.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

5.4.2.2.3 Minimum consistency requirements

The EVM measurement calculates the average EVM by the transient interval of 10 uplink subframes. The different modulation methods do not exceed the values as defined in Table 85 in the case of the parameters defined in Table 86.

5.4.2.2.4 Test description

5.4.2.2.4.1 Initial state

The initial conditions include a set of test configurations for the UE test AND a series of steps required by the SS (system simulator) to guide the UE to the correct test state.

The initial test configuration includes the environmental state, the test frequency, and the E-UTRA channel bandwidth indicated in Table 5.4.2.1-1 in 3GPP TS36.521-1. All of these configurations are as shown in Table 93. Detailed uplink and downlink reference measurement channels (RMC) are described in Appendix A.2 of 3GPP TS36.521-1. The configurations of PDSCH and PDCCH before measurement are as described in Appendix C.2 of 3GPP TS36.521.1.

Table 93 -- Test configurations

Initial conditions			
Test environment (as specified in clause 4.1 in 3GPP TS36.508)		Normal conditions	
Test frequency (as specified in clause 4.3.1 in 3GPP TS36.508)		Low range	
Test channel bandwidth (as specified in clause 4.3.1 in 3GPP TS36.508)		10MHz	
Test parameters of channel bandwidth			
	Downlink configuration	Uplink configuration	
Ch BW	N/A	Mod'n	RB allocation
			TDD
10MHz		QPSK	Alternating 12 and 1
10MHz		16QAM	Alternating 12 and 1

- 1) CONNECT SS, UE and UE antenna interfaces in accordance with A.3 in 3GPP TS36.508.
- 2) The cell parameter configuration is as shown in clause 4.4.3 of 3GPP TS36.508.

- 3) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure the EVM. Average 16¹⁾ time slots are obtained by mixing RB allocations, as shown in Figure 10.

Note: An average of 16 time slots always indicates the average of each transition type.

5.4.2.2.5 Test requirements

The PUSCH EVM as calculated in accordance with the Appendix E.4.2 and E.7 of 3GPP TS36.521-1 does not exceed 17.5% (QPSK) and 12.5% (16QAM). It is required for the test to comply with the early and latter EVM windows.

5.4.2.3 Carrier leakage

5.4.2.3.1 Purpose of measurement

Carrier leakage (I/Q initial deviation) is the interference as caused by the intermodulation or DC bias, AND it is expressed as the non-modulated sine wave of the carrier frequency. It is an interference approximated to fixed amplitude interference, AND it is independent of the amplitude of the signal. The I/Q initial deviation interferes with the central subcarrier of E (such as allocation), especially when the amplitude is small. The measurement interval is defined as a time slot.

The purpose of this test is to verify the transmitter's modulation quality by carrier leakage.

5.4.2.3.2 Test applicability

This test applies to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

5.4.2.3.3 Minimum consistency requirements

Relative carrier leakage power (IQ initial deviation power) refers to the increased power ratio of the sine wave and the modulated waveform. The relative carrier leakage power does not exceed the value in Table 94.

Table 94 -- Minimum requirements for relevant carrier leakage ratio

	Parameter	Relevant limit (dBc)
LO leakage	Output power > 0dB	-25
	-30dBm ≤ output power ≤ 0dB	-20
	-40dBm ≤ output power < 30dB	-10

The specification reference of this requirement is as shown in clause 6.5.2.2.1 of 3GPP TS36.101.

5.4.2.3.4 Test description

5.4.2.3.4.1 Initial conditions

5.4.2.3.4.2 Test procedure

- 1) SS sends the uplink scheduling information (to schedule the uplink RMC) in accordance with the C_RNTI defined by DPDCCH format 0 for each uplink HARQ process in Table 84. Since the UE has no uplink payload data transmission, the UE sends an uplink MAC padding bit in the uplink RMC.
- 2) SEND the TPC command in the uplink scheduling information which is sent to the UE, so that the output power of the UE is $3.2\text{dBm} \pm 3.2\text{dB}$ (carrier frequency $f \leq 3.0\text{GHz}$) or $3.5\text{dBm} \pm 3.5\text{dB}$ (carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).
- 3) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure the carrier leakage. The TDD time slot switching does not require testing.
- 4) SEND the TPC command in the uplink scheduling information which is sent to the UE, so that the output power of the UE is $-26.8\text{dBm} \pm 3.2\text{dB}$ (carrier frequency $f \leq 3.0\text{GHz}$) or $-26.5\text{dBm} \pm 3.5\text{dB}$ (carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).
- 5) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure the carrier leakage. The TDD time slot switching does not require testing.
- 6) SEND the TPC command in the uplink scheduling information which is sent to the UE, so that the output power of the UE is $-36.8\text{dBm} \pm 3.2\text{dB}$ (carrier frequency $f \leq 3.0\text{GHz}$) or $-36.5\text{dBm} \pm 3.5\text{dB}$ (carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).
- 7) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure the carrier leakage. The TDD time slot switching does not require testing.

5.4.2.3.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508.

5.4.2.3.5 Test requirements

The E.3.1 20 group IQ offset values obtained from the appendix of 3GPP TS36.521-1 do not exceed the values in Table 96.

Table 96 -- Test requirements for relevant carrier leakage ratio

	Parameter	Relevant value (dBc)
LO leakage	$f \leq 3.0\text{GHz}$: $3.2\text{dBm} \pm 3.2\text{dB}$	-24.2
	$3.0\text{GHz} < f \leq 4.2\text{GHz}$: $3.5\text{dBm} \pm 3.5\text{dB}$	
	$f \leq 3.0\text{GHz}$: $-26.8\text{dBm} \pm 3.2\text{dB}$	-19.2
	$3.0\text{GHz} < f \leq 4.2\text{GHz}$: $-26.5\text{dBm} \pm 3.5\text{dB}$	
	$f \leq 3.0\text{GHz}$: $-36.8\text{dBm} \pm 3.2\text{dB}$	-9.2

1.4MHz	QPSK		3	
3MHz	QPSK		4	
5MHz	QPSK		8	
10MHz	QPSK		16	
15MHz	QPSK		25	
20MHz	QPSK		30	
Note: The test channel bandwidth is as shown in Table 5.4.2.1-1 of 3GPP TS36.521-1.				

- 1) CONNECT SS, UE and UE antenna interfaces in accordance with A.3 in 3GPP TS36.508.
- 2) REFER to clause 4.4.3 of 3GPP TS36.508 for cell parameter configuration.
- 3) The initial configuration of the downlink signal is described in Appendix C0, C.1 and C.3.0 of 3GPP TS36.521-1. The initial configuration of uplink signals is described in Appendix H.1 and H.3.0 in 3GPP TS36.521-1.
- 4) The uplink reference measurement channel configuration is as shown in Table 6.5.1A.4.1.1.
- 5) SET the transmission conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 6) ENSURE that the UE is in the 3A-RF state of clause 5.2A.2 of 3GPP TS36.508. The message contents are given in clause 5.4.2.4.4.3.

a) Purposes of measurement

In-band radiation is used to measure the interference that falls into unallocated resources.

In-band radiation is defined as the average of 12 subcarriers, AND it is caused by the RB offset from the boundary of the allocated transmission bandwidth. The in-band radiation is the power ratio of the UE in the non-allocated RB and the allocated RB. The measurement interval is 1 time slot. When the PUSCH or PUCCH is shortened due to multiplexing with the SRS, the measurement interval also shortens for an SC-FDMA symbol.

5.4.2.4.3.2 Test procedure

- 1) PUSCH test procedure:
 - (1) SS sends the uplink scheduling information (to schedule the uplink RMC) in accordance with the C_RNTI as defined in DPDCCH format 0 for each uplink HARQ process in Table 84. Since the UE does not have uplink payload data transmission, the UE sends the uplink MAC padding bit in the uplink RMC.

- (2) SEND the TPC command in the uplink scheduling information which is sent to the UE, so that the output power of the UE is $3.2\text{dBm} \pm 3.2\text{dB}$ (carrier frequency $f \leq 3.0\text{GHz}$) or $3.5\text{dBm} \pm 3.5\text{dB}$ (carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).
- (3) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure the in-band radiation.
- (4) SEND the TPC command in the uplink scheduling information which is sent to the UE, so that the output power of the UE is $-26.8\text{dBm} \pm 3.2\text{dB}$ (carrier frequency $f \leq 3.0\text{GHz}$) or $-36.5\text{dBm} \pm 3.5\text{dB}$ (carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).
- (5) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure the in-band radiation. The TDD time slot switching does not require testing.
- (6) SEND the TPC command in the uplink scheduling information which is sent to the UE, so that the output power of the UE is $-36.8\text{dBm} \pm 3.2\text{dB}$ (carrier frequency $f \leq 3.0\text{GHz}$) or $-36.5\text{dBm} \pm 3.5\text{dB}$ (carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).
- (7) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure the in-band radiation. The TDD time slot switching does not require testing.

2) PUCCH test process:

- (1) SS sends the downlink MAC padding bit in the downlink RMC. The PDSCH emission is to make the UE transmit ACK/NACK through PUCCH.
- (2) SEND the TPC command in the uplink scheduling information which is sent to the UE, so that the output power of the UE to send PUCCH is $3.2\text{dBm} \pm 3.2\text{dB}$ (carrier frequency $f \leq 3.0\text{GHz}$) or $3.5\text{dBm} \pm 3.5\text{dB}$ (carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).
- (3) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure the in-band radiation.
- (4) SEND the TPC command in the uplink scheduling information which is sent to the UE, so that the output power of the UE to send PUCCH is $-26.8\text{dBm} \pm 3.2\text{dB}$ (carrier frequency $f \leq 3.0\text{GHz}$) or $-26.5\text{dBm} \pm 3.5\text{dB}$ (carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).
- (5) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure the in-band radiation.
- (6) SEND the TPC command in the uplink scheduling information which is sent to the UE, so that the output power of the UE to send PUCCH is

Note 3: The applicable frequency of the limit value is the mirror-image part of the symmetrical allocated bandwidth based on the carrier centre, AND it does not include the allocated RB.

Note 4: The measurement bandwidth is 1RB, AND the limit value is expressed as the ratio of the measurement power of 1 non-allocated RB to the measurement power of all allocated RB.

Note 5: The applicable power refers to the RB containing the DC frequency (when N_{RB} is odd) or the two RB (removing the allocated RB) (when N_{RB} is even) part containing the adjacent DC frequency.

Note 6: L_{CRBs} is the transmission bandwidth (SEE Figure 5.4.2-1).

Note 7: N_{RB} is the transmission bandwidth configuration (SEE Figure 5.4.2-1).

Note 8: EVM is the limit value of the modulation format as used for the RB which is allocated in Table 6.5.2.1.1-1.

Note 9: The starting frequency deviation of the non-allocated RB and the allocated RB as measured by Δ_{RB} (if $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$, it is the out-band first adjacent RB).

Note 10: P_{RB} is the emission power per 180kHz in the allocated RB, expressed in dBm.

5.4.2.5 EVM equalizer spectrum smoothness

5.4.2.5.1 Purpose of test

In order to comply with the spectrum smoothness requirements of EVM measurements, the zeroing equalizer correction in the EVM measurement procedure described in Appendix E of 3GPP TS36.521-1 must be valid. The EVM spectrum smoothness is defined as the maximum total amplitude (dB) of the equalizer coefficients for the allocated uplink block change (dB) as generated during the EVM measurement process. EVM equalizer spectrum smoothness does not limit how to correct the signal in the measurement process, BUT the equalizer correction used must comply with the minimum requirements for the equalizer spectrum smoothness, in order to ensure the valid EVM results. The basic measurement interval is in consistency with the EVM.

5.4.2.5.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

5.4.2.5.3 Minimum consistency test

The maximum fluctuation of the EVM equalizer coefficients in the frequency range of the uplink allocation shall not exceed the maximum value. For the uplink allocation within range 1 and range 2, the evaluation factor must comply with the following additional requirements: the difference between the maximum coefficient of range 1 and the minimum coefficient of range 2 must be no more than 5dB, AND the difference between the maximum coefficient of range 2 and the minimum coefficient of range 1 must be not more than 7dB (SEE Figure 11).

The spectrum smoothness of the EVM equalizer does not exceed the limit shown in Table 6.5.2.4.3-2. For the uplink allocation within range 1 and range 2, the evaluation factor must comply with the following additional requirements: the difference between the maximum coefficient of range 1 and the difference

- 2) In each of the uplink scheduling information, continuously SEND the uplink power control “up” command to the UE, to allow the UE to make emission at the PUMAX power during the test.
- 3) USE the Global In-Channel Tx-Test (Appendix E in 3GPP TS36.521-1) to measure the frequency error. TDD time slot switching does not need test.

5.4.2.5.4.3 Message contents

The message contents are in accordance with clause 4.6 of 3GPP TS36.508.

5.4.2.5.5 Test requirements

20 spectrum smoothness effects can obtain the 4 fluctuation results in Appendix E.4.4 of 3GPP TS36.521-1, AND the results obtained do not exceed the values in Table 105:

Under normal conditions, the maximum harmonics of range 1 and range 2 do not exceed the values in Table 105. In addition to satisfying these requirements, it shall also comply with the following additional requirements: the difference between the maximum coefficient of range 1 and the minimum coefficient of range 2 must be not more than 6.4dB, AND the difference between the maximum coefficient of range 2 and the minimum coefficient of range 1 must be not more than 8.4dB (SEE Figure 12).

Under extreme conditions, the maximum harmonics of range 1 and range 2 do not exceed the values in Table 106. In addition to meeting these requirements, it shall also comply with the following additional requirements: the difference between the maximum coefficient of range 1 and the minimum coefficient difference of range 2 must be not more than 7.4dB, AND the difference between the maximum coefficient of range 2 and the minimum coefficient difference of range 1 must not be greater than 11.4dB (SEE Figure 12).

**Table 105 -- EVM equalizer spectrum smoothness test requirements
(normal conditions)**

Frequency range	Maximum change (dB)
$F_{UL_Meas} - F_{UL_Low} \geq 3\text{MHz}$ AND $F_{UL_High} - F_{UL_Meas} \geq 3\text{MHz}$ (range 1)	5.4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 3\text{MHz}$ OR $F_{UL_High} - F_{UL_Meas} < 3\text{MHz}$ (range 2)	9.4 (p-p)
Note 1: F_{UL_Meas} refers to the subcarrier frequency which is used to evaluate the equalizer coefficients.	
Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA band in Table 5.2-1.	

**Table 106 -- EVM equalizer spectrum smoothness test requirements
(extreme conditions)**

Frequency range	Maximum change (dB)
$F_{UL_Meas} - F_{UL_Low} \geq 5\text{MHz}$ AND $F_{UL_High} - F_{UL_Meas} \geq 5\text{MHz}$ (range 1)	5.4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 5\text{MHz}$ OR $F_{UL_High} - F_{UL_Meas} < 5\text{MHz}$ (range 2)	13.4 (p-p)
Note 1: F_{UL_Meas} refers to the subcarrier frequency which is used to evaluate the equalizer coefficients.	
Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA band in Table 5.2-1.	

- 6) ENSURE that the UE is in the 3A-RF state in accordance with the clause 5.2A.2 of 3GPP TS36.508. The message contents are given in clause 5.5.1.4.3.

5.5.1.1.2 Test procedure

- 1) SEND the uplink scheduling information (to schedule the uplink RMC) in accordance with the C_RNTI as defined by the DPDCCH format 0 in each uplink HARQ process of Table 84, Since the UE has no uplink payload data transmission, the UE sends the uplink MAC padding bit in the uplink RMC.
- 2) In each of the uplink scheduling information, continuously SEND the uplink power control “up” command to the UE, to allow the UE to make emission at the PUMAX power during the test.
- 3) Calculating from the center frequency, MEASURE the power spectrum density occupying 2 times of bandwidth OR larger range. The filter characteristics are close to the Gaussian filter (a typical spectral analysis filter). Other analysis power spectral densities are also allowed. The measurement interval is an uplink subframe. TDD time slot switching does not need measurement.
- 4) CALCULATE all the power of the total frequency measured in 3) and SAVE its value as “total power”.
- 5) Calculating from the bottom end of the measurement frequency, FIND the frequency point which accounts for 0.5% of the total power as the “lower frequency”.
- 6) Calculating from the top end of the measurement frequency, FIND the frequency point which accounts for 0.5% of the total power as the “upper frequency”.
- 7) USE the extreme frequency obtained from 5) and 6), to calculate the difference (“upper frequency” – “lower frequency” = “occupied bandwidth”).

5.5.1.1.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508.

5.5.1.2 Test applicability

This test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

5.5.1.3 Purposes of measurement

The test is to verify that the configured value of the UE in the transmit band does not exceed its limit value as specified.

5.5.1.4 Minimum consistency requirements

The occupied bandwidth is the bandwidth of 99% of the average power of all the emission spectrum of the specified channel. The channel bandwidth which is occupied by the configurations of all transmission band (resource block) shall be less than the channel bandwidth of Table 6.6.1.2-1.

Table 108 -- Occupied channel bandwidth

	Occupied channel bandwidth/channel bandwidth					
	1.4MHz	3.0MHz	5MHz	10MHz	15MHz	20MHz
Channel bandwidth (MHz)	1.4	3	5	10	15	20

The specification reference of this requirement is as shown in clause 6.6.1 of 3GPP TS36.101.

5.5.1.5 Test requirements

The measured occupied bandwidth does not exceed the values given in Table 109.

Table 109 -- Occupied channel bandwidth

	Occupied channel bandwidth/channel bandwidth					
	1.4MHz	3.0MHz	5MHz	10MHz	15MHz	20MHz
Channel bandwidth (MHz)	1.4	3	5	10	15	20

5.5.2 Out-of-band radiation

The radiation at the adjacent frequency out-of-band is unexpected radiation, which is derived from the modulation process and the non-linearity of the transmitter, BUT it excludes the spurious radiation. The limits of the out-of-band radiation are measured by the spectrum radiation mask and the adjacent channel leakage ratio.

5.5.2.1 Additional spectrum radiation mask

5.5.2.1.1 Purpose of measurement

This test verifies that the radiated power of the UE does not exceed its specified limit values (additional requirements) at the specified channel bandwidth.

5.5.2.1.2 Test applicability

This test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

5.5.2.1.3 Minimum consistency requirements

5.5.2.1.3.1 Minimum requirements (network signaling value “NS_03”)

- 1) SS sends the uplink scheduling information (to schedule the uplink RMC) in accordance with the C_RNTI defined by the DPDCCH format 0 of the UL HARQ process in Table 112 or Table 113. Since the UE does not have uplink payload data transmission, the UE sends an uplink MAC padding bit in the uplink RMC.
- 2) S sends continuously the uplink power control “up” command to the UE in each uplink scheduling information, so that the UE makes emission at the PUMAX power during the test.
- 3) In accordance with the test configuration, the average power of the channel bandwidth in the UE's radio access mode needs to comply with the requirements of Table 24. The measurement gap is at least one subframe (1ms).
- 4) USE the measurement filter bandwidth in the Table 116, Table 118 or Table 117, Table 119 to measure the emission power. AND the center frequency of the filter shall be stepped continuously in accordance with the table. The measurement power is recorded in each step, AND the measurement interval shall include the emission time slot.

5.5.2.1.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508, excluding the following network signaling values.

5.5.2.1.4.3.1 Message content exception (network signaling value “NS_03”)

IE additionalSpectrumEmission is set to NS_03. This can be set in the cell broadcast information SystemInformationblockType2. This exception means that additional spurious radiation requirements need to be satisfied with under a particular layout.

Table 114 -- SystemInformationblockType2: Additional spurious radiation requirements

Reference source: Table 4.4.3.3-1 of 3GPP TS36.508			
IE	Value	Remarks	Conditions
additionalSpectrumEmission	3 (NS_03)		

5.5.2.1.4.3.2 Message content exception (network signaling value “NS_04”)

IE additionalSpectrumEmission is set to NS_04. This can be set in the cell broadcast information SystemInformationblockType2. This exception means that additional spurious radiation requirements need to be satisfied with under a particular layout.

Table 115 -- SystemInformationblockType2: Additional spurious radiation requirements

Reference source: Table 4.4.3.3-1 of 3GPP TS36.508			
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5.5.2.2.4.2 Test procedure

- 1) SS sends uplink scheduling information for each uplink HARQ through PDCCH DCI format 0 for C_RNTI, AND schedules the uplink RMC in accordance with Table 122. Since the UE does not have data to transmit, the UE sends an uplink MAC padding bit on the uplink RMC.
- 2) SEND a continuous uplink power control “up” command to the UE in the uplink scheduling information, until the UE makes transmission at the PUMAX level.
- 3) MEASURE the average power of the channel bandwidth of the UE in the radio access mode in accordance with the measurement configuration, which must comply with the requirements of Table 7. The test period must be at least one subframe (1ms). Special time slots are not tested.
- 4) MEASURE the E-UTRA rectangular filtered average power.
- 5) MEASURE the first E-UTRA adjacent channel rectangle filtered average power.
- 6) MEASURE the average power of UTRA first and second adjacent channels after RRC filter.
- 7) CALCULATE the power ratio E-UTRAACLR between the measured values of step 4 and step 5.
- 8) CALCULATE the power ratio UTRAACLR1 and UTRAACLR2 between the measured values of step 4 and step 6.

5.5.2.2.4.3 Message content

SET the message contents in accordance with clause 4.6 of 3GPP TS36.508.

5.5.2.2.5 Test requirements

5.5.2.2.5.1 E-UTRA test requirements

- The average power within the channel bandwidth of the test terminal obtained from step 3 needs to comply with the requirements of Table 7;
- If the measured adjacent channel power is greater than -50dBm from step 7, the measured E_UTRAA_{ACLR} must be greater than the limit in Table 123.

Table 123 -- E-UTRA UE ACLR

	Channel bandwidth / E-UTRA _{ACLR1} / Measured bandwidth					
	1.4MHz	3.0MHz	5MHz	10MHz	15MHz	20MHz
E-UTRA _{ACLR1}	29.2dB	29.2dB	29.2dB	29.2dB	29.2dB	29.2dB
E-UTRA channel measured bandwidth	1.08MHz	2.7MHz	4.5MHz	9.0MHz	13.5MHz	18MHz

Spurious radiation is the radiations caused by unwanted emissions such as the harmonic radiation, parasitic radiation, and frequency intermodulation, frequency exchange, BUT it does not include radiation between different channels. Spurious radiation limits are specified in the form of common requirements, and the coexistence of UE is solved in accordance with SM.329 and E-UTRA operating frequency band requirements.

Unless otherwise stated, the frequency range corresponding to the spurious radiation limit shall exceed Δf_{OOB} (MHz) from the edge of this allocated channel bandwidth (Table 125). To improve the accuracy, sensitivity and effectiveness of the measurement, the resolution bandwidth shall be less than the measurement bandwidth. When the resolution bandwidth is less than the measurement bandwidth, the result must be integrated with the entire test bandwidth in order to obtain the noise bandwidth equivalent to the measured bandwidth.

5.5.3.1 Transmitter spurious radiation

5.5.3.1.1 Purposes of test

VERIFY that the transmitter does not cause unacceptable interference relative to the adjacent channels, which is measured by transmitter spurious radiation (ACLR).

5.5.3.1.2 Test applicability

The test case is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

5.5.3.1.3 Minimum consistency requirements

The spurious radiation limit applies to frequency ranges out of the channel bandwidth edge of Δf_{OOB} (MHz).

Table 125 -- Δf_{OOB} size between the E-UTRA channel and spurious radiation domain

Channel bandwidth	1.4MHz	3.0MHz	5MHz	10MHz	15MHz	20MHz
Δf_{OOB} (MHz)	2.8	6	10	15	20	25

The spurious radiation limits as shown in Table 126 apply to all transmit band configurations (RBs) and channel bandwidths. The minimum offset of the measured frequency to the channel edge frequency shall be $\Delta f_{OOB} + MBW/2$, where MBW represents the measured bandwidth as shown in Table 126, in order to ensure that the measurement of the spurious is performed in a frequency range outside the allocated channel bandwidth edge Δf_{OOB} (MHz).

Table 126 -- Spurious radiation limits

Frequency range	Maximum value	Measured bandwidth	Notes
$9\text{kHz} \leq f < 150\text{kHz}$	-36dBm	1kHz	
$150\text{kHz} \leq f < 30\text{MHz}$	-36dBm	10kHz	
$30\text{MHz} \leq f < 1000\text{MHz}$	-36dBm	100kHz	

- 1) CONNECT the SS and UE antenna interfaces as shown in Figure A.7 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with clause 4.4.3 of 3GPP TS36.508.
- 3) The initial configurations of the downlink signals are set in accordance with Appendix C.0, C.1 and C.3.0 of 3GPP TS36.521-1, and the initial configurations of the uplink signals are set in accordance with Appendix H.1 and H.3.0 in 3GPP TS36.521-1.
- 4) SET the uplink reference measurement channel in accordance with Table 122.
- 5) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 6) ENSURE that the UE is in state 3A-RF in accordance with clause 5.2A.2 of 3GPP TS36.508. The message content is as defined in clause 5.5.3.1.4.3.

5.5.3.1.4.2 Test procedure

- 1) SS transmits uplink scheduling information for each uplink HARQ through PDCCH DCI format 0 of C_RNTI, AND schedules the uplink RMC in accordance with Table 122. Since the UE does not have data transmission, the UE sends an uplink MAC padding bit on the uplink RMC.
- 2) SEND a continuous uplink power control “up” command to the UE in the uplink scheduling information, until the UE performs transmission at the PUMAX level.
- 3) MEASURE the power of the transmitted signal in accordance with the measured filter bandwidth in Table 128. The filter center frequency must be subjected to continuous step setting in accordance with Table 128. Each step of the measured power needs to be verified. The measurement period needs containing the activated time slot.

5.5.3.1.4.3 Message content

The message contents are as shown in clause 4.6 of 3GPP TS36.508.

5.5.3.1.5 Test requirements

The average spurious radiation obtained from step 3 shall not exceed the values as described in Table 128.

The spurious radio limit requirements the frequency range of which exceeds the channel bandwidth edge for Δf_{00B} (MHz) are as shown in Table 125.

- Note 11: It is applicable to the frequency range which is to be defined (whether it is 793 ~ 805MHz, but not 799 ~ 805MHz).
- Note 12: The standard deviation of the measured radiation shall be less than 0.5dB.
- Note 13: It is applicable to the E-UTRA uplink frequency $\geq 1749.9\text{MHz}$ AND $\leq 1784.9\text{MHz}$.
- Note 14: It is applicable to the case where the uplink transmission bandwidth $\leq 54\text{RB}$ when the carrier wave center frequency is within the range 2560.5 ~ 2562.5MHz at the 15MHz bandwidth AND when the carrier wave center frequency is within the range 2552 ~ 2560MHz at the 20MHz bandwidth. When the channel bandwidth is 2500 ~ 2570MHz, this requirement applies, AND it is not required to limit other uplink transmission bandwidth.
- Note 15: It is applicable to the case where the uplink transmission bandwidth $\leq 54\text{RB}$ when the carrier wave center frequency is within the range 2605.5 ~ 2607.5MHz at the 15MHz bandwidth AND when the carrier wave center frequency is within the range 2597 ~ 2605MHz at the 20MHz bandwidth. When the channel bandwidth is 2570 ~ 2615MHz, this requirement applies, AND it is not required to limit other uplink transmission bandwidth. As for the case wherein the allocated carrier wave coincides the frequency range 2615 ~ 2620, this requirement needs using the maximum output power, which is defined by the cell P-Max.
- Note 16: When operating at 2000 ~ 2010MHz, it is required to send the NS_11 to satisfy with this requirement.
- Note 17: It is applicable to the case where the frequency range is less than the Δf_{OoB} (MHz) away to the channel bandwidth edge of Table 125.
- Note 18: Due to the change of PHS operating band, the band 1, 6, 9, 11, and 34 in the table need to be reviewed.
The maximum transmission upper limit 54RB in the note 14 and note 15 of Table 129 applies to the consistency test, AND it may be applicable to facilitate to the coexistence of the affected bands in certain region. The applicable spurious radiation requirement -15.5dBm/5MHz is the widest technical conditions at the coexistence of FDD/TDD, which may require modification in the future.

This requirement refers to the clause 6.6.3.2 of the specification 3GPP TS 36.101.

5.5.3.2.4 Test description

5.5.3.2.4.1 Initial conditions

The initial condition is a set of test configurations that the UE needs to test, AND the steps that SS needs to make, so that the UE can achieve the correct test state.

The initial test configuration includes the environmental conditions, the test frequency, and the channel bandwidth based on the E-UTRA band as defined in Table 5.4.2.1-1 in 3GPP TS36.521-1. All test configurations must be tested for each channel bandwidth with the corresponding test parameters, as shown in Table 122. Specific uplink reference measurement channels (RMCs) are as defined in Appendix A.2 of 3GPP TS36.521-1. The configuration of the PDSCH and PDCCH before the measurement is as defined in Appendix C.2 of 3GPP TS36.521-1.

Table 130 -- Test configurations

Initial conditions	
Test environment (as specified in clause 4.1 in 3GPP TS36.508)	NC

- 4) The uplink reference measurement channel is set in accordance with Table 122.
- 5) SET the propagation conditions are set in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 6) ENSURE that the UE is in state 3A-RF in accordance with clause 5.2A.2 of 3GPP TS36.508. The message content is as defined in clause 5.5.3.2.4.1.

5.5.3.2.4.2 Test procedure

- 1) SS transmits uplink scheduling information for each uplink HARQ through PDCCH DCI format 0 of C_RNTI, AND schedules the uplink RMC in accordance with Table 122. Since the UE does not have data transmission, the UE sends an uplink MAC padding bit on the uplink RMC.
- 2) SEND a continuous uplink power control “up” command to the UE in the uplink scheduling information, until the UE performs transmission at the P_{UMAX} level.
- 3) MEASURE the power of the transmitted signal in accordance with the measured filter bandwidth in Table 132. The band 14 measurement must be carried out in accordance with the bandwidth 6.25KHz, using the definition in Table 131. The filter center frequency must be subjected to continuous step setting in accordance with Table 131. Each step of the measured power needs to be verified. The measurement period needs containing the activated time slot.

Table 131 -- Measurement setting of band 14

	Option 1: Measurement with RMS, without VBW	Option 2: Measurement with VBW uses power filtering
VBW	≥ 62.5kHz (≥ 10 times RBW)	≤ 43Hz
RBW	≤ 6.25kHz	≤ 6.25kHz
Detection type	Average signal envelope of each measurement point, such as “RMS detector”	Peak value
Trace averaging	Power (RMS voltage)	Power (RMS voltage), controlled by trace averaging
Averaging type (for detector)	Power (RMS voltage) (used together with “RMS detector”)	Not applicable
Averaging type (for VBW filter)	Not applicable	Power (RMS voltage)
Number of averages	30 is used to reduce fluctuation OR the scan time of longer flat is used	1 OR the flat narrowband filter is used, otherwise the longer scan time is used
Scan time	Not set	Scan frequency (time interval divided by scan time) ≤ 0.8

5.5.3.2.4.3 Message content

- Note 1: The FDL_low and the FDL_high are the upper limit and lower limit of the E-UTRA band.
- Note 2: As an exception, it is allowed for the measurement activities for which the level reaches up to the defined value in Table 8.2.4.3.1-2 for each E-UTRA carrier wave which is used in the measurement, due to the 2nd, 3rd or 4th harmonic wave spurious radiation. If the transmission bandwidth contains at least one RE (resource element), AND meanwhile the 2nd and 3rd harmonic wave of this RE (that is, 2 times, 3 times and 4 times of the RE frequency) falls outside the measured bandwidth, it is an exception.
- Note 3: It is required to strictly limit the operating band or the protection zone, to satisfy the in-band spurious requirements.
- Note 4: N/A.
- Note 5: As for the asynchronous TDD, it is required to strictly limit the operating band or the protection zone.
- Note 6: It is applicable to the network calibrated NS_05.
- Note 7: It is applicable to coexisting operation with the PHS system at 1884.5 ~ 1919.6MHz.
- Note 8: It is applicable to coexisting operation with the PHS system at 1884.5 ~ 1915.7MHz.
- Note 9: It is applicable to the network calibrated NS_08 (only applicable to the R9 terminal).
- Note 10: It is applicable to the network calibrated NS_09 (only applicable to the R9 terminal).
- Note 11: It is applicable to the frequency range which is to be defined (whether it is 793 ~ 805MHz, but not 799 ~ 805MHz).
- Note 12: The standard deviation of the measured radiation shall be less than 0.5dB.
- Note 13: It is applicable to the E-UTRA uplink frequency $\geq 1749.9\text{MHz}$ AND $\leq 1784.9\text{MHz}$.
- Note 14: It is applicable to the case where the uplink transmission bandwidth $\leq 54\text{RB}$ when the carrier wave center frequency is within the range 2560.5 ~ 2562.5MHz at the 15MHz bandwidth AND when the carrier wave center frequency is within the range 2552 ~ 2560MHz at the 20MHz bandwidth. When the channel bandwidth is 2500 ~ 2570MHz, this requirement applies, AND it is not required to limit other uplink transmission bandwidth.
- Note 15: It is applicable to the case where the uplink transmission bandwidth $\leq 54\text{RB}$ when the carrier wave center frequency is within the range 2605.5 ~ 2607.5MHz at the 15MHz bandwidth AND when the carrier wave center frequency is within the range 2597 ~ 2605MHz at the 20MHz bandwidth. When the channel bandwidth is 2570 ~ 2615MHz, this requirement applies, AND it is not required to limit other uplink transmission bandwidth. As for the case wherein the allocated carrier wave coincides the frequency range 2615 ~ 2620, this requirement needs using the maximum output power, which is defined by the cell P-Max.
- Note 16: When operating at 2000 ~ 2010MHz, it is required to send the NS_11 to satisfy with this requirement.
- Note 17: It is applicable to the case where the frequency range is less than the Δf_{OOB} (MHz) away to the channel bandwidth edge of Table 125.
- Note 18: Due to the change of PHS operating band, the band 1, 6, 9, 11, and 34 in the table need to be reviewed.
- Note 19: For the measurement made at each frequency interval edge, the minimum frequency of the measurement point shall be set at the lower edge of the frequency interval added $\text{MBW}/2$; AND the maximum frequency of the measurement shall be set at the upper edge of the frequency interval subtracted by $\text{MBW}/2$. And the MBW is the measured bandwidth as defined by the protection zone.
- Note 20: The maximum transmission upper limit 54RB in the note 14 and note 15 of Table 129 applies to the consistency test, AND it may be applicable to facilitate to the coexistence of the affected bands in certain region. The applicable spurious radiation requirement -15.5dBm/5MHz is the widest technical conditions at the coexistence of FDD/TDD, which may require modification in the future.

5.5.3.3 UE coexistence spurious radiation band (ReI9 and subsequent)

The frequency spurious radiation obtained from step 3 shall not exceed the value in Table 132, except for the E-UTRA band as defined in Table 134.

Table 134 -- UE coexistence spurious radiation band limit

E-UTRA band	Spurious radiation						
	Protection band	Frequency interval (MHz)			Maximum level (dBm)	Measured bandwidth (MHz)	Descriptions
38	E-UTRA band 1, 3, 8, 20, 22, 33, 34, 42, 43	FDL_low	-	FDL_high	-50	1	
	E-UTRA band 7	FDL_low	-	FDL_high	-50	1	Note 3

Note 1: The FDL_low and the FDL_high are the upper limit and lower limit of the E-UTRA band. AND the specific definition is as shown in Table 5.2-1 of 3GPP TS36.521-1.

Note 2: As an exception, it is allowed for the measurement activities for which the level reaches up to the defined value in Table 8.2.4.3.1-2 for each E-UTRA carrier wave which is used in the measurement, due to the 2nd, 3rd or 4th harmonic wave spurious radiation. If the transmission bandwidth contains at least one RE (resource element), AND meanwhile the 2nd and 3rd harmonic wave of this RE (that is, 2 times, 3 times and 4 times of the RE frequency) falls outside the measured bandwidth, it is an exception.

Note 3: It is required to strictly limit the operating band or the protection zone, to satisfy the in-band spurious requirements.

Note 4: N/A.

Note 5: As for the asynchronous TDD, it is required to strictly limit the operating band or the protection zone.

Note 6: It is applicable to the network calibrated NS_05.

Note 7: It is applicable to coexisting operation with the PHS system at 1884.5 ~ 1919.6MHz.

Note 8: It is applicable to coexisting operation with the PHS system at 1884.5 ~ 1915.7MHz.

Note 9: It is applicable to the network calibrated NS_08 (only applicable to the R9 terminal).

Note 10: It is applicable to the network calibrated NS_09 (only applicable to the R9 terminal).

Note 11: It is applicable to the frequency range which is to be defined (whether it is 793 ~ 805MHz, but not 799 ~ 805MHz).

Note 12: The standard deviation of the measured radiation shall be less than 0.5dB.

Note 13: It is applicable to the E-UTRA uplink frequency $\geq 1749.9\text{MHz}$ AND $\leq 1784.9\text{MHz}$.

Note 14: It is applicable to the case where the uplink transmission bandwidth $\leq 54\text{RB}$ when the carrier wave center frequency is within the range 2560.5 ~ 2562.5MHz at the 15MHz bandwidth AND when the carrier wave center frequency is within the range 2552 ~ 2560MHz at the 20MHz bandwidth. When the channel bandwidth is 2500 ~ 2570MHz, this requirement applies, AND it is not required to limit other uplink transmission bandwidth.

Note 15: It is applicable to the case where the frequency range is within the Δf_{OoB} (MHz) range (the Δf_{OoB} (MHz) is as defined in Table 125) at the channel bandwidth edge.

Note 16: For the measurement made at each frequency interval edge, the minimum frequency of the measurement point shall be set at the lower edge of the frequency interval added MBW/2; AND the maximum frequency of the measurement shall be set at the upper edge of the frequency interval subtracted by MBW/2. And the MBW is the measured bandwidth as defined by the protection zone.

5.6 Transmission intermodulation

5.6.1 Purposes of test

VERIFY that the terminal transmission intermodulation does not exceed the value described in the test requirements.

accordance with Table 122. Since the UE does not have data to transmit, the UE sends an uplink MAC padding bit on the uplink RMC.

- 2) SEND a continuous uplink power control “up” command to the UE in the uplink scheduling information, until the UE performs transmission at the PUMAX level.
- 3) MEASURE the terminal rectangular filtered average power. For TDD time slots in the transient period, neither the non-target signal nor intermodulation test are performed.
- 4) USE a certain offset value below the uplink carrier frequency as the interference signal frequency, AND this offset value is the first offset value in Table 137.
- 5) SET the CW signal level in accordance with Table 137.
- 6) SEARCH for the intermodulation product signal above or below the uplink carrier frequency region, MEASURE the average transmission intermodulation power of the two signals after rectangular filtering, and CALCULATE the ratio to the value measured in step 3.
- 7) USE a certain offset value above the uplink carrier frequency as the interference signal frequency, which is the first offset value in Table 137.
- 8) SEARCH for the intermodulation product signal above or below the uplink carrier frequency region, MEASURE the average transmission intermodulation power of the two signals after rectangular filtering, and CALCULATE the ratio to the value measured in step 3.
- 9) REPEAT this measurement and USE the second offset value of Table 137.
- 10) MEASURE the power of the transmitted signal in accordance with the measured filter bandwidth in Table 128. The filter center frequency must be subjected to the continuous step set in accordance with Table 128. As for the measured power, each step needs to be verified. The measurement period needs to contain the active time slot.

5.6.4.3 Message content

The message contents are set in accordance with clause 4.6 of 3GPP TS36.508.

5.6.5 Test requirements

The ratios obtained in steps 5 and 7 shall not exceed those described in Table 137.

Table 137 -- Transmission intermodulation

Channel	5MHz	10MHz	15MHz	20MHz
---------	------	-------	-------	-------

bandwidth (UL)								
Interference signal frequency offset	5MHz	10MHz	10MHz	20MHz	15MHz	30MHz	20MHz	40MHz
Continuous wave interference signal level	-40dBc							
Intermodulation product	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc
Detection bandwidth	4.5MHz	4.5MHz	9.0MHz	9.0MHz	13.5MHz	13.5MHz	18MHz	18MHz

6 Receiver characteristics

6.1 Overview

Unless otherwise specified, the receiver characteristics are determined at the antenna connector of the UE. For a UE with only one internal antenna, it is assumed that the gain for the reference antenna of each antenna port is 0dBi. For the UE having more than one receiving antenna connector, if more than one antenna port is used (diversity), each receiving antenna port shall be added with the same interference signal.

Unless otherwise specified, the test signal level is defined at each antenna port. Unless otherwise specified, the downlink power control is OFF.

In general, in the “initial condition” part of the test, the UE is set to the correct state via the air interface in accordance with the normal SS signaling flow under better radio conditions. In the “test procedure” part, PROVIDE the specific radio conditions, PEROFRM the expected measurement, or TEST the expected response in accordance with the test requirements.

ACS, blocking, spurious radiation, and intermodulation requirements define the full-bandwidth signal, that is, all resource blocks are allocated to a specific user's signal. The requirements shall be verified by the configured network signaling value NS_01 (Table 8), except for clause 6.3.

6.2 Diversity characteristics

This clause assumes that the receiver is equipped with two Rx ports as a baseline. The 4 ports are to be studied later. All requirements shall be verified using all antenna ports at the same time (except for clause 6.9).

6.3 Reference sensitivity level

6.3.1 Purpose of test

VERIFY the ability of a certain reference measurement channel to receive data under the low signal level, ideal propagation conditions, and no additional noise when the UE is at the specified average throughput. Under such

Note 1: Each E-UTRA band of the test channel bandwidth will be detected independently.

Note 2: It is dependent onto the E-UTRA band; in accordance with Table 139, only the uplink RB allocation value applicable to each test channel bandwidth is tested.

Note 3: The downlink signal uses the unilateral dynamic OCNG OP.1 TDD.

- 1) CONNECT SS to UE antenna interface as shown in Figure A.3 in 3GPP TS36.508.
- 2) SET the cell parameter in accordance with clause 4.4.3 of 3GPP TS36.508.
- 3) The initial setting of downlink signals is in accordance with Appendix C0, C.1 and C.3.1 of 3GPP TS36.521-1, AND the initial setting of uplink signals is in accordance with Appendix H.1 and H.3.1 of 3GPP TS36.521-1.
- 4) The uplink and downlink reference measurement channels are set in accordance with Table 140.
- 5) Propagation conditions are set in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 6) Ensure that the UE is in state 3A-RF in accordance with 5.2A.2 in 3GPP TS36.508. The message content is as defined in clause 6.3.4.3.

6.3.4.2 Test procedure

- 1) SS sends PDSCH to transmit the downlink RMC based on PDCCH DCI format 1A in accordance with Table 140. SS sends the downlink MAC padding bit on the DL RMC.
- 2) SS sends the uplink scheduling information for each uplink HARQ 0 and the addressing C_RNTI in accordance with Table 140, to schedule the uplink RMC; since UE has no data to transmit, UE sends uplink MAC padding bit in UL RMC.
- 3) SET the downlink signal level at the appropriate REFSENS value as defined in Table 144. SEND a continuous uplink power control “up” command to the UE in the uplink scheduling information, so as to ensure that the UE at least transmit the PUMAX level in the throughput test period.
- 4) MEASURE the average throughput, in accordance with the Appendix G.2 of 3GPP TS36.521-1, for a sufficient period of time to achieve statistical significance.

6.3.4.3 Message content

Message content is in accordance with clause 4.6 of 3GPP TS36.508, with the following exceptions.

15MHz	64-QAM		75	QPSK		16	2 ~ 5
15MHz	64-QAM		17	QPSK		16	1
20MHz	64-QAM		100	QPSK		18	3 ~ 5
20MHz	64-QAM		83	QPSK		18	2
20MHz	64-QAM		17	QPSK		18	1
Note 1: Each E-UTRA band of the test channel bandwidth is detected separately. AND the available channel bandwidth is as shown in Table 139.							
Note 2: As for the uplink signal, USE the unilateral dynamic OCNG OP.1 TDD.							

- 1) CONNECT SS to UE antenna interface as shown in Figure A.3 in 3GPP TS36.508.
- 2) SET the cell parameter in accordance with clause 4.4.3 of 3GPP TS36.508.
- 3) The initial setting of downlink signals is in accordance with Appendix C0, C.1 and C.3.1 of 3GPP TS36.521-1, AND the initial setting of uplink signals is in accordance with Appendix H.1 and H.3.1 of 3GPP TS36.521-1.
- 4) The uplink and downlink reference measurement channels are set in accordance with Table 140.
- 5) Propagation conditions are set in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 6) ENSURE that the UE is in state 3A-RF in accordance with 5.2A.2 in 3GPP TS36.508. The message content is as defined in clause 6.4.4.3.

6.4.4.2 Test procedure

- 1) SS sends the PDSCH to transmit the downlink RMC in accordance with Table 147, based on PDCCH DCI format 1A, and addressing C_RNTI. And the SS sends the downlink MAC padding bit in the downlink RMC.
- 2) SS sends the uplink scheduling information for each uplink HARQ progress in accordance with Table 147, based on PDCCH DCI format 0, and addressing C_RNTI, to schedule the uplink RMC. Since UE has no data to transmit, UE sends uplink MAC padding bit in UL RMC.
- 3) SET the downlink signal level as defined in Table 156 (case 1). SEND the uplink power control command (≤ 1 dB step) to the UE, to ensure that the UE outputs the power at least within the +0, -3.4dB range of the target level of the Table 156 (case 1) during the throughput test (for the carrier frequency $f \leq 3.0$ GHz) OR within the +0, -4.0dB range of the target level (for the carrier frequency 3.0 GHz $< f \leq 4.2$ GHz).
- 4) MEASURE the average throughput, in accordance with Appendix G.2 of 3GPP TS36.521-1, for a sufficient period of time to achieve statistical significance.

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

6.5.3 Minimum consistency requirements

The adjacent channel selectivity (ACS) is used to measure the ability of the receiver to receive the E-UTRA signal at the allocated channel frequency in the presence of adjacent channel, AND this adjacent channel is located at the allocated channel's center frequency after deviating for a certain frequency. ACS is the ratio of the attenuation of the receiver filter on the allocated channel frequency to the attenuation of the receiver filter on the adjacent channel.

For a maximum -25dBm adjacent channel interference, the UE shall meet the minimum requirements of Table 150. It is not possible to directly measure the ACS, BUT rather to select the lower and higher range of the test parameters from Table 151 and Table 152, where the throughput R_{av} shall be greater than or equal to 95% of the maximum throughput of the reference measurement channel of the Appendix A.2.2, A.2.3, A.3.2 in 3GPP TS36.521-1 (downlink signal unilateral dynamic OCNG OP.1 is as shown in Appendix A.5.2 1 of TDD-3GPP TS36.521-1).

Table 150 -- Adjacent channel selectivity

Receiver parameter	Unit	Channel bandwidth					
		1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
ACS	dB	33.0	33.0	33.0	33.0	30	27

Table 151 -- Adjacent channel selectivity test parameters, case 1

Receiver parameter	Unit	Channel bandwidth					
		1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
Power of the configured transmission bandwidth	dBm	REFSENS + 14dB					
$P_{Interferer}$	dBm	REFSENS + 45.5dB	REFSENS + 45.5dB	REFSENS + 45.5dB*	REFSENS + 45.5dB	REFSENS + 42.5dB	REFSENS + 39.5dB
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025	3+0.0075	5+0.0025	7.5+0.0075	10+0.0125	12.5+0.0025
Note 1: At the minimum uplink configuration as specified in Table 7.3.1-2 of 3GPP TS36.521-1, the transmission power of the transmitter shall be set at $P_{C_{MAX_L}} - 4dB$ ($P_{C_{MAX_L}}$ is as shown in clause 6.2.5 of TS36.521-1)							
Note 2: The interference includes the reference measurement channel (A3.2 of 3GPP TS36.521-1), the unilateral dynamic OCNG OP.1 is as shown in Appendix A5.1.2.1 of 3GPP TS36.521-1, AND the setting is as shown in Appendix C.3.1 of 3GPP TS36.521-1.							

Table 152 -- Adjacent channel selectivity test parameters, case 2

Receiver parameter	Unit	Channel bandwidth					
		1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
Power of the configured	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5

- 5) Propagation conditions are set in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 6) ENSURE that the UE is in state 3A-RF in accordance with 5.2A.2 in 3GPP TS36.508. The message content is as defined in clause 6.5.4.3.

6.5.4.2 Test procedure

- 1) SS sends the PDSCH to transmit the downlink RMC in accordance with Table 153, based on PDCCH DCI format 1A, and addressing C_RNTI. And the SS sends the downlink MAC padding bit in the downlink RMC.
- 2) SS sends the uplink scheduling information for each uplink HARQ progress in accordance with Table 153, based on PDCCH DCI format 0, and addressing C_RNTI, to schedule the uplink RMC. Since UE has no data to transmit, UE sends uplink MAC padding bit in UL RMC.
- 3) SET the downlink signal level as defined in Table 156 (case 1). SEND the uplink power control command (≤ 1 dB step) to the UE, to ensure that the UE outputs the power at least within the +0, -3.4dB range of the target level of the Table 156 (case 1) during the throughput test (for the carrier frequency $f \leq 3.0$ GHz) OR within the +0, -4.0dB range of the target level (for the carrier frequency 3.0 GHz $< f \leq 4.2$ GHz).
- 4) SET the interference signal level in accordance with Table 156 (case 1); USE the modulated interference bandwidth as defined in Appendix D of 3GPP TS36.521-1.
- 5) MEASURE the average throughput, in accordance with Appendix G.2 of 3GPP TS36.521-1, for a sufficient period of time to achieve statistical significance.
- 6) SET the downlink signal level as defined in Table 156 (case 2). SEND the uplink power control command (≤ 1 dB step) to the UE, to ensure that the UE outputs the power at least within the +0, -3.4dB range of the target level of the Table 156 (case 2) during the throughput test (for the carrier frequency $f \leq 3.0$ GHz) OR within the +0, -4.0dB range of the target level (for the carrier frequency 3.0 GHz $< f \leq 4.2$ GHz).
- 7) MEASURE the average throughput, in accordance with Appendix G.2 of 3GPP TS36.521-1, for a sufficient period of time to achieve statistical significance.
- 8) For the combination of the available channel bandwidth and operating band, REPEAT the tests for both the case 1 and case 2.

6.5.4.3 Message content

Message content in accordance with the clause 4.6 of 3GPP TS36.508, with the following exceptions.

bandwidth							
$P_{\text{Interferer}}$	dBm	-25					
$BW_{\text{Interferer}}$	MHz	1.4	3	5	5	5	5
$F_{\text{Interferer (offset)}}$	MHz	1.4+0.0025	3+0.0075	5+0.0025	7.5+0.0075	10+0.0125	12.5+0.0025
Note 1: At the minimum uplink configuration as specified in Table 139, the transmission power of the transmitter shall be set at $P_{\text{CMAX_L}} - 24\text{dB}$ ($P_{\text{CMAX_L}}$ is as shown in clause 6.2.5 of TS36.521-1)							
Note 2: The interference includes the reference measurement channel (A3.2 of 3GPP TS36.521-1), the unilateral dynamic OCNG OP.1 TDD is as shown in Appendix A5.1.2.1 of 3GPP TS36.521-1, AND the setting is as shown in Appendix C.3.1 of 3GPP TS36.521-1.							

6.6 Blocking characteristics

6.6.1 In-band blocking

6.6.1.1 Purpose of test

The in-band blocking is defined for an interference signal falling within the UE receive band OR the UE receive band plus or minus 15MHz bandwidth, where the throughput of the UE shall meet or exceed the throughput requirements of the specified measurement channel.

When there are other e-NodeB, it is lack of in-band blocking capability, which will reduce e-NodeB coverage range.

6.6.1.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

6.6.1.3 Minimum consistency requirements

The throughput shall be greater than or equal to 95% of the throughput of the reference measurement channel (downlink signal unilateral dynamic OCNG OP.1 TDD is as shown in Appendix A.5.2.1 of 3GPP TS36.521-1), as described in A.2.2, A.2.3 and A.3.2 of 3GPP TS36.521-1, the parameters are as shown in Table 158 and Table 159.

Table 158 -- In-band blocking parameters

Receiver parameter	Unit	Channel bandwidth					
		1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
Power of the configured transmission bandwidth	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
$BW_{\text{Interferer}}$	MHz	1.4	3	5	5	5	5
$F_{\text{offset, case 1}}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{\text{offset, case 2}}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
Note 1: At the minimum uplink configuration as specified in Table 7.3.3-3, the transmitter shall be set at $P_{\text{CMAX_L}} - 4\text{dB}$ ($P_{\text{CMAX_L}}$ is as shown in clause 6.2.5 of TS36.521-1).							

10MHz	QPSK		N/A	QPSK		N/A
15MHz	QPSK		75	QPSK		75
15MHz	QPSK		N/A	QPSK		N/A
15MHz	QPSK		N/A	QPSK		N/A
15MHz	QPSK		N/A	QPSK		N/A
20MHz	QPSK		100	QPSK		100
20MHz	QPSK		N/A	QPSK		N/A
20MHz	QPSK		N/A	QPSK		N/A
20MHz	QPSK		N/A	QPSK		N/A
20MHz	QPSK		N/A	QPSK		N/A

Note 1: Each E-UTRA band of the test channel bandwidth is detected separately. AND the available channel bandwidth is as shown in Table 5.4.2.1-1 of TS36.521-1.

Note 2: Depending on the E-UTRA band, each channel bandwidth is tested one by one in accordance with Table 139 only for the appropriate uplink RB allocation values.

Note 3: As for the downlink signal, USE the unilateral dynamic OCNG OP.1 TDD.

- 1) CONNECT SS and the interference source to UE antenna interface as shown in Figure A.4 in 3GPP TS36.508.
- 2) SET the cell parameter in accordance with clause 4.4.3 of 3GPP TS36.508.
- 3) The initial setting of downlink signals is in accordance with Appendix C0, C.1 and C.3.1 of 3GPP TS36.521-1, AND the initial setting of uplink signals is in accordance with Appendix H.1 and H.3.1 of 3GPP TS36.521-1.
- 4) The uplink and downlink reference measurement channels are set in accordance with Table 160.
- 5) Propagation conditions are set in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 6) ENSURE that the UE is in state 3A-RF in accordance with 5.2A.2 in 3GPP TS36.508. The message content is as defined in clause 6.6.1.4.3.

6.6.1.4.2 Test procedure

- 1) SS sends the PDSCH to transmit the downlink RMC in accordance with Table 160, based on PDCCH DCI format 1A, and addressing C_RNTI. And the SS sends the downlink MAC padding bit in the downlink RMC.
- 2) SS sends the uplink scheduling information for each uplink HARQ progress in accordance with Table 160, based on PDCCH DCI format 0, and addressing C_RNTI, to schedule the uplink RMC. Since UE has no data to transmit, UE sends uplink MAC padding bit in UL RMC.
- 3) SET the interference signal generator parameter in accordance with Table 163 and Table 164 to below the signal as required by the case 1.

- 4) SET the downlink signal level as defined in Table 163. SEND the uplink power control command (≤ 1 dB step) to the UE, to ensure that the UE outputs the power at least within the +0, -3.4dB range of the target level of the Table 163 during the throughput test (for the carrier frequency $f \leq 3.0$ GHz) OR within the +0, -4.0dB range of the target level (for the carrier frequency 3.0 GHz $< f \leq 4.2$ GHz).
- 5) SET the interference signal level in accordance with Table 156 (case 1); USE the modulated interference bandwidth as defined in Appendix D of 3GPP TS36.521-1.
- 6) MEASURE the average throughput, in accordance with Appendix G.2 of 3GPP TS36.521-1, for a sufficient period of time to achieve statistical significance.
- 7) SET the downlink signal level as defined in Table 156 (case 2). SEND the uplink power control command (≤ 1 dB step) to the UE, to ensure that the UE outputs the power at least within the +0, -3.4dB range of the target level of the Table 156 (case 2) during the throughput test (for the carrier frequency $f \leq 3.0$ GHz) OR within the +0, -4.0dB range of the target level (for the carrier frequency 3.0 GHz $< f \leq 4.2$ GHz).
- 8) MEASURE the average throughput, in accordance with Appendix G.2 of 3GPP TS36.521-1, for a sufficient period of time to achieve statistical significance.
- 9) REPEAT steps 3 ~ 5; USE the interference signal exceeding the required signal in the step 3 of case 1.
- 10) REPEAT steps 3 ~ 6, USE the interference signal in the step 3 and step 6 of case 2. The range of case 2 equals to the interference bandwidth. The test frequency is as shown in Table 161.
- 11) REPEAT steps 3 ~ 5; USE all interference signals in the step 3 of case 3 and case 4.

Table 161 -- Interference frequency example

	Low frequency	High frequency
Band 1 DL	2110MHz	2170MHz
Band 1 Midrange	2140MHz	
Receive band wanted signal (BW 5MHz)	2137.5MHz	2142.5MHz
Interference test case 1	2129.9875MHz	2150.0125MHz
Interference test case 2 (inner frequency)	2124.9925MHz	2155.0075MHz
Interference test case 2 (outer frequency)	2099.9925MHz	2180.0075MHz
Outer limit for inband blocking	2095MHz	2185MHz
Number of test frequencies case 2	6	6
Number of test frequencies for band 17 (asymmetrical), BW 5MHz, case 2	0	2

6.6.1.4.3 Message content

36, 37, 38, 39, 40, 41						
12	$F_{\text{Interferer}}$	MHz		$F_{\text{DL_low}} - 10 \sim F_{\text{DL_high}} + 15$		$F_{\text{DL_low}} - 10$
17	$F_{\text{Interferer}}$	MHz		$F_{\text{DL_low}} - 9 \sim F_{\text{DL_high}} + 15$	$F_{\text{DL_low}} - 15 \sim F_{\text{DL_low}} - 9$	
<p>Note 1: For some bands, the interference signal may be not in the UE receive band range, BUT in the UE receive band plus/minus 15MHz range.</p> <p>Note 2: For each carrier wave frequency, it shall be valid at the following two frequency points:</p> <ul style="list-style-type: none"> • Carrier wave frequency $-BW/2 - F_{\text{offset}}$, test case 1; • Carrier wave frequency $+BW/2 + F_{\text{offset}}$, test case 1; <p>Note 3: The $F_{\text{Interferer}}$ refers to the range of the center frequency of the interference signal.</p> <p>Note 4: Case 3 and case 4 are applicable only to the UE bandwidth 5MHz.</p>						

6.6.2 Out-of-band blocking

6.6.2.1 Purposes of test

The out-of-band blocking pin is defined for a CW interference signal that is outside the UE receive band plus/minus 15MHz bandwidth, AND the given throughput shall meet or exceed the measurement channel requirements.

The adjacent channel selection corresponding to the first positive/negative 15MHz outside of the UE receive band is as shown in clause 6.5.1. AND the In-band blocking is as shown in clause 6.6.1.

In case of lack of out-of-band blocking, and e-NodeB coverage will be reduced when other e-NodeBs exist.

6.6.2.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

6.6.2.3 Minimum consistency requirements

The throughput shall be greater than or equal to 95% of the maximum throughput of the reference channel as described in Appendix A.2.2, A.2.3, and A.3.2 of 3GPP TS36.521-1 (downlink signal unilateral dynamic OCNG OP.1 TDD is as shown in Appendix A.5.2.1 of 3GPP TS36.521-1), AND the parameters are as shown in Table 165 and Table 166.

For Table 166, in the frequency range 1, 2, 3, until $\max(24, 6 \cdot \lceil N_{\text{RB}}/6 \rceil)$, when using a 1MHz measurement step, the spurious response frequency for each specified frequency channel allows exceptions, where N_{RB} is the number of resource blocks in the downlink transmission bandwidth configuration (SEE Table 5.4.2-1 in 3GPP TS36.521-1). For these exceptions, the spurious response requirements of the clause 6.7 apply.

signals is in accordance with Appendix H.1 and H.3.1 of 3GPP TS36.521-1.

- 4) The uplink and downlink reference measurement channels are set in accordance with Table 167.
- 5) Propagation conditions are set in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 6) ENSURE that the UE is in state 3A-RF in accordance with 5.2A.2 in 3GPP TS36.508. The message content is as defined in clause 6.6.2.4.3.

6.6.2.4.2 Test procedure

- 1) SS sends the PDSCH to transmit the downlink RMC in accordance with Table 160, based on PDCCH DCI format 1A, and addressing C_RNTI. And the SS sends the downlink MAC padding bit in the downlink RMC.
- 2) SS sends the uplink scheduling information for each uplink HARQ progress in accordance with Table 160, based on PDCCH DCI format 0, and addressing C_RNTI, to schedule the uplink RMC. Since UE has no data to transmit, UE sends uplink MAC padding bit in UL RMC.
- 3) SET the interference signal parameter of the CW signal generator in accordance with Table 170. The frequency step is 1MHz.
- 4) SET the downlink signal level as defined in Table 169. SEND the uplink power control command (≤ 1 dB step) to the UE, to ensure that the UE outputs the power at least within the +0, -3.4dB range of the target level of the Table 169 during the throughput test (for the carrier frequency $f \leq 3.0$ GHz) OR within the +0, -4.0dB range of the target level (for the carrier frequency 3.0 GHz $< f \leq 4.2$ GHz).
- 5) MEASURE the average throughput, in accordance with Appendix G.2 of 3GPP TS36.521-1, for a sufficient period of time to achieve statistical significance.
- 6) Record the frequency at which throughput does not meet the requirements.

6.6.2.4.3 Message content

Message content is in accordance with clause 4.6 of 3GPP TS36.508, with the following exceptions.

Table 168 -- Dedicated uplink power control

Source: clause 6.3.2 of TS 3GPP TS 36.331			
IE	Value/remarks	Notes	Conditions
UplinkPowerControlDedicated-DEFAULT::=SEQUENCE {			
p0-UePUSCH	0		

deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6dB)		
filterCoefficient	fc8	Larger filter length is used to reduce the RSRP measurement change	
}			

6.6.2.5 Test requirements

In addition to the spurious response frequencies recorded in the last step, the throughput shall be greater than or equal to the maximum throughput of the reference measurement channel, as described in Appendix A.3.2 in 3GPP TS36.521-1. The parameters are as shown in Table 169 and Table 170.

For Table 166, in the frequency range 1, 2, 3, until $\max(24, 6 \cdot \lceil N_{RB} / 6 \rceil)$, when using a 1MHz measurement step, the spurious response frequency for each specified frequency channel allows exceptions, where N_{RB} is the number of resource blocks in the downlink transmission bandwidth configuration (SEE Table 5.4.2-1 in 3GPP TS36.521-1). For these exceptions, the spurious response requirements of the clause 6.7 apply.

For Table 166, in the frequency range is 4, until $\max(8, \lceil N_{RB} + 2 \cdot L_{CRBs} \rceil / 8)$, when using a 1MHz measurement step, the spurious response frequency for each specified frequency channel allows exceptions, where N_{RB} is the number of resource blocks in the downlink transmission bandwidth configuration (SEE Table 5.4.2-1 in 3GPP TS36.521-1) and the L_{CRBs} is the number of uplink resource blocks. For these exceptions, the spurious response requirements of the clause 6.7 apply.

Table 169 -- Out-of-band blocking parameters

Receiver parameter	Unit	Channel bandwidth					
		1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
Power of the configured transmission bandwidth	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9

Note 1: At the minimum uplink configuration of Table 139, the transmitter shall be set at $P_{CMAX_L} - 4\text{dB}$ (P_{CMAX_L} is as shown in clause 6.2.5 of TS36.521-1)

Note 2: The interference includes the reference measurement channel (A.3.2 of 3GPP TS36.521-1), the unilateral dynamic OCNG OP.1 TDD is as shown in Appendix A.5.1.1/A.5.1.2.1 of 3GPP TS36.521-1, AND the setting is as shown in Appendix C.3.1 of 3GPP TS36.521-1.

Table 170 -- Out-of-band blocking

E-UTRA band	Parameter	Unit	Range 1	Range 2	Range 3	Range 4
		$P_{Interferer}$	dBm	-44	-30	-15
33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43	$F_{Interferer}$ (CW)	MHz	$F_{DL_low} - 15 \sim F_{DL_low} - 60$	$F_{DL_low} - 60 \sim F_{DL_low} - 85$	$F_{DL_low} - 85 \sim 1\text{MHz}$	-
		MHz	$F_{DL_high} + 15 \sim F_{DL_high} + 60$	$F_{DL_high} + 60 \sim F_{DL_high} + 85$	$F_{DL_high} + 85 \sim 12750\text{MHz}$	-

Note: as for the range 3, it shall only measure the maximum channel bandwidth.

6.6.3 Narrowband blocking

6.6.3.1 Purpose of test

VERIFY the ability of the UE to receive the E-UTRA signal at the allocated channel frequency when there is a narrowband CW interference at a frequency which is less than the nominal channel interval.

In case of lack of narrowband blocking capability, and eNodeB coverage will be reduced when other eNodeB emissions present.

6.6.3.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

6.6.3.3 Minimum consistency requirements

The throughput shall be greater than or equal to 95% of the maximum throughput of the reference measurement channel described in Appendix A.2.2, A.2.3, and A.3.2 of 3GPP TS36.521-1 (unilateral dynamic OFDM channel noise generation pattern OCNG OP.1 TDD of the downlink signal is as shown in Appendix A.5.2.1 in 3GPP TS36.521-1).

Table 171 -- Narrowband blocking

Parameter	Unit	Channel bandwidth					
		1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
P_w	dBm	P_{REFSENS} + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{UW} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{UW} (offset for $f = 15\text{kHz}$)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{UW} (offset for $f = 7.5\text{kHz}$)	MHz						

Note 1: At the minimum uplink configuration as specified in Table 139, the transmission power of the transmitter shall be set at $P_{\text{CMAX}_L} - 4\text{dB}$ (P_{CMAX_L} is as shown in clause 6.2.5 of TS36.521-1)

Note 2: The reference measurement channel is as shown in Appendix A.3.2 of 3GPP TS36.521-1, and the unilateral dynamic OCNG OP.1 TDD is as shown in Appendix A.5.2.1 of 3GPP TS36.521-1.

REFER to the specification TS36.521-1 for this requirement.

6.6.3.4 Test description

6.6.3.4.1 Initial conditions

Table 172 -- Test configurations

Initial conditions	
Test environment (as specified in clause 4.1 in 3GPP TS36.508)	NC
Test frequency (as specified in clause 4.3.1 in 3GPP TS36.508)	Mid range
Test channel bandwidth (as specified in clause 4.3.1 in 3GPP TS36.508)	Minimum, 5MHz, maximum

- 6) ENSURE that the UE is in state 3A-RF in accordance with 5.2A.2 in 3GPP TS36.508. The message content is as defined in clause 6.6.3.4.3.

6.6.3.4.2 Test procedure

- 1) SS sends the PDSCH to transmit the downlink RMC in accordance with Table 172, based on PDCCH DCI format 1A, and addressing C_RNTI. And the SS sends the downlink MAC padding bit in the downlink RMC.
- 2) SS sends the uplink scheduling information for each uplink HARQ progress in accordance with Table 160, based on PDCCH DCI format 0, and addressing C_RNTI, to schedule the uplink RMC. Since UE has no data to transmit, UE sends uplink MAC padding bit in UL RMC.
- 3) SET the interference signal parameter when the CW signal generator is lower than the required signal in accordance with Table 174.
- 4) SET the downlink signal level as defined in Table 174. SEND the uplink power control command (≤ 1 dB step) to the UE, to ensure that the UE outputs the power at least within the +0, -3.4dB range of the target level of the Table 169 during the throughput test (for the carrier frequency $f \leq 3.0$ GHz) OR within the +0, -4.0dB range of the target level (for the carrier frequency 3.0 GHz $< f \leq 4.2$ GHz).
- 5) MEASURE the average throughput, in accordance with Appendix G.2 of 3GPP TS36.521-1, for a sufficient period of time to achieve statistical significance.
- 6) REPEAT the steps 3 ~ 5, USE the interference signal which exceeds the required signal in the step 3.

6.6.3.4.3 Message content

Message content is in accordance with clause 4.6 of 3GPP TS36.508, with the following exceptions.

Table 173 -- Dedicated uplink power control

Source: clause 6.3.2 of TS 3GPP TS 36.331			
IE	Value/remarks	Notes	Conditions
UplinkPowerControlDedicated-DEFAULT::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6dB)		
filterCoefficient	fc8	Larger filter length is used to reduce the RSRP measurement change	
}			

Table 175 -- Spurious response parameters

Receiver parameter	Unit	Channel bandwidth					
		1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
Power of transmission bandwidth configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: At the minimum uplink configuration of Table 139, the transmitter shall be set at $P_{\text{CMAX}_L} - 4\text{dB}$ (P_{CMAX_L} is as shown in clause 6.2.5 of TS36.521-1)							
Note 2: The reference measurement channel is as shown in Appendix A.3.2 of 3GPP TS36.521-1, AND the unilateral dynamic OCNG OP.1 TDD is as shown in Appendix A.5.2.1.							

Table 176 -- Spurious response

Parameter	Unit	Level
$P_{\text{Interferer}} \text{ (CW)}$	dBm	-44
$F_{\text{Interferer}}$	MHz	Spurious response frequency

REFER to 3GPP TS36.521-1 for this requirement specification.

6.7.4.1 Initial conditions

The initial conditions are consistent with 6.6.2.4.1.

6.7.4.2 Test procedure

- 1) SS sends the PDSCH to transmit the downlink RMC in accordance with Table 167, based on PDCCH DCI format 1A, and addressing C_{RNTI} . And the SS sends the downlink MAC padding bit in the downlink RMC.
- 2) SS sends the uplink scheduling information for each uplink HARQ progress in accordance with Table 160, based on PDCCH DCI format 0, and addressing C_{RNTI} , to schedule the uplink RMC. Since UE has no data to transmit, UE sends uplink MAC padding bit in UL RMC.
- 3) SET the interference signal parameter for the CW signal generator in accordance with Table 179. The spurious frequency is taken from the record of the last step in the clause 6.6.2.4.2.
- 4) SET the downlink signal level as defined in Table 178. SEND the uplink power control command ($\leq 1\text{dB}$ step) to the UE, to ensure that the UE outputs the power at least within the +0, -3.4dB range of the target level of the Table 178 during the throughput test (for the carrier frequency $f \leq 3.0\text{GHz}$) OR within the +0, -4.0dB range of the target level (for the carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$).
- 5) MEASURE the average throughput for the spurious frequency, in accordance with Appendix G.2 of 3GPP TS36.521-1, for a sufficient period of time to achieve statistical significance.

6.7.4.3 Message content

Under these conditions, when two or more interference signals having a specific frequency relationship with the expected signal are present, the UE that cannot meet the throughput requirements will reduce the coverage range.

6.8.1.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

6.8.1.3 Minimum consistency requirements

The intermodulation response suppression measures the ability of the receiver to receive the expected signal at its allocated channel frequency when there are two or more interference signals having a specific frequency relationship with the expected signal.

In the presence of two interference signals, for the parameter configurations of the specific signal average power, the throughput shall be greater than or equal to 95% of the maximum throughput of the reference measurement channel as described in Appendix A.2.2, A.2.3, and A.3.2 of 3GPP TS36.521-1 (the unilateral dynamic OFDM channel noise generation pattern OCNG OP.1 TDD of the downlink signal is as shown in Appendix A5.2.1 of 3GPP TS36.521-1). The parameters are as shown in Table 180.

Table 180 -- Wideband intermodulation

Receiver parameters	Unit	Channel bandwidth					
		1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
Power at transmission bandwidth configuration	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9
$P_{\text{Interferer 1 (CW)}}$	dBm	-46					
$P_{\text{Interferer 2 (Modulated)}}$	dBm	-46					
$BW_{\text{Interferer 2}}$		1.4		3		5	
$F_{\text{Interferer 1 (Offset)}}$	MHz	$-BW/2-2.1/+B$ $W/2+2.1$		$-BW/2-4.5/+B$ $W/2+4.5$		$-BW/2-7.5/+BW/2+7.5$	

Table 180 (continued)

Receiver parameters	Unit	Channel bandwidth					
		1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
$F_{\text{Interferer 2 (Offset)}}$	MHz	$2 \times F_{\text{Interferer 1}}$					
Note 1: At the minimum uplink configuration of Table 139, the transmission power of the transmitter shall be set at $P_{\text{CMAX_L}} - 4\text{dB}$ ($P_{\text{CMAX_L}}$ is as shown in clause 6.2.5 of TS36.521-1)							
Note 2: The reference measurement channel is as shown in Appendix A.3.2, AND the unilateral dynamic OCNG OP.1 TDD is as shown in Appendix A.5.1.2.1 of 3GPP TS36.521-1.							
Note 3: The interference includes the reference measurement channel (as shown in A.3.2 of 3GPP TS36.521-1), the unilateral dynamic OCNG OP.1 TDD is as shown in Appendix A5.2.1 and Appendix C.3.1 of 3GPP TS36.521-1. The interference modulation signal is 5MHz E-UTRA signal, AND the channel bandwidth $\geq 5\text{MHz}$ is as shown in Appendix D of 3GPP TS36.521-1.							

REFER to the specification TS36.521-1 for this requirement.

6.8.1.4 Test description

- 6) ENSURE that the UE is in state 3A-RF in accordance with 5.2A.2 in 3GPP TS36.508. The message content is as defined in clause 6.8.1.4.3.

6.8.1.4.2 Test procedure

- 1) SS sends the PDSCH to transmit the downlink RMC in accordance with Table 181, based on PDCCH DCI format 1A, and addressing C_RNTI. And the SS sends the downlink MAC padding bit in the downlink RMC.
- 2) SS sends the uplink scheduling information for each uplink HARQ progress in accordance with Table 181, based on PDCCH DCI format 0, and addressing C_RNTI, to schedule the uplink RMC. Since UE has no data to transmit, UE sends uplink MAC padding bit in UL RMC.
- 3) SET the interference signal parameter of the CW signal generator in accordance with Table 181. The spurious frequency is taken from the record of the last step of clause 6.6.2.4.2.
- 4) SET the downlink signal level as defined in Table 183. SEND the uplink power control command (≤ 1 dB step) to the UE, to ensure that the UE outputs the power at least within the +0, -3.4dB range of the target level of the Table 178 during the throughput test (for the carrier frequency $f \leq 3.0$ GHz) OR within the +0, -4.0dB range of the target level (for the carrier frequency 3.0 GHz $< f \leq 4.2$ GHz).
- 5) SET the interference signal level in accordance with Table 183, USE the modulation interference bandwidth as defined in Appendix D of 3GPP TS36.521-1.
- 6) MEASURE the average throughput, in accordance with Appendix G.2 of 3GPP TS36.521-1, for a sufficient period of time to achieve statistical significance.

6.8.1.4.3 Message content

Message content is in accordance with clause 4.6 of 3GPP TS36.508, with the following exceptions.

Table 182 -- Dedicated uplink power control

Source: clause 6.3.2 of TS 3GPP TS 36.331			
IE	Value/remarks	Notes	Conditions
UplinkPowerControlDedicated-DEFAULT::=SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6dB)		
filterCoefficient	fc8	Larger filter length is used to reduce the RSRP measurement change	

- 5) Propagation conditions are set in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 6) ENSURE that the UE is in state 3A-RF in accordance with 5.2A.2 in 3GPP TS36.508. The message content is as defined in clause 6.9.4.3.

6.9.4.2 Test procedure

- 1) Spectrum analyzer (or the corresponding instrument) sweeps in a certain frequency range, to measure the average power of spurious radiation.
- 2) REPEAT step 1 for all the receiving ports of the UE.

6.9.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508.

6.9.5 Test requirements

The spurious radiation measured in accordance with step 1 shall not exceed the maximum value of Table 186.

Table 186 -- Common receiver spurious radiation requirements

Band	Measured bandwidth	Maximum level	Notes
$30\text{MHz} \leq f < 1\text{GHz}$	100kHz	-57dBm	
$1\text{GHz} \leq f \leq 12.75\text{GHz}$	1MHz	-47dBm	
$12.75\text{GHz} \leq f \leq$ The 5 th step harmonic wave GHz of the downlink maximum frequency	1MHz	-47dBm	Note 1
Note 1: It is only applicable to the band 42 and 43.			

7 Performance requirements

7.1 TDD PDSCH demodulation (cell specific reference signal)

7.1.1 TDD single antenna port performance

7.1.1.1 TDD PDSCH single antenna port performance

7.1.1.1.1 Purpose of test

VERIFY the ability of the UE to receive a predetermined signal, AND it involves the testing of single antenna ports in different channel models, different MCS and full resource allocation cases. For a determined downlink reference measurement channel, the percentage of bit information throughput shall not be less than the preset determined value, wherein the multipath fading channel is affected by the SNR.

7.1.1.1.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

7.1.1.1.4 Test description

7.1.1.1.4.1 Initial conditions

The initial condition refers to the configurations required to set the UE test AND the steps required by the SS to make the UE achieve the normal monitoring state.

The pre-test PDSCH and PDCCH configurations are identified in Appendix C.2.

Test environment: routine, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: intermediate frequency, as defined in clause 4.3.1.2 of 3GPP TS36.508.

1PRB allocated test frequency: low frequency, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test bandwidth: the bandwidth as specified in each test case in Table 188, as defined in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT the SS, fader, and AWGN noise sources to the UE antenna interface as shown in Figure A.9 of 3GPP TS36.508.
- 2) Reasonably SET the cell parameters in accordance with Table 8.2.2-1 and Table 187 of 3GPP TS36.521-1.
- 3) ESTABLISH initially the downlink signal in accordance with the Appendix C.0, C.1 and C.3.2 of 3GPP TS36.521-1; ESTABLISH the uplink signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) ESTABLISH the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508, AND the message content is as defined in clause 7.1.1.1.4.3.

7.1.1.1.4.2 Test procedure

- 1) In accordance with Table 187 and Table 188, the SS transmits the PDSCH through the C_RNTI having a PDCCH DCI format 1A in order to transmit the DL RMC. SS sends the downlink MAC padding bit on the DL RMC.
- 2) SET reasonably the reference channel parameters, MCS, reference channel, propagation conditions, matrix correlation and SNR in accordance with Table 189.

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

7.1.2.1.3 Minimum consistency requirements

The percentage of bit information throughput for the downlink reference measurement channel is determined in clause A3.4.2 of 3GPP TS36.521-1; AND it is set in accordance with the downlink physical channel in Table C.3.2-1 of 3GPP TS36.521-1 and the relevant parameters in Table 8.2.2-1 and Table 193 of 3GPP TS36.521-1.

The percentage of maximum throughput that uses this configuration shall meet or exceed the minimum requirements for specific signal-to-noise ratios in Table 194. The transmission diversity (SFBC) performance for a 2 or 4 transmission antenna has been determined.

Table 193 -- Transmission diversity performance test parameters (FRC)

Parameters		Unit	Test case 1 ~ 2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
Antenna port N_{oc}		dBm/15kHz	-98
ACK/NACK feedback mode			Multiplexing
Note: $\rho_B = 1$.			

Table 194 -- Transmission diversity minimum performance (FRC)

Test case number	Bandwidth	Reference channel	OCNG mode	Propagation conditions	Matric correlation and antenna configuration	Reference value		UE level
						Maximum throughput ratio (%)	SNR (dB)	
1	10MHz	R.11 TDD	OP.1 TDD	EVA5	2x2Medium	70	6.8	2 ~ 5
2	10MHz	R.10 TDD	OP.1 TDD	HST	2x2Low	70	-2.3	1 ~ 5

The normative requirements for this requirement refer to clause 8.2.2.2 of 3GPP TS 36.101.

7.1.2.1.4 Test description

7.1.2.1.4.1 Initial conditions

The initial condition refers to the configurations required to set the UE test AND the steps required by the SS to make the UE achieve the normal monitoring state.

The pre-test PDSCH and PDCCH configurations are specified in Appendix C.2.

Test environment: routine, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: intermediate frequency, as defined in clause 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: the bandwidth specified in each test case in Table 194, as defined in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT the SS, fader, and AWGN noise sources to the UE antenna interface as shown in Figure A.10 of 3GPP TS36.508.
- 2) Reasonably SET the cell parameters in accordance with Table 8.2.2-1 and Table 193 of 3GPP TS36.521-1.
- 3) ESTABLISH initially the downlink signal in accordance with the Appendix C.0, C.1 and C.3.2 of 3GPP TS36.521-1; ESTABLISH the uplink signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) ESTABLISH the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508, AND the message content is as defined in clause 7.1.2.1.4.3.

7.1.2.1.4.2 Test procedure

- 1) In accordance with Table 193 and Table 194, the SS transmits the PDSCH through the C_RNTI having a PDCCH DCI format 1A in order to transmit the DL RMC. SS sends the downlink MAC padding bit on the DL RMC.
- 2) SET reasonably the reference channel parameters, MCS, reference channel, propagation conditions, matrix correlation, antenna configuration and SNR in accordance with Table 195.
- 3) In accordance with clause G.3 of 3GPP TS36.521-1, the average throughput measurement in the period is sufficient to achieve static statistics. COUNT the number of NACK, ACK, statDTX in each uplink sub-test interval, and DETERMINE whether it passes this sub-test in accordance with Table G3.5 and Table G3.6 of 3GPP TS36.521-1.
- 4) REPEAT steps 1 ~ 3 in each sub-test in Table 195.

7.1.2.1.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508.

7.1.2.1.5 Test requirements

Table 193 defines the basic settings. The maximum throughput percentage of the downlink reference test channel specified for each throughput test case in the clause A3.4.2 of 3GPP TS36.521-1 shall meet or exceed a specific value under a particular SNR in Table 195, AND this particular SNR contains the test tolerances of all throughput tests.

- Replacing Table 193 - Using Table 196.
- Replacing Table 194 - Using table 197.
- Replacing Table 195 - Using table 198.

7.1.2.2.5 Test requirements

The same test requirements are given in clause 7.1.2.2.5, with the following exceptions:

- Replacing Table 8.2.1.2.1.3-1 of 3GPP TS36.521-1 – Using the Table 8.2.1.2.1_1.3-1 of 3GPP TS36.521-1.
- Replacing Table 8.2.1.2.1.5-1 of 3GPP TS36.521-1 – Using the Table 8.2.1.2.1_1.5-1 of 3GPP TS36.521-1.

Table 198 -- Transmission diversity test performance (FRC)

Test case number	Bandwidth	Reference channel	OCNG mode	Propagation conditions	Metric correlation and antenna configuration	Reference value		UE level
						Maximum throughput ratio (%)	SNR (dB)	
1	5MHz	R.11.1 TDD	OP.1 TDD	EVA5	2x2Medium	70	6.8 + TT	1

7.1.2.3 PDSCH transmission diversity 4x2

7.1.2.3.1 Purpose of test

VERIFY the ability of the UE to receive a predetermined signal, which involves the testing of four antenna port transmission diversity. For a determined downlink reference measurement channel, the percentage of bit information throughput shall not be lower than the preset determined value, where the multipath fading channel is affected by the SNR. SFBC-FSTD is an algorithm used by four antenna port transmission diversity.

7.1.2.3.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

7.1.2.3.3 Minimum consistency requirements

In accordance with the percentage of the bit information throughput of the downlink reference measurement channel as specified in clause A.3.4.2 of 3GPP TS36.521-1, the relevant parameters of Table 8.2.2-1 and Table 199 in 3GPPTS 36.521-1, and the settings of the downlink physical channel of Table C.3.2-1 of 3GPP TS36. 521-1, DEFINE the requirements.

The percentage of the maximum throughput used for this configuration shall meet or exceed the specified minimum signal-to-noise ratio as specified in

- 4) ESTABLISH the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508, AND the message content is as defined in clause 7.1.2.3.4.3.

7.1.2.3.4.2 Test procedure

- 1) In accordance with Table 199 and Table 200, the SS transmits the PDSCH through the C_RNTI having a PDCCH DCI format 1A in order to transmit the DL RMC. SS sends the downlink MAC padding bit on the DL RMC.
- 2) SET reasonably the reference channel parameters, MCS, reference channel, propagation conditions, correlation matrix, antenna configuration and SNR in accordance with Table 202.
- 3) In accordance with clause G.3 of 3GPP TS36.521-1, MEASURE the average throughput in the duration period for a sufficient period of time to achieve statistical significance. COUNT the number of NACK, ACK, statDTX in each uplink in the sub-test interval, and DETERMINE whether it passes this sub-test in accordance with Table G3.5 and Table G3.6 of 3GPP TS36.521-1.
- 4) REPEAT steps 1 ~ 3 in each sub-test in Table 195.

7.1.2.3.4.3 Message content

It shall be in accordance with the message content in clause 4.6 of 3GPP TS36.508, with the following exceptions.

Table 201 -- PDSCH-ConfigDedicated-DEFAULT: relevant information test point 1 requirements of the downlink power allocation of the additional TDD PDSCH transmission diversity performance

Reference source: Clause 4.6.3 of 3GPP TS36.508			
Information cell	Value/remarks	Remarks	Conditions
PDSCH-ConfigDedicated-DEFAULT::=SEQUENCE {			
p-a	dB-3		
}			

7.1.2.3.5 Test requirements

Table 199 defines the initial settings.

In the clause A.3.4.2 of 3GPP TS36.521, it defines that the ratio of the maximum throughput percentage for the downlink reference measurement channel specified for each throughput test case shall meet or exceed the specified value under the specified SNR in Table 202, AND this specified SNR contains the test tolerances of all throughput test cases.

					configuration	ratio (%)		
1	10MHz	R.11.1 TDD	OP.1 TDD	EVA70	2x2Low	70	13.1	2 ~ 5

The normative requirements for this requirement refer to clause 8.2.2.3 of 3GPP TS 36.101.

7.1.3.1.4 Test description

7.1.3.1.4.1 Initial conditions

The initial condition refers to the configurations required to set the UE test AND the steps required by the SS to make the UE achieve the normal monitoring state.

The pre-test PDSCH and PDCCH configurations are specified in Appendix C.2 of 3GPP TS36.521-1.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: intermediate frequency, as defined in clause 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: the bandwidth specified in each test case in Table 203, as defined in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT the SS, fader, and AWGN noise sources to the UE antenna interface as shown in Figure A.10 of 3GPP TS36.508.
- 2) Reasonably SET the cell parameters in accordance with Table 8.2.2-1 and Table 203 of 3GPP TS36.521-1.
- 3) ESTABLISH initially the downlink signal in accordance with the Appendix C.0, C.1 and C.3.2 of 3GPP TS36.521-1; ESTABLISH the uplink signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508, AND the message content is as defined in clause 7.1.3.1.4.3.

7.1.3.1.4.2 Test procedure

- 1) In accordance with Table 203 and Table 204, the SS transmits the PDSCH through the C_RNTI having a PDCCH DCI format 2A in order to transmit the DL RMC. SS sends the downlink MAC padding bit on the DL RMC.

The normative requirements for this requirement refer to clause 8.2.2.3 of 3GPP TS 36.101.

7.1.3.1.4 Test description

7.1.3.1.4.1 Initial conditions

The initial condition refers to the configurations required to set the UE test AND the steps required by the SS to make the UE achieve the normal monitoring state.

The pre-test PDSCH and PDCCH configurations are specified in Appendix C.2 of 3GPP TS36.521-1.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: intermediate frequency, as defined in clause 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: the bandwidth specified in each test case in Table 207, as defined in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT the SS, fader, and Gaussian noise sources to the UE antenna connector as shown in Figure A.10 of 3GPP TS36.508.
- 2) Reasonably SET the cell parameters in accordance with Table 8.2.2-1 and Table 207 of 3GPP TS36.521-1.
- 3) ESTABLISH initially the downlink signal in accordance with the Appendix C.0, C.1 and C.3.2 of 3GPP TS36.521-1; ESTABLISH the uplink signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508, AND the message content is as defined in clause 7.1.3.2.4.3.

7.1.3.1.4.2 Test procedure

- 1) In accordance with Table 207 and Table 208, the SS transmits the PDSCH through the C_RNTI having a PDCCH DCI format 2A in order to transmit the DL RMC. SS sends the downlink MAC padding bit on the DL RMC.
- 2) SET reasonably the reference channel parameters, MCS, reference channel, propagation conditions, correlation matrix, antenna configuration and SNR in accordance with Table 211.

specified value under the specified SNR in Table 211, AND this specified SNR contains the test tolerances of all throughput test cases.

Table 211 -- Large delay CDD (FRC) test requirements

Test case	Bandwidth	Reference channel	OCNG mode	Propagation conditions	Correlation matrix and antenna configuration	Reference value		UE category
						Maximum throughput ratio (%)	SNR (dB)	
1	10MHz	R.14 TDD	OP.1 TDD	EVA70	4x2Low	70	15.1	2 ~ 5

7.1.4 TDD PDSCH closed-loop space division multiplexing (cell specific reference signal)

7.1.4.1 TDD PDSCH closed-loop single/multi-stream space division multiplexing 2x2

7.1.4.1.1 Purpose of test

VERIFY the ability of the UE to receive a predetermined signal, which involves the testing of closed-loop spatial multiplexing of two antenna ports under broadband and frequency selective precoding. For a determined downlink reference measurement channel, the percentage of bit information throughput shall not be lower than the preset determined value, where the multipath fading channel is affected by SNX.

7.1.4.1.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

7.1.4.1.3 Minimum consistency requirements

In accordance with the percentage of the bit information throughput of the downlink reference measurement channel as specified in clause A.3.4.2 of 3GPP TS36.521-1, the relevant parameters of Table 8.2.2-1 and Table 212 and Table 214 in 3GPPTS 36.521-1, and the settings of the downlink physical channel of Table C.3.2-1 in Appendix C of 3GPP TS36. 521-1, DEFINE the requirements.

The ratio of the maximum throughput percentage that uses this configuration shall meet or exceed the specified minimum requirements for the specified noise-to-signal ratio in Table 213 and Table 215. For the single stream space division multiplexing closed-loop rank 1, it designates the precoding performance of wideband and frequency selectivity. For the multi-stream space division multiplexing closed-loop rank 2, it designates the precoding performance of wideband and frequency selectivity.

Table 215 -- Multi-stream space division multiplexing (FRC) minimum performance

Test case	Bandwidth	Reference channel	OCNG mode	Propagation conditions	Correlation matrix and antenna configuration	Reference value		UE category
						Maximum throughput ratio (%)	SNR (dB)	
3	10MHz	R.11-1 TDD	OP.1 TDD	EVA5	2x2Low	70	12.8	2 ~ 5
4	10MHz	R.11-1 TDD	OP.1 TDD	ETU70	2x2Low	70	13.9	2 ~ 5

The normative requirements for this requirement refer to clause 8.2.2.4 of 3GPP TS 36.101.

7.1.4.1.4 Test description

7.1.4.1.4.1 Initial conditions

The initial condition refers to the configurations required to set the UE test AND the steps required by the SS to make the UE achieve the normal monitoring state.

Appendix C.2 of 3GPP TS36.521-1 specifies the configuration of pre-test PDSCH and PDCCH.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: intermediate frequency, as defined in clause 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: the bandwidth specified in Table 213 and Table 215 for each test case, as defined in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT the SS, attenuator, and Gaussian noise sources to the UE antenna interface as shown in Figure A.10 of 3GPP TS36.508.
- 2) SET reasonably the cell parameters in accordance with Table 8.2.2-1, Table 212 and Table 214 of 3GPP TS36.521-1.
- 3) ESTABLISH the initial downlink signal in accordance with Appendix C.0, C.1 and C.3.2 of 3GPP TS36.521-1; ESTABLISH the uplink signal in accordance with H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508. The message content is as defined in clause 7.1.4.1.4.3.

7.1.4.2.3 Minimum consistency requirements

In accordance with the percentage of the bit information throughput of the downlink reference measurement channel as specified in clause A.3.4.2 of 3GPP TS36.521-1, the relevant parameters of Table 8.2.2-1 and Table 222 and Table 224 in 3GPPTS 36.521-1, and the settings of the downlink physical channel of Table C.3.2-1 in Appendix C of 3GPP TS36. 521-1, DEFINE the requirements.

The ratio of the maximum throughput percentage that uses this configuration shall meet or exceed the specified minimum requirements for the specified noise-to-signal ratio in Table 223 and Table 225. For the single stream space division multiplexing closed-loop rank 1, it designates the precoding performance of wideband and frequency selectivity. For the multi-stream space division multiplexing closed-loop rank 2, it designates the precoding performance of wideband and frequency selectivity.

Table 222 -- Single stream space division multiplexing (FRC) test parameters

Parameters		Unit	Test case 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6
Antenna port N_{oc}		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay		ms	10 OR 11
Reporting interval		ms	1 OR 4
Reporting method			PUSCH 1-2

Table 222 (continued)

Parameters		Unit	Test case 1
Codebook Subset Restriction bitmap			00000000000000000000000000000000 00000000000000000000000000000000
ACK/NACK feedback method			Multiplexing
Note 1: $\rho_B = 1$. Note 2: If the UE reports on the subframe #n during the valid uplink reporting period AND it is based on the PMI estimate of the previous subframe of the SF # (n-4) subframe, the PMI report shall not be applied in front of the subframe SF# (n + 4) of the eNB downlink. Note 3: As for the uplink and downlink configuration 1, the reporting interval is alternated between 1ms and 4ms.			

Table 223 -- Single stream space division multiplexing (FRC) minimum performance

Test case	Bandwidth	Reference channel	OCNG mode	Propagation conditions	Correlation matrix and antenna configuration	Reference value		UE category
						Maximum throughput ratio (%)	SNR (dB)	
1	10MHz	R.13 TDD	OP.1 TDD	EVA5	4x2Low	70	-3.5	1 ~ 5

- 1) CONNECT the SS, attenuator, and Gaussian noise sources to the UE antenna interface as shown in Figure A.11 of 3GPP TS36.508.
- 2) SET reasonably the cell parameters in accordance with Table 8.2.2-1, Table 222 and Table 224 of 3GPP TS36.521-1.
- 3) ESTABLISH the initial downlink signal in accordance with Appendix C.0, C.1 and C.3.2 of 3GPP TS36.521-1; ESTABLISH the uplink signal in accordance with H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause A.2 of 3GPP TS36.508. The message content is as defined in clause 7.1.4.2.4.3.

7.1.4.2.4.2 Test purpose **[translator note: it should be test procedure]**

- 1) For single-stream space division multiplexing, in accordance with Table 222 and Table 223, to transmit the DL RMC, SS transmits PDSCH through the C_RNTI having the PDCCH DCI format 2. For multi-stream space division multiplexing, in accordance with Table 224 and Table 225, to transmit the DL RMC, SS transmits PDSCH through C_RNTI having the PDCCH DCI format 2. SS sends the downlink MAC padding bit on the DL RMC.
- 2) SS determines the uplink transmission time which bears the PUSCH CQI feedback by the DCI format 0, AND meanwhile the CQI requirement bit is set at 1, the I_MCS is set at 29, and the allocated N_PRB shall be ≤ 4 .
- 3) SET reasonably the bandwidth, MCS, reference channel, propagation conditions, correlation matrix, antenna configuration and SNR parameters in accordance with Table 230 and Table 231.
- 4) In accordance with clause G.3 of 3GPP TS36.521-1, MEASURE the average throughput in the duration period for a sufficient period of time to achieve statistical significance. COUNT the number of NACK, ACK, statDTX in each uplink in the sub-test interval, and DETERMINE whether it passes this sub-test in accordance with Table G3.5 and Table G3.6 in the clause G.3 of 3GPP TS36.521-1.
- 5) REPEAT the steps 1 ~ 4 for each test interval in Table 230 and Table 231.

7.1.4.2.4.3 Message content

The message content is in accordance with clause 4.6 of 3GPP TS36.508, with the following exceptions.

Table 231 -- Multi-stream space division multiplexing (FRC) test requirements

Test case	Bandwidth	Reference channel	OCNG mode	Propagation conditions	Correlation matrix and antenna configuration	Reference value		UE category
						Maximum throughput ratio (%)	SNR (dB)	
2	10MHz	R.14 TDD	OP.1 TDD	EVA5	4x2Low	70	11.6	2 ~ 5

7.1.5 TDD PDSCH single layer space division multiplexing performance (UE specific reference symbol)

7.1.5.1 TDD PDSCH single layer space division multiplexing on antenna port 5 (R.8 and later version)

7.1.5.1.1 Purpose of test

The test is to verify the ability of the UE to receive a particular signal. The signal used for the test represents a multipath fading channel, which is determined by the signal-to-noise ratio at a percentage of a certain downlink reference measurement channel (RMC) information bit throughput. When using the full RB or single RB allocation to make single layer transmission by the use of the UE dedicated reference signal at the antenna port 5, this percentage shall be not less than a certain value.

7.1.5.1.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

7.1.5.1.3 Minimum consistency requirements

This requirement is required as a percentage of the information bit throughput for the downlink reference measurement channel (RMC) (SEE A.3.4.3.1 of 3GPP TS36.521-1). The other corresponding parameters are as shown in Table 8.3.2-1 and Table 232 in 3GPP TS36.521-1, AND the downlink physical channel settings are as shown in Table C.3.2-1 in 3GPP TS36.521-1.

In accordance with this setting, the fraction of the maximum throughput percentage at the specified signal-to-noise ratio shall meet or exceed the minimum requirements as specified in Table 233.

Table 232 -- DRS test parameters

Parameters		Unit	Test 1	Test 2	Test 3	Test 4
Downlink power allocation	ρ_A	dB	0	0	0	0
	ρ_B	dB	0	0	0	0
Cell dedicated reference signal		Antenna port 0				
Antenna port N_{oc}		dBm/15kHz	-98	-98	-98	-98
PRB symbol not used			OCNG	OCNG	OCNG	OCNG
Allocated number of resource block		PRB	50	50	50	1
Note 1: $\rho_B = 0$.						

- 3) The initial settings of the downlink signals are described in Appendix C0, C.1 and Appendix C.3.2 in 3GPP TS36.521-1; AND the uplink signal is as shown in Appendix H.1 and H.3.2 in 3GPP TS36.521-1.
- 4) The setting of transmission conditions is given in Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in state 3A-RF (in accordance with clause 5.2A.2 of 3GPP TS36.508). The message content is defined in clause 7.1.5.1.4.3

7.1.5.1.4.2 Test procedure

- 1) Based on C_RNTI, the system simulator transmits the PDSCH to transmit the DL RMC via the PDCCH DCI format 1 in accordance with Table 232 and Table 233. The system emulator transmits downlink MAC padding bits in the DL RMC.
- 2) SET the following appropriate parameters in accordance with Table 235: bandwidth, MCS, reference channel, transmission condition, correlation matrix, and signal-to-noise ratio.
- 3) USE a transmission antenna to transmit the BCH/CRS/PDCCH/PCFICH on antenna port 0; in accordance with the wave velocity forming model as specified in Appendix B.4.1 of 3GPP TS36.521-1 AND the codebook update particles as designated in Table 8.3.2-1 of 3GPP TS36.521-1, the dedicated data for the test UE is transmitted on the antenna port 5 using two antennas.
- 4) In accordance with clause G.3 of 3GPP TS36.521-1, in order to obtain statistical significance, it is necessary to calculate the average throughput in a sufficiently long interval. The number of NACKs, ACKs, and status of DTX on UL is recorded in each test interval, AND the test is judged as passed or failed in accordance with Table G.3.5 and Table G.3.6 of 3GPP TS36.521-1.
- 5) REPEAT steps 1 ~ 3 for each test interval in accordance with the appropriate parameters in Table 235.

7.1.5.1.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508, except for the following exceptions.

Table 234 -- PhysicalConfigDedicated-DEFAULT: Requirements for the downlink power allocation test point 1 in the additional PDSCH DRS performance test items 1 ~ 4

Source path: Clause 6.3.2 of 3GPP TS36.331			
Information cell	Value/remarks	Remarks	Conditions
PhysicalConfigDedicated-DEFAULT::=SEQUENCE {			
antennaInfo CHOICE {			

- Replacing Table 232 - Using Table 236.
- Replacing Table 233 - Using Table 237.

Table 236 -- DRS test parameters (antenna port 5)

Parameters		Unit	Test 1	Test 2	Test 3	Test 4
Downlink power allocation	ρ_A	dB	N/A	0	0	0
	ρ_B	dB		0	0	0
Cell dedicated reference signal		Antenna port 0				
Antenna port N_{oc}		dBm/15kHz	N/A	-98	-98	N/A
PRB symbol not used				OCNG	OCNG	
Allocated number of resource block		PRB		50	50	
Note 1: $\rho_B = 0$. Note 2: These physical resource blocks are allocated to any number of virtual UE, AND each virtual UE occupies one PDSCH; the data transmitted on the OCNG PDSCH shall be the irrelevant QPSK modulated pseudo-random data. During the test, the modulation symbol of the signal is mapped onto the antenna port 5. Note 3: This test is covered in the clause 7.1.5.1.						

Table 237 -- DRS minimum performance (FRC) (Antenna port 5)

Test item	Bandwidth and MCS	Reference channel	OCNG mode	Transmission conditions	Correlation matrix and antenna configuration	Reference value		UE level
						Maximum throughput ratio (%)	SNR (dB)	
1	N/A							
2	15MHz 16QAM 1/2	R.26-1 TDD	OP.1 TDD	EPA5	2x2Low	70	7.0	1
3	10MHz 64QAM 3/4	R.27-1 TDD	OP.1 TDD	EPA5	2x2Low	70	17.0	1
4	N/A							
Note: These tests are covered in the clause 7.1.5.1.								

The reference standard for this requirement is given in clause 8.3.2 of 3GPP TS 36.101.

7.1.5.2.4 Test description

The rest of the test description is the same as in 7.1.5.1.3, with the following exceptions:

- Replacing Table 232 – Using Table 236.
- Replacing Table 233 – Using Table 237.
- Replacing Table 235 – Using Table 238.

7.1.5.2.5 Test requirements

The reference standard for this requirement is given in clause 8.3.2 of 3GPP TS 36.101.

7.1.5.3.4 Test description

7.1.5.3.4.1 Initial conditions

The initial condition is a series of test configurations required for the test of UE AND the steps to make the system simulator and the UE to reach the correct measurement state.

The settings for PDSCH and PDCCH before measurement are as given in Appendix C.2.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: medium range, as defined in clause 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: 10MHz, as defined in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT it to the system emulator; CONNECT the attenuator and AWGN noise sources to the UE antenna interface as shown in Figure A.10 of 3GPP TS36.508.
- 2) SET the appropriate cell parameters in accordance with Table 8.3.2-1 and Table 239 of 3GPP TS36.521-1.
- 3) The initial settings of the downlink signals are described in Appendix C0, C.1 and Appendix C.3.2 in 3GPP TS36.521-1; AND the uplink signal is as shown in Appendix H.1 and H.3.2 in 3GPP TS36.521-1.
- 4) The setting of transmission conditions is given in Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in state 3A-RF (in accordance with clause 5.2A.2 of 3GPP TS36.508). The message content is defined in clause 7.1.5.3.4.3

7.1.5.3.4.2 Test procedure

- 1) Based on C_RNTI, the system simulator transmits the PDSCH to transmit the DL RMC via the PDCCH DCI format 2B in accordance with Table 239 and Table 240. The system emulator transmits downlink MAC padding bits in the DL RMC.
- 2) SET the following appropriate parameters in accordance with Table 242: bandwidth, MCS, reference channel, transmission condition, correlation matrix, and signal-to-noise ratio.

- 3) The initial settings of the downlink signals are described in Appendix C0, C.1 and Appendix C.3.2 in 3GPP TS36.521-1; AND the uplink signal is as shown in Appendix H.1 and H.3.2 in 3GPP TS36.521-1.
- 4) The setting of transmission conditions is given in Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in state 3A-RF (in accordance with clause 5.2A.2 of 3GPP TS36.508). The message content is defined in clause 7.1.5.4.4.3

7.1.5.4.4.2 Test procedure

- 1) Based on C_RNTI, the system simulator transmits the PDSCH to transmit the DL RMC via the PDCCH DCI format 2B in accordance with Table 243 and Table 244. The system emulator transmits downlink MAC padding bits in the DL RMC.
- 2) SET the following appropriate parameters in accordance with Table 246: bandwidth, MCS, reference channel, transmission condition, correlation matrix, and signal-to-noise ratio.
- 3) USE two transmission antennas to transmit the BCH/CRS/PDCCH/PCFICH on antenna port 0 and 1; in accordance with the beam forming model as specified in Appendix B.4.1 of 3GPP TS36.521-1 AND the codebook update particles as designated in Table 8.3.2-1 of 3GPP TS36.521-1, the DRS/dedicated data is transmitted on the two transmission antennas, wherein one path of data transmitted from to the test UE is to the antenna port 7 (or 8), AND the other path of data which does not belong to this test UE is transmitted to the other antenna port 8 (or 7).
- 4) In accordance with clause G.3 of 3GPP TS36.521-1, in order to obtain statistical significance, it is necessary to calculate the average throughput in a sufficiently long interval. The number of NACKs, ACKs, and status of DTX on UL is recorded in each test interval, AND the test is judged as passed or failed in accordance with Table G.3.5 and Table G.3.6 of 3GPP TS36.521-1.
- 5) REPEAT steps 1 ~ 3 for each test interval in accordance with the appropriate parameters in Table 246.

7.1.5.4.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508, with the following exceptions.

Table 245 -- PhysicalConfigDedicated - Default

Source path: clause 6.3.2 of 3GPP TS 36.331			
Information cell	Value/attentions	Remarks	Conditions
PhysicalConfigDedicated-DEFAULT::= SEQUENCE {			

Test frequency: medium range, as defined in clause 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: 10MHz, as defined in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT it to the system emulator; CONNECT the attenuator and AWGN noise sources to the UE antenna interface as shown in Figure A.10 in Appendix A of 3GPP TS36.508.
- 2) SET the appropriate cell parameters in accordance with Table 8.3.2-1 and Table 247 of 3GPP TS36.521-1.
- 3) The initial settings of the downlink signals are described in Appendix C0, C.1 and Appendix C.3.2 in 3GPP TS36.521-1; AND the uplink signal is as shown in Appendix H.1 and H.3.2 in 3GPP TS36.521-1.
- 4) The setting of transmission conditions is given in Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in state 3A-RF (in accordance with clause 5.2A.2 of 3GPP TS36.508). The message content is defined in clause 7.1.6.1.4.3

7.1.6.1.4.2 Test procedure

- 1) Based on C_RNTI, the system simulator transmits the PDSCH to transmit the DL RMC via the PDCCH DCI format 2B in accordance with Table 247 and Table 248. The system emulator transmits downlink MAC padding bits in the DL RMC.
- 2) SET the following appropriate parameters in accordance with Table 250: bandwidth, MCS, reference channel, transmission condition, correlation matrix, and signal-to-noise ratio.
- 3) USE two transmission antennas to transmit the BCH/CRS/PDCCH/PCFICH on antenna port 0 and 1; in accordance with the beam forming model as specified in Appendix B.4.2 of 3GPP TS36.521-1 AND the codebook update particles as designated in Table 8.3.2-1 of 3GPP TS36.521-1, the DRS/dedicated data for the test UE is transmitted on the two transmission antennas at the antenna port 7 and 8.
- 4) In accordance with clause G.3 in Appendix G of 3GPP TS36.521-1, in order to obtain statistical significance, it is necessary to calculate the average throughput in a sufficiently long interval. The number of NACKs, ACKs, and status of DTX on UL is recorded in each test interval, AND the test is judged as passed or failed in accordance with Table G.3.5 and Table G.3.6 of 3GPP TS36.521-1.
- 5) REPEAT steps 1 ~ 3 for each test interval in accordance with the appropriate parameters in Table 250.

The initial condition is a series of test configurations required for the test of UE AND the steps to make the system simulator and the UE to reach the correct measurement state.

The settings for PDSCH and PDCCH before measurement are as given in Appendix C.2.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: medium range, as defined in clause 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: 1.0MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT it to the system emulator; CONNECT the attenuator and AWGN noise sources to the UE antenna interface as shown in Figure A.9 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with Table 251.
- 3) The initial settings of the downlink signals are described in Appendix C.1 and Appendix C.3.2 in 3GPP TS36.521-1; AND the uplink signal is as shown in Appendix H.1 and H.3.2 in 3GPP TS36.521-1.
- 4) The setting of transmission conditions is given in Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in state 3A-RF (in accordance with clause 5.2A.2 of 3GPP TS36.508). The message content is defined in clause 7.2.1.4.3

7.2.1.4.2 Test procedure

- 1) Based on C_RNTI, the system simulator transmits the PDSCH to transmit the downlink RMC via the PDCCH DCI format 1 in accordance with Table 252. The definitions of PDCCH and PDSCH are correspondingly as shown in Table A.3.5.1-1 and the Table A.3.5.1-2 of 3GPP TS36.521-1. The system emulator transmits downlink MAC padding bits in the DL RMC.
- 2) SET the following appropriate parameters in accordance with Table 254: transmission condition, antenna parameters, correlation matrix, and SNR parameters.
- 3) In accordance with clause G.4 of 3GPP TS36.521-1, it is necessary to measure the Pm-dsg within a sufficient long interval to comply with the statistical requirements. COUNT the number of NACKs, ACKs, and statDTX within each sub-measurement period of the uplink PUCCH, and the Pm-dsg is the ratio between the statDTX to the NACK+ACK+statDTX. If the Pm-dsg is less than the value as defined in Table 259, the UE passes the test; otherwise, the UE fails to pass the test.

7.2.1.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508, with the following exceptions.

Table 253 -- TDD-Configuration-Default

Reference source: clause 6.4 of 3GPP TS 36.5084 [translator note: it should be 508]			
Cell	Value	Remarks	Conditions
TDD-Configuration-DEFAULT::= SEQUENCE {			
subframeAssignment	sa0		
specialSubframePatterns	Ssp4		
}			

7.2.1.4.4 Test requirements

For the test parameters as defined in Table 251, the probability of miss-detection of the downlink scheduling grant (Pm-dsg) shall be less than the value as specified in Table 254.

Table 254 -- Test requirements PDCCH/PCFICH

Test number	Bandwidth	Aggregate level	Reference channel	OCNG template	Transmission conditions	Antenna configuration and correlation matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10MHz	8 CCE	R.15 TDD	OP.1 TDD	ETU70	1x2Low	1	-0.8

7.2.2 TDD PCFICH/PDCCH transmission diversity performance

7.2.2.1 TDD PCFICH/PDCCH transmission diversity 2x2

7.2.2.1.1 Purpose of test

VERIFY the demodulation performance of the PCFICH/PDCCH, that is, the average probability of miss-detection of the downlink scheduling grant (Pm-dsg), which shall be less than the reference value given below for a given SNR and transmission diversity. PDCCH and PCHICH are combined for the test, AND the reference measurement channel is as defined in A.3.5.1.

7.2.2.1.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

7.2.2.1.3 Minimum test requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the downlink scheduling grant (Pm-dsg). PDCCH and PCFICH are combined for test, that is, the miss-detection of PCFICH means the miss-detection of PDCCH.

The settings for PDSCH and PDCCH before measurement are as given in Appendix C.2 of 3GPP TS36.508.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: medium range, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test bandwidth: 1.4MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT it to the system emulator; CONNECT the attenuator and AWGN noise sources to the UE antenna interface as shown in Figure A.10 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with Table 255.
- 3) The initial settings of the downlink signals are described in Appendix C.1 and Appendix C.3.2 in 3GPP TS36.521-1; AND the uplink signal is as shown in Appendix H.1 and H.3.2 in 3GPP TS36.521-1.
- 4) The setting of transmission conditions is given in Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in state 3A-RF (in accordance with clause 5.2A.2 of 3GPP TS36.508). The message content is defined in clause 7.2.2.1.4.3

7.2.2.1.4.2 Test procedure

- 1) Based on C_RNTI, the system simulator transmits the PDSCH to transmit the downlink RMC via the PDCCH DCI format 2 in accordance with Table 256. The definitions of PDCCH and PDSCH are correspondingly as shown in Table A.3.5.1-1 and the Table A.3.5.1-2 of 3GPP TS36.521-1. The system emulator transmits downlink MAC padding bits in the DL RMC. The transmission scheme of the PDSCH shall adopt the transmission diversity.
- 2) SET the following appropriate parameters in accordance with Table 259: transmission condition, antenna parameters, correlation matrix, and SNR parameters.
- 3) In accordance with clause G.4 of 3GPP TS36.521-1, it is necessary to measure the Pm-dsg within a sufficient long interval to comply with the statistical requirements. COUNT the number of NACKs, ACKs, and statDTX within each sub-measurement period of the uplink PUCCH, and the Pm-dsg is the ratio between the statDTX to the NACK+ACK+statDTX. If the Pm-dsg is less than the value as defined in Table 259, the UE passes the test; otherwise, the UE fails to pass the test.

7.2.2.1.4.3 Message content

number		level	channel	template	conditions	configuration and correlation matrix	Pm-dsg (%)	SNR (dB)
1	10MHz	4 CCE	R.16_1 TDD	OP.1 TDD	EVA70	2x2Low	1	0.1

The reference standard for this requirement is given in clause 8.4.2 of 3GPP TS 36.101.

7.2.2.2.4 Test description

7.2.2.2.4.1 Initial conditions

The initial condition is a series of test configurations required for the test of UE AND the steps to make the system simulator and the UE to reach the correct measurement state.

The settings for PDSCH and PDCCH before measurement are as given in Appendix C.2 of 3GPP TS36.508.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: medium range, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test bandwidth: 1.0MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT it to the system emulator; CONNECT the attenuator and AWGN noise sources to the UE antenna interface as shown in Figure A.10 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with Table 260.
- 3) The initial settings of the downlink signals are described in Appendix C.1 and Appendix C.3.2 in 3GPP TS36.521-1; AND the uplink signal is as shown in Appendix H.1 and H.3.2 in 3GPP TS36.521-1.
- 4) The setting of transmission conditions is given in Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in state 3A-RF (in accordance with clause 5.2A.2 of 3GPP TS36.508). The message content is defined in clause 8.4.2.2.1_1.4.3.

7.2.2.2.4.2 Test procedure

- 1) Based on C_RNTI, the system simulator transmits the PDSCH to transmit the downlink RMC via the PDCCH DCI format 2 in accordance with Table 261. The definitions of PDCCH and PDSCH are correspondingly as shown in Table A.3.5.1-1 and the Table A.3.5.1-2 of 3GPP TS36.521-1.

The system emulator transmits downlink MAC padding bits in the DL RMC. The transmission scheme of the PDSCH shall adopt the transmission diversity.

- 2) SET the following appropriate parameters in accordance with Table 264: transmission condition, antenna parameters, correlation matrix, and SNR parameters.
- 3) In accordance with clause G.4 of 3GPP TS36.521-1, it is necessary to measure the Pm-dsg within a sufficient long interval to comply with the statistical requirements. COUNT the number of NACKs, ACKs, and statDTX within each sub-measurement period of the uplink PUCCH, and the Pm-dsg is the ratio between the statDTX to the NACK+ACK+statDTX. If the Pm-dsg is less than the value as defined in Table 264, the UE passes the test; otherwise, the UE fails to pass the test.

7.2.2.2.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508, with the following exceptions.

Table 262 -- TDD-Configuration-DEFAULT

Reference source: clause 4.6.4 of 3GPP TS 36.508			
Cell	Value	Remarks	Conditions
TDD-Configuration-DEFAULT::= SEQUENCE {			
subframeAssignment	Sa0		
specialSubframePatterns	Ssp4		
}			

Table 263 -- PhysicalConfigDedicated-DEFAULT

Reference source: clause 6.3.2 of 3GPP TS 36.331			
Information cell	Value/attentions	Remarks	Conditions
PhysicalConfigDedicated-DEFAULT::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated::=SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

7.2.2.2.5 Test requirements

For the test parameters as defined in Table 260, the probability of miss-detection of the downlink scheduling grant (Pm-dsg) shall be less than the value as specified in Table 264.

Table 264 -- Test requirements for PDCCH/PCFICH two transmission antenna ports

Test number	Bandwidth	Aggregate level	Reference channel	OCNG template	Transmission conditions	Antenna configuration and correlation matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10MHz	4 CCE	R.16_1 TDD	OP.1 TDD	EVA70	2x2Low	1	0.1+TT

7.2.2.3 TDD PCFICH/PDCCH transmission diversity 4x2**7.2.2.3.1 Purpose of test**

VERIFY the demodulation performance of the PCFICH/PDCCH, that is, the average probability of miss-detection of the downlink scheduling grant (Pm-dsg), which shall be less than the reference value given below for a given SNR and transmission diversity. PDCCH and PCHICH are combined for the test, AND the reference measurement channel is as defined in A.3.5.1.

7.2.2.3.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

7.2.2.3.3 Minimum test requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the downlink scheduling grant (Pm-dsg). PDCCH and PCFICH are combined for test, that is, the miss-detection of PCFICH means the miss-detection of PDCCH.

Table 265 -- PDCCH/PCFICH test parameters

Parameters		Unit	Single antenna port
Uplink and downlink configuration			0
Special subframe configuration			4
Number of PDCCH symbols		Symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
RE-s and PRB-s not used			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at the antenna port		dBm/15kHz	-98
Cyclic prefix			Normal

ACK/NACK feedback mode	Multiplexing
Note 1: As defined in Table 4.2-2 of 3GPP TS 36.211. Note 2: As defined in Table 4.2-1 of 3GPP TS 36.211. Note 3: The power setting of PHICH refers to the PHICH group power, that is, the total power of all the activated PHICH sequences in the PHICH group.	

For the test parameters defined in Table 265, the probability of miss-detection of the downlink scheduling grant (Pm-dsg) shall be less than the value specified in Table 266.

Table 266 -- PDCCH/PCFICH two transmission antenna ports minimum performance

Test number	Bandwidth	Aggregate level	Reference channel	OCNG template	Transmission conditions	Antenna configuration and correlation matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10MHz	4 CCE	R.17 TDD	OP.1 TDD	EVA5	4x2Medium	1	1.2

The reference standard for this requirement is given in clause 8.4.2 of 3GPP TS 36.101.

7.2.2.3.4 Test description

7.2.2.3.4.1 Initial conditions

The initial condition is a series of test configurations required for the test of UE AND the steps to make the system simulator and the UE to reach the correct measurement state.

The settings for PDSCH and PDCCH before measurement are as given in Appendix C.2 of 3GPP TS36.508.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: medium range, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test bandwidth: 1.0MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT it to the system emulator; CONNECT the attenuator and AWGN noise sources to the UE antenna interface as shown in Figure A.11 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with Table 265.
- 3) The initial settings of the downlink signals are described in Appendix C.1 and Appendix C.3.2 in 3GPP TS36.521-1; AND the uplink signal is as shown in Appendix H.1 and H.3.2 in 3GPP TS36.521-1.

- 4) The setting of transmission conditions is given in Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in state 3A-RF (in accordance with clause 5.2A.2 of 3GPP TS36.508). The message content is defined in clause 7.2.2.3.4.3

7.2.2.3.4.2 Test procedure

- 1) Based on C_RNTI, the system simulator transmits the PDSCH to transmit the downlink RMC via the PDCCH DCI format 2 in accordance with Table 266. The definitions of PDCCH and PDSCH are correspondingly as shown in Table A.3.5.1-1 and the Table A.3.5.1-2 of 3GPP TS36.521-1. The system emulator transmits downlink MAC padding bits in the DL RMC. The transmission scheme of the PDSCH shall adopt the transmission diversity.
- 2) SET the following appropriate parameters in accordance with Table 269: transmission condition, antenna parameters, correlation matrix, and SNR parameters.
- 3) In accordance with clause G.4 of 3GPP TS36.521-1, it is necessary to measure the Pm-dsg within a sufficient long interval to comply with the statistical requirements. COUNT the number of NACKs, ACKs, and statDTX within each sub-measurement period of the uplink PUCCH, and the Pm-dsg is the ratio between the statDTX to the NACK+ACK+statDTX. If the Pm-dsg is less than the value as defined in Table 269, the UE passes the test; otherwise, the UE fails to pass the test.

7.2.2.3.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508, with the following exceptions.

Table 267 -- TDD-Configuration-DEFAULT

Reference source: clause 4.6.4 of 3GPP TS 36.508			
Cell	Value	Remarks	Conditions
TDD-Configuration-DEFAULT::= SEQUENCE {			
subframeAssignment	Sa0		
specialSubframePatterns	Ssp4		
}			

Table 268 -- PhysicalConfigDedicated-DEFAULT

Reference source: clause 6.3.2 of 3GPP TS 36.331			
Information cell	Value/attentions	Remarks	Conditions
PhysicalConfigDedicated-DEFAULT::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated::=SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		

Test frequency: medium range, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test bandwidth: 5MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT it to the system emulator; CONNECT the attenuator and AWGN noise sources to the UE antenna interface as shown in Figure A.11 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with Table 270.
- 3) The initial settings of the downlink signals are described in Appendix C.1 and Appendix C.3.2 in 3GPP TS36.521-1; AND the uplink signal is as shown in Appendix H.1 and H.3.2 in 3GPP TS36.521-1.
- 4) The setting of transmission conditions is given in Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in state 3A-RF (in accordance with clause 5.2A.2 of 3GPP TS36.508). The message content is defined in clause 7.2.2.4.4.3.

7.2.2.4.4.2 Test procedure

- 1) Based on C_RNTI, the system simulator transmits the PDSCH to transmit the downlink RMC via the PDCCH DCI format 2 in accordance with Table 266. The definitions of PDCCH and PDSCH are correspondingly as shown in Table A.3.5.1-1 and the Table A.3.5.1-2 of 3GPP TS36.521-1. The system emulator transmits downlink MAC padding bits in the DL RMC. The transmission scheme of the PDSCH shall adopt the transmission diversity.
- 2) SET the following appropriate parameters in accordance with Table 274: transmission condition, antenna parameters, correlation matrix, and SNR parameters.
- 3) In accordance with clause G.4 of 3GPP TS36.521-1, it is necessary to measure the Pm-dsg within a sufficient long interval to comply with the statistical requirements. COUNT the number of NACKs, ACKs, and statDTX within each sub-measurement period of the uplink PUCCH, and the Pm-dsg is the ratio between the statDTX to the NACK+ACK+statDTX. If the Pm-dsg is less than the value as defined in Table 274, the UE passes the test; otherwise, the UE fails to pass the test.

7.2.2.4.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508, with the following exceptions.

Table 272 -- TDD-Configuration-DEFAULT

Reference source: clause 4.6.4 of 3GPP TS 36.508

7.3.1.4 Test description

7.3.1.4.1 Initial conditions

The initial conditions include a set of test configurations for the UE test AND a series of steps required by the SS (system simulator) to guide the UE to the correct test state.

The pre-measurement PDSCH and PDCCH configurations are set in accordance with C.2.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: Intermediate interval, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test channel bandwidth: in accordance with the test requirements, AND as defined in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT SS, channel, noise sources and UE antenna interfaces in accordance with A.9 of 3GPP TS36.508.
- 2) The cell parameter configuration is as shown in Table 275.
- 3) The initial configuration of the downlink signal is as described in Appendix C0, C.1 and C.3.2 of 3GPP TS36.521-1. The initial configuration of the uplink signal is described in Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the transmission conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508. The message is as given in clause 7.3.1.4.3.

7.3.1.4.2 Test procedure

- 1) In accordance with the appropriate test of Table 279, SET the bandwidth parameters, reference channel, propagation conditions, antenna configuration, correlation matrix, and signal-to-noise ratio.
- 2) In each HARQ progress (4 HARQ progresses for UL/DL configuration 1), SS shall arrange PUSCH transmission in accordance with Table A.2.3.1.1-1 of 3GPP TS36.521-1, set the PDCCH DCI format 0, AND meanwhile set the new data indicator NDI as true. Since the UE has no payload, the UE shall send the uplink MAC padding bit of the PUSCH. Upon receiving the transmission of PUSCH, the SS will transmit the corresponding ACK. PHICH is set in accordance with Table A.3.6-1 of 3GPP TS36.521-1. SS will only send PDCCH to arrange the appropriate subframe for PUSCH transmission. Table 277 indicates a transmission period.

PHICH contents	The uplink authorization shall be transmitted in accordance with the requirements of Appendix A3.6 of 3GPP TS26.521-1.	
RE-s and PRB-s not used		OCNG
N_{oc} at the antenna port	dBm/15kHz	-98
Cyclic prefix		Normal
ACK/NACK feedback mode		Multiplexing
Note 1: As defined in Table 4.2-2 of 3GPP TS 36.211. Note 2: As defined in Table 4.2-1 of 3GPP TS 36.211. Note 3: As defined in clause 6.9 of 3GPP TS 36.211. Note 4: The power setting of PHICH refers to the PHICH group power, that is, the total power of all the activated PHICH sequences in the PHICH group.		

Under the test conditions given in Table 280, the probability that the test will erroneously detect the ACK as NACK (P_{m-an}) shall be lower than the value given in Table 281.

Table 281 -- PHICH double antenna minimum performance requirements

Test number	Bandwidth	Reference channel	OCNG mode	Transmission conditions	Antenna configuration and correlation matrix	Reference value	
						P_{m-an} (%)	SNR (dB)
1	1.4MHz	R.19	OP.1 TDD	EPA5	2x2Low	0.1	5.3

The specification of this requirement is given in clause 8.5.2 of TS 36.101.

7.3.2.1.4 Test description

7.3.2.1.4.1 Initial conditions

The initial conditions include a set of test configurations for the UE test AND a series of steps required by the SS (system simulator) to guide the UE to the correct test state.

The pre-measurement PDSCH and PDCCH configurations are set in accordance with C.2.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: intermediate interval, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test channel bandwidth: 1.4MHz, as defined in clause 4.3.1.1 of TS36.508.

- 1) CONNECT SS, channel, noise sources and UE antenna interfaces in accordance with A.10 of 3GPP TS36.508.
- 2) The cell parameter configuration is as shown in Table 280.
- 3) The initial configuration of the downlink signal is as described in Appendix C.1 and C.3.2 of 3GPP TS36.521-1. The initial configuration of the uplink signal is described in Appendix H.1 and H.3.2 of 3GPP TS36.521-1.

1	10MHz	R.19_1	OP.1 TDD	EVA70	2x2Low	0.1	4.2
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The specification of this requirement is given in clause 8.5.2 of TS 36.101.

7.3.2.2.4 Test description

7.3.2.2.4.1 Initial conditions

The initial conditions include a set of test configurations for the UE test AND a series of steps required by the SS (system simulator) to guide the UE to the correct test state.

The pre-measurement PDSCH and PDCCH configurations are set in accordance with C.2.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: Intermediate interval, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test channel bandwidth: 10MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT SS, channel, noise sources and UE antenna interfaces in accordance with A.10 of 3GPP TS36.508.
- 2) The cell parameter configuration is as shown in Table 285.
- 3) The initial configuration of the downlink signal is as described in Appendix C.1 and C.3.2 of 3GPP TS36.521-1. The initial configuration of the uplink signal is described in Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the transmission conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508. The message is as given in clause 7.3.2.2.4.3.

7.3.2.2.4.2 Test procedure

- 1) In accordance with the appropriate test of Table 289, SET the bandwidth parameters, reference channel, propagation conditions, antenna configuration, correlation matrix, and signal-to-noise ratio.
- 2) In each HARQ progress (4 HARQ progresses for UL/DL configuration 1), SS shall arrange PUSCH transmission in accordance with Table A.2.3.1.1-1 of 3GPP TS36.521-1, set the PDCCH DCI format 0, AND meanwhile set the new data indicator NDI as true. Since the UE has no payload, the UE shall send the uplink MAC padding bit of the PUSCH. Upon receiving the transmission of PUSCH, the SS will transmit the

- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508. The message is as given in clause 7.3.2.3.4.3.

7.3.2.3.4.2 Test procedure

- 1) In accordance with the appropriate test of Table 294, SET the bandwidth parameters, reference channel, propagation conditions, antenna configuration, correlation matrix, and signal-to-noise ratio.
- 2) In each HARQ progress (4 HARQ progresses for UL/DL configuration 1), SS shall arrange PUSCH transmission in accordance with Table A.2.3.1.1-1 of 3GPP TS36.521-1, set the PDCCH DCI format 0, AND meanwhile set the new data indicator NDI as true. Since the UE has no payload, the UE shall send the uplink MAC padding bit of the PUSCH. Upon receiving the transmission of PUSCH, the SS will transmit the corresponding ACK. PHICH is set in accordance with Table A.3.6-1 of 3GPP TS36.521-1. SS will only send PDCCH to arrange the appropriate subframe for PUSCH transmission. Table 292 indicates a transmission period.
- 3) SS will only monitor the uplink retransmissions due to ACK detection errors. This retransmission (if any) may occur at 13 ~ 20 of the TTI. If TTI 13 ~ 20 is DTXs, it indicates that ACK has been successfully accepted; if these TTIs are transmitted, they are recorded as NACKs.
- 4) REPEAT the steps 1 ~ 3 for a sufficient time to reach statistical significance in accordance with Clause G.4. Pm-an is defined as (NACK)/(ACK + NACK). If Pm-an is less than the value specified in Table 294, it is considered that the UE has passed the test. Otherwise the UE is considered to fail.

Table 292 -- PHICH test mode

Subframe number	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
PDCCH		S			S		S			S										
PHICH												A			A		A			A

						(%)	(dB)
1	5MHz	R.20_1	OP.1 TDD	EPA5	4x2Medium	0.1	6.2

The specification of this requirement is given in clause 8.5.2 of TS 36.101.

7.3.2.4.4 Test description

7.3.2.4.4.1 Initial conditions

The initial conditions include a set of test configurations for the UE test AND a series of steps required by the SS (system simulator) to guide the UE to the correct test state.

The pre-measurement PDSCH and PDCCH configurations are set in accordance with C.2.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: Intermediate interval, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test channel bandwidth: 5MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT SS, channel, noise sources and UE antenna interfaces in accordance with A.11 of 3GPP TS36.508.
- 2) The cell parameter configuration is as shown in Table 295.
- 3) The initial configuration of the downlink signal is as described in Appendix C.1 and C.3.2 of 3GPP TS36.521-1. The initial configuration of the uplink signal is described in Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the transmission conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508. The message is as given in clause 7.3.2.4.4.3.

7.3.2.4.4.2 Test procedure

- 1) In accordance with the appropriate test of Table 299, SET the bandwidth parameters, reference channel, propagation conditions, antenna configuration, correlation matrix, and signal-to-noise ratio.
- 2) In each HARQ progress (4 HARQ progresses for UL/DL configuration 1), SS shall arrange PUSCH transmission in accordance with Table A.2.3.1.1-1, set the PDCCH DCI format 0, AND meanwhile set the new data indicator NDI as true. Since the UE has no payload, the UE shall

Under the test conditions given in Table 295, the probability that the test averagely and erroneously detects the ACK as NACK (P_{m-an}) shall be lower than the value given in Table 299.

Table 299 -- PHICH four antenna test requirements

Test number	Bandwidth	Reference channel	OCNG mode	Transmission conditions	Antenna configuration and correlation matrix	Reference value	
						P _{m-an} (%)	SNR (dB)
1	5MHz	R.20_1	OP.1 TDD	EPA5	4x2Medium	0.1	6.2+TT

8 Report of channel state information

8.1 Overview

For the test case in this clause, the UE does not always detect the PDCCH, which will cause the uplink ACK/NACK transmission to be statDTX. When the downlink configuration that evaluates the CQI performance does not use the retransmission, the UE may attempt to merge the multiple transmissions of the data due to the missed new data indication in the lost PDCCH transmission, so the BLER and throughput calculations must be deducted from those packets which are considered as retransmission. For all test cases without retransmission (the maximum number of HARQ retransmission is 1), if the number of statDTX discarded consecutively in a HARQ progress is an odd number containing 1, the next response of this HARQ progress is discarded regardless of whether it is an ACK or NACK. When calculating the throughput, the discarded ACK/NACK is treated as statDTX.

The contents of this clause mainly contain the requirements of the channel state information (CSI) reporting.

The AWGN signal on each receive antenna connector shall not be relevant to the fading signal. The test signal level for each antenna connector shall be defined in the respective test case.

In the test cases of this clause, the performance of the UE is independent of the operating frequency. Therefore, the performance requirements of the test case may be tested at any of the operating frequencies supported by the UE. For multi-band UEs that support multiple channel bandwidth configurations, all test points under their supported operating frequency bands shall be tested and verified.

8.2 CQI report under AWGN conditions

The accuracy of the channel quality indication (CQI) report under non-frequency selective conditions depends on the report change and the BLER performance corresponding to the transmission format as indicated by the reported CQI value. The purpose is to verify that the report CQI value is consistent with the CQI definition in clause 7.2 of TS36.213. Considering the

the unilateral dynamic OCNG mode OP.1 is as shown in Appendix A.5.2.1 of 3GPP TS36.521-1.

Note 2: For each test, at least one of the two SNRs and the corresponding expected signal input level complies with the minimum requirements.

Note 3: In order to avoid the conflict between CQI report and HARQ-ACK, both of them shall be reported on PUSCH instead of PUCCH. The PDCCH DCI format 0 is transmitted on the downlink subframes #3 and #8, to allow periodic CQI and HARQ-ACK multiplexing report on the PUSCH of the uplink subframes #7 and #2.

8.2.1.4 Test case description

8.2.1.4.1 Initialization conditions

The initial condition is a set of test configurations that the UE must be tested AND the step for the SS to guide the UE to the correct measurement state.

The configuration of PDSCH and PDCCH before measurement is described in C.2 in 3GPP TS36.521-1.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: medium range, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test channel bandwidth: 10MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT the SS, fading simulator, and AWGN noise sources to the antenna connector of the UE in accordance with Figure A.9 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with Table 300.
- 3) ESTABLISH a downlink initial signal in accordance with Appendix C0, C.1 and C.3.2 of 3GPP TS36.521-1, and ESTABLISH an uplink initial signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508; the message content is as shown in clause 8.2.1.4.3.

8.2.1.4.2 Test procedure

- 1) SET such parameters as bandwidth, reference channel, propagation conditions, antenna configuration, and SNR in accordance with Table 300.
- 2) The SS shall transmit the downlink RMC on the PDSCH through the PDCCH DCI format 1A based on C_RNTI and the CQI having a value of

8 in Table A.4-3 of Appendix A.4 of 3GPP TS36.521-1. KEEP this CQI value unchanged regardless of the wideband CQI value transmitted by the UE. SS sends the downlink MAC padding bit on the downlink RMC. SS shall request the PDCCH DCI format 0 for which the bit is set to 0 via the CQI, and send the uplink scheduling information on the subframes #2 and #7 in accordance with the Appendix A.4-11 of 3GPP TS36.521-1, to schedule the uplink RMC. The UE shall use the PUSCH to send AC/NACK and periodic CQI reports. The DPDSCH is sent continuously until 2000 wideband CQI reports are collected. In this process, SS collects a wideband CQI report every 5ms, and it is considered as a wideband CQI report even if the UE does not have any transmissions within its CQI timing.

- 3) ESTABLISH a cumulative probability allocation for the reported wideband CQI values, and CALCULATE the median (wideband CQI median is a wideband CQI value equal to or across a 50% allocation from the side of the lower CQI value), and this CQI value is called as the wideband CQI median.
- 4) If the CQI median is not 1 or 15, AND at least 1800 wideband CQI values are located within the set $\{(CQI\ median - 1), CQI\ median, (CQI\ median + 1)\}$, PROCEED to step 5; otherwise SKIP to step 8.
- 5) The SS shall transmit the downlink RMC on the PDSCH in accordance with the PDCCH DCI format 1A based on the C_RNTI and the median value of the wideband CQI, AND does not respond to the UE's wideband CQI report. SS sends the downlink MAC padding bit on the DL RMC. SS shall request the PDCCH DCI format 0 for which the bit is set at 0 via the CQI, and send the uplink scheduling information on the subframe #2 and #7 in accordance with Appendix A.4-11, to schedule the uplink RMC. The UE shall use the PUSCH to send ACK/NACK and periodic CQI reports. For any PDSCH sent by the SS, the corresponding ACK, NACK, and statDTX responses are recorded, AND filtered as follows: as of a series of responses for each HARQ progress, DISCARD all the statDTX responses. CONTINUE to collect data until the number of ACK + NACK responses after filtering reaches 1000.
- 6) For the filtered ACK and NACK responses, if the ratio $(NACK/ACK + NACK)$ is ≤ 0.1 , PROCEED to step 6; otherwise SKIP to step 7.
- 7) The SS shall transmit the downlink RMC on the PDSCH through the PDCCH DCI format 1A based on the C_RNTI and the wideband CQI median + 1, AND does not respond to the wideband CQI report of the UE. SS sends the downlink MAC padding bit on the DL RMC. SS shall request the PDCCH DCI format 0 for which the bit is set at 0 via the CQI, and send the uplink scheduling information on the subframe #2 and #7 in accordance with Appendix A.4-11, to schedule the uplink RMC. The UE shall use the PUSCH to send ACK/NACK and periodic CQI reports. For any PDSCH sent by the SS, the corresponding ACK, NACK, and statDTX

Note 4: The RI's report interval is set to the maximum allowable value 160ms to avoid the conflicts between RI, CQI/PMI, and HARQ-ACK report. When the three reports conflict, the CQI/PMI report shall be discarded, AND the RI and HARQ-ACK shall report. In the eNB end, during the verification process, it shall skip a CQI report collection every 160ms.

8.2.2.4 Description of test cases

8.2.2.4.1 Initial conditions

The initial condition is a set of test configurations that the UE must be tested AND the step for the SS to guide the UE to the correct measurement state.

The configuration of the PDSCH and PDCCH before measurement is described in Appendix C.2 of 3GPP TS36.521-1.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: medium range, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test channel bandwidth: 10MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT the SS, fading simulator, and AWGN noise sources to the antenna connector of the UE in accordance with Figure A.9 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with Table 304.
- 3) ESTABLISH a downlink initial signal in accordance with Appendix C0, C.1 and C.3.2 of 3GPP TS36.521-1, and ESTABLISH an uplink initial signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508; the message content is as shown in clause 8.2.2.4.3.

8.2.2.4.2 Test procedure

- 1) SET such parameters as bandwidth, reference channel, propagation condition, antenna configuration and SNR in accordance with Table 304.
- 2) SS shall send the downlink RMC on the PDSCH through the PDCCH DCI format 2 based on C_RNTI, and the two codewords of the space division multiplexing are based on the CQI of median 8 in accordance with Table A.4-3 of Appendix A.4 of 3GPP TS36.521-1, KEEP these CQI values unchanged and DO not consider the wideband CQI value as sent by the UE. SS sends the downlink MAC padding bit on the downlink RMC. SS

shall use the fixed precoding matrix as specified by the bitmap parameter codebookSubsetRestriction. SS shall request the PDCCH DCI format 0 for which the bit is set at 0 via the CQI, and send the uplink scheduling information on the subframe #2 and #7 in accordance with Appendix A.4-11 of 3GPP TS36.521-1, to schedule the uplink RMC. The UE shall use the PUSCH to send ACK/NACK and periodic CQI reports. CONTINUE sending PDSCH until collecting 2000 wideband space differential CQI reports. In this process, the SS collects the wideband CQI report and the wideband space differential CQI report once every 5ms, AND it will be considered as the corresponding wideband CQI and wideband space differential CQI report even if there is no transmission in the CQI timing of the UE.

- 3) In accordance with clause 8.2.2.3, the wideband CQI₀ (corresponding codeword #0) and wideband CQI₁ (corresponding codeword #1) are calculated from each wideband CQI report. The offset level of codeword #1 is selected from the set {0, 1, 2, 3, -4, -3, -2, -1}. The cumulative probability allocation is established for the reported wideband CQI values AND the median is calculated (wideband CQI median is a wideband CQI value equal to or across the 50% allocation from the lower CQI value side). The calculation of the wideband CQI₀ median is based on the wideband CQI₀, AND the calculation of the wideband CQI₁ is based on the wideband CQI₁.
- 4) If the CQI median is not 1 or 15 AND at least 1800 wideband CQI values are located within the set {(CQI median -1), CQI median, (CQI median +1)}, PROCEED to step 5; otherwise skip to step 7.
- 5) SS shall send the downlink RMC on the PDSCH through the PDCCH DCI format 2 based on C_RNTI, and the two codewords of the space division multiplexing are based on the wideband CQI₀ median - 1 (corresponding to the codeword #0) and the wideband CQI₁ median - 1 (corresponding to the codeword #1). SS shall send the downlink MAC padding bits on downlink RMC. SS shall use the fixed precoding matrix specified by the bitmap parameter codebookSubsetRestriction AND shall not respond to any wideband CQI reports of the UE. SS shall request the PDCCH DCI format 0 for which the bit is set at 0 via the CQI, and send the uplink scheduling information on the subframe #2 and #7 in accordance with Appendix A.4-11 of 3GPP TS36.521-1, to schedule the uplink RMC. The UE shall use the PUSCH to send ACK/NACK and periodic CQI reports. For any PDSCH sent by the SS, the ACK, NACK, and statDTX responses corresponding to each codeword are recorded respectively. Due to the impact of ACK/NACK multiplexing feedback, statDTX and NACK cannot be distinguished, AND at this time it shall consider this feedback as NACK and filter these responses as follows: as of a series of responses for each HARQ progress, DISCARD all the statDTX responses. CONTINUE to collect data until the number of ACK + NACK responses after filtering reaches 1000.

- 6) If both the codeword #0 and the codeword #1 are satisfied $(\text{NACK}/\text{ACK} + \text{NACK}) \leq 0.1$, then CONTINUE the step 6; otherwise skip to step 7.
- 7) SS shall send the downlink RMC on the PDSCH through the PDCCH DCI format 2 based on C_RNTI, and the two codewords of the space division multiplexing are based on the wideband CQI₀ median + 1 (corresponding to the codeword #0) and the wideband CQI₁ median + 1 (corresponding to the codeword #1). SS shall send the downlink MAC padding bits on downlink RMC. SS shall use the fixed precoding matrix specified by the bitmap parameter codebookSubsetRestriction AND shall not respond to any wideband CQI reports of the UE. SS shall request the PDCCH DCI format 0 for which the bit is set at 0 via the CQI, and send the uplink scheduling information on the subframe #2 and #7 in accordance with Appendix A.4-11 of 3GPP TS36.521-1, to schedule the uplink RMC. The UE shall use the PUSCH to send ACK/NACK and periodic CQI reports. For any PDSCH sent by the SS, the ACK, NACK, and statDTX responses corresponding to each codeword are recorded respectively. Due to the impact of ACK/NACK multiplexing feedback, statDTX and NACK cannot be distinguished, AND at this time it shall consider this feedback as NACK and filter these responses as follows: as of a series of responses for each HARQ progress, DISCARD all the statDTX responses. CONTINUE to collect data until the number of ACK + NACK responses after filtering reaches 1000.
- 8) If both the codeword #0 and the codeword #1 are satisfied $(\text{NACK}/\text{ACK} + \text{NACK}) \geq 0.1$, then the UE passes the test and continues to step 8; otherwise skip to step 7.
- 9) If the UE only completes one of the two SNRs of the test, the same procedure (steps 1 ~ 7) is repeated for another SNR; otherwise the UE test fails.
- 10) If the UE completes only one of the two tests, the same procedure (steps 1 ~ 7) is repeated for another test in accordance with the test conditions in Table 304; otherwise the UE test fails.

8.2.2.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508, with the following exceptions.

Table 305 -- Default value of PhysicalConfigDedicated

Quoted from clause 5.5.1.2 of 36.508			
Information cell	Value	Remarks	Conditions
PhysicalConfigDedicated-DEFAULT:: =SEQUENCE {			
cqi-ReportConfig	CQI-ReportConfig-DEFAULT		
antennaInfo CHOICE {			
antennaInfoDedicated:: = SEQUENCE {			
transmissionMode	tm4		

8.3 CQI report under fading conditions

8.3.1 Frequency selective scheduling mode

The accuracy of the subband channel quality indication (CQI) reported under the frequency selective fading channel condition is determined by two factors: the bidirectional percentage of the differential CQI offset level 0 reported by each subband; AND the throughput relative increase of the transmission format corresponding to the maximum differential CQI offset level reported on any selected subband as compared with the transmission by the use of fixed transmission format on any subbands in the S set as defined in TS 36.21. Considering the sensitivity of the input SNR, when the accuracy of the subband CQI report under the frequency selective fading conditions is at least one of the two SNR levels having a difference of 1dB, this report shall be considered as valid.

8.3.1.1 CQI report under fading conditions - PUSCH 3-0

8.3.1.1.1 Purposes of test

The purpose is to verify that the preferred subband can be used for frequency selective scheduling.

8.3.1.1.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

8.3.1.1.3 Minimum consistency requirements

For the parameters defined in Table 309 and the use of the downlink physical channel as defined in Appendix C of 3GPP TS36.521-1, the minimum requirements are as shown in Table 310:

- a) For each subband, the reporting rate of subband differential CQI offset level 0 shall be $\alpha\% \sim \beta\%$.
- b) From all the subbands which have the maximum differential CQI offset level, the ratio between the throughput reached by the selecting any subband to transmit the TBS as corresponding to this maximum differential CQI offset level AND the throughput reached by the TBS as indicated by the wideband CQI median which is transmitted and reported from any subband in the set S shall be more than or equal to γ .
- c) From all the subbands which have the maximum differential CQI offset level, the average BLER corresponding to the transmission format indicated by selecting any subband to transmit the TBS as corresponding to this maximum differential CQI offset level shall be ≥ 0.05 .

This requirement applies only to the full size subband, AND a new subband is selected from each TTI to realize the cross-subband random scheduling. The

Test frequency: medium range, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test channel bandwidth: 10MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT the SS, fading simulator and AWGN noise source to the antenna connector of the UE in accordance with Figure A.9 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with Table 309.
- 3) ESTABLISH the downlink initial signal in accordance with Appendix C0, C.1 and C.3.2 of 3GPP TS36.521-1, and ESTABLISH the uplink initial signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508; AND the message content is as defined in clause 8.3.1.1.4.3.

8.3.1.1.4.2 Test procedure

- 1) In accordance with Table 309, SET the bandwidth, reference channel, transmission conditions, antenna configuration and SNR and other parameters.
- 2) The SS shall transmit the downlink RMC on the PDSCH through the PDCCH DCI format 1A based on C_RNTI and the CQI having a value of 8 in Table A.4.3 of Appendix A.4 of 3GPP TS36.521-1. KEEP this CQI value unchanged without considering the reported wideband and subband CQI value. The PDSCH is continuously sent until 2000 wideband CQI reports and subband CQI reports for each full size subband are collected. SS sends the downlink MAC padding bit on the downlink RMC. The SS requests the PDCCH DCI format 0 having a bit setting 1, I_MCS=29 and N_PRB \leq 4 via the CQI, and schedules the uplink transmission on the subframe #2 and #7 to carry the PUSCH CQI feedback. In this process, SS collects a wideband CQI report every 5ms, AND it will be considered as the wideband CQI and full size subband CQI report even if the UE does not have any transmissions in the CQI timing.
- 3) ESTABLISH a cumulative probability allocation for the reported wideband CQI values, and CALCULATE a median (wideband CQI median is a wideband CQI value equal to or across a 50% allocation from the side of the lower CQI value), and this CQI value is called the wideband CQI median.
- 4) Check whether the number of reports of CQI index 0 for each full size subband is between $2000 \times \alpha\% \sim 2000 \times \beta\%$ (2000 is the full

size subband CQI reported number, 100 is the percentage), CONTINUE the step 5 if complying with this condition; otherwise SKIP to step 7.

- 5) SS shall randomly select a full size subband from each TTI through the PDCCH DCI format 1A based on C_RNTI, and transmit the downlink RMC on the PDSCH in accordance with the wideband CQI median, AND it does not consider the UE's wideband CQI and the full size subband CQI report. NOTE that each full size subband shall be selected by equal probability. SS sends the downlink MAC padding bit on the downlink RMC. The transmission format used is as shown in Table A.4-6 of 3GPP TS36.521-1. The SS requests the PDCCH DCI format 0 having a bit setting 1, I_MCS=29 and N_PRB ≤ 4 via the CQI, and schedules the uplink transmission on the subframe #2 and #7 to carry the PUSCH CQI feedback. The average throughput is measured in accordance with Appendix G.5.3 of 3GPP TS36.521-1, AND this throughput is called t_{median} .
- 6) The SS shall select a full size subband from all subbands through the PDCCH DCI format 1A based on the C_RNTI, and the CQI value corresponding to this subband is the maximum of all the full size subband CQI values reported by the UE, and it transmits the downlink RMC on the PDSCH based on this subband CQI maximum value. The offset level of the subband differential CQI is selected from the set {0, 1, 2, -1}. NOTE that the SS shall send the PDSCH in the same full size subband, until the next subband CQI report of the UE is available. If the full size subband that is subsequently reported is the same as the subband corresponding to the highest CQI value of the full size subband, the SS shall select a subband other than the last selected subband for transmission. The transmission format used is shown in Table A.4.6 of 3GPP TS36.521-1. The SS requests the PDCCH DCI format 0 having a bit setting 1, I_MCS=29 and N_PRB ≤ 4 via the CQI, and schedules the uplink transmission on the subframe #2 and #7 to carry the PUSCH CQI feedback. The average throughput and (NACK / (ACK + NACK)) are measured in accordance with Appendix G.5.3 of 3GPP TS36.521-1, which is called t_{subband} . If the ratio ($t_{\text{subband}}/t_{\text{median}} \geq \gamma$), and the ratio (NACK / (ACK + NACK)) ≥ 0.05, then the UE passes the test and skips to step 8; otherwise SKIP to step 7.
- 7) If the UE only completes one of the two SNRs of the test, the same procedure (steps 1 ~ 6) is repeated for another SNR; otherwise the UE test fails.
- 8) If the UE completes only one of the two tests, the same procedure (steps 1 ~ 8) is repeated for another test in accordance with the test conditions in Table 309; otherwise the UE test fails.

8.3.1.1.4.3 Message content

The message contents are as shown in clause 4.6 of 3GPP TS36.508, with the following exceptions.

minimum BLER as corresponding to the transmission format as indicated by the reported CQI. Considering the sensitivity of the input SNR, when the accuracy of the CQI report under the non-frequency selective fading conditions is at least one of the two SNR levels having a difference of 1dB, this report shall be considered as valid.

8.3.2.1 CQI report under fading conditions - PUCCH 1-0

8.3.2.1.1 Purposes of test

The purpose is to verify that the terminal can track channel changes during non-frequency selective scheduling AND select the largest possible transmission format based on the channel state.

8.3.2.1.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

8.3.2.1.3 Minimum consistency requirements

For the parameters defined in Table 315 AND when using the downlink physical channel as defined in Appendix C of 3GPP TS36.521-1, the minimum requirements are as shown in Table 316 AND it shall comply with the following requirements:

- a) When the CQI index is not in the {median CQI-1, median CQI + 1} interval, the report rate is at least $\alpha\%$;
- b) As for the throughput obtained by using the transmission format indicated by the wideband CQI index as reported for each time AND the throughput obtained by using the fixed transmission format corresponding to the wideband CQI median value, the ratio of the two shall be $\geq \gamma$;
- c) When it is transmitted using the transmission format indicated by each reported wideband CQI index, the average BLER corresponding to the transmission format shall be ≥ 0.02 .
- d) The TBS selection based on wideband CQI median and the reported wideband CQI is as shown in Table A.4-3 (terminal level 2 ~ 5) or Table A.4-9 (terminal level 1) in 3GPP TS36.521-1. The transmission block size TBS (wideband CQI median) is jointly determined by the closest bit rate indicated by wideband CQI median AND the N_{PRB} value corresponding to the maximum transmission configuration (Table 5.6-1) in Table 7.1.7.2.1-1 of TS 36.213.

Table 315 -- Single antenna fading test

Parameters	Unit	Test 1	Test 2
Bandwidth	MHz	10MHz	
Transmission mode		1 (port 0)	
Uplink and downlink configuration		2	

Test channel bandwidth: 10MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT the SS, fading simulator and AWGN noise source to the antenna connector of the UE in accordance with Figure A.9 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with Table 315.
- 3) ESTABLISH the downlink initial signal in accordance with Appendix C0, C.1 and C.3.2 of 3GPP TS36.521-1, and ESTABLISH the uplink initial signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508; AND the message content is as defined in clause 8.3.2.1.4.3.

8.3.2.1.4.2 Test procedure

- 1) In accordance with Table 315, SET the bandwidth, transmission conditions, antenna configuration, measurement antenna, and other parameters.
- 2) The SS shall transmit the downlink RMC on the PDSCH through the PDCCH DCI format 1A based on C_RNTI and the CQI having a value of 8 in Table A.4.3 of Appendix A.4 of 3GPP TS36.521-1. KEEP this CQI value unchanged without considering the wideband CQI value as reported by the UE. SS sends the downlink MAC padding bit on the downlink RMC. The SS requests the PDCCH DCI format 0 having a bit setting 0, via the CQI, and sends the uplink scheduling information on the subframe #2 and #7 in accordance with the Appendix A.4-11 of 3GPP TS36.521-1, to schedule the uplink RMC. The UE shall use the PUSCH to send the ACK/NACK and periodic CQI report. The PDSCH is continuously sent until 2000 wideband reports are collected. In this process, SS collects a wideband CQI report every 2ms, AND it will be considered as the wideband CQI report even if the UE does not have any transmissions in the CQI timing.
- 3) ESTABLISH a cumulative probability allocation for the reported wideband CQI values, and CALCULATE a median (wideband CQI median is a wideband CQI value equal to or across a 50% allocation from the side of the lower CQI value), and this CQI value is called the wideband CQI median.
- 4) If less than $(100 - \alpha) / 100 \times 2000$ wideband CQI values are within the set $\{(CQI\ median - 1), CQI\ median, (CQI\ median + 1)\}$, PROCEED the step 5; otherwise SKIP to step 7.

- 5) SS shall transmit the downlink RMC on the PDSCH in accordance with the wideband CQI median through the PDCCH DCI format 1A based on C_RNTI. KEEP this CQI value unchanged without considering the wideband CQI value as reported by the UE. SS sends the downlink MAC padding bit on the downlink RMC. The SS shall request the PDCCH DCI format 0 having a bit setting 0 via the CQI, and send the uplink scheduling information on the subframe #2 and #7 in accordance with the Appendix A.4-11 of 3GPP TS36.521-1, to schedule the uplink RMC. The UE shall use the PUSCH to send the ACK/NACK and periodic CQI report. The average throughput is measured in accordance with Appendix G.5.3 of 3GPP TS36.521-1, AND this throughput is called t_{median} .
- 6) The SS shall transmit the downlink RMC on the PDSCH based on the wideband CQI value as reported by the UE through the PDCCH DCI format 1A based on C_RNTI. The SS shall request the PDCCH DCI format 0 having a bit setting 0 via the CQI, and send the uplink scheduling information on the subframe #2 and #7 in accordance with the Appendix A.4-11 of 3GPP TS36.521-1, to schedule the uplink RMC. The UE shall use the PUSCH to send the ACK/NACK and periodic CQI report. The average throughput is measured in accordance with Appendix G.5.3 of 3GPP TS36.521-1, AND this throughput is called t_{wideband} . As for the PDSCH as transmitted by each HARQ progress, the corresponding ACK, NACK, and statDTX response are recorded and filtered as follows: as for a series of responses for each HARQ progress, DISCARD all the statDTX responses. If the ratio $(t_{\text{wideband}}/t_{\text{median}}) \geq \gamma$ AND the ratio $(\text{NACK} / (\text{ACK} + \text{NACK})) \geq 0.02$, the UE passes the test and skips to step 8; otherwise skip to step 7.
- 7) If the UE only completes one of the two SNRs of the test, the same procedure (steps 1 ~ 6) is repeated for another SNR; otherwise the UE test fails.
- 8) If the UE completes only one of the two tests, the same procedure (steps 1 ~ 7) is repeated for another test in accordance with the test conditions in Table 315; otherwise the UE passes this test

8.3.2.1.4.3 Message content

The message content is as shown in clause 4.6 of 3GPP TS36.508, with the following exceptions.

Table 317 -- Default value of PhysicalConfigDedicated

Quoted from clause 5.5.1.2 of 36.508			
Information cell	Value	Remarks	Conditions
PhysicalConfigDedicated-DEFAULT:: =SEQUENCE {			
cqi-ReportConfig	CQI-ReportConfig-DEFAULT		
}			

the bidirectional percentage of the differential CQI offset level +2 of the preferred subband reported; AND in all subbands having the maximum differential CQI offset level, the throughput relative increase of the throughput as obtained from the transmission format corresponding to the maximum differential CQI offset level as transmitted by any selected subband compared with the throughput as obtained by the transmission of fixed format on any subbands in the S set as defined in TS 36.213. The purpose is to verify that the preferred subband can be used for the frequency selective scheduling when the terminal is under the non-frequency selective interference conditions.

8.3.3.1 CQ1 report under frequency selective interference and fading conditions - PUSCH 3-0

8.3.3.1.1 Purposes of test

The purpose is to verify that the terminal can be used for frequency selective scheduling under non-frequency selective interference conditions.

8.3.3.1.2 Test applicability

The test is applicable to all phase 1 TD-LTE digital cellular mobile communication network user equipment.

8.3.3.1.3 Minimum consistency requirements

For the parameters defined in Table 321, the downlink physical channel as defined in Appendix C of 3GPP TS36.521-1 is used. The minimum requirements are as shown in Table 322:

- a) The differential CQI level + 2 report of at least one subband of the full size subbands at the edge of the channel shall be at least $\alpha\%$;
- b) From all the subbands having the maximum differential CQI offset level, the ratio between the throughput as reached by the TBS corresponding to this maximum differential CQI offset level as transmitted by any selected subband AND the throughput as reached by the TBS indicated by the wideband CQI median as transmitted and reported by any subband in the set S shall be greater than or equal to γ ;

This requirement applies only to the full size subband, AND a new subband is selected randomly from each available downlink subframes. The test does not contain the non-full size subbands. The transport block size TBS (wideband CQI median) is determined jointly by the closest bit rate indicated by the wideband CQI median AND the N_{PRB} value corresponding to this subband in Table 7.1.7.2.1-1 of TS 36.213.

Table 321 -- Single antenna transmission subband test

Parameters	Unit	Test 1	Test 2
Bandwidth	MHz	10MHz	10MHz
Transmission mode		1 (port 0)	1 (port 0)
Uplink and downlink configuration		2	

- 2) SET the cell parameters in accordance with Table 321.
- 3) ESTABLISH the downlink initial signal in accordance with Appendix C0, C.1 and C.3.2 of 3GPP TS36.521-1, and ESTABLISH the uplink initial signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508; AND the message content is as defined in clause 8.3.3.1.4.3.

8.3.3.1.4.2 Test procedure

- 1) In accordance with Table 321, SET the bandwidth, transmission conditions, antenna configuration, measurement channel, and other parameters.
- 2) The SS shall transmit the downlink RMC on the PDSCH through the PDCCH DCI format 1A based on C_RNTI and the CQI having a value of 8 in Table A.4-3 of Appendix A.4 of 3GPP TS36.521-1. KEEP this CQI value unchanged without considering the wideband and subband CQI value as reported by the UE. The PDSCH is continuously sent until 2000 wideband CQI reports and subband CQI reports for each full size subband are collected. SS sends the downlink MAC padding bit on the downlink RMC. The SS requests the PDCCH DCI format 0 having a bit setting 1, I_MCS=29 and N_PRB \leq 4 via the CQI, and schedules the uplink transmission on the subframe #2 and #7 to carry the PUSCH CQI feedback. In this process, SS collects a wideband CQI report every 5ms, AND it will be considered as the wideband CQI and full size subband CQI report even if the UE does not have any transmissions in the CQI timing.
- 3) ESTABLISH a cumulative probability allocation for the reported wideband CQI values, and CALCULATE a median (wideband CQI median is a wideband CQI value equal to or across a 50% allocation from the side of the lower CQI value), and this CQI value is called the wideband CQI median.
- 4) If the ratio of the subband differential CQI offset level + 2 report corresponding to at least one full size subband at the edge of the channel is $\geq \alpha\%$, CONTINUE the step 5; otherwise the UE test fails.
- 5) SS shall randomly select a full size subband from each TTI through the PDCCH DCI format 1A based on C_RNTI, and transmit the downlink RMC on the PDSCH using the transmission format corresponding to the wideband CQI median, AND it does not consider the UE's wideband or subband CQI report. NOTE that each full size subband shall be selected by equal probability. SS sends the downlink MAC padding bit on the downlink RMC. The transmission format used is as shown in Table A.4-6

8.3.4.1.4.1 Initial conditions

The initial condition is a set of test configurations that the UE must be tested AND the step for the SS to guide the UE to the correct measurement state.

The configuration of PDSCH and PDCCH before measurement is described in Appendix C.2 of 3GPP TS36.521-1.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: medium range, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test channel bandwidth: 10MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT the SS, fading simulator and AWGN noise source to the antenna connector of the UE in accordance with Figure A.9 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with Table 327.
- 3) ESTABLISH the downlink initial signal in accordance with Appendix C0, C.1 and C.3.2 of 3GPP TS36.521-1, and ESTABLISH the uplink initial signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508; AND the message content is as defined in clause 8.3.4.1.4.3.

8.3.4.1.4.2 Test procedure

- 1) In accordance with Table 327, SET the bandwidth, transmission conditions, antenna configuration, measurement channel, and other parameters.
- 2) The SS shall transmit the downlink RMC on the PDSCH through the PDCCH DCI format 1A based on C_RNTI and the CQI having a value of 8 in Table A.4-3 of Appendix A.4 of 3GPP TS36.521-1. KEEP this CQI value unchanged without considering the wideband and subband CQI value as reported by the UE. The PDSCH is continuously sent until 2000 wideband CQI reports and subband CQI reports for each full size subband are collected. SS sends the downlink MAC padding bit on the downlink RMC. The SS requests the PDCCH DCI format 0 having a bit setting 1, I_MCS=29 and N_PRB \leq 4 via the CQI, and schedules the uplink transmission on the subframe #2 and #7 to carry the PUSCH CQI feedback. In this process, SS collects a wideband CQI report every 5ms,

AND it will be considered as the wideband CQI and full size subband CQI report even if the UE does not have any transmissions in the CQI timing.

- 3) ESTABLISH a cumulative probability allocation for the reported wideband CQI values, and CALCULATE a median (wideband CQI median is a wideband CQI value equal to or across a 50% allocation from the side of the lower CQI value), and this CQI value is called the wideband CQI median.
- 4) SS shall transmit the downlink RMC on the PSDCH through the PDCCH DCI format 1A based on C_RNTI, the randomly selected full size subband, and in accordance with the wideband CQI median. AND it does not consider the UE's wideband or subband CQI report. NOTE that each full size subband shall be selected by equal probability. SS sends the downlink MAC padding bit on the downlink RMC. The transmission format used is as shown in Table A.4-6 of 3GPP TS36.521-1. The SS requests the PDCCH DCI format 0 having a bit setting 1, I_MCS=29 and N_PRB ≤ 4 via the CQI, and schedules the uplink transmission on the subframe #2 and #7 to carry the PUSCH CQI feedback. The average throughput is measured in accordance with Appendix G.5.3, AND this throughput is called t_{median} .
- 5) The SS shall select a full size subband from the M subbands as reported by the UE, use the TBS corresponding to this subband, and transmit the downlink RMC on the PDSCH through the PDCCH DCI format 1A based on C_RNTI. NOTE that the SS shall send the PDSCH in the same full size subband, until the next subband CQI report of the UE is available. If the full size subband that is subsequently reported is the same as the full size subband which is used, the SS shall select a subband other than the last selected subband for transmission. SS sends the downlink MAC padding bit on the downlink RMC. The transmission format used is shown in Table A.4-6 of Appendix A.4 of 3GPP TS36.521-1. The SS requests the PDCCH DCI format 0 having a bit setting 1, I_MCS=29 and N_PRB ≤ 4 via the CQI, and schedules the uplink transmission on the subframe #2 and #7 to carry the PUSCH CQI feedback. The average throughput is measured in accordance with Appendix G.5.3 of 3GPP TS36.521-1, which is called $t_{subband}$. RECORD the number of uplink transmission of the NACKs, ACKs, and statDTXs in the test interval. If the ratio $t_{subband}/t_{median} \geq \gamma$, then the UE passes the test and skips to step 6; otherwise the UE test fails.
- 6) If the UE completes only one of the two tests, the same procedure (steps 1 ~ 5) is repeated for another test in accordance with the test conditions in Table 327; otherwise the UE passes this test.

8.3.4.1.4.3 Message content

Table 329 -- Default value of PhyscialConfigDedicated

Quoted from clause 5.5.1.2 of 36.508			
Information cell	Value	Remarks	Conditions

Table 334 -- Minimum requirements

Parameters	Test 1	Test 2
γ	1.15	1.15
UE level	1 ~ 5	1 ~ 5

The reference specifications for this requirement are as shown in clause 9.3.4.2.1 of TS 36.101.

8.3.4.2.4 Test description

8.3.4.2.4.1 Initial conditions

The initial condition is a set of test configurations that the UE must be tested AND the step for the SS to guide the UE to the correct measurement state.

The configuration of PDSCH and PDCCH before measurement is described in Appendix C.2 of 3GPP TS36.521-1.

Test environment: normal, as defined in clause 4.1 of 3GPP TS36.508.

Test frequency: medium range, as defined in clause 4.3.1.1 of 3GPP TS36.508.

Test channel bandwidth: 10MHz, as defined in clause 4.3.1.1 of 3GPP TS36.508.

- 1) CONNECT the SS, fading simulator and AWGN noise source to the antenna connector of the UE in accordance with Figure A.9 of 3GPP TS36.508.
- 2) SET the cell parameters in accordance with Table 333.
- 3) ESTABLISH the downlink initial signal in accordance with Appendix C0, C.1 and C.3.2 of 3GPP TS36.521-1, and ESTABLISH the uplink initial signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the UE is in the 3A-RF state in accordance with clause 5.2A.2 of 3GPP TS36.508; AND the message content is as defined in clause 8.3.4.2.4.3.

8.3.4.2.4.2 Test procedure

- 1) In accordance with Table 333, SET the bandwidth, transmission conditions, antenna configuration, measurement channel, and other parameters.
- 2) The SS shall transmit the downlink RMC on the PDSCH through the PDCCH DCI format 1A based on C_{RNTI} and the CQI having a value of

8 in Table A.4-3 of 3GPP TS36.521-1. KEEP this CQI value unchanged without considering the wideband and subband CQI value as reported by the UE. The PDSCH is continuously sent until 2000 wideband CQI reports and subband CQI reports for each full size subband are collected. SS sends the downlink MAC padding bit on the downlink RMC. The SS requests the PDCCH DCI format 0 having a bit setting 0 via the CQI, and send the uplink scheduling information on the subframe #2 and #7 in accordance with the Appendix A.4-11 of 3GPP TS36.521-1, to schedule the uplink RMC. The UE shall use the PUSCH to send the ACK/NACK and periodic CQI report. In this process, SS collects a wideband CQI report, AND it will be considered as the wideband CQI report even if the UE does not have any transmissions in the CQI timing.

- 3) ESTABLISH a cumulative probability allocation for the reported wideband CQI values, and CALCULATE a median (wideband CQI median is a wideband CQI value equal to or across a 50% allocation from the side of the lower CQI value), and this CQI value is called the wideband CQI median.
- 4) SS shall transmit the downlink RMC on the PDSCH through the PDCCH DCI format 1A based on C_RNTI, the randomly selected full size subband, and in accordance with the wideband CQI median. AND it does not consider the UE's wideband or subband CQI report. NOTE that each full size subband shall be selected by equal probability. SS sends the downlink MAC padding bit on the downlink RMC. The transmission format used is as shown in Table A.4-6 of 3GPP TS36.521-1. The SS requests the PDCCH DCI format 0 having a bit setting 0 via the CQI, and send the uplink scheduling information on the subframe #2 and #7 in accordance with the Appendix A.4-11 of 3GPP TS36.521-1, to schedule the uplink RMC. The average throughput is measured in accordance with Appendix G.5.3 of 3GPP TS36.521-1, AND this throughput is called t_{median} .
- 5) The SS shall send the downlink RMC on the PDSCH through the PDCCH DCI format 1A based on C_RNTI, by the use of the full size subband as reported by the UE and the corresponding TBS. If the UE reports the non-full size subband, the SS shall schedule the latest reported subband in the subband group of $j = 1$, AND use the TBS corresponding to this subband. NOTE that the SS shall send the PDSCH in the same full size subband, until the next subband CQI report of the UE is available. SS sends the downlink MAC padding bit on the downlink RMC. The transmission format used is shown in Table A.4-6 of Appendix A.4 of 3GPP TS36.521-1. The SS requests the PDCCH DCI format 0 having a bit setting 0 via the CQI, and send the uplink scheduling information on the subframe #2 and #7 in accordance with the Appendix A.4-11 of 3GPP TS36.521-1, to schedule the uplink RMC. The UE shall use the PUSCH to send the ACK/NACK and periodic CQI report. The average throughput is measured in accordance with Appendix G.5.3 of 3GPP TS36.521-1, which is called t_{subband} . RECORD the number of uplink transmission of the NACKs, ACKs, and statDTXs in the test interval. If the ratio $t_{\text{subband}}/t_{\text{median}}$

8.4.1.4 Test method

8.4.1.4.1 Initial conditions

The initial condition is a set of configurations for the terminal test AND the steps of the SS to bring the terminal into the correct measured state.

The PDSCH and PDCCH configurations before the test are described in Appendix C.2.

Test environment: in accordance with the standard environment of clause 4.1 in 3GPP TS36.508.

Test frequency point: in accordance with the mid range as defined in clause 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: 10MHz, as described in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT the SS and terminal antenna connectors in accordance with Figure A.10 of 3GPP TS36.508.
- 2) CONFIGURE the cell in accordance with the parameters in Table 339.
- 3) INITIALIZE the downlink signal in accordance with Appendix C.1 and C.3.2 of 3GPP TS36.521-1; INITIALIZE the uplink signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the terminal is in the 3A-RF state as described in clause 5.2A.2 of 3GPP TS36.508. The message content is as defined in 8.4.2.4.3.

8.4.1.4.2 Test procedure

- 1) SET the bandwidth, propagation conditions, antenna configuration, and test channel parameters in accordance with Table 339 based on situations.
- 2) Regardless of the PMI reported by the terminal, each subframe SS uses the PDCCH having a DCI format 1B to schedule the PDSCH, and randomly selects the precoding matrix from the codebook (Table 6.3.4.2.3-1 of 3GPP TS36.211) to send the downlink reference measurement channel to the corresponding C_RNTI. NOTE that each precoding matrix shall be selected at the same probability. SS sends the downlink MAC padding bit on the downlink reference measurement channel. SS schedules the uplink transmission PUSCH CQI feedback via PDCCH DCI format 0. The CQI request bit is set to 1 and I_MCS = 29, and the allocated N-PRB is ≤ 4 . SET the t_{md} and SNR_{md} in accordance with Appendix G.5.2 of 3GPP TS36.521-1.

downlink transmission subframe.

Note 2: If the terminal performs reporting on the SF#n based on the downlink estimated PMI which is no later than SF# (n – 4), the eNB cannot use the reported PMI on the downlink before the SF# (n + 4).

Note 3: In order to avoid the conflict between HARQ-ACK and wideband CQI/PMI or subband CQI, it shall avoid using the PUCCH, BUT use the PUSCH to report the both at the same time. The PDCCH DCI format 0 shall be transmitted on the downlink SF#4 and SF#9, to allow the multiplexing of the periodic CQI and HARQ-ACK on the PUSCH of the uplink subframes SF#8 and SF#3.

Note 4: It shall neglect the reporting of the short subband (that is, the last subband part only has 2 RBs), AND at this time it shall use the $j = 1$ subband of the latest used subband part to transmit data.

Note 5: When the wideband PMI is reported, the data shall be transmitted on the latest used subband.

Note 6: The PMI confirmation field in the DCI format 1B shall be set at 0, AND the TPMI shall indicate the codebook index used in Table 6.3.4.2.3-2 of 3GPP TS36.211 in accordance with the PMI reported recently in PUCCH.

Table 346 -- Minimum requirements (TDD)

Parameters	Test 1
γ	1.2
Terminal capability level	1 ~ 5

The test requirements are established in accordance with clause 9.4.1.2.2 of 3GPP TS36.101.

8.4.2.4 Test method

8.4.2.4.1 Initial conditions

The initial condition is a set of configurations for the terminal test AND the steps of the SS to bring the terminal into the correct measured state.

The PDSCH and PDCCH configurations before the test are described in Appendix C.2.

Test environment: in accordance with the standard environment of clause 4.1 in 3GPP TS36.508.

Test frequency point: in accordance with the mid range as defined in clause 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: 10MHz, as described in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT the SS and terminal antenna connectors in accordance with Figure A.10 of 3GPP TS36.508.
- 2) CONFIGURE the cell in accordance with the parameters in Table 345.
- 3) INITIALIZE the downlink signal in accordance with Appendix C.1 and C.3.2 of 3GPP TS36.521-1; INITIALIZE the uplink signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.

- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the terminal is in the 3A-RF state as described in clause 5.2A.2 of 3GPP TS36.508. The message content is as defined in 8.4.2.4.3.

8.4.2.4.2 Test procedure

- 1) SET the bandwidth, propagation conditions, antenna configuration, and test channel parameters in accordance with Table 345 based on situations.
- 2) Regardless of the PMI reported by the terminal, each subframe SS uses the PDCCH having a DCI format 1B to schedule the PDSCH, and randomly selects the precoding matrix from the codebook (Table 6.3.4.2.3-1 of 3GPP TS36.211) to send the downlink reference measurement channel to the corresponding C_RNTI. NOTE that each precoding matrix shall be selected at the same probability. SS sends the downlink MAC padding bit on the downlink reference measurement channel. SS schedules the UE to transmit ACK and CQI feedback on the subframe #3 and #8 via PDCCH DCI format 0. The CQI request bit is set to 1 and $I_MCS = 29$, and the allocated N-PRB is ≤ 4 . SET the t_{md} and SNR_{md} in accordance with Appendix G.5.2 of 3GPP TS36.521-1.
- 3) SET the SNR to SNR_{md} . Each subframe SS transmits the PDCCH having a DCI format 0, AND set the CQI request bit at 1. SS sends the PDSCH in accordance with the precoding matrix indicated by the PMI reported by the terminal. SS sends the downlink MAC padding bit on the downlink reference measurement channel. SS schedules the UE to transmit ACK and CQI feedback on the subframe #3 and #8 via PDCCH DCI format 0. The CQI request bit is set to 1 and $I_MCS = 29$, and the allocated N-PRB is ≤ 4 . MEASURE the t_{ue} in accordance with Appendix G.5.3 of 3GPP TS36.521-1.
- 4) CALCULATE $\gamma = t_{ue}/t_{md}$. If the ratio (throughput/ t_{md}) $\geq \gamma$, wherein γ is from Table 350 [translator note: incomplete sentence], then it passes the test; otherwise the test fails.

8.4.2.4.3 Message content

Except for the following message, the messages in other tests are configured in accordance with clause 4.6 of 3GPP TS36.508.

Table 347 -- PhysicalConfigDedicated-DEFAULT

Quoted from clause 5.5.1.2 of 36.508			
Information cell	Value/remarks	Notes	Conditions
PhysicalConfigDedicated-DEFAULT:: =SEQUENCE {			
cqi-ReportConfig	CQI-ReportConfig-DEFAULT		

The test requirements are established in accordance with clause 9.4.2.1.2 of 3GPP TS36.101.

8.4.3.4 Test method

8.4.3.4.1 Initial conditions

The initial condition is a set of configurations for the terminal test AND the steps of the SS to bring the terminal into the correct measured state.

The PDSCH and PDCCH configurations before the test are described in Appendix C.2.

Test environment: in accordance with the standard environment of clause 4.1 in 3GPP TS36.508.

Test frequency point: in accordance with the mid range as defined in clause 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: 20MHz, as described in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT the SS and terminal antenna connectors in accordance with Figure A.10 of 3GPP TS36.508.
- 2) CONFIGURE the cell in accordance with the parameters in Table 351.
- 3) INITIALIZE the downlink signal in accordance with Appendix C.1 and C.3.2 of 3GPP TS36.521-1; INITIALIZE the uplink signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the terminal is in the 3A-RF state as described in clause 5.2A.2 of 3GPP TS36.508. The message content is as defined in 8.4.3.4.3.

8.4.3.4.2 Test procedure

- 1) SET the bandwidth, propagation conditions, antenna configuration, and test channel parameters in accordance with Table 351 based on situations.
- 2) Regardless of the PMI reported by the terminal, each subframe SS uses the PDCCH having a DCI format 1B to schedule the PDSCH, and randomly selects the precoding matrix from the codebook (Table 6.3.4.2.3-1 of 3GPP TS36.211) to send the downlink reference measurement channel to the corresponding C_RNTI. NOTE that each precoding matrix shall be selected at the same probability. SS sends the downlink MAC padding bit on the downlink reference measurement channel. SS schedules the uplink transmission PUSCH CQI feedback via

Note 2: If the terminal performs reporting on the SF#n based on the downlink estimated PMI which is no later than SF# (n – 4), the eNB cannot use the reported PMI on the downlink before the SF# (n + 4).

Note 3: It shall use the unilateral/bilateral dynamic OCNG mode OP.1/2 TDD as described in Appendix A.5.2.1/2 of 3GPP TS36.521-1.

Table 358 -- Minimum requirements (TDD)

Parameters	Test 1
Y	1.2
Terminal capability level	1 ~ 5

The test requirements are established in accordance with clause 9.4.2.1.2 of 3GPP TS36.101.

8.4.4.4 Test method

8.4.4.4.1 Initial conditions

The initial condition is a set of configurations for the terminal test AND the steps of the SS to bring the terminal into the correct measured state.

The PDSCH and PDCCH configurations before the test are described in Appendix C.2 of 3GPP TS36.521-1.

Test environment: in accordance with the standard environment of clause 4.1 in 3GPP TS36.508.

Test frequency point: in accordance with the mid range as defined in clause 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: 10MHz, as described in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT the SS and terminal antenna connectors in accordance with Figure A.10 of 3GPP TS36.508.
- 2) CONFIGURE the cell in accordance with the parameters in Table 357.
- 3) INITIALIZE the downlink signal in accordance with Appendix C.1 and C.3.2 of 3GPP TS36.521-1; INITIALIZE the uplink signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the terminal is in the 3A-RF state as described in clause 5.2A.2 of 3GPP TS36.508. The message content is as defined in 8.4.4.4.3.

8.4.4.4.2 Test procedure

PMI delay	ms	10
Reporting mode		PUSCH 2-2
Reporting interval	ms	1
Measurement channel		R.14-2 TDD
OCNG mode		OP.1/2 TDD
Subband size (k)	RBs	3 (full size)
Recommended subband number (M)		5
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0, 1, 2, 3}
ACK/NACK feedback mode		Multiplexing
Note 1: As for the randomly selected pre-coding, the pre-coding shall be updated at each possible downlink transmission subframe.		
Note 2: If the terminal performs reporting on the SF#n based on the downlink estimated PMI which is no later than SF# (n – 4), the eNB cannot use the reported PMI on the downlink before the SF# (n + 4).		

Table 364 -- Minimum requirements (TDD)

Parameters	Test 1
γ	1.15
Terminal capability level	1 ~ 5

The test requirements are established in accordance with clause 9.4.2.2.2 of 3GPP TS36.101.

8.4.5.4 Test method

8.4.5.4.1 Initial conditions

The initial condition is a set of configurations for the terminal test AND the steps of the SS to bring the terminal into the correct measured state.

The PDSCH and PDCCH configurations before the test are described in Appendix C.2 of 3GPP TS36.521-1.

Test environment: in accordance with the standard environment of clause 4.1 in 3GPP TS36.508.

Test frequency point: in accordance with the mid range as defined in clause 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: 10MHz, as described in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT the SS and terminal antenna connectors in accordance with Figure A.10 of 3GPP TS36.508.
- 2) CONFIGURE the cell in accordance with the parameters in Table 363.
- 3) INITIALIZE the downlink signal in accordance with Appendix C.1 and C.3.2 of 3GPP TS36.521-1; INITIALIZE the uplink signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.

- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the terminal is in the 3A-RF state as described in clause 5.2A.2 of 3GPP TS36.508. The message content is as defined in 8.4.5.4.3.

8.4.5.4.2 Test procedure

- 1) SET the bandwidth, propagation conditions, antenna configuration, and test channel parameters in accordance with Table 363 based on situations.
- 2) Regardless of the PMI reported by the terminal, each subframe SS uses the PDCCH having a DCI format 1B to schedule the PDSCH, and randomly selects the precoding matrix from the codebook (Table 6.3.4.2.3-1 of 3GPP TS36.211) to send the downlink reference measurement channel to the corresponding C_RNTI. NOTE that each precoding matrix shall be selected at the same probability. SS sends the downlink MAC padding bit on the downlink reference measurement channel. SS schedules the uplink transmission PUSCH CQI feedback via PDCCH DCI format 0. The CQI request bit is set to 1 and I_MCS = 29, and the allocated N-PRB is ≤ 4 . SET the t_{md} and SNR_{md} in accordance with Appendix G.5.2 of 3GPP TS36.521-1.
- 3) SET the SNR to SNR_{md} . SS sends the PDSCH in accordance with the precoding matrix indicated by the PMI reported by the terminal. SS sends the downlink MAC padding bit on the downlink reference measurement channel. SS schedules the uplink transmission PUSCH CQI feedback via PDCCH DCI format 0. The CQI request bit is set to 1 and I_MCS = 29, and the allocated N-PRB is ≤ 4 . MEASURE the t_{ue} in accordance with Appendix G.5.3 of 3GPP TS36.521-1.
- 4) CALCULATE $\gamma = t_{ue}/t_{md}$.

8.4.5.4.3 Message content

Except for the following message, the messages in other tests are configured in accordance with clause 4.6 of 3GPP TS36.508.

Table 365 -- PhysicalConfigDedicated-DEFAULT

Quoted from clause 5.5.1.2 of 3GPP TS 36.508			
Information cell	Value/remarks	Notes	Conditions
PhysicalConfigDedicated-DEFAULT:: =SEQUENCE {			
cqi-ReportConfig	CQI-ReportConfig-DEFAULT		
antennaInfo CHOICE {			
explicitValue	AntennaInfoDedicated		
}			
}			

γ_2	1	N/A	1.1
Terminal capability level	2 ~ 5	2 ~ 5	2 ~ 5

8.5.1.4 Test methods

8.5.1.4.1 Initial conditions

The initial condition is a set of configurations for the terminal test and the steps required by the SS to bring the terminal into the correct measured state.

The PDSCH and PDCCH configurations before the test are described in Appendix C.2 of 3GPP TS36.521.1.

Test environment: in accordance with the standard environment of the clause 4.1 in 3GPP TS36.508.

Test frequency: The mid range as defined in 4.3.1.2 of 3GPP TS36.508.

Test bandwidth: 10MHz, as described in clause 4.3.1.2 of 3GPP TS36.508.

- 1) CONNECT the SS, fading channel and AWGN noise generation source and terminal antenna connector in accordance with Figure A.10 of 3GPP TS36.508.
- 2) CONFIGURE the cell in accordance with the parameters in Table 369.
- 3) INITIALIZE the downlink signal in accordance with Appendix C.1 and Appendix E.3.2 of 3GPP TS36.521-1; INITIALIZE the uplink signal in accordance with Appendix H.1 and H.3.2 of 3GPP TS36.521-1.
- 4) SET the propagation conditions in accordance with Appendix B.0 of 3GPP TS36.521-1.
- 5) ENSURE that the terminal is in the 3A-RF state as described in 5.2A.2 of 3GPP TS36.508. The message content is as defined in clause 8.5.1.4-3.

8.5.1.4.2 Test procedure

- 1) SET the bandwidth, reference channel, propagation conditions, antenna configuration, antenna correlation, and CodeBookSubsetRestriction for the fixed level and SNR in accordance with Table 369 based on actual situations.
- 2) The SS uses the PDSCH of DCI format 2 to send the downlink reference measurement channel to the corresponding C_RNTI in accordance with the CQI (wideband CQI) reported by the terminal, PMI and RI. SS sends the downlink MAC padding bit on the downlink reference measurement channel. The transmission format used is as defined in Table A.4-3a of 3GPP TS36.521-1. SS schedules the uplink transmission PUSCH CQI feedback via PDCCH DCI format 0. The CQI request bit is set to 1 and

$I_MCS = 29$, and the allocated N_PRB is ≤ 4 . MEASURE the t_{fix} in accordance with Appendix G.5.3 of 3GPP TS36.521-1.

- 3) SET the propagation conditions in accordance with Appendix B.1 of 3GPP TS36.521-1.
- 4) SS schedules the PUSCH CQI feedback via PDCCH DCI format 0. The CQI request bit is set to 1. The UL RMC is scheduled for transmission in subframes #2 and #7 in accordance with Appendix A.4-11 of 3GPP TS36.521.1.
- 5) SS sends the RRCConnectionReconfiguration message; AND sets the codebookSubsetRestriction in accordance with Table 369 for the terminal to report RI.
- 6) The terminal shall send the RRCConnectionReconfigurationComplete message.
- 7) SET the propagation conditions in accordance with Table 369.
- 8) The SS uses the PDSCH of DCI format 2 to send the downlink reference measurement channel to the corresponding C_RNTI in accordance with the CQI (wideband CQI) reported by the terminal, PMI and RI. SS sends the downlink MAC padding bit on the downlink reference measurement channel. The transmission format used is as defined in Table A.4-3a of 3GPP TS36.521-1. SS schedules the uplink transmission PUSCH CQI feedback via PDCCH DCI format 0. CQI request bit is set to 1 and $I_MCS = 29$, and the allocated N_PPB is ≤ 4 . MEASURE the $t_{reported}$ in accordance with Appendix G.5.3 in 3GPP TS36.521-1. If the ratio of $(t_{reported}/t_{fix})$ conforms to the requirements of Table 375, it is considered that the terminal passes this test, CONTINUE to step 9; otherwise, the terminal fails to pass the test.
- 9) If not all tests are finished, REPEAT the test steps 1 ~ 8 in accordance with the test conditions in Table 370 based on actual situations for the other tests. Otherwise, the terminal is considered to pass this test.

8.5.1.4.3 Message content

Except for the following message, messages in other tests are configured in accordance with clause 4.6 of 3GPP TS36.508.

Table 371 -- PhysicalConfigDedicated-DEFAULT

Quoted from clause 5.5.1.2 of 3GPP TS36.508			
Information cell	Value/remarks	Notes	Conditions
PhysicalConfigDedicated-DEFAULT:: =SEQUENCE {			
cqi-ReportConfig	CQI-ReportConfig-DEFAULT		
antennaInfo CHOICE {			
antennaInfoDedicated:: = SEQUENCE			
transmissionMode	tm4		